Temporary Maintenance Instruction
TMI 139-549

Erosion shield (tail rotor blade assembly) – Replacement (remove and install a new item)

All AW139 Helicopters

The technical content of this document is approved under the authority of DOA nr. EASA.21J.005.

The present TMI will be evaluated for its introduction in the standard set of Technical Publication.
If no further notice is received, the present document expires on: October 29th, 2022.

2021-10-29

Introduction

This TMI provides the instructions to perform the ultrasonic check of the tail rotor blade after the replacement of the erosion shield.

All the information reported in the subsequent pages will be introduced within next issue of pertinent technical publication, Data Module:

ANNEX	DATA MODULE CODE	DATA MODULE TITLE
Annex 1	39-A-64-11-01-07A-921A-C	Erosion shield (tail rotor blade assembly) - Replacement (remove and install a new item)
Annex 2	39-A-64-11-01-07B-921A-C	Erosion shield (tail rotor blade assembly) - Replacement (remove and install a new item)
Annex 3	39-B-64-11-01-07A-921A-C	Erosion shield (tail rotor blade assembly) - Replacement (remove and install a new item)
Annex 4	39-A-64-11-01-00A-355A-C	Tail rotor blade assembly - Test for cracks and other defects with ultrasonic
Annex 5	39-A-64-11-01-05A-355A-C	Pitch control arm (tail rotor blade assembly) - Test for cracks and other defects with ultrasonic

Erosion shield (tail rotor blade assembly) – Replacement (remove and install a new item)

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Annex 1

Erosion shield (tail rotor blade assembly)

Replacement (remove and install a new item)

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References

Table 1 References

Data module/Technical publication	Title
39-A-64-11-01-00A-257A-B	Tail rotor blade assembly - Paint and apply marking
39-A-64-11-01-00A-257A-C	Tail rotor blade assembly - Paint and apply marking
39-A-64-11-01-00A-355A-C	Tail rotor blade assembly - Test for cracks and other defects with ultrasonic
39-A-64-11-01-00A-361A-C	Tail rotor blade - Blade body profile and sweep angles - Dimensions check
39-A-64-11-01-00A-37DA-C	Tail rotor blade assembly - Static balance
39-A-64-11-01-05A-355A-C	Pitch control arm (tail rotor blade assembly) - Test for cracks and other defects with ultrasonic
39-A-ZZ-00-00-00A-066A-A	Local supply support equipment and tools - Support equipment and tools data

Preliminary requirements

Required Conditions

Table 2 Required conditions

Action/Condition	Data module/Technical publication
None	

Support Equipment

Table 3 Support Equipment

Name	Identification No.	Quantity
Heat gun (300 thru 370 °C) (ZZ-00-00)	Local supply	1
Spatula (flexible metallic) (ZZ-00-00)	Local supply	1
Pliers (ZZ-00-00)	Local supply	1
Hammer (aluminum) (ZZ-00-00)	Local supply	1
Vacuum bag (ZZ-00-00)	Local supply	1
Autoclave (ZZ-00-00)	Local supply	1

Supplies

Table 4 Supplies

Name	Identification No.	Quantity
Lint-free cloth	C011	AR
Solvent	C005	AR
Tape	C258	AR
Paint	C421	AR
Adhesive	C306	AR
Adhesive	C189	AR
Primer	C190	AR

Spares

Table 5 Spares

Name	Identification No.	Quantity
Erosion shield	ZG641101-017	1

Safety conditions

WARNING

The materials that follow are dangerous. Before you do this procedure, make sure that you know all the safety precautions and first aid instructions for these materials:

- **Solvent (C005)**
- **Paint (C421)**
- **Adhesive (C306)**
- **Adhesive (C189)**
- **Primer (C190)**

Procedure

1 Put the tail rotor blade (1, Fig 1) on an applicable work table.

2 Clean the full surface of the erosion shield (2) with a Lint-free cloth (C011) and the Solvent (C005) . Let the surface dries at ambient temperature for 30 minutes minimum.

3 Mask the edge of the skin blade with the Tape (C258) .

4 Apply two layers of the Paint (C421) to get an equal surface on the erosion shield.

5 Apply the same layer of thermochromic paint locally on the metallic tape for a length of 25 mm (0.98 in).

6 Let the first layer of paint dry at ambient temperature for 10 minutes before you apply the second layer.

7 Let the paint dry for 4 hours at ambient temperature before you continue with the subsequent step.

Note

Two operators are necessary to do the removal procedure of the erosion shied. One operator does the surface heating. The other one does the mechanical removal of the erosion shield.

8 Locally heat the erosion shield with the Heat gun (300 thru 370 °C) (ZZ-00-00) . Set the heating gun temperature to 300 thru 370 °C (572 thru 698 °F) and start from leading edge of the blade.

9 Hold the heating gun jet at 30 thru 40 mm (1.2 thru 1.6 in) from the surface of the erosion shield during its removal operation.

10 Put the thin Spatula (flexible metallic) (ZZ-00-00) between the erosion shield and the blade body. Do this when the thermochromic paint starts to change its colour from orange (ambient temperature) to light green. Start with the spatula from the trailing edge of the blade and continue to the leading edge.

11 During the removal procedure, you can use the Pliers (ZZ-00-00) to hold the disconnected parts while and after the use of the flexible metallic spatula.

12 Prevent to apply too much heat on the erosion shield surface. The maximum permitted temperature of the blade parts in the worked area must not be more than 160 °C (320 °F).

13 Make sure that the thermochromic paint does not change its colour to brown/black at the end of the procedure. Also make sure that there are no bubbles on the thermochromic paint caused by the applied high temperature.

14 Tell the Manufacturer if these unwanted conditions occur.

15 Tap the area with the Hammer (aluminum) (ZZ-00-00) where you removed the erosion shield to make sure that there is no damage on the blade body.

16 Do the wet abrasive sand blasting to prepare the surface to bond the new Erosion shield (ZG641101-017-) .

16.1 Apply a layer of the Primer (C190) on the erosion shield surface to be bonded.

16.2 Apply a layer of the Adhesive (C189) .

16.3 Apply the peel-ply on the repaired surface for protection purposes.

16.4 Do a "verifilm" test to make sure that there is no clearance between the applied adhesive and the erosion shield. If you found clearances, apply the necessary layer of Adhesive (C306) locally.

17 Put the prepared erosion shield in its position on the blade body.

18 You can use the applicable bands to hold the erosion shield in its position.

19 Install the Vacuum bag (ZZ-00-00) on the erosion shield. Apply the pressure of 69 kPa (10 lbf/in^2) on the erosion shield with the bag. Let this bag stay in that position for 2 hours.

20 Initially cure the erosion shield at the temperature of 47 thru 57 °C (117 thru 135 °F) for one hour minimum. Do not change the pressure applied with the vacuum bag (69 kPa (10 lbf/in^2).

21 Let the vacuum bag applied at the ambient temperature for 3 hours again.

22 Finally cure the erosion shield in the Autoclave (ZZ-00-00) . Set the autoclave ambient conditions as follow:

- Pressure: 177 thru 245 kPa (26 thru 36 lbf/in^2)
- Temperature: 125 thru 130 °C (257 thru 266 °F). Continue to increase the temperature of 1.1 thru 2.7 °C every minute.
- Cure time: 60 thru 120 minutes.

23 Remove the vacuum bag and the bands if installed.

24 Make sure that the erosion shield is correctly in its position.

Note

For the ultrasonic check of the tail rotor blade P/N 3G6410A00131 contact the Manufacturer to receive the applicable instructions.

25 Do the ultrasonic check on the blade fully to make sure that the erosion shield is correctly bonded, refer to:

- 39-A-64-11-01-00A-355A-C for the main inspection of the tail rotor blade (ref. to attachment 4 of this TMI);
- 39-A-64-11-01-05A-355A-C for the inspection of the pitch control arm (ref. to attachment 5 of this TMI).

26 Voids below the erosion shield must not be more than 12 mm (0.5 in) in chord and not more than 5.0 cm^2 (0.775 in^2). The voids must be at 15 mm (0.6 in) minimum from the edge of the erosion shield.

27 Multiple voids are permitted if they are at 300 mm (11.8 in) from each other and the total area (top and bottom) is not more than 10.0 cm^2 (1.55 in^2).

28 Do the check of the blade body profile and sweep angles. Refer to 39-A-64-11-01-00A-361A-C.

29 Do the dimensional check of the tail rotor blade as shown in the Fig 2 .

30 Carefully do the dimensional check of the blade chord as shown in the Fig 2 .

31 Paint the repaired area. Refer to 39-A-64-11-01-00A-257A-B or 39-A-64-11-01-00A-257A-C as necessary.

32 Make the "R" mark immediately after the blade Serial Number on the blade identification plate with an applicable marking pen.

Requirements after job completion

1 Do the check of the static balance of the tail rotor blade. Refer to 39-A-64-11-01-00A-37DA-C

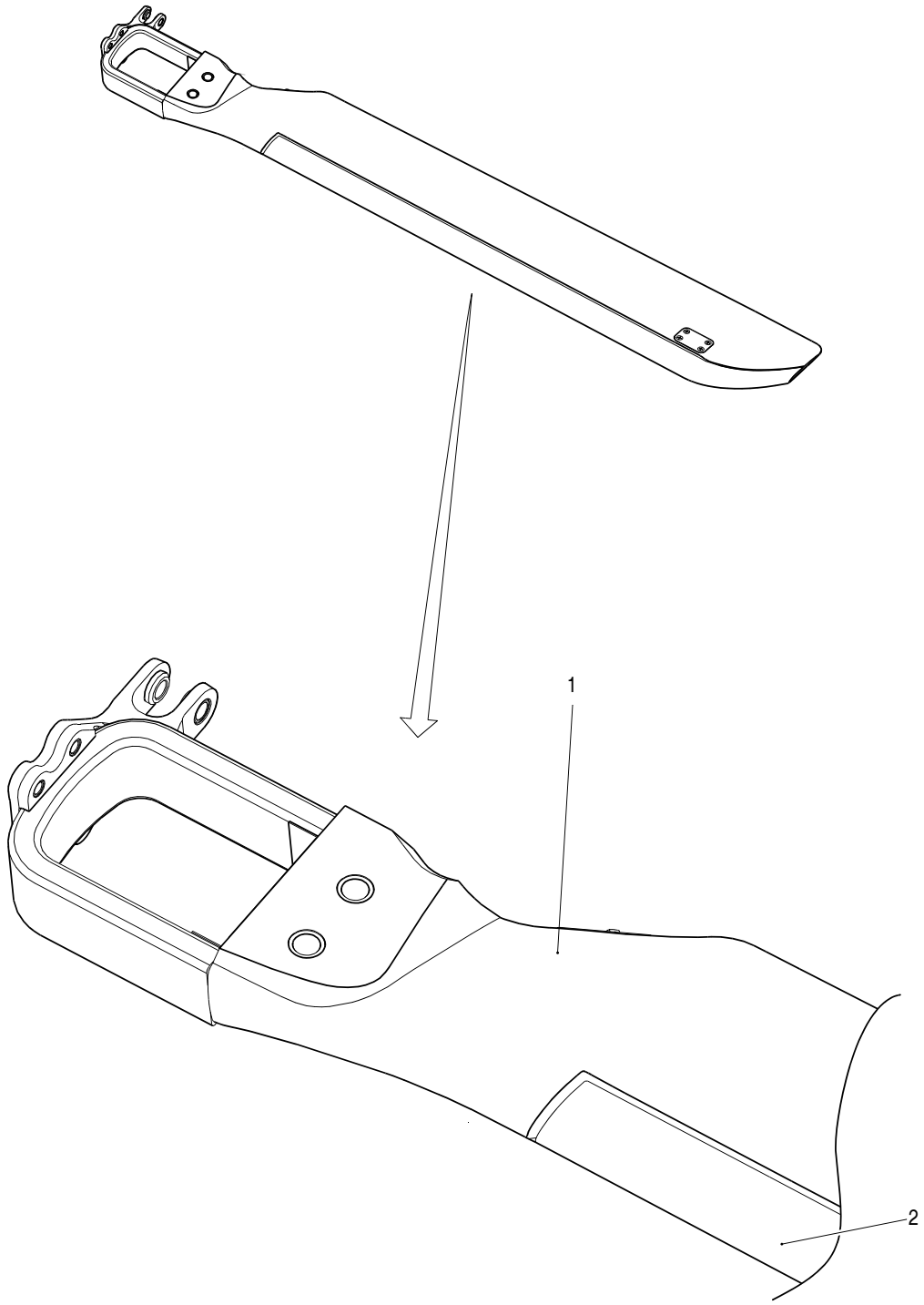

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Fig 1 Erosion shield (Tail rotor blade) - Replacement (remove and install a new item)

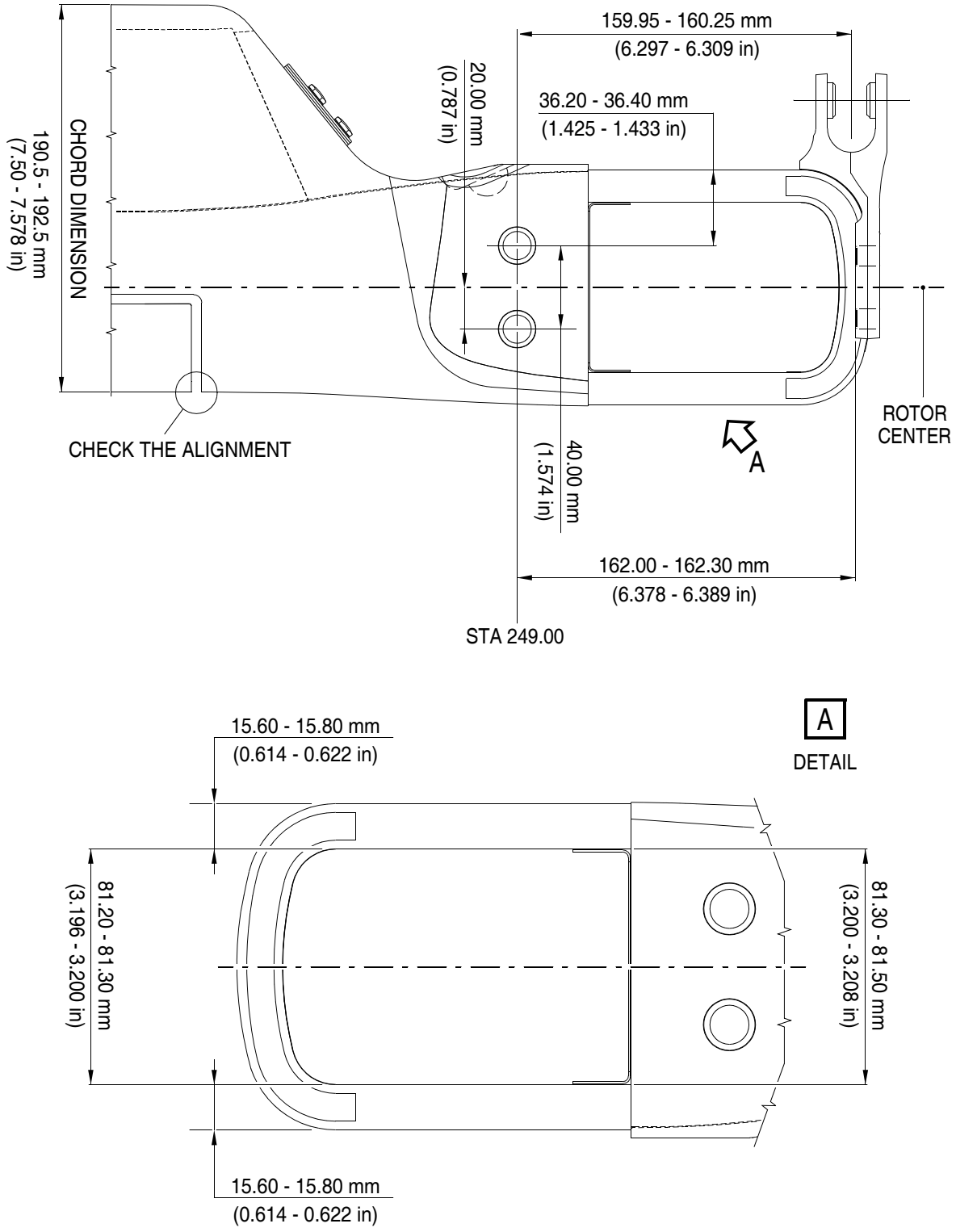

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Fig 2 Dimensional check of tail rotor blade

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Annex 2

Erosion shield (tail rotor blade assembly)

Replacement (remove and install a new item)

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Table 1 References

Data module/Technical publication	Title
39-A-64-11-01-00A-257A-C	Tail rotor blade assembly - Paint and apply marking
39-A-64-11-01-00A-355A-C	Tail rotor blade assembly - Test for cracks and other defects with ultrasonic
39-A-64-11-01-00A-361A-C	Tail rotor blade - Blade body profile and sweep angles - Dimensions check
39-A-64-11-01-00A-37DA-C	Tail rotor blade assembly - Static balance
39-A-64-11-01-05A-355A-C	Pitch control arm (tail rotor blade assembly) - Test for cracks and other defects with ultrasonic
39-A-64-11-01-09A-520A-C	Erosion shield reinforcement - Remove procedure
39-A-64-11-01-09A-720A-C	Erosion shield reinforcement - Install procedure

Table 1 References (Continued)

Data module/Technical publication	Title
39-A-GF-06-00-00A-066A-A	Hammer (alum) M/R and T/R blades tapping insp. (GF-06-00) - Support equipment and tools data
39-A-ZZ-00-00-00A-066A-A	Local supply support equipment and tools - Support equipment and tools data
CSPP-A-60-50-01-00B-259A-C	Disassembled metal components (surface preparation for bonding) - Other procedure to protect surfaces

Preliminary requirements

Required Conditions

Table 2 Required conditions

Action/Condition	Data module/Technical publication
The blade surface finish must be removed	39-A-64-11-01-00A-257A-C
If present, the erosion shield reinforcement must be removed	39-A-64-11-01-09A-520A-C

Support Equipment

Table 3 Support Equipment

Name	Identification No.	Quantity
Vibro etching pen (ZZ-00-00)	Local supply	1
Heat gun (ZZ-00-00)	Local supply	1
Spatula (flexible - rounded corners) (ZZ-00-00)	Local supply	1
Spatula (Teflon or Nylon) (ZZ-00-00)	Local supply	1
Brush (ZZ-00-00)	Local supply	1
Grinding wheel (ZZ-00-00)	Local supply	1
Vacuum bag set (ZZ-00-00)	Local supply	1
Hammer (rubber) (ZZ-00-00)	Local supply	1
Strap (Elastic) (ZZ-00-00)	Local supply	AR
Hammer (alum.), M/R & T/R blades tapping insp.	GF-06-00	1
Scissors (rounded ends) (ZZ-00-00)	Local supply	1
Marker pen (ZZ-00-00)	Local supply	AR

Supplies

Table 4 Supplies

Name	Identification No.	Quantity
Lint-free cloth	C011	AR
Solvent	C005	AR
Abrasive paper	C017	AR
Isopropyl alcohol	C039	AR
Barrier material	C051	AR
Abrasive paper	C055	AR
Adhesive	C057	AR
Aliphatic naphtha	C059	AR
Masking tape	C064	AR
Adhesive	C101	AR
Adhesive	C231	AR
Tape	C258	AR
Paint	C421	AR
Peel ply	C454	AR
Adhesive	C189	AR
Adhesive	C191	AR
Fiberglass	C192	AR
Denaturalized alcohol	C205	AR
Glass prepreg fabric cloth	C660	AR
Teflon tape	C223	AR
Breather fabric	C917	AR
Release film	C920	AR
Polyethylene film	Local supply	AR

Spares

Table 5 Spares

Name	Identification No.	Quantity
Erosion shield (primed for bonding)	3G6410L00551A	1
Identification plate	A016A002C1	1
Identification plate	A031A001A	1

Safety conditions

WARNING

The materials that follow are dangerous. Before you do this procedure, make sure that you know all the safety precautions and first aid instructions for these materials:

- **Isopropyl alcohol (C039)**
- **Aliphatic naphtha (C059)**
- **Solvent (C005)**
- **Adhesive (C101)**
- **Adhesive (C189)**
- **Adhesive (C191)**
- **Fiberglass (C192)**
- **Adhesive (C231)**
- **Paint (C421)**

Note

The subsequent procedure must only be done by the Manufacturer or by an authorized repair and overhaul facility.

