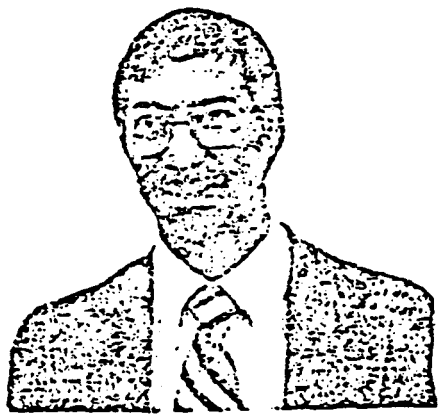
J. Robert Cromack
10/27/81
Cromack Exhs. 1-16
Extra

J. Robert Cromack, P.E.
President
CROMACK ENGINEERING ASSOCIATES, INC.
P.O. Box 28243
Tempe, Arizona 85282
(602) 831-7512



BACKGROUND

Birth: March 23, 1933, Wewoka, OK
Public School: Austin High School
Austin, Texas - May '51
Family: Married, 3 children

EDUCATION

	Years	Degree	Specialty
University of Texas	1951-56		Business Administration
University of Texas	1958-60	BSME	Mechanical Engineering
Texas A&M University	1962-63		Dynamics, Vibration
Arizona State University	1964-66	MSE	Solid Mechanics, Design
University of California at Los Angeles	1969	Certificate	Medical-Engineering
Armed Forces Institute of Pathology	1970	Certificate	Accident Pathology

PROFESSIONAL AFFILIATIONS

Registration:
Professional Engineer: Arizona (#11631), Texas (#22832)

Societies:
American Association for Automotive Medicine - National President 1978-79
International Association for Accident and Traffic Medicine
International Insititute of Accidentology
Society of Automotive Engineers - Accident Investigation Practices Subcommittee
Sigma XI/Scientific Research Society of America

MILITARY EXPERIENCE

49th Armoured Division, TNG, S/Sgt. Mil. Pol. & Avn. Sect., 1949-58

PROFESSIONAL EXPERIENCE

General Dynamics - Convair, Ft. Worth, TX, 1956-58
Engineering specifications writer. Prepared engineering specifications and reports with technical staff for the B-58 and F-102 aircraft.

DEFT. EX. D-Cromack #1
DATE: 10/27/81
REPORTER: ALBERT J. GASDOR

International Harvester, Engineering Research, Chicago, Illinois, 1960-62. Test engineer. Responsible for conducting tests and evaluating prototype engines, heat exchangers, and farm tractors. Applied research and design of pre-production equipment.

Albritton Engineering Corporation, Hydraulics Division, Bryan, Texas, 1962-63. Development engineer. Set up a test and development program for a hydraulically actuated impact mechanism.

Consultant, Dallas, Texas and Tempe, Arizona, 1963-66. Consulting engineer. Consultant in dynamics and vibration to Collins Radio Co., DoD contracts. Consultant in dynamics and design to Dyna-Tech Corp., aviation safety.

Arizona State University Research Foundation, Tempe, Arizona, 1964-66. Research associate. Study of crashworthiness of aircraft passenger seats, complex mathematical modelling of occupant-seat system, design and failure analysis of seat structures.

Southwest Research Institute, San Antonio, Texas, 1966-1976. Section Manager, Automotive Research Division, Program Manager of research projects involving:

Alternative inspection policies for collision damaged cars. Inspection policies for special purpose vehicles (trucks, buses).

Stability and handling characteristics for cars subjected to hazardous driving maneuvers.

Evaluation of occupant performance in full scale guardrail/car impact tests.

Multidisciplinary Accident Investigation research.

Development of an international accident investigation protocol.

Special studies to assess classification procedure for occupant injury and vehicle damage.

Evaluation of effectiveness of breakaway poles and sign supports struck by cars.

Evaluation of restraint system effectiveness in collision damaged 1973-76 model year cars.

Investigation of accidents involving cars equipped with air bags and school buses in which a fatality occurred.

Evaluation of startle effect and dynamic performance of air bags using human volunteers on impact sled.

Evaluation of dynamic performance of inflatable belts using human volunteers on impact sled.

Assessment of human surrogate performance in child restraints on impact sled.

Assessment of standard belt systems at suprahuman tolerance levels on impact sled.

San Antonio College, San Antonio, Texas, 1967-1976. Engineering faculty, Evening Division. Lecturer in engineering and mathematics.

Dynamic Science, Inc., Phoenix, Arizona, 1976-1977. Director of Science and Research. Managed engineers and scientists. Technical programs involving crash testing of automobiles with active and passive restraints, evaluation of barriers for heavy vehicles, cargo shift and cargo tank rollover tests, mobile parametric measurement device, advanced crash recorder development.

Cromack and Associates, Phoenix, Arizona, 1977-1978. Owner and principal associate. Mechanical engineering, including dynamics, design and failure analysis. Highway and consumer product safety. Research and analysis.

Glendale Community College, Phoenix, Arizona, 1978. Physics faculty, Continuing Education Division. Lecturer in college physics.

Cromack Engineering Associates, Inc., Tempe, Arizona, 1978-present. President. Technical programs involving electric and hybrid vehicle handling simulation analysis, methodology for human factors engineering analysis of railroad safety appliances, evaluation of NHTSA's plans for active and passive restraints, analysis of truck underride accident statistics, engineering analysis for product liability and personal injury litigation and training program for inspectors of cars involved in low damage and unreported accidents.

PARTICIPATION IN TECHNICAL AND PROFESSIONAL ACTIVITIES

Member, Management Advisory Council, Southwest Research Institute, 1967-69.

Faculty, Accident Investigation Workshop, NATO/CCMS, Wolfsburg, Federal Republic of Germany, 1970

Member, General Services Council, Southwest Research Institute, 1970-72.

Faculty, Accident Investigation Workshop, NATO/CCMS, Turin, Italy, 1971

Coordinating Panel (Ex-officio member), Road Safety Pilot Studies, Accident Investigation Project, NATO/CCMS, 1971-73.

Panel Member, Society of Automotive Engineers, Vehicle Safety Research Institute, Position Statement Formulation--Accident Causation Project, 1972.

Member, Communications Advisory Committee, Southwest Research Institute, 1973-74.

Committee Chairman, Committee on Occupant Restraints, American Association for Automotive Medicine, 1974-78.

Invited Participant, Automobile Collision Data Workshop, Office of Technology Assessment, Rosslyn, Virginia, 1975.

Invited Participant, Motor Vehicle Collision Investigation Symposium, National Highway Traffic Safety Administration, Buffalo, New York, 1975.

Board of Directors, American Association for Automotive Medicine, 1975-7

Committee Member, Committee on Data and Research Needs, Office of Traffic Safety of the State of Texas, 1976

National Secretary, American Association for Automotive Medicine, 1976.

Faculty, Multidisciplinary Highway Collision Investigation Training Courses, National Highway Traffic Safety Administration, 1976-77.

Panel member, National Review Panel for the National Accident Sampling System, National Highway Traffic Safety Administration 1976-79.

National President, American Association for Automotive Medicine, 1978-79.

Visiting Lecturer, University of Arizona Medical School, Department of Pathology, 1978-1979.

TECHNOLOGICAL CONTRIBUTIONS TO THE COMMUNITY--PUBLICATIONS AND PRESENTATIONS

Thesis - Arizona State University, May 1966

Journals, Procedings and Transactions - 17 publications

Technical Reports - 18 published reports plus over 205 published multidisciplinary accident investigation reports.

Presentations - over 40 presentations.

Publications - Journals, Proceedings and Transactions

1. Cromack, J. Robert, and Williamson, Thomas R., "Human/Psychological Factors in Multidisciplinary Accident Investigations", Proceedings of the 15th Annual Conference of the American Association for Automotive Medicine, Colorado Springs, Colorado, October 1971.

2. Williamson, T. R., Cromack, J. R., Lee, S. N. and Fell, J. C., "Human Factors in Multidisciplinary Accident Investigation", Proceedings, 80th Annual Convention, American Psychological Association, Hawaii, September 1972.

3. Barnwell, G. M., Cromack, J. R., Flamboe, E. E., Perring, H., "Injury Patterns According to Crash Configuration", Proceedings of the International Conference on the Biokinetics of Impact, Amsterdam, June 1973.

4. Barnwell, G. M., Cromack, J. R., Muller, A. F., Kuiperbak, J. G., "Some International Data on Traffic Accident Configurations and Their Associated Injuries", Proceedings of the International Conference of Biokinetics of Impact, Amsterdam, June 1973.

5. Sethness, G., Cromack, J. R., Braswell, C. L., "Summary of Experience in Reducing Data From an International Collision Analysis Report Form", Proceedings, International Accident Investigation Workshop, Pilot Study on Road Safety for Committee on Challenges of Modern Society, NATO, Brussels, Belgium, June 1973.

6. Swierdinsky, T. H., Ziegler, J. A., and Cromack, J. R., "Injury Assessment from International Traffic Accident Data", Proceedings, International Accident Investigation Workshop, Pilot Study on Road Safety for Committee on Challenges of Modern Society, NATO, Brussels, Belgium, June 1973.

7. Cromack, J. R., "A Proposed New Abbreviated Collision Analysis Report Form", Proceedings, International Accident Investigation Workshop, Pilot Study on Road Safety for Committee on Challenges of Modern Society, NATO, Brussels, Belgium, June 1973.

8. Schreyer, G. W., Dixon, H. D., Braswell, C. L., Cromack, J. R., "Traffic Accident Reconstruction from Coded Information", Proceedings of the 17th Conference of the American Association for Automotive Medicine, Oklahoma City, Oklahoma, November 1973.

9. Cromack, J. R. and Lee, S. N., "Consistency Study for the Vehicle Deformation Index", Automotive Engineering Congress, Society of Automotive Engineers, No. 740210, Detroit, Michigan, February 1974.

10. Cromack, J. R., "Supradiaphramatic Cardiovascular Pressurization of Cadavers", Human Subjects for Biomechanical Research Journal, Ann Arbor, Michigan, December 1974.

11. Zierman, H. H. and Cromack, J. R., "Air Bags and Seat Belts in Injury Amelioration", Journal of Trauma, American Association for the Surgery of Trauma, 1975.

12. Cromack, J. R. and Barnwell, G. M., "A Critical Analysis of Traffic Accident Data", Automobile Engineering Meeting, Society of Automotive Engineers, No. 750916, Detroit, Michigan, October 1975.

13. Cromack, J. R., "Comments on the Application of SAE J224a", Proceedings, Motor Vehicle Collision Investigation Symposium, Calspan, Buffalo, New York, October 1975.

14. Cromack, J. R. and Ziperman, H. H., "Three Point Belt Induced Injuries: A Comparison Between Laboratory Surrogates and Real World Accident Victims", Proceedings, 19th Stapp Car Crash Conference, No. 751141, San Diego, California, November 1975.

15. Burkes, J. M., Cromack, J. R., and Glenn, T. H., "Human Volunteer Testing of the Inflatable Belt Restraint", Proceedings of the 19th Conference of the American Association for Automotive Medicine, San Diego, California, November 1975.

16. Ziperman, H. H., Peel, H. H. and Cromack, J. R., "Arterial Pressurization in Cadavers in Impact Studies", Proceedings of the 19th Conference of the American Association for Automotive Medicine, San Diego, California, November, 1975.

17. Cromack, J. R. and Mason, R. L., "Restraint System Use and Misuse", Proceedings of the 20th Conference of the American Association for Automotive Medicine, Atlanta, Georgia, November 1976.

Publications - Technical Reports

1. Collins, J. A., Cromack, J. R., Mykelstad, N. O., Turnbow, J. W., "Crashworthiness Study for Passenger Seat Design", Arizona State University Engineering Report No. 66-51, for USAALABS, Fort Eustis, Virginia, July 1966.

