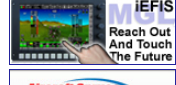
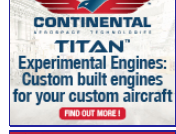


VansAirForceForums

[Home](#) > VansAirForceForums

- **POSTING RULES**
- [Donate yearly](#) (please).
- [Advertise in here!](#)
- [Today's Posts](#) | [Insert Pics](#)



[VAF Forums](#) > [Main](#) > [RV Building Tips/Techniques](#)
The Unhappy Crackly Club

User CP FAQ Members List Calendar New Posts Search Quick Links Log Out

[Post Reply](#)[View First Unread](#)

Yesterday, 10:30 PM

**Scott Chastain****The Unhappy Crackly Club**

Note: This thread was originally posted in 2018. The third-party media host suddenly caused all the photographs to disappear and the thread was deleted. I have since repaired it and hope that others might benefit from a re-post.

On the night of December 1, 2017, I flew RV-8 N898W, Descending Dove, to Tehachapi, CA (TSP) and spent the night in the pilots' lounge. I found after-hours access to a room with plenty of space on the floor to inflate my mattress and unroll a sleeping bag. I wanted to explore the town of Tehachapi the next day.



I awoke at first light. When I did, I quickly packed up my belongings and went out to the Dove to load up my sleeping gear. Pulling off the canopy cover, I discovered a ten-inch crack on the left side of the canopy directly over the passenger seat. Somewhat sickened by the sight, I covered it back up and spent the rest of the day exploring Tehachapi and mulling over my options with a pit in my stomach.





WHIRLWIND
AIRCRAFT
GROUND ADJUSTABLE
RV SERIES



earthX
charge your ride
www.earthxbatteries.com
The most trusted and used
lithium battery on the market,
including Van's aircraft!



Plane
Power
Kitted to Fit.



SUPERIOR
XP ENGINES
320 360 382 400



SDS
Programable
EFI / EI
Systems



SENSENICH



TBI
FREE SHIP
\$849
MKII 0-320 0-360
VAF FORUM SALE
sales@rotecaerosport.com



Later that afternoon, I found a local pilot by the name of Joe who helped me stop-drill the crack. I flew home to Merced (MCE) and watched the crack carefully over my left shoulder. It did not appear to be migrating further from the hole.



But over time, it did. I applied Weld-On #3 acrylic adhesive as some VAF members suggested. Then, two days before Christmas, I took a friend of mine to Half Moon Bay (HAF) for lunch. Following the return flight, I saw that the crack had splintered upward another 4 inches. I pulled the canopy and loaded it onto my truck to attempt a repair at home.



The RV-8 canopy was purchased from Todd Silver back in 2006. It was installed using the Sikaflex method without rivets or screws. The canopy skirts were also mounted to the outside of the plexiglass using Sikaflex, then riveted to the frame below the trim line. Thus, a full replacement of the canopy would entail having to fully strip the plexiglass from the skirts and frame, repainting the frame, and sacrificing the custom-made skirts in the process. Additionally, since it was a Todd's canopy, more likely than not, the windscreen would also need to be replaced since it bore a unique profile and tint to those sold by Van's.



I foresaw in the replacement option a project that would involve a lot more time and effort and money than I was prepared to sacrifice at the time, so repair of the canopy and living with a battle scar was the option I chose. I decided that when it came time to overhaul the engine, upgrade the panel, and renew the interior, the canopy would be replaced, too. But for now, it was off to the garage for some homebuilt surgery.

There, a simple jig was fabricated to mount the canopy frame in such a way that it could be banked sharply in any direction without any possibility of falling to the floor and shattering. The forward portion of the frame was jugged in the roller receptacles using 5/8-inch hardwood dowels.





Scott Chastain

RV-8 N898W *Descending Dove*



Yesterday, 10:31 PM



[Scott Chastain](#)

#2

Join Date: Jan 2005
Location: KMCE
Posts: 263

The Unhappy Cracky Club

There were well over 1400 airframe hours on the canopy, and many thousands of hours beyond that were spent baking in the sun during airshow performances and flightline displays. About 100 Hobbs hours prior to becoming a part of the Unhappy Cracky Club, the canopy began sliding on the rail with difficulty. At first, I attributed the rough slide to a worn-out C-661 slider block; following the flightline fissure in Tehachapi, however, it was obvious that a side load on the block was causing the problem. The plexiglass had shrunk and pulled the frame to such an extent that the sliding process was being impeded. After the crack occurred, the canopy suddenly glided freely again on the rails.

The repair process began by heating the shop to over 70-degrees and positioning the canopy so that the crack lay horizontally. The surgical area was thoroughly washed with soap and water, then cleaned with PPG DX330 Acryli-Clean.





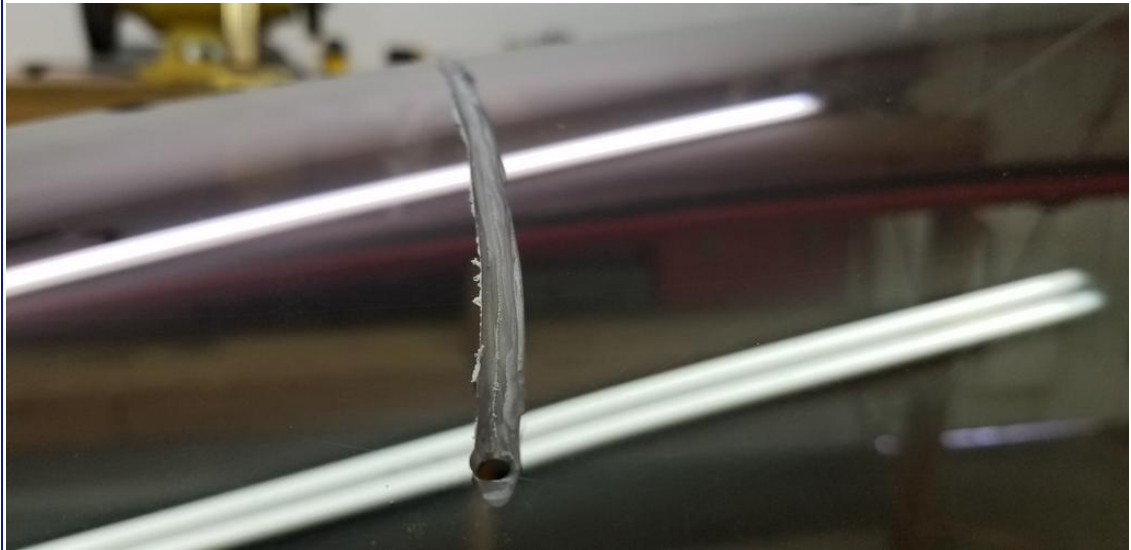
A Dremel #125 V-groove bit was used to begin the process of opening up the crack channel and relieving some of the built-in stress on the acrylic.