Procedure

Note

If necessary, do Step Note to replace and move the identification plates of the TRB.

1 Replace and relocate the identification plates of the TRB. Do steps that follow:

1.1 On the Identification plate (A016A002C1) , with an applicable Vibro etching pen (ZZ-00-00) , write the correct part number and serial number of the relevant TRB on the allocated section of the new identification plate.

1.2 On the Identification plate (A031A001A) , using an applicable Vibro etching pen (ZZ-00-00) , write the painting scheme of the TRB, copying from the existing identification plate (P/N A031A001A) installed on the TRB. Refer to detail A of Fig 9 .

CAUTION

During heat gun usage, be careful not to damage the TRB surface.

1.3 Heat the existing identification plates (refer to detail A) up to 90 °C (194 °F) with the Heat gun (ZZ-00-00) and lift it with a thin Spatula (flexible - rounded corners) (ZZ-00-00) .

1.4 Apply the Barrier material (C051) around the contour of the new locations of the identification plates. Refer to detail A to identify locations and use the dimensions of the new plates. Secure the barrier material with the Masking tape (C064) .

1.5 Rub the exposed areas to remove the existing paint and primer with the Abrasive paper (C017) .

1.6 Remove the protective tapes from the new identification plates and rub their bonding surfaces with the Abrasive paper (C017) .

1.7 Clean the areas to be bonded (on the TRB and on the identification plates) with the Lint-free cloth (C011) and the Denaturalized alcohol (C205) . Let the parts dry for 30 minutes at room temperature.

1.8 Bond the identification plates to the TRB with the Adhesive (C057) . Allow them to cure for 24 hours at room temperature or two hours at 60 thru 70 °C (140 thru 158 °F).

1.9 Remove the masking tape and the barrier material.

2 **Removal of the erosion shield.**

2.1 Put the tail rotor blade on an applicable work table.

2.2 Clean the whole surface of the erosion shield with a Lint-free cloth (C011) moist with Isopropyl alcohol (C039) or Aliphatic naphtha (C059) or Solvent (C005) , or similar cleaner, and let it dry for at least 30 minutes at ambient temperature.

2.3 Apply 50 mm wide Tape (C258) as protection from heat along the boundary of the erosion shield (upper side and lower side) (see Fig 1).

Note

Let the paint dry between layers for at least 10 minutes at ambient temperature.

2.4 Apply two layers of Paint (C421) with a Brush (ZZ-00-00) on the whole erosion shield as well as overlapping approximately 25 mm (0.98 in) of the aluminum tape. You must get a smooth surface.

2.5 Let the paint dry at least 4 hours at ambient temperature.

2.6 Do a visual inspection to make sure that the paint is applied equally.

2.7 Separate the upper section of the erosion shield from the lower one, do as follows:

CAUTION

During milling operation make sure not to damage the underlying surfaces. Stop immediately when the color of the composite material underneath becomes visible.

2.7.1 Mill the leading edge of the erosion shield with a Grinding wheel (ZZ-00-00) . Be careful not to damage the underlying skin (see Fig 1).

2.7.2 Examine the leading edge to make sure that there is no damage to the composite material of the skin. If you find damage, contact the Design Authority for further information.

Note

We recommend to do the removal operation with the combined action of two operators minimum, one for heating, the other for the mechanical removal.

Note

The change of the thermochromic paint color (color at ambient temperature) shows the moment when the operator must start to insert the spatula to start the debonding operations.

Note

Do the heating and removal operations at the same time and in the same zone. This makes the removal easier and prevents damage to the skin material.

2.8 Starting from the root, locally heat the erosion shield with a Heat gun (ZZ-00-00) set at 300 - 370 °C (572 thru 698 °F). Keep the nozzle 3 - 4 cm (1.2 thru 1.6 in) away from the erosion shield surface during the whole phase of removal (see Fig 1).

CAUTIONS

- **Always use the spatula to break the erosion shield bonding. Use pliers only to make the lift of the removed part easier.**
- **Do not apply traction or peeling loads with pliers to the erosion shield. If you apply a pulling force you can damage parts of the skin.**

Note

Do not heat the parts that you have lifted before for more than necessary. This will prevent bubbles forming in the paint, which can make incorrect the inspection that follows.

Note

During the removal, you can use pliers only on the erosion shield areas that have been removed, while using the spatula at the same time.

2.9 When the thermochromic paint starts to change color from orange (ambient temperature color) to light green, as quickly as possible try to insert a Spatula (flexible - rounded corners) (ZZ-00-00) again and again under the erosion shield, to start the removal (see Fig 1).

2.10 After the removal is complete, examine fully the removed erosion shield. Make sure that the thermochromic paint has not become brown/black (signs of burning) and that there are no paint bubbles due to overheating. If you find these indications, contact the Design Authority for further information.

Note

A dark green equal color along the length of the removed erosion shield and the absence of paint bubbles due to overheating, show that you did the removal operation at the correct temperature. Thus, the temperature on the adhesive underlying the erosion shield and the skin external plies have not reached the limit of 160 °C (320 °F).

2.11 Remove the aluminum tape from the tail rotor blade (upper side and lower side).

3 **Cleaning and inspection of the erosion shield bonding area.**

CAUTION

During sanding make sure not to damage the glass fiber of the blade dummy heater mat. Use gradually finer abrasive paper near the dummy heater mat surface.

Note

It is permitted to keep halos of adhesive, shown by a light red color on the dummy heater mat surface (see Fig 2), to ensure the integrity of the underlying composite surfaces.

3.1 Remove the old red adhesive layer from the erosion shield bonding area with Abrasive paper (C055) , grit 180 - 240. Be careful not to damage the glass fiber of the dummy heater mat underneath.

3.2 Clean with a Lint-free cloth (C011) moist with Isopropyl alcohol (C039) or Aliphatic naphtha (C059) or Solvent (C005) , or similar cleaner, and let the part dry for at least 30 minutes.

3.3 Examine the full area below the removed erosion shield (dummy heater mat) as follows:

3.3.1 Visually examine the external surface to make sure that there is no damage to the glass fibers, that there are no surface defects and that its condition is not too dry. If you find damage, the dummy heater mat must be replaced, continue with Step 3.5.

3.3.2 Examine for debondings/delaminations with the Hammer (alum.), M/R & T/R blades tapping insp. (GF-06-00) . No debondings/delaminations of the dummy heater mat are permitted. If you find debonded/delaminated areas evaluate and repair them as written in Step 3.4.

3.4 Repair of debonded/delaminated areas of the dummy heater mat.

Note

If the damage is more than permitted repair limits the dummy heater mat must be replaced as written in Step 3.5.

3.4.1 Remove superficial debondings/delaminations up to 5 cm^2 (per single debonding/delamination) and for a maximum total area (upper side and lower side) of 40 cm^2, do as follows:

3.4.1.1 Map the debonded/delaminated area with a Marker pen (ZZ-00-00) .

CAUTION

During drilling phase be careful not to damage the underlying layers and the non debonded/delaminated layers.

Note

Drill holes until you get the debonded/delaminated area. Do not drill more than the maximum depth of 0,6 mm. This will prevent damage to the skin below.

Note

If necessary, it is possible to drill additional holes (one by one and repeating the injection operation) to make sure that the debonding/delamination is fully repaired.

3.4.1.2 Drill two holes equally spaced from the center of the marked area. Use a drill diameter of 2 - 3 mm with a flat cutting edge.

3.4.1.3 Put the tail rotor blade in vertical position.

3.4.1.4 Put the Adhesive (C101) or the Adhesive (C231) into one of the two holes with a syringe. Continue until the adhesive comes out of the other hole. At the same time it is possible to use a vacuum pump on the other hole.

3.4.1.5 Seal a Vacuum bag set (ZZ-00-00) , or an equivalent tool, and apply a pressure of 0,6 - 0,8 kg/cm^2.

3.4.1.6 Cure the adhesive at ambient temperature for 24 hours before handling and for at least 5 days for blade operation or, if a heating equipment (lamps or heating blankets) is available, at a temperature between 60 and 70 °C for at least 120 minutes.

3.4.1.7 After curing, remove the vacuum bag set and clean the unwanted adhesive with Abrasive paper (C055) , grit 180 - 240.

3.4.1.8 Do a tap inspection of the repaired area with the Hammer (alum.), M/R & T/R blades tapping insp. (GF-06-00) . No unbondings/delaminations are permitted after repair.

3.4.2 Remove debondings/delaminations from 5 cm^2 to 10 cm^2 (per single debonding/delamination) and for a maximum total area (upper side and lower side) of 20 cm^2 (included debondings/ delaminations repaired in Step Note), do as follows:

3.4.2.1 Map the debonded/delaminated area with a Marker pen (ZZ-00-00) .

3.4.2.2 Remove the debonded/delaminated layers of the dummy heater mat with Abrasive paper (C055) , grit 180 - 240.

3.4.2.3 Clean with a Lint-free cloth (C011) moist with Isopropyl alcohol (C039) or Aliphatic naphtha (C059) or Solvent (C005) , or similar cleaner, and let the part dry for at least 30 minutes.

Note

The repair will be completed subsequently with the application of layers of adhesive and fiberglass to level the removed dummy heater mat areas.

3.5 Replacement of the dummy heater mat.

3.5.1 Remove all the layers of the dummy heater mat up to the skin underneath as per Step (upper and lower surface). Stop immediately when you see the tracers of the blade skin.

3.5.2 Clean with a Lint-free cloth (C011) moist with Isopropyl alcohol (C039) or Aliphatic naphtha (C059) or Solvent (C005) , or similar cleaner, and let the part dry for at least 30 minutes.

3.5.3 Visually examine the full area below the removed dummy heater mat (blade skin) to make sure that there is no damage to the glass fibers. If you find damage, contact the Design Authority for further information.

3.5.4 Do a tap inspection of the full area below the removed dummy heater mat (blade skin) with the Hammer (alum.), M/R & T/R blades tapping insp. (GF-06-00) . No debondings/delaminations are permitted. If you find debonded/delaminated areas on the blade skin where the dummy heater mat is fully removed, contact the Design Authority for further information.

Note

The replacement will be completed subsequently during the bonding phases of the new erosion shield.

4 **Removal for restore of the dummy heater mat (only if you install for the first time the new erosion shield P/N 3G6410L00551).**

Note

This step is applicable only if the dummy heater mat was not fully removed (Step 3.5).

4.1 Mark the STA 405,0 and the STA 455,0 (minimum) on the tail rotor blade, both upper and lower surface (see Fig 3).

4.2 Remove all the layers of the dummy heater mat up to the skin underneath as per Step from the marked area (upper and lower surface). Stop immediately when you see the tracers of the skin (see Fig 3).

4.3 Mark one STA (both upper and lower surface) toward the tip at a distance of 25 mm (1 in) from the area where the dummy heater mat was removed up to the skin.

4.4 Remove a thickness equal to three layers of dummy heater mat (equivalent to three layers of Fiberglass (C192)) from the marked area at the tip with Abrasive paper (C055) , grit 180 - 240.

4.5 Clean with a Lint-free cloth (C011) moist with Isopropyl alcohol (C039) or Aliphatic naphtha (C059) or Solvent (C005) , or similar cleaner, and let the part dry for at least 30 minutes.

4.6 Visually examine the full area below the removed dummy heater mat (blade skin) to make sure that there is no damage to the glass fibers. If you find damage, contact the Design Authority for further information.

4.7 Do a tap inspection of the blade skin area with the Hammer (alum.), M/R & T/R blades tapping insp. (GF-06-00) . No debondings/delaminations are permitted. If you find debonded/delaminated areas on the blade skin where the dummy heater mat is fully removed, contact the Design Authority for further information.

Note

The restore will be completed subsequently during the bonding phases of the new erosion shield.

5 **Preparation of the bonding surface.**

5.1 (Only for new not treated erosion shield) Prepare the new erosion shield as written in DM CSPP-A-60-50-01-00B-259A-C.

5.2 (Only for new treated erosion shield) Make sure that the new Erosion shield (primed for bonding) (3G6410L00551A) comply with the Shelf life limit.

5.3 Prepare the bonding surface of the blade, do as follows:

Note

You must bond the new erosion shield to the blade within 72 hours from cleaning by abrasion.

5.3.1 Wipe clean with a soft Lint-free cloth (C011) moist with Isopropyl alcohol (C039) or Aliphatic naphtha (C059) or Solvent (C005) , or similar cleaner, and let it dry for at least 30 minutes.

CAUTION

During sanding make sure not to damage the glass fiber of the dummy heater mat and, if the dummy heater mat is fully removed, of the blade skin.

5.3.2 Lightly sand the dummy heater mat surface and the blade skin surface (if the dummy heater mat is fully removed up to the skin) with Abrasive paper (C055) , grit 80 - 100, as preparation for bonding. Be careful not to damage the fibers.

5.3.3 Remove sanding residuals with a dry Lint-free cloth (C011) .

5.3.4 Wipe clean with a soft Lint-free cloth (C011) moist with Isopropyl alcohol (C039) or Aliphatic naphtha (C059) or Solvent (C005) , or similar cleaner. Let it dry in the air for at least 30 minutes.

5.3.5 Protect the bonding surface of the blade with a Polyethylene film (Local supply) .

CAUTIONS

- **Do the steps that follow in a dust free environment. You must control the temperature (18 to 27 °C) and the relative humidity (not more than 55%). The area must be fully sealed and the solid particle total count (size 3 µm or larger) not more than 350/dm^3.**
- **Always handle the erosion shield and the blade with clean white dry gloves not to contaminate the bonding surfaces.**

Note

Depending on the condition of the blade, do the applicable step:

– if the dummy heater mat is fully removed, do the application of the full dummy heater mat as written in Step ;

– if the dummy heater mat is fully removed only at root (for the first installation of the new erosion shield P/N 3G6410L00551), restore it as written in Step 7;

– if the dummy heater mat was restored for the installation of the new erosion shield P/N 3G6410L00551, do the first consolidation of the erosion shield as written in Step 8.

6 **Application of the full dummy heater mat.**

6.1 Remove the Polyethylene film from the bonding surface of the blade.

6.2 Mask the boundary of the bonding surface of the blade with the Teflon tape (C223) .

6.3 Make on a work bench one layer of Glass prepreg fabric cloth (C660) and four layers of Fiberglass (C192) with slightly larger dimensions than the bonding surface of the erosion shield.

6.4 Remove the inner backing film and put the layer of Glass prepreg fabric cloth (C660) on the bonding surface of the blade, starting from the root (STA 405) up to the tip, without wrinkles or swells. If you find wrinkles or swellings, remove them as much as possible with a Spatula (Teflon or Nylon) (ZZ-00-00) or with white dry gloves. Remove the outer backing film from the layer of fiberglass.

6.5 Trim with the Scissors (rounded ends) (ZZ-00-00) the unwanted Fiberglass in line with the blade skin joggle on the whole erosion shield seat.

6.6 Do the same procedure for the application of the remaining four layers of Fiberglass (C192) .

6.7 Do a consolidation of the dummy heater mat as follows:

6.7.1 Apply the Release film (C920) on the repair area.

6.7.2 Take the erosion shield to be bonded and put it over the blade in its correct position.

6.7.3 Lightly tap the whole leading edge of the erosion shield with the Hammer (rubber) (ZZ-00-00) and tighten one or more Strap (Elastic) (ZZ-00-00) around the airfoil to keep the shield in position.

6.7.4 Apply one layer of Breather fabric (C917) on the erosion shield.

6.7.5 Seal a complete Vacuum bag set (ZZ-00-00) and apply a pressure of 0,6 - 0,8 kg/cm^2. Let to consolidate for 15 minutes min.

6.7.6 Remove the vacuum bag set, the elastic strap(s) and the erosion shield from the blade.

7 **Restore of the dummy heater mat (only if you install for the first time the new erosion shield P/N 3G6410L00551).**

7.1 Remove the Polyethylene film from the bonding surface of the blade.

Note

It is possible to prepare the material with larger dimensions and trim it after application on the repair area. If you do this method, mask the boundary of the area with the Teflon tape (C223) to protect the underlaying surfaces during trim operations.

7.2 Make on a work bench the material that follows, with chordwise dimension as the bonding surface and spanwise dimension as given (see Fig 4 and Fig 5):

- Layer 1: one layer of Adhesive (C189) (weight .06) with spanwise dimension as the total repair area (blade skin plus 25 mm (1 in) overlap toward the tip).
- Layer 2: one layer of Glass prepreg fabric cloth (C660) with spanwise dimension as the area where all the layers of dummy heater mat were removed up to the blade skin.
- Layer 3: one layer of Fiberglass (C192) with spanwise dimension as the area where all the layers of dummy heater mat were removed up to the blade skin minus 1 mm.
- Layer 4: one layer of Fiberglass (C192) with spanwise dimension as the total repair area (blade skin plus 25 mm (1 in) overlap toward the tip) minus 2 mm.
- Layer 5: one layer of Fiberglass (C192) with spanwise dimension as the total repair area (blade skin plus 25 mm (1 in) overlap toward the tip) minus 3 mm.
- Layer 6 (if it can be installed): one layer of Fiberglass (C192) with spanwise dimension as the total repair area (blade skin plus 25 mm (1 in) overlap toward the tip) minus 4 mm.

7.3 Mask the boundary of the repair area with the Teflon tape (C223) .

7.4 Remove the inner backing film from the Layer 1 (Adhesive (C189)). Put the adhesive on the whole repair area without wrinkles or swells (see Fig 4) and shape it correctly in the step between the blade skin and the dummy heater mat (25 mm overlap).

7.5 Remove the outer backing film from the adhesive and make sure that the surface appears well extended and free from wrinkles and swellings. If you find wrinkles or swellings, remove them as much as possible with a Spatula (Teflon or Nylon) (ZZ-00-00) or with white dry gloves.

7.6 Remove the backing film from the Layer 2 (Glass prepreg fabric cloth (C660)) and put it on the Layer 1, in the area where the dummy heater mat was removed up to the blade skin (from STA 405 up to the dummy heater mat). Remove the outer backing film from the layer of fiberglass.

7.7 Remove the backing film from the Layer 3 (Fiberglass (C192)) and put it on the Layer 2, starting 1 mm after the STA 405 up to the dummy heater mat. Remove the outer backing film from the layer of fiberglass.

7.8 Do a consolidation of the dummy heater mat as follows:

7.8.1 Cover the dummy heater mat fully with the Release film (C920) .

7.8.2 Take the erosion shield to be bonded and put it over the blade in its correct position.

7.8.3 Lightly tap the whole leading edge of the erosion shield with the Hammer (rubber) (ZZ-00-00) and tighten one or more Strap (Elastic) (ZZ-00-00) around the airfoil to keep the shield in position.

7.8.4 Apply one layer of Breather fabric (C917) on the erosion shield.

7.8.5 Seal a complete Vacuum bag set (ZZ-00-00) and apply a pressure of 0,6 - 0,8 kg/cm^2. Let to consolidate for 15 minutes min.

7.8.6 Remove the vacuum bag set, the elastic strap(s) and the erosion shield from the blade.

7.9 Remove the release film from the repair area.

7.10 Remove the backing film from the Layer 4 (Fiberglass (C192)) and put it on the Layer 3 and on the overlap covered by adhesive, starting 1 mm after the Layer 3 (STA 405 plus 2 mm) up to the end of the repair area (see Fig 5). Remove the outer backing film from the layer of fiberglass.

