

[4910-13-U]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39 [63 FR 72132 No. 251 12/31/98]

[Docket No. 96-CE-72-AD; Amendment 39-10972; AD 99-01-05]

RIN 2120-AA64

Airworthiness Directives; All Airplane Models of The New Piper Aircraft, Inc. (formerly Piper Aircraft Corporation) That Are Equipped with Wing Lift Struts

AGENCY: Federal Aviation Administration, DOT.

ACTION: Final rule.

SUMMARY: This amendment supersedes Airworthiness Directive (AD) 93-10-06, which currently requires repetitively inspecting the wing lift struts and wing lift strut forks for cracks or corrosion on all airplane models of The New Piper Aircraft, Inc. (Piper) that are equipped with wing lift struts, and replacing any strut or fork found cracked or corroded. This AD clarifies certain requirements of AD 93-10-06, eliminates the lift strut fork repetitive inspection requirement on the Piper PA-25 series airplanes, incorporates models inadvertently omitted from AD 93-10-06, and requires fabricating and installing a placard on the lift strut. This AD results from reports, questions, and information received from the field on AD 93-10-06, which show a need to clarify and add information that will more fully achieve the safety intent of that AD. The actions specified by this AD are intended to prevent in-flight separation of the wing from the airplane caused by corroded wing lift struts or cracked wing lift forks, which could result in loss of control of the airplane.

DATES: Effective February 8, 1999.

The incorporation by reference of certain publications listed in the regulations is approved by the Director of the Federal Register as of February 8, 1999.

ADDRESSES: The service bulletins referenced in this AD may be obtained from The New Piper Aircraft, Inc., Customer Services, 2926 Piper Drive, Vero Beach, Florida 32960. Copies of the instructions to the Jensen Aircraft STC's may be obtained from Jensen Aircraft, Inc., 9225 County Road 140, Salida, Colorado 81201. Copies of the instructions to the F. Atlee Dodge STC may be obtained from F. Atlee Dodge, Aircraft Services, Inc., P.O. Box 190409, Anchorage, Alaska 99519-0409. This information may also be examined at the Federal Aviation Administration (FAA), Central Region, Office of the Regional Counsel, Attention: Rules Docket No. 96-CE-72-AD, Room 1558, 601 E. 12th Street, Kansas City, Missouri 64106; or at the Office of the Federal Register, 800 North Capitol Street, NW, suite 700, Washington, DC.

FOR FURTHER INFORMATION CONTACT: William O. Herderich, Aerospace Engineer, FAA, Atlanta Certification Office, One Crown Center, 1895 Phoenix Boulevard, suite 450, Atlanta, Georgia 30349; telephone: (770) 703-6084; facsimile: (770) 703-6097.

SUPPLEMENTARY INFORMATION:

Events Leading to the Issuance of This AD

A proposal to amend part 39 of the Federal Aviation Regulations (14 CFR part 39) to include an AD that would apply to all Piper airplane models equipped with wing lift struts was published in the Federal Register as a notice of proposed rulemaking (NPRM) on April 23, 1998, (63 FR 20143). The NPRM proposed to supersede AD 93-10-06, Amendment 39-8586 (58 FR 29965, May 25, 1993), which currently requires repetitively inspecting the wing lift struts and wing lift strut forks for cracks or corrosion, and replacing any strut or fork found cracked or

corroded. The NPRM proposed to retain the requirements of repetitively inspecting the wing lift struts and wing lift strut forks for cracks or corrosion, and replacing any strut or fork found cracked or corroded. The proposed NPRM would also clarify certain requirements of AD 93-10-06, eliminate the lift strut fork repetitive inspection requirement on the Piper PA-25 series airplanes, incorporate airplane models inadvertently omitted from the applicability of AD 93-10-06, and require installing a placard on the lift strut. Accomplishment of the inspections specified in the NPRM would be required in accordance with Piper Service Bulletin (SB) No. 528D, dated October 19, 1990, or Piper SB No. 910A, dated October 10, 1989; or the Appendix to the proposed AD.

Accomplishment of the installation as specified in the NPRM would be required in accordance with one of the following:

- The maintenance manual for original equipment manufacturer (OEM) wing lift struts or new sealed wing lift strut assemblies as referenced in Piper SB 528D, dated October 19, 1990, or Piper SB No. 910A, dated October 10, 1989;
- F. Atlee Dodge Instructions No. 3233-I for Modified Piper Wing Lift Struts (STC SA4635NM), dated February 1, 1991; or
- Jensen Aircraft Installation Instructions for Modified Lift Strut Fittings, which incorporates the following pages:

Pages	Revision Level	Date
1 and 5	Original Issue	July 15, 1983
2, 4, and 6	Revision No. 1	March 30, 1984
and 3	Revision No. 2	April 20, 1984

The NPRM was the result of reports, questions, and information received from the field on AD 93-10-06, which show a need to clarify and add information that will more fully achieve the safety intent of that AD.

