

HARD LANDING - INSPECTION/CHECK

EFFECTIVITY: ALL

1. General

- A. A hard landing inspection is necessary after a non-normal landing condition, when the loads can be outside the design limit envelope. This envelope includes a combination of aircraft weight, vertical CG acceleration at touchdown, and ambient temperature.
- B. This tasks accounts for:
 - (1) Hard Landing - is an exceedance of the vertical CG acceleration threshold;
 - (2) Off-envelope Landing - is an exceedance of the ambient temperature limit.
- C. In case of overweight landing, refer to [AMM TASK 05-50-25-200-801-A/600](#).
- D. A hard landing inspection is necessary when: the crew members report on the aircraft technical Log Book that they think that a hard landing occurred; or when the analysis of the flight operation data shows that the envelope of landing parameters was not obeyed.
- E. Although, for the regulation, the sink rate parameter will define a hard landing, the data acquisition system does not give accurate data for you to use this parameter to define a hard landing. Thus, the procedures that follow use the vertical CG acceleration (for MLG hard landing detection) and the pitch rate (for NLG hard landing detection).
- F. The procedures in this section are given in the sequence below. The tasks identified with (◆) are part of the Scheduled Maintenance Requirements Document (SMRD).

| TASK NUMBER | DESCRIPTION | EFFECTIVITY |
|------------------------------------|--------------|-------------|
| 05-50-02-200-801-A | HARD LANDING | ALL |

TASK 05-50-02-200-801-A

EFFECTIVITY: ALL

2. HARD LANDING

A. General

- (1) Refer to [Figure 601](#). The flowchart is a summary of the necessary actions when the crew reports that a possible hard landing occurred or when the analysis of flight data shows that a hard landing occurred.
- (2) When the crew reports, in the Log Book, that a hard landing occurred, do the Phase-I inspection immediately. If you find no incorrect condition during the Phase-I inspection, a fly-by of 10 FC (Flight Cycles) not longer than 10 FH (Flight Hours) is permitted. Then you can do one of these two procedures:

- (a) During the fly-by period, do the Phase-II inspection. In this case, no FDR data analysis is necessary. It will be necessary to do the Phase-III inspection only if you find an incorrect condition during the Phase-II inspection.

NOTE: Because the FDR data were not analyzed, you do not know which landing gear had a hard landing. Thus, do the Phase-II inspections on the NLG and on the MLG.

- (b) During the fly-by period, obey the instructions contained in this section to analyze the FDR data. The Phase-II inspection must then be done only if the data analysis shows that the landing conditions do not obey the threshold limits given in this section for the MLG or NLG touchdown. The Phase-III inspection will be done only if you find an incorrect condition during the Phase-II inspection.

- NOTE:**
- The FDR data download must be done within a maximum of 20FH. If not, the data can be missed due to the recording time of the FDR.
 - The flight data analysis of only one FDR is enough to define whether or not a hard landing has occurred.
 - FDR is installed in the RH rear fuselage. Open the access door 272DR (AMM MPP 06-41-01/100).

- (3) When the source for you to find a hard-landing condition is the flight data analysis, not a crew report, the you must do the required inspections as per [Figure 601](#) flow chart. The Phase-III inspection will only be necessary if you find an unsatisfactory condition during the Phase-II inspection.

- NOTE:**
- If it is not possible to do Phase-II inspection immediately, a fly-by of 10 FC is granted from the moment of the hard landing detection through the FDR data analysis, provided that the Phase-I inspection is performed immediately and no damage is found during this inspection.
 - If any discrepancy is found during the Phase-I inspection, the Phase-II inspection must be done immediately.
 - During the fly-by period, the Phase-II inspection must be done.

- (4) Do the analysis of the hard landing separately for the MLG and the NLG. Main-landing gear hard touchdown is a result of a high vertical CG acceleration at the MLG touchdown. The NLG hard touchdown can occur because of a high pitch rate when the nose landing gear touches the runway.
- (5) When the crew reports that it thinks that there was a possible hard landing, do the analysis for the MLG and for the NLG.
- (6) Once the hard landing analysis is done separately for the MLG and NLG, the respective inspections that will be necessary also are different, depending on which landing gear was submitted to a hard landing.
- (7) For the analysis for hard landing, these parameters from the FDR data are necessary ([AMM TASK 31-31-00-700-803-A/500](#)):
 - Vertical CG acceleration (normal acceleration)
 - Pitch angle
 - Air/Ground indication
 - Time (GMT)
 - Date
 - Flight number
- (8) If a landing was done out of the temperature envelope, the MLG and NLG hard landing detection procedures are not applicable. Then, go directly to the Phase-II inspection. Do the Phase-III inspection if you find an incorrect condition during the Phase-II inspection.
- (9) The procedures that we give you here are conservative. Their function is to permit you to find a hard-landing condition and put the related aircraft in a serviceable condition. If you will not do a Phase-III inspection, it is not necessary to send data to Embraer. But, if you must do a Phase-III inspection, send the data to Embraer for analysis (FDR data and a report of the damage found). The decision to put the aircraft back into service will then be made by Embraer together with you.

B. References

| REFERENCE | DESIGNATION |
|---|--|
| AMM MPP 06-21-00/100 | - |
| AMM MPP 06-41-01/100 | - |
| AMM MPP 06-44-00/100 | - COMPONENT LOCATION |
| AMM MPP 49-00-00/200 | - MAINTENANCE PRACTICES |
| AMM MPP 49-02-00/200 | - MAINTENANCE PRACTICES |
| AMM TASK 05-50-16-200-801-A/600 | HIGH ENERGY STOP - INSPECTION |
| AMM TASK 25-51-01-000-801-A/400 | BAGGAGE COMPARTMENT LINING - REMOVAL |
| AMM TASK 25-51-01-200-801-A/600 | BAGGAGE COMPARTMENT LINING - VISUAL INSPECTION |
| AMM TASK 25-51-01-400-801-A/400 | BAGGAGE COMPARTMENT LINING - INSTALLATION |
| AMM TASK 25-81-01-000-801-A/400 | - |

