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MANDATORY

**SERVICE
BULLETIN**

MANDATORY SERVICE BULLETIN Z142/55a

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„SAFETY RELATED“

1. **DATE:** March 8, 2007

2. **APPLICABLE TO:** All Z142 aircraft with strengthened wings.

3. **REASON:**
 - 3.1 Knowledge about aircraft operation from the life time point of view based on evaluation of data from the AMU1 Acceleration Monitoring Unit.

It has been found out that total and acrobatic limit load spectra of the aircraft which have been used for the life time proof are exceeded.

A wide range of aircraft safe life time reached depending on kind of operation has been found out (currently approximately from 1100 to 11000 flight hours).

It has been found out that some aircraft are exploited for an operation in ACROBATIC and UTILITY category only.

 - 3.2 General overview of actions following from the knowledge that was found out.

Prohibition of aircraft operation in ACROBATIC category in case the aircraft is not equipped with the AMU1 Acceleration Monitoring Unit.

Determination of operation conditions and limit for UTILITY category for the aircraft which are not equipped with the AMU1 Acceleration Monitoring Unit

Establishing of a possibility of additional AMU1 Acceleration Monitoring Unit installation on the aircraft in operation, to enable their operation in ACROBATIC category.

Determination of safe life time of single aircraft based on evaluation of the data from the AMU1 Acceleration Monitoring Unit

Replacement of the wings with strengthened new wings at their life time expiration.

Establishing of life time limits, intervals of replacements and intervals of checks related to acrobatic operation time, not to total operation time only.

Change of some life time limits, intervals of replacements and intervals of checks.

3.3 Determination of aircraft individual safe life limit based on analysis of data from the AMU1 Acceleration Registration Unit.

3.3.1 AMU1 Acceleration Registration Unit enables individual safe life evaluation of the aircraft related to actual operation. Basic approved safe life time is 5500 hours TIS at an operation in ACROBATIC, UTILITY and NORMAL category for the aircraft equipped with strengthened wings and simultaneously with the AMU1 Acceleration Monitoring Unit, operated in accordance with the limits of frequencies of load factors which correspond with this basic total safe fatigue life time.

3.3.2 Change of aircraft safe life time of 5500 hours TIS and of replacement intervals of main wing hinges pins and bushings and rear hinge pins.

3.3.2a If the aircraft is operated outside the limits of frequencies of load factors which correspond with basic total safe fatigue life time of the aircraft of 5500 hours TIS, its safe life time is changed in some of ways here stated:

- by a change of total time of aircraft operation;
- by a determination of the limit from which the aircraft shall be operated in NORMAL category only;
- by a determination of acrobatic time limit for specified total operation time limit;
- by a determination of the limit at which the wings and other prescribed parts shall be replaced to enable further operation of the aircraft.

The manufacturer will notify the operator of possible concrete ways of safe life time change of pertinent aircraft on the Form No. Z142-AMU1/1. The operator will choose concrete way of safe life time limitation of the aircraft from proposed ways. Then the manufacturer will send the Form No. Z142-AMU1/1 with chosen safe life time change to the operator.

The CAA of the Czech Republic will be notified of the safe life time change of the affected aircraft by means of the Form No. Z142-AMU1/2. CAA of the Czech Republic will send approved Form to the CAA of the country where the aircraft is registered for validation and transfer to the operator.

A notification of the safe life time change by means of the Form No. Z142-AMU1/2 will be sent to the operator at the latest 500 flight hours before a change of the limits for aircraft operation (in case of decreasing of safe life time below 5500 flight hours, or at a determination of the limit for aircraft transfer to NORMAL category only, or at a determination of acrobatic time limit, or at a determination of the limit for wings replacement), or at reaching 5000 flight hours (in case of increasing of safe life time above 5500 flight hours).

In justified cases, the time limit for sending the Form No. Z142-AMU1/2 can be shorter.

The Form with changed total safe life time must be inserted into Technical Manual of the Z142 Aircraft, Chapter 7.

- 3.3.2b If the aircraft is operated in acrobatic operation outside the limits of frequencies of load factors which correspond with basic time of replacement intervals of main wing hinges pins and bushings and rear hinge pins, interval time of these replacements is changed.

The manufacturer will notify the operator of replacement interval time change on pertinent aircraft on the Form No. Z142-AMU1/1.