Interested persons have been afforded an opportunity to participate in the making of this amendment. Due consideration has been given to the two comments received.

Comment Disposition

Both commenters request that the FAA reference Univair Aircraft Corporation lift strut assemblies in the AD. Univair holds a parts manufacturer approval (PMA) for parts that are identical to the improved design Piper lift strut assemblies referenced in the NPRM.

The FAA does not concur. FAA policy is to not reference PMA parts in AD's, unless the FAA determines that the unsafe condition applies to the PMA parts. If these Univair parts are installed, then the actions of this AD would not apply because the parts are an FAA-approved equivalent to the improved design Piper lift strut assemblies that, when installed, eliminate the repetitive inspection requirement of the AD.

No changes have been made to the AD based on these comments.

The FAA's Determination

After careful review of all available information related to the subject presented above, the FAA has determined that air safety and the public interest require the adoption of the rule as proposed except for minor editorial corrections. The FAA has determined that these minor corrections will not change the meaning of the AD and will not add any additional burden upon the public than was already proposed.

Cost Impact

The FAA estimates that 22,000 airplanes in the U.S. registry will be affected by this AD, that it will take approximately 8 workhours per airplane to accomplish the initial inspection, and that the average labor rate is approximately \$60 an hour. Based on these figures, the total cost impact of this AD on U.S. operators is estimated to be \$10,560,000, or \$480 per airplane.

These figures are based only on the cost of the initial inspection and do not account for the costs of any repetitive inspections. The FAA has no way of determining how many repetitive inspections each owner/operator will incur over the life of the airplane. The FAA also has no way of determining how many airplanes have improved design wing lift struts and forks installed. This will eliminate the requirements of this AD, and thus reduce the cost impact of this AD upon the public.

AD 93-10-06 currently requires the same actions as proposed in this document. The only differences between AD 93-10-06 and this AD are the addition of ultrasonic methods as an option for accomplishing the inspections, the elimination of the requirement of inspecting the lift strut forks on Piper PA-25 series airplanes, the addition of certain airplane models equipped with Piper lift strut assemblies, the addition of the requirement of installing the "No Step" placard on the wing lift struts, and editorial corrections and additions for clarification purposes.

Regulatory Impact

The regulations adopted herein will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12612, it is determined that this final rule does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

For the reasons discussed above, I certify that this action (1) is not a "significant regulatory action" under Executive Order 12866; (2) is not a "significant rule" under DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979); and (3) will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act. A copy of the final evaluation prepared for this action is contained in the Rules Docket. A copy of it may be obtained by contacting the Rules Docket at the location provided under the caption "ADDRESSES".

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

Adoption of the Amendment

Accordingly, pursuant to the authority delegated to me by the Administrator, the Federal Aviation Administration amends part 39 of the Federal Aviation Regulations (14 CFR part 39) as follows:

PART 39 - AIRWORTHINESS DIRECTIVES

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

§ 39.13 [Amended]

2. Section 39.13 is amended by removing Airworthiness Directive (AD) 93-10-06, Amendment 39-8536 (58 FR 29965, May 25, 1993), and by adding a new AD to read as follows:

AIRWORTHINESS DIRECTIVE

REGULATORY SUPPORT DIVISION
P.O. BOX 26460
OKLAHOMA CITY, OKLAHOMA 73125-0460

The following Airworthiness Directive issued by the Federal Aviation Administration in accordance with the provisions of Federal Aviation Regulations, Part 39, applies to an aircraft model of which our records indicate you may be the registered owner. Airworthiness Directives affect aviation safety and are regulations which require immediate attention. You are cautioned that no person may operate an aircraft to which an Airworthiness Directive applies, except in accordance with the requirements of the Airworthiness Directive (reference FAR Subpart 39.3).

99-01-05 THE NEW PIPER AIRCRAFT, INC.: Amendment 39-10972; Docket No. 96-CE-72-AD;
Supersedes AD 93-10-06, Amendment 39-8536.

