



December 2021 C-130 Newsletter

C-130J - HF Antenna Deicing Boot and Saddle Improvements



The Lockheed Martin C-130J was designed to fly Faster, Farther, and Higher than the original C-130 Hercules. One visual cue to tell if a Hercules is a C-130J is the black deicing boot and saddle on the base of the vertical stabilizer. This combination is the HF Antenna. During portions of the flight testing, it was discovered that ice was building on the lower section the vertical stabilizer. The design engineers in Marietta, Georgia modified a composite saddle fairing with rubber boot combination that would prevent the buildup of excessive ice on this area of the lower vertical stabilizer. The inflatable rubber boot is attached by an adhesive onto the composite saddle. This effective design allows the boot to inflate and deflate to prevent ice from forming in this critical area. Many years later this boot is still doing the job those engineers designed it to do by preventing ice accumulation. One of the fundamental goals of Lockheed Martin is to support our customers by developing better and more cost-effective ways to sustain its multiple lines of aircraft.

Lockheed Martin utilizes sustainment field repair data to analyze ways to reduce aircraft lifecycle cost and increase aircraft reliability. One of those Reliability improvements was with the rubber deicing boot and saddle. The Reliability team started to notice high removals due to deteriorated rubber boots and high scrap rates for the saddle when they were being removed for maintenance in the field. Lockheed Martin began looking into options to reduce the failures and reduce removal damage.

The first decision was to extend the life of the pneumatic deicer boot by applying a conditioner. The intent of the conditioner is to keep the rubber soft and pliable preventing the pin hole leaks that often lead to replacement of the boot and subsequently, the saddle. Age Master Rubber Protective Agent was the product selected to keep the rubber protected from the weathering elements. The conditioner is applied at scheduled intervals per the 30JG-00-1, Application of Rubber Protective Agent to Vertical Stabilizer Deicer Boot to ensure the boot remains healthy for longer periods of time. This extends the overall health and life of the rubber boot.



Secondly, Lockheed Martin also evaluated different repairs that could be performed on aircraft without needing to remove the saddle for maintenance. Avoiding removal of the saddle would prevent potential induced removal damage. During this assessment, repair of the Rain Erosion Coating was selected. This is the area of the saddle directly in front and below the rubber boot on the saddle. Subsequently the -23, Corrosion Control Manual was updated to add a repair for the Rain Erosion Coating. This new repair was just another way to keep the aircraft in service with less maintenance down time.

Finally, through Failure Reporting Analysis and Corrective Action System (FRACAS) analysis it was discovered that saddles were being removed for boot maintenance and the technicians were inadvertently damaging the composite saddle due to strong adhesion to the structure. This type of induced damage was happening with multiple customers around the globe. Most of the damage to the composite saddle was around the edge where it fastens to the structure. This edge location on the saddle is considered a nonrepairable area of the saddle due to fastener edge distance. This means many saddles are being replaced instead of repaired. The replacement cost of a saddle is approximately 80% more than to repair the saddle. Lockheed Martin started evaluating different processes to seal the saddle to the vertical stabilizer structure to prevent this type of damage.

The original production engineering utilized a separating agent and traditional sealant to install the saddle on the vertical stabilizer. The adhesion process in theory is satisfactory, but far from desirable, in regard to separating for maintenance. Aviation Devices and Electronic Components LLC makes 21st century sealants, gaskets, sealant tapes, and injectables for many locations on the C-130. Aviation Devices and Electronic

Components LLC products have been utilized in the commercial world for quite a few years before military manufacturers and operators started investigating their use. Commercial airlines also like the ease of using Aviation Devices and Electronic Components LLC products and the extremely fast cure times allowing aircraft to return to service quickly. Lockheed Martin began working on a solution for the saddle fairing with Aviation Devices and Electronic Components LLC. Many different tape and gasket products were evaluated during this process.



Aviation Devices and Electronic Components LLC produces multiple types of sealant tapes and gaskets that could be used at this location, but the final solution would eventually utilize a hybrid configuration of both the HT3000RT tape with a Conductive gasket and utilize Thixoflex for the final Aero seal. The HT3000RT tape was used on the top, left, and right sides of the installation. This tape is a polyurethane gel tape that has Teflon on one side. The polyurethane side of the tape protects the aircraft structure from corrosion while the Teflon side allows for easy removal of the saddle in the future. The conductive gasket which mounts to the leading edge of the saddle is also made of polyurethane gel with a wire mesh. This conductive gasket on one edge of the saddle fulfilled the conductive requirement for the entire saddle. A conductive gasket was also implemented on the left and right-side access panels of the boot to ease access instead of using sealant. During this evaluation a fit check was performed at the Lockheed Martin Marietta production facility with exceptional results. The production technicians liked using a tape instead of a sealant on the mating surfaces. A seasoned aircraft maintainer and production technician said, “working with sealant often is just plain messy. I get sealant on my clothes and it’s hard to clean up. The sealant ends up all over everything even when you’re careful. The less sealant we can use on a job the better”. Using the Aviation Devices and Electronic Components LLC tape and gasket solution on the mating surfaces reduces that mess, Thixoflex is then used for the final Aero sealing and smoothing between the saddle and the vertical stabilizer structure. Thixoflex is a fast-curing polyurethane type sealant alternative that is often used in combination with the Aviation Devices and Electronic Components LLC tapes and gaskets. After the final solution was developed the next step for this project was to update the C-130J fleet maintenance manuals.

Subsequently every C-130J operator's maintenance manual procedures were revised to include the new Aviation Devices and Electronic Components LLC conductive gasket, tape combination with the Thixoflex as an option to the traditional separable fay surface sealing. These updated procedures are found in the 23JG-20-1, Removal and Installation of the HF Antenna. By using the tape and gasket combination on the vertical stabilizer saddle, removal damage has been considerably reduced. Damage and rework of the mating structure has also been lessened. The aircraft down time to change the saddle and boot combination has also been slashed. Operators are liking the benefits of using the Aviation Devices and Electronic Components LLC gasket and tapes.

Following the maintenance manual updates Lockheed Martin also recently had four internal training sessions to add focus to the new repairs and new design change for the Lockheed Martin field engineers. Lockheed Martin has around 72 field engineers in 29 different countries around the globe. This training allows the onsite field engineers to educate C-130J operators in person on their aircraft showing them the best methods to Apply the Boot Conditioner, perform the Rain Erosion Coating repair, and Remove and Replace the deicing boot and saddle fairing using the Aviation Devices and Electronic Components LLC solution.

Currently all operators have the maintenance procedures to perform all three improved repair procedures. By utilizing any or all three of these repair procedures operators can maximize aircraft availability. These maintenance manual design improvements are at no additional cost to any C-130J operators. If you weren't aware of these new repair procedures look them up and know that Lockheed Martin is continuously improving support for our customers. In summary the conditioner extends the life of the rubber deicing boot, the Rain Erosion Coating Repair prevents the need to remove the Saddle and the Aviation Devices and Electronic Components LLC tape and gasket combination allow removals to occur cleanly and easily without damaging the structure or saddle.

*Note: Through this process it has been discovered that customers are not stocking the Aviation Devices and Electronic Components LLC products and since they are an option in the maintenance manuals will simply use the separable sealant method and will not see the benefits of using these 21st century products.

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