NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, D.C. 20594

Airworthiness Group Chairman's Factual Report of Investigation

March 2, 2015

A. ACCIDENT CEN13FA196

Location:	South Bend, Indiana
Date:	March 17, 2013
Time:	1623 Eastern Daylight Time
Aircraft:	Hawker Beechcraft Corporation Model 390 Premier 1A, N26DK

B. GROUP

Accident site documentation, March 19 – 22, 2013:

Chairman:	Tom Jacky National Transportation Safety Board Washington, D.C.
Member:	Bob Hendrickson Federal Aviation Administration Washington, D.C.
Member:	Kris Wetherel Hawker Beechcraft Corporation Wichita, Kansas
Member:	J. Chris Greene Williams International Walled Lake, Michigan

Re-Examination of the Wreckage, South Bend Indiana, May 22, 2013

Chairman:	Tom Jacky National Transportation Safety Board Washington, D.C.
Member:	Brian Weber Beechcraft Corporation Wichita, Kansas

Examination of Spoiler Control Unit at East Aurora, New York, June 10, 2013:

Witness: George Haralampopoulos
National Transportation Safety Board
Washington, D.C.

Member: Brian Weber
Beechcraft Corporation
Wichita, Kansas

Examination of EGPWS Unit at Redmond, Washington, July 2, 2013:

Witness: Joshua Cawthra
National Transportation Safety Board
Federal Way, Washington

Examination of Starter-Generators at Wichita, Kansas, September 9, 2013:

Chairman: Tom Jacky
National Transportation Safety Board
Washington, D.C.

Member: Brian Weber
Beechcraft Corporation
Wichita, Kansas

Examination of Aileron Components at Wichita, Kansas, September 10, 2013:

Chairman: Tom Jacky
National Transportation Safety Board
Washington, D.C.

Member: Brian Weber
Beechcraft Corporation
Wichita, Kansas

Examination of Throttle Quadrant Assembly at Wichita, KS, September 11, 2013:

Chairman: Tom Jacky
National Transportation Safety Board
Washington, D.C.

Member: Brian Weber
Beechcraft Corporation
Wichita, Kansas

Wreckage Re-Examination at Wright City, Missouri, November 14, 2013:

Chairman: Tom Jacky
National Transportation Safety Board
Washington, D.C.

Member: Brian Weber
Beechcraft Corporation
Wichita, Kansas

Generator Control Unit Examination at Wichita, Kansas, March 18, 2014:

Chairman: Tom Jacky
National Transportation Safety Board
Washington, D.C.

Member: Brian Weber
Beechcraft Corporation
Wichita, Kansas

Member: John Wills
Ametek Advanced Industries
Wichita, Kansas

Main Battery Examination at West Covina, California, March 24-26, 2014:

Witness: Pocholo Cruz
National Transportation Safety Board
Washington, D.C.

Member: Brian Weber
Beechcraft Corporation
Wichita, Kansas

Maintenance Data Computer, Flight Management Computer, and Air Data Computer Examinations at Cedar Rapids, Iowa, April 7-8, 2014:

Witness: George Haralampopoulos
National Transportation Safety Board
Washington, D.C.

Member: Brian Weber
Beechcraft Corporation
Wichita, Kansas

C. SUMMARY

On March 17, 2013, at 1623 eastern daylight time, a Hawker Beechcraft model 390 (Premier IA), N26DK, serial number RB-226, collided with three residential structures and terrain following an aborted landing attempt on runway 9R located at the South Bend Regional Airport (KSBN), South Bend, Indiana. The private pilot and pilot-rated-passenger occupying the cockpit seats were fatally injured. An additional two passengers and one individual on the ground sustained serious injuries. The airplane was registered to 7700 Enterprises of Montana LLC and operated by Digicut Systems of Tulsa, Oklahoma, under the provisions of 14 Code of Federal Regulations Part 91 while on an instrument flight plan. Day visual meteorological conditions prevailed for the business flight that departed Richard Lloyd Jones Jr. Airport (KRVS), Tulsa, Oklahoma, at 1358 central daylight time.

