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

June 21, 1999

Group Chairman's Factual Report - Flight Data Recorder

A. ACCIDENT — DCA98RA013

Location	:	Palembang, Indonesia
Date	:	December 19, 1997
Time	:	About 1614 Local Time
Aircraft	:	Silk Air Flight MI-185, a Boeing B-737-36N, 9V-TRF

B. GROUP IDENTIFICATION

Chairman	:	Thomas R. Jacky, NTSB
Member	:	Erin Gormley, NTSB
Member	:	Professor O. Diran, IIC, Air Accident Investigation Commission, Indonesia
Member	:	Captain Santoso Sayogo, Deputy IIC, Air Accident Investigation Commission, Indonesia
Member	:	Ho See Hai, Civil Aviation Authority Singapore
Member	:	Captain Gui Wee Kee, Civil Aviation Authority Singapore
Member	:	Captain Tan Wee Lee, Civil Aviation Authority Singapore
Member	:	Martin Ingham, Boeing Commercial Airplane Group
Member	:	Fred Rabel, Boeing Commercial Airplane Group
Member	:	Kenneth Kell, Air Accident Investigation Commission

The group met multiple times for the investigation of the aspects of the flight data recorder (FDR). A documentation of the group meetings follows:

1) December 26, 1997 - January 21, 1998: The group convened at NTSB headquarters in Washington, D.C. for the initial readout of the FDR. The readout included waveform recovery attempts and documentation of the damage to the accident tape. In addition, preliminary scans of all the FDR parameters for the entire accident flight, entire 25-hour contents of the FDR, and data at the end of recovered, recorded flight data were conducted. Present during this meeting of the group were representatives of BASI, Civil Aviation Authority of Singapore, Boeing Commercial Airplane Group, and NTSB.

2) January 22, 1998: The group met at the FDR manufacturer facility in Redmond, Washington, for inspection of damage to the FDR tape. Present for this phase of the investigation were representatives of BASI, the Civil Aviation Authority of Singapore, and NTSB.

In addition to the group, the following persons provided additional assistance from the FDR manufacturer:

Greg Francois, Allied Signal
Duncan Schofield, Allied Signal

3) March 8-18, 1998: The group convened at NTSB headquarters in Washington, D.C. for further examination of the damage to the FDR tape. In addition, all FDR parameters throughout the entire contents of the FDR were scanned, and waveform analysis of the accident data reconstruction was accomplished. Present for this phase of the investigation were the group members from BASI and NTSB.

4) March 19-20, 1998: The FDR group convened at the FDR tape media manufacturer, Quantegy, Incorporated, in Opelika, Alabama for examination of the FDR tape and documentation of the damage to the tape. The group members from BASI and NTSB were present. In addition, the following provided assistance from Quantegy:

Bob Parham, Quantegy
George Reynolds, Quantegy
David Hall, Quantegy

5) August 28-29, 1998: Personnel from the Vehicle Recorder Group of the NTSB hand-carried the FDR tape media to Digital Instruments, in Caramel, California. The FDR tape was examined using magnetic force microscopy (mfm) for evidence of residual waveforms in the damaged area. A report of the activities during the activity is included as an attachment to this report.

The following provided assistance from Digital Instruments:

Roger Proksch, Digital Instruments

After this activity, the FDR tape was returned to the Air Accident Investigation Commission of Indonesia.

6) November 30 – December 4, 1998: The group convened at the laboratory of the Bureau Enquites Accidents (BEA) in Paris, France to use an optical recovery technique to observe the original tape media. The group representative from BASI hand-carried the FDR tape to Paris for this group activity. The following provided assistance from the BEA:

7) March 18, 1999: The manufacturer of the tape media in Opelika, Alabama was provided with a sample of FDR tape media similar to that of the accident FDR. In addition, a water sample taken from the Musi River at the accident site was provided for chemical analysis. The tape and water samples were provided to test a specialized technique developed by Quantegy to recover residual magnetic signals on the original tape.

C. SUMMARY

According to airline records, the flight data recorder (FDR), a Sundstrand Data Corporation (SDC - now named Allied Signal Aerospace) Universal Flight Data Recorder (UFDR) part number 980-4100-DXUN, S/N 8577 was fitted to 9V-TRF in June 1997. The accident airplane was delivered from the manufacturer with an Allied Signal Aerospace solid state flight data recorder (SSFDR), part number 980-4700-003; however, the solid-state recorder was removed to provide data for FDR replay software that was being developed by the airline.

The armored casing of the FDR was recovered from the Musi River and transported to the NTSB laboratory immersed in water. Readout of the FDR was accomplished using the laboratory's playback hardware, Sundstrand copy recorder and interface connected to a VAX minicomputer, and software systems, HP9000 hardware running TSB Canada-developed Replay And Presentation System, RAPS.

The transcription of the incident flight was accomplished without significant synchronization loss. The data quality was considered very good when the recorded signal was recovered by the software recovery system, RAPS. Any corruption and dropouts in the data were easily recovered using the waveform recovery facility included in the software. No parameters exhibited sustained or abnormal values. Data plots and tabular listings of pertinent data at the end of recovered FDR data are included in this report.

The FDR's underwater locator beacon (ULB) was found detached from the FDR at the accident site. The ULB was sent the Vehicle Recorder Division's laboratory, then forwarded to its manufacturer, RJE International, Inc. in Irvine, California for further examination, after the ULB failed a status test at the NTSB laboratory. A subsequent report from the manufacturer confirmed that the ULB did not operate due to "water intrusion damage" from broken end cap, from "apparent impact damage".

Transcription of the accident flight and observation of the resultant data determined in the following points:

1) The accident flight, as transcribed, was approximately 34 minutes, 12.4 seconds in duration, from the transition of the Air / Ground discrete parameter from "Ground" to "Air", occurred at 0837:15 Coordinated Universal Time (UTC), or Elapsed Time 1,095 FDR Subframe Reference Number, to the end of recorded data. The last recorded data that could be recovered was recorded at 0911:27.4 UTC, or 3,148.4 FDR Subframe Reference Time. At this time, the airplane was at flight consistent with cruise flight. Why the recorder had ceased to operate could not be determined.

The raw-data, transcription file used for this report represented approximately 53 minutes of aircraft operation. The transcription file included the landing of the leg immediately prior to the accident flight, as well as data following the transition to 25-hour-old data.

The end of data from the previous flight was at 0737:10 UTC, or 297 seconds FDR Subframe Reference Number. The beginning of accident flight data occurred at 0824:00 UTC, or 301 seconds FDR Subframe Reference Number.

2) The 25 hours of recorded data was examined to determine if any excitation of vertical 'g' or abnormality in elevator position could be observed which might suggest control surface flutter. This data was compared with data recorded during an actual elevator flutter event. No excitation or abnormalities in either the elevator position or vertical acceleration data were noted.

3) The data showed that 9V-TRF departed from runway heading of about 248° and took up a heading of approximately 339° and climbed to a cruise altitude of 35,000 feet. The data ceased at about 0911:27.4 UTC, while the aircraft was cruising at an altitude of about 35,000 feet and a latitude/longitude position of about 50.62° North and 22.50° West. Changes in the VHF Left discrete parameter were observed and were correlated with transmissions recorded on ground based Air Traffic Control logging recorder.

4) Comparison of the extracted data from the tape to the physical condition of the and the position of the tape, indicated that approximately 3 inches of tape that would have contained accident flight information was not recovered.

D. DETAILS OF INVESTIGATION

1. Description of Recorded Data

This model FDR records airplane flight information in a digital format onto eight tracks of 1/4-inch Mylar tape. The FDR records 64 words of digital information every second, with each word 12 bits in length. Each grouping of 64 words (each second) is called a subframe. Each subframe has a unique 12-bit synchronization (sync) word identifying it as either subframe 1, 2, 3, or 4. The sync word is the first word in each subframe. Each grouping of consecutive 1, 2, 3 and 4 subframes comprise a frame (i.e., four seconds of

data). The data stream is "in sync" when successive sync words appear at the proper 64-word intervals. Each data parameter (e.g. altitude, heading, airspeed) has a specifically assigned word number within the subframe.

If the data stream is interrupted, the sync words will not appear at the proper interval or sequence and sync will be lost along with the surrounding data. A loss of data synchronization can result from either a mechanical or electrical interruption of the data. Foreign matter between the tape recording medium and the heads during the record or playback process can cause a mechanical interruption. Mechanical interruptions can also be caused by airframe vibration, which can introduce wow and flutter to the tape transport and distort the recorded signal. An interruption of electrical power to the recorder will also interrupt the serial data stream and cause a loss of sync. Finally, an interruption of the serial data stream to the FDR will also cause a loss of synchronization.

FDRs are required to retain the airplane's most recent 25 hours of operation. This is accomplished by erasing the oldest data and replacing it with the newest. The UFDR records onto 8 individual tracks, written bi-directionally. The UFDR records approximately 3 hours of data on each track until reaching end-of-tape sensors, then reverses tape direction, increments the recording track, and writes data in the reverse direction on the tape. Using this method, the FDR records even-numbered tracks in one direction, odd-numbered tracks in the opposite direction.

The UFDR utilizes a data-checking process known as "check-stroke". The data are written onto the FDR tape in 1-second "bursts". The UFDR adds a series of preamble and postamble bits to the beginning and end of each seconds-worth of information. After writing a seconds-worth of data, the tape is stopped, reversed and read for accuracy. The tape is then advanced, past the most recent written second of data, stopped, and then the next second of data is written. By writing the data onto the tape in this manner, a segment of unused or blank tape is created. The segment is known as an inter-record gap. The result of the check-stroke recording method is an alternating pattern of consecutive second's-worth of data, separated by inter-record gaps. The pattern can be viewed optically with the use of a magnetically sensitive fluid. The inter-record gap and each second of data measure about 0.48 inches along the FDR tape.

However, the UFDR's method of operation does not guarantee that the first word written within each second's-worth of data is the synch word; rather than appear at the beginning of each second's-worth of data, the inter-record gap can appear at any point within the 64-word subframe. Therefore, a specific subframe of data will usually bridge an inter-record gap.

The transition from the most recently recorded data to the oldest data is normally detected by examining the recovered data for a discontinuity; for example, a significant change in heading, airspeed or altitude. Another method of determining the data transition is to apply a magnetically sensitive fluid, such as Magnasee, to the tape and examine the tape

for a section of tape without data. This should correspond to the physical distance between the erase and record heads, approximately 3 inches.

The FDR receives a serial binary data stream from the Flight Data Acquisition Unit (FDAU). The FDAU retrieves data sent from various sources (e.g. data buses, analog sensors, etc.) throughout the airplane. The FDAU collects, conditions, and converts these analog and digital signals into the serial data stream. The data stream is then sent to the FDR, which converts the digital data stream into analog, Harvard Bi-Phase waveforms. The waveforms are then recorded on the FDR tape.

The airplane manufacturer provided Boeing document number D6-55333, 737/757/767 Digital Flight Data Acquisition Unit Interface Control and Requirements Document. This document detailed information for converting the recorded information to engineering units. According to manufacturer records, the FDR data was recorded in the Boeing 737-2 aircraft data frame format. A copy of the B737-2 format is included in Attachment 1.

2. Examination and Readout

a. Examination

According to Indonesian investigative officials, the FDR's armored enclosure was retrieved from the accident site (the Musi River) seven days following the accident. The enclosure was hand-carried to the Vehicle Recorder Division's laboratory in Washington, D.C. Since the armored enclosure was not waterproof and was retrieved from the Musi River, the FDR tape media was exposed to water. Therefore the armored enclosure was transported in a beverage cooler, immersed in water.

Upon receipt, the armored enclosure examined for damage. Two of the enclosure's four retaining bolts were broken. In addition, the enclosure was partially opened. The two sheared bolts were on the side of the enclosure nearest the write and erase heads. The partial opening was along the same side as the sheared bolts, and the opening exposed the tape between the two tape reels, near the write and erase heads.

When other portions of the FDR were retrieved from the accident site, the pieces were also transported to the NTSB. The pieces exhibited evidence of impact damage.

The underwater locator beacon (ULB) was also retrieved from the accident site, and was sent to the NTSB. The NTSB then sent the ULBs from the FDR and CVR the manufacturer for further examination. The results of the manufacturer's examination are discussed later in this report.

After opening the FDR's armored enclosure, the position of the tape and reels were noted for future reference. The FDR tape was broken in one place and partially broken in

another place. The segments of tape were wound onto the platform's reel hubs, the hub and tape removed from the transport, and the tape segments transferred to empty 5½-inch tape reels. The segments were spliced together, and the partially torn segment was re-inforced with a splice. The splice was added to prevent further damage to the tape during the readout process. The FDR tape was then cleaned and dried.

b. Readout

The FDR tape was placed onto the NTSB's UFDR Copy Recorder/Interface Unit and wound to the tape position noted upon opening of the armored enclosure. Each of the tape's eight recording tracks (channels) was searched for data consistent with the incident flight, followed by a data transition (from newest to oldest data). Once the transition was discovered (on track 2 of tracks 0 through 7), the tape was repositioned to the area corresponding to the accident flight takeoff, and the entire accident flight transcribed into a computer file for further processing.

The tape was then transferred to the Safety Board's Nagra tape recorder for transcription using the Board's RAPS software. The tape was again positioned to the reference position noted upon opening the tape protective enclosure, and track 2 transcribed around the data transition location. The tape was transcribed several times to attempt to acquire a complete waveform through the accident sequence and transition from newest to oldest data. Also transcribed were data from the previous approach and landing through the end of data.

The transcribed data were reduced from the recorded binary decimal values (0 to 4095) to engineering units (e.g., feet, knots, degrees, etc.) by the conversion formulas obtained from the airplane manufacturer. An automated process that incorporates the laboratory's computer and associated software accomplishes the actual conversion. Elapsed time, or FDR Subframe Reference Number, from the beginning of the data transcription was used as the time base for data output. The FDR also recorded an independent time source derived from the Captain's clock (e.g., Coordinated Universal Time (UTC), or Greenwich Mean Time (GMT)) and a frame counter to provide corroborating timing information.

Inspection of the transcribed data revealed the recorder operated normally, except for several minor synchronization losses throughout the accident flight. Utilizing RAPS' bitwave analysis module, the minor synchronization losses present in both the hardware-recovered data and the initial RAPS recoveries were corrected. The corrected frame data were then combined with the in-sync data to form a composite file. Normal data reduction techniques were then used to convert the composite data to engineering units and discrete values.

3. Description of Damaged Portion of Tape

The data files recovered using the hardware-based system and RAPS ended at approximately the same UTC. However, the files ended at flight data consistent with cruise flight at a pressure altitude of 35,000 feet, at about 0911:00 UTC, several minutes prior to the recorded accident time. The data did not include data consistent with a descent and impact with the ground. Transcription of the segment of FDR tape near the data transition indicated that several inches of the FDR tape were moving past the NAGRA's read heads without corresponding transcribed data.

To examine signal strength of the FDR tape through the data transition area, the tape was played on another NAGRA tape deck into a NTSB signal analysis software package known as WAVES. The software allows waveforms to digitized and analyzed. When track 2 (the accident data track) was read into WAVES, the resulting waveform was plotted. A copy of the plot is included in Attachment 2. The plot 2-1 indicates FDR data, in subframes, across the X-axis of the plot, and relative waveform or signal strength along the Y-axis. The X-axis, in elapsed seconds per tape speed, was chosen in order to maximize the observation of each FDR subframe. Therefore, the time across the X-axis is relative and does not correspond to either FDR Subframe Reference Number or UTC, as transcribed from the FDR tape. Each subframe appears as a black block, with the inter-record gap separating each subframe.

The plot indicated 2 areas of reduced signal strength on the FDR tape within the final recorded seconds of the accident flight. The first reduction occurs at about relative time 21 seconds. Prior to 21 seconds, the accident data were of full, normal relative strength. After 21 seconds, the signal is significantly reduced. The reduced signal strength continues until about relative time 23.8 seconds, where another reduction is noted. The signal is lost at about 24.4 seconds. From 24.4 seconds until about 30.6 seconds, no data is noted, aside from several "bursts" of waveform activity.

As comparison against the other seven tracks of the accident FDR tape, each track was subsequently readout, through the area of the track 2 data transition, using WAVES and plotted. Each of the tracks were relatively aligned against each other and plotted. A copy of the plot, numbered 2-2 is included in Attachment 2.

Each of the FDR tape's 8 tracks, numbered 1-8 (in comparison to the previously-mentioned track numbering convention, track 0 corresponds to this system's track 1, track 7 corresponds to this system's track 8, etc. Therefore, the accident track number 2 is referred to track 3 in this track convention, and is denoted with a star) showed a loss of signal through the damaged segment of tape. Unlike the accident track, in which would contain the transition to old data, and therefore gap of blank tape corresponding to the distance between the erase and write heads, each of the seven non-accident tracks would have data written uninterrupted through the length of tape examined.

As a further comparison, the tape from another UFDR involved in an accident, in which the airplane impacted the Atlantic Ocean, was included as plot 2-3. Four tracks of the

accident tape were readout using WAVES. The tracks were readout in the area of the data transition, and correspond to tape located between the tape reels. Track 2, the accident track, illustrates the gap between the erase and writes heads, for the transition from newest to oldest data. Each of the other tracks plotted show reduced signal strength in the area of the data transition, but not a total loss of signal as indicated by the Silk Air FDR tape.

Examination of the portion of tape between the supply and take-up reels revealed tape that was stiffer and less flexible as the tape in other regions of the hubs. In addition, rather than being flat across the width, the tape appeared to have a bend, or "C-shape" to it. This shape was prevalent in only the portion of the tape between the reels.

Further visual examination of the tape was made using Magnassee, a magnetically sensitive fluid. When the fluid was applied to the non-transcribing segment of tape, there was little or no visual indication of magnetic signal. In other portions of the tape segment, which physically corresponded to tape near the take-up and supply reels, there was a reduced or weakened signal. When the FDR tape was laid lengthwise to examine the entire area of reduced signal, 13 inches of effected tape were measured.

Next, a segment of white leader tape was thread through the accident recorder's tape platform. The leader tape was positioned to correspond to the position of the tape noted at opening of the armored enclosure. The positions of each read head, write head, guide roller and connections to the tape reels were noted.

The exercise determined that the distance of tape between the supply and take-up reel was approximately 13 inches. In addition, the marked leader tape was aligned with the accident tape. The ends of the weak-signaled segment of FDR were aligned with the points on the leader tape where the tape met the reel hubs. When the leader was aligned with the FDR tape, the position of the FDR tape break corresponded to the position of the tape guide roller in the corner of the armored enclosure, the second guide roller encountered by the tape fed from the supply reel.

A drawing of the tape position is included in Attachment 3. The amount of tape on each reel, as indicated by the drawing, is similar to the found position of the tape within the accident UFDR. Noting that the accident flight and data transition was found on track 2, the FDR was moving the tape from the reel with the smaller amount of tape to the reel with the larger amount of tape. The erase and write heads used for track 2 (and all even-numbered tracks) are noted, while the erase and write heads used for the odd-numbered tracks are crossed-out.

Since the length of the damaged FDR tape corresponded to the length of tape between the reels, an estimate was made of the amount of accident flight information damaged or lost. The distances from the track 2 write head to the point where the tape reaches the take-up reel was measured at about 3 inches. Noting that the length of each subframe of data and inter-record gap is about 0.4 inches, approximately 7 or 8 seconds of

data would have been potentially affected. Using the position of the broken tape as a guide, another measurement of the potential damaged accident data was made. The distance from the tape break to the visual end of accident data was 7.75 inches, while the distance from the tape break to the track 2 write head was 4.6 inches. Therefore, the length of accident flight data tape without visible data was determined to be 3.15 inches.

However, the Safety Board did not have the ability to correspond the last data per transcription (i.e., RAPS) to a physical location on the FDR tape. Further efforts were taken to determine the exact amount of lost data within the transcribed data set. Also, efforts were taken to explore whether the loss of signal strength within the segment of damaged tape was indicative of a total loss of signal (e.g. tape erased, corroded, etc) or whether residual waveform still existed, but the Safety Board was unable to read the signals.

To maximize the data transcribed by the NAGRA tape unit into RAPS, the software was adjusted to digitize a large amount of waveform data into computer memory without searching for synchronization words. The segment of tape about the data transition was transcribed in this manner, from an area of readable signal, through the loss of data, into the area of 25-hour old data. This data were recovered to a waveform file and then manually decoded using bitwave analysis.

4. Examination of FDR Tape at FDR Manufacturer's Facility, January 22, 1998

The FDR tape media was hand-carried to the FDR manufacturer in Redmond, Washington on January 22, 1998 to allow the FDR manufacturer personnel to examine the tape.

The examination of the FDR tape by the manufacturer's personnel revealed that in several areas of the tape the oxide had been removed from the Mylar backing, so that light could shine through the tape. The examination also revealed that in several areas of the tape within the take-up or supply reel, the outer edges of the tape appeared to have damage similar to the 13 inches of damaged tape.

Although the manufacturer's personnel noted several locations within the 13 inches of damaged tape where the magnetic oxide was not present on the tape, the personnel was not able to explain the loss of data nor present estimates on how to best recover data that was potentially on the tape.

5. Visit by BASI Representative – Further Reconstruction of Data from Damaged Section of Tape, March 8, 1998

The BASI group member visited the NTSB laboratory in Washington, D.C. for further examination of the FDR tape. In addition, work was completed on the waveform reconstruction at the end of the readable portion of the tape.

Using the large amounts of waveform digitized through the segment of tape corresponding to data transition, the reconstruction of the waveforms was completed. The waveform examination led to procuring accident flight data to the time 0911:27.4 UTC. The end of discernable data occurred during a number 4 subframe, after word 28 of 64.

Although waveform analysis of the data "bursts" between the newest and oldest data determined that the bursts contained data, efforts to detect synch words within the data were unsuccessful. The bursts did not contain enough data to correlate to the valid data. No determination could be made as to whether the data were from the accident flight or 25-hour old data.

6. Examination of Data at End of Recovered Information

Tabular printouts of selected parameters for the final minute of recorded data, from elapsed time 3,081 seconds FDR Subframe Reference Number, to the end of recorded accident data, at 3,148.4 seconds (FDR Subframe Reference Number), are included in Attachment 4. Every parameter recorded by the FDR was included; however, due to a limited amount of parameter space per page, the data were included in multiple data sets. Data from different tabular sets can be aligned by the use of FDR Subframe Reference Number or UTC.

To aid in the examination of the state of the accident airplane's systems at the end of FDR data, several tabular data sets were printed with all parameters from a specific data bus[1]. The data buses (and applicable mnemonics) listed were as follows:

Autothrottle Computer (A/T)
Airborne Vibration Monitor (AVM)
Digital Air Data Computer (DADC)
Engine Indicating System (EIS)
Electronic Flight Instrument System (EFIS)
EFIS Control Panel (EFISCP)
Flight Management Computer (FMC)
Flight Control Computer (FCC)
Inertial Reference Unit (IRU)
Ground Proximity Warning Computer (GPWC)

7. Examination of FDR Tape at Tape Manufacturer's Facility, March 19, 1998

With assistance from the FDR manufacturer, the original tape media was determined to be AMPEX 797, manufactured by Quantegy Corporation, in Opelika, Alabama. The tape

[1] A data bus is a series of hardware or components connected by wiring that measure, condition, and share data. In FDR applications, the Flight Data Acquisition Unit (FDAU) is connected to each data bus and collects data values from the buses as programmed.

media was hand-carried to the manufacturer facility in Opelika, AL on March 19, 1998 for examination of the tape by Quantegy personnel.

The purpose of the trip was to allow Quantegy personnel to examine the tape and provide assistance in determining why there was a large area of no data with further readout of the tape. The manufacturer performed several tests with the tape to provide assessment as to the tape's strength, etc.

The FDR tape was placed on a Kosaka Laboratory, Inc. profilometer (tape surface analyzer) to check the tape's "roughness". The analyzer used a laser to measure the surface of a 1,000-micron x 40-micron segment of the tape. The results of the examination indicated the surface of the FDR tape was similar to normal AMPEX 797 tape.

The tape was then placed on a Zygo Laser measurement platform, which was used to measure the FDR tape width. The tape width was checked near the tape break and compared against a normal segment of the tape. The measurement determined that the width of the tape at the break was similar to the normal tape.

An Instron tension-measuring device was used to determine the modulus of elasticity[2] of the damaged portion of the tape against normal AMPEX 797 tape. An area just beyond the tape break, towards the supply reel, was used for the test. The modulus determined for this segment of the tape was 481 kg/mm^2. The modulus of another segment of the damaged tape, away from the break, was calculated to be 409 kg/mm^2. This modulus value was typical of unstretched AMPEX 797 tape.

The tape was then placed in Quantegy's Scanning Electron Microscope (SEM). Observation of the tape using the SEM revealed many round blisters on the surface of the tape. The blisters occurred in clusters on the damaged portion of the tape. A SEM photo of a group of blisters is included in Attachment 5. Observation of the blisters determined that some of the blisters had "pushed up" the oxide layer of the tape away from the Mylar tape backing. In addition, some of the blisters had been opened, revealing a white powder in the remaining hole in the oxide layer. In other areas, the white powder was not present in the oxide layer hole. These holes allowed light to penetrate through the tape.

To further analyze the blisters, a x-ray analysis of the blisters was accomplished, and compared against a x-ray analysis of normal segment of AMPEX 797 tape. Plots of the resulting x-ray elemental examination are included in Attachment 6.

Plot 6-1, the resultant elemental analysis of the normal AMPEX 797 tape, shows material with a high Iron (elemental symbol Fe) content. However, the elemental analysis of the blister area, plot 6-2 indicated a material low in iron, yet high in sulfur (elemental

[2] The modulus of elasticity for a given material is the ratio of unit stress to unit strain, given in units of forces divided area squared.

symbol S). The Quantegy personnel indicated that the white powder in the blisters was likely a sulfur oxide.

The tape was next replayed using Quantegy's playback equipment and audio amplification. The playback was to examine possible waveform activity in the damaged section of tape. However, Quantegy's efforts were unable to discern any additional magnetic activity in the damaged area of the FDR tape. Further examination of the tape in a VSM detector to measure any remaining magnetic activity in the damaged area did not reveal any.

Finally, Quantegy personnel prepared 3 sample solutions to immerse segments of AMPEX 797 tape into to determine the effect of chemical solutions on signal strength. The 3 samples included a 2% nitric acid, 3% peroxide, and tap water. The tape samples were immersed for 86 hours, then checked for signal loss. The results indicated only a 3% signal loss in the nitric acid solution, and less than 1% for the peroxide and control solutions.

On March 30, 1998, the Safety Board received a letter from Quantegy regarding the visit. The letter contained a synopsis of the visit, the tests done to the accident FDR tape, and options for future tests on the tape. A copy of the March 30, 1998 letter is included in Attachment 7.

8. Examination of FDR Tape at Digital Instruments, August 28-29, 1998

At the suggestion of the personnel at Quantegy, Inc., the FDR tape was hand-carried by Erin Gormley of the NTSB's Vehicle Recorder Division to Digital Instruments of Santa Barbara, California, for further examination. The purpose of the examination was to determine if Magnetic Force Microscopy (MFM), a process to optically view magnetic signals on tape media, would reveal additional, previously unrecovered information from the FDR tape in the damaged portion of the tape.

The MFM instrumentation was used to examine the accident tape in the damaged section of tape.

A copy of the Factual Report of Testing, dated October 23, 1998, developed as a result of the testing, is included in Attachment 8.

9. Examination of FDR Tape at Bureau Enquentes Accidents, November/December, 1998

The tape media was hand-carried by the group member from BASI to the headquarters of the Bureau Enquentes Accidents (BEA), Le Bourget, France on November 30, 1998, for further examination. At the BEA laboratory, the tape was examined using a technique for optically examining magnetic waveform signals on UFDR tapes. The technique, and the microscope used to make the waveforms visible, is known as garnet.

The BEA's garnet microscope was used to examine the portion of the accident that was damaged. The purpose of the examination was to find residual waveform activity that was previously unrecoverable.

The BEA indicated that in the damaged area of the tape, the garnet was unable to determine any additional waveform activity. The report developed by the BEA Garnet examination is included as Attachment 9 of this report.

10. Examination of FDR Underwater Locator Beacon, August, 1998

The FDR faceplate was retrieved from the accident site and sent to the NTSB Vehicle Recorder Laboratory in March 1998. The FDR's underwater locator beacon (ULB), Datasonics part number ELP-362D, serial number 6279 was attached to the faceplate. However, the faceplate was detached from the body of the FDR. The Indonesian investigative officials indicated that when the faceplate was retrieved from the Musi River, the faceplate was detached from the rest of the FDR.

The CVR's ULB, Datasonics part number ELP-362D, serial number 9430, was also retrieved from the Musi River and sent to the NTSB Vehicle Recorder Laboratory. The CVR ULB was not attached to either the CVR faceplate or CVR armored enclosure.

Upon receipt in Washington D.C., the ULBs were tested using an ATS-260 handheld ULB tester. Both ULBs failed the test. Therefore, the ULBs were forwarded to the manufacturer in Irvine, California, for further examination.

In August, 1998, the ULB manufacturer provided the NTSB a Failure Analysis Report of findings. A copy of the report is included in Attachment 10.

11. Further Testing Conducted by the Tape Media Manufacturer, March 1999

The NTSB provided Quantegy, the FDR tape manufacturer, with a sample of AMPEX 797 tape taken from another UFDR unit. In addition, the NTSB provided a sample of the water from the beverage cooler the armored enclosure was transported to the NTSB in.

The purpose of providing the tape and water samples to Quantegy was for additional examination of the water to provide any information as to the cause of the corrosion of the tape. In addition, Quantegy was to use the UFDR tape sample to attempt to degrade the signal on the FDR tape in order to test the viability of using an alternate method to read the waveform on the tape. The method advocated by Quantegy would involve reading the waveform signal from the backside of the tape, through the Mylar tape backing.

The chemical analysis of the river water by Quantegy indicated that the water was not indicative of any corrosive materials. In addition, Quantegy personnel indicated that the "print-through" method would be of dubious merit for further investigative effort.

12. Data Plots

Three plots of selected parameters during the incident flight are included in Attachment 11. Plot 11-1 details performance data for the entire flight, from 1,000 to 3,200 Elapsed Time. Plot 11-2 detail auto-throttle parameters for the time period 0 to 3,200 Elapsed Time, and plot 11-3 details super frame parameters from 1,000 to 3,200 Elapsed Time.

Erroneous and/or out-of-sync data were plotted, therefore care should be used while reading the plots.

13. Examination of Entire Contents of Accident FDR

In order to glean additional information regarding both the loss of FDR data or to help discern any pre-existing flight control problems, particularly the elevators, the entire contents of the FDR were examined.

The entire contents of the FDR were transcribed using the Safety Board's Sundstrand UFDR Interface Unit. The FDR was transcribed at high speed into a computer file on the Safety Board's VAX computer. This file was used for all further examination of the 25-hours.

As transcribed, the FDR recorded approximately 26 hours of airplane operation, including 12 takeoffs and 12 landings.

No significant events were detected in the data that would explain the loss of the FDR data or the accident sequence.

A plot of the entire contents of the FDR is included in Attachment 12. The data covers the elapsed time segment from zero to approximately 93,4000 seconds FDR Subframe Reference Number.

[redacted]

Tom Jacky
Aerospace Engineer

Attachments

1. Boeing FDR Data Frame 737-2
2. WAVES Plots
3. Drawing of UFDR Tape Platform and Tape Damage
4. Tabular Printouts of Silk Air Flight MI-185 Data
5. Photograph of Blisters on Silk Air FDR Tape
6. Plots of Elemental Analysis of Silk Air FDR Tape
7. March 30, 1998 Letter From Quantegy
8. Examination of FDR Tape at Digital Instruments, Factual Report
9. Bureau Enquentes Accidents (BEA) Report of Garnet Inspection of FDR Tape
10. ULB Manufacturer's Failure Analysis Report
11. Accident Flight Data Plots
12. Plot of Entire Contents of FDR

ATTACHMENT 1

Boeing FDR Data Frame 737-2

APPENDIX B
DATA FRAME FORMAT
AIRCRAFT DATA FRAME: 737-2

WORD	S/F	BITS	PARAMETER	PORT	SOURCE	A/C TYPE	COMMENTS	REV
1	1-4	12-1	SYNC WORD					
2	1-4	12-1	VERTICAL ACCELERATION	A 1	ACCEL		SEE NOTE 1D	
3	1-4	12-3	LATERAL ACCELERATION	A 3	ACCEL		SEE NOTE 3D	
		2	LAVATORY SMOKE	B114				B
		1	YAW DAMPER DISENGAGE	B 22	YAW DMPR			
4	1	12-3	THR LEVER ANGLE-RIGHT	D 1	A/T-1			A
	2	12-3	THR LEVER ANGLE-LEFT	D 1	A/T-1			A
	3	12-3	THR LEVER ANGLE-RIGHT	D 1	A/T-1			A
	4	12-3	THR LEVER ANGLE-LEFT	D 1	A/T-1			A
	1-4	2	SLAT 1 MID EXTEND	B 59	L.E. F/S MOD			
		1	AIR/GROUND	B 37	A/G RELAY			
5	1-4	12-1	ELEVATOR POSN-LEFT	A 7	SYNCHRO		SEE NOTE 7D	
6	1-4	12-3	PITCH ANGLE	D10	EFIS L-1	EFIS	SEE NOTE 10C	
		12-3	PITCH ANGLE	D11	EFIS R-1	EFIS	SEE NOTE 10C	
		12-3	PITCH ANGLE	D15	IRU L-1	NONEFIS	SEE NOTE 10C	
		12-3	PITCH ANGLE	D16	IRU R-1	NONEFIS	SEE NOTE 10C	
		2	SLAT 3 MID EXTEND	B 61	L.E. F/S MOD			
		1	VHF RIGHT KEYING	B 4	R VHF			
7	1-4	12-3	N1-LEFT	A27	N1 GAUGE	NONEIS	NOTE 2B, 15D	C
		12-3	N1-LEFT	D17	EIS-P-01	EIS	SEE NOTE 2B	C
		2	MIDDLE MARKER	B 81	LAMP			
		1	OUTER MARKER	B 80	LAMP			
8	1-4	12-3	ROLL ANGLE	D10	EFIS L-1	EFIS	SEE NOTE 10C	
		12-3	ROLL ANGLE	D11	EFIS R-1	EFIS	SEE NOTE 10C	
		12-3	ROLL ANGLE	D15	IRU L-1	NONEFIS	SEE NOTE 10C	
		12-3	ROLL ANGLE	D16	IRU R-1	NONEFIS	SEE NOTE 10C	
		2	TRIM UP MANUAL	B 21	PILOT SW			
		1	TRIM DOWN MANUAL	B 34	PILOT SW			
9	1-4	12-3	ANGLE OF ATTACK	D12	DSWC-L-1			
	1-4	2	HF-LEFT KEYING	B 7	L HF			
	1	1	RIGHT GEAR DOWN	B 9	LAMP			
	2	1	LEFT GEAR DOWN	B 19	LAMP			
	3	1	RIGHT GEAR DOWN	B 9				
	4	1	LEFT GEAR DOWN	B 19				
10	1-4	12-1	VERTICAL ACCELERATION	A 1	ACCEL			
11	1-4	12-3	LONGITUDINAL ACCEL	A13	ACCEL		SEE NOTE 9D	
		2	INNER MARKER	B 79	LAMP			
		1	VHF LEFT KEYING	B 3	L VHF			
12	1-4	12-1	AILERON POSN-LEFT	A10	SYNCHRO		SEE NOTE 8D	
13	1-4	12	V NAV MODE OPER	D 8	FCC R-1		SEE NOTE 10C	
		12	V NAV MODE OPER	D13	FCC L-1		SEE NOTE 10C	
		11	APPROACH	D 8	FCC R-1		SEE NOTE 10C	
		11	APPROACH	D13	FCC L-1		SEE NOTE 10C	
		10	CWS A	D 8	FCC R-1		SEE NOTE 10C	
		10	CWS A	D13	FCC L-1		SEE NOTE 10C	
		9	MCP SPEED	D 8	FCC R-1		SEE NOTE 10C	
		9	MCP SPEED	D13	FCC L-1		SEE NOTE 10C	
		8	SINGLE CHANNEL	D 8	FCC R-1		SEE NOTE 10C	
		8	SINGLE CHANNEL	D13	FCC L-1		SEE NOTE 10C	
		7	V/S MODE	D 8	FCC R-1		SEE NOTE 10C	
		7	V/S MODE	D13	FCC L-1		SEE NOTE 10C	
		6	ALT HOLD	D 8	FCC R-1		SEE NOTE 10C	
		6	ALT HOLD	D13	FCC L-1		SEE NOTE 10C	

APPENDIX B
DATA FRAME FORMAT
AIRCRAFT DATA FRAME: 737-2

WORD	S/F	BITS	PARAMETER	PORT	SOURCE	A/C TYPE	COMMENTS	REV
13	1-4	5	HDG SELECT	D 8	FCC R-1		SEE NOTE 10C	
		5	HDG SELECT	D13	FCC L-1		SEE NOTE 10C	
		4	G/S ENGAGE	D 8	FCC R-1		SEE NOTE 10C	
		4	G/S ENGAGE	D13	FCC L-1		SEE NOTE 10C	
		3	FLARE ENGAGE	D 8	FCC R-1		SEE NOTE 10C	
		3	FLARE ENGAGE	D13	FCC L-1		SEE NOTE 10C	
	1	2	HYD SYS A ENG - 1	B 38	LAMP			
	2	2	NOSE GEAR DOWN	B 20	LAMP			
	3	2	HYD SYS A ENG - 1	B 38				
	4	2	NOSE GEAR DOWN	B 20				
	1-4	1	SLAT 3 FULL EXTEND	B 67	L.E. F/S MOD			
14	1	12-3	T.E. FLAP POSN-LEFT	D13	FCC-L-1			
	2	12-3	DRIFT ANGLE	D14	FMC-08		SEE NOTE 9C	
		12-3	DRIFT ANGLE	D15	IRU L-1		NOTE 9C,10C	
		12-3	DRIFT ANGLE	D16	IRU R-1		NOTE 9C,10C	
	3	12-3	T.E. FLAP POSN-RIGHT	D 8	FCC R-1			
	4	12	ISOLATION VALVE	D 2	FMC-01			
		11	WING ANTI-ICE	D 2	FMC-01			
		10	COWL ANTI-ICE RIGHT	D 2	FMC-01			
		9	COWL ANTI-ICE LEFT	D 2	FMC-01			
		8	ECS PACK H/L RIGHT	D 2	FMC-01			
		7	ECS PACK H/L LEFT	D 2	FMC-01			
		6	ECS PACK ON/OFF RIGHT	D 2	FMC-01			
		5	ECS PACK ON/OFF LEFT	D 2	FMC-01			
		4	ENGINE BLEED NO. 2	D 2	FMC-01			
		3	ENGINE BLEED NO. 1	D 2	FMC-01			
	1-4	2	HF-RIGHT KEYING	B 8	R HF			
		1	VHF CENTER KEYING	B 5	C VHF			
15	1-4	12-3	MAG HEADING	D10	EFIS L-1	EFIS	NOTE 7C,10C	
		12-3	MAG HEADING	D11	EFIS R-1	EFIS	NOTE 7C,10C	
		12-3	MAG HEADING	D15	IRU L-1	NONEFIS	NOTE 7C,10C	
		12-3	MAG HEADING	D16	IRU R-1	NONEFIS	NOTE 7C,10C	
		12-3	TRUE HEADING	D10	EFIS L-1	EFIS	NOTE 7C,10C	
		12-3	TRUE HEADING	D11	EFIS R-1	EFIS	NOTE 7C,10C	
		12-3	TRUE HEADING	D15	IRU L-1	NONEFIS	NOTE 7C,10C	
		12-3	TRUE HEADING	D16	IRU R-1	NONEFIS	NOTE 7C,10C	
		2	TRUE/MAG SWITCH	B 29	TRUE/MAG SW		SEE NOTE 7C	A
		1	ALT FLAPS	B 25	FLAP ALT SW			
16	1-4	12-3	ELEVATION	A61	ILS-L/MLS L	NONEFIS	SEE NOTE 21D	
		12-3	ELEVATION	D10	EFIS L-1	EFIS	NOTE 5C,10C	
		12-3	ELEVATION	D11	EFIS R-1	EFIS	NOTE 5C,10C	
		12-3	GLIDESLOPE DEV	A61	ILS-L/MLS L	NONEFIS	SEE NOTE 21D	
		12-3	GLIDESLOPE DEV	D10	EFIS L-1	EFIS	NOTE 5C,10C	
		12-3	GLIDESLOPE DEV	D11	EFIS R-1	EFIS	NOTE 5C,10C	
		2	T/R DEP R INBOARD	B 16	ENG ACC UNIT			
		1	T/R DEP L OUTBOARD	B 14	ENG ACC UNIT			
17	1-4	12-1	RUDDER POSITION	A20	SYNCHRO		SEE NOTE 13D	
18	1-4	12-1	VERTICAL ACCELERATION	A 1	ACCEL			
19	1-4	12-3	LATERAL ACCELERATION	A 3	ACCEL			
		2	NOSE AIR/GROUND	B 31	A/G RELAY			
		1	T/R UNLOCK L OUTBOARD	B 17	ENG ACC UNIT			
20	1	12	DOWN ADVISORY MSB	D18	TCAS		SEE NOTE 13C	
		11	DOWN ADVISORY LSB+1	D18	TCAS		SEE NOTE 13C	
		10	DOWN ADVISORY LSB	D18	TCAS		SEE NOTE 13C	
		9	UP ADVISORY MSB	D18	TCAS		SEE NOTE 13C	
		8	UP ADVISORY LSB+1	D18	TCAS		SEE NOTE 13C	
		7	UP ADVISORY LSB	D18	TCAS		SEE NOTE 13C	
		6	VERTICAL CONTROL MSB	D18	TCAS		SEE NOTE 13C	

APPENDIX B
DATA FRAME FORMAT
AIRCRAFT DATA FRAME: 737-2

WORD	S/F	BITS	PARAMETER	PORT	SOURCE	A/C TYPE	COMMENTS	REV
20	1	5	VERTICAL CONTROL LSB+1	D18	TCAS		SEE NOTE 13C	
		4	VERTICAL CONTROL LSB	D18	TCAS		SEE NOTE 13C	
		3	COMBINED CONT MSB	D18	TCAS		SEE NOTE 13C	
		2	COMBINED CONT LSB+1	D18	TCAS		SEE NOTE 13C	
		1	COMBINED CONT LSB	D18	TCAS		SEE NOTE 13C	
	2	12	ADV ALT RATE SIGN	D18	TCAS		SEE NOTE 13C	
		11	ADV ALT RATE MSB	D18	TCAS		SEE NOTE 13C	
		10	ADV ALT RATE LSB+4	D18	TCAS		SEE NOTE 13C	
		9	ADV ALT RATE LSB+3	D18	TCAS		SEE NOTE 13C	
		8	ADV ALT RATE LSB+2	D18	TCAS		SEE NOTE 13C	
		7	ADV ALT RATE LSB+1	D18	TCAS		SEE NOTE 13C	
		6	ADV ALT RATE LSB	D18	TCAS		SEE NOTE 13C	
		5	TCAS SL LSB	D18	TCAS		SEE NOTE 13C	
		4	TCAS SL LSB+1	D18	TCAS		SEE NOTE 13C	
		3	TCAS SL MSB	D18	TCAS		SEE NOTE 13C	
		2	REPLY INFORMATION LSB	D18	TCAS		SEE NOTE 13C	
		1	REPLY INFORMATION LSB+1	D18	TCAS		SEE NOTE 13C	
	3	12	DOWN ADVISORY MSB	D18	TCAS		SEE NOTE 13C	A
		11	DOWN ADVISORY LSB+1	D18	TCAS		SEE NOTE 13C	A
		10	DOWN ADVISORY LSB	D18	TCAS		SEE NOTE 13C	A
		9	UP ADVISORY MSB	D18	TCAS		SEE NOTE 13C	A
		8	UP ADVISORY LSB+1	D18	TCAS		SEE NOTE 13C	A
		7	UP ADVISORY LSB	D18	TCAS		SEE NOTE 13C	A
		6	VERTICAL CONTROL MSB	D18	TCAS		SEE NOTE 13C	A
		5	VERTICAL CONTROL LSB+1	D18	TCAS		SEE NOTE 13C	A
		4	VERTICAL CONTROL LSB	D18	TCAS		SEE NOTE 13C	A
		3	COMBINED CONT MSB	D18	TCAS		SEE NOTE 13C	A
		2	COMBINED CONT LSB+1	D18	TCAS		SEE NOTE 13C	A
		1	COMBINED CONT LSB	D18	TCAS		SEE NOTE 13C	A
	4	12	ADV ALT RATE SIGN	D18	TCAS		SEE NOTE 13C	A
		11	ADV ALT RATE MSB	D18	TCAS		SEE NOTE 13C	A
		10	ADV ALT RATE LSB+4	D18	TCAS		SEE NOTE 13C	A
		9	ADV ALT RATE LSB+3	D18	TCAS		SEE NOTE 13C	A
		8	ADV ALT RATE LSB+2	D18	TCAS		SEE NOTE 13C	A
		7	ADV ALT RATE LSB+1	D18	TCAS		SEE NOTE 13C	A
		6	ADV ALT RATE LSB	D18	TCAS		SEE NOTE 13C	A
		5	PILOT SL MSB	D18	TCAS		SEE NOTE 13C	
		4	PILOT SL LSB+1	D18	TCAS		SEE NOTE 13C	
		3	PILOT SL LSB	D18	TCAS		SEE NOTE 13C	
		2	REPLY INFORMATION LSB+2	D18	TCAS		SEE NOTE 13C	
		1	REPLY INFORMATION MSB	D18	TCAS		SEE NOTE 13C	
21	1-4	12-2	CONTROL COLUMN POSN	A 4	SYNCHRO		SEE NOTE 4D	
	1	1	HYD SYS B ENG - 2	B 39	LAMP			
	2	1	EFIS SELECT SW-CAPT	B 27	EFIS SW	EFIS	SEE NOTE 10C	A
		1	SPARE DISC	B 27		NONEFIS		A
	3	1	HYD SYS B ENG - 2	B 39				
	4	1	IRS SELECT SW-CAPT	B 10	IRS SW		SEE NOTE 10C	A
22	1-4	12-3	PITCH ANGLE	D10	EFIS L-1	EFIS	SEE NOTE 10C	
		12-3	PITCH ANGLE	D11	EFIS R-1	EFIS	SEE NOTE 10C	
		12-3	PITCH ANGLE	D15	IRU L-1	NONEFIS	SEE NOTE 10C	A
		12-3	PITCH ANGLE	D16	IRU R-1	NONEFIS	SEE NOTE 10C	A
		2	TRIM UP - A/P	B 33	FCC			
		1	TRIM DOWN - A/P	B 28	FCC			
23	1-4	12-1	PITCH TRIM POSITION	A 2	SYNCHRO		SEE NOTE 2D	
24	1-4	12	WINDSHEAR CAUTION	D 4	GPWC-L-1			
		11	WINDSHEAR	D 4	GPWC-L-1			
		10	TERRAIN PULL UP	D 4	GPWC-L-1			
		9	MINIMUMS	D 4	GPWC-L-1			
		8	GLIDESLOPE	D 4	GPWC-L-1			
		7	TOO LOW TERRAIN	D 4	GPWC-L-1			
		6	TOO LOW FLAP	D 4	GPWC-L-1			