(Continued)

| REFERENCE | DESIGNATION |
|---------------------------------|---|
| AMM TASK 25-81-01-000-802-A/400 | - |
| AMM TASK 25-81-01-400-801-A/400 | - |
| AMM TASK 25-81-01-400-802-A/400 | - |
| AMM TASK 27-11-00-700-801-A/500 | AILERON PRIMARY-MECHANICAL CONTROL BACKLASH - FUNCTIONAL CHECK |
| AMM TASK 27-11-01-700-801-A/500 | - |
| AMM TASK 27-11-01-700-802-A/500 | - |
| AMM TASK 27-21-01-700-801-A/500 | - |
| AMM TASK 27-21-01-700-802-A/500 | - |
| AMM TASK 27-22-00-700-801-A/500 | - |
| AMM TASK 27-31-00-700-801-A/500 | ELEVATOR PRIMARY MECHANICAL CONTROL BACKLASH - FUNCTIONAL CHECK |
| AMM TASK 27-31-01-700-801-A/500 | TENSION OF THE ELEVATOR CONTROL CABLES - FUNCTIONAL CHECK |
| AMM TASK 27-31-01-700-802-A/500 | TENSION OF THE ELEVATOR AUTOPILOT-SERVO CABLES |
| AMM TASK 27-40-00-700-801-A/500 | HORIZONTAL STABILIZER BACKLASH - FUNCTIONAL CHECK |
| AMM TASK 31-31-00-700-803-A/500 | FDR DATA - PERSONAL COMPUTER DOWNLOADING |
| AMM TASK 32-00-01-910-801-A/200 | LG SAFETY PIN - INSTALLATION AND REMOVAL |
| AMM TASK 32-10-00-200-801-A/600 | MLG DOORS - INSPECTION |
| AMM TASK 32-10-02-200-801-A/600 | MLG SHOCK ABSORBER - INSPECTION |
| AMM TASK 32-34-00-700-801-A/500 | LG EMERGENCY EXTENSION - OPERATIONAL AND FUNCTIONAL CHECKS |
| AMM TASK 32-49-03-200-801-A/600 | BRAKE ASSEMBLY - INSPECTION |
| AMM TASK 51-50-01-820-801-A/200 | - |
| AMM TASK 52-21-00-000-801-A/400 | PASSENGER-CABIN ESCAPE HATCHES - REMOVAL |
| AMM TASK 52-21-00-400-801-A/400 | PASSENGER-CABIN ESCAPE HATCHES - INSTALLATION |
| AMM TASK 53-04-01-000-801-A/400 | FORWARD WING-TO-FUSELAGE FAIRING - REMOVAL |
| AMM TASK 53-04-01-400-801-A/400 | FWD WING-TO-FUSELAGE FAIRING - INSTALLATION |
| AMM TASK 53-04-10-000-801-A/400 | CENTER WING-TO-FUSELAGE FAIRING - REMOVAL |
| AMM TASK 53-04-10-400-801-A/400 | CENTER WING-TO-FUSELAGE FAIRING - INSTALLATION |
| AMM TASK 53-04-20-000-801-A/400 | LATERAL WING-TO-FUSELAGE FAIRING - REMOVAL |
| AMM TASK 53-04-20-400-801-A/400 | LATERAL WING-TO-FUSELAGE FAIRING - INSTALLATION |
| AMM TASK 53-04-30-000-801-A/400 | - |
| AMM TASK 53-04-30-400-801-A/400 | - |
| AMM TASK 71-11-01-000-801-A/400 | ENGINE UPPER COWLING - REMOVAL |

(Continued)

| REFERENCE | DESIGNATION |
|---------------------------------|-------------------------------------|
| AMM TASK 71-11-01-400-801-A/400 | ENGINE UPPER COWLING - INSTALLATION |
| AMM TASK 71-12-01-000-802-A/400 | ENGINE LOWER COWLING - REMOVAL |
| AMM TASK 71-12-01-400-802-A/400 | ENGINE LOWER COWLING - INSTALLATION |
| BF Goodrich 32-49-02 | - |

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

Not Applicable

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

| QTY | FUNCTION | PLACE |
|-----|-------------|-------|
| 5 | Do the task | AR |

I. MLG Hard Landing Detection

SUBTASK 200-002-A

- (1) In the FDR data, record the maximum value of vertical CG acceleration in a range that starts 10 seconds before the first transition of the Air/Ground parameter from "Air" to "Ground". Use as a reference to select the 10 seconds the time of the first "ground" recorded for the Air/Ground parameter ([Figure 604](#)).

- (2) Get the aircraft mass at landing.

NOTE: • A satisfactory procedure to have an estimate of the aircraft mass at the landing can be used.

- When it is not possible to make an estimate of the aircraft mass at landing, use, in a conservative approach, the aircraft mass at the take-off.

- (3) With the two parameters (Maximum CG acceleration and aircraft mass), refer to [Figure 602](#) to know if a hard landing occurred.

- (4) If the vertical CG acceleration peak recorded by the FDR at the MLG touchdown is not higher than the vertical CG acceleration permitted for the aircraft mass, no other action is necessary and the aircraft can be put back into service.

- (5) If the vertical CG acceleration peak recorded by the FDR at the MLG touchdown is higher than the vertical CG acceleration permitted for the aircraft mass, do the MLG Phase-II inspection.
- (6) If you find no incorrect condition during the MLG Phase-II inspection, no other action is necessary and you can put the aircraft back into service. If you find an incorrect condition during the MLG Phase-II inspection, do the MLG Phase-III inspection and send Embraer these data:
 - (a) FDR data that contain the hard landing incident;
 - (b) Report of the incorrect conditions that you found during the preceding inspections.

NOTE: When you do a Phase-III inspection on an aircraft, send Embraer the flight data and a report of the damage that you found. You and Embraer together will then make the decision to put the aircraft back into service.

J. NLG Hard-Landing Detection

SUBTASK 200-003-A

- (1) Mark the initial and the final data samples to specify the range of pitch data for analysis:
 - (a) The range starts at the first sample for which the pitch angle is lower than 2.5 degrees, after the maximum vertical-CG acceleration recorded in the 10-second interval used for MLG hard-landing detection. Refer to [Figure 604](#).
 - (b) The range stops 2 seconds after the first negative pitch angle, after the transition of the "Air/Ground" parameter to "Ground". Refer to [Figure 604](#).
- (2) Get the pitch rates as shown in [Figure 605](#).
- (3) Compare the maximum pitch rate got with the threshold values of this table:

Table 601 - PITCH RATE THRESHOLD

| Aircraft Model | Pitch rate threshold (Degrees per second) |
|------------------------|---|
| EMB-145 (all versions) | - 5.0 |
| EMB-135ER/LR | - 6.0 |

- (4) If the maximum pitch rate that you got is not more than the permitted threshold, no other action is necessary. Then put the aircraft back into service.
- (5) If the maximum pitch rate that you got is more than the threshold, do the NLG Phase-II inspection.
- (6) If you find no incorrect condition during the NLG Phase-II inspection, no other action is necessary. Then put the aircraft back into service. If you find an incorrect condition during the NLG Phase-II inspection, do the NLG Phase-III inspection and send Embraer these data:
 - (a) FDR data that contain the hard landing incident;

- (b) Report of the incorrect conditions that you found during the preceding inspections.

NOTE: When you do a Phase-III inspection on an aircraft, send Embraer the flight data and a report of the damage that you found. You and Embraer together will then make the decision to put the aircraft back into service.

K. Preparation

SUBTASK 841-002-A

- (1) Make sure that the landing gear safety pins are installed to the main and nose landing gears ([AMM TASK 32-00-01-910-801-A/200](#)).
- (2) Make sure that aileron hydraulic systems I and II and rudder hydraulic systems I and II are off.
- (3) Make sure that the gust lock is disconnected.