On March 19, the accident airplane was moved from the accident site to a maintenance hangar on the South Bend Airport. Once placed in the hangar, the airplane was documented from March 19, 2013 to March 22, 2013 for airworthiness aspects (structure, systems, powerplants).

During the on-site examination, the following airplane components were removed from the airplane and retained by the investigation for further examination:

1. Williams Electronic Control Unit (Left)
   Part Number: 117162
   Serial Number: LH2A0603

2. Williams Electronic Control Unit (Right)
   Part Number: 117162
   Serial Number: LH2A0608

3. Rockwell Collins Data Concentrator Unit (Left)
   Part Number: DCU-3000
   Serial Number: 2RKFM

4. Rockwell Collins Data Concentrator Unit (Right)
   Part Number: DCU-3000
   Serial Number: 2RKHP

5. Rockwell Collins Flight Management Computer
   Part Number: FMC-3000
   Serial Number: 28DPH

6. Rockwell Collins Maintenance Data Computer:
   Part Number: MDC
   Serial Number: Unknown

7. Rockwell Collins Air Data Computer (Left)
   Part Number: ADC-3000

Serial Number: 2NJHP

8. Rockwell Collins Air Data Computer (Right)
   Part Number: ADC-3000
   Serial Number: 2NJLP

9. Ametek Starter-Generator (Left)
   Serial Number: 425AB

10. Ametek Starter-Generator (Right)
    Serial Number: 461AB

11. Moog Spoiler Control Unit
    Part Number: 233700-109
    Serial Number: 0218

12. Premier 1 Pedestal Assembly
    Part Number: 97-2001-11
    Serial Number: 0314

13. Aileron Assembly Components, Right Wing
    a. Sector Assembly, P/N 390-521109-0014,
    b. Aileron Pushrod (P/N 390-381016-0003),
    c. Pivot Fitting Assembly (P/N 390-52115-006)

14. Honeywell Mark V Enhanced Ground Proximity Warning System Unit
    Part Number: 965-0976-040-210-210
    Serial Number: 26547

15. Concorde Main Airplane Battery
    Part Number: RG-380E/44
    Serial Number: 40332918

The airplane wreckage was moved from the South Bend Airport hangar to Wright City, Missouri in November, 2013. On November 14, 2013, the group removed the following components from the airplane wreckage:

16. Ametek Advanced Industries Generator Control Unit (GCU), Left Engine
    Part Number: CG201A-1
    Serial Number: 645

17. Ametek Advanced Industries Generator Control Unit (GCU), Right Engine
    Part Number: CG201A-1
    Serial Number: 643

This report documents the examination of the removed components in support of the

investigation. None of the component examinations determined faults or failures that indicated that the unit malfunctioned.

At the conclusion of the on scene investigation and subsequent examinations, all photographs, notes, and documents were provided to each of the parties to the investigation.

D. DETAILS OF INVESTIGATION

During the on-scene investigation and based on the circumstances of the accident, the group removed and subsequently examined components from the following airplane systems:

1.0 Communications

The airplane's cockpit voice recorder (CVR) was removed from the airplane at the accident site and sent to the NTSB's Vehicle Recorder Laboratory in Washington, D.C. for further investigation. See CVR Group Chairman's Factual Report of Investigation for further information.

2.0 Electrical Power

2.1 Starter-Generators

Following examination of the airplane's powerplants, the two engine accessory mounted starter/generators were removed from their respective engines for examination. An initial visual examination of the units determined that both starter-generator drive shafts were intact and both armatures could be rotated. The brush inspection covers were removed and the brushes were observed to be in good condition.

