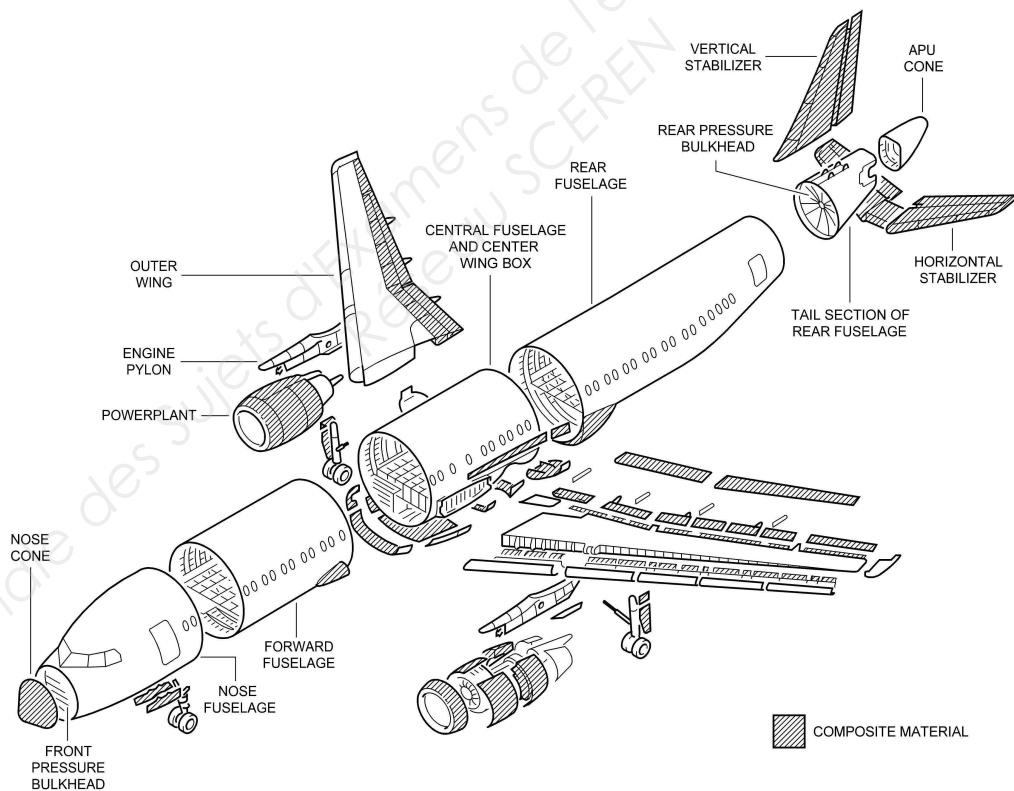


Epreuve E2 – TECHNOLOGIE (U2)

Analyse et communication techniques

DOSSIER TECHNIQUE

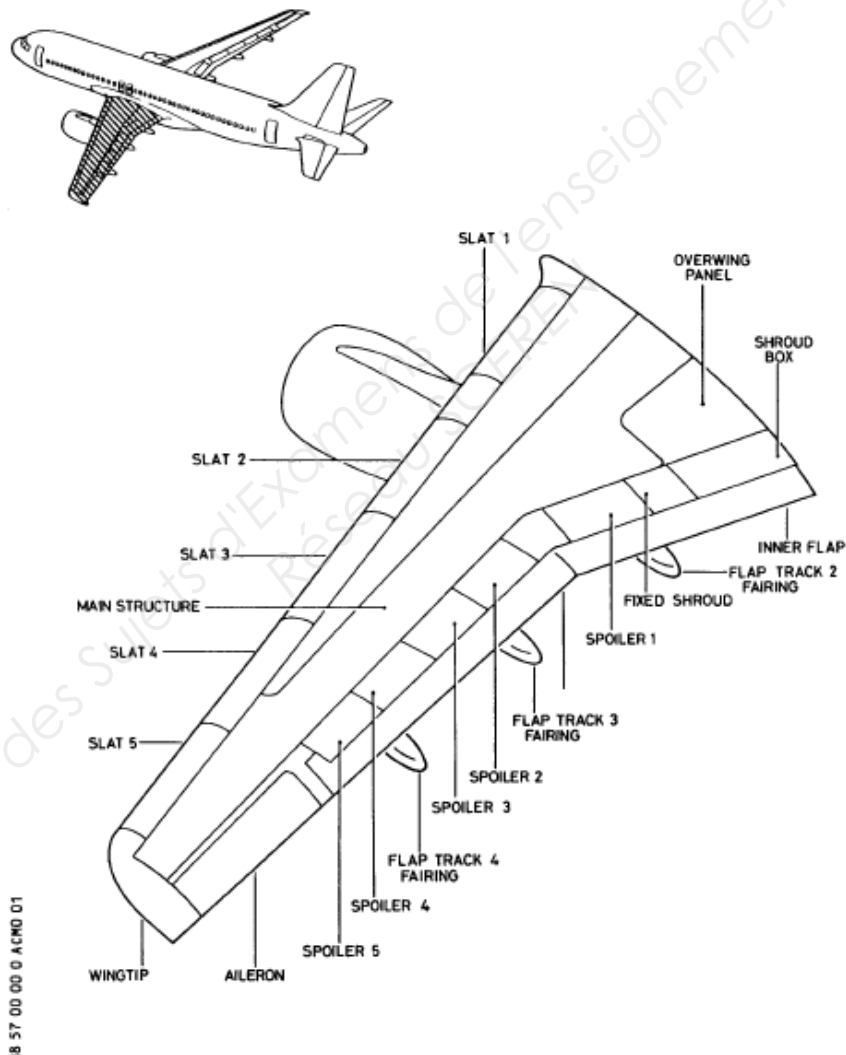


BACCALAUREAT PROFESSIONNEL TECHNICIEN AEROSTRUCTURE
Epreuve – E2 (U2)

SOMMAIRE

- 1- Présentation du système d'étude
- 2- Identification du spoiler
- 3- Etude de la réparation composite
- 4- Etude de la réparation métallique
- 5- Etude des systèmes Aéronefs