L. MLG Phase-I Inspection

SUBTASK 212-002-A

- (1) Examine the tires for damage.
- (2) Open access panel 193AL (AMM MPP 06-41-01/100) (AMM TASK 53-04-30-000-801-A/400) and do an inspection in the region adjacent to the wing stub ([Figure 607](#), Sheet 1).
- (3) Examine the fuselage skin and stringers and look for:
 - Missing or pulled rivets;
 - Signs of deformation;
 - Cracks.
- (4) Open access panels 191EL and 191FR (AMM MPP 06-41-01/100) ([AMM TASK 53-04-01-000-801-A/400](#)), 511AL and 611AR ([AMM MPP 06-44-00/100](#)) and do an inspection in the region adjacent to the wing stub ([Figure 607](#), Sheet 2).
- (5) Examine the fuselage skin and stringers and look for:
 - Missing or pulled rivets;
 - Signs of deformation;
 - Cracks;
- (6) Do an inspection all along the wing-to-fuselage fairing contour and look for signs of deformation, dents, or damage to the painting.
- (7) Look for missing screws at the wing-to-fuselage attachment fairing.
- (8) Do an engine inspection as given in the Rolls-Royce, AE3007A Series Maintenance Manual, SUBTASK 05-50-00-210-005.

M. MLG Phase-II Inspection

SUBTASK 212-003-A

(1) MLG Inspection

- (a) If a BRAKE OVERHEAT message occurs or if one or more wheel fuse plugs were released, do a High Energy Stop inspection ([AMM TASK 05-50-16-200-801-A/600](#)).
- (b) Examine the main-landing-gear attachment fittings for distortion, flaking paint, cracks, and pulled or missing fasteners ([AMM TASK 32-10-00-200-801-A/600](#)).
- (c) Examine the main-landing-gear wheel for signs of damage (e.g., deformation, cracks, dents, etc.).
- (d) Examine the tires for damage.
- (e) Examine the main and auxiliary brace struts and support fitting for distortion and loose fasteners.
- (f) Examine the main-gear-bearing attachment bolts for signs of distortion and looseness.
- (g) Examine the shock absorber ([AMM TASK 32-10-02-200-801-A/600](#)) and the maneuvering and unlocking actuators for signs of fluid leakage. Refer to the latest revision of Component Maintenance Manual EMBRAER T.P. 145/1188 and T.P. 145/1189 to repair the MLG.
- (h) Examine the brake assembly and hoses for signs of fluid leakage.
- (i) If you find signs of contamination caused by mud, salt water, etc., disassemble and clean the related components.
- (j) Examine the main-landing-gear wheelwell for signs of fuel leaks or other fluid leaks.

(2) Fuselage Inspection

- (a) Examine the external surface of the fuselage for fuel or other fluid leaks.
- (b) Externally examine the upper and lower fuselage skin panels between frames 36 and 69 and the wing stub for buckling, distortion, flaking paint, cracks, wrinkles, and pulled or missing fasteners (AMM MPP 06-21-00/100).

For the inspection of the lower skin panels, it is necessary to remove the wing-to-fuselage fairings ([AMM TASK 53-04-01-000-801-A/400](#), [AMM TASK 53-04-10-000-801-A/400](#), [AMM TASK 53-04-20-000-801-A/400](#), and [AMM TASK 53-04-30-000-801-A/400](#)).

NOTE: If you find wrinkles in the skin panels, do a visual internal inspection on the fuselage.

- (c) Examine the wing-to-fuselage junction for signs of distortion, missing or loose fasteners, or cracks.

- (d) Examine the main and nose landing-gear doors for signs of distortion, cracks, or loose fasteners.
- (e) Examine the main door for signs of distortion and pulled or missing fasteners. To do this inspection, open and close the doors and make sure that they operate correctly.
- (f) Examine the baggage door and service the door for signs of distortion and pulled or missing fasteners. To do this inspection, open and close the doors and make sure that they operate correctly.
- (g) Examine the emergency hatch structure and its lower frame for distortion, cracks, and pulled, loose or missing fasteners. To do this inspection, remove the passenger-cabin escape hatches ([AMM TASK 52-21-00-000-801-A/400](#)).
- (h) Examine the baggage compartment lining ([AMM TASK 25-51-01-200-801-A/600](#)).

WARNING: BEFORE YOU DO THE TASK, OBEY THE SAFETY PRECAUTIONS GIVEN IN [AMM MPP 49-00-00/200](#) OR [AMM MPP 49-02-00/200](#), AS APPLICABLE, TO PREVENT INJURY TO PERSONS AND DAMAGE TO THE MATERIAL.

- (i) Examine the lower fuselage structure between frames 64 to 80 for signs that the runway was touched. If there are signs of damage, examine these areas (AMM MPP 06-21-00/100):
 - 1. The tail cone.
 - 2. The APU fairing.
 - 3. The APU escape duct.
- (3) Nacelle/Pylon Inspection
 - (a) Examine the upper and lower engine pylon skin panels for signs of buckling, distortion, flaking paint, wrinkles, and pulled or missing fasteners.
 - (b) Examine the engine mounts (the bolts included), yoke-to-pylon spar I/II/III/IV attachment, and spar I/II/III/IV - to-bulkhead attachments for signs of cracks, distortions, misalignments, and loose fasteners ([Figure 601](#)).
 - 1. Remove the engine upper cowling ([AMM TASK 71-11-01-000-801-A/400](#)) and engine lower cowling ([AMM TASK 71-12-01-000-802-A/400](#)) for the inspection of the upper mounts.
 - 2. Remove the baggage-compartment lining panels ([AMM TASK 25-51-01-000-801-A/400](#)) and thermoacoustic insulation blankets (AMM TASK 25-81-01-000-801-A/400 or AMM TASK 25-81-01-000-802-A/400) as applicable.
- (4) Wing Inspection
 - (a) Visually examine wing spars II and III. Start from the main-landing-gear bay. Remove the access panels and, with flap I down, also examine the lower skin adjacent to them for distortion, buckling, cracks, and loose or missing fasteners.

NOTE: It is not necessary to defuel the aircraft in this phase.

- (b) Examine the upper and lower wing skin panels for signs of fastener hole elongation, skin cracks, or loose fasteners.
- (c) Examine the external surface of the wing for leakage of fuel or other fluids.
- (5) Flight Control Inspection
 - (a) Examine all flight controls to make sure that the movements are free.
- (6) Engine Inspection:
 - (a) Do the engine inspection. Refer to Rolls-Royce Maintenance Manual CSP 34022 (TASK 05-50-00-200-805).