APPENDIX B
DATA FRAME FORMAT
AIRCRAFT DATA FRAME: 737-2

WORD	S/F	BITS	PARAMETER	PORT	SOURCE	A/C TYPE	COMMENTS	REV
24	1-4	5	TOO LOW GEAR	D 4	GPWC-L-1			
		4	DON'T SINK	D 4	GPWC-L-1			
		3	TERRAIN	D 4	GPWC-L-1			
		2	PULL UP	D 4	GPWC-L-1			
		1	SINK RATE	D 4	GPWC-L-1			
25	1-4	12-1	SPD BRK HDL POSN	A15	SYNCHRO		SEE NOTE 10D	
26	1-4	12-1	VERTICAL ACCELERATION	A 1	ACCEL			
27	1-4	12-3	LONGITUDINAL ACCEL	A13	ACCEL			
		2	SLAT 1 FULL EXTEND	B 65	L.E. F/S MOD			
		1	SLAT 2 FULL EXTEND	B 66	L.E. F/S MOD			
28	1-4	12-3	CONTROL WHEEL POSN	A 5	SYNCHRO		SEE NOTE 5D	
		2	STICK SHAKER - LEFT	B101	STALL WRN			
		1	STICK SHAKER - RIGHT	B102	STALL WRN			
29	1-4	12	ENG #1 FIRE	B107	LAMP			
		11	ENG #2 FIRE	B106	LAMP			
		10	APU FIRE	B 32	LAMP			
		9	CABIN ALT > 10kft	B109	PRESS SW			
		8	A/T WARN CAPTAIN	B104	LAMP		"AND" INPUT	
		8	A/T WARN F/O	B103	LAMP		"AND" INPUT	
		7	NOSE GEAR RED WARN	B 44	LAMP			
		6	RIGHT GEAR RED WARN	B 43	LAMP			
		5	LEFT GEAR RED WARN	B108	LAMP			
		4	WHEEL WELL FIRE	B 30	LAMP			
		3	A/P WARN CAPTAIN	B 2	LAMP		"AND" INPUT	
		3	A/P WARN F/O	B110	LAMP		"AND" INPUT	
	1	2	HYD SYS B ELEC	B 41	LAMP			
	2	2	HYD SYS STANDBY	B 42	LAMP			
	3	2	HYD SYS B ELEC	B 41				
	4	2	HYD SYS STANDBY	B 42				
	1-4	1	MASTER CAUTION	B 6	LAMP			
30	1	12-7	PRES POSN LAT-MSData	D14	FMC-08		NOTE 9C,12C	
		12-7	PRES POSN LAT-MSData	D15	IRU L-1		9C,10C,12C	
		12-7	PRES POSN LAT-MSData	D16	IRU R-1		9C,10C,12C	
		6-1	PRES POSN LONG-MSData	D14	FMC-08		NOTE 9C,12C	
		6-1	PRES POSN LONG-MSData	D15	IRU L-1		9C,10C,12C	
		6-1	PRES POSN LONG-MSData	D16	IRU R-1		9C,10C,12C	
	2	12-1	DME DISTANCE-LEFT	D 9	DAA-L-2		SEE NOTE 3B	C
		12-1	DME DISTANCE-LEFT	D25	DME-L		NOTE 3B, 6C	C
	3	12-8	GMT HOURS	D 7	CAPT CLOCK			A
		7-2	GMT MINUTES	D 7	CAPT CLOCK			A
		1	MLS SELECT RIGHT	B 24	MLS SELECT		SEE NOTE 3E	
	4	12-1	DME DISTANCE-RIGHT	D 6	DAA-R-2		SEE NOTE 3B	C
		12-1	DME DISTANCE-RIGHT	D26	DME-R		NOTE 3B, 6C	C
31	1	12-1	PRES POSN LAT-LSData	D14	FMC-08		NOTE 9C,12C	
		12-1	PRES POSN LAT-LSData	D15	IRU L-1		9C,10C,12C	
		12-1	PRES POSN LAT-LSData	D16	IRU R-1		9C,10C,12C	
	2	12-2	MLS CHANNEL RIGHT	D24	MLS R		SEE NOTE 5C	
		12-2	VOR/ILS FREQ-RIGHT	D 6	DAA-R-2		SEE NOTE 5C	
		1	VOR/ILS SELECT-RIGHT	D 6	DAA-R-2			
	3	12-7	GMT SECONDS	D 7	CAPT CLOCK			
		6	DME SOURCE	B116	CONFIG		SEE NOTE 5E	C
		5	FRAME 1/FRAME 2 SEL	B120	CONFIG			C
		4	EFIS/NONEFIS SELECT	B118	CONFIG			C
		3	EIS/NONEIS SELECT	B119	CONFIG			C
		2	91/NOT 91 RULE SEL	B117	CONFIG			C
		1	MLS SELECT LEFT	B 23	MLS SELECT		SEE NOTE 3E	
	4	12-2	MLS CHANNEL LEFT	D23	MLS L		SEE NOTE 5C	
		12-2	VOR/ILS FREQ-LEFT	D 9	DAA-L-2		SEE NOTE 5C	

APPENDIX B
DATA FRAME FORMAT
AIRCRAFT DATA FRAME: 737-2

WORD	S/F	BITS	PARAMETER	PORT	SOURCE	A/C TYPE	COMMENTS	REV
31	4	1	VOR/ILS SELECT-LEFT	D 9	DAA-L-2			
32	1	12-1	PRES POSN LONG-LSData	D14	FMC-08		NOTE 9C,12C	
		12-1	PRES POSN LONG-LSData	D15	IRU L-1		9C,10C,12C	
		12-1	PRES POSN LONG-LSData	D16	IRU R-1		9C,10C,12C	
	2(1)	12-1	BARO COR ALT NO. 1	D 5	DADC-L-4			
	2(2)	12	PAD ZERO					
		11-1	SPEED SELECTED	D13	FCC-L-1			
	2(3)	12-1	BARO COR ALT NO. 2	D 5	DADC-L-4			
	2(4)	12-1	ALTITUDE SELECTED	D13	FCC-L-1			
	2(5)	12-1	HEADING SELECTED	D13	FCC-L-1			
	2(6)	12-1	SELECTED COURSE #1	D13	FCC-L-1			
	2(7)	12-1	DH SELECTED	D10	EFIS L-1	EFIS	SEE NOTE 10C	
		12-1	DH SELECTED	D11	EFIS R-1	EFIS	SEE NOTE 10C	
		12	PAD ZERO			NONEFIS		
		11-1	MIN OP SPEED	D12	DSWC-L-1	NONEFIS		
	2(8)	12-1	SELECTED COURSE #2	D13	FCC-L-1			
	2(9)	12-1	SELECTED MACH	D13	FCC-L-1			
	2(10)	12-1	CONTINUOUS N1 LIMIT #1	D 2	FMC-01			
	2(11)*	12-1	CONTINUOUS N1 LIMIT #2	D 2	FMC-01			
	2(12)	12-1	GO-AROUND N1 LIMIT #1	D 2	FMC-01			
	2(13)	12-1	GO-AROUND N1 LIMIT #2	D 2	FMC-01			
	2(14)	12-1	CRUISE N1 LIMIT #1	D 2	FMC-01			
	2(15)	12-1	CRUISE N1 LIMIT #2	D 2	FMC-01			
	2(16)	12-11	PAD ZERO			EIS	SEE NOTE 10C	A
		10-1	HYD OIL PRESS-B	D22	EIS-S-02	EIS	SEE NOTE 2B	C
	2(16)	12-1	MAX ALLOWABLE AIRSPEED	D 5	DADC-L-4	NONEIS	SEE NOTE 2B	C
	3(1)	12-9	PAD ZERO					
		8-1	LEFT CN1 (FAN) VIB	D 3	AVM L-A-1			
	3(2)	12-9	PAD ZERO					
		8-1	LEFT CN2 (HPC) VIB	D 3	AVM L-A-1			
	3(3)	12-9	PAD ZERO					
		8-1	LEFT TN1 (LPT) VIB	D 3	AVM L-A-1			
	3(4)	12-9	PAD ZERO					
		8-1	LEFT TN2 (HPT) VIB	D 3	AVM L-A-1			
	3(5)	12-9	PAD ZERO					
		8-1	RIGHT CN1 (FAN) VIB	D 3	AVM L-A-1			
	3(6)	12-9	PAD ZERO					
		8-1	RIGHT CN2 (HPC) VIB	D 3	AVM L-A-1			
	3(7)	12-9	PAD ZERO					
		8-1	RIGHT TN1 (LPT) VIB	D 3	AVM L-A-1			
	3(8)	12-9	PAD ZERO					
		8-1	RIGHT TN2 (HPT) VIB	D 3	AVM L-A-1			
	3(9)	12-9	PAD ZERO					
		8-1	LEFT N1 BALANCE ANGLE	D 3	AVM L-A-1			
	3(10)	12-9	PAD ZERO					
		8-1	LEFT N1 BALANCE MASS	D 3	AVM L-A-1			
	3(11)	12-9	PAD ZERO					
		8-1	RIGHT N1 BALANCE ANGLE	D 3	AVM L-A-1			
	3(12)	12-9	PAD ZERO					
		8-1	RIGHT N1 BALANCE MASS	D 3	AVM L-A-1			
	3(13)	12-1	DISTANCE TO GO	D 2	FMC-01			
	3(14)	12	PAD ZERO					
		11-10	DAY MSB	D 7	CAPT CLOCK			A
		9-6	DAY LSB	D 7	CAPT CLOCK			A
		5	MONTH MSB	D 7	CAPT CLOCK			A
		4-1	MONTH LSB	D 7	CAPT CLOCK			A
	3(15)	12-1	GROSS WEIGHT	D 2	FMC-01			
	3(16)	12-1	TOTAL FUEL QUANTITY	D 9	DAA-L-2			
	4	12	PAD ZERO					
		11-3	WIND SPEED	D14	FMC-08		SEE NOTE 9C	
		11-3	WIND SPEED	D15	IRU L-1		NOTE 9C,10C	
		11-3	WIND SPEED	D16	IRU R-1		NOTE 9C,10C	
		2	SPARE DISC	B111				A
		1	SPARE DISC	B112				

APPENDIX B
DATA FRAME FORMAT
AIRCRAFT DATA FRAME: 737-2

WORD	S/F	BITS	PARAMETER	PORT	SOURCE	A/C TYPE	COMMENTS	REV
33	1-4	12-3	COMPUTED AIRSPEED	D 5	DADC-L-4			
		2	SLAT 4 MID EXTEND	B 62	L.E. F/S MOD			
		1	FLAP 1 INTRANSIT	B 45	L.E. F/S MOD			
34	1-4	12-1	VERTICAL ACCELERATION	A 1	ACCEL			
35	1-4	12-3	LATERAL ACCELERATION	A 3	ACCEL			
	1	2	SPARE DISC	B113				
	2	2	HYD SYS A ELEC	B 40	LAMP			
	3	2	SPARE DISC	B113				
	4	2	HYD SYS A ELEC	B 40				
	1-4	1	FLAP 2 EXTEND	B 50	L.E. F/S MOD			
36	1	12-3	WIND DIRECTION TRUE	D14	FMC-08		SEE NOTE 9C	
		12-3	WIND DIRECTION TRUE	D15	IRU L-1		NOTE 9C,10C	
		12-3	WIND DIRECTION TRUE	D16	IRU R-1		NOTE 9C,10C	
	2	12-3	OIL TEMP LEFT	A45	TEMP BULB	NONEIS	NOTE 2B, 20D	C
		12-3	OIL TEMP LEFT	D21	EIS-S-01	EIS	SEE NOTE 2B	C
	3	12	N1 LIMIT MODE	D 2	FMC-01		SEE NOTE 1C	
		11	N1 LIMIT MODE	D 2	FMC-01		SEE NOTE 1C	
		10	N1 LIMIT MODE	D 2	FMC-01		SEE NOTE 1C	
		9	N1 LIMIT MODE	D 2	FMC-01		SEE NOTE 1C	
		8	N1 LIMIT MODE	D 2	FMC-01		SEE NOTE 1C	
		7	PMC LEFT	D 2	FMC-01			
		6	PMC RIGHT	D 2	FMC-01			
		5	SPARE DISC	B 76				
		4	SPARE DISC	B 77				
		3	SPARE DISC	B 78				
	4	12-3	OIL TEMP RIGHT	A46	TEMP BULB	NONEIS	NOTE 2B, 20D	C
		12-3	OIL TEMP RIGHT	D22	EIS-S-02	EIS	SEE NOTE 2B	C
	1-4	2	SLAT 4 FULL EXTEND	B 68	L.E. F/S MOD			
		1	AIR/GROUND	B 37				
37	1-4	12-1	ELEVATOR POSN-RIGHT	A 8	SYNCHRO		SEE NOTE 7D	
38	1-4	12-3	PITCH ANGLE	D10	EFIS L-1	EFIS	SEE NOTE 10C	
		12-3	PITCH ANGLE	D11	EFIS R-1	EFIS	SEE NOTE 10C	
		12-3	PITCH ANGLE	D15	IRU L-1	NONEFIS	SEE NOTE 10C	A
		12-3	PITCH ANGLE	D16	IRU R-1	NONEFIS	SEE NOTE 10C	A
		2	SLAT 6 MID EXTEND	B 64	L.E. F/S MOD			
		1	FLAP 2 INTRANSIT	B 46	L.E. F/S MOD			
39	1-4	12-3	N1-RIGHT	A28	N1 GAUGE	NONEIS	NOTE 2B, 15D	C
		12-3	N1-RIGHT	D17	EIS-P-01	EIS	SEE NOTE 2B	C
		2	FLAP 3 INTRANSIT	B 47	L.E. F/S MOD			
		1	FLAP 4 INTRANSIT	B 48	L.E. F/S MOD			
40	1-4	12-3	ROLL ANGLE	D10	EFIS L-1	EFIS	SEE NOTE 10C	
		12-3	ROLL ANGLE	D11	EFIS R-1	EFIS	SEE NOTE 10C	
		12-3	ROLL ANGLE	D15	IRU L-1	NONEFIS	SEE NOTE 10C	A
		12-3	ROLL ANGLE	D16	IRU R-1	NONEFIS	SEE NOTE 10C	A
		2	ENGINE 1 CUTOFF	B 35	FUEL SW			A
		1	ENGINE 2 CUTOFF	B 36	FUEL SW			A
41	1-4	12-3	ANGLE OF ATTACK	D12	DSWC-L-1			
		2	FLAP 3 EXTEND	B 51	L.E. F/S MOD			
		1	FLAP 4 EXTEND	B 52	L.E. F/S MOD			
42	1-4	12-1	VERTICAL ACCELERATION	A 1	ACCEL			
43	1-4	12-3	LONGITUDINAL ACCEL	A13	ACCEL			
		2	SLAT 6 FULL EXTEND	B 70	L.E. F/S MOD			
		1	SLAT 5 FULL EXTEND	B 69	L.E. F/S MOD			

APPENDIX B
DATA FRAME FORMAT
AIRCRAFT DATA FRAME: 737-2

WORD	S/F	BITS	PARAMETER	PORT	SOURCE	A/C TYPE	COMMENTS	REV
44	1-4	12-1	AILERON POSN-RIGHT	A11	SYNCHRO		SEE NOTE 8D	
45	1	12-3	N2-LEFT	A18	N2 GAUGE	NONEIS	NOTE 2B, 11D	C
		12-3	N2-LEFT	D17	EIS-P-01	EIS	SEE NOTE 2B	C
	2	12-3	FUEL FLOW-LEFT	A33	FF GAUGE	NONEIS	NOTE 2B, 17D	C
		12-3	FUEL FLOW-LEFT	D17	EIS-P-01	EIS	SEE NOTE 2B	C
	3	12-3	N2-RIGHT	A19	N2 GAUGE	NONEIS	NOTE 2B, 11D	C
		12-3	N2-RIGHT	D17	EIS-P-01	EIS	SEE NOTE 2B	C
	4	12-3	FUEL FLOW-RIGHT	A34	FF GAUGE	NONEIS	NOTE 2B, 17D	C
		12-3	FUEL FLOW-RIGHT	D17	EIS-P-01	EIS	SEE NOTE 2B	C
	1-4	2	SLAT 5 INTRANSIT	B 57	L.E. F/S MOD			
		1	SLAT 5 MID EXTEND	B 63	L.E. F/S MOD			
46	1-4	12-3	TOTAL AIR TEMP	D 5	DADC-L-4			
		2	EVENT MARKER (RESV)	B 1	EVENT SW		SEE NOTE 1E	
		1	SLAT 1 INTRANSIT	B 53	L.E. F/S MOD			
47	1-4	12-7	BRAKE PRES ALT-LEFT	A23	PRESS SENSOR		SEE NOTE 14D	
		12-7	BRAKE PRES MAIN-LEFT	A25	PRESS SENSOR		SEE NOTE 14D	
		6-1	BRAKE PRES ALT-RIGHT	A24	PRESS SENSOR		SEE NOTE 14D	
		6-1	BRAKE PRES MAIN-RIGHT	A26	PRESS SENSOR		SEE NOTE 14D	
48	1-4	12-3	AZIMUTH	A62	ILS-L/MLS L	NONEFIS	SEE NOTE 22D	
		12-3	AZIMUTH	D10	EFIS L-1	EFIS	NOTE 5C,10C	
		12-3	AZIMUTH	D11	EFIS R-1	EFIS	NOTE 5C,10C	
		12-3	LOCALIZER DEV	A62	ILS-L/MLS L	NONEFIS	SEE NOTE 22D	
		12-3	LOCALIZER DEV	D10	EFIS L-1	EFIS	NOTE 5C,10C	
		12-3	LOCALIZER DEV	D11	EFIS R-1	EFIS	NOTE 5C,10C	
	1-4	2	LEVEL CHANGE	D 8	FCC R-1		SEE NOTE 10C	
		2	LEVEL CHANGE	D13	FCC L-1		SEE NOTE 10C	
	1-4	1	MAIN/ALT BRAKE SELECT	B100	PRESS SW		SEE NOTE 14D	A
49	1-4	12-2	RUDDER PEDAL POSITION	A 6	SYNCHRO		SEE NOTE 6D	
		1	SLAT 2 MID EXTEND	B 60	L.E. F/S MOD			
50	1-4	12-1	VERTICAL ACCELERATION	A 1	ACCEL			
51	1-4	12-3	LATERAL ACCELERATION	A 3	ACCEL			
		2	NOSE AIR/GROUND	B 31	A/G RELAY			
		1	SLAT 6 INTRANSIT	B 58	L.E. F/S MOD			
52	1-4	12	LOCAL LIMITED MASTER	D 8	FCC R-1		SEE NOTE 10C	
		12	LOCAL LIMITED MASTER	D13	FCC L-1		SEE NOTE 10C	
		11	CWS B	D 8	FCC R-1		SEE NOTE 10C	
		11	CWS B	D13	FCC L-1		SEE NOTE 10C	
		10	CMD B	D 8	FCC R-1		SEE NOTE 10C	
		10	CMD B	D13	FCC L-1		SEE NOTE 10C	
		9	CMD A	D 8	FCC R-1		SEE NOTE 10C	
		9	CMD A	D13	FCC L-1		SEE NOTE 10C	
		8	F/D B ON	D 8	FCC R-1		SEE NOTE 10C	
		8	F/D B ON	D13	FCC L-1		SEE NOTE 10C	
		7	F/D A ON	D 8	FCC R-1		SEE NOTE 10C	
		7	F/D A ON	D13	FCC L-1		SEE NOTE 10C	
		6	CWS ROLL	D 8	FCC R-1		SEE NOTE 10C	
		6	CWS ROLL	D13	FCC L-1		SEE NOTE 10C	
		5	CWS PITCH	D 8	FCC R-1		SEE NOTE 10C	
		5	CWS PITCH	D13	FCC L-1		SEE NOTE 10C	
		4	TO/GA	D 8	FCC R-1		SEE NOTE 10C	
		4	TO/GA	D13	FCC L-1		SEE NOTE 10C	
		3	ALT ACQUIRE	D 8	FCC R-1		SEE NOTE 10C	
		3	ALT ACQUIRE	D13	FCC L-1		SEE NOTE 10C	
		2	SLAT 2 INTRANSIT	B 54	L.E. F/S MOD			
		1	SLAT 4 INTRANSIT	B 56	L.E. F/S MOD			
53	1-4	12-2	CONTROL COLUMN POSN	A 4	SYNCHRO			

APPENDIX B
DATA FRAME FORMAT
AIRCRAFT DATA FRAME: 737-2

WORD	S/F	BITS	PARAMETER	PORT	SOURCE	A/C TYPE	COMMENTS	REV
53	1-4	1	SLAT 3 INTRANSIT	B 55	L.E. F/S MOD			
54	1-4	12-3	PITCH ANGLE	D10	EFIS L-1	EFIS	SEE NOTE 10C	
		12-3	PITCH ANGLE	D11	EFIS R-1	EFIS	SEE NOTE 10C	
		12-3	PITCH ANGLE	D15	IRU L-1	NONEFIS	SEE NOTE 10C	A
		12-3	PITCH ANGLE	D16	IRU R-1	NONEFIS	SEE NOTE 10C	A
		2	A/P OFF	D 8	FCC R-1		SEE NOTE 10C	
		2	A/P OFF	D13	FCC L-1		SEE NOTE 10C	
		1	ON	B105	LAMP	NONEFIS		
		1	SPARE DISC	B105		EFIS		
55	1-4	12-1	RADIO ALTITUDE	A29	RA-L	NONEFIS	SEE NOTE 16D	
		12-1	RADIO HEIGHT	D10	EFIS L-1	EFIS	NOTE 8C,10C	
		12-1	RADIO HEIGHT	D11	EFIS R-1	EFIS	NOTE 8C,10C	
56	1-4	12-2	GROUNDSPEED	D10	EFIS L-1	EFIS	SEE NOTE 10C	
		12-2	GROUNDSPEED	D11	EFIS R-1	EFIS	SEE NOTE 10C	
		12-2	GROUNDSPEED	D14	FMC-08		SEE NOTE 9C	A
		12-2	GROUNDSPEED	D15	IRU L-1		NOTE 9C,10C	A
		12-2	GROUNDSPEED	D16	IRU R-1		NOTE 9C,10C	A
		1	T/R UNLOCK R INBOARD	B 18	ENG ACC UNIT			
57	1-4	12-1	SPD BRK HDL POSN	A15	SYNCHRO			
58	1-4	12-1	VERTICAL ACCELERATION	A 1	ACCEL			
59	1-4	12-3	LONGITUDINAL ACCEL	A13	ACCEL			
		2	A/T MANUAL DISC	B 26	A/T DISC SW		SEE NOTE 4E	
		1	T/R DEP R OUTBOARD	B 15	ENG ACC UNIT			
60	1-4	12-3	CONTROL WHEEL POSN	A 5	SYNCHRO			
		2	T/R UNLOCK R OUTBOARD	B 12	ENG ACC UNIT			
		1	T/R DEP L INBOARD	B 13	ENG ACC UNIT			
61	1	12-3	EGT-LEFT	A35	EGT GAUGE	NONEIS	NOTE 2B, 18D	C
		12-3	EGT-LEFT	D17	EIS-P-01	EIS	SEE NOTE 2B	C
		12	160 MI RANGE SEL CAPT	D19	EFCP-L-1	EFIS		
		11	80 MI RANGE SEL CAPT	D19	EFCP-L-1	EFIS		
		10	40 MI RANGE SEL CAPT	D19	EFCP-L-1	EFIS		
		9	20 MI RANGE SEL CAPT	D19	EFCP-L-1	EFIS		
		8	10 MI RANGE SEL CAPT	D19	EFCP-L-1	EFIS		
		7	WXR DATA CAPT	D19	EFCP-L-1	EFIS		
		6	ILS (STD) MODE SEL CAPT	D19	EFCP-L-1	EFIS		
		5	VOR (STD) MODE SEL CAPT	D19	EFCP-L-1	EFIS		
		4	PLAN MODE SEL CAPT	D19	EFCP-L-1	EFIS		
		3	ILS (MOD) MODE SEL CAPT	D19	EFCP-L-1	EFIS		
	2	12-3	OIL PRESSURE LEFT	A37	OIP GAUGE	NONEIS	NOTE 2B, 19D	C
		12-3	OIL PRESSURE LEFT	D21	EIS-S-01	EIS	SEE NOTE 2B	C
		12	PAD ZERO			EFIS		
		11	FULL COMPASS ROSE CAPT	D19	EFCP-L-1	EFIS		
		10	AIRPORTS CAPT	D19	EFCP-L-1	EFIS		
		9	RTE DATA CAPT	D19	EFCP-L-1	EFIS		
		8	WPT CAPT	D19	EFCP-L-1	EFIS		
		7	NAV AIDS CAPT	D19	EFCP-L-1	EFIS		
		6	SPARE CAPT	D19	EFCP-L-1	EFIS		
		5	NAV MODE SELECTED	D19	EFCP-L-1	EFIS		
		4	VOR (MOD) MODE SEL CAPT	D19	EFCP-L-1	EFIS		
		3	MAP MODE SELECT CAPT	D19	EFCP-L-1	EFIS		
	3	12-3	EGT-RIGHT	A36	EGT GAUGE	NONEIS	NOTE 2B, 18D	C
		12-3	EGT-RIGHT	D17	EIS-P-01	EIS	SEE NOTE 2B	C
		12	160 MI RANGE SEL F/O	D20	EFCP-R-1	EFIS		
		11	80 MI RANGE SEL F/O	D20	EFCP-R-1	EFIS		
		10	40 MI RANGE SEL F/O	D20	EFCP-R-1	EFIS		
		9	20 MI RANGE SEL F/O	D20	EFCP-R-1	EFIS		
		8	10 MI RANGE SEL F/O	D20	EFCP-R-1	EFIS		

APPENDIX B
DATA FRAME FORMAT
AIRCRAFT DATA FRAME: 737-2

WORD	S/F	BITS	PARAMETER	PORT	SOURCE	A/C TYPE	COMMENTS	REV
61	3	7	WXR DATA F/O	D20	EFCP-R-1	EFIS		
		6	ILS (STD) MODE SEL F/O	D20	EFCP-R-1	EFIS		
		5	VOR (STD) MODE SEL F/O	D20	EFCP-R-1	EFIS		
		4	PLAN MODE SEL F/O	D20	EFCP-R-1	EFIS		
		3	ILS (MOD) MODE SEL F/O	D20	EFCP-R-1	EFIS		
	4	12-3	OIL PRESSURE RIGHT	A38	OIP GAUGE	NONEIS	NOTE 2B, 19D	C
		12-3	OIL PRESSURE RIGHT	D22	EIS-S-02	EIS	SEE NOTE 2B	C
		12	PAD ZERO			EFIS		
		11	FULL COMPASS ROSE F/O	D20	EFCP-R-1	EFIS		
		10	AIRPORTS F/O	D20	EFCP-R-1	EFIS		
		9	RTE DATA F/O	D20	EFCP-R-1	EFIS		
		8	WPT F/O	D20	EFCP-R-1	EFIS		
		7	NAV AIDS F/O	D20	EFCP-R-1	EFIS		
		6	SPARE F/O	D20	EFCP-R-1	EFIS		
		5	NAV MODE SELECTED	D20	EFCP-R-1	EFIS		
		4	VOR (MOD) MODE SEL F/O	D20	EFCP-R-1	EFIS		
		3	MAP MODE SELECT F/O	D20	EFCP-R-1	EFIS		
	1-4	2	FLAP 1 EXTEND	B 49	L.E. F/S MOD			
		1	T/R UNLOCK L INBOARD	B 11	ENG ACC UNIT			
62	1-4	12	L NAV MODE OPER	D 8	FCC R-1		SEE NOTE 10C	
		12	L NAV MODE OPER	D13	FCC L-1		SEE NOTE 10C	
		11	VOR/LOC ENGAGE	D 8	FCC R-1		SEE NOTE 10C	
		11	VOR/LOC ENGAGE	D13	FCC L-1		SEE NOTE 10C	
		10	GA	D 1	A/T-1			
		9	MCP SPEED	D 1	A/T-1			
		8	N1	D 1	A/T-1			
		7	RETARD	D 1	A/T-1			
		6	A/T ENGAGE	D 1	A/T-1			
		5	A/T LIMIT	D 1	A/T-1			
		4	MIN SPEED	D 1	A/T-1			
		3-1	ALTITUDE (29.92)	D 5	DADC-L-4		SEE NOTE 3C	
63	1-4	12-1	ALTITUDE (29.92)	D 5	DADC-L-4		SEE NOTE 3C	
64	1	12-1	FRAME COUNTER					
	2(1)	12-1	VENDOR STATUS & DATA					
	2(2)	12-1	VENDOR STATUS & DATA					
	2(3)	12-1	VENDOR STATUS & DATA					
	2(4)	12-1	VENDOR STATUS & DATA					
	2(5)	12-1	VENDOR STATUS & DATA					
	2(6)	12-1	VENDOR STATUS & DATA					
	2(7)	12-1	VENDOR STATUS & DATA					
	2(8)	12-1	VENDOR STATUS & DATA					
	2(9)	12-1	VENDOR STATUS & DATA					
	2(10)	12-1	VENDOR STATUS & DATA					
	2(11)	12-1	VENDOR STATUS & DATA					
	2(12)	12-1	VENDOR STATUS & DATA					
	2(13)	12-1	VENDOR STATUS & DATA					
	2(14)	12-1	VENDOR STATUS & DATA					
	2(15)	12-1	VENDOR STATUS & DATA					
	2(16)	12-1	VENDOR STATUS & DATA					
	3(1)	12-9	S/F CYCLE COUNT 0					
		8-1	FDEP MONTH MSC				SEE NOTE 3F	
	3(2)	12-9	S/F CYCLE COUNT 1					
		8-1	FDEP MONTH LSC				SEE NOTE 3F	
	3(3)	12-9	S/F CYCLE COUNT 2					
		8-1	FDEP DAY MSC				SEE NOTE 3F	
	3(4)	12-9	S/F CYCLE COUNT 3					
		8-1	FDEP DAY LSC				SEE NOTE 3F	
	3(5)	12-9	S/F CYCLE COUNT 4					
		8-1	FDEP DEPART MSC				SEE NOTE 3F	
	3(6)	12-9	S/F CYCLE COUNT 5					
		8-1	FDEP DEPART LSC + 1				SEE NOTE 3F	
	3(7)	12-9	S/F CYCLE COUNT 6					

APPENDIX B
DATA FRAME FORMAT
AIRCRAFT DATA FRAME: 737-2

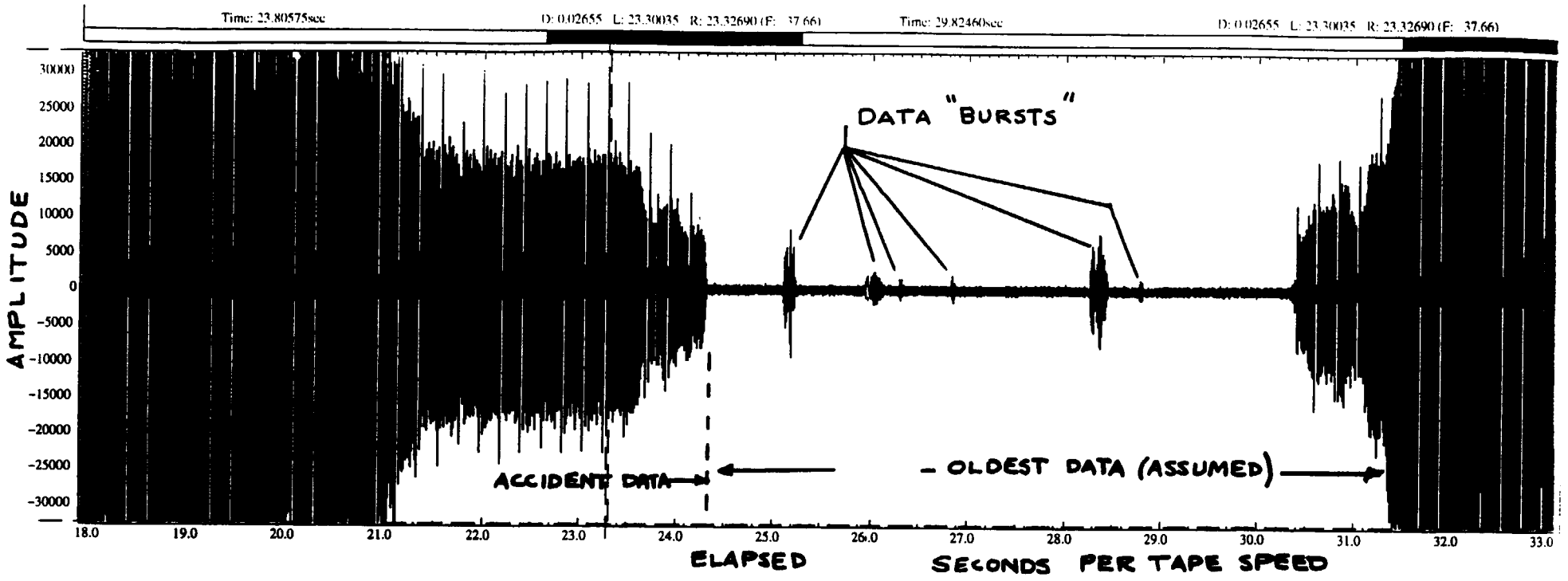
WORD	S/F	BITS	PARAMETER	PORT	SOURCE	A/C TYPE	COMMENTS	REV
64	3(7)	8-1	FDEP DEPART LSC				SEE NOTE 3F	
	3(8)	12-9	S/F CYCLE COUNT 7					
		8-1	FDEP DEST MSC				SEE NOTE 3F	
	3(9)	12-9	S/F CYCLE COUNT 8					
		8-1	FDEP DEST LSC + 1				SEE NOTE 3F	
	3(10)	12-9	S/F CYCLE COUNT 9					
		8-1	FDEP DEST LSC				SEE NOTE 3F	
	3(11)	12-9	S/F CYCLE COUNT 10					
		8-1	FDEP FLT NUMBER MSC				SEE NOTE 3F	
	3(12)	12-9	S/F CYCLE COUNT 11					
		8-1	FDEP FLT NUMBER LSC+2				SEE NOTE 3F	
	3(13)	12-9	S/F CYCLE COUNT 12					
		8-1	FDEP FLT NUMBER LSC+1				SEE NOTE 3F	
	3(14)	12-9	S/F CYCLE COUNT 13					
		8-1	FDEP FLT NUMBER LSC				SEE NOTE 3F	
	3(15)	12-9	S/F CYCLE COUNT 14					
		8-5	FDEP LEG NUMBER				SEE NOTE 3F	
		4	FLEET IDENT MSB	B 91	A/C IDENT			
		3	FLEET IDENT LSB + 2	B 90	A/C IDENT		•	
		2	FLEET IDENT LSB + 1	B 89	A/C IDENT			
		1	FLEET IDENT LSB	B 88	A/C IDENT			
	3(16)	12-9	S/F CYCLE COUNT 15					
		8	A/C NUMBER MSB	B 99	A/C IDENT			
		7	A/C NUMBER LSB + 6	B 98	A/C IDENT			
		6	A/C NUMBER LSB + 5	B 97	A/C IDENT			
		5	A/C NUMBER LSB + 4	B 96	A/C IDENT			
		4	A/C NUMBER LSB + 3	B 95	A/C IDENT			
		3	A/C NUMBER LSB + 2	B 94	A/C IDENT			
		2	A/C NUMBER LSB + 1	B 93	A/C IDENT			
		1	A/C NUMBER LSB	B 92	A/C IDENT			
	4(1)	12	A/C TYPE MSB	B 87	A/C IDENT			
		11	A/C TYPE LSB+4	B 86	A/C IDENT			
		10	A/C TYPE LSB+3	B 85	A/C IDENT			
		9	A/C TYPE LSB+2	B 84	A/C IDENT			
		8	A/C TYPE LSB+1	B 83	A/C IDENT			
		7	A/C TYPE LSB	B 82	A/C IDENT			
		6-1	MANUFACTURER CODE				SEE NOTE 1F	
	4(2)	12-1	MANDATORY S/W P/N CODE				SEE NOTE 2F	
	4(3)	12-1	ACMS S/W P/N CODE				SEE NOTE 2F	
	4(4)	12-1	CLIMB N1 LIMIT #1	D 2	FMC-01			
	4(5)	12-1	CLIMB N1 LIMIT #2	D 2	FMC-01			
	4(6)	12-10	PAD ZERO			EIS	SEE NOTE 2B	C
		9-1	ENG OIL QTY NO. 1	D21	EIS-S-01	EIS	SEE NOTE 2B	C
	4(6)	12-1	IMPACT PRESSURE	D 5	DADC-L-4	NONEIS	SEE NOTE 2B	C
	4(7)	12-10	PAD ZERO			EIS	SEE NOTE 2B	C
		9-1	ENG OIL QTY NO. 2	D22	EIS-S-02	EIS	SEE NOTE 2B	C
	4(7)	12-1	STATIC AIR TEMP	D 5	DADC-L-4	NONEIS	SEE NOTE 2B	C
	4(8)	12-11	PAD ZERO			EIS	SEE NOTE 2B	C
		10-1	HYD OIL PRESS-A	D21	EIS-S-01	EIS	SEE NOTE 2B	C
	4(8)	12-1	STATIC PRESSURE	D 5	DADC-L-4	NONEIS	SEE NOTE 2B	C
	4(9)	12-1	TARGET N1 NO. 1	D 2	FMC-01			
	4(10)	12-1	TARGET N1 NO. 2	D 2	FMC-01			
	4(11)	12-1	N1 BUG DRIVE NO. 1	D 2	FMC-01			
	4(12)	12-1	N1 BUG DRIVE NO. 2	D 2	FMC-01			
	4(13)	12-9	FLIGHT NUMBER MSB	D 2	FMC-01			
		8-5	FLIGHT NUMBER LSB + 2	D 2	FMC-01			
		4-1	FLIGHT NUMBER LSB + 1	D 2	FMC-01			
	4(14)	12-6	PAD ZERO					
		5	FMC/IRU DATA SOURCE		DFDAU		SEE NOTE 4F	
		4-1	FLIGHT NUMBER LSB	D 2	FMC-01			
	4(15)	12-9	PAD ZERO					
		8-5	NDB EFFECTIVITY YR*10	D 2	FMC-01			
		4-1	NDB EFFECTIVITY YR*1	D 2	FMC-01			
	4(16)	12	PAD ZERO					
		11	NDB EFFECTIVITY MN*10	D 2	FMC-01			

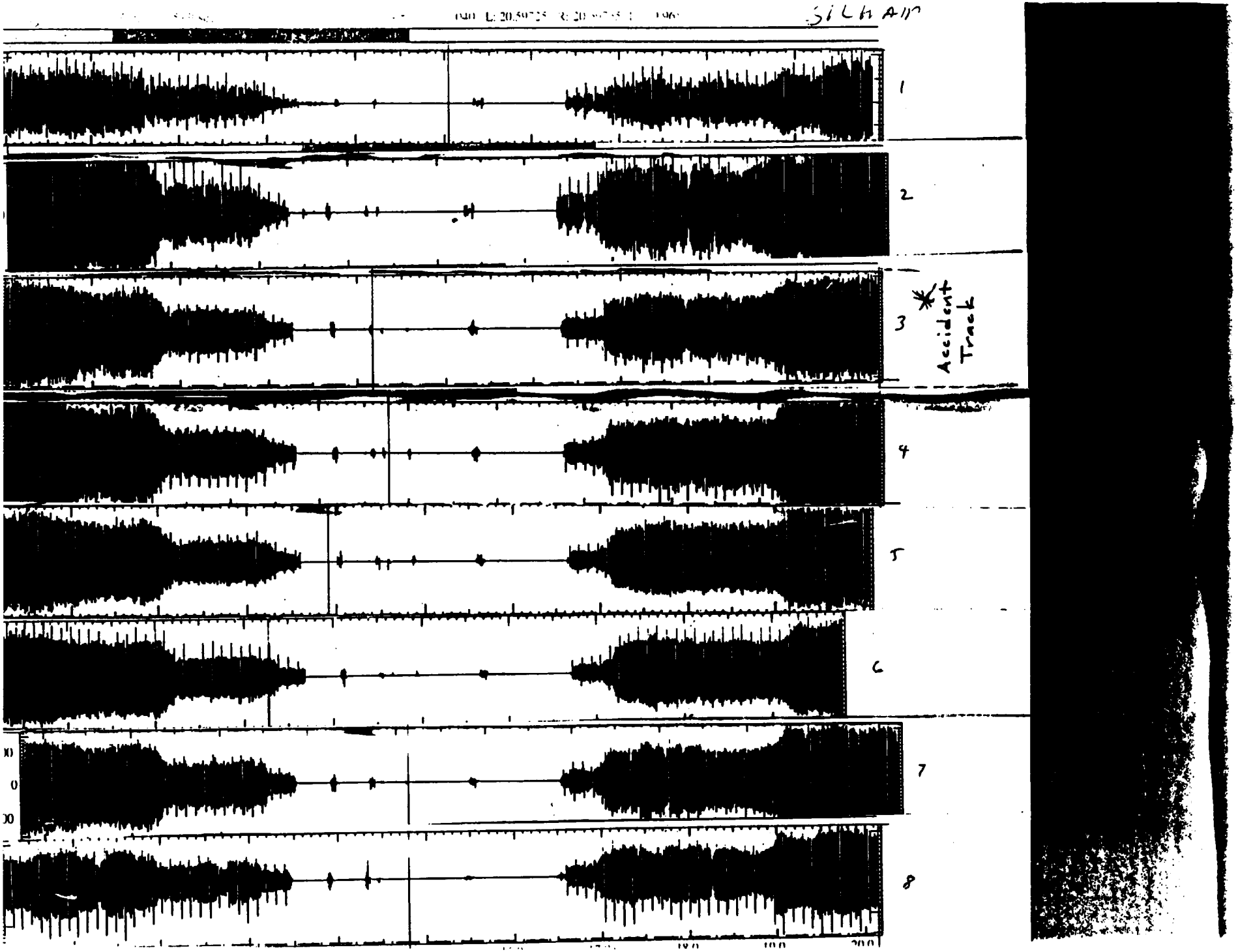
APPENDIX B
DATA FRAME FORMAT
AIRCRAFT DATA FRAME: 737-2

WORD	S/F	BITS	PARAMETER	PORT	SOURCE	A/C TYPE	COMMENTS	REV
64	4(16)	10-7	NDB EFFECTIVITY MN*1	D 2	FMC-01			
		6-5	NDB EFFECTIVITY DAY*10	D 2	FMC-01			
		4-1	NDB EFFECTIVITY DAY*1	D 2	FMC-01			

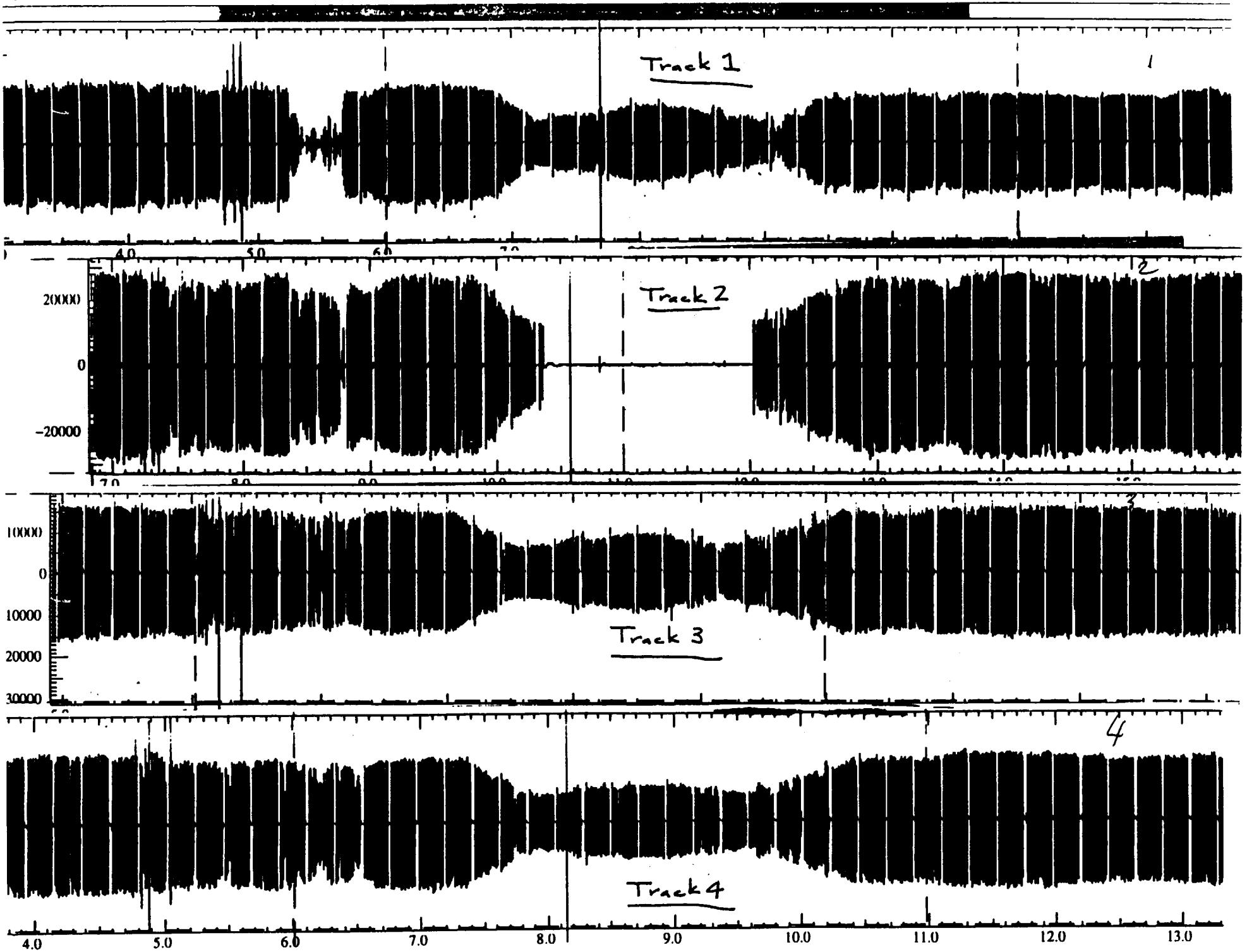
ATTACHMENT 2

WAVES Plots


Time: 23.80575sec
D: 0.02655 L: 23.30035 R: 23.32690 (F: 37.66)
Time: 29.82460sec
D: 0.02655 L: 23.30035 R: 23.32690 (F: 37.66)
AMPLITUDE
30000
25000
20000
15000
10000
5000
0
-5000
-10000
-15000
-20000
-25000
-30000
DATA "BURSTS"
ACCIDENT DATA
OLDEST DATA (ASSUMED)
18.0
19.0
20.0
21.0
22.0
23.0
24.0
25.0
26.0
27.0
28.0
29.0
30.0
31.0
32.0
33.0
ELAPSED SECONDS PER TAPE SPEED