Présentation du système d'étude



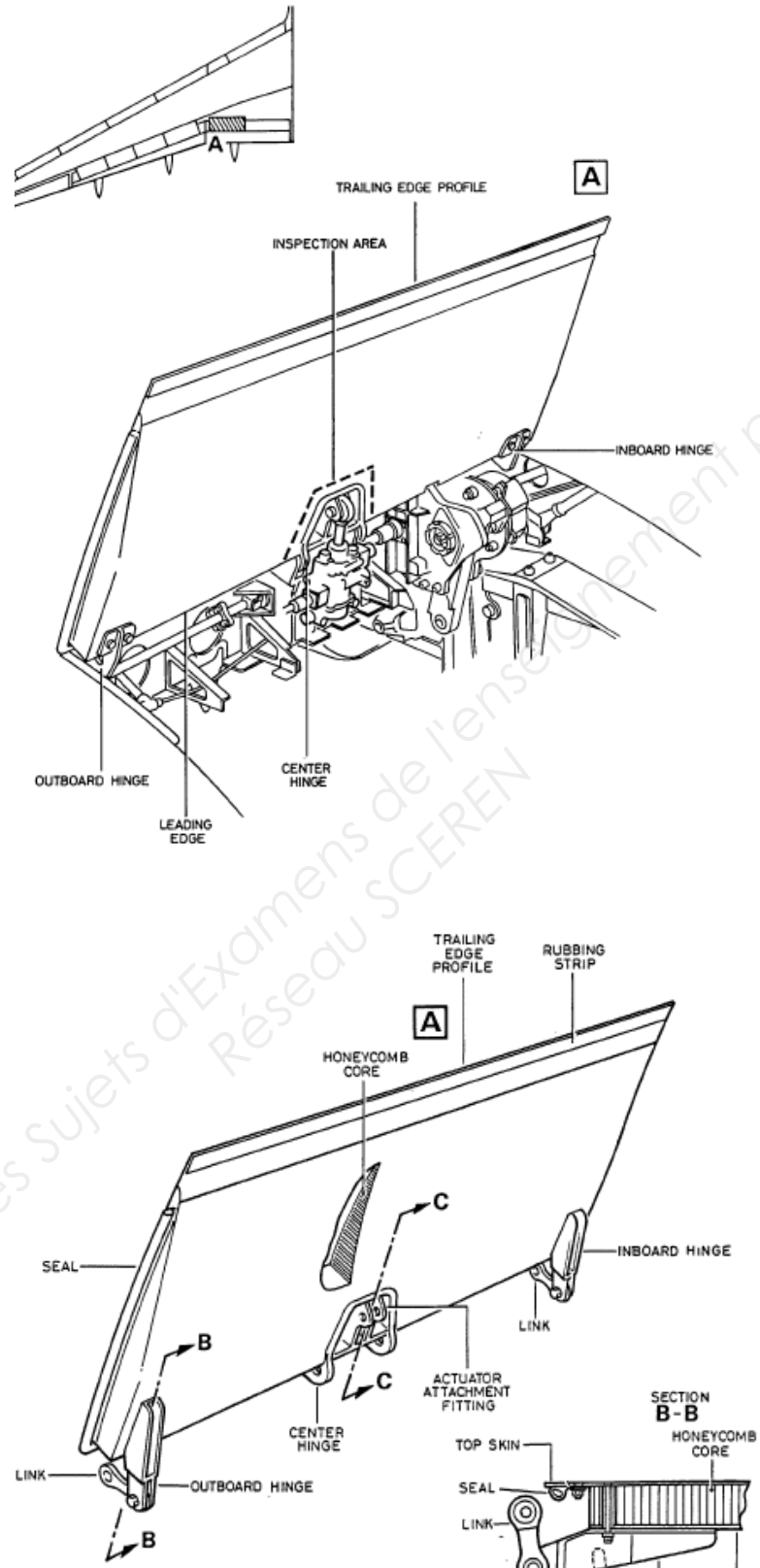
BACCALAUREAT PROFESSIONNEL TECHNICIEN AEROSTRUCTURE
Epreuve – E2 (U2)

Durée : 4 heures

coefficient : 4

DT : Page 2 sur 16

Identification du spoiler

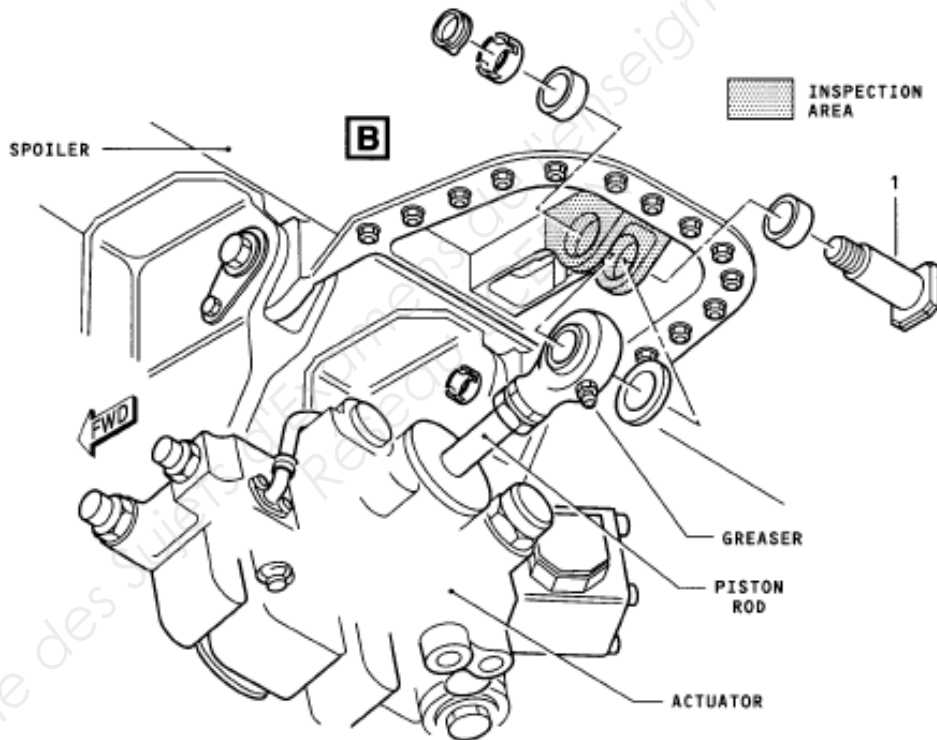
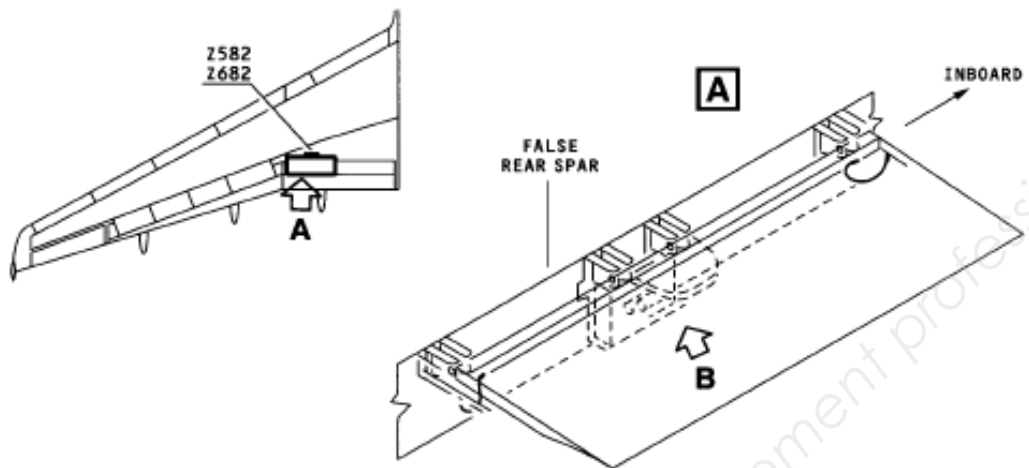


BACCALAUREAT PROFESSIONNEL TECHNICIEN AEROSTRUCTURE
Epreuve – E2 (U2)

