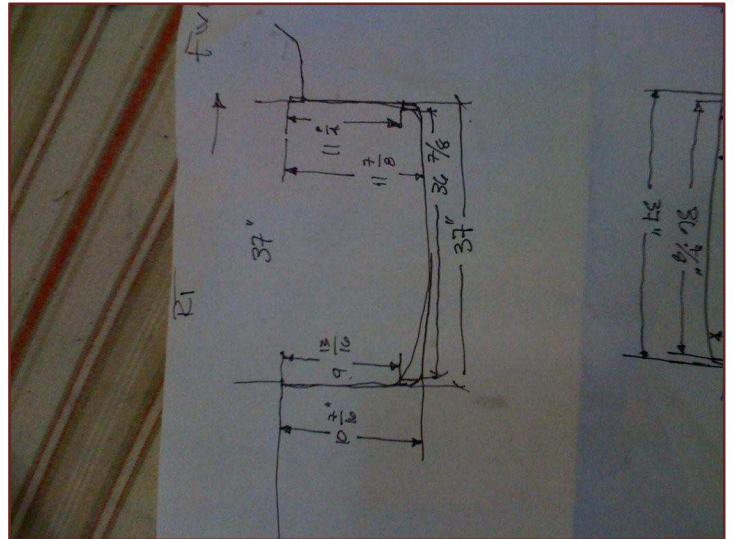
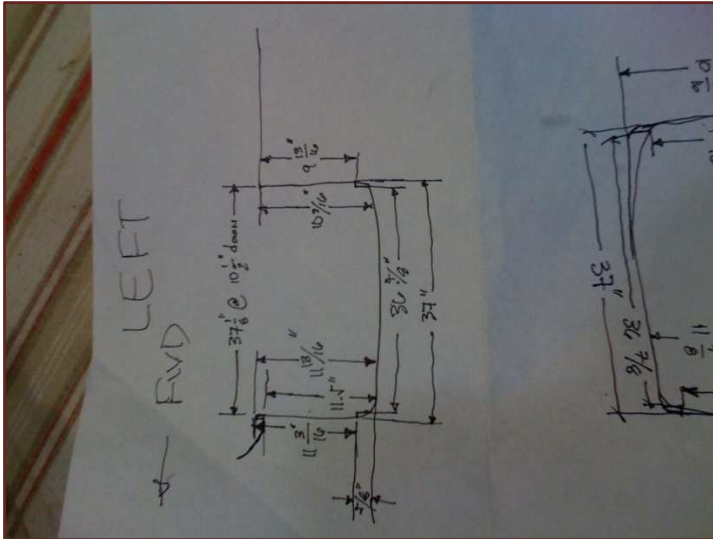


## Vans Aircraft RV-10 – Alternate Door Seal Modification

### Submitted by Les Kearney, Alberta, Canada

These pictures below detail the door opening measurements that were taken at an *Air Crafters* fibreglass course. When trimming the door opening on the canopy, you'll find that you have to trim much more than suggested in the Van's plans. Just measure the door opening width and then compare to the opening dimensions to the fibreglass that has to fit into the opening and you'll see what I mean.



The pictures above show a short length of the McMaster Carr seals (Part #1120A313) as well as an end on shot. The edge grip is solid and fits onto the door sill opening, whilst the rubber bulb is compressible against the closed door, forming a tight weatherproof seal. You'll need about 100 feet to do the job and have some spare.

## **Vans Aircraft RV-10 – Alternate Door Seal Modification**

**Submitted by Les Kearney, Alberta, Canada**

Once you have roughly fitted the canopy onto the fuselage, align the door frame in the fuselage opening and drilled #30 holes around the opening perimeter. I Did NOT drill the holes to #12 and #19 as per the plans, this I left until later. You can just see the end of the cleco's that protrude through the fiberglass from the back side. This was sufficient to hold everything in place until the doors and door hardware were installed, in order to ensure that everything is aligned correctly.

