



Tech.Variances: 1422002810145168

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Technical Variance

Where the recipient of this document works in accordance with regulations under control of the relevant national aviation authority, outside of the EU jurisdiction and no applicable bi-lateral agreement or equivalent exists, it is essential that the recipient ensures that the relevant national aviation authority accepts / approves the incorporation of this Technical Variance.

This Technical Variance is only applicable for parts of the Rolls-Royce Engine Type Design and does not apply to parts marked with 'PMA' in accordance with the national regulations. (e.g. USA/FAA)

The content of this document is supplemental to the Manual(s) specified below and should be suitably stored in accordance with local airworthiness requirements.

TV No.	288309	Issue:	1	Date of Application:	15 Jan 2025
Application Type	One-off <input checked="" type="checkbox"/> Repeater <input type="checkbox"/>	Expiry date (If Repeater)	N/A		
Operator/Applicant	SAFRAN NACELLES / ROLLS-ROYCE DEUTSCHLAND	Original Request No.	2025-01-000652-1		
Engine Type	BR700-710	Engine Model	BR700-710A2-20		
Part Description	THRUST REVERSER UNIT (TRU)	Eng Serial No.	N/A		
Part No.	07G0001-017	Part Serial No.	LH1185		
Manual Title	CMM	Ref.	CMM-710-2BR	ATA Ref.	78-30-11
TV Title	OSD 62593 – THRUST REVERSER PIVOT DOOR LATERAL FRAME DELAMINATED				
Hours	4443	Cycles	1370		

Existing Requirement

Component Maintenance Manual (CMM) ATA 78-30-11 'Thrust Reverser for BR710 as installed on the Bombardier Global Express aircraft' does not contain specific repair for pivoting door lateral frame on the TRU.

Requested Variance

During removal of the pivot door corner angle of the subject Left Hand (LH) TRU, delamination has been found on the inboard lateral frame of upper pivoting door. Refer to Figure 1 for damage details.

A Technical Variance (TV) is requested to provide a procedure to repair the reported condition.

Summary of Investigation and Conclusions

Rolls-Royce Deutschland (RRD) and SAFRAN Nacelles Engineering have reviewed the above request and concluded that the lateral frame can be repaired in accordance with the instructions provided in pages 2 to 11 of this TV.

The recommendations given in this TV will not affect the integrity or functionality of the component.

Make a record of this **TV288309** in the applicable records.

Approval Statement

TV CLASSIFICATION	MAJOR <input type="checkbox"/>	MINOR <input checked="" type="checkbox"/>
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The technical content of this document is approved under the authority of:

- DOA ref. EASA.21J.065. It has been demonstrated that the TV and areas affected by the TV comply with the type-certification basis.
- A representative of European Union Aviation Safety Agency (EASA) Certificate no: *Certificate Number, where applicable*. Rolls-Royce has demonstrated compliance with the type-certification basis and environmental protection requirements, as established and notified by the Agency, following the certification programme as accepted by the Agency.
- Airframer reference no: *Airframer Reference Number, where applicable*.

Approval by Airworthiness Office

Delegated Airworthiness Engineer DAE 065-031
ETS-CA-DEL-13 Tech Response

Digitally signed
by Angus Mccoll
(U516127)
Date: 2025.02.07
11:04:43 +01'00'

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Country	Export Classification	Date
GERMANY	Not Listed	07 February 2025

Technology for Export Control

**General Data:**

Unless otherwise stated, referenced TASKS are contained in the Manual identified on page 1 of this Technical Variance document

TASKS identified by OP TASK are in the Engine Overhaul Processes Manual (TSD594-J)

TASKS identified by EMM TASK are in the Engine Maintenance Manual

1. General

This repair instruction gives the procedure to repair the lateral frame on the upper pivoting door.

2. Job Set-up Information

A. Standard Equipment

Standard workshop tools and equipment.

B. Consumable Materials

REFERENCE	DESIGNATION
05-635 (OMat 2/101)	Lint free cloth
09-88 (OMat 7/197)	Diestone D
06-070A (OMat 8/258)	Sealant Fire, DAPCO 2100
05-152 (OMat 8/183)	Carbon fabric
06-077 (OMat 8/160)	Epoxy adhesive EA9390
05-164 (OMat 2/131)	Non-porous parting film
05-163 (OMat 2/130)	Porous parting film
05-153 (OMat 8/182)	Glass fabric
OMat 2/129	Breather fabric
05-503 (OMat 2/110A)	Vacuum bag sealant tape
05-610 or 05-615 or 05-620 (OMat 262)	Temporary Marker

NOTES: 1) To identify the consumable materials, refer to the List of Consumable Materials EMM TASK 70-02-04-910-802 and Overhaul Materials Manual (OMat).

2) It is possible that some materials in the Consumable Materials chart cannot be used for some or all of the necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local and provincial laws and regulations when it is necessary to work with these materials.



C. Repair parts

ITEM	DESIGNATION	REFERENCE	QUANTITY
1	Blind Rivet	NAS1919M04S03U	8
2	Blind Rivet	NAS1919M05S03U	5
3	Blind Rivet	NAS1921M05S05U	2
4	Blind Rivet	NAS1921M05S07U	3
5	Blind Rivet	NAS1919M05S03AU	12
6	Blind Rivet	NAS1919M05S04AU	8
7	Blind Rivet	NAS1919M05S05AU	6
8	Blind Rivet	NAS1919M05S06AU	3
9	Washer	HATS0028CC041	10
10	Washer	HATS0028CC048	1
11	Hi-Lite Pin	HST10BJ6-3	1
12	Hi-Lite Pin	HST10BJ6-4	12
13	Hi-Lite Pin	HST315CE6-5	6
14	Hi-Lite Pin	HST315CE6-6	1
15	Hi-Lite Pin	HST315CE6-7	3
16	Hi-Lite Pin	HST315CE6-8	2
17	Collar	HST97DUW6	21
18	Blind Bolt	CR7621S-06-03D	5
19	Blind Bolt	CSR922-5-3	2
20	Lockbolt shank	LGPL9SPV06B03AC	1
21	Lockbolt shank	LGPL9SPV06B04AC	1
22	Lockbolt shank	LGPL9SPV06B05AC	4
23	Collar	SLFC-MV06	6
24	Lockbolt shank	LGPL9SCV06B07AC	2
25	Screw	NAS7203-4	2

NOTES: - Attachment parts length corresponds to theoretical clamping thickness.