Durée : 4 heures

coefficient : 4

DT : Page 3 sur 16



Actuator Bracket - Spoiler 1 - Inspection Area
Figure 605/TASK 57-71-00-991-005

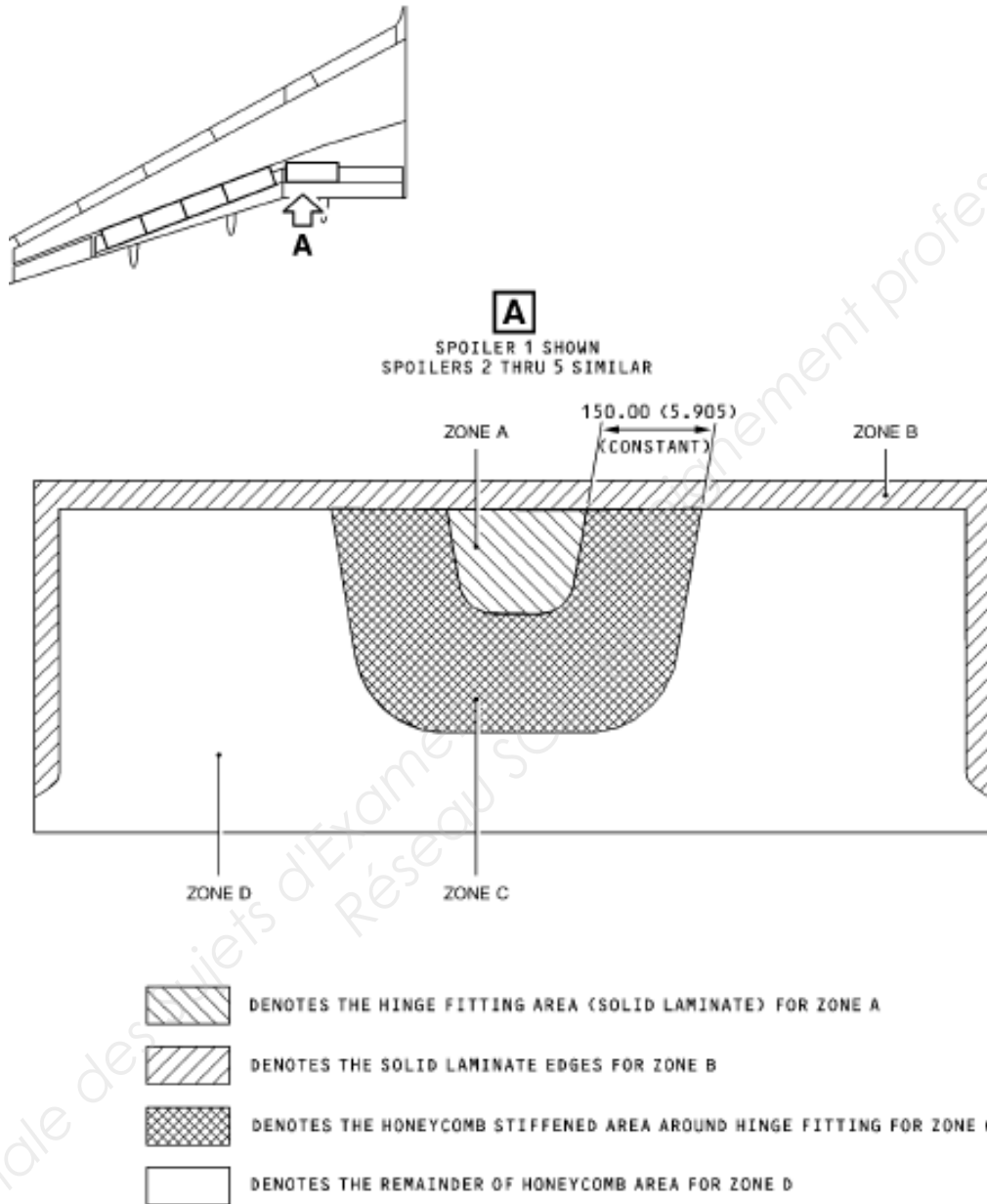
BACCALAUREAT PROFESSIONNEL TECHNICIEN AEROSTRUCTURE
Epreuve – E2 (U2)

Durée : 4 heures

coefficient : 4

DT : Page 4 sur 16

Etude de la réparation composite



NOTE: DIMENSIONS IN MILLIMETERS (INCHES IN BRACKETS).

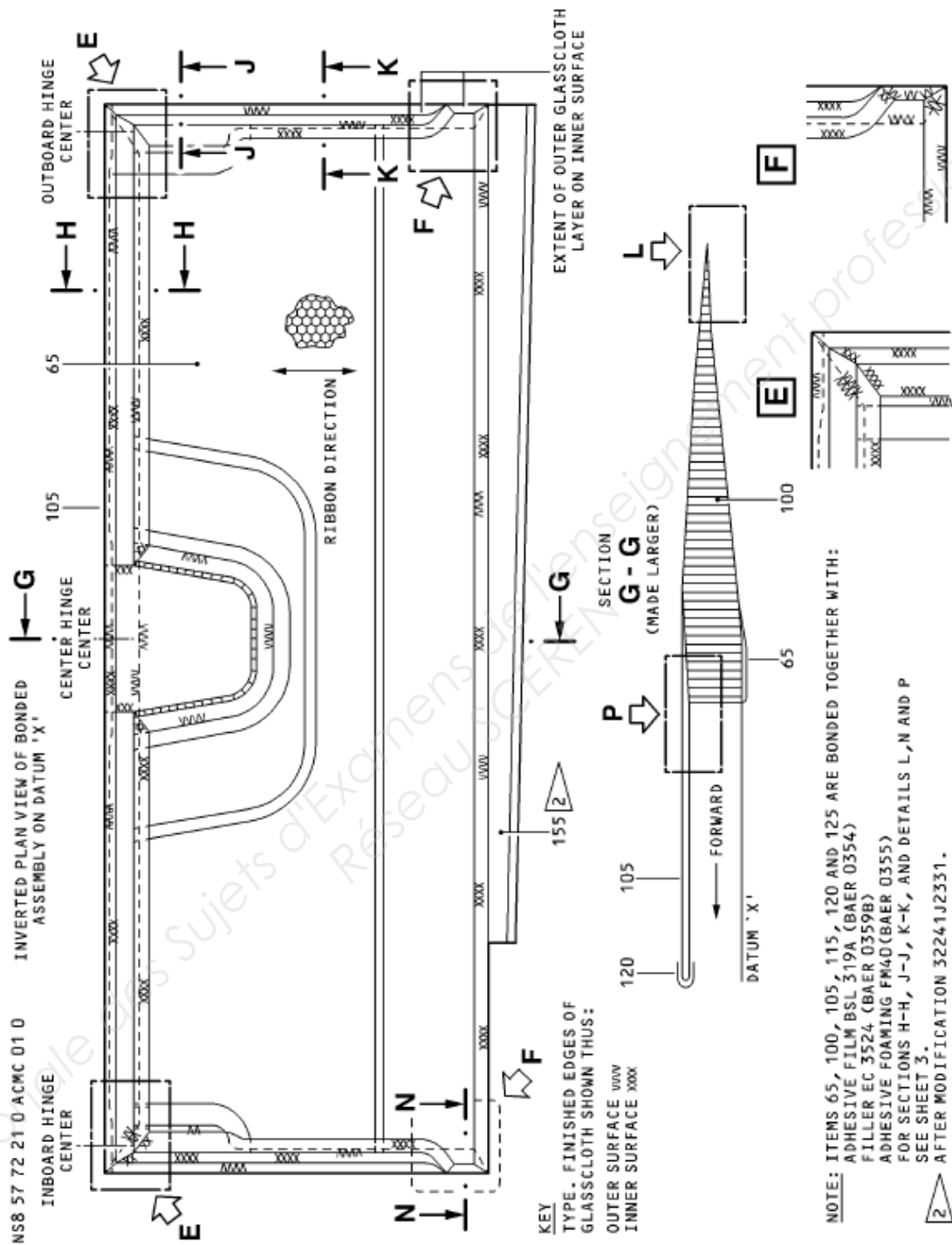
Repair Zones for structure of spoilers 1 thru 5
Figure 101

