

APPLICABLE MODELS

PA-24, PA-24-250, PA24-260, PA-24-400

INSTALLATION MANUAL

ISSUE DATE 02/15/82

REVISION DATE 01/18/96

KNOTS 2U, LTD.**709 Airport Road****Burlington, WI 53105****(262) 763-5100**

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REVISIONS

REV	DATE	PAGE	EFFECT
A	05/01/93	All	Complete revision of manual with improved installation procedures and revision of top flap/fuselage seal.
B	01/18/96	All	Revised center aileron and hinge seal installation, parts list and order of aileron seal installation. Moved Revisions to cover.

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SECTION 1.0 = LEFT AND RIGHT AILERON GAP SEALS =**N O T E:**

Before installing the aileron seals there are three #4 roundhead rivets on the bottom wing skin, one at the center of the aileron and one at each hinge, which should be replaced with P/N AN426A D4-4 flush rivets. When drilling these rivets and drilling mounting holes for the seals, do not permit drill to penetrate deep enough to touch the aileron. Use extreme care in mounting the outboard and inboard seals as they are used as a reference for positioning the rest of the seals. The seals may be painted before installation. Use care not to get paint or solvent on the teflon area of the seals or to damage the teflon when removing masking tape.

1.1 ROA- RIGHT OUTBOARD AILERON SEAL INSTALLATION

Center the ailerons to the neutral position. Place **P/N ROA** 1/16th* inch behind and parallel to the rear spar rivet row on the underside of the trailing edge of the wing. Use 1/32nd inch spacing between the outboard end of the seal and the wing tip bulkhead. Using the pilot holes in the gap seal as a template, drill four #40 locator holes in the skin. Cleco as you go.

1.2 RIA- RIGHT INBOARD AILERON SEAL INSTALLATION-

Place **P/N RIA** 1/16th* inch behind and parallel to the rear spar rivet row on the underside of the trailing edge of the wing, with inboard end even with the point where the trailing edge wing skin changes, before the flap section starts. Using the pilot holes in the gap seal as a template, drill two locator holes in the skin. Cleco seal in place. (See Detail #1)

1.3 ROH- RIGHT OUTBOARD HINGE SEAL INSTALLATION

Center the ailerons to the neutral position. Place **P/N ROH** over the center of the outboard hinge, with 1/16th* inch distance from the leading edge of the seal to the rear spar rivet row. (See Detail #1). Locate 2 holes in the seal, in line with the holes in the outboard seal. Maintain proper edge distance and confirm hole positions are clear of the hinge bulkhead and allow enough room for nutplates on top of skin. Drill two #40 holes at these locations and cleco seal in place

1.4 RIH- RIGHT INBOARD HINGE SEAL INSTALLATION-

Center the ailerons to the neutral position. Place **P/N RIH** over the center of the inboard hinge, with 1/16th* inch distance from the leading edge of the seal to the rear spar rivet row. (See Detail #1). Locate 2 holes in the seal, in line with the holes in the outboard seal. Maintain proper edge distance and confirm hole positions are clear of the hinge bulkhead and allow enough room for nutplates on top of skin. Drill two #40 holes at these locations and cleco seal in place

1.5 RCA- RIGHT CENTER AILERON SEAL INSTALLATION-

Position **P/N RCA** between the two hinge seals, with the trailing edges of the seals forming a straight line. Trim the center seal, equally at each end, to fit flush against the hinge seals. Using the pilot holes in the center seal as a template, drill four #40 pilot holes through the lower skin, one at each end and two at mid points in the seal. Cleco seal in place. Drill and cleco the remaining pilot holes.

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1.6 FINAL FITTING AND ALIGNMENT OF AILERON SEALS-

Verify all clearances and check aileron for full travel without binding. If binding occurs trim and/or adjust seals to give a proper seal and free movement of the aileron through its full travel range. Take care to leave no sharp edges to abrade the aileron. When properly installed the seal should contact the aileron firmly so that when the trailing edge of the gap seal is pulled away from the aileron it will snap back into position. (See Detail #1). Remove the aileron and the gap seals from the wing.

- * **THIS SPACING IS NOMINAL AND SHOULD BE ADJUSTED TO GIVE PROPER CONTACT OF THE SEAL TO THE AILERON SURFACE, WHEN THE AILERON IS ROLLED THROUGH ITS FULL TRAVEL RANGE. ON AIRCRAFT WITH THE ROBERTSON MODIFICATION THE SEALS SHOULD BE SPACED ABOUT 1/4 INCH FURTHER AFT TO ASSURE PROPER CONTACT WITH AILERON.**

1.7 CLEANING AND DEBURRING-

Enlarge the pilot holes for *P/N's ROA, RCA, and RIA* to #30 drill size. Clean and deburr all holes drilled in the wing and the seals. Clean all drill shavings from the seals and wing and corrosion proof holes and trimmed edges with alodine solution, or equivalent.