- The grip lengths are given for information but must be checked before the installation of the fasteners. One grip above or below the fastener grip given in the part list is acceptable.
- Refer to EMM TASK 70-42-28-300-802, BRG3215 (Remove and Install - Pin (Threaded) Fastener (Hi-Lok and Hi-Lite)) for the removal and installation of fasteners.
- Refer to EMM TASK 70-42-27-300-801, BRG3072 (Removal and installation of huck rivets) for the removal and installation of fasteners.



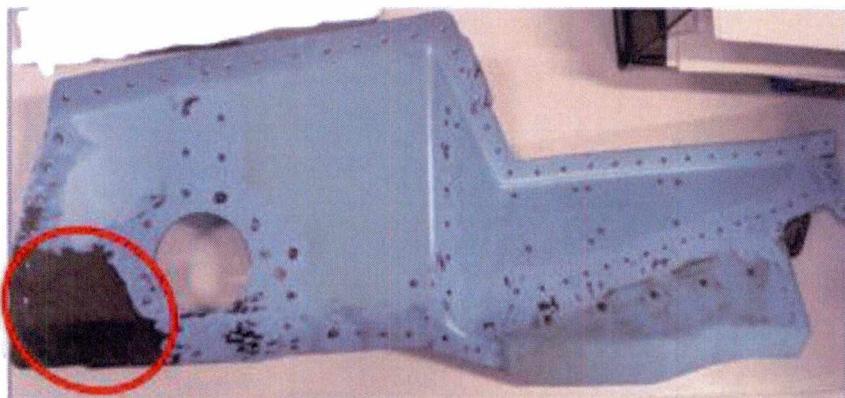
Procedure	Related Data
1. Clean the work area.	Whenever required, apply the following tasks: Refer to EMM TASK 70-20-01-160-801 Non-Aqueous Liquid Degreasing. Clean the work area using 09-88 (OMat 7/197) (Diestone D) or equivalent. Wipe the surface dry before the solvent evaporates. Use an 05-635 (OMat 2/101) or equivalent, lint free cloth.
2. Do an inspection.	Refer to Figure 1. Make sure that the condition is the same as reported. If not, then contact RRD OSD.
3. Smooth the damage	Refer to Figure 1. If necessary, to facilitate the carbon plies filling shape and installation, lightly smooth the carbon plies to obtain regular shape. Make sure to remove the minimum quantity of material, do not increase the final size of the damage or the deepest area.
4. Fill the damage area.	<p><u>CAUTION: DO NOT APPLY TOO MUCH PRESSURE, IT CAN CAUSE ADHESIVE DEFICIENCY IN THE PLY.</u></p> <p>Refer to BRG3004 for carbon plies installation, if necessary. Prepare the necessary quantity of 05-152 (OMat 8/183) carbon fabric</p> <p><u>NOTE:</u> Make the filling plies with the same shape as the cut-out area.</p> <p><u>NOTE:</u> Adjust the number of carbon filling plies to restore the skin thickness.</p> <p><u>NOTE:</u> The cover ply must be of sufficient dimensions to cover the repair area.</p> <p>Weigh the 05-152 (OMat 8/183) carbon fabric plies to find the necessary quantity of 06-077 (OMat 8/160) epoxy adhesive. The mass of adhesive must be equal to the mass of 05-152 (OMat 8/183) carbon fabric.</p> <p>Cut pieces of 05-164 (OMat 2/131) non-porous parting film, each larger than carbon plies.</p> <p>Put the 05-152 (OMat 8/183) carbon fabric on the 05-164 (OMat 2/131) non-porous parting film.</p> <p>Mix the required amount of 06-077 (OMat 8/160) adhesive. Refer to the manufacturer's instructions.</p> <p>Use a spatula to evenly apply the 06-077 (OMat 8/160) adhesive on the 05-152 (OMat 8/183) carbon fabric.</p> <p>Put a second piece of 05-164 (OMat 2/131) non-porous parting film on the impregnated carbon fabric ply. Use a roller to move the adhesive through the 05-152 (OMat 8/183) carbon fabric ply to fill it and remove trapped air.</p> <p>Repeat this operation in order to install all the carbon filling plies.</p>



5.	Bagging operation.	<p>Install the thermocouples adjacent to the cover plies.</p> <p>Install 05-163 (OMat 2/130) porous parting film on the cover ply.</p> <p><u>NOTE:</u> Make sure that it is a minimum of 80,00 mm (3.000 inch) larger all around the cover ply .</p> <p>Install 05-153 (OMat 8/182) glass fabric on the porous parting film.</p> <p><u>NOTE:</u> The 05-153 (OMat 8/182) glass fabric is not to be smaller than the porous parting film.</p> <p><u>NOTE:</u> 05-153 (OMat 8/182) glass fabric is used as a bleeder fabric.</p> <p>Install 05-164 (OMat 2/131) non porous parting film on top of the glass fabric.</p> <p><u>NOTE:</u> Make sure that the edges of the 05-164 (OMat 2/131) non-porous parting film are equal all around the glass fabric.</p> <p>Put OMat 2/129 breather fabric on the repair area.</p> <p><u>NOTE:</u> Make sure that the edges of the OMat 2/129 breather fabric are equal around the repair area.</p> <p>Put the heat blanket over the OMat 2/129 breather fabric</p> <p><u>NOTE:</u> Make sure that the edges of the heat blanket are equal around the cover plies.</p> <p>Install another piece of OMat 2/129 breather fabric on the heat blanket.</p> <p><u>NOTE:</u> The OMat 2/129 breather fabric is not to be smaller than the heat blanket.</p> <p>Install the vacuum gauge. Put 05-503 (OMat 2/110A) vacuum bag sealant tape all around the repair area. Install OMat 2/126 vacuum bag to cover all the repair areas.</p>
6.	Cure the adhesive.	<p><u>CAUTION:</u> THE RATE OF TEMPERATURE INCREASE AND DECREASE MUST NOT BE MORE THAN 3° C (5.4° F) PER MINUTE.</p> <p>Refer to Figure 2.</p> <p>Cure the 06-077 (OMat 8/160) adhesive impregnated fiberglass fabric in two stages, first for 1 hour at between 55°C and 65°C (131°F and 149°F) and then for 150 minutes at between 115°C and 125° C (239°F and 257°F).</p> <p>Evacuate the reaction gases using a vacuum of -0.7 bar (-10.0 PSI) inside the bag.</p>
7.	Clean and reprotect the repair area.	<p>Remove and trim and carbon plies and unwanted cured adhesive.</p> <p>Refer to EMM Task 70-20-01-160-801 "Non-Aqueous Liquid Degreasing".</p> <p>Cold liquid degrease the repair area by swab application.</p> <p>Wipe the surface dry before the solvent evaporates.</p> <p>Use an 05-635 (OMat 2/101) or equivalent, lint free cloth.</p> <p>Remove all loose material. Use vacuum cleaner.</p> <p>Reprotect the area using Primer 5014 for composite. Refer to CMM 78-30-11.</p>