7.11 Remove the backing film from the Layer 5 (Fiberglass (C192)) and put it on the Layer 4, starting 1 mm after the Layer 4 (STA 405 plus 3 mm) up to the end of the repair area. Remove the outer backing film from the layer of fiberglass.

7.12 Do a consolidation of the dummy heater mat as written in Step 7.8. Let to consolidate for 15 minutes min.

7.13 Remove the release film from the repair area.

7.14 Visually examine the area to check for clearance between the profile of the old dummy heater mat and the profile of the new applied part. If it is possible to apply one more layer of fiberglass, (Layer 6) continue with steps that follow, otherwise continue with the bonding operations of the erosion shield (Step 8).

7.15 Remove the backing film from the Layer 6 (Fiberglass (C192)) and put it on the Layer 5, starting 1 mm after the Layer 5 (STA 405 plus 4 mm) up to the end of the repair area. Remove the outer backing film from the layer of fiberglass.

7.16 Do a consolidation of the dummy heater mat as written in Step 7.8. Let to consolidate for 15 minutes min.

8 **First consolidation of the erosion shield.**

8.1 Remove the Polyethylene film or the release film from the bonding surface of the blade.

8.2 If delaminated layers of the dummy heater mat were removed (Ref. Step 3.4.2), apply patches of Adhesive (C191) (weight .03) and Fiberglass (C192) in order to level the bonding surface (see Fig 6).

8.3 Protect from adhesive squeeze-out the boundary of the erosion shield bonding surface on the blade with Teflon tape (C223) , upper side and lower side (see Fig 6).

8.4 Apply the adhesive on the bonding surface as follows (see Fig 6):

8.4.1 Make on a work bench one layer of Adhesive (C189) (weight .06) with slightly larger dimensions than the bonding surface of the erosion shield. Remove the inner backing film from the adhesive.

8.4.2 Put the layer of adhesive on the bonding surface of the blade, starting from the root (STA 405) up to the tip, without wrinkles or swells. If you find wrinkles or swellings, remove them as much as possible with a Spatula (Teflon or Nylon) (ZZ-00-00) or with white dry gloves. Do not remove the outer backing film.

8.4.3 Take the erosion shield to be bonded and put it over the blade in its correct position.

8.4.4 Lightly tap the whole leading edge of the erosion shield with the Hammer (rubber) (ZZ-00-00) .

8.4.5 Trim with the Scissors (rounded ends) (ZZ-00-00) the unwanted adhesive in line with the blade skin joggle on the whole erosion shield seat (see Fig 6).

8.5 Do the consolidation of the erosion shield as follows:

8.5.1 Tighten one or more Strap (Elastic) (ZZ-00-00) around the airfoil to keep the shield in position.

8.5.2 Apply one layer of Breather fabric (C917) on the erosion shield.

8.5.3 Seal a complete Vacuum bag set (ZZ-00-00) and apply a pressure of 0,6 - 0,8 kg/cm^2. Let to consolidate for minimum 30 minutes.

8.5.4 Remove the vacuum bag set, the elastic strap(s) and the erosion shield from the blade.

9 **Second consolidation of the erosion shield.**

9.1 Remove the backing film from the adhesive outer surface.

CAUTION

Use applicable gloves to prevent contaminations of the bonding surface.

9.2 Apply manual pressure on the whole bonding surface and make sure that pressure on the adhesive has been properly applied (adhesive must appear well extended and free from wrinkles and swellings, small wrinkles are permitted as long as the area shows an adequate pressure).

Note

It is recommended to apply a strip of Adhesive (C191) (weight .06) 10 mm wide on the whole leading edge.

9.3 Make on a work bench strips and / or patches of Adhesive (C191) (weight .03 and / or weight .06) of the necessary dimension to cover the areas of low pressure (areas of lighter color) (see Fig 7).

9.4 Remove the inner backing film and apply the strips and / or patches of adhesive on the areas of low pressure.

Note

After each application of the adhesive on the areas of low pressure, apply again manual pressure on the whole bonding area to make sure if there are other areas of low pressure.

9.5 Remove the backing film from the outer surface of the adhesive strips and / or patches.

9.6 If the dummy heater mat was restored at the root, examine the area for correct pressure, with particular care to the leading edge. If you find areas of low pressure, locally add strips and / or patches of Adhesive (C191) (weight .06) to level the surface.

9.7 Cover the adhesive on the bonding surface fully with the adhesive backing film or with the Release film (C920) .

9.8 Take the erosion shield to be bonded and put it over the blade in its correct position.

9.9 Lightly tap the whole leading edge of the erosion shield with the Hammer (rubber) (ZZ-00-00) .

9.10 Do the consolidation of the erosion shield as written in Step 8.5. Let to consolidate for minimum 30 minutes.

10 **Final assembly.**

10.1 Remove the adhesive backing film or the release film from the bonding surface.

CAUTION

Use applicable gloves to prevent contaminations of the bonding surface.

10.2 Apply manual pressure on the whole bonding surface and make sure that pressure on the adhesive has been properly applied (adhesive must appear well extended and free from wrinkles and swellings, small wrinkles are permitted as long as the area shows an adequate pressure).

10.3 If you find areas of low pressure make on a work bench strips and / or patches of Adhesive (C191) (weight .03 and / or weight .06) of the necessary dimension to cover these areas (areas of lighter color) (see Fig 7).

10.4 Remove the inner backing film and apply the strips and / or patches of adhesive on the areas of low pressure.

Note

After each application of the adhesive on the areas of low pressure, apply again manual pressure on the whole bonding area to make sure if there are other areas of low pressure.

10.5 Remove the backing film from the outer surface of the adhesive strips and / or patches.

10.6 If the dummy heater mat was restored at the root, examine the area for correct pressure, with particular care to the leading edge. If you find areas of low pressure, locally add strips and / or patches of Adhesive (C191) (weight .06) to level the surface.

10.7 Take the erosion shield to be bonded and put it over the blade in its correct position.

11 **Adhesive curing.**

11.1 Protect from adhesive squeeze-out the boundary of the erosion shield with Teflon tape (C223) , upper side and lower side (see Fig 7).

11.2 If the dummy heater mat was restored at the root, apply one layer of Peel ply (C454) on the part of adhesive that is exposed and that is not covered by the erosion shield.

11.3 Put several metal or Teflon plates (width 40 mm, thickness 0,8 mm) protected by Teflon tape (C223) , on the blade skin and on the erosion shield joint line to make the adhesive squeeze-out and the profile of the blade more equal. Secure them with Teflon tape (C223) .

CAUTION

Protect possible edges with adhesive tape to prevent breaking of the bag.

11.4 Seal the autoclave Vacuum bag set (ZZ-00-00) and apply an initial low pressure. After 5 minutes make sure that the bag has not ruptured.

11.5 Apply a pressure of 0,6 - 0,8 kg/cm^2 for a minimum of 2 hour at ambient temperature.

11.6 Keep the same pressure of 0,6 - 0,8 kg/cm^2 and do a preliminary cure of the adhesive at the temperature of 47 thru 57 °C (117 thru 135 °F) for one hour minimum.

11.7 Let the vacuum bag applied at the ambient temperature for 3 hours again.

11.8 Move the blade into an autoclave and cure as follows:

- Temperature: 125 - 135 °C increasing 1,1 - 2,7 °C/minute;
- Time: 60 - 120 minutes;
- Pressure: 1,8 - 2,5 kg/cm^2.

11.9 After curing, decrease the temperature, disconnect the pressure and remove the blade from the autoclave.

11.10 Remove the vacuum bag set and other auxiliary devices from the blade.

11.11 If present, remove the Peel ply from the blade at root.

11.12 Lightly sand to remove adhesive squeeze-out, if present, with Abrasive paper (C055) , grit 240 - 320. Be careful to do only spanwise movements on the metallic surfaces.

12 **Inspection.**

Note

Refer to the applicable data modules of Maintenance Publication (39-A-AMP-00-X) for the permitted limits.

12.1 Do a visual inspection of the blade for condition.

Note

For the ultrasonic check of the tail rotor blade P/N 3G6410A00131 contact the Manufacturer to receive the applicable instructions.

12.2 Do the ultrasonic check on the blade fully to make sure that the erosion shield is correctly bonded, refer to:

– 39-A-64-11-01-00A-355A-C for the main inspection of the tail rotor blade (ref. to attachment 4 of this TMI);
– 39-A-64-11-01-05A-355A-C for the inspection of the pitch control arm (ref. to attachment 5 of thsi TMI).

12.3 Do the check of the blade profile and twist angles. Refer to 39-A-64-11-01-00A-361A-C.

12.4 Do the dimensional check of the blade chord at the four Stations indicated in Fig 8 . The measured chord out of the tolerance values must agree with these limits:

– maximum error for single Station: 2 mm
– maximum total error (algebraic sum of the single errors): 6 mm

13 Install the erosion shield reinforcement. Refer to 39-A-64-11-01-09A-720A-C.

Note

Pre-balance is necessary to give specific painting requirements (eg many layers of paint or localized application of paint or epoxy adhesive) to make sure that the subsequent balance of the painted blade will be correct.

14 Do a preliminary static balance of the unpainted blade.

15 Paint the tail rotor blade. Refer to 39-A-64-11-01-00A-257A-C

Note

You must apply the "R" mark each time you bond again the erosion shield.

16 Make the "R" mark immediately after the blade Serial Number on the blade identification plate with an applicable marking pen.

Requirements after job completion

1 Do the check of the static balance of the tail rotor blade. Refer to 39-A-64-11-01-00A-37DA-C

2 Record the erosion shield replacement on the blade log card each time you bond again the shield.

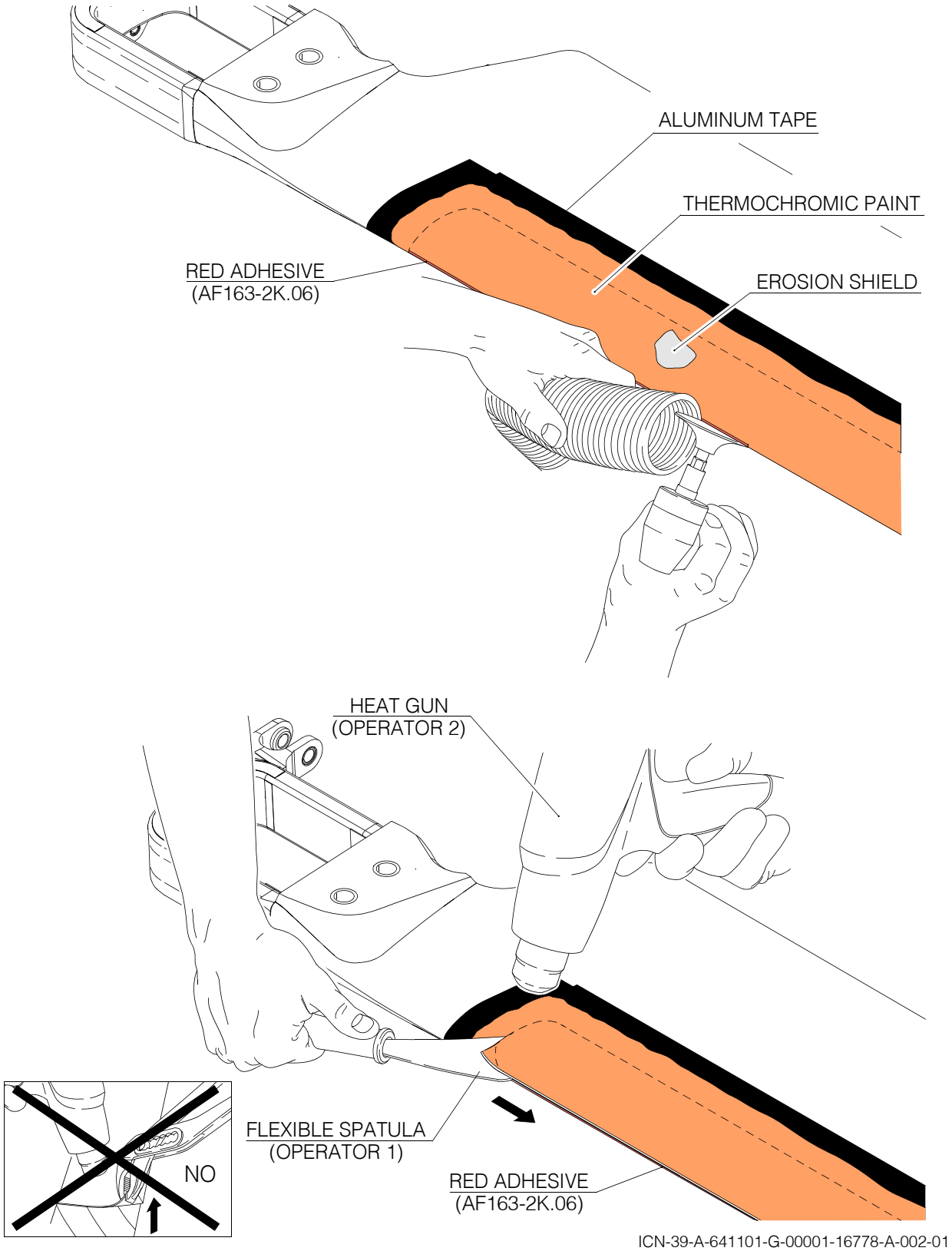
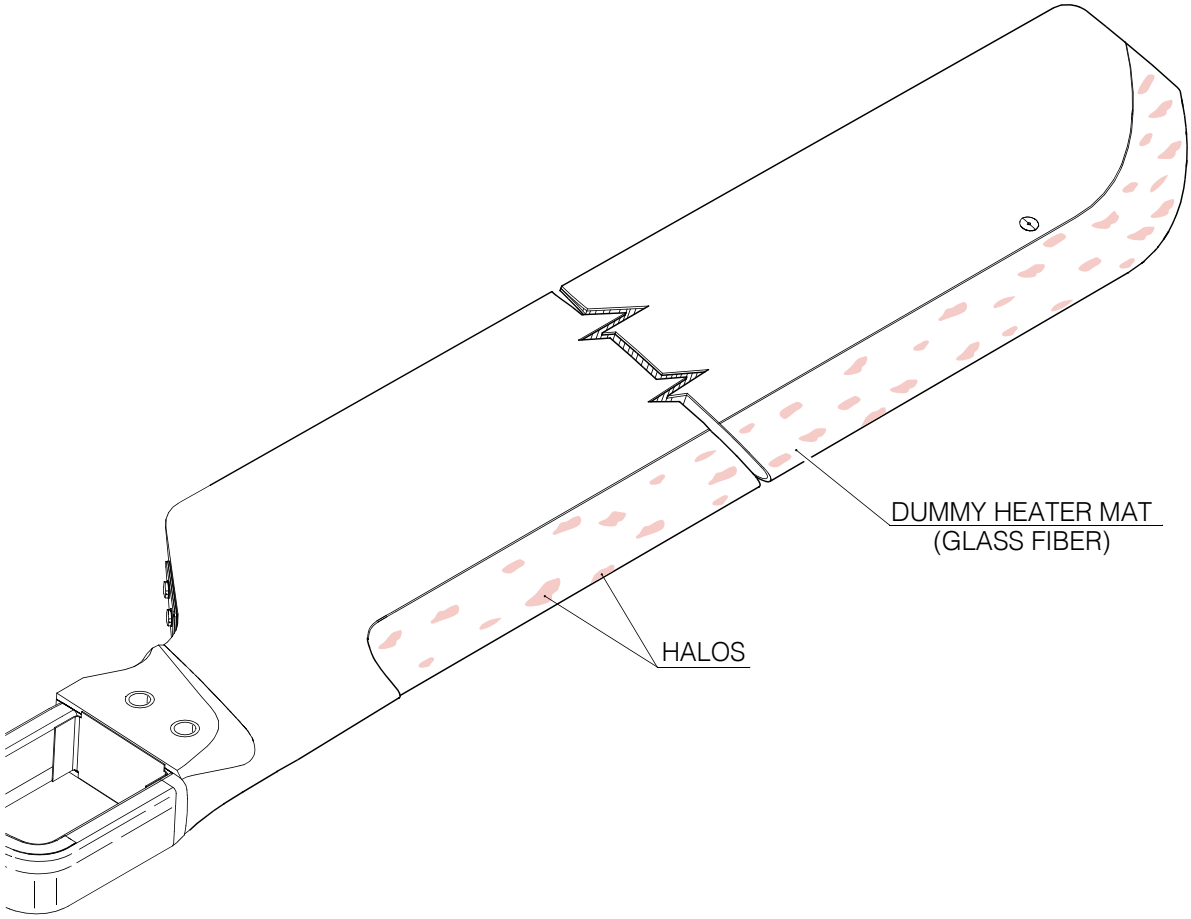


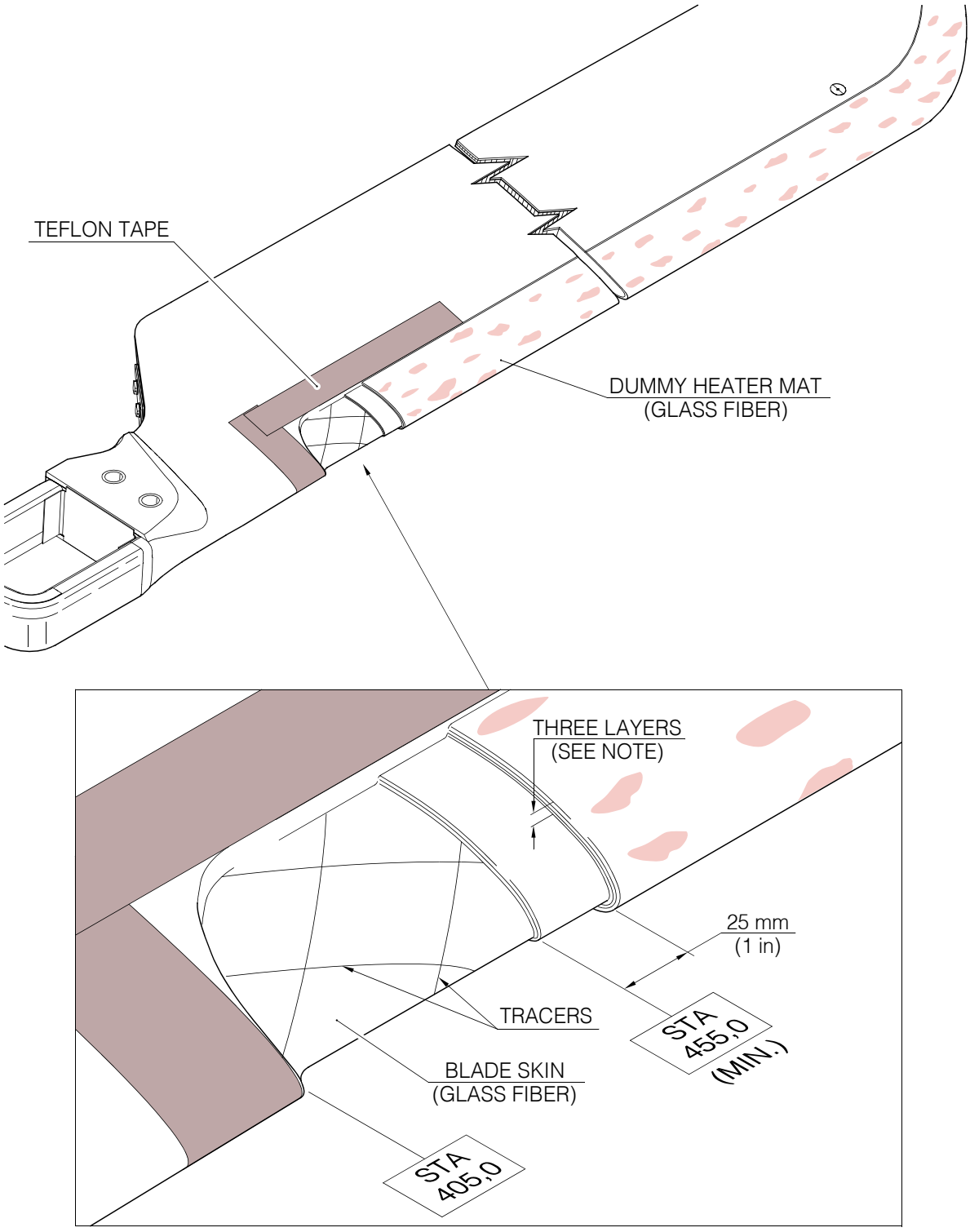
Fig 1 Leading edge cut and erosion shield removal