1.8 RIVETING RIGHT OUTBOARD, CENTER AND INBOARD SEALS-

Rivet *P/N's ROA, RCA, and RIA* in place, using *P/N AN470AD-4-3* rivets. A rivet squeezer is recommended for installing the gap seals.

1.9 ROH- RIGHT OUTBOARD HINGE NUT PLATE MOUNTING-

Enlarge the two mounting holes on the outboard hinge and the matching holes on the wing to #10 drill size. Deburr the holes. Position nut plate *P/N MS21059L08* over the inboard hole and attach to the skin only, using two *P/N AN426AD-3-4* rivets. (See detail #1) on some aircraft the outboard nut plate will not fit, due to clearance limitations. In such a case, use the optional nut plate provided, *P/N F22NA17-82*.

1.10 RIH- RIGHT INBOARD HINGE NUT PLATE MOUNTING-

Enlarge the mounting holes on the inboard hinge and the matching holes on the wing to #10 drill size. Deburr the holes. Position one nut plate *P/N MS21059L08* over each hole and attach to the skin only, using two *P/N AN426AD-3-4* rivets. (See detail #1)

1.11 FINAL ASSEMBLY RIGHT SIDE-

Install aileron and safety to aircraft. Install hinge seals on wing, using two *P/N AN526-832-R6* screws and two *P/N AN960-8L* washers in each hinge seal.

1.12 LEFT SIDE INSTALLATION-

Repeat steps 1.1 through 1.11 on left wing and aileron.

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SECTION 2.0 = LEFT AND RIGHT FLAP GAP SEALS =***N O T E:***

Do not remove the large #5 rivets which secure the flap tracks. Also, the flap seals should be positioned just far enough aft to contact the flap when the flap is up and to allow the flap to pull away when it is deployed. On models with manual flaps a "Z" section of skin prevents access to the rivet bucktails. On those models, follow either procedure "A" or procedure "B":

- A.** Remove the flap. Remove the rivets from lower trailing edge of flap section and rivets on the "Z" section to the top skin. Move the skin to expose bottom rivets. On aircraft with tip tanks the fuel line must be unclamped and moved to buck rivets. Refasten the "Z" section with Cherrymax *P/N CR3243-4-2* and top skin with *P/N AN426AD-4-2* rivets and *P/N AN470AD-3-4* rivets.
- B.** Do not remove flap and "Z" section. Use Cherrymax *P/N CR3243-4-3* on the inboard seals and Cherrymax *P/N CR3243-4-2* on the center and outboard seals. This procedure is not recommended on aircraft which have the tip tank fuel lines and/or wires in the area behind the "Z" section! For all other aircraft proceed as follows.

2.1 ROF- RIGHT OUTBOARD FLAP SEAL INSTALLATION-

Lower the flaps. Starting on the underside of the right wing at the outboard end of the flap, remove the rivets which secure the lower wing skin as far as the outboard flap track. Install cleco fasteners as you drill, to hold the layers of metal in place. Next, insert *P/N ROF* between the lower skin and the rear spar 3/4 inches, or enough to give 3/16th inches edge distance to the rivets. Mark the depth and width of the notch required at the inboard end, to clear the track. Remove the seal and cut the notch with a relief radius at the corner, per detail #2. Insert seal into the wing enough to cover the notches. Using the existing holes of the removed rivets as a drilling guide, drill holes through them gap seal and cleco in place. Raise the flap to check for proper closure against the gap seal. (See detail #2)

2.2 RCF- RIGHT CENTER FLAP SEAL INSTALLATION-

Start inboard of the outboard flap track and remove the rivets which secure the lower wing skin to the spar as far as the center flap track. Cleco as you go. Position *P/N RCF* between the outboard flap track and the center flap track, to mark the position of the notches at each end, per detail #2. Notch the seal and insert in the slot and check for proper alignment of trailing edge with the previously inserted seal. Using the existing holes of the just removed rivets, drill through the gap seal and cleco in place.

2.3 RIF- RIGHT INBOARD FLAP SEAL INSTALLATION-

Start inboard of the center flap track and remove rivets to the inboard flap track and stop. Insert *P/N RIF* into the wing and check for proper alignment of the trailing edge with the previously inserted seal. Using the existing holes of the just removed rivets, drill holes through the gap seal and cleco in place. (See detail #2)

2.4 FINAL ALIGNMENT CHECK-

Retract the flaps, check for binding and a straight trailing edge of the seal line. Seals should just rest against the leading edge of the flap and may be bent to assure proper fit against flap.