On September 9, 2013, the group met at the Ametek facility in Wichita, Kansas to examine the following components removed from the accident airplane engines:

Ametek Starter-Generator, Left Engine
Part Number: MG94A-1
Mod Status: B
Serial Number: 425AB

Ametek Starter-Generator, Right Engine
Part Number: MG94A-1
Mod Status: B
Serial Number: 461AB

The units were retrieved from secure storage at the Wichita Aircraft Certification Office (ACO) in Wichita, Kansas by the group chairman and hand-carried to the Ametek Advanced Industries facility in Wichita, Kansas.

The starter-generator units were removed from their shipping containers and packaging and visually inspected. Both units had foreign object debris (FOD) inside the unit. Most of the debris appeared to be similar to loose, blown attic insulation. Compressed air was used to clean the debris out of the interior of the units. The left unit had considerably more FOD than the right-hand unit.

The fan blades on the right-hand unit were bent onto the starter-generator unit such that the fan was impinged on the unit and could not be rotated.

The Ametek Advanced Industries Acceptance Test Procedure (ATP) MG94A-1, Revision J, was performed on each unit. For the test, each unit was installed onto an Ametek test cell. In each case, the starter-generator passed all portions of test, except for the serial number 425AB (left hand unit), which failed test section 12.9, Commutator Run Out (0.0007 allowed, measured at 0.0008).

Regarding the failure of serial number 425AB (left hand unit) of the Commutator Run Out (test section 12.9), Ametek noted that, given that the ATP requirements are established for "as new" or "zero time" units, a commutator on a starter-generator returned from the field may fail the test; units returned from the field are expected to be outside this requirement due to use.

For ATP Section 11.0, Starter Performance, the test was successfully conducted twice on serial number 425AB (left hand unit) and successfully conducted three times on S/N 461AB (right hand unit).

The resultant Acceptance Test Data Sheet for each unit is provided in Attachment 1.

2.2 Generator Control Units

The group met in Wright City, Missouri on November 14, 2013 to identify and remove the two generator control units (GCU) from the airplane wreckage[1]. The GCUs were removed by the Group Chairman and shipped to the Wichita Aircraft Certification Office (ACO) in Wichita, Kansas for secured storage.

The GCUs were identified as follows:

Ametek Advanced Industries Generator Control Unit, Left Engine

Part Number:	CG201A-1
Customer Part Number:	390-384005-0009
Serial Number:	645
Mod Status:	F
MFG. Date:	8-9-2007
Test Date:	8-10-2007

[1] The wreckage was moved from South Bend, Indiana to Wright City, Missouri in November, 2013.

Ametek Advanced Industries Generator Control Unit, Right Engine

Part Number:	CG201A-1
Customer Part Number:	390-384005-0009
Serial Number:	643
Mod Status:	F
MFG. Date:	8-9-2007
Test Date:	8-10-2007

On March 18, 2014, the group met at the Ametek facility in Wichita, Kansas to examine the GCUs. On the day of the examination, the GCUs were retrieved from secure storage at the Wichita ACO by the group chairman and hand carried to the Ametek Advanced Industries facility in Wichita, Kansas.

The GCUs were removed from their shipping containers and packaging and visually inspected. The top of the outer dust sleeve for GCU serial number 645 (left engine) was dented inwards, towards the internal components. However, when the outer sleeve was removed, no visible internal damage was noted. The external connector and pins appeared clean, with no noted damage.

There was no visible damage noted on GCU serial number 643 (right engine). The connector and pins appeared clean with no noted visible corrosion.

The Ametek Advanced Industries Acceptance Test Procedure (ATP) CG201A -1, Revision E, was performed on each unit. Both GCUs passed all portions of ATP test except for the following:

1) Section 9.3 – Line Contactor Control, Protection and Over Voltage Test:

For the Over Voltage portion of the test section procedure, the Meter 2 Voltage Limits are set as 32.50 +/-0.02 Volts DC. For GCU Serial Number 645, the recorded result of the procedure was 32.47 Vdc, and for GCU Serial Number 643, the recorded result of the procedure was 32.55 Vdc.