BACCALAUREAT PROFESSIONNEL TECHNICIEN AEROSTRUCTURE
Epreuve – E2 (U2)

Durée : 4 heures

coefficient : 4

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Spoiler 2
Figure 2 (sheet 2)

BACCALAUREAT PROFESSIONNEL TECHNICIEN AEROSTRUCTURE
Epreuve – E2 (U2)

Durée : 4 heures

coefficient : 4

DT : Page 6 sur 16

TYPE OF DAMAGE	DAMAGE SIZE			TYPE OF REPAIR	REPAIR CATEGORY	REPAIR TO BE PERFORMED	SRM REPAIR REFERENCE (4) (5)	INSPECTION REQUIRED /AIR	MINIMUM DISTANCE 'X' BETWEEN DAMAGES:		MAX. NO. OF DAMAGES
	LENGTH mm (in.)	WIDTH mm (in.)	AREA mm ² (in ²)						DEPTH mm (in.)	mm (in.)	
SCRATCHES CRACKS GOUGES	≤ 200.00 (7.874)	≤ 10.00 (0.394)	≤ 0.125 (0.005)	TEMPORARY	C	IMMEDIATELY	51-77-12 PARA. 2A	NO			
				PERMANENT	A	WITHIN 2500 FH	51-77-12 PARA. 3A				
	≤ 100.00 (3.937)	≤ 10.00 (0.394)	≤ 0.375 (0.015)	TEMPORARY	C	IMMEDIATELY	51-77-12 PARA. 2A				
				PERMANENT	A	WITHIN 2500 FH	51-77-12 PARA. 3D(1)				
DELAMINATION AND DEBONDING (3)	≤ 10.00 (0.394)	≤ 80.00 (0.124)	ALL DEPTHS	REPAIR NOT REQUIRED							
	≤ 40.00 (1.574)	≤ 1260.00 (1.953)	ALL DEPTHS	TEMPORARY REPAIR NOT REQUIRED							
DENTS AND PERFORATION DAMAGE (3)	≤ 80.00 (3.150)	≤ 5000.00 (7.750)	ALL DEPTHS	PERMANENT	A	WITHIN 2500 FH	51-77-12 PARA. 3D(1) OR PARA. 3D(2) OR 51-77-13 PARA. 2C	NO	3L (WHERE L IS THE MAXIMUM DAMAGE DIMENSION)		NO LIMIT
				PERMANENT	A	IMMEDIATELY	51-77-12 PARA. 3D(1) OR PARA. 3D(2) OR 51-77-13 PARA. 2C				
	TEMPORARY	C	IMMEDIATELY	51-77-12 PARA. 2A							
	PERMANENT	A	WITHIN 2500 FH	51-77-12 PARA. 3A							
	TEMPORARY	C	IMMEDIATELY	51-77-12 PARA. 2A							
	PERMANENT	A	WITHIN 2500 FH	51-77-12 PARA. 3D(1) OR PARA. 3D(2) OR 51-77-13 PARA. 2C							
DENTS AND PERFORATION DAMAGE (3)	≤ 40.00 (1.574)	≤ 1260.00 (1.954)	ALL DEPTHS THROUGH COMPONENT	TEMPORARY	C	IMMEDIATELY	51-77-12 PARA. 2A	NO			NO LIMIT
				PERMANENT	A	WITHIN 2500 FH	51-77-12 PARA. 3A				
	TEMPORARY	C	IMMEDIATELY	51-77-12 PARA. 2A							
	PERMANENT	A	WITHIN 2500 FH	51-77-12 PARA. 3D(1) OR PARA. 3D(2) OR 51-77-13 PARA. 2C							
DENTS AND PERFORATION DAMAGE (3)	≤ 80.00 (3.150)	≤ 5000.00 (7.750)	ALL DEPTHS THROUGH COMPONENT	PERMANENT	A	IMMEDIATELY	51-77-12 PARA. 3D(1) OR PARA. 3D(2) OR 51-77-13 PARA. 2C	NO			NO LIMIT
				PERMANENT	A	IMMEDIATELY	51-77-12 PARA. 3D(1) OR PARA. 3D(2) OR 51-77-13 PARA. 2C				

NOTE: FOR DAMAGE THAT EXCEEDS THE LIMITS IN THIS TABLE CONTACT AIRBUS FOR FURTHER INSTRUCTIONS.

- ① THIS ASSUMES DAMAGE TO SURFACE PLY ONLY AND THERE IS NO DAMAGE TO UNDERLYING PLYS.
- ② REFER TO PARA 6E FOR DAMAGE AROUND FASTENERS.
- ③ FOR SPECIFIC MATERIALS TO BE USED IN WET LAY-UP REPAIRS REFER TO PB 201 PARA. 5A
- ④ FOR SPECIFIC MATERIALS TO BE USED IN HOT BOND REPAIRS REFER TO PB 201 PARA. 5B

CAUTION: OBEY THE EFFECTIVITY PER WEIGHT VARIANT AND AIRCRAFT TYPE GIVEN IN TABLE 101.

Allowable Damage Limits and Repairs for Zone A
Figure 102

BACCALAUREAT PROFESSIONNEL TECHNICIEN AEROSTRUCTURE
Epreuve – E2 (U2)

Durée : 4 heures

coefficient : 4

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D. Skin Repair

(1) Wet Lay-Up Repair for non Perforating Damage (Refer to Figure 5 (sheet 1 thru 4))

(a) Prepare the repair area (Refer to Chapter 51-77-11, Paragraph 4.M.(2)).

NOTE: If the repair will be done after Option D (as shown in sheet 4), do the steps of Paragraph 3.B.(2) to 3.B.(7) first.

WARNING: BONDING AND ADHESIVE COMPOUND IS DANGEROUS.

(b) Prepare the laminating resin (Refer to Chapter 51-77-11, Paragraph 6.B.(2) and 4.A.).

(c) Prepare the repair plies (Item 4 or 5, Repair Materials List and refer to Chapter 51-77-11, Paragraph 4.H.).