Applicability: The following model and serial number airplanes, certificated in any category:

Models Serial Numbers

TG-8 (Army TG-8, Navy XLNP-1) All serial numbers

E-2 and F-2 All serial numbers

J3C-40, J3C-50, J3C-50S, (Army L-4, L-4B, All serial numbers

L-4H, and L-4J), J3C-65 (Navy NE-1 and

NE-2), J3C-65S J3F-50, J3F-50S, J3F-60,

J3F-60S, J3F-65 (Army L-4D), J3F-65S,

J3L, J3L-S, J3L-65 (Army L-4C), and J3L-65S

J4, J4A, J4A-S, and J4E (Army L-4E) 4-401 through 4-1649

J5A (Army L-4F), J5A-80, J5B, (Army L-4G), All serial numbers

J5C, L-14, AE-1, and HE-1

PA-11 and PA-11S 11-1 through 11-1678

PA-12 and PA-12S 12-1 through 12-4036

PA-14 14-1 through 14-523

PA-15 15-1 through 15-388

PA-16 and PA-16S 16-1 through 16-736

PA-17 17-1 through 17-215

PA-18, PA-18S, PA-18 "105" (Special), 18-1 through 18-8309025, 189001

PA-18S "105" (Special) PA-18A, PA-18 "125", through 1809032, and 1809034

(Army L-21A), PA-18S "125", PA-18AS "125", through 1809040

PA-18 "135" (Army L-21B), PA-18A "135",

PA-18S "135", PA-18AS "135", PA-18 "150",

PA-18A "150", PA-18S "150", PA-18AS "150",

PA-18A (Restricted), PA-18A "135" (Restricted),

and PA-18A "150" (Restricted)

PA-19 (Army L-18C), and PA-19S 19-1, 19-2, and 19-3

PA-20, PA-20S, PA-20 "115", PA-20S "115", 20-1 through 20-1121

PA-20 "135", and PA-20S "135"

PA-22, PA-22-108, PA-22-135, PA-22S-135, 22-1 through 22-9848

PA-22-150, PA-22S-150, PA-22-160, and PA-22S-160

PA-25, PA-25-235, and PA-25-260 25-1 through 25-8156024

NOTE 1: This AD applies to each airplane identified in the preceding applicability provision, regardless of whether it has been modified, altered, or repaired in the area subject to the requirements of this AD. For airplanes that have been modified, altered, or repaired so that the performance of the requirements of this AD is affected, the owner/operator must request approval for an alternative method of compliance in accordance with paragraph (f) of this AD. The request should include an assessment of the effect of the modification, alteration, or repair on the unsafe condition addressed by this AD; and, if the unsafe condition has not been eliminated, the request should include specific proposed actions to address it.

Compliance: Required as indicated in the body of this AD, unless already accomplished.

To prevent in-flight separation of the wing from the airplane caused by corroded wing lift struts or cracked wing lift strut forks, which could result in loss of control of the airplane, accomplish the following:

NOTE 2: The paragraph structure of this AD is as follows:

Level 1: (a), (b), (c), etc.

Level 2: (1), (2), (3), etc.

Level 3: (i), (ii), (iii), etc.

Level 4: (A), (B), (C), etc.

Level 2, Level 3, and Level 4 structures are designations of the Level 1 paragraph they immediately follow.

(a) For all affected airplane models, within 1 calendar month after the effective date of this AD or within 24 calendar months after the last inspection accomplished in accordance with AD 93-10-06 (superseded by this action), whichever occurs later, remove the wing lift struts in accordance with Piper Service Bulletin (SB) No. 528D, dated October 19, 1990, or Piper SB No. 910A, dated October 10, 1989, as applicable, and accomplish

one of the following (the actions in either paragraph (a)(1), (a)(2), (a)(3), (a)(4), or (a)(5); including subparagraphs, of this AD):

(1) Inspect the wing lift struts for corrosion in accordance with the "Instructions" section in Part I of either Piper SB No. 528D, dated October 19, 1990, or Piper SB No. 910A, dated October 10, 1989, as applicable.

(i) If no perceptible dents (as defined in the above SB's) are found in the wing lift strut and no corrosion is externally visible, prior to further flight, apply corrosion inhibitor to each strut in accordance with whichever of the above SB's that is applicable. Reinspect the lift struts at intervals not to exceed 24 calendar months and accomplish any of the requirements of paragraph (a) of this AD, including all subparagraphs.

(ii) If a perceptible dent (as defined in the above SB's) is found in the wing lift strut or external corrosion is found, prior to further flight, accomplish one of the installations (and subsequent actions presented in each paragraph) specified in paragraphs (a)(3), (a)(4), or (a)(5) of this AD.

(2) Inspect the wing lift struts for corrosion in accordance with the Appendix to this AD. The inspection procedures in this Appendix must be accomplished by a Level 2 inspector certified using the guidelines established by the American Society for Non-destructive Testing, or MIL-STD-410.