2. Hull, R. W., Cromack, J. R. and Wolfe, E. J., "Maximum Design Top Speed - Phase I", Contract No. FH-11-6826, Report No. AR-634, Federal Highway Administration, Washington, D.C., September 1967.

3. Minor, J. E., Johnson, C. C., and Rastrelli, L. U., et al., "A Study of the Landing Gear Dynamic Test Facility", AFFDL-TR-67-83, Air Force Flight Dynamics Laboratory, Air Force Systems Command Wright Patterson AFB, Ohio, December 1967.

4. Hull, R. W., Cromack, J. R., Ward, R. G., "Alternative Inspection Policies for Collision Damaged Vehicles and Inspection of Special Purpose Vehicles", Volumes I and II, DOT-HS-800-159 and 160, National Highway Safety Bureau, Department of Transportation, Washington, D. C., June 1969.

5. Cromack, J. R., "Performance of Anthropometric Dummies in Automobile Guardrail Impact Tests", Internal Research Project No. 11-9033, Southwest Research Institute, San Antonio, Texas, October 1969.

6. Cromack, J. R., et al., "Multidisciplinary Accident Investigation", Report No. DOT-HS-800-320, Interim Final Report, National Highway Safety Bureau, Department of Transportation, Washington, D. C., August 1970.

7. Cromack, J. R., "Overview of Field Procedures", Accident Investigation Workshop, U. S. Pilot Study on Road Safety, Accident Investigation Project, NATO/CCMS, Wolfsburg, Federal Republic of Germany, October 1970.

8. Cromack, J. R., "Vehicle Deformation Index", Accident Investigation Workshop, U. S. Pilot Study on Road Safety, Accident Investigation Project, NATO/CCMS, Wolfsburg, Federal Republic of Germany, October 1970.

9. Cromack, J. R., et al., "Multidisciplinary Accident Investigation", Volumes I and II, Final Report, DOT-HS-800-397 and 398, National Highway Traffic Safety Administration, Department of Transportation, Washington, D. C., March 1971.

10. Cromack, J. R., "Field Experience in Implementing the NATO Collision Analysis Report Form", Accident Investigation Workshop, Road Safety Pilot Study, Accident Investigation Project, NATO/CCMS, Turin, Italy, July 1971.

11. Cromack, J. R., et al., "Multidisciplinary Accident Investigation", Vols. I and II DOT-HS-800-[illegible] & [illegible], National Hwy. Traffic Safety Administration, Department of Transportation, Washington, DC.

12. Cromack, J. R., et al., "U.S. Pilot Study on Road Safety, NATO/CCMS Accident Investigation Project", Volumes I-III, DOT-HS-_____, National Highway Traffic Safety Administration, Washington, D.C., September 1973.

13. Clark, John M., Jr., Cromack, J. R., Zierman, H. H. "High Speed Cinematic Study of Human Volunteers Subjected to Air Cushion Deployment", SwRI Report No. AR-893, General Motors Corporation, Warren, Michigan, June 1973.

14. Kuiperbak, J. G., et al., Accident Investigation, Road Safety Pilot Study, Committee on the Challenges of Modern Society, NATO/CCMS Report No. 26, June 1974, Brussels, Belgium.

15. Cromack, J. Robert, et al., Multidisciplinary Accident Investigation, Southwest Research Institute, Volumes 1-4, DOT-HS-801-180 to 183, National Highway Traffic Safety Administration. October 10, 1974, Washington, D.C.

16. Burkes, J. M., Clark, J. M., Jr., Cromack, J. R., Zierman, H. H., "Dynamic Evaluation of General Motors Driver ACRS", Volumes I and II, SwRI Report No. AR-942 and 942a, General Motors Corporation, Warren, Michigan, March 1974.

17. Burkes, J. M., Cromack, J. R., and Zierman, H. H., "Impact Testing of Allied Chemical Inflatable with Dummies and Human Volunteers", Volumes I and II, DOT-HS-801-738 and 739, National Highway Traffic Safety Administration, Washington, D.C., October 1975.

18. Cromack, J. R., et al., "Multidisciplinary Accident Investigations--Special Study of Active and Passive Restraint Systems, 1973-76 Model Year Vehicles",
Volume I - Restraint System Effectiveness Program, DOT-HS-_____
Volume II - In-Depth Investigations of ACRS, Control Group and School Bus Accidents, DOT-HS-_____
Volume III - Data Summaries for Restraint System Effectiveness Program, DOT-HS-_____
Volume IV - Forms, Codebook, and Computer Programs, DOT-HS-_____
National Highway Traffic Safety Administration, Washington, D.C., March 1976.

19. Cromack, J. R., et al., Approximately 305 In-Depth Accident Investigation Reports, See the DOT "Multidisciplinary Accident Investigation Summaries", for Specific Cases, 1969 through Present

Presentations

1. "Biodynamics Research in Highway Safety", Sigma Xi, Southwest Research Institute Chapter, San Antonio, Texas, March 1969.

2. "A Multidisciplinary Accident Investigation Program for San Antonio," American Society of Safety Engineers, San Antonio Chapter, San Antonio, Texas, October 1969.

3. "Anatomy of a Traffic Accident", Presentation to the Board of Governors of Southwest Research Institute, San Antonio, Texas, November 1969.

4. "Highway Crash Investigations", Exchange Club, San Antonio, December 1969.

5. "Selected Cases in Multidisciplinary Accident Investigation", Greater San Antonio Safety Council, San Antonio, Texas, January 1970.

6. Panel Moderator, Regional Fleet Safety Seminar for Business, Industry and Military, Texas Safety Association. San Antonio, Texas, March 1970.

7. "Overview of Field Procedures", Presentation to the Wolfsburg Accident Investigation Workshop, NATO/CCMS, Wolfsburg, Germany, October 1970.

8. "Vehicle Deformation Index", Presentation to the Wolfsburg Accident Investigation Workshop, NATO/CCMS, Wolfsburg, Germany, October 1970.

9. "Traffic Accident Research Findings", Alamo Kiwanis Club of San Antonio, San Antonio, Texas, November 1970.

10. "Case Studies in Multidisciplinary Accident Investigation", American Petroleum Institute and American Institute of Petroleum Engineers, San Antonio Chapter, San Antonio, Texas, January 1971.

11. "Highway Safety in Bexar County", WOAI-TV Early Evening Report, Presentation for the 21st Annual Engineers Week, Texas Society of Professional Engineers, February 1971.

12. "Case Studies in Multidisciplinary Accident Investigation", Sertoma Club of San Antonio, San Antonio, Texas, August 1971.

13. "Human/Psychological Factors in Multidisciplinary Accident Investigation", American Association for Automotive Medicine, Colorado Springs, Colorado, October 1971.

14. "Field Experience in Implementing the NATO Collision Analysis Report Form", Turin Accident Investigation Workshop, NATO/CCMS, Turin, Italy, July 1971.

15. "Injury Patterns According to Crash Configuration", International Research Conference in Biokinetics of Impact, Amsterdam, June 1973.

16. "International Data on Traffic Accident Configuration and Associated Injuries", International Research Conference in Biokinetics of Impact, Amsterdam, June 1973.

17. "Summary of Experience in Reducing Data from International Collision Analysis Report Forms", Accident Investigation Project, Road Safety Pilot Study, NATO/CCMS, Brussels, Belgium, June 1973.

18. "A Proposed Abbreviated Collision Analysis Report Form", Accident Investigation Project, Road Safety Pilot Study, NATO/CCMS, Brussels, Belgium, June 1973.

19. "A Consistency Study for the Vehicle Deformation Index", Society of Automotive Engineers, Detroit, Michigan, January 1974.

20. "Highway Traffic Accident Research in the Southwest," Joint Meeting of Society of Automotive Engineers, South Texas Section and the Society of Sigma Xi, Southwest Research Institute Chapter, San Antonio, Texas, September 1974.

21. "A Study of Vehicle Damage and Occupant Injury Scales and Indices", A Presentation to the National Highway Traffic Safety Administration, DOT-HS-S01-283, Washington, D. C., October 1974.

22. "Supradiaphramatic Cardiovascular Pressurization of Cadavers", A Presentation at the Symposium on the Use of Human Subjects for Biomechanical Research, Ann Arbor, Michigan, December 1974.

23. "The Need for Standardization in Reporting Collision Damage and Injury and Traffic Accidents", Presented at the Automobile Collision Data Workshop, Office of Technology Assessment, U. S. Congress, Rosslyn, Virginia, January 1975.

24. "The Physiology and Mechanics of Traffic Accidents", International Health Sciences Institute, San Antonio, Texas, July 1975.

25. "A Critical Analysis of Traffic Accident Data", Society of Automotive Engineers, Detroit, Michigan, October 1975.

26. "Comments on the Application of SAE J224a", Motor Vehicle Collision Investigation Symposium, Buffalo, New York, October 1975.

27. "Three Point Belt Induced Injuries: A Comparison Between Laboratory Surrogates and Real World Accident Victims", Stapp Car Crash Conference, San Diego, California, November 1975.

28. "Traffic Accident and Belt Restraint Research at Southwest Research Institute", Presentation to General Motors Corporation Executive Management, San Antonio, Texas, January 1976.

29. "Accident Analysis--Breakaway and Non-Breakaway Poles, Including Sign and Light Standards, Along Highways", Phase I Briefing for the National Highway Traffic Safety Administration, Washington, D.C., January 1976.

30. Statement on the "National Highway Traffic Safety Administration Research Program Plans and Policies", Presented at the public hearings before the National Motor Vehicle Safety Advisory Council in Washington, D.C., March 1976.

31. "Pole Accidents--To What Extent?", Southwest Electrical Exchange, San Antonio, Texas, April 1976.

32. "Restraint System Use and Misuse", American Association for Automotive Medicine, Atlanta, Georgia, November 1976.

33. "Guide for Medical Examiners To Determine Fitness to Drive Buses and Trucks in Interstate Commerce.", American Association for Automotive Medicine, Vancouver, B.C., September 1977.

34. "Occupant Protection in Traffic Accidents", American Society of Safety Engineers, Phoenix, AZ, February 3, 1977.

35. "Seat Belt Safety", Phoenix Trial Lawyers Association, Phoenix, AZ, January 1978.

36. "Air Bags...Automotive Story of the Year", Tempe Kiwanis, Tempe, AZ, January 1978.

37. "Belts...Bags...Or Bones?", Tempe South Rotary, Tempe, AZ, May 26, 1978.

38. "Conspectus of the Parameters Used to Describe Traffic Accident Severity", Joint International Meeting of the American Association for Automotive Medicine and the International Association for Accident and Traffic Medicine, Ann Arbor, MI, July 1978.

39. "Human Volunteer Testing With Inflatable Restraints", Panel on Air Bags and Passive Restraints, Winter Meeting of the American Society of Mechanical Engineers, San Francisco, CA, December 1978.

40. "Passive Occupant Protection for Cars of the 80's", Mesa Optemist Club, Mesa, Arizona, April 26, 1979.

Jee-25

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

FRIENDS FOR ALL CHILDREN, INC., as legal guardian and next friend of the named 150 infant individuals, et al.,

Plaintiff,

-against-

Civil Action No. 76-0544

LOCKHEED AIRCRAFT CORPORATION,

Defendant and Third-Party Plaintiff,

-against-

THE UNITED STATES OF AMERICA,

Third-Party Defendant.