AFTER CLEANING

ICN-39-A-641101-G-00001-27384-A-001-01

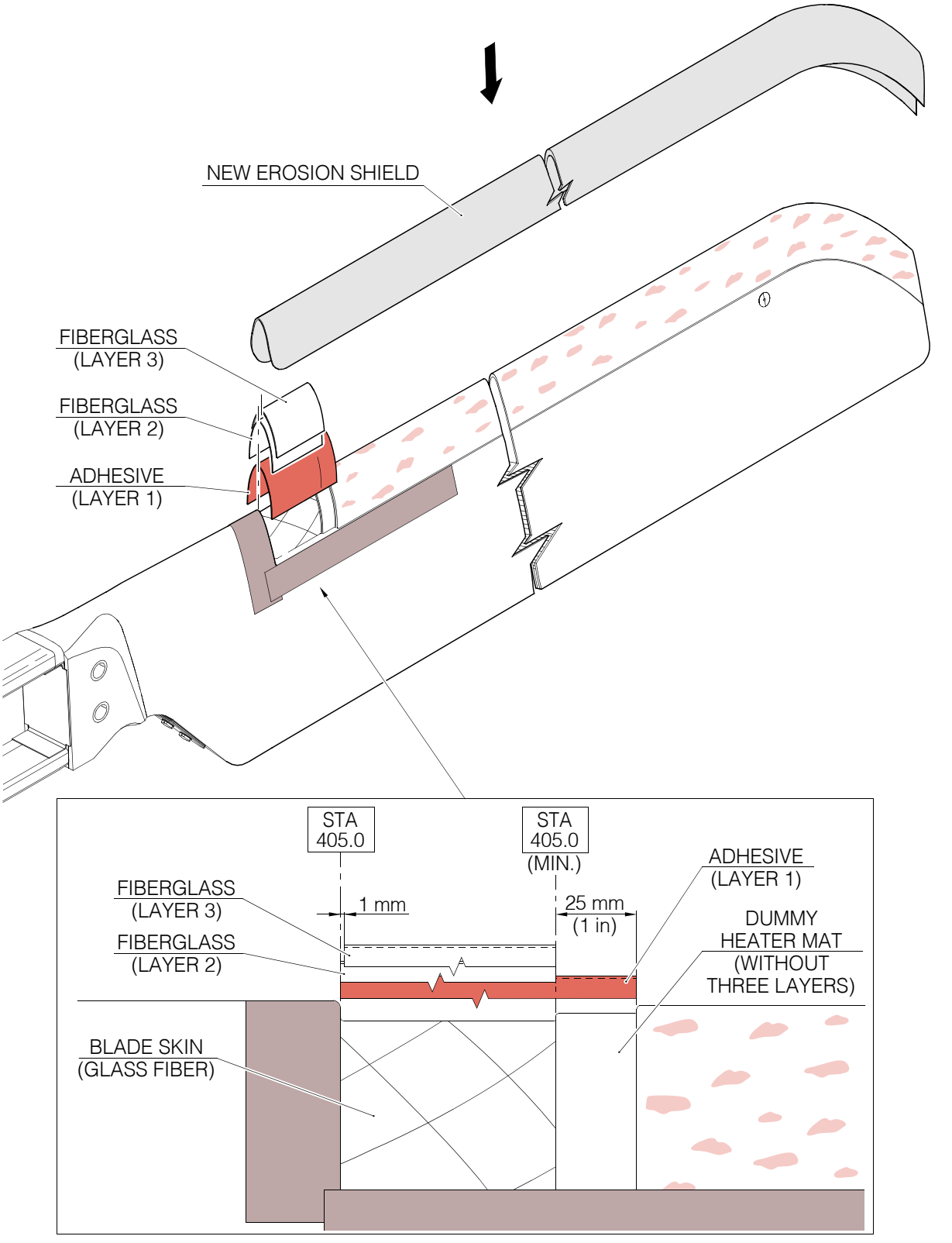
Fig 2 Dummy heater mat cleaning



NOTE: REMOVE THE SAME THICKNESS AS THREE LAYERS OF DUMMY HEATER MAT (THREE LAYERS OF FIBERGLASS (C192)).

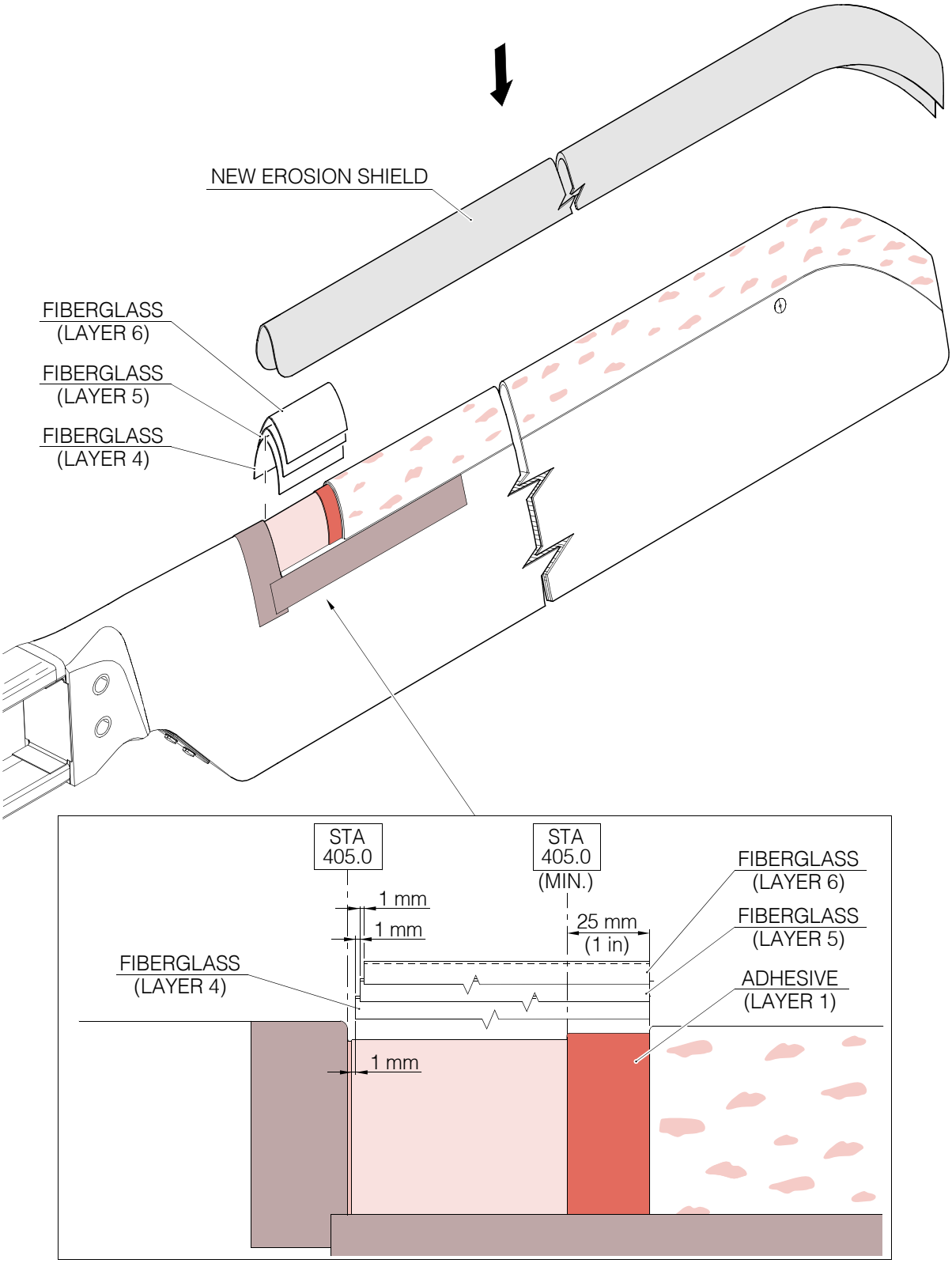
ICN-39-A-641101-G-00001-27385-A-001-01

Fig 3 Dummy heater mat restore (removal)



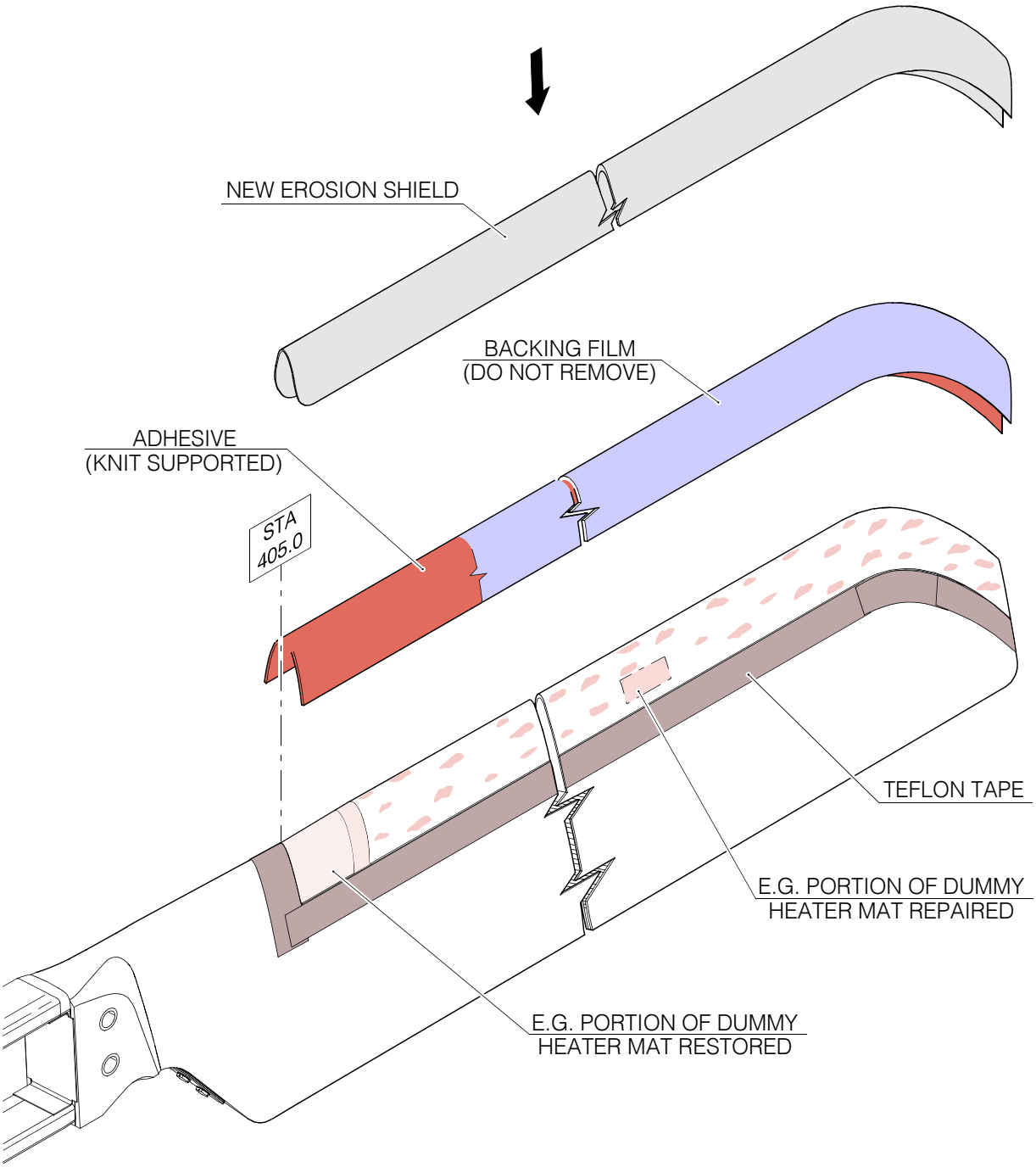
ICN-39-A-641101-G-00001-27387-A-001-01

Fig 4 Dummy heater mat restore (1st application)



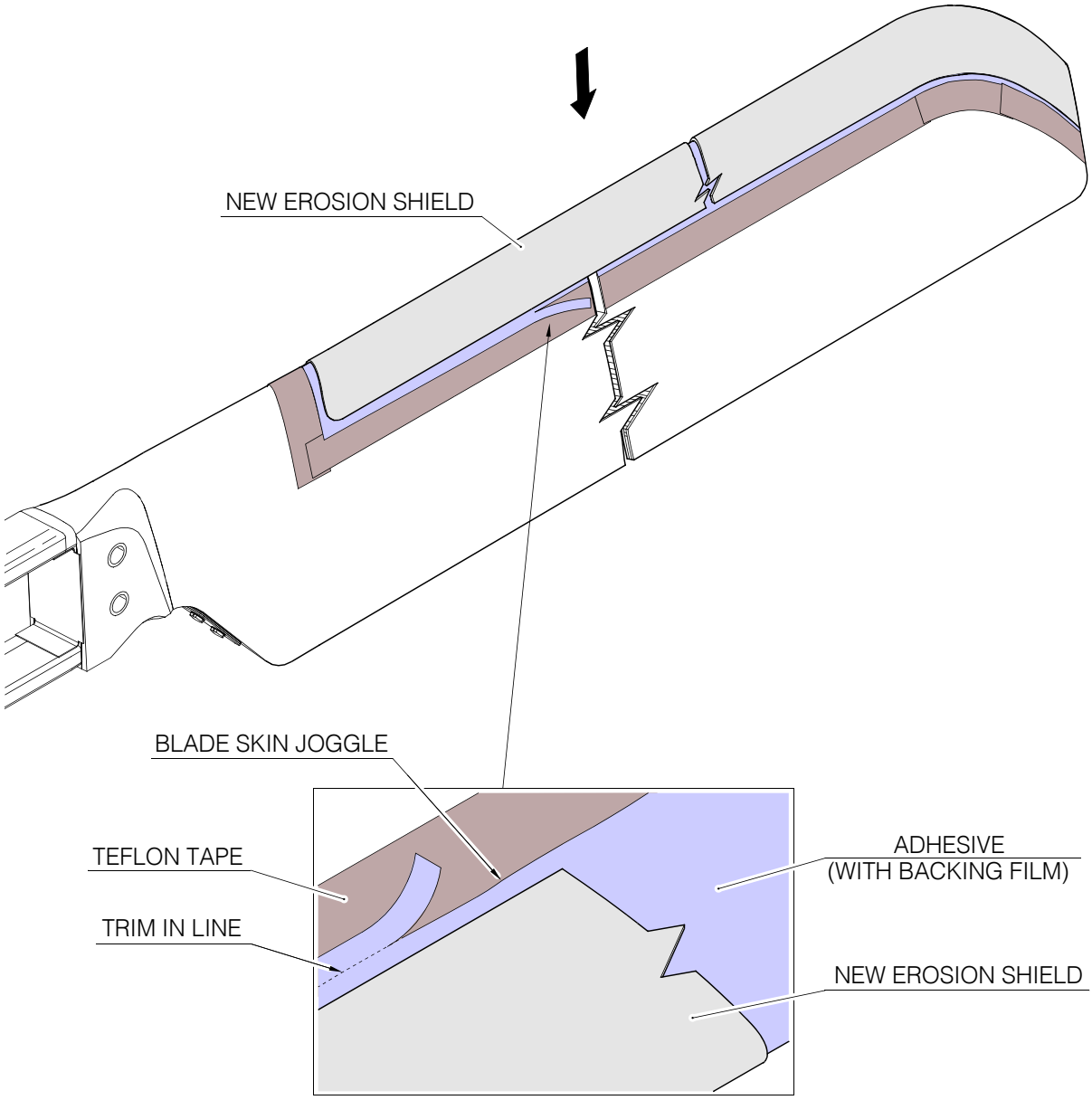
ICN-39-A-641101-G-00001-27388-A-001-01

Fig 5 Dummy heater mat restore (2nd application)