The Dremel bit was patiently and gradually worked to follow the crack deeper and deeper into the plexiglass as the V-groove began to form.





The crackline was clearly visible as the V-groove deepened.




Scott Chastain
RV-8 N898W Descending Dove

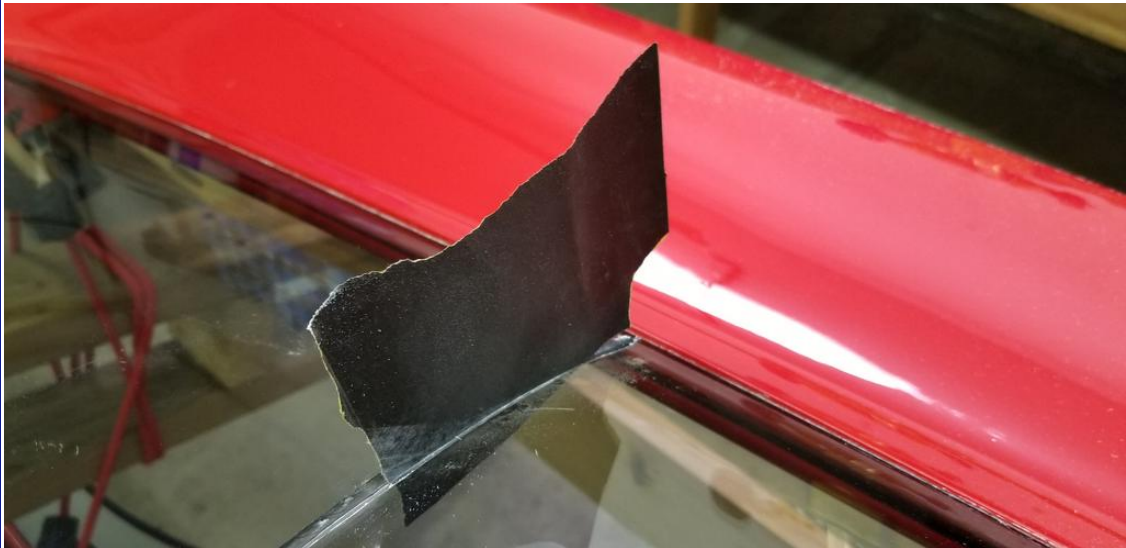


Yesterday, 10:32 PM

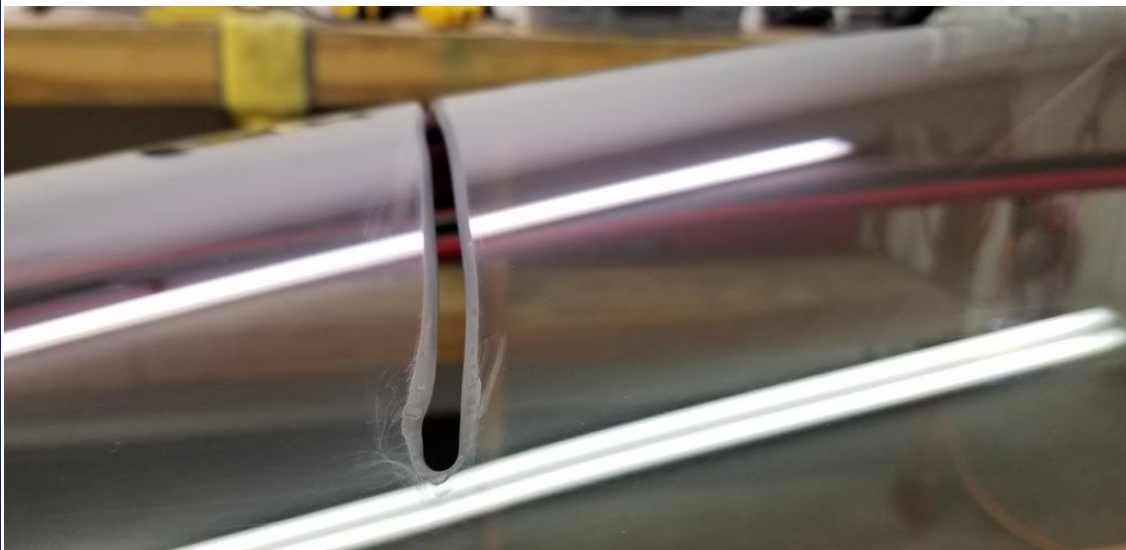
#3

[Scott Chastain](#)Join Date: Jan 2005
Location: KMCE
Posts: 263 The Unhappy Cracky Club

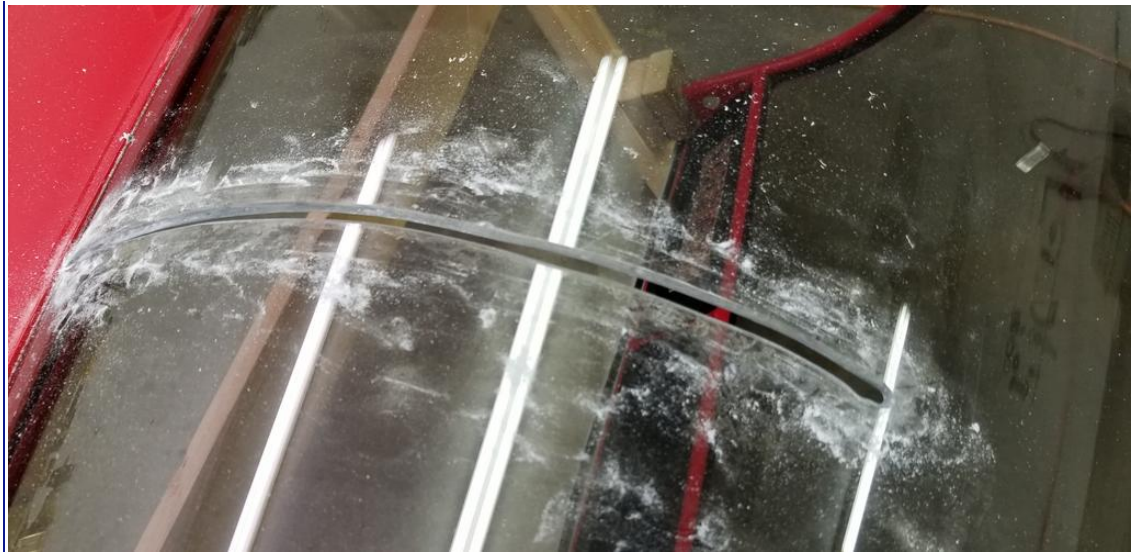
A piece of wet-dry sandpaper was inserted at the base of the crack as the V-groove channel widened.



