Tips from Comanche *Flyer* magazines Feb 1973 – Sep 2012

CHAPTER SIX

CABIN
(DOORS, SEATS, WINDOWS, HEATERS, INSULATION, VENTS)

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Removal of Right Front Seat

So many people ask me why I removed the right front seat from my Comanche that I thought I'd put it in writing:

Winter Preflight: In winter, a passenger (wife) can climb aboard while I preflight. She's out of the wind and cold and doesn't have to wait for me to go through the only door first.
Entry: It's easier for me to enter. There's no right seat to climb over to get to the captain's chair.
Door: It's easier to open and close the door without having to reach around anybody. The rear seat passenger doesn't try to operate the door as someone would if they were sitting in the seat next to it.
Passenger Room: It's first class seating back there with room to stretch. The passenger is not bothered by flight controls, knobs and instruments. Stretching room is great for long haul flights. Of course, I can (and do) reinstall the seat for a passenger who wants to be up front where the action is.
More Usable Space: There's all that extra room for the flight case and for opening navigation charts, etc.
Weight and Balance: Two front seat passengers put the load on the leading edge of the weight and balance envelope. Putting the weight in the back seat, minus 30 lbs. of front seat, moves the CG closer to the center.

Well, there you have it! All Comanche flyers are welcome along up front, but otherwise, make mine a three seater.

ED: My local FAA rep says that this modification, while perfectly legal, would require two Weight and Balance calculations: one with the co-pilot seat present and the other without it.
ED: There is no data to support this theory.

Self Opening Door In Flight

A member wrote in about an alarming situation where his door opened in flight 3 or 4 times, scaring passengers and enriching mechanics, not to mention making him feel foolish for possibly leaving it unlatched. All else failing, he tore into it himself and found that his persistent closing of the door with the handle had bent the plate that holds the handle and the rachet latch thus would let the handle slide behind a shoulder from vibration in flight (that's what he said).

The solution was to straighten (flatten) the plate and replace the handle. To which we add, "Don’t use the handle to close the door. Use the armrest. Then lock the door with the handle."

One Piece Windshield Installation

I recently installed a one piece windshield in my '59 Comanche and I feel it is the biggest improvement I have made in an already great airplane. Besides greatly improved visibility, the cockpit seems much larger.

I purchased the windshield and installed it myself with the help of a friend and under the supervision of an IA, who signed off the work and submitted the 337 form per the STC. The whole job, including recovering the top of the panel took about 20 man hours, and required no special tools other than a 1/4" drill with a 5" sanding disc with #80 grit sandpaper and a roll of duct tape.

The windshield is oversized and must be fitted into each airplane with the use of a sander (don't try to cut it with a saber saw, because you will crack it for sure). After removing the old windshield and cutting out the center−post, place the duct tape around the window frame so you won't chip the paint when you try to fit the window into the opening. You might have to try to put the window into the opening 15 or 20 times before you get it to fit, each time removing no more than a 1/16 of an inch at a time with the sander.

When fitting the windshield, go slowly and carefully. Always consider what removing 1/16" on one end will mean at the other end. After fitting the windshield, you must drill 6 holes plus 1 for the thermometer. The drill you use must be very dull or it will crack the Plexiglas (drill a hole in a concrete floor first). After you have fitted and drilled the windshield, place silicon sealer around the window channel and put the windshield in for the last time.

Cabin Door Adjustment

The Comanche door is adjustable. There is an eccentric cam in each door hinge. By positioning these eccentrics, you can change slightly the fit of the door to the opening, and move it up or down, in or out. It is a time consuming job and largely one of trial and error.

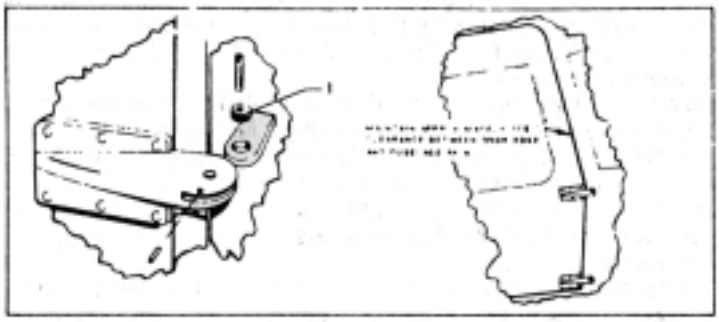
For example, if there is a leak at the bottom rear, you should probably rotate the lower eccentric so that the door moves slightly aft. Reproduced below is the page from the PIPER service manual explaining how to install a door. If you want to do this yourself, we suggest that you mark the initial positions of the eccentrics before you start. Plan to spend a long time. You will probably want to use the smoke technique listed above to find the air leaks. Good Luck! It can be done, if your door is not warped out of shape.

Installation of Cabin Door:
The entrance door on the Comanche is made of formed aluminum assemblies spot welded together. This type of construction gives a ridged assembly, but still retains the flexibility needed for proper fitting of the door.

When installing a new door, follow the procedure given below:

1. Temporarily mount the new door on the fuselage using two 10−32 bolts at the hinge points. As the door will be removed from time to time during the process, the bolts will make the door easy to remove.
2. Swing the door closed and check for alignment of the main door latch and the auxiliary latch with their respective latch striker plate. If the door fails to align, remove it and reposition the two serrated door hinge eccentric cams. (See figure 4−5.) Repeat the above procedure until the door is properly aligned.
3. Once the door is properly aligned with the door frame, the procedure of trimming and fitting the door can be started. Using a small pair of metal shears and a file, trim the door edges until there is an approximate clearance of 1/8 inch between the fuselage skin edge and the door edge. (See Figure 4−5.)
4. After the door is fitted, use a short piece of 1/4 inch diameter dowel and a hammer to contour the edges of the door to align with the fuselage skin.
5. With the door removed use sandpaper to smooth the rough edges. Replace the door using the required hinge pins, staked with roll pins. Install the door holding assembly. Apply a light coat of oil to the latch assemblies.

Figure 4−5. Door Installation



Twin Gear Door Hinges

Q. What can be done for short lifetime of PA−30 gear door hinges?

A. The gear door hinge (Part #21065−12) is inexplicably loose when new, but if the doors are properly adjusted, they will last a long time. The doors will flutter anytime the gear is down. This obviously does cause wear but the real problem is if the doors are not tight while in flight. To adjust them, first be sure that the door fits in the retracted position. Adjust by loosening the door hinge screws in the wing panel, reposition door and then retighten screws. The gear door actuating rods should then be adjusted so that a nine pound weight suspended at the center line of the inboard edge of the door in the retracted position will create a 0.125 of an inch deflection from the wing contour at the inboard edge of the door. These doors must have this tension on them in the retracted position or they will wear very rapidly.

Two Piece Quarter Inch Windshield

Although the popular one-piece windshield, is available, as you noted, it is a pain to install properly; and you should get a good shop to do it. Bad points other than installation are: replacement cost, if damaged by the numerous dangers to windshields; loss of the center−post for mounting compass; or as on mine, the G.S. antenna. Another option is a two-piece, 1/4" windshield, which I chose. I got it from Aircraft Supply at Allegheny County Airport (phone 800 569 9397), an outfit that advertises in Trade-A-Plane. It is custom made, and a little oversized to be sure of fit, but it is1/3 the cost of the one-piece windshield. With silicone sealer and foam in the center, there seems to be no difference in noise attenuation. If I get a gouge, nick, etc. it will be 50 bucks to replace, versus $200 for the single-piece.

Cabin Door Upper Latch Modification Part 1

In 1963, a '61 Comanche PA−24−250 was stolen and recovered in Tampa that year minus radios. When it found refuge at Wabash (IN) Airport in 1971, the door was in bad shape. It still showed signs of forced entry and the gap at the top was large enough to lose a flight bag. Seven years of adjusting, tampering, replacing and even a futile attempt at bending without results.

Finally, when the upper latch fell apart and refused to function, in desperation I purchased the Warrior upper door latch assembly from out local Piper dealer. During our plane's December, 1978, annual, the assembly was delivered to Bill Lynch our local IA in Wabash, the problem explained and a request that the Warrior door latch be installed as a solution.

This man is a genius. He first contacted Piper and found:

1. the structural integrity of the fuselage was not reduced by cutting a hole in the upper fuselage door frame to accept the warrior latch as the "gusset" (later explained) added strength, and
2. if the parts used were Piper parts, no problem.

The old upper door mechanism is completely removed (including outside knob) and the interior and exterior holes covered (see photograph). A hole is cut in the inner door frame to receive the recessed Warrior latch, the assembly properly aligned to allow the hook to enter the fuselage door frame hole, and three oval head bolts and nuts hold the mechanism to the door. Now comes the tough part: The cabin head liner is loosened (not removed) for access to the fuselage door frame. The opening in the fuselage door frame is cut to align with the hook and the adjustable catch installed in side the fuselage door frame. The end result − BEAUTIFUL!!

Needless to say, some Warrior PA−28 parts need to be modified slightly. For instance, the plastic square shaft of the door assembly is shortened as the Warrior door is wider than the Comanche. Unless the shaft is shortened, the outside handle will protrude about an inch above the door facing. To compensate for a part of this width, the inside door mechanism protrudes approximately 3/8 of an inch and a rubber seal is placed around the mechanism for cosmetic purposes only.

In addition, the fuselage was not originally designed to install the catch assembly and it is necessary to fabricate a gusset and rivet it to the existing frame of the fuselage between the skin and the headliner to hold the adjustable latch bracket assembly. Now, the door seals properly. The noise is eliminated and the door fits flush with the outside skin. The extra handle in the picture was installed six years ago when the old latch assembly was adjusted in an attempt to cure the gap. The Piper part number of the "Latch Assembly Door Auxiliary" is 96919−00 which is the complete assembly for the door.

The point shaft is discarded. Those parts that fit in the fuselage are "Upper Door Latch Bracket Assembly" No. 96872−00; "Door Plate" No. 97234−00; and the "Striker Plate" No. 63293−02.

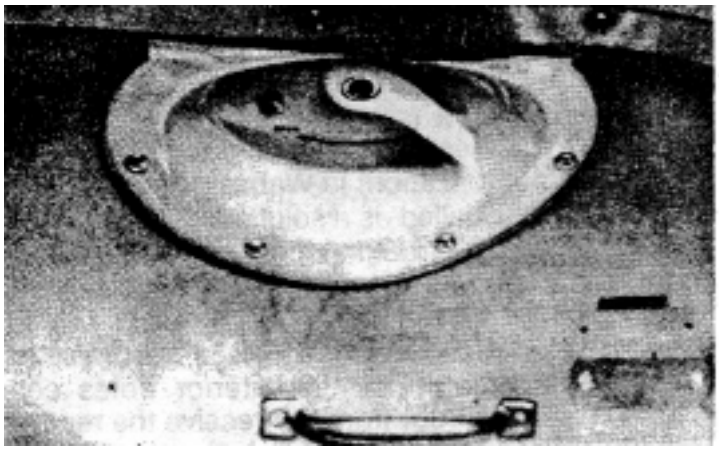
Cabin Door Upper Latch Modification Part 2

In the previous article the part numbers were inadvertently given incorrectly. There was a mistake in the door plate part number. The Pan No. 97234−00 is in error and is for a gasket rather than the door plate. The correct door plate Part Number is 79234−00.