(d) Put repair plies on the repair area (Refer to Chapter 51-77-11, Paragraph 5.A.).

(e) Install the vacuum bag and, if the repair cure is to be accelerated by the application of heat, the heating equipment (Refer to Chapter 51-77-11, Paragraph 5.D.).

(f) Allow the repair to cure under vacuum pressure (Refer to Chapter 51-77-11, Paragraph 5.E.). If the repair cure is to be accelerated by the application of heat, let the repair cure at the required temperature and time (Refer to Chapter 51-77-11, Paragraph 6.B.(2) and Paragraph 5.E.).

(g) Remove the vacuum bag and heating equipment.

(h) Inspect the repair (Refer to Chapter 51-77-10, Paragraph 5.).

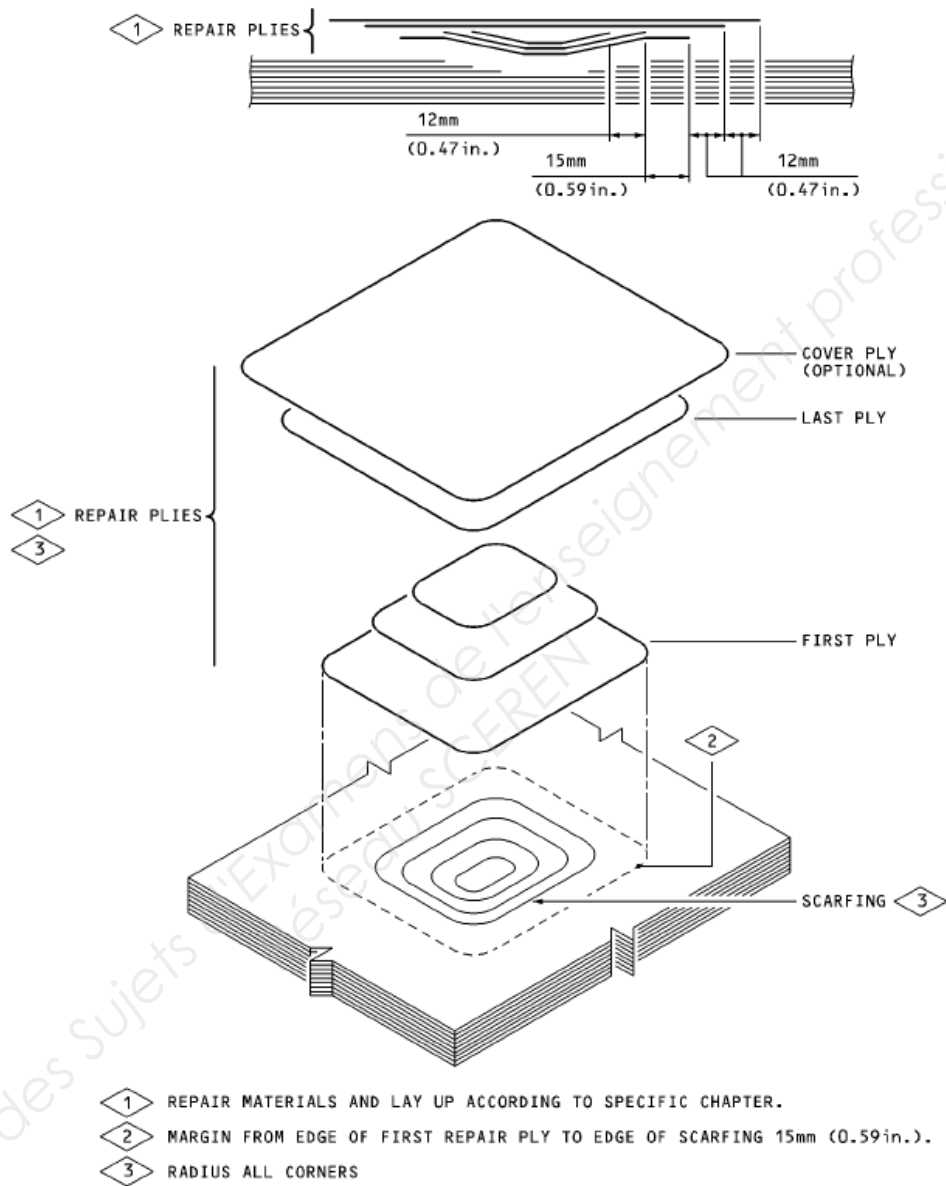
(i) Remove any resins remnants from the border area of the repair, use abrasive cloth. Start with 280 grade and finish with 400 grade.

WARNING: CLEANING AGENT (MATERIAL NO. 11-003) IS DANGEROUS.

WARNING: CLEANING AGENT (MATERIAL NO. 11-004) IS DANGEROUS.

(j) Clean the repair area with cleaning agent (Material No. 11-003 or 11-004 and refer to Chapter 51-77-11, Paragraph 4.E.).

(k) If required, restore the surface protection (Refer to Chapter 51-75-12).



NS6 51 77 12 0 AJMA 01 0

Wet Lay-Up Repair for non Perforating Damage - Option A
Figure 5 (sheet 1)

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51-77-12 Page 14
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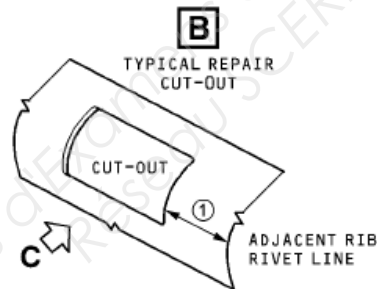
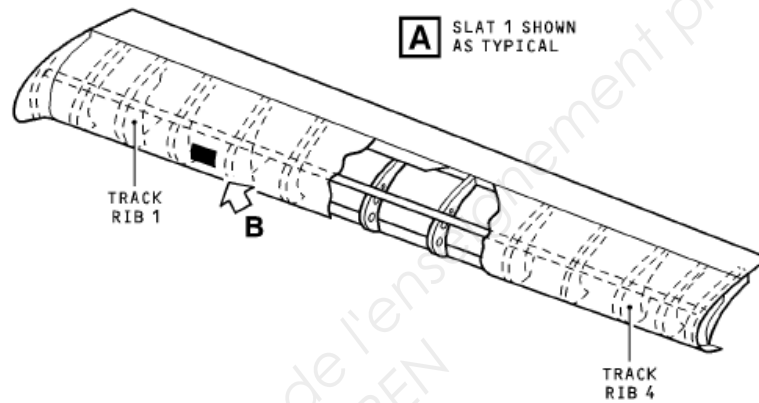
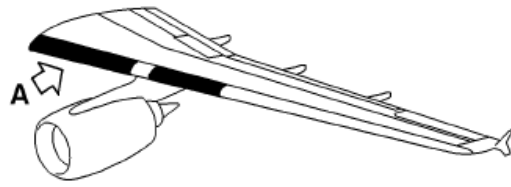
BACCALAUREAT PROFESSIONNEL TECHNICIEN AEROSTRUCTURE
Epreuve – E2 (U2)

Durée : 4 heures

coefficient : 4

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Etude de la réparation métallique



NS8 57 40 00 2 AYMA 00 0

NOTE: FOR VIEW C SEE SHEET 2.