N. MLG Phase-III Inspection

SUBTASK 212-004-A

- (1) MLG Inspection
 - (a) Examine all bolts and pin connections in the main landing gear for signs of distortions. Also examine spars II and III for permanent buckles in the web.
 - (b) Examine the area above the main-landing-gear support attachment for buckled skin or loose rivets.
 - (c) Examine the bolts that attach the main-gear trunnion bearing for breaking and stretching.
 - (d) If it is necessary to replace the wheel because of blown tires or flat tires. After a hard landing, examine the wheel structure for cracks. An accurate inspection is necessary on the wheel that was removed (BF Goodrich 32-49-02).
 - (e) Examine the brakes for signs of damage ([AMM TASK 32-49-03-200-801-A/600](#)).
- (2) Fuselage Inspection
 - (a) Examine the fuselage external surfaces for loose or sheared rivets, structural damage, and signs of leakage of fuel and other fluids.
 - (b) Carefully examine the fuselage in the area below the floor beams in the wing center section.
 - (c) Examine the wing-to-fuselage joints and the wheelwell for cracks and other types of damage. Look for flaked paint and pulled-out or missing fasteners.
 - (d) Examine the upper fuselage structure above the wing stub for buckled structure, cracks, and flaked paint. Also look for pulled-out or missing fasteners.
- (3) Nacelle/Pylon Inspection
 - (a) Examine the engine struts and nacelle for loose or sheared rivets, structural damage, and signs of leakage of fuel and other fluids.
- (4) Wing Inspection

- (a) Examine the wing external surfaces for loose or sheared rivets, structural damage, and signs of leakage of fuel and other fluids.
 - (b) Defuel the tank and open the access panels to examine spar II for signs of cracks, flaked paint, and pulled-out or missing fasteners.
- (5) Flight Control Inspection
- (a) Inspect all flight controls for the specified cable tension (AMM TASK 27-11-01-700-801-A/500, AMM TASK 27-11-01-700-802-A/500, AMM TASK 27-21-01-700-801-A/500, AMM TASK 27-21-01-700-802-A/500, [AMM TASK 27-31-01-700-801-A/500](#), [AMM TASK 27-31-01-700-802-A/500](#)).
 - (b) Do the functional check for backlash ([AMM TASK 27-11-00-700-801-A/500](#), AMM TASK 27-22-00-700-801-A/500, [AMM TASK 27-31-00-700-801-A/500](#), and [AMM TASK 27-40-00-700-801-A/500](#)).
- (6) Free-fall Operation Inspection
- (a) Examine the landing gear for free-fall system correct operation ([AMM TASK 32-34-00-700-801-A/500](#)).
- NOTE:
- An irregular, not-smooth operation of the landing gear during the free-fall system operation can be a sign of deformation of the landing gear. It must then be examined for correct alignment.
 - If a structural damage occurs, refer to the SRM.
- (7) Do the aircraft alignment (AMM TASK 51-50-01-820-801-A/200).

O. NLG Phase-I Inspection ([Figure 608](#))

SUBTASK 212-005-A

- (1) Examine the tires for damage.
- (2) Do an inspection on the fuselage skin in the NLG region.
- (3) Open access panels 113DL and 114CR and do an inspection on the internal structure.
- (4) Do an internal inspection on the structure of the nose landing-gear bay.
- (5) In all these regions, look for:
 - Missing or pulled rivets;
 - Signs of deformation;
 - Cracks;
 - Dents;
 - Damaged paint.

P. NLG Phase-II Inspection

SUBTASK 212-006-A

(1) Nose Landing-Gear Inspection

- (a) Examine the nose-landing-gear attachment fittings for distortion, flaking paint, cracks, and pulled or missing fasteners.
- (b) Examine the nose landing-gear wheel for signs of damage (e.g., deformation, cracks, dents, etc.).
- (c) Examine the tires for damage.
- (d) Examine the drag-and-locking-strut link assemblies and drag-and-locking-strut support fitting for distortion and loose fasteners.
- (e) Examine the nose-gear-strut-bearing attachment bolts for signs of distortion or loose condition.
- (f) Examine the shock absorber maneuvering and unlocking actuators for signs of fluid leakage.
- (g) If signs of contamination caused by mud, salt water, etc. are found, disassemble and clean the related components.
- (h) Examine the nose landing-gear wheelwell for signs of leakage of fluids.

Q. NLG Phase-III Inspection

SUBTASK 212-007-A

- (1) Examine the nose landing-gear wheelwell for buckled structure. Also examine the fuselage skin attachments above the landing gear beam for distortion. Look for cracks, flaked paint, and pulled-out or missing fasteners.

R. Follow-on

SUBTASK 842-002-A

- (1) NOTE: Install the panels or other items that you possibly removed to do the inspection.

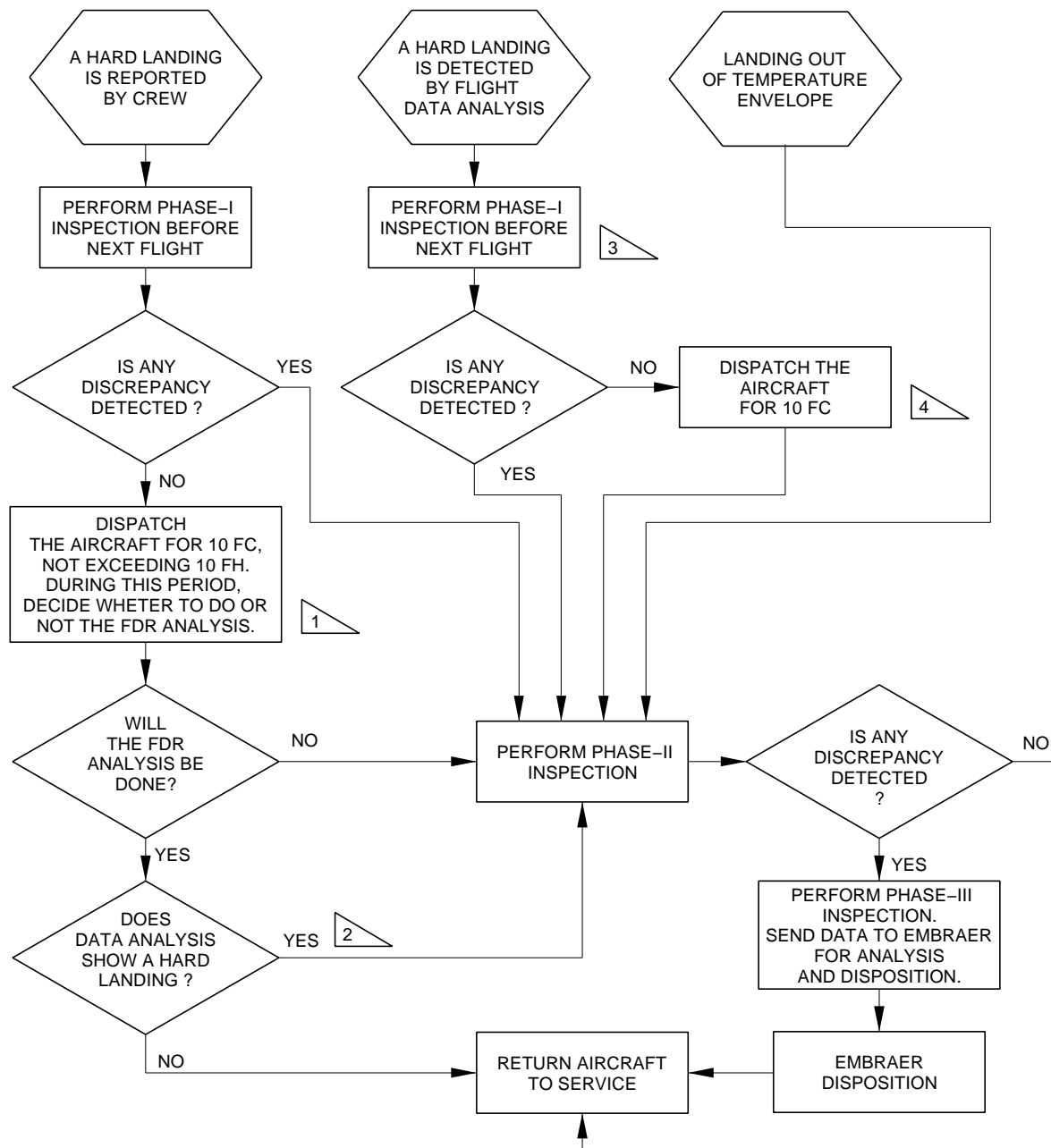
Install the wing-to-fuselage fairings ([AMM TASK 53-04-01-400-801-A/400](#), [AMM TASK 53-04-10-400-801-A/400](#), [AMM TASK 53-04-20-400-801-A/400](#), and [AMM TASK 53-04-30-400-801-A/400](#)).

