

# SERVICE LETTER

**No.** 608

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Subject: Ceconite Aircraft Covering

Models Affected: PA-18 "150" Super Cub, PA-25-235 and PA-25-260 Pawnee with Ceconite Covering

Serial Numbers Affected: New production aircraft with Ceconite covering are as follows:  
PA-25-235 and PA-25-260 Pawnee; Serial Numbers 25-5304 and up.  
PA-18 "150" Super Cub; Serial Numbers 18-8920 and up.

Compliance Time: Not applicable.

Purpose: To distribute the attached Ceconite Application, Maintenance and Repair Procedures.

Instructions: Ceconite Application, Maintenance and Repair Instructions are contained in the attached publication, which has been prepared in a standard manual format.

The instructions contained herein conform to the requirements of Ceconite Manual No. 101 for covering Piper aircraft models PA-18 and PA-25, under FAA Supplemental Type Certificate No. SA 1351 WE.

Additional copies of the attached publication are available from the Service Communications Department, Piper Aircraft Corporation, Lock Haven, Pennsylvania 17745.

BALANCE OF SERVICE LETTER FORMAT NOT APPLICABLE.

COVERING PIPER AIRCRAFT

WITH AIRTEX CECONITE ENVELOPES

APPLICATION, MAINTENANCE AND REPAIR PROCEDURES

These instructions conform to the requirements of Ceconite Manual No. 101 for covering Piper Aircraft Models PA-18 and PA-25, under F.A.A. Supplemental Type Certificate No. SA 1351 WE.

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## I. CECONITE APPLICATION PROCEDURES

Ceconite is applied and doped in exactly the same manner as Grade "A" cotton fabric, with the following exceptions:

CEMENTING: All cementing must be done with nitrate base cement.  
SHRINKING: Shrinking is accomplished with heat.  
PRIME COAT: Thinned NITRATE dope must be used for the first coat.  
RIB STITCHING: Special Dacron thread is required. (#690/3)  
SEWING THREAD: Special Dacron thread is required. (#207)

### A. APPLYING THE ENVELOPE

Airtex Ceconite envelopes are made loose enough to facilitate slipping them over the airframe and to prevent excessive tension after doping. Ceconite may be shrunk by heat, applied by a thermostatically controlled household electric iron, set at "wool" temperature (240° F.). A normal ironing stroke is employed at the speed of about five inches per second, first in a side to side motion and then at right angles. Shrinking should be done in several stages on opposite sides of the structure, so as to uniformly shrink the entire area. Just remove any excess slack. The fabric should be as slack as cotton covering immediately after the first coat of dope has been applied. Normal tension will develop in the Ceconite after it has been doped. Excess tension through over-shrinking may cause deformation of the structure when added to the tension normally developed by the dried dope film. Fold wrinkles may be ironed out by local application of the tip of the iron. The use of excessively high iron temperatures will cause a celluloid-like texture in the fabric as it approaches the melting point. It is suggested that a test panel be used to determine the best temperature setting and dwell time of the iron, for safe working. No shrinking should be attempted before the envelope is securely cemented to the structure.

### B. CEMENTING

Before applying envelope, brush generous amount of nitrate base cement on structure surfaces at attachment points. Apply envelope and brush nitrate base cement through surface of envelope at these attachment points to insure good bonding of envelope with structure surface. Press the fabric in place and chase out any trapped air while smoothing the joint. Repeat this process if another layer of fabric is to be lapped over the first one. To prevent rippling of the drying cement, wet the hands in nitrate thinner when smoothing the joint. Only nitrate base cement should be used. Rubber or chloroprene base cements should not be used, as they are not compatible with aircraft dopes.

### C. WINGS

Wing envelopes are made left-hand and right-hand to assure alignment of the wing tip seam with the centerline of the bow. Draw the envelope over the wing tip down to the butt end. Even up the edges of

the fabric along the trailing edge and, without applying tension, clamp the edges around the butt, aileron and flap edges. Re-check the alignment, and then proceed to cement all edges in place. Neatly trim and slit where necessary to accommodate hinges and other fittings, lap-cementing the edges to the structure. Extra or spare pieces of Ceconite should be cemented over the butt area, lapping it onto the surfaces, top and bottom. Before doing this, check the wires and cables and see that they are tensioned and secured to assure a straight run, without fouling.