(i) If no corrosion is found that is externally visible and all requirements in the Appendix to this AD are met, prior to further flight, apply corrosion inhibitor to each strut in accordance with whichever of the above SB's that is applicable. Reinspect the lift struts at intervals not to exceed 24 calendar months and accomplish any of the requirements of paragraph (a) of this AD, including all subparagraphs.

(ii) If external corrosion is found or if any of the requirements in the Appendix of this AD are not met, prior to further flight, accomplish one of the installations (and subsequent actions presented in each paragraph) specified in paragraphs (a)(3), (a)(4), or (a)(5) of this AD.

(3) Install original equipment manufacturer (OEM) part number wing struts (or FAA-approved equivalent part numbers) that have been inspected in accordance with the specifications presented in either paragraph (a)(1) or (a)(2) of this AD, and are found to be airworthy according to the inspection requirements included in these paragraphs. Thereafter, inspect these wing lift struts at intervals not to exceed 24 calendar months in accordance with the specifications presented in either paragraph (a)(1) or (a)(2) of this AD.

(4) Install new sealed wing lift strut assemblies, part numbers as specified in Piper SB No. 528D and Piper SB No. 910A (or FAA-approved equivalent part numbers) on each wing as specified in the Instructions section in Part II of the above-referenced SB's. These sealed wing lift strut assemblies also include the wing lift strut forks. Installation of these assemblies constitute terminating action for the inspection requirements of both paragraphs (a) and (b) of this AD.

(5) Install F. Atlee Dodge wing lift strut assemblies in accordance with F. Atlee Dodge Installation Instructions No. 3233-I for Modified Piper Wing Lift Struts (Supplemental Type Certificate (STC) SA4635NM), dated February 1, 1991. Thereafter, inspect these wing lift struts at intervals not to exceed 60 calendar months in accordance with the specifications presented in paragraph (a)(1) or (a)(2) of this AD.

(b) For all affected airplane models, except for Models PA-25, PA-25-235, and PA-25-260, within the next 100 hours time-in-service (TIS) after the effective date of this AD or within 500 hours TIS after the last inspection accomplished in accordance with AD 93-10-06 (superseded by this action), whichever occurs later, remove the wing lift strut forks, and accomplish one of the following (the actions in either paragraph (b)(1), (b)(2), (b)(3), (b)(4), or (b)(5); including subparagraphs, of this AD):

(1) Inspect the wing lift strut forks using FAA-approved magnetic particle procedures.

(i) If no cracks are found, reinspect at intervals not to exceed 500 hours TIS provided that the replacement requirements of paragraphs (b)(1)(ii)(B) and (b)(1)(ii)(C) of this AD have been met.

(ii) Replace the wing lift strut forks at whichever of the following is applicable:

(A) If cracks are found on any wing lift strut fork: Prior to further flight;

(B) If the airplane is equipped with floats or has been equipped with floats within the last 2,000 hours TIS and no cracks are found during the above inspections: Upon accumulating 1,000 hours TIS on the wing lift strut forks or within the next 100 hours TIS, whichever occurs later; or

(C) If the airplane has not been equipped with floats within the last 2,000 hours TIS and no cracks are found during the above inspections: Upon accumulating 2,000 hours TIS on the wing lift strut forks or within the next 100 hours TIS, whichever occurs later.

(iii) Replacement parts shall be of the same part numbers of the existing part (or FAA-approved equivalent part numbers) and shall be manufactured with rolled threads. Lift strut forks manufactured with machined (cut) threads shall not be utilized.

(iv) The 500-hour TIS interval repetitive inspections are still required when the above replacements are accomplished.

(2) Install new OEM part number wing lift strut forks (or FAA-approved equivalent part numbers). Reinspect and replace these wing lift strut forks at the intervals specified in paragraphs (b)(1)(i), (b)(1)(ii), (b)(1)(iii), and (b)(1)(iv), including all subparagraphs, of this AD.

(3) Install new sealed wing lift strut assemblies, part numbers as specified in Piper SB No. 528D and Piper SB No. 910A (or FAA-approved equivalent part numbers) on each wing, as specified in the Instructions section in Part II of the above-referenced SB's.

(i) This installation may have "already been accomplished" through the actions specified in paragraph (a)(4) of this AD.

(ii) No repetitive inspections are required after installing these sealed wing lift strut assemblies.