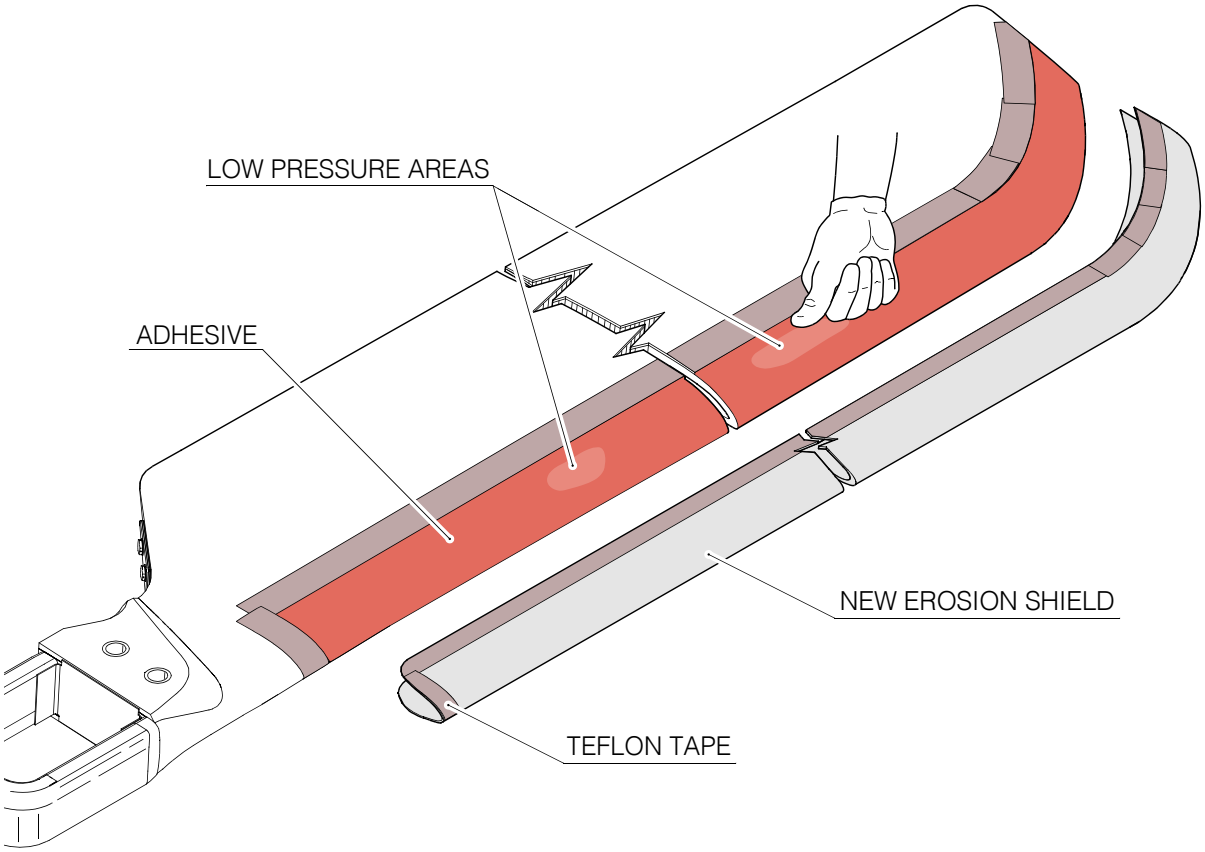
ICN-39-A-641101-G-00001-27389-A-001-01

Fig 6 First adhesive application



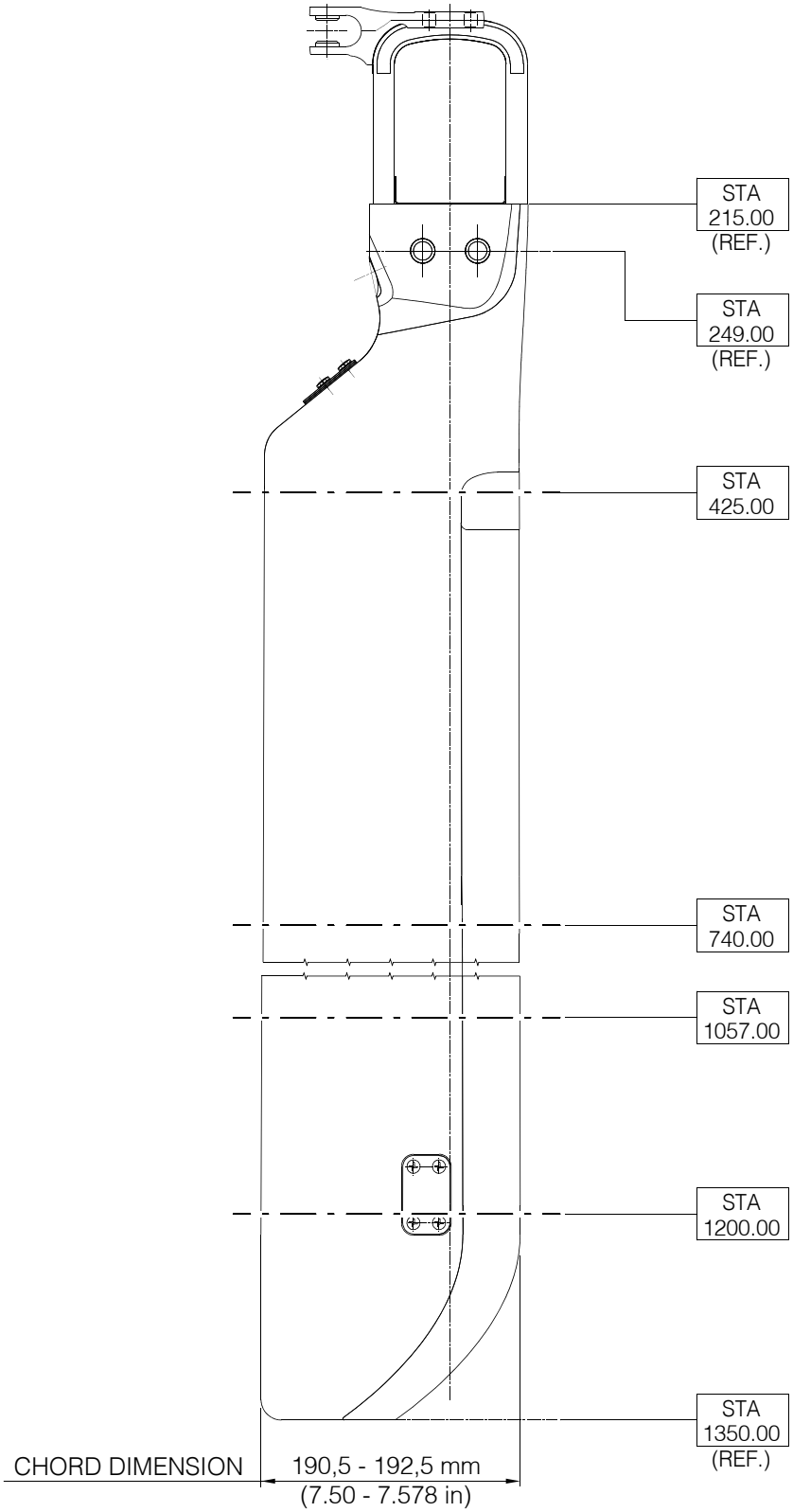
ICN-39-A-641101-G-00001-27390-A-001-01

Fig 6 First adhesive application



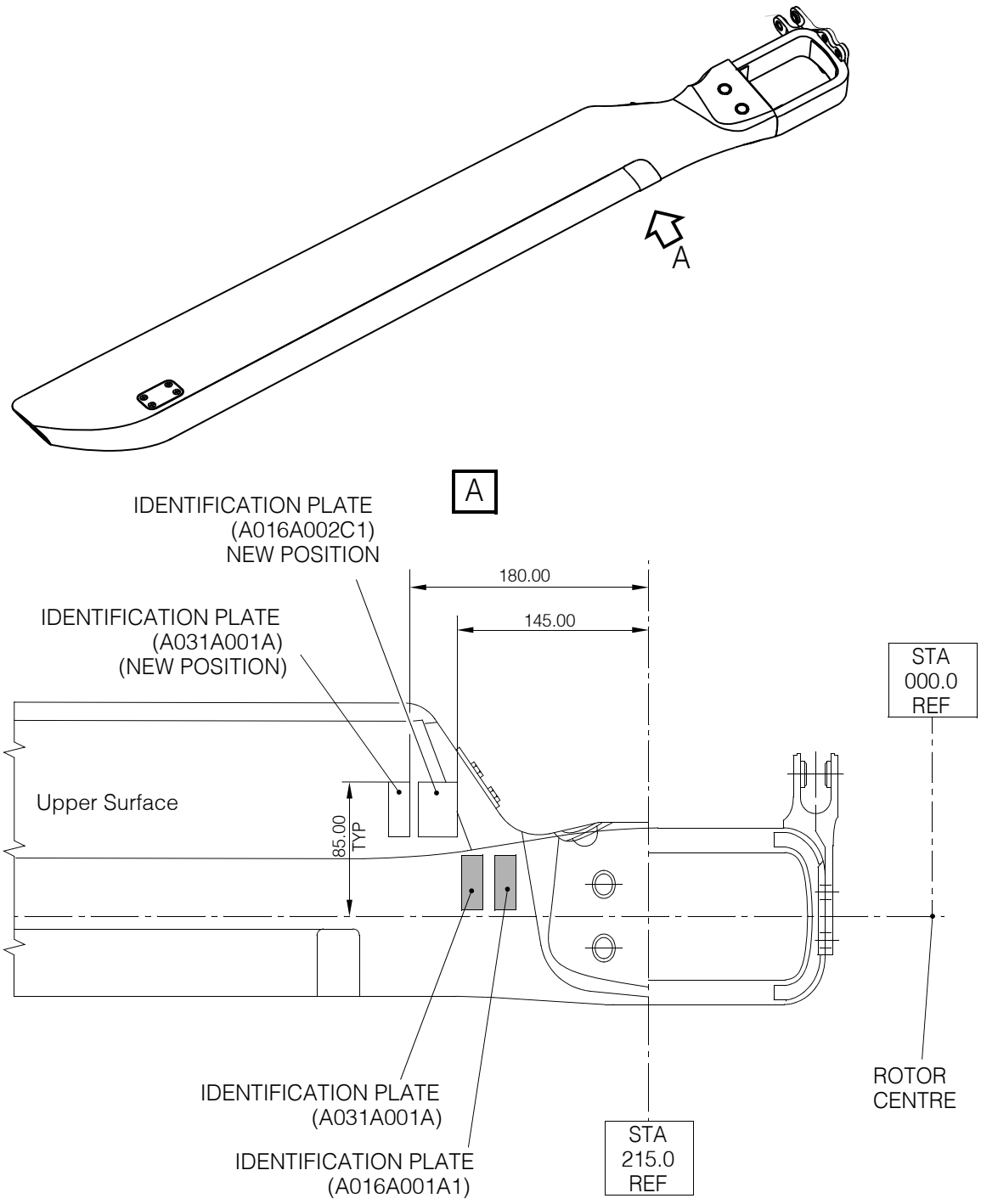
ICN-39-A-641101-G-00001-27386-A-001-01

Fig 7 Low pressure areas check



ICN-39-A-641101-G-00001-19802-A-002-01

Fig 8 Dimensional check of tail rotor blade



ICN-39-A-641101-G-00001-31115-A-001-01

Fig 9 Replacement of ID plates of tail rotor blade

Annex 3

Erosion shield (tail rotor blade assembly)

Replacement (remove and install a new item)

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References

Table 1 References

Data module/Technical publication	Title
39-A-64-11-01-00A-257A-B	Tail rotor blade assembly - Paint and apply marking
39-A-64-11-01-00A-257A-C	Tail rotor blade assembly - Paint and apply marking
39-A-64-11-01-00A-355A-C	Tail rotor blade assembly - Test for cracks and other defects with ultrasonic
39-A-64-11-01-00A-361A-C	Tail rotor blade - Blade body profile and sweep angles - Dimensions check
39-A-64-11-01-00A-37DA-C	Tail rotor blade assembly - Static balance
39-A-64-11-01-05A-355A-C	Pitch control arm (tail rotor blade assembly) - Test for cracks and other defects with ultrasonic
39-A-ZZ-00-00-00A-066A-A	Local supply support equipment and tools - Support equipment and tools data
39-B-64-11-01-07A-921A-A	Heating mat electrical cable (tail rotor blade) - Replacement (remove and install a new item)

Preliminary requirements

Required Conditions

Table 2 Required conditions

Action/Condition	Data module/Technical publication
None	

Support Equipment

Table 3 Support Equipment

Name	Identification No.	Quantity
Heat gun (300 thru 370 °C) (ZZ-00-00)	Local supply	1
Spatula (flexible metallic) (ZZ-00-00)	Local supply	1
Pliers (ZZ-00-00)	Local supply	1
Hammer (aluminum) (ZZ-00-00)	Local supply	1
Vacuum bag (ZZ-00-00)	Local supply	1
Autoclave (ZZ-00-00)	Local supply	1

Supplies

Table 4 Supplies

Name	Identification No.	Quantity
Lint-free cloth	C011	AR
Solvent	C005	AR
Tape	C258	AR
Paint	C421	AR
Adhesive	C306	AR
Fiberglass patch	C165	AR
Abrasive paper	C017	AR
Primer	C190	AR
Kapton tape (125 µm thick)	C381	AR
Acetone	C087	AR
Adhesive	C191	AR

Spares

Table 5 Spares

Name	Identification No.	Quantity
Erosion shield	ZG641102-031	1
Heater mat	ZG641102-032	1

Safety conditions

WARNING

The materials that follow are dangerous. Before you do this procedure, make sure that you know all the safety precautions and first aid instructions for these materials:

- **Solvent (C005)**
- **Paint (C421)**
- **Adhesive (C306)**
- **Primer (C190)**
- **Acetone (C087)**
- **Adhesive (C191)**

Procedure

1 Put the tail rotor blade (1, Fig 1) on an applicable work table.

2 Remove the heater mat electrical cable. Refer to the applicable step of data module. 39-B-64-11-01-07A-921A-A.

3 Clean the full surface of the erosion shield (2) with a Lint-free cloth (C011) and the Solvent (C005) . Let the surface dries at ambient temperature for 30 minutes minimum.

4 Mask the edge of the skin blade with the Tape (C258) .

5 Apply two layers of the Paint (C421) to get an equal surface on the erosion shield.

6 Apply the same layer of thermochromic paint locally on the metallic tape for a length of 25 mm (0.98 in).

7 Let the first layer of paint dries at ambient temperature for 10 minutes before you apply the second layer.

8 Let the paint dries for 4 hours at ambient temperature before you continue with the subsequent step.

Note

Two operators are necessary to do the removal procedure of the erosion shied. One operator does the surface heating. The other one does the mechanical removal of the erosion shield.

9 Locally heat the erosion shield with the Heat gun (300 thru 370 °C) (ZZ-00-00) . Set the heating gun temperature to 300 thru 370 °C (572 thru 698 °F) and start from leading edge of the blade.

10 Hold the heating gun jet at 30 thru 40 mm (1.2 thru 1.6 in) from the surface of the erosion shield during its removal operation.

11 Put the thin Spatula (flexible metallic) (ZZ-00-00) between the erosion shield and the blade body. Do this when the thermochromic paint starts to change its colour from orange (ambient temperature) to light green. Start with the spatula from the trailing edge of the blade and continue to the leading edge.

12 During the removal procedure, you can use the Pliers (ZZ-00-00) to hold the disconnected parts while and after the use of the flexible metallic spatula.

13 Prevent to apply too much heat on the erosion shield surface. The maximum permitted temperature of the blade parts in the worked area must not be more than 160 °C (320 °F).

14 Make sure that the thermochromic paint does not change its colour to brown/black at the end of the procedure. Also make sure that there are no bubbles on the thermochromic paint caused by the applied high temperature.

15 Tell the Manufacturer if these unwanted conditions occur.

16 Tap the area with the Hammer (aluminum) (ZZ-00-00) where you removed the erosion shield to make sure that there is no damage on the blade body.

17 Examine the heater mat to make sure that:

17.1 The races of the heater mat are not in the view.

17.2 If the races of the heater mat are in the view, make sure that they are not raised and/or they have deformations.

17.3 If the heater mats are in the view, apply a layer of the Adhesive (C306) to repair the surface above the heater mat.

17.4 There are no cuts, burn signs or other damage.

17.5 The races of the heater mat are correctly de-bonded and are not lifted.

18 If the results that you get during the Step 17 are satisfactory, continue with the subsequent steps:

18.1 Manually remove the adhesive and the fiberglass patch from below the erosion shield. Use the Abrasive paper (C017) . The adhesive which is on the surface immediately above the heater mat must not be removed fully.

18.2 Do the wet abrasive sand blasting to prepare the surface of the new Erosion shield (ZG641102-031-) for bonding.

18.3 Apply a layer of the Primer (C190) on the erosion shield surface to be bonded.

18.4 Get the Kapton tape (125 µm thick) (C381) polyimide film. Accurately cut a piece which has the shape and dimensions shown on the Fig 2.

18.5 Clean the kapton film with the Acetone (C087) .

18.6 Apply a layer of the Adhesive (C306) and a ply of the Fiberglass patch (C165) on the heater mat.

18.7 Apply a layer of Adhesive (C306) on the fiberglass patch.

Note

The fiberglass patch cross dimension must be more of 10 mm (0.4 in) than the heater mat dimension. Make sure that this extension has to point towards the trailing edge.

18.8 Apply the peel-ply on the repaired surface for protection purposes.

18.9 Do a "verifilm" test to make sure that there is no clearance between the repaired surface and the erosion shield. If you found clearances, apply the necessary layer of Adhesive (C306) locally.

18.10 Put the prepared kapton in the area of the electrical connections of the heater mat. Apply the Adhesive (C306) above the polyimide film.

19 If the results that you get during the Step 17 are not satisfactory, continue with the subsequent steps:

19.1 Remove the heater mat with the abrasion method. Do not remove the adhesive fully above the blade body to prevent damage of the bias fibers of the blade body.

19.2 Visually examine the blade body area where the heater mat was removed. Do the tapping check with the Hammer (aluminum) (ZZ-00-00) on the same area. Make sure that there is no damage on the bias fibers of the blade body.

19.3 Apply a layer of the Adhesive (C306) on the bias fibers of the blade body.

19.4 Apply the peel-ply on the area where you applied the adhesive.

19.5 Put the new Heater mat (ZG641102-032-) on the peel-ply.

19.6 Do a "verifilm" test to make sure that there is no clearance between the adhesive and the heater mat. If you found clearances, apply the necessary layer of Adhesive (C306) locally.

19.7 Apply a bead of the Adhesive (C191) which has a diameter of 3 thru 5 mm (0.12 thru 0.20 in), on the leading edge of the blade body bias-fiber.

19.8 Put the heater mat in its correct position on the blade body.

19.9 Get the new Erosion shield (ZG641102-031-) . Do the wet abrasive sand-blasting to prepare its surface for the bonding.

19.10 Apply a layer of the Primer (C190) on the surface to be bonded.

19.11 Get the Kapton tape (125 µm thick) (C381) polyimide film. Accurately cut a piece which has the shape and dimensions shown on the Fig 2.

19.12 Clean the kapton film with the Acetone (C087) .

19.13 Apply a layer of the Adhesive (C306) and a ply of the Fiberglass patch (C165) on the heater mat.

19.14 Apply a layer of the Adhesive (C306) on the fiberglass patch.

Note

The fiberglass patch cross dimension must be more of 10 mm (0.4 in) than the heater mat dimension. Make sure that this extension has to point towards the trailing edge.

19.15 Apply the peel-ply on the repaired surface for protection purposes.

19.16 Do a "verifilm" test to make sure that there is no clearance between the repaired surface and the erosion shield. If you found clearances, apply the necessary layer of Adhesive (C306) locally.

19.17 Put the prepared kapton in the area of the electrical connections of the heater mat. Apply the Adhesive (Supply Ref. 5) above the polyimide film.

20 Put the abrasion shield which you prepared for bonding in its position on the blade body.

21 You can use the applicable bands to hold the abrasion shield in its position.

22 Install the Vacuum bag (ZZ-00-00) on the abrasion shield. Apply the pressure of 69 kPa (10 lbf/in^2) on the abrasion shield with the bag. Let this bag stay in that position for 2 hours.

23 Initially cure the abrasion shield at the temperature of 47 thru 57 °C (117 thru 135 °F) for one hour minimum. Do not change the pressure applied with the vacuum bag (69 kPa (10 lbf/in^2).

24 Let the vacuum bag applied at the ambient temperature for 3 hours again.

25 Finally cure the abrasion shield in the Autoclave (ZZ-00-00) . Set the autoclave ambient conditions as follow:

- Pressure: 177 thru 245 kPa (26 thru 36 lbf/in^2)
- Temperature: 125 thru 130 °C (257 thru 266 °F). Continue to increase the temperature of 1.1 thru 2.7 °C every minute.
- Cure time: 60 thru 120 minutes.

26 Remove the vacuum bag and the bands if installed.

27 Make sure that the abrasion shield is correctly in its position.

28 Make sure that the fiberglass patch edge comes out from the contour of the abrasion shield.

Note

For the ultrasonic check of the tail rotor blade P/N 4G6410A00131 contact the Manufacturer to receive the applicable instructions.

29 Do the ultrasonic check on the blade fully to make sure that the erosion shield and the heater mat are correctly bonded, refer to:

- 39-A-64-11-01-00A-355A-C for the main inspection of the tail rotor blade (ref. to attachment 4 of this TMI);
- 39-A-64-11-01-05A-355A-C for the inspection of the pitch control arm (ref. to attachment 5 of this TMI).