2) Section 9.5 – Field Weakening, Start Terminate and Open Field Test:

For the Start Terminate portion of the test section procedure, the required oscilloscope output frequency results are 3,297 Hz +/-70 Hz (3,297 rpm nominal, 3,227 – 3,367 acceptable range). For GCU Serial Number 645, the recorded result of the procedure was 3,410 Hz, and for GCU Serial Number 643, the recorded result of the procedure was 3,400 Hz.

The resultant CG201A-1 Acceptance Test Data Sheet for each unit is provided in Attachment 2.

2.3 Main Airplane Battery

The airplane is equipped with a 24-volt, maintenance free lead-acid battery with a minimum performance capacity of 42 ampere-hours. The battery provides power for self-contained engine starts and is a backup power source for the essential loads. The battery (BAT) switch is located on the electrical control panel on the lower central instrument panel. During normal flight conditions, the BAT switch is in the ON position. The standby (STBY) position is selected to isolate the standby bus from the essential bus, once the main battery has been exhausted.

The main airplane battery was identified in the airplane wreckage. The battery was documented as follows:

Concorde Battery Main Airplane Battery
Part Number: RG-380E/44
Serial Number: 40332918

The power cable to the airplane battery was first observed to be disconnected from the battery. The connection was not visibly damaged. The battery top cover was separated from the battery base. A Digital Volt Ohm meter reading was used to measure the battery voltage. The NO LOAD voltage was measured to be 25.05 volts.

The battery was shipped to the Concorde Battery Corporation in West Covina, California. The group met at the Concorde Battery Corporation facility in West Covina, California from March 24-27, 2014 for examination and test of the airplane battery.

The result of the tests indicated that the battery was electrically intact and that the battery exceeded the acceptance test standards for a new battery.

Concorde Battery provided an engineering report for the tests that were accomplished on the battery. The Concorde Return Battery Test Report is included in Attachment 3.

2.4 Standby Battery

The standby battery was identified as follows:

Manufacturer: Securaplane
Part Number: 100-0206-01
Serial Number: 1416

The standby battery is a 5-amp-hour, lead-acid battery used to supply 24 VDC to the standby bus and 5 VDC for lighting of selected equipment during abnormal power conditions. The standby bus supplies power to dedicated airplane components required to allow operation of the airplane when no other source of power is available. The battery will supply 150 watts of power for a minimum of 30 minutes or until the cutoff voltage of 20 VDC is reached.

The Standby Battery was retained by the NTSB at the accident scene and examined. No further examination of the standby battery was accomplished.

3. Flight Controls

3.1 Primary Control System – Roll Control

Roll attitude is controlled through the ailerons, spoilers and roll trim. The primary control systems, except the spoilers, are manually operated through control cables, push/pull tubes, and mechanical linkages.

The following items from the right wing roll control aileron assembly were removed from the wing in the hangar:

a. Aileron Sector Assembly (Assy)
Part Number: 390-521109-0016
Wing Station 233, Right Hand Wing

b. Aileron Pushrod
Part Number: 390-381016-0005

c. Pivot Fitting Assembly, Right Hand Wing
Part Number: 390-52115-006)

The aileron components were shipped by the Group Chairman to the Wichita Aircraft Certification Office (ACO) in Wichita, Kansas for secured storage.

On September 10, 2013 the group met at the Beechcraft facility in Wichita, Kansas to examine the aileron components. On the day of the examination, the parts were retrieved from secure storage at the Wichita ACO by the group chairman and hand carried to the Beechcraft facility.

The parts were submitted to the Beechcraft Materials Laboratory to examine the three fractures in the components and a bend in the aileron bellcrank assembly pushrod.

On January 21, 2014 Beechcraft submitted a letter documenting their findings. The letter is provided in Attachment 4.

3.2 Spoiler Control Unit

The spoiler control system is electrically controlled by movement of the pilot's or copilot's control wheels and hydraulically actuated.