DEFENDANT LOCKHEED AIRCRAFT CORPORATION'S NOTICE TO TAKE ORAL DEPOSITIONS

TO: OREN R. LEWIS, ESQ.
LEWIS, WILSON, LEWIS & JONES
2054 NORTH 14TH STREET
ARLINGTON, VA 22216

SIR:

PLEASE TAKE NOTICE that pursuant to Rule 30 of the Federal Rules of Civil Procedure, the deposition upon oral examination of the following individuals will be taken on behalf of defendant Lockheed Aircraft Corporation by its attorneys Haight, Gardner, Poor & Havens at its offices at 1819 H Street, N.W., Suite 1000, Washington, D.C. at the times and dates indicated, to continue from day to day until completed:

Stanley Morain	10:00 a.m.	October 26, 1981
Charles Turner	10:00 a.m.	October 27, 1981
John J. Carroll	10:00 a.m.	October 27, 1981
Alvin Hyde	10:00 a.m.	October 27, 1981

DEFT. EX. Cromack A
DATE: 10/27/81
REPORTER: A. J. GASDOR

Emanual Tanay	10:00 a.m.	October 27, 1981
Burton Sokoloff	10:00 a.m.	October 27, 1981
Bruce Copeland	10:00 a.m.	October 27, 1981
Marianne Schuelein	10:00 a.m.	October 27, 1981
Eric Denhoff	10:00 a.m.	October 27, 1981
Robert Cromack	10:00 a.m.	October 27, 1981
Kenneth Mason	10:00 a.m.	October 27, 1981
Douglas Busby	10:00 a.m.	October 27, 1981

Such depositions will be taken upon oral examination for the purposes of discovery or as evidence or both, pursuant to Rules 26 and 30 of the Federal Rules of Civil Procedure, before an officer authorized by law to administer oaths.

PLEASE FURTHER TAKE NOTICE that pursuant to Rule 34 of the Federal Rules of Civil Procedure, the plaintiffs and the deponents are hereby requested to produce at the above deposition all documents in the possession, custody or control of the deponents, plaintiffs or their attorneys pertaining or relating to the medical or psychological condition of the above-named plaintiff or the cause of said condition, including but not limited to: any documents concerning aerospace medicine or related fields, reports concerning the C-5A, materials relating to trauma, materials relating to "survivor guilt syndrome" or massive psychic trauma, G-forces or other forces, geographic, topographic or terrain features, including, without limitation, soil or vegetation or environmental conditions surrounding the accident on April 4, 1975, which plaintiffs allege are related to any condition from which they now claim to suffer, all medical reports, records, memoranda, notes, x-rays, test results and similar documents produced by or on behalf of the deponent or

plaintiffs or plaintiffs' attorneys, and the deponents are hereby requested to produce all other documents, including, without limitation, maps, charts, illustrations, catalogs, photographs, slides or motion pictures reviewed or considered by the deponents with respect to any opinions they are expected to give at trial regarding the forces or environmental condition surrounding the accident on April 4, 1975, their examination of plaintiffs and/or their review of plaintiffs' medical record and history, whether such other documents were furnished to the deponent by plaintiffs, defendant or a third-party, or by any representative of plaintiffs.

PLEASE TAKE FURTHER NOTICE that pursuant to Rule 34 of the Federal Rules of Civil Procedure, the plaintiffs and the deponents are hereby requested to produce for inspection and copying at the above deposition the following documents and things in the possession, custody or controll of plaintiffs, their attorneys or expert witness pertaining or relating to or relied upon in connection with any claims by plaintiffs for the expert opinions to be rendered in this lawsuit including:

(1) All reports, letters, data, analyses, drawings, photographs, slides, motion pictures, maps, charts, illustrations, catalogs, computer printouts, books, or any other documents or matter of whatever kind which deponents relied upon in forming an opinion as to any issue in these cases;

(2) All reports, letters, data, analyses, drawings, photographs, slides, motion pictures, maps, charts, illustrations, catalogs, computer printouts, books, or any other documents or matter of whatever kind which deponents reviewed in forming an opinion as to any issue in these cases;

(3) All articles, books, treatises, monographs, papers, films, graphs, charts or any other document or matter authored or partially authored by deponents relating to any issue in these cases;

(4) All resumes, curricula, vitae, newspapers, magazine or journal articles, or advertisements concerning or relating to deponents.

Dated: Washington, D.C.
October 26, 1981

HAIGHT, GARDNER, POOR & HAVENS
Attorneys for Defendant
Lockheed Aircraft Corporation

By Carroll E. Dubuc

Carroll E. Dubuc
[redacted]
Washington, DC 20006
(202) 737-7847

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the foregoing was hand-delivered this 26th day of October, 1981, to:

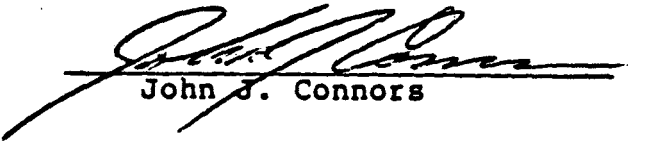
OREN R. LEWIS, JR., ESQ.
Lewis, Wilson, Lewis & Jones, Ltd.
2054 North 14th Street
Arlington, Virginia 22216

JAMES P. PIPER, ESQ.
Trial Attorney, Aviation Unit
Torts Section, Civil Division
U.S. Department of Justice
550 - 11th Street, N.W. - Rm. 906
Washington, D.C. 20530

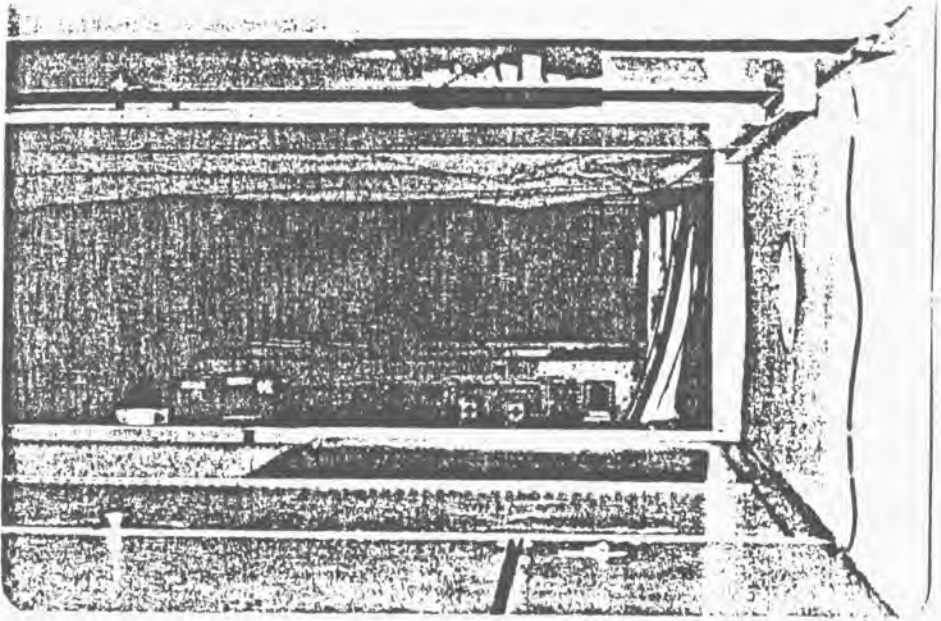
CHARLES R. WORK, ESQ.
Peabody, Rivlin, Lambert & Meyers
1150 Connecticut Avenue, N.W.
Washington, D.C. 20036

and mailed postage prepaid to:

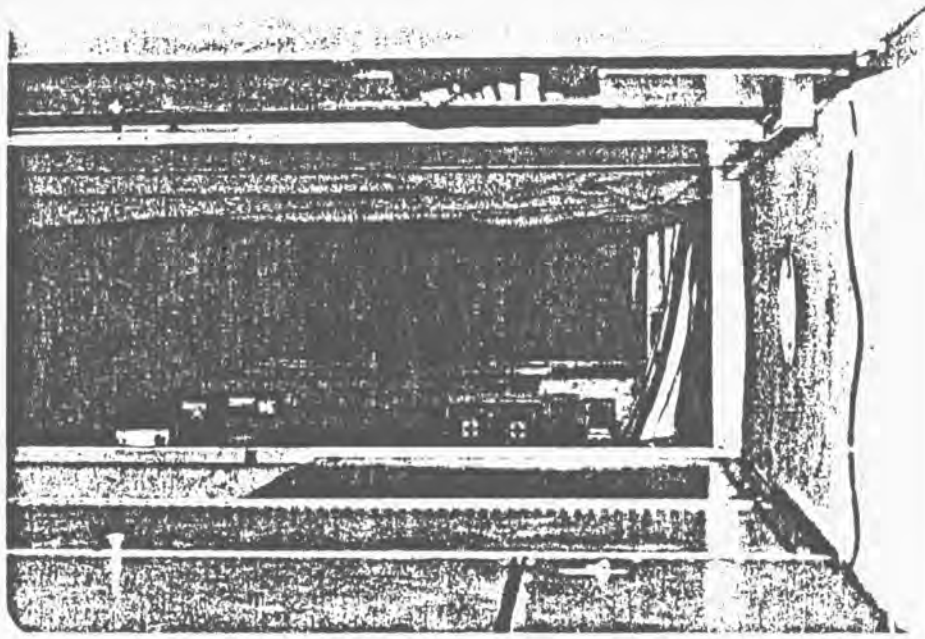
J. VERNON PATRICK, JR., ESQ.
Berkowitz, Lefkovits & Patrick
1400 City National Bank Bldg.
Birmingham, Alabama 35203