30 Do the check of the blade body profile and sweep angles. Refer to 39-A-64-11-01-00A-361A-C.

31 Do the dimensional check of the tail rotor blade as shown in the Fig 3 .

32 Carefully do the dimensional check of the blade chord as shown in the Fig 3 .

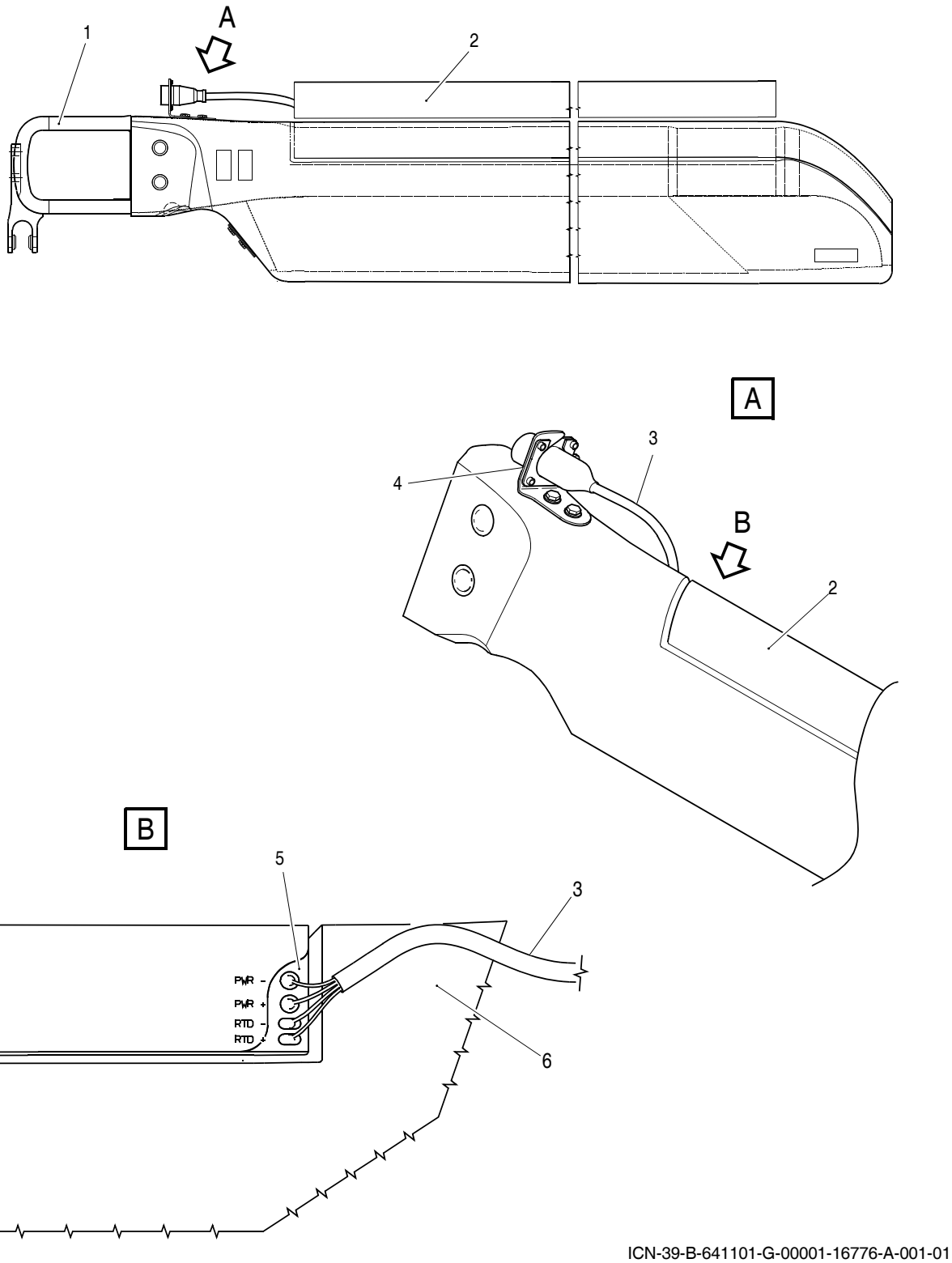
33 Install the heater mat electrical cable. Refer to the applicable step of data module 39-B-64-11-01-07A-921A-A.

34 Paint the repaired area. Refer to 39-A-64-11-01-00A-257A-B or 39-A-64-11-01-00A-257A-C as necessary.

35 Make the "R" mark immediately after the blade Serial Number on the blade identification plate with an applicable marking pen.

Requirements after job completion

1 Do the check of the static balance of the tail rotor blade. Refer to 39-A-64-11-01-00A-37DA-C



ICN-39-B-641101-G-00001-16776-A-001-01

Fig 1 Erosion shield (Tail rotor blade) - Replacement (remove and install a new item)

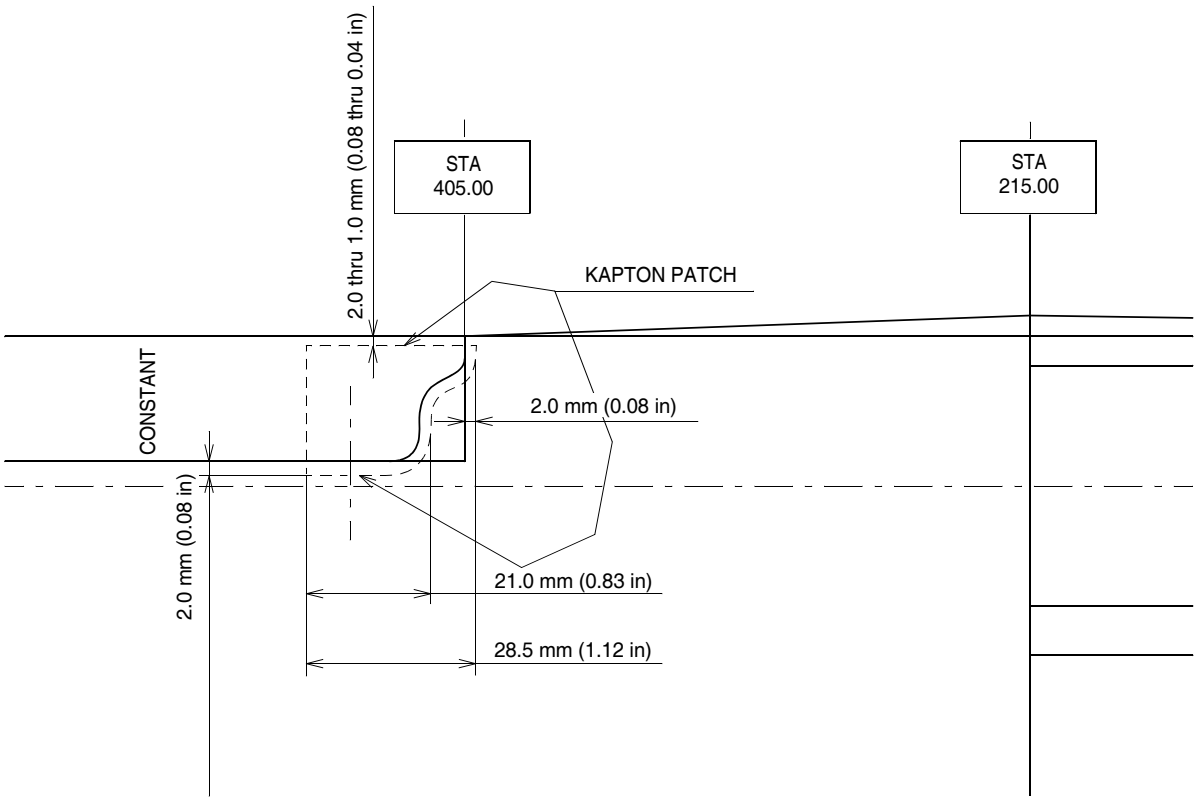


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Fig 2 Erosion shield (Tail rotor blade) - Kapton film dimensions

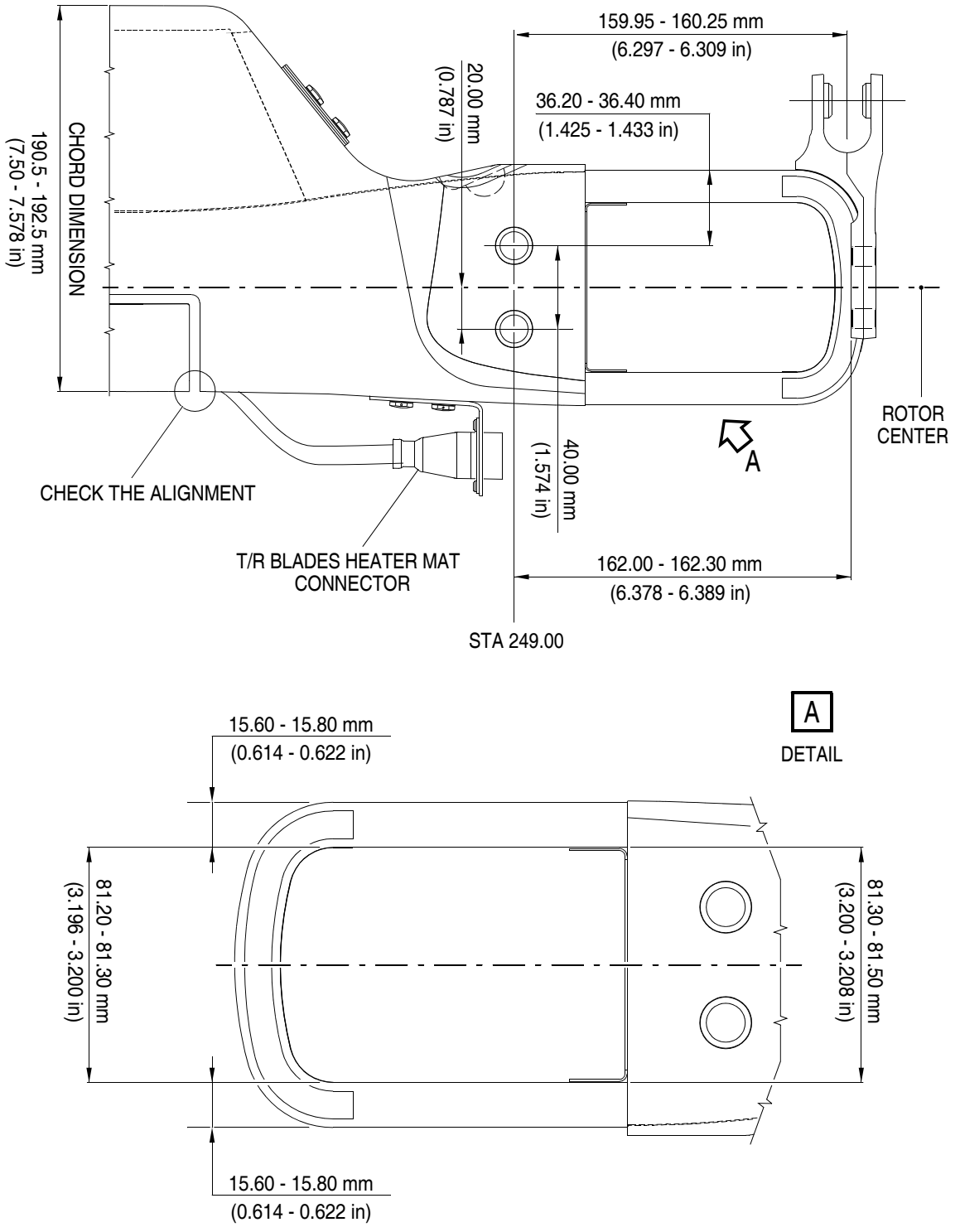

Fig 3 Dimensional check of tail rotor blade

Annex 4

Tail rotor blade assembly

Test for cracks and other defects with ultrasonic

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References

Table 1 References

Data module/Technical publication	Title
39-A-64-11-01-05A-355A-C	Pitch control arm (tail rotor blade assembly) - Test for cracks and other defects with ultrasonic
39-A-GF-05-00-00A-066A-A	Hammer (steel) M/R and T/R blades tapping insp. (GF-05-00) - Support equipment and tools data
39-A-ZZ-00-00-00A-066A-A	Local supply support equipment and tools - Support equipment and tools data

Preliminary requirements

Required Conditions

Table 2 Required conditions

Action/Condition	Data module/Technical publication
None	

Support Equipment

Table 3 Support Equipment

Name	Identification No.	Quantity
Hammer (steel) M/R and T/R blades tapping insp.	GF-05-00	1
Ultrasonic equipment (C-SCAN)	Local supply	1
Ultrasonic equipment (EPOCH 600)	Local supply	1
Bond testing instrument (BONDMASTER 1000e+)	Local supply	1
Calibration block	3G6410A00133B666A	1

Supplies

Table 4 Supplies

Name	Identification No.	Quantity
Solvent	C005	AR
Cheesecloth	C028	AR
Aliphatic naphtha	C059	AR
Acetone	C087	AR
Teflon adhesive tape	C416	AR

Spares

Table 5 Spares

Name	Identification No.	Quantity
No spares are required		

Safety conditions

WARNING

The materials that follow are dangerous. Before you do this procedure, make sure that you know all the safety precautions and first aid instructions for these materials:

- **Solvent (C005)**
- **Aliphatic naphtha (C059)**
- **Acetone (C087) .**

Procedure

Note

This inspection procedure is divided into four phases:

- Phase 1: Inspection of the red area (see Fig 1) with immersion technique by means of squirters and Through-Transmission mode;
- Phase 2: Inspection of the green area (see Fig 2) with manual contact technique and Pulse echo mode;
- Phase 3: Inspection of the blue area (see Fig 3) with manual contact technique and Through-Transmission mode;
- Phase 4: Inspection of the yellow area (see Fig 4) with manual contact technique and Pitch-catch mode.

Note

The inspection of the pitch control arm bonding is not detailed in this procedure. For the inspection of the pitch control arm refer to 39-A-64-11-01-05A-355A-C.

Note

For each inspection phase a work instruction containing details of the ultrasonic equipment, probes and setup parameters must be prepared. This work instruction must be approved by a Ultrasonic Testing Level 3 qualified in compliance with EN4179 or NAS410 and it must be used for the inspection of the parts and calibration checks.

Note

The inspections and discontinuity evaluation must be done by personnel qualified, as a minimum, at Level 2 in Ultrasonic Testing method in compliance with EN4179 or NAS410 and with the related work instruction for each phase.

1 Do the Phase 1 of the ultrasonic inspection (Through-Transmission mode) as follows:

Note

To do the Phase 1, make sure that the Ultrasonic equipment (C-SCAN) (ZZ-00-00) is equipped with:

- a mechanical system for the scanning movement of squirters and probes, including a system for the automatic control and coordination of the movement axes (accuracy ± 0.5 mm or better);
- a rigid holder for a couple of squirters (Ø6 mm nozzle) and probes. The holder must permit a proper alignment of the probes;
- a tank containing coupling water and a pump system to ensure squirters water supply and recirculation;

- an ultrasonic instrument and a logarithmic amplifier for generation, acquisition and processing of the inspection results;
- a couple of immersion probes of 1 MHz (or higher frequency), 0.5 inch;
- a controlled computer system for displaying, recording and printing the inspection data in form of amplitude C-SCAN.

1.1 Clean thoroughly the surface of the Calibration block (3G6410A00133B666A) and the tail rotor blade with a clean Cheesecloth (C028) moist with Acetone (C087) or Solvent (C005) or Aliphatic naphtha (C059) .

1.2 Set up the inspection parameters to create an amplitude C-SCAN map of the calibration block. To do this, cover the inspection area (Fig 1) with a scan index not greater than 2 mm. Make sure that:

- the range on ultrasonic instrument is sufficient to display the transmitted signal in water (without part between squirters) and on each area of the block. A gate must be used to read and record the amplitude of the signal;
- the transmitted signal is not saturated (amplitude ≤ 100% screen) in any part of the calibration block (see reference signal of Fig 1 , Detail A);
- the artificial discontinuities B3 (skin to honeycomb disbond), B4 (skin to skin disbond), D1 and D2 (straps to carbon winding disbonds) of the calibration block are detected (see reference signal of Fig 1 , Detail B) and correctly sized (tolerance = scan index).

1.3 Make sure that the C-SCAN map, with an amplitude color palette, clearly shows the high attenuation areas in comparison with sound areas as given in Fig 1 , Detail C.

1.4 Scan the tail rotor blade with the set up parameters to create an amplitude C-SCAN map for the inspection of the red area of Fig 1 .

Note

Each area of the C-SCAN map where you find a signal attenuation equal or greater of that measured on artificial discontinuities in the calibration block must be considered as a relevant indication (with the exception of foaming filler area), correctly sized with the -6 dB technique and examined as necessary.

1.5 At the end of the inspection, do a calibration check as follows:

- Scan the calibration block;
- Make sure that the transmitted signal on artificial discontinuity indications in the C-SCAN map agrees with the reference signal of Fig 1 (Detail B) and their sizing is correct.

If this check fails, the inspection must be repeated after having restored the correct calibration.

1.6 Dry the tail rotor blade assembly and the calibration block.

2 Do the Phase 2 of the ultrasonic inspection (Pulse echo mode) as follows:

Note

The scope of this phase is the detection of possible skins to spar disbonds in spar area where Phase 1 inspection shows high attenuation because of the presence of foaming filler (see Fig 1 , Detail C), on both upper and lower sides of the tail rotor blade.

2.1 Clean thoroughly the surface of the Calibration block (3G6410A00133B666A) and the tail rotor blade assembly with a clean Cheesecloth (C028) moist with Acetone (C087) or Solvent (C005) or Aliphatic naphtha (C059) .

2.2 Put the probe (OLYMPUS V201 (5 MHz, 0.25 inch, delay line), or equivalent) with Gel for ultrasonic testing on the surface of the calibration block in a sound area of the spar.

2.3 Set up on the Ultrasonic equipment (EPOCH 600) (ZZ-00-00) , or equivalent, a velocity of 2890 m/s and a range of 3 mm.

2.4 Set up the instrument parameters to get on the screen the reflection of blade skin to spar interface (see reference signal of Fig 2 , Detail A). Use a gate to measure its amplitude and depth.

2.5 Put the probe with the Gel for ultrasonic testing on the discontinuity B2 location (skin to spar disbond) of the calibration block.

2.6 Verify the presence of the signal that indicates the skin to spar disbond reflection (see reference signal of Fig 2 , Detail B) and find its size with 6 dB drop technique (tolerance: ± 10% of nominal dimensions).

Note

During probe movement, always make sure that you have a good coupling between the probe and the surface of the calibration block.

2.7 Do a dynamic check moving the probe in and out discontinuity B2 location and check what stated at Step 2.6 above to set the maximum scanning speed.

Note

During the inspection, make sure that you have a good coupling between the probe and the surface of the blade skin.

2.8 Do the inspection of the whole spar area with foaming filler (green area of Fig 2) on both upper and lower sides of blade with a scan index not greater than 3 mm. Keep approximately the same scanning speed found during the dynamic calibration check (Step Note above).

Note

Each area where a condition similar to the reference signal of Fig 2 (Detail B) is detected must be considered as a relevant indication, correctly sized with the 6 dB drop technique and examined as necessary.

2.9 At the end of the inspection, do a calibration check on discontinuity B2 of the calibration block to verify what stated at Step 2.6 above. If this check fails, the inspection must be repeated after having restored the correct calibration.

2.10 Clean the tail rotor blade and the calibration block with a clean Cheesecloth (C028) moist with Acetone (C087) or Solvent (C005) or Aliphatic naphtha (C059) until the Gel for ultrasonic testing is fully removed.

3 Do the Phase 3 of the ultrasonic inspection (Through-Transmission mode) as follows:

Note

The scope of this phase is the detection of discontinuities in handle area of the blade (Fig 3). The inspection must be done directing the ultrasonic beam in two perpendicular directions (Detail A and Detail B).

3.1 Clean thoroughly the surface of the Calibration block (3G6410A00133B666A) and the tail rotor blade assembly with a clean Cheesecloth (C028) moist with Acetone (C087) or Solvent (C005) or Aliphatic naphtha (C059) .

3.2 Put the probes (Panametrics C542 (2.25 MHz, Ø 0.25 inch), or equivalent) with Gel for ultrasonic testing on the opposite surfaces of the calibration block in a sound area as given in Fig 3 , Detail A. Make sure that you keep the correct alignment between them.

3.3 Set up on the Ultrasonic equipment (EPOCH 600) (ZZ-00-00) , or equivalent, a velocity of 2890 m/s and a range of 32.5 mm.

3.4 Set up instrument parameters to show on the screen the transmitted signal (see reference signal of Fig 3 , Detail A1). Use a gate to measure its amplitude.

3.5 Put the probes with the Gel for ultrasonic testing on discontinuities A1 (anti-torsional box disbond) and A2 (ant-torsional box delamination) locations of the calibration block. Make sure that you keep the correct alignment between them.

3.6 Make sure that, in both locations, the amplitude of transmitted signal is reduced to 10% FSH or less (see reference signal of Fig 3 , Detail A2) and check the size of discontinuities with the 6 dB drop technique (tolerance: ± 10% of nominal dimensions).

Note

During movement of the probes, always make sure that the alignment of the probes is correct and that you have a good coupling between the probes and the surfaces of the calibration block.

3.7 Do a dynamic check moving the probes in and out discontinuities A2 and A2 locations and check what stated at Step 3.6 above to set the maximum scanning speed.