The spoiler control unit (SCU) was identified in the airplane wreckage and retained by the NTSB for further examination. The SCU was identified as follows:

Moog Spoiler Control Unit
Part Number: 233700-109
Serial Number: 0218

The SCU's outer chassis was compromised by accident impact forces and the internal circuit cards exposed. The BIT/Diagnostic circuit card was identified and removed from the chassis. On June 10, 2013 the card was hand-carried to the Moog Aircraft Group facility in East Aurora, New York by an NTSB representative for download of the information stored in non-volatile memory on the card.

Moog provided a report of the NVM download and examination to the NTSB in a letter dated July 12, 2013. The report included information regarding the last 250 faults recorded on the SCU. The report is included in Attachment 5.

4.0 Indicating/Recording Systems – Data Concentrator Units

The airplane's two data concentrator units (DCU) were identified and retained for further examination. An initial visual examination at the hangar revealed no bent pins, burn marks, or other visible damage.

The DCUs were retained in the event that the units were equipped with non-volatile memory and store flight data. However, the manufacturer (Rockwell Collins) indicated that the units did not have non-volatile memory and therefore did not retain any flight data.

Based on this information, no further examination of the DCUs was accomplished.

5.0 Navigation

5.1 Air Data Computers

The airplane's two air data computers (ADC) were identified in the wreckage at the hangar and retained by the NTSB for further examination. The air data computers were identified as follows:

Collins Air Data Computer (Left)
Part Name: ADC-3000
Part Number: 822-1109-016
Serial Number: 2NJHP

Collins Air Data Computer (Right)
Part Name: ADC-3000
Part Number: 822-1109-016
Serial Number: 2NJLP

The ADC-3000 units were shipped to the Rockwell Collins facility in Cedar Rapids, Iowa and placed into secure storage.

An initial inspection of the units was conducted on March 25, 2014 at the Rockwell Collins facility in Cedar Rapids, Iowa under FAA witness. The purpose of the inspection was to determine whether the non-volatile memory in the ADCs could be extracted directly from the unit. Rockwell Collins indicated that the nonvolatile memory in the ADC contains information related to failures and other events, such as weight on wheel transitions and power cycles.

5.1.1 Examination of Left ADC-3000

The group concluded that, on the basis of the initial inspection on March 25, 2014, that the memory in the Left ADC (serial number 2NJHP) was viable and that the impact damage to the unit still allowed recovery of the recorded information.

On April 7-8, 2014 the group met at the Rockwell Collins facility in Cedar Rapids, Iowa to witness the attempted extraction of NVM from the left ADC. For the examination, the circuit card with memory (A4) was removed from the ADC and placed into an exemplar engineering unit. The memory from the A4 card was successfully extracted.

The group's review of the extracted and converted memory data, provided in a "Fault Log", indicated that log covered more than 46 operating hours and more than 30 flights. The end of the most recent data, the fault log indicated that the ADC power was removed twice in the air.

5.1.2 Examination of Right ADC-3000

The group concluded that, on the basis of the initial inspection on March 25, 2014, the damage to the Right ADC (serial number 2NJLP) compromised the circuit card with memory (A4 card). Since the A4 card was damaged, reading of the NVM was not possible. No further examination of the Right ADC was conducted.

5.2 Ground Proximity System

The airplane's ground proximity warning system computer, recovered at the accident site and retained by the NTSB for further examination, was identified as:

Honeywell Mark V Enhanced Ground Proximity Warning System (EGPWS) Unit
Part Number: 965-0976-040-210-210
Serial Number: 26547

The EGPWS was damaged by impact forces and the front door/panel was separated from the unit. See Figure 1.

Figure 1 - EGPWS front panel, separated from unit.

The EGPWS was shipped to the NTSB Western Pacific Regional office in Federal Way, Washington. On July 2, 2013 an NTSB Aviation Accident Investigator hand-carried the unit to the Honeywell Aerospace Corporation facility in Redmond for examination.