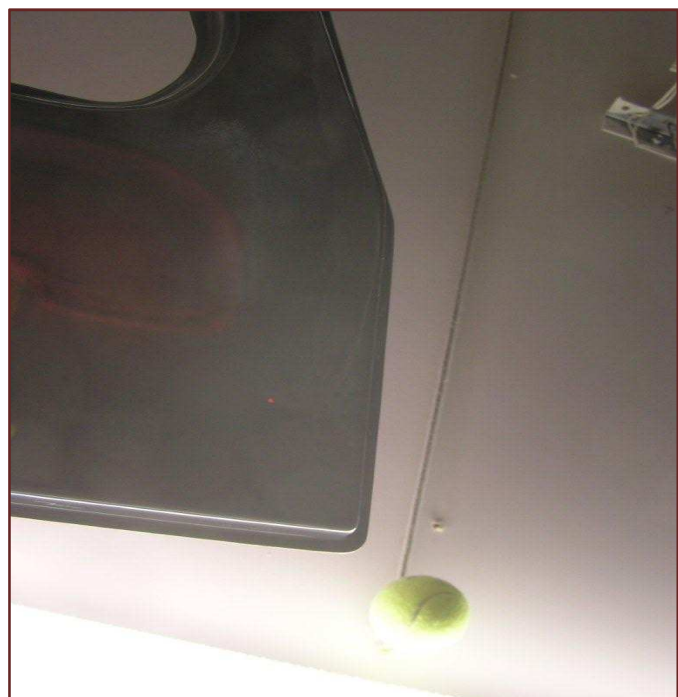


## Vans Aircraft RV-10 – Alternate Door Seal Modification

### Submitted by Les Kearney, Alberta, Canada

I should have mentioned that on the previous photo, it shows how all of the outward facing radii around the door opening have been cut away, this allows the seals material to sit square within the door opening, with the compression bulb facing outward towards the door.

I had to move the bottom portion of the port door sill inboard about 1/8" to reduce the pressure on the door when closing. This is one of the advantages of not doing final installation of the canopy until the door fit is confirmed, as it enables you to still move things around in the opening as required and then permanently install the canopy when you are happy with the door fit.



## Vans Aircraft RV-10 – Alternate Door Seal Modification

### Submitted by Les Kearney, Alberta, Canada

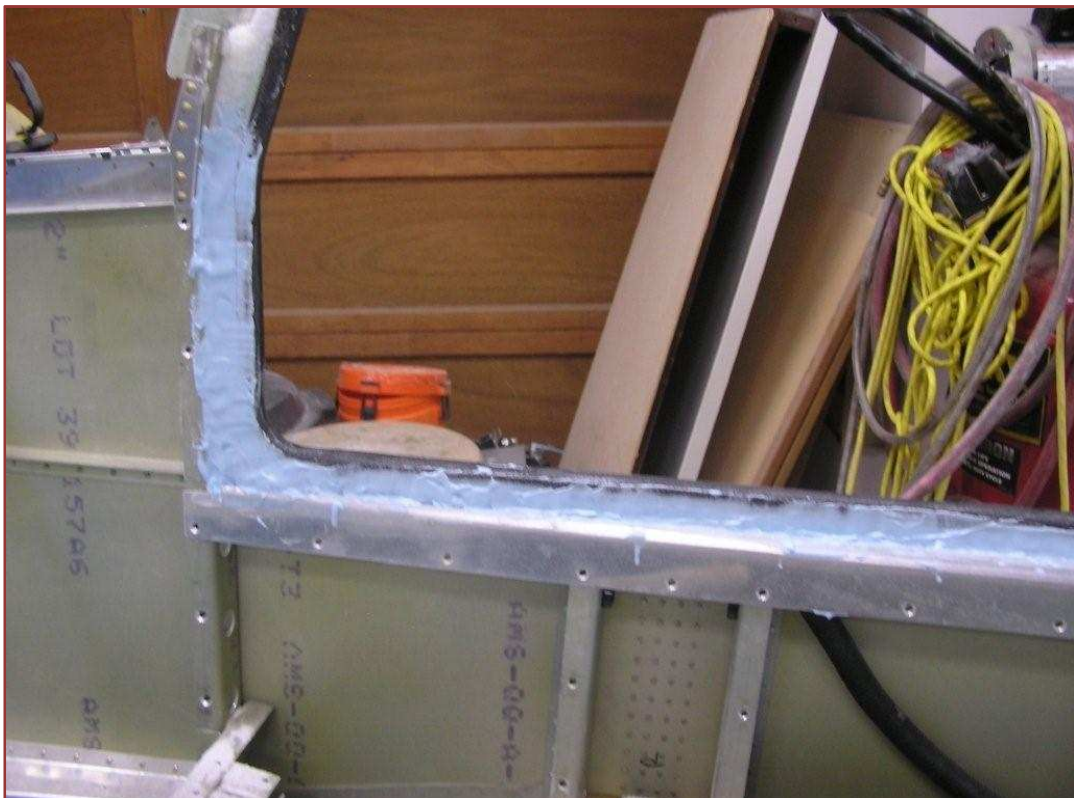
The McMaster Carr seals cost about US\$1.00 per lineal foot. And they fit onto the door opening (they slide on) with a pressure fit; you don't have to worry about using adhesive. You will have to put a bead of *Proseal* or silicone sealant into the notch where the seal joins, just to keep everything watertight but this should be no big issue.