① DIMENSION DEPENDANT ON EACH REPAIR.

Slats 1 and 2 - Nose and Top Skin Repair between the Ribs with the Z stringer undamaged or locally straightened.

Figure 212 (sheet 1)

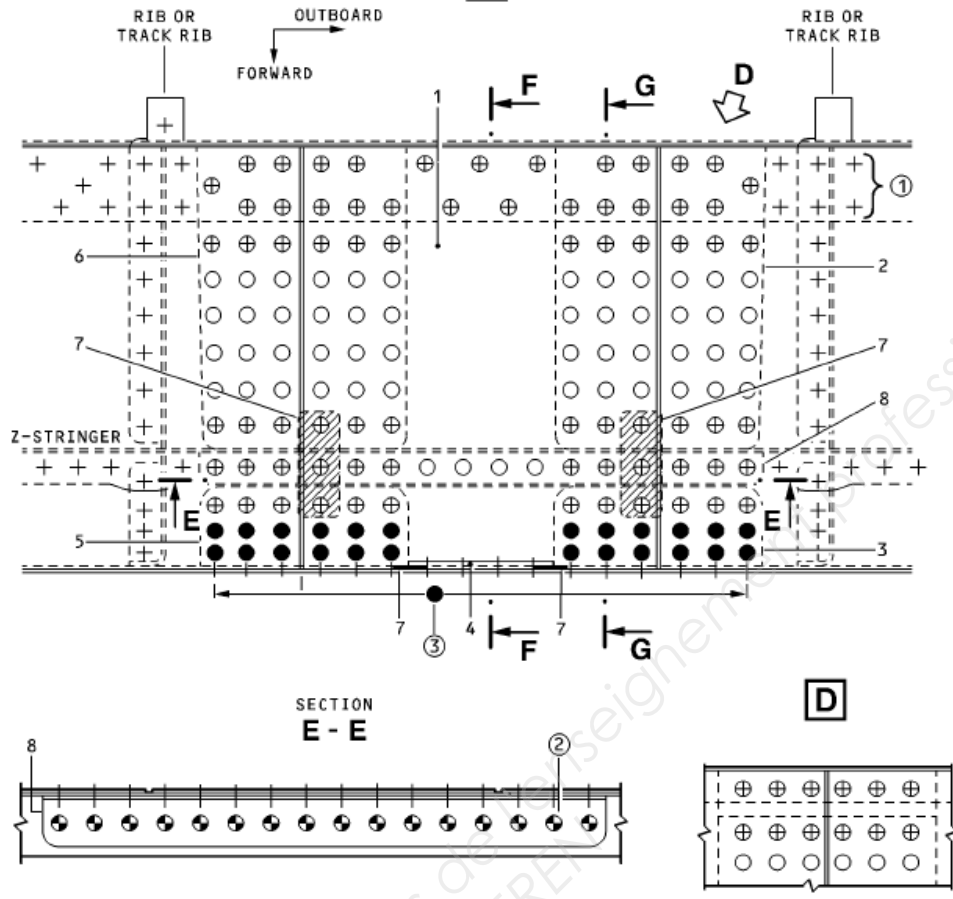
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BACCALAUREAT PROFESSIONNEL TECHNICIEN AEROSTRUCTURE
Epreuve – E2 (U2)

Durée : 4 heures

coefficient : 4

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CAUTION: OBEY THE EFFECTIVITY PER WEIGHT VARIANT AND AIRCRAFT TYPE GIVEN IN TABLE 216.

NOTE: MINIMUM EDGE DISTANCE = 8.00 (0.315).
 MINIMUM DISTANCE BETWEEN FASTENERS = 14.50 (0.570).
 FOR SECTION F-F AND G-G SEE SHEET 3.
 FOR FASTENER TABLE SEE SHEET 4.
 DIMENSIONS IN MILLIMETERS (INCHES IN BRACKETS).
 AT THE SKIN/INSERT CUT-OUT, MINIMUM RADIUS DIMENSION = 8.00 (0.315),
 MINIMUM GAP DIMENSION = 1.00 TO 2.00 (0.039 TO 0.079).

- ① TRAILING EDGE TOP SKIN CONNECTIONS FOR ONE OR TWO ROWS DEPENDING ON SLAT AND VERSION.
- ② MS20470 (SOLID RIVETS) IN LINE WITH THOSE OF THE UPPER FLANGE OF THE Z STRINGER.
- ③ 16 EQUI - SPACED FASTENERS.

FASTENER TABLE

SYMBOL	PART NUMBER	DESCRIPTION	MATERIAL	ALTERNATIVE OR REMARKS
○	NAS1921C05 OR NAS1921C05S	BLIND RIVETS	A286 CRES	OVERSIZE OSMLS100EU05 OR
	OR CR3522P5		MONEL	CR3552P5
⊕	NAS1921C05 OR NAS1921C05S	BLIND RIVETS	A286 CRES	OVERSIZE OSMLS100EU05
● SLAT 1	NAS1921C05 OR NAS1921C05S	BLIND RIVETS	A286 CRES	OVERSIZE OSMLS100EU05
● SLAT 2	NAS1921C05 OR NAS1921C05S	BLIND RIVETS	A286 CRES	OVERSIZE OSMLS100EU05 OR
	OR CR3522P5		MONEL	CR3552P5
● SLAT 2	MS20470AD5 OR ASNA0078A5 OR B5	SOLID RIVETS	ALUMINIUM	CR3213 OR CR3223
		BLIND RIVETS		

BACCALAUREAT PROFESSIONNEL TECHNICIEN AEROSTRUCTURE
 Epreuve – E2 (U2)