#### D. FUSELAGE

Airtex fuselage envelopes are supplied with the vertical stabilizer (fin) as a separate piece, which is attached after the fuselage envelope is cemented in place and heat-shrunk.

The fuselage envelope is designed to be drawn over the fin and tail-post and then up the fuselage to the firewall, adjusting the position to leave sufficient overlap at both ends. The unsewed portion at the rear of the lower longeron has been left open to facilitate the passing of the envelope over the fin and tail post.

Carefully line up the seams with the lower longerons and clamp the fabric in place at the forward end. Center the top of the envelope and clamp into place. The fabric at the tail post should also be centered and clamped. Trim away the excess fabric in the door and window areas, leaving more than enough for lap-cementing into the window channels and to the structure. Save the cut out material for covering the doors.

When all cemented joints are dry, heat-shrink the fuselage envelope. The vertical stabilizer envelope is then fitted and cemented over the fuselage fabric. The forward end may be cut back on an angle to meet the upper longeron to which the rest of the fin envelope is to overlap. Cut slits where fittings occur, and cement down the edges. After the cement dries, heat-shrink the fin where necessary to make it fair neatly to the top of the fuselage.

#### E. CONTROL SURFACES

Airtex envelopes are left open along the hinged side of the elevators, horizontal stabilizers and rudder, where the edges are to be lap-cemented in place. Trim the fabric neatly around hinge fittings while cementing in place. Ailerons and flaps are made as "blankets" so that they are simply wrapped around the leading edge and cemented at the trailing edge.

## F. CONDITIONS FOR DOPING

Most dope failures are directly traceable to improper temperatures. This not only applies to the dope room temperature, but to the actual temperature of the dope itself. If the dope is left in a cold room over night, it will take many hours for it to warm up, regardless of how warm the room is the next day. If temperatures go below 70°F. the dope temperature should be checked with a liquid thermometer, and not used until it is above 70°F. Dope applied too cold will crack, craze and peel.

Humidity control is important to prevent blushing. The ideal relative humidity for doping is 45 to 50%. Minimum is 20% and maximum is 55%. Raising the temperature will reduce the relative humidity. In extreme cases, substitute retarder for thinner, up to 30% of the volume. This slows drying so that the surface temperature of the dope is not reduced as fast by the slower drying retarder.

The dope room temperature should be maintained at 75 to 80°F., with a minimum of 70° and a maximum of 100°F. In-coming air should be shielded to prevent drafts over the doped surface. Otherwise, blushing may occur. Drafts and excessive dryness may cause the dope film to skin over the surface, trapping solvents, resulting in a weak dope film.

## II. DOPING SCHEDULE FOR CECONITE

### A. PRIME COAT

Apply one prime coat of NITRATE clear dope, thinned from 30% to 50% with nitrate thinner. Slap the brush on both sides of the pot to remove excess dope. Otherwise, the dope may puddle and drip through to the surface below, causing spots. It is essential that this prime coat be pressed through the fabric weave to completely encapsulate the fibers, assuring a good mechanical grip. This necessitates use of a fairly firm brush and firm pressure as the dope is applied. The back of the fabric should not just feel wet, it should leave a deposit of dope on a finger rubbed across it. When the prime coat has dried, apply a second coat of nitrate dope, thinned only enough to provide easy brushing without roping.

### B. BASE COATS

Apply two coats of clear butyrate dope, thinned only enough to produce good brushing or spraying characteristics. Brush or spray coats at right angles to each other. These coats are necessary to fill the weave sufficiently to provide a good base for secure adhesion of tapes and grommets, which may peel if not applied over these base coats.

### C. RIB STITCHING

Regular cotton reinforcing tapes may be used over rib caps. Rib stitching must be done with Dacron rib stitch cord #690/3. Pass a length of 3/8" wide reinforcing tape around the wing over each rib, and after pulling it taut, tie the ends together at the trailing edge. After rib stitching, these tapes are cut off about an inch beyond the first and last stitches.