I glassed in the door hinges leaving only a small slot for the door side of the hinges to go in. As the back side of the hinge was now blind, I installed nutplates on the back of the hinges.

I also glassed in the nylon door guides that fit on the forward and aft ends of the door. The pictures aren't great but you should see what I mean. I have also included a picture of the door opening with the seals on, which also shows how I got a nice smooth channel for the seals.

With the seals in place, I put *Superfil* along the back side of the seal. When hardened, I pulled the seals off and had a nice smooth channel on the interior side for the seals to sit in. I hope this is clear.

Here are three pictures that show how I notched my lower door sill for the door seals. Firstly I temporarily installed the seals and then filled the gap below the seals with *Superfil*. Initially, it doesn't look pretty. Then I sanded the *Superfil* so it was much neater.



## Vans Aircraft RV-10 – Alternate Door Seal Modification

Submitted by Les Kearney, Alberta, Canada



The second photo shows the result after sanding (following removal of the seal).

The last photo shows the seal partially removed. The result is a nice neat finished look when viewed from the cabin side, especially when painted.

The last photo is of the upper canopy door opening (forward pillar) with the door seal installed. Although you can't see it very well, there is a smooth transition for the seal to the canopy.

Anyway, the key to good seals is to have continuous contact all the way around the door. By glassing in the door blocks and the opening for the hinges, the only break is for the fitting for the door lift on the top of the door. Even here, it will be possible to fit the seals (with a fit of effort).



## Vans Aircraft RV-10 – Alternate Door Seal Modification

Submitted by Les Kearney, Alberta, Canada

These photos show how I filled the gaps between the door and the canopy. In the first, you can see the packing tape wrapped around the door perimeter. You can also see where I forced an epoxy / floc mixture between the canopy and door. This effectively sealed the gap. I did this a section at a time over a couple of days so as not to make the door too difficult to open. Although the epoxy doesn't adhere to the packing tape very well, it does take a bit of effort to separate.

The second photo shows the end result. The epoxy appears as "white icing" around the perimeter. I will fill behind the white epoxy with *Superfil* and sand flush once I have adjusted for the final door gap.

Note - this does not deal with the uneven level between the door and the canopy - it only resolves gaps.



## Vans Aircraft RV-10 – Alternate Door Seal Modification

Submitted by Les Kearney, Alberta, Canada

This shows how I got the door and canopy on the same "plane". I closed the door and then speed an epoxy / micro balloon mixture across the transition from the door to the canopy. Low areas on either the door or canopy were filled.

Once the entire perimeter was 'flushed' as shown above, I opened the door and allowed both sides to cure. After curing I sanded the edges so the doors would close (this process left ragged edges that interfered with door closing - photos 2 # 3).

The photo to the right shows the result after filling. You can clearly see how the door gap has been filled and is now even throughout.



## **Vans Aircraft RV-10 – Alternate Door Seal Modification**

**Submitted by Les Kearney, Alberta, Canada**

The last two photographs show the door gap after filling and sanding. Some minor feathering is required, but things are close to being finished. The mottled look is pretty ugly, but this will be covered by paint so it doesn't matter. What appears as bumps on the door is tape protecting the door hardware.

After all is said and done, I have got my doors to close with the pressure of one finger. On their own, the doors will close to within ½" to ¾". This is something I wouldn't have believed possible when I started fitting the doors. At one point I was wondering if I was going to have to order a new door - I was that discouraged.

Finally, I bought 100 feet of seals so I have enough to do six doors. While fitting the doors, I used two lengths that will be scrapped when all is said and done. Then I will have enough to do the doors and have a spare set.