8. Installation of Lateral Frame	<p>Refer to Figure 3 and 4.</p> <p>Refer to EMM TASKs 70-42-27-300-801, BRG3072 (Removal and installation of Blind (Huck) rivets) and 70-42-28-300-802, BRG3215 (Remove and Install - Pin (Threaded) Fastener (Hi-Lok and Hi-Lite))</p> <p>Use Dapco 2100 (06-070A (OMat 8/258)) as sealant between parts on mating surfaces and to wet install the fasteners.</p> <p>If necessary to install fasteners, remove and reinstall the pivot fitting.</p> <p>To install the seal compressors, use the procedure described in the SB BR700-78-100783</p> <p>Apply Dapco 2100 (06-070A (OMat 8/258)) around all the parts re-installed.</p>
9. Inspect the repair area.	Make sure that the repair is satisfactorily completed.
10. Identify the part with the TV number.	<p>Refer to OP TASK 70-00-00-300-363.</p> <p>Mark TV288309 adjacent to the reworked area with marker (05-610 or 05-615 or 05-620 (OMat 262)) of a contrasting colour.</p> <p>Record TV288309 in the appropriate documentation.</p>



Areas with different plies number remaining are shown below.
The number given is the number of remaining plies: 1 ply = .011 inch thick.

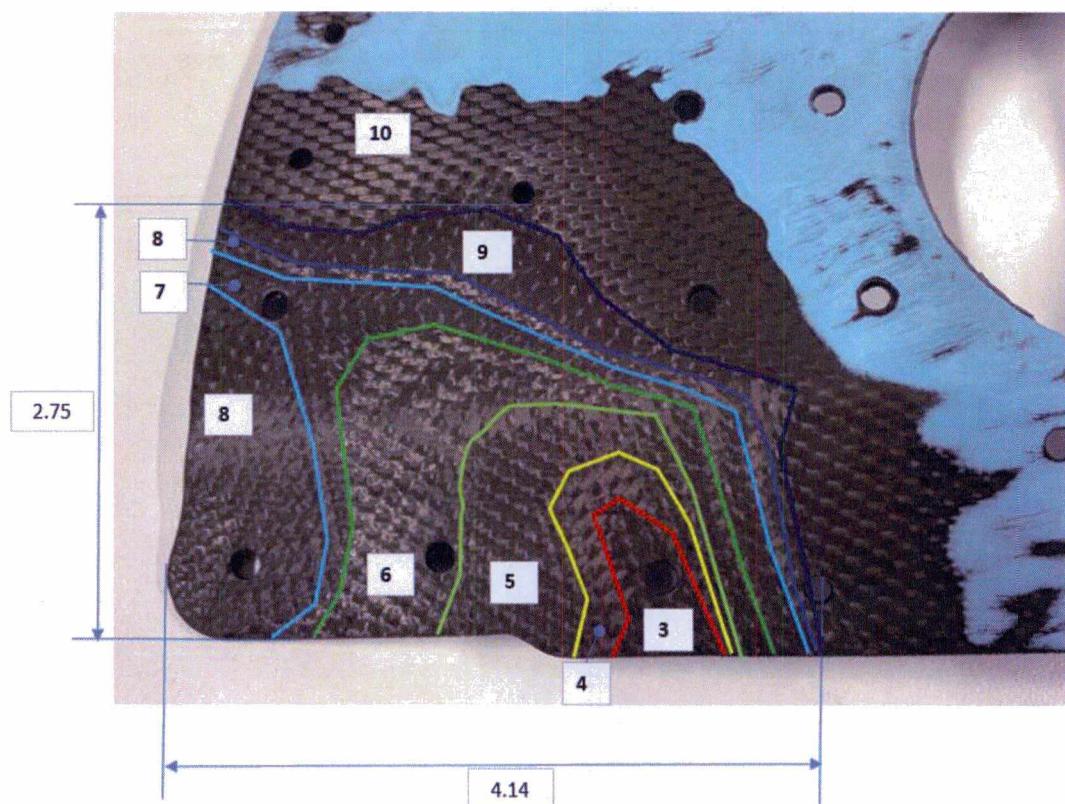


Figure 1: Details of the damage

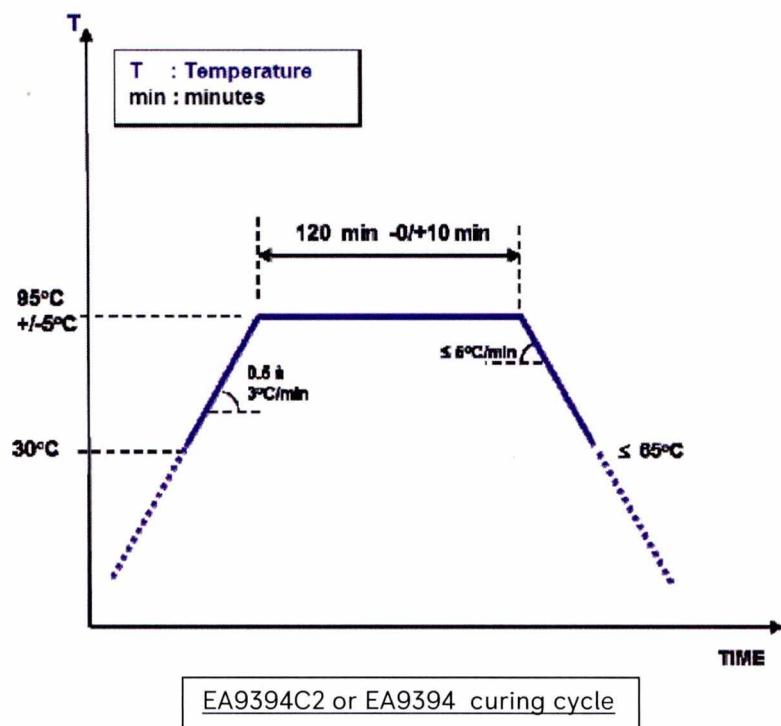
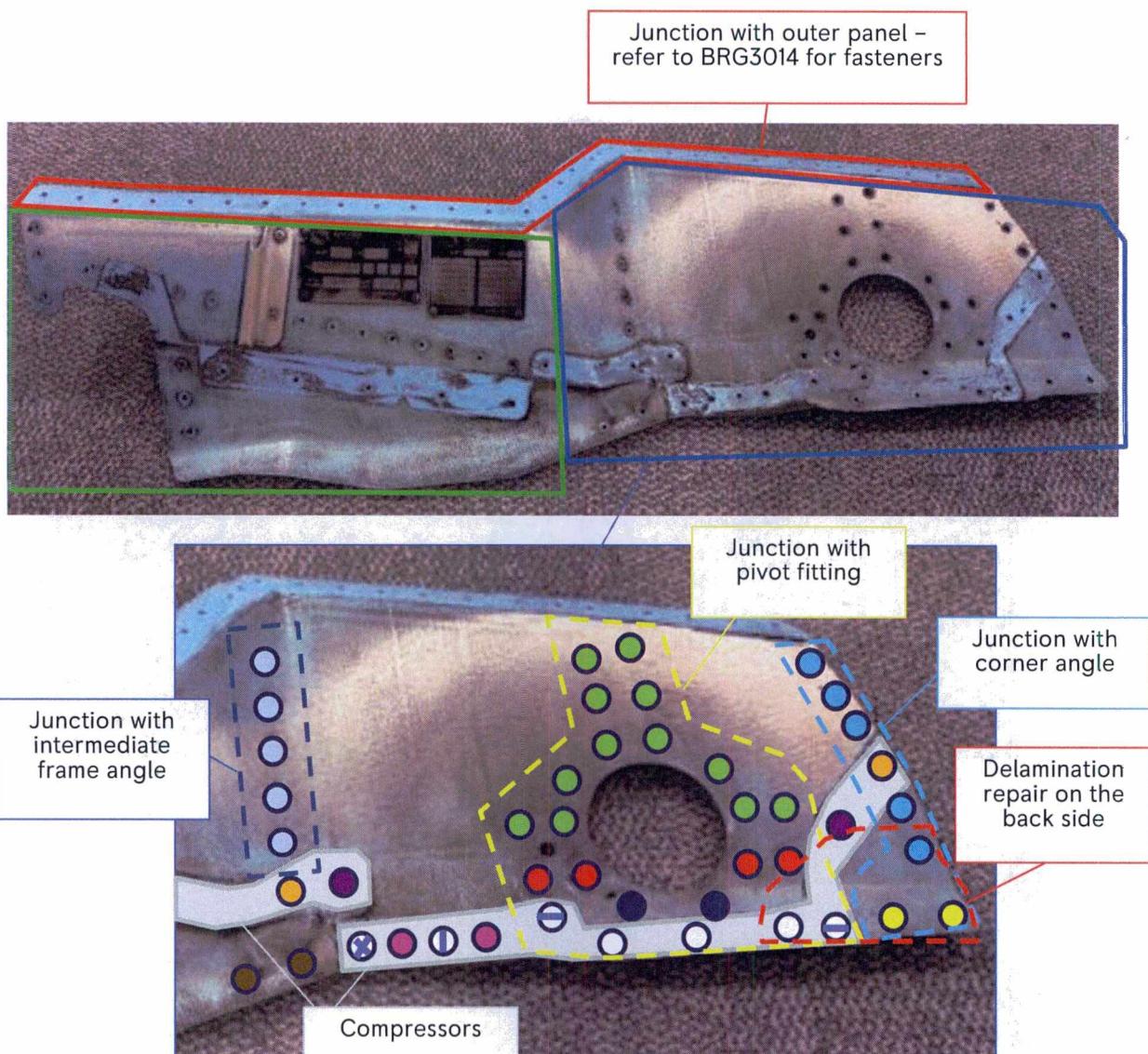


Figure 2: Curing cycle



- NAS1919M05S04AU
- HST10BJ6-4 + HST97DUW6
- LGPL9SPV06B05AC + SLFC-MV06
- CR7621S-06-03D
- LGPL9SCV06B07AC + SLFC-MV06
- NAS1919M05S05AU
- LGPL9SCV06B07AC + SLFC-MV06
- CSR922-5-3 (HEAD ON INNER PANEL SIDE)
- NAS1921M05S07U + HATS0028CC041
- HST315CE6-8 + HST97DUW6
- HST315CE6-6 + HATS0028CC041 + HST97DU6
- HST315CE6-7 + HST97DUW6
- NAS1921M05S05U + HATS0028CC041
- NAS1919M05S03U

