**NATIONAL TRANSPORTATION SAFETY BOARD**
Office of Research and Engineering
Washington, D.C. 20594

March 25, 2003

# Aircraft Performance Group

**Crash Site Factual Report**

## I. ACCIDENT

| | |
|---|---|
| NTSB Number: | DCA03MA022 |
| Location: | Charlotte, North Carolina |
| Date: | January 8, 2003 |
| Time: | 0848 EST |
| Aircraft: | Raytheon (Beechcraft) 1900D, N233YV |
| Operator: | Air Midwest Inc. (d.b.a. US Airways Express) |

## II. GROUP

| | |
|---|---|
| Chairman | Kevin J. Renze, Ph.D.<br>National Transportation Safety Board<br>Vehicle Performance Division, RE-60<br>490 L'Enfant Plaza East, SW<br>Washington, DC 20594 |
| Member | Daniel R. Bower, Ph.D.<br>National Transportation Safety Board<br>Vehicle Performance Division, RE-60<br>490 L'Enfant Plaza East, SW<br>Washington, DC 20594 |
| Member | H. Samuel Bruner, P.E.<br>Director, Air Vehicle Analysis and Integration<br>Raytheon Aircraft Company<br>9709 E. Central<br>P.O. Box 85<br>Wichita, Kansas 67201 |
| Member | Bradley S. Carter<br>Captain/Flight Instructor<br>Air Midwest Inc.<br>2203 Air Cargo Rd.<br>Wichita, Kansas 67209 |

Member — Pierre Huggins
Air Line Pilots Association, International
Staff Engineer
535 Herndon Parkway
Herndon, VA 20170

Member — David McFarland
Technical Manager, Proposal Development Center
Raytheon Aerospace LLC
8800 University Parkway, Suite B-5
Pensacola, FL 32514

## III. SUMMARY

On January 8, 2003, at about 0848 Eastern Standard Time, Air Midwest flight 5481 (d.b.a. US Airways Express), a Raytheon (Beechcraft) 1900D, N233YV, crashed shortly after takeoff from Charlotte-Douglas International Airport (CLT), Charlotte, North Carolina. The flight was a scheduled passenger flight to Greenville-Spartanburg, South Carolina. The 2 crewmembers and 19 passengers onboard were fatally injured. The airplane was destroyed due to impact forces and a post crash fire.

The Performance Group chairman (D. Bower at the time) launched on the go-team, arrived on scene in the afternoon on the day of the accident, and commenced on-scene documentation of the accident site. The remaining group members (including K. Renze) joined the investigation the following day. On scene Performance Group activities were concluded on the evening of January 10, 2003.

## IV. ON-SCENE INVESTIGATION

Accident Location

Debris from the Raytheon (Beechcraft) 1900D, N233YV aircraft was found scattered at the northwest corner of the US Airways maintenance hangar main door pocket wall, on the Charlotte-Douglas International Airport (CLT) property. The aircraft main wreckage was located on the concrete tarmac approximately 30 feet southwest of the hangar corner, centered at N35° 12’ 23.8” and W80° 56’ 47.1” [per Federal Bureau of Investigation (FBI) GPS measurement]. With respect to runway 18R, the accident site was located approximately 7600 feet south of the threshold and approximately 1650 feet east of the centerline.

The impact and fire damaged remains of the aircraft nose, fuselage, left and right wings, two engines, empennage, and landing gear were identified at the main wreckage site. The remains of the empennage were separated from the aft fuselage. The horizontal stabilizer was inverted, resting on its top surface with the taillets attached.

A planform view of the CLT airport property and a profile view of departure runway 18R are included in Attachment I. A three-view drawing of the accident aircraft type is provided in Attachment II.

An FBI laser transit survey team surveyed the crash site under the supervision of the NTSB Structures Group chairman. The aircraft component, impact, and scrape mark location survey data are included in Attachment III.

Aircraft Data Recorders

The Cockpit Voice Recorder (CVR) and Flight Data Recorder (FDR) were recovered from N233YV on the afternoon of January 8, 2003 and flown back to Washington, DC for analysis. No video footage of the accident flight was available from the CLT security cameras.

Impact and Scrape Marks

Impact and scrape mark damage (see Attachment IV) was present on the concrete tarmac and on the lower corner of the hangar cinder block wall. The initial concrete tarmac impact mark (A) was located approximately 7600 feet south of the runway 18R threshold and approximately 1650 feet east of the runway 18R centerline.

The northern base of the cinder block hangar wall was displaced toward the building interior, punctured in one location, and fractured in several places. The punctured hole in the hangar wall extended from 5’3” above the concrete tarmac to 8’5” above the tarmac. The hole was 1’7” wide at approximately 6’3” above the tarmac. Approximately 20 feet above the cinder block wall puncture, sooting and bubbling of the building exterior metal flashing was observed. Impact mark (C) was located between the fourth and sixth cinder block rows on the north face of the wall corner.

The distance between impact mark (A) on the concrete tarmac and the puncture in the hangar wall was 31’6”. A second concrete tarmac impact mark (B) was located 20 feet away from impact mark (A) on a heading of 210 degrees magnetic. Three ground scar marks radiated from impact mark (A), the longest of which was 5’3”. Two ground scar marks radiated from impact mark (B), the longest of which was 4’10”.

Departure Runway Debris Search

After an initial survey of the accident site on January 8, 2003, the Performance Group chairman organized and led a walking search of the length of departure runway 18R. Approximately 100 police officers, FBI agents, and NTSB staff members swept a 450 foot width perpendicular to, and centered on, the runway 18R centerline. Runway 18R and the adjacent infield were searched from the flight 5481 takeoff roll origin to approximately 5800 feet downrange. At this point, the search path veered to the left and crossed runway 5-23 on a bearing to the accident site. The Day 1 search region is depicted by the blue perimeter in Attachment I.

Several small screws, washers, fuel caps and assorted pieces of debris were found. The debris items found were oxidized, weathered, and worn. No items were identified that could be linked to the accident airplane.

At the time of the accident, ASOS winds were reported 230 at 7 knots. On January 9, 2003 the infield ground to the left of runway 18R and the taxiways in the downwind direction were searched for possible aircraft parts. Approximately 30 police officers, FBI agents, NTSB staff, and Performance Group members participated on foot to search an area approximately 2100 feet by 900 feet centered about the estimated N233YV liftoff point. The Day 2 search region is defined by the red perimeter in Attachment I. No parts were identified that could be linked to the accident airplane.

Radar Data

Airport Surveillance Radar (ASR) data were obtained from the CLT TRACON for N233YV flight 5481 during the taxi, takeoff roll, takeoff, and maneuver to the impact site. The ASR data are collected from a rotating antenna with a period of 4.6 seconds and recorded in time-range-azimuth-altitude format. The accident data are presented in Attachment V. The Charlotte ASR-9 radar antenna is located at N35° 12' 50.75", W80° 56' 52.38", elevation 779 feet.

Weight and Balance

Standard seating arrangement, weight and balance, and moment limit charts for the Raytheon (Beechcraft) 1900D are included in Attachment VI. A copy of the N233YV load manifest filed for flight 5481 is shown in Attachment VII.

## V. ATTACHMENTS

Attachment I:

A. Planform view of Charlotte-Douglas International Airport (CLT) provided by the airport authority.
B. Profile view of departure runway 18R obtained from airport obstruction chart OC 78, dated July 1986.

Attachment II: Three-view drawing of the Raytheon (Beechcraft) 1900D aircraft from the airplane flight manual, dated August 2000.

Attachment III: Accident wreckage diagram and accompanying database compiled by the Federal Bureau of Investigation survey team under the supervision of the NTSB Structures Group chairman.

Attachment IV: Impact and scrape mark sketches.

Attachment V: N233YV Airport Surveillance Radar (ASR) data obtained from the CLT TRACON.

Attachment VI:

A. Standard seating data for the Raytheon (Beechcraft) 1900D from the airplane flight manual, dated October 1999.
B. Weight and balance data for the Raytheon (Beechcraft) 1900D from the airplane flight manual, dated March 2002.