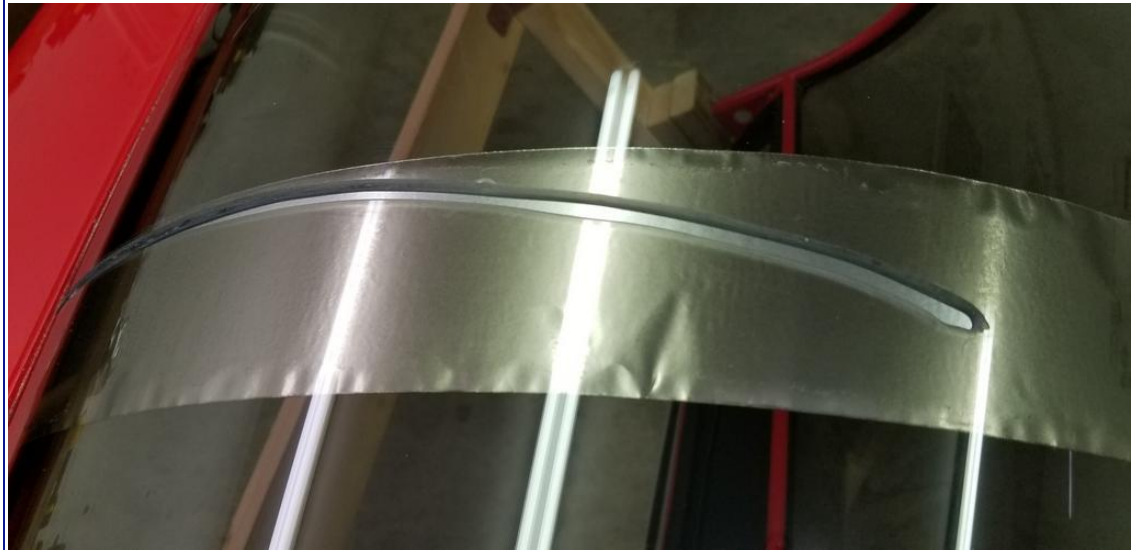
For the final 5 or 6 inches near the apex, the crackline suddenly began to flatten out and carry the fissure into the interior of the bubble at a 45-degree angle. For that reason, the V-groove was opened much wider at the top portion than at the base.



After the channel was fully opened, all sharp edges were sanded using 120-grit sandpaper. The end result was a V-groove that measured a quarter of an inch at the top and gradually narrowed toward the skirts to the initiation of the crack itself. There, the previous application of Weld-On #3 appeared to remain intact.



The surgical area was once again cleaned with solvent then prepared from inside the canopy using aluminum tape. The tape served a double function of stabilizing the plexiglass, freeing up any distortion while preventing the bonding material from dripping through.



The PlastiFix kit was prepared for use and experimented with a few times prior to application to the canopy. A very light plastic powder was dispensed into a small cup, and liquid was then dispensed into the cup, one drop at a time, using a syringe-tipped dropper bottle. The resulting globule was then delicately stabbed with the syringe and lifted out of the cup, whereupon further dispensing of the liquid melted the powder from the needle as the mixture settled into its bonding bed. The trick was to work quickly before the mixture began to harden, and more than one or two drops into the bucket resulted in globules that could not be lifted back out. Instead, they broke apart and hardened at the bottom of the cup as unusable orphans. One drop from the syringe consistently worked well.





After a little practice on the workbench, it was time to use PlastiFix on the split canopy itself.

Scott Chastain

RV-8 N898W Descending Dove



Yesterday, 10:33 PM



[Scott Chastain](#)

The Unhappy Cracky Club

#4

Join Date: Jan 2005
Location: KMCE
Posts: 263

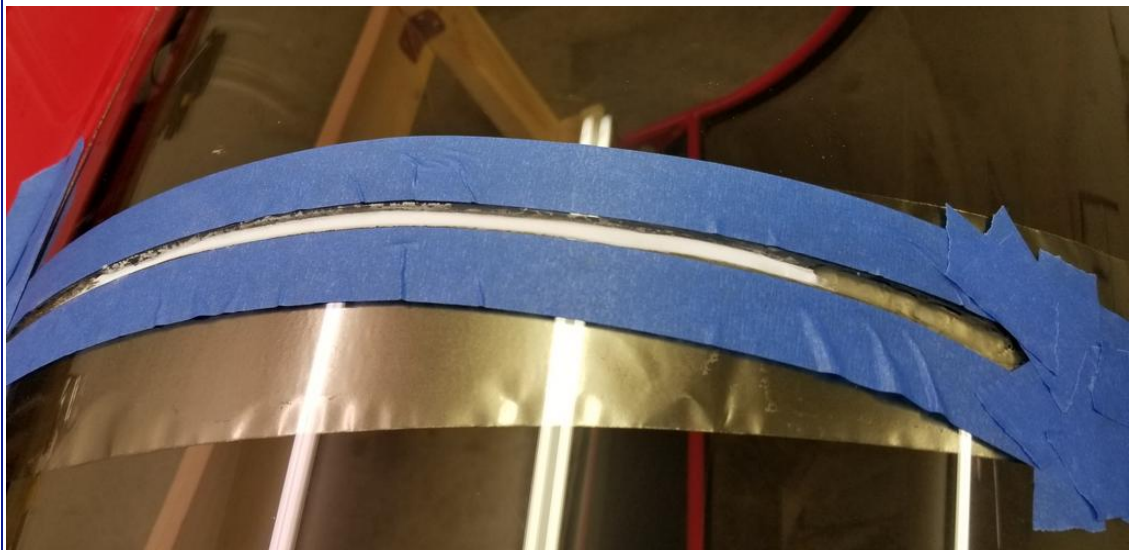
It was important for the borders of the repair to be masked off to prevent the liquid from needlessly tarnishing undamaged plexiglass. It was also important for the repair surface to be relatively level to allow the liquid to settle properly during cure.

