

**Table of contents**

1.	Background:	1
2.	Action:	1
3.	Effectivity:	2
4.	Time of Accomplishment:	2
5.	Manpower:	2
6.	Cost Information:	3
7.	Electrical Load:	3
8.	Suggested Inventory Action:	3
9.	Related Documents:	4
10.	Weight and Balance:	4
11.	Internal Publications Affected:	4
12.	Electrical Loads:	5
13.	Software Changes:	6
14.	Supplemental Instructions:	6

**1. Background:**

Multiple operators have reported cases of disbonded heat shield clickbond fasteners common to the Main Landing Gear Wheel Well Pressure deck. At 171 flight cycles 4 clickbonds were found to be disbonded common to the L/H Main Landing Gear Wheel Well Pressure Deck. A second operator reported that at 380 flight cycles there were 8 clickbonds found to be disbonded at the Main Landing Gear Wheel Well Pressure Deck Heat Shield locations.

Boeing issued S/B B787-81205-SB530020 to correct this discrepancy.

**2. Action:**

This Engineering Authorization (EA) gives instructions to replace the Main Landing Gear Wheel Well Pressure Deck Heat Shields and install additional clickbond fasteners to retain the new heat shields. In service, disbonded clickbond fasteners have resulted in the inability to continue operation until the clickbonds were reinstalled. If this EA is not incorporated, disbonded fasteners could result in detachment of the Main Landing Gear Wheel Well Pressure Deck Heat Shields and inability to dispatch the airplane.

**3. Effectivity:**

OP #	NOMENCLATURE	M&E #	UNIT	QTY
001	787-8	78-2000-9-0001	0901-0910, 0912	11
002	787-8	78-2000-9-0001	0907	1

**4. Time of Accomplishment:**

Planning is instructed to schedule this EA for accomplishment within the following constraints.

FORECAST M&E	CONSTRAINT	CONSTRAINT VALUE	OPS
78-0553-8-0018	Not to Exceed	31-Dec-2015	001
78-0553-8-0020	Not to Exceed	31-Dec-2015	002
78-0553-8-0028	As scheduled by Planning		003

**Note**

Due to time involved, Engineering recommends that aircraft be accomplished during heavy check opportunities, whenever possible.

**5. Manpower:**

Planning is instructed to ensure that the manpower necessary to accomplish this EA is allocated at the scheduled visits.

OP	ELAPSED TIME	LABOR HOURS	PERSONS	SPECIAL SKILL (IF REQUIRED)	CON- STRAINTS
001	40	40	1	Mech	
001	1	1	1	Insp	
002	40	40	1	Mech	
002	1	1	1	Insp	
003	20	20	1	Mech	
003	1	1	1	Insp	

**6. Cost Information:**

AFE NO.	JOB NO.	ACCOUNT NO.	COST CENTER	COMMENTS

**7. Electrical Load:**

OP Number	Fleet	Current	Bus	Change(kVA)	Phase of Flight	Power Factor

**8. Suggested Inventory Action:**

Inventory Planning is instructed to make the following stock changes to support this EA.

NEW MFG P/N	OLD MFG P/N	DESCRIPTION	DISPOSITION
44-4444-4-4444	22-2222-2-2222	Test Desc	Test Disposition

**9. Related Documents:**

The following documents were used in the development of this EA but are not required for accomplishment.

DOCUMENT NO.	REV	DATE	DESCRIPTION
AC 120-79			
ECRA 5310-06655			

**10. Weight and Balance:**

OP#	FLEET	ITEM	WEIGHT (LBS)	ARM (IN)	MOMENT (IN-LBS)	COMMENTS AND INSTRUCTIONS
001	787-8		+1	+0.00	+813	Test comment
002	787-8		+1	+0.00	+813	

**11. Internal Publications Affected:**

Methods and Standards is instructed to incorporate the following Service Bulletins in their entirety.

