LIIKENTEEN TURVALLISUUSVIRASTO

T 5558/13

LENTOKELPOISUUSTIEDOTE

17.12.2013

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Euroopan unionin yhteisen ilmailuviranomaisen EASA:n päätöksen 2/2003 mukaisesti suunnitteluvaltion lentokelpoisuusmääräyksen noudattaminen on ilma-aluksen jatkuvan lentokelpoisuuden edellytyksenä. Määräyksen mukaisen toimenpiteen saa tehdä ja kuitata, jollei Liikenteen turvallisuusvirasto (Trafi) määrää toisin, se jolla ilmailumääräyksen mukaisesti on oikeus tehdä kyseisen ilma-aluksen tai -välineen määräaikaishuoltoja.

Suunnitteluvaltion lentokelpoisuusmääräys (Yhdysvallat) AD98-15-18R1

Maule Aerospace Technology. Siipitukien tarkastus.

Koskee: Seuraavia Maule-merkkisiä lentokoneita:

Bee Dee M-4	M-4	M-4C	M-4S	M-4T
M-4-180C	M-4-180S	M-4-180T	M-4-210	M-4-210C
M-4-210S	M-4-210T	M-4-220	M-4-220C	M-4-220S
M-4-220T	M-5-180C	M-5-200	M-5-210C	M-5-210TC
M-5-220C	M-5-235C	M-6-180	M-6-235	M-7-235
M-7-235A	M-7-235B	M-7-235C	MT-7-235	MX-7-160
MX-7-180	MX-7-180A	MX-7-180B	MX-7-235	MX-7-420
MXT-7-160	MXT-7-180	MXT-7-180A	M-8-235	

Lentokelpoisuusmääräyksen vaatimat toimenpiteet:

Määräaika

A. Tee alla olevat toimenpiteet kohtien B – D määritteleminä aikoina, ellei niitä jo ole tehty lentokelpoisuusmääräyksen M2573/98 muutos 1 (FAA AD 98-15-18) mukaisesti. Tiivistetyn siipituen avaaminen ja uudelleen tiivistäminen asianmukaisesti katsotaan lentokelpoisuusmääräyksen edellyttämän toistuvan tarkastuksen päättämiseksi niin kauan kuin kaikki asianmukaiset määräykset ja vaatimukset, kuten staattinen lujuus, väsyminen, aineiden vaikutus, välitön ja pitkäaikainen (sisä- ja ulkopuolinen) suojaus syöpymältä, uudelleentiivistysmenetelmät y.m. on otettu huomioon.

Siipitukien irrotus

B. Irrota siipituet Maule Service Bulletinin nro. 11 (SB11) kohdan INSTRUCTIONS PART I ohjeiden mukaisesti sinä alla mainituista ajankohdista B.1, B.2 tai B.3, joka tulee viimeiseksi. Tee irrotuksen jälkeen kohdan C.1, C.2, D.1 tai D.2 mukaiset toimenpiteet.

1. kun Maulen valmistaman siipituen, osanumero 2079E ja/tai 2080E kalenteriaika savuttaa kaksi vuotta;
2. kolmen kuukauden kuluessa laskettuna 9.9.1998:sta (AD 98-15-18:n voimaanastumispäivä) tai
3. kahden vuoden kuluessa viimeisestä määräyksen M 2328/96 (AD95-26-18) mukaisesta tarkastuksesta.

Siipitukien tarkastus

C. Tarkasta siipituet kohdan B mukaisen irrotuksen jälkeen ennen lentotoiminnan jatkamista kohdan C.1 tai C.2 ohjeiden mukaisesti tai vaihda siipituet uusiin kohdan D.1 tai D.2 ohjeiden mukaisesti.

1. Tarkasta siipituet syöpymien tai lovien varalta Maule SB11 kohdan INSPECTION PART I mukaisesti.
   i) Ellei tarkastuksessa siipituesta löydy lovia tai syöpymää, niin suojaa siipituki syöpymältä Maule SB11 kohdan INSPECTION PART I mukaisesti ennen seuraavaa lentoa. Toista tarkastus sen jälkeen 24 kuukauden välein kohdan C.1 tai C.2 mukaisesti.
   ii) Jos tarkastuksessa löytyy lovia tai syöpymää, niin vaihda siipituki uuteen kohdan D.1 tai D.2 mukaisesti ennen seuraavaa lentoa.
2. Tarkasta siipituet tämän määräyksen liitteenä olevien ohjeiden mukaisesti. Tarkastuksen saa tehdä vain hyväksytty huolto-organisaatio toimilupansa mukaisesti.
   i) Ellei tarkastuksessa siipituesta löydy syöpymää ja kaikki tämän määräyksen liitteen mukaiset vaatimukset täyttyvät, niin suojaa siipituki syöpymältä Maule SB11 kohdan INSPECTION PART I mukaisesti ennen seuraavaa lentoa. Toista tarkastus sen jälkeen 24 kuukauden välein.

ii) Jos tarkastuksessa löytyy syöpymää tai jos jokin tämän määräyksen liitteen mukaisista vaatimuksista ei täyty, niin vaihda asianomainen siipituki uuteen kohdan D.1 tai D.2 mukaisesti ennen seuraavaa lentoa

Siipitukien vaihto

D. Vaihda siipituet uusiin ennen seuraava lentoa kohdan B irrotuksen jälkeen kohdan D.1 tai D.2 ohjeiden mukaisesti tai tarkasta ne kohdan C.1 tai C.2 ohjeiden mukaisesti.