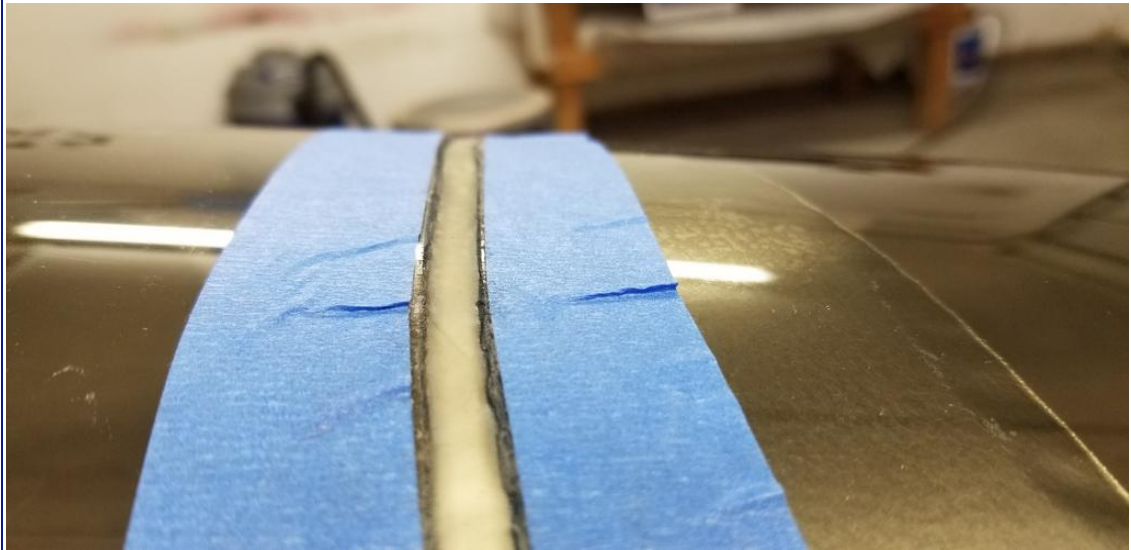


With the syringe apparatus, both ends of the V-groove channel were first treated.



At that point, a more aggressive yet perfectly acceptable technique was used whereby the powder was carefully layered onto the bed of the V-groove and catalyzed with the liquid where it lay. With the syringe removed, the drops were much larger.

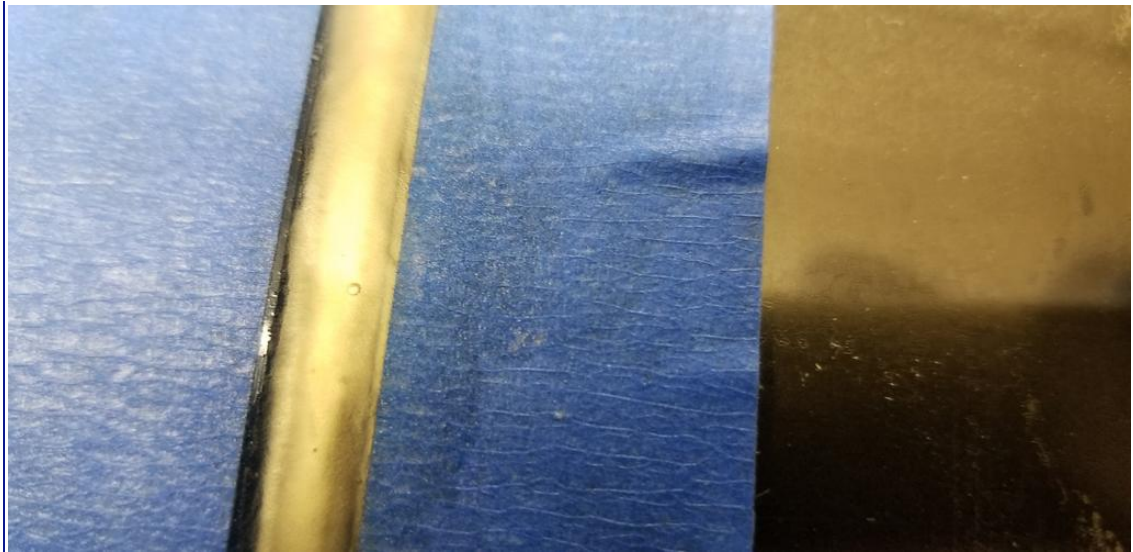




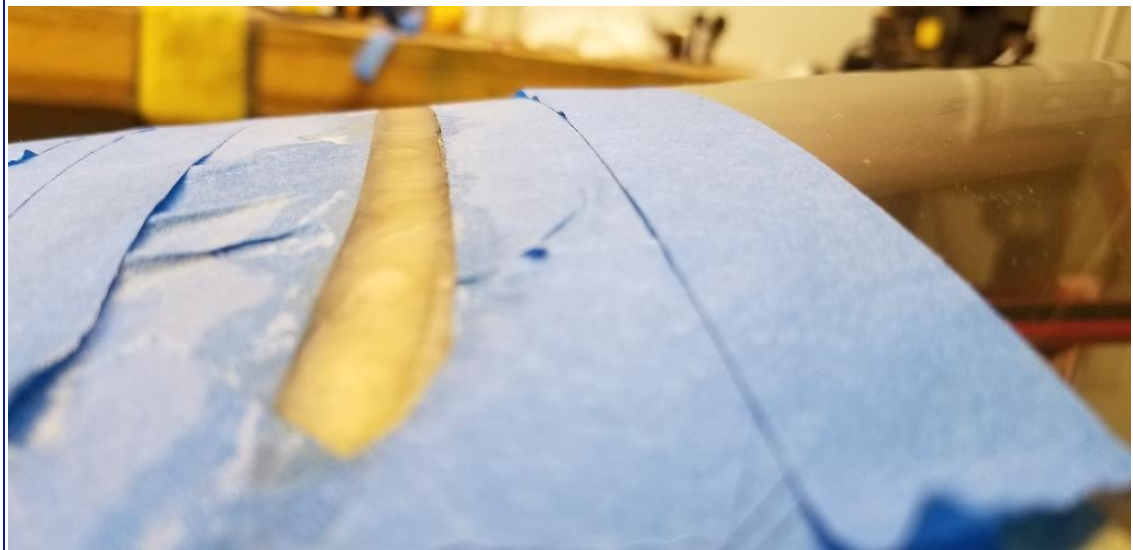
There was a short cure time of about ten minutes between layers. The process was repeated several times until the cured bonding agent uniformly filled the V-groove.



It was difficult to prevent a few bubbles from developing in the cured product. Fortunately, most bubbles rose to the surface before the mixture hardened and were popped with the syringe and filled on the subsequent layer. Others did not.



Following 4 iterations, the V-groove joint was filled just beyond capacity. A very slight 1/32" layer provided leeway to level the bonding agent to the plexiglass with a sanding block, the beginning of the final step in the repair process.