- (2) Install the passenger-cabin escape hatches ([AMM TASK 52-21-00-400-801-A/400](#)).
- (3) Install the engine upper cowling ([AMM TASK 71-11-01-400-801-A/400](#)) and the engine lower cowling ([AMM TASK 71-12-01-400-802-A/400](#)).
- (4) Install the baggage-compartment lining panels ([AMM TASK 25-51-01-400-801-A/400](#)) and thermoacoustic insulation blankets ([AMM TASK 25-81-01-400-801-A/400](#) or [AMM TASK 25-81-01-400-802-A/400](#)) as applicable.

EFFECTIVITY: ALL

Flowchart of Hard-Landing Detection and Inspection Procedures

Figure 601



1 THE FDR DATA DOWNLOAD SHALL BE PERFORMED IN A MAXIMUM OF 20FH. IF NOT, THE DATA CAN BE MISSED DUE TO THE RECORDING TIME OF THE FDR.

2 PHASE-II INSPECTION TO BE DONE WITHIN THE REMAINING 10 FC FLY-BY PERIOD.

3 FROM THE MOMENT OPERATORS IS INFORMED OF THE EVENT.

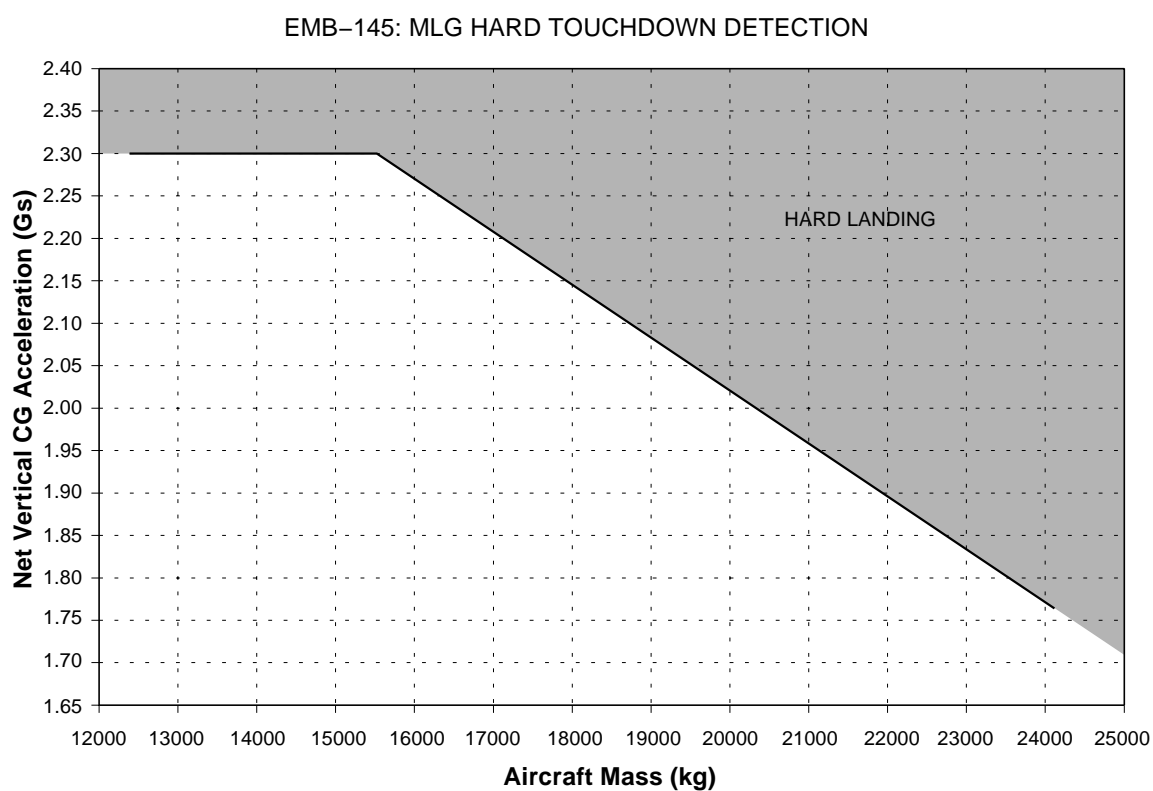
4 FROM THE DATE PHASE-I INSPECTION IS PERFORMED AND NO DAMAGE IS FOUND.