2.5 CLEAN UP AND RIVETING-

Lower the flaps and clean all drill shavings from the wing and the gap seals. Corrosion proof holes and trimmed edges with alodine solution or, equivalent. Using *P/N AN470AD-4* rivets, of lengths as required, rivet gap seals in place.

2.6 LEFT SIDE INSTALLATION-

Repeat steps 2.1 through 2.5 on the left side.

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SECTION 3.0 = LEFT AND RIGHT FLAP/FUSELAGE SEALS =**3.1 RF- LOWER RIGHT FLAP/FUSELAGE SEAL INSTALLATION-**

Remove the two existing screws from the aft end of the wing root fairing strip on the underside of the right wing. Insert *P/N RF* under the wing root fairing 3/4 inches in and parallel with the inboard edge of the flap, with a space of 1/8th inches end clearance. The seal should slide under the rubber molding on the inboard end and may be trimmed for proper fit. (See detail #2) Next, using the two screw holes in *P/N RF* as a template, drill two #32 holes in the existing flap fairing. If the flap fairing is sagging it should be tightened and/or adjusted until it is level with the inboard end of the flap. Using the holes in the wing root where the screws were removed as a template, drill two #21 size holes through *P/N RF*. Cleco seal in place and check the edges for proper clearance and alignment with the trailing edge and end of the flap. Run the flaps up and down fully to verify clearances. Trim or file, where necessary, for proper fit and alignment. Remove the seal from the wing.

3.2 CLEANING AND DEBURRING-

Deburr the drilled holes and clean all drill shavings from the seal and aircraft and corrosion proof with alodine solution, or equivalent.

3.3 RF -ATTACHING THE RIGHT LOWER FLAP/FUSELAGE SEAL-

Install *P/N RF* using two *P/N TRA8X1/2* screws and two *AN980-8L* washers. Use the screws which were removed to refasten the leading edge and the wing root.

3.4 LEFT SIDE INSTALLATION-

Repeat steps 3.1 through 3.3 on the left side.

SECTION 4.0 = LEFT AND RIGHT TOP FLAP/FUSELAGE SEALS =**4.1 TRF- TOP RIGHT FLAP/FUSELAGE SEAL INSTALLATION-**

Remove molding from top of flap fairing. Place *P/N TRF* in position and check for proper fit. Using the seal as a template, locate two #32 holes on the flap fairing. Enlarge holes in gap seal to #21 drill size. Install seal using two *P/N TRA8X1/2* screws with two to four *P/N AN960-8* washers (as required), below the seal, to clear existing rivet heads and two *P/N AN960-8L* washers on top of seal. (See detail #2) After installation run flap up and down to check for chafing or binding. Adjust or trim as necessary. Glue rubber molding in place over inboard edge of seal. Corrosion proof with alodine solution, or equivalent.

4.2. PAINTING-

If the seals have not been painted prior to installation they may be painted at this time, using care not to get paint or solvents on the teflon portion of the gap seals or to remove the teflon when removing the masking tape.

4.3. LEFT SIDE INSTALLATION-

Repeat steps 4.1 through 4.2 on left side.