John J. Connors

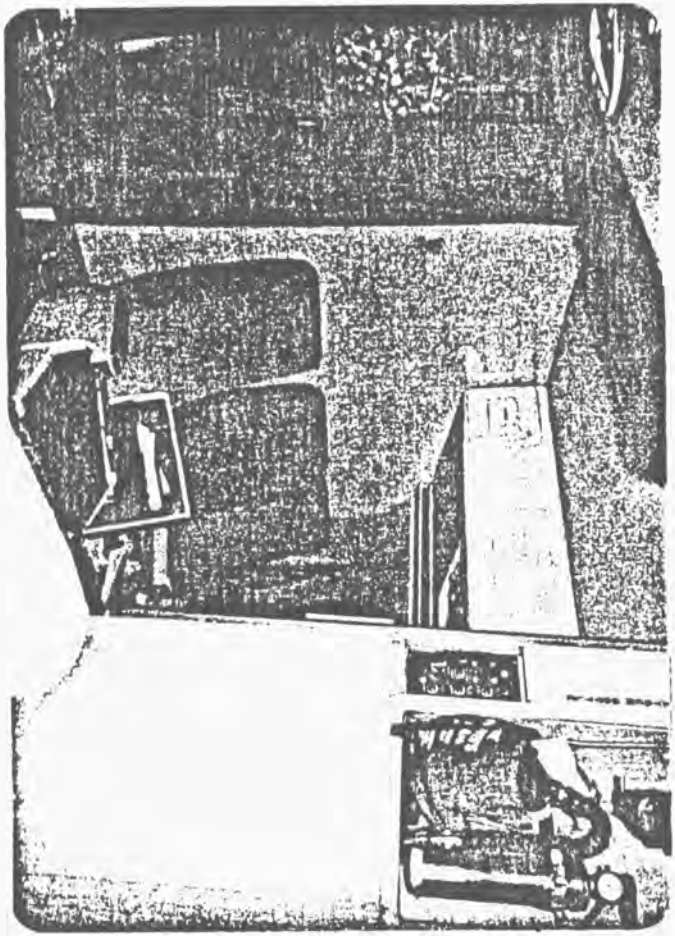


DEFT. EX. DD-Cromack Exh 26
DATE: 10-27-81
REPORTER: ALBERT J. GASDOR

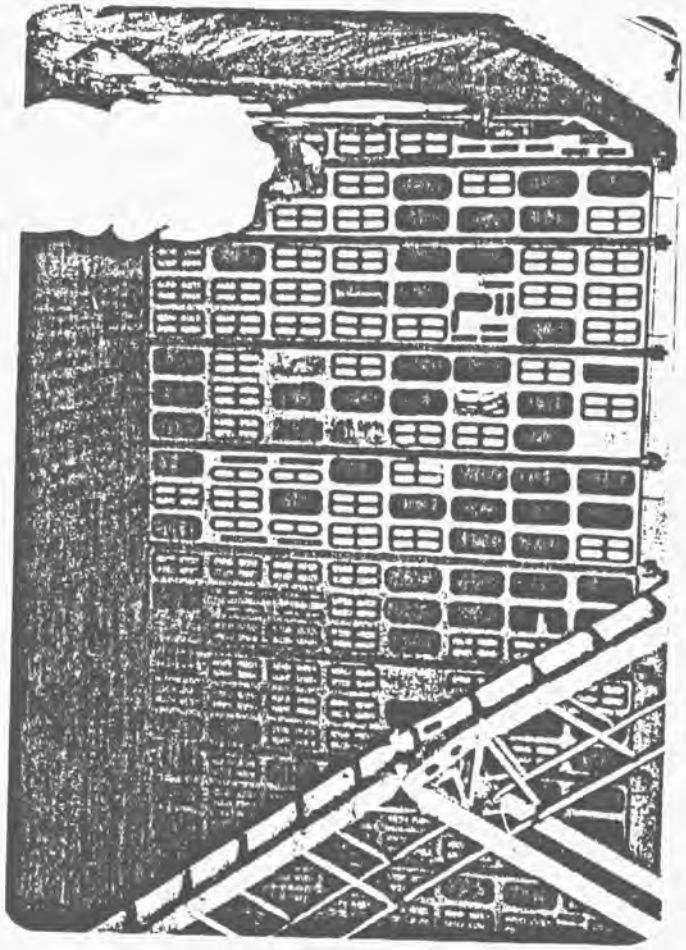


DEFT. EX. DD-Cromack Exh 2a
DATE: 10-27-81
REPORTER: ALBERT J. GASDOR

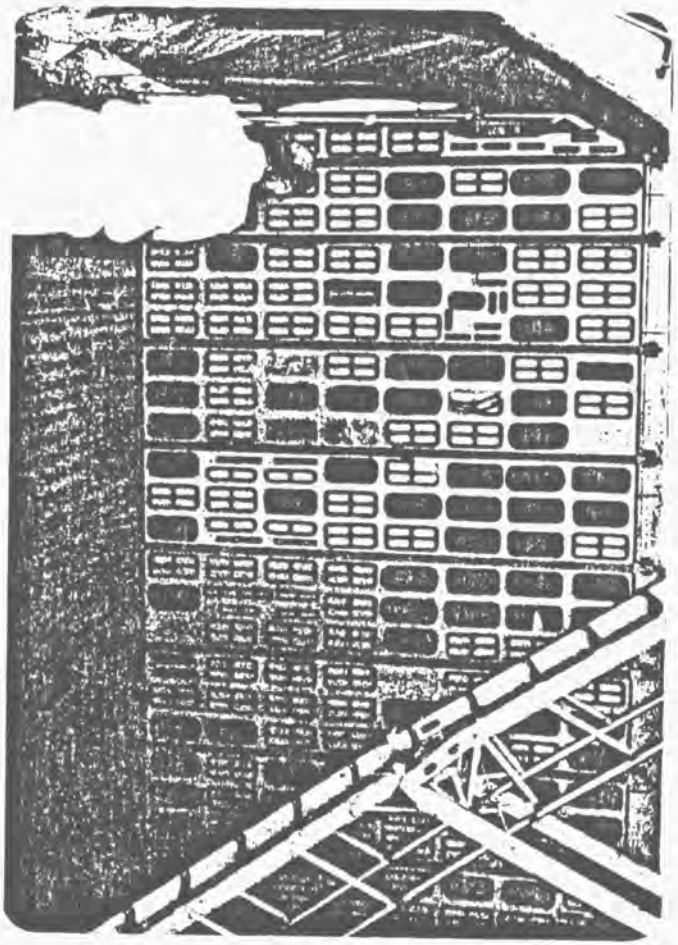
DEFT. EX. DD- Cromack Exh 2d
DATE: 10-27-81
REPORTER: ALBERT J. GASDOR



DEFT. EX. DD- Cromack Exh 2c
DATE: 10-27-81
REPORTER: ALBERT J. GASDOR



DEFT. EX. DD-Cromach Exh 2F
DATE: 10-27-81
REPORTER: ALBERT J. GASDOR



DEFT. EX. DD-Cromach Exh 2E
DATE: 10-27-81
REPORTER: ALBERT J. GASDOR

STMT of CAPT. HARP

WRECKAGE SCHEMATIC

SUMMARY OF EVENTS

COLLATERAL REPT SUMMARY

SOME ENLARGEMENTS OF PHOTOS IN POSSESSION OF LAWYERS

MEDICAL CONFERENCE ATTENDANCE

REPORT BY BILL TIM

INSPECTION OF C5A A/C AT KELLY AFB

INSPECTION OF DAMAGED PARTS AT SOME AFB ANNEX IN SAN ANTONIO, TX

REPTS OF J W TURNBOW, J.W. EDWARDS, J.G. GAUME & R.D. JABLONSKY

5 VOL. DEPO OF J.W. EDWARDS

1 VOL DEPO OF TURNBOW

1 VOL TRIAL TRANSCRIPTION OF EDWARDS

OCC. DISTRIBUTION IN TROOP COMPARTMENT

GENERAL DIMENSIONS OF C5A

~~DECODING OF~~ ~~BASIC~~ SLRP MESSAGES ON RECORD 11977

A LARGE NO. OF COLOR & B&W PHOTOS 5X7"

TWO MOVIES OF ACCIDENT SITE & INVESTIGAT.

MADAR DATA PLOT (UNREADABLE) & PRINTOUT (ALS LARGELY UNREADABLE)

DEFT. EX. ~~B~~ Cromack #3
DATE: 10/27/81
REPORTER: A. J. GASDOR

Proj 1089

MICHAEL COHEN, M.D., PH.D.

February 19, 1980

J. Robert Cromack, P.E.
Cromack Engineering Association, Inc.
P.O. Box 28243
Tempe, Arizona 85282

Dear Mr. Cromack:

Subsequent to Dr. Turnbow's recommendation of your expertise in matters related to the calculation of gravity forces, particularly with respect to the tragic aircrash of the C-5A near Saigon, South Vietnam, April 4, 1975, I was greatly encouraged to learn of your interest in this case during our brief telephone discussion last week.

Enclosed are materials which may be helpful to you in preparing for our meeting here in Arlington on the morning of March 7, 1980. In addition to your presence, other experts who are to be available at that meeting include, among others, Dr. Richard Snyder (the impact tolerance specialist) and Dr. Kenneth Mason (Professor, and Forensic Aviation Pathologist at the University of Edinburgh).

Fees with respect to this project are being paid through the Guardian ad Litem, Charles R. Work, Esquire, Peabody, Rivlin, Lambert & Meyers, 1150 Connecticut Avenue, N.W., Washington, D.C. 20036, to represent the children whose interests are involved in this case. Please do not hesitate to contact my office for assistance in planning your trip. I will be happy, of course, to answer any questions you may have.

Sincerely,

Michael Cohen, M.D., Ph.D.

MC/jan
Enclosures

SWORN STATEMENT

OF

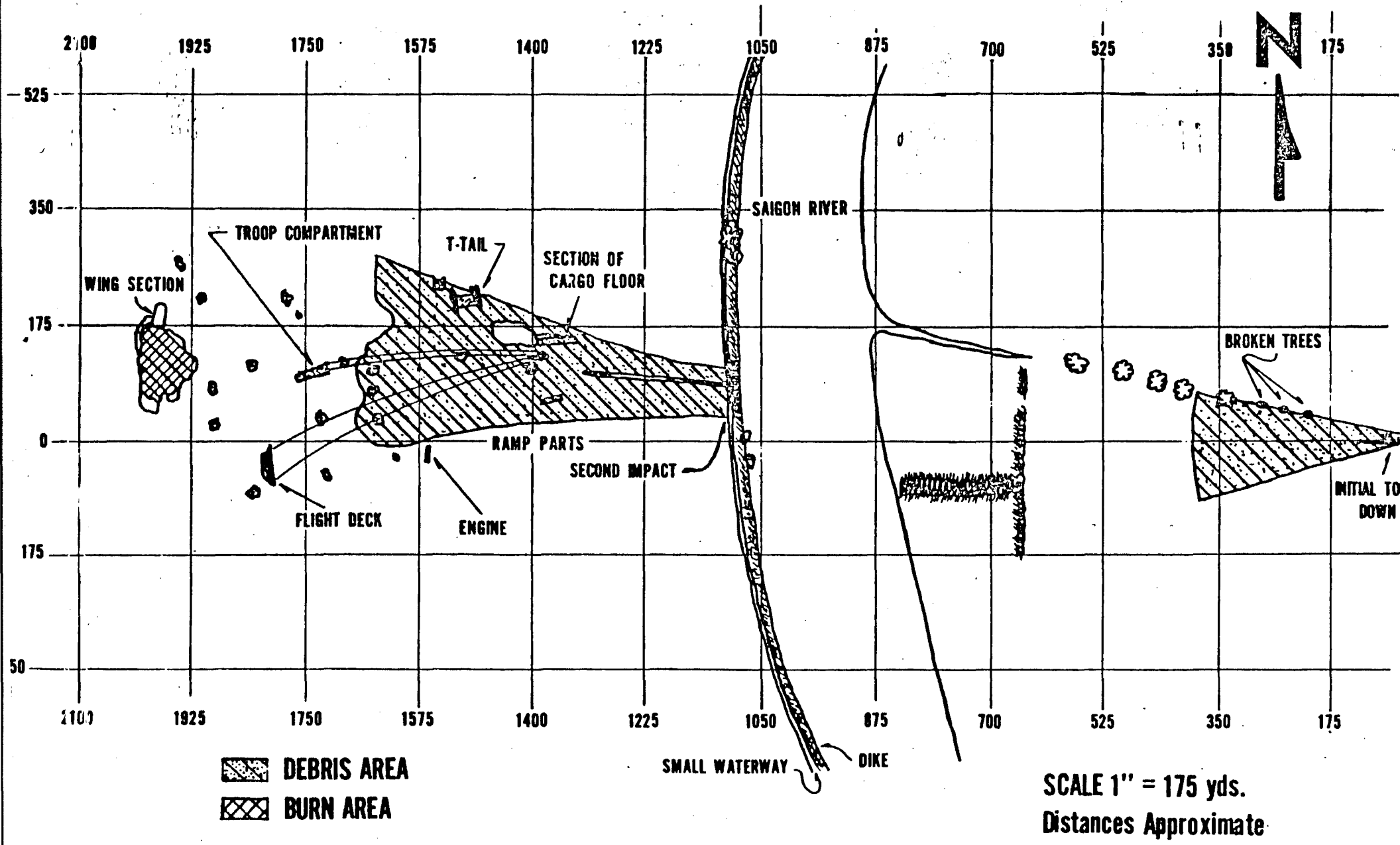
CAPTAIN TILFORD W. HARP

22 MILITARY AIRLIFT SQUADRON

TRAVIS AIR FORCE BASE, CALIFORNIA

16 MAY 1975

WRECKAGE DIAGRAM
C-5A SN 68-218 4 APRIL 1975



STATEMENT OF WITNESS

Travis Air Force Base, California
(Place)

16 MAY 1975
(Date)

I, Captain Tilford W. Harp [redacted], hereby state that Colonel Bernard A. Waxstein, Jr., has identified himself to me as CSA Collateral Investigation Officer USAF.
(Special Agent AFOSI, Security Police, Other--Specify)

I do hereby voluntarily and of my own free will make the following statement without having been subjected to any coercion, unlawful influence or unlawful inducement.
I am Tilford W. Harp, Captain, 448-46-8613, 22 Military Airlift Squadron, USAF. I was assigned to the 22 Military Airlift Squadron, Travis Air Force Base, California, on 1 September 1973. I have approximately 1577 hours total flying time in the USAF and 539 hours total flying time in the C-5 aircraft. My crew qualification as of 4 April 1975 was First Pilot and my crew position upon departure from Saigon, Vietnam at approximately 1600 hours, 4 April 1975, was that of copilot.