Figure 3 (sheet 1 on 2): Lateral Frame installation

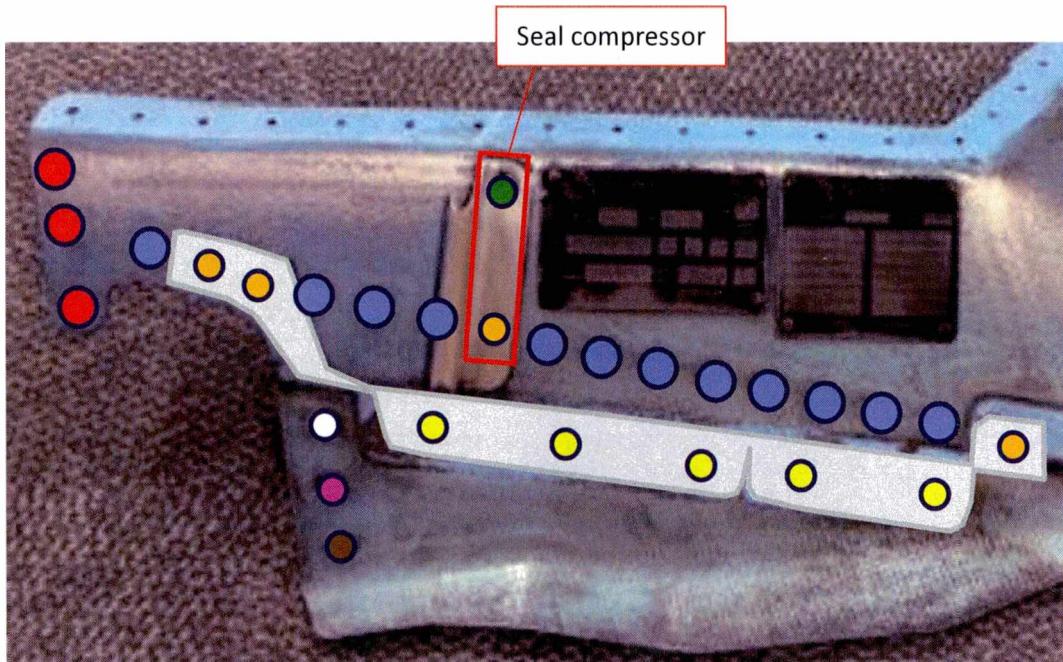
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- NAS1919M05S04AU + HATS0028CC041
- NAS1919M05S05AU
- NAS1919M05S06AU
- NAS1919M05S03AU
- HST10BJ6-3 + HST97DUW6
- NAS1919M04S03U
- NAS1919M05S04AU
- LGPL9SPV06B04AC + SLFC-MV06
- LGPL9SPV06B03AC + SLFC-MV06

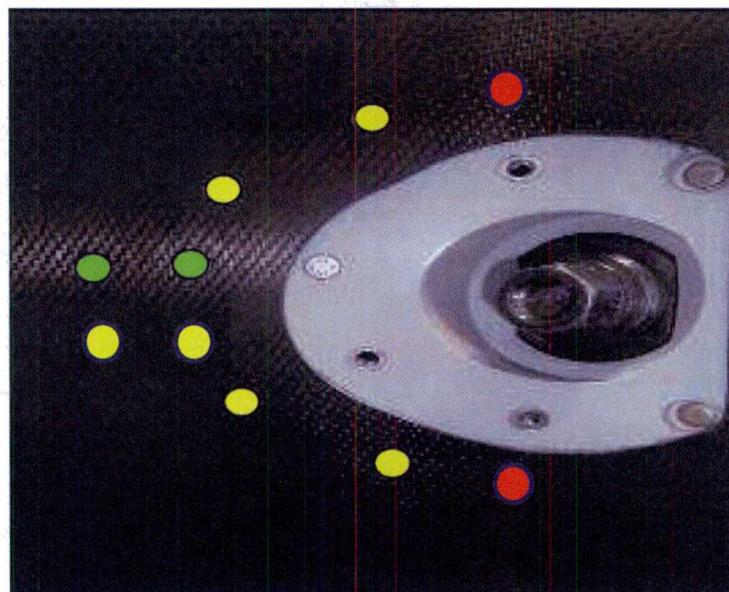
Figure 3 (sheet 2 on 2): Lateral Frame installation



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**Technical Variance
Continuation Sheet**

TV No.288309
Issue 1



- HST315CE-6-5 + HST97DUWU6
- HST315CE-6-6 + HST97DUWU6
- NAS7203-4

Figure 4: Pivot fitting removal / installation (if necessary)

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The signatures below confirm compliance with the Engine Type Certification requirements as stated in EU 21A.433 (a).
This page must not be distributed to the applicant.

Note: All approvals below must include a signature, printed name, role/function and a date.			
TV Originator Only required if not originated by a TV Competent Author.	BOUTENET Guillaume (SAFRAN NACELLES)	Digitally signed by BOUTENET Guillaume (SAFRAN NACELLES) Date: 2025.01.20 09:37:58 -05'00'	TV Competent Author Responsible for the showing of compliance demonstration, where applicable.
		J, Arun Babu Digitally signed by J. Arun Babu Date: 2025.02.07 14:23:46 +05'30' Arun Babu Competent Author Service Engineering	
TV Approver Confirmation that: <ol style="list-style-type: none"> the procedures as specified in the Civil Aerospace Design Organisation handbook have been followed including all mandatory requirements. no feature or characteristic has been identified that may make the product unsafe for the uses for which certification is requested. Refer to Standardisation Report Safety Review section of this TV. 			
Generic Approval TV		TV Number <input type="checkbox"/>	Applicable the criteria given in RRCS 10060-003 Appendix A has been confirmed
		<input checked="" type="checkbox"/>	Not Applicable
Specialist Function LAZAR Mirela (SAFRAN NACELLES)		Specialist Function <input type="checkbox"/>	Specialist Function <input type="checkbox"/>
Specialist Function <input type="checkbox"/>		Specialist Function <input type="checkbox"/>	Specialist Function <input type="checkbox"/>
Specialist Function <input type="checkbox"/>		Specialist Function <input type="checkbox"/>	Specialist Function <input type="checkbox"/>
Compliance Verification Engineer (CVE) (Including a RR assigned CVE number) Confirmation of an independent verification of the compliance demonstration, where applicable. Refer to Standardisation Report Compliance Demonstration section of this TV.			
		 Digitally signed by Angus McCol (U516127) Date: 2025.02.07 11:03:33 +01'00' X CVE - Certificate No 115 ETS-CA-DEL-13 Tech Response	



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PROPOSED TECHNICAL VARIANCE HAS A POTENTIAL EFFECT ON: (Tick in the appropriate boxes)											
	Yes	No		Yes	No		Yes	No		Yes	No
Stress	✓		•Performance/operability		✓	•Noise		✓	Repair		✓
Containment		✓	Balancing/Vibration		✓	Icing		✓	Limits		✓
Component life		✓	Oil system		✓	•Flight deck indication		✓	Tooling		✓
Design		✓	Fuel system		✓	Testing		✓	Others (Please specify)		✓
Material		✓	•Engine handling/control		✓	Build/strip procedure		✓	1.		
Air system		✓	•Fire and ventilation		✓	Cleaning		✓	2.		
Thermals		✓	•Emissions		✓	Inspection		✓	3.		