EMB145AMM050668G.DGN

EFFECTIVITY: ALL

Net Vertical CG Acceleration Versus Aircraft Mass at Landing

Figure 602



EM145AMM050648A.DGN

EFFECTIVITY: ALL

Vertical CG Acceleration for Hard-Landing Touchdown Detection

Figure 603

TABLE 4-1: VERTICAL CG ACCELERATION FOR HARD MLG TOUCHDOWN DETECTION

| Aircraft Mass (kg) | Nz (Gs) | Aircraft Mass (kg) | Nz (Gs) | Aircraft Mass (kg) | Nz (Gs) |
|-------------------------------|--------------------|-------------------------------|--------------------|-------------------------------|--------------------|
| 24100 | 1.7708 | 21100 | 1.9554 | 18100 | 2.1400 |
| 24000 | 1.7769 | 21000 | 1.9615 | 18000 | 2.1462 |
| 23900 | 1.7831 | 20900 | 1.9677 | 17900 | 2.1523 |
| 23800 | 1.7892 | 20800 | 1.9738 | 17800 | 2.1585 |
| 23700 | 1.7954 | 20700 | 1.9800 | 17700 | 2.1646 |
| 23600 | 1.8015 | 20600 | 1.9862 | 17600 | 2.1708 |
| 23500 | 1.8077 | 20500 | 1.9923 | 17500 | 2.1769 |
| 23400 | 1.8138 | 20400 | 1.9985 | 17400 | 2.1831 |
| 23300 | 1.8200 | 20300 | 2.0046 | 17300 | 2.1892 |
| 23200 | 1.8262 | 20200 | 2.0108 | 17200 | 2.1954 |
| 23100 | 1.8323 | 20100 | 2.0169 | 17100 | 2.2015 |
| 23000 | 1.8385 | 20000 | 2.0231 | 17000 | 2.2077 |
| 22900 | 1.8446 | 19900 | 2.0292 | 16900 | 2.2138 |
| 22800 | 1.8508 | 19800 | 2.0354 | 16800 | 2.2200 |
| 22700 | 1.8569 | 19700 | 2.0415 | 16700 | 2.2262 |
| 22600 | 1.8631 | 19600 | 2.0477 | 16600 | 2.2323 |
| 22500 | 1.8692 | 19500 | 2.0538 | 16500 | 2.2385 |
| 22400 | 1.8754 | 19400 | 2.0600 | 16400 | 2.2446 |
| 22300 | 1.8815 | 19300 | 2.0662 | 16300 | 2.2508 |
| 22200 | 1.8877 | 19200 | 2.0723 | 16200 | 2.2569 |
| 22100 | 1.8938 | 19100 | 2.0785 | 16100 | 2.2631 |
| 22000 | 1.9000 | 19000 | 2.0846 | 16000 | 2.2692 |
| 21900 | 1.9062 | 18900 | 2.0908 | 15900 | 2.2754 |
| 21800 | 1.9123 | 18800 | 2.0969 | 15800 | 2.2815 |
| 21700 | 1.9185 | 18700 | 2.1031 | 15700 | 2.2877 |
| 21600 | 1.9246 | 18600 | 2.1092 | 15600 | 2.2938 |
| 21500 | 1.9308 | 18500 | 2.1154 | 15500 | 2.3000 |
| 21400 | 1.9369 | 18400 | 2.1215 | 12400 | 2.3000 |
| 21300 | 1.9431 | 18300 | 2.1277 | – | – |
| 21200 | 1.9492 | 18200 | 2.1338 | – | – |

145AMM050649.MCE

EFFECTIVITY: ALL
Downloaded FDR Data
Figure 604

| Time | Air/Ground indication | Pitch angle | Vertical CG acceleration | Flight number |
|--------|-----------------------|-------------|--------------------------|---------------|
| Sample | GMT | A/G | Pitch | NrAcc |
| Date | FltNbr | | | |
| 188776 | | | 1 . 0076 | |
| 188776 | Air | 4 . 84 | 1 . 0076 | |
| 188776 | | | 1 . 0260 | |
| 188776 | Air | 5 . 19 | 1 . 0580 | |
| 188776 | | | 1 . 0672 | |
| 188777 | 13 : 00 : 42 | Air | 5 . 54 | 1 . 0901 |
| 188777 | | | 1 . 0901 | |
| 188777 | Air | 5 . 54 | 1 . 0992 | |
| 188777 | | | 1 . 0992 | |
| 188777 | Air | 5 . 72 | 1 . 0901 | |
| 188777 | | | 1 . 0580 | |
| 188777 | Air | 5 . 72 | 1 . 0672 | |
| 188777 | | | 1 . 0580 | |
| 188778 | 13 : 00 : 43 | Air | 5 . 72 | 1 . 0580 |
| 188778 | | | 1 . 0580 | |
| 188778 | Air | 5 . 54 | 1 . 0992 | |
| 188778 | | | 1 . 2504 | |
| 188778 | Air | 5 . 28 | 1 . 5435 | |
| 188778 | | | 1 . 5435 | |
| 188778 | Air | 4 . 22 | 1 . 4107 | |
| 188778 | | | 0 . 9252 | |
| 188779 | 13 : 00 : 44 | Air | 2 . 81 | 0 . 8656 |
| 188779 | | | 0 . 8656 | |
| 188779 | Air | 1 . 23 | 0 . 9160 | |
| 188779 | | | 1 . 0489 | |
| 188779 | Gnd | 0 . 26 | 1 . 0489 | |
| 188779 | | | 0 . 9252 | |
| 188779 | Air | - 0 . 79 | 0 . 9389 | |
| 188779 | | | 1 . 1496 | |
| 188780 | 13 : 00 : 45 | Air | 1 . 2183 | 230403 |
| 188780 | | | 1 . 2183 | |
| 188780 | Gnd | - 1 . 06 | 1 . 0992 | |
| 188780 | | | 0 . 9389 | |
| 188780 | Gnd | - 0 . 79 | 0 . 9389 | |
| 188780 | | | 0 . 9893 | |
| 188780 | Gnd | - 0 . 70 | 1 . 0076 | |
| 188780 | | | 0 . 9893 | |
| 188781 | 13 : 00 : 46 | Gnd | - 0 . 79 | 0 . 9893 |
| 188781 | | | 1 . 0168 | |
| 188781 | Gnd | - 0 . 88 | 0 . 9481 | |
| 188781 | | | 0 . 9893 | |
| 188781 | Gnd | - 0 . 79 | 1 . 0992 | |
| 188781 | | | 1 . 0992 | |
| 188781 | Gnd | - 0 . 70 | 1 . 0901 | |
| 188781 | | | 0 . 9893 | |
| 188782 | 13 : 00 : 47 | Gnd | - 0 . 70 | 0 . 9893 |
| 188782 | | | 1 . 0260 | |
| 188782 | Gnd | - 0 . 70 | 0 . 9893 | |

EM145AMM050650A.DGN

EFFECTIVITY: ALL Pitch Rate Calculation Data Figure 605

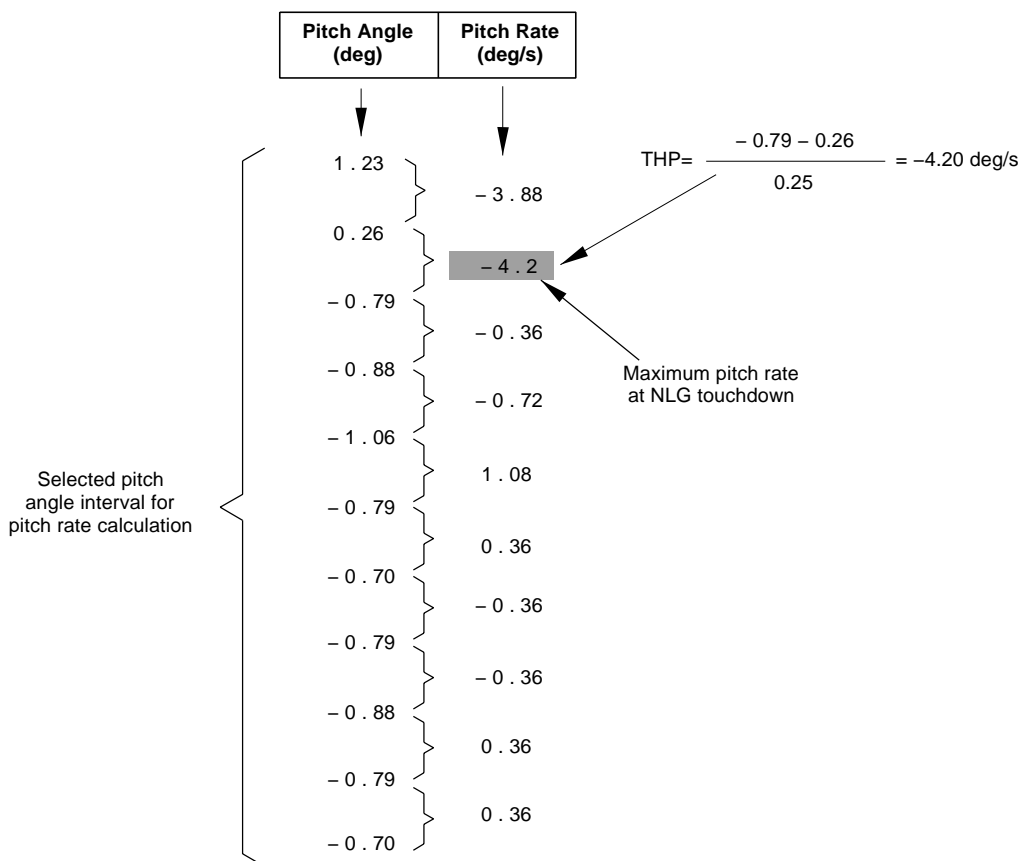
Where:

$$THP_i = \frac{TH_i - TH_{i-1}}{0.25}$$

THP_i = pitch rate at i time instant;