Scott Chastain
RV-8 N898W *Descending Dove*



Yesterday, 10:34 PM

#5

[Scott Chastain](#)Join Date: Jan 2005
Location: KMCE
Posts: 263

The Unhappy Cracky Club

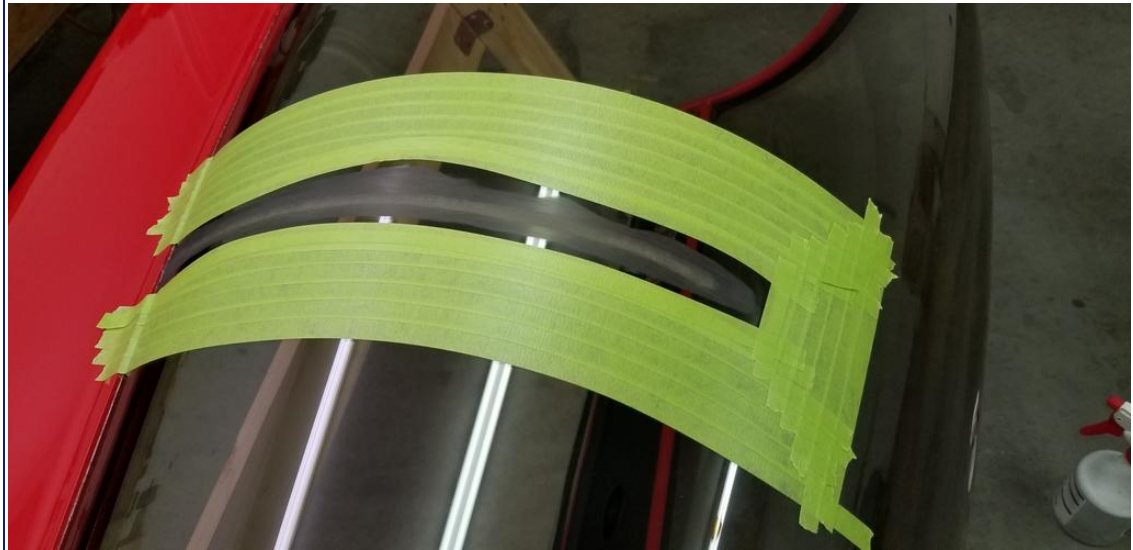
With the bonding agent masking removed, the process of leveling and polishing the damaged area of the canopy began.



The immediate area around the scar was again masked off and block sanded wet using 120-grit sandpaper. There were several areas where catalyzed material bled through the tape and onto the plexiglass. Those areas were also block sanded with 120-grit paper.



The canopy scar was then re-masked to begin the polishing process. Tape was applied in such a way that, for each progressively finer grit of paper used, about 1/4-inch of new perimeter was exposed to allow the polishing area to move outward in succession.



Grit progression for the first stages of polishing went from 120, 220, 400, 600, 800, 1,000, 1,500, to 2,000. Each stage was applied in a 90-degree crosshatch pattern relative to each previous grit to maximize polishing potential and to help prevent grooving.



Acrylic material being removed during the polishing process was evident on the floor of the shop.



Following the 2,000-grit stage, the canopy orientation was reversed so that block sanding the interior of the bubble could be accomplished.



Scott Chastain
RV-8 N898W Descending Dove




Yesterday, 10:35 PM

#6



[Scott Chastain](#)

Join Date: Jan 2005
Location: KMCE
Posts: 263

 **The Unhappy Cracky Club**

The interior scar was masked off for sanding, but unlike the exterior portion, progressively finer grits were applied in 1/8-inch increments to help minimize optical distortion.



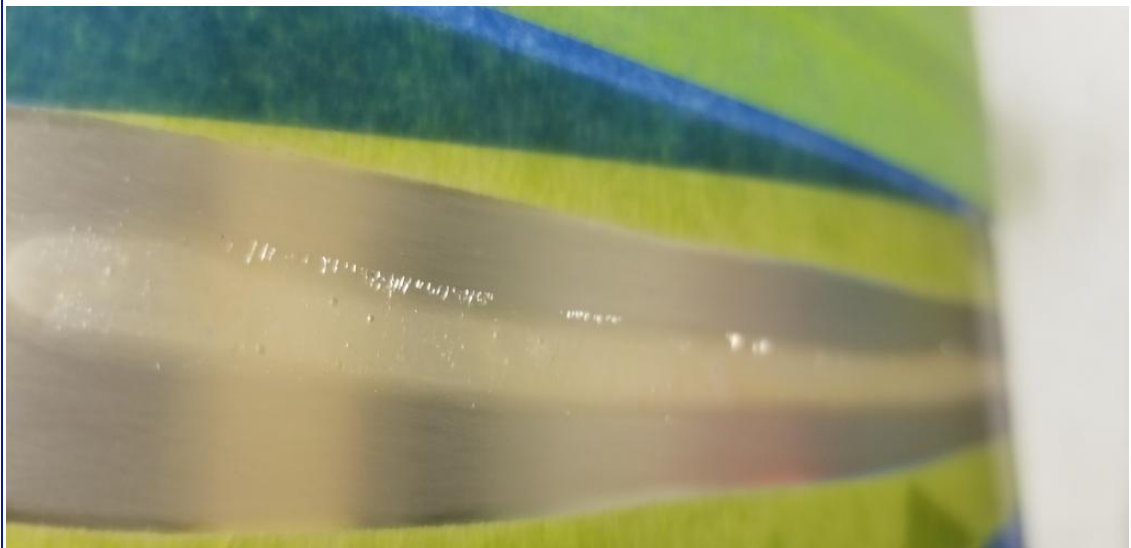
The scar was measured after each grit stage, and sandpaper was cut to width as block sanding continued. This was necessary to allow the sanding block and paper to clear the masking tape and make contact with the scar as it was sanded.



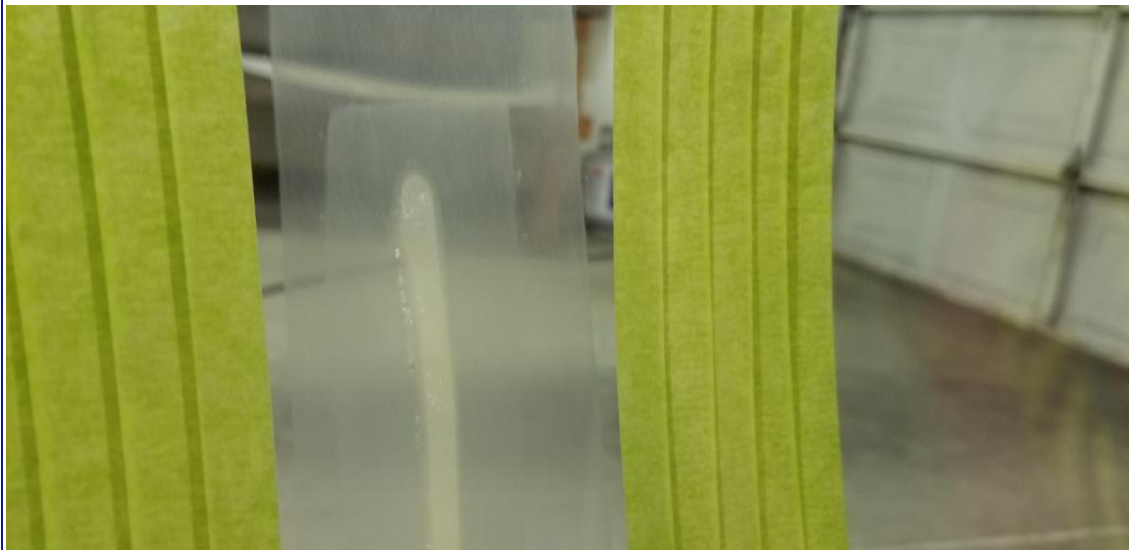
A shop rag nested inside the canopy absorbed water and was used to pick up abraded acrylic throughout the process.