For any ticked to indicate "Yes"; relevant technical substantiation (compliance demonstration with the certification basis) and/or mitigation / justification is to be provided on the Standardisation Report's continuation sheet(s).

Where identified by •, airframer approval may be required.

Future Arisings: - Subject to the understanding at the time of issue of this document.	Yes	No
Can limits approved in this TV be read across to future TVs for the current marks/models of this engine type?		✓
Can the limits approved by this TV be introduced into the Manuals?		✓
<i>If "No" to either of the above – provide justification why these limits cannot be read across for future arisings</i>		
<i>If "Yes to either of the above – provide actual limits that can be applied for future arisings</i>		
This is to be documented in the Previous Occurrences, Future Arisings and Associated Exit Strategies section of this Standardisation report in this TV.		



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Safety Review

It is the accountability of the TV Approver to ensure that the Safety Review has been correctly completed before TV issuance.

Mandatory Regulatory Requirements - Airworthiness Directives (ADs)

A review of open EASA, FAA and CAA-UK ADs has been carried out and it is confirmed that all applicable ADs have been assessed and substantiated for relevance to the deviation contained in this TV. Chief Engineer and/or Airworthiness Office approval is not mandated for this specific assessment, however guidance may be required if uncertain.

Applicable AD No.	Applicable AD Subject	Relevant?	Relevance Substantiation
None	N/A	N/A	N/A

Regulator & Project commitments and Safety Policies - Safety Management Plans (SMPs)

A review of the applicable specific engine type/model SMP has been carried out and it is confirmed that all applicable regulator & project commitments and safety policies have been assessed and substantiated for relevance to the deviation contained in this TV. Chief Engineer and/or Airworthiness Office approval is not mandated for this specific assessment, however guidance may be required if uncertain. However, if any commitments / safety policies are assessed to be both applicable and relevant Chief Engineer approval is mandated, unless specific waiver approval has been provided by the CE in a previous precedent TV for the same deviation.

SMP No.	Applicable SMP Commitment	Relevant?	Relevance Substantiation
EDNS01000983731/005-ISS005	Safety Management Plan – BR710 & BR725	N	SMP does not contain specific commitments against the part/Issue addressed in this TV.

Safety Occurrence Reporting - Red Tops (RTs)

A review of all open and closed Red Tops (RT) has been carried out and it is confirmed that all applicable RTs have been assessed and substantiated for relevance to the deviation contained in this TV. Chief Engineer and/or Airworthiness Office approval is not mandated for this specific assessment, however guidance may be required if uncertain. However, if open and/or closed Red Top is assessed to be both applicable and relevant Chief Engineer approval is mandated, unless specific waiver approval has been provided by the CE in a previous precedent TV for the same deviation.

Applicable RT No.	Applicable RT Subject	Relevant?	Relevance Substantiation
I-02-715-0012 I/1/Tay/000018 I/1/Tay/000056	All three RTs are for TRU Controls	N	All three RTs are for TRU controls and not on any part of the structure, additionally they are not RRD type design.



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Proposed TV Certification Basis, Classification & Rationale

Certification Basis	<p>Airworthiness Standards: JAR-E, Change 8 Amendment E/91/1, effective 27.05.1991 Amendment E/93/1, effective 17.05.1993 Emissions and Fuel Venting: ICAO Annex 16, Volume II (Second Edition July 1993).</p> <p>Special Conditions (SC): Ingestion of Hail, Ingestion of Rain</p> <p>Equivalent Safety Findings: JAR-E840(a)(2) Rotor Integrity</p> <p>Deviations: JAR-E890(a) Engine Calibration in Reverse Thrust – Exemption</p> <p>Environmental Protection: CS-34 Amendment 4 as implemented by ED Decision 2021/011/R (applicable 25 July 2021), ICAO Annex 16 Volume II, Amendment 10 applicable 1 January 2021 as implemented into EU legislation 27 April 2021. NOx standard in accordance with ICAO Annex 16 Volume II, Part III, Chapter 2, § 2.3.2 e) (CAEP/8). Maximum nvPM mass concentration levels in compliance with Part III, Chapter 4, paragraph 4.2.2.1. nvPM mass and number emissions in compliance with Part III, Chapter 4, paragraph 4.2.2.2 a) 1) and 4.2.2.2 b) 1) (CAEP/11 In-Production standard)</p>
Classification Rationale and Decision	<p>The subject TV has been classified as 'Minor' in line with RRCS10060/002.</p>
	<p style="text-align: center;">MAJOR <input type="checkbox"/> MINOR <input checked="" type="checkbox"/></p>

Technical Substantiation and Compliance Demonstration

Component Classification	UNCLASSIFIED	Material	N/A
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Assessment:

RRD and SAFRAN Nacelles Engineering have reviewed the above request and concluded that the affected lateral frame can be repaired in accordance with the step-by-step instructions provided in this TV.

Safran Nacelles Substantiation:

All exchanged and installed parts mentioned in this Technical Variance are configured in the SAFRAN Nacelles configuration system under the specific TR top-level part number.

Stress Substantiation:

Introduction

The studied structure is sub part of the BR710 Left Hand Side (LHS) Thrust Reverser (T/R). This subpart is the lateral frame of Upper Pivoting Door.

The lateral frame has been found delaminated. Per damage report, the minimum remaining thickness is 3 intact plies.

References

- Ref [1] Certification stress dossier "04 - UPPER DOOR\ 04956 SIDE WALLS Issue 3"
- Ref [2] Certification stress dossier "04 - UPPER DOOR\04955 REAR FRAME Issue 3"



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Stress analysis

Material data for lateral frame are detailed in Ref [1] page C1-2 (28/64) for junction areas:

MATERIAL - FASTENER BEARING IN CARBON/EPOXY HD-SM 1016
[Ref: HD-DT 0050 Iss.A]

Allowable Room Temp Bearing Stress		Mpa	ksi
Bolts (incl. Huck LGPL)	protruding head	685	99.35
	countersunk head	640	92.82
Rivets		440	63.82

ALLOWABLE FASTENER LOADS AT ROOM TEMPERATURE

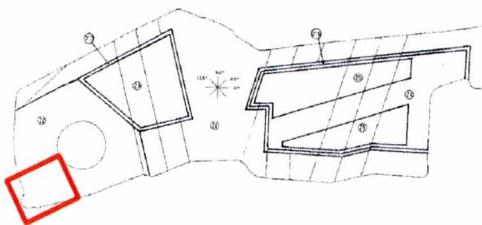
A KDF = 0.76 must be applied to consider T= 120°C.