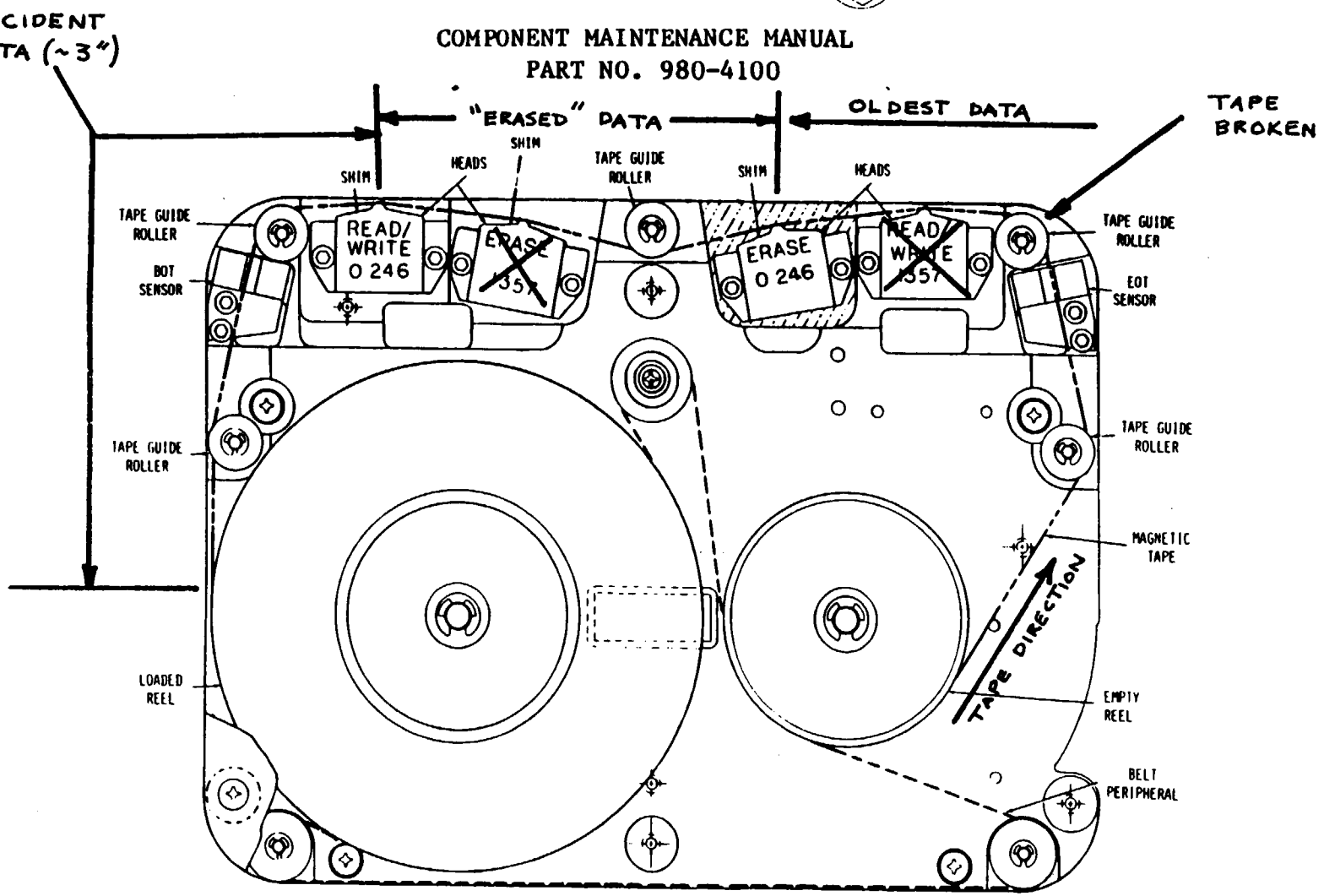

SILHAM
1
2
3
Accident Track
4
5
6
7
8

TWA-500


Track 1
1
4.0
5.0
6.0
Track 2
2
20000
0
-20000
7.0
8.0
9.0
10.0
11.0
12.0
Track 3
3
10000
0
10000
20000
30000
Track 4
4
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0

ATTACHMENT 3

Drawing of UFDR Tape Platform and Tape Damage


ACCIDENT DATA (~3")
"ERASED" DATA
OLDEST DATA
TAPE BROKEN
SHIM
HEADS
SHIM
TAPE GUIDE ROLLER
SHIM
HEADS
TAPE GUIDE ROLLER
READ/ WRITE 0 246
ERASE 357
ERASE 0 246
READ/ WRITE 357
TAPE GUIDE ROLLER
BOT SENSOR
EOT SENSOR
TAPE GUIDE ROLLER
TAPE GUIDE ROLLER
MAGNETIC TAPE
TAPE DIRECTION
LOADED REEL
EMPTY REEL
BELT PERIPHERAL

ATTACHMENT 4

Tabular Printouts of Silk Air Flight MI-185 Data

Silk Air MI-185

Flight Path - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 22, 1999

NTSB Vehicle Recorder Division

FDR Subframe Reference Number	SF No.	ALTITUDE (FEET)	CAS (knots)	Angle of Attack (degs.)	GMT Hours (hrs)	GMT Minutes (min)	GMT Seconds (sec)	Latitude (dd:mm:ss)	Longitude (dd:mm:ss)	Groundspeed (knots)	HEAD (DEG)	Drift Angle (DEG)	ROLL (degs.)	PITCH (degs.)
3081	1	35004	248.5	2.3				S02°43'50.76"	E105°02'44.50"	446.0	339.96		0.00	3.69
				2.5									0.00	3.69
														3.69
														3.69
3082	2	35004	248.5	2.5						446.0	339.96	-1.05	0.00	3.69
				2.5									0.00	3.69
														3.69
														3.69
3083	3	35008	248.5	2.5	9	10	22			446.0	339.96		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3084	4	35008	249.0	2.3						446.0	339.96		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3085	1	35008	249.0	2.3				S02°43'23.57"	E105°02'34.59"	446.0	339.96		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3086	2	35008	249.5	2.3						446.0	339.96	-1.05	0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3087	3	35008	249.5	2.3	9	10	26			446.0	339.96		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3088	4	35008	249.5	2.3						446.0	339.96		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3089	1	35008	249.5	2.3				S02°42'53.91"	E105°02'24.72"	446.0	339.96		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3090	2	35008	249.5	2.3						446.0	339.96	-1.05	0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3091	3	35008	250.0	2.3	9	10	30			446.0	339.96		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3092	4	35008	249.5	2.3						446.0	339.96		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3093	1	35008	249.5	2.3				S02°42'26.72"	E105°02'14.84"	446.0	339.96		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3094	2	35008	250.0	2.3						446.0	339.61	-0.88	0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3095	3	35008	250.0	2.3	9	10	34			446.0	339.61		0.00	3.69
				2.1									0.00	3.69
														3.69
														3.69
3096	4	35008	250.5	2.3						446.0	339.61		-0.35	3.69
				2.3									-0.35	3.69
														3.69
														3.69
3097	1	35004	250.5	2.1				S02°41'59.53"	E105°02'04.94"	446.0	339.61		-0.35	3.69
				2.3									-0.35	3.69
														3.69
														3.69
3098	2	35004	250.5	2.3						446.0	339.61	-0.88	-0.35	3.69
				2.3									-0.35	3.69
														3.69
														3.69
3099	3	35004	250.5	2.3	9	10	38			446.0	339.61		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3100	4	35004	250.0	2.3						446.0	339.61		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69

FDR Subframe Reference Number	SF No.	ALTITUDE (FEET)	CAS (knots)	Angle of Attack (degs.)	GMT Hours (hrs)	GMT Minutes (min)	GMT Seconds (sec)	Latitude (dd:mm:ss)	Longitude (dd:mm:ss)	Groundspeed (knots)	HEAD (DEG)	Drift Angle (DEG)	ROLL (degs.)	PITCH (degs.)
3101	1	35004	250.0	2.3				S02°41'32.33"	E105°01'50.12"	446.0	339.61		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3102	2	35004	250.0	2.3						446.0	339.61	-0.97	0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3103	3	35000	250.0	2.3	9	10	42			446.0	339.96		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3104	4	35004	250.0	2.3						446.0	339.96		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3105	1	35004	250.5	2.3				S02°41'05.14"	E105°01'40.22"	446.0	339.96		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3106	2	35004	250.5	2.3						446.0	339.96	-0.97	0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3107	3	35004	250.5	2.3	9	10	46			446.0	339.96		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3108	4	35008	251.0	2.3						446.0	339.96		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3109	1	35008	251.0	2.1				S02°40'35.48"	E105°01'30.34"	446.0	339.96		0.00	3.69
				2.1									0.00	3.69
														3.69
														3.69
3110	2	35008	251.0	2.1						446.0	339.96	-1.05	0.00	3.69
				2.1									0.00	3.69
														3.69
														3.69
3111	3	35008	251.0	2.1	9	10	50			446.0	339.96		0.00	3.69
				2.1									0.00	3.69
														3.69
														3.69
3112	4	35012	251.0	2.1						446.0	339.96		0.00	3.69
				2.1									0.00	3.69
														3.69
														3.69
3113	1	35012	251.0	2.1				S02°40'08.29"	E105°01'20.44"	446.0	339.96		0.00	3.69
				2.1									0.00	3.69
														3.69
														3.52
3114	2	35008	251.0	2.1						446.0	339.96	-1.05	0.00	3.52
				2.1									0.00	3.52
														3.52
														3.52
3115	3	35008	251.0	2.1	9	10	54			446.0	339.96		0.00	3.52
				2.1									0.00	3.52
														3.52
														3.52
3116	4	35008	251.0	2.1						446.0	339.96		0.00	3.52
				2.1									0.00	3.52
														3.52
														3.52
3117	1	35008	251.0	2.3				S02°39'41.10"	E105°01'10.56"	446.0	339.96		0.00	3.52
				2.1									0.00	3.52
														3.52
														3.52
3118	2	35008	251.0	2.1						446.0	339.96	-1.05	0.00	3.52
				2.1									0.00	3.52
														3.52
														3.52
3119	3	35008	251.0	2.1	9	10	58			446.0	339.96		0.00	3.52
				2.1									0.00	3.52
														3.52
														3.52
3120	4	35008	251.0	2.1						446.0	339.96		0.00	3.52
				2.1									0.00	3.52
														3.52
														3.52

FDR Subframe Reference Number	SF No.	ALTITUDE (FEET)	CAS (knots)	Angle of Attack (degs.)	GMT Hours (hrs)	GMT Minutes (min)	GMT Seconds (sec)	Latitude (dd:mm:ss)	Longitude (dd:mm:ss)	Groundspeed (knots)	HEAD (DEG)	Drift Angle (DEG)	ROLL (degs.)	PITCH (degs.)
3121	1	35008	251.0	2.3				S02°39'13.91"	E105°01'00.69"	446.0	339.96		0.00	3.52
				2.1									0.00	3.52
														3.52
														3.52
3122	2	35008	251.0	2.1						446.0	339.96	-1.14	0.00	3.52
				2.3									0.00	3.52
														3.52
														3.52
3123	3	35004	251.0	2.3	9	11	2			446.0	339.96		0.00	3.52
				2.1									0.00	3.52
														3.52
														3.52
3124	4	35004	251.0	2.3						446.0	339.96		0.00	3.52
				2.3									0.00	3.52
														3.69
														3.69
3125	1	35004	251.5	2.3				S02°38'44.25"	E105°00'50.78"	446.0	339.96		0.00	3.69
				2.3									-0.35	3.69
														3.69
														3.69
3126	2	35004	251.5	2.1						446.0	339.96	-1.05	0.00	3.69
				2.1									0.00	3.69
														3.69
														3.69
3127	3	35004	251.5	2.1	9	11	6			446.0	339.96		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3128	4	35004	251.0	2.1						446.0	339.96		0.00	3.69
				2.3									0.00	3.69
														3.69
														3.69
3129	1	35008	251.0	2.1				S02°38'17.05"	E105°00'35.94"	446.0	339.96		0.00	3.69
				2.1									0.00	3.69
														3.69
														3.69
3130	2	35008	250.5	2.1						446.0	339.96	-0.97	0.00	3.69
				2.1									-0.35	3.69
														3.69
														3.52
3131	3	35008	251.0	2.1	9	11	10			446.0	339.96		-0.35	3.52
				2.1									-0.35	3.52
														3.52
														3.52
3132	4	35008	251.0	2.3						446.0	339.96		0.00	3.52
				2.1									0.00	3.52
														3.52
														3.52
3133	1	35008	251.0	2.3				S02°37'49.86"	E105°00'26.06"	446.0	339.96		0.00	3.52
				2.1									0.00	3.52
														3.52
														3.52
3134	2	35008	251.0	2.3						446.0	339.96	-0.97	0.00	3.52
				2.1									0.00	3.52
														3.52
														3.52
3135	3	35008	250.5	2.3	9	11	14			446.0	339.61		0.00	3.52
				2.3									0.00	3.52
														3.52
														3.52
3136	4	35008	250.5	2.3						446.0	339.61		0.00	3.52
				2.1									-0.35	3.52
														3.52
														3.52
3137	1	35004	251.0	2.3				S02°37'22.67"	E105°00'16.19"	446.0	339.96		-0.35	3.52
				2.1									-0.35	3.52
														3.52
														3.52
3138	2	35008	251.0	2.1						446.0	339.96	-0.97	0.00	3.52
				2.1									0.00	3.52
														3.52
														3.52
3139	3	35004	251.0	2.1	9	11	18			446.0	339.61		0.00	3.52
				2.3									0.00	3.52
														3.52
														3.52
3140	4	35008	251.0	2.3						446.0	339.61		0.00	3.52
				2.1									0.00	3.52
														3.52
														3.52

FDR Subframe Reference Number	SF No.	ALTITUDE (FEET)	CAS (knots)	Angle of Attack (degs.)	GMT Hours (hrs)	GMT Minutes (min)	GMT Seconds (sec)	Latitude (dd:mm:ss)	Longitude (dd:mm:ss)	Groundspeed (knots)	HEAD (DEG)	Drift Angle (DEG)	ROLL (degs.)	PITCH (degs.)
3141	1	35008	250.5	2.3				S02°36'53.01"	E105°00'06.28"	446.0	339.61		0.00	3.52
				2.3									0.00	3.52
														3.52
														3.52
3142	2	35008	250.5	2.3						446.0	339.61	-0.97	-0.35	3.52
				2.1									-0.35	3.52
														3.52
														3.52
3143	3	35004	250.5	2.1	9	11	22			446.0	339.96		-0.35	3.52
				2.1									0.00	3.52
														3.52
														3.52
3144	4	35004	251.0	2.1						446.0	339.96		0.00	3.52
				2.1									0.00	3.52
														3.52
														3.52
3145	1	35004	251.0	2.3				S02°36'25.82"	E104°59'56.44"	446.0	339.96		0.00	3.52
				2.1									0.35	3.52
														3.52
														3.52
3146	2	35004	251.0	2.3						446.0	339.61	-0.97	0.35	3.52
				2.1									0.35	3.52
														3.52
														3.52
3147	3	35004	251.0	2.1	9	11	26			446.0	339.61		0.35	3.52
				2.1									0.00	3.52
														3.52
														3.52
3148														
3149														

Silk Air MI-185

latlng - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 21, 1999

NTSB Vehicle Recorder Division

Silk Air MI-185, latlng - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 21, 1999, NTSB Vehicle Recorder Division

FDR Subframe Reference Number	SF No.	ALTITUDE (FEET)	CAS (knots)	GMT Hours (hrs)	GMT Minutes (min)	GMT Seconds (sec)	VHF KEYING LEFT	Latitude (dd:mm:ss)	Longitude (dd:mm:ss)	Frame Counter (counts)	FDR Frm 1/2	N1 L M Bit 15	N1 L M Bit 17	N1 L M Bit 18	N1 L M Bit 19	N1 L M Bit 20
3081	1	35004	248.5				Not Keye	S02°43'50.8"	E105°02'44.5"	484						
3082	2	35004	248.5				Not Keye									
3083	3	35008	248.5	9.00	10.00	22.00	Not Keye				F-2	0	0	1	0	0
3084	4	35008	249.0				Not Keye									
3085	1	35008	249.0				Not Keye	S02°43'23.6"	E105°02'34.6"	485						
3086	2	35008	249.5				Not Keye									
3087	3	35008	249.5	9.00	10.00	26.00	Keyed				F-2	0	0	1	0	0
3088	4	35008	249.5				Keyed									
3089	1	35008	249.5				Keyed	S02°42'53.9"	E105°02'24.7"	486						
3090	2	35008	249.5				Not Keye									
3091	3	35008	250.0	9.00	10.00	30.00	Not Keye				F-2	0	0	1	0	0
3092	4	35008	249.5				Not Keye									
3093	1	35008	249.5				Not Keye	S02°42'26.7"	E105°02'14.8"	487						
3094	2	35008	250.0				Not Keye									
3095	3	35008	250.0	9.00	10.00	34.00	Not Keye				F-2	0	0	1	0	0
3096	4	35008	250.5				Not Keye									
3097	1	35004	250.5				Not Keye	S02°41'59.5"	E105°02'04.9"	488						
3098	2	35004	250.5				Not Keye									
3099	3	35004	250.5	9.00	10.00	38.00	Not Keye				F-2	0	0	1	0	0
3100	4	35004	250.0				Not Keye									
3101	1	35004	250.0				Not Keye	S02°41'32.3"	E105°01'50.1"	489						
3102	2	35004	250.0				Not Keye									
3103	3	35000	250.0	9.00	10.00	42.00	Not Keye				F-2	0	0	1	0	0
3104	4	35004	250.0				Not Keye									
3105	1	35004	250.5				Not Keye	S02°41'05.1"	E105°01'40.2"	490						
3106	2	35004	250.5				Not Keye									
3107	3	35004	250.5	9.00	10.00	46.00	Not Keye				F-2	0	0	1	0	0
3108	4	35008	251.0				Not Keye									
3109	1	35008	251.0				Not Keye	S02°40'35.5"	E105°01'30.3"	491						
3110	2	35008	251.0				Not Keye									
3111	3	35008	251.0	9.00	10.00	50.00	Not Keye				F-2	0	0	1	0	0
3112	4	35012	251.0				Not Keye									
3113	1	35012	251.0				Not Keye	S02°40'08.3"	E105°01'20.4"	492						
3114	2	35008	251.0				Not Keye									
3115	3	35008	251.0	9.00	10.00	54.00	Not Keye				F-2	0	0	1	0	0
3116	4	35008	251.0				Not Keye									
3117	1	35008	251.0				Not Keye	S02°39'41.1"	E105°01'10.6"	493						
3118	2	35008	251.0				Not Keye									
3119	3	35008	251.0	9.00	10.00	58.00	Not Keye				F-2	0	0	1	0	0
3120	4	35008	251.0				Not Keye									
3121	1	35808	251.0				Not Keye	S02°39'13.9"	E105°01'00.7"	494						
3122	2	35008	251.0				Not Keye									
3123	3	35004	251.0	9.00	11.00	2.00	Not Keye				F-2	0	0	1	0	0
3124	4	35004	251.0				Not Keye									
3125	1	35004	251.5				Not Keye	S02°38'44.2"	E105°00'50.8"	495						
3126	2	35004	251.5				Not Keye									
3127	3	35004	251.5	9.00	11.00	6.00	Not Keye				F-2	0	0	1	0	0
3128	4	35004	251.0				Not Keye									
3129	1	35008	251.0				Not Keye	S02°38'17.1"	E105°00'35.9"	496						
3130	2	35008	250.5				Not Keye									
3131	3	35008	251.0	9.00	11.00	10.00	Not Keye				F-2	0	0	1	0	0
3132	4	35008	251.0				Not Keye									
3133	1	35008	251.0				Not Keye	S02°37'49.9"	E105°00'26.1"	497						
3134	2	35008	251.0				Not Keye									
3135	3	35008	250.5	9.00	11.00	14.00	Not Keye				F-2	0	0	1	0	0
3136	4	35008	250.5				Not Keye									
3137	1	35004	251.0				Not Keye	S02°37'22.7"	E105°00'16.2"	498						
3138	2	35008	251.0				Not Keye									
3139	3	35004	251.0	9.00	11.00	18.00	Not Keye				F-2	0	0	1	0	0
3140	4	35008	251.0				Not Keye									
3141	1	35008	250.5				Not Keye	S02°36'53.0"	E105°00'06.3"	499						
3142	2	35008	250.5				Not Keye									
3143	3	35004	250.5	9.00	11.00	22.00	Not Keye				F-2	0	0	1	0	0
3144	4	35004	251.0				Not Keye									
3145	1	35004	251.0				Not Keye	S02°36'25.8"	E104°59'56.4"	500						
3146	2	35004	251.0				Not Keye									
3147	3	35004	251.0	9.00	11.00	26.00	Not Keye				F-2	0	0	1	0	0
3148	4						Not Keye									
3149																

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NTSB Vehicle Recorder Division

FDR Subframe Reference Number	SF No.	Vert. Accel. (G'S)	Pitch Trim Posn (Units)	LATG (g)	Long. Accel (g)	CCP (degrees)	CWP (degrees)	Rudder Pedal (degrees)	Rudder (degrees)	ELEV POS L (degs)	ELEV POS R (degs)	Aileron Posn - Left (degs.)	Aileron Posn - Right (degs.)	Spd Brk Hdl Posn (degrees)	Brake Pres Alt Left (psi)	Brake Pres Alt Right (psi)	Brake Pres Main L (psi)	Brake Pres Main R (psi)
3081	1	0.995 0.998 0.986 1.000 0.991 1.005 1.000 1.005	4.64	0.008 0.008 0.008 0.006	0.018 0.020 0.018 0.018	1.6 1.6	0.4 0.7	-1.39	-0.73	-2.50	-2.88	1.9	3.6	-0.56 -0.45	165	220	165	220
3082	2	1.000 1.002 1.002 0.998 1.002 1.011 0.995 1.005	4.64	0.008 0.006 0.006 0.008	0.018 0.018 0.018 0.018	1.6 1.6	0.7 0.7	-1.39	-0.81	-2.57	-2.88	1.8	3.7	-0.56 -0.45	110	165	110	165
3083	3	0.986 0.993 1.005 0.998 0.986 0.989 0.995 0.984	4.68	0.006 0.006 0.006 0.008	0.020 0.018 0.016 0.018	1.6 1.6	0.7 0.7	-1.39	-0.73	-2.50	-2.88	1.8	3.6	-0.56 -0.56	110	220	110	220
3084	4	0.993 0.991 0.998 0.998 0.998 0.977 0.995 0.984	4.64	0.004 0.008 0.010 0.006	0.018 0.018 0.018 0.018	1.6 1.6	0.7 0.7	-1.39	-0.81	-2.57	-2.88	1.6	3.7	-0.45 -0.45	165	220	165	220
3085	1	0.989 0.993 0.995 0.986 0.982 0.986 0.991 0.986	4.64	0.010 0.008 0.006 0.010	0.016 0.018 0.018 0.020	1.6 1.6	1.1 0.7	-1.39	-0.89	-2.63	-2.88	1.6	3.7	-0.45 -0.45	110	220	110	220
3086	2	0.982 0.989 0.989 0.979 0.984 0.991 0.991 0.984	4.68	0.006 0.006 0.002 0.006	0.016 0.018 0.018 0.018	1.6 1.6	0.7 0.7	-1.39	-0.73	-2.63	-2.95	1.7	3.6	-0.45 -0.45	165	275	165	275
3087	3	0.984 0.989 0.991 1.002 0.993 0.986 1.000 0.991	4.68	0.010 0.006 0.006 0.004	0.018 0.018 0.016 0.018	1.6 1.6	0.7 0.7	-1.39	-0.81	-2.63	-3.01	1.7	3.7	-0.45 -0.45	165	220	165	220
3088	4	0.989 0.991 0.995 0.991 0.998 1.000 0.995 0.984	4.64	0.004 0.010 0.004 0.006	0.018 0.018 0.018 0.014	1.6 1.6	1.1 1.1	-1.39	-0.81	-2.63	-2.95	1.7	3.7	-0.56 -0.56	110	220	110	220
3089	1	0.989 0.986 0.984 0.993 0.989 0.993 0.986 0.995	4.64	0.006 0.006 0.004 0.006	0.016 0.018 0.018 0.016	1.6 1.6	1.1 1.1	-1.39	-0.81	-2.63	-2.88	1.6	3.7	-0.45 -0.45	165	220	165	220
3090	2	0.989 0.984 0.982 1.005 0.993 0.995 1.007 0.993	4.68	0.006 0.006 0.008 0.006	0.018 0.016 0.016 0.016	1.6 1.6	1.1 0.7	-1.39	-0.73	-2.63	-2.95	1.7	3.7	-0.45 -0.45	165	275	165	275

FDR Subframe Reference Number	SF No.	Vert. Accel. (G'S)	Pitch Trim Posn (Units)	LATG (g)	Long. Accel (g)	CCP (degrees)	CWP (degrees)	Rudder Pedal (degrees)	Rudder (degrees)	ELEV POS L (degs)	ELEV POS R (degs)	Aileron Posn - Left (degs.)	Aileron Posn - Right (degs.)	Spd Brk Hdl Posn (degrees)	Brake Pres Alt Left (psi)	Brake Pres Alt Right (psi)	Brake Pres Main L (psi)	Brake Pres Main R (psi)
3091	3	1.000 0.993 0.995 1.000 0.995 1.005 0.982 1.000	4.68	0.006 0.008 0.004 0.008	0.016 0.016 0.016 0.018	1.6 1.6	0.7 0.7	-1.39	-0.73	-2.63	-2.95	1.8	3.6	-0.56 -0.45	165	220	165	220
3092	4	0.986 0.982 0.993 0.993 0.984 0.991 0.995 0.995	4.64	0.006 0.012 0.008 0.010	0.016 0.016 0.016 0.018	1.6 1.6	0.7 0.4	-1.39	-0.81	-2.63	-2.88	1.7	3.6	-0.45 -0.56	165	220	165	220
3093	1	0.993 1.002 1.000 0.989 1.000 0.998 1.011 1.002	4.64	0.008 0.004 0.006 0.006	0.018 0.016 0.018 0.016	1.6 1.6	0.0 0.4	-1.39	-0.73	-2.63	-2.95	1.9	3.5	-0.45 -0.45	165	220	165	220
3094	2	0.986 0.995 0.986 1.000 0.989 0.995 0.989 0.984	4.68	0.006 0.008 0.006 0.004	0.014 0.016 0.016 0.016	1.6 1.6	0.7 0.7	-1.39	-0.81	-2.69	-2.95	1.7	3.7	-0.56 -0.56	165	275	165	275
3095	3	0.989 0.993 0.986 0.984 0.984 0.986 0.998 1.011	4.64	0.012 0.006 0.004 0.006	0.016 0.016 0.016 0.016	1.6 1.6	1.1 1.9	-1.39	-0.81	-2.69	-3.01	1.7	3.9	-0.56 -0.56	165	275	165	275
3096	4	0.993 0.998 0.998 0.998 0.975 0.984 0.982 0.991	4.64	0.004 0.002 0.004 0.004	0.016 0.014 0.014 0.016	1.6 1.6	2.2 2.2	-1.39	-0.81	-2.69	-3.01	1.4	4.0	-0.56 -0.45	165	220	165	220
3097	1	0.982 0.986 0.998 0.995 0.991 0.995 0.986 0.991	4.68	0.006 0.006 0.006 0.004	0.016 0.016 0.014 0.014	1.6 1.6	2.2 2.2	-1.39	-0.81	-2.76	-3.01	1.3	4.1	-0.56 -0.45	165	220	165	220
3098	2	0.998 0.991 0.993 0.993 1.000 0.998 1.007 0.995	4.64	0.006 0.012 0.008 0.008	0.014 0.018 0.014 0.016	1.6 1.6	1.9 1.1	-1.39	-0.81	-2.76	-2.88	1.3	3.8	-0.45 -0.45	165	275	165	275
3099	3	0.998 0.991 0.995 1.007 0.998 0.995 0.989 1.007	4.64	0.004 0.006 0.002 0.006	0.016 0.016 0.016 0.014	1.6 1.6	1.1 0.7	-1.39	-0.81	-2.57	-2.95	1.7	3.6	-0.56 -0.56	165	220	165	220
3100	4	0.995 1.002 1.002 1.005 1.007 0.993 1.005 1.000	4.64	0.006 0.008 0.008 0.008	0.016 0.016 0.016 0.014	1.6 1.6	1.1 1.1	-1.39	-0.81	-2.63	-3.01	1.7	3.7	-0.56 -0.45	165	220	165	220

FDR Subframe Reference Number	SF No.	Vert. Accel. (G'S)	Pitch Trim Posn (Units)	LATG (g)	Long. Accel (g)	CCP (degrees)	CWP (degrees)	Rudder Pedal (degrees)	Rudder (degrees)	ELEV POS L (degs)	ELEV POS R (degs)	Aileron Posn - Left (degs.)	Aileron Posn - Right (degs.)	Spd Brk Hdl Posn (degrees)	Brake Pres Alt Left (psi)	Brake Pres Alt Right (psi)	Brake Pres Main L (psi)	Brake Pres Main R (psi)
3101	1	1.014 0.998 1.000 1.005 0.998 1.000 0.995 1.002	4.64	0.008 0.004 0.006 0.008	0.016 0.014 0.016 0.016	1.6 1.6	1.1 1.5	-1.39	-0.81	-2.63	-2.95	1.6	3.9	-0.45 -0.45	165	220	165	220
3102	2	1.000 1.000 1.016 1.009 1.002 1.016 1.014 0.989	4.64	0.006 0.006 0.006 0.010	0.016 0.016 0.016 0.016	1.6 1.6	1.1 1.1	-1.39	-0.89	-2.63	-2.88	1.6	3.7	-0.45 -0.56	165	220	165	220
3103	3	1.002 1.009 1.002 1.005 1.000 1.002 1.014 1.011	4.64	0.010 0.012 0.010 0.008	0.016 0.018 0.016 0.016	1.6 1.6	1.1 1.1	-1.35	-0.81	-2.57	-2.95	1.6	3.7	-0.56 -0.56	110	220	110	220
3104	4	1.009 1.000 1.005 1.002 1.002 1.011 1.021 1.005	4.64	0.006 0.006 0.010 0.006	0.018 0.016 0.016 0.016	1.6 1.6	0.7 1.1	-1.39	-0.73	-2.63	-2.88	1.7	3.6	-0.45 -0.56	165	275	165	275
3105	1	1.011 1.005 1.007 0.995 0.998 1.002 1.000 1.007	4.64	0.006 0.006 0.008 0.012	0.014 0.018 0.016 0.014	1.6 1.6	0.4 0.4	-1.39	-0.73	-2.63	-2.95	1.8	3.5	-0.56 -0.45	110	220	110	220
3106	2	0.993 1.007 1.002 1.002 1.002 1.016 0.995 1.005	4.64	0.008 0.010 0.004 0.008	0.016 0.016 0.016 0.014	1.6 1.6	0.4 0.4	-1.39	-0.81	-2.63	-2.95	1.9	3.5	-0.56 -0.45	165	220	165	220
3107	3	1.002 1.009 1.002 1.016 1.000 0.993 1.009 0.989	4.64	0.008 0.010 0.008 0.010	0.014 0.016 0.014 0.018	1.6 1.6	0.4 0.4	-1.39	-0.81	-2.69	-2.95	1.9	3.6	-0.45 -0.56	165	275	165	275
3108	4	0.995 0.998 1.007 0.991 0.991 0.995 0.995 0.998	4.61	0.006 0.006 0.004 0.008	0.012 0.016 0.016 0.016	1.6 1.6	0.7 0.7	-1.39	-0.81	-2.69	-3.01	1.8	3.6	-0.45 -0.45	165	220	165	220
3109	1	0.995 1.000 0.989 0.998 0.993 0.991 0.984 0.984	4.64	0.000 0.004 0.006 0.010	0.014 0.014 0.014 0.014	1.6 1.6	1.1 1.1	-1.39	-0.81	-2.69	-2.95	1.6	3.7	-0.45 -0.56	165	220	165	220
3110	2	0.993 0.991 0.991 1.005 0.998 0.998 0.989 1.005	4.64	0.008 0.006 0.006 0.010	0.014 0.012 0.014 0.014	1.6 1.6	0.7 0.7	-1.39	-0.73	-2.63	-3.07	1.6	3.6	-0.45 -0.56	165	275	165	275

FDR Subframe Reference Number	SF No.	Vert. Accel. (G'S)	Pitch Trim Posn (Units)	LATG (g)	Long. Accel (g)	CCP (degrees)	CWP (degrees)	Rudder Pedal (degrees)	Rudder (degrees)	ELEV POS L (degs)	ELEV POS R (degs)	Aileron Posn - Left (degs.)	Aileron Posn - Right (degs.)	Spd Brk Hdl Posn (degrees)	Brake Pres Alt Left (psi)	Brake Pres Alt Right (psi)	Brake Pres Main L (psi)	Brake Pres Main R (psi)
3111	3	0.986 0.991 0.986 0.991 0.986 0.984 0.979 1.005	4.64	0.006 0.008 0.004 0.006	0.014 0.014 0.014 0.014	1.6 1.6	0.7 0.7	-1.39	-0.73	-2.76	-3.01	1.8	3.6	-0.45 -0.56	220	275	220	275
3112	4	0.998 0.991 0.993 1.000 0.977 0.986 0.993 0.991	4.61	0.010 0.008 0.006 0.006	0.014 0.014 0.014 0.014	1.6 1.6	0.7 1.1	-1.39	-0.81	-2.76	-3.01	1.7	3.6	-0.56 -0.56	165	220	165	220
3113	1	0.991 0.982 0.993 0.989 1.000 1.000 0.986 0.995	4.64	0.006 0.006 0.008 0.008	0.014 0.014 0.014 0.014	1.6 1.6	1.5 1.5	-1.39	-0.81	-2.69	-3.07	1.6	3.9	-0.56 -0.56	165	220	165	220
3114	2	0.998 0.977 0.989 0.998 0.982 0.989 0.984 0.993	4.68	0.008 0.008 0.010 0.008	0.016 0.016 0.014 0.016	1.6 1.6	1.1 1.1	-1.39	-0.73	-2.76	-3.01	1.6	3.8	-0.45 -0.45	165	220	165	220
3115	3	0.986 0.993 0.993 0.995 0.989 0.995 0.993 0.998	4.64	0.008 0.006 0.008 0.008	0.014 0.016 0.016 0.014	1.6 1.6	0.7 0.7	-1.39	-0.73	-2.76	-3.01	1.7	3.6	-0.45 -0.45	165	275	165	275
3116	4	0.982 0.993 1.002 0.995 0.998 0.995 0.993 0.995	4.64	0.006 0.008 0.006 0.008	0.014 0.014 0.014 0.016	1.6 1.6	0.7 0.7	-1.39	-0.73	-2.69	-3.01	1.7	3.6	-0.45 -0.45	165	220	165	220
3117	1	0.991 1.000 0.993 0.991 0.998 0.991 0.993 0.989	4.64	0.008 0.010 0.008 0.008	0.014 0.016 0.016 0.014	1.6 1.6	0.7 0.7	-1.39	-0.81	-2.63	-2.95	1.7	3.6	-0.56 -0.56	165	275	165	275
3118	2	0.982 0.991 1.002 0.998 0.989 0.989 1.002 0.989	4.64	0.008 0.008 0.006 0.008	0.016 0.016 0.016 0.016	1.6 1.6	1.1 1.1	-1.39	-0.73	-2.69	-3.01	1.7	3.7	-0.56 -0.56	165	220	165	220
3119	3	0.998 1.000 1.005 1.002 1.002 0.993 0.998 1.002	4.64	0.008 0.004 0.008 0.004	0.016 0.016 0.014 0.016	1.6 1.6	1.1 1.1	-1.39	-0.89	-2.57	-3.01	1.5	3.8	-0.56 -0.45	165	220	165	220
3120	4	0.995 0.995 1.000 1.002 0.993 0.998 1.009 1.005	4.64	0.008 0.008 0.008 0.006	0.016 0.014 0.014 0.014	1.6 1.6	1.1 1.1	-1.39	-0.81	-2.63	-2.95	1.6	3.8	-0.45 -0.45	165	220	165	220

FDR Subframe Reference Number	SF No.	Vert. Accel. (G'S)	Pitch Trim Posn (Units)	LATG (g)	Long. Accel (g)	CCP (degrees)	CWP (degrees)	Rudder Pedal (degrees)	Rudder (degrees)	ELEV POS L (degs)	ELEV POS R (degs)	Aileron Posn - Left (degs.)	Aileron Posn - Right (degs.)	Spd Brk Hdl Posn (degrees)	Brake Pres Alt Left (psi)	Brake Pres Alt Right (psi)	Brake Pres Main L (psi)	Brake Pres Main R (psi)
3121	1	0.993 0.998 1.005 1.000 1.000 0.993 0.998 0.998	4.68	0.008 0.006 0.008 0.008	0.016 0.016 0.016 0.016	1.6 1.6	1.1 1.1	-1.39	-0.73	-2.63	-3.01	1.6	3.7	-0.56 -0.45	165	220	165	220
3122	2	0.982 1.000 1.002 1.000 1.007 1.009 1.009 1.005	4.68	0.008 0.012 0.008 0.008	0.016 0.016 0.016 0.016	1.6 1.6	0.7 0.7	-1.39	-0.73	-2.69	-3.01	1.7	3.7	-0.45 -0.45	165	220	165	220
3123	3	1.005 1.002 1.009 0.995 0.991 1.005 0.995 1.009	4.64	0.004 0.006 0.004 0.008	0.016 0.016 0.014 0.016	1.6 1.6	0.7 1.1	-1.42	-0.81	-2.63	-2.88	1.7	3.6	-0.45 -0.45	165	220	165	220
3124	4	1.009 1.005 1.007 1.000 1.023 1.002 1.014 1.009	4.64	0.004 0.004 0.004 0.004	0.014 0.016 0.014 0.014	1.6 1.6	1.1 1.5	-1.39	-0.81	-2.69	-3.01	1.6	3.9	-0.56 -0.45	165	220	165	220
3125	1	1.009 1.009 0.995 1.000 1.007 1.009 1.007 1.014	4.64	0.008 0.006 0.004 0.004	0.014 0.016 0.014 0.014	1.6 1.6	1.5 1.5	-1.39	-0.73	-2.69	-3.07	1.6	3.9	-0.56 -0.56	165	275	165	275
3126	2	1.000 0.998 1.002 0.989 1.000 1.005 1.016 1.005	4.64	0.008 0.006 0.006 0.006	0.016 0.014 0.014 0.016	1.6 1.6	1.5 1.5	-1.39	-0.73	-2.69	-2.95	1.5	3.8	-0.45 -0.56	165	275	165	275
3127	3	1.018 1.000 1.005 1.009 1.005 0.998 1.002 1.002	4.64	0.006 0.010 0.012 0.010	0.012 0.014 0.016 0.016	1.6 1.6	0.7 0.4	-1.39	-0.73	-2.63	-3.01	1.6	3.7	-0.45 -0.45	165	220	165	220
3128	4	1.007 0.993 0.998 1.000 1.005 1.005 1.000 1.014	4.61	0.010 0.008 0.004 0.008	0.014 0.016 0.014 0.016	1.6 1.6	0.4 0.7	-1.39	-0.65	-2.69	-3.01	1.9	3.7	-0.56 -0.56	165	275	165	275
3129	1	0.995 0.995 0.991 1.007 0.995 0.984 0.995 1.002	4.64	0.006 0.006 0.006 0.006	0.014 0.014 0.014 0.016	1.6 1.6	1.1 1.5	-1.39	-0.81	-2.76	-3.07	1.6	3.9	-0.45 -0.45	165	275	165	275
3130	2	0.991 0.995 0.995 0.995 0.993 1.000 0.993 0.993	4.64	0.002 0.006 0.006 0.006	0.016 0.016 0.016 0.016	1.6 1.6	1.9 1.9	-1.39	-0.89	-2.76	-3.07	1.4	4.0	-0.56 -0.45	165	220	165	220

FDR Subframe Reference Number	SF No.	Vert. Accel. (G'S)	Pitch Trim Posn (Units)	LATG (g)	Long. Accel (g)	CCP (degrees)	CWP (degrees)	Rudder Pedal (degrees)	Rudder (degrees)	ELEV POS L (degs)	ELEV POS R (degs)	Aileron Posn - Left (degs.)	Aileron Posn - Right (degs.)	Spd Brk Hdl Posn (degrees)	Brake Pres Alt Left (psi)	Brake Pres Alt Right (psi)	Brake Pres Main L (psi)	Brake Pres Main R (psi)
3131	3	0.993 0.991 0.993 0.982 0.984 0.986 0.989 0.989	4.64	0.006 0.006 0.006 0.008	0.014 0.014 0.014 0.016	1.6 1.6	1.9 1.9	-1.39	-0.81	-2.69	-3.07	1.4	3.9	-0.56 -0.45	165	220	165	220
3132	4	0.991 0.986 0.998 0.995 0.995 1.000 1.005 1.002	4.68	0.012 0.006 0.008 0.008	0.014 0.014 0.016 0.014	1.6 1.6	0.7 0.7	-1.39	-0.73	-2.69	-3.07	1.6	3.6	-0.56 -0.45	165	275	165	275
3133	1	0.993 1.002 1.000 0.993 0.998 0.991 0.993 1.002	4.61	0.006 0.006 0.004 0.010	0.016 0.016 0.016 0.014	1.6 1.6	0.7 0.7	-1.39	-0.73	-2.69	-3.01	1.7	3.6	-0.56 -0.56	165	275	165	275
3134	2	0.993 0.995 1.000 1.007 0.995 1.005 1.002 1.007	4.68	0.006 0.010 0.008 0.008	0.018 0.014 0.014 0.014	1.6 1.6	0.4 0.4	-1.39	-0.81	-2.63	-3.01	1.8	3.6	-0.45 -0.45	165	275	165	275
3135	3	1.016 1.009 0.998 1.016 0.998 1.000 0.993 1.011	4.68	0.008 0.004 0.004 0.002	0.016 0.018 0.016 0.016	1.6 1.6	1.1 1.5	-1.39	-0.73	-2.63	-3.01	1.7	3.9	-0.56 -0.45	165	220	165	220
3136	4	0.995 0.993 0.993 0.995 1.000 1.000 0.991 1.002	4.64	0.006 0.006 0.002 0.002	0.014 0.016 0.016 0.014	1.6 1.6	2.2 2.2	-1.39	-0.89	-2.69	-3.01	1.3	4.1	-0.45 -0.45	165	220	165	220
3137	1	1.007 0.998 0.993 1.000 0.995 0.998 1.000 1.016	4.64	0.008 0.010 0.010 0.008	0.014 0.016 0.016 0.014	1.6 1.6	1.9 1.5	-1.39	-0.89	-2.69	-2.95	1.4	3.9	-0.45 -0.45	165	220	165	220
3138	2	0.998 1.002 1.005 1.000 1.007 0.998 1.000 1.002	4.64	0.008 0.008 0.008 0.006	0.014 0.014 0.016 0.016	1.6 1.6	1.5 1.5	-1.39	-0.81	-2.69	-3.07	1.6	3.9	-0.45 -0.45	165	275	165	275
3139	3	0.995 1.011 1.002 1.002 1.000 0.991 0.995 1.002	4.61	0.002 0.006 0.012 0.008	0.016 0.016 0.016 0.016	1.6 1.6	1.5 1.5	-1.39	-0.81	-2.69	-3.01	1.6	3.9	-0.45 -0.56	165	275	165	275
3140	4	1.000 0.986 0.984 1.005 0.991 0.991 0.998 1.007	4.64	0.006 0.008 0.008 0.010	0.016 0.016 0.022 0.014	1.6 1.6	1.5 1.5	-1.39	-0.81	-2.69	-2.95	2.7	3.8	-0.45 -0.45	165	275	165	275