(4) Install Jensen Aircraft wing lift strut fork assemblies as specified in the STC's presented in the paragraphs that follow, as applicable, in accordance with Jensen Aircraft Installation Instructions for Modified Lift Strut Fittings, which incorporates the following pages:

Pages	Revision Level	Date
1 and 5	Original Issue	July 15, 1983
2, 4, and 6	Revision No. 1	March 30, 1984
a and 3	Revision No. 2	April 20, 1984

No repetitive inspections are required after installing these Jensen Aircraft wing lift strut fork assemblies; however, repetitive inspections of the lift strut are required as specified in paragraph (a)(1), (a)(2), or (a)(3) of this AD:

(i) For Models PA-12 and PA-12S airplanes: STC SA1583NM;

(ii) For Model PA-14 airplanes: STC SA1584NM;

(iii) For the Models PA-16 and PA-16S airplanes: STC SA1590NM;

(iv) For the Models PA-18, PA-18S, 189001 PA-18 "105" (Special), PA-18S "105" (Special), PA-18A, PA-18 "125" (Army L-21A), PA-18S "125", PA-18AS "125", PA-18 "135" (Army L-21B), PA-18A "135", PA-18S "135", PA-18S "135", PA-18AS "135", PA-18 "150", PA-18A "150", PA-18S "150", PA-18AS "150", PA-18A (Restricted), PA-18A "135" (Restricted), and PA-18A "150" (Restricted) airplanes: STC SA1585NM;

(v) For the Models PA-20, PA-20S, PA-20 "115", PA-20S "115", PA-20 "135", and PA-20S "135" airplanes: STC SA1586NM; and

(vi) For the Model PA-22 airplanes: STC SA1587NM.

(5) Install F. Atlee Dodge wing lift strut assemblies in accordance with F. Atlee Dodge Installation Instructions No. 3233-I for Modified Piper Wing Lift Struts (STC SA4635NM), dated February 1, 1991.

(i) No repetitive inspections of the wing lift strut forks are required when these assemblies are installed.

(ii) This installation may have "already been accomplished" through the actions specified in paragraph (a)(5) of this AD.

(c) If holes are drilled, in either one of the scenarios presented in paragraphs (c)(1) and (c)(2) of this AD, to attach cuffs, door clips, or other hardware, inspect the wing lift struts at intervals not to exceed 24 calendar months using the procedures specified in paragraphs (a)(1) and (a)(2), including all subparagraphs, of this AD:

(1) Wing lift strut assemblies installed in accordance with (a)(4) or (b)(3) of this AD; or

(2) F. Atlee Dodge wing lift strut assemblies installed in accordance with paragraph (a)(5) or (b)(5) of this AD.

(d) For all affected airplane models, within 1 calendar month after the effective date of this AD or within 24 calendar months after the last inspection accomplished in accordance with AD 93-10-06 (superseded by this action), whichever occurs later, and thereafter prior to further flight after the installation of any lift strut assembly, accomplish one of the following:

(1) Install "NO STEP" decal, Piper part number (P/N) 80944-02, on each wing lift strut approximately 6 inches from the bottom of the struts in a way that the letters can be read when entering and exiting the aircraft; or

(2) Paint the statement "NO STEP" approximately 6 inches from the bottom of the struts in a way that the letters can be read when entering and exiting the aircraft. Use a minimum of 1-inch letters using a color that contrasts with the color of the airplane.

(e) Special flight permits may be issued in accordance with sections 21.197 and 21.199 of the Federal Aviation Regulations (14 CFR 21.197 and 21.199) to operate the airplane to a location where the requirements of this AD can be accomplished.

(f) An alternative method of compliance or adjustment of the initial or repetitive compliance times that provides an equivalent level of safety may be approved by the Manager, Atlanta Aircraft Certification Office (ACO), One Crown Center, 1895 Phoenix Boulevard, suite 450, Atlanta, Georgia 30349.

(1) The request shall be forwarded through an appropriate FAA Maintenance Inspector, who may add comments and then send it to the Manager, Atlanta ACO.

(2) Alternative methods of compliance approved in accordance with AD 93-10-06, Amendment 39-8536, are considered approved as alternative methods of compliance for this AD.

NOTE 3: Information concerning the existence of approved alternative methods of compliance with this AD, if any, may be obtained from the Atlanta Aircraft Certification Office.