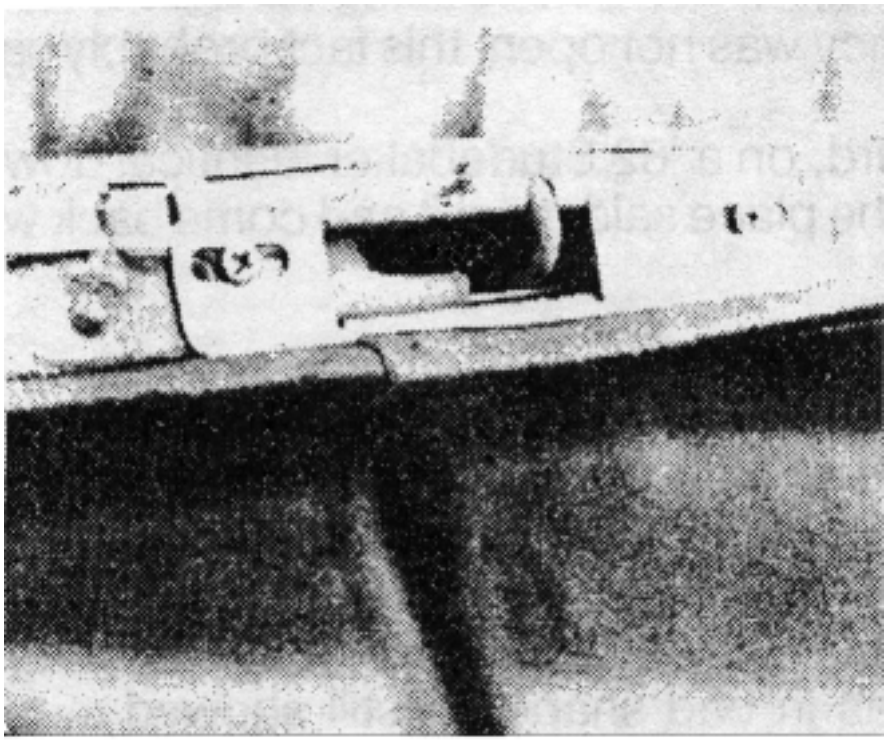
The actual parts which are needed are: the "door latch assembly" No. 96919−00; the "loop assembly" No. 63037−00; the "upper door latch bracket" No. 96872−00; the "door plate" No. 79234−00; and the "striker plate" No. 63293−02.

Lately, we have discovered the outside handle is not shipped by Piper with the door latch assembly. Therefore, the "handle" will also be needed as Part No. 63039−00.

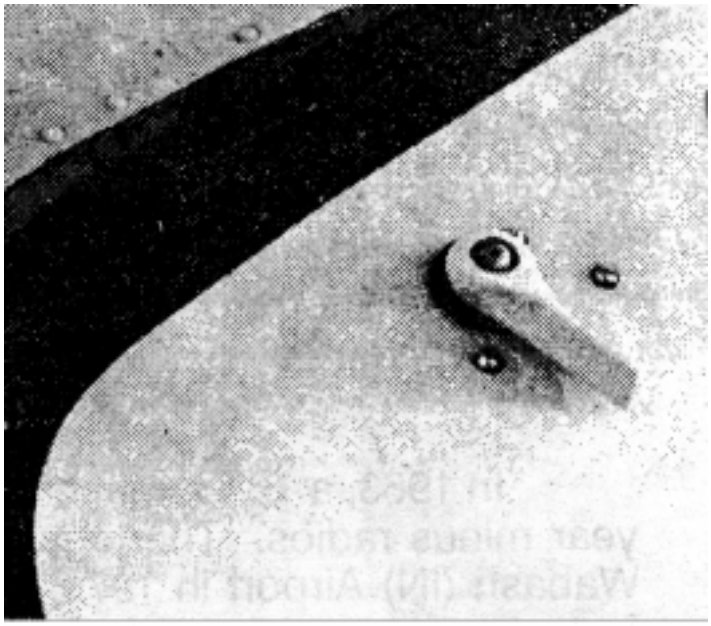
These parts and part numbers are displayed on the Piper microfilm pans catalog issued September, 1978, Figure 13, pages 1C5, 1C7, and 1C8; and issued September, 1978, Figure 9, pages 11310 and 11313.



Inside Door Handle and Latch



Fuselage Striker Plate



Outside Door Handle

Window Molding Repair

I have been able to repair the inside window trims using Vinyl Repair available from auto stores.
In most cases, the trim can be repaired without removing it. For large cracks, a better repair is done by removing the trim, applying the Vinyl Repair glue a little at a time until the gap is built up and closed. With a little sanding and touch up paint, the trim comes out almost as good as new.

Cabin Heat

Q. No matter how low I set my temperature control on my twin, the passengers in the rear have a high volume of hot air on their feet and find it occasionally uncomfortable. I know these heaters have a good rating, but I must be missing the boat.

A. Assuming that you have a good heat flow to the front, we have found that this problem can be corrected by stuffing a small copper colored wire mesh pot scrubber in the rear air line. This will restrict the flow of air. You may have to experiment with it to determine just how much restriction you need. Don't use anything other than a metal wire mesh.

Cabin Heat

Q. My 1959 250 has an annoying problem: the heater works very well in the front of the airplane, but the passengers in the rear are very cold. What can I do to redistribute the heat?

A. The heater system in 250's went through several changes. Up to Serial Number 1251, there was no rear heat ducting. All heat came from the manifold just underneath the instrument panel. Serial Numbers 1252−2298 had some rear ducts which ran along the fuselage sides. Serial Number 2299 and up had rear seat heat of an entirely different design and this appeared to work well. For your information, the 260 system was of an even different design.

Has anyone modified the heating system of any 250's to upgrade it to a later design? If so, let us know the detail of your fix.

Cabin Heater Duct Location

Q. Our Comanche says we have rear heater ducts. If so, are they in the door panel or the frame?

A. The Piper Service Manual, Figure 10−2, S #24−1252 to 24− 2298 shows the ducts starting at the upper aft side of the firewall coming down the right side to a level just below the door and then aft to the back seat compartment with a defrosting outlet coming from the duct up through the door on to the door window.

Twin JANITROL Heater

Q. How do I find out what is wrong with the Twin Comanche Heater when it doesn't work?

A. Some tips for trouble shooting the Janitrol Heater on PA− 30/39: This is intended to help an A&P mechanic more quickly locate heater problems. No repairs should be attempted without having access to either the Janitrol Service Manual and/or (preferably) the Piper Service Manual on the heater and its installation in the PA−30/39.This is divided into three parts:

I. On the ground − electrical
II. On the ground − fuel related
III. In the air- electrical

I. On the Ground − Electrical - Heater Inoperative:
   1. With the nose cap removed, station a helper who knows how to operate the controls inside the aircraft. He should put the right engine mixture control in idle cut-off, master switch on, right electrical fuel pump on and heater on.
   2. Using a volt meter or test lamp, you should have 12V at point 1 on terminal strip Fig. 13−19. If none, check circuit breaker inside the aircraft.
   3. Check voltage down stream side of overheat switch. If you don't have 12V at this point and the red button is pushed in, overheat switch is bad.
   4. Check voltage down stream of combustion air switch. If you don't have 12V at this point, either the combustion air switch is bad, the combustion air switch is out of adjustment, or the combustion air blower is defective. This last is the most likely as it is the weakest point in the heater.
   5. Check voltage up stream of cycling switch. If you don't have 12V at this point, adjustable duct switch is defective. Be sure heater control is set at highest point.
   6. If you did have 12V on the up stream side of cycling switch, check voltage at fuel solenoid. If you don't have 12V at this point, then cycling switch is bad.
   7. With 12V at all of the above points, check voltage at ignition unit. If it has 12V, have person in aircraft turn master switch off.
   8. Remove spark plug wire and the rubber grommet around spark plug; then unscrew spark plug. Note: when removing spark plug, be very careful not to drop gasket as it will fall down under burner can. Use same care to reinstall plug.
   9. Screw wire back on plug and make sure the side of plug is properly grounded. Have person inside turn master switch on for just long enough to check for spark. This should be from the end of center electrode to ground electrode. If the spark is going from the side of porcelain to ground electrode, the plug is defective and should be changed.
   10. The correct gap for the plug is 0.050 to 0.060. If there is no spark with a good plug, change the ignition unit and/or vibrator. Be sure the rubber grommet is properly installed as this keeps heated air from being lost.

II. On the Ground − Fuel:
   1. Fuel for the heater comes from right engine system. If engine is not operating, right electric pump must be on and fuel selector on a tank with fuel in it.
   2. Heater fuel valve must be open.

3. Remove the fuel line from heater side of fuel regulator and shutoff valve. Attach a good tight line on valve that will reach outside of nose compartment. Then have master switch turned on and you should get fuel from this valve. If none comes, check the other side of valve. If there is no fuel at this point, change the fuel shutoff valve.

III. Inoperative Heater − In Flight:

1. If heater works all right on ground but not in flight. Install two small insulated wires long enough to go from heater out from under nose cowl, in through the small window left of pilot's seat. This window will close with two very small wires with only a small air leak.
2. Attach one wire to the down stream side of combustion air pressure switch and the other to the up stream side of the cycling switch.
3. Attach a voltmeter or test lamp to the wire from the combustion air pressure switch while in flight. If you do not have 12V at all times at this point, it means one of the following:
    a. Overheat switch is out. This usually only happens when the vent air blower is inoperative as it is the only means of moving air through heater when on the ground.
    b. Combustion air blower bad, combustion air switch bad, combustion air switch out of adjustment. Combustion air blower is most likely as it is the weakest part of the heater.
    c. Tube combustion air switch plugged at tail pipe. If the heater will operate all right on ground but you lose the voltage at this point in the air, this may be the problem. This tube can be cleaned with a pointed rod at the tail pipe and then blown out with compressed air from the top. See fig. 13−25, item #87
4. If the voltage stays on all of the time with voltmeter hooked to wire going to combustion air switch change voltmeter to wire from cycling switch.
5. If there is no voltage, select the highest heat. The voltage should come on and off as the adjustable duct switch or the cycling switch is operating.
6. If the voltage stays on all the time and there is not enough heat, or no heat, check the spray nozzle located on the front end of the combustion tube. This nozzle can be cleaned after removal by soaking in lacquer thinner or other solvent and then blown out with compressed air.
7. To increase the available heat on models S# 30−1717,30− 1745 and up, have an override switch added which when in the full high heat position, bypasses the adjustable duct switch which is set at approximately 225 degrees to the cycling switch which is approximately 250. If the older aircraft have kit #760−249 installed, this will update them to the later models.

Cabin Heat

The heater is great, but heat distribution to the back isn't too great. This is improved considerably if you use the defroster because this air travels upward and to the rear. Just balance a lot of defroster air with a small amount of heater air for the right temperature.

Engine Heater

I had the Tanis engine heater elements installed, since it sometimes gets cool up here, and discovered that, if you leave the system on, say, overnight when it is very cold, moisture meeting the warm air from the breather hole may plug it up completely. I had a broken oil seal to prove it along with an opaque windshield and oil which still seeps out of odd places two years later. Check the breather pipe for frost.

Ed Note: Both Continental and Lycoming engines usually have special openings in their breather tubes called “whistle slots” to prevent the tube from having moisture freeze at the tip and block crankcase air venting. It is our experience that sometimes these tubes have been replaced without the “whistle slot” being cut in them. This slot should be verified to be present and to be open at every annual inspection.