FDR Subframe Reference Number	SF No.	Vert. Accel. (G'S)	Pitch Trim Posn (Units)	LATG (g)	Long. Accel (g)	CCP (degrees)	CWP (degrees)	Rudder Pedal (degrees)	Rudder (degrees)	ELEV POS L (degs)	ELEV POS R (degs)	Aileron Posn - Left (degs.)	Aileron Posn - Right (degs.)	Spd Brk Hdl Posn (degrees)	Brake Pres Alt Left (psi)	Brake Pres Alt Right (psi)	Brake Pres Main L (psi)	Brake Pres Main R (psi)
3141	1	0.993 1.002 0.998 1.002 1.002 0.993 1.007 1.007	4.64	0.006 0.006 0.008 0.006	0.014 0.016 0.016 0.016	1.6 1.6	1.5 1.9	-1.39	-0.81	-2.63	-3.01	1.5	3.9	-0.45 -0.45	165	220	165	220
3142	2	0.998 0.998 0.984 0.993 0.986 0.993 0.995 0.973	4.64	0.006 0.006 0.004 0.006	0.014 0.014 0.016 0.016	1.6 1.6	1.9 1.9	-1.39	-0.81	-2.69	-3.01	1.4	4.0	-0.56 -0.45	165	220	165	220
3143	3	0.993 1.009 1.000 0.998 0.984 0.995 0.998 1.002	4.64	0.006 0.006 0.008 0.008	0.016 0.016 0.016 0.016	1.6 1.6	1.5 1.1	-1.39	-0.73	-2.69	-3.07	1.5	3.8	-0.45 -0.45	165	220	165	220
3144	4	0.991 0.995 0.991 1.000 0.991 0.995 0.991 1.000	4.61	0.006 0.008 0.008 0.008	0.016 0.016 0.016 0.016	1.6 1.6	0.7 0.4	-1.42	-0.81	-2.63	-2.95	1.6	3.5	-0.45 -0.56	165	275	165	275
3145	1	0.989 1.000 0.991 1.002 0.986 1.002 0.995 1.007	4.64	0.008 0.008 0.010 0.008	0.016 0.014 0.014 0.016	1.6 1.6	0.4 0.0	-1.39	-0.73	-2.63	-2.95	1.8	3.5	-0.45 -0.45	110	220	110	220
3146	2	0.995 0.995 0.986 0.989 0.995 1.002 1.002 1.000	4.64	0.006 0.010 0.010 0.002	0.014 0.016 0.014 0.018	1.6 1.6	0.4 0.4	-1.39	-0.81	-2.63	-2.95	1.9	3.6	-0.45 -0.56	165	220	165	220
3147	3	0.995 0.995 0.993 1.005 0.998 0.998 1.000 1.007	4.64	0.002 0.008 0.006 0.006	0.016 0.014 0.014 0.016	1.6 1.6	0.0 0.7	-1.39	-0.89	-2.69	-2.95	1.8	3.7	-0.56 -0.56	165	275	165	275
3148 3149	4	0.998 0.991 1.000 1.000	4.64	0.008 0.010	0.016 0.014	1.6	0.7		-0.89	-2.63		1.7		-0.33				

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FDR Subframe Reference Number	SF No.	TLA Eng 1 Left (degs.)	TLA Eng 2 Right (degs.)	GA	MCP Speed 1	A/T Limit	N1	Retard	A/T Engage	Min Speed	GMT Seconds (sec)
3081	1		31.99	Not	Not	Not	Not	Not	Engage	Not	
3082	2	32.17		Not	Not	Not	Not	Not	Engage	Not	
3083	3		31.99	Not	Not	Not	Not	Not	Engage	Not	22.0
3084	4	32.17		Not	Not	Not	Not	Not	Engage	Not	
3085	1		31.99	Not	Not	Not	Not	Not	Engage	Not	
3086	2	32.17		Not	Not	Not	Not	Not	Engage	Not	
3087	3		31.99	Not	Not	Not	Not	Not	Engage	Not	26.0
3088	4	32.17		Not	Not	Not	Not	Not	Engage	Not	
3089	1		31.99	Not	Not	Not	Not	Not	Engage	Not	
3090	2	32.17		Not	Not	Not	Not	Not	Engage	Not	
3091	3		31.99	Not	Not	Not	Not	Not	Engage	Not	30.0
3092	4	32.34		Not	Not	Not	Not	Not	Engage	Not	
3093	1		32.17	Not	Not	Not	Not	Not	Engage	Not	
3094	2	32.34		Not	Not	Not	Not	Not	Engage	Not	
3095	3		32.17	Not	Not	Not	Not	Not	Engage	Not	34.0
3096	4	32.34		Not	Not	Not	Not	Not	Engage	Not	
3097	1		32.17	Not	Not	Not	Not	Not	Engage	Not	
3098	2	32.34		Not	Not	Not	Not	Not	Engage	Not	
3099	3		32.17	Not	Not	Not	Not	Not	Engage	Not	38.0
3100	4	32.34		Not	Not	Not	Not	Not	Engage	Not	
3101	1		32.17	Not	Not	Not	Not	Not	Engage	Not	
3102	2	32.34		Not	Not	Not	Not	Not	Engage	Not	
3103	3		31.99	Not	Not	Not	Not	Not	Engage	Not	42.0
3104	4	32.34		Not	Not	Not	Not	Not	Engage	Not	
3105	1		31.99	Not	Not	Not	Not	Not	Engage	Not	
3106	2	32.17		Not	Not	Not	Not	Not	Engage	Not	
3107	3		31.99	Not	Not	Not	Not	Not	Engage	Not	46.0
3108	4	32.17		Not	Not	Not	Not	Not	Engage	Not	
3109	1		31.99	Not	Not	Not	Not	Not	Engage	Not	
3110	2	32.17		Not	Not	Not	Not	Not	Engage	Not	
3111	3		31.99	Not	Not	Not	Not	Not	Engage	Not	50.0
3112	4	32.17		Not	Not	Not	Not	Not	Engage	Not	
3113	1		31.99	Not	Not	Not	Not	Not	Engage	Not	
3114	2	32.17		Not	Not	Not	Not	Not	Engage	Not	
3115	3		32.17	Not	Not	Not	Not	Not	Engage	Not	54.0
3116	4	32.17		Not	Not	Not	Not	Not	Engage	Not	
3117	1		32.17	Not	Not	Not	Not	Not	Engage	Not	
3118	2	32.17		Not	Not	Not	Not	Not	Engage	Not	
3119	3		32.17	Not	Not	Not	Not	Not	Engage	Not	58.0
3120	4	32.17		Not	Not	Not	Not	Not	Engage	Not	
3121	1		32.17	Not	Not	Not	Not	Not	Engage	Not	
3122	2	32.17		Not	Not	Not	Not	Not	Engage	Not	
3123	3		32.17	Not	Not	Not	Not	Not	Engage	Not	2.0
3124	4	32.17		Not	Not	Not	Not	Not	Engage	Not	
3125	1		32.17	Not	Not	Not	Not	Not	Engage	Not	
3126	2	32.17		Not	Not	Not	Not	Not	Engage	Not	
3127	3		32.17	Not	Not	Not	Not	Not	Engage	Not	6.0
3128	4	32.17		Not	Not	Not	Not	Not	Engage	Not	
3129	1		32.17	Not	Not	Not	Not	Not	Engage	Not	
3130	2	32.34		Not	Not	Not	Not	Not	Engage	Not	
3131	3		32.17	Not	Not	Not	Not	Not	Engage	Not	10.0
3132	4	32.17		Not	Not	Not	Not	Not	Engage	Not	
3133	1		32.17	Not	Not	Not	Not	Not	Engage	Not	
3134	2	32.34		Not	Not	Not	Not	Not	Engage	Not	
3135	3		31.99	Not	Not	Not	Not	Not	Engage	Not	14.0
3136	4	32.34		Not	Not	Not	Not	Not	Engage	Not	
3137	1		31.99	Not	Not	Not	Not	Not	Engage	Not	
3138	2	32.34		Not	Not	Not	Not	Not	Engage	Not	
3139	3		31.99	Not	Not	Not	Not	Not	Engage	Not	18.0
3140	4	32.34		Not	Not	Not	Not	Not	Engage	Not	
3141	1		31.99	Not	Not	Not	Not	Not	Engage	Not	
3142	2	32.34		Not	Not	Not	Not	Not	Engage	Not	
3143	3		31.99	Not	Not	Not	Not	Not	Engage	Not	22.0
3144	4	32.34		Not	Not	Not	Not	Not	Engage	Not	
3145	1		31.99	Not	Not	Not	Not	Not	Engage	Not	
3146	2	32.34		Not	Not	Not	Not	Not	Engage	Not	
3147	3		31.99	Not	Not	Not	Not	Not	Engage	Not	26.0
3148	4	32.34									
3149											

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FDR Subframe Reference Number	Right CN1 (FAN) Vib	Left CN1 (FAN) Vib	Right CN2 (HPC) Vib	Left CN2 (HPC) Vib	Right TN1 (LPT) Vib	Left TN1 (LPT) Vib	Right TN2 (HPT) Vib	Left TN2 (HPT) Vib	Right N1 Balanc Ang	Left N1 Balanc Ang	Right N1 Balanc Mass	Left N1 Balanc Mass	SF No.	SF Cycle Counter
3081													1	
3082													2	
3083													3	4
3084													4	
3085													1	
3086													2	
3087			0.10										3	5
3088													4	
3089													1	
3090													2	
3091					0.53								3	6
3092													4	
3093													1	
3094													2	
3095							0.16						3	7
3096													4	
3097													1	
3098													2	
3099										266.0			3	8
3100													4	
3101													1	
3102													2	
3103												30.0	3	9
3104													4	
3105													1	
3106													2	
3107									50.0				3	10
3108													4	
3109													1	
3110													2	
3111											132.0		3	11
3112													4	
3113													1	
3114													2	
3115													3	12
3116													4	
3117													1	
3118													2	
3119													3	13
3120													4	
3121													1	
3122													2	
3123													3	14
3124													4	
3125													1	
3126													2	
3127													3	15
3128													4	
3129													1	
3130													2	
3131		0.41											3	0
3132													4	
3133													1	
3134													2	
3135				0.23									3	1
3136													4	
3137													1	
3138													2	
3139						0.12							3	2
3140													4	
3141													1	
3142													2	
3143								0.33					3	3
3144													4	
3145													1	
3146													2	
3147	0.27												3	4
3148													4	
3149														

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FDR Subframe Reference Number	SF No.	ALTITUDE (FEET)	SF Cycle Counter	DH Selected	Baro Cor Alt No. 1 (ft)	Baro Cor Alt No. 2 (ft)	SPRFRM SF2 Wd 32 Bits 1-12	Max Allow. Airspeed (kt)	Static Air Temp (degC)	Impact Pressure (mb)	Static Pressure (in Hg)	Total Air Temp (degC)
3081	1	35004										-17.5
3082	2	35004					3868.0					-17.5
3083	3	35008	4									-17.5
3084	4	35008										-17.5
3085	1	35008										-17.5
3086	2	35008					261.0					-17.5
3087	3	35008	5									-17.2
3088	4	35008								13.4		-17.2
3089	1	35008										-17.2
3090	2	35008		200.0			800.0					-17.2
3091	3	35008	6									-17.2
3092	4	35008							26.5			-17.2
3093	1	35008										-17.2
3094	2	35008					3756.0					-17.0
3095	3	35008	7									-17.0
3096	4	35008									6.1	-17.0
3097	1	35004										-17.0
3098	2	35004					0.0					-17.0
3099	3	35004	8									-17.0
3100	4	35004										-17.0
3101	1	35004										-17.0
3102	2	35004					3168.0					-17.0
3103	3	35000	9									-17.0
3104	4	35004										-17.0
3105	1	35004										-17.0
3106	2	35004					3168.0					-17.0
3107	3	35004	10									-17.0
3108	4	35008										-16.8
3109	1	35008										-16.8
3110	2	35008					3168.0					-16.8
3111	3	35008	11									-16.8
3112	4	35012										-16.8
3113	1	35012										-16.8
3114	2	35008					3168.0					-16.8
3115	3	35008	12									-16.8
3116	4	35008										-16.8
3117	1	35008										-16.8
3118	2	35008					3095.0					-16.8
3119	3	35008	13									-16.8
3120	4	35008										-16.8
3121	1	35008										-16.8
3122	2	35008					3095.0					-16.8
3123	3	35004	14									-16.8
3124	4	35004										-16.8
3125	1	35004										-16.5
3126	2	35004					768.0	192.0				-16.5
3127	3	35004	15									-16.5
3128	4	35004										-16.5
3129	1	35008										-16.5
3130	2	35008			34976		1093.0					-16.2
3131	3	35008	0									-16.2
3132	4	35008										-16.2
3133	1	35008										-16.2
3134	2	35008					0.0					-16.2
3135	3	35008	1									-16.2
3136	4	35008										-16.5
3137	1	35004										-16.5
3138	2	35008				35008	1094.0					-16.2
3139	3	35004	2									-16.2
3140	4	35008										-16.2
3141	1	35008										-16.2
3142	2	35008					2187.0					-16.2
3143	3	35004	3									-16.5
3144	4	35004										-16.5
3145	1	35004										-16.5
3146	2	35004					3868.0					-16.5
3147	3	35004	4									-16.5
3148	4											
3149												

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FDR Subframe Reference Number	Full Compass Rose Capt	Airports Capt	RTE Data Capt	WPT Capt	NAV Aids Capt	NAV Mode Sel Capt	ILS (STD) Mode Sel Capt	VOR (STD) Mode Sel Capt	Plan Mode Sel Capt	ILS (MOD) Mode Sel Capt	VOR (MOD) Mode Sel Capt	Map Mode Sel Capt	160 Mi Range Sel Capt	80 Mi Range Sel Capt	40 Mi Range Sel Capt	20 Mi Range Sel Capt	10 Mi Range Sel Capt	WXR Data Capt
3081							Not Sel		Not Sel	Not Sel			Not Set	Not Set	SET	Not Set	Not Set	WXR Sel
3082	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel		Not Sel			Not Sel	Map						
3083																		
3084							Not Sel		Not Sel	Not Sel			Not Set	Not Set	SET	Not Set	Not Set	WXR Sel
3085																		
3086	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel		Not Sel			Not Sel	Map						
3087																		
3088																		
3089							Not Sel		Not Sel	Not Sel			Not Set	Not Set	SET	Not Set	Not Set	WXR Sel
3090	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel		Not Sel			Not Sel	Map						
3091																		
3092							Not Sel		Not Sel	Not Sel			Not Set	Not Set	SET	Not Set	Not Set	WXR Sel
3093																		
3094	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel		Not Sel			Not Sel	Map						
3095																		
3096																		
3097							Not Sel		Not Sel	Not Sel			Not Set	Not Set	SET	Not Set	Not Set	WXR Sel
3098	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel		Not Sel			Not Sel	Map						
3099																		
3100							Not Sel		Not Sel	Not Sel			Not Set	Not Set	SET	Not Set	Not Set	WXR Sel
3101																		
3102	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel		Not Sel			Not Sel	Map						
3103																		
3104																		
3105							Not Sel		Not Sel	Not Sel			Not Set	Not Set	SET	Not Set	Not Set	WXR Sel
3106	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel		Not Sel			Not Sel	Map						
3107																		
3108							Not Sel		Not Sel	Not Sel			Not Set	Not Set	SET	Not Set	Not Set	WXR Sel
3109																		
3110	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel		Not Sel			Not Sel	Map						
3111																		
3112																		
3113							Not Sel		Not Sel	Not Sel			Not Set	Not Set	SET	Not Set	Not Set	WXR Sel
3114	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel		Not Sel			Not Sel	Map						
3115																		
3116							Not Sel		Not Sel	Not Sel			Not Set	Not Set	SET	Not Set	Not Set	WXR Sel
3117																		
3118	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel		Not Sel			Not Sel	Map						
3119																		
3120																		
3121							Not Sel		Not Sel	Not Sel			Not Set	Not Set	SET	Not Set	Not Set	WXR Sel
3122	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel		Not Sel			Not Sel	Map						
3123																		
3124							Not Sel		Not Sel	Not Sel			Not Set	Not Set	SET	Not Set	Not Set	WXR Sel
3125																		
3126	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel		Not Sel			Not Sel	Map						
3127																		
3128																		
3129							Not Sel		Not Sel	Not Sel			Not Set	Not Set	SET	Not Set	Not Set	WXR Sel
3130	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel		Not Sel			Not Sel	Map						
3131																		
3132							Not Sel		Not Sel	Not Sel			Not Set	Not Set	SET	Not Set	Not Set	WXR Sel
3133																		
3134	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel		Not Sel			Not Sel	Map						
3135																		
3136																		
3137							Not Sel		Not Sel	Not Sel			Not Set	Not Set	SET	Not Set	Not Set	WXR Sel
3138	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel		Not Sel			Not Sel	Map						
3139																		
3140							Not Sel		Not Sel	Not Sel			Not Set	Not Set	SET	Not Set	Not Set	WXR Sel
3141																		
3142	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel		Not Sel			Not Sel	Map						
3143																		
3144																		
3145							Not Sel		Not Sel	Not Sel			Not Set	Not Set	SET	Not Set	Not Set	WXR Sel
3146	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel		Not Sel			Not Sel	Map						
3147																		
3148																		
3149																		

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FDR Subframe Reference Number	Full Compass Rose F/O	Airports F/O	RTE Data F/O	WPT F/O	NAV Aids F/O	NAV Mode Sel F/O	ILS (STD) Mode Sel Capt	VOR (STD) Mode Sel F/O	Plan Mode Sel F/O	ILS (MOD) Mode Sel F/O	VOR (MOD) Mode Sel F/O	Map Mode Sel F/O	160 Mi Range Sel F/O	80 Mi Range Sel F/O	40 Mi Range Sel F/O	20 Mi Range Sel F/O	10 Mi Range Sel F/O	WXR Data F/O
3081							Not Sel											
3082								Not Sel	Not Sel	Not Sel			Not Set	SET	Not Set	Not Set	Not Set	WXR Sel
3083											Not Sel	Map						
3084	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel												
3085							Not Sel											
3086								Not Sel	Not Sel	Not Sel			Not Set	SET	Not Set	Not Set	Not Set	WXR Sel
3087											Not Sel	Map						
3088	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel												
3089							Not Sel											
3090								Not Sel	Not Sel	Not Sel			Not Set	SET	Not Set	Not Set	Not Set	WXR Sel
3091											Not Sel	Map						
3092	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel												
3093							Not Sel											
3094								Not Sel	Not Sel	Not Sel			Not Set	SET	Not Set	Not Set	Not Set	WXR Sel
3095											Not Sel	Map						
3096	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel												
3097							Not Sel											
3098								Not Sel	Not Sel	Not Sel			Not Set	SET	Not Set	Not Set	Not Set	WXR Sel
3099											Not Sel	Map						
3100	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel												
3101							Not Sel											
3102								Not Sel	Not Sel	Not Sel			Not Set	SET	Not Set	Not Set	Not Set	WXR Sel
3103											Not Sel	Map						
3104	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel												
3105							Not Sel											
3106								Not Sel	Not Sel	Not Sel			Not Set	SET	Not Set	Not Set	Not Set	WXR Sel
3107											Not Sel	Map						
3108	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel												
3109							Not Sel											
3110								Not Sel	Not Sel	Not Sel			Not Set	SET	Not Set	Not Set	Not Set	WXR Sel
3111											Not Sel	Map						
3112	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel												
3113							Not Sel											
3114								Not Sel	Not Sel	Not Sel			Not Set	SET	Not Set	Not Set	Not Set	WXR Sel
3115											Not Sel	Map						
3116	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel												
3117							Not Sel											
3118								Not Sel	Not Sel	Not Sel			Not Set	SET	Not Set	Not Set	Not Set	WXR Sel
3119											Not Sel	Map						
3120	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel												
3121							Not Sel											
3122								Not Sel	Not Sel	Not Sel			Not Set	SET	Not Set	Not Set	Not Set	WXR Sel
3123											Not Sel	Map						
3124	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel												
3125							Not Sel											
3126								Not Sel	Not Sel	Not Sel			Not Set	SET	Not Set	Not Set	Not Set	WXR Sel
3127											Not Sel	Map						
3128	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel												
3129							Not Sel											
3130								Not Sel	Not Sel	Not Sel			Not Set	SET	Not Set	Not Set	Not Set	WXR Sel
3131											Not Sel	Map						
3132	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel												
3133							Not Sel											
3134								Not Sel	Not Sel	Not Sel			Not Set	SET	Not Set	Not Set	Not Set	WXR Sel
3135											Not Sel	Map						
3136	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel												
3137							Not Sel											
3138								Not Sel	Not Sel	Not Sel			Not Set	SET	Not Set	Not Set	Not Set	WXR Sel
3139											Not Sel	Map						
3140	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel												
3141							Not Sel											
3142								Not Sel	Not Sel	Not Sel			Not Set	SET	Not Set	Not Set	Not Set	WXR Sel
3143											Not Sel	Map						
3144	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel	Not Sel												
3145							Not Sel											
3146								Not Sel	Not Sel	Not Sel			Not Set	SET	SET	Not Set	Not Set	WXR Sel
3147																		
3148																		
3149																		

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FDR Subframe Reference Number	SF No.	OIL Temp Left (degC)	OIL Temp Right (degC)	GMT Seconds (sec)
3081	1			
3082	2	104		
3083	3			22.0
3084	4		103	
3085	1			
3086	2	104		
3087	3			26.0
3088	4		103	
3089	1			
3090	2	104		
3091	3			30.0
3092	4		103	
3093	1			
3094	2	104		
3095	3			34.0
3096	4		103	
3097	1			
3098	2	104		
3099	3			38.0
3100	4		103	
3101	1			
3102	2	104		
3103	3			42.0
3104	4		103	
3105	1			
3106	2	104		
3107	3			46.0
3108	4		103	
3109	1			
3110	2	104		
3111	3			50.0
3112	4		103	
3113	1			
3114	2	104		
3115	3			54.0
3116	4		103	
3117	1			
3118	2	103		
3119	3			58.0
3120	4		102	
3121	1			
3122	2	103		
3123	3			2.0
3124	4		102	
3125	1			
3126	2	103		
3127	3			6.0
3128	4		102	
3129	1			
3130	2	103		
3131	3			10.0
3132	4		102	
3133	1			
3134	2	103		
3135	3			14.0
3136	4		102	
3137	1			
3138	2	103		
3139	3			18.0
3140	4		102	
3141	1			
3142	2	103		
3143	3			22.0
3144	4		102	
3145	1			
3146	2	103		
3147	3			26.0
3148	4			
3149				

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NTSB Vehicle Recorder Division

FDR Subframe Reference Number	SF No.	ALTITUDE (FEET)	SF Cycle Counter	Engine Oil QTY No 1 (pints)	Engine Oil QTY No 2 (pints)	HYD OIL Press A (psi)	HYD OIL Press B (psi)	OIL Temp Left (degC)	OIL Temp Right (degC)	GMT Hours (hrs)	GMT Minutes (min)	GMT Seconds (sec)
3081	1	35004										
3082	2	35004						104				
3083	3	35008	4							9	10	22
3084	4	35008							103			
3085	1	35008										
3086	2	35008						104				
3087	3	35008	5							9	10	26
3088	4	35008		26.8					103			
3089	1	35008										
3090	2	35008						104				
3091	3	35008	6							9	10	30
3092	4	35008			26.5				103			
3093	1	35008										
3094	2	35008						104				
3095	3	35008	7							9	10	34
3096	4	35008				3048.0			103			
3097	1	35004										
3098	2	35004						104				
3099	3	35004	8							9	10	38
3100	4	35004							103			
3101	1	35004										
3102	2	35004						104				
3103	3	35000	9							9	10	42
3104	4	35004							103			
3105	1	35004										
3106	2	35004						104				
3107	3	35004	10							9	10	46
3108	4	35008							103			
3109	1	35008										
3110	2	35008						104				
3111	3	35008	11							9	10	50
3112	4	35012							103			
3113	1	35012										
3114	2	35008						104				
3115	3	35008	12							9	10	54
3116	4	35008							103			
3117	1	35008										
3118	2	35008						103				
3119	3	35008	13							9	10	58
3120	4	35008							102			
3121	1	35008										
3122	2	35008						103				
3123	3	35004	14							9	11	2
3124	4	35004							102			
3125	1	35004										
3126	2	35004					3072.0	103				
3127	3	35004	15							9	11	6
3128	4	35004							102			
3129	1	35008										
3130	2	35008						103				
3131	3	35008	0							9	11	10
3132	4	35008							102			
3133	1	35008										
3134	2	35008						103				
3135	3	35008	1							9	11	14
3136	4	35008							102			
3137	1	35004										
3138	2	35008						103				
3139	3	35004	2							9	11	18
3140	4	35008							102			
3141	1	35008										
3142	2	35008						103				
3143	3	35004	3							9	11	22
3144	4	35004							102			
3145	1	35004										
3146	2	35004						103				
3147	3	35004	4							9	11	26
3148	4											
3149												

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NTSB Vehicle Recorder Division

FDR Subframe Reference Number	SF No.	ALTITUDE (FEET)	SF Cycle Counter	SPRFRM SF2 Wd 32 Bits 1-12	Selected Course #1	Selected Course #2	Selected Mach	Altitude Selected	SPRFRM SF2 Wd 32 Bits 1-11	Speed Selected	TE Flap Posn Left (degrees)	TE Flap Posn Right (degrees)
3081	1	35004									0.0	
3082	2	35004		3868					1820			
3083	3	35008	4									0.0
3084	4	35008										
3085	1	35008									0.0	
3086	2	35008		261	27.0				261			
3087	3	35008	5									0.0
3088	4	35008										
3089	1	35008									0.0	
3090	2	35008		800					800			
3091	3	35008	6									0.0
3092	4	35008										
3093	1	35008									0.0	
3094	2	35008		3756		326.4			1708			
3095	3	35008	7									0.0
3096	4	35008										
3097	1	35004									0.0	
3098	2	35004		0			0.000		0			
3099	3	35004	8									0.0
3100	4	35004										
3101	1	35004									0.0	
3102	2	35004		3168					1120			
3103	3	35000	9									0.0
3104	4	35004										
3105	1	35004									0.0	
3106	2	35004		3168					1120			
3107	3	35004	10									0.0
3108	4	35008										
3109	1	35008									0.0	
3110	2	35008		3168					1120			
3111	3	35008	11									0.0
3112	4	35012										
3113	1	35012									0.0	
3114	2	35008		3168					1120			
3115	3	35008	12									0.0
3116	4	35008										
3117	1	35008									0.0	
3118	2	35008		3095					1047			
3119	3	35008	13									0.0
3120	4	35008										
3121	1	35008									0.0	
3122	2	35008		3095					1047			
3123	3	35004	14									0.0
3124	4	35004										
3125	1	35004									0.0	
3126	2	35004		768					768			
3127	3	35004	15									0.0
3128	4	35004										
3129	1	35008									0.0	
3130	2	35008		1093					1093			
3131	3	35008	0									0.0
3132	4	35008										
3133	1	35008									0.0	
3134	2	35008		0					0	0.00		
3135	3	35008	1									0.0
3136	4	35008										
3137	1	35004									0.0	
3138	2	35008		1094					1094			
3139	3	35004	2									0.0
3140	4	35008										
3141	1	35008									0.0	
3142	2	35008		2187				34992	139			
3143	3	35004	3									0.0
3144	4	35004										
3145	1	35004									0.0	
3146	2	35004		3868					1820			
3147	3	35004	4									0.0
3148	4											
3149												

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NTSB Vehicle Recorder Division

FDR Subframe Reference Number	SF No.	Latitude (dd:mm:ss)	Longitude (dd:mm:ss)	Groundspeed (knots)	Wind Speed (knots)	Wind Direction True (DEG)	Drift Angle (DEG)	True Heading (DEG)	Deviation: Glide Slope (DDM)	Deviation: Localizer (DDM)	TE Flap Posn Left (degrees)	TE Flap Posn Right (degrees)	Altitude: Radio (feet)
3081	1	S02°43'51"	N105°02'44	446		115.0		339.96	-0.24	0.30	0.0		2628.0
3082	2			446			-1.1	339.96	-0.24	0.30			2628.0
3083	3			446				339.96	-0.24	0.30		0.0	2628.0
3084	4			446	11.5			339.96	-0.24	0.30			2628.0
3085	1	S02°43'24"	N105°02'35	446		115.0		339.96	-0.24	0.24	0.0		2628.0
3086	2			446			-1.1	339.96	-0.24	0.24			2628.0
3087	3			446				339.96	-0.24	0.24		0.0	2628.0
3088	4			446	11.0			339.96	-0.24	0.24			2628.0
3089	1	S02°42'54"	N105°02'25	446		112.5		339.96	-0.24	0.30	0.0		2628.0
3090	2			446			-1.1	339.96	-0.24	0.30			2628.0
3091	3			446				339.96	-0.24	0.30		0.0	2628.0
3092	4			446	10.5			339.96	-0.24	0.30			2628.0
3093	1	S02°42'27"	N105°02'15	446		112.1		339.96	-0.24	0.24	0.0		2628.0
3094	2			446			-0.9	339.61	-0.24	0.24			2628.0
3095	3			446				339.61	-0.24	0.24		0.0	2628.0
3096	4			446	9.5			339.61	-0.24	0.24			2628.0
3097	1	S02°42'00"	N105°02'05	446		111.4		339.61	-0.24	0.30	0.0		2628.0
3098	2			446			-0.9	339.61	-0.24	0.30			2628.0
3099	3			446				339.61	-0.24	0.30		0.0	2628.0
3100	4			446	9.0			339.61	-0.24	0.30			2628.0
3101	1	S02°41'32"	N105°01'50	446		109.7		339.61	-0.24	0.24	0.0		2628.0
3102	2			446			-1.0	339.61	-0.24	0.24			2628.0
3103	3			446				339.96	-0.24	0.24		0.0	2628.0
3104	4			446	9.5			339.96	-0.24	0.24			2628.0
3105	1	S02°41'05"	N105°01'40	446		107.9		339.96	-0.24	0.30	0.0		2628.0
3106	2			446			-1.0	339.96	-0.24	0.30			2628.0
3107	3			446				339.96	-0.24	0.30		0.0	2628.0
3108	4			446	9.0			339.96	-0.24	0.30			2628.0
3109	1	S02°40'35"	N105°01'30	446		104.4		339.96	-0.24	0.24	0.0		2628.0
3110	2			446			-1.1	339.96	-0.24	0.24			2628.0
3111	3			446				339.96	-0.24	0.24		0.0	2628.0
3112	4			446	9.0			339.96	-0.24	0.24			2628.0
3113	1	S02°40'08"	N105°01'20	446		100.9		339.96	-0.24	0.30	0.0		2628.0
3114	2			446			-1.1	339.96	-0.24	0.30			2628.0
3115	3			446				339.96	-0.24	0.30		0.0	2628.0
3116	4			446	9.0			339.96	-0.24	0.30			2628.0
3117	1	S02°39'41"	N105°01'11	446		99.1		339.96	-0.24	0.24	0.0		2628.0
3118	2			446			-1.1	339.96	-0.24	0.24			2628.0
3119	3			446				339.96	-0.24	0.24		0.0	2628.0
3120	4			446	9.5			339.96	-0.24	0.24			2628.0
3121	1	S02°39'14"	N105°01'01	446		98.8		339.96	-0.24	0.30	0.0		2628.0
3122	2			446			-1.1	339.96	-0.24	0.30			2628.0
3123	3			446				339.96	-0.24	0.30		0.0	2628.0
3124	4			446	9.5			339.96	-0.24	0.30			2628.0
3125	1	S02°38'44"	N105°00'51	446		98.1		339.96	-0.24	0.24	0.0		2628.0
3126	2			446			-1.1	339.96	-0.24	0.24			2628.0
3127	3			446				339.96	-0.24	0.24		0.0	2628.0
3128	4			446	9.0			339.96	-0.24	0.24			2628.0
3129	1	S02°38'17"	N105°00'36	446		96.7		339.96	-0.24	0.30	0.0		2628.0
3130	2			446			-1.0	339.96	-0.24	0.30			2628.0
3131	3			446				339.96	-0.24	0.30		0.0	2628.0
3132	4			446	9.0			339.96	-0.24	0.30			2628.0
3133	1	S02°37'50"	N105°00'26	446		99.5		339.96	-0.24	0.24	0.0		2628.0
3134	2			446			-1.0	339.96	-0.24	0.24			2628.0
3135	3			446				339.61	-0.24	0.24		0.0	2628.0
3136	4			446	8.5			339.61	-0.24	0.24			2628.0
3137	1	S02°37'23"	N105°00'16	446		102.7		339.96	-0.24	0.30	0.0		2628.0
3138	2			446			-1.0	339.96	-0.24	0.30			2628.0
3139	3			446				339.61	-0.24	0.30		0.0	2628.0
3140	4			446	8.5			339.61	-0.24	0.30			2628.0
3141	1	S02°36'53"	N105°00'06	446		102.7		339.61	-0.24	0.24	0.0		2628.0
3142	2			446			-1.0	339.61	-0.24	0.24			2628.0
3143	3			446				339.96	-0.24	0.24		0.0	2628.0
3144	4			446	9.0			339.96	-0.24	0.24			2756.0
3145	1	S02°36'26"	N104°59'56	446		104.4		339.96	-0.24	0.30	0.0		2628.0
3146	2			446			-1.0	339.61	-0.24	0.30			2628.0
3147	3			446				339.61	-0.24	0.30		0.0	2628.0
3148	4							339.61	-0.24				
3149													

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FDR Subframe Reference Number	SF No.	TE Flap Posn Left (degrees)	HCP Speed 2	LNAV Mode Op	CWS Roll	CWS Pitch	A/P Off	Single Channel	TO/GA	V/S Mode	ALT Hold	ALT Acquire	HDG Select	VOR/LOC Engage	G/S Engage	Flare Engage	Local Limited Master	GMT Seconds (sec)
3081	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3082	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3083	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	22.0
3084	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3085	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3086	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3087	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	26.0
3088	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3089	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3090	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3091	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	30.0
3092	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3093	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3094	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3095	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	34.0
3096	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3097	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3098	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3099	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	38.0
3100	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3101	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3102	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3103	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	42.0
3104	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3105	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3106	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3107	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	46.0
3108	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3109	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3110	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3111	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	50.0
3112	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3113	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3114	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3115	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	54.0
3116	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3117	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3118	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3119	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	58.0
3120	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3121	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3122	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3123	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	2.0
3124	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3125	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3126	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3127	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	6.0
3128	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3129	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3130	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3131	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	10.0
3132	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3133	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3134	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3135	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	14.0
3136	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3137	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3138	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3139	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	18.0
3140	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3141	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3142	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3143	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	22.0
3144	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3145	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3146	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3147	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	26.0
3148	4		Not					Not		Not	Not		Not		Not	Not		
3149																		

Silk Air MI-185

FCC-L-2 - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data, Date Printed: May 21, 1999

NTSB Vehicle Recorder Division

FDR Subframe Reference Number	SF No.	TE Flap Posn Left (degrees)	HCP Speed 2	LNAV Mode Op	CWS Roll	CWS Pitch	A/P Off	Single Channel	TO/GA	V/S Mode	ALT Hold	ALT Acquire	HDG Select	VOR/LOC Engage	G/S Engage	Flare Engage	Local Limited Master	GMT Seconds (sec)
3081	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3082	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3083	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	22.0
3084	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3085	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3086	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3087	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	26.0
3088	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3089	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3090	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3091	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	30.0
3092	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3093	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3094	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3095	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	34.0
3096	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3097	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3098	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3099	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	38.0
3100	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3101	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3102	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3103	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	42.0
3104	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3105	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3106	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3107	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	46.0
3108	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3109	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3110	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3111	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	50.0
3112	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3113	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3114	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3115	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	54.0
3116	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3117	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3118	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3119	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	58.0
3120	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3121	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3122	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3123	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	2.0
3124	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3125	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3126	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3127	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	6.0
3128	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3129	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3130	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3131	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	10.0
3132	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3133	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3134	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3135	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	14.0
3136	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3137	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3138	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3139	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	18.0
3140	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3141	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3142	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3143	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	22.0
3144	4		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3145	1	0.0	Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3146	2		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	
3147	3		Not	Engage	Not	Not	On	Not	NOT ENGA	Not	Not	Not	Not	Not	Not	Not	Not	26.0
3148	4		Not					Not		Not	Not		Not		Not	Not		
3149																		

Silk Air MI-185

FMC-01 - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data, Date Printed: May 21, 1999

NTSB Vehicle Recorder Division

FDR Subframe Reference Number	SF No.	ALTITUDE (FEET)	CAS (knots)	Total Air Temp (degC)	GMT Seconds (sec)
3081	1	35004	248.5	-17.50	
3082	2	35004	248.5	-17.50	
3083	3	35008	248.5	-17.50	22.0
3084	4	35008	249.0	-17.50	
3085	1	35008	249.0	-17.50	
3086	2	35008	249.5	-17.50	
3087	3	35008	249.5	-17.25	26.0
3088	4	35008	249.5	-17.25	
3089	1	35008	249.5	-17.25	
3090	2	35008	249.5	-17.25	
3091	3	35008	250.0	-17.25	30.0
3092	4	35008	249.5	-17.25	
3093	1	35008	249.5	-17.25	
3094	2	35008	250.0	-17.00	
3095	3	35008	250.0	-17.00	34.0
3096	4	35008	250.5	-17.00	
3097	1	35004	250.5	-17.00	
3098	2	35004	250.5	-17.00	
3099	3	35004	250.5	-17.00	38.0
3100	4	35004	250.0	-17.00	
3101	1	35004	250.0	-17.00	
3102	2	35004	250.0	-17.00	
3103	3	35000	250.0	-17.00	42.0
3104	4	35004	250.0	-17.00	
3105	1	35004	250.5	-17.00	
3106	2	35004	250.5	-17.00	
3107	3	35004	250.5	-17.00	46.0
3108	4	35008	251.0	-16.75	
3109	1	35008	251.0	-16.75	
3110	2	35008	251.0	-16.75	
3111	3	35008	251.0	-16.75	50.0
3112	4	35012	251.0	-16.75	
3113	1	35012	251.0	-16.75	
3114	2	35008	251.0	-16.75	
3115	3	35008	251.0	-16.75	54.0
3116	4	35008	251.0	-16.75	
3117	1	35008	251.0	-16.75	
3118	2	35008	251.0	-16.75	
3119	3	35008	251.0	-16.75	58.0
3120	4	35008	251.0	-16.75	
3121	1	35008	251.0	-16.75	
3122	2	35008	251.0	-16.75	
3123	3	35004	251.0	-16.75	2.0
3124	4	35004	251.0	-16.75	
3125	1	35004	251.5	-16.50	
3126	2	35004	251.5	-16.50	
3127	3	35004	251.5	-16.50	6.0
3128	4	35004	251.0	-16.50	
3129	1	35008	251.0	-16.50	
3130	2	35008	250.5	-16.25	
3131	3	35008	251.0	-16.25	10.0
3132	4	35008	251.0	-16.25	
3133	1	35008	251.0	-16.25	
3134	2	35008	251.0	-16.25	
3135	3	35008	250.5	-16.25	14.0
3136	4	35008	250.5	-16.50	
3137	1	35004	251.0	-16.50	
3138	2	35008	251.0	-16.25	
3139	3	35004	251.0	-16.25	18.0
3140	4	35008	251.0	-16.25	
3141	1	35008	250.5	-16.25	
3142	2	35008	250.5	-16.25	
3143	3	35004	250.5	-16.50	22.0
3144	4	35004	251.0	-16.50	
3145	1	35004	251.0	-16.50	
3146	2	35004	251.0	-16.50	
3147	3	35004	251.0	-16.50	26.0
3148	4				
3149					

Silk Air MI-185

FMC-01 - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 21, 1999

NTSB Vehicle Recorder Division

Silk Air MI-185, FMC-01 - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 21, 1999, NTSB Vehicle Recorder Division

FDR Subframe Reference Number	SF No.	PMC Left	PMC Right	Isolation Valve	Wing Anti-Ice	Cowl Anti-Ice L	Cowl Anti-Ice R	ECS Pack Hi/Lo L	ECS Pack Hi/Lo R	ECS Pack On/Off L	ECS Pack On/Off R	Engine Bleed #1	Engine Bleed #2	N1 L M Bit 15	N1 L M Bit 17	N1 L M Bit 18	N1 L M Bit 19	N1 L M Bit 20	GMT Seconds (sec)
3081	1																		
3082	2																		
3083	3	ON	ON											0	0	1	0	0	22.0
3084	4			Closed	OFF	OFF	OFF	LOW	LOW	ON	ON	ON	ON						
3085	1																		
3086	2																		
3087	3	ON	ON											0	0	1	0	0	26.0
3088	4			Closed	OFF	OFF	OFF	LOW	LOW	ON	ON	ON	ON						
3089	1																		
3090	2																		
3091	3	ON	ON											0	0	1	0	0	30.0
3092	4			Closed	OFF	OFF	OFF	LOW	LOW	ON	ON	ON	ON						
3093	1																		
3094	2																		
3095	3	ON	ON											0	0	1	0	0	34.0
3096	4			Closed	OFF	OFF	OFF	LOW	LOW	ON	ON	ON	ON						
3097	1																		
3098	2																		
3099	3	ON	ON											0	0	1	0	0	38.0
3100	4			Closed	OFF	OFF	OFF	LOW	LOW	ON	ON	ON	ON						
3101	1																		
3102	2																		
3103	3	ON	ON											0	0	1	0	0	42.0
3104	4			Closed	OFF	OFF	OFF	LOW	LOW	ON	ON	ON	ON						
3105	1																		
3106	2																		
3107	3	ON	ON											0	0	1	0	0	46.0
3108	4			Closed	OFF	OFF	OFF	LOW	LOW	ON	ON	ON	ON						
3109	1																		
3110	2																		
3111	3	ON	ON											0	0	1	0	0	50.0
3112	4			Closed	OFF	OFF	OFF	LOW	LOW	ON	ON	ON	ON						
3113	1																		
3114	2																		
3115	3	ON	ON											0	0	1	0	0	54.0
3116	4			Closed	OFF	OFF	OFF	LOW	LOW	ON	ON	ON	ON						
3117	1																		
3118	2																		
3119	3	ON	ON											0	0	1	0	0	58.0
3120	4			Closed	OFF	OFF	OFF	LOW	LOW	ON	ON	ON	ON						
3121	1																		
3122	2																		
3123	3	ON	ON											0	0	1	0	0	2.0
3124	4			Closed	OFF	OFF	OFF	LOW	LOW	ON	ON	ON	ON						
3125	1																		
3126	2																		
3127	3	ON	ON											0	0	1	0	0	6.0
3128	4			Closed	OFF	OFF	OFF	LOW	LOW	ON	ON	ON	ON						
3129	1																		
3130	2																		
3131	3	ON	ON											0	0	1	0	0	10.0
3132	4			Closed	OFF	OFF	OFF	LOW	LOW	ON	ON	ON	ON						
3133	1																		
3134	2																		
3135	3	ON	ON											0	0	1	0	0	14.0
3136	4			Closed	OFF	OFF	OFF	LOW	LOW	ON	ON	ON	ON						
3137	1																		
3138	2																		
3139	3	ON	ON											0	0	1	0	0	18.0
3140	4			Closed	OFF	OFF	OFF	LOW	LOW	ON	ON	ON	ON						
3141	1																		
3142	2																		
3143	3	ON	ON											0	0	1	0	0	22.0
3144	4			Closed	OFF	OFF	OFF	LOW	LOW	ON	ON	ON	ON						
3145	1																		
3146	2																		
3147	3	ON	ON											0	0	1	0	0	26.0
3148	4			Closed	OFF	OFF	OFF	LOW	LOW	ON	ON	ON	ON						
3149																			

Silk Air MI-185

GPWC-L-1 - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 21, 1999

NTSB Vehicle Recorder Division

Silk Air MI-185, GPWC-L-1 - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 21, 1999, NTSB Vehicle Recorder Division

FDR Subframe Reference Number	SF No.	Windshear Caution	Windshear	Terrain Pull Up	Minimums (1-TRUE)	Glideslope	Too Low Terrain	Too Low Flap	Too Low Gear	Don't Sink (1-TRUE)	Terrain	Pull Up (1-TRUE)	Sink Rate (1-TRUE)	GMT Seconds (sec)
3081	1	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3082	2	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3083	3	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	22.0
3084	4	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3085	1	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3086	2	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3087	3	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	26.0
3088	4	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3089	1	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3090	2	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3091	3	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	30.0
3092	4	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3093	1	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3094	2	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3095	3	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	34.0
3096	4	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3097	1	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3098	2	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3099	3	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	38.0
3100	4	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3101	1	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3102	2	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3103	3	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	42.0
3104	4	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3105	1	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3106	2	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3107	3	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	46.0
3108	4	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3109	1	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3110	2	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3111	3	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	50.0
3112	4	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3113	1	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3114	2	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3115	3	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	54.0
3116	4	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3117	1	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3118	2	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3119	3	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	58.0
3120	4	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3121	1	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3122	2	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3123	3	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	2.0
3124	4	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3125	1	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3126	2	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3127	3	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	6.0
3128	4	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3129	1	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3130	2	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3131	3	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	10.0
3132	4	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3133	1	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3134	2	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3135	3	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	14.0
3136	4	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3137	1	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3138	2	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3139	3	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	18.0
3140	4	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3141	1	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3142	2	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3143	3	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	22.0
3144	4	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3145	1	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3146	2	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3147	3	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	26.0
3148	4	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
3149														

Silk Air MI-185

tab1 - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 21, 1999

NTSB Vehicle Recorder Division

FDR Subframe Reference Number	Slat 1 Full Extend	Slat 1 Intransit	Slat 1 Mid Extend	Slat 2 Full Extend	Slat 2 Intransit	Slat 2 Mid Extend	Slat 3 Full Extend	Slat 3 Intransit	Slat 3 Mid Extend	Slat 4 Full Extend	Slat 4 Intransit	Slat 4 Mid Extend	Slat 5 Full Extend	Slat 5 Intransit	Slat 5 Mid Extend	Slat 6 Full Extend	Slat 6 Intransit	Slat 6 Mid Extend
3081	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3082	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3083	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3084	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3085	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3086	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3087	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3088	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3089	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3090	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3091	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3092	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3093	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3094	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3095	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3096	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3097	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3098	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3099	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3100	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3101	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3102	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3103	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3104	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3105	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3106	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3107	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3108	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3109	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3110	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3111	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3112	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3113	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3114	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3115	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3116	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3117	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3118	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3119	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3120	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3121	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3122	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3123	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3124	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3125	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3126	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3127	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3128	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3129	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3130	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3131	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3132	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3133	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3134	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3135	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3136	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3137	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3138	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3139	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3140	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3141	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3142	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3143	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3144	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3145	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3146	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3147	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext	Not Ext	Not Intra	Not Ext
3148	Not Ext		Not Ext	Not Ext			Not Ext		Not Ext									
3149																		

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tab2 - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 21, 1999

NTSB Vehicle Recorder Division

FDR Subframe Reference Number	Left Gear Down	Left Gear Red Wrn	Right Gear Down	Right Gear Red Wrn	Nose Gear Down	Nose Gear Red Wrn	T/R Dep L INBOARD	T/R Dep L OUTBRD	T/R Dep R INBOARD	T/R Dep R OUTBRD	T/R Unlock L INBD	T/R Unlock L OUTBD	T/R Unlock R INBRD	T/R Unlock R OUTBD
3081		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3082	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3083		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3084	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3085		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3086	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3087		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3088	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3089		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3090	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3091		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3092	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3093		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3094	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3095		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3096	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3097		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3098	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3099		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3100	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3101		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3102	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3103		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3104	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3105		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3106	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3107		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3108	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3109		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3110	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3111		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3112	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3113		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3114	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3115		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3116	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3117		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3118	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3119		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3120	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3121		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3122	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3123		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3124	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3125		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3126	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3127		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3128	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3129		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3130	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3131		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3132	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3133		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3134	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3135		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3136	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3137		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3138	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3139		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3140	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3141		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3142	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3143		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3144	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3145		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3146	UP	NO WARN		NO WARN	UP	NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3147		NO WARN	UP	NO WARN		NO WARN	Not Depl	Not Depl	Not Depl	Not Depl	Locked	Locked	Locked	Locked
3148	UP	NO WARN		NO WARN	UP	NO WARN		Not Depl	Not Depl			Locked		
3149														