We arrived at Clark AB, R.P. at 1437L on 3 April 1975 on aircraft 80218. We were given a 12 hour release against a possible mission into Saigon on aircraft 218. Following dinner at the Officers' Club, we (all the officers) went to bed at 1900L and were awakened at 0300L with an alert on aircraft 80218 going to Saigon with return to Clark. We showed at Operations Center at 0400L with normal flight planning and eating at the Snack Bar by the Operations Center. We were told at this time (0600L) that we would be taking an aeromedical crew into Saigon to bring back some orphans. We were told we would have to wait until the crew of nurses, medical technicians and medical supplies arrived prior to departure. At approximately 0700L we arrived at the aircraft to find that maintenance was still being performed on the copilot's windshield and the No. 2 engine. Maintenance was completed at approximately 0800L, but we were still waiting on extra blankets, food, juices, etc., for the orphans for the return flight. During this time, we asked for additional life rafts, oxygen equipment, and a special security team to go with us to Saigon. We also asked for the Infra Red Kit to place in the troop doors for going into Saigon, a possible high threat area. All items were refused due to not having them available, not enough, etc. Everyone realized the humanitarian importance of the mission from higher headquarters and the mission proceeded. At approximately 0900L, we were called by Ops Center to come inside and wait, that there was a holdup in Saigon, that Saigon was not ready for us. We went inside and were immediately told to turn around and go back outside and make an ASAP departure. We departed Clark at 1013L with an uneventful flight to Saigon at FL310. Captain Traynor was in the left seat, I was in the right seat, Captain Malone was in the jump seat. We landed at Saigon at 1253L. During the flight to Saigon, we discussed the offload and onload at Saigon. Captain Traynor stressed the importance of professionalism and security at Saigon since we knew there would be several camera men present. Also, on the flight to Saigon, part of the crew changed the crew baggage from downstairs into the crew rest facilities.

Tilford W. Harp

After arrival at Saigon, we taxied to parking on Taxiway 18, and shutdown engines and proceeded with the offload of the howitzers, Sgt Engels (engineer) and I remained on the flight deck to monitor the Auxiliary Power Units and the radios. Following completion of the offload, we proceeded with the onload. The onload was very disorganized. My description of the onload as being disorganized reflects on the ground assistance at Saigon, not on the aircrew or medical crew. The aircrew and

medical crew did an outstanding job of getting us loaded in our ground time and making an on time departure. To me, the onload seemed disorganized due to a lack of coordination on Saigon's part. The passengers were not ready to load, there were no stairs to load the passengers, the passengers' baggage had not been palletized, etc. Compared to normal MAC operations, coordination was definitely lacking at Saigon, but it can probably be explained by the volatile environment. The Defense Attache Office was not able to supply us with accurate manifests, but told us there was an accurate master copy of the passenger manifest on file. The only manifests that I saw were given to Captain Melton (who gave them to Sgt Snedegar), and Captain Melton gave me the impression that not everyone had been manifested. I believe the DAO representative had mentioned this to him. Someone downstairs during the onload mentioned that it was no problem because the orphanage (or some agency) had accurate manifests. At one time or another, everyone helped with the onload of babies, women and children. Another aeromedical crew had joined us at Saigon, and the med crews and flight crew did an outstanding job of getting everyone seated and strapped in. I might mention that during completion of the onload I was on interphone, and observed a normal closing of the aft doors through interphone communications. By observed, I meant what I heard over interphone. The load master had indicated all lights were out on his panel, the doors were closed, and then requested that I go to SAFE with the aft door switch, which I did. We still had the door open light on the annunciator panel, but this was due to the Crew Entry Door still being open. All indications over interphone sounded normal.

We made a maximum power rolling takeoff at 1603L with no problems. All procedures were accomplished in an orderly and professional manner. We climbed at 200KIAS until approximately 16,000 feet and began a slow acceleration to 270 Kts indicated airspeed. We discussed the possibility of going at FL370 due to bad weather off the coast of Saigon, but due to oxygen requirements in case of a rapid decompression, we decided to proceed to Clark at FL330. We proceeded on course to Vung Tau radio beacon. Approximately 3 minutes past Vung Tau, passing FL230, and around 260 Kts, a loud bang was heard followed by fog in the cockpit. I immediately donned my oxygen mask and checked in on interphone, followed on interphone by the troop compartment. Whenever the requirement to don oxygen equipment is apparent, each crew position is required to check in on interphone that his respective crew position is on oxygen. For example: "copilot is on oxygen." I checked in on oxygen, and the troop compartment (TSgt Doughty) checked in saying they were on oxygen and everyone was okay. A few seconds later, the troop compartment told us about the injury to SMSgt Perkins. I turned on the No Smoking, Fasten Seat Belts switches as we began a slow descending left turn back to Saigon. I attempted to tell Saigon Control of our problem, but my microphone was cutting in and out. Captain Langford, the Navigator, took control of the radios and got out a transmission to Saigon, and then Captain Malone, in the jump seat, took the radio and made all the radio calls from that point on. The Engineer had notified us we had lost hydraulic systems 1 and 2 and I was noticing the lights on the overhead panel when the pilot remarked that he was unable to bring the nose of the aircraft up. I looked at the pilot, and he had the control wheel to his chest (as was mine), and we were still rapidly descending. I forcefully shook my control wheel with no response, and tried the trim switches on the yoke and the manual hydraulic pitch trim lever, all with no results. At this time, we pushed up the throttles and the airplane began a climb with airspeed rapidly decreasing. We rolled to the right and pulled back the throttles and started to descend. At this time, we realized the only way to control the aircraft was with power. I yelled at the engineer to get us a hydraulic system for the flight controls. He said that we

CONTINUATION SHEET FOR AF FORM 1168, 1168a and/or 1169.

had 3 and 4 systems. This rung a bell in my mind, and I then selected Right Inboard Elevator System No. 3 at about 20,000 feet but with no results. We were getting vectors back to Saigon from our Navigator. During the descent, we discussed what we had and what we didn't have. At approximately 10,000 feet we began putting the gear down. The forward main gears came down normally, and I emergency extended the nose gear and the aft main gear. At about 8 miles from the field, we began a shallow left turn to Runway 25L at approximately 4000 feet and 230 knots airspeed. The pilot was flying power, and I was flying ailerons since it took both of us to handle it. As we started our turn, the nose began dropping very low and we applied power with a descent that began to rapidly accelerate. I saw a wide open field with some water in front of us. and I rolled wings level just as the pilot stated something to the effect of land straight ahead. We had full throttles applied trying to break our rate of descent, and I can remember seeing nothing but ground rapidly approaching in the windshield. All I could think to do was hold the wings level and hope for the best. Just prior to impact, the pilot retarded the throttles to idle and I hit the flap handle down hoping to pitch up the nose. We impacted the ground relatively smooth and went skidding through the swamp and bog. Suddenly we were airborne again and passed over the Saigon River. We impacted a second time extremely hard and the airplane began to break up and the lights went out and the windshields were blacked out with mud. We began to roll to the right and soon came to a stop. I popped my lap belt open and exited out the pilot's side window. The helicopters arrived in a matter of minutes and we began to assist with the rescue of the injured. I was taken to a first aid station for injuries to my legs, then bussed to the Seventh Day Adventist Hospital in Saigon for x-rays. We were then taken to the Gray House in Saigon for billeting, and we departed for Clark the next day on a C-141, arriving at 1845L.

JWH

31. I further state that I have read this entire statement. Initialed all pages and corrections, and signed this statement, and that it is correct and true as written.

WITNESSES:

Tilford W. Harp
(Signature)

22 MAS, Travis AFB CA
(Address)

_____
(Signature)

_____
(Address)

_____
(Signature)

_____
(Address)

Subscribed and sworn to before me, a person authorized by law to administer oaths, this

16th day of May 1975

at Travis Air Force Base, California

(Signature of Person Administering Oath.)

BERNARD A. WAXSTEIN, JR., Colonel, USAF
C5A Collateral Investigation Officer
(Type Name, Grade & Title of Person Administering Oath.)

AF ACCIDENT/INCIDENT REPORT

(Fill in all spaces applicable. If additional space is needed, use additional sheet(s).)

1. DATE OF OCCURRENCE (Day, month and year)	2. VEHICLE(S)/MATERIEL INVOLVED (Model designation and serial no. if applicable)	3. FOR GROUND ACCIDENTS ONLY (Base Code and Report Serial No.)
4 April 1975	C-5A SN 68-218	--

4. PLACE OF OCCURRENCE: STATE, COUNTY; DISTANCE AND DIRECTION FROM NEAREST TOWN. IF ON BASE, IDENTIFY. IF OFF BASE GIVE DISTANCE FROM NEAREST BASE.	5. HOUR AND TIME ZONE LOCAL	6.
2NM NE OF RWY 25L TAN SON NHUT AB, RVN	1630 H	[X] DAY [ ] NIGHT [ ] DAWN [ ] DUSK

7. ORGANIZATION POSSESSING/OWNING VEHICLE OR MATERIEL AT TIME OF MISHAP

MAJOR COMMAND	SUBCOMMAND OR AF	AIR DIVISION	WING	GROUP	SQUADRON OR UNIT	NAME AND BASE OF
MAC	22AF	--	60MAW	--	--	TRAVIS AFB XDAT

8. (List organizations of second vehicle, if they differ from Item 7 above)

9. ORGANIZATION AND BASE SUBMITTING REPORT (Do not abbreviate)

MILITARY AIRLIFT COMMAND, SCOTT AIR FORCE BASE, ILLINOIS

10. LIST OF PERSONNEL DIRECTLY INVOLVED

(See AFM 127-2 and AFR 127-4 for specific instructions)

LAST NAME, FIRST NAME, MIDDLE INITIAL	GRADE	SSAN	ASSIGNED DUTY	AERO RATING	DEGREE INJURY[1] (Use Abbr)	DAYS LOST OR TIME CHARGED
TRAYNOR, DENNIS W.	CAPT	[redacted]	EP	PILOT	N	
HARP, TILFORD W.	CAPT		CP	PILOT	N	
MELTON, EDGAR R.	CAPT		AGM	PILOT	F	
MALONE, KEITH D.	CAPT		AGM	PILOT	N	
WALLACE, WILLIAM G.	MAJ		AN	SR NAV	N	
LANGFORD, JOHN T.	CAPT		NN	NAV	N	
MCATEE, LYNN F.	MSGT		FE	SR CM	N	
ENGELS, ALLEN R.	TSGT		FE	CM	N	
DIONNE, DONALD T.	SSGT		FE	CM	F	
PIERCE, HOWARD C.	SMSGT		LM	SR CM	TT	90
BRADLEY, PERCY D.	TSGT		LM	CM	N	
AGUILLON, FELIZARDO C.	TSGT		LM	CM	F	
DOUGHTY, PETER P.	TSGT		LM	CM	N	
PAYNE, WENDLE L.	MSGT		LM	SR CM	F	
PARKER, WILLIAM A.	TSGT		LM	SR CM	F	
SNEDEGAR, RAYMOND F.	MSGT		LM	SR CM	N	

[1] (Enter applicable letter(s) in DEGREE INJURY column. None-N; Temporary Total-TT; Permanent Partial-PT; Permanent Total-PT; Fatal-F; Missing-M)

11. NARRATIVE DESCRIPTION OF ACCIDENT: Give a detailed history of flight, or chronological order of facts and circumstances leading to the mishap, the results of investigation and analysis to include discussion of all cause factors listed, findings, and recommendations, and any corrective action taken.

