

**May 31 – June 3, 2008**

**POWERPLANTS GROUP FIELD NOTES  
NACELLE & ENGINE  
TEGUCIGALPA, HONDURAS**

**A. ACCIDENT**

Location: Tegucigalpa, Honduras  
Date: May 30, 2008  
Aircraft: Airbus 320-233, Registration Number EI-TAF  
Powerplants Two International Aero Engines V2527-A5

**B. POWERPLANTS GROUP**

Group Chairman: Marcello Orellana  
Civil Aviation Authority of El Salvador  
El Salvador  
Member: Harald Reichel  
National Transportation Safety Board  
Washington, USA  
Member: Bruno Previtali  
Airbus  
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Member: Douglas Zabawa – Flight Safety  
International Aero Engines  
East Hartford, Connecticut

## C. INVESTIGATION

### General

The investigative parties from the USA arrived on May 31, 2008. The team reviewed the wreckage during the late afternoon of this day.

It appeared that the wreckage with respect to the powerplants was not significantly disturbed since the time of the accident.

On June 01, 2008, the team walked the length of the runway and observed the following:

- There was no evidence of nacelle or engine debris on the paved runway surface.
- There was possible evidence of contact of the No. 1 engine nacelle against the earthen surface leading to the edge of the embankment off the end of the runway. The ground scar was approximately 1 foot wide and 4 feet in length and was most prevalent at the edge of the embankment.
- A portion of a drain mast assembly that is located at Bottom Dead Center (BDC) on the nacelle was found in the earthen area between the end of the runway and the embankment.

The nacelles probably contacted the two airfield perimeter fences. Steel poles supported each of the chain link fences. The fences were topped with barbed wire and looped razor wire. Four of the supporting fence poles (2 on either side) on the ends of the hole in the fencing were bent over and lying on the ground. The posts just inboard of these locations were sheared off approximately 2 feet above the ground.

### Right Hand Nacelle and Engine Examination June 01, 2008

A review of the right hand engine's nacelle ([Figure 1](#)) revealed no indications of an external (under cowl) fire. There were no indications of an uncontained engine event.

The powerplant had separated at the upper pylon connection plane with the wing during the accident. Portions of the forward clevises on the underside of the wing were present but fractured. The spherical aft main mount bearing was still intact and attached to the underside of the wing.

The fan cowl doors were separated from the nacelle but were in close proximity to the engine.

The pylon strut leading edge fairing was buckled and collapsed. There was evidence of contact with wire from a power line ([Figure 2](#)).

There was evidence that the steel phone pole guide wires and electrical power and phone cables that had contacted the pylon strut leading edge also wrapped themselves along the entire nacelle surface. The translating cowl fairings were buckled inward at the sides as observed looking on the inside (fan duct) surfaces. There were scrape marks across several locations along the side of the external cowl surface.

All of the outer fan bypass duct hardware was displaced in a lozenge fashion towards the front and fractured (Figure 3). The engine fan exit case was fractured and buckled inward and forward along the upper quadrant.

The inhibition pin for the thrust reverser was found in a position consistent with an operational (not locked out) thrust reverser.

All four thrust reverser actuators were identified (Figure 4). The eye end assembly that connected to the translating cowl structure was not present on any of the four actuators. All four actuators were in the retracted position, consistent with a stowed reverser. The upper right hand side non-locking actuator was disconnected from its hydraulic lines and flex shaft. Upon turning the worm gear with a wrench, a piston translated out of the sleeve end.

The rear stage turbine blades were all intact, in place and straight (Figure 5).

The thrust reverser translating cowl was displaced aftward giving the impression that it was deployed.

The engine impacted an earthen embankment that was sloped approximately 45 degrees causing crushing damage to the front and lower front of the nacelle.

#### Right Hand Nacelle and Engine Examination June 02, 2008

The right hand engine was moved from its location in order to allow the inspection of the fan blades.

The lower portion of the inlet cowl and the fan case were pushed rearward, consistent with the slope of the impacted embankment and orientation of the engine at impact. The bottom half of the inlet cowl was crushed rearward. There was a horizontal black mark on the upper lip of the inlet cowl that was consistent with contact against the black suspended overhead wires along the road.

After the removal of the engine from the earthen embankment, the fan blades were observed (Figure 6). The crushed inlet cowl structure and ingested dirt precluded visual inspection of the rest.

From the 6 o'clock to the 12 o'clock position<sup>1</sup> all of the blades were fractured at the inner flowpath plane with the exception of 2 blades, which were severely bent in the direction opposite of rotation. From the 12 o'clock to the 3 o'clock position the airfoil bending was confined to the outer ½ span in the direction opposite of rotation. From the 3 o'clock to the 6 o'clock position the fan blade airfoils outer half spans were deformed in the direction of rotation.

Within the dirt forward of the moved engine at approximately the 6 o'clock position, were 5 fractured fan blade airfoils that exhibited deformation in the direction opposite of rotation (Figure 7). They were also nested together with dirt and remnants of the inlet cowl sandwiched between each blade pair.