All rib stitch knots should be placed along the edge of the lower cap strip, and the last stitch should be locked with an additional half hitch. All stitches should be kept as close to the cap strip as possible, so as not to draw or tear the fabric.

All outboard wing rib stitches are spaced two inches apart, while the inboard stitches, within the propeller slip stream, are spaced one inch apart. On the PA-18 this area includes the first three ribs from the wing root. On the PA-25 wing, the first two ribs outboard of the wing walk take one inch spacing. All wing rib stitching is continuous from loop to loop, on each rib.

All control surfaces are rib stitched with individual loops, with the exception of the PA-25 stabilizer, which is rib stitched with a continuous cord and two inch spacing.

Rib stitch locations and spacings are shown on the following Piper drawings:

	Rudder	Elevator	Aileron	Stabilizer	Flap
PA-18:	12573	12789	42592	12790	12773
PA-25:	64277	64280	42592	64279	61237

The vertical stabilizers of both models should be rib stitched with four individual stitches spaced four inches apart, starting four inches from the hinge fitting on the upper rib.

Individual stitches on control surfaces shall be reinforced on both sides with a 3/4" length of 3/8" reinforcing tape, between the cord and the rib cap. All single loop stitches are tied off with three overhand knots; (square knot and a half hitch).

### D. GROMMETS AND RINGS

To assure good adhesion with the butyrate dope, grommets and rings should be dipped in butyrate thinner long enough to soften the surface, immediately before they are applied.

Rings must be placed to provide access to all cable pulleys, turn-buckles and other points requiring periodic inspection. Drain grommets must be placed on the bottom surfaces at all points where water could collect, as prescribed on the above listed drawings.

sanding over rib stitch knots or other projections, or at corners. A light coat of aluminum dope is sometimes sprayed on before sanding, for a sanding guide. When the aluminum is sanded away, it has been sanded enough. Remove all sanding dust before proceeding.

#### H. ALUMINUM COAT

Mix no more than four ounces of aluminum powder to a gallon of clear butyrate dope and then thin to a spraying consistency. Excessive aluminum powder will make a poor bond with the color coats. Spray one cross coat at right angles. When dry, it may be lightly sanded with extra fine sand paper and dusted.

#### I. COLOR COATS

Spray three coats of colored butyrate dope. The gloss of the last coat can be enhanced if about half of the thinning is done with retarder. This slows the drying, giving the coat a chance to self-level before it dries and reduces the haze of over-spray.

#### J. SUMMARY OF DOPING SCHEDULE

1. Prime with one coat of thinned nitrate dope, followed with one brush coat of nitrate at brushing consistency.
2. Apply two brush or spray coats of clear butyrate dope.
3. Apply rib stitching, tapes and grommets.
4. Brush or spray four "build-up" coats of clear butyrate dope.
5. Sand surface.
6. Spray a cross coat of aluminum dope.
7. Sand lightly.
8. Spray three coats of colored dope, the last coat with retarder added.

#### K. CAUSES OF POOR ADHESION AND CRACKING OF THE DOPE FILM

Adequate penetration of the prime coat is important to assure a good mechanical bond to the fabric. Use a firm brush and press the dope into the weave.

Do not back-brush butyrate coats, as this may dissolve the nitrate prime coats.

The temperature of the dope must always be above 70°F. when applied, or crazing and peeling may result.

Do not interrupt the doping sequence for more than a day or two. If the dope is allowed to cure over a period of time, subsequent coats cannot dissolve into the surface, which can result in the peeling of the later coats.

Rings and grommets should not be applied until after the second coat of butyrate dope, to assure good adhesion to the surface. All rings and grommets should be imbedded in wet butyrate dope with another coat on top.

Do not open the drain holes until all doping is completed. Then use a sharp, narrow blade to cut out the fabric in the hole. Do not punch the hole, as it will close again.

Shielded seaplane type grommets should be used on planes to be used on floats.