ATTACHED

LIST OF PERSONNEL DIRECTLY INVOLVED (CONT)

LAST NAME, FIRST NAME MIDDLE INITIAL	GRADE	SSAN	ASSIGNED DUTY	AERO RATING	DEGREE INJURY	DAYS LOST OR TT ONLY
MAC Mission Observer:						
Willis, William S.	LtCol	[redacted]	MMO	Cmd Plt	F	
Medical Crew Members						
Wirtz, Marcia	1Lt	[redacted]	FN		N	
Aune, Regina	1Lt		FN		TT	90
Wise, Philip	Sgt		MT		TT	120
Gnerek, Gregory	Sgt		MT		TT	14
Hadley, James A.	SSgt		MT		N	
Goffinett, Harriet	1Lt		FN		TT	21
Johnson, Denning C.	TSgt		MT		F	
Boutwell, Olen	MSgt		MT		N	
Klinker, Mary T.	Capt		FN		F	
Paget, Michael G.	SSgt		MT		F	
AAVS Photographers						
Castro, Joe (NMI)	MSgt	[redacted]	ACM		F	
Nance, Kenneth E.	Sgt		ACM		F	

Passengers:

A manifest of passengers was received from the Defense Attache Office in Saigon. The manifest contained the names of 44 DOD personnel and dependents. Of the personnel on the manifest five are known to have survived the crash. An additional list of 10 attendants was received from the Defense Attache Office. Of these attendants, three are known to have survived the crash. There was no manifest of orphans aboard the aircraft; however, Saigon officials reported 247 were aboard. The aircrew interviews confirmed 145 orphans were located in the troop compartment of which 143 are believed to have survived. Approximately 102 orphans were located in the cargo compartment. Six were known to have survived. The chaos which followed the crash, the number of hospitals to which injured survivors were dispatched, the multi-agencies which accepted remains and the unstable political situation in the Republic of Viet Nam made a total accurate accounting impossible. The following is the final best estimate furnished by a representative from Air Force Military Personnel Center and concurred in by the investigation board.

	ON BOARD	SURVIVED	DECEASED
Flight Crew	16	11	5
Med Crew	10	7	3
Photographers	2	0	2
MAC Observer	1	0	1
Orphans (Troop Compt)	145	143*	2*
Attendants (Troop Compt)	7*	6*	1
Orphans (Cargo Compt)	102*	6	96*
Others (Cargo Compt)	47*	2	45*
Totals	330	175	155

SYNOPSIS

1. On 4 April 1975, C-5A SN 68-218 departed Tan Son Nhut Air Base on a special mission (OPERATION BABYLIFT). During climb out, the aft pressure door and ramp departed the aircraft causing hydraulic lines and flight control cables to be severed. Due to the lack of any normal pitch control system, the pilot had extremely limited control of the aircraft and crash landed in a rice paddy/marsh area 2 NM NE of Tan Son Nhut Air Base.

HISTORY OF FLIGHT

2. C-5A SN 68-218 departed Travis AFB at 0647Z, 1 April 1975, to onload 105mm howitzers at Warner Robins AFB, GA. The flight then continued to Travis AFB, Hickam AFB (Captain Traynor's crew enplaned), Andersen AFB, and Clark AB, Philippines. Captain Traynor's crew went into crew rest and was alerted for a show time of 2000Z, 3 April 1975. The mission was to return from Saigon on a priority special mission basis (OPERATION BABYLIFT). The return mission was to be in a combat floor loaded configuration and many items of support were necessary after Captain Traynor's crew had been alerted for the mission. These included coordination for fleet service, survival gear, meals, blankets, restraining straps, and medical team support. The mission subsequently departed at 0214Z, 4 Apr 75, and arrived Saigon at 0450Z (1250H).

3. Upon arrival at Tan Son Nhut Air Base the offloading was completed. (Note: This was the first occasion for the aft cargo doors to be opened since the onload at Warner Robins.) Preparation was made for the onload of passengers. A takeoff weight of 464,000 lbs and fuel weight 96,200 lbs was computed. A clearance was filed via Track 4, Casong, PE-9, R-68, Lubang, T-23, Clark AB. After the onload of passengers, the engines were started and a TRT rolling takeoff was subsequently made at 0803Z (1603L) on Rwy 07R.

4. After takeoff, a right hand turn was initiated and the aircraft proceeded direct to Vung Tau. The aircraft passed Vung Tau at 0812Z (1612L), climbing through FL200. At 0815Z a rapid decompression occurred as the aircraft was climbing through 23,372 feet, airspeed 254 knots, and a heading of 136 degrees. The aircrew donned oxygen masks and established interphone contact. Immediately following the decompression, the number one and number two hydraulic systems were lost (including pressure and quantity). Approximately 45 seconds after the decompression, a shallow descending left turn was begun for an emergency return to Saigon.

5. As the damage was being assessed, the pilot realized that he had no pitch control. He asked the copilot to assist him with the pitch; however, the copilot's pitch control was also inoperative. During the descent the airspeed increased to 300 knots, the nose of the aircraft began to rise, and the airspeed began to rapidly decrease. To prevent the aircraft from entering the stall speed range, a right bank of 30-40 degrees was made and power reduced. The aircraft then entered a steep dive. The wings were leveled, and the pilot observed a rapid increase in airspeed. Realizing that his only means of pitch control was power and bank, he added power to arrest the dive. As the airspeed increased through 326 knots, the nose of the aircraft began to rise. From this point on the pilots developed techniques for some limited control of pitch through cautious use of power and bank and established a controllable rate of descent at 250-260 knots.

6. The initial assessment of damage revealed that the pressure door, a large portion of the ramp, and center cargo door had departed the aircraft. Initially both side cargo doors were observed to be attached to the aircraft but subsequent observations revealed the right hand side cargo door was missing. A large portion of the torque deck was missing and numerous cables were hanging from the sloping torque deck area immediately aft of the pressure bulkhead.

7. An emergency was declared and the aircrew was briefed to prepare for an emergency landing at Tan Son Nhut. The undivided attention of the pilots was directed to aircraft control. While the pilot maintained power requirements, the copilot flew the ailerons. In order to ascertain the approach pitch/power requirements at the earliest time, extension of the landing gear was initiated at approximately 10,000 feet and 260 knots. The aircraft commander called for the gear down and "Before Landing Checklist". The forward main landing gear extended normally. The nose gear was extended by use of the emergency extend switch. The pitch control remained stable. The aft main gear was then extended using the emergency extend switches. The aircraft had previously been placed on a heading of 310 degrees to position it for a VFR final to Rwy 25L at Saigon. Approaching 6 NM from the end of the runway, approximately 4000 feet MSL and 230 knots, a shallow 15 degree bank left turn was begun for landing. Approximately one-half way through the turn, the aircraft nosed down at a rapid rate. Seeing that they would be unable to reach the runway, the pilots rolled the wings level and applied power to the full throttle capability, (full throttle quadrant). All landing gear were noted in the down and locked position by the flight engineer. Immediately prior to impact, the pilot retarded the throttles to idle. The aircraft touched down at 1630H in a rice paddy/marsh area approximately 2 NM NE of the runway. The aircraft was in a slightly left wing low, level flight attitude with an airspeed above 269 knots. It rolled and slid along the ground for 1000 feet and became airborne, attaining a flight path angle of approximately 12 degrees. The aircraft continued in flight for 2700 feet during which time the Saigon river was crossed. The second impact was on the western bank of the river at which time the aircraft skidded and broke into four major sections (tail, flight deck, troop, and wing). The cargo compartment disintegrated as the aircraft progressed down the touch down path.

8. After coming to a stop, the surviving crew members and medical team evacuated the passengers in the troop compartment and surrounding area to the best of their ability. Rescue helicopters arrived approximately 5 minutes after the crash.

INVESTIGATION

9. The Accident Investigation Board was appointed by Headquarters Military Airlift Command. The Board was composed of personnel from Hq MAC, 21AF, 22AF, 60MAW, and PACAF. In addition to above units, technical assistance and advisory personnel were provided by Lockheed Georgia Co., San Antonio ALC, C-5 System Program Office, Air Force Inspection and Safety Center, and the National Transportation Safety Board.

10. The investigation team arrived at Clark AB, P.I., at 0630H, 6 April 1975, thirty eight hours after the accident. The CDPIR had been recovered by the U.S. Navy and was shipped to Lockheed Georgia Co. for readout. An informal interview was conducted at the Clark AB Hospital with the surviving members of the flight crew. The interview was oriented toward determining the sequence of events and the extent of inflight damage incurred during the rapid decompression. The Aircraft Commander had in his possession a maintenance data recorder (MDR) tape which was later determined to be a spare tape. Upon completion of the interview, selected members of the team received an intelligence briefing on the military situation in Vietnam and were airlifted to Tan Son Nhut AB, RVN 4 hours later to be brought up to date on investigative actions thus far accomplished. The team was briefed by a representative from the United States Defense Attache Office (USDAO) in Saigon. Explosive Ordinance Disposal (EOD) personnel had examined the wreckage and briefed the team on their findings. Photographs taken by Air America and other U.S. personnel were made available; however, no formal investigative action had been taken. During the briefing it was pointed out that due to the present

political situation within Vietnam, there was little hope in achieving complete security of the crash site. A message was sent from Gen Cao Van Vien, Chief of JBS/RVNAF, to Province officials requesting maximum effort be made to secure the wreckage; however, an unbelievably high rate of pilferage had begun almost immediately after the crash and many items had already been carried off. Security was provided against the Viet Cong but none whatsoever against pilferage.

11. The DAO representative provided a manifest of DOD civilians and dependents and a handwritten list of ten names. These lists were believed to contain all the names of those individuals who had been assigned to attend the orphans during the trip to Clark. There was no manifest available for the orphans and it was doubtful that an absolute accounting of the number on board could be determined.

12. After the DAO briefing, the investigation team was airlifted to the crash site by Air America helicopters. Although the site was within two miles of the Tan Son Nhut Air Base, vehicle movement to the site was impossible. All movement of personnel, equipment and supplies was by Air America H-1 helicopter. An initial survey of the site revealed that a vast majority of the aircraft avionics and communications equipment had been removed from the aircraft and the crash site by the local populace. In addition, these same people were in the process of removing any remaining pieces of wreckage which could be handcarried. Attempts to stop the removal of wreckage from the crash site were met with resistance. The investigation team conducted a walk thru of the crash site with EOD personnel and an explosives detector dog. The wreckage was thoroughly examined for the possibility of sabotage.