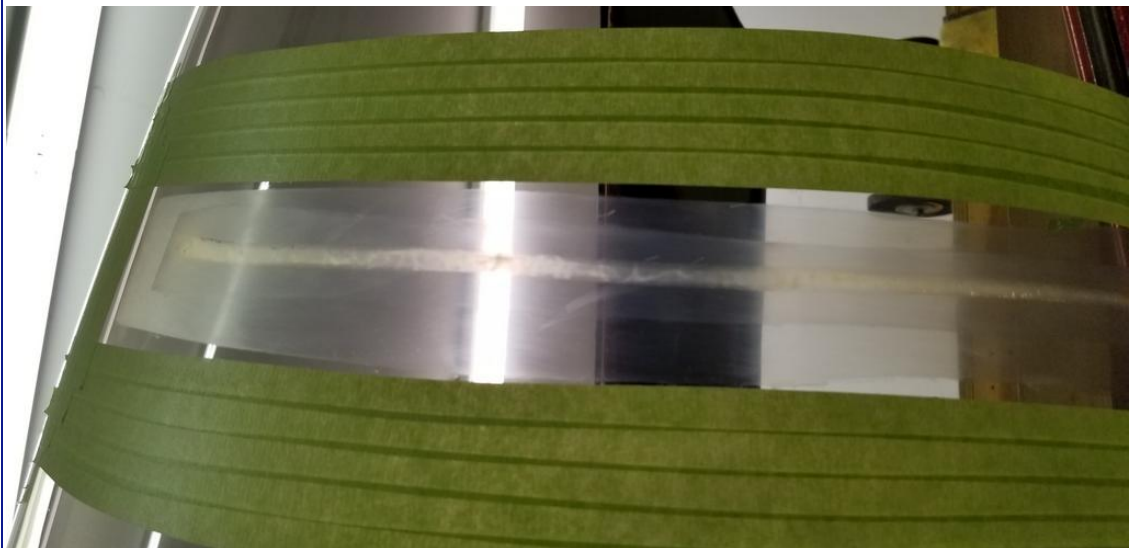
As the polishing progressed, small occlusions became visible along the upper edges of the V-groove.



The cause of the occlusions was unknown. Great care was taken to clean the plastic prior to bonding. Nevertheless, whether or not the imperfections would develop into full-blown cracks was yet to be seen. The worst-case scenario would be a repeat of the repair process a second or even a third time, and if those attempts failed, a full canopy replacement would likely be in order. Thus, it was decided to allow the occlusions to remain for in-flight testing.



After block sanding both sides of the scar up to 2,000-grit, the final stage of polishing awaited a Headlight Magic kit delivery from UPS. So far, the repair appeared somewhat promising, and with the exception of the tiny occlusions noted earlier, the canopy was coming out better than expected.



Meanwhile, a replacement C-661 slider block was measured, drilled, and prepared for installation.



Scott Chastain
RV-8 N898W *Descending Dove*



Yesterday, 10:36 PM



[Scott Chastain](#)

[The Unhappy Cracky Club](#)

#2

Join Date: Jan 2005
Location: KMCE
Posts: 263

The final stage of polishing progressed from 2,000-grit to 4,000-grit to 12,000-grit, and then finally to an abrasive micro-grit polish supplied in the Headlight Magic kit from Polyvance.

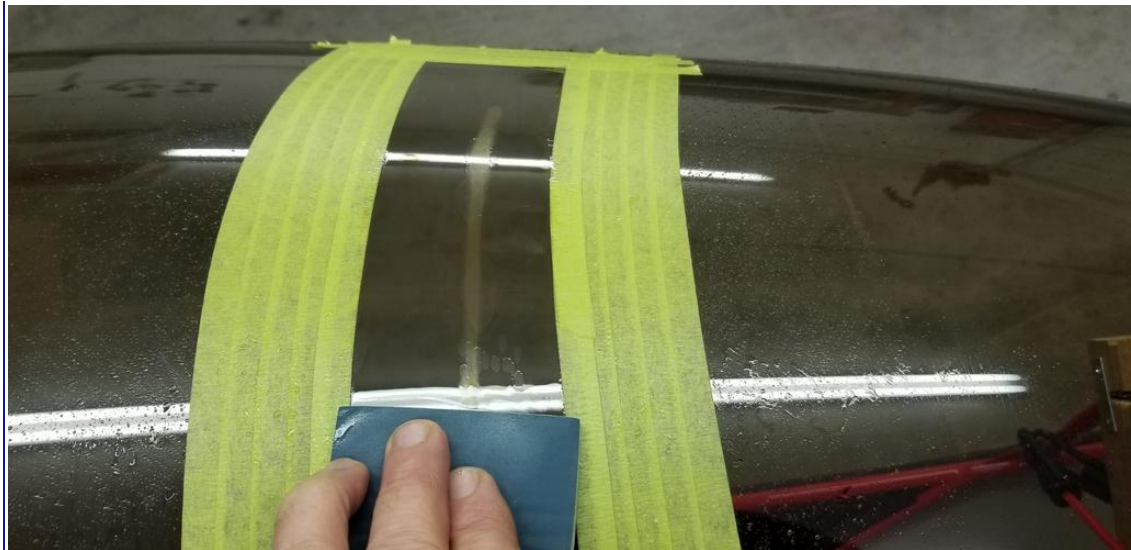


The interior side of the canopy was completely polished first.



The canopy orientation was again reversed to complete the polishing stages on the exterior surface.





The polishing compound was rubbed into the surface until it began to disappear as a smudge across the plexiglass. It was then rinsed off with water and re-applied as necessary to problem areas.



The final result was a canopy that appeared at first glance undamaged, although some distortion was noticeable when the original scar was examined closely. The removal of material during the polishing process made such distortion unavoidable. Additionally, the scar was opaque and not by any means as clear as the surrounding acrylic. Nevertheless, the canopy appeared structurally sound and worthy of flight.



A view from the interior revealed a few areas where further application of polishing compound was needed.



The canopy was ready for installation and would be flight tested at altitude and under typical 3 to 4-G aerobatic maneuvering to stress the integrity of the bond. It was decided that, since the process was not nearly as labor-intensive or expensive as full canopy replacement, three attempts to repair the canopy would be a warranted option under the circumstances should flight testing cause the bond to fail. If nothing else, the process was educational and worth attempting.

I hoped it would prove successful in the end.