Silk Air MI-185

tab3 - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 21, 1999

NTSB Vehicle Recorder Division

FDR Subframe Reference Number	VNAV Mode Op	Approach	CWS A	MCP Speed 1	Single Channel	V/S Mode	ALT Hold	HDG Select	G/S Engage	Flare Engage	Local Limited Master	CWS B	CMD A	CMD B	F/D A On	F/D B On	CWS Pitch	CWS Roll	TO/GA	ALT Acquire
3081	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3082	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3083	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3084	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3085	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3086	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3087	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3088	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3089	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3090	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3091	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3092	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3093	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3094	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3095	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3096	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3097	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3098	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3099	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3100	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3101	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3102	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3103	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3104	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3105	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3106	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3107	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3108	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3109	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3110	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3111	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3112	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3113	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3114	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3115	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3116	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3117	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3118	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3119	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3120	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3121	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3122	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3123	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3124	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3125	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3126	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3127	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3128	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3129	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3130	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3131	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3132	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3133	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3134	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3135	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3136	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3137	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3138	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3139	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3140	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3141	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3142	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3143	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3144	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3145	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3146	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3147	Engage	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Not	Engage	Not	On	On	Not	Not	NOT ENGA	Not
3148	Engage	Not	Not		Not	Not	Not	Not	Not	Not										
3149																				

Silk Air MI-185

tab4 - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 21, 1999

NTSB Vehicle Recorder Division

FDR Subframe Reference Number	Flap 1 Extend	Flap 1 Intransit	Flap 2 Extend	Flap 2 Intransit	Flap 3 Extend	Flap 3 Intransit	Flap 4 Extend	Flap 4 Intransit	Spd Brk Hdl Posn (degrees)	Stick Shaker Left	Stick Shaker Right	Drift Angle (DEG)	Latitude (dd:mm:ss)	Longitude (dd:mm:ss)
3081	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake		S02°43'50.8"	E105°02'44.5"
3082	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake	-1.1		
3083	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake			
3084	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake			
3085	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake		S02°43'23.6"	E105°02'34.6"
3086	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake	-1.1		
3087	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3088	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3089	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake		S02°42'53.9"	E105°02'24.7"
3090	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake	-1.1		
3091	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3092	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake			
3093	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake		S02°42'26.7"	E105°02'14.8"
3094	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake	-0.9		
3095	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake			
3096	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake			
3097	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake		S02°41'59.5"	E105°02'04.9"
3098	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake	-0.9		
3099	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3100	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake			
3101	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake		S02°41'32.3"	E105°01'50.1"
3102	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake	-1.0		
3103	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake			
3104	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3105	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake		S02°41'05.1"	E105°01'40.2"
3106	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake	-1.0		
3107	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3108	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3109	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake		S02°40'35.5"	E105°01'30.3"
3110	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake	-1.1		
3111	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3112	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake			
3113	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake		S02°40'08.3"	E105°01'20.4"
3114	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake	-1.1		
3115	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3116	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3117	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake		S02°39'41.1"	E105°01'10.6"
3118	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake	-1.1		
3119	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake			
3120	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			

FDR Subframe Reference Number	Flap 1 Extend	Flap 1 Intransit	Flap 2 Extend	Flap 2 Intransit	Flap 3 Extend	Flap 3 Intransit	Flap 4 Extend	Flap 4 Intransit	Spd Brk Hdl Posn (degrees)	Stick Shaker Left	Stick Shaker Right	Drift Angle (DEG)	Latitude (dd:mm:ss)	Longitude (dd:mm:ss)
3121	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake		S02°39'13.9"	E105°01'00.7"
3122	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake	-1.1		
3123	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3124	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake			
3125	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake		S02°38'44.2"	E105°00'50.8"
3126	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake	-1.1		
3127	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3128	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3129	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake		S02°38'17.1"	E105°00'35.9"
3130	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake	-1.0		
3131	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake			
3132	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3133	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake		S02°37'49.9"	E105°00'26.1"
3134	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake	-1.0		
3135	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake			
3136	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3137	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake		S02°37'22.7"	E105°00'16.2"
3138	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake	-1.0		
3139	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3140	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3141	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake		S02°36'53.0"	E105°00'06.3"
3142	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake	-1.0		
3143	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3144	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake			
3145	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake		S02°36'25.8"	E104°59'56.4"
3146	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.45	No Shake	No Shake	-1.0		
3147	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	Not Ext	Not Intra	-0.56	No Shake	No Shake			
3148									-0.56					
3149									-0.33	No Shake	No Shake			

Silk Air MI-185

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NTSB Vehicle Recorder Division

FDR Subframe Reference Number	Engine 1 Fire	Engine 2 Fire	A/T Wn Capt	A/T Wn FO	APU Fire	Cabin Alt > 10k Ft	A/P Wrn Capt	A/P Wrn FO	Wheel Well Fire	Master Caution	Yaw Damper	ALT Hold	APU Fire	ECS Pack Hi/Lo L	ECS Pack Hi/Lo R	ECS Pack On/Off L	ECS Pack On/Off R	Engine 1 Cutoff	Engine 2 Cutoff	Lavatory Smoke
3081	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3082	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3083	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3084	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire	LOW	LOW	ON	ON	RUN	RUN	No Smk
3085	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3086	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3087	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3088	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire	LOW	LOW	ON	ON	RUN	RUN	No Smk
3089	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3090	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3091	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3092	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire	LOW	LOW	ON	ON	RUN	RUN	No Smk
3093	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3094	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3095	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3096	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire	LOW	LOW	ON	ON	RUN	RUN	No Smk
3097	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3098	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3099	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3100	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire	LOW	LOW	ON	ON	RUN	RUN	No Smk
3101	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3102	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3103	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3104	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire	LOW	LOW	ON	ON	RUN	RUN	No Smk
3105	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3106	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3107	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3108	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire	LOW	LOW	ON	ON	RUN	RUN	No Smk
3109	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3110	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3111	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3112	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire	LOW	LOW	ON	ON	RUN	RUN	No Smk
3113	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3114	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3115	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3116	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire	LOW	LOW	ON	ON	RUN	RUN	No Smk
3117	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3118	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3119	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3120	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire	LOW	LOW	ON	ON	RUN	RUN	No Smk
3121	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3122	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3123	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3124	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire	LOW	LOW	ON	ON	RUN	RUN	No Smk
3125	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3126	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3127	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3128	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire	LOW	LOW	ON	ON	RUN	RUN	No Smk
3129	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3130	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3131	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3132	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire	LOW	LOW	ON	ON	RUN	RUN	No Smk
3133	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3134	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3135	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3136	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire	LOW	LOW	ON	ON	RUN	RUN	No Smk
3137	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3138	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3139	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3140	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire	LOW	LOW	ON	ON	RUN	RUN	No Smk
3141	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3142	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3143	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3144	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire	LOW	LOW	ON	ON	RUN	RUN	No Smk
3145	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3146	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3147	No Fire	No Fire	No Wng	No Wng	No Fire	No Warn	NO	NO	No Fire	No Wrn	not dsng	Not	No Fire					RUN	RUN	No Smk
3148	FIRE	FIRE	No Wng	No Wng	FIRE	No Warn	NO	NO	FIRE	No Wrn	not dsng	Not	FIRE	LOW	LOW	ON	ON			No Smk
3149																				

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NTSB Vehicle Recorder Division

FDR Subframe Reference Number	Engine 1 Cutoff	Engine 2 Cutoff	Retard	N1	Local Limited Master	Isolation Valve	Hyd Sys A -Eng 1	Hyd Sys A Elec	Hyd Sys B -Eng 2	Hyd Sys B Elec	Hyd Sys Standby	HDG Select	Engine Bleed #1	Engine Bleed #2	DME DISTANCE - L (N.M.)	DME DISTANCE - R (N.M.)	CWS Pitch	CWS Roll	CWS A	CWS B
3081	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3082	RUN	RUN	Not	Not	Not			Normal			Normal	Not			106.6		Not	Not	Not	Not
3083	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3084	RUN	RUN	Not	Not	Not	Closed		Normal			Normal	Not	ON	ON		74.2	Not	Not	Not	Not
3085	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3086	RUN	RUN	Not	Not	Not			Normal			Normal	Not			106.2		Not	Not	Not	Not
3087	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3088	RUN	RUN	Not	Not	Not	Closed		Normal			Normal	Not	ON	ON		74.2	Not	Not	Not	Not
3089	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3090	RUN	RUN	Not	Not	Not			Normal			Normal	Not			105.8		Not	Not	Not	Not
3091	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3092	RUN	RUN	Not	Not	Not	Closed		Normal			Normal	Not	ON	ON		74.2	Not	Not	Not	Not
3093	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3094	RUN	RUN	Not	Not	Not			Normal			Normal	Not			105.4		Not	Not	Not	Not
3095	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3096	RUN	RUN	Not	Not	Not	Closed		Normal			Normal	Not	ON	ON		74.1	Not	Not	Not	Not
3097	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3098	RUN	RUN	Not	Not	Not			Normal			Normal	Not			104.9		Not	Not	Not	Not
3099	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3100	RUN	RUN	Not	Not	Not	Closed		Normal			Normal	Not	ON	ON		74.1	Not	Not	Not	Not
3101	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3102	RUN	RUN	Not	Not	Not			Normal			Normal	Not			104.6		Not	Not	Not	Not
3103	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3104	RUN	RUN	Not	Not	Not	Closed		Normal			Normal	Not	ON	ON		74.1	Not	Not	Not	Not
3105	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3106	RUN	RUN	Not	Not	Not			Normal			Normal	Not			104.1		Not	Not	Not	Not
3107	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3108	RUN	RUN	Not	Not	Not	Closed		Normal			Normal	Not	ON	ON		74.0	Not	Not	Not	Not
3109	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3110	RUN	RUN	Not	Not	Not			Normal			Normal	Not			103.7		Not	Not	Not	Not
3111	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3112	RUN	RUN	Not	Not	Not	Closed		Normal			Normal	Not	ON	ON		74.0	Not	Not	Not	Not
3113	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3114	RUN	RUN	Not	Not	Not			Normal			Normal	Not			103.3		Not	Not	Not	Not
3115	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3116	RUN	RUN	Not	Not	Not	Closed		Normal			Normal	Not	ON	ON		73.9	Not	Not	Not	Not
3117	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3118	RUN	RUN	Not	Not	Not			Normal			Normal	Not			102.9		Not	Not	Not	Not
3119	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3120	RUN	RUN	Not	Not	Not	Closed		Normal			Normal	Not	ON	ON		73.9	Not	Not	Not	Not
3121	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3122	RUN	RUN	Not	Not	Not			Normal			Normal	Not			102.4		Not	Not	Not	Not
3123	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3124	RUN	RUN	Not	Not	Not	Closed		Normal			Normal	Not	ON	ON		73.9	Not	Not	Not	Not
3125	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3126	RUN	RUN	Not	Not	Not			Normal			Normal	Not			102.1		Not	Not	Not	Not
3127	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3128	RUN	RUN	Not	Not	Not	Closed		Normal			Normal	Not	ON	ON		73.9	Not	Not	Not	Not
3129	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3130	RUN	RUN	Not	Not	Not			Normal			Normal	Not			101.6		Not	Not	Not	Not
3131	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3132	RUN	RUN	Not	Not	Not	Closed		Normal			Normal	Not	ON	ON		73.9	Not	Not	Not	Not
3133	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3134	RUN	RUN	Not	Not	Not			Normal			Normal	Not			101.2		Not	Not	Not	Not
3135	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3136	RUN	RUN	Not	Not	Not	Closed		Normal			Normal	Not	ON	ON		73.8	Not	Not	Not	Not
3137	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3138	RUN	RUN	Not	Not	Not			Normal			Normal	Not			100.8		Not	Not	Not	Not
3139	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3140	RUN	RUN	Not	Not	Not	Closed		Normal			Normal	Not	ON	ON		73.8	Not	Not	Not	Not
3141	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3142	RUN	RUN	Not	Not	Not			Normal			Normal	Not			100.4		Not	Not	Not	Not
3143	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3144	RUN	RUN	Not	Not	Not	Closed		Normal			Normal	Not	ON	ON		73.9	Not	Not	Not	Not
3145	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3146	RUN	RUN	Not	Not	Not			Normal			Normal	Not			100.0		Not	Not	Not	Not
3147	RUN	RUN	Not	Not	Not		Normal		Normal	Normal		Not					Not	Not	Not	Not
3148						Closed					Normal	Not	ON	ON					Not	
3149																				

Silk Air MI-185

tab7 - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 21, 1999

NTSB Vehicle Recorder Division

FDR Subframe Reference Number	HDG Select	CWS Pitch	CWS Roll	CWS A	CWS B	ALT Acquire	Cowl Anti-Ice L	Cowl Anti-Ice R	EVENT	LNAV Mode Op	MCP Speed 1	MCP Speed 2	Sink Rate (1-TRUE)	V/S Mode	VNAV Mode Op	Wind Direction True (DEG)	Wind Speed (knots)	Wing Anti-Ice	Windshear Caution
3081	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage	115.0			FALSE
3082	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3083	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3084	Not	Not	Not	Not	Not	Not	OFF	OFF	NO Event	Engage	Not	Not	FALSE	Not	Engage		11.5	OFF	FALSE
3085	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage	115.0			FALSE
3086	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3087	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3088	Not	Not	Not	Not	Not	Not	OFF	OFF	NO Event	Engage	Not	Not	FALSE	Not	Engage		11.0	OFF	FALSE
3089	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage	112.5			FALSE
3090	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3091	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3092	Not	Not	Not	Not	Not	Not	OFF	OFF	NO Event	Engage	Not	Not	FALSE	Not	Engage		10.5	OFF	FALSE
3093	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage	112.1			FALSE
3094	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3095	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3096	Not	Not	Not	Not	Not	Not	OFF	OFF	NO Event	Engage	Not	Not	FALSE	Not	Engage		9.5	OFF	FALSE
3097	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage	111.4			FALSE
3098	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3099	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3100	Not	Not	Not	Not	Not	Not	OFF	OFF	NO Event	Engage	Not	Not	FALSE	Not	Engage		9.0	OFF	FALSE
3101	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage	109.7			FALSE
3102	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3103	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3104	Not	Not	Not	Not	Not	Not	OFF	OFF	NO Event	Engage	Not	Not	FALSE	Not	Engage		9.5	OFF	FALSE
3105	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage	107.9			FALSE
3106	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3107	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3108	Not	Not	Not	Not	Not	Not	OFF	OFF	NO Event	Engage	Not	Not	FALSE	Not	Engage		9.0	OFF	FALSE
3109	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage	104.4			FALSE
3110	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3111	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3112	Not	Not	Not	Not	Not	Not	OFF	OFF	NO Event	Engage	Not	Not	FALSE	Not	Engage		9.0	OFF	FALSE
3113	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage	100.9			FALSE
3114	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3115	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3116	Not	Not	Not	Not	Not	Not	OFF	OFF	NO Event	Engage	Not	Not	FALSE	Not	Engage		9.0	OFF	FALSE
3117	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage	99.1			FALSE
3118	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3119	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3120	Not	Not	Not	Not	Not	Not	OFF	OFF	NO Event	Engage	Not	Not	FALSE	Not	Engage		9.5	OFF	FALSE
3121	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage	98.8			FALSE
3122	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3123	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3124	Not	Not	Not	Not	Not	Not	OFF	OFF	NO Event	Engage	Not	Not	FALSE	Not	Engage		9.5	OFF	FALSE
3125	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage	98.1			FALSE
3126	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3127	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3128	Not	Not	Not	Not	Not	Not	OFF	OFF	NO Event	Engage	Not	Not	FALSE	Not	Engage		9.0	OFF	FALSE
3129	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage	96.7			FALSE
3130	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3131	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3132	Not	Not	Not	Not	Not	Not	OFF	OFF	NO Event	Engage	Not	Not	FALSE	Not	Engage		9.0	OFF	FALSE
3133	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage	99.5			FALSE
3134	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3135	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3136	Not	Not	Not	Not	Not	Not	OFF	OFF	NO Event	Engage	Not	Not	FALSE	Not	Engage		8.5	OFF	FALSE
3137	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage	102.7			FALSE
3138	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3139	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3140	Not	Not	Not	Not	Not	Not	OFF	OFF	NO Event	Engage	Not	Not	FALSE	Not	Engage		8.5	OFF	FALSE
3141	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage	102.7			FALSE
3142	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3143	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3144	Not	Not	Not	Not	Not	Not	OFF	OFF	NO Event	Engage	Not	Not	FALSE	Not	Engage		9.0	OFF	FALSE
3145	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage	104.4			FALSE
3146	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3147	Not	Not	Not	Not	Not	Not			NO Event	Engage	Not	Not	FALSE	Not	Engage				FALSE
3148	Not			Not			OFF	OFF				Not	FALSE	Not	Engage			OFF	FALSE
3149																			

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TCAS1 - aus7.frm & aus11.frm, Palembang, Indonesia
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FDR Subframe Reference Number	SF No.	Down Adv MSB (29)	Down Adv LSB+1 (28)	Down Adv LSB (27)	Up Adv MSB (26)	Up Adv LSB+1 (25)	Up Adv LSB (24)	TCAS SL MSB (23)	TCAS SL LSB+1 (24)	TCAS SL LSB (25)	Reply Info MSB (26)	Reply Info LSB+2 (27)	Reply Info LSB+1 (28)	Reply Info LSB (29)	Vert Con MSB (23)	Vert Con LSB+1 (22)	Vert Con LSB (21)	Comb Con MSB (20)	Comb Con LSB+1 (19)	Comb Con LSB (18)
3081	1	0	0	0	0	0	0													
3082	2							1	1	1			1	1	0	0	0	0	0	0
3083	3	0	0	0	0	0	0													
3084	4										0	0			0	0	0	0	0	0
3085	1	0	0	0	0	0	0													
3086	2							1	1	1			1	1	0	0	0	0	0	0
3087	3	0	0	0	0	0	0													
3088	4										0	0			0	0	0	0	0	0
3089	1	0	0	0	0	0	0													
3090	2							1	1	1			1	1	0	0	0	0	0	0
3091	3	0	0	0	0	0	0													
3092	4										0	0			0	0	0	0	0	0
3093	1	0	0	0	0	0	0													
3094	2							1	1	1			1	1	0	0	0	0	0	0
3095	3	0	0	0	0	0	0													
3096	4										0	0			0	0	0	0	0	0
3097	1	0	0	0	0	0	0													
3098	2							1	1	1			1	1	0	0	0	0	0	0
3099	3	0	0	0	0	0	0													
3100	4										0	0			0	0	0	0	0	0
3101	1	0	0	0	0	0	0													
3102	2							1	1	1			1	1	0	0	0	0	0	0
3103	3	0	0	0	0	0	0													
3104	4										0	0			0	0	0	0	0	0
3105	1	0	0	0	0	0	0													
3106	2							1	1	1			1	1	0	0	0	0	0	0
3107	3	0	0	0	0	0	0													
3108	4										0	0			0	0	0	0	0	0
3109	1	0	0	0	0	0	0													
3110	2							1	1	1			1	1	0	0	0	0	0	0
3111	3	0	0	0	0	0	0													
3112	4										0	0			0	0	0	0	0	0
3113	1	0	0	0	0	0	0													
3114	2							1	1	1			1	1	0	0	0	0	0	0
3115	3	0	0	0	0	0	0													
3116	4										0	0			0	0	0	0	0	0
3117	1	0	0	0	0	0	0													
3118	2							1	1	1			1	1	0	0	0	0	0	0
3119	3	0	0	0	0	0	0													
3120	4										0	0			0	0	0	0	0	0
3121	1	0	0	0	0	0	0													
3122	2							1	1	1			1	1	0	0	0	0	0	0
3123	3	0	0	0	0	0	0													
3124	4										0	0			0	0	0	0	0	0
3125	1	0	0	0	0	0	0													
3126	2							1	1	1			1	1	0	0	0	0	0	0
3127	3	0	0	0	0	0	0													
3128	4										0	0			0	0	0	0	0	0
3129	1	0	0	0	0	0	0													
3130	2							1	1	1			1	1	0	0	0	0	0	0
3131	3	0	0	0	0	0	0													
3132	4										0	0			0	0	0	0	0	0
3133	1	0	0	0	0	0	0													
3134	2							1	1	1			1	1	0	0	0	0	0	0
3135	3	0	0	0	0	0	0													
3136	4										0	0			0	0	0	0	0	0
3137	1	0	0	0	0	0	0													
3138	2							1	1	1			1	1	0	0	0	0	0	0
3139	3	0	0	0	0	0	0													
3140	4										0	0			0	0	0	0	0	0
3141	1	0	0	0	0	0	0													
3142	2							1	1	1			1	1	0	0	0	0	0	0
3143	3	0	0	0	0	0	0													
3144	4										0	0			0	0	0	0	0	0
3145	1	0	0	0	0	0	0													
3146	2							1	1	1			1	1	0	0	0	0	0	0
3147	3	0	0	0	0	0	0													
3148	4										0	0								
3149																				

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TCAS2 - aus7.frm & aus11.frm, Palembang, Indonesia
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NTSB Vehicle Recorder Division

FDR Subframe Reference Number	SF No.	Adv Alt Rate Sign	Adv Alt Rate MSB (16)	Adv Alt Rate LSB+4 (15)	Adv Alt Rate LSB+3 (14)	Adv Alt Rate LSB+2 (13)	Adv Alt Rate LSB+1 (12)	Adv Alt Rate LSB (11)	Pilot SL MSB (17)	Pilot SL LSB+1 (16)	Pilot SL LSB (15)	TCAS SL MSB (23)	TCAS SL LSB+1 (24)	TCAS SL LSB (25)	Reply Info MSB (26)	Reply Info LSB+2 (27)	Reply Info LSB+1 (28)	Reply Info LSB (29)
3081	1																	
3082	2	0	0	0	0	0	0	0				1	1	1			1	1
3083	3																	
3084	4	0	0	0	0	0	0	0	0	0	0				0	0		
3085	1																	
3086	2	0	0	0	0	0	0	0				1	1	1			1	1
3087	3																	
3088	4	0	0	0	0	0	0	0	0	0	0				0	0		
3089	1																	
3090	2	0	0	0	0	0	0	0				1	1	1			1	1
3091	3																	
3092	4	0	0	0	0	0	0	0	0	0	0				0	0		
3093	1																	
3094	2	0	0	0	0	0	0	0				1	1	1			1	1
3095	3																	
3096	4	0	0	0	0	0	0	0	0	0	0				0	0		
3097	1																	
3098	2	0	0	0	0	0	0	0				1	1	1			1	1
3099	3																	
3100	4	0	0	0	0	0	0	0	0	0	0				0	0		
3101	1																	
3102	2	0	0	0	0	0	0	0				1	1	1			1	1
3103	3																	
3104	4	0	0	0	0	0	0	0	0	0	0				0	0		
3105	1																	
3106	2	0	0	0	0	0	0	0				1	1	1			1	1
3107	3																	
3108	4	0	0	0	0	0	0	0	0	0	0				0	0		
3109	1																	
3110	2	0	0	0	0	0	0	0				1	1	1			1	1
3111	3																	
3112	4	0	0	0	0	0	0	0	0	0	0				0	0		
3113	1																	
3114	2	0	0	0	0	0	0	0				1	1	1			1	1
3115	3																	
3116	4	0	0	0	0	0	0	0	0	0	0				0	0		
3117	1																	
3118	2	0	0	0	0	0	0	0				1	1	1			1	1
3119	3																	
3120	4	0	0	0	0	0	0	0	0	0	0				0	0		
3121	1																	
3122	2	0	0	0	0	0	0	0				1	1	1			1	1
3123	3																	
3124	4	0	0	0	0	0	0	0	0	0	0				0	0		
3125	1																	
3126	2	0	0	0	0	0	0	0				1	1	1			1	1
3127	3																	
3128	4	0	0	0	0	0	0	0	0	0	0				0	0		
3129	1																	
3130	2	0	0	0	0	0	0	0				1	1	1			1	1
3131	3																	
3132	4	0	0	0	0	0	0	0	0	0	0				0	0		
3133	1																	
3134	2	0	0	0	0	0	0	0				1	1	1			1	1
3135	3																	
3136	4	0	0	0	0	0	0	0	0	0	0				0	0		
3137	1																	
3138	2	0	0	0	0	0	0	0				1	1	1			1	1
3139	3																	
3140	4	0	0	0	0	0	0	0	0	0	0				0	0		
3141	1																	
3142	2	0	0	0	0	0	0	0				1	1	1			1	1
3143	3																	
3144	4	0	0	0	0	0	0	0	0	0	0				0	0		
3145	1																	
3146	2	0	0	0	0	0	0	0				1	1	1			1	1
3147	3																	
3148	4	0	0	0	0	0	0	0	0	0	0				0	0		
3149																		

Silk Air MI-185

vhf - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 21, 1999

NTSB Vehicle Recorder Division

Silk Air MI-185, vhf - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 21, 1999, NTSB Vehicle Recorder Division

FDR Subframe Reference Number	SF No.	ALTITUDE (FEET)	CAS (knots)	GMT Hours (hrs)	GMT Minutes (min)	GMT Seconds (sec)	VHF KEYING LEFT	Latitude (dd:mm:ss)	Longitude (dd:mm:ss)	Frame Counter (counts)	FDR Frm 1/2	N1 L M Bit 15	N1 L M Bit 17	N1 L M Bit 18	N1 L M Bit 19	N1 L M Bit 20
3081	1	35004	248.5				Not Keye	S02°43'50.8"	E105°02'44.5"	484						
3082	2	35004	248.5				Not Keye									
3083	3	35008	248.5	9	10	22	Not Keye				F-2	0	0	1	0	0
3084	4	35008	249.0				Not Keye									
3085	1	35008	249.0				Not Keye	S02°43'23.6"	E105°02'34.6"	485						
3086	2	35008	249.5				Not Keye									
3087	3	35008	249.5	9	10	26	Keyed				F-2	0	0	1	0	0
3088	4	35008	249.5				Keyed									
3089	1	35008	249.5				Keyed	S02°42'53.9"	E105°02'24.7"	486						
3090	2	35008	249.5				Not Keye									
3091	3	35008	250.0	9	10	30	Not Keye				F-2	0	0	1	0	0
3092	4	35008	249.5				Not Keye									
3093	1	35008	249.5				Not Keye	S02°42'26.7"	E105°02'14.8"	487						
3094	2	35008	250.0				Not Keye									
3095	3	35008	250.0	9	10	34	Not Keye				F-2	0	0	1	0	0
3096	4	35008	250.5				Not Keye									
3097	1	35004	250.5				Not Keye	S02°41'59.5"	E105°02'04.9"	488						
3098	2	35004	250.5				Not Keye									
3099	3	35004	250.5	9	10	38	Not Keye				F-2	0	0	1	0	0
3100	4	35004	250.0				Not Keye									
3101	1	35004	250.0				Not Keye	S02°41'32.3"	E105°01'50.1"	489						
3102	2	35004	250.0				Not Keye									
3103	3	35000	250.0	9	10	42	Not Keye				F-2	0	0	1	0	0
3104	4	35004	250.0				Not Keye									
3105	1	35004	250.5				Not Keye	S02°41'05.1"	E105°01'40.2"	490						
3106	2	35004	250.5				Not Keye									
3107	3	35004	250.5	9	10	46	Not Keye				F-2	0	0	1	0	0
3108	4	35008	251.0				Not Keye									
3109	1	35008	251.0				Not Keye	S02°40'35.5"	E105°01'30.3"	491						
3110	2	35008	251.0				Not Keye									
3111	3	35008	251.0	9	10	50	Not Keye				F-2	0	0	1	0	0
3112	4	35012	251.0				Not Keye									
3113	1	35012	251.0				Not Keye	S02°40'08.3"	E105°01'20.4"	492						
3114	2	35008	251.0				Not Keye									
3115	3	35008	251.0	9	10	54	Not Keye				F-2	0	0	1	0	0
3116	4	35008	251.0				Not Keye									
3117	1	35008	251.0				Not Keye	S02°39'41.1"	E105°01'10.6"	493						
3118	2	35008	251.0				Not Keye									
3119	3	35008	251.0	9	10	58	Not Keye				F-2	0	0	1	0	0
3120	4	35008	251.0				Not Keye									
3121	1	35008	251.0				Not Keye	S02°39'13.9"	E105°01'00.7"	494						
3122	2	35008	251.0				Not Keye									
3123	3	35004	251.0	9	11	2	Not Keye				F-2	0	0	1	0	0
3124	4	35004	251.0				Not Keye									
3125	1	35004	251.5				Not Keye	S02°38'44.2"	E105°00'50.8"	495						
3126	2	35004	251.5				Not Keye									
3127	3	35004	251.5	9	11	6	Not Keye				F-2	0	0	1	0	0
3128	4	35004	251.0				Not Keye									
3129	1	35008	251.0				Not Keye	S02°38'17.1"	E105°00'35.9"	496						
3130	2	35008	250.5				Not Keye									
3131	3	35008	251.0	9	11	10	Not Keye				F-2	0	0	1	0	0
3132	4	35008	251.0				Not Keye									
3133	1	35008	251.0				Not Keye	S02°37'49.9"	E105°00'26.1"	497						
3134	2	35008	251.0				Not Keye									
3135	3	35008	250.5	9	11	14	Not Keye				F-2	0	0	1	0	0
3136	4	35008	250.5				Not Keye									
3137	1	35004	251.0				Not Keye	S02°37'22.7"	E105°00'16.2"	498						
3138	2	35008	251.0				Not Keye									
3139	3	35004	251.0	9	11	18	Not Keye				F-2	0	0	1	0	0
3140	4	35008	251.0				Not Keye									
3141	1	35008	250.5				Not Keye	S02°36'53.0"	E105°00'06.3"	499						
3142	2	35008	250.5				Not Keye									
3143	3	35004	250.5	9	11	22	Not Keye				F-2	0	0	1	0	0
3144	4	35004	251.0				Not Keye									
3145	1	35004	251.0				Not Keye	S02°36'25.8"	E104°59'56.4"	500						
3146	2	35004	251.0				Not Keye									
3147	3	35004	251.0	9	11	26	Not Keye				F-2	0	0	1	0	0
3148	4						Not Keye									
3149																

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Last2.tab - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 21, 1999

NTSB Vehicle Recorder Division

FDR Subframe Reference Number	SF No.	CAS (knots)	Long. Accel (g)	N1 Eng 1 (% rpm)	N1 Eng 2 (% rpm)	N2 Eng 1 -LEFT (% rpm)	N2 Eng 2 -RIGHT (% rpm)	Fuel Flow 1 - L (PPH)	Fuel Flow 2 - R (PPH)	TLA Eng 1 - Left (degs.)	TLA Eng 2 - Right (degs.)	A/T Engage	GMT Hours (hrs)	GMT Minutes (min)	GMT Seconds (sec)	Latitude (dd:mm:ss)	Longitude (dd:mm:ss)	Frame Counter (counts)
3081	1	248.50	0.018 0.020 0.018 0.018	86.50	86.38	91.25					31.99	1.00				S02°43'51"	N105°02'44	484
3082	2	248.50	0.018 0.018 0.018 0.018	86.50	86.38			2464.00		32.17		1.00						
3083	3	248.50	0.020 0.018 0.016 0.018	86.50	86.38		91.00				31.99	1.00	9.00	10.00	22.00			
3084	4	249.00	0.018 0.018 0.018 0.018	86.38	86.38				2432.00	32.17		1.00						
3085	1	249.00	0.016 0.018 0.018 0.020	86.38	86.38	91.12					31.99	1.00				S02°43'24"	N105°02'35	485
3086	2	249.50	0.016 0.018 0.018 0.018	86.50	86.38			2448.00		32.17		1.00						
3087	3	249.50	0.018 0.018 0.016 0.018	86.38	86.38		90.88				31.99	1.00	9.00	10.00	26.00			
3088	4	249.50	0.018 0.018 0.018 0.014	86.38	86.38				2432.00	32.17		1.00						
3089	1	249.50	0.016 0.018 0.018 0.016	86.38	86.38	91.25					31.99	1.00				S02°42'54"	N105°02'25	486
3090	2	249.50	0.018 0.016 0.016 0.016	86.38	86.38			2464.00		32.17		1.00						
3091	3	250.00	0.016 0.016 0.016 0.018	86.38	86.38		90.88				31.99	1.00	9.00	10.00	30.00			
3092	4	249.50	0.016 0.016 0.016 0.018	86.38	86.50				2432.00	32.34		1.00						
3093	1	249.50	0.018 0.016 0.018 0.016	86.50	86.50	91.25					32.17	1.00				S02°42'27"	N105°02'15	487
3094	2	250.00	0.014 0.016 0.016 0.016	86.50	86.50			2464.00		32.34		1.00						
3095	3	250.00	0.016 0.016 0.016 0.016	86.50	86.50		91.00				32.17	1.00	9.00	10.00	34.00			
3096	4	250.50	0.016 0.014 0.014 0.016	86.50	86.50				2448.00	32.34		1.00						
3097	1	250.50	0.016 0.016 0.014 0.014	86.50	86.50	91.25					32.17	1.00				S02°42'00"	N105°02'05	488
3098	2	250.50	0.014 0.018 0.014 0.016	86.50	86.50			2480.00		32.34		1.00						
3099	3	250.50	0.016 0.016 0.016 0.014	86.50	86.50		91.00				32.17	1.00	9.00	10.00	38.00			
3100	4	250.00	0.016 0.016 0.016 0.014	86.50	86.50				2448.00	32.34		1.00						

FDR Subframe Reference Number	SF No.	CAS (knots)	Long. Accel (g)	N1 Eng 1 (% rpm)	N1 Eng 2 (% rpm)	N2 Eng 1 -LEFT (% rpm)	N2 Eng 2 -RIGHT (% rpm)	Fuel Flow 1 - L (PPH)	Fuel Flow 2 - R (PPH)	TLA Eng 1 - Left (degs.)	TLA Eng 2 - Right (degs.)	A/T Engage	GMT Hours (hrs)	GMT Minutes (min)	GMT Seconds (sec)	Latitude (dd:mm:ss)	Longitude (dd:mm:ss)	Frame Counter (counts)
3101	1	250.00	0.016 0.014 0.016 0.016	86.50	86.50	91.25					32.17	1.00				S02°41'32"	N105°01'50	489
3102	2	250.00	0.016 0.016 0.016 0.016	86.50	86.50			2480.00		32.34		1.00						
3103	3	250.00	0.016 0.018 0.016 0.016	86.50	86.50		91.00				31.99	1.00	9.00	10.00	42.00			
3104	4	250.00	0.018 0.016 0.016 0.016	86.50	86.38				2432.00	32.34		1.00						
3105	1	250.50	0.014 0.018 0.016 0.014	86.50	86.38	91.12					31.99	1.00				S02°41'05"	N105°01'40	490
3106	2	250.50	0.016 0.016 0.016 0.014	86.50	86.38			2464.00		32.17		1.00						
3107	3	250.50	0.014 0.016 0.014 0.018	86.38	86.38		91.00				31.99	1.00	9.00	10.00	46.00			
3108	4	251.00	0.012 0.016 0.016 0.016	86.38	86.38				2432.00	32.17		1.00						
3109	1	251.00	0.014 0.014 0.014 0.014	86.50	86.38	91.25					31.99	1.00				S02°40'35"	N105°01'30	491
3110	2	251.00	0.014 0.012 0.014 0.014	86.38	86.38			2464.00		32.17		1.00						
3111	3	251.00	0.014 0.014 0.014 0.014	86.38	86.38		90.88				31.99	1.00	9.00	10.00	50.00			
3112	4	251.00	0.014 0.014 0.014 0.014	86.38	86.38				2432.00	32.17		1.00						
3113	1	251.00	0.014 0.014 0.014 0.014	86.38	86.38	91.25					31.99	1.00				S02°40'08"	N105°01'20	492
3114	2	251.00	0.016 0.016 0.014 0.016	86.38	86.38			2464.00		32.17		1.00						
3115	3	251.00	0.014 0.016 0.016 0.014	86.38	86.38		91.00				32.17	1.00	9.00	10.00	54.00			
3116	4	251.00	0.014 0.014 0.014 0.016	86.38	86.50				2432.00	32.17		1.00						
3117	1	251.00	0.014 0.016 0.016 0.014	86.38	86.50	91.25					32.17	1.00				S02°39'41"	N105°01'11	493
3118	2	251.00	0.016 0.016 0.016 0.016	86.38	86.50			2464.00		32.17		1.00						
3119	3	251.00	0.016 0.016 0.014 0.016	86.38	86.50		91.00				32.17	1.00	9.00	10.00	58.00			
3120	4	251.00	0.016 0.014 0.014 0.014	86.38	86.50				2448.00	32.17		1.00						

FDR Subframe Reference Number	SF No.	CAS (knots)	Long. Accel (g)	N1 Eng 1 (% rpm)	N1 Eng 2 (% rpm)	N2 Eng 1 -LEFT (% rpm)	N2 Eng 2 -RIGHT (% rpm)	Fuel Flow 1 - L (PPH)	Fuel Flow 2 - R (PPH)	TLA Eng 1 - Left (degs.)	TLA Eng 2 - Right (degs.)	A/T Engage	GMT Hours (hrs)	GMT Minutes (min)	GMT Seconds (sec)	Latitude (dd:mm:ss)	Longitude (dd:mm:ss)	Frame Counter (counts)
3121	1	251.00	0.016	86.38	86.50	91.25					32.17	1.00				S02°39'14"	N105°01'01	494
			0.016															
			0.016															
			0.016															
3122	2	251.00	0.016	86.38	86.50			2464.00		32.17		1.00						
			0.016															
			0.016															
			0.016															
3123	3	251.00	0.016	86.38	86.50		91.00				32.17	1.00	9.00	11.00	2.00			
			0.016															
			0.014															
			0.016															
3124	4	251.00	0.014	86.50	86.50				2448.00	32.17		1.00						
			0.016															
			0.014															
			0.014															
3125	1	251.50	0.014	86.38	86.50	91.12					32.17	1.00				S02°38'44"	N105°00'51	495
			0.016															
			0.014															
			0.014															
3126	2	251.50	0.016	86.38	86.50			2464.00		32.17		1.00						
			0.014															
			0.014															
			0.016															
3127	3	251.50	0.012	86.50	86.50		91.00				32.17	1.00	9.00	11.00	6.00			
			0.014															
			0.016															
			0.016															
3128	4	251.00	0.014	86.38	86.50				2432.00	32.17		1.00						
			0.016															
			0.014															
			0.016															
3129	1	251.00	0.014	86.50	86.50	91.25					32.17	1.00				S02°38'17"	N105°00'36	496
			0.014															
			0.014															
			0.016															
3130	2	250.50	0.016	86.38	86.50			2464.00		32.34		1.00						
			0.016															
			0.016															
			0.016															
3131	3	251.00	0.014	86.50	86.50		91.12				32.17	1.00	9.00	11.00	10.00			
			0.014															
			0.014															
			0.016															
3132	4	251.00	0.014	86.38	86.50				2448.00	32.17		1.00						
			0.014															
			0.016															
			0.014															
3133	1	251.00	0.016	86.50	86.62	91.25					32.17	1.00				S02°37'50"	N105°00'26	497
			0.016															
			0.016															
			0.014															
3134	2	251.00	0.018	86.50	86.50			2464.00		32.34		1.00						
			0.014															
			0.014															
			0.014															
3135	3	250.50	0.016	86.50	86.50		91.12				31.99	1.00	9.00	11.00	14.00			
			0.018															
			0.016															
			0.016															
3136	4	250.50	0.014	86.50	86.50				2448.00	32.34		1.00						
			0.016															
			0.016															
			0.014															
3137	1	251.00	0.014	86.50	86.50	91.38					31.99	1.00				S02°37'23"	N105°00'16	498
			0.016															
			0.016															
			0.014															
3138	2	251.00	0.014	86.50	86.50			2464.00		32.34		1.00						
			0.014															
			0.016															
			0.016															
3139	3	251.00	0.016	86.50	86.50		91.12				31.99	1.00	9.00	11.00	18.00			
			0.016															
			0.016															
			0.016															
3140	4	251.00	0.016	86.50	86.50				2432.00	32.34		1.00						
			0.016															
			0.022															
			0.014															

FDR Subframe Reference Number	SF No.	CAS (knots)	Long. Accel (g)	N1 Eng 1 (% rpm)	N1 Eng 2 (% rpm)	N2 Eng 1 -LEFT (% rpm)	N2 Eng 2 -RIGHT (% rpm)	Fuel Flow 1 - L (PPH)	Fuel Flow 2 - R (PPH)	TLA Eng 1 - Left (degs.)	TLA Eng 2 - Right (degs.)	A/T Engage	GMT Hours (hrs)	GMT Minutes (min)	GMT Seconds (sec)	Latitude (dd:mm:ss)	Longitude (dd:mm:ss)	Frame Counter (counts)
3141	1	250.50	0.014 0.016 0.016 0.016	86.50	86.50	91.38					31.99	1.00				S02°36'53"	N105°00'06	499
3142	2	250.50	0.014 0.014 0.016 0.016	86.50	86.50			2480.00		32.34		1.00						
3143	3	250.50	0.016 0.016 0.016 0.016	86.50	86.50		91.12				31.99	1.00	9.00	11.00	22.00			
3144	4	251.00	0.016 0.016 0.016 0.016	86.50	86.50				2448.00	32.34		1.00						
3145	1	251.00	0.016 0.014 0.014 0.016	86.50	86.50	91.38					31.99	1.00				S02°36'26"	N104°59'56	500
3146	2	251.00	0.014 0.016 0.014 0.018	86.50	86.50			2480.00		32.34		1.00						
3147	3	251.00	0.016 0.014 0.014 0.016	86.50	86.50		91.12				31.99	1.00	9.00	11.00	26.00			
3148	4		0.016 0.014	86.62						32.34								
3149																		

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Engine Data #1-aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 22, 1999