SB NO.	REV	DATE	OR LATER REVISION?	COMMENTS & INSTRUCTIONS
B787-81205-SB530020	002	4-Mar-2014	Y/N	

Methods and Standards is instructed to incorporate the following Manual Change EC/RA's.

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Methods and Standards is instructed to make the following custom manual changes.

REVISE/NEW/DELETE	FLEET CODE	MANUAL TYPE	ATA/CHAP/SECTION OR LOCATION	PAGE/SERIES/SHEET/INDEX/TASK	COMMENTS & INSTRUCTIONS

Methods and Standards is instructed to incorporate the following documents into the Interiors Furnishings Manual (IFM).

FLEET	MANUAL TYPE	PART NUMBER	NOMENCLATURE	ATA CHAPTER/SECTION	COMMENTS & INSTRUCTIONS

**12. Electrical Loads:**

Avionics Engineering is instructed to update the aircraft Electrical Loads Report to reflect the changes made in this EA.

OP#	FLEET	CURRENT	BUS	CHANGE (KVA)	PHASE OF FLIGHT	POWER FACTOR
001	787-8	1.0 A	test val	0.0000	test val	0.00

**13. Software Changes:**

OP#	DESTINATION HARDWARE P/N	ERD, FIN, EQUIP#	LOCATION ADDRESS (SLID)	OLD SOFTWARE PART NUMBER	NEW SOFTWARE PART NUMBER	COMMENTS AND INSTRUCTIONS
001	182513-001	E4220001M8	LS1755836	UAL27-DCA8-0001	UAL26-DCA8-0000	Test Comment

**14. Supplemental Instructions:**

DEPARTMENT	REV	SPECIAL INSTRUCTIONS
Material Control & Inventory Planning	A	Ensure parts are available to accomplish the EA.
Tooling Logistics		Ensure tooling are available to accomplish the EA
Technical Publications		Ensure required documents are available on-line to accomplish EA.
Quality Control		Review EA worksteps for accuracy and workability.
Warranties	A	File warranty with the Boeing Company per S/B B787-81205-SB830020 Issue 002, page 18. Note that the warranty covers labor, material and tooling.

Rev

DC9 Operation
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## Operation Overview

**Technical Documents:**

Maintenance must have the following documents to accomplish this operation.

DOCUMENT NO.	REV	DATE	DCN#	DESCRIPTION
787 SRM 51-40-10	1	March 31, 2017	1115	Adhesively Bonded Standoff Stud Installation Process-Standard Repair
787 AMM 53-58-01	1.5	January 15, 2017	4444	Heat Shield - Removal

**Tools/Software Required:**

Maintenance must have the following tools to accomplish this operation.

MFG P/N	DESCRIPTION	UNIT OF ISSUE	M&E	REQUIRED
MIT450Z3613	TESTER, HEAT SHIELD TENSION, EA5310-05921, BAC	22	22	No
B3444444	PANEL, REAR SHIELD	23	85-1562-2-0056	Yes

**Bill of Materials - List of Parts:**

Maintenance must have the following parts to accomplish this operation.

MFG P/N	Part Description	Quantity per Acft/Unit	Unit of Issue	Part Action
036Z0156-1	KIT, HEAT SHIELD	22	LB	Keep them ready



## General Information

### CAUTIONS:

1. **KEEP THE WORK AREA, WIRES AND ELECTRICAL BUNDLES CLEAN OF METAL PARTICLES OR CONTAMINATION WHEN YOU USE TOOLS. UNWANTED MATERIAL, METAL PARTICLES OR CONTAMINATION CAUGHT IN WIRE BUNDLES CAN CAUSE DAMAGE TO THE BUNDLES. DAMAGED WIRE BUNDLES CAN CAUSE SPARKS OR OTHER ELECTRICAL DAMAGE.**
2. **PROTECT/CLEAN ELECTRICAL WIRING INTERCONNECTION SYSTEM (EWIS) IN ACCORDANCE WITH SECTIONS 20-60-02 AND 20-60-07 OF THE 787 AMM. EWIS IS DEFINED AS WIRES, POWER FEEDERS, WIRING DEVICES, AND TERMINATION DEVICES INSTALLED IN ANY AREA OF THE AIRPLANE. EWIS HAS THE PURPOSE OF TRANSMITTING ELECTRICAL ENERGY, DATA, AND SIGNALS BETWEEN TWO OR MORE INTENDED TERMINATION POINTS.**