3.8 Put the probes in at least 3 different locations in both areas A and B of the tail rotor blade (Fig 3 , Detail A) and check the amplitude of transmitted signal.

3.9 If the mean amplitude is outside the range 80 ± 10% FSH, a correction of calibration gain is permitted only if it is not more than ± 4 dB and if what stated at Step 3.6 above is satisfied with correction applied.

Note

During scanning operations, always make sure that you keep the correct alignment between the probes and that you have a good coupling between the probes and the surfaces of the tail rotor blade.

3.10 Scan 100% of inspection areas A and B (Fig 3 , Detail A) with approximately the same scanning speed determined during the dynamic calibration check (Step Note above) and a scan index not greater than 3 mm.

Note

Each area where a condition similar to the reference signal of Fig 3 , Detail A2 (signal amplitude <10% FSH) is detected must be considered as a relevant indication, sized with the 6dB drop technique and examined as necessary.

3.11 At the end of the inspection, do a calibration check on discontinuities A1 and A2 locations of the calibration block to verify what stated at Step 3.6 above and to make sure that the UT equipment

and probes are adequate. If this check fails, the inspection must be repeated after having restored the correct calibration.

3.12 Put the probes with the Gel for ultrasonic testing on opposite surfaces of the calibration block in a sound area as given in Fig 3 , Detail B. Make sure that you keep the correct alignment between the probes.

3.13 Set up on the ultrasonic equipment a velocity of 2890 m/s and a range of 46.0 mm.

3.14 Set up the instrument parameters to show on the screen the transmitted signal (see reference signal of Fig 3 , Detail B1), with a gate to measure its amplitude.

3.15 Put the probes with the Gel for ultrasonic testing on discontinuities D3 and D4 locations (strap to carbon winding disbonds) of the calibration block. Make sure that you keep the correct alignment between the probes.

3.16 Verify that in both locations the amplitude of transmitted signal is reduced to 10% FSH or less (see reference signal of Fig 3 , Detail B2) and check the size of discontinuities with the 6 dB drop technique (tolerance: ± 10% of nominal dimensions).

Note

During probes movement, always make sure that the alignment of the probes is correct and that you have a good coupling between the probes and the surfaces of the part.

3.17 Do a dynamic check moving the probes in and out discontinuities D3 and D4 locations and checking what stated at Step 3.16 above to set the maximum scanning speed.

3.18 Put the probes in at least 3 different locations in both areas C and D of the tail rotor blade (Fig 3 , Detail B) and check the amplitude of transmitted signal.

3.19 If the mean amplitude is outside the range 80 ± 10% FSH, a correction of calibration gain is permitted only if it is not more than ± 4 dB and if what stated at Step 3.16 above is satisfied with correction applied.

Note

During scanning operations, always make sure that you keep the correct alignment between the probes and that you have a good coupling between the probes and the surfaces of the part.

3.20 Scan 100% of inspection areas C and D (Fig 3 , Detail B) with approximately the same scanning speed determined during dynamic calibration check (Step Note above) and a scan index not greater than 3 mm.

Note

Each area where a condition similar to the reference signal of Fig 3 , Detail B2 (signal amplitude <10% FSH) is detected must be considered as a relevant indication, sized with the 6dB drop technique and examined as necessary.

3.21 At the end of the inspection, do a calibration check on discontinuities D3 and D4 locations of the calibration block to verify what stated at Step 3.16 above and to make sure that the UT equipment and probes are adequate. If this check fails, the inspection shall be repeated after having restored the correct calibration.

3.22 Clean the tail rotor blade and the calibration block with a clean Cheesecloth (C028) moist with Acetone (C087) or Solvent (C005) or Aliphatic naphtha (C059) until the Gel for ultrasonic testing is fully removed.

4 Do the Phase 4 of the ultrasonic inspection (Pitch-Catch mode) as follows:

Note

The scope of the phase is the detection of erosion shield to skins disbonds (yellow area of Fig 4) on both upper and lower sides of the blade.

4.1 Clean thoroughly the surface of the Calibration block (3G6410A00133B666A) and the tail rotor blade assembly with a clean Cheesecloth (C028) moist with Acetone (C087) or Solvent (C005) or Aliphatic naphtha (C059) .

4.2 Set up on the Bond testing instrument (BONDMASTER 1000e+) (ZZ-00-00) , or equivalent, the parameters shown in Table 6 - Bonding test set up (to be used for reference only):

Table 6 Bonding test set up

SETUP 1	H -3.0 dB	ANGLE	REF MEM	START	STOP
	V -3.0 dB	205°	OFF	20 kHz	40 kHz
SETUP 2	HPOS	VPOS		DISPLAY	
				SWEPT	
BOX ALARM	ALARM	+/-	HORN	ALM DWL	SIZ/POS
	ON	NEGATIVE	ON	OFF	…
LIMIT	MOVE	TOP	BOTTOM	LEFT	RIGHT
	H POS	70.0%	30.0%	30.0%	70.0%
	MOVE	TOP	BOTTOM	LEFT	RIGHT
	V POS	70.0%	30.0%	30.0%	70.0%

4.3 Protect the pins of the probe (Olympus SPO-5629-P, or equivalent) with Teflon adhesive tape (C416) .

4.4 Put the probe on the surface of the calibration block in a sound area of the erosion shield.

4.5 Keep the probe in contact with the part and perpendicular to it, and do the nulling operation (press key “NULL” or equivalent).

4.6 Verify that the signal remains inside the alarm box (see reference signal of Fig 4 , Detail A).

4.7 Put the probe on the discontinuities B1 and B5 location (erosion shield disbonds) of the calibration block.

4.8 Verify that the signal exceeds the alarm box (see reference signal of Fig 4 , Detail B) and an alarm sound is audible. Check the size of discontinuities (tolerance: ± 10% of nominal dimensions).

4.9 If necessary, adjust the reference setup parameters reported at Step 4.2 to agree with Step 4.8 above.

Note

During movement of the probe, always make sure that the probe pins are in contact with the surface of the part and perpendicular to it.

4.10 Do a dynamic check moving the probe in and out discontinuity B1 and B5 locations and checking what stated at Step 4.8 above to set the maximum scanning speed.

Note

During the inspection, visually check the PTFE tape on pins frequently. If you find signs of wear, the tape must be replaced and a new calibration check must be done (Step 4.6 and Step 4.8 above).

Note

Make sure that you keep a good contact between the probe and the surface of the erosion shield during the whole inspection.

4.11 Do the inspection of the whole erosion shield area (yellow area of Fig 4) chordwise and span-wise on both upper and lower sides of the tail rotor blade, maintaining approximately the same scanning speed determined during dynamic calibration check (Step Note above) with a scan index not greater than 4 mm.

Note

Each area where a condition similar to the reference signal of Fig 4 , Detail B, is detected must be considered as a relevant indication, correctly sized and assessed as necessary.

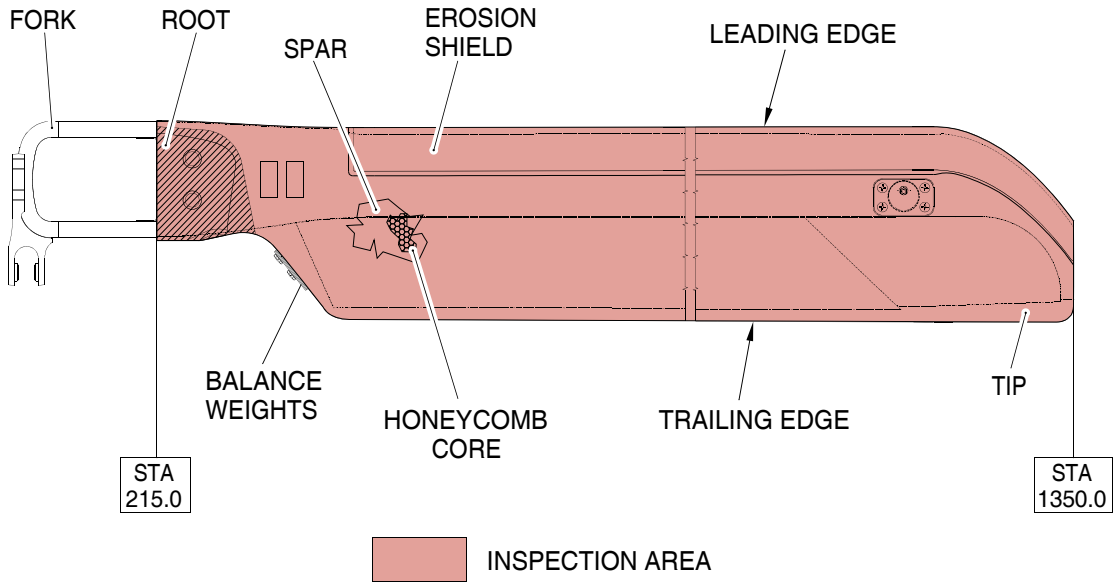
4.12 At the end of the inspection, do a calibration check on discontinuities B1 and B5 of the calibration block to verify what stated at Step 4.8 above and to make sure that the equipment and probes are adequate. If this check fails, the inspection shall be repeated after having restored the correct calibration.

4.13 Remove used PTFE tape from the probe pins.

4.14 Do a tap inspection with the Hammer (steel) M/R and T/R blades tapping insp. (GF-05-00) on the whole erosion shield area on both upper and lower sides of blade. Be very careful on edges and bending areas. Mark and assess all relevant indications.

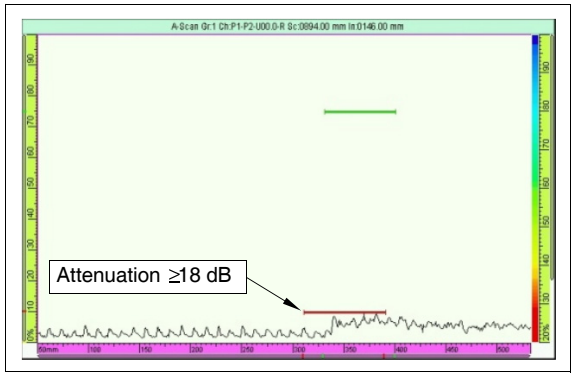
Requirements after job completion

No conditions.



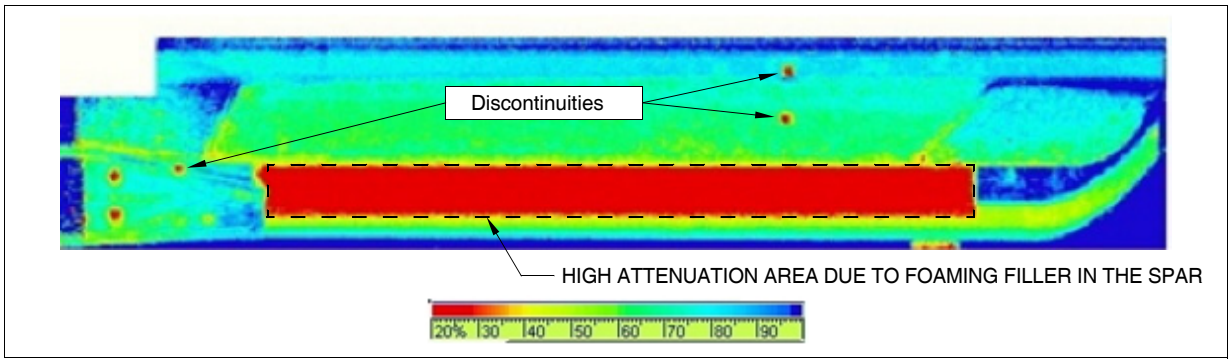
DETAIL A

TRANSMITTED SIGNAL NOT SATURATED IN SOUND AREA



DETAIL B

TRANSMITTED SIGNAL ON ARTIFICIAL DISCONTINUITIES

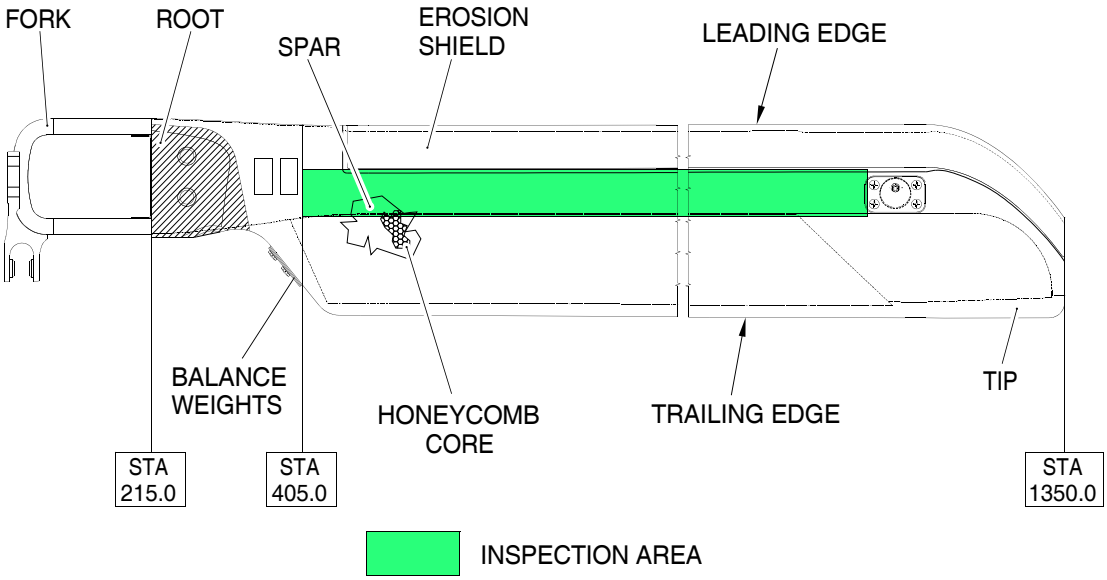


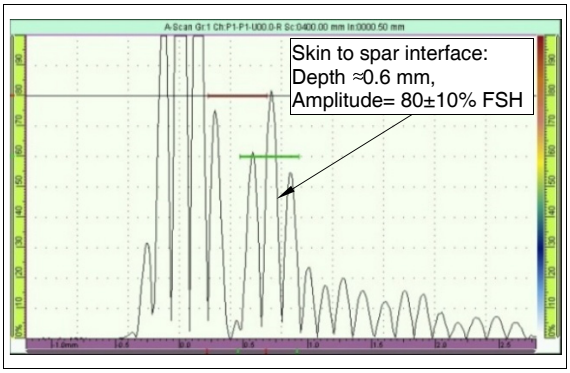
DETAIL C

TYPICAL AMPLITUDE C-SCAN MAP

ICN-39-A-641101-G-00001-34109-A-001-01

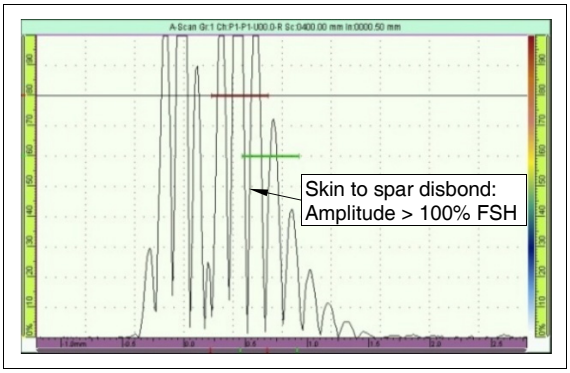
Fig 1 Inspection Phase 1 (Main inspection) - Immersion technique with squirters and Through-Transmission mode





DETAIL A

REFLECTED SIGNAL IN SOUND AREA (SKIN TO SPAR INTERFACE)

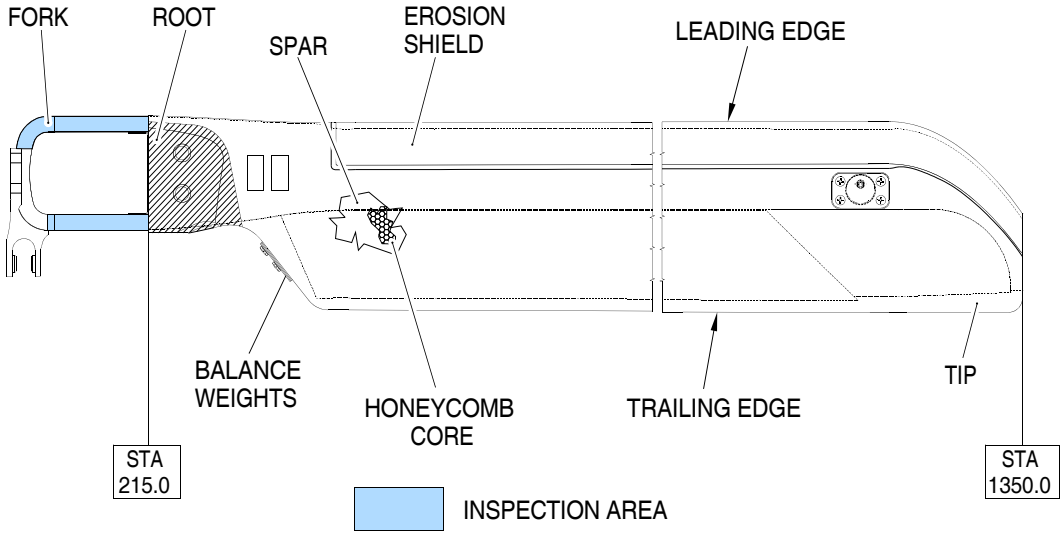


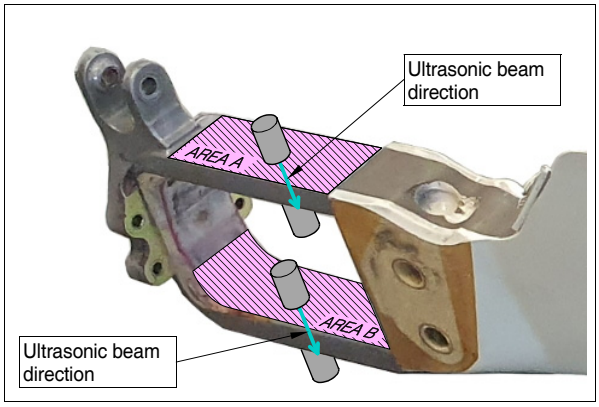
DETAIL B

REFLECTED SIGNAL ON ARTIFICIAL DISCONTINUITY

ICN-39-A-641101-G-00001-34110-A-001-01

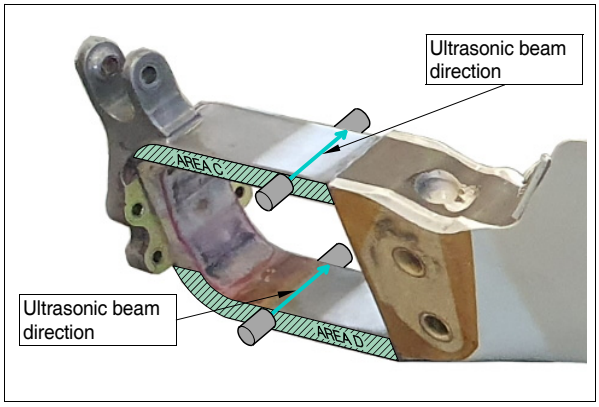
Fig 2 Inspection Phase 2 (Spar area with foaming filler) - Manual contact technique and Pulse echo mode





DETAIL A

INSPECTION AREAS A AND B (ULTRASONIC BEAM IN LEADING EDGE TO TRAILING EDGE DIRECTION)