NTSB Vehicle Recorder Division

FDR Subframe Reference Number	SF No.	ALTITUDE (FEET)	CAS (knots)	N1 Eng 1 (% rpm)	N1 Eng 2 (% rpm)	N2 Eng 1 (% rpm)	N2 Eng 2 (% rpm)	EGT 1 (DEG C)	EGT 2 (DEG C)	Engine 1 Cutoff	Engine 2 Cutoff	Engine 1 Fire	Engine 2 Fire	Engine Bleed #1	Engine Bleed #2	Fuel Flow 1 - L (PPH)	Fuel Flow 2 - R (PPH)	TLA Eng 1 - Left (degs.)	TLA Eng 2 - Right (degs.)
3081	1	35004	248.5	86.50	86.38	91.25		144.0		RUN	RUN	No Fire	No Fire						31.99
3082	2	35004	248.5	86.50	86.38					RUN	RUN	No Fire	No Fire			2464.0		32.17	
3083	3	35008	248.5	86.50	86.38		91.00		272.0	RUN	RUN	No Fire	No Fire						31.99
3084	4	35008	249.0	86.38	86.38					RUN	RUN	No Fire	No Fire	ON	ON		2432.0	32.17	
3085	1	35008	249.0	86.38	86.38	91.12		144.0		RUN	RUN	No Fire	No Fire						31.99
3086	2	35008	249.5	86.50	86.38					RUN	RUN	No Fire	No Fire			2448.0		32.17	
3087	3	35008	249.5	86.38	86.38		90.88		272.0	RUN	RUN	No Fire	No Fire						31.99
3088	4	35008	249.5	86.38	86.38					RUN	RUN	No Fire	No Fire	ON	ON		2432.0	32.17	
3089	1	35008	249.5	86.38	86.38	91.25		144.0		RUN	RUN	No Fire	No Fire						31.99
3090	2	35008	249.5	86.38	86.38					RUN	RUN	No Fire	No Fire			2464.0		32.17	
3091	3	35008	250.0	86.38	86.38		90.88		272.0	RUN	RUN	No Fire	No Fire						31.99
3092	4	35008	249.5	86.38	86.50					RUN	RUN	No Fire	No Fire	ON	ON		2432.0	32.34	
3093	1	35008	249.5	86.50	86.50	91.25		144.0		RUN	RUN	No Fire	No Fire						32.17
3094	2	35008	250.0	86.50	86.50					RUN	RUN	No Fire	No Fire			2464.0		32.34	
3095	3	35008	250.0	86.50	86.50		91.00		272.0	RUN	RUN	No Fire	No Fire						32.17
3096	4	35008	250.5	86.50	86.50					RUN	RUN	No Fire	No Fire	ON	ON		2448.0	32.34	
3097	1	35004	250.5	86.50	86.50	91.25		144.0		RUN	RUN	No Fire	No Fire						32.17
3098	2	35004	250.5	86.50	86.50					RUN	RUN	No Fire	No Fire			2480.0		32.34	
3099	3	35004	250.5	86.50	86.50		91.00		272.0	RUN	RUN	No Fire	No Fire						32.17
3100	4	35004	250.0	86.50	86.50					RUN	RUN	No Fire	No Fire	ON	ON		2448.0	32.34	
3101	1	35004	250.0	86.50	86.50	91.25		144.0		RUN	RUN	No Fire	No Fire						32.17
3102	2	35004	250.0	86.50	86.50					RUN	RUN	No Fire	No Fire			2480.0		32.34	
3103	3	35000	250.0	86.50	86.50		91.00		272.0	RUN	RUN	No Fire	No Fire						31.99
3104	4	35004	250.0	86.50	86.38					RUN	RUN	No Fire	No Fire	ON	ON		2432.0	32.34	
3105	1	35004	250.5	86.50	86.38	91.12		144.0		RUN	RUN	No Fire	No Fire						31.99
3106	2	35004	250.5	86.50	86.38					RUN	RUN	No Fire	No Fire			2464.0		32.17	
3107	3	35004	250.5	86.38	86.38		91.00		272.0	RUN	RUN	No Fire	No Fire						31.99
3108	4	35008	251.0	86.38	86.38					RUN	RUN	No Fire	No Fire	ON	ON		2432.0	32.17	
3109	1	35008	251.0	86.50	86.38	91.25		144.0		RUN	RUN	No Fire	No Fire						31.99
3110	2	35008	251.0	86.38	86.38					RUN	RUN	No Fire	No Fire			2464.0		32.17	
3111	3	35008	251.0	86.38	86.38		90.88		272.0	RUN	RUN	No Fire	No Fire						31.99
3112	4	35012	251.0	86.38	86.38					RUN	RUN	No Fire	No Fire	ON	ON		2432.0	32.17	
3113	1	35012	251.0	86.38	86.38	91.25		144.0		RUN	RUN	No Fire	No Fire						31.99
3114	2	35008	251.0	86.38	86.38					RUN	RUN	No Fire	No Fire			2464.0		32.17	
3115	3	35008	251.0	86.38	86.38		91.00		272.0	RUN	RUN	No Fire	No Fire						32.17
3116	4	35008	251.0	86.38	86.50					RUN	RUN	No Fire	No Fire	ON	ON		2432.0	32.17	
3117	1	35008	251.0	86.38	86.50	91.25		144.0		RUN	RUN	No Fire	No Fire						32.17
3118	2	35008	251.0	86.38	86.50					RUN	RUN	No Fire	No Fire			2464.0		32.17	
3119	3	35008	251.0	86.38	86.50		91.00		272.0	RUN	RUN	No Fire	No Fire						32.17
3120	4	35008	251.0	86.38	86.50					RUN	RUN	No Fire	No Fire	ON	ON		2448.0	32.17	
3121	1	35008	251.0	86.38	86.50	91.25		144.0		RUN	RUN	No Fire	No Fire						32.17
3122	2	35008	251.0	86.38	86.50					RUN	RUN	No Fire	No Fire			2464.0		32.17	
3123	3	35004	251.0	86.38	86.50		91.00		272.0	RUN	RUN	No Fire	No Fire						32.17
3124	4	35004	251.0	86.50	86.50					RUN	RUN	No Fire	No Fire	ON	ON		2448.0	32.17	
3125	1	35004	251.5	86.38	86.50	91.12		144.0		RUN	RUN	No Fire	No Fire						32.17
3126	2	35004	251.5	86.38	86.50					RUN	RUN	No Fire	No Fire			2464.0		32.17	
3127	3	35004	251.5	86.50	86.50		91.00		272.0	RUN	RUN	No Fire	No Fire						32.17
3128	4	35004	251.0	86.38	86.50					RUN	RUN	No Fire	No Fire	ON	ON		2432.0	32.17	
3129	1	35008	251.0	86.50	86.50	91.25		144.0		RUN	RUN	No Fire	No Fire						32.17
3130	2	35008	250.5	86.38	86.50					RUN	RUN	No Fire	No Fire			2464.0		32.34	
3131	3	35008	251.0	86.50	86.50		91.12		272.0	RUN	RUN	No Fire	No Fire						32.17
3132	4	35008	251.0	86.38	86.50					RUN	RUN	No Fire	No Fire	ON	ON		2448.0	32.17	
3133	1	35008	251.0	86.50	86.62	91.25		144.0		RUN	RUN	No Fire	No Fire						32.17
3134	2	35008	251.0	86.50	86.50					RUN	RUN	No Fire	No Fire			2464.0		32.34	
3135	3	35008	250.5	86.50	86.50		91.12		272.0	RUN	RUN	No Fire	No Fire						31.99
3136	4	35008	250.5	86.50	86.50					RUN	RUN	No Fire	No Fire	ON	ON		2448.0	32.34	
3137	1	35004	251.0	86.50	86.50	91.38		144.0		RUN	RUN	No Fire	No Fire						31.99
3138	2	35008	251.0	86.50	86.50					RUN	RUN	No Fire	No Fire			2464.0		32.34	
3139	3	35004	251.0	86.50	86.50		91.12		272.0	RUN	RUN	No Fire	No Fire						31.99
3140	4	35008	251.0	86.50	86.50					RUN	RUN	No Fire	No Fire	ON	ON		2432.0	32.34	
3141	1	35008	250.5	86.50	86.50	91.38		144.0		RUN	RUN	No Fire	No Fire						31.99
3142	2	35008	250.5	86.50	86.50					RUN	RUN	No Fire	No Fire			2480.0		32.34	
3143	3	35004	250.5	86.50	86.50		91.12		272.0	RUN	RUN	No Fire	No Fire						31.99
3144	4	35004	251.0	86.50	86.50					RUN	RUN	No Fire	No Fire	ON	ON		2448.0	32.34	
3145	1	35004	251.0	86.50	86.50	91.38		144.0		RUN	RUN	No Fire	No Fire						31.99
3146	2	35004	251.0	86.50	86.50					RUN	RUN	No Fire	No Fire			2480.0		32.34	
3147	3	35004	251.0	86.50	86.50		91.12		400.0	RUN	RUN	No Fire	No Fire						31.99
3148																			
3149																			

Silk Air MI-185

Engines Data #2-aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 22, 1999

NTSB Vehicle Recorder Division

FDR Subframe Reference Number	N1 L M Bit 15	N1 L M Bit 17	N1 L M Bit 18	N1 L M Bit 19	N1 L M Bit 20	SF Cycle Counter	Engine Oil QTY No 1 (pints)	Engine Oil QTY No 2 (pints)	OIL Temp Left (DEG	OIL Temp Right (DEG	N1 Bug Drive No. 1	N1 Bug Drive No. 2	Target N1 No. 1	Target N1 No. 2	Climb N1 Limit 1	Climb N1 Limit 2	Cruise N1 Limit 1	Cruise N1 Limit 2	Cont N1 Limit #1	Cont N1 Limit #2
3081																				
3082									104											
3083	0	0	1	0	0	4														
3084										103						99.03				
3085																				
3086									104											
3087	0	0	1	0	0	5														
3088							26.75			103										
3089																				
3090									104											
3091	0	0	1	0	0	6														
3092								26.50		103										
3093																				
3094									104											
3095	0	0	1	0	0	7														
3096										103										
3097																				
3098									104											
3099	0	0	1	0	0	8														
3100										103			96.75							
3101																				
3102									104										99.00	
3103	0	0	1	0	0	9														
3104										103				96.75						
3105																				
3106									104											99.00
3107	0	0	1	0	0	10														
3108										103	96.75									
3109																				
3110									104											
3111	0	0	1	0	0	11														
3112										103		96.72								
3113																				
3114									104											
3115	0	0	1	0	0	12														
3116										103										
3117																				
3118									103								96.72			
3119	0	0	1	0	0	13														
3120										102										
3121																				
3122									103									96.72		
3123	0	0	1	0	0	14														
3124										102										
3125																				
3126									103											
3127	0	0	1	0	0	15														
3128										102										
3129																				
3130									103											
3131	0	0	1	0	0	0														
3132										102										
3133																				
3134									103											
3135	0	0	1	0	0	1														
3136										102										
3137																				
3138									103											
3139	0	0	1	0	0	2														
3140										102										
3141																				
3142									103											
3143	0	0	1	0	0	3														
3144										102					98.97					
3145																				
3146									103											
3147	0	0	1	0	0	4														
3148																				
3149																				

Silk Air MI-185

Engine Data #3 - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 22, 1999

NTSB Vehicle Recorder Division

Silk Air MI-185, Engine Data #3 - aus7.frm & aus11.frm, Palembang, Indonesia
Finalized Data - end of data, Date Printed: May 22, 1999, NTSB Vehicle Recorder Division

FDR Subframe Reference Number	SF's Raw count	SF Cycle Counter	Right CN1 (FAN) Vib	Right CN2 (HPC) Vib	Right N1 Balanc Ang	Right N1 Balanc Mass	Right TN1 (LPT) Vib	Right TN2 (HPT) Vib	Left CN1 (FAN) Vib	Left CN2 (HPC) Vib	Left N1 Balanc Ang	Left N1 Balanc Mass	Left TN1 (LPT) Vib	Left TN2 (HPT) Vib	Cowl Anti-Ice L	Cowl Anti-Ice R	Go-Arnd N1 Limit 1	Go-Arnd N1 Limit 2
3081	1																	
3082	2																	
3083	3	4.0																
3084	4														OFF	OFF		
3085	1																	
3086	2																	
3087	3	5.0		0.098														
3088	4														OFF	OFF		
3089	1																	
3090	2																	
3091	3	6.0					0.527											
3092	4														OFF	OFF		
3093	1																	
3094	2																	
3095	3	7.0						0.156										
3096	4														OFF	OFF		
3097	1																	
3098	2																	
3099	3	8.0									266.00							
3100	4														OFF	OFF		
3101	1																	
3102	2																	
3103	3	9.0										30.000						
3104	4														OFF	OFF		
3105	1																	
3106	2																	
3107	3	10.0			50.000													
3108	4														OFF	OFF		
3109	1																	
3110	2																99.000	
3111	3	11.0				132.00												
3112	4														OFF	OFF		
3113	1																	
3114	2																	99.000
3115	3	12.0																
3116	4														OFF	OFF		
3117	1																	
3118	2																	
3119	3	13.0																
3120	4														OFF	OFF		
3121	1																	
3122	2																	
3123	3	14.0																
3124	4														OFF	OFF		
3125	1																	
3126	2																	
3127	3	15.0																
3128	4														OFF	OFF		
3129	1																	
3130	2																	
3131	3	0.0							0.410									
3132	4														OFF	OFF		
3133	1																	
3134	2									0.234								
3135	3	1.0																
3136	4														OFF	OFF		
3137	1																	
3138	2																	
3139	3	2.0											0.117					
3140	4														OFF	OFF		
3141	1																	
3142	2													0.332				
3143	3	3.0																
3144	4														OFF	OFF		
3145	1																	
3146	2																	
3147	3	4.0	0.273															
3148																		
3149																		

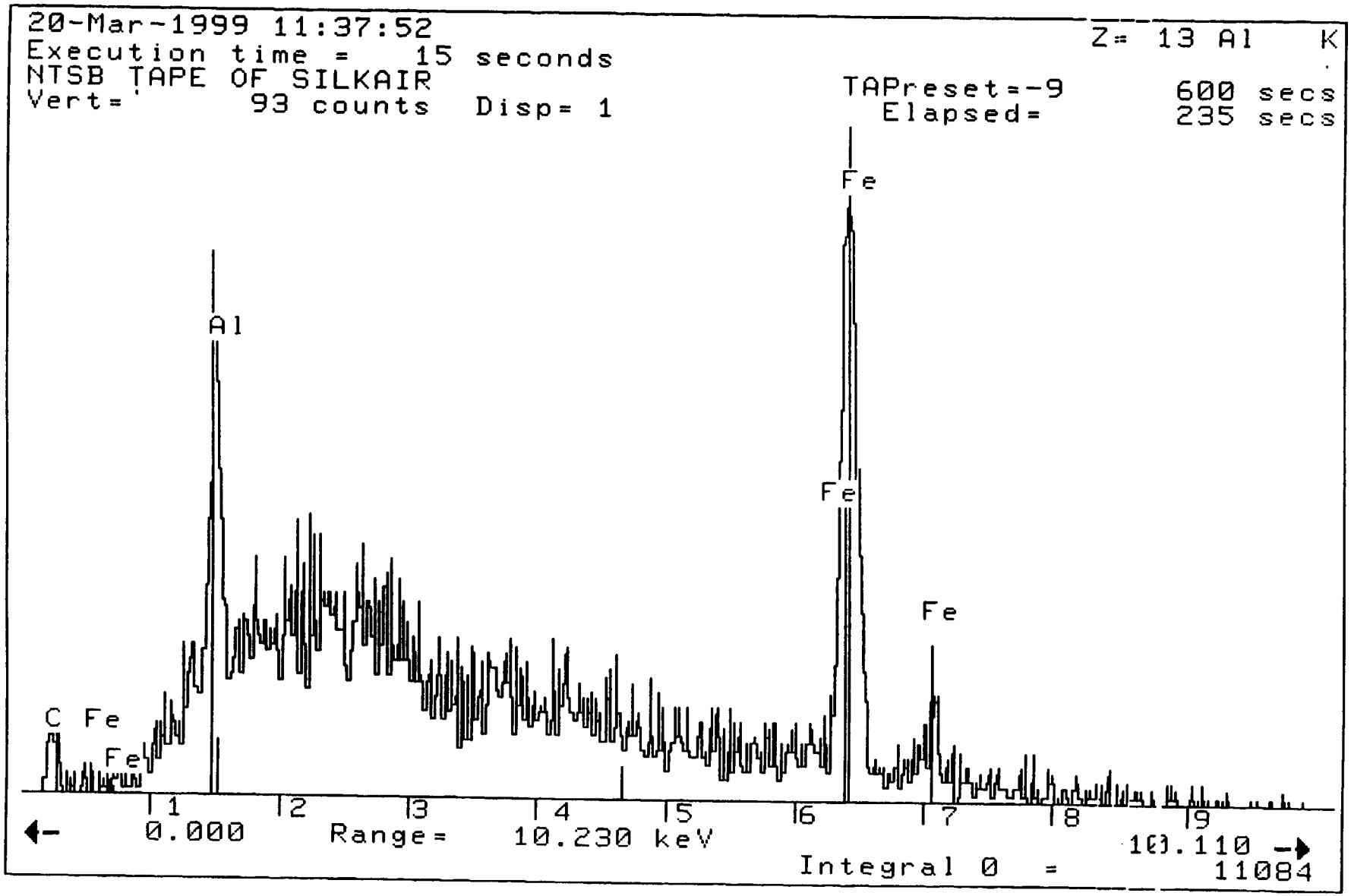
ATTACHMENT 5

Photograph of Blisters on Silk Air FDR Tape

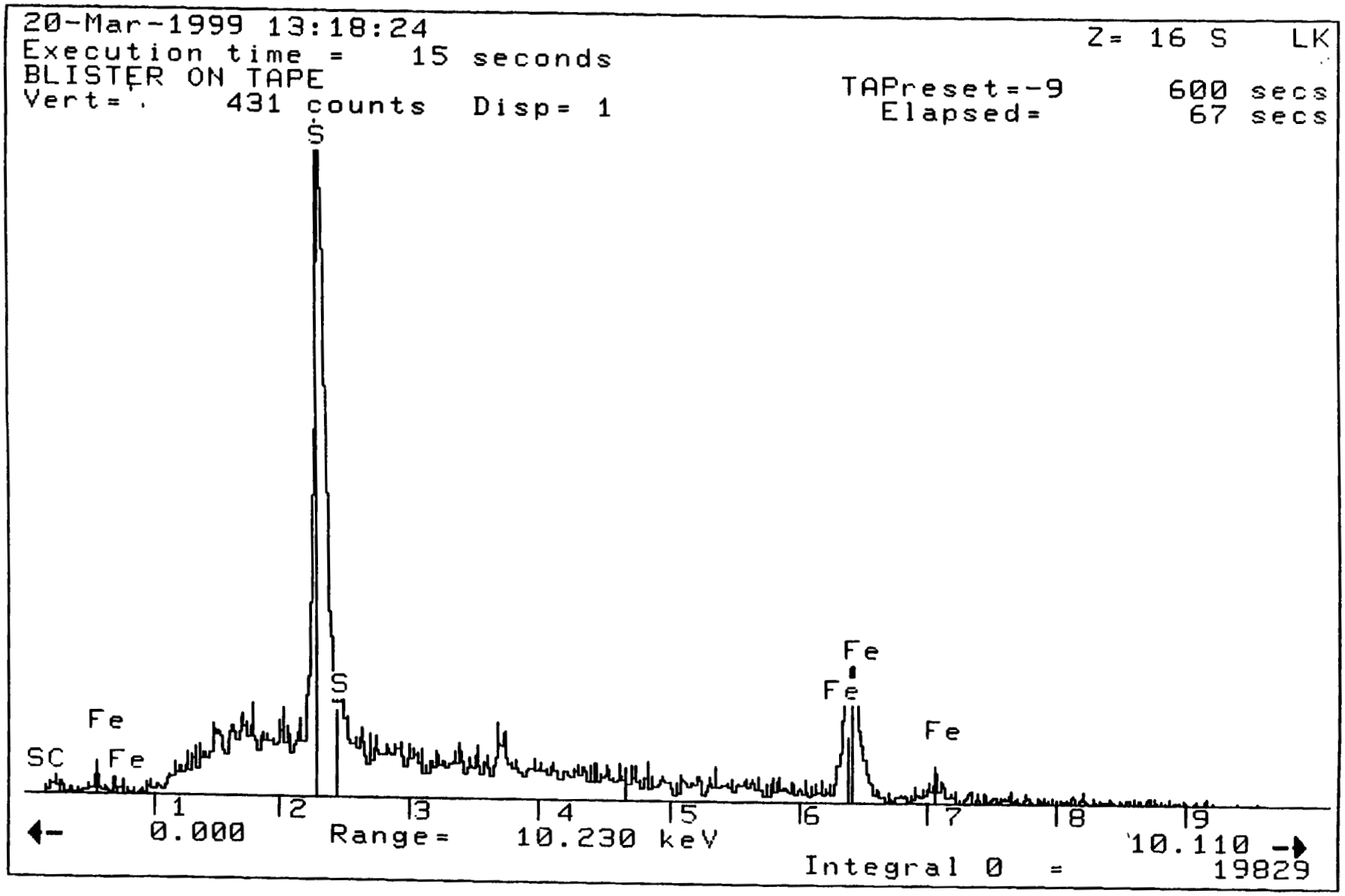
66.2 μ

ATTACHMENT 6

Plots of Elemental Analysis of Silk Air FDR Tape



ELEMENTAL COMPOSITION CONSISTANT WITH 737 & 705 tape


20-Mar-1999 13:18:24
Execution time = 15 seconds
BLISTER ON TAPE
Vert= 431 counts Disp= 1
Z= 16 S LK
TAPreset=-9 600 secs
Elapsed= 67 secs
S
S
Fe
Fe
Fe
Fe
Fe
SC
1
2
3
4
5
6
7
8
9
0.000
Range= 10.230 keV
10.110
Integral 0 = 19829

ATTACHMENT 7

March 30, 1998 Letter From Quantegy

QUANTEGY

March 30, 1998

Mr. Thomas Jacky
National Transportation Safety Board
Vehicle Performance Division (RE-60)
490 L'Enfant Plaza East, S.W.
Washington, DC 20594

Dear Mr. Jacky:

Please find attached a synopsis prepared by Mr. George Reynolds, Physicals and Microscopy Lab. Supervisor, of the observations and analysis made regarding the 797 tape from SilkAir flight MI185. Mr. Reynolds has also included information regarding additional test that you may want to have performed in the future.

Sincerely,

Robert E. Parham

Robert E. Parham
Staff Engineer
Instrumentation Media Products
Quantegy Inc.

Exploratory Synopsis of 797 tape from SilkAir flight MI185

The following observations/analysis were made during the site visit by Mr. Thomas Jacky from NTSB and Mr. Kenneth Kell from the BASI (Bureau of Air Safety Investigation) Australia. The condition of the tape was understandably bad, which under the circumstances should be considered miraculous, given the severity of the crash and the river pollution at the crash site, which had leaked into the recorder. Our charge was to determine the cause or causes for the loss of signal of all recorded tracks of the tape located between the supply and take-up reels and a similar diminished signal pattern that occurred in the TWA flight 800 tape. All of the following were done in a non-destructive mode per instruction of the Indonesian government and aforementioned authorities.

1. The cuppy appearance of the free tape (not in the pack) was indicative that the changes in the physical properties of the tape could be quantified to lend some insight as to the degree of force that might explain if the loss was due to magnetostriction that would have occurred on impact.

2. A check of the width with the Zygo Laser measurement revealed very little difference between the tape width in the pack and exposed tape. Because the tape was broken during the crash, the break was most likely due to shear at the corner post of the recorder As was reported by Ken, one corner of the recorder was sheared open and was most likely the cause of the break. Normally, when polyester tape is broken an elongation of about 100% of tape length occurs prior to the break.

3. A small portion (100mm) of the tape was placed in the Instron and a very low force was applied to determine the modulus in two areas of the tape. Results show the pack tape to be at 409 Kg/mm^2 (typical 797) and the exposed tape to be at 481 Kg/mm^2. This indicates that the force applied altered the elasticity of the tape just short of the 5% strain limit where deformation of the coating and tape would be very evident and nonreversible.

4. A microscopic examination of the surface was made after removing some of the magnetic developer. A smooth portion was chosen for a Kosaka surface analysis to determine if roughness could account for the signal loss. Measurements in this area indicate a very normal roughness for 797 product. After removal of additional magnetic developer, large blisters were evident which could explain the head to tape separation. Additional tests on equivalent reels should indicate a better approximation of the stress

5. Because of the small size, the entire reel was placed in the SEM to better examine the blisters. X-ray analysis of the blisters revealed large deposits high in sulfur and in lower concentrations ubiquitously on the surface. The combination of fuel and the aforementioned pollution could account for chemical degradation that occurred. The presence of sulfur would suggest that sulfuric acid or sulfides might be the major contributor to the water pollution. Ken said that more work was going to be made at the crash site in an effort to obtain more samples of the river bottom.

6. Audio playback with spectrum analyzer and speaker amplification confirmed the NTSB observation of a total loss of signal, save two or three small sections of tape of the exposed path. It was expected to hear a series of "clicks and pops" if the loss was due to head to tape separations in the area of the blister. However, the silence of the tape indicated the loss was predominately magnetic and not spacing loss.

7. To assure that the lost portion had not been magnetically swept due the recovery operations this section was mounted to a VSM detector with the magnet turned off to see if any remaining remance would indicate exposure to any kind of a permanent magnetic field. None was detected.

Current and future analysis.

Given the above information, samples of 797 tape were immersed in solutions of tap water, 2% nitric acid and 3% H_2O_2. After 86 hours only the nitric acid sample indicated a continuing loss. However this amounted to only a 3% reduction in Mr from the control sample. The water and peroxide sample are currently stable at less than 1% loss after 86 hours. It would seem that chemical activity is not the primary cause for the signal loss in either incident. It is our understanding that the TWA tape was exposed to only salt water.

A 797 tape has been prepared with an equivalent 440 u" signal to be used for stress test on the Instron and experiments to determine magnetostriction losses. These should be completed by 4/10. The first phase of tests from an elongation of 1 to 5% has been completed with little or no loss in signal output. Only the frequency shifted lower on the 4% and 5% samples as was expected.

A call has been placed to Mr. Ken Babcock of Digital Instruments to determine the possibility of using their AFM Nanoscan instrument with a magnetic probe to magnetically map the remaining section of tape on track in question. (1-800-[redacted]).
A later call (5:20pm CST 3/25) was received from Roger Proksch of DI. His number is [redacted] and after a few hours of phone tag we finally were able to discuss the problem. Roger said that there was no magnetic Nanoscope in Australia and theirs (Santa Barbara, CA) has been made to scan tracks up to 1 cm in length. This would mean that

several scans would have to be joined to complete the missing section. He did say that the film thickness might inhibit scanning from the backside. I volunteered to send him some equivalent recorded tape with sections of diminished signal to determine the feasibility of the analysis before NTSB decides to undertake the project

ATTACHMENT 8

Examination of FDR Tape at Digital Instruments, Factual Report

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

October 23, 1998

Report of Testing

Factual Report of Testing
by Erin M. Gormley

A. ACCIDENT DCA98RA013

Location	: Palembang, Indonesia
Date	: December 19, 1997
Time	: 0809 UTC
Aircraft	: Boeing B737-300

B. GROUP REPRESENTATION

N/A

C. SUMMARY

On December 19, 1997, an Indonesian B737-300 operated by Silkair crashed in Palembang, Indonesia. The flight data recorder (FDR), a Sundstrand Data Control[1] Universal Flight Data Recorder (UFDR), was recovered from the crash site and sent to the Vehicle Recorder Division's laboratory in Washington, DC for readout and evaluation. The details of the FDR readout performed are presented in the Group Chairman's Factual Report - Flight Data Recorder. The FDR tape appeared to have received extensive damage most probably resulting from crash impact forces and extensive immersion in water. Normal recovery of the data was hampered because of the damage. Waveform analysis of the data indicated a reduced signal strength which the tape manufacturer, Quantegy, was unable to resolve. An alternate method was proposed of using Magnetic Force Microscopy (MFM) to optically view the tape to determine if recorded magnetic data were present in the damaged area. The UFDR tape was brought to Digital Instruments of Santa Barbara, California to determine if the MFM technique could resolve additional data.

[1] Sundstrand Data Control (SDC) is now operating under the name Allied Signal Inc.

D. DETAILS OF TESTING

1. UFDR Recording Operation

The Flight Data Acquisition Unit (FDAU) receives data sent from various sources throughout the aircraft. The FDAU converts these analog and digital signals into a serial binary data stream of zeros and ones which are recorded onto the tape in the form of Harvard Bi-Phase waveforms. A zero is represented by a wave making a single transition across a bit cell where as a one shows a wave reversal during a bit cell. The information is recorded by arranging the magnetic oxide particles on the tape to represent the waveform.

Twelve consecutive bits comprise a word of data. A normal UFDR recording process writes 64 12-bit words a second (called a subframe) which occupies .36 inches of tape. After each subframe, an Inter-Record Gap (IRG) is written which is .06 inches in length. The UFDR records 25 hours of data on 8 separate tracks. After completing a track, an optical end-of-tape sensor passes a window, the recorder reverses and begins recording in the opposite direction on the next track. As the tape progresses, it passes over a head that erases previously recorded data before coming in contact with the write head which writes the data being processed by the FDAU. There is approximately 3 inches between the erase head and write head. This produces a 3 inch section of the tape, called an erase band, located between the newest recorded data and the 25-hour old recorded data.

2. MFM Instrumentation

MFM involves moving a ferromagnetic probe tip over a sample and mapping the magnetic fields present. The Dimension 5000 Scanning Probe Microscope (SPM) uses this technique to examine a 100 micron sample of tape at once. The magnetized tip is positioned with the northern pole closest to the sample. As the tip taps the sample, it is attracted to the south poles and repelled by the north poles of the magnetic particles that make up the recorded data. The photographic images that are produced from the viewing represent this relationship (Attachment I-1). The dark sections show where the tip was attracted and the bright sections show where the tip was repulsed. The width of the band differentiates a zero from a one, a zero being the wider of the two. As the tip moves along the sample, it also maps the surface topography and produces an image. The program used to capture the images can also perform a section analysis. By placing markers at certain points, the peak-to-peak amplitude and period of the signal may be measured (Attachment I-2).

3. Silkair Tape Examination

Visual inspection of the accident aircraft's FDR tape revealed that the unreeled section that was exposed to water appeared damaged compared to the reeled tape which appeared normal. The tape was broken in one section presumably from crash impact

forces. It had also been stretched and frayed in other sections. These sections were spliced together for reinforcement. A physical image of the tape, in the most damaged section, revealed a loss of oxide, roughness, and crater-like pockets on the surface. A random section of undamaged tape was placed under the microscope to identify presumably normal data. The bars of varying brightness, representing bits of zeros and ones, appeared as expected. The amplitude in this area measured about 5 volts peak-to-peak which is considered normal. By examining another random section of tape in the damaged section, no such pattern was visible.

The DFDR data, as contained in the Chairman's Factual Report - Flight Data Recorder, were transcribed from the tape using specialized NTSB laboratory equipment and computers. The procedure includes passing the tape over read heads and storing the data to a hard disk. This automated process makes it impossible to correlate the last data bit recovered by the tape heads and stored by the system with the physical location on the tape. On a normal tape, the last recovered bit is followed by a 3 inch erase band and then 25 hour old data. Since this location was unknown, the microscope could not be focused on a particular section. It was necessary to find the last data as previously recovered so additional data (if they existed) as well as the transition to the erase band could be identified. In order to find that point, the tape was secured on the mounting platform of the microscope and a spot on the tape was designated as an x-y zero reference point. The probe was moved in the y-direction to view the section of tape calculated to be Track 3, the accident track. Starting at that point, data were seen and an amplitude of .5 volts peak-to-peak were measured, considerably less than the normal 5 volts peak-to-peak signal measured in the good area. Progressing towards the damaged section of data, the signal fluctuated but generally became weaker. Attachment I-3 contains a plot of lateral position moving towards the damaged section versus weakening amplitude of the recorded data. Attachments I-4 to I-6 show the degradation in clarity of the bits as the probe progressed laterally. At one test point, there were no data visible. Some specks of magnetic particles were apparent but not in an arranged pattern that would indicate bits (Attachment I-7). This section was not considered characteristic of an erase band. An example of a typical erase band is shown in Attachment I-8. At this point, the probe was moved vertically to view 2 other tracks and data were not found. This may indicate that there were no data present on any of the tracks throughout that section. Since the microscope focuses on such a small area of tape it was difficult to determine exactly where the data went from a weak signal to virtually non-existent.

E. FURTHER TESTING

The degradation in signal amplitude observed with the MFM technology was greater than that observed with the waveform analysis performed on the signal readout with the tape head. In order to determine if additional bits do exist beyond those already recovered, further MFM analysis is required. A special rig with a measurement device must be constructed to accommodate the reels of tape and regulate the movement of the sample. The data, beginning at a known reference point, would have to be mapped out along the weakening signal until they completely disappear. These waveforms must be

translated into the binary format comprised of zeros and ones. The resulting words must then be compared with the output of the NTSB software to determine which were the last bits the tape head resolved. Each additional bit after this point would be considered newly recovered. Once this point is physically noted on the tape, it would be useful to determine if the last bit of data is followed by the expected 3 inch erase band. Also, other tracks should be checked to determine if data are present as would be expected.

Quantegy, the tape manufacturer, indicated after originally examining the tape, that a destructive test could be performed. This test would destroy the tape so it could no longer be read by a tape head. The magnetic particles on the tape, which comprise the signal, are situated homogeneously throughout the layer coating the mylar base. The side of the tape that was examined was damaged and the particles depleted in sections. The test procedure would involve separating the layer containing the magnetic particles from the mylar and trying to examine the signal from the opposite side in the event the magnetic particles situated there were not affected as much by the damage to the tape. Since both sides of the tape exhibit damage, it is unlikely any more data could be recovered using this method. Regardless, it would be beneficial to see if the procedure yields any additional information concerning the signal degradation that occurred.

[redacted]

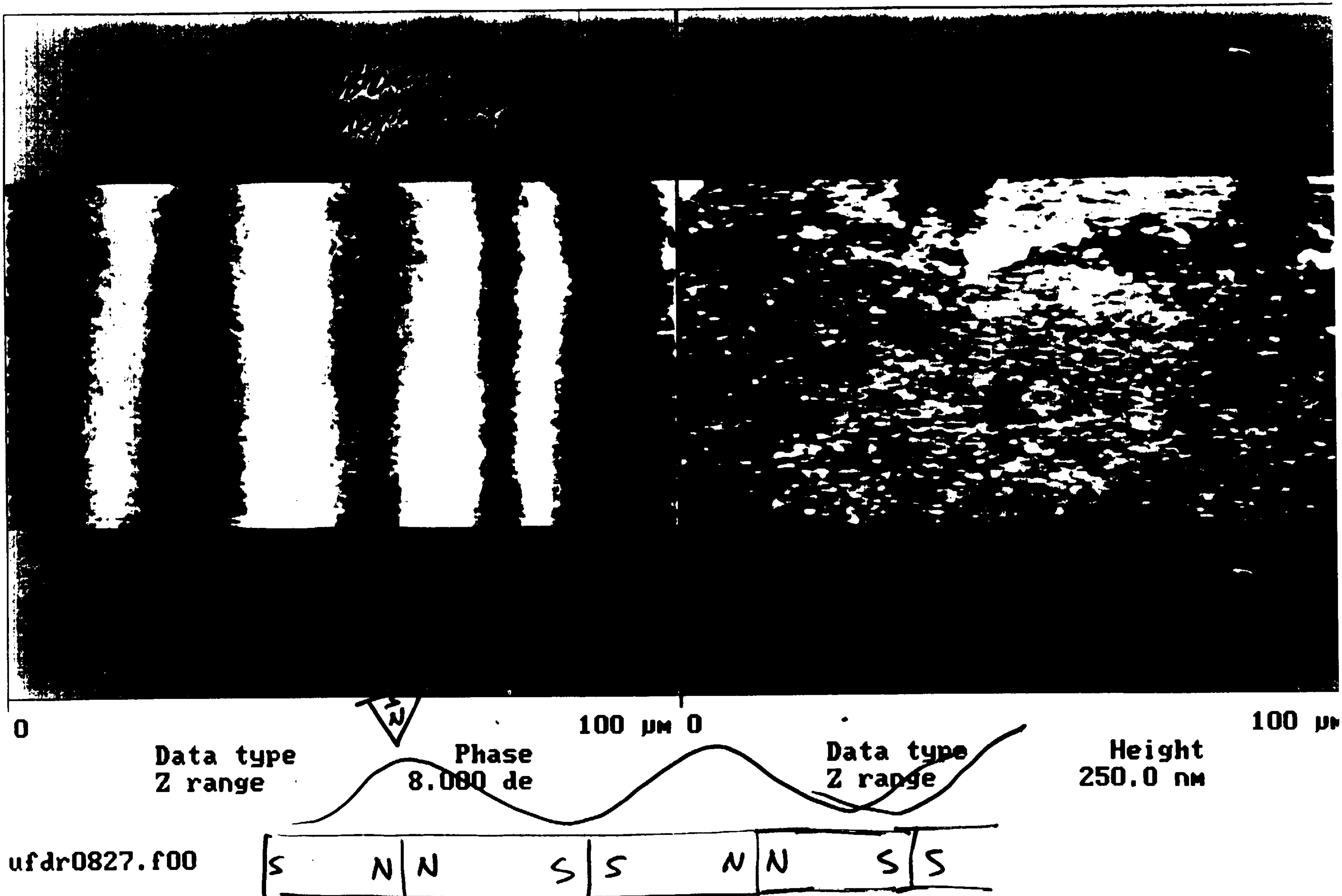
Erin M. Gormley
Aerospace Engineer
Vehicle Recorders Division

List of Attachments:

Attachments I-1 to I-8: MFM Images

Attachment I
MFM Images

I-1

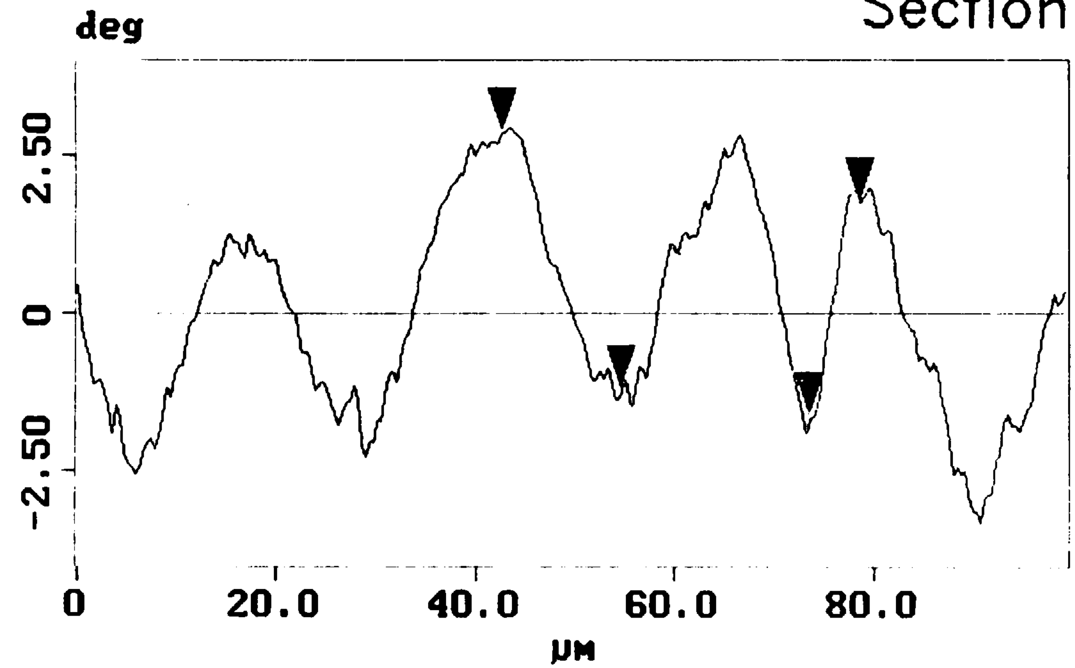


ufdr0827.f00

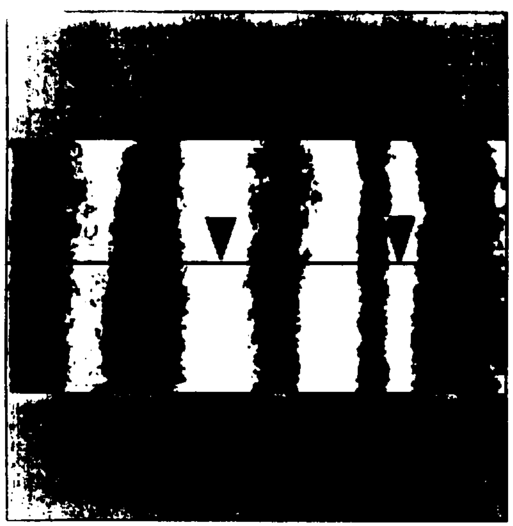
8-6

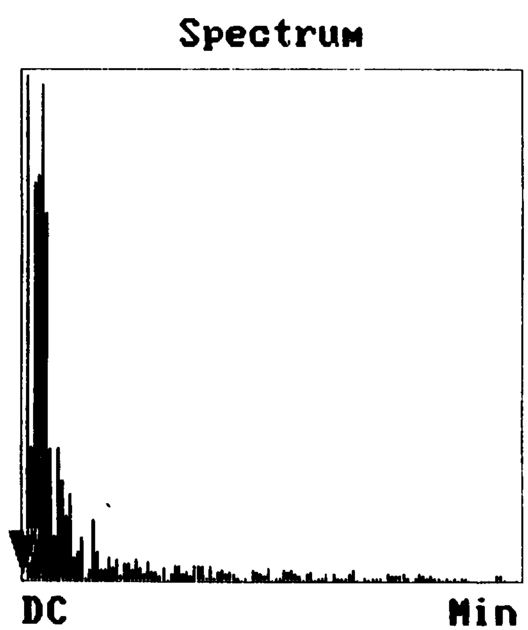
Cursor Marker Spectrum Zoom Center Line Offset Clear

Section Analysis



L	5.078 μm
RMS	1.362 deg
lc	DC
Ra(lc)	0.184 deg
Rmax	1.137 deg
Rz	0.838 deg
Rz Cnt	4
Radius	17.629 μm
Sigma	4.826 nm



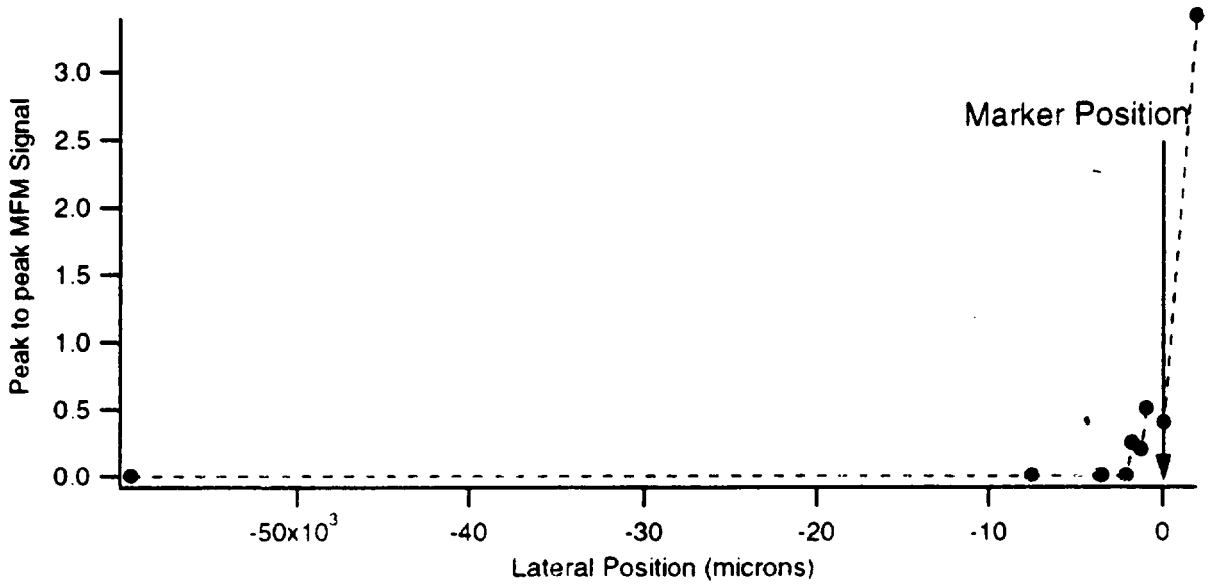


Surface distance	2009.3
Horiz distance(L)	12.109 μm
Vert distance	4.018 deg
Angle	
Surface distance	1403.2
Horiz distance	5.078 μm
Vert distance	3.425 deg
Angle	
Surface distance	
Horiz distance	
Vert distance	
Angle	
Spectral period	DC
Spectral freq	0 Hz
Spectral RMS amp	0.00001 nm

ufdr0827.f00

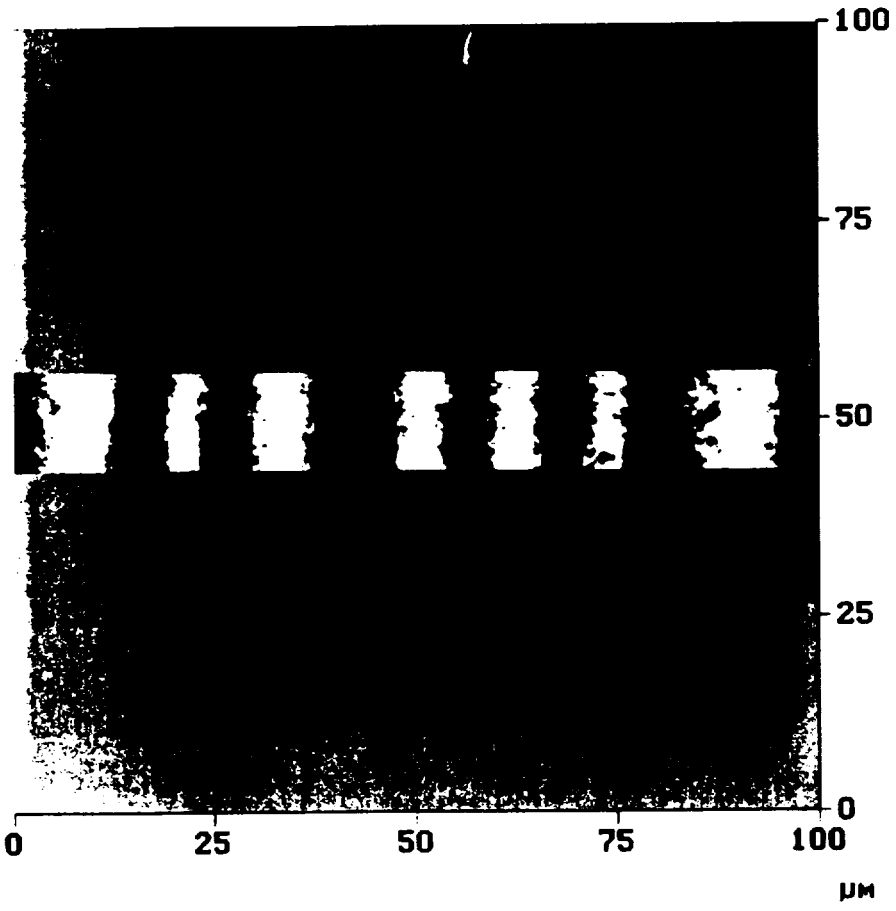
Cursor: fixed Zoom: 1:1 Cen line: Off Offset: Off

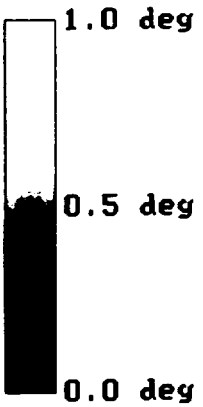
MFM Signal vs. Lateral Position



Clear Execute Undo

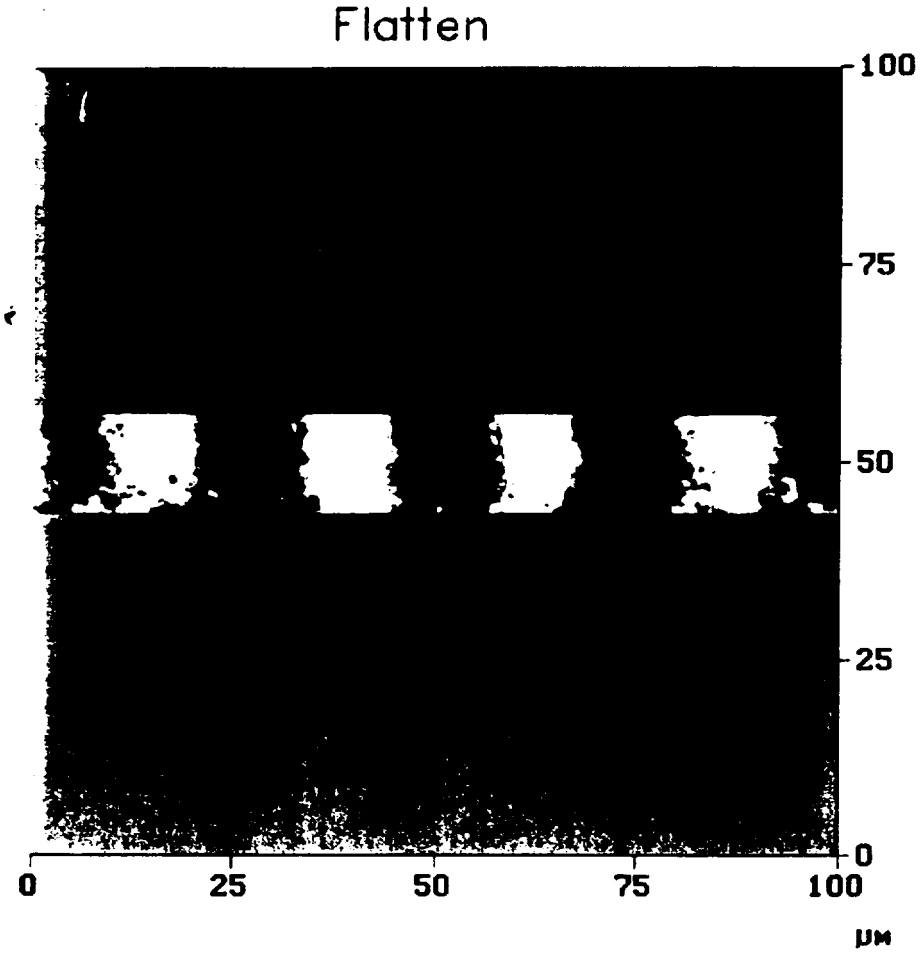
Flatten





Digital Instruments	NanoScope
Scan size	100.0 µm
Scan rate	0.5008 Hz
Number of samples	256
Image Data	Phase
Data scale	1.000 deg