*Note: much, if not all of the ideas detailed here have shamelessly been stolen from other builders who were kind enough to help me out.*

The McMaster Carr part number for the seal material is #1120A313, and can be found via the online McMaster Carr catalogue at <http://www.mcmaster.com/#edge-seals/=417512>.

Happy building

**Les Kearney**

**Alberta, Canada**

Email: [kearney@shaw.ca](mailto:kearney@shaw.ca)

.



## Vans Aircraft RV-10 – Alternate Door Seal Modification

Submitted by Vern Smith

The next few pages detail Vern Smith's RV-10 door installation



## Vans Aircraft RV-10 – Alternate Door Seal Modification

Submitted by Vern Smith

The door hinge area on the top of the door must also be covered to provide a new seal landing over the hinges. Fibreglass scraps left over from trimming the door can be epoxied into place and glassed over to provide the necessary covers.



## Vans Aircraft RV-10 – Alternate Door Seal Modification

Submitted by Vern Smith

Now this creates a new challenge, as the frame mount for the gas strut hits the new door seal area. To solve this you can either buy some aftermarket gas strut hinges, or you can choose to make new strut mount landing blocks that moves the strut mount down by a 1/4". These blocks can be fabricated from 1/4" aluminium blocks and filled-in around them with epoxy and flox. One other possible fix is the make the area over the rear hinge convexed to clear the strut mount, your call?



**Vans Aircraft RV-10 – Alternate Door Seal Modification**

**Submitted by Vern Smith**



The finished product.

## **Vans Aircraft RV-10 – Alternate Door Seal Modification**

**Submitted by Vern Smith**

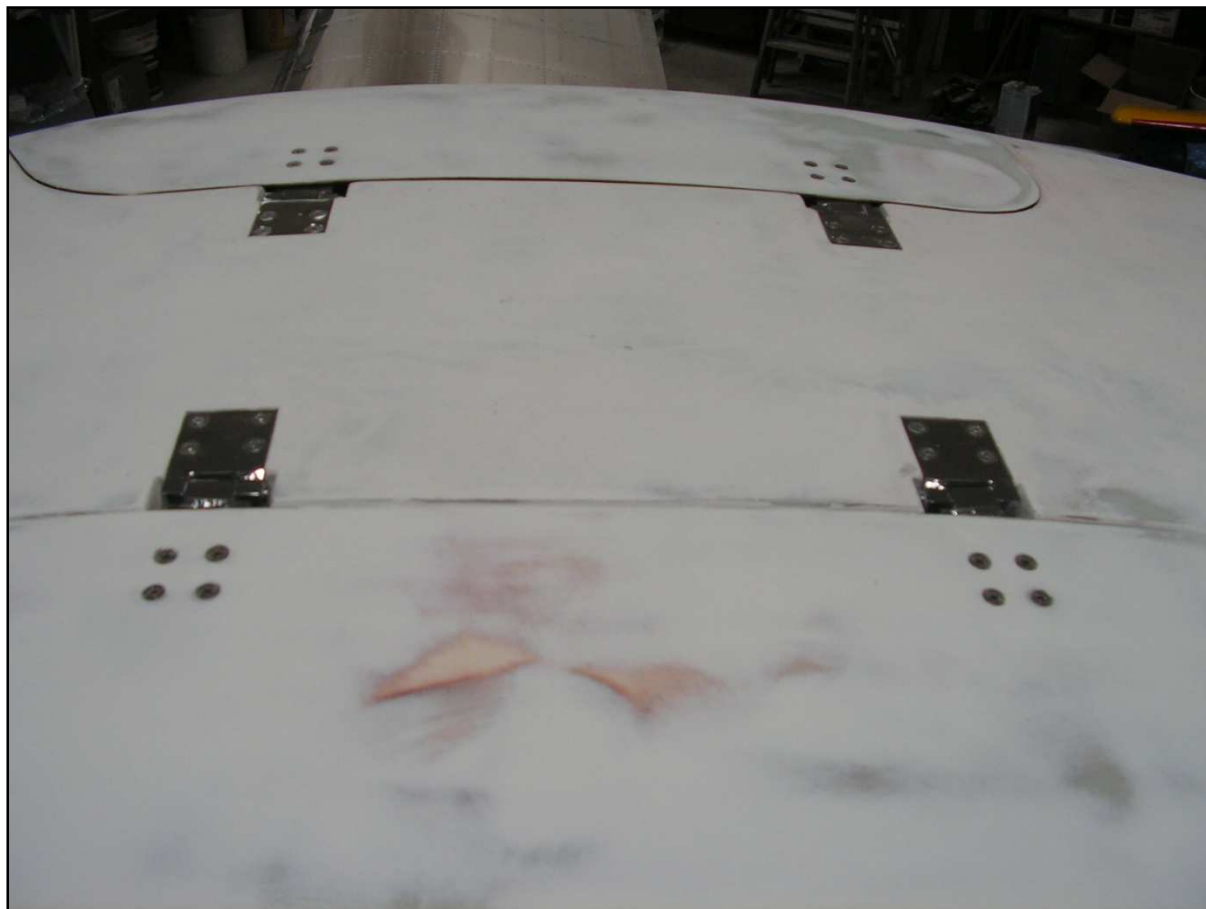
One other small fix has to do with the locking rods and locking gear rack. On a few other RV-10's I've noticed some surface damage to the inner door panel caused by the pin that is safety-wired to the gear rack and door lock rod. In fact, if you look at the picture below note the area where the grey primer is visible. To solve this interference a small washer can be installed on the back side of the pin before safety-wiring the pin in place. The washer keeps the pin from sticking out and hitting the inner fibreglass panel.