Per Ref [1] page C1-3 (29/64), the lateral frame is made of 10 carbon plies in damage area (zone Z2) (see picture below)

C. MATERIAL AND FASTENER ALLOWABLES
ALLOWABLE STRAIN ZONE WITHOUT HOLE

CARBON/EPOXY HD-SM 1016

Region	Nbre of plies	At room temp.				At 120°C			
		telegraphing	coeff R/T modulus	ct	vc	telegraphing	coeff a 175°C modulus	ct	sc
monolithic	E	10	1	0.84	722.40	1	0.94	897.60	
	G			1	71.65	6600	0.45	387.00	
	Ft			1	0.82	57.92	0.92	65.92	6045-4080
	S			1	14.14		0.53	37.43	5179
zone 1 ET 2 (+xx+xx+xx)	E	1	1	0.84	722.40	1	0.94	897.60	
	G	9	1	0.84	722.40	1	0.45	387.00	
	Ft			1	71.65	8771	0.92	65.92	6282-4104
	S			1	0.82	57.92	0.53	37.43	
monolithic	E	8	1	0.84	722.40	1	0.94	897.60	
	G			1	71.65	6600	0.45	387.00	
	Ft			1	0.82	57.92	0.92	65.92	6134-4080
	S			1	14.14		0.53	37.43	7.64
monolithic	E	7	1	0.84	722.40	1	0.45	387.00	
	G			1	71.65	8526	0.92	65.92	5940-4065
	Ft			1	0.82	57.92	0.53	37.43	
	S			1	14.14		0.54	7.64	
zone 5 (xx+xx+xx)	E	6	1	0.84	722.40	1	0.45	387.00	
	G			1	71.65	8526	0.92	65.92	5940-4065
	Ft			1	0.82	57.92	0.53	37.43	
	S			1	14.14		0.54	7.64	





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Current area and Rear Frame angle junction

The lateral frame current area is justified in Ref [1]. The lateral frame is monolithic panel manufactured from Carbon Epoxy. Per Ref [1] page F1-1 (43/64), reported delamination is located in areas 6 & 7 with minimum MS > 2.0:

No	Location	Material	Kind of loading				M.S = allowable value - 1 / ultimate value		
			Load case	Ultimate Stress Force	Ultimate value	Kind of loading	Allowable value	M.S.	Page
1	SECTION 1-1	CARBON/EPOXY	309	St	0.9516	S	8459	>2	G2-2
2	SECTION 1-1	CARBON/EPOXY	309	Str	473	T	6045	>2	G3-2
3	SECTION 1-1	CARBON/EPOXY	318	Str	520	T	6045	>2	G3-2
4	SECTION 1-1	CARBON/EPOXY	353	F	739.45	B	838	0.13x	G5-1 inc fitting factor 1.15
5	SECTION 1-1	CARBON/EPOXY	309-353	Str	1839	T	3829.25	1.4	G7-1 hole notch
6	SECTION 3-3	CARBON/EPOXY	309	St	1365	S	8459	>2	G9-2
7	SECTION 3-3	CARBON/EPOXY	309	Str	176	T	6045	>2	G9-3
8	SECTION 3-3	CARBON/EPOXY	309	F	46.55	B	835	0.87x	G9-3 inc fitting factor 1.15
9	SECTION 3-3	CARBON/EPOXY	309	Str	1873	T	3829.25	1.09	G10-1 hole notch
10	KICKER	CARBON/EPOXY	318	Str	-1110	C	-4080	>2	G11-3
11	KICKER	CARBON/EPOXY	353	Str	1444	S	5170	>2	G11-3

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Per damage report, the minimum remaining thickness is 3 intact plies but on a reduced area. The remaining impacted area has at least 5 plies.

So considering conservatively a concentration factor $K_t = 3$ to justify delaminated plies, MS revised > 0.

MS current area > 0

In this area, the lateral frame is connected to an angle which ensured junction between the lateral and rear frames. The lateral frame / angle junction is not detailed in certification stress report. So load is considered to be same as at rear frame / angle junction. This junction is calculated in Ref [2] from page H3-1 (55/96) to page H4-2 (58/96). Conservatively, both lateral frames (inboard and outboard) are considered.

From Ref [2] p. H 4-2 (58/96), maximum fastener load is $P = 198 \text{ lbf}$ for LC 309.

The lateral frame/ angle junction is ensured by LGPL9SCV06 fasteners and NAS1921M05 rivets. Conservatively, 7 plies are considered in intact configuration at this junction.

Considering conservatively rivet bearing allowable values, the junction bearing intact capacity is:
 $\text{Pall} = 63.82 \times 1000 \times 7 \times 0.011 \times 5/32 \times 0.76 = 583 \text{ lbf}$

Per damage report, we consider 3 remaining plies, so revised bearing capacity is:
 $\text{Pall} = 63.82 \times 1000 \times 3 \times 0.011 \times 5/32 \times 0.76 = 250 \text{ lbf}$

So revised margin of safety is:
 $\text{MS revised} = 250 / 198 - 1 = 0.26$

MS junction = 0.26

Based on above statements, proposed repair is acceptable from structural strength point of view as permanent without life limitation.

M. LAZAR (SAFRAN Nacelles)

Repair Stress Engineer

Date : 20/JAN/2025



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Compliance Demonstration

The effect of this TV on the certification requirements has been investigated and the following items have been considered. All other requirements (Airworthiness and Environmental Protection) are deemed to be not applicable to the subject of this TV.