### GENERAL NOTES:

1. Contact Engineering if the aircraft or component has been repaired or modified in such a manner that prevents the inspection/repair/modification from being accomplished in accordance with the instructions contained in this workcard
2. If open-up/access/close-up steps required by this workcard are accomplished by other routine workcards, it is permissible to (N/A) those steps on this workcard referencing the applicable routine workcard.
3. Manuals included as reference material are identified by parentheses and the words Reference Only in the Technical Data Required list. Reference materials are not required to perform the task and are included for mechanics convenience
4. Obey all of the warnings and cautions given in the specified manual sections.
5. Unless shown differently, these dimensions and tolerances are used:
  - Linear dimensions are in inches
  - Tolerance on linear dimensions, other than rivet and bolt edge margins, is plus or minus 0.03-inch
  - Tolerance on rivet and bolt edge margin is plus or minus 0.05 inch
  - Angular tolerance is plus or minus 2 degrees
  - Hole dimensions for standard solid rivets and fasteners are in SRM Chapter 51
6. Torque Values:
  - Values for structural fasteners are given in 787 Structural Repair Manual, Chapter 51.
  - Values for airframe maintenance tasks are included in Chapter 20 of 787 Airplane Maintenance Manual (AMM).
  - Values for electrical maintenance tasks are included in Chapter 20 of Standard Wiring Practices Manual (SWPM).
  - Values for engine maintenance tasks are included in Chapter 70 of 787 Airplane Maintenance Manual (AMM).
  - Non-standard torque values for maintenance tasks are included in the applicable installation step.
7. Use the approved fastener and process material substitutions in accordance with SRM Chapter 51.



Rev

DC9 Operation

8. If the length of any fastener specified in this service bulletin does not meet the installation standards in SRM Chapter 51, then a fastener of the same specification, or an approved substitute, with a length which meets the installation standards in SRM Chapter 51 may be used. In addition, washers may be installed for fastener grip length in accordance with SRM Chapter 51.
9. A General Visual Inspection is defined as: A visual examination of an interior or exterior area, installation or assembly to detect obvious damage, failure or irregularity. This level of inspection is made from within touching distance unless otherwise specified. A mirror may be necessary to ensure visual access to all surfaces in the inspection area. This level of inspection is made under normal available lighting conditions such as daylight, hangar lighting, flashlight or droplight and may require removal or opening of access panels or doors. Stands, ladders or platforms may be required to gain proximity to the area being checked.
10. A Detailed Inspection is defined as: An intensive examination of a specific item, installation, or assembly to detect damage, failure, or irregularity. Available lighting is normally supplemented with a direct source of good lighting at an intensity deemed appropriate. Inspection aids such as mirrors, magnifying lenses, etc. may be necessary. Surface cleaning and elaborate procedures may be required.
11. The instructions in this operation may include operation of tools or test equipment. Boeing Engineering Tool Drawings, the Illustrated Tool and Equipment Manual, and the Special Tool and Ground Handling Drawing Index contain data on versions of the tools or test equipment that you can use. It is permitted to use replaced tools. It is not permitted to use superseded tools.
12. The work instructions in this Engineering Authorization refer to procedures included in other Boeing documents. When the words "refer to" are used and United Airlines has an accepted alternative procedure, the accepted alternative procedure can be used. When the words "in accordance with" are included in the instruction, the procedure in the Boeing document must be used.
13. If it is necessary to remove more parts for access, you can remove those parts. If you can get access without removing identified parts, it is not necessary to remove all of the identified parts. Jacking and shoring limitations must be observed.