One other modification involved getting the door hinges chrome plated by a local shop and replacing the supplied steel screws with structural stainless hardware from Aircraft Spruce. The two bolts which secure the front shoulder harnesses to the cabin tap can also be chrome plated, to improve the aesthetics of the installation.

## Vans Aircraft RV-10 – Alternate Door Seal Modification

Submitted by Vern Smith



The cabin top hinge pockets were also filled in to fit snugly around the hinges. This was achieved by applying packing tape over the hinges, bolting them in place and filling the void with epoxy and flox. If you opt for this modification, make sure there is enough area around the hinge for the thickness of the paint; otherwise you'll be left with a paint ridge after the aircraft has been painted.

**Vans Aircraft RV-10 – Alternate Door Seal Modification**

**Submitted by Vern Smith**



## Vans Aircraft RV-10 – Alternate Door Seal Modification

### Additional Information from RV-10 Matronics List

Bob Newman ([rnewman@tcwtech.com](mailto:rnewman@tcwtech.com)), N541RV flying, also used the McMaster Carr seals as well, but did the following:

After grinding the gutter lip down, I took a scrap piece of door seal about 3 feet (914mm) long and filled it (about 50% full) with epoxy/structural filler mix and applied it to the door frame. When cured I had the perfect mating detail for the door seal as part of the cabin top.

I stepped and repeated this around the door frame opening then discard the scrap seal and use new seal for the final installation. The following album has the details, seal pictures start about one third of the way into the album.

<https://picasaweb.google.com/aviator1964/DoorsLatchesSeals?authuser=0&feat=diectlink>





## **Vans Aircraft RV-10 – Alternate Door Seal Modification**

### **Additional Information from RV-10 Matronics List**

Go to Ivan Kristense's (<http://www.ivankristensen.com/>) photo site. In the middle of his door photos, there is a video showing in detail how to trim the door gutter edge.

Bob Leffler ([rv@thelefflers.com](mailto:rv@thelefflers.com)) cut off the full radius of his door gutters (pink top) and the final fit of his doors is very tight with the seals on.

Once the doors are trimmed to fit, mark the interior edge of the gutter for a consistent gap (less than 3/8" for the bulb).

Sand down the radius to marks on interior edge of gutter and trim/sand gutter width to dimensions at various locations given by Ivan.

Fill/sand to achieve necessary gutter thickness of 1/4 " for attaching the seal.

The following photos are of Jay Brinkmeyers ([jaybrinkmeyer@yahoo.com](mailto:jaybrinkmeyer@yahoo.com)) RV-10.



## Vans Aircraft RV-10 – Alternate Door Seal Modification

### Additional Information from RV-10 Matronics List

Maybe it's obvious, but maybe not...

After cutting the door edges flush and sanding, I used an ~18" section of door seal as a mold. Filling each section with structural epoxy made for a really tight fit and minimal additional prep work to get the seal right. Just add cosmetic filler to blend into the cabin top and door edges. I bought lots more edge than required as it tends to get tired and look wavy after fitting lots of times (you can see some of that in the photos). Save the good stuff for the end.