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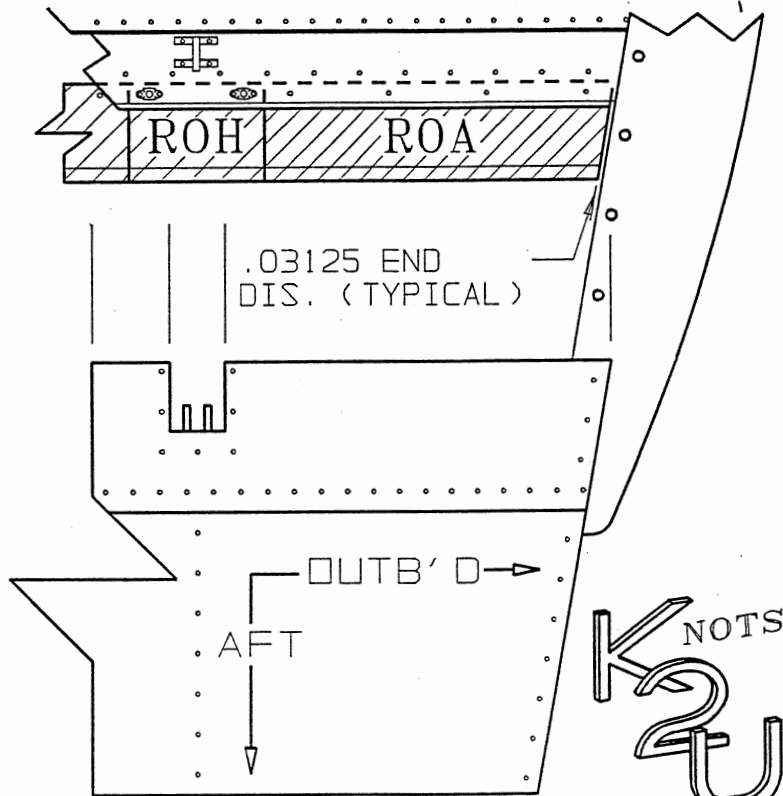
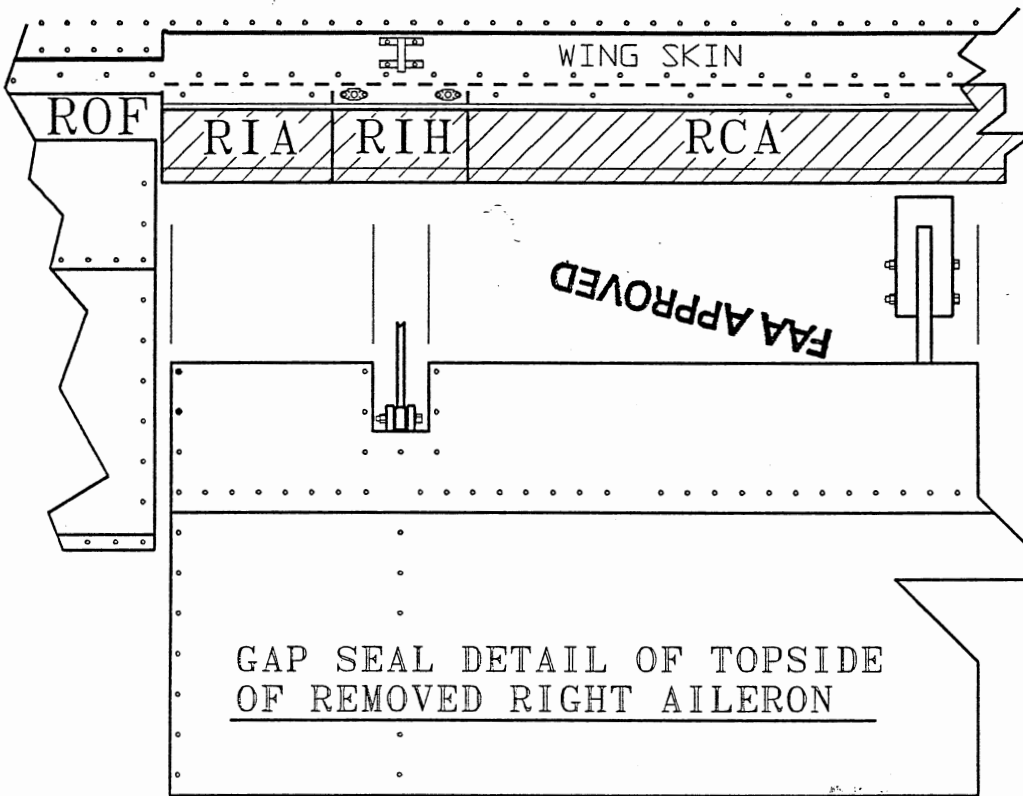
SECTION 5.0 = PAPERWORK =**5.1 PERFORM PAPERWORK AND LOGBOOK ENTRIES-**

Place Maintenance Manual and STC with logs. Component weights:

Gap seals and hardware = 2.2 pounds. Arm = 123.0 ins. Moment = 270.6

SECTION 6.0 = PARTS LIST =

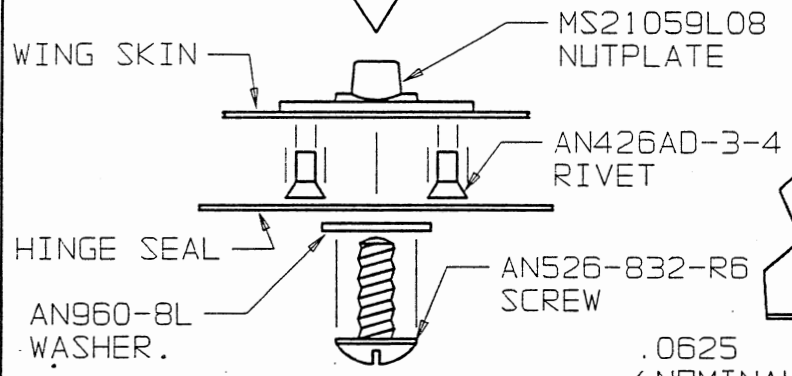
PART NO.	NO. REQ	DESCRIPTION
LOA	1	Left Outboard Aileron Seal
LCA	1	Left Center Aileron Seal
LIA	1	Left Inboard Aileron seal
LIH, LOH, RIH, ROH	1 (4)	Hinge Seal(s)
ROA	1	Right Outboard Aileron Seal
RCA	1	Right Inboard Aileron Seal
RIA	1	Right Inboard Aileron Seal
LOF	1	Left Outboard Flap Seal
LCF	1	Left Center Flap Seal
LIF	1	Left Inboard Flap Seal
ROF	1	Right Outboard Flap Seal
RCF	1	Right Center Flap Seal
RIF	1	Right Inboard Flap Seal
LF	1	Left Flap/Fuselage Seal
RF	1	Right Flap/Fuselage Seal
TLF	1	Top Left Flap/Fuselage Seal
TRF	1	Top Right Flap/Fuselage Seal
AN470-AD4-3	42	Roundhead Rivet
AN470-AD4-5	84	Roundhead Rivet
AN470-AD4-6	108	Roundhead Rivet
AN426-AD3-4	16	Countersunk Rivet
AN426-AD4-4	6	Countersunk Rivet
AN526-832-R6	8	Roundhead Screw
AN960-8	8	Flat Washer
AN960-8L	16	Flat Washer
TRA8X1/2	8	PK Screw
MS21059L08	8	Floating Nut Plate
F22NA17-82*	2*	Nut Plate (Optional, Instead Of MS21059L08)*



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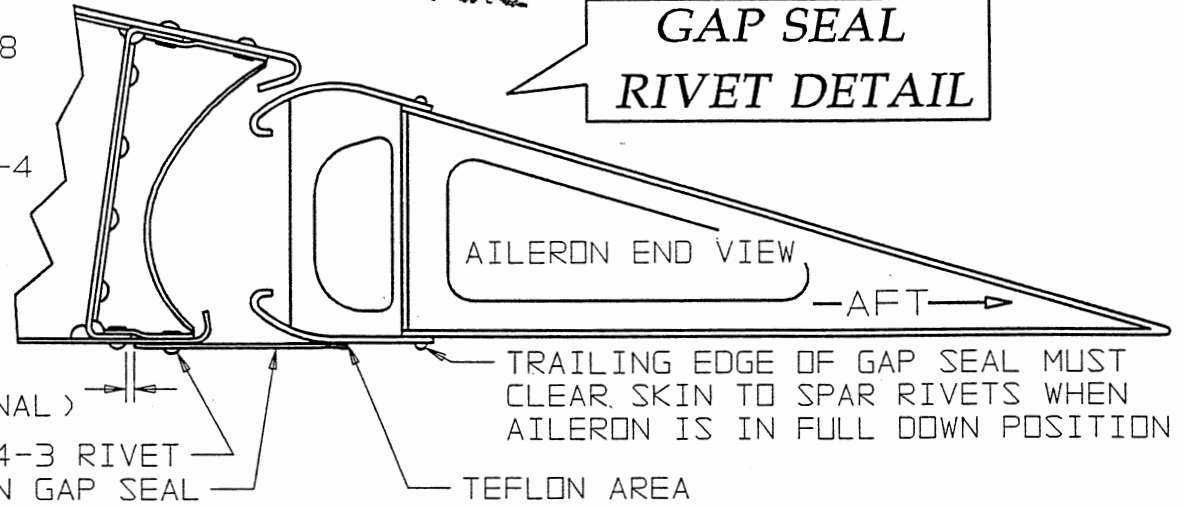
PROPRIETARY INFORMATION
KNOTS 2 U. INC