The 12 o'clock to 6 o'clock segment leading edge airfoils exhibited sharp edged tearing and leading edge breakout damage consistent with hard object impact.

#### Left Hand Nacelle and Engine Examination June 02, 2008

A review of the left hand nacelle revealed no indications of an external (under cowl) fire. There were no indications of an uncontained engine event.

The aircraft was shored and secured during the previous day allowing safe access to the left hand engine. The engine and pylon were still in place on the wing of the aircraft. The nacelle was resting on the ground, partially supporting the aircraft. The nacelle and pylon had rolled in a counterclockwise direction and the nacelle was displaced laterally inward because they were partially arresting the sliding, towards the aircraft.

The nacelle was intact (Figure 8) with the exception of the lower half of the right hand fan cowl door. This fractured cowl fragment contained the latches and attached fragments of the left hand fan cowl door. All the latches were intact and still secured.

The inlet cowl forward lip had scratch marks (Figure 9) between the 3 and 10 o'clock location consistent with contact against the fencing at the top of the embankment at the end of the runway. The inlet cowl was crushed at the bottom with the crushing damage occurring in an upward and inward direction.

There was a heavy scratch along the left side of the nacelle that featured a blue streak from paint that had transferred from contact with a blue colored pickup truck. The scratch was continuous along all joints of the cowling.

The inhibition pin for the thrust reverser was found in a position consistent with an operational (not locked out) thrust reverser.

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<sup>1</sup> All orientation and directional references such as top and bottom, front and rear, right and left, and clockwise and counter clockwise are made aft looking forward unless noted otherwise. ALF indicates 'aft looking forward'. FLA indicates 'forward looking aft'.

The engine fan blades were intact, in place and straight (Figure 10). All the leading edges exhibited localized deformation; sharp edged tearing and breakout damage consistent with hard object impact (Figure 11).

The spinner (Figure 12) had multiple score marks along the forward half of the cone that had spiral characteristics.

There was a piece of razor wire at the 9 o'clock position that rested against the fan exit guide vane leading edges. The upper end of the wire was wrapped around the leading edge of one of the fan exit guide vanes.

There was a fresh rub on the fan rub strip featuring heavy gouging and rotational scoring. These marks were predominantly on the forward 2-½ inches of the fan rub strip. The 'Blue-Goo' portion of the rub strip was fully penetrated at the 5:30 to 6:30 location of the fan strip with the cell structure of the underlying honeycomb visible (Figure 13).

There was a uniform coating of dirt over 360 degrees on the fan rub strip and the acoustic panels between the fan exit guide vanes (FEGV) and the fan blades.

All the FEGVs and Low Pressure Compressor (LPC) Inlet Guide Vanes (IGVs) appeared in-place, intact, and straight.

The cowl doors were opened with force using wooden beams and rope. The engine serial number observed on the dataplate was V12257.

The Electronic Engine Control (EEC) was removed and transferred to a secure location. The part number of the EEC was 824972-4-014 and the serial number N 2540-1709. The EPR mod was 07 and the programming plug part number was 2A3106.

The thrust reverser translating cowl was in the stowed position.

The master chip detector was removed, inspected and found to be clean (Figure 14).

### Engine History

The following data was obtained from the TACA supplied maintenance records:

IAE V2527E-A5 - S/N V12257 (Left hand)	
Time Since New	4689.95 hours
Cycles Since New	2195 cycles
Time Since Last Major Shop Visit	4689.95 hours

Cycles Since Last Major Shop Visit	2195 cycles
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IAE V2527E-A5 - S/N V10828 (Right hand)	
Time Since New	21,574.50 hours
Cycles Since New	9949 cycles
Time Since Last Major Shop Visit	16,325.31 hours
Cycles Since Last Major Shop Visit	7577 cycles

A representative from TACA reported that the thrust reversers were not on the MEL list, indicating that they were not locked out.

Figure 1 – Right Hand Powerplant



Photo No: P6010080.tif

Figure 2 – Right hand pylon leading edge



Photo No: IMG\_4378.tif



Figure 3 – Right hand powerplant



Photo No: P6010082.tif

Figure 4 – Right hand powerplant thrust reverser left side lower locking actuator



Photo No: IMG\_4463.tif



Figure 5 – Right hand engine rear stage turbine blades



Photo No: IMG\_4358.tif

Figure 6 – Right hand engine inlet and fan



Photo No: IMG\_4481.tif

Figure 7 – Right hand engine fractured fan blades



Photo No: IMG\_4477.tif

Figure 8 – Left hand powerplant



Photo No: IMG\_4346.tif



Figure 9 – Left hand inlet lip scratches



Photo No: IMG\_4432.tif

Figure 10 – Left hand engine fan



Photo No: IMG\_4412.tif

Figure 11 – Left hand engine fan blades details



Photo No: IMG\_4415.tif

Figure 12 – Left hand engine spinner



Photo No: IMG\_4436.tif

Figure 13 – Left hand engine fan rub strip at 6 o'clock position



Photo No: IMG\_4421.tif

Figure 14 – Left hand engine main chip detector



Photo No: IMG\_4419.tif