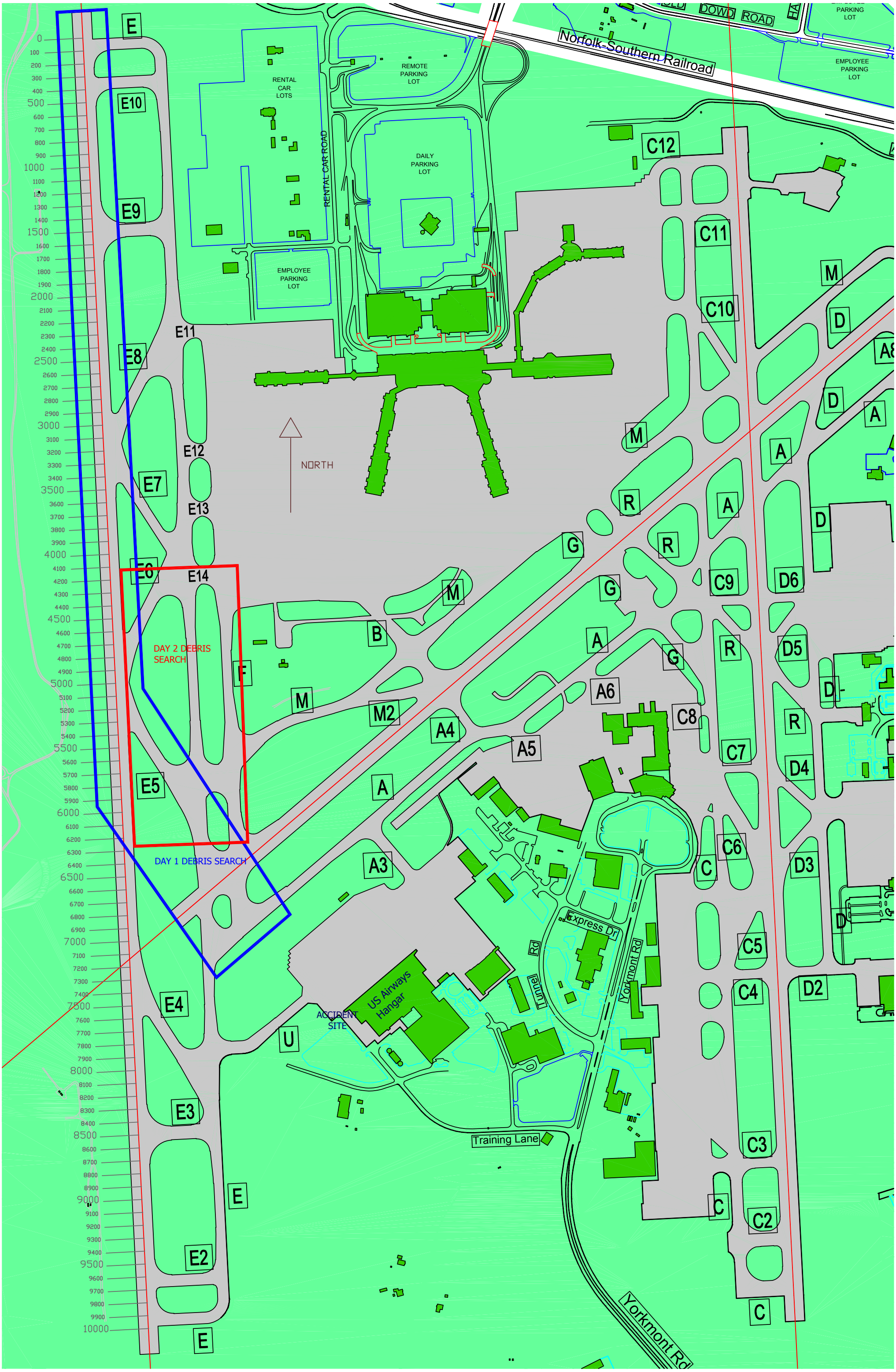
C. Moment limit data for the Raytheon (Beechcraft) 1900D from the airplane flight manual, dated March 2002.

Attachment VII: N233YV flight 5481 load manifest, dated January 8, 2003.

## ATTACHMENT I

A. Planform view of Charlotte-Douglas International Airport (CLT) provided by the airport authority.

B. Profile view of departure runway 18R obtained from airport obstruction chart OC 78, dated July 1986.


E
E10
E9
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E4
E3
E2
E
E11
E12
E13
E14
RENTAL CAR LOTS
REMOTE PARKING LOT
DAILY PARKING LOT
EMPLOYEE PARKING LOT
RENTAL CAR ROAD
Norfolk-Southern Railroad
DOWD ROAD
EMPLOYEE PARKING LOT
NORTH
DAY 2 DEBRIS SEARCH
DAY 1 DEBRIS SEARCH
ACCIDENT SITE
US Airways Hangar
Express Dr
Tunnel Rd
Yorkmont Rd
Training Lane
C12
C11
C10
C9
C8
C7
C6
C5
C4
C3
C2
C
M
D
A
R
G
B
F
M2
A4
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A6
A3
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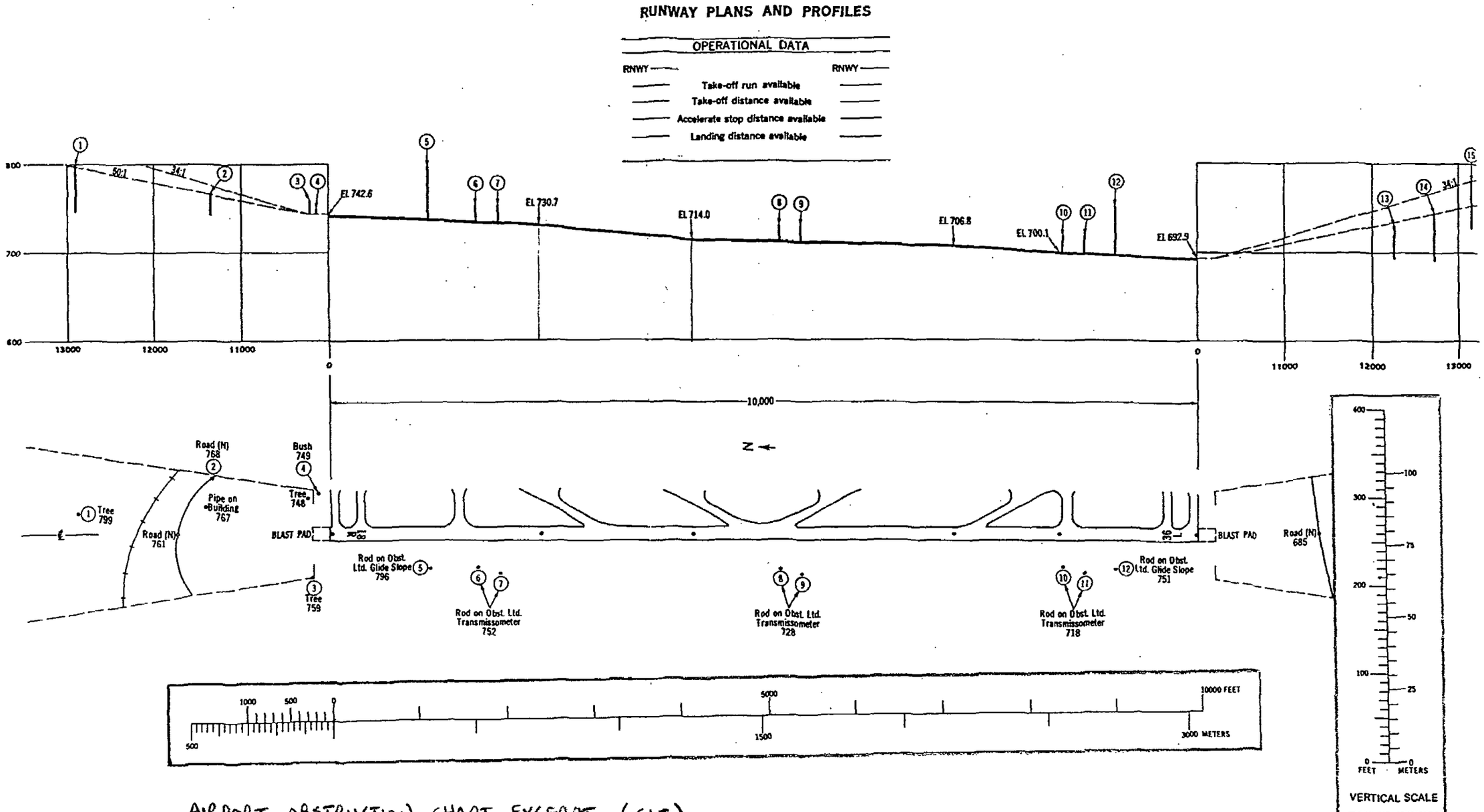
D6
D5
D4
D3
D2