1. Asenna Maulen valmistamat siipituet (tai FAA:n hyväksymät vastaavat osanumerot), jotka on tarkastettu kohdan B.1. tai B.2 mukaisesti ja jotka kyseisen kohdan vaatimusten mukaisesti on todettu lentokelpoisiksi. Noudata asennuksessa Maule SB11 kohdan INSPECTION PART II ohjeita. Tarkasta siipituet sen jälkeen kohdan C.1 tai C.2 mukaisesti 24 kuukauden välein.
2. Asenna Maulen uudet tiivistetyt siipituet, joiden osanumero on 2200E tai 2201E (tai FAA:n hyväksymät vastaavat osanumerot), Maule Service Bulletinin nro. 11 kohdan INSTRUCTIONS PART II ohjeiden mukaisesti. Näitä tiivistettyjä siipitukia ei enää tarvitse tarkastaa lentokelpoisuusmääräyksen mukaisesti.

Lentokelpoisuusmääräys AD 98-15-18R1 korvaa määräyksen AD 98-15-18 ja suomalaisen määräyksen M2573/98 muutos 1.

Tehty toimenpide sekä lentokelpoisuusmääräyksen numero on merkittävä ilma-aluksen teknilliseen kirjanpitoon.

Jos ilma-aluksen omistaja, haltija tai käyttäjä haluaa korvata lentokelpoisuusmääräyksen vaatimat toimenpiteet muilla vastaavan turvallisuustason antavilla toimenpiteillä, voi hän jättää perustellun hakemuksen EASA:lle osoitteessa European Aviation Safety Agency, Postfach 10 12 53, D-50452 KÖLN, Saksa.

T5558/13 Liite/Bilaga 17.12.2013

Appendix to AD 98-15-18 R1

Procedures and Requirements for Ultrasonic Inspection of Maule 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 do this inspection.

2. An ultrasonic probe with the following specifications will be needed to do 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 do 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 Maule Air, Inc. Service Bulletin No. 11, dated October 30, 1995, 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 Maule Air, Inc. Service Bulletin No. 11, dated October 30, 1995.

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

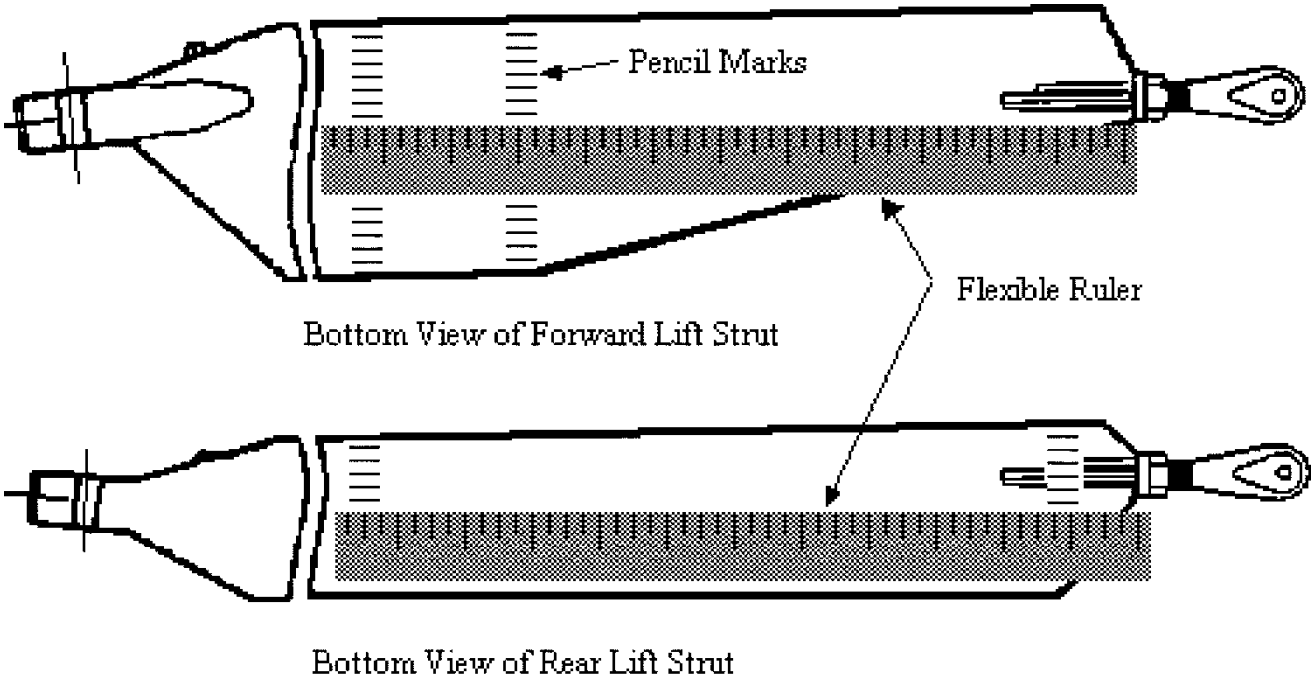

Figure 1

Issued in Kansas City, Missouri, on November 22, 2013.
Earl Lawrence,
Manager, Small Airplane Directorate,
Aircraft Certification Service.