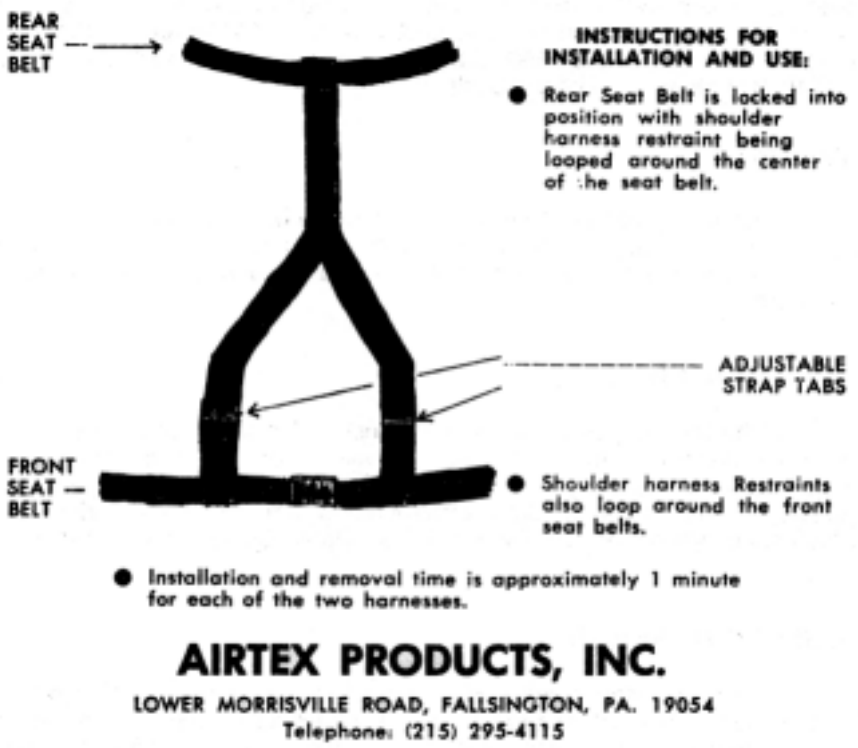
Shoulder Harness

The double strap nylon harness is adaptable for use in any light aircraft. It has adjustable loop ends which engage any type two inch safety belt. The terminal end has a buckle for attaching to the anchor bracket, chair back or structural tubing. A bracket for overhead or floor attachment is available. It is stocked in black only.

I have installed a very acceptable kit in my 1959 PA24−250. The harnesses for the two front seat passengers are secured by the rear belts and interconnect with the front lap belts. Complete installation and/or removal from the airplane takes less than one minute per harness. I have had an A&P check the installation which, he assures me, is a good, solid, and safe one. My wife and I use the harnesses at all times, except when carrying rear seat passengers. I then remove them, since it would be moderately inconvenient to have our guests climb over a tangle of belts.

The harnesses can be obtained from Airtex Products, Lower Morrisville Road, Fallsington, PA 19054. (Phone 215 295 4115)

Incidentally, there is probably no reason (other than aesthetics) why the shoulder harness cannot be used with four people in the plane. To accomplish this without undue maneuvering by the rear seat passengers, I would disconnect the harnesses from the rear seat belts, seat the passengers, and then reconnect. I suggest, however, that the rear seat belts (and their connecting cables/attachments) be replaced with heavier duty units or otherwise strengthened if this installation is expected to be fully effective when the rear seats are occupied.



Seat Modifications

A member wrote asking me how I converted my 1959 Comanche from the rear bench seat arrangement to rear individual seats. He was under the impression that I might have had to get an STC or have approved drawings or an approved kit or something else equally involved (and costly). Not so! My brother and I did the simple and small amount of work. We had an A & I inspect it and make up a form 337 and then took it to our local GADO for a visual inspection, open and closed. That was that! All of a sudden we had a modern looking interior.

Insulation

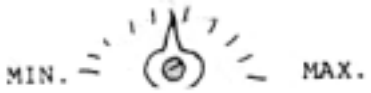
A type of sound insulation that is available in almost any thickness and approved by FAA is Uniroyal Ensolite Type FRC. The above products are manufactured by Uniroyal Company. For information call Thrust Industries, Inc, R.R. #2 Box 105B, Haubstadt, IN 47639,Phone: 812-768-6730 or 800-467-6730.

Cabin Heater Temperature Sensor Adjustment

I too had a persistent heat problem on my '69C Comanche and again on my current 70CR. Both times, a simple (15 min.) adjustment to the temperature sensor unit solved the problem. The adjustment will require an Allen wrench. The procedure is to locate the temperature unit on the heater (move the temp. control in the cabin at the max. heat setting and see if the sensor is moving all the way to the max. position. It is difficult to see but will have a small pointer and look something like this:

Loosen the Allen set screw and move the pointer to the max. position and retighten the Allen screw. On some Stewart Warner heaters the arm with the set screw is made of plastic and cracks easily, making any adjustment impossible. This should be replaced with a cast aluminum part if you can find one (mine came directly from an Aerostar 601A).

Anyway, try this before you spend a lot of money.



Twin Cabin Heat

I am happy to report that my cold cabin problem in my 1966 Twin Comanche has been corrected to the point that instead of 35° F OAT being the minimum temperature a person could tolerate in the cabin with a coat on; now passengers can be comfortable down to 15° F OAT with the heater set on high.

My solution was to wrap the air ducts from the heater to the fire wall with insulation. In addition, be sure the heater control knob in the nose is turned to max output, insulate the cabin completely and stop any air leaks. The insulation from heat loss and noise in my aircraft was done at Horseshoe Falls Airport, TX. My Comanche is a Miller Robertson PA−30 and therefore noise reduction was important to me. The noise reduction was about 30%. It probably is around 85−95 dBA now and must have been well over 100 previously. The cost of the insulation to cold and noise was approximately $1,500.

Insulation

I have been chasing noise and air leaks with some success. I used silicone rubber liberally around the spar where it passes through the fuselage and likewise around the gear pushpull cables at their entry points, the original sponge rubber air seal having long since disappeared. I also fashioned some seals of inner−tube rubber to go around the aileron and flap cables and glued them to the fuselage with 3M Weatherstrip Cement.

Results were good. I now have considerably less draft around the ends of the rear seat back and around the feet of backseat riders. The door problems have been solved, but only temporarily; I can always solve it, but only temporarily. The recurring problem is Piper's quarter−round sealing material, which is water−absorbent except for a thin outer skin. After about six months, the outer skin has breaks, the inner sponge is wet, and below freezing weather solidifies the seal and makes the door almost impossible to close. I am aware of the existence of the inflatable door seal, but that seems like a lot of complexity for such a simple function.

Insulation

I've read several letters / instructions in the Flyer concerning sound db reduction procedures for our planes. We recently installed Ensolite insulation material up to 1" thick in the belly, sides, doors and rear bulkhead / shelf; we installed a pneumatic cabin door seal and 1/4" thick windows and windshield, all with negligible db reduction. Many, many hours of work which we would not undertake again for slight reduction realized.

ED: In scientific research and in Comanche wisdom, even negative results are good to know.

Insulation

Those of you who are wanting to insulate and sound proof, Piper is using an item in current production aircraft. It is Part No. 187−967 and is sold by the yard in 38 in. widths.

Cabin Removable Floors

Removable floorboards are a modification well worth the one time expense. Gear and flap system repairs since the installation have totally justified the costs. It also makes possible routing or rerouting all the wiring under the floor, where it belongs, instead of being behind the sidewalls..

Cabin Heat

I have been cold weather flying in the Midwest for two years and unknowingly had my back seat passengers freezing. It has been toasty warm in the first class section while my passengers riding in the rear seats, have had cold bottoms. Too proud to complain, they endured it. It was not until a few weeks ago that my seventy−five year young father−in−law told me that the back seat area temperature was frigid. I then realized that something had to be done.

My best friend (wife) spent the following afternoon riding in the back seat of the plane while I climbed to a cool altitude and levelled off. She inspected every inch of the rear cabin seeking out cold drafts. To our astonishment, the rear seat was like a wind tunnel. What to do?

I spent several days reading of other peoples solutions to a cold rear while my co-pilot (wife) gathered up a length of vinyl upholstery fabric, a sewing machine, double edged carpet tape and headed for the airport.

(**ED**: Carpeting, upholstery fabric, and headliner material installed in an aircraft must be made of an FAA approved material and pass certain burn testing criteria. Having your seats re-upholstered with unapproved materials at the local auto trim shop is not recommended.)
We had the pleasant surprise to find that the rear seat just snapped out of two grooves in which it rested. (Eat your heart out, all you other brand aircraft owners that have to remove many bolts that are almost physically impossible to reach.)

With the back seat out I looked down and found that there was no floor! I was looking at the belly of the airplane along with a collection of pulleys, wires, gas lines, dirt, etc. After a general cleanup of the area, my wife, who is a combined sheet metal layout worker and seamstress, proceeded to hum, sigh, and slice away at the vinyl till it covered over the hole in the floor and secured it without using tape, adhesive, or Velcro. (Access to the hole is now possible without damaging the cover).

Her solution was to cut the vinyl large enough to slip about six inches under leading edge of the cargo bin carpet. The front edge ran forward up over the spar, then down to the rear edge of the cabin floor slipping under the cabin carpet. We loosened the side wall panels enough to slip the vinyl about four inches up behind, then tightened the screws for as near air tight as you can get.
While mother was sealing the cargo bin bulkhead with duct tape, I replaced the foam rubber weather stripping on the cargo bin door. Both were done as recommended in Comanche Tips. With the back once more in place, we were ready for a test flight.

Back at altitude in temperatures near freezing, my chief inspector (wife) crawled over every inch of the back and found only one place near the floor behind the pilot's seat where the flame of a candle might flicker a little.

Thanks to Comanche Tips, we non−mechanics were led to a point from which we could trouble shoot our problem. Voila, we are back in business and now might find a rear seat riding friend that will accept a second ride with us when the cold wind blows.

Window Installation

When I put new windows in, I ordered 3/16" Plexiglass for the side windows and then routered the edges so as to let the glass fit out flush with the A/C skin, thus giving a smooth surface which resulted in less air noise.

When I did the side windows, I put in a Cherokee type storm window in the left hand front in place of the old metal framed one.

Insulation

During the question and answer session at the ICS annual meeting in Everett, WA, I talked about sound proofing my Comanche 250, CF−CIO using "EAR" energy absorbing material and leaded vinyl.
There are many things one can do to sound proof one's Comanche. Let me touch on a few: the firewall area, the cabin, the rear bulkhead, the side vent window, the main door, the luggage compartment door and the windows. These are the main areas to address, but not necessarily in that order.

My wife, Irene, and I started on the cabin area first. We stripped out the interior down to the outer skin. We did not remove the floor for two reasons; one was the number of rivets to contend with and secondly the cables under the floor would create a potential hazard should a piece of insulation come loose. We put 1/2 inch "EAR" − a very dense foam type of energy absorbing material produced by the "EAR" Corporation − throughout the cabin area. We fitted it into every nook and cranny. To hold it in place we used a 3M adhesive designated "EC847". It is a rubber based adhesive and remains pliable thus allowing it to flex with the expansion and contraction of the metal skin. It is very easy to work with and stands up to heat and cold as well as any adhesive I've ever come across. It's not a contact cement but rather an adhesive. It was recommended by the 3M technical rep. in my area. To complete the cabin area we put "EAR" under the carpet, thus covering the floor.

A great deal of the cabin noise comes from the rear bulkhead (the rear of the luggage compartment). We covered the entire area, including the access panel. We put the insulation on the rear side. We also did the luggage compartment door. Irene fit the "EAR", which is very flexible, through the four holes in the frame of the door. We removed the aluminum panel opposite the luggage door and put "EAR" there. We have carpet on the floor of our luggage compartment floor so we put insulation under it.

When we removed the rear seat we found many interesting things. The cavern below it was open to the elements through a piece of sacking covering the opening to the main gear wells. We filled them in with "EAR" and then put a large piece over the opening under the seat. It serves two functions − cuts the noise and stops the draft. We also put "EAR" in the main cabin door which had been devoid of any type of insulation previously. In short, we filled every possible spot with "EAR" and then we went for a 2 hour flight. The sound level was noticeably reduced especially with respect to the lack of echo effect. The sound was muffled. That part of the project was judged a success; so on to the next step.

The firewall and the nose wheel presented a bit of a challenge. There was a lot of piecing and fitting of curves. We used "leaded vinyl" on the firewall and the nose wheel well. We put the leaded vinyl on the engine side, again using 3M's EC847 adhesive. The leaded vinyl cuts out 26 decibels of sound even though it is only 1/8 inch thick.

Now most of you will wonder about the weight. The "EAR" weighs 4.6 ounces per square foot. Total weight used was 11 pounds. The "leaded vinyl" weighs 1 pound per square foot and we used 12.86 pounds. We used a balance scale to weigh each piece as we put it on. A total of 23.86 pounds was added to the airplane but the sound level was tremendously reduced. The aircraft was now so quiet we could hear any window leaks distinctly.

Now we tackled the task of refitting and resealing the cabin and luggage doors. The luggage door was resealed and tested by having a friend pass a light around the door while I sat inside the luggage compartment and looked for light leaks. We spent considerable time adjusting the thin metal flashing on the door frame to make it match up with the weatherstripping on the door. This is a very important point on both the luggage and main cabin doors.

We did the same thing on the main door but we used a different technique. First we removed all the old weatherstripping and then we adjusted the door to achieve the closest possible fit. Then we used a short 2 inch piece of self adhesive weatherstrip; actually we used different thicknesses: 1/4 inch, 5/16th and 3/8th inch. Then, having adjusted the door and

having adjusted the thin metal flashing so that it is sticking straight out toward the door we then put a piece (the 2 inch piece) of weatherstrip on the door and closed ft. When the door is opened the indentation made by the flashing should be visible. If it isn't, go to the next thickest piece of weatherstrip until you can see an indentation on the weatherstrip. After you have done this all the way around the door, you know what thickness weatherstrip to use and where. We then did the light test by passing the light around the outside of the door while looking for any light leaks.

Lastly we resealed the vent window. It had one little leak and we could sure hear it, thus it got all new weatherstripping which cured the noise.

The results are incredible; a number of pilots have told me that it is the quietest light aircraft they have ever been in. It is much quieter than my friend's 1976 Bonanza. We can sit and carry on a conversation in normal tones and all 4 people can hear.

Would I recommend it to others? You bet I would. It took nearly 5 full days to do the full job and cost less than $250. The next step is to put in a thick one piece windshield and double side windows. These will cut the prop noise substantially.

Insulation

This is in response to your Flyer reference to soundproofing your bird. What follows is a summary of my research into this area. Note that I have not yet had a chance to put this to practical use; however, this information might get you thinking, and if we put it in the Flyer it will surely be added to and improved.

First I call your attention to the frequency range and power of the noise we deal with in light airplanes. Our greatest noise generators are the engine exhausts, the prop beat and the wind 'jet' noise, in that order. The prop and exhaust generate very high-power noise in the 66 to 130 Hertz range, while the air leaks (and cooling vents) generate noise in the 100 to 2000 Hertz range. It is one of the sad but true laws of physics that the higher frequencies are much easier to attenuate with sound absorbing materials. The measurements made by some of our Comanche drivers document cabin noise near the center of the cabin to be in the order of 90 to 100 db (db is a measure of the relative power of the noise). For comparison, measurement of common household appliances yield readings of: food blender − 90 db, 6" skill saw − 100 db, power lawn mower − 98 db, and electric shaver − 85 db. Finally, 120 db is the threshold of pain, and we are cautioned not to subject ourselves to high energy noise because of hearing loss that can result, to say nothing of the fatigue which sets in as a result of operating in a high noise environment. These seem like pretty good reasons to soundproof our birds: right now I use noise rejecting earphone headsets.

After rereading articles of other Comanche flyers, I started trying to find some of the soundproofing materials mentioned. This led me to the 3M Company, Uniroyal, and EAR corp. (a branch of Cabot corp.) But most importantly I was directed to a "Sound Engineer" for one of the above companies.

The engineer was very helpful, had a world of experience with larger airplanes, and had some suggestions for us on how to attack our noise problem. I am withholding his name as I am sure we have among our ranks someone equally knowledgeable who would have a vested interest in helping out. Here follows the engineer's suggestions: First he advised going after the exhaust noise. He said to investigate utilizing the muffler from the later model airplanes which have the same engine as your Comanche. These later models have had more attention paid to noise reduction; also we might use devices to diffuse the sharp leading edge of the exhaust pulse, like tuned exhausts and perforated exhaust extensions.

The next area he suggested attacking was the wind noise. He said to use one of the silicon weather sealants (comes in tubes from your auto parts store) to seal every possible air leak. This may require taking your bird up and using stethoscope to locate each leak; mark the areas with chalk or on a pencilled diagram. There have been several articles in the "Tip's Special" on rerigging the cabin door and the baggage compartment door to insure a good seal including plans for installing Cherokee door latches. An idea (to use as a last resort) was to spread the above mentioned silicon sealant around a poorly fitting window or door seal, cover the sealant with waxed paper and you will have perfect seal.

With regard to double paned side windows vs. thicker single panes, the engineer said that we might see a 1 1/2 db improvement in noise at the resonant frequency of the total mass of the window, but little improvement at the other frequencies impingent on the window. However, he felt that the double pane was better, if the air gap between panes is

maintained (the panes don't touch), and if the air leaks are controlled. He points out that the airliners all use multiple panes in the side windows. We should also note that we are installing storm windows on our homes now to help keep our bodies toasty: a double pane airplane window serves some of that purpose. Also, there is a slight weight penalty with a single pane. Of course double panes are a pain (sic) when you want to take pictures out of your side windows, distortion and all.

Now we get to his comments regarding the cabin liner. There are several materials available to line your cabin area to reduce the noise. The principle function of this material is to damp the vibration of flat metal sheets, the secondary function is to absorb and dissipate the sound energy. The previously mentioned high energy noise will tend to cause the wing panels and body panels to vibrate, just like a bass or snare drum head, with us inside the drum. We can use bulkheads to reduce the size of the flat plate area and thereby change the resonant frequency, or we can apply some material to the panel to damp the oscillations. We, of course, look to the latter. We could apply some material to every square inch of the interior of the airplane and thereby damp all the panels, but at a considerable weight penalty. Therefore we might think about using the damping material as bulkheads. In other words, put strips of the damping material on large flat plate areas to change the resonant frequency of the plate. This is recommended rather than a wholesale covering of the inside of the airplane with damping material. You will find in the "Tips" that several fellows have covered the back of the baggage compartment with good results but they treated the symptom and not the cause; there are large untreated flat plate areas in the tailcone, to say nothing of the tuning effect of the tailcone volume. The tailcone on an airplane is much like the speaker on the old Gramophone; remember the RCA advertisement with the dog listening to his master's voice? This same effect is noted somewhat from the wing areas. Both these sources are vented right into the cabin area, so soundproofing the outlet (the wing root and baggage compartment) should help some, but reducing the size of the flat plate area in the "speaker cone" should help more so by changing the resonant frequency to a higher frequency which we can more effectively handle with the soundproofing in the baggage area. Remember, higher frequency noise is more easily attenuated.

After all the above comes the type of sound proofing or damping material. I contacted the three companies mentioned at the first of this piece and came away with a host of different ideas, prices, availabilities, weights per cubic foot, etc. This all distilled down to a single material, carried by a single rep (in my area), this rep works with the light plane manufacturers in Wichita, and is quite knowledgeable. The rep is Dave McArthur with Buckley Industries, 1850 E. 53rd St. North, Wichita, KS 67214. Phone (800) 835−2779. He recommends Uniroyal's "Ensolite LSC". This material is a flexible, closed cell polyfoam. It is specifically designed for aircraft installations and is certified for use therein. The LSC stands for Low Smoke Content which is very important. The problem with most cabin liner material is the toxic fumes emitted when it burns. You may control the fire, but the fumes can get you before you can land. LSC is supposed to be the least toxic material available for the soundproofing problem. By the way, toxic fumes are a problem with all the synthetic materials in your airplane. Ensolite LSC weighs 6 pounds per cubic foot or about 4 oz. per square foot in 1/2 inch thickness. You can buy it in any thickness; I have decided on 1/2 inch thickness which Dave will sell for $1.16 per square foot. He will cut the roll for us. The roll is 58 inches wide and 25 yards long, and we don't need it all. Dave recommends 3M adhesive #3M77N. I figure I will need about 140 square feet (maybe 125 depending on whether I can get to all areas) for a cost of around $250 for materials and adhesive. I plan on a weight of 31 pounds less the weight of the old fiberglass materials I remove from the plane.

For your reference, similar materials from 3M cost $6.65 per square foot in 1/2 inch thickness (adhesive was already applied), and EAR wanted $165 for theirs without adhesive.

I fly a twin Comanche and have been talking to a friend regarding his Q−Tipped props. He reports a reduction in cabin noise as a result of the Q−Tips, but his estimates are subjective since he has not (to my knowledge) taken any measurement before and after the installation. Single engine Comanche drivers might consider Q−Tips for the noise problem also.

This brings me to my final thoughts. It would really be interesting to obtain access to a meter to record the frequency and power of the cabin noise in an unmodified Comanche and then go step−by−step installing various sound proofing items. At each step measure the improvement in the cabin environment. Then we could evaluate each step relative to the cost and effort of the installation. With regard to measurements, remember that the location of the meter's sensor and even the number of people in the cabin will affect the readings. The extra bodies will absorb some of the energy and the sensor should be at exactly the same location for each reading. Also, the readings should be made at climb power, high cruise, and normal cruise. Various power settings and aircraft speed obviously change the power and frequency of the noise

generated. My plans are to do just such a study; however, the press of business has not allowed me the time to even consider it. My airplane needs a new interior and I couldn't think of a better time to start such a test program than when the interior is to be replaced. You know, even the selection of materials for your upholstery can reduce the cabin noise by absorption, Naugahyde being more reflective than corduroy.

Insulation and Soundproofing

We are manufacturer's representatives and distributors for several lines of equipment and have represented EAR for approximately five years. This letter is not meant to be an advertisement, but a means to save time and expense for those interested in a quieter bird.

EAR C−3002−7−50 is an off-white rather dense foam 1/2" thick with a weight of 7 lbs. per cubic foot. A standard pack is four feet wide by twenty feet long and should be enough to treat the fuselage of your Comanche. We can offer the standard pack to ICS members for $131.55 per roll, FOB the Factory. Mary and I haven't treated 888DM yet but when we do, I am thinking seriously of using EAR C−3002−7−25 which is 1/4" thick and comes in a four-foot by forty-foot roll. This should be enough for two Comanches and from our experience in noise control, I feel the 1/4" will do an adequate job and be much easier to install under the fuselage carpet. We can offer the 1/4" at $142.65 per roll, FOB the Factory.

I trust the above will save those interested some time and money. We don't have the names of other representatives or distributors, but will list here the factory address for anyone preferring to contact the factory rather than us. E.A.R., Division Cabot Corporation, 7911 Zionsville Rd., Indianapolis, IN 46268, Telephone No.: (877) EAR-IDEA (327-4332), .

Twin JANITROL Heater

The problem involved my Janitrol heater. I have had a problem with this unit since last fall, when one day on a trip from Montreal to Toronto, for no apparent reason the heater stopped in while in the clouds and rime ice with the outside air temp −15C. Jackets and gloves were the order of the day.

In Toronto I had the heater looked at and it worked; consequently, we did not locate the problem. It worked for some time after that. After the lay−up the heater would not work. An engineer changed the fuel inlet valve and solenoid. $626.50 was the cost. It worked until our return trip. Between Winnipeg and Thunder Bay, no more heat. This time in we were in the clouds and −20C. We landed at Thunder Bay, and had an engineer check the unit. Guess what, it worked on the ground. We are off again into the Cold Blue Yonder. 30 minutes out of Thunder Bay everything goes cold again. This time we made it to the Canadian Sault and were successful in having an engineer look at the unit. As soon as we landed the heat started out of the unit. I was determined that we stay at the Sault until we find the problem. Enough is enough. After a four hour delay they found the problem to be the firewall fuel solenoid to be corroded and not functioning properly. They put in a new solenoid and we were cozy all the way home. I spent nearly $1,000 on this heater trying to find the problem. For the benefit of any one else who may encounter this problem with their Janitrol, start by verifying the firewall fuel control solenoid is operative.

Cabin Door Hinge Modification

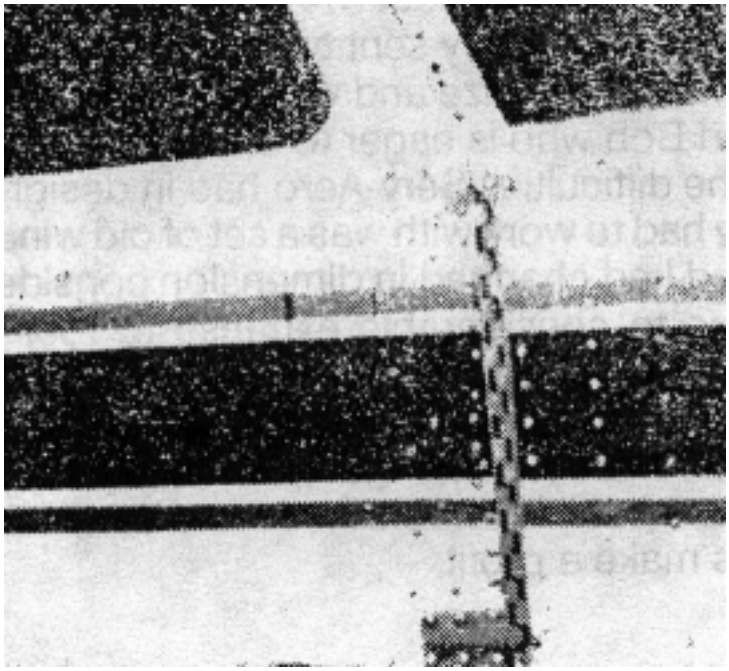
Enclosed is a photo of my new permanent fix for the infamous Piper cabin door. During the past 12 years I think I have tried everything I ever heard of to fix the door, ranging from shims under the striker plate to the Cherokee upper door latch. Nothing ever worked as well as I thought it should, although the upper door latch came close, but in turbulence the bottom of the door would come ajar. As my plane works 5 days a week, it became apparent that a better fix had to be devised. It was a short trip to Lancaster, TX, where I take all my aircraft problems. The following is a list of parts needed to make my modification:

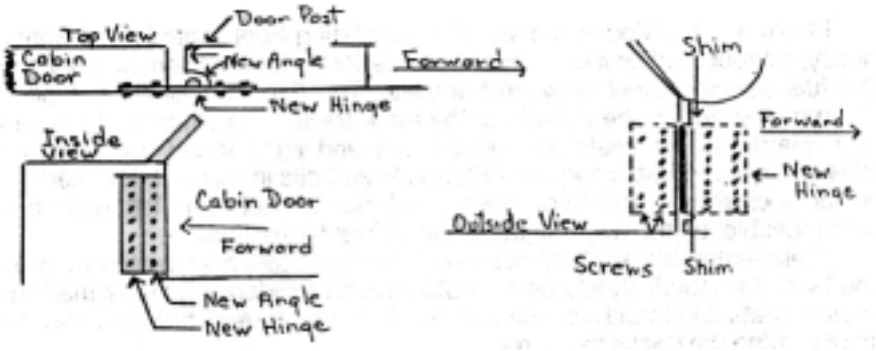
1. 310061−000 Hinge.
2. CR2249−4 Rivets
3. AN470AD4−5 Rivets
4. 0.032 aluminum angle

After looking into all sorts of possibilities, we elected to use the Mooney door hinge, and re−engineer the door structure and the cabin attach structure to take the new hinge.

As you can see from the photo, the installation is neat and clean, and as an added bonus the wind noise is minimal. We now have another 337 in the book.

First we removed existing cabin door hinge and modified the cabin door post to accept new hinge made by Mooney Aircraft Co. All work accomplished per AC43.13−1A chapter 2, section 3. The weight change was negligible.





Servo−AERO Window Moldings

I have completed the installation of Serv−Aero's window moldings in 1964 '250 Comanche. They are quite an improvement over the old moldings.

The window moldings consist of four pieces. I probably received one of the first sets that Serv−Aero produced. Of that set, only two of the moldings were of the correct size. The door window molding was about a half an inch too small in length and the left side rear window was about 1/4 inch too short in height. A call to Serv−Aero remedied the problem. They sent

two new moldings free of charge. The two new moldings were the correct size and were easily installed. It was a pleasure to deal with Serv−Aero and Bob who is eager to stand behind his product.

I can understand the difficulties Serv−Aero had in designing the molds for the window moldings. All they had to work with was a set of old window moldings. I know mine were dried, brittle and had changed in dimension considerably over the years.

Serv−Aero has gone to considerable expense to tool up and manufacture these moldings. They are of much better quality than the originals. They are made out of fiberglass and should outlast the life of our birds. I hope that all of you that responded to the survey for window moldings order them from Serv−Aero, as it would be a shame to have gone to all of this trouble for us and then not to be able to recover his investment, much less make a profit.

Installing SENECA Seats in a Comanche

I have a '69 C Model twin and the articulating front seats from a Seneca fit perfectly, almost. The plane has tip tank selector switches on the front corners of the fuel selector panel between the seats. However, the Seneca seats use large, thick aluminum washers on the outside of the track roller bolts which foul the tip tank switch guards in my plane as the seats are moved fore and aft. I found no problem with eliminating these washers and using Phillips head bolts in place of hex heads to gain even more clearance. I did not change the rollers. The right and left seats are not interchangeable as the frames are offset to the outside.

I believe the fore and aft position of the PA−24 (260) seat tracks are the same as the Twin. Incidentally, I have tried several Cherokee seats and found that most fit, but, because of track position, not all work without moving the tracks to the rear.

I bought a complete set of six chairs from an '82 Seneca which are the same as those from a Lance or Saratoga. Those I purchased are club seats (seats 3 and 4 face aft and don't tilt). The Seneca's arm rests are fixed to the cabin walls; (seats 3 and 4 are on tracks with their arm rests on the chair). Here is how I adapted the Seneca’s seats to my Comanche:

Take the seat upholstery off of seats No. 3 and 4 in the Comanche. Weld two sleeves to the No. 3 chair to mount the nice wide Seneca center arm rest. Put the Seneca 5 and 6 seats’ upholstery on the Comanche seat frames. Carefully peel the nylon netting from the Seneca seat frames. Netting, foam padding and fabric come off in one piece. Do not separate. Wrap netting around the Comanche frame tubes and glue with contact cement. Hog ring pliers and rings from an auto trim shop are needed to replace upholstery.

Unscrew the Seneca chair back rear cover; free fabric from the outside vertical frame and drill No. 10 hole (note angle of armrest) to accept Comanche armrest rear bolt. Use a 1/2" x No. 10 sleeve under fabric for clearance. Glue fabric back. Push bolt through fabric and sleeve to mount armrest as on Comanche seat back. Replace back cover. Mount Seneca backs to Comanche seats (they fit).

I now have four matching chairs with headrests and arm rests. The front seats raise, lower and tilt: The rear tilt and move fore and aft. I can reinstall my stock 5 and 6 Comanche seats if I want to. There are no airframe modifications at all and weights are virtually the same. I made a logbook entry. I also have two spare sets of upholstery if I need them.

If the Comanche in question does not have tracks for the 3 and 4 seats, I suggest that the Seneca floor panel under the rear chairs be bought with the seats. The floor is then installed in the Comanche with the Seneca seat snap−ins intact. You may wish to cut down the bases to lower the overall height.

Ed Note: After speaking with a friend with the local GADO, it is our understanding that this modification would require a Form 337 and a field approval to be legal. While many parts may “fit” and seem to be interchangeable between dissimilar airplanes, it is not always acceptable to make such exchanges. We would recommend that you check with your local GADO before purchasing items from another type aircraft unless it is a common and established modification such as the ram’s horn yokes from another Piper procuct. But even that will require a 337 and field approval.

Cabin Door Seal

My airplane now has a cabin door that closes and seals like a dream. There is no slamming, yanking, etc. to close the door. The first step to this end was purchasing a Webco upper door latch kit. I feel this is a must! I made some minor modifications to the installation (like a grommet around the handle shaft for an excellent water seal) but, with careful installation, this is a beauty! NEXT, the door was reinforced per Piper bulletin and foamed inside for rigidity and noise factors. Then the original Piper "swinging block" latch was changed to a deadbolt type similar to later latches but using two square sections of chrome moly tube that are sized so one slides inside the other with the large section also making the "strike" in the fuselage. This took hours of engineering to keep the original handle configuration but the bottom line is, the door now closes and is pinned in place with only 0.009 clearance and it does this with about a 6 ounce pull on the arm rest.

The sealing was accomplished by first using a filler (like "Bondo") to make a "shelf" out of the original sheet metal "tab" that Piper had for sealing purposes.

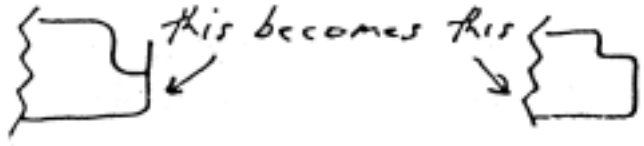
The door edge itself was then smoothed with a little filler after the rivets that protrude to the inside were ground down almost flush. Remember, these rivets are there only to hold the door sections in place for spot welding and most of the shank can be ground down to help in sealing.

(**ED**: We have some strong reservations about grinding down any rivets in an aircraft. We think we would like to see something in writing from Piper or the FAA that these rivets are unnecessary before we got the grinder out. Their opinion may differ dramatically from yours.)

Now, various rubber sections can be used to make a seal. A "P" section of the right size will lie on the shelf and be compressed by the now flat door edge.

Tab of "P" strip is glued or whatever to fuselage to hold "bulb" in place. Or a smaller foam "P" strip can be laid on the shelf with a rectangular foam section on the door edge to compress on the "P" strip. These are available at most building supply stores in various sizes, are self−adhesive, take only minutes to install and cost less than two gallons of AVGAS!

But the secret is the time spent to fill and smooth the mating surfaces! Attention to detail and dimension here pays off handsomely later.



Cabin Door Handle Replacement

As happens every now and then, the handle on my 1964 PA−30 broke at the root one fine cold day recently. It had been repaired once before, so I determined to do something about the problem.

Comanche Flyers should be advised that GM Part #7743519 (1973 to 1978 Chevrolet Van, front door, rear lock) is a beefy and good looking substitute for the original Piper part. Together with a plastic washer to protect your upholstery a shiny new handle set me back $11.89!

BAGGAGE DOOR WATER LEAK
I recently contacted another member who wrote about a rain leak problem in rear baggage door. I solved the same problem with a rain gutter over the hinge (like standard Seneca rear door) and that did the trick.

Cabin Door Upper Latch Modification

I recently decided to give my Comanche cabin door the full treatment. Several attempts with the usual rubber stripping had failed.

I started with self−installation of a Bob Fields inflatable door seal. This was fairly straight forward except I had to aggressively pound out the fuselage doorjamb with a rubber hammer in order to achieve enough room for the door to close with the uninflated door seal.

On my first test flight, the door popped open at the top forward pin catch. This catch is significantly worn at the fuselage plate on my plane but I do not think the seal could be firmly inflated with this type of upper latch. Consequently, phase two was initiated. I ordered from a salvage yard a Cherokee upper door latch (including the fuselage component) for $65. Installation for this latch has been described in prior "tips." Some points I thought important were:

1. Because the Cherokee door is thicker that the Comanche, the door latch attachment plate with its large depression cannot be used. I used the stock plate as a pattern to make a flat plate from aluminum. The latch mechanism is then the exact thickness for the door.
2. The latch hook was straightened and the latch mechanism was shimmed by washers to give it proper direction to mate with the fuselage receiving loop.
3. The fuselage receiving loop with its mounting bracket was then riveted to the door jamb after pulling away enough headliner for access. No need to tear it. Mounting the fuselage component in the correct position is very important so look at the relative positions on a stock Piper door with this latch (many models have the same latch). I mounted the door mechanism first and then attached the fuselage component in the proper position. Don't put the door component too far forward or it will interfere with easy placement of the fuselage receiving loop.
4. Finally, I used a prior tip and applied Bondo to the sides of the fuselage door jamb (except the bottom) to give it a smooth finish that the inflatable seal mates against. Don't forget to experiment with the eccentric cams in the door hinges to obtain a perfect fit.
5. I now have a perfect Comanche door impervious to wind or water. It would have surely been easier to buy 4 headsets with a quality intercom; then nobody would have cared how much wind noise there was, except me.

Baggage Compartment Water Leaks

For years, whenever we flew in rain, the cabin would leak above the baggage compartment. We sealed everything in sight (antennas, rotating beacon, windows) and nothing worked. Finally, we forced sealant into the lap joint just forward of the rotating beacon and the problem was solved. I am still amazed at the torrent of water which would come through the joint which faces aft.

Cabin Heat

Here are a few tips for Comanche flyers.
Leaky baggage compartment doors: Many mechanics will put on the weather stripping and follow the rounded contours of the inner door stamping leaving a 1 or 2 inch gap for water to come in. The seal must go straight out and make a right angle at the corners. The seals can be checked in bright daylight by having someone you trust lock you in the compartment to look for light around the door edges.

Cold back seats may be eliminated in earlier models by removing the cabin air exhaust tube that goes from the hat shelf to the floor of the baggage compartment. This allows the baggage compartment to be heated before the air leaves the plane. Remember to install a screen over the exhaust hole in the compartment floor.

Cabin Door Seal

We were always having trouble with the main cabin door seal (you might say, "What's new?")

Without any seal in place the door was a good fit and flush and the eccentric cams could be used with good effect. However, with a new seal in place, it would not close properly at the top, even with manipulations of the eccentrics and to

close the top latch required both strength and perseverance. As the seal settled in, it became relatively less difficult, but still not acceptable. I never tried the hollow section seal or the inflatable one.

What eventually worked very well was to take a genuine Piper seal and trim (sacrilege, I know), 3/32" off the face which sticks to the outer face of the recess in the door. The door closes flush, the top latch engages properly, and the seal is good. It took a couple of weeks to settle in. To cut the slice off the seal, find a flat surface with a recess about 1/2" deep, press the rubber into the recess then use a new razor or scalpel blade and keep it wet while you slice through the rubber in small increments so as to not distort the cut. 3M contact adhesive works very well.

Twin Heater Backfire

I was also interested in the letter about the heater problem, particularly the backfiring. I had a similar problem and again after a great deal of effort, discovered that the cause of the backfiring was a dirty injector nozzle located at the front end of the heater. It is no small task to remove this nozzle and care must be taken when loosening the fixtures as they are made of a very light metal and are subject to being bent in the event that a large wrench is applied to loosen the couplings.

In any event, there was a small particle in the nozzle which caused the nozzle to create a drip of fuel. When this happened, the heater backfired, shooting flame out the exhaust port which was readily visible, reflecting off the engine nacelle. The condition worsened until the problem was corrected. I also had the same problems at heater shut down. However, since the nozzle has been cleaned, I have had no further difficulty during the past 12 months. The backfiring may also be heard while taxiing. You will hear a popping noise. Also, my ignitor was black with carbon, etc.

Window Molding Repairs

In 1974, right after purchasing my Comanche, I replaced the original tinted double-paned side windows with quarter inch tinted windows (from Great Lakes Aero), which includes a modern type of storm window for the pilot, sans metal frame. The curtains, curtain rods, window moldings and the retaining frame are all removed and the windows are then reinstalled per instructions from Great Lakes Aero.

The window moldings were the one thing in my airplane that really dated it. Many of the screw holes were wallowed out and had been patched with small pieces of aluminum like big washers. There were multiple cracks as well as areas of buckling and discoloration. In short, they looked bad.

Mr. Ed Wilkinson in Tyler had just completed rebuilding a Cessna 310 for his part 135 operation and he had redone his moldings and gave me some excellent suggestions.

I have completed the job and they truly look factory new. The following is a description of the process that I used, including the mistakes I made:

To begin, remove the curtains, curtain rods, and the moldings. If windows are being changed, the retaining frames are also removed. Save or replace the 6−32 long reach screws for the moldings. Clean the moldings with a wax and grease remover; I used Acryl−Clean by Ditzler. It cleans wax, Armor All, etc., without attacking the ABS plastic.

Sand down the back side of the molding with #80 grit (very coarse) sandpaper. This prepares the surface for fiberglassing. Correct any buckling by cutting small "V" shaped cuts in the ABS. Apply two layers of bi−directional cloth behind each area of defect, at the corners of each of the window moldings, and at the curved corners of each of the "window" areas to provide additional strength and prevent chipping. Initially, I used flexible parts repair kit to fill in the defects. This material is normally used to repair external soft parts on cars. It did not give a good clean bond with the ABS plastic and was removed. I next tried Bondo, which works fine and could be used; however, the fiberglass is a stronger repair and allows for more flexing without cracking. Do not apply too many layers of glass. The edge of the molding must fit into the groove of the retaining frame. After applying the glass to the back side of the molding, fill in the defects with glass and resin mixture and finish the surface with resin for a smooth finish. After curing, sand and contour the glass work. Do not be afraid of removing part of the crinkle like finish of the ABS at the edges of the defects that are being repaired. Basically, use standard auto body technique to prepare these areas.

A trip to my local auto body & paint shop for advice and supplies was next. A product called Vinyl Texture Paint by DuPont was recommended. Clear plastic primer paint and color matched lacquer were purchased. I took a small piece of trim with me to the paint shop and had them color match it with lacquer.

Re-clean the moldings including the hat rack. The finished product should be the same through the interior of the airplane. Prime with the clear plastic primer (I used an RM product).

I found that a medium pressure (40 psi) with a moderate distance from the surface (approximately one foot) gave me the desired texture. I applied one good coat and then lightly sanded the entire surface with 320 grit sandpaper to even out the pattern. Then I applied two more coats of the texture paint. With experience, I believe this entire process could be done with one coat of the textured vinyl paint. The second and third coats, however, really added to the quality of the finish, particularly at the corners and curved areas of the window moldings, as well as in the deep recessed areas of the hat rack. The recessed areas of the hat rack required more sanding because I initially applied too much of the textured paint and it was too coarse compared to the other areas.

I would recommend that in preparation for this project, one should get a good piece of cardboard and shoot some of the clear primer on it and then shoot the textured vinyl paint on the cardboard at different pressures and distances to gauge the pattern desired.

After the final coat of textured paint, light sanding was done to any overhanging edges of the paint or any rough areas, and then a coat of clear primer was applied. The color coat of lacquer was then applied. Interestingly, the color of the Piper ABS plastic and the textured vinyl paint was very similar. This texture paint is sold in two basic colors, black and white. The white is really an off−white and this is the color you want to use.

The lacquer will dry to a dull non−gloss finish, which is desired on these moldings. If one wanted a gloss finish, you could use an acrylic enamel for the final color finish. However, I think this would be ill advised. There is a Baron locally that had a complete interior job done that was really well done and the molding was painted to match the new interior, again well done, but done in a gloss finish, which I think tends to cheapen the finished look. It is too gaudy for a fine aircraft interior. When painting the moldings, line up the screws and other small metallic trim items and paint them to match. If you change windows at this time, clean and repaint the window retaining frames.

Reinstall in reverse order. The screw holes that have been repaired with fiberglass will have to be carefully redrilled using a strap duplicator. I made several one−time−use type hole duplicators by cutting strips of thin semi-rigid plastic about five to six inches in length and two inches in width. Tape two pieces together at one end (the tape functions like a small hinge). Fold together. Drill a hole through the other end. Unfold your one-time hole duplicator and position one end over an appropriate screw hole and screw it in with a short 6−32 screw. Then position the molding in place and fold the other piece of the duplicator onto the molding and drill down to the screw head. I would recommend drilling a small pilot hole, double checking the hole position with an awl or ice pick, etc, and then removing the molding and drilling the hole to 6−32 screw size. Final installation can then be accomplished.

Summary:

Project Description:
Rework the moldings inside a Comanche. Supplies Needed:
1. Wax−grease remover (Acryl−Clean by Ditzler).
2. Sandpaper, #80 & #320 grit.
3. Fiberglass materials with resin and catalyst, etc.
4. Clear plastic primer paint, 1 quart (RM product).
5. Textured Vinyl Paint, one quart (I used DuPont's product, others are available).
6. Color matched lacquer paint and thinner.

Tools Needed:
1. #1 & #2 Phillips screwdrivers.
2. Drill and bits.
3. Paint gun and compressor.
4. Sanding blocks.

5. Mixing trays, etc, for fiberglass work.
6. A clean area and table to work on pieces.
7. Hole duplicators − see above for description of one time cheapies.

Time: Who knows? I used two weekends, but I played a lot, and experimented and made many mistakes.

One Piece Windshield Installation

We just finished doing the conversion from a two piece to a single piece windshield in our 1962 '180. After talking to several people about installing a new single piece windshield in our Comanche, we found that the misinformation greatly outweighed the help.

We spent several days just trimming and another doing the actual installation. This is what we recommend:

First, decide if you wish the windshield tinted; do this by flying with someone who has a tinted windshield in bright sunlight and at night. We selected solar gray. Next, select a good vendor for your new windshield. The least expensive is not necessarily the best buy. Pick a supplier that someone has used with good results. The main concern is that the windshield shape is exact to fit the frame. A bargain unit requires pushing and pressure to put in at great expense of time.

When the windshield arrives, arrange to borrow someone's hangar because it will take at least one full day if the windshield is properly cut, two or more, if you use trial and error. The task requires at least two people.

We are very lucky because the Comanche has captured hardware top and bottom. The side fairings at the ends will require new hardware because of factory installation used 12 rivets on each side that must be drilled out.

Plan ahead. If your dash needs to be recovered, do it when the windshield is out. We bought a new piece of black vinyl, made a paper pattern and installed a new dash cover.

A must is to have a battery operated screwdriver. Use a water soluble caulk for easy clean up. Consider the dimension changes when going from 1/8" to 1/4" Plexiglas, and take your time.

Make a paper pattern before removing your old windshield for accurate trimming of your new windshield. Use a belt sander when trimming an 1/8" or less and rounding the edges. Do an accurate job of the initial trimming and you will save one full day of time.

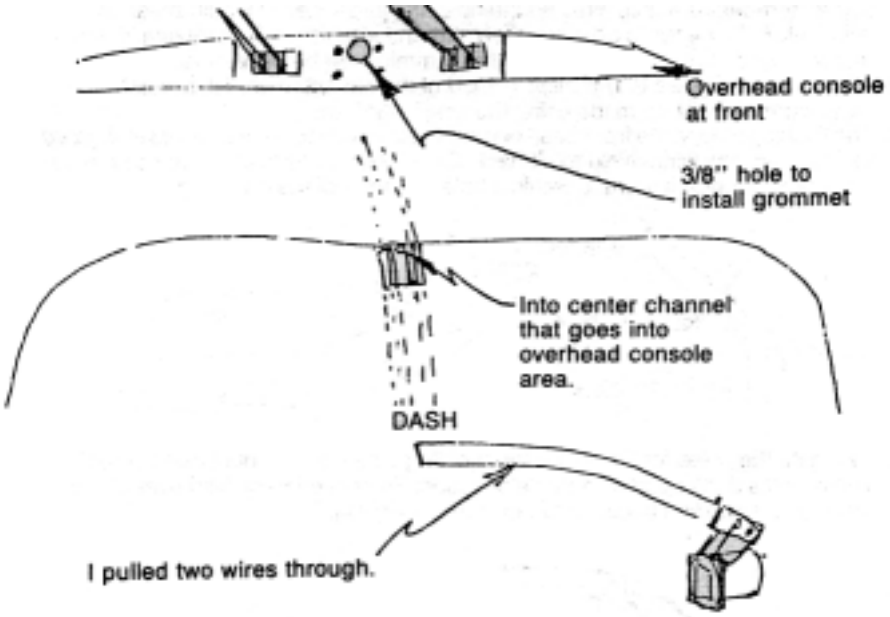
With a little thought, you can still have a lighted compass by tapping into the overhead console lighting circuit.

CAUTION:
There is a considerable saving in doing the work yourself, however, the installation must be supervised, inspected and signed off by an IA.

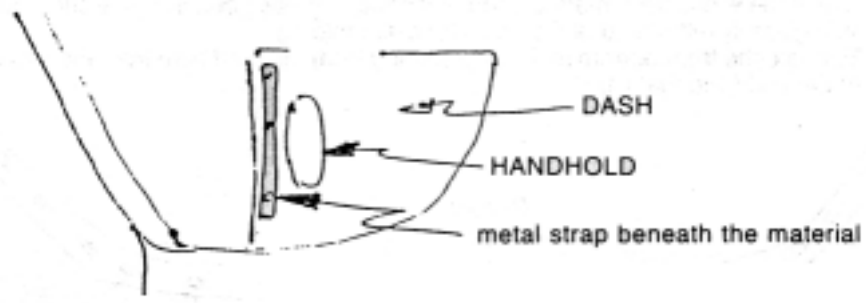
Instructions for Installing Single Piece Windshield:

1. Buy all the material needed.
   (Materials: Soldering iron, 18−20 gauge wire, heat shrink, caulking, DAP black or clear, water soluble; pattern paper, new hardware, 30 − #8, 3/4" screws with locking nuts (paint the heads), 8 − #10 screws, 1/4" longer than those used on top of windshield (paint the heads), 20 − #8, 3/8" screws for front molding strip (paint the heads), 1/2" diameter wood rasp, coping saw with fine blade, belt sander with coarse belt, hacksaw, drill and assorted bits, vinyl material and adhesive (for dash), razor blades, small 1/8" diameter file, vacuum cleaner, electric or battery operated screwdriver, marking pencil.)
2. Start by removing the air temperature gauge, the outer center strip, the front molding and the inside side molding.
3. Next drill out the 12 rivets on both the left and right side. Remove the sun visor and the eight bolts at the top of the windshield. Remove the inside molding strips.
4. Remove the outer left and right hand molding strips along with their companion pieces on the inside.

5. Put some pattern paper over the windshield and trace the windshield. Then add about 3/4" to the top to allow for inserted port and make the sides the same. Make sure you follow the existing glass on the sides and the bottom of the windshield.
6. Remove the two plexiglass pieces by pulling out and down at the bottom.
7. Remove the compass keeping the bracket intact. Cut the center bar 1 1/2" down from the top so as to leave enough for remounting the compass. Drill out the four rivets the base of the center bar.
   (Note-. You may need to install the compass 2" down from the top to ensure it clears the sun visors.Try the compass location and move the sun visors.)
8. Now redrill the four holes for the compass. I installed new light wiring by drilling into the channel up from the center bar which goes into the overhead console. Make sure you drill hole at top of channel in overhead console area because it is difficult to get wires fished through, it tries to poke out at the top.

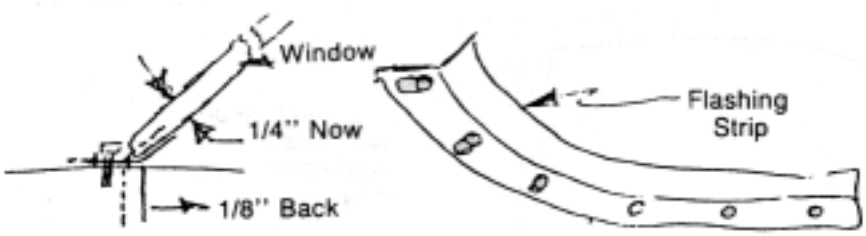


9. I then soldered to connector L50 which provides power to overhead red cockpit light while grounding the other.
10. Clean up all the aluminum shavings with a vacuum cleaner.
11. Make a pattern of the dash cover; then remove the old material. It can be tricky removing and reinstalling the front lip so be careful.
12. Install the new material cut from the pattern and reinstall the defroster and hand holds.

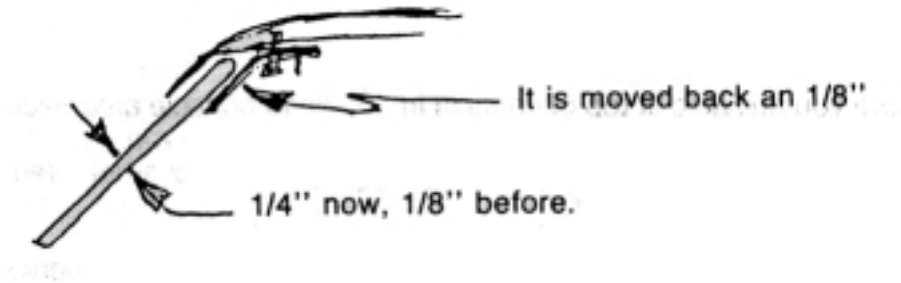


13. Now use the windshield pattern to mark the new single piece windshield. In most cases it will require several inches be cut from the bottom and sides. I tried to use the top as my reference. A bandsaw works great. If there is a shop that works with Plexiglas, pay them to do the cutting and especially the drilling of the air temperature hole. I drilled the hole first just in case I would break the windshield, its better to do it first than after the installation is complete. If you made your pattern correctly, no further trimming will be necessary.
14. Since the Plexiglas is 1/4" thick instead of the old 1/8" material, several adjustments must be made using the small 1/8" file.

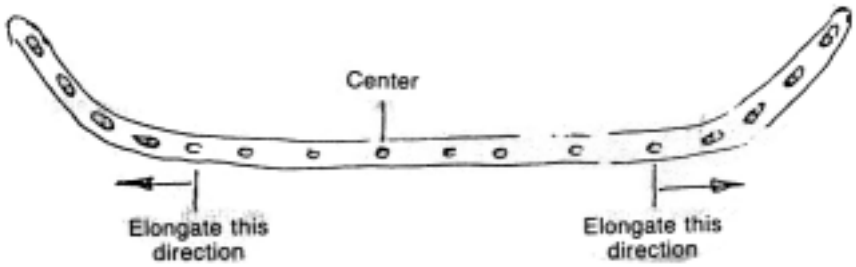
A. The flashing strip at the front base of windshield needs to have its holes elongated to allow the new windshield to sit back. Only those holes in the front need to be elongated. Elongate them to within a hole diameter of the front edge.
B. Elongate the holes for the inside top molding where they mount into the roof. These holes don't need as much elongation. They need to be filed toward the front of the molding because of the fatter Plexiglass.



C. Trial fit the windshield; mark the top holes with a grease pencil; make sure the side glass is 1/4"ahead of the holes for side molding.

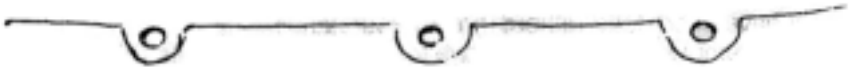


D. Elongate the front bottom mold strip starting from the third hole from the center. At the ends, elongate 1/4".
E. Remove the windshield and using the 1/2" file make clearance hole around the top bolts.

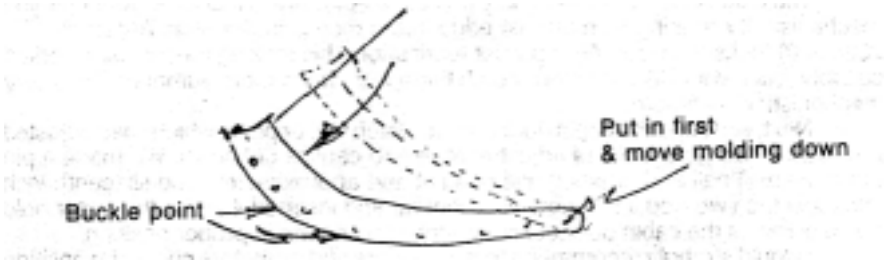


F. Trial fit it again using the bottom sill to verify hole alignment. Check top clearances around boltholes. The windshield should be allowed to move slightly. During hot temperatures it needs to expand without being constrained and subsequently breaking. Likewise, it will contract in very cold temperatures. If everything looks good you're ready to install it. OPTION: The short center bar that's left will rock back and forth. The installation plans call out a support

bracket. I chose to drill a hole in the very center and add a bolt. This will require an additional clearance to be filed in the center of the plexiglass.



G. Use the belt sander to make any adjustments and bevel all the edges before installation. Clean off any protective materials.
H. Add caulking to inside of top and both bottom corners. Install windshield and adjust bottom sill as needed. Align the sides and top evenly.
I. Install the inside upper molding starting at the center, and leave the end.
J. Caulk the left inside molding and put caulk on outside of windshield edge. Slip the outside mounting in place, mate it with the inside molding and install the #8 screws and nuts. Repeat for the right side.
K. Now finish the top inside molding.
L. Caulk the bottom of the windshield and install the front molding strip by tipping the strip up and putting the screws in the ends first and working toward the center. The molding will buckle slightly on the sides. When all of the screws are installed, take a piece of wood and gently tap the molding at the buckling points to reshape them.
M. Clean off excess caulk with soap and water. You are done! Congratulations!



Cabin Door Adjustment

Our passenger door is not the original item, due to a large gentleman getting out of the aircraft and pushing down too hard on the original door. Our door fits well, but did come open twice on us, which caused no harm, but was frightening to passengers.

My good friend, John Allen, and I readjusted our door on a hot afternoon in July and I wish to file the following report:

First of all, I think this is a two man job. Some of the reaching and twisting could not have been done without three or four hands.

Upon removal of the arm rest we found that the brackets (PN 25283−00) on the inside of the door had come loose and the nut soldered to them had come loose as well. Solder job.

Next, we found that the latch (PN 22679−00) was mis−adjusted so that only about seven−sixteenths of it would project through the cabin door latch striker plate (PN 22609−00). We then removed the latch assembly and further discovered that a roll pin (PN 480683) was restricting the travel of the latch in the locking direction enough to be detrimental. We removed the roll pin and the latch can now travel out sufficient to engage the striker plate enough to lock securely. We adjusted the tube assembly (PN 22648−00) by loosening the clevis (PN 16514−00) and nut (PN 404−332) and lengthening the tube assembly approximately seven sixteenths of an inch.

The external door handle retraction springs were found broken and inoperative, so we made a new spring and installed same (PN 83302−47). Somewhere in the process, we lubricated all moving parts and eliminated a noisy squeak. We then reassembled the latch assembly into the door (some moderate force required and four hands). We readjusted the tube

(PN 22648−00) to place the latch in a position to just barely clear the cabin door latch striker plate upon closing of the door (another three−sixteenths of an inch taken up). Now the latch would barely clear upon closing the door and upon locking, would project into the striker plate approximately 3/4 inch. Nice and secure.

We also noticed that the latch itself was made with an incline on the side which was toward the outside of the door (right external side, pilot's perspective), which would, with vibration, tend to open the latch mechanism. This, combined with the short engagement and the roll pin and spring arrangement (PN 83302− 48), clearly had created a high potential for inadvertent door unlatching and opening.

The Latch Plate Shaft Assembly (PN 23353−00), which locks the door opening mechanism by rotating its rear most edge into a recess in the Shaft Assembly (PN 23346−00) locks the door. After proper lubrication, this locking mechanism worked suitably, but I would like to have a notch there with much more authority, like a sear mechanism on a firearm.

Next, we found the cabin door auxillary latch striker plate, which I had adjusted previously, had gotten out of adjustment due to causes unknown. We made a pin out of a small nail and crushed half of it flat and approximately one−sixteenth inch thick and then we filed it to length and contour and inserted it under the upper hold down screw of the cabin door auxiliary latch striker plate in proper position.

I would strongly recommend that all owners and operators check the position and engagement of the latch and make proper adjustments. The capacity exists in the system to take up a large amount of mis−adjustment and will ensure, with the removal of the roll pin, a vastly greater probability that the door will only come open when you intend it to.

The three−quarter inch by three−eighths inch weather stripping worked great ($1.89), except a double layer was needed on the front edge from the top hinge pin to Door Retainer Pin Assembly (PN 20742−00). Much quieter.

Having done all the above, I felt like an entry of "Passenger Door Overhauled at 3468 hours" should have been logged. Whew! I hope these suggestions will be of some value.

Self−Opening Cabin Door in Flight

I have had several cases of a door coming open in flight with my PA30, and have come to the conclusion that if it happens just after take off, the door was not properly latched and checked. Usually, this occurs when closed by a person in the right seat, or carelessness on the part of the pilot due to being in a hurry. This is embarrassing, yes, but not serious; except it tends to scare the person in the right seat all out of proportion to the hazard. It is a good idea to slow down and expect buffeting and possibly a slightly different stall on landing. It has never been a serious problem.

If the door pops after about two hours of flight, I believe rough air is a factor, if not the sole cause. I have not found anything wrong with the latching mechanism.

As a result of an incident when the door popped open in the pass going west into Albuquerque, I decided to land and take care of this and another minor problem.

When mentioning this to a group at the Portland meeting, Rene Abdo said that the door could be closed in flight. I pass on his technique because I had another incident and found that it worked. Slow the aircraft to 90 mph indicated, open the small window left of the pilot, slip the aircraft to the right and simultaneously pull the door sharply closed. I did wonder if the door was fully latched, but it held okay until my planned stop.

ED: The door opening in flight in a Comanche is not an emergency; it is a situation to be dealt with. The airstream will keep the door pressed against the door jamb. Even though it is noisy, it should not be a problem. Alice Fuchs in her book on the Twin Comanche suggests opening the storm window, skidding, and slowing to 100 MPH, but no slower. Above all, don’t be distracted by the open door; always fly the airplane and don’t attempt maneuvers that may be more dangerous than the problem at hand. You can always land and close the door.

Fresh Air

Mark Pluck's work on the 180 fresh air system (January '92 Flyer) might be slightly improved by insulating the "aeroduct" tubing in the engine compartment. I got tired of having hot, fresh air years ago and I insulated the duct, all the way from the inlet to the firewall valve. Air has been cool ever since.

Depending on one's finances and the cooperation of one's AI mechanic, there are two simple methods of doing this. The low cost method is to obtain from most hardware stores the fiberglass pipe−wrap insulating tape. This is about 2" wide and 3/8" to 1/2" thick, and it comes in rolls several feet long. Also obtain metal self adhesive tape. There are a few varieties of this. The best is S.S., called "Speed Tape" and available from aviation suppliers. The insulation is best applied when the cowling is off. Use gloves. Some safety wire will hold the starting end of the fiberglass tape and you just need to keep winding it around the tube, with about 1/3 overlap. Don't pull it tight. Wind just tight enough to keep it from slipping off the previous wind. You want full, relaxed thickness of the glass. Secure the ends with more 0.020 safety wire. The second and last step is the hard one. Pulling at least 6" lengths of the metal tape clear off the roll to reduce tension, wrap the glass with the metal tape. Use a bit more than I/3 overlap, as it really only sticks well to itself. When the entire duct is wrapped in the metal tape, start again from the opposite end with a second layer. When done, the duct should still be flexible, though stiffer and yet feel soft. Larger hose clamps may now be needed to go over the attaching ends.

The easier method is, of course, the more expensive. There is an aviation item known as "firesleeve." It is red in color and consists of a rubberized insulating blanket. (It was originally asbestos; I don't know what the current material is made from.) It comes in various diameters, and it will be hard to get in the 2" and larger sizes that you need. Large aircraft are the primary users of this material, so try their suppliers. It simply slips over the end of the tube to be protected.

Though I have had, for some time, rather exotic USAF S.S over Teflon oil cooler lines on my bird, I plan to sleeve these with "firesleeve" when time and money permit. In fact, it would be nice to sleeve all the flex lines in the engine compartment.

Cabin Heaters: Twin JANITROL.

I have successfully cured my non operating Janitrol heater. I've owned N7523Y, a 1964 Twin Comanche, for about seven years. The heater was inoperative when I got the plane, so about six years ago I had it checked out at WEBCO, and the fuel valve was replaced. It operated for an hour and a half, then quit.

Although I did a pressure decay test every two years and the heater operated on the ground, I was never successful in having it operate when I needed it in the air.

This winter I really became determined. Again, I pressure decay tested and the heater worked on the ground, but not in the air. So I obtained the help of the local expert, Louis Rigo in Garden Grove, CA, who agreed to help.

Louis disassembled the heater (as I had done five years previously) and he cleaned it up. It had looked clean to me, but when he really cleaned it up, he found a three inch long crack in the rear of the combustion chamber. The heater had passed the pressure decay test, but had a three inch crack! I sleep better now, having seen the crack, and having replaced that part of the chamber entirely.

We reinstalled the heater, and found it still worked on the ground, but not in the air.

Next we tried replacing the vibrator. Being a 1964 aircraft, the vibrator was original, and was the old mechanical type with an armature which physically moved from point to point, creating the alternating current needed for the heater. These armatures can stick, and the vibrator was jiggled sufficiently when I had done pressure decay tests previously, that the vibrator worked on the ground, but didn't work in the air. The replacement is the solid state vibrator which is a few dollars more, but is more reliable. This worked. I flew to Santa Barbara and back, and the heater worked just wonderfully for an hour and a half, and then just quit in flight with no reason.

I troubleshot everything, and all items checked out fine. We concluded that the new solid state vibrator was at fault− replaced it with another, and it ran great on the ground. Next time in the air, the heater would not come on.

The last item was the coil. Louis said that he had a coil in a boat once which would work fine, but would heat up after a while until you couldn't touch it without a burn, and it would quit from the heat. When it would cool down, it would work fine, and he used to put a wet cloth on it to cool it and keep it operating. So, knowing his wet cloth method wouldn't work at 10,000 ft., we decided to change the coil. Now the heater works like a charm.

In all, we changed the fuel valve on the bulkhead (it was loaded up with a chalk like substance, and barely passed bubbles of fuel), half the combustion chamber, the vibrator, the coil, and we checked every wire, point, connection. Now it works.

If you get a good stream of fuel passing through the fuel valve, move to the vibrator, which may be sticking. The coil was the last thing I suspected which is why it was the last thing which we replaced. My feeling is that the valve, vibrator and coil were all bad, and now they are all new and the heater works just fine.

Check your heater for cracks; remove it; clean the combustion chamber in solvent; clean it with some steel wool so you can really see the metal; and look carefully for any cracking. Chances are it will need a cleaning anyway, so don't feel that this effort is wasted. My peace of mind is vastly improved now, and I honestly was shocked when I saw that crack. I never would have guessed that such a large crack could appear, and not show up in the pressure decay test.

After you check your heater, write to the Flyer if any cracks were present, and let us all know. If many of these things appear, it may be occurring in other planes with Janitrol heaters also.

Interior Molding (May 2012)

Q Does anyone know where I can get a replacement plastic molding that goes around the window on the inside of the cabin door of a PA30?

A Yes! Vantage Plane Plastics in Alva, Okla. (*www.planeplastics.com*). You might also try John Bailey at Knots 2U since he bought out the STCs of a plastic manufacturer and these may include the window surrounds.
I have bought from Plane Plastics and the quality is good. It is undrilled and unpainted, so you have to match drill the holes and then spray the part whatever color you choose.
Pat Barry

Placard Replacements (Jul 2012)

Q Many years ago, I purchased a complete set of placards for my instrument panel and other things in the cabin like the fuel selectors valves, etc. Mine are getting pretty scuffed up, and I learned that the company I used before, Otto Steiner, has gone out of business. Where can I get replacements for these adhesive backed labels for my Comanche?

A I have seen what appears to be the exact same labels of which you speak on the Aircraft Spruce website, a site called Screaming Aero Graphix at www.screamingaero.com , and on the Aircraft Engravers site at www.engravers.net . The latter website also makes custom-made placards out of different materials such as Lexan for your panel or other areas. I have used them for my own panel restoration, and they do good work.
Dave Clark