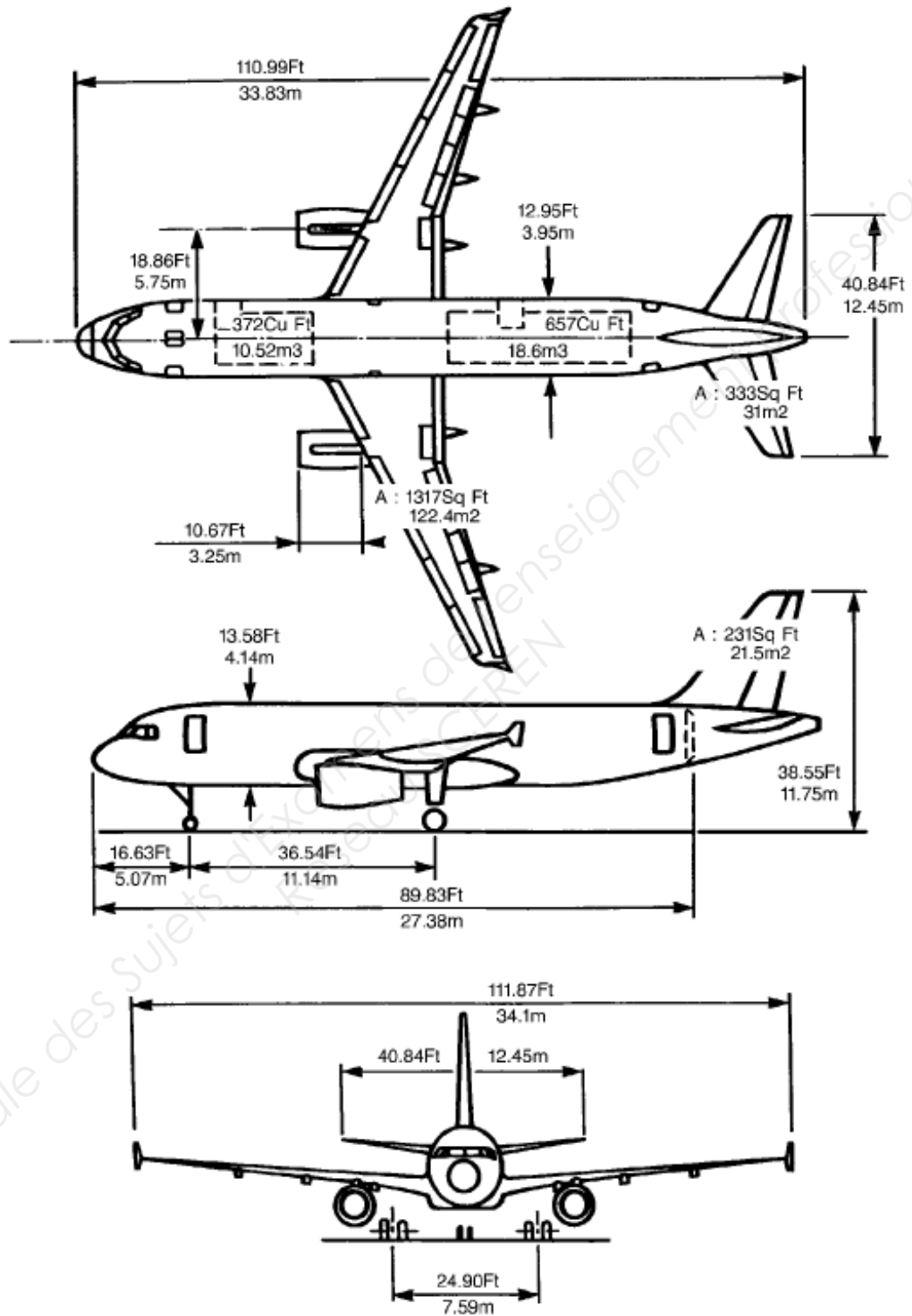
Durée : 4 heures

coefficient : 4

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NS8 57 4D 00 2 AYMF 01 0

Etude des systèmes Aéronefs



JM5 06 10 00 0 NCZD 03

BACCALAUREAT PROFESSIONNEL TECHNICIEN AEROSTRUCTURE
Epreuve – E2 (U2)

Durée : 4 heures

coefficient : 4

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SPOILER - DESCRIPTION AND OPERATION

1. General

Five spoilers numbered 1 thru 5 inboard to outboard are provided on the rear upper surface of each wing.

The spoilers are used for:

- Roll function
- Load Alleviation function (LAF)
- Speedbrake function
- Ground spoilers function

Each spoiler is electrically controlled and Hydraulically actuated by an electrohydraulic servocontrol.

2. System Description

A-. ROLL FUNCTION

The spoilers 2 thru 5 assist the ailerons in roll control.

The Roll axis is controlled and monitored by the three SEC's associated with ailerons.

The SEC's elaborate the surface deflection orders in manual control mode, mainly from the side stick ; in autopilot mode from FMGES.

B-. LOAD ALLEVIATION FUNCTION (LAF)

The LAF relieves wing structure loads in turbulence by moving the spoilers 4 and 5 and ailerons symmetrical.

The LAF order are added with Roll orders.

C-. SPEEDBRAKE FUNCTION

The speedbrake function is controlled and monitored by the three SEC's with spoilers 2, 3 and 4.

The speedbrake lever controls the position of these spoilers and so is used for the preselection of ground spoilers function.

D-. GROUND SPOILERS

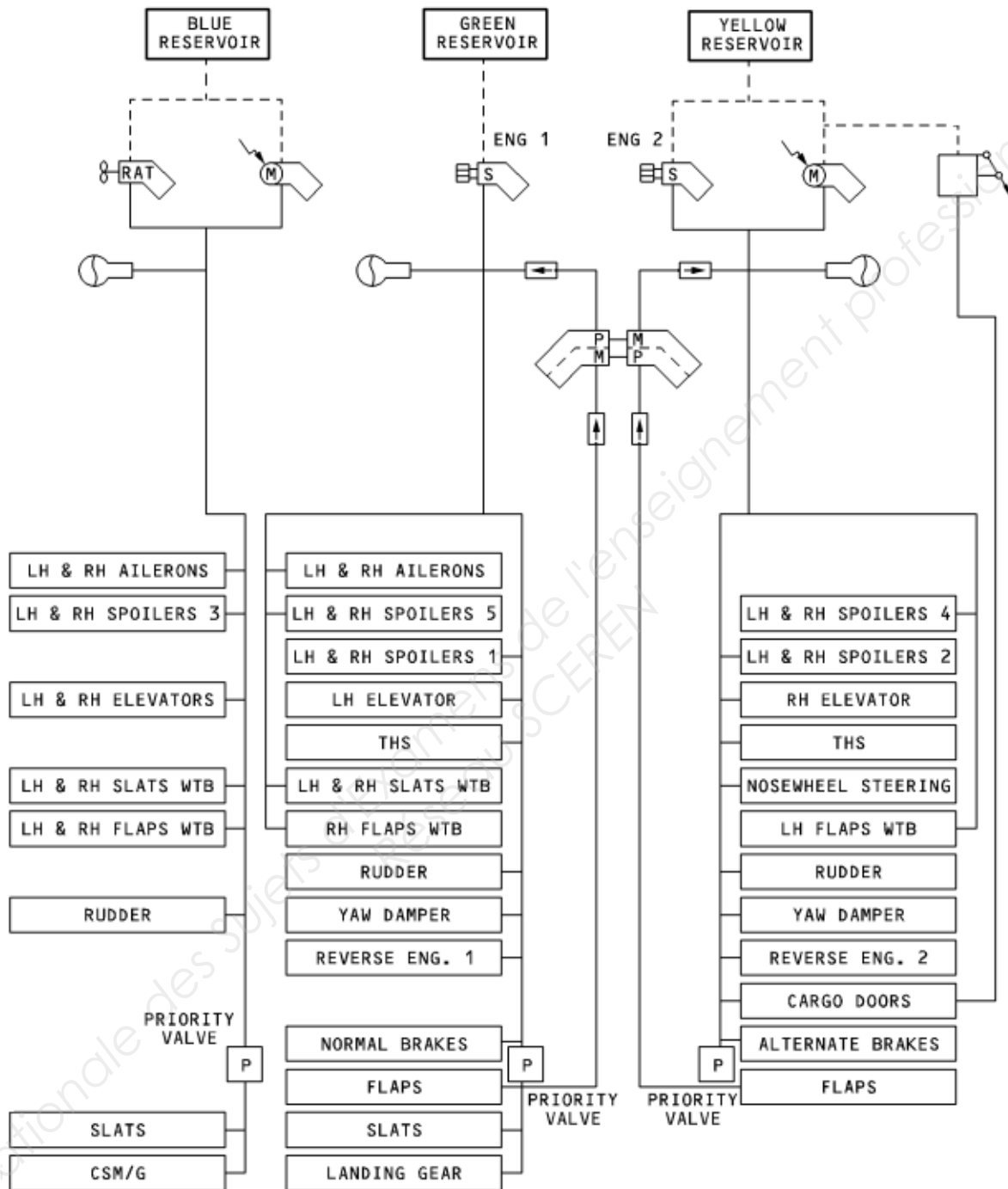
The ground spoilers function is ensured by all spoilers.