The CAA of the Czech Republic will be notified of replacement interval time change on pertinent aircraft by means of the Form No. Z142-AMU1/2. CAA of the Czech Republic will send approved Form to the CAA of the country where the aircraft is registered for validation and transfer to the operator.

A notification of replacement interval time change by means of approved Form No. Z142-AMU1/2 will be sent to the operator at the latest 200 flight hours before valid replacement time limit.

In justified cases, the time limit for sending the Form No. Z142-AMU1/2 can be shorter.

The Form with changed time of replacement intervals of main wing hinges pins and bushings and rear hinge pins must be inserted into Technical Manual of the Z142 Aircraft, Chapter 7.

- 3.3.3 Based on extensive experience with the use of the AMU1 Acceleration Registration Unit, its installation on the aircraft in operation is enabled.

- 3.3.3a Additional installation of AMU1 Acceleration Registration Unit into the aircraft equipped with strengthened wings, i.e. into the aircraft on which the paragraph 4.2.1 of this bulletin has been performed.

A statement of an owner about total time in acrobatic operation of the pertinent aircraft with strengthened wings is a condition for additional installation of AMU 1 Acceleration Monitoring Unit without contemporaneous wings replacement. It must be stated how the time in acrobatic operation is counted (considered). This statement must be sent to the manufacturer.

Aircraft manufacturer will perform an evaluation and will inform an operator if it would be possible to operate the aircraft after additional installation of AMU1 Acceleration Monitoring Unit in ACROBATIC and UTILITY category without replacement of wings and other prescribed parts.

At wings replacement, contemporaneous AMU 1 Acceleration Monitoring Unit installation without sending a statement of an owner about total time in acrobatic operation of the pertinent aircraft can be performed.

Acrobatic operation is considered an operation in ACROBATIC and UTILITY categories.

After additional installation of AMU1 Acceleration Monitoring Unit, the data from AMU1 shall be sent to the manufacturer together with number of hours TIS in acrobatic operation, total number of hours TIS and number of landings (if registered).

These information shall be sent in intervals related to total operation time and acrobatic operation time, it depends on which comes earlier.

Intervals of sending an information related to total operation time: in 50 flight hour intervals during 100 flight hours but not less than once a year, and then after each 100 flight hours but not less than once a year.

Intervals of sending an information related to acrobatic operation time: in 25 flight hour intervals during 50 flight hours in ACROBATIC and/or UTILITY category but not less than once a year, and then after each 50 flight hours in ACROBATIC and/or UTILITY category but not less than once a year.

Information on time in ACROBATIC and/or UTILITY categories shall enable identification of operation time in each single stated category.

In case it is necessary, the aircraft manufacturer can require sending the data from the AMU1 Acceleration Monitoring Unit or records from the Aircraft Log Book in shorter intervals.

In case it will be found out by the evaluation of the data and records from operation before and after AMU 1 installation that the aircraft is operated outside the limits of frequencies of load factors which correspond with basic total safe fatigue life time of the aircraft of 5500 hours TIS, safe fatigue life time will be changed according to the procedure stated in the paragraph 3.3.2 of this bulletin.

- 3.3.3b Additional installation of AMU1 Acceleration Registration Unit into the aircraft equipped with unstrengthened wings.

Additional installation of AMU1 Acceleration Registration Unit into the aircraft equipped with unstrengthened wings is not possible.

This installation is possible only at contemporaneous replacing unstrengthened wings with strengthened wings, accordingly with accomplishment of paragraph 4.2.1 of this bulletin.

- 3.3.4 Acrobatic flights recording.

Aircraft operator is obliged to record flights in ACROBATIC and/or UTILITY categories including their time into the Aircraft Log Book according to the procedure stated in the paragraph 4.1.1 of this bulletin

In case AMU1 Acceleration Registration Unit installation is performed and the operator already records acrobatic flights in a different way than stated in the paragraph 4.1.1 of this bulletin, he will inform about it the aircraft manufacturer which will determine further procedure.

Note:

A duty of acrobatic flights recording is established for the reason of performance of replacements and checks which are related also to time of acrobatic operation.

4. ACTIONS REQUIRED:

4.1 Limits for the aircraft with strengthened wings

- 4.1.1 Operation limits for the aircraft equipped with the AMU1 in case of sending the AMU1 data to the aircraft manufacturer.