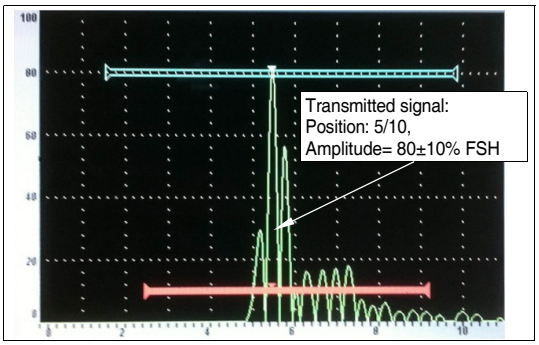


DETAIL B

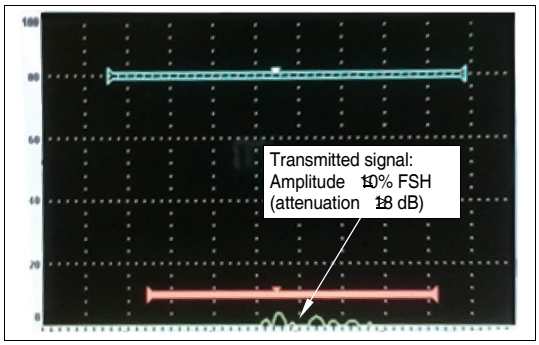
INSPECTION AREAS C AND D (ULTRASONIC BEAM IN UPPER SIDE TO LOWER SIDE DIRECTION)

ICN-39-A-641101-G-00001-34111-A-001-01

Fig 3 Inspection Phase 3 (Fork) - Manual contact technique and Through-Transmission mode

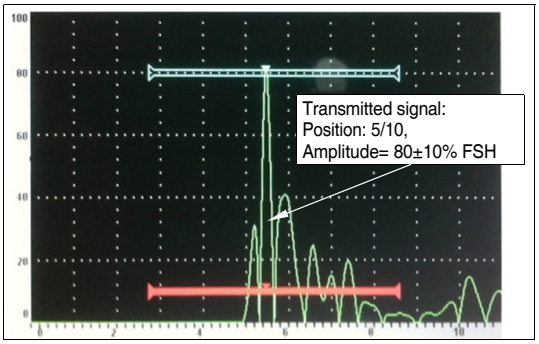


DETAIL A1
TRANSMITTED SIGNAL IN SOUND AREA

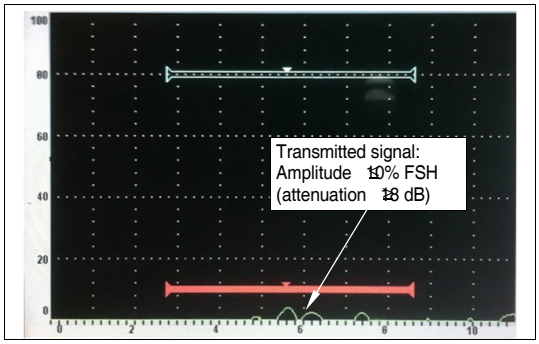


DETAIL A2
TRANSMITTED SIGNAL ON ARTIFICIAL DISCONTINUITIES

INSPECTION REFERENCE SIGNALS FOR AREAS A AND B



DETAIL B1
TRANSMITTED SIGNAL IN SOUND AREA



DETAIL B2
TRANSMITTED SIGNAL ON ARTIFICIAL DISCONTINUITIES

INSPECTION REFERENCE SIGNALS FOR AREAS C AND D

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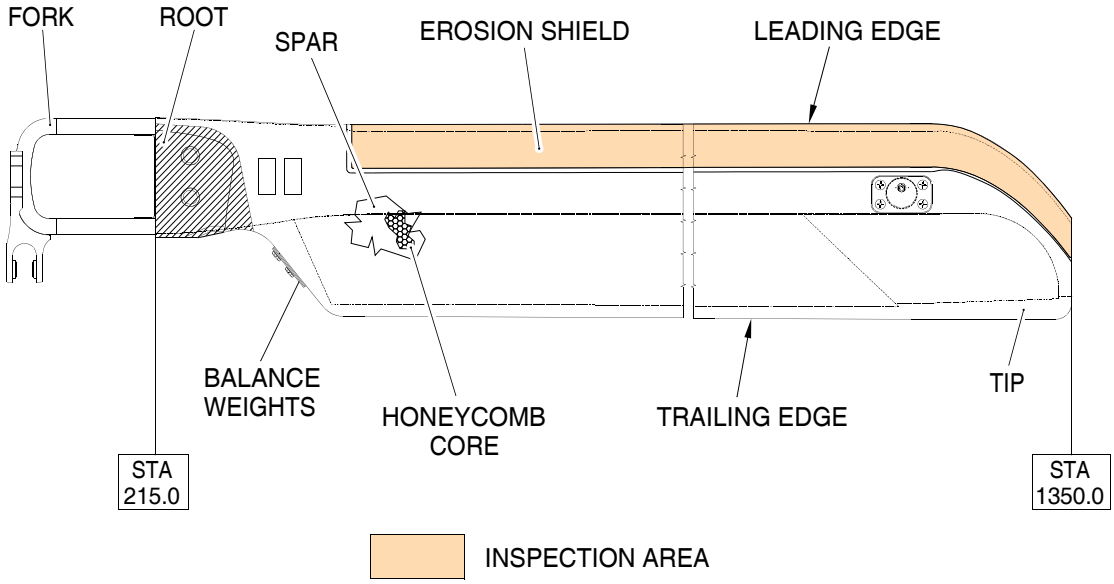
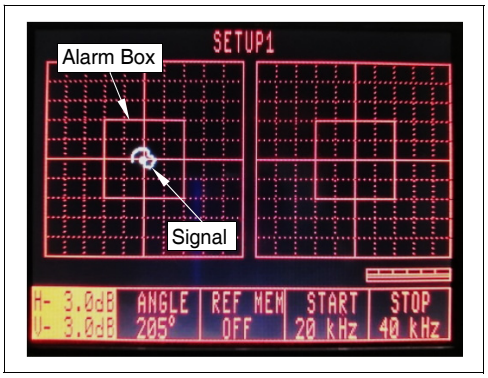
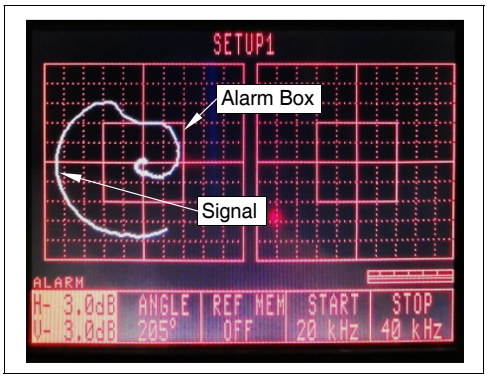
Fig 3 Inspection Phase 3 (Fork) - Manual contact technique and Through-Transmission mode





DETAIL A
SIGNAL IN SOUND AREA



DETAIL B
SIGNAL ON ARTIFICIAL DISCONTINUITIES

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Fig 4 Inspection Phase 4 (Erosion shield) - Manual contact technique and Pitch-catch mode

Annex 5

Pitch control arm (tail rotor blade assembly)

Test for cracks and other defects with ultrasonic

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References

Table 1 References

Data module/Technical publication	Title
39-A-ZZ-00-00-00A-066A-A	Local supply support equipment and tools - Support equipment and tools data

Preliminary requirements

Required Conditions

Table 2 Required conditions

Action/Condition	Data module/Technical publication
None	

Support Equipment

Table 3 Support Equipment

Name	Identification No.	Quantity
Ultrasonic equipment (EPOCH 600)	Local supply	1

Table 3 Support Equipment (Continued)

Name	Identification No.	Quantity
Calibration block	3G6410A00133A666A	1

Supplies

Table 4 Supplies

Name	Identification No.	Quantity
Solvent	C005	AR
Cheesecloth	C028	AR
Aliphatic naphtha	C059	AR
Acetone	C087	AR

Spares

Table 5 Spares

Name	Identification No.	Quantity
No spares are required		

Safety conditions

WARNING

The materials that follow are dangerous. Before you do this procedure, make sure that you know all the safety precautions and first aid instructions for these materials:

- **Solvent (C005)**
- **Aliphatic naphtha (C059)**
- **Acetone (C087) .**

Procedure

Note

This inspection procedure is divided into two phases:

- Phase 1: ultrasonic inspection of the red area (see Fig 1) with manual contact technique and Through-Transmission mode;
- Phase 2: visual inspection of the blue area not covered by ultrasonic inspection.

1 Do the Phase 1 of the inspection (ultrasonic inspection) as follows:

Note

For the inspection a work instruction containing details of the ultrasonic equipment, probes and setup parameters must be prepared. This work instruction must be approved by a Ultrasonic Testing Level 3 qualified in compliance with EN4179 or NAS410 and it must be used for the inspection of the parts and calibration checks.

Note

The inspections and discontinuity evaluation must be done by personnel qualified, as a minimum, at Level 2 in Ultrasonic Testing method in compliance with EN4179 or NAS410 and with the related work instruction.

1.1 Clean thoroughly the surface of the Calibration block (3G6410A00133A666A) and the pitch control arm (1, Fig 1) with a clean Cheesecloth (C028) moist with Acetone (C087) or Solvent (C005) or Aliphatic naphtha (C059) .

1.2 Put the transmitting and receiving probes (Karl Deutsch S12 HB (0.8-3 MHz, Ø 0.5 inch), or equivalent) with Gel for ultrasonic testing on the opposite surfaces of the calibration block in sound area T location as given in Fig 2 . Make sure that you keep the correct alignment between them.

1.3 Set up on the Ultrasonic equipment (EPOCH 600) (ZZ-00-00) , or equivalent, a velocity of 2980 m/s and a range of 23,0 mm.

1.4 Set up instrument parameters to show on the screen the transmitted signal (see reference signal in sound area T of Fig 2). Use a gate to measure its amplitude.

1.5 Put the probes with the Gel for ultrasonic testing on the discontinuity C1 location of the calibration block, representative of a pitch control arm disbond (see Fig 2). Make sure that you keep the correct alignment between them.

1.6 Make sure that, in discontinuity C1 location, the amplitude of transmitted signal is reduced to 10% FSH or less (see reference signal in discontinuity C1 of Fig 2) and check the size of discontinuities with the 6 dB drop technique (tolerance: ± 10% of nominal dimensions).

Note

During movement of the probes, always make sure that the alignment of the probes is correct and that you have a good coupling between the probes and the surfaces of the calibration block.

1.7 Do a dynamic check moving the probes in and out discontinuity C1 location and check what stated at Step 1.6 above to set the maximum scanning speed.

Note

During scanning operations, always make sure that you keep the correct alignment between the probes and that you have a good coupling between the probes and the surfaces of the pitch control arm.

1.8 Scan 100% of inspection area given in Fig 1 with approximately the same scanning speed determined during the dynamic calibration check (Step Note above) and a scan index not greater than 3 mm.

Note

Each area where a condition similar to the reference signal of the discontinuity C1 given in Fig 2 (signal amplitude <10% FSH) is detected must be considered as a relevant indication, sized with the 6dB drop technique and examined as necessary.

1.9 At the end of the inspection, do a calibration check on discontinuity C1 location of the calibration block to verify what stated at Step 1.6 above and to make sure that the UT equipment and probes are adequate. If this check fails, the inspection must be repeated after having restored the correct calibration.

1.10 Clean the pitch control arm and the calibration block with a clean Cheesecloth (C028) moist with Acetone (C087) or Solvent (C005) or Aliphatic naphtha (C059) until the Gel for ultrasonic testing is fully removed.

2 Do the Phase 2 of the inspection (visual inspection) as follows:

2.1 Examine the boundary (upper, lower and trailing edge sides) of the bonding area given in Fig 1 not covered by the ultrasonic inspection to make sure that there is a continuous and equal adhesive squeeze-out along the profile.

2.2 If you find areas without adhesive squeeze-out or evidence of disbonds tell the Manufacturer to receive the applicable instructions.

Requirements after job completion

No conditions.

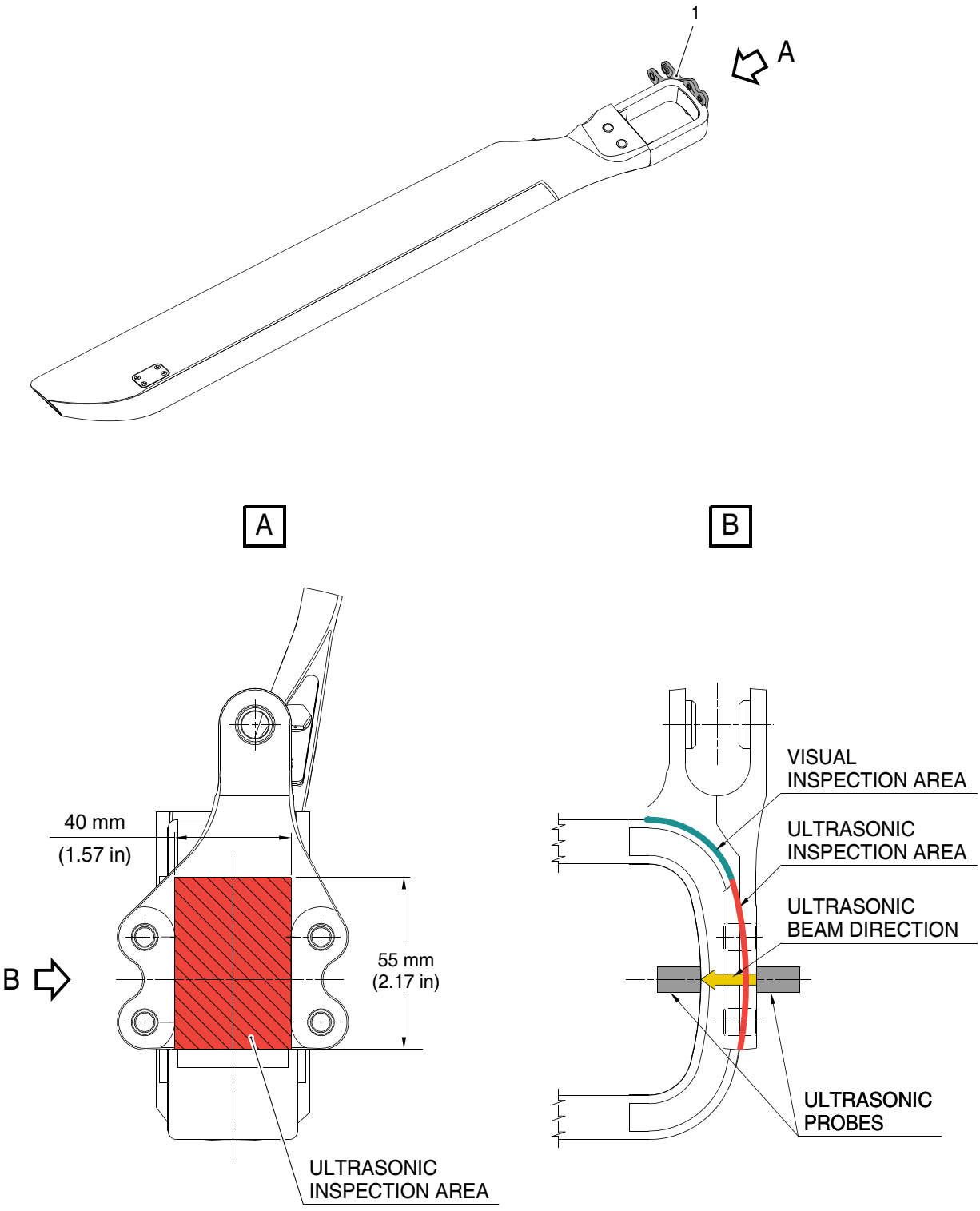

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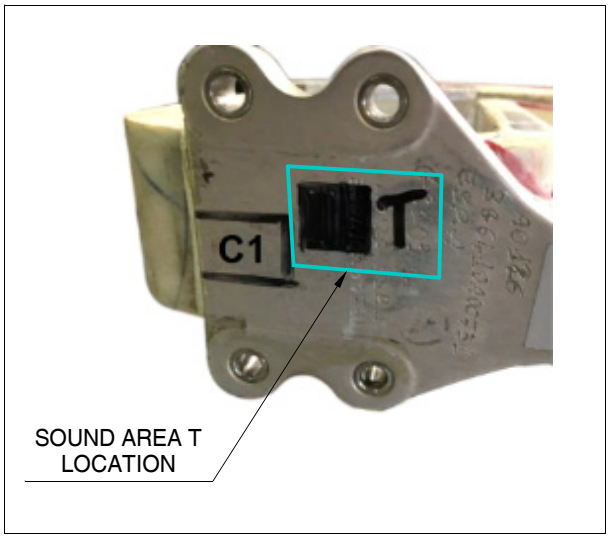
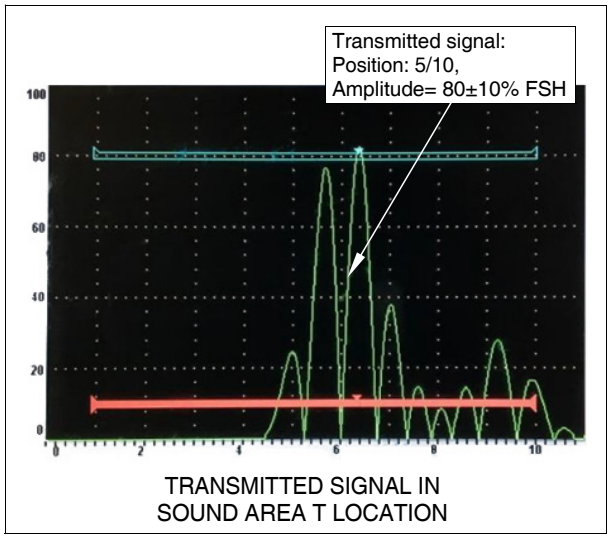
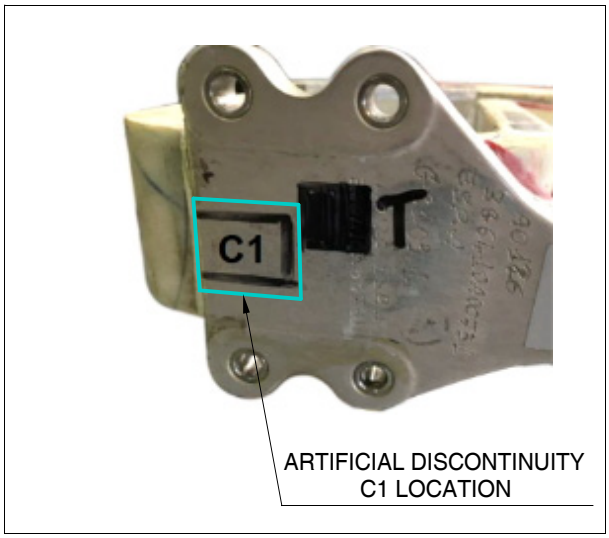
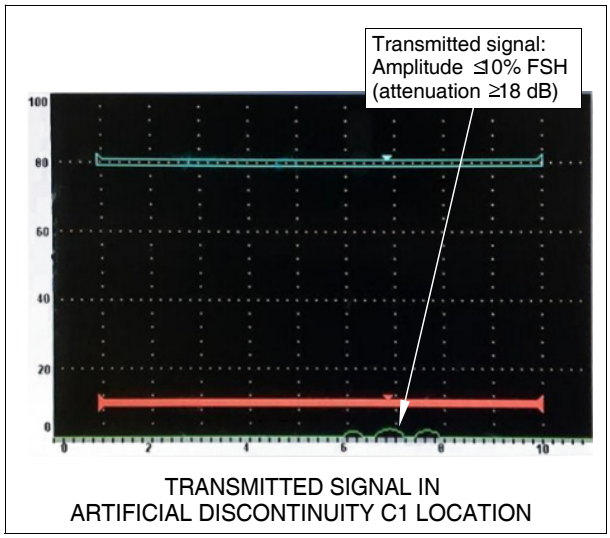
Fig 1 Pitch control arm (tail rotor blade assembly) - Inspection areas





CALIBRATION IN SOUND AREA T





CALIBRATION ON ARTIFICIAL DISCONTINUITY C1

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Fig 2 Calibration of the Ultrasonic instrument