#### E. FINISHING TAPES

All sewed seams, fitting openings, lapped edges, points of wear and rib stitching must be covered with pinked edge cotton tape. Two inch wide tape is generally used, except that on the Model PA-25, four inch tape is applied to the leading and trailing edges of the stabilizer, and to the leading edge of the elevator. On both the PA-18 and PA-25 models, 1 1/2" tape is applied to the trailing edges of the rudder and elevator. All other tapes are two inch. See the above listed drawings for details.

Tapes should not be applied until after the second coat of butyrate dope, to assure a filled surface for good adhesion.

Individual rib stitches should be covered with circular cotton patches.

Pre-soak all tapes in butyrate dope prior to bedding them on the surface in a wet coat of dope. Chase out any air pockets, and follow with a top coat of dope. On curved edges, pin the end of the tape to the fabric, and while applying the tape, stretch it as much as possible so that the edges will conform with the curve without wrinkles along the edges. Secure the final end with a pin until the dope has set. On sharp turns and corners, notch the tape on both edges and overlap the edges of the notches.

Soak reinforcing tapes thoroughly before applying finishing tapes.

CAUTION! Do not apply butyrate pre-doped tape with nitrate dope. Nitrate dope cannot dissolve the butyrate coating and peeling will result.

#### F. BUILD-UP COATS

Apply at least four coats (brushed or sprayed) of butyrate dope, alternating strokes at right angles to assure a uniform application.

#### G. SANDING

After thorough drying, the surface may be sanded (standard grade paper, #320 or equivalent) to remove any roughness or inclusions. Be careful not to cut through the dope film or into the fabric when

### III. REPAIRING CECONITE SURFACES

Any punctures or tears should be immediately repaired so that moisture does not accumulate inside. Cracks in the dope film should also be promptly repaired by a local application of rejuvenator. When the dope softens, gently rub the area with a finger to blend the crack together. Then apply two coats of colored butyrate dope.

Before patching, the dope around the repair area must be removed down to the clear coats and extended several inches beyond the edges of the proposed patch. The dope may be removed by sanding or by scraping after softening with thinner or rejuvenator. Patches should be cut out with pinking shears to a size large enough to extend one and one half inches beyond the edges of the repair. Irregular shaped damages and tears longer than 16 inches require replacement of the panel.

Grade "A" cotton airplane cloth or three inch cotton pinked tape may be used for repairing slits or small tears, but Ceconite fabric must be used for large patches or panel replacement. All patches may be applied in the standard manner, using butyrate dope as the adhesive.

Small Ceconite patches should be prepared by temporarily tacking the fabric over a frame, so that it can be given a prime coat of thinned nitrate dope, followed by a slightly thinned coat of nitrate dope. After drying, remove the patch from the frame, cut it to shape and apply to the surface to be repaired, in a bed of wet butyrate dope. Dope down the edges, and when dry apply the standard dope schedule over the entire area, feathering several inches beyond the patch. Do not attempt to heat shrink the doped patch, as ignition of the solvents may occur. Any slack will be removed as the dope dries and cures.

Large patches and replacement panels may be prime coated after the new fabric is applied. However, the edges of the new fabric should be primed with nitrate in the areas to be in contact with the old fabric, before it is applied. Lay the edges of the patch in a bed of wet butyrate dope and dope the edges down, keeping within the nitrate primed area. When this is dry, apply the prime coats to the rest of the patch or panel, using nitrate dope. The reason for this procedure is that butyrate dope will dissolve into nitrate, but nitrate dope cannot dissolve into butyrate dope. Normally, replacement panels need not be heat shrunk, if applied evenly. If needed, heat shrinking should be done before the prime coat is applied. In any event, do not build up any tension on the panel; the dope will shrink it sufficiently. After priming, complete the finish with the standard doping schedule, feathering the coats several inches beyond the repaired area.

When panels between ribs must be replaced, cut the fabric one inch inside the rib nearest the damaged portion and carry the patch over and beyond the rib by three inches. The replacement panel must extend over the leading edge back to the front spar and the other end lapped over the trailing edge. When the replacement panel extends over ribs, apply reinforcing tape and rib stitch it, without disturbing the old rib stitching.

Tape shall be applied to the edges of all large patches and replacement panels after the second coat of butyrate dope.