13. In an effort to expedite the recovery of aircraft components vital to the investigation, priority was given to crash site activities. Arrangements were made to retain a majority of the investigation team at Tan Son Nhut to probe the wreckage. Coordination with the DAO, Air America, and 604 MASS was made to facilitate the logistics required to remove components from the crash site and airlift them to Clark AB, P.I., for reassembly and evaluation. Continuous on site photographic coverage was provided. After four days of probing the crash site, part recovery dwindled to nil and further effort was terminated. As they were recovered, the components were airlifted to Clark AB where they were photographed, washed off, and reassembled in a hangar. Technical representatives and board members closely analyzed these components and documented all information which could provide a clue to determining the sequence and origin of failure. After all documentation and analysis was completed it was determined that sufficient evidence was not available to establish a definite point of failure origin and sequence. Additional action was under taken to obtain additional aircraft components which would assist in determining cause. After deliberation, three programs were implemented in an attempt to retrieve these vital aircraft components.

a. NAVY SALVAGE OPERATIONS: A request was made to obtain Naval assistance in locating aircraft components that departed the aircraft at the time of the rapid decompression. These operations proved to be an essential part of the investigation. Valuable components recovered by the Navy were the ramp and part of the pressure door. (For details see TAB O).

b. "BUY BACK" PROGRAM: Funds were granted to purchase aircraft components that had been pilfered from the crash site by Vietnamese locals. Handbills depicting aircraft components critical to the investigation and avionics components containing state of the art technology were developed

and distributed among the local populace. These handbills offered three different monetary rewards based upon the importance of the component. The "Buy Back" Program was successful in recovering the aircraft MDR tape on 19 April. The effectiveness of the "Buy Back" Program was limited due to the fall of the South Vietnamese Government. (For details see TAB O).

c. FURTHER PROBING AND DIGGING OF THE CRASH SITE: Selected team members returned to the crash site. DAO roads and grounds workers (32 people) were contracted to probe and dig the area where most of the recovered ramp components had been found during earlier activities. Several components were recovered; however, they did not significantly add to the investigation. In addition to aircraft components, two 105mm howitzer rounds were dug up. These were determined to be unexpended rounds from earlier military activities in the area. When the team was satisfied that no further components were to be found and military activity in the Province was beginning to increase, security was withdrawn from the crash site and the remaining wreckage was abandoned on 19 April 1975.

14. While crash site activities were underway, crew statements had been taken and flight crew members, medical team members, and available passengers had been interviewed. Although these statements and interviews provided significant information regarding the damage to the aircraft during the rapid decompression, the on-board activities after the rapid decompression, and the crash landing and rescue operation, they did not provide the necessary data to determine the origin of the aft ramp failure.

15. On 19 April, it was decided that all possible visual analysis had been made on the recovered components. The components were crated for shipment to San Antonio ALC for laboratory analysis. The technical representatives accompanied the aircraft components to San Antonio on 20 April. The remainder of the investigation team, after insuring that the Naval Salvage Operations and the "Buy Back" Program would continue as previously coordinated, flew to Travis AFB on 22 April 1975 to await laboratory analysis and complete as much of the administrative portion of the report as possible.

16. On 27 April, the Navy Salvage Operation successfully recovered a 20 ft by 12 ft by 4 ft section of the aft ramp and a 7 ft by 12 ft section of the pressure door. These components along with other miscellaneous parts recovered by the Navy were transported to Subic Bay and then airlifted to San Antonio ALC for documentation and analysis. After these critical components were recovered the Navy Salvage Operations were terminated due to the deteriorating military situation in Vietnam and the increased exposure to hostile activities.

17. In order to insure sufficient time was available to thoroughly analyze the recovered aircraft components, a decision was made to request a report due date extension to 23 May. The request was granted. During this additional period, further study was made of flight control failures and life support equipment malfunctions. Technical assistance was requested in both areas to develop recommendations which would provide lasting corrective actions.

18. Analysis of aircraft components at San Antonio ALC provided information which established a failure sequence; however, a precise failure initiation point could not be positively identified. To assist in developing a most probable failure initiation point, the technical team moved to the Lockheed-

Georgia Company at Marietta, GA. where an engineering layout of the aft ramp locking system was constructed and analytical studies of various locking conditions were made. These studies and analysis were used to support the Board's final determination of failure initiation. The Board reconvened at Travis AFB on 19 May to formulate findings and recommendations and to complete the administrative portion of the report.

MEDICAL ANALYSIS

19. There were no medical factors or human factors which contributed to the accident. All of the crewmen were in good health, on no medication, with no irregularities during the 72 hour period preceding the crash. Following the rapid decompression, the crew recognized the nature of the emergency immediately donning oxygen masks and beginning a descent. The decompression resulted in the injury of a loadmaster who was on the aft ladder at the time and the death of a student engineer who was apparently thrown from the aircraft at RD.

20. At impact, all of the crewmembers on the flight deck survived with only minor injury. In the troop compartment, which remained well intact, the crewmembers and civilian attendants had to sit in the aisles because all seats were occupied by babies. This resulted in various degrees of injury to adults, the death of one civilian attendant, serious head injury and subsequent death of a loadmaster. Because the cargo compartment disintegrated after touchdown impact, almost all its occupants sustained fatal injury; there was only one crewmember who survived (a medical technician). A representative from the Casualty Reporting Office, MPC, after his investigation, determined that there were 175 survivors of the total 330 souls-on-board.

21. Rescue activity at the accident site was rapid and efficient because of the presence of VNAF and Air America helicopters in the immediate area. As the crewmembers began evacuating babies from the troop compartment and helping those that were injured, helicopters began shuttling survivors to Tan Son Nhut Air Base completing their task in approximately 1½ hours. No life support equipment was used during rescue.

DISPOSITION OF DECEASED

22. The day after the crash, all deceased were flown to Utapa RTAFB and turned over to the nearby Army facility, Camp Samae San. There were an estimated 150 bodies, 10 of which were USAF personnel.

23. Army regulations prohibit release of bodies before positive identification is made. The Army pathologist at Camp Samae San subsequently requested the medical records of those deceased USAF personnel. The records were gathered together immediately at Clark AB and flown to the Army pathologist. He could release the bodies to the Air Force once he has made identification.

24. The following actions had to be accomplished before names of dead could be officially released:

a. Body had to be positively identified at Camp Samae San

b. The remains released to the Air Force and flown to Clark AB.

c. The remains received by the Clark Mortuary Office after which an autopsy was performed at USAF Hospital Clark to confirm the decedent's identity.

d. The mortuary office next notifies the Casualty Reporting Office (CRPO) that the decedent has been identified.

e. The Casualty Reporting Office at Clark AB CRPO notifies its office at MPC Randolph who then officially releases the name.

25. The above process should take no longer than 2 to 3 days if kept in Air Force channels. The delay in this case was due to the Army Regulation requiring absolute identification before releasing the remains to the Air Force.

26. Although not relating directly to the accident, there were a number of life support discrepancies noted. For example, the cargo compartment was not configured for passengers; there were no seats with seat belts available to adults in the troop compartment; the loadmaster's seat in the troop compartment came out of its mountings; an escape slide inflated in the troop compartment at impact; a number of passenger oxygen masks malfunctioned; the flight deck entrance door caused severe injury to a loadmaster when it was blown from its hinges as designed during the rapid decompression; there were several malfunctions of the quick don oxygen masks and fire fighters masks. For details of these discrepancies and appropriate recommendations, refer to pages 8-12 under Flight Surgeon's Analysis and Recommendations attached to the form 711gA of the aircraft commander, Capt Traynor.

SABOTAGE/GROUND FIRE ANALYSIS

27. The possibility that an internal explosion or an externally fired projectile triggered the failure in the aft ramp was thoroughly explored. All witness statements and indications of possible explosive damage were given detailed analysis.

28. Crew interviews and statements reveal that a security watch was established on the ground at Tan Son Nhut. Crew members had inspected potential hiding places for explosive devices prior to their departure and found nothing. Prior to the rapid decompression, crew members unanimously stated that they neither heard or saw anything that could be associated with an explosion. Most of the crew members associated all their sensations as very similar to the sound and feel of a rapid decompression in the altitude chamber.

29. Rumors that the aircraft was taking ground fire during departure could not be confirmed. The investigation team was unable to find anyone who actually saw the reported ground fire. It was concluded that the likelihood of seeing even tracers under daylight conditions would be remote. There was no sound of any hits noted by the crew. In addition, the aircraft had departed small arms environment when the rapid decompression occurred.

30. The DAO reported that a nine-year old girl survivor from the cargo compartment saw a red handbag explode. This report was investigated, and the explosion determined to have been caused by the rapid decompression due to trapped air in the handbag. Interviews with crew members who had assessed the damage revealed that there was an open red handbag on the baggage and it was open after the decompression. If it had contained an explosive device, the bag would have been destroyed. Additionally, any explosion from the baggage would have caused noticeable damage to the interior of the aircraft. No related damage was noted by the crew or during the investigation.

31. On three separate occasions, EOD personnel searched the crash site for evidence of explosives. An EOD team from the 635 MMS, Utapao AFB, Thailand, arrived at the crash site at 0200H 5 April 1975. Their search failed to uncover any damage that was caused by an explosion. An additional EOD team from the 3rd MMS, Clark AB, P.I., arrived at Tan Son Nhut Air Base at 1300H, 5 April 1975, were briefed by the 635 MMS team, and proceeded to the crash site. Their search of the crash site was also negative. However, they did recover a hand grenade from near the vertical stabilizer. The grenade had not completely detonated and was most probably equipment carried by an ARVN soldier who had been struck by the aircraft during the crash landing. When the accident investigation personnel arrived at the crash site, a third search of the wreckage was made. An explosive detector dog and the 3rd MMS EOD team checked all aircraft components which the investigation team members could identify as areas susceptible to explosive damage. Results of the detector dog crash site activities were negative. The detector dog was then used to check aircraft components as they were recovered and placed in the hangar at Clark. As a final check for explosive components recovered from the aircraft were checked by a detector dog when they arrived at San Antonio ALC. During this check, the dog alerted on three separate components. However, they were sent to the FBI laboratory for chemical analysis and the FBI lab tests were negative. EOD and FBI lab reports are contained in TAB O.

32. Enroute to the crash site, all board members, observers, and technical advisors were instructed to look for any evidence of inflight explosion, sabotage, or enemy ground fire. Two areas of suspicion were noted and received detailed investigation. First, a burned section of the right forward main landing gear fairing was discovered. Explosives were discounted because:

a. Examination of other right forward main landing gear components, such as wheel bogies, tires, and gear doors, did not reveal any evidence of fire.

b. Laboratory analysis of the residue on the fairing failed to identify any explosive residue.

c. The fairing aluminum melted in the fire had dripped in a straight down puddle rather than the streaking metallizing deposits typical of inflight melting.

d. No connection between a possible inflight fire in this area and the rapid decompression events could be established.

e. There was evidence of heavy carbon deposits on crash fractured surfaces and no evidence of high temperature burning.

f. It was determined through photographs that the fairing was intact after the crash and had been subsequently moved to the recovered location and burned.

It was concluded that the fire damage on the fairing was caused by a Vietnamese "cooking" fire. Many of these fires were found around the crash site.

33. The second area investigated in this regard involved small arms projectile holes noted in the wreckage. In every instance these holes were examined and determined to be non-related. ARVN soldiers were observed to be shooting randomly into the wreckage and projectile holes were formed on top of crash impact damage. The only conclusion that can be drawn is that these holes were caused by "target practice" at the crash site. Again, the location and size of the projectile holes provided no possible connection with subsequent accident events. Aside from these observations which were carefully investigated, team members saw no evidence of fragmentation or deformation that suggested explosion or enemy ground fire as a factor in the accident.

AIRCREW ANALYSIS

34. The primary aircrew was found to be current and qualified in accordance with Air Force and MAC directives. Capt Traynor completed a flight evaluation on 8 Mar 75. Capt Harp's most recent MAC evaluation was on 16 Oct 74. Unqualified crew members were participating on the crew under authorized supervision.

35. Due to the fact that the pilots were required to give their undivided attention to control of the aircraft, all other aircrew and medical team members were required to accomplish procedures without specific direction. This was done in a highly commendable and professional manner. These duties included preparing passengers for crash landing in both the cargo and troop compartment. Loose articles were stowed in the flight deck by the scanner. The navigator provided heading and positioning information. The navigator and extra pilot occupying the pilot observer seat both made contact with Saigon Approach Control after observing that the copilot was required to assist the pilot in flying the aircraft.

WEATHER ANALYSIS

36. The aircrew was briefed on weather at 032101Z April 75 by the Clark duty forecaster. The briefing was as follows:

> VMC with no significant weather from Clark to 112°E; isolated thunderstorms and associated weather, tops FL400, from 112°E to 110°E; no significant weather from 110°E to Saigon; landing weather at Saigon was forecast to be 040 Sctd 130 Brkn 280 Brkn 7.0 340/08 Alt 2979.