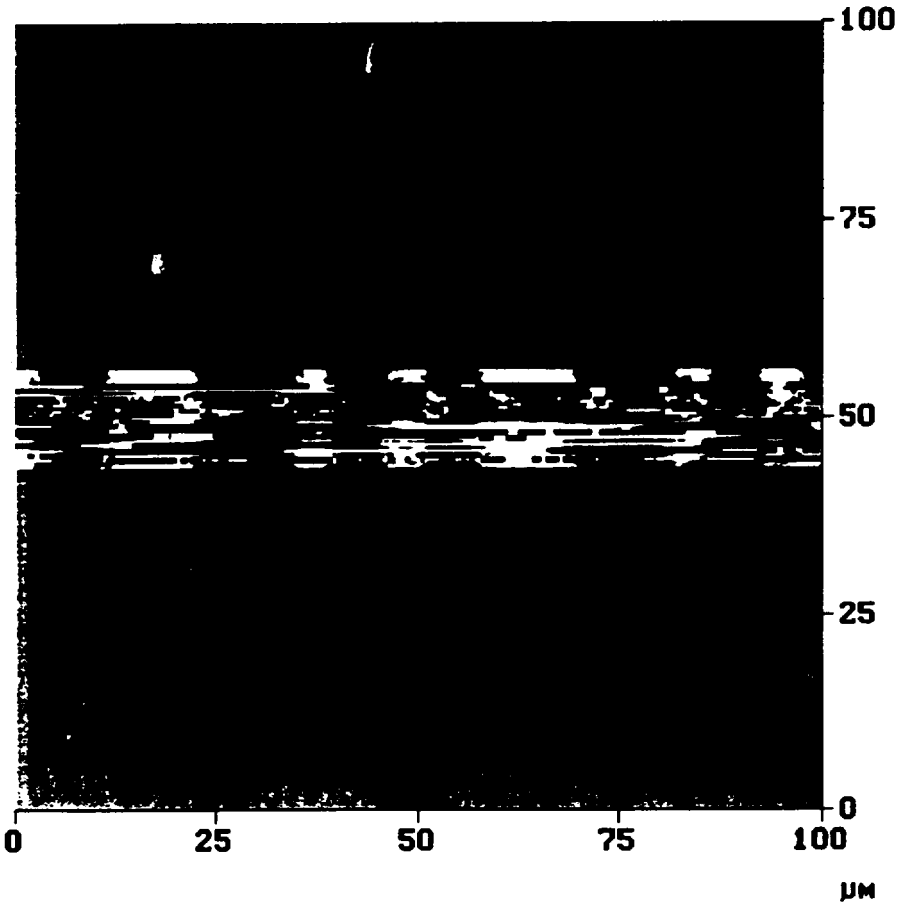
ufdr0828.005

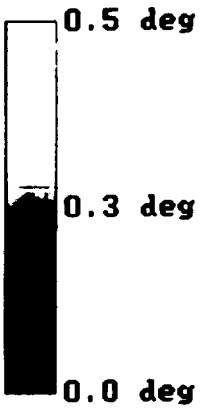


Digital Instruments NanoScope
Scan size 100.0 µ
Scan rate 0.5008 H
Number of samples 256
Image Data Phase
Data scale 1.000 deg

ufdr0828.006

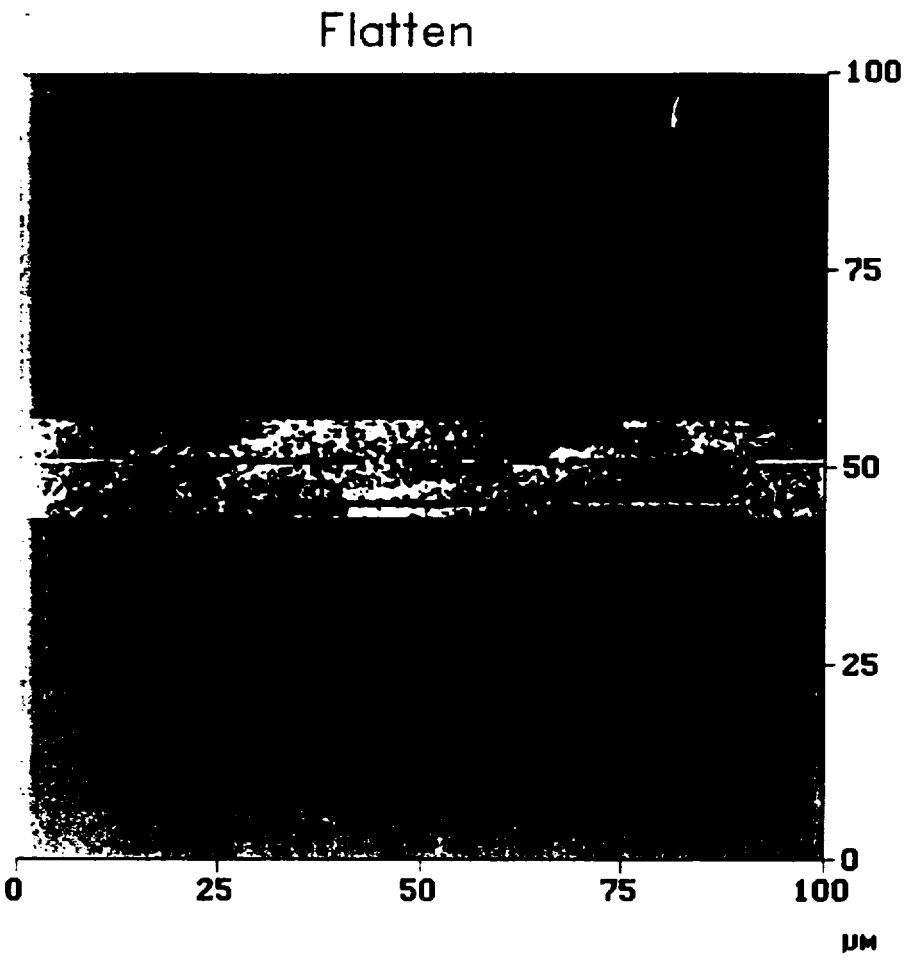
Flatten





Digital Instruments	NanoScope
Scan size	100.0 µm
Scan rate	0.5008 Hz
Number of samples	256
Image Data	Phase
Data scale	500.0 mdeg

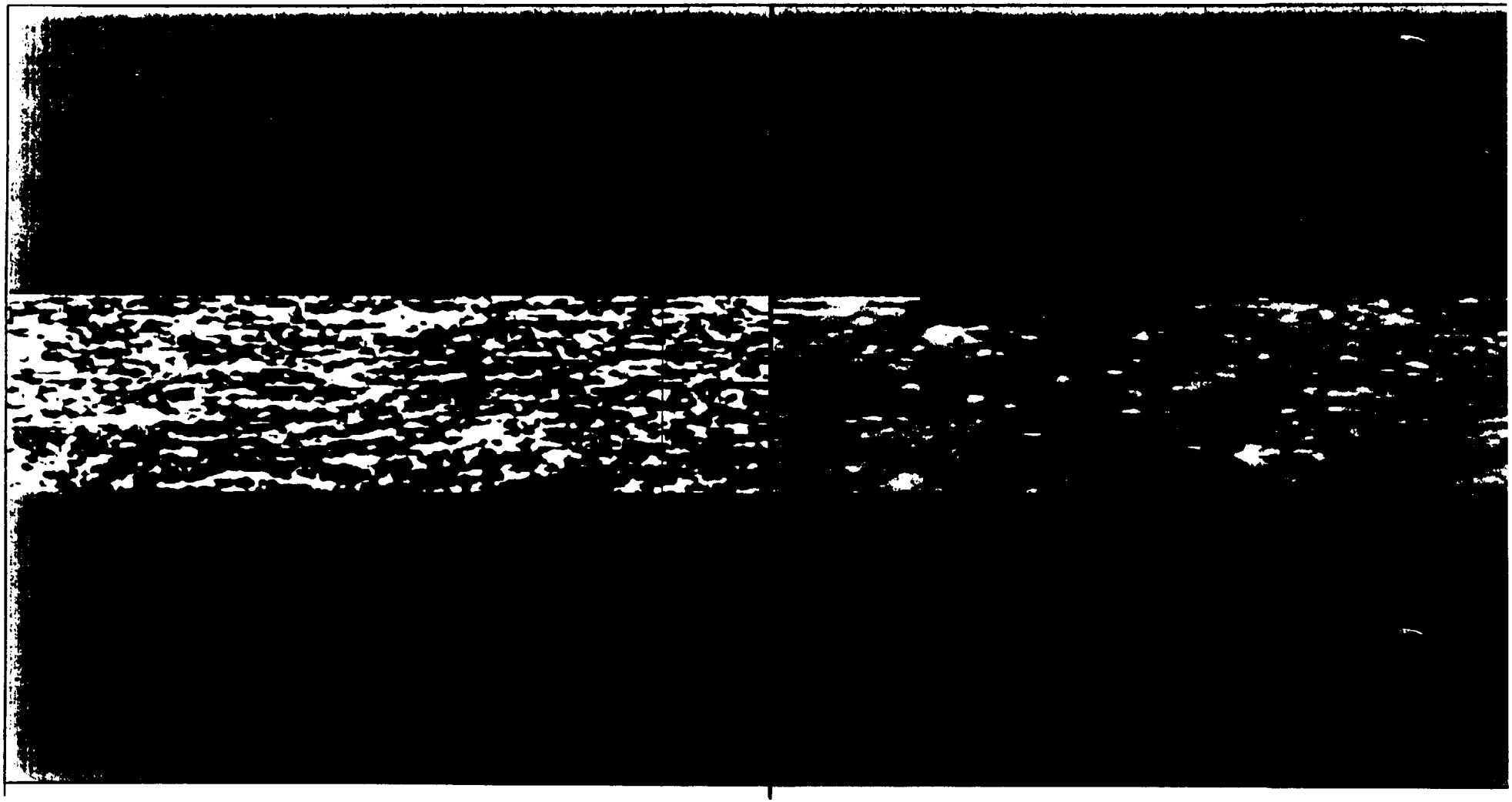
ufdr0828.007



Digital Instruments NanoScope
Scan size 100.0 µ
Scan rate 1.002 H
Number of samples 256
Image Data Phase
Data scale 1.000 deg

ufdr0828.009

Erased Data



0 50.0 µm 0 50.0 µ

Data type Phase Data type Height
Z range 2.500 de Z range 500.0 nm

ufdr0828.000

ATTACHMENT 9

Bureau Enquentes Accidents (BEA) Report of Garnet Inspection of FDR Tape

MINISTERE DE L'EQUIPEMENT, DES TRANSPORTS ET DU LOGEMENT

INSPECTION GENERALE DE L'AVIATION CIVILE
ET DE LA METEOROLOGIE

BUREAU ENQUÊTES-ACCIDENTS

Division Technique

Le Bourget, le 11/12/1998

Ref : C01634 /IGACEM/BEA/T

Objet : Garnet examination report

P.J. : 2 copies of the report

Professor O. DIRAN
Aircraft Accident Investigation
Commission
Department of Communications
GEDUNG KARSA LT2
DEPARTEMEN PERHUBUNGAN
JL MEDAN MERDEKA BARAT 8
JAKARTA 10110
INDONESIE

Dear Professor DIRAN,

Please find enclosed the report made by BEA laboratories about the examination with garnet microscope of the UFDR tape from the Silkair B737-36N registered 9V-TRF.

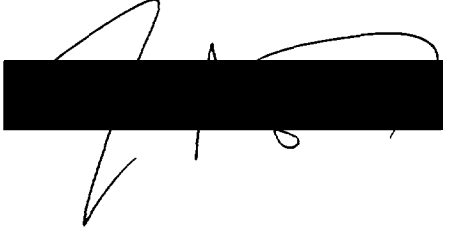
Unfortunately we could not retrieve any additional data, but this report confirms that there is a unusual erased part on the UFDR tape.

BEA was glad to have the opportunity to work on this subject in close cooperation with M. Kell from BASI and Mrs Gormley from NTSB.

I naturally stay at your disposal if you need more information,

Sincerely,

Jérôme BASTIANELLI
Head of the Engineering Branch



Copies : M. K. KELL, BASI, PO BOX 967, Civic Square ACT 2608, AUSTRALIA (2 reports)
Mrs E. GORMLEY, NTSB, Office of Research & Engineering, RE-40, 490 L'Enfant Plaza East, S.W. Washington, DC 20594, USA (1 report)

MINISTERE DE L'EQUIPEMENT, DES TRANSPORTS ET DU LOGEMENT

INSPECTION GENERALE DE L'AVIATION CIVILE
ET DE LA METEOROLOGIE

BUREAU ENQUÊTES-ACCIDENTS

Le Bourget, le 10/12/1998

EXAMINATION & ANALYSIS WITH GARNET MICROSCOPE OF THE FLIGHT DATA RECORDER TAPE FROM SILKAIR B737-36N REGISTERED 9V-TRF

FINAL REPORT

CONTENTS

I. UFDR RECORDING FUNCTIONAL DESCRIPTION

The Flight Data Recorder which fitted the B737 9V-TRF was a Sundstrand Universal Flight Data Recorder (UFDR). This tape recorder has a specific functioning mode which it is important to know before any operation with the garnet microscope.

The flight data parameters are recorded on a 8 track magnetic tape sequentially (4 forwards and 4 backwards) for a total capacity of 25 hours.

The UFDR uses 4 heads with 4 tracks each : a backward read/write head, a forward erase head, a backward erase head, and a forward read / write head. (See APPENDIX 1)

The UFDR receives the digitized parameters from the Flight Data Acquisition Unit (FDAU) in Arinc 573 continuous Harvard Biphase format (at a rate of 768 bit/s). However, the recorder does not write the data on the tape continuously but by blocks separated by short inter-record gaps (IRG).

The continuous input data is converted to NRZ format and stored in a buffer of 768 bits. When this first buffer is full, preamble and postamble are added and the resulting 784 bits are then re-converted to bi-phase signal and recorded on the tape

at a rate of approximately 11200 bit/s. A second buffer alternates with the first one to receive the input data continuously

As the input data is not interpreted, it is very unlikely that the first bit stored in the current buffer corresponds to the beginning of a subframe, so that each subframe may be recorded on two different blocks.

During this writing phase, the tape velocity is 5 inch / s, which results in a record length of approximately 0.36 inch.

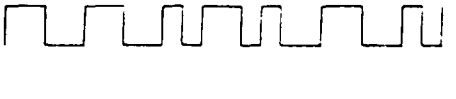
To reduce the length of inter-record gaps, the tape motion is not continuous but consists of a cycle repeated every second (see APPENDIX 1) :

-initial position of the read/write head on the tape: (about 0.23 inch) before the beginning of the previous record. Tape speed is zero.
-sequence 1: tape acceleration to 5 inch / s
-sequence 2: tape speed stabilization during which the head can read the previous record to check that the number of bi-phase transitions written is the same as in the received data.
-sequence 3: inter-record gap (0.06 inch).
-sequence 4: head in write mode, recording the 784 bits of the current buffer on the tape. (record length is 0.354 inch)
-sequence 5: tape deceleration
-sequence 6: tape travel back to initial position - 0.414 inch - so that next data block will be written 0.06 inch after this data block.

II. GARNET RECOVERY THEORETICAL DESCRIPTION

On the Sundstrand UFDR data is coded using Harvard Biphase format. The signal consist of cells of equal length. Each cell corresponds to one bit and ends with a magnetic transition. If there is another transition inside the cell, the value of the bit is 1. If not, the value is 0.

Example of Harvard Biphase Signal :

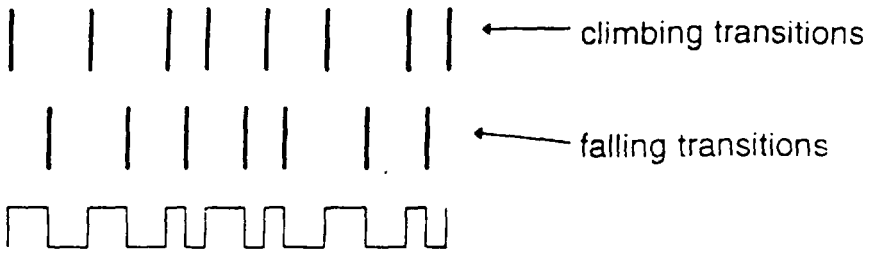


boundaries of the cell

This example corresponds to the value 0 0 0 0 1 0 1 0 0 0 1. (no transition in the first cell : 0, no transition in the second cell 0, no transition in the third cell 0, no transition in the fourth cell 0, transition in the fifth cell 1 ...)

The garnet crystal characteristically enables the visualization of the magnetic transition of the recorded signal

According to the focus of the microscope the operator can either see the climbing transitions or the falling transitions



The garnet microscope recovery method consists of decoding the signal from the images of the transition.

The first step is to make images. As mentioned in part I. data is recorded in blocks of 768 bits (=12*64) plus a preamble and a postamble of about 2*8 bits. Between two blocks there is a long section without any magnetic transition. called the inter-record gap (IRG).

The first image is made just after a gap. Then the tape is moved slightly to the left. and the next image is taken. In order to enable the link between two following images, image number n+1 starts just before the end of picture number n. After 15 to 18 images the new gap appears. A new set of images can be made just after this new gap.

As the data stream between two gaps is about 1 cm length. one image shows about 1/15 of centimeter of the tape.

Once all the images of the area of the tape that needs to be studied have been made. these images are numerized and stored in computers.

The operator then determines the distance between two consecutive transitions. According to what these transitions represent. only three values should be found for such distances : a 1.5a and 2a

Let's suppose that we are looking for climbing transition. If the bit value is 1. the signal is :

and the image of the transitions will show

Let's call "a" the distance between these two transitions. "a" is also the length of one cell.

If the bit value is zero and then one the signal is

and the image of the transitions will show

The distance between two transitions is « a » (one cell) plus 0.5a (half-cell length).

And if the bit value is two consecutive zeros, the signal will be :

and the image of the transitions will show :

The distance between two transitions is 2a because that is the length of two cells.

So, despite the fact that there are only two values (0 and 1), you can observe three different values for the distance between two following transitions.

Then the operator transforms the list of the consecutive distances (a, 1.5a, or 2a) into a list of bit values (0 or 1) following to the method described above.

When the file of 0's and 1's is obtained, one must delete the preamble (the first 7 or 6 zeros followed by one 1) and the postamble (the last 6 or 7 zeros preceded by one 1). After that, one must, at the end of this file, paste on the file obtained by the decoding of the next block (between the gap where the process stopped and the next one)

One obtains a file of three or four seconds of recording, which makes about 2500 bits. The sync words have to be searched, and one must verify that between two consecutive sync words you have 768 bits. If not, the data between these two sync words will probably be wrong.

One must remember that the recording after a gap and a preamble does not begin with a sync word. This sync word can be anywhere in the data stream. The only condition is that between two sync words there are 768 bits

Once the sync words have been found, and after having checked that they are separated by 768 bits, one must transform the file (which is a text file) into a hexadecimal file, which means transforming from ASCII to raw data

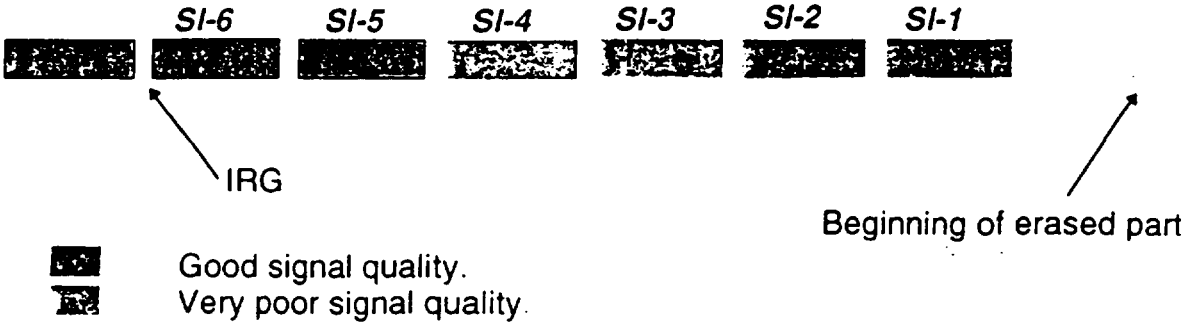
After that the raw data can be used as normal.

III. SEQUENCE OF OPERATIONS

All the following operations took place at the BEA technical facilities in Le Bourget. Mr. Kenneth KELL (Bureau of Air Safety Investigation, Australia) representing Professor DIRAN, Investigator in charge, and Mrs Erin GORMLEY (National Transport Safety Board, United States) representing the investigative body that performed the read-out and analysis of the accident tape, followed the operations. Those operations, under their control were performed by:

Jérôme BASTIANELLI	Head of BEA Engineering Department
Franck GIRAUD	Flight Data Recorder Engineer

Schematic 1 shows the section of track 5 where the signal quality starts to decrease.



The different blocks of data have been named from SI-1 to SI-6 in a back time scale. SI-1 is the last block of data before the erased part. SI-6 is the first block encountered that shows a standard quality.

SI-6 was choosen to be decoded in order to be sure that this block of data had been retrieved by normal playback.

III.3. Recovery of a good data block (SI-6)

APPENDIX 2 shows the pictures of SI-6. This block of data has been retrieved using the decoding technique described in chapter I. The result gives as expected a block of 784 bits, corresponding to 768 bits of recorded data (1second):

111011111000	011000100110	000010000101	110100010001
111010111110	100011101110	110110100001	111110011000
111100000000	110010100000	110010110101	001111111111
110011000000	001011101110	110011100001	010100111111
111101100100	111111110111	001000110000	101010110010
100011011111	101011101110	111110100001	110000111000
100110010000	100010100000	010001100101	101100010001
001000000000	110101101110	111111100001	111010000000
111000000000	010001000001	000011000100	000000000000
	001011101110	111110100001	110110110100
001101111111	110010100000	000010110101	001111111111
110011000000	110111101110	100011100001	001010000000
110000000001	110000000000	001110001111	110101001101
011011111111	110011101110	111110100001	000000000000
100110010000	000010100000	110101000000	000000000000
001000000000	011011101110	110011100001	000010000000

The sync word is shown in . It corresponds to the hexadecimal value of **0a47**.

This block of data has been correlated to the binary files of the last subframes retrieved by the NTSB as follow

III.4. Crosschecking with data already retrieved

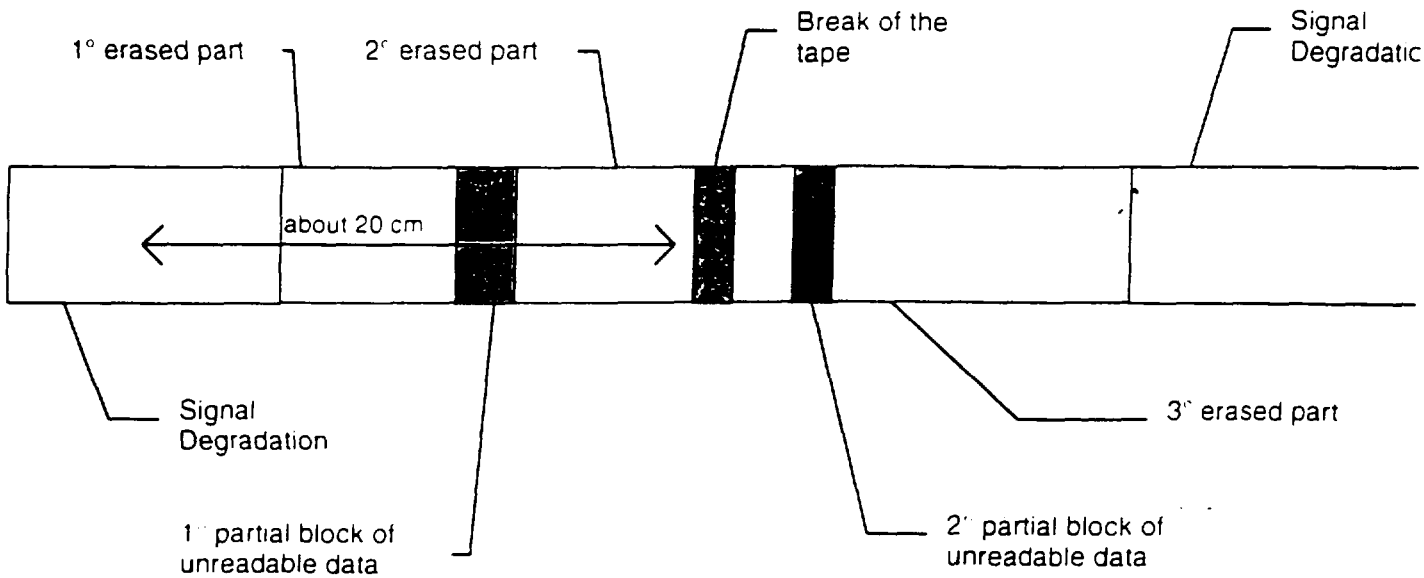
This correlation shows that SI-6 is the sixth block of data before the end of recording in the NTSB recovered file. This proves that blocks from SI-6 to SI-1 were retrieved by the tape deck.

Additive data that could have been non retrievable by normal tape deck could have only been after SI-1, in the erased part.

III.5. Conclusions

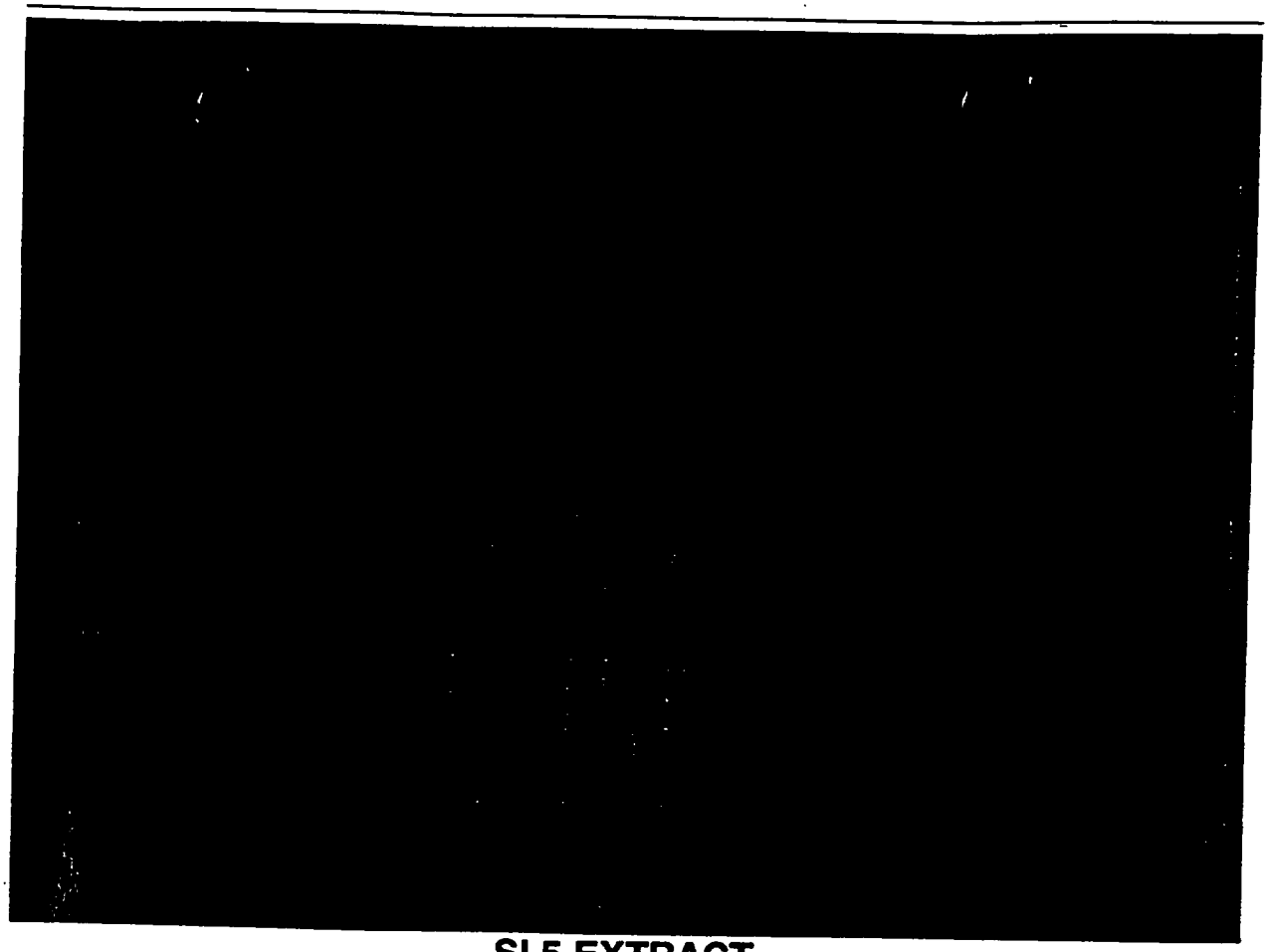
III.5.1. Condition of the tape.

The paragraph hereafter gives a visual representation of the tape by showing different parts of it. The following schematic gives the main frame of the tape. in the damaged section. The pictures after are representative of the area of the tape.

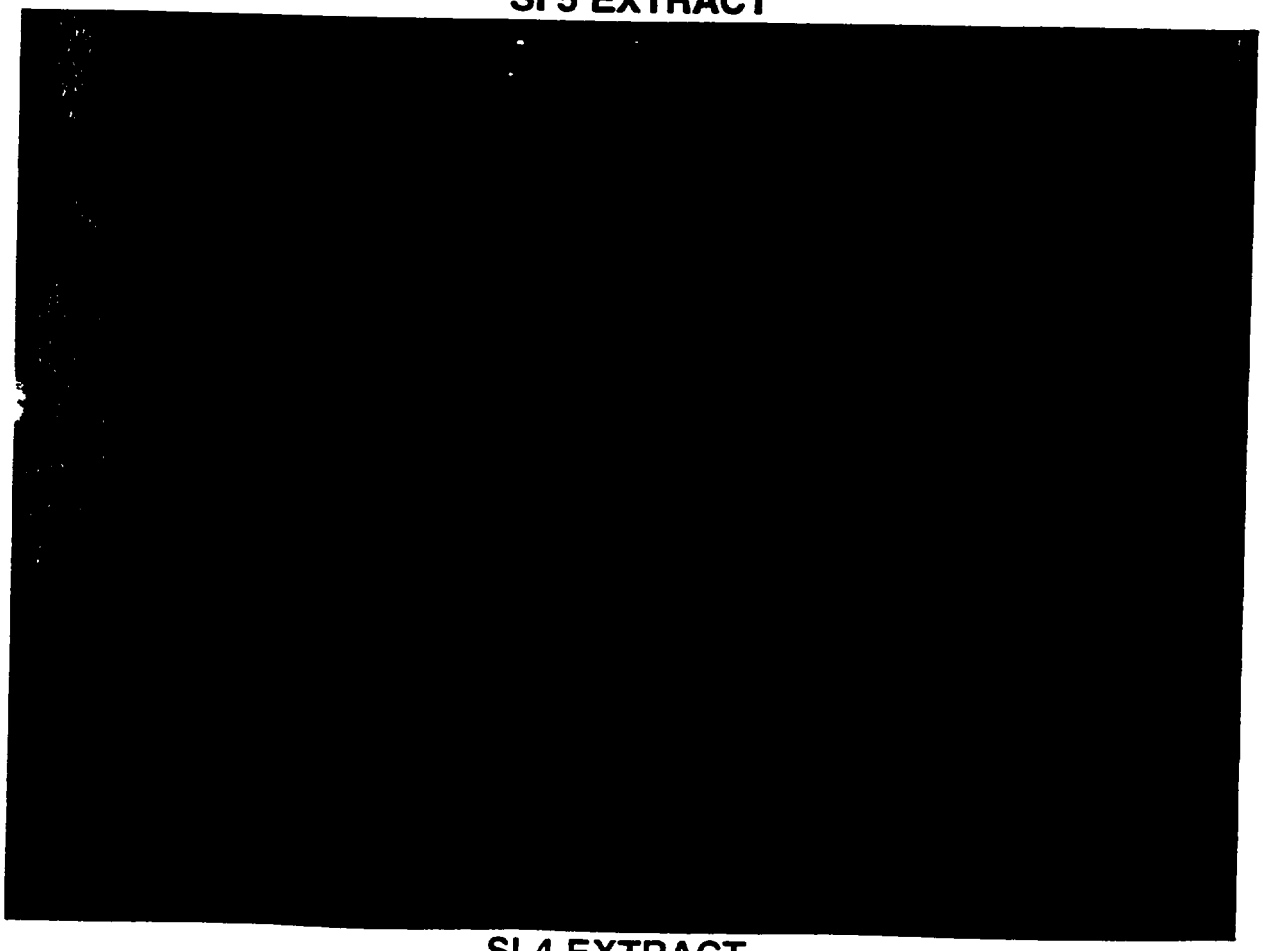


III.5.1. Signal degradation

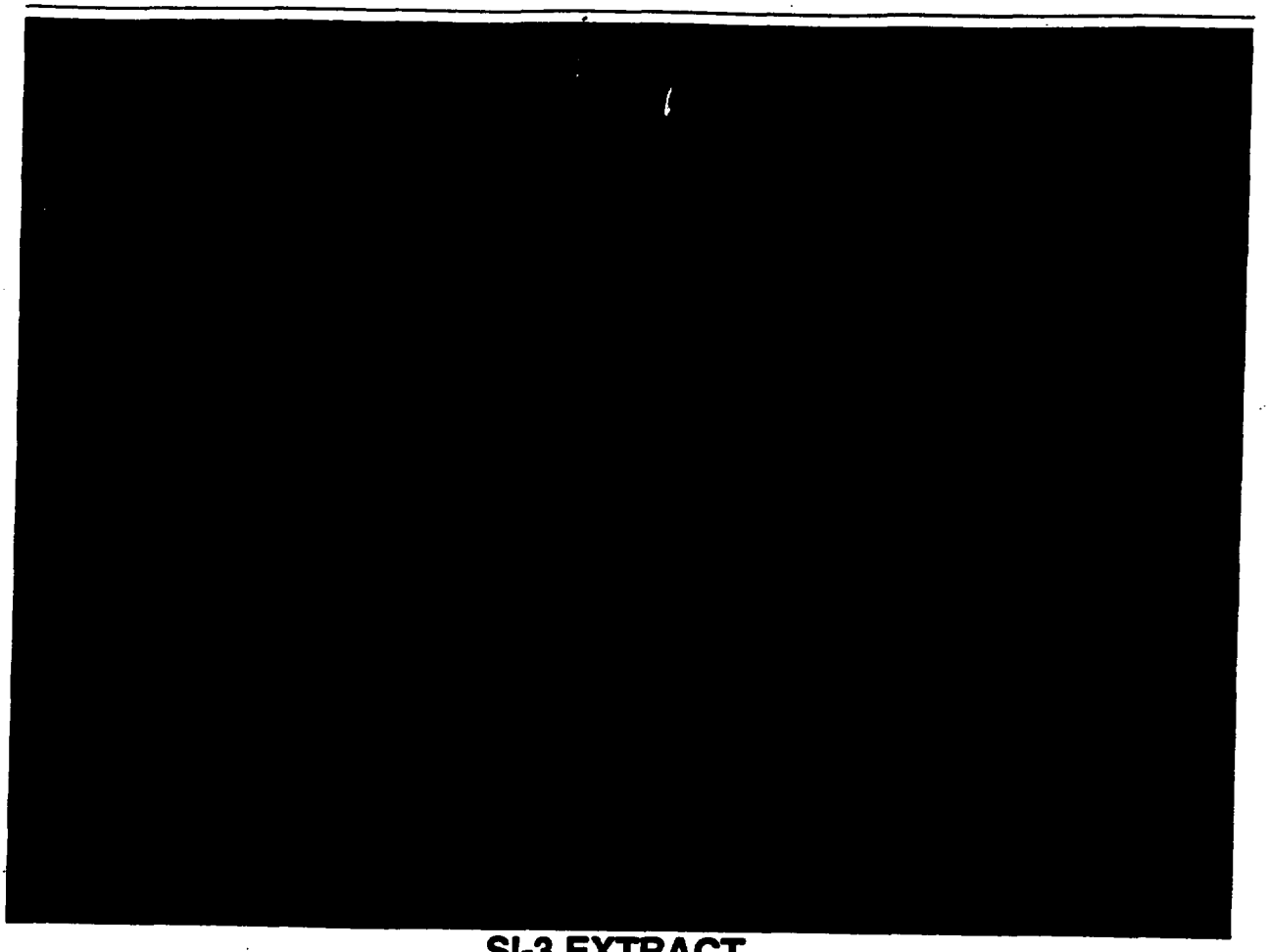
The following sequence of extracts from SI-5 to SI-1 shows the degradation in the quality of the signal on the tape



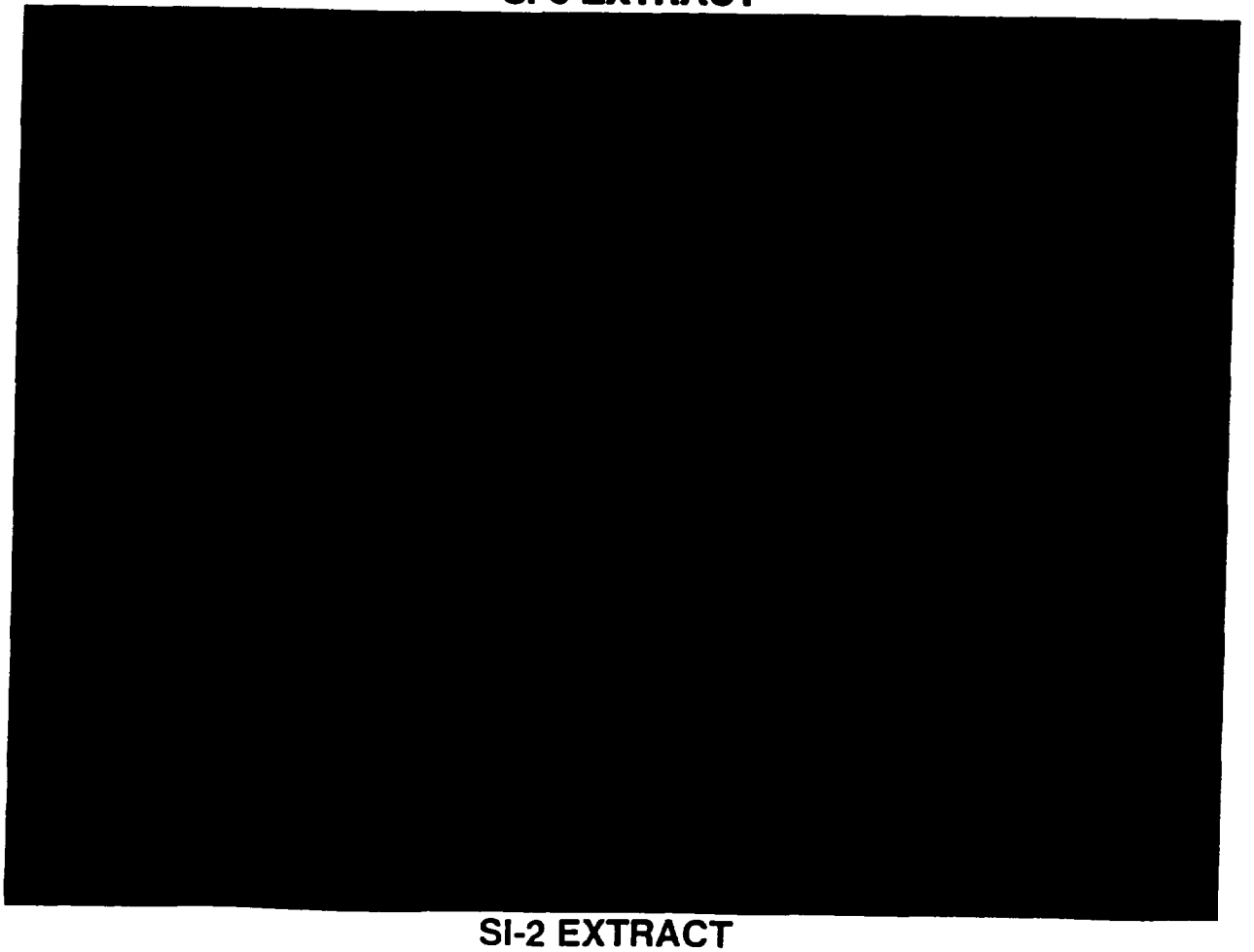
SI 5 EXTRACT



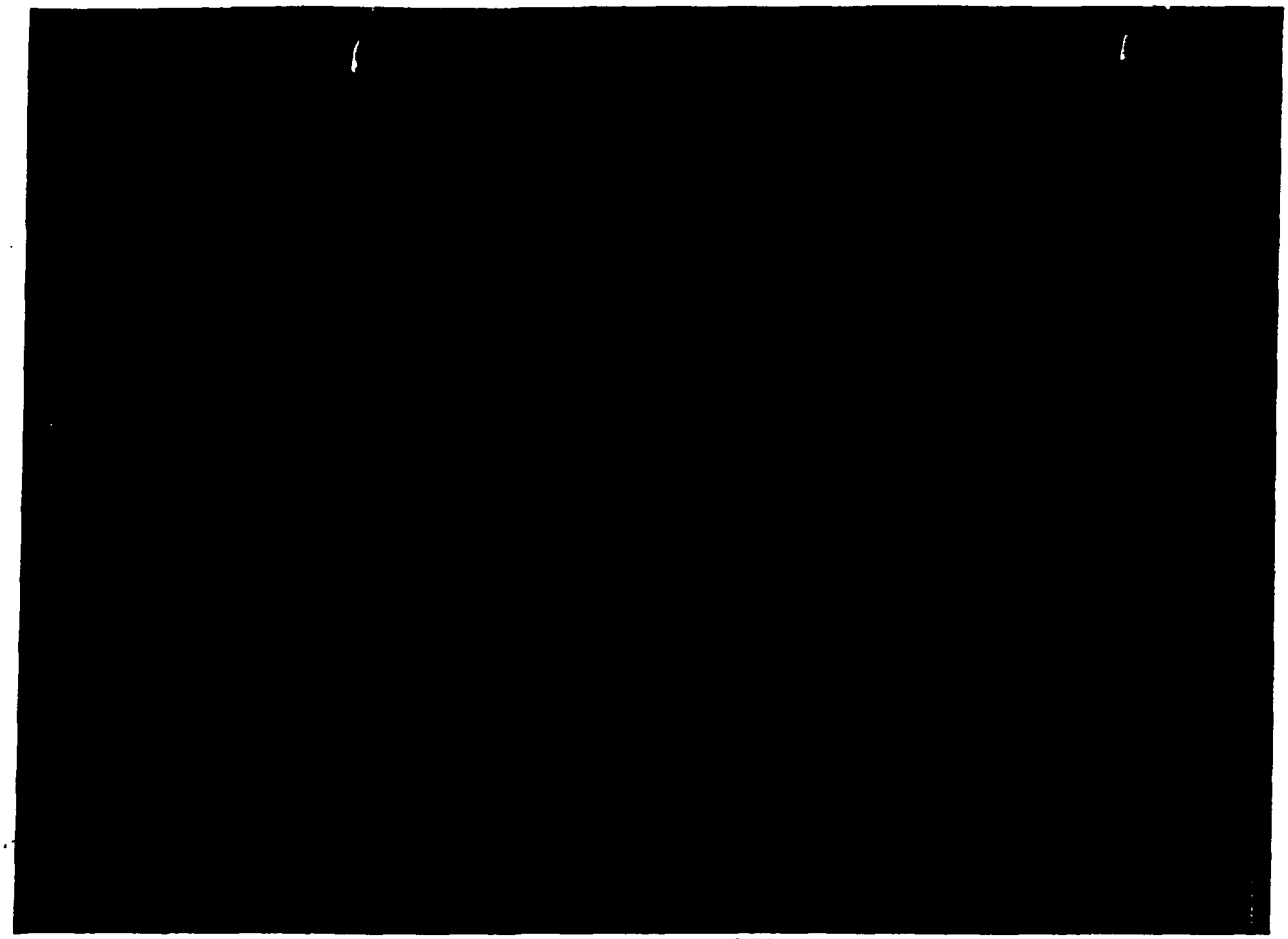
SI-4 EXTRACT



SI-3 EXTRACT



SI-2 EXTRACT

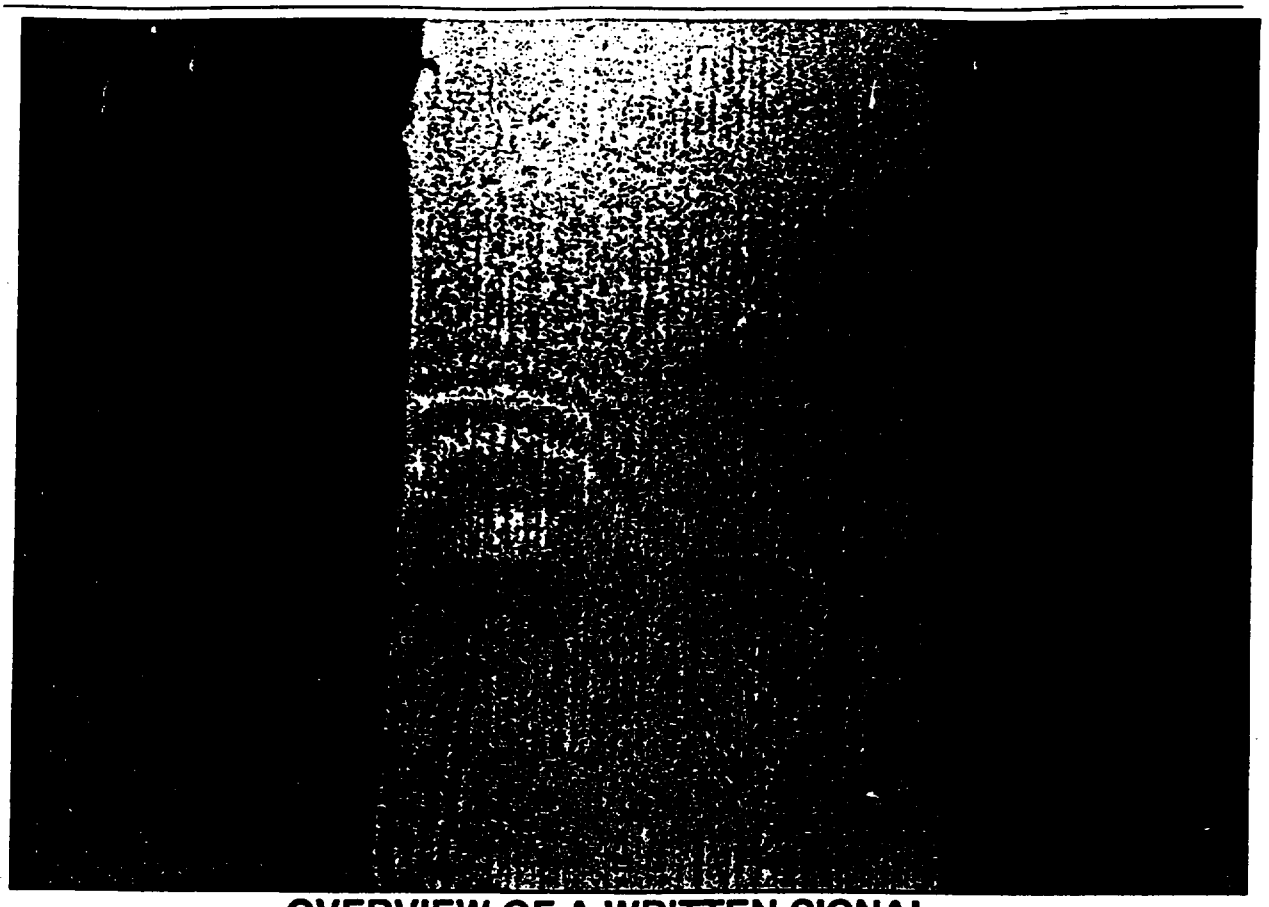


SI-1 EXTRACT

III.5.1.2 Erased area

The erased zones on the tape are representative of a constant magnetic field. Actually, the rays are detectable visually because the garnet detects a differential magnetic field on the tape (High magnetic field on a transition, and low between two transitions).