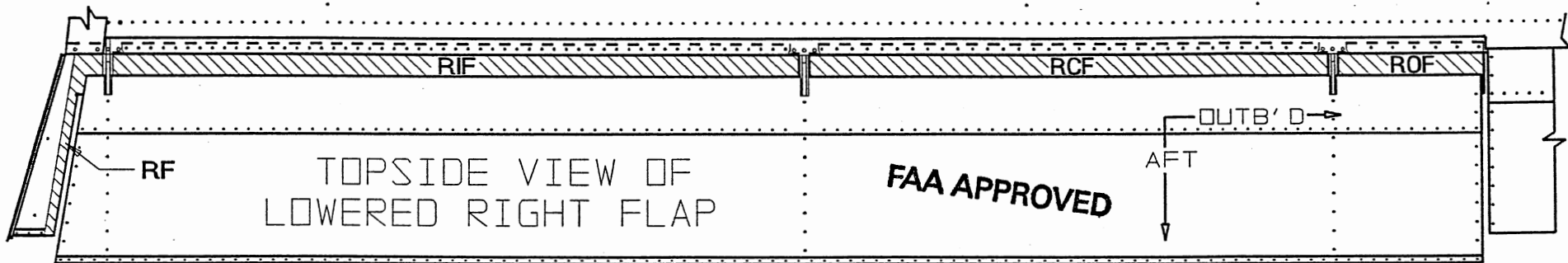
NUTPLATE DETAIL



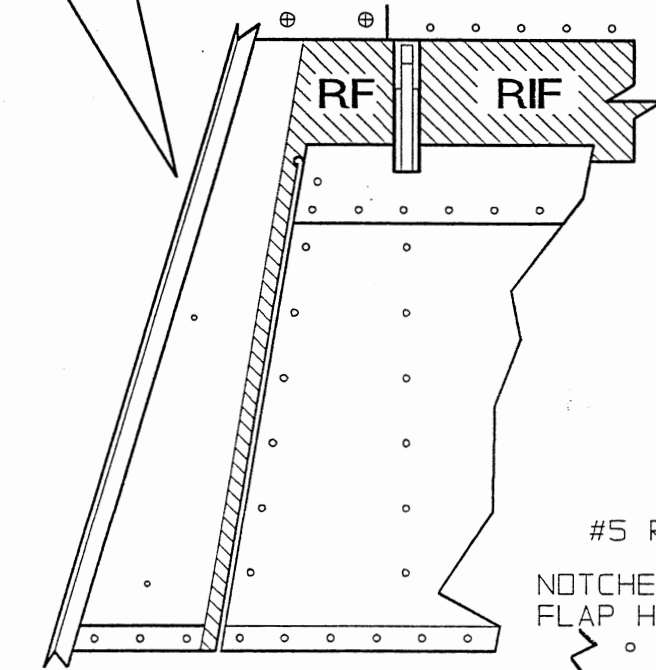
RIGHT SIDE SHOWN,
LEFT SIDE OPPOSITE

GAP SEAL RIVET DETAIL



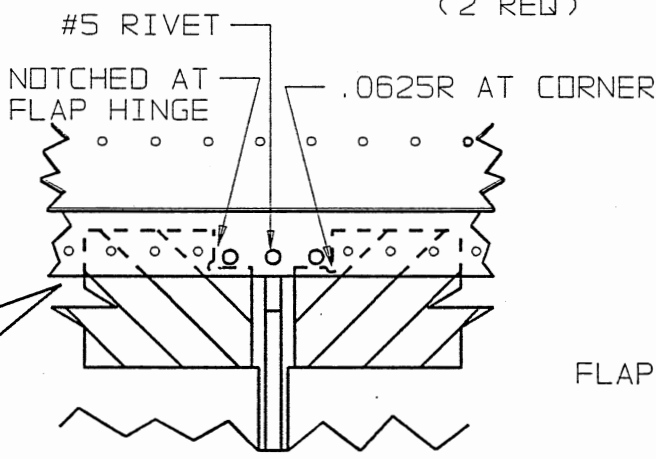


P/N RF DETAIL

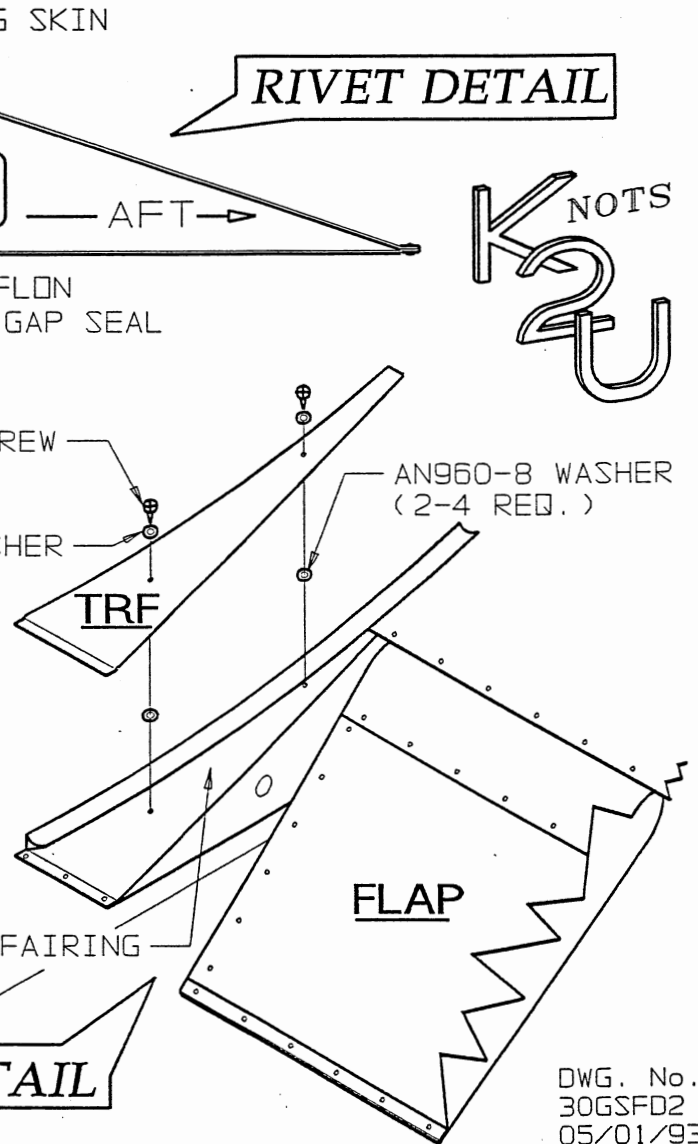


RIGHT SIDE SHOWN,
LEFT SIDE OPPOSITE

NOTCH DETAIL



P/N TRF DETAIL



.1875 MINIMUM
EDGE DISTANCE

INFORMATION
K2U, INC

United States of America
Department of Transportation — Federal Aviation Administration
Supplemental Type Certificate

Number SA526GL

This certificate, issued to Knots 2U, Ltd.
3106 Bieneman Road
Burlington, WI 53105

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part 3 of the Civil Air Regulations. (See Type Certificate Data Sheet No. 1A15 for complete certification basis)

Original Product — Type Certificate Number: 1A15
Make: Piper Aircraft Corporation
Model: PA-24

Description of Type Design Change:

Installation of aileron, flap, flap to fuselage, and rudder gap seals; wing root fairings; and dorsal fin in accordance with the appropriate manual identified in the Knots 2U, Inc. Installation Manual List Number SA526GL, dated July 4, 1987, or later FAA approved revisions.

Limitations and Conditions:

1. Any or all combinations of the above items are approved.
2. Compatibility of this design change with previously approved modifications must be determined by the installer.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: 2/5/81

Date issued: 12/16/81; 7/21/82; 8/20/87;
5/29/90; 5/7/97

Date of issuance: 6/9/81

Date amended: 5/14/82; 8/14/87



By direction of the Administrator

Gregory J. Michaels
Gregory J. Michaels, ^(Signature) Senior Aerospace Engineer
Airframe & Administrative Branch
Chicago Aircraft Certification Office

(Title)

Any alteration of this certificate is punishable by a fine of not exceeding \$1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.47.

SECTION 10.0 MAINTENANCE MANUAL***KNOTS 2U, INC.*****GAP SEALS****FMA APPROVED****PART A. INSPECTION**

1. Daily inspection at pre-flight to ensure there is no bending of the controls, bent gap seals, or broken parts.
2. When aircraft has been stored outside during snow or freezing conditions, a careful inspection should be made of areas behind and under the seals for accumulations of ice. If ice is found which cannot be removed by careful brushing with the seal held slightly away from surface, the aircraft should be de-iced or defrosted.
3. 100 hour inspections are suggested to check for chafing of the control surfaces, wear of the gap seals, peeling of the teflon coating and/or wearing of the rivets. Check for loose rivets and/or other gap seal attachment hardware.