Due to accident impact damage, the EGPWS was unable to receive power for examination and data download (See Figure 2). Therefore, the unit's outer case/dust cover was opened and the relevant circuit card, with flash memory chips attached, examined.

Figure 2 - EGPWS unit, as received at Honeywell, prior to examination.

The contents of the flash memory were extracted and converted into engineering unit. The associated electronic files were provided to the NTSB.

A review of the information in the file STATUS.TXT revealed the final recorded TAKEOFF status was recorded for Flight Leg 344, from Airport KRVS (Note: KRVS is the 4-letter designator for Richard Lloyd Jones Jr. Airport), at an EGPWS operating time of 823:33:59 (HHH:MM:SS). The last LANDING status recorded was indicated for Flight Leg 343, at Airport KRVS, at an EGPWS operating time of 823:02:59. No LANDING status was noted for Flight Leg 344. The entire Flight Leg 344 TAKEOFF status and Flight Leg 343 LANDING status is included in Attachment 6.

A review of the recorded warning data revealed that no EGPWS alerts or warnings were recorded for Flight Leg 344. An excerpt of the last recorded EGPWS Warning, recorded during Flight Leg 342, was also included in Attachment 6.

5.3 Flight Management Computer

The airplane's flight management computer card was identified in the airplane wreckage and retained for further examination. The card was identified as follows:

Rockwell Collins Flight Management Computer Card
Part Name: FMC-3000
Part Number: 822-0883-703
Serial Number: 28DPH

The FMC-3000 card was shipped to the Rockwell Collins facility in Cedar Rapids, Iowa and placed into secure storage.

An initial inspection of the FMC-3000 card was conducted on March 25, 2014 at the Rockwell Collins facility in Cedar Rapids, Iowa under FAA witness. The purpose of the inspection was to determine whether the volatile memory could be extracted from the unit.

During the inspection damage was observed on the circuit card assemblies. Damage was also noted to the FMC-3000's internal batteries. It was decided to measure the battery voltage to determine if downloading the data would be viable. Measurement of the batteries indicated zero voltage.

Therefore, the FMC was unsuccessfully downloaded due to lack of power from the unit's internal battery voltage (v=0). Rockwell Collins indicated that internal battery power is needed to preserve the unit's memory.

Rockwell Collins provided an engineering report titled CRASH INVESTIGATION REPORT FOR THE FMC-3000. The report is included in Attachment 7.

No further examination of the FMC was conducted.

6.0 Central Maintenance System – Maintenance Data Computer

The airplane's maintenance diagnostic computer was identified at the accident site and retained by the NTSB for further examination. The maintenance data computer was identified as follows:

Manufacturer:	Rockwell Collins
Part Name:	MDC-3110
Part Number:	822-1987-005
Serial Number:	Unknown

The MDC normally records logged faults from numerous airplane line replaceable units during ground, taxi and flight segments. The faults are recorded into non-volatile memory on the card.

The MDC-3110 card was shipped to the Rockwell Collins facility in Cedar Rapids, Iowa and placed into secure storage.

An initial inspection of the MDC-3110 card was conducted on March 25, 2014 at the Rockwell Collins facility in Cedar Rapids, Iowa under FAA witness. The purpose of the inspection was to determine whether the MDC non-volatile memory could be extracted directly from the unit. However, the amount physical damage to the board connector and several of the board components was too great to attempt.

On April 7-8, 2014 the group met at the Rockwell Collins facility in Cedar Rapids, Iowa to witness the attempted extraction of NVM from the MDC-3110.

The integrated circuit chip with the NVM memory was removed from the board and placed in an engineering board. Several attempts to download the memory were attempted, but portions of the memory were corrupted; a download of the full memory data was not successful.

No further examination of the MDC-3110 was conducted.