The crew called via PMSV for a rebrief at 040150Z. Minor changes were given in arrival weather; enroute weather was not changed.

37. On the flight to Saigon the weather encountered was essentially as briefed except that the cirrus associated with the isolated thunderstorms off the coast was denser than expected and light turbulence was experienced at FL310 while in IMC from 112°E to 110°E.

38. On the return flight to Clark the take-off weather was 26 Sctd 40 Sctd 300 Brkn 7.0 130/14 Alt 29.79 There were isolated towering cumulus between Saigon and the coast but the aircraft was in VMC from take-off until impact. Saigon weather at impact time was 26 Setd 300 Brkn 7.0 120/15 Alt 29.76

39. Discussions with the crew and an analysis of the available meteorological information indicates that weather was not a factor in the events leading up to the rapid decompression or in the attempted recovery of the aircraft.

FLIGHT ANALYSIS

40. Indications on the flight deck were normal for takeoff (1603H) and climb up to the point of the rapid decompression. There was no warning of the rapid decompression (RD). The flight deck immediately filled with condensation. The pilot directed the crew to go on oxygen. The approximate coordinates of the decompression were 10° 09.9N 107° 16.6E at an altitude of 23,372 feet, airspeed of 254 and heading of 136°. Time of occurrence was 0815Z (1615L). The primary members of the aircrew had no major difficulty in donning their oxygen masks. The copilot's interphone was intermittent. A shallow rate of descent was initiated after the RD to allow time for a damage assessment. The number one and number two hydraulic systems immediately showed zero pressure and quantity. At the time of the occurrence, the rudder pedal kicked hard right but the aircraft did not yaw. This was evidently due to the severing action of the rudder cables. The pedals were centered with no reaction. Min Q was selected. At the time of the RD the control column chattered momentarily. This was also apparently due to the cable severing action.

41. Approximately 45 seconds after the RD, the pilot started a left hand turn for Saigon. After rolling out, he realized that he was unable to stop the rate of descent by movement of the control column. He tried both the trim button on the control column and the manual trim lever without success. Failure of the trim to react was due to the fact that the number two hydraulic system line was severed during the RD, thereby, depleting the system. Use of the alternate trim switches on the control pedestal was not attempted. The alternate trim receives hydraulic power from the number one system and would have been ineffective because the number one hydraulic line had also been severed during the RD. Number three and four hydraulic systems were normal. The number three system hydraulic line transits the right side of the torque deck area but was not severed during the RD. This system supplies hydraulic pressure to both the rudders and elevators but as the rudder and elevator cables had been severed, movement of these control surfaces was impossible utilizing the control column. The rudder could not be moved by using the yaw augmentation manual trim knob or the rudder trim switches as these electrical wires to the vertical stabilizer were severed in the hayloft area. Regardless, rudder use was not required as directional control was satisfactory. After noting that he had no pitch control, the pilot directed the copilot to assist him in arresting the descent (approaching 4000 FPM). The copilot elevator cables had also been severed and his attempts to arrest the descent were also ineffective. At approximately 18,000 feet, the copilot selected the right inboard elevator switch to the number three system. It had no effect. As the speed approached 300 knots, the nose of the aircraft started to rise. A rapid ascent followed. The pilot was concerned about approaching the stall speed and rolled the aircraft into a 30 to 40 degree bank. Power was reduced and a rapid descent followed. Based on his understanding of aerodynamics, the pilot elected to add power in an attempt to arrest the descent. The airspeed increased through 326 knots and the nose of the aircraft again started to rise. The addition of power plus a stabilizer trim that was set for 254 knots in all likelihood combined to cause this action. The descent rate was then moderated using power and bank. The best controllable speed range was from 250-260 KCAS. This can be attributed to the fact that the stabilizer trim was set for 254 knots (.5 nose down) at the time of the RD.

42. The third pilot, in the jump seat, repeatedly tried to relay the urgency of the emergency to Saigon Approach Control on frequency 121.5. They did not fully understand the nature of the emergency and attempted to issue specific altitude clearances, radio frequency changes, headings, and IFF squawks. The third pilot advised the controller "negative" to all requests. He then attempted to tell the controller of the crash landing possibility and requested runway 25L. The controller requested that the aircraft contact Saigon tower on another frequency. The aircraft was at this time in a turn to final at approximately 4000 feet MSL. The inability to relay the state of the emergency to Saigon Approach Control undoubtedly added to the seriousness of the emergency.

43. The nature of the emergency demanded that the pilots devote their undivided attention to control of the aircraft. The possibility of a crash landing was anticipated by aircrew and medical crew personnel. In the troop compartment all infants were checked for security in the seats. Individual attendants, medical and aircrew members sat in the aisle facing rearward. In the cargo compartment aircrew and medical crew members prepared the passengers who were facing forward, sitting on blankets with a restraint strap across their lap. When last seen, two aircrew members were on headset in the cargo compartment (both are deceased).

44. Following the initial near loss of control, the pilots developed the technique of copilot flying roll control and pilot regulating the power. Roll control was provided by flight spoilers on both wings and the right aileron. The left aileron was inoperative because of the loss of number one and number two hydraulic systems; however, the loss of this aileron was only slightly noticeable to the pilots. The pilot had concern over the controllability of the aircraft with gear down; therefore, he elected to extend the gear descending through 10,000 feet. He called for "Gear Down, Before Landing Checklist". The copilot placed the gear handle down to extend the forward main landing gear at approximately 260 knots. Both during and after extension of the forward main landing gear, control of pitch remained reasonably stable. The nose gear was then lowered with the emergency extend switch at 240-250 knots. Green wheels were obtained in approximately two minutes. The scanner then checked the fiber optic scope but was unable to see the indicator. He did observe hydraulic fluid in the area. This may have been due to hydraulic line damage caused by the high airspeed. After noting a green wheels indication on the nose gear, the copilot placed both aft main landing gear emergency extend switches to extend. During the emergency extension of the landing gear, the flight engineer was reviewing the Emergency Gear Extension, Hydraulic Pressure Not Available Checklist.

45. The aircraft was placed on a VFR heading of 310° for a final turn to Rwy 25L (field elevation 33 feet). The flight engineer advised the pilot that he was prepared to read the Wheels Up Landing checklist. The turn to final was started approximately 6 NM from the end of runway 25L, approximately 4000 feet MSL and 230 knots. The angle of bank was 12-15 degrees. The aft main landing gear was still in the process of extending . The airspeed decreased to 212 knots. Approximately halfway through the turn, the rate of descent increased rapidly to approximately 4000 FPM. Seeing that they were not going to make the runway, the pilots rolled the aircraft wings level.

46. Full power was applied (pushed forward to the maximum throttle movement) in an attempt to arrest the rate of descent. In a period of 23 seconds, the airspeed increased to 280 knots. The flight engineer noted that all landing gear indicated green wheels. Just prior to impact, the pilot stated "crew crash landing " on the interphone. The alarm bell was not rung because to do so would have diverted the pilots undivided attention from aircraft control which was primary to survival. The airspeed decreased to 269 knots. Approximately 50 feet above the terrain, the pilot placed the throttles to idle. The copilot placed the flap handle down. The flaps did not move. Only number four hydraulic system pressure was available for flap operation prior to impact and the aircraft speed undoubtedly restricted the movement. Additionally all main landing gear departed the aircraft on the first impact causing the loss of number four hydraulic system.

47. The aircraft approached the ground in a level attitude slightly left wing low. A low rate of descent, partially due to ground effect, was held for approximately 165 feet at which time the aircraft settled to contact the ground on its main landing gear. A heading of 273° and a low rate of descent was clearly established by wheel marks left in two small earthen dikes which were 165 feet apart. The low rate of descent on the initial impact prevented major destruction of the aircraft and significantly improved the survival rate. The primary surface contacted was grassy. Some main wheels penetrated soft soil approximately three feet. The decelerating forces were low and the aircraft became airborne after rolling and skidding 1000 feet. The aircraft climbed upward at 12° and traveled 2700 feet before impacting a dike which paralleled the western bank of the Saigon River.

48. Upon the second impact, the aircraft skidded and began to tear and shed parts. After approximately 1200 feet of travel, the aircraft separated into four major sections. The flight deck just forward of the courier compartment, the troop compartment in its entirety, the empennage, and entire wing section came to rest in four different locations. The lower fuselage (including the cargo compartment) was entirely destroyed. As a note of interest, the primary wing structure and pylons remained intact until their finalgyration and coming to rest in an inverted position.

50. Two major decisions were made by the pilot that subsequently allowed for a semi-controlled crash landing and survival of the majority of the passengers and crew. These decisions were:

COLLATERAL INVESTIGATION OF AIRCRAFT ACCIDENT

INVOLVING

C-5A SERIAL NUMBER 68-218

15 AUG 1975

I. AUTHORITY

1. This is a report of a collateral investigation conducted from 4 April 1975 through 15 August 1975 at Saigon, Republic of Vietnam; Clark Air Base, Republic of Philippines; Travis Air Force Base, California; and Scott Air Force Base, Illinois by Bernard A. Waxstein, Jr., Colonel, USAF, under the authority of Special Order A-29, Headquarters Military Airlift Command (MAC), Scott AFB, Illinois, dated 4 April 1975. (TAB 1) The investigation was conducted in accordance with Air Force Regulation 110-14, as supplemented (TAB 2) and Air Force Manual 120-3.

II. MATTERS INVESTIGATED

2. This investigation was made to ascertain the facts and circumstances and to obtain and preserve all available evidence of the aircraft accident involving Air Force C-5A Serial Number 68-218, hereinafter referred to as C-5A 218, occurring at 0830 GMT (1630 hours local), 4 April 1975, 2 nautical miles northeast of Runway 25L, Tan Son Nhut Air Base, Saigon, Republic of Vietnam. As a result of the accident the best evidence obtainable to date indicates that 138 of the 314 persons aboard the aircraft were fatally injured, to include 11 U. S. Air Force crew members; 40 U. S. citizens, (35 Department of Defense (DOD) civilian employees of the United States Defense Attache Office (USDAO), Saigon and 5 others to include 2 dependent wives, 2 dependent children and 1 private citizen); 79 Vietnamese National children; and 8 third country nationals (5 German, 2 Australian, 1 Malaysian). The total of those who survived is 176, to include 18 crew members; 8 U. S. citizens (2 U. S. government civilian employees, 4 dependent children and 2 private citizens); and 150 Vietnamese National children. (See paragraph 27, below) The aircraft, assigned to the 60 Military Airlift Wing (MAC), Travis Air Force Base, California was totally destroyed. (TAB 82)

3. During the course of this investigation, 58 witnesses were interviewed and the testimony of 36 witnesses was taken in the form of sworn statements, where possible, unsworn statements and verbatim transcripts of testimony. (TABS 3 thru 38) Documentary evidence was obtained in the form of records, diagrams, maps, transcripts of tape recordings, photographs, laboratory analysis reports, letters, etc., (TABS 39 thru 99) and pertinent files and directives reviewed. Technical assistance was provided by personnel of the Directorate of Aircrew Standardization and Evaluation, Deputy Chief of Staff, Operations; and the Directorate of

Maintenance Engineering, Deputy Chief of Staff, Logistics; both of Hq MAC, as well as personnel of the Directorate of Aircrew Standardization, Deputy Chief of Staff, Operations; and the Directorate of Maintenance Engineering, Deputy Chief of Staff, Logistics, 22 Air Force, Travis AFB. Additional technical assistance was provided by personnel of the Metallurgical Laboratory, San Antonio Air Logistics Center (AFLC), Kelly Air Force Base, Texas.

III. FACