

SECTION 4. WINDSHIELDS, ENCLOSURES, AND WINDOWS

3-40. GENERAL. These repairs are applicable to plastic windshields, enclosures, and windows in *nonpressurized airplanes*. For pressurized airplanes, replace or repair plastic elements in accordance with the manufacturer's recommendation. When windshields and side windows made of acrylic plastics are damaged, they are usually replaced unless the damage is minor and a repair would not be in the line of vision. Repairs usually require a great deal of labor. Replacement parts are readily available, so replacement is normally more economical than repair.

a. Minor Repairs. There are times, however, when a windshield may be cracked and safety is not impaired. In that case, repairs can be made by stop-drilling the ends of the crack with a # 30 drill (1/8 inch) to prevent the concentration of stresses causing the crack to continue. Drill a series of number 40 holes a half-inch from the edge of the crack about a half-inch apart, and lace through these holes with brass safety wire (see figure 3-24) and seal with clear silicone to waterproof.

b. Temporary Repairs. One way to make a temporary repair is to stop-drill the ends of the crack, and then drill number 27 holes every inch or so in the crack. Use AN515-6 screws and AN365-632 nuts with AN960-6 washers on both sides of the plastic. This will hold the crack together and prevent further breakage until the windshield can be properly repaired or replaced. (See figure 3-24.)

c. Permanent Repairs. Windshields or side windows with small cracks that affect only the appearance rather than the airworthiness of a sheet, may be repaired by first stop-drilling the ends of the crack with a # 30 or a 1/8-inch drill. Then use a hypodermic syringe and needle to fill the crack with

polymerizable cement such as PS-30 or Weld-On 40, and allow capillary action to fill the crack completely. Soak the end of a 1/8-inch acrylic rod in cement to form a cushion and insert it in the stop-drilled hole. Allow the repair to dry for about 30 minutes, and then trim the rod off flush with the sheet.

d. Polishing and Finishing. Scratches and repair marks, within certain limitations, can be removed from acrylic plastic. No sanding that could adversely affect the plastic's optical properties and distort the pilot's vision should be done on any portion of a windshield.

(1) If there are scratches or repair marks in an area that can be sanded, they may be removed by first sanding the area. Use 320- or 400-grit abrasive paper that is wrapped around a felt or rubber pad.

(2) Use circular rubbing motions, light pressure, and a mild liquid soap solution as a lubricant. After the sanding is complete, rinse the surface thoroughly with running water. Then, using a 500-grit paper, continue to sand lightly. Keep moving to higher grit paper and sand and rinse until all of the sanding or repair marks have been removed.

(3) After using the finest abrasive paper, use rubbing compound and buff in a circular motion to remove all traces of the sanding.

e. Cleaning. Acrylic windshields and windows may be cleaned by washing them with mild soap and running water. Rub the surface with your bare hands in a stream of water. Follow with the same procedure but with soap and water. After the soap and dirt have been flushed away, dry the surface with a soft, clean cloth or tissue and polish it with a