Scott Chastain

RV-8 N898W *Descending Dove*

Yesterday, 10:37 PM

[Scott Chastain](#)

The Unhappy Cracky Club

#8

Join Date: Jan 2005
Location: KMCE
Posts: 263

The San Joaquin Valley winter fog finally broke on the afternoon of Sunday, January 14. I raced from Church to the airport and put some preheat on the engine while I prepped the Dove for her first flight since the canopy repair. After taking my dog, Gracie, for a little adventure walk around the airport, I pushed the plane out of the hangar for the first time since Christmas Day. It had been 3 weeks since the canopy was removed.



I noted the occlusions and took a few pictures of the repair. Then I strapped in, cranked over and taxied out. The first hour of flight testing would be simple but comprehensive.



I took off and performed a simple 270-degree, 1.5-G turnout departure over the field in the direction of Mariposa, CA (MPI). After reaching 4,500 MSL, I leveled off and prepared the engine and propeller for a set of aerobatic maneuvers with 180-mph entry speeds.

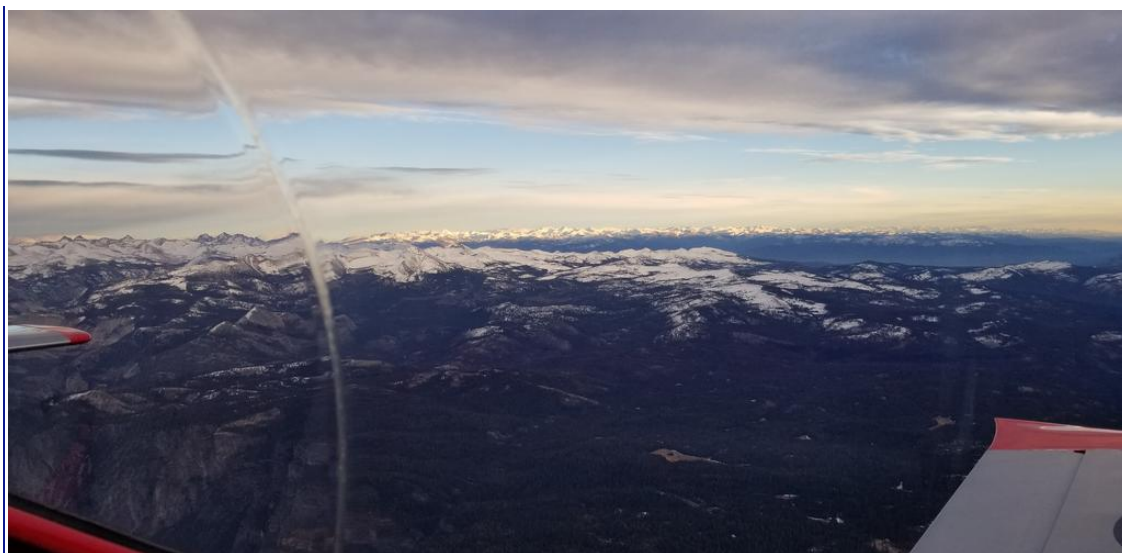


I began with a set of clearing turns and pulled a sustained 2-Gs in the process. A few lazy-8s were performed, followed by three loops with sustained 3-G entries and exits at the bottom, followed by some rolls. The repair held.

With daylight fast disappearing, I then climbed toward Yosemite National Park until I reached 14,500-feet MSL, watching the OAT on the AF-2500 engine monitor. It was a roasty 47-degrees Fahrenheit at 4,500. Ten thousand feet later over Yosemite, the OAT gauge was showing -2. I guessed that some serious recalibration of the gauge was in order. It was not that cold outside, but it was certainly colder than when the Tehachapi fissure occurred.



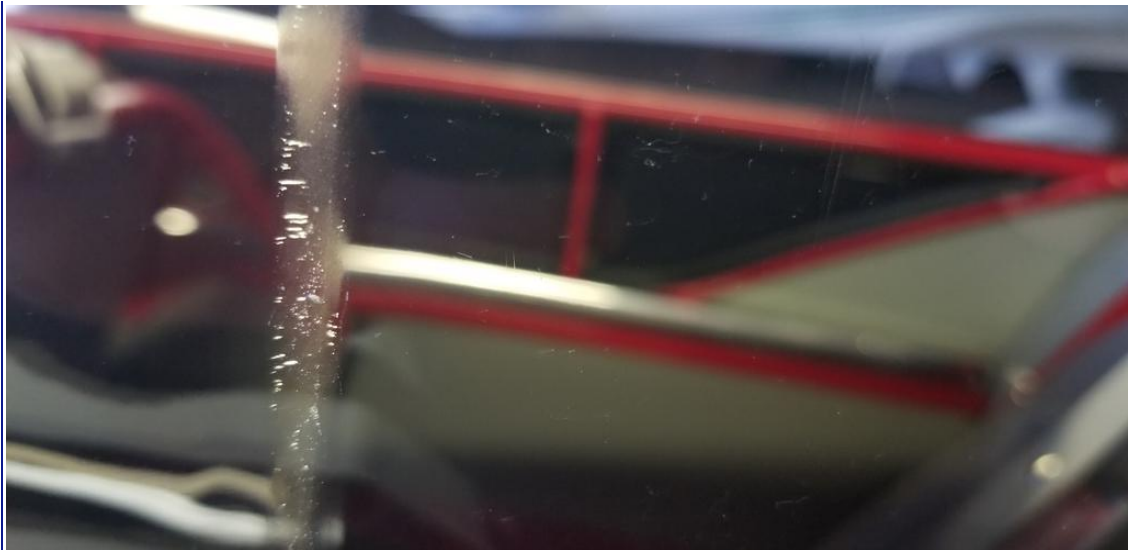
The acrylic bond appeared to be unaffected by the cold, and in the occlusions no apparent changes were seen.



I made an aggressive descent back into the haze to attempt cracking the repair with a rapid temperature increase and near-VNE airflow over the canopy, but the repair was stable and remained unfazed.



Back in the hangar, I took another close-up shot of the worrisome occlusions that became apparent during the polishing process. Compared to photos taken before startup, no changes were noted during the 1.03-hour flight.



I was pleased that initial flight testing had proven the PlastiFix repair process airworthy. Further testing at 17,500 MSL, experimentation with 4-G split-S maneuvers, and even more rapid temperature and airspeed fluctuations would come next. It would be interesting to see how the repair would handle those stresses.

It was good to get airborne again.

Scott Chastain
RV-8 N898W Descending Dove



Yesterday, 10:38 PM



[Scott Chastain](#)

[The Unhappy Cracky Club](#)

#9

Join Date: Jan 2005
Location: KMCE
Posts: 263

A blast of rain and cold weather swept through California at the end of the week, and I awoke Saturday morning to clear, crisp flying weather. I drove out to the airport and put some preheat on the engine while I waited for the old man to show up. My dad and I were heading to Paso Robles (PRB) for brunch to get the weekend off to a good start.