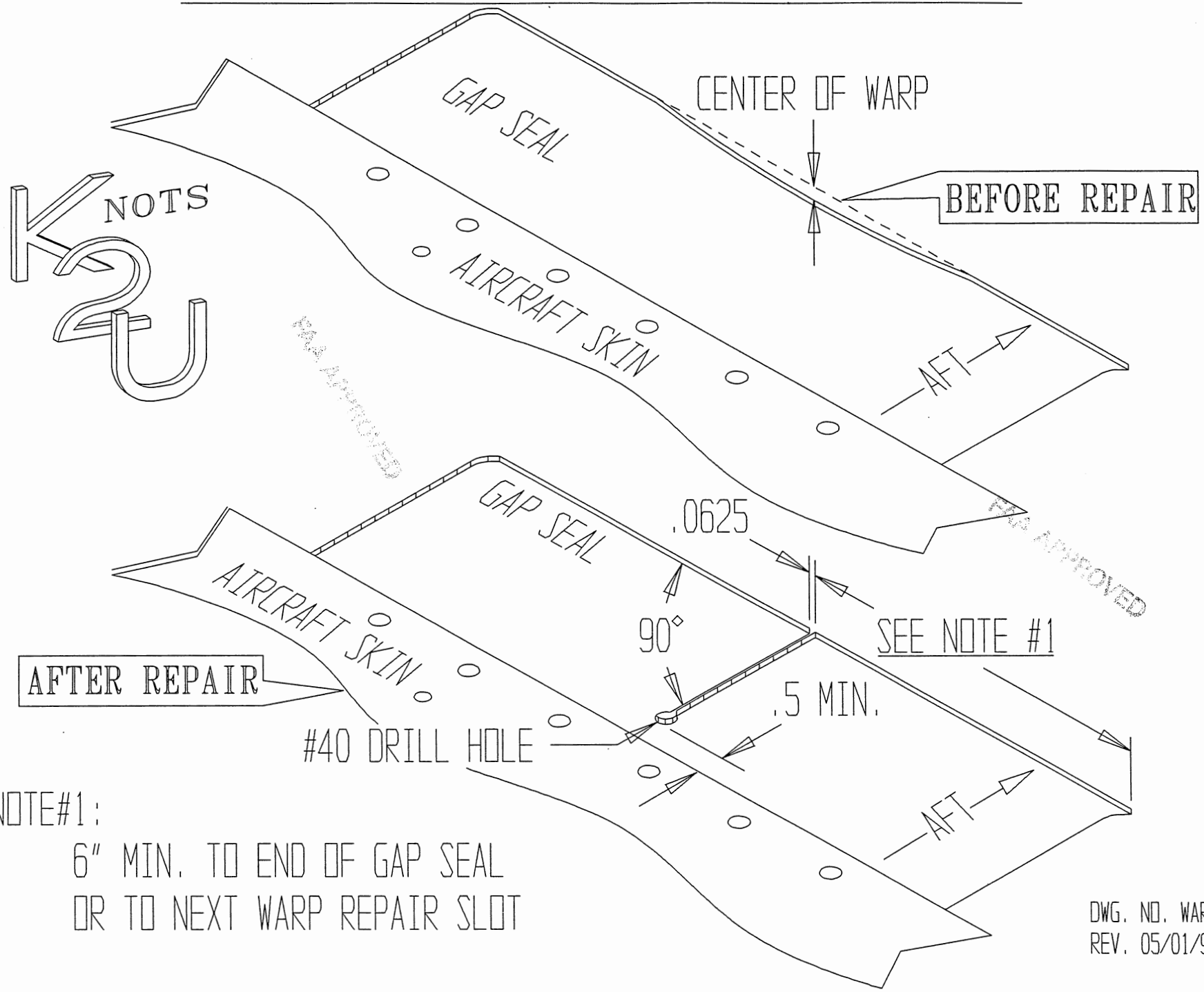
PART B. MAINTENANCE

1. Maintenance of the gap seals is to keep the seal surface clean of oil and dirt and the edge of the seal touching the control surface smoothly. If the gap seal appears to be abrading the control surface 3M 5490 teflon tape, or equivalent should be applied to appropriate seal surface, before further flight to prevent control wear. Replacement teflon tape is available from **KNOTS 2U, INC.**
2. If upon installation, or through wear, there is a warp in the seal, or it lies unevenly, you may drill a #40 size hole and cut the seal to the hole in a direction 90 degrees to the trailing edge of the seal. Drill the hole in the center of the warp, 1/2 inch from the trailing edge of the surface to which the seal is attached. The cut in the seal should be trimmed to a slot 1/32nd inch wide, with parallel edges. Warp slots should be no closer than 6 inches, to each other, or the end of the seal. Refer to Maintenance Detail drawing.
3. When washing aircraft, care should be taken to brush along the length of the seal rather than perpendicular to, or across the seal.
4. When aircraft is painted care should be taken to prevent paint, paint stripper or solvents from contacting the teflon. If teflon is damaged, use the maintenance procedures with 3M 5490 tape, or equivalent.

PART C. CRACKING, DEFECTS, LOOSE RIVETS

1. If cracks are found in a gap seal, stop drill the crack.
2. If there are more than 3 cracks in a gap seal, the seal must be replaced. If the teflon peels 3M 5490 teflon tape, or equivalent, may be applied.
3. If there are excessive bends or kinks in the seal, and the air flow over the control surface is disturbed, the seal must be replaced.
4. If a seal rivet becomes loose drill out the rivet and replace with the next size rivet.

EXAMPLE OF REPAIR OF WARPED GAP SEAL



NOTE#1:

6" MIN. TO END OF GAP SEAL
OR TO NEXT WARP REPAIR SLOT

DWG. NO. WARP
REV. 05/01/93