Requirement	Title	Means of Compliance Demonstration	Evidence
JAR-E 100	Strength	Engineering Judgement	<p>This TV recommends to repair damaged part (lateral frame) on the TRU in accordance with the repair instructions given in this TV. Therefore, based on SAFRAN nacelle assessment, it is concluded that the recommendations given in this TV will restore the part to design intent and hence will not affect the strength of the part.</p> <p>Thus, compliance with the requirements of JAR-E 100 'Strength' is demonstrated.</p>
JAR-E 90	Prevention of Corrosion and Deterioration	Engineering Judgement	<p>The repair procedure instructed in this TV recommends to re-protect the repair area using Primer 5014. This will ensure that the corrosion resistance properties are restored at the repair area thus preventing any further deterioration. Therefore, based on engineering judgement, it is concluded that the recommendations given in this TV will prevent further corrosion and deterioration of the TRU.</p> <p>Thus, it is concluded that compliance with the requirements of JAR-E 90 'Prevention of Corrosion and Deterioration' is demonstrated.</p>
JAR-E 70	Materials and Manufacturing Methods	Engineering Judgement	<p>All the repair parts and consumables are identical to the latest issue of the production drawing. Further, the repair parts materials provide a good structure and retain the original mechanical properties. Thus, compliance to the requirements of JAR-E 70 'Materials and Manufacturing Methods' is demonstrated.</p>
JAR-E 110	Drawings and Assembly of Parts	Engineering Judgement	<p>This TV recommends marking the TV number for the traceability of the repair on the part. The marking will be done in accordance with the OP TASK 70-00-00-300-363 (OP363), which is equivalent to JES131 design requirements, and the marking is done on the area designated in the manufacturing drawing.</p> <p>Thus, compliance to the requirements of JAR-E 110 'Drawings and Assembly of Parts' is demonstrated.</p>
JAR-E 500	Functioning	Engineering Judgement	<p>The procedure given in this Technical Variance restores the TRU to its design intent. All damaged parts are repaired using standard procedures, returning all components to their original design. Therefore, it is concluded that the recommendation provided in this TV will not affect the fit, form or function of the part.</p> <p>Thus, compliance to the requirements of JAR-E 500 'Functioning' is demonstrated.</p>
JAR-E 510	Failure Analysis	Engineering Judgement	<p>As per the FMECA Report E-TR1498/11-ISSO2, failure of the Thrust Reverser Fixed Structure by fatigue / stress corrosion cracking / delamination / sonic fatigue / impact damage / operating system failure / external threats are classified as Hazardous / Major but Extremely Remote. Further, failure of the Thrust Reverser Fixed Structure due to detachment of actuator location during flight cycle is classified as Major but Remote.</p> <p>However, based on the SAFRAN Nacelles assessment, it is assessed that the repair instructions given in this TV does not introduce any new failure modes, nor do they change any assumptions, analysis or conclusions contained in the existing FMECA report E-TR1498/11-ISSO2. Therefore, compliance to the requirements of JAR-E 510 'Failure Analysis' is demonstrated.</p>



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Technical Variance Standardisation Report

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JAR-E Section 4, paragraph 7	Manuals	Compliance Statement	This TV will be published and made available to the operator. Thus, compliance to this certification requirement is demonstrated.
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Based on the evidence given compliance with the applicable certification basis has been demonstrated.

Previous Occurrences, Future Arisings and Associated Exit Strategies

Previous Occurrences:

TV274226

Future Arising:

This case is considered as one off and needs to be assessed on case-by-case basis in future.

Export Control Information (This table applies to TV Approval Sheet, Standardisation Report & Information Sheet Only)

Country	Export Classification	Date
Germany	Not Listed	07/02/2025

Note 1 (Germany): The technology contained in these parts of a TV must be confirmed, by the TV Approver, to have an Export Classification of either "Not Listed" or "PL9009.c". These sections of a TV must NOT contain technology of any other Export Classification but may reference such technology (e.g. Technical Reports). However, such referenced material must NOT be archived in the TV Database.

Note 2 : (All other countries including Singapore & USA) : Export Control must be considered and these parts of the TV document marked in accordance with the requirements of that country. Refer to the relevant Export Control Manager.

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Technology for Export Control
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Technical Variance Standardisation Report

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What date is the completed TV due to the customer (RR Promise date)?	Date:	<input type="checkbox"/>
Are the relevant detail drawings, general arrangement and schemes included with the pack? Any comments :		<input type="checkbox"/>
Are the relevant Engine Manual Inspection Checks, I.P.C. illustrations, Service Bulletins included in the pack? Any comments :		<input type="checkbox"/>
Has a TV history search for the engine and part number (including description) been completed and appropriate TV's included in the pack? Any comments :		<input type="checkbox"/>
Has a TV history search for similar engines and part numbers (including description) been completed and appropriate TV's included in the pack? Any comments :		<input type="checkbox"/>
Are the relevant Previous TVs and FRSs included in the pack? Any comments :		<input type="checkbox"/> examples of rejected
Has a concession search been completed and relevant documentation included in the pack? Any comments :		<input type="checkbox"/> documentation included in the pack?
Is the condition of mating parts understood (if applicable) And is the part to be rebuilt reusing the mating part or using matched pair option? Any comments :		<input type="checkbox"/>
Have the Engine Manual Limits and Aircraft Maintenance limits been included (if applicable)? Any comments :		<input type="checkbox"/>
Has the root cause of damage been identified by the TV request originator and a statement included in the pack? Any comments :		<input type="checkbox"/>
Has a sketch / diagram of non-conformance been included? Any comments :		<input type="checkbox"/>
Have replicasts been included? Any comments :		<input type="checkbox"/>
Are all damaged / repaired areas fully dimensioned on the request? Where applicable, have relevant min remaining wall sections been included? Any comments :		<input type="checkbox"/>
Are there Repair Parts (Spares) required to carry out the repair, if so, does the relevant supply chain exist? Any comments :		<input type="checkbox"/>
Has EDC been updated with the latest information? Any comments :		<input type="checkbox"/>
Have you confirmed that no export controlled technology is within the TV document content? Any comments :		<input type="checkbox"/>
Have you reviewed all current and historic Red Top Investigations? Any comments :		<input type="checkbox"/>

NOTE : An entry should be made in all boxes. Acceptable entries include: Y (Yes), N (No) or NA (Not Applicable). Explain briefly within the boxes above if N or NA is entered