(g) The inspections required by this AD shall be done in accordance with Piper Service Bulletin No. 528D, dated October 19, 1990, and Piper Service Bulletin No. 910A, dated October 10, 1989. The installation required by this AD shall be done in accordance with F. Atlee Dodge Installation Instructions No. 3233-I for Modified Piper Wing Lift Struts (Supplemental Type Certificate (STC) SA4635NM), dated February 1, 1991, and Jensen Aircraft Installation Instructions for Modified Lift Strut Fittings, which incorporates the following pages:

Pages	Revision Level	Date
1 and 5	Original Issue	July 15, 1983
2, 4, and 6	Revision No. 1	March 30, 1984
a and 3	Revision No. 2	April 20, 1984

This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. The service bulletins referenced in this AD may be obtained from The New Piper Aircraft, Inc., Customer Services, 2926 Piper Drive, Vero Beach, Florida 32960. Copies of the instructions to the Jensen Aircraft STC's may be obtained from Jensen Aircraft, 9225 County Road 140, Salida, Colorado 81201. Copies of the instructions to the F. Atlee Dodge STC may be obtained from F. Atlee Dodge, Aircraft Services, Inc., P.O. Box 190409, Anchorage, Alaska 99519-0409. Copies may be inspected at the FAA, Central Region, Office of the Regional Counsel, Room 1558, 601 E. 12th Street, Kansas City, Missouri, or at the Office of the Federal Register, 800 North Capitol Street, NW, suite 700, Washington, DC.

(h) This amendment supersedes AD 93-10-06, Amendment 39-8536.

(i) This amendment becomes effective on February 8, 1999.

FOR FURTHER INFORMATION CONTACT:

William O. Herderich, Aerospace Engineer, FAA, Atlanta Certification Office, One Crown Center, 1895 Phoenix Boulevard, suite 450, Atlanta, Georgia 30349; telephone: (770) 703-6084; facsimile: (770) 703-6097.

APPENDIX TO AD 99-01-05; AMENDMENT 39-10972;

DOCKET NO. 96-CE-72-AD

PROCEDURES AND REQUIREMENTS

FOR ULTRASONIC INSPECTION OF PIPER WING LIFT STRUTS

Equipment Requirements

1. A portable ultrasonic thickness gauge or flaw detector with echo-to-echo digital thickness readout capable of reading to 0.001-inch and an A-trace waveform display will be needed to accomplish this inspection.

2. An ultrasonic probe with the following specifications will be needed to accomplish this inspection: 10 MHz (or higher), 0.283-inch (or smaller) diameter dual element or delay line transducer designed for thickness gauging. The transducer and ultrasonic system shall be capable of accurately measuring the thickness of AISI 4340 steel down to 0.020-inch. An accuracy of +/- 0.002-inch throughout a 0.020-inch to 0.050-inch thickness range while calibrating shall be the criteria for acceptance.

3. Either a precision machined step wedge made of 4340 steel (or similar steel with equivalent sound velocity) or at least three shim samples of same material will be needed to accomplish this inspection. One thickness of the step wedge or shim shall be less than or equal to 0.020-inch, one shall be greater than or equal to 0.050-inch, and at least one other step or shim shall be between these two values.

4. Glycerin, light oil, or similar non-water based ultrasonic couplants are recommended in the setup and inspection procedures. Water-based couplants, containing appropriate corrosion inhibitors, may be utilized, provided they are removed from both the reference standards and the test item after the inspection procedure is completed and adequate corrosion prevention steps are then taken to protect these items.

• **NOTE:** Couplant is defined as "a substance used between the face of the transducer and test surface to improve transmission of ultrasonic energy across the transducer/strut interface."

• NOTE: If surface roughness due to paint loss or corrosion is present, the surface should be sanded or polished smooth before testing to assure a consistent and smooth surface for making contact with the transducer. Care shall be taken to remove a minimal amount of structural material. Paint repairs may be necessary after the inspection to prevent further corrosion damage from occurring. Removal of surface irregularities will enhance the accuracy of the inspection technique.