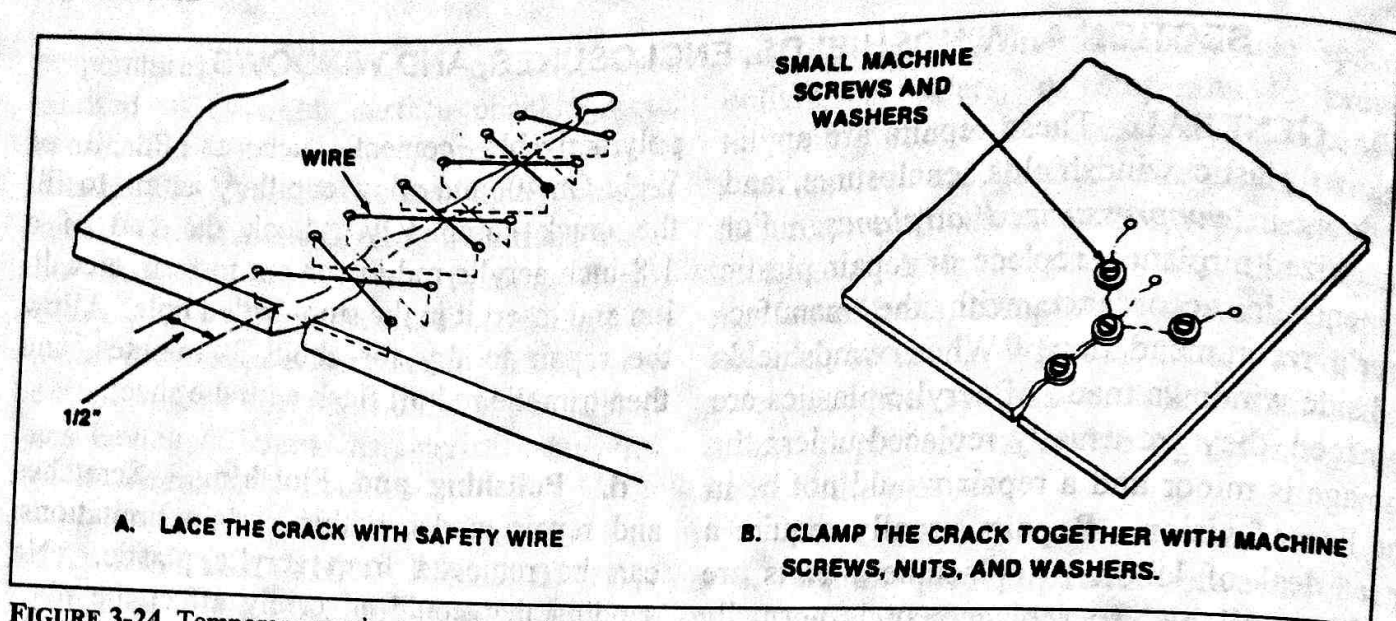


FIGURE 3-24. Temporary repairs to cracked windshields or windows.

windshield cleaner especially approved for use on aircraft transparent plastics. These cleaners may be purchased through aircraft supply houses.

f. **Waxing.** A thin coating of wax will fill any minute scratches that may be present and will cause rain to form droplets that are easily blown away by the wind.

3-41. PROTECTION. Acrylic windshields are often called "lifetime" windshields, to distinguish them from those made of the much shorter-lived acetate material. However, even acrylic must be protected from the ravages of the elements.

a. **When an aircraft is parked in direct sunlight,** the windshield will absorb heat and will actually become hotter than either the inside of the aircraft or the outside air. The sun will cause the inside of a closed aircraft to become extremely hot, and this heat is also absorbed by the plastic windshield.

b. **To protect against this damage,** it is wise to keep the aircraft in a hangar. If this is not possible, some type of shade should be provided to keep the sun from coming in direct contact with the windshield. Some aircraft owners use a close-fitting, opaque, reflective

cover over the windshield. In many cases, this has done more harm than good. This cover may absorb moisture from the air and give off harmful vapors, and if it touches the surface of the plastic it can cause crazing or minute cracks to form in the windshield. Another hazard in using such a cover is that sand can blow up under the cover and scratch the plastic.

3-42. WINDSHIELD INSTALLATION. Aircraft windshields may be purchased either from the original aircraft manufacturer or from any of several FAA-PMA sources. These windshields are formed to the exact shape required, but are slightly larger than necessary so they may be trimmed to the exact size.

a. **After removing the damaged windshield,** clean all of the sealer from the grooves and cut the new windshield to fit. New windshields are covered with either protective paper or film to prevent damage during handling or installation. Carefully peel back just enough of this covering to make the installation. The windshield must fit in its channels with about 1/8- to 1/4-inch clearance to allow for expansion and contraction. If any holes are drilled in the plastic for screws, they should be about 1/8 inch oversize.