Basic total safe fatigue life time of the aircraft with strengthened wings and with the AMU1 Acceleration Registration Unit is 5500 hours at operation in ACROBATIC, UTILITY and NORMAL category. Aircraft operation in accordance with a load spectrum which corresponds with the basic total safe fatigue life time is a condition for saving this limit. This limit can be increased or decreased according to actual load spectrum.

Aircraft operator is obliged to record flights performed in ACROBATIC and UTILITY categories including pertinent flight time into the Aircraft Log Book.

Aircraft operator is obliged to download the AMU1 data and send them to the aircraft manufacturer according to paragraph 3.3.3a. In case aircraft operator does not send the AMU1 data to the aircraft manufacturer according to paragraph 3.3.3a, the aircraft can be operated according to paragraph 4.1.2 only.

A flight in ACROBATIC, respectively UTILITY category is a flight during which acrobatic manoeuvres permitted in the Aircraft Log Book for ACROBATIC, respectively UTILITY category are performed.

Flights in UTILITY category are marked with U letter in the Aircraft Log Book.

Flights in ACROBATIC category are marked with A letter in the Aircraft Log Book.

Flight time is total time from the instant of aircraft first movement for the purpose of take-off to the instant when the aircraft finally stops in the end of that flight.

Note:

Total time of flights performed in ACROBATIC and UTILITY category depends on kind of acrobatics and a way of its performance. According to measurements of acrobatic operation performed by the manufacturer, for total operation time of 5500 hours TIS, an acrobatic flight time is approximately from 230 hours TIS (for competition acrobatics) to 850 hours TIS (for basic acrobatic training).

- 4.1.2 Operation limits for the aircraft equipped with the AMU1 in case the AMU1 data are not sent to the aircraft manufacturer.

The aircraft can be operated according to paragraph 4.1.3.

- 4.1.3 Operation limits for the aircraft which are not equipped with the AMU1.

If aircraft operation time in ACROBATIC and/or UTILITY category is not greater than 250 hours TIS, the aircraft can be operated till the limit of 700 hours in UTILITY category only. This time incorporates also hitherto flights in ACROBATIC and/or UTILITY category. Total operation time is 5500 hours TIS.

If aircraft operation time in ACROBATIC and/or UTILITY category has exceeded 250 hours TIS, the aircraft can be operated in NORMAL category only till total operation time of 5500 hours TIS.

4.1.4 Mandatory replacements of airframe parts with limited safe life time:

Conic pins and bushings of main wing hinges	- after 1500 hours TIS, or - after 200*) hours TIS in ACROBATIC category, or - after 200*) joint hours TIS in ACROBATIC and UTILITY category ^{*2)} ,
Pin of rear wing hinge	it depends on what comes earlier
Fitted bolts of upper outer and upper inner wing hinges	In case of loosening or failure of even one single fitted bolt, replacement of all 20 bolts on both hinges shall be performed

*) Basic time which can be changed on the basis of AMU1 data evaluation.

*2) In case the aircraft is not operated in ACROBATIC category since last replacement, the replacement interval is 1500 hours TIS.

4.1.5 Mandatory inspections of airframe parts:

Visual check of loosening or failure of fitted bolts of upper outer wing hinges (on upper side of the wing)	- At pre-flight inspection - After 100 hours TIS or after 1 year, depending on what comes earlier
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4.1.6 Cancel Mandatory Service Bulletin Z142/42a.

4.1.7 Pertinent changes of aircraft accompanying documentation.

4.2 Replacement of wings with strengthened wings.

4.2.1 Replacement of unstrengthened wings with strengthened wings.

Total safe fatigue life time limit for the aircraft with unstrengthened wings is 3600 hours TIS in UTILITY and NORMAL categories with the safe fatigue life time limit for acrobatic operation of 190 flight hours in UTILITY category, see Mandatory Service Bulletin Z142/54a.

Basic total safe fatigue life time of the aircraft is increased by replacement of unstrengthened wings with strengthened wings, at contemporaneous installation of AMU 1 Acceleration Monitoring Unit, accordingly at performance of paragraph 4.3 of this bulletin, from 3600 to 5500 hours TIS in ACROBATIC, UTILITY and NORMAL categories.

4.2.2 Recurrent replacement of strengthened wings.

If the aircraft is operated outside the limits of frequencies of load factors which correspond with basic total safe fatigue life time of the aircraft of 5500 hours TIS, its safe life time is changed. In that case the aircraft operator must perform the procedures according to paragraph 3.3.2 of this bulletin.