instrument Setup

1. Set up the ultrasonic equipment for thickness measurements as specified in the instrument's user's manual. Because of the variety of equipment available to perform ultrasonic thickness measurements, some modification to this general setup procedure may be necessary. However, the tolerance requirement of step 13 and the record keeping requirement of step 14, must be satisfied.
2. If battery power will be employed, check to see that the battery has been properly charged. The testing will take approximately two hours. Screen brightness and contrast should be set to match environmental conditions.
3. Verify that the instrument is set for the type of transducer being used, i.e. single or dual element, and that the frequency setting is compatible with the transducer.
4. If a removable delay line is used, remove it and place a drop of couplant between the transducer face and the delay line to assure good transmission of ultrasonic energy. Reassemble the delay line transducer and continue.
5. Program a velocity of 0.231-inch/microsecond into the ultrasonic unit unless an alternative instrument calibration procedure is used to set the sound velocity.
6. Obtain a step wedge or steel shims per item 3 of the Equipment Requirements. Place the probe on the thickest sample using couplant. Rotate the transducer slightly back and forth to "ring" the transducer to the sample. Adjust the delay and range settings to arrive at an A-trace signal display with the first backwall echo from the steel near the left side of the screen and the second backwall echo near the right of the screen. Note that when a single element transducer is used, the initial pulse and the delay line/steel interface will be off of the screen to the left. Adjust the gain to place the amplitude of the first backwall signal at approximately 80% screen height on the A-trace.
7. "Ring" the transducer on the thinnest step or shim using couplant. Select positive half-wave rectified, negative half-wave rectified, or filtered signal display to obtain the cleanest signal. Adjust the pulse voltage, pulse width, and damping to obtain the best signal resolution. These settings can vary from one transducer to another and are also user dependent.
8. Enable the thickness gate, and adjust the gate so that it starts at the first backwall echo and ends at the second backwall echo. (Measuring between the first and second backwall echoes will produce a measurement of the steel thickness that is not affected by the paint layer on the strut). If instability of the gate trigger occurs, adjust the gain, gate level, and/or damping to stabilize the thickness reading.
9. Check the digital display reading and if it does not agree with the known thickness of the thinnest thickness, follow your instrument's calibration recommendations to produce the correct thickness reading. When a single element transducer is used this will usually involve adjusting the fine delay setting.
10. Place the transducer on the thickest step of shim using couplant. Adjust the thickness gate width so that the gate is triggered by the second backwall reflection of the thick section. If the digital display does not agree with the thickest thickness, follow your instruments calibration recommendations to produce the correct thickness reading. A slight adjustment in the velocity may be necessary to get both the thinnest and the thickest reading correct. Document the changed velocity value.
11. Place couplant on an area of the lift strut which is thought to be free of corrosion and "ring" the transducer to surface. Minor adjustments to the signal and gate settings may be required to account for coupling improvements resulting from the paint layer. The thickness gate level should be set just high enough so as not to be triggered by irrelevant signal noise. An area on the upper surface of the lift strut above the inspection area would be a good location to complete this step and should produce a thickness reading between 0.034-inch and 0.041-inch.

12. Repeat steps 8, 9, 10, and 11 until both thick and thin shim measurements are within tolerance and the lift strut measurement is reasonable and steady.

13. Verify that the thickness value shown in the digital display is within +/- 0.002-inch of the correct value for each of the three or more steps of the setup wedge or shims. Make no further adjustments to the instrument settings.

14. Record the ultrasonic versus actual thickness of all wedge steps or steel shims available as a record of setup.

Inspection procedure

1. Clean the lower 18 inches of the wing lift struts using a cleaner that will remove all dirt and grease. Dirt and grease will adversely affect the accuracy of the inspection technique. Light sanding or polishing may also be required to reduce surface roughness as noted in the equipment requirements section.

2. Using a flexible ruler, draw a 1/4-inch grid on the surface of the first 11 inches from the lower end of the strut as shown in Piper Service Bulletin No. 528D or 910A, as applicable. This can be done using a soft (#2) pencil and should be done on both faces of the strut. As an alternative to drawing a complete grid, make two rows of marks spaced every 1/4-inch across the width of the strut. One row of marks should be about 11 inches from the lower end of the strut, and the second row should be several inches away where the strut starts to narrow. Lay the flexible ruler between respective tick marks of the two rows and use tape or a rubber band to keep the ruler in place. See Figure 1.

3. Apply a generous amount of couplant inside each of the square areas or along the edge of the ruler. Re-application of couplant may be necessary.

4. Place the transducer inside the first square area of the drawn grid or at the first 1/4-inch mark on the ruler and "ring" the transducer to the strut. When using a dual element transducer, be very careful to record the thickness value with the axis of the transducer elements perpendicular to any curvature in the strut. If this is not done, loss of signal or inaccurate readings can result.

5. Take readings inside each square on the grid or at 1/4-inch increments along the ruler and record the results. When taking a thickness reading, rotate the transducer slightly back and forth and experiment with the angle of contact to produce the lowest thickness reading possible. Pay close attention to the A-scan display to assure that the thickness gate is triggering off of maximized backwall echoes.

• NOTE: A reading shall not exceed .041-inch. If a reading exceeds .041-inch, repeat steps 13 and 14 of the Instrument Setup section before proceeding further.

6. If the A-trace is unsteady or the thickness reading is clearly wrong, adjust the signal gain and/or gate setting to obtain reasonable and steady readings. If any instrument setting is adjusted, repeat steps 13 and 14 of the instrument Setup section before proceeding further.