As my flight instructor when I was just a boy, and as my primary rivet bucker during the build of N898W, my father would be the first passenger to fly in the Dove since the canopy repair. At nearly 82-years old, the 1961 Cal Berkeley graduate climbed into the back seat and strapped in. Soon enough, we were airborne.



My father told me that he didn't even notice the repair while we were flying. He called it patina, something that came naturally with age and time, and there was still so much clear visibility beyond and outside of the repair that, mentally, it soon ceased to exist in his mind.

After biscuits and sausage gravy at Joe's One-Niner Diner, we taxied to the departure end of Runway 31 and shut down at the Estrella Warbirds Museum. An icy breeze whipped through the static displays as we walked through them. I saw my father look over the weapons of war with pause. They looked all too familiar to him from his days in the U.S. Army following the Korean War.



Memories from his T-33 ride many years ago came flooding back.



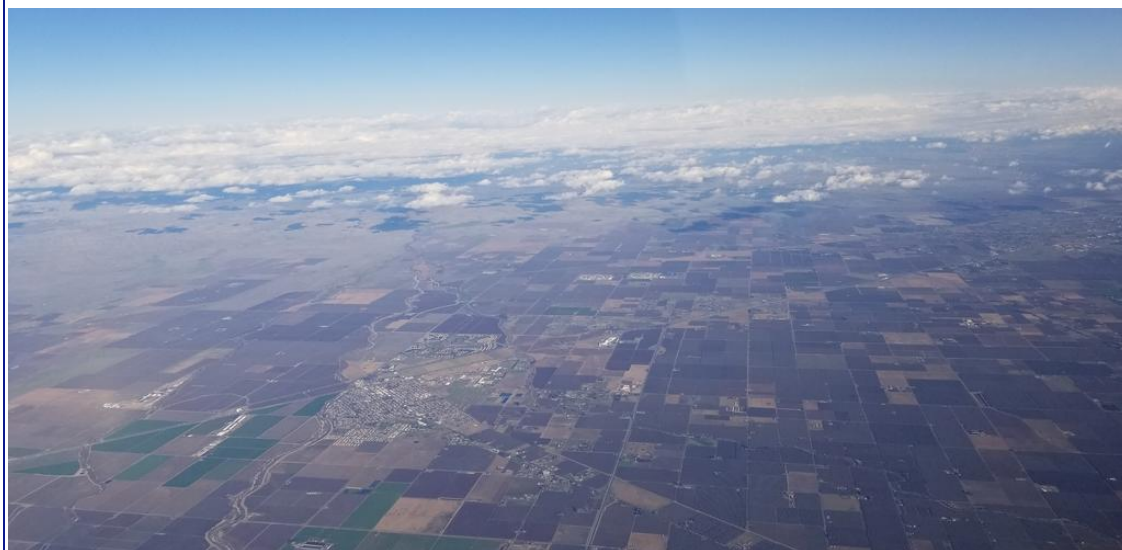
After spending our morning together, we flew back home to Merced (MCE). My father drove back to the house to be with my mom and to stay warm for the rest of the day. I decided later that, since it was unusually cold for California, now would be a good time to complete the flight testing of the repaired canopy. I strapped back in and flew out toward one of my aerobatic practice areas to perform a few 3.5-G maneuvers.



Then I climbed up to 17,500 MSL and saw the OAT gauge registering -58F.



I still needed to re-calibrate the OAT gauge. Judging from the National Weather Service estimates, it was probably about +10F at that altitude. Nevertheless, it was some of the coldest air I had flown through in the Dove, and the repair remained unfazed. The view from up there was spectacular while it lasted.





I descended over Los Banos (LSN) for \$4.10 fuel. The visibility looking southeast down the valley was nearly limitless.



The canopy was robust enough to send back into battle. I topped off the tanks. In spite of its scars, I was grateful to have a plane that I could count on, that the Dove would fly on to see another day. As the sun began to descend in the chill of an approaching darkness, I wondered when that day would come.



Then I climbed in, cranked over, and took off. It came soon enough.

Scott Chastain

RV-8 N898W *Descending Dove*

Quote

Today, 05:00 AM

#10

Join Date: Mar 2009
Location: Plano, TX
Posts: 1,860

WingsOnWheels

Nicely done repair! Canopy issues are my biggest worry. I really don't want to go through all that again. More so the windshield...

Colin P.

RV-6A #20603

Complete 5/10/19

PP SEL / A&P

I donate every year on my B-Day (in Dec), but donated early in Sep'19.

Quote

Today, 07:32 AM

#11

Join Date: Oct 2005
Location: Melbourne, Australia
Posts: 1,766

Captain Avgas

It's surely interesting that so many canopies bonded on with Sikaflex have developed serious cracks.

Regards

Bob Barrow

RV7A

Last edited by Captain Avgas : Today at 07:35 AM.

Quote

Today, 07:46 AM

#12

Join Date: Oct 2009
Location: Victoria, BC, Canada
Posts: 3,628

Snowflake

Quote:

Originally Posted by **Captain Avgas**
It's surely interesting that so many canopies bonded on with Sikaflex have developed serious cracks.

It's interesting that so many screwed on canopies have developed them as well.

Rob Prior

1996 RV-6 "Tweety" C-FRBP (formerly N196RV)

Quote

Today, 07:59 AM

#13

Join Date: Apr 2011
Location: Cincinnati, OH
Posts: 2,414

Steve Melton

oversize the holes and screw it on so it floats and has room to expand may be one method to eliminate cracks.

Steve Melton

Cincinnati, OH

RV-9A, Tip-up, Superior O-320, roller lifters, 160HP, WW 200RV, dual impulse slick mags, oil pressure = 65 psi, EGT = 1300F, flight hours = 800+ for all

Simplicity is the art in design.

www.rvplasticparts.com

Quote

Post Reply

[« Previous Thread](#) | [Next Thread »](#)

Quick Reply

Message:

B

I

U

Please click one of the Quick Reply icons in the posts above to activate Quick Reply.

Options

☐ Quote message in reply?

Quick Reply

Post Quick Reply

Go Advanced

Posting Rules

You **may** post new threads

You **may** post replies

You **may not** post attachments

You **may** edit your posts

vB code is **On**

Smilies are **On**

[IMG] code is **On**

HTML code is **Off**

Forum Jump

RV Building Tips/Techniques

Go

All times are GMT -7. The time now is 08:18 AM.

[Contact Us](#) - [VAFForums Home](#) - [Archive](#) - [Privacy Statement](#) - [Top](#)

The VAFForums come to you courtesy [Delta Romeo, LLC](#). By viewing and participating in them you agree to build your plane using standardized methods and practices and to fly it safely and in accordance with the laws governing the country you are located in.