In case of aircraft operation over frequencies of g-loads, after expiration of safe fatigue life time of strengthened wings, new strengthened wings can be mounted on the aircraft recurrently. Total safe fatigue life time of the aircraft of 5500 hours TIS must be kept.

In addition, all prescribed replacements and inspections according to pertinent accompanying documentation, revised according to paragraph 4.1.7 of this bulletin, must be performed.

Based on real aircraft operation, the aircraft manufacturer will determine number of possible wings replacements, replacements of other parts or other aircraft checks.

4.2.3 Pertinent changes of aircraft accompanying documentation.

4.2.4 Cancel Mandatory Service Bulletin Z142/43a-Rev. 1.

4.3 Installation of the AMU1 Acceleration Registration Unit.

4.3.1 Installation of AMU1 Acceleration Registration Unit into the aircraft equipped with strengthened wings.

4.3.2 Pertinent changes of aircraft accompanying documentation.

4.3.3 Cancel Mandatory Service Bulletin Z142/50a.

5. ACCOMPLISHMENT::

5.1 Limits for the aircraft with strengthened wings, see paragraph 4.1:

Immediately after bulletin receipt.

5.2 Replacement of wings with strengthened wings, see paragraph 4.2:

At operator's option.

5.3 Installation of the AMU1 Acceleration Registration Unit, see paragraph 4.3:

At operator's option.

6. PERFORMED BY:

6.1 Limits for the aircraft with strengthened wings, see paragraph 4.1:

Operator (replacement of pages in accompanying documentation).

6.2 Replacement of wings with strengthened wings, see paragraph 4.2:

Approved Service organization authorized to perform “C” inspections or overhauls.

6.3 Installation of the AMU1 Acceleration Registration Unit, see paragraph 4.3:

Aircraft manufacturer on the basis of an order, or service organization approved for these works by aircraft manufacturer.

7. COSTS COVERED BY: Operator

8. MATERIAL: **8.1 Limits for the aircraft with strengthened wings, see paragraph 4.1:**

New pages of accompanying documentation – see enclosures.

8.2 Replacement of wings with strengthened wings, see paragraph 4.2:

Supplied by manufacturer on order of operator:

- Wing L.H. P/N: C142.2100
- Wing R.H. P/N: C142.2200

8.3 Installation of the AMU1 Acceleration Registration Unit, see paragraph 4.3:

Supplied by manufacturer on order of operator.

9. PROCEDURES: **9.1 Limits for the aircraft with strengthened wings, see paragraph 4.1:**

Replace original pages of manuals by new pages.
Record change accomplishment into List of Changes.

9.2 Replacement of wings with strengthened wings, see paragraph 4.2:

9.2.1 Remove wings from the aircraft. Remove removable wing parts, controls, flap control in the wing, fuel and electric installation according to the procedure mentioned in Z142 Repair Manual.

- 9.2.2 Accomplish installation of parts and systems removed from original wings on new wings according to the procedure mentioned in Repair Manual.
- 9.2.3 Check diameters of wing attachment point holes and fuselage frame attachment hole diameters. In case a difference is found, ream the smaller holes to the same larger diameter
- 9.2.4 Provide new wings with a new external paint.
- 9.2.5 Install new wings on aircraft. After the installation has been finished, accomplish weighing, deflection adjustment of ailerons and flaps and leveling according to the procedures mentioned in Repair Manual. If there is a change of aircraft mass, make a record in Aircraft Flight Manual.
- 9.2.6 Record wing replacement into Aircraft Log Book.
- 9.2.7 Replace original pages of manuals by new pages.
Record change accomplishment into List of Changes.

9.3 Installation of the AMU1 Acceleration Registration Unit, see paragraph 4.3:

- 9.3.1 Perform installation of AMU1 Acceleration Registration Unit..
- 9.3.2 Record AMU1 installation into Aircraft Log Book.
- 9.3.3 Replace original pages of manuals by new pages.
Record change accomplishment into List of Changes.

10. ENCLOSURE:

New pages of accompanying documentation with date of issue 8.3.2007:

- Technical Manual of the Z142 Aircraft, Czech version:
8; 78; 103A; 103B; 103C; 105; 106D; 106E
- Technical Manual of the Z142 Aircraft, English version:
8; 78; 103A; 103B; 103C; 105; 107



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