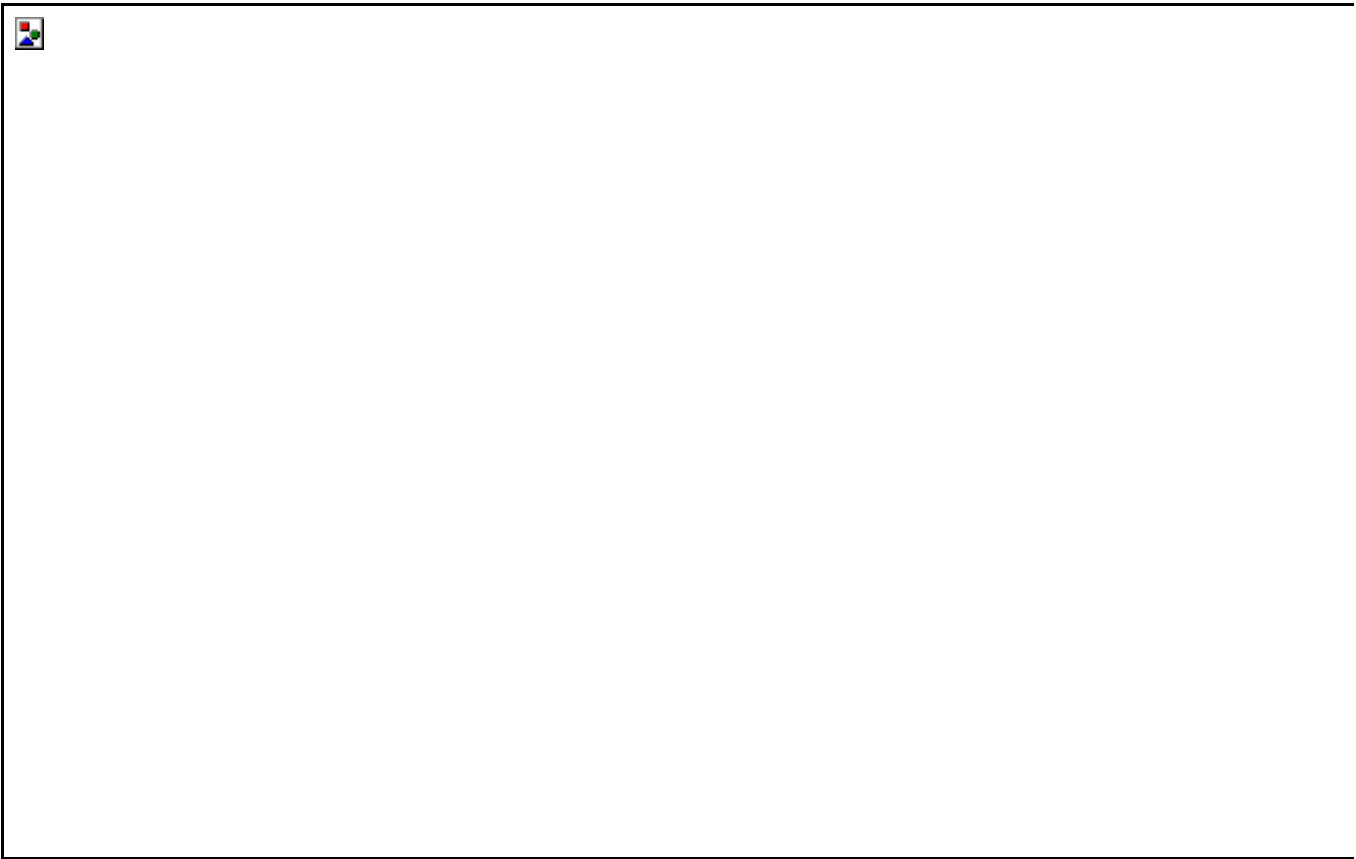
7. In areas where obstructions are present, take a data point as close to the correct area as possible.

• NOTE: The strut wall contains a fabrication bead at approximately 40% of the strut chord. The bead may interfere with accurate measurements in that specific location.

8. A measurement of 0.024-inch or less shall require replacement of the strut prior to further flight

9. If at any time during testing an area is encountered where a valid thickness measurement cannot be obtained due to a loss of signal strength or quality, the area shall be considered suspect. These areas may have a remaining wall thickness of less than 0.020-inch, which is below the range of this setup, or they may have small areas of localized corrosion or pitting present. The latter case will result in a reduction in signal strength due to the sound being scattered from the rough surface and may result in a signal that includes echoes from the pits as well as the backwall. The suspect area(s) shall be tested with a Maule "Fabric Tester" as specified in Piper Service Bulletin No. 528D or 910A.

10. Record the lift strut inspection in the aircraft log book.



A large empty rectangular box with a thin black border, occupying the lower half of the page. In the top-left corner of this box, there is a small, square icon containing a colorful, abstract pattern. The rest of the box is completely blank, intended for recording the details of the lift strut inspection.

Figure 1