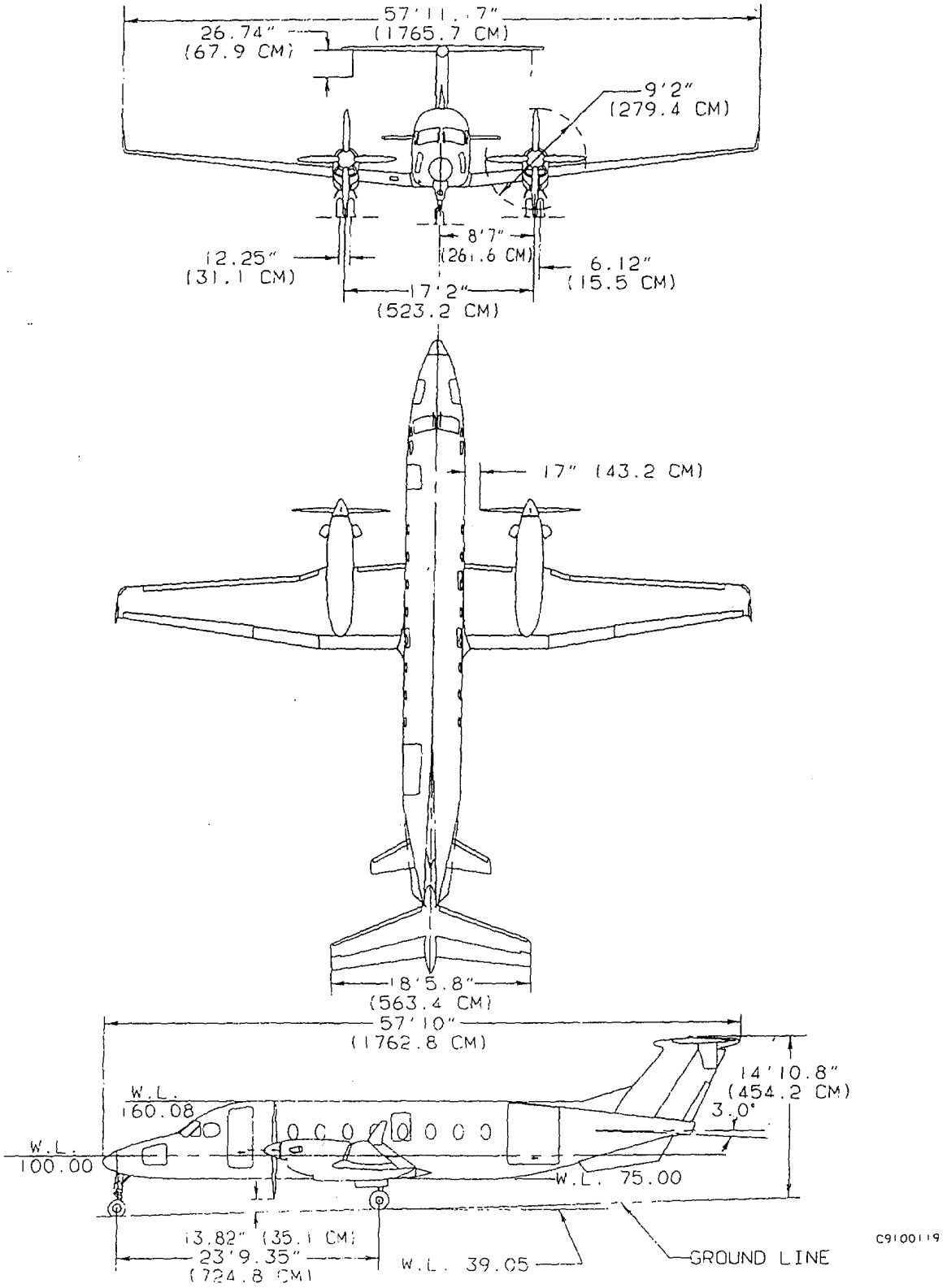

AIRPORT OBSTRUCTION CHART EXCERPT (CLT)

OC 78

JULY 1986

## ATTACHMENT II

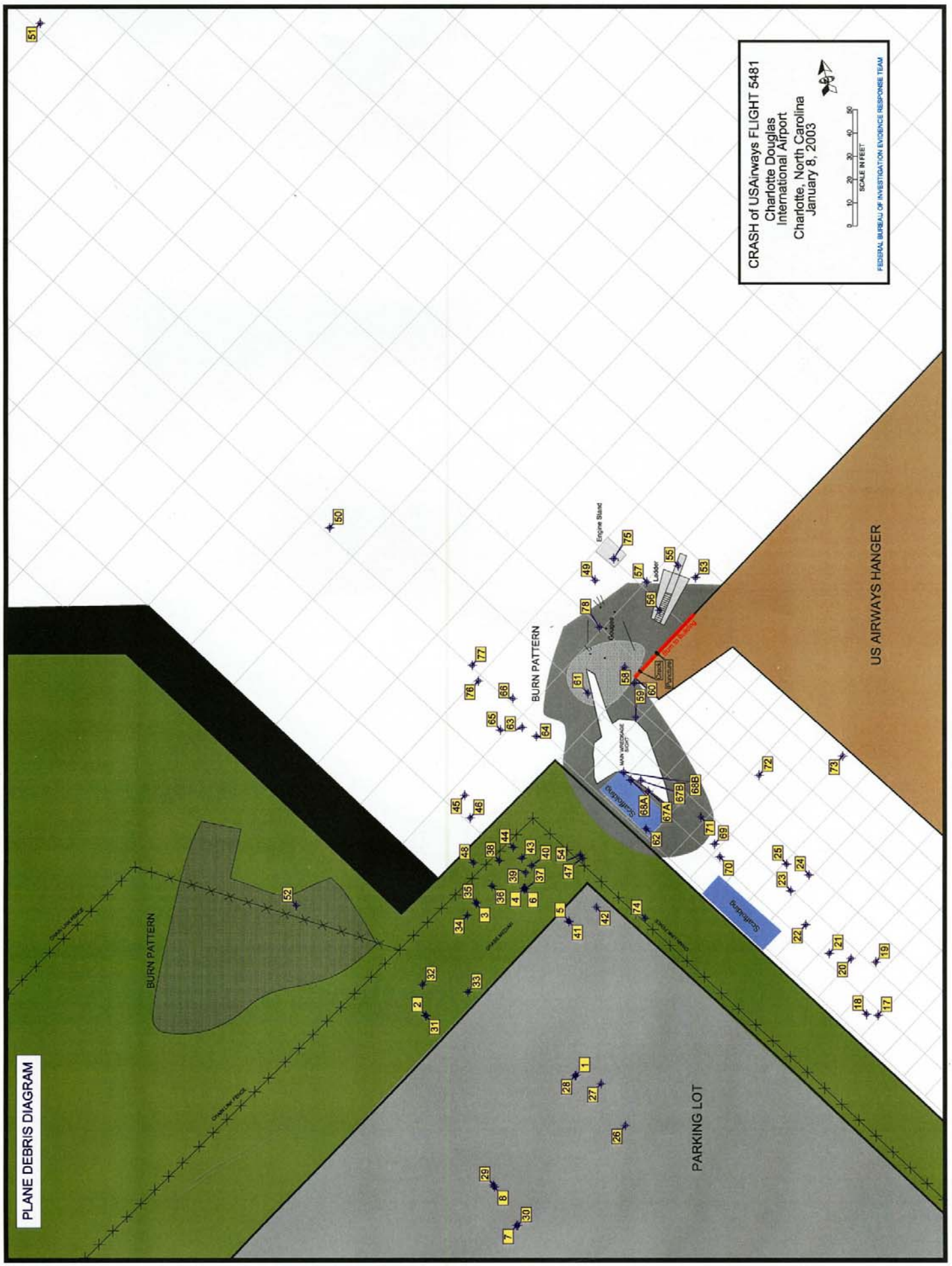
Three-view drawing of the Raytheon (Beechcraft) 1900D aircraft from the airplane flight manual, dated August 2000.




1900D THREE VIEW

## ATTACHMENT III

Accident wreckage diagram and accompanying database compiled by the Federal Bureau of Investigation survey team under the supervision of the NTSB Structures Group chairman.


PLANE DEBRIS DIAGRAM
CRASH of USAirways FLIGHT 5481
Charlotte Douglas
International Airport
Charlotte, North Carolina
January 8, 2003
SCALE IN FEET
0 10 20 30 40 50
FEDERAL BUREAU OF INVESTIGATION EVIDENCE RESPONSE TEAM
BURN PATTERN
BURN PATTERN
US AIRWAYS HANGER
PARKING LOT
Scaffolding
Scaffolding
Engine Stand
Ladder
Stack
Structure
MAIN WRECKAGE SIGHT
CHAIN LINK FENCE
CHAIN LINK FENCE

# Structures Group Wreckage Database

## DCA03MA022

## Charlotte, NC

## January 8, 2003

| NTSB number | Northing (X) | Easting (Y) | Elevation (Z) | Description | Photo ID |
|---|---|---|---|---|---|
| 1 | | | | Propeller governor | Dsc00755 |
| 2 | | | | Propeller shaft | Dsc00758 |
| 3 | | | | Propeller hub assembly | |
| 4 | | | | Propeller flange | |
| 5 | | | | Engine Instrument Panel | Dsc00768 |
| 6 | | | | Windshield piece | |
| 7 | | | | Cockpit wing window latch | Dsc00756 |
| 8 | | | | Lexan piece - windscreen | |
| 9 | | | | Number not used | |
| 10 | | | | Number not used | |
| 11 | | | | Number not used | |
| 12 | | | | Number not used | |
| 13 | | | | Number not used | |
| 14 | | | | Number not used | |
| 15 | | | | Number not used | |
| 16 | | | | Number not used | |
| 17 | | | | 5' long lower wing skin panel | Dsc00743 |
| 18 | | | | 12' long frame | Dsc00745 |
| 19 | | | | 4' x 1' nacelle fairing | Dsc00746 |
| 20 | | | | 6' x 1' small piece of side fuselage skin | Dsc00747 |
| 21 | | | | Left wingtip lights and strobe power supply | Dsc00748 |
| 22 | | | | Seat support piece | Dsc00749 |
| 23 | | | | Nacelle access panel | Dsc00750 |
| 24 | | | | Interior composite panel | Dsc00751 |
| 25 | | | | Composite frame | Dsc00752 |
| 26 | | | | Miscellaneous piece | Dsc00753 |
| 27 | | | | Door lug assembly | Dsc00754 |
| 28 | | | | Propeller governor | Dsc00755 |
| 29 | | | | Cockpit wing window latch | Dsc00756 |
| 30 | | | | Plexiglass fragment | Dsc00757 |
| 31 | | | | Propeller shaft | Dsc00758 |
| 32 | | | | Plexiglass fragment of wing cockpit window | Dsc00759 |
| 33 | | | | Ring flange | Dsc00760 |
| 34 | | | | Propeller feathering ring | Dsc00761 |
| 35 | | | | Propeller hub assembly | Dsc00762 |
| 36 | | | | Propeller counterweight | Dsc00763 |
| 37 | | | | Propeller counterweight | Dsc00764 |
| 38 | | | | Miscellaneous engine piece | Dsc00765 |
| 39 | | | | O2 system panel | Dsc00766 |
| 40 | | | | Propeller spinner | Dsc00767 |
| 41 | | | | Engine instrument panel | Dsc00768 |
| 42 | | | | Flange segment | Dsc00769 |

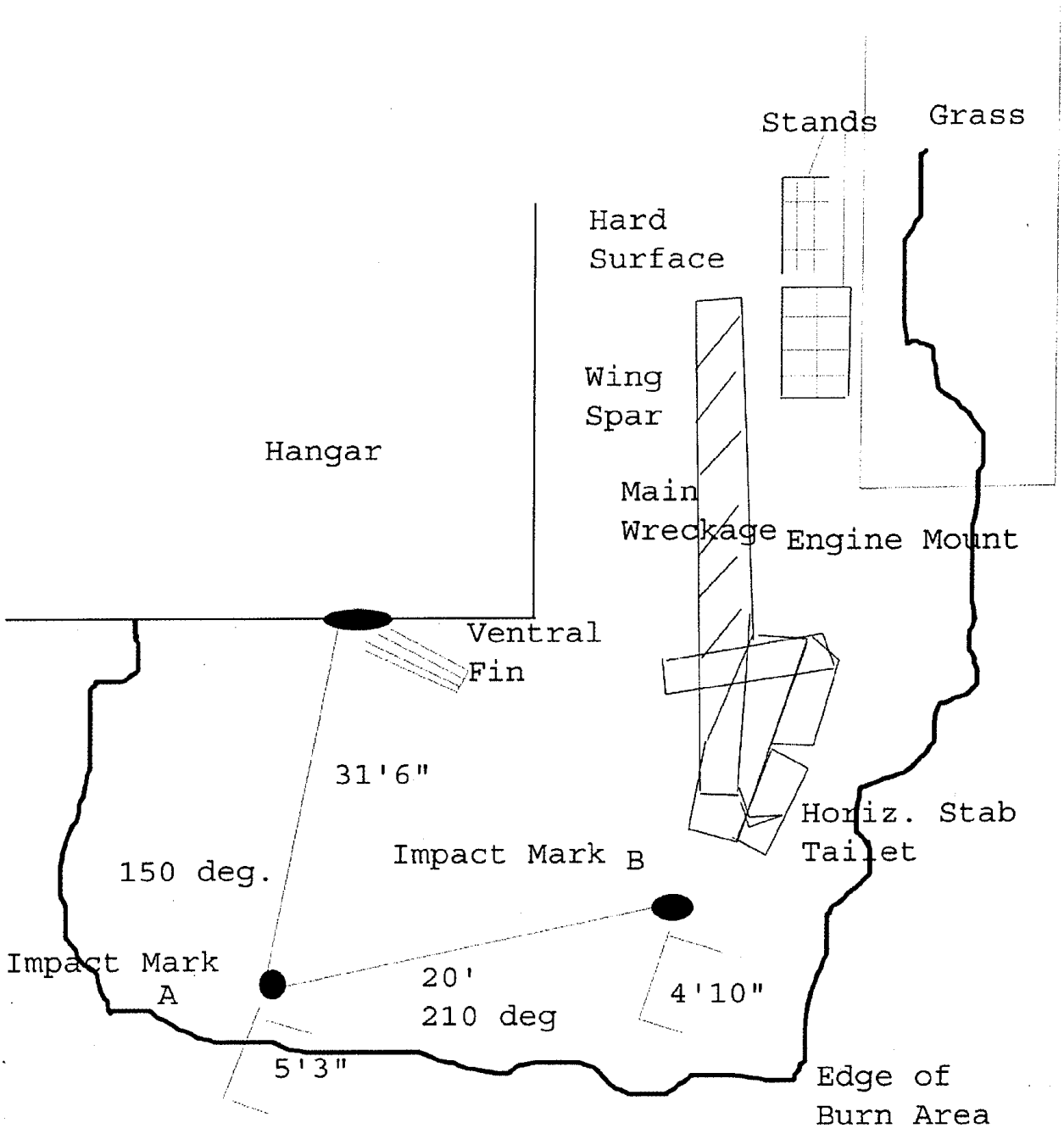
| | | | | | |
|---|---|---|---|---|---|
| 43 | | | | Propeller counterweight | Dsc00770 |
| 44 | | | | Sheet metal segment | Dsc00771 |
| 45 | 5241.454 | 2118.832 | 719.645 | Propeller hub assembly #1 engine | Dsc_0002 |
| 46 | 5239.165 | 2109.004 | 719.689 | Propeller collar #1 engine | Dsc_0003 |
| 47 | 5190.992 | 2091.559 | 719.985 | Propeller counterweight piece | Dsc_0004 |
| 48 | 5237.817 | 2089.678 | 719.656 | Propeller counterweight piece | Dsc_0004 |
| 49 | 5185.492 | 2211.391 | 719.673 | Propeller blade #2 engine | Dsc_0005 |
| 50 | 5299.532 | 2234.018 | 720.99 | Propeller blade | Dsc_0006 |
| 51 | 5423.471 | 2451.519 | 717.336 | Propeller blade #2 engine | Dsc_0007 |
| 52 | 5313.937 | 2071.358 | 711.154 | Propeller piston assembly, #2 engine | Dsc_0008 |
| 53 | 5142.495 | 2212.511 | 719.847 | Partial propeller blade #1 engine | Dsc_0010 |
| 54 | 5191.862 | 2093.019 | 719.984 | Control yoke | Dsc_0011 |
| 55 | 5149.834 | 2217.653 | 719.809 | Right winglet | Dsc_0030 |
| 56 | 5157.817 | 2198.352 | 719.848 | Right elevator counterweight | Dsc_0031 |
| 57 | 5163.334 | 2210.634 | 719.886 | Aft section of ventral fin | Dsc_0032 |
| 58 | 5172.742 | 2174.025 | 719.78 | Ventral fin | Dsc_0033 |
| 59 | 5168.068 | 2152.404 | 719.735 | Propeller blade | Dsc_0034 |
| 60 | 5168.686 | 2167.165 | 719.782 | Fuselage frame section | Dsc_0035 |
| 61 | 5188.554 | 2162.727 | 719.739 | Horizontal stabilizer | Dsc_0036 |
| 62 | 5163.752 | 2104.339 | 719.119 | Partial propeller blade | Dsc_0038 |
| 63 | 5216.811 | 2147.939 | 719.634 | Right main landing gear wheel assembly | Dsc00805 |
| 64 | 5210.737 | 2144.105 | 719.639 | Engine cowling pieces | Dsc_0040 |
| 65 | 5226.055 | 2146.798 | 719.581 | Left forward avionics door | Dsc_0041 |
| 66 | 5220.824 | 2160.547 | 719.606 | Right forward avionics door | Dsc_0042 |
| 67A | 5162.705 | 2120.481 | 719.41 | Left (#1) engine, front | Dsc_0043 |
| 67B | 5165.959 | 2125.131 | 719.508 | Left (#1) engine, back | Dsc_0043 |
| 68A | 5170.189 | 2125.345 | 719.696 | Right (#2) engine, front | Dsc_0044 |
| 68B | 5173.299 | 2128.768 | 720.844 | Right (#2) engine, back | Dsc_0044 |
| 69 | 5134.331 | 2097.743 | 719.222 | Left winglet | Dsc_0045 |
| 70 | 5132.088 | 2092.238 | 719.177 | Right aileron | Dsc_0046 |
| 71 | 5140.237 | 2109.437 | 719.312 | Wing leading edge section | Dsc_0047 |
| 72 | 5115.292 | 2127.393 | 719.69 | Seat track segment | Dsc_0048 |
| 73 | 5079.444 | 2135.628 | 719.713 | Cabin window | Dsc_0049 |
| 74 | 5164.039 | 2065.852 | 720.048 | Fuel shutoff valve | Dsc_0050 |
| 75 | 5177.473 | 2220.725 | 719.698 | Right wingtip lens | Dsc00809 |
| 76 | 5235.573 | 2168.088 | 719.541 | Nose radome cover segment | Dsc00818 |
| 77 | 5238.223 | 2174.879 | 724.371 | Engine cowling | Dsc00815 |
| 78 | | | | Aircraft skin imbedded in tarmac | Dsc00823 |

## ATTACHMENT IV

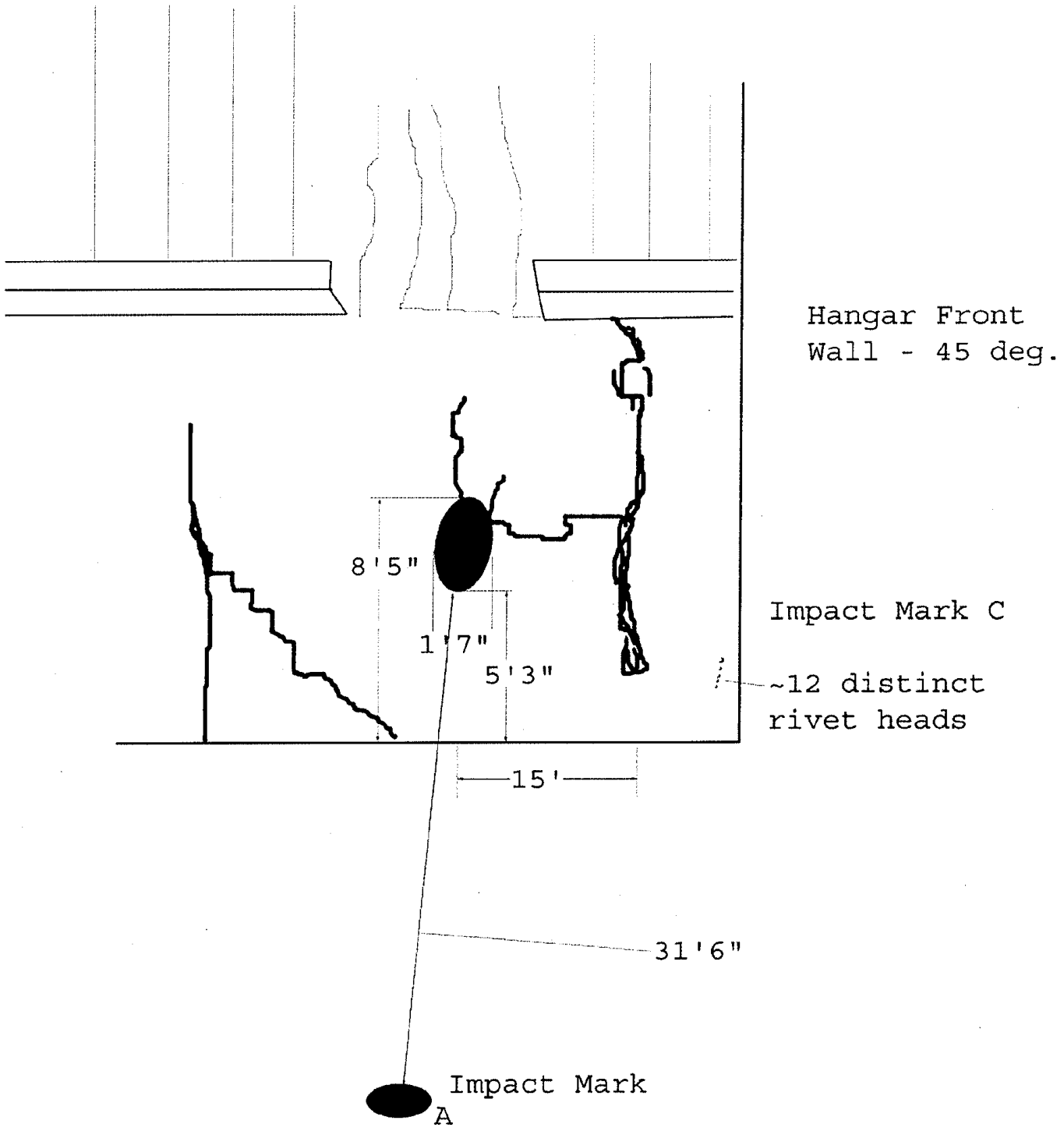
Impact and scrape mark sketches.

# Overhead View

Engines B1900D 17'2" between centerlines




Note: All bearings are relative to magnetic North.
Drawing not to scale.




Note: All bearings are relative to magnetic North.
Drawing not to scale.

## ATTACHMENT V

N233YV Airport Surveillance Radar (ASR) data obtained from the CLT TRACON.

ODS CDR EDITOR LISTING A3.06 .

DATA SELECTED
BT RB

FILTERS
TIME: 01/08/03 13:44:00 - 01/08/03 13:52:00. CONTROLLER:
ALTITUDE: ACID: SUBSYSTEM:
BEACON: 5224 RANGE: AZIMUTH:
ETG: N INTERFACILITY: NON_CONFLICT: N ASSOCIATED: Y UNASSOCIATED: Y
TRACK:
SMART BUFFER LINES PER PAGE: 56 SCAN SUMMARY OFF HEADERS ON SORT BY TIME
SHOW N/A CA DATA BINARY TIME FILTER SEARCH

PC ARTSIIIA CDR Editor

BEACON TARGET REPORTS 1/ 8/03 PAGE 2

| STIME | RANGE | ACP | DEG | QUA | STR | BEACON | ALT | | | SYS | SCAN |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13:45:28.680 | 31 | 0.81 | 3995 | 351 | 7 S | 5224-3 | 7-3 | BT | 0 | 20 | |
| 13:45:33.254 | 31 | 0.81 | 3988 | 351 | 7 S | 5224-3 | 7-3 | BT | 0 | 21 | |
| 13:45:37.901 | 31 | 0.81 | 3982 | 350 | 7 S | 5224-3 | 7-3 | BT | 0 | 22 | |
| 13:45:42.545 | 31 | 0.83 | 3975 | 349 | 7 S | 5224-3 | 7-3 | BT | 0 | 23 | |

RADAR REINFORCED TARGET REPORTS 1/ 8/03 PAGE 2

| STIME | RANGE | ACP | DEG | QUA | STR | BEACON | ALT | | | SYS | SCAN |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13:45:47.143 | 31 | 0.83 | 3967 | 349 | 7 S | 5224-3 | 7-3 | RB | 0 | 24 | |
| 13:45:51.787 | 31 | 0.83 | 3959 | 348 | 7 S | 5224-3 | 7-3 | RB | 0 | 25 | |

BEACON TARGET REPORTS 1/ 8/03 PAGE 2

| STIME | RANGE | ACP | DEG | QUA | STR | BEACON | ALT | | | SYS | SCAN |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13:45:56.383 | 31 | 0.83 | 3951 | 347 | 7 S | 5224-3 | 7-3 | BT | 0 | 26 | |
| 13:46:01.019 | 31 | 0.83 | 3947 | 347 | 7 S | 5224-3 | 7-3 | BT | 0 | 27 | |
| 13:46:05.618 | 31 | 0.83 | 3945 | 347 | 7 S | 5224-3 | 7-3 | BT | 0 | 28 | |
| 13:46:10.269 | 31 | 0.83 | 3944 | 347 | 7 S | 5224-3 | 7-3 | BT | 0 | 29 | |
| 13:46:14.856 | 31 | 0.81 | 3944 | 347 | 7 S | 5224-3 | 7-3 | BT | 0 | 30 | |
| 13:46:19.492 | 31 | 0.83 | 3944 | 347 | 7 S | 5224-3 | 7-3 | BT | 0 | 31 | |
| 13:46:24.096 | 31 | 0.83 | 3943 | 347 | 7 S | 5224-3 | 7-3 | BT | 0 | 32 | |
| 13:46:28.737 | 31 | 0.83 | 3943 | 347 | 7 S | 5224-3 | 7-3 | BT | 0 | 33 | |
| 13:46:33.324 | 31 | 0.80 | 3938 | 346 | 7 S | 5224-3 | 7-3 | BT | 0 | 34 | |

RADAR REINFORCED TARGET REPORTS 1/ 8/03 PAGE 2

| STIME | RANGE | ACP | DEG | QUA | STR | BEACON | ALT | | | SYS | SCAN |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13:46:37.968 | 31 | 0.75 | 3924 | 345 | 7 S | 5224-3 | 7-3 | RB | 0 | 35 | |

BEACON TARGET REPORTS 1/ 8/03 PAGE 2

| STIME | RANGE | ACP | DEG | QUA | STR | BEACON | ALT | | | SYS | SCAN |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13:46:42.449 | 30 | 0.66 | 3898 | 343 | 7 S | 5224-3 | 7-3 | BT | 0 | 36 | |
| 13:46:47.050 | 30 | 0.55 | 3852 | 339 | 7 S | 5224-3 | 7-3 | BT | 0 | 37 | |
| 13:46:51.505 | 29 | 0.42 | 3763 | 331 | 7 S | 5224-3 | 7-3 | BT | 0 | 38 | |

RADAR REINFORCED TARGET REPORTS 1/ 8/03 PAGE 2

| STIME | RANGE | ACP | DEG | QUA | STR | BEACON | ALT | | | SYS | SCAN |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13:46:55.976 | 28 | 0.30 | 3589 | 315 | 7 S | 5224-3 | 7-3 | RB | 0 | 39 | |

BEACON TARGET REPORTS 1/ 8/03 PAGE 2

| STIME | RANGE | ACP | DEG | QUA | STR | BEACON | ALT | | | SYS | SCAN |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13:47:00.156 | 25 | 0.22 | 3248 | 285 | 7 S | 5224-3 | 8-3 | BT | 0 | 40 | |

RADAR REINFORCED TARGET REPORTS 1/ 8/03 PAGE 2

| STIME | RANGE | ACP | DEG | QUA | STR | BEACON | ALT | | | SYS | SCAN |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13:47:04.337 | 22 | 0.23 | 2871 | 252 | 7 S | 5224-3 | 12-3 | RB | 0 | 41 | |

BEACON TARGET REPORTS 1/ 8/03 PAGE 2

| STIME | RANGE | ACP | DEG | QUA | STR | BEACON | ALT | | | SYS | SCAN |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13:47:08.864 | 21 | 0.30 | 2636 | 232 | 7 S | 5224-3 | 16-3 | BT | 0 | 42 | |
| 13:47:13.158 | 19 | 0.33 | 2459 | 216 | 7 S | 5224-3 | 19-3 | BT | 0 | 43 | |

RADAR REINFORCED TARGET REPORTS 1/ 8/03 PAGE 2

| STIME | RANGE | ACP | DEG | QUA | STR | BEACON | ALT | | | SYS | SCAN |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13:47:17.631 | 18 | 0.33 | 2253 | 198 | 7 S | 5224-3 | 17-3 | RB | 0 | 44 | |
| **13:47:21.974** | **16** | **0.38** | **2053** | **180** | **7 S** | **5224-3** | **13-3** | **RB** | **0** | **45** | |

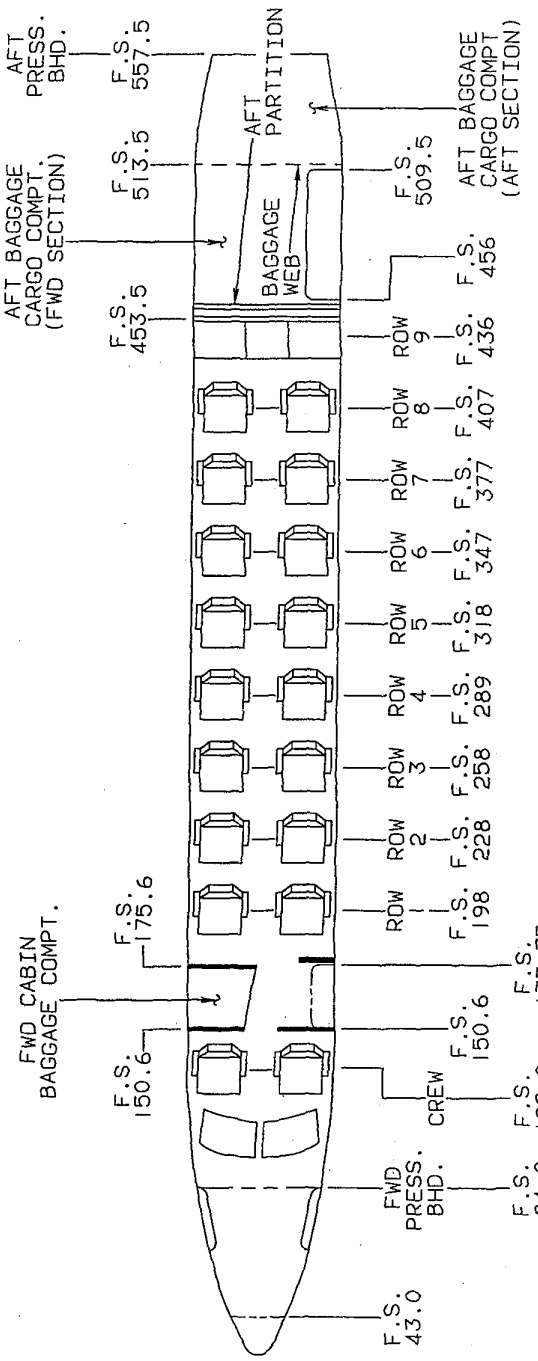
## ATTACHMENT VI

A. Standard seating data for the Raytheon (Beechcraft) 1900D from the airplane flight manual, dated October 1999.

B. Weight and balance data for the Raytheon (Beechcraft) 1900D from the airplane flight manual, dated March 2002.

C. Moment limit data for the Raytheon (Beechcraft) 1900D from the airplane flight manual, dated March 2002.

**(UE-118 AND AFTER)**
**LOADING DATA**
**STANDARD SEATING**




**BAGGAGE/CARGO LOCATION** | **CAPACITY-POUNDS** | **CENTROID (FUSELAGE STATION)**

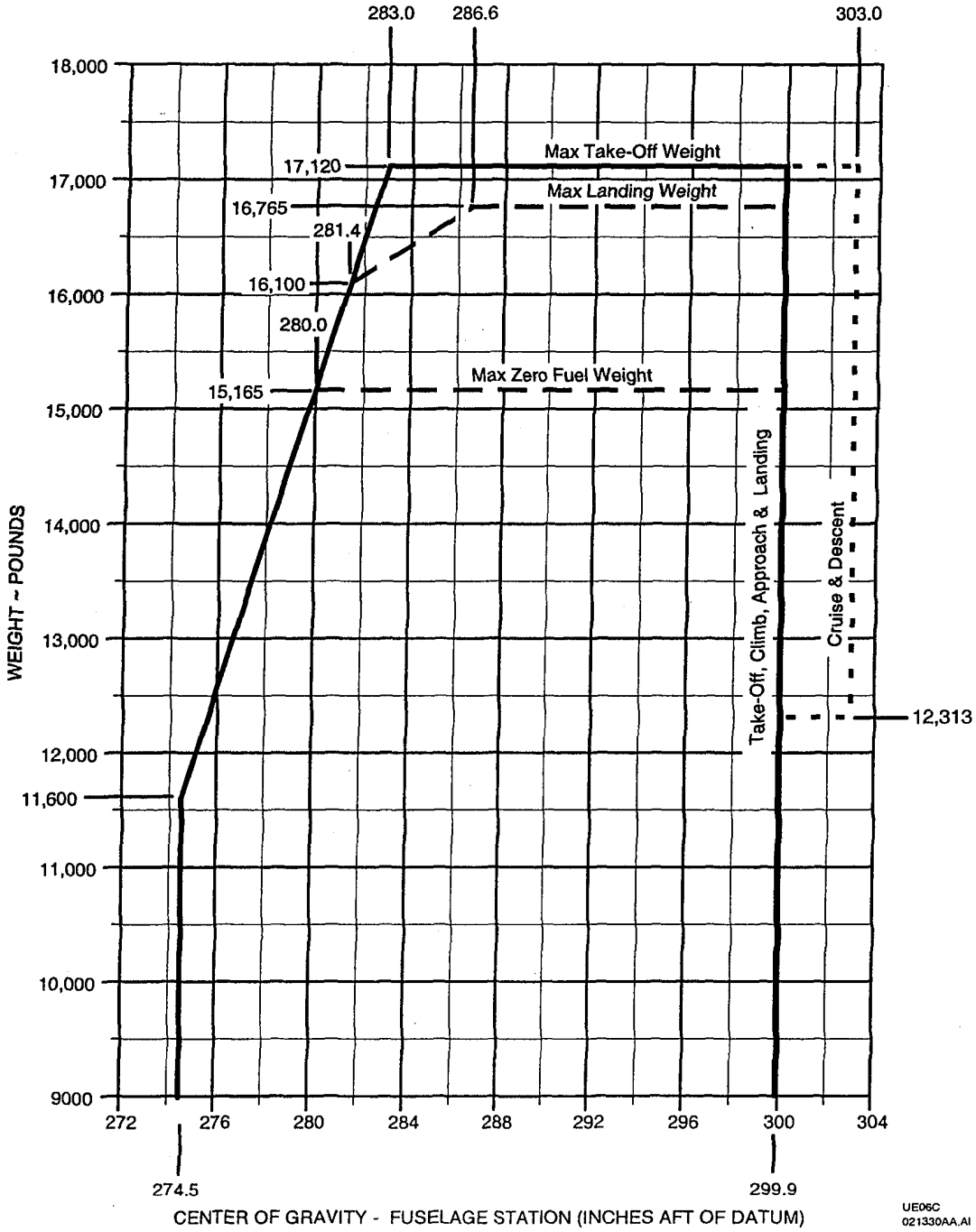
| | | |
|---|---|---|
| FORWARD CABIN BAGGAGE COMPARTMENT (INCLUDES UP TO 100 POUNDS WHICH MAY BE SUSPENDED FROM CLOTHES ROD) | 250 | 163.6 |
| AFT BAGGAGE/CARGO COMPARTMENT - FWD SECTION | 1000 | 483.5 |
| - AFT SECTION | 630 | 533.0 |

**NOTE:**

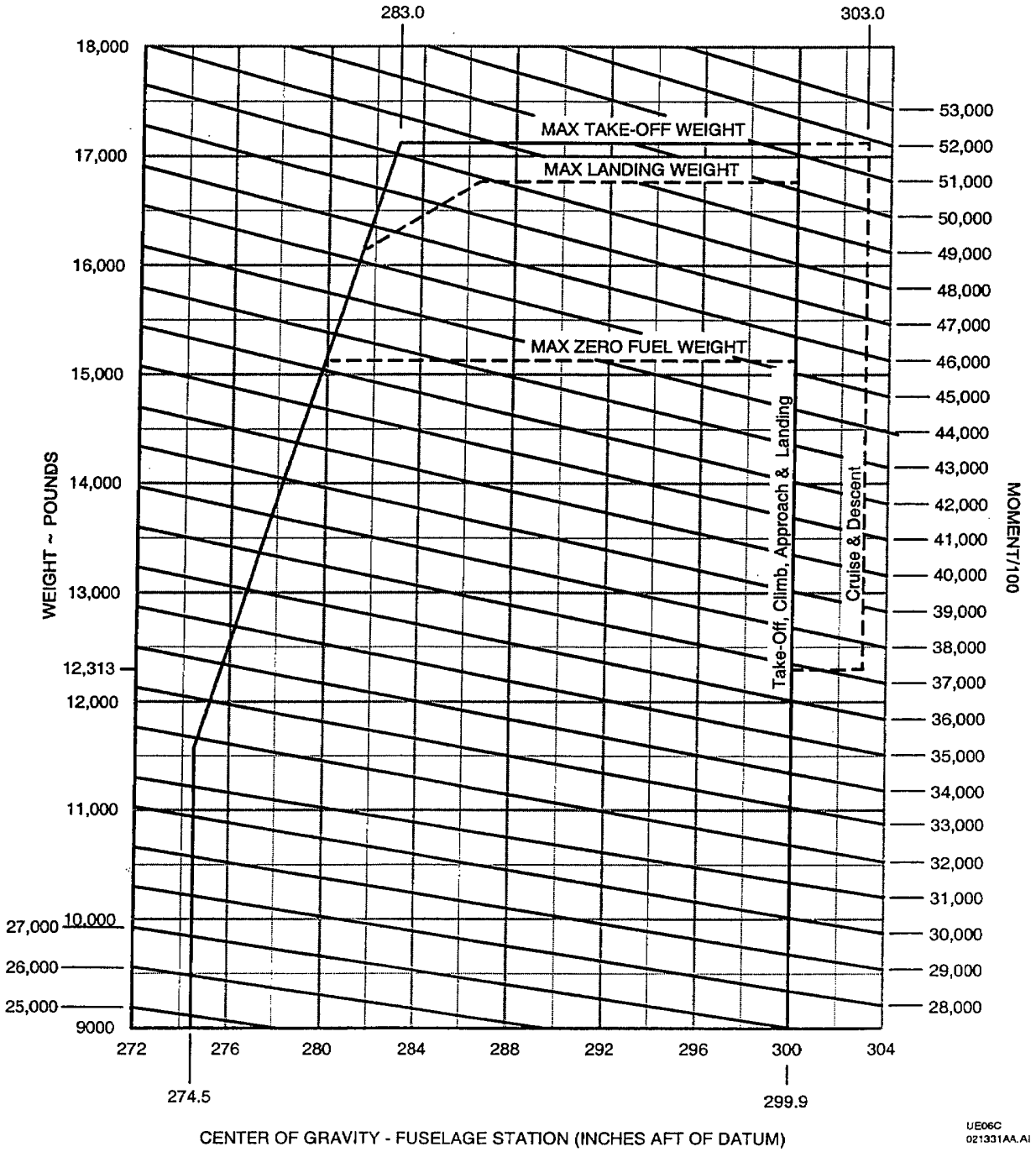
1. FOR COMPARTMENT LOADINGS WHICH RESULT IN ONLY PARTIAL UTILIZATION OF TOTAL COMPARTMENT VOLUME, LOAD ITEMS MUST BE DISTRIBUTED OR SECURED IN A MANNER TO PRECLUDE SHIFTING UNDER NORMALLY ANTICIPATED OPERATING CONDITIONS.

C94UE06C1819 C

## WEIGHT & BALANCE DIAGRAM
## (ENGLISH UNITS)



MOMENT LIMITS VS WEIGHT
(ENGLISH UNITS)



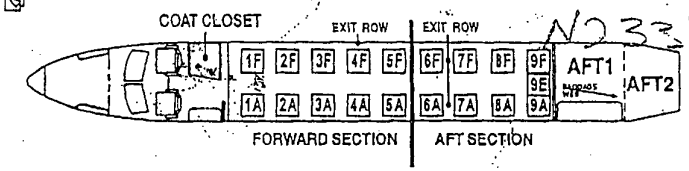
## ATTACHMENT VII

N233YV flight 5481 load manifest, dated January 8, 2003.

004

# air midwest / am. BEECHCRAFT 1900D LOAD MANIFEST

Form F (10/01)



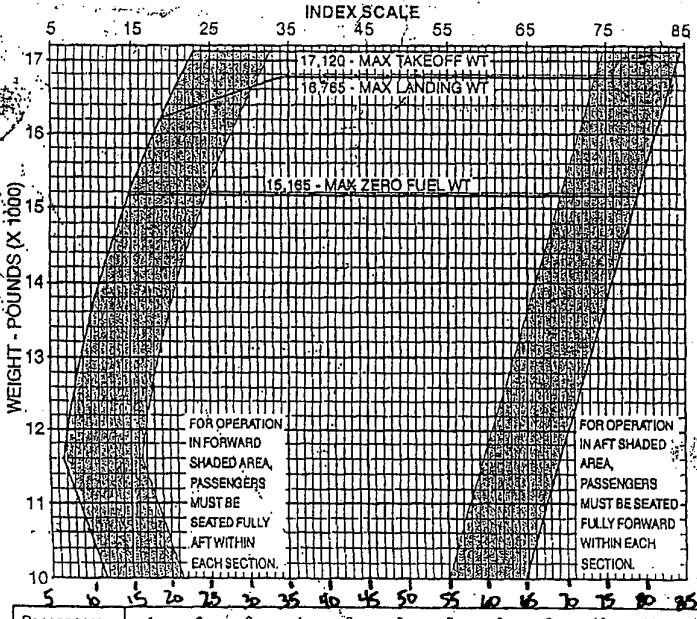

N233Y

## PASSENGERS FORWARD

| PASSENGERS | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | -1 | -2 | -4 | -5 | -6 | -7 | -8 | -9 | -11 | -12 |
| 1 | +4 | +3 | +2 | +1 | -1 | -2 | -3 | -4 | -5 | -7 | -8 |
| 2 | +8 | +7 | +6 | +5 | +4 | +2 | +1 | 0 | -1 | -2 | -4 |
| 3 | +13 | +12 | +11 | +9 | +8 | +7 | +6 | +5 | +4 | +2 | +1 |
| 4 | +17 | +16 | +15 | +13 | +12 | +11 | +10 | +9 | +8 | +6 | +5 |
| 5 | +22 | +21 | +19 | +18 | +17 | +16 | +15 | +13 | +12 | +11 | +10 |
| 6 | +26 | +25 | +23 | +22 | +21 | +20 | +19 | +18 | +16 | +15 | +14 |
| 7 | +31 | +29 | +28 | +27 | +26 | +25 | +23 | +22 | +21 | +20 | +19 |
| 8 | +35 | +33 | +32 | +31 | +30 | +29 | +28 | +26 | +25 | +24 | +23 |
| 9 | +39 | +38 | +36 | +35 | +34 | +33 | +32 | +30 | +29 | +28 | +27 |

| FUEL | |
|---|---|
| WEIGHT (LB) | IND |
| 0 - 174 | +0 |
| 175 - 702 | +1 |
| 703 - 1308 | +2 |
| 1309 - 1892 | +3 |
| 1893 - 2500 | +4 |
| 2501 - 3014 | +5 |
| 3015 - 3426 | +6 |
| 3427 - 3689 | +7 |
| 3690 - 3946 | +8 |
| 3947 - 4199 | +9 |
| 4200 - 4469 | +10 |
| 4470 - 4522 | +11 |

## WEIGHT AND CG ENVELOPE




| CARGO - AFT1 | |
|---|---|
| WEIGHT (LB) | IND |
| 1 - 10 | +0 |
| 11 - 32 | +1 |
| 33 - 54 | +2 |
| 55 - 76 | +3 |
| 77 - 98 | +4 |
| 99 - 120 | +5 |
| 121 - 142 | +6 |
| 143 - 164 | +7 |
| 165 - 186 | +8 |
| 187 - 208 | +9 |
| 209 - 230 | +10 |
| 231 - 252 | +11 |
| 253 - 274 | +12 |
| 275 - 296 | +13 |
| 297 - 318 | +14 |
| 319 - 340 | +15 |
| 341 - 362 | +16 |
| 363 - 384 | +17 |
| 385 - 406 | +18 |
| 407 - 428 | +19 |
| 429 - 450 | +20 |
| 451 - 472 | +21 |
| 473 - 494 | +22 |
| 495 - 516 | +23 |
| 517 - 538 | +24 |
| 539 - 560 | +25 |
| 561 - 582 | +26 |
| 583 - 604 | +27 |
| 605 - 626 | +28 |
| 627 - 648 | +29 |
| 649 - 670 | +30 |
| 671 - 692 | +31 |
| 693 - 714 | +32 |
| 715 - 736 | +33 |
| 737 - 758 | +34 |
| 759 - 780 | +35 |
| 781 - 802 | +36 |
| 803 - 824 | +37 |
| 825 - 846 | +38 |
| 847 - 868 | +39 |
| 869 - 890 | +40 |
| 891 - 912 | +41 |
| 913 - 934 | +42 |
| 935 - 956 | +43 |
| 957 - 978 | +44 |
| 979 - 1000 max | +45 |

| CARGO - AFT2 | |
|---|---|
| WEIGHT (LB) | IND |
| 1 - 8 | +0 |
| 9 - 26 | +1 |
| 27 - 43 | +2 |
| 44 - 61 | +3 |
| 62 - 78 | +4 |
| 79 - 96 | +5 |
| 97 - 114 | +6 |
| 115 - 131 | +7 |
| 132 - 149 | +8 |
| 150 - 166 | +9 |
| 167 - 184 | +10 |
| 185 - 201 | +11 |
| 202 - 219 | +12 |
| 220 - 236 | +13 |
| 237 - 254 | +14 |
| 255 - 272 | +15 |
| 273 - 289 | +16 |
| 290 - 307 | +17 |
| 308 - 324 | +18 |
| 325 - 342 | +19 |
| 343 - 359 | +20 |
| 360 - 377 | +21 |
| 378 - 394 | +22 |
| 395 - 412 | +23 |
| 413 - 429 | +24 |
| 430 - 447 | +25 |
| 448 - 465 | +26 |
| 466 - 482 | +27 |
| 483 - 500 | +28 |
| 501 - 517 | +29 |
| 518 - 535 | +30 |
| 536 - 552 | +31 |
| 553 - 570 | +32 |
| 571 - 587 | +33 |
| 588 - 605 | +34 |
| 606 - 623 | +35 |
| 624 - 630 max | +36 |

| COAT CLOSET | |
|---|---|
| WEIGHT (LB) | IND |
| 0 - 17 | -0 |
| 18 - 51 | -1 |
| 52 - 86 | -2 |
| 87 - 120 | -3 |
| 121 - 155 | -4 |
| 156 - 190 | -5 |
| 191 - 224 | -6 |
| 225 - 250 max | -7 |

| Passengers | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nov-Apr | 175 | 350 | 525 | 700 | 875 | 1050 | 1225 | 1400 | 1575 | 1750 | 1925 | 2100 | 2275 | 2450 | 2625 | 2800 | 2975 | 3150 | 3325 |
| May-Oct | 170 | 340 | 510 | 680 | 850 | 1020 | 1190 | 1360 | 1530 | 1700 | 1870 | 2040 | 2210 | 2380 | 2550 | 2720 | 2890 | 3060 | 3230 |

| Bags | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 25 | 50 | 75 | 100 | 125 | 150 | 175 | 200 | 225 | 250 | 275 | 300 | 325 | 350 | 375 | 400 | 425 | 450 | 475 | 500 | 525 | 550 | 575 | 600 | 625 | 650 | 675 | 700 | 725 | 750 | 775 | 800 | 825 | 850 | 875 | 900 |

DATE 1/08/03 STN CLT FLT 5481 / 1 23:IV

CAPT LESLIE FO GIBBS

| W/B COMPUTATION | WEIGHT | (-) | (+) |
|---|---|---|---|
| OPERATING WEIGHT | 106737 | | 12 |
| PASSENGERS | 33252 | | 27 |
| COAT CLOSET | 10 | 0 | |
| CARGO FWD - AFT1 | 7752 | | 35 |
| CARGO AFT - AFT2 | 4 | | 3 |
| ZFW SUB TOTAL (MAX 15165) | 14875 | | 77 |
| FUEL AT TAKEOFF | 2200 | 0 | 41 |
| GROSS TAKEOFF WEIGHT | 17075 | | 81 |

| CORRECTION 1 | WEIGHT | (-) | (+) |
|---|---|---|---|
| OPERATING WEIGHT | | | |
| PASSENGERS | | | |
| COAT CLOSET | | | |
| CARGO FWD - AFT1 | | | |
| CARGO AFT - AFT2 | | | |
| ZFW SUBTOTAL (MAX 15165) | | | |
| FUEL AT TAKEOFF | | | |
| GROSS TAKEOFF WEIGHT | | | |

TOTAL PASSENGERS 19

ADULTS 18 CHILDREN 1 INFANTS 0

Max GTW 17,120 Dest GSP ETE 00+24

NEXT FUEL PT GSP HOLDOVER TIME BEGAN AT N/A

It has been determined that the center of gravity is within limits according to this loading schedule.

Crew Signature

ON 12:05 IN 12:15 OUT 13:30 OFF

First Flight of the Day Full Power Takeoff made this flight NO

GS Incident No X Yes Explain

25