7.0 Engine Controls – Throttle Quadrant Assembly

7.1 On-scene examination

The throttle quadrant assembly was identified as follows:

Part Name:	Premier 1 Throttle Quadrant Assembly
Manufacturer:	Harlow Aerostructures LLC
Manufacturer Part Number:	97-2001-11
Serial Number:	0314

The throttle quadrant assembly was removed from the airplane wreckage and retained for further examination (See Figure 3). The assembly was shipped to the Federal Aviation Administration's Wichita Aircraft Certification Office (ACO) and placed in secure storage.

Figure 3 - Center Pedestal, including throttle quadrant, at hangar, prior to shipment to manufacturer.

7.2 Examination at the Manufacturer

On September 11, 2013, the group met at the Harlow Aerostructures LLC facility in Wichita, Kansas to examine the Throttle Quadrant Assembly removed from the accident airplane. The group chairman retrieved the throttle quadrant assembly from FAA Wichita ACO and hand carried to the Harlow Aerostructures facility.

According to Harlow Aerostructures, the throttle quadrant assembly was manufactured on September 11, 2007 and had not been returned to Harlow Aerostructures since manufacture. A copy of the ATP records for the throttle quadrant assembly at the time of manufacture was provided to the group.

The Harlow Aerostructures acceptance test procedure (ATP) was performed on the throttle quadrant assembly. In addition, a visual inspection was conducted. Finally, additional examination of the throttle idle stop gate and throttle switch positions at the aft range of the throttle movement was conducted.

7.2.1 Visual Examination

After the throttle quadrant assembly was removed from its shipping container and packaging, physical damage was noticed during the visual examination. Both throttle levers were bent to the right. Both of the cut off handles were jammed and could not be

moved. The left cut off handle was jammed in the "up" position. The right cut off handle was jammed in the "down" position.

The FOD brushes were trimmed in the area of the idle stop to accommodate visual examination and further testing. A visual examination of the idle stops by the group did not reveal any physical damage. According to Harlow, the idle stops appeared undamaged and per design. See Figures 4 and 5.

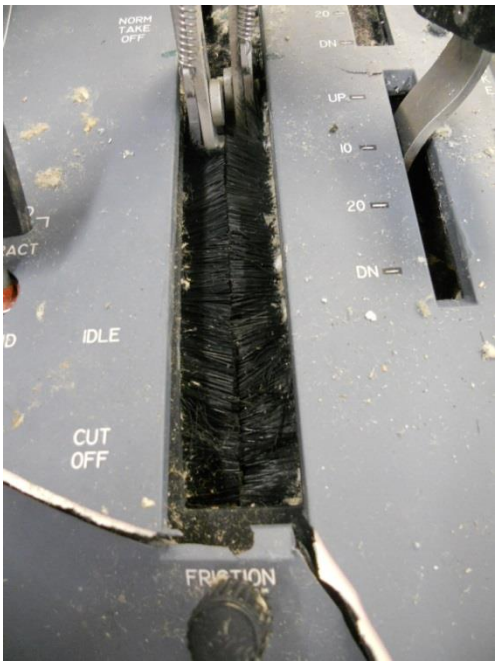

Figure 4 - FOD brushes near the Idle/Cut Off area, before the brushes were cut.