The activation of this function is dependent upon :

- The function preselection (give by speedbrake lever position)
- The two engines at idle
- Flight/Ground transition (With Ground and wheel speed information).

AIRCRAFT MAINTENANCE MANUAL

HYDRAULIC POWER



Hydraulic Power Users

BACCALAUREAT PROFESSIONNEL TECHNICIEN AEROSTRUCTURE
Epreuve – E2 (U2)


















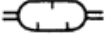










Durée : 4 heures

coefficient : 4

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PIPELINE IDENTIFICATION

HYDRAULIC SYSTEM IDENTIFICATION		
NUMBER	COLOR CODE	SYSTEM
1	GREEN	GREEN
2	BLUE	BLUE
3	YELLOW	YELLOW

	ELECTRIC PUMP		PRESSURE ACCUMULATOR
	ENGINE PUMP		TEMPERATURE SENSOR
	RAM AIR TURBINE (RAT)		PRIORITY VALVE
	HANDPUMP		HIGH PRESSURE MANIFOLD
	ELECTRICALLY OPERATED SHUT OFF VALVE		TWO WAY RESTRICTOR
	GROUND CONNECTOR		POWER TRANSFER UNIT
	SELF SEALING COUPLING		SPRING-TYPE ACCUMULATOR
	PRESSURE RELIEF VALVE		PRESSURE GAGE
	CHECK VALVE		PULSATION DAMPENER
	HYDRAULIC SAFETY VALVE (FUSE)		LOW PRESSURE MANIFOLD
	FILTER		HYDRAULICALLY OPERATED SELECTOR VALVE
	PRESSURE TRANSMITTER		VALVE WITH MANUAL OPERATION
	PRESSURE SWITCH		HYDRAULIC MOTOR
	SOLENOID VALVE		HYDRAULIC ACTUATOR

Symbols

BACCALAUREAT PROFESSIONNEL TECHNICIEN AEROSTRUCTURE
Epreuve – E2 (U2)

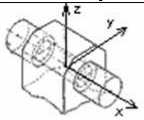
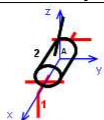
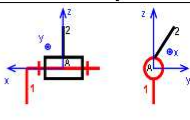
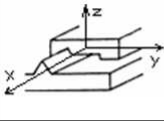
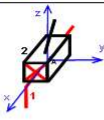
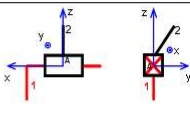
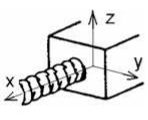
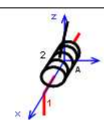
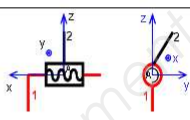
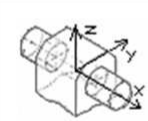
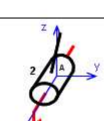
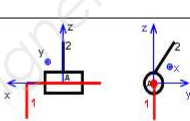
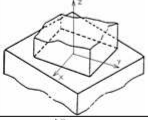
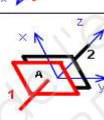
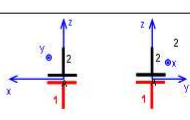
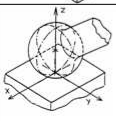
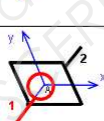
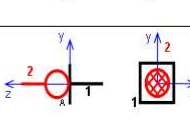
Durée : 4 heures

coefficient : 4

DT : Page 15 sur 16

Construction mécanique

• Symboles de liaison (extrait).

Exemple	Nom	Degrés de liberté	Schéma spatial	Schémas plans								
	Pivot d'axe (A,x)	<table border="1"> <tr><td>Translation</td><td>Rotation</td></tr> <tr><td>0</td><td>Rx</td></tr> <tr><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td></tr> </table>	Translation	Rotation	0	Rx	0	0	0	0		
Translation	Rotation											
0	Rx											
0	0											
0	0											
	Glissière d'axe (A,x)	<table border="1"> <tr><td>Translation</td><td>Rotation</td></tr> <tr><td>Tx</td><td>0</td></tr> <tr><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td></tr> </table>	Translation	Rotation	Tx	0	0	0	0	0		
Translation	Rotation											
Tx	0											
0	0											
0	0											
	Hélicoïdale d'axe (A,x)	<table border="1"> <tr><td>Translation</td><td>Rotation</td></tr> <tr><td>Tx</td><td>Rx</td></tr> <tr><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td></tr> </table> $T_x = (p / 2\pi) \theta_x$	Translation	Rotation	Tx	Rx	0	0	0	0		
Translation	Rotation											
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	Pivot glissant d'axe (A,x)	<table border="1"> <tr><td>Translation</td><td>Rotation</td></tr> <tr><td>Tx</td><td>Rx</td></tr> <tr><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td></tr> </table>	Translation	Rotation	Tx	Rx	0	0	0	0		
Translation	Rotation											
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	Appui-plan de normale (A,z)	<table border="1"> <tr><td>Translation</td><td>Rotation</td></tr> <tr><td>Tx</td><td>0</td></tr> <tr><td>Ty</td><td>0</td></tr> <tr><td>0</td><td>Rz</td></tr> </table>	Translation	Rotation	Tx	0	Ty	0	0	Rz		
Translation	Rotation											
Tx	0											
Ty	0											
0	Rz											
	Ponctuelle de normale (A,z)	<table border="1"> <tr><td>Translation</td><td>Rotation</td></tr> <tr><td>Tx</td><td>Rx</td></tr> <tr><td>Ty</td><td>Ry</td></tr> <tr><td>0</td><td>Rz</td></tr> </table>	Translation	Rotation	Tx	Rx	Ty	Ry	0	Rz		
Translation	Rotation											
Tx	Rx											
Ty	Ry											
0	Rz											

• Formulaire

$$\tau_{moy} = \frac{T}{S}$$

$$R_{pg} = \frac{R_{rg}}{k}$$

$$\tau_{moy} < \text{ou} = R_{pg}$$

τ_{moy}	contrainte de cisaillement
R_{pg}	Resistance pratique au cisaillement
R_{rg}	Résistance à la rupture au cisaillement
k	coefficient de sécurité
T	Effort tranchant
S	Surface cisailé

BACCALAUREAT PROFESSIONNEL TECHNICIEN AEROSTRUCTURE
Epreuve – E2 (U2)

Durée : 4 heures

coefficient : 4

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