TH_i = pitch angle at i time instant;

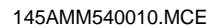
TH_{i-1} = pitch angle at i-1 time instant.



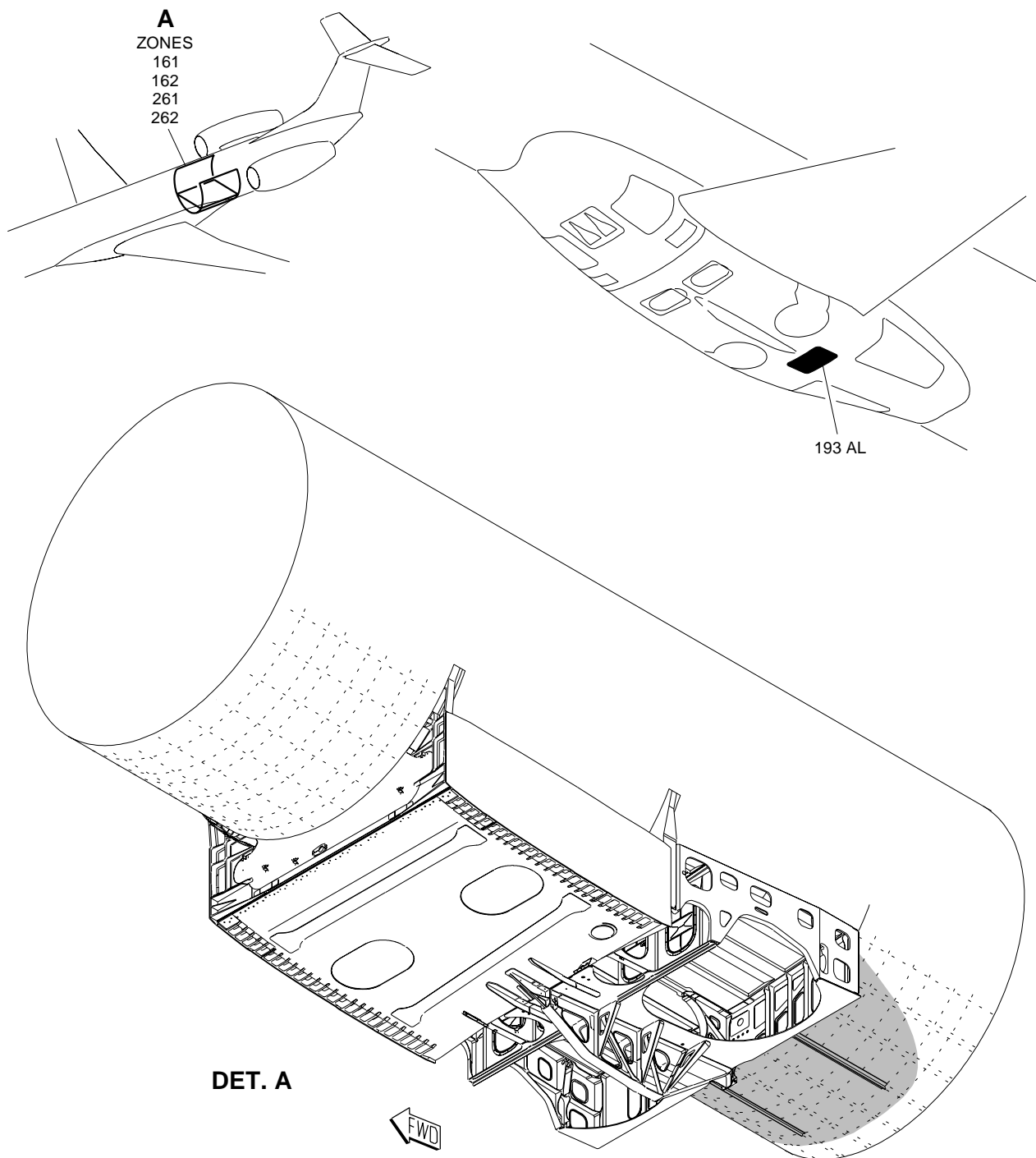
145AMM050651.MCE



Figure 606

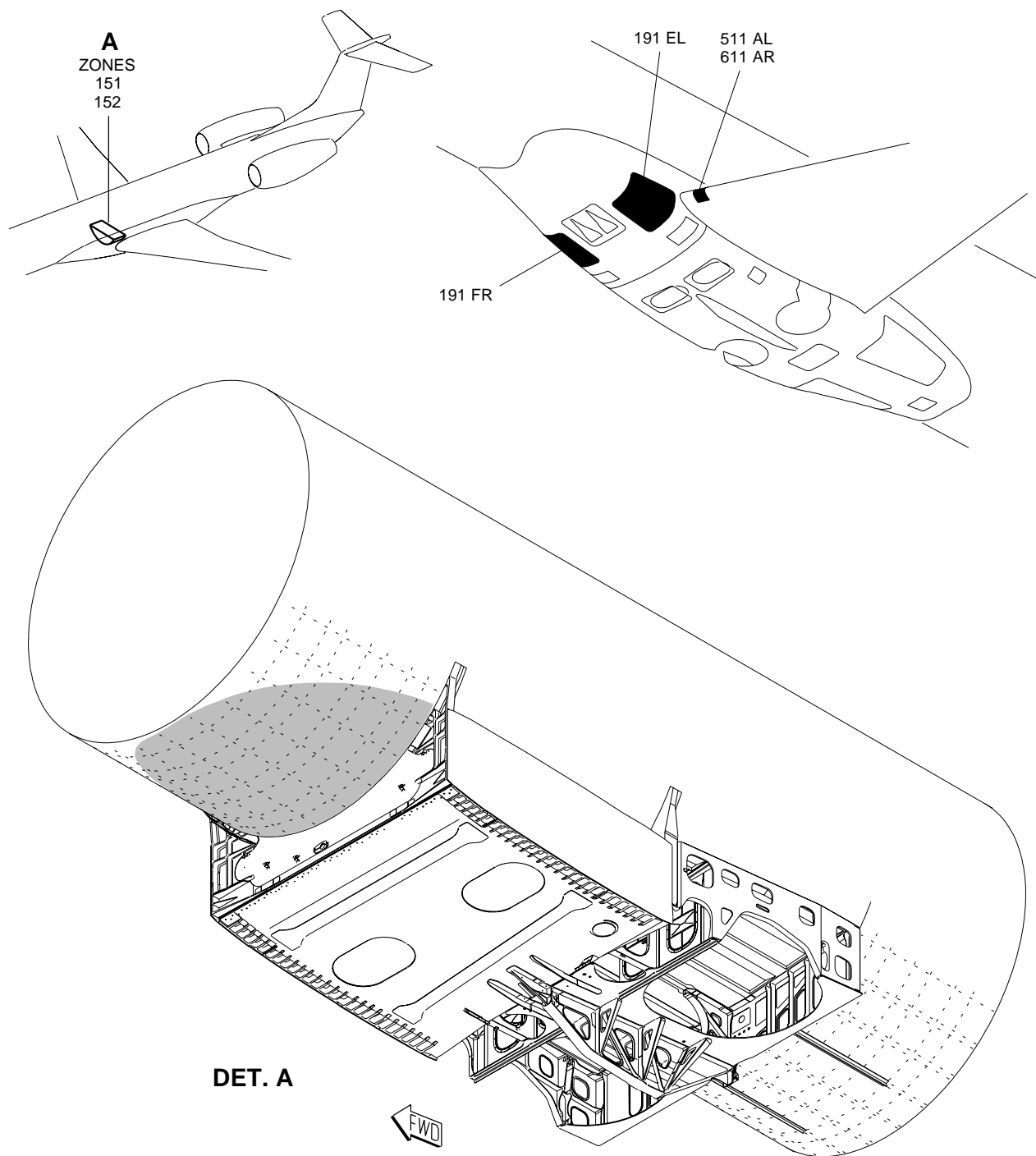


EFFECTIVITY: ALL
MLG Phase-I Inspection
Figure 607 - Sheet 1



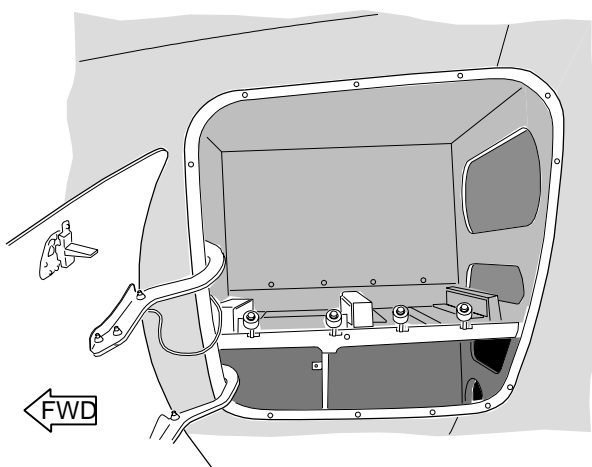
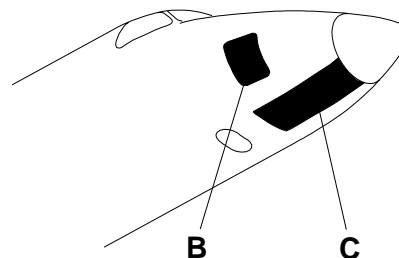
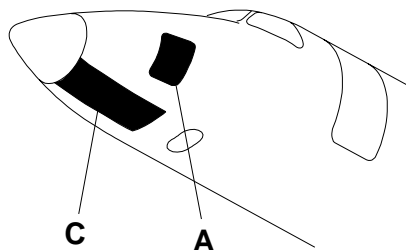
EM145AMM050953A.DGN

EFFECTIVITY: ALL
MLG Phase-I Inspection
Figure 607 - Sheet 2

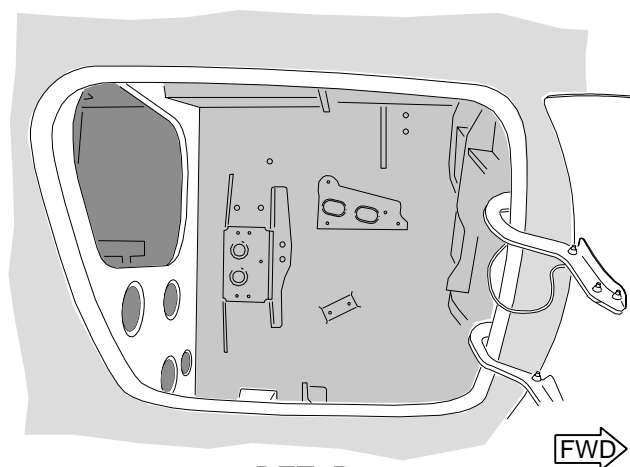


EM145AMM050670C.DGN

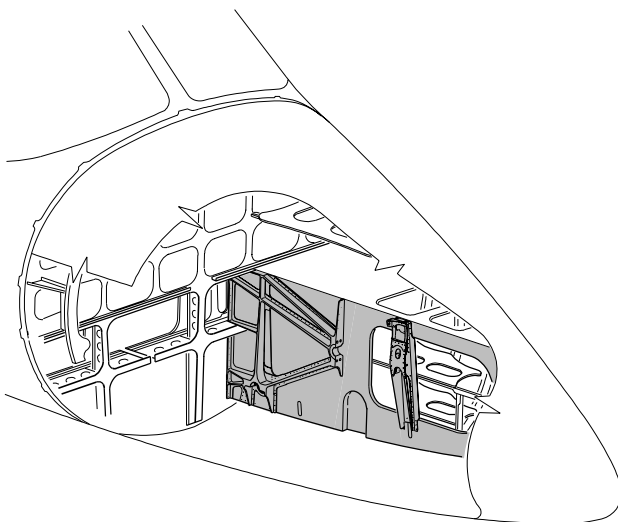
EFFECTIVITY: ALL
NLG Phase -I Inspection
Figure 608



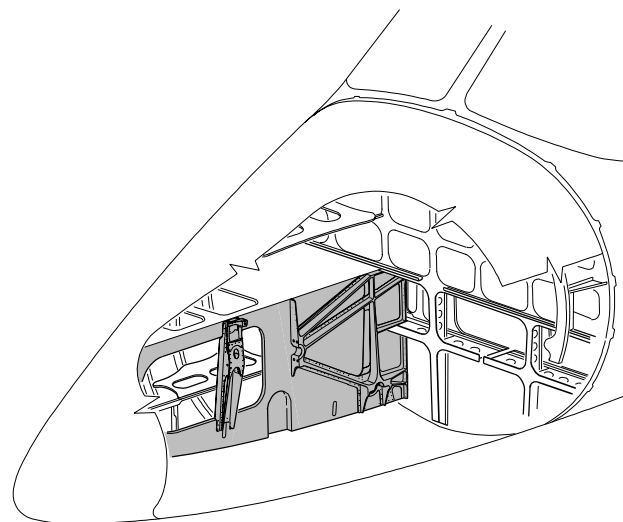
DET. A



DET. B



DET. C



EM145AMM050671A.DGN