There are no transitions in those erased part, which means that there is a constant magnetic field (at zero, or low constant). The two pictures below show the difference between a normal zone with signal on it, and an erased part:

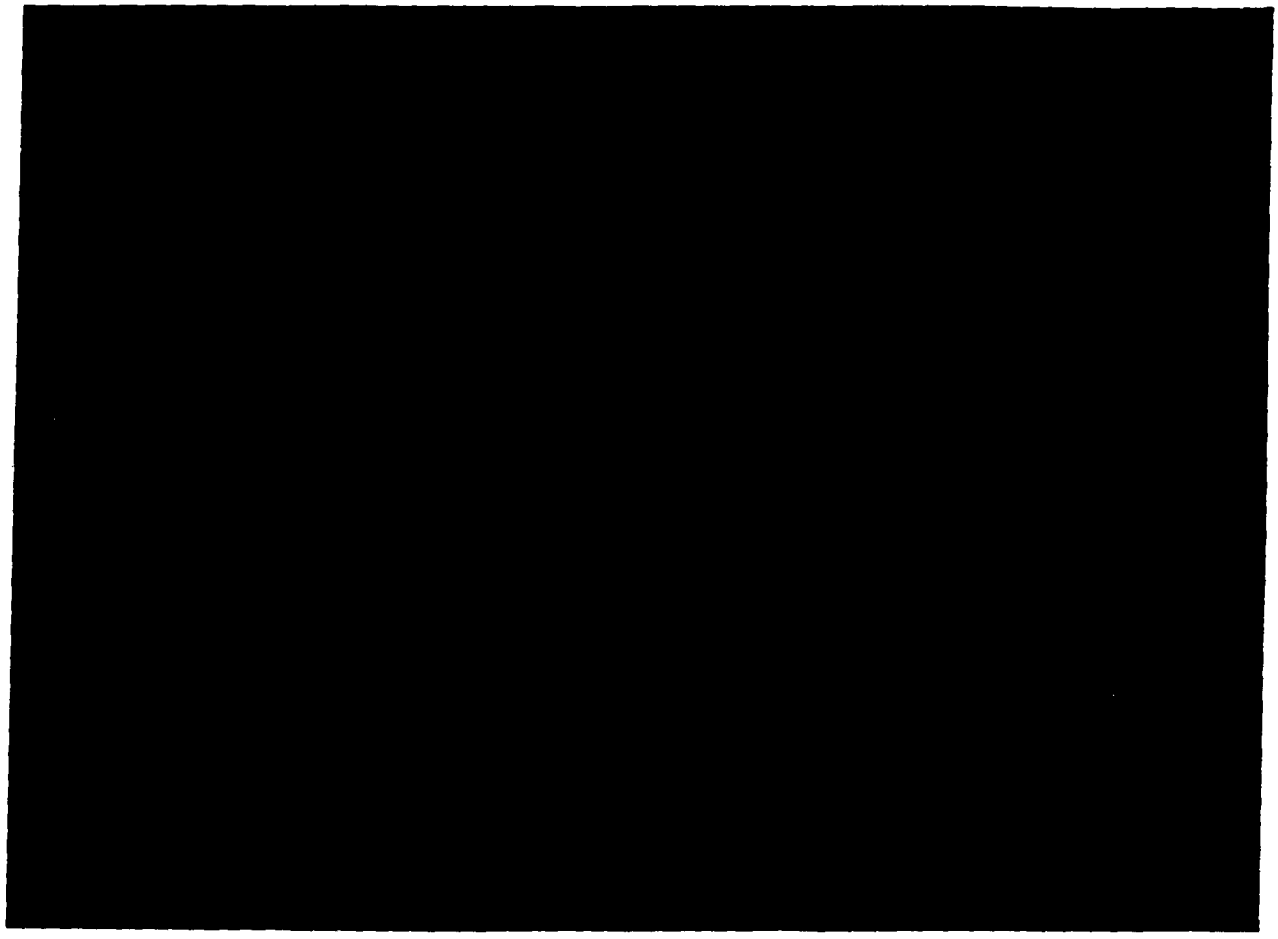


OVERVIEW OF A WRITTEN SIGNAL

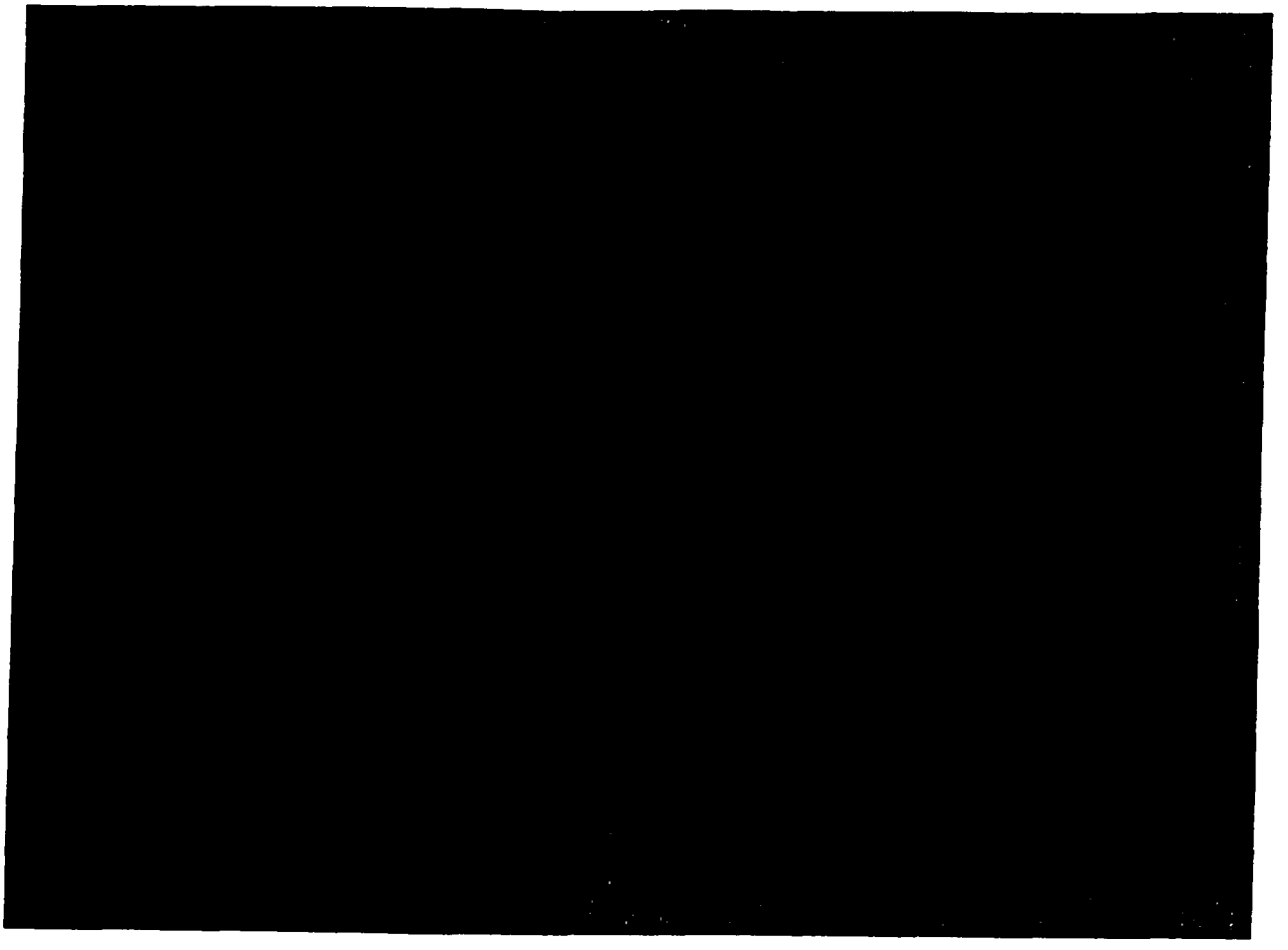
OVERVIEW OF AN ERASED ZONE

III. 5.1.3 Blocks of unreadable data

Within the erased part of the tape, two zones are detectable where there is a very little amount of signal. It is not possible to detect more than a few rays which makes the visual decoding impossible, as there is no reference to the beginning or the ending of a data block. Those areas are not readable.



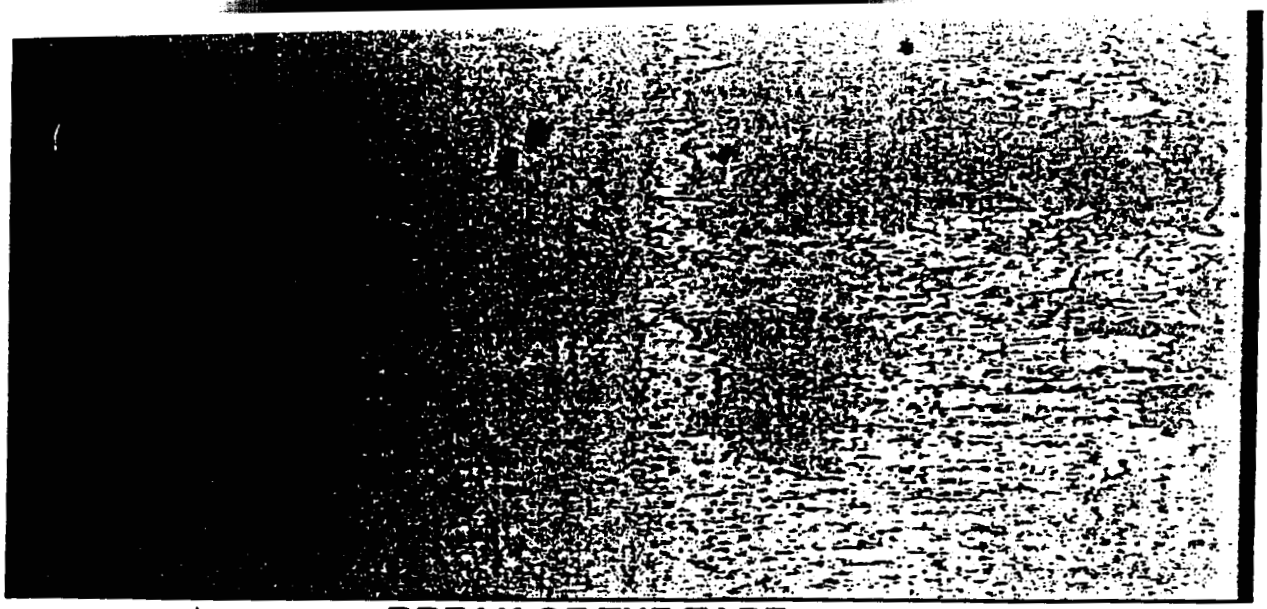
FIRST PARTIAL BLOCK OF UNREADABLE DATA



SECOND PARTIAL BLOCK OF UNREADABLE DATA

III.5.1.4. Break of the tape.

During the accident the tape broke and was consolidated for its read-out



BREAK OF THE TAPE

III.5.1.5 Oldest data

After the erased section of the tape, the signal corresponding to the oldest data of the tape is beginning to be readable. Anyway the signal quality is increasing when moving forward along the tape moving far from the break and like for the SI-1to SI-6 data blocks, the quality becomes standard after a few centimeters.

FIRST BLOCK OF DATA AFTER TYHE ERASED PART

III.5.2 Recoverable data

The garnet microscope optically shows the magnetic transitions of the signal which is written on the tape. Any kind of erasure on the tape that would destroy the magnetic fields would make the transitions disapear.

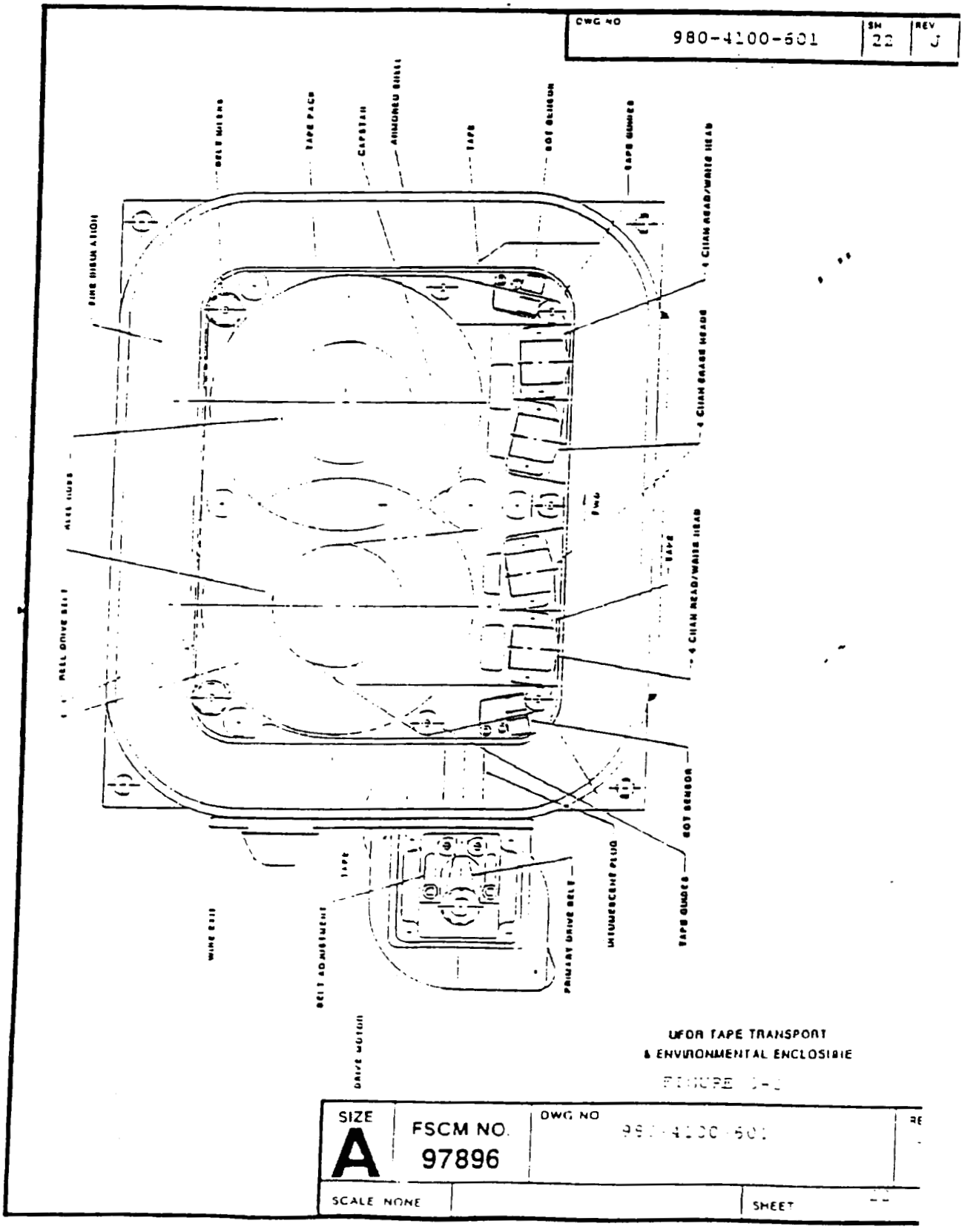
In this case, we can confirm that all the readable data has been retrieved by normal tape decks read-out, and that the lenght of tape which is unreadable by usual means is unreadable beause of a zero or constant magnetic field. This means that signal has been erased.

Because of the damaged part of the tape showing corrosion, it seems that the explanation for this erasure to have happened is more likely due to an environmental or chemical cause.

APPENDIX ONE

FIGURES OF THE UFDR

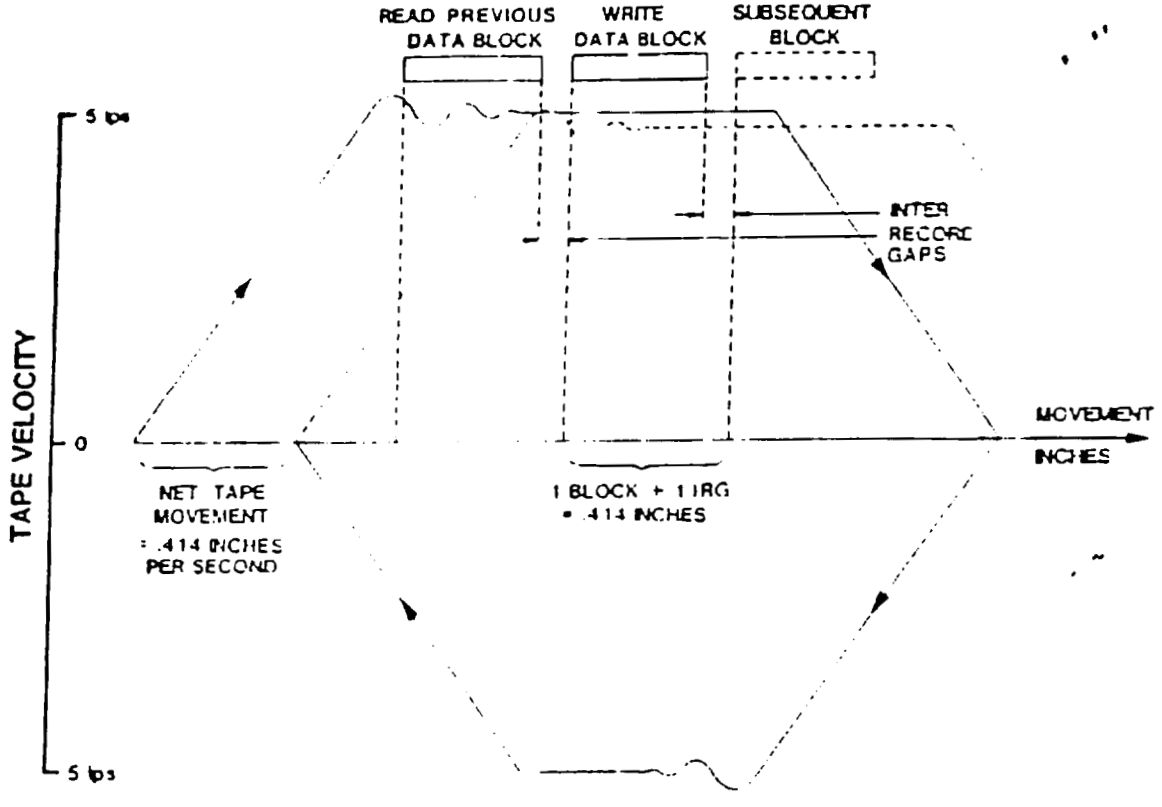
APPENDIX 1a - UFDR FIGURES



APPENDIX 1b - UFDR CHECKSTROKE PRINCIPLE

DWG NO	SH	REV
980-4100-601	26	J

UFDR CHECKSTROKE PRINCIPLE



TAPE VELOCITY VERSUS DISPLACEMENT GRAPH

FIGURE 3-3

SIZE	FSCM NO	DWG NO	REV
A	97896		
SCALE NONE		SHEET	

APPENDIX TWO

PICTURES OF SI-6

ATTACHMENT 10

ULB Manufacturer's Failure Analysis Report

Failure Analysis Report

FAR# 0309

Part # 001722 Serial # 6279 Original SO#

Model/Description ELP-362D Emergency Locating Pinger

Unit Type ☐ Component ☐ Sub assembly ☐ Top assembly ☑ System ☐ Other:

Customer/Section RJE / NTSB for Silk Air PO# RMA706 RMA# RA5182

Problem Identified By ☑ Customer ☐ Internal ☐ Audit finding ☐ Other

Complaint/ Problem NTSB is conducting an accident investigation. The unit hit the water at high speed. RJE sending customer letter with RA. RJE tested with ATS-260 and DPL-275A and unit failed. S/N 6279 = 0.21 VDC across water switch.

CUSTOMER NEEDS TO BE CONTACTED PRIOR TO ANY DESTRUCTIVE TESTING.

Initiator WRB Date 03/17/98

Evaluation of Problem

Preliminary Evaluation: Confirmed unit does not operate. Considerable external corrosion. Water contact appeared recessed. Ertalyte insulator on end cap broken from apparent impact damage. Opened unit and discovered extensive PCB and battery damage due to water intrusion. Unit will not operate due to water intrusion damage.

Failure Code ☐

Action Taken: Replaced broken ertalyte insulator and pressure checked unit to 8000 psi. No leakage occurred.

Above actions completed? ☒ Yes ☐ No, Enter implementation date:

Do the actions prevent recurrence? ☐ Yes ☒ No, Enter additional actions required

Unit failed due to water intrusion from broken ertalyte insulator. Impact to the WTO end cap is apparent cause for broken ertalyte insulator. NSTB evaluation needs to advise to conditions that caused impact to beacon end cap.

Department responsible CSR/Sales ☐ Engineering ☐ Production ☐ QA / Mgt ☐

Approvals

Production	QA	Engineering	Sales
	J Barth	WRB	WRB

Audit Review

Audit Results:

Auditor Date

FR1-11 Rev B 2/18/1998

Failure Analysis Report

FAR# 0309 Cont.

Part # 001722 Serial # S9430 Original SO#

Model/Description ELP-362D Emergency Locating Pinger

Unit Type ☐ Component ☐ Sub assembly ☐ Top assembly ☑ System ☐ Other:

Customer/Section RJE / NTSB for Silk Air PO# RMA706 RMA# RA5182

Problem Identified By ☑ Customer ☐ Internal ☐ Audit finding ☐ Other

Complaint/ Problem NTSB is conducting an accident investigation. The unit hit the water at high speed. RJE sending customer letter with RA. RJE tested with ATS-260 and DPL-275A and unit failed. S/N S9430 = 0.00 VDC across water switch.

CUSTOMER NEEDS TO BE CONTACTED PRIOR TO ANY DESTRUCTIVE TESTING.

Initiator WRB Date 03/17/98

Evaluation of Problem

Preliminary Evaluation: Considerable external physical damage evident: large impact dent on side of housing, large flat area of displaced metal on rim of battery end cap, WTO end cap dented. Confirmed unit does not operate. Evidence of lithium battery outgassing due to corrosion at dented area on battery end cap. Opened unit and discovered battery had outgassed and caused extensive corrosion due to lithium gas.

Failure Code ☐

Action Taken: Battery sent to Electrochem for evaluation. Battery failed internally due to severe shock. Tested unit on bench and found electronics transmitted but not to specifications. Examined transductor and found core cracked due to severe shock and damaged by lithium gassing.

Above actions completed? ☒ Yes ☐ No, Enter implementation date:

Do the actions prevent recurrence? ☐ Yes ☒ No, Enter additional actions required

Physical damage to unit indicates beacon separated from mount and was subjected to several severe impacts that exceeded design specifications. NTSB needs to confirm crash conditions.

Department responsible CSR/Sales ☐ Engineering ☐ Production ☐ QA / Mgt ☐

Approvals

Production	QA	Engineering	Sales
	J Barth		

Audit Review

Audit Results:

Auditor Date

FFI-011 Rev B 2/18/1998

COPY

Silk Air ELP-362 evaluation at Datasonics, Inc.

The two returned ELP-362D serial numbers S9430 and 6279 were evaluated as follows:
Persons present:

Paul Pietryka, Production Engineering Manager
Russ Blake, ELP Project Engineer
John Barth, QA Manager
Nicole Deprincipe, QA Inspector

Task	Results	
	6279	S9430
Visually examine the unit	Physical damage evident: a. considerable external corrosion form environment. b. Water contact appeared recessed, discovered Ertalyte insulator on water end cap is broken.	Physical damage evident: a. large impact on side of housing b. battery end cap: one large area of metal removed, one area of metal raised, one dent c. Contact end cap: medium dent
1. Check unit with AST-260 S/N 436A	Red LED to replace battery lit	Red LED to replace battery lit
2. Perform voltage check at water contact with Data Precision meter S/N 15408	0.009 to 0.010 volts DC	0.000 volts DC
3. Remove battery end cap and visually examine interior.	Corrosion inside housing on one side. Probable cause was water intrusion.	Unable to remove end cap. Require authorization from NTSB to destructively remove end cap.
4. Check continuity of spring contact on battery end cap.	Continuity good	Continuity good
5. Remove battery and check battery voltage.	4.810 volts DC	Intermittent .5 to 3.7 volts DC
6. Place ELP on test fixture and measure current drain and if ELP transmits.	4.026 ma. (Nominal current is less than 1 ma.) Unit did not transmit.	4.294 ma. (Nominal current is less than 1 ma.) Unit did not transmit.
7. Replace battery if unit checks good at step 6.	N/A	N/A
8. Remove water contact end cap and visually examine interior.	Water intrusion evident. Considerable loose granular residue inside. PC board has extensive water damage	No water intrusion evident. Interior and PCB had extensive corrosion and residue due to Lithium out-gassing from the battery pack.
9. Check continuity of water contact to terminal	Continuity good	Continuity good

10. Apply power to ELP module to check board voltages and confirm operation of module	Board inoperative due to extensive water damage	Board inoperative due to extensive lithium battery out-gassing damage
11. Remove ELP module to evaluate ceramic.	Ceramic was not damaged. Capacitance = 7.41 nf	Ceramic was not damaged. Capacitance = 7.18 nf
12. Final evaluation		

Test Equipment used:
AST-260 S/N 436A
Data Precision meter S/N 15408
BK Precision Capacitance meter S/N 16016567
Datasonics ELP Test Fixture S/N 001
Iwatsu O-Scope S/N 037

April 3rd - Received written approval to cut housing on S9430 from RJE.
April 9th – Cut battery end cap off housing. Battery had outgassed. Fuse end was loose from cells, but still connected. Could not remove battery from housing. We decided to remove the electronics module, evaluate the ceramic and push the battery out from the module side. Removed electronic module. Inside of housing and bottom side of module had corrosion from battery outgassing. Positive electrode on ceramic separated with module. Unable to determine when separation occurred. Solder connection points were not visibly corroded. Ceramic was intact.
April 9th – Contacted Electrochem and obtained authorization to return battery for evaluation. Discussed failure analysis needs with Jim Turski and Bill Clark of Electrochem.
April 29th – Received battery evaluation from Electrochem. Conclusion was battery experienced severe shock causing internal failures.
May 1st – Meeting of all personnel to review results to date and finalize evaluation. Decided to:

6279: *Replace Ertalyte insulator and pressure check unit.*
Removed broken Ertalyte insulator and cleaned the threads and o-ring surfaces from corrosion caused by the water and battery leakage. Replaced Ertalyte insulator and assembled unit. Pressure tested unit to 8000 psi per AS 8045 specification. Unit had no leakage during pressure test.
Remove and test electronic module and ceramic.
Found no visible damage to ceramic and capacitance was correct (7.42 nf...normally 7.0 to 7.8 nf).
Tested electronics and would not function at all due to water damage. Transductor was correct (2.45 mH...normally 2.45 mH).

S9430: Remove and test electronic module and ceramic.
Found no visible damage to ceramic and capacitance was correct (7.18 nf...normally 7.0 to 7.8 nf).
Tested electronics and found to operate (but not to spec.), nor would transmit out a signal. Inductance of the transductor was low (0.69 mH...normally 2.45 mH).
Removed transductor and found the core was cracked and had extensive lithium out-gassing damage.

Silk Air ELP-362 evaluation at Datasonics, Inc.

The two returned ELP-362D serial numbers S9430 and 6279 were evaluated as follows:
Persons present:

Paul Pietryka, Production Engineering Manager
Russ Blake, ELP Project Engineer
John Barth, QA Manager
Nicole Deprincipe, QA Inspector

Task	Results	
	S9430	6279
Visually examine the unit	Physical damage evident: a. considerable external corrosion form environment. b. Water contact appeared recessed, discovered Ertalyte insulator on water end cap is broken.	Physical damage evident: a. large impact on side of housing b. battery end cap: one large area of metal removed, one area of metal raised, one dent c. Contact end cap: medium dent
1. Check unit with AST-260 S/N 436A	Red LED to replace battery lit	Red LED to replace battery lit
2. Perform voltage check at water contact with Data Precision meter S/N 15408	0.009 to 0.010 volts DC	0.000 volts DC
3. Remove battery end cap and visually examine interior.	Corrosion inside housing on one side.	Unable to remove end cap. Require authorization from NTSB to destructively remove end cap.
4. Check continuity of spring contact on battery end cap.	Continuity good	
5. Remove battery and check battery voltage.	4.810 volts DC	
6. Place ELP on test fixture and measure current drain and if ELP transmits.	4.026 ma. (Nominal current is less than 1 ma.) Unit did not transmit.	
7. Replace battery if unit checks good at step 6.	N/A	
8. Remove water contact end cap and visually examine interior.	Water intrusion evident. Considerable loose granular residue inside. PC board has extensive water damage	
9. Check continuity of water contact to terminal	Continuity good	
10. Resistance of center PCB contact to case		

11. Apply power to ELP module to check board voltages and confirm operation of module	Board inoperative due to extensive water damage	
12. Remove ELP module to evaluate ceramic.	Require authorization from NTSB	

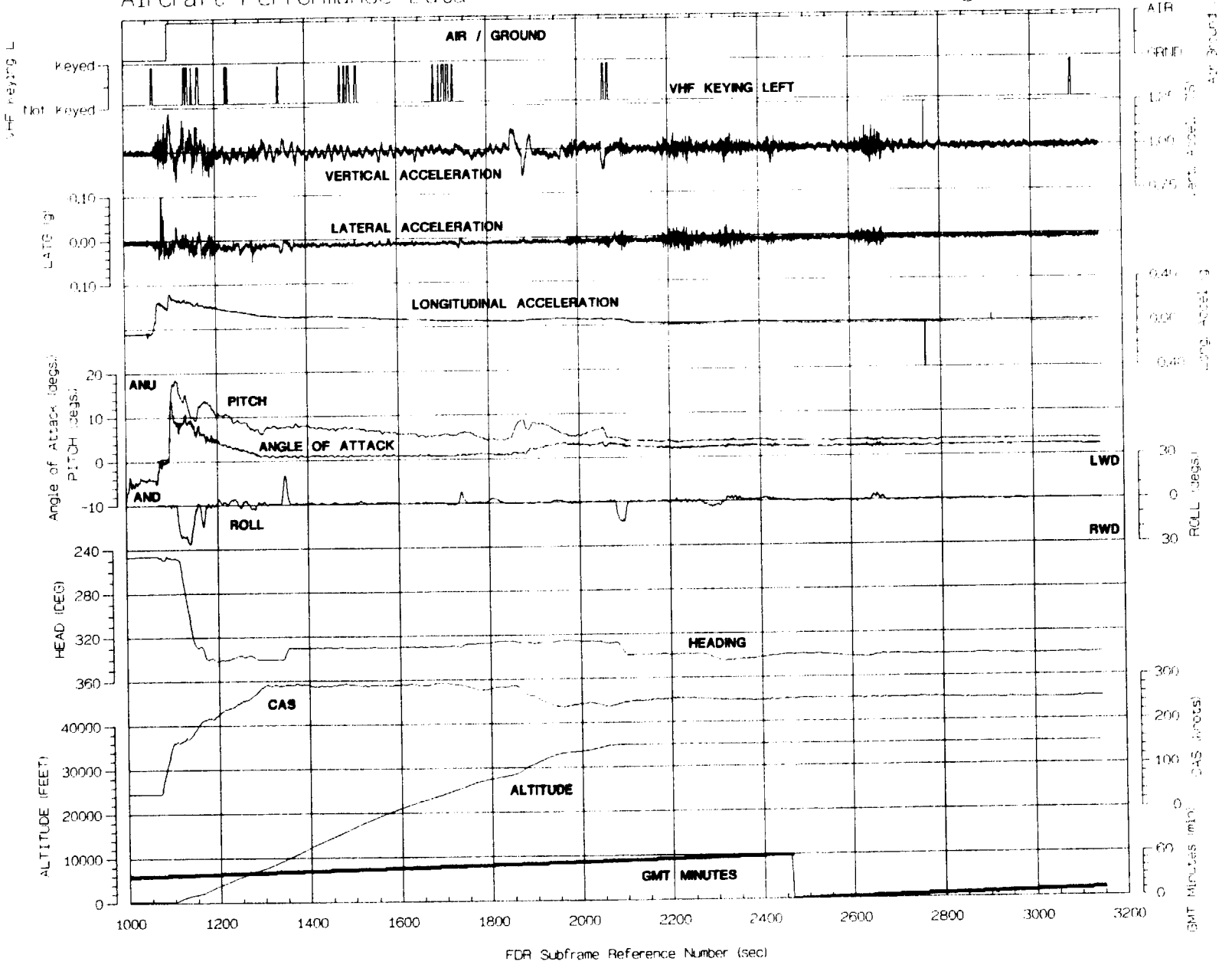
Test Equipment used:
AST-260 S/N 436A
Data Precision meter S/N 15408

ATTACHMENT 11

Accident Flight Data Plots

Silk Air 737 - MI-185

Aircraft Performance Data — Palembang, Indonesia



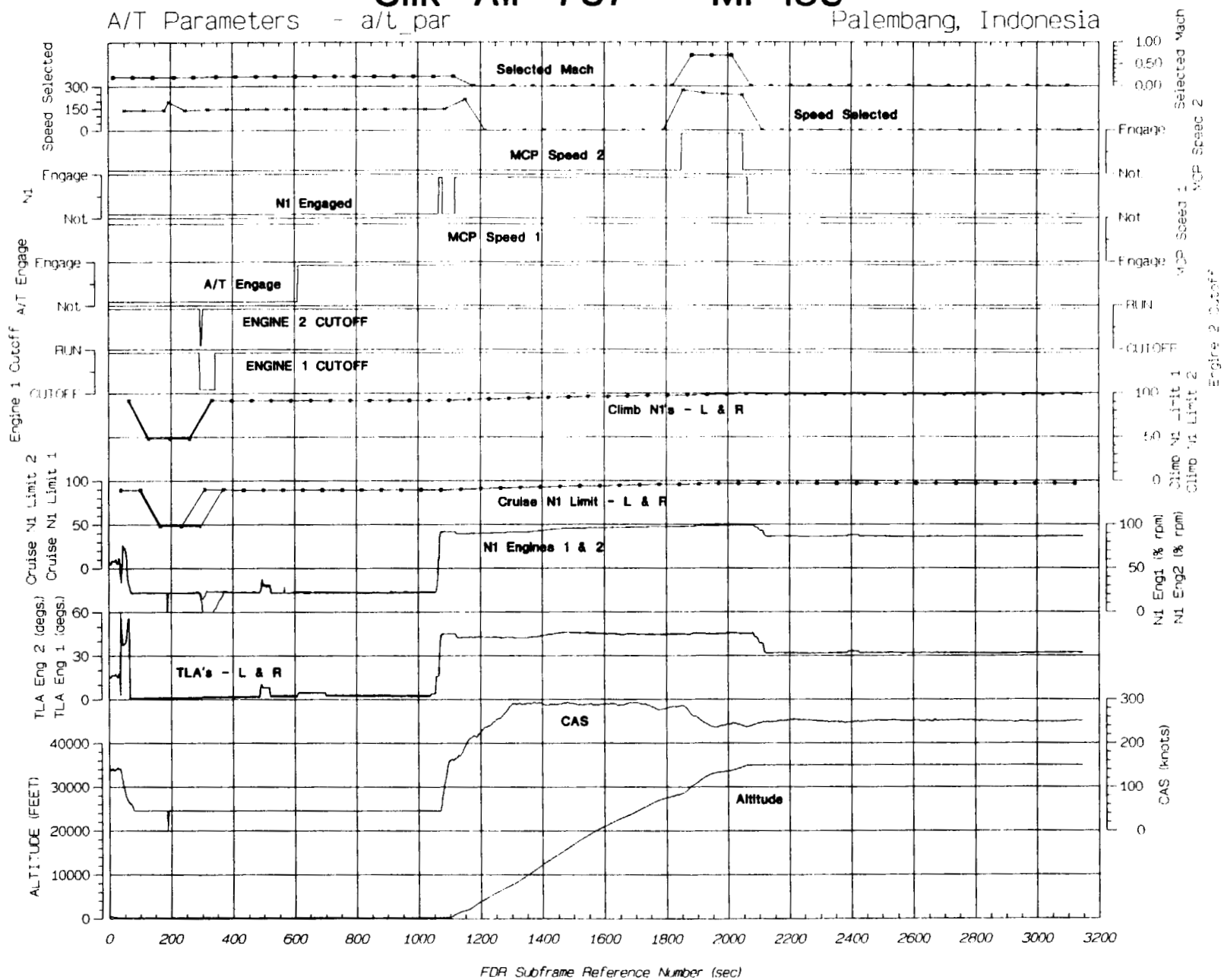
Finalized Data - aus7.frm & aus11.frm
Revised: June 16, 1999

NTSB Vehicle Recorder Division

Silk Air 737 - MI-185

A/T Parameters - a/t_par

Palembang, Indonesia

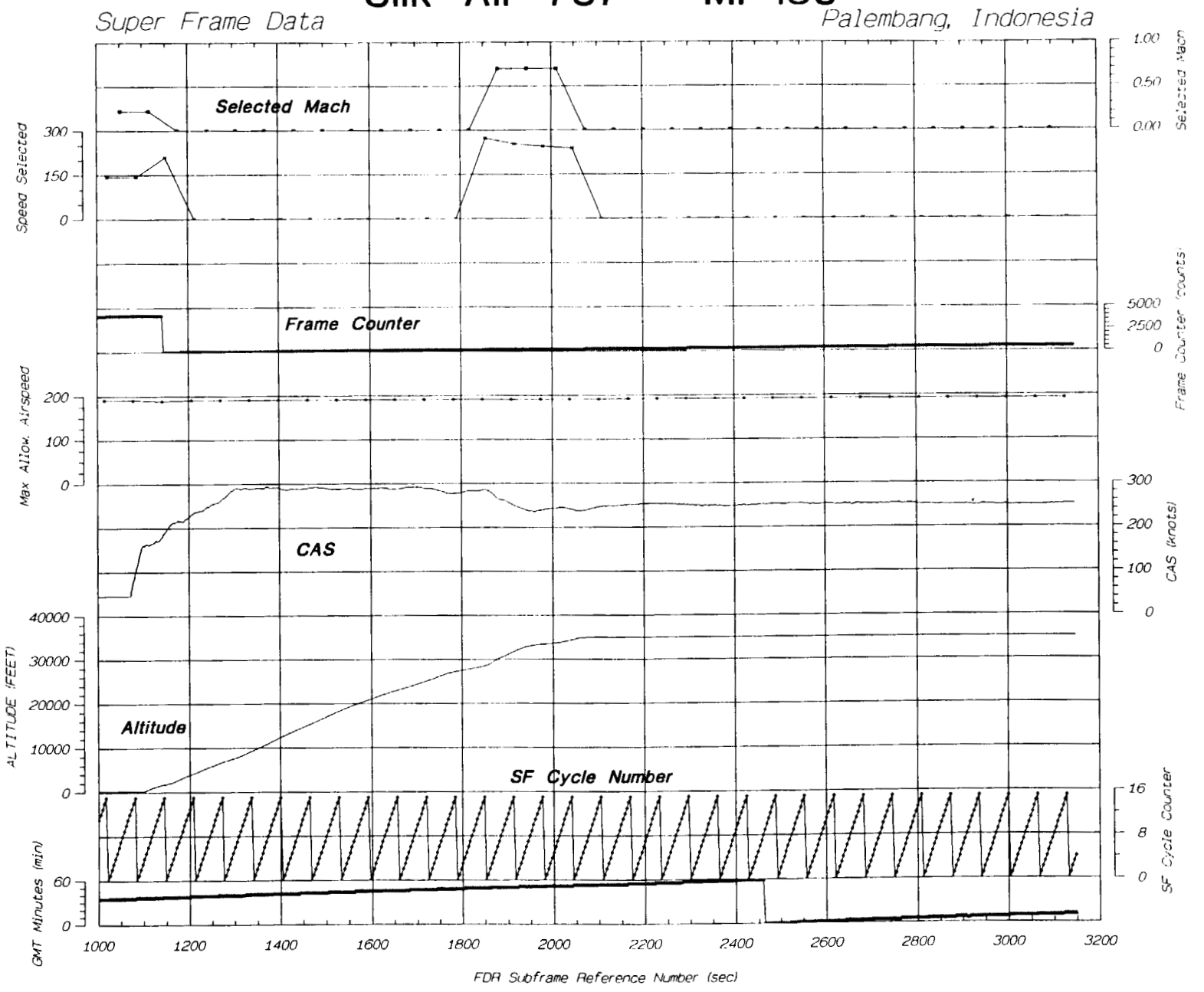


Finalized Data - aus7.frm & aus11.frm

Revised: June 17, 1999

NTSB Vehicle Recorder Division

Silk Air 737 - MI-185



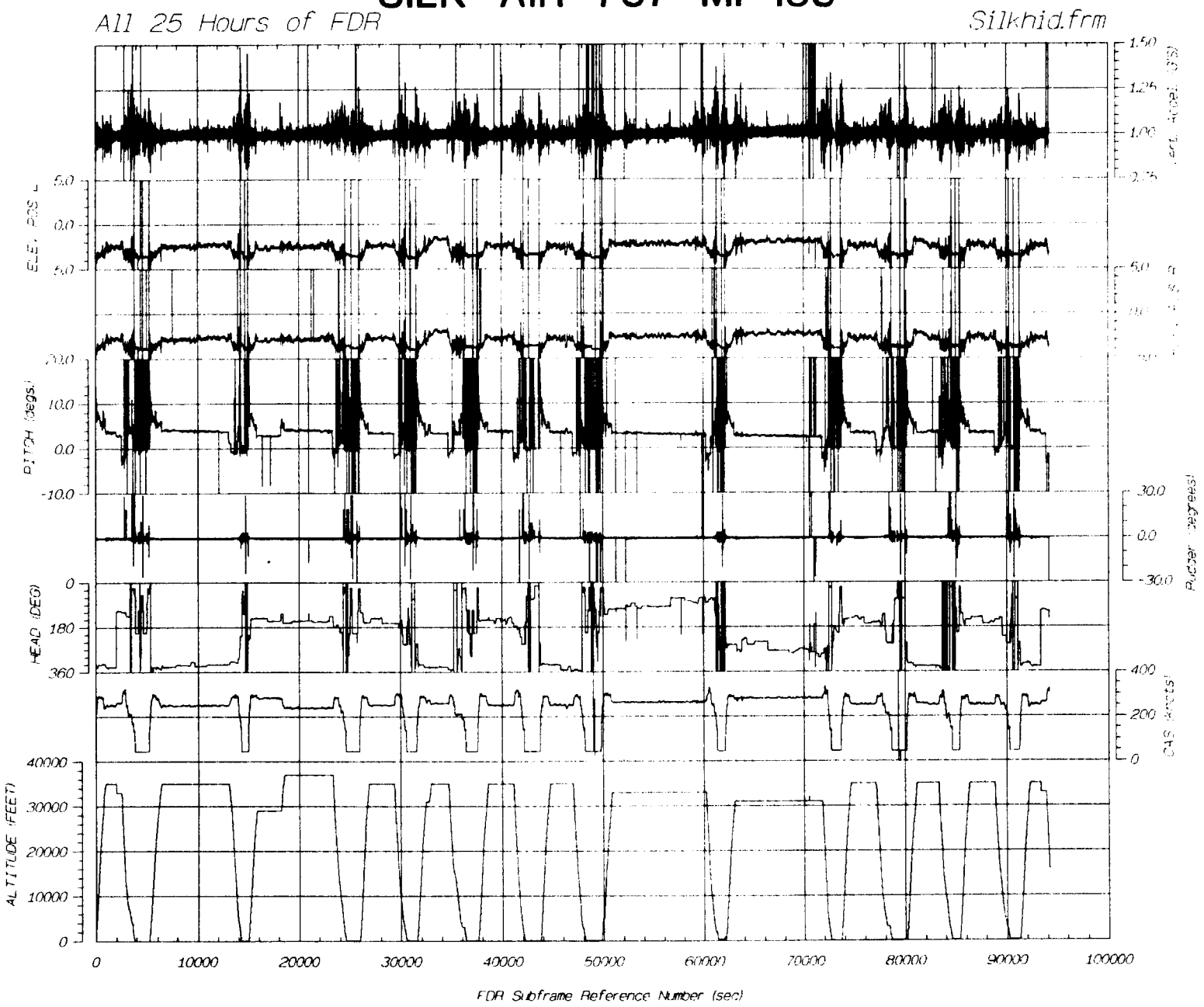
Finalized Data - aus7.frm & aus11.frm
Revised: May 24, 1999

NTSB Vehicle Recorder Division

ATTACHMENT 12

Plot of Entire Contents of FDR

SILK AIR 737 MI-185



Finalized Data
Plotted: May 22, 1999

NTSB Vehicle Performance Division