**Access and Open-up:**

***Work Instructions***

- 1.0 Gain access to the R/H Main Landing Gear and remove and retain the wheel well pressure deck AFT heat shield (ref.787 AMM 53-58-01). Ensure to retain all attachment hardware. Also ensure to remove and retain the threaded spacers from existing clickbond studs.

Mechanic

Rev

DC9 Operation
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2.0 Gain access to the R/H Main Landing Gear and remove and retain the wheel well pressure deck MIDDLE heat shield (ref.787 AMM 53-58-01). Ensure to retain all attachment hardware. Also ensure to remove and retain the threaded spacers from existing clickbond studs.

Mechanic

**Clickbond Installation and Testing:**

**CAUTION: MUST BE TAKEN TO AVOID SANDING INTO THE CARBON FIBER. ONLY MINIMUM SANDING IS REQUIRED TO PREPARE AREA FOR BONDING.**

3.0 At 27 locations shown in Figure 3, Detail "F", hand sand the surfaces to remove the enamel and Primer. Sand area minimum as shown in Figure 3 (Sheet 6 of 7), Detail "F". (ref 787 SRM 51-40-10).

**CAUTION: MUST BE TAKEN TO AVOID SANDING INTO THE CARBON FIBER. ONLY MINIMUM SANDING IS REQUIRED TO PREPARE AREA FOR BONDING.**

Mechanic

4.0 At 27 locations shown in Figure 3, Detail "F", place locating template P/N 2MIT450Z3613 at the fastener location and glue in position new stand off stud P/N CB4005K3CR6-12 using adhesive per BMS5-141 (ref 787 SRM 51-40-10).

Mechanic



Rev

DC9 Operation

5.0 Perform a proof test on the Clickbond at 72 locations (45 existing plus 27 new). Perform the test using the 787 SRM chapter 51-40-10 (see Figure 3 (Sheet 7 of 7) Detail "G" sheet for locations).

If any clickbond fails the test, remove and replace with new using the 787 SRM chapter 51- 40-10. Ensure to generate a separate Non-Routine (N/R) for each failed clickbond location and record in the N/R # using the spaces below:

1) sample data	2) sample data
3) sample data	4) sample data
5) sample data	6) sample data
7) sample data	8) sample data
9) sample data	10) sample data

Mechanic

6.0 In the areas to be painted at the 27 locations shown in Figure 3 (Sheet 6 of 7) Detail "F" circle note 4, apply surface protection to the area as follows:

- Clean the surface and reactivate primer (Ref SOPM 20-41-02)
- Apply Primer BMS10-103, Type 1 and Enamel 8000B70846BMQBC2 per BMS10-60, Type 1. (Ref 787-8 SRM 51-40-10).

N/A this step if Primer and Paint was not required at any of the locations

Mechanic

**MIDDLE Heat Shield Installation:**

7.0 Obtain and position in place a new MIDDLE heat shield P/N 771SM43391-14 (see Figure 4 circle note 1). Install the heat shield in place using the retained hardware as specified in steps 7.1 thru 7.3.



Rev

DC9 Operation
---------------

7.1 On the forward edge of the new heat shield (ref. step 7.0), use the following hardware to attach to the aircraft structure: See Figure 4 circle note 2 for locations. Also see Figure 5 for the hardware stack up.

- Qty 9, Threaded Spacers P/N CB9658K3-550. Install spacers hand tight onto the bonded stud.
- Qty 9, PD-Washer-Heat Shield P/N 453Z2404-3.
- Qty 9, Self locking Nut, P/N BACN10YR3CM.

Install Nut using a torque range of 19-25 in-lbs. Ensure that the screw chamfer extends past the end of the nut.

Mechanic

7.2 Secure the center section of the new heat shield (ref. step 7.0), using the following hardware: See Figure 4 circle note 3 for locations. Also see Figure 5 for the hardware stack up.

- Qty 9, Threaded Spacers P/N CB9658K3-360. Install spacers hand tight onto the bonded stud.
- Qty 9, PD-Washer-Heat Shield P/N 453Z2404-3.
- Qty 9, Self locking Nut, P/N BACN10YR3CM.

Install Nut using a torque range of 19-25 in-lbs. Ensure that the screw chamfer extends past the end of the nut.

Mechanic

7.3 Secure the center section of the new heat shield (ref. step 7.0), using the following hardware: See Figure 4 circle note 4 for locations. Also see Figure 5 for the hardware stack up.

- Qty 9, Threaded Spacers P/N CB9658K3-360. Install spacers hand tight onto the bonded stud.
- Qty 9, PD-Washer-Heat Shield P/N 453Z2404-3.
- Qty 9, Self locking Nut, P/N BACN10YR3CM.

Install Nut using a torque range of 19-25 in-lbs. Ensure that the screw chamfer extends past the end of the nut.

7.3.1 Here is a third level substep. Secure the center section of the new heat shield (ref. step 7.0), using the following hardware: See Figure 4 circle note 4 for locations. Also see Figure 5 for the hardware stack up.

7.3.2 Here is a third level substep. Duplicate. Secure the center section of the new heat shield (ref. step 7.0), using the following hardware: See Figure 4 circle note 4 for locations. Also see Figure 5 for the hardware stack up.

7.3.2.1 Here is a fourth level substep. Duplicate. Secure the center section of the new heat shield (ref. step 7.0), using the following hardware: See Figure 4 circle note 4 for locations. Also see Figure 5 for the hardware stack up.



Rev

DC9 Operation

- 7.3.2.2 Here is a fourth level substep. Duplicate. Secure the center section of the new heat shield (ref. step 7.0), using the following hardware: See Figure 4 circle note 4 for locations. Also see Figure 5 for the hardware stack up.
- 7.3.2.2.1 Here is a fifth level substep. Duplicate. Secure the center section of the new heat shield (ref. step 7.0), using the following hardware: See Figure 4 circle note 4 for locations. Also see Figure 5 for the hardware stack up.
- 7.3.2.2.2 Here is a fifth level substep. Duplicate. Secure the center section of the new heat shield (ref. step 7.0), using the following hardware: See Figure 4 circle note 4 for locations. Also see Figure 5 for the hardware stack up.
- 7.3.2.2.2.1 Here is a sixth level substep. Duplicate. Secure the center section of the new heat shield (ref. step 7.0), using the following hardware: See Figure 4 circle note 4 for locations. Also see Figure 5 for the hardware stack up.
- 7.3.2.2.2.2 Here is a sixth level substep. Duplicate. Secure the center section of the new heat shield (ref. step 7.0), using the following hardware: See Figure 4 circle note 4 for locations. Also see Figure 5 for the hardware stack up.
- 7.3.2.2.2.2.1 Here is a seventh level substep. Duplicate. Secure the center section of the new heat shield (ref. step 7.0), using the following hardware: See Figure 4 circle note 4 for locations. Also see Figure 5 for the hardware stack up.
- 7.3.2.2.2.2.1.1 Here is a eighth level substep. Duplicate. Secure the center section of the new heat shield (ref. step 7.0), using the following hardware: See Figure 4 circle note 4 for locations. Also see Figure 5 for the hardware stack up.

Mechanic

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Mechanic

**AFT Heat Shield Installation:**

- 8.0 Obtain and position in place a new AFT heat shield P/N 771SM43391-16 (see Figure 4 circle note 5). Install the heat shield in place using the retained hardware as specified in steps 8.1 thru 8.3.



Rev

DC9 Operation
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8.1 On the forward edge of the new heat shield (ref. step 8.0), use the following hardware to attach to the aircraft structure: See Figure 4 circle note 6 for locations. Also see Figure 5 for the hardware stack up.

- Qty 9, Threaded Spacers P/N CB9658K3-550. Install spacers hand tight onto the bonded stud.
- Qty 9, PD-Washer-Heat Shield P/N 453Z2404-3.
- Qty 9, Self locking Nut, P/N BACN10YR3CM.

Install Nut using a torque range of 19-25 in-lbs. Ensure that the screw chamfer extends past the end of the nut.

Mechanic

8.2 Secure the center section of the new heat shield (ref. step 8.0), using the following hardware: See Figure 4 circle note 7 for locations. Also see Figure 5 for the hardware stack up.

- Qty 9, Threaded Spacers P/N CB9658K3-360. Install spacers hand tight onto the bonded stud.
- Qty 9, PD-Washer-Heat Shield P/N 453Z2404-3.
- Qty 9, Self locking Nut, P/N BACN10YR3CM.

Install Nut using a torque range of 19-25 in-lbs. Ensure that the screw chamfer extends past the end of the nut.

Mechanic

8.3 Secure the center section of the new heat shield (ref. step 8.0), using the following hardware: See Figure 4 circle note 8 for locations. Also see Figure 5 for the hardware stack up.

- Qty 9, Threaded Spacers P/N CB9658K3-360. Install spacers hand tight onto the bonded stud.
- Qty 9, PD-Washer-Heat Shield P/N 453Z2404-3.
- Qty 9, Self locking Nut, P/N BACN10YR3CM.

Install Nut using a torque range of 19-25 in-lbs. Ensure that the screw chamfer extends past the end of the nut.

Mechanic

Mechanic



Rev

DC9 Operation

9.0 On the inboard side of the Middle heat shield, connect the bonding jumper using the following hardware in the following stack-up order (see Figure 4 circle note 9 for location):

Screw | Washer | Heat Shield | Washer | Bonding Jumper | Washer | Nut

- Screw, P/N BACS12HL3AU15 (install with screw head on the pressure side of the Heat Shield).
- Washer, P/N NAS1149C0363R.
- Bonding Jumper, P/N BACJ40AP20-( ).
- Nut, P/N BACN10YR3CM.

Install Nut using a torque range of 19-25 in-lbs. Ensure that the Screw chamfer extends past the end of the nut)

Mechanic

10.0 Perform a resistance check for the bonding jumper in step 9.0 to ensure maximum resistance is 1.0 milliOhm or less. Refer to the SWPM 20-20-10 Category 1. Also see 787 AMM 53-58-01 - Heat shield installation

Mechanic

11.0 On the inboard side of the Aft heat shield, connect the bonding jumper using the following hardware in the following stack-up order (see Figure 2 circle note 10 for location):

Screw | Washer | Heat Shield | Washer | Bonding Jumper | Washer | Nut

- Screw, P/N BACS12HL3AU15 (install with screw head on the pressure side of the Heat Shield).
- Washer, P/N NAS1149C0363R.
- Bonding Jumper, P/N BACJ40AP20-( ).
- Nut, P/N BACN10YR3CM.
- Install Nut using a torque range of 19-25 in-lbs. Ensure that the Screw chamfer extends past the end of the nut)

Mechanic



Rev

DC9 Operation

12.0 Perform a resistance check for the bonding jumper in step 11.0 to ensure maximum resistance is 1.0 milliOhm or less. Refer to the SWPM 20-20-10 Category 1. Also see 787 AMM 53-58-01 - Heat shield installation

Mechanic

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**Sign-Off:**

13.0 Sign-off the completed operation in SCEPTRE using transaction scLOCc.

**\*\*\*END OF WORK STEPS/ NO FURTHER SIGNOFFS REQUIRED\*\*\***





Rev

DC9 Operation

Fig 1. R/H MLG - Aft and Middle Heat Shield Clickbond Fasteners Installation & Test