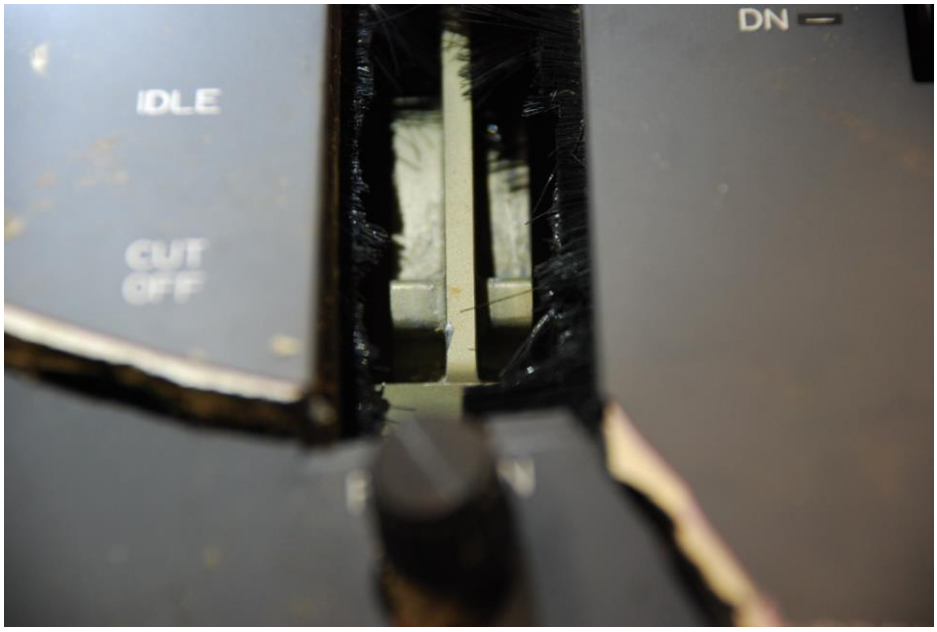

Figure 5 - Area of the Cut Off gates, after the FOD brushes were cut.

Foreign object debris (FOD) was noted inside the assembly, mostly loose attic insulation.

7.2.2 Acceptance Test Procedure

The throttle handles were physically bent to a vertical position to facilitate ATP testing. The left hand throttle cable attachment was removed to facilitate ATP testing.

The Harlow Aerostructures LLC 97-2001-11 Acceptance Test Procedure, Revision P, was performed on the throttle quadrant assembly. The test conditions regarding height gauge readings (throttle cable length) were not accomplished, since the throttle assembly was not removed from the pedestal. The test conditions regarding pull tests (force measurements) were not accomplished due to damage to the throttle quadrant assembly.

For the test, the throttle quadrant connectors were removed and a Harlow ETF-97-2001 test box was attached to the assembly to confirm continuity and performance of switch positions and solenoids. Electrical continuity was confirmed for the left and right throttles.

Damage to pedestal frame prevented the flap lever from being placed in the flaps retracted position.

The resultant ATP test records sheets were included in Attachment 8.

7.2.3 Throttle Idle Stop Gate and Throttle Switch Positions

Following the ATP, the throttles were placed in selected positions around the idle stop and the position documented. For the right hand throttle, the cut off lever was physically pried from its found jammed position to a position to allow throttle travel over the idle stop gate.

The following observations were made (Note: the "s" lights refer to switches within each respective throttle switch group):

Left Throttle

- When the left hand (LH) throttle was placed at the estimated gate position, the s9, s19, and s11 lights on the Harlow ETF-97-2001 test box were illuminated.
- When LH throttle was moved to the first switch position, then s9 was off, s19 and s11 were illuminated on the Harlow test box.
- When LH throttle was moved to the 2nd switch position, s9 and s11 are off, only s19 was illuminated on the Harlow test box.
- When LH throttle was moved to 3rd switch position, s9, s11, and s19 are all off on the Harlow test box.

Right Throttle

- When the right hand (RH) throttle was placed at the estimated gate position, the s9, s19, and s11 lights on the Harlow ETF-97-2001 test box were illuminated on the Harlow test box.
- When RH throttle was moved to the first switch position, then s9 was off, s19 and s11 were illuminated on the Harlow test box.
- When RH throttle was moved to the 2nd switch position, s9 and s11 are off, only s19 was illuminated on the Harlow test box.
- When RH throttle was moved to 3rd switch position, s9, s11, and s19 are all off on the Harlow test box.

At the conclusion of the examination, the throttle quadrant assembly was repackaged into its shipping container. The group chairman shipped the assembly to the stored wreckage.

Tom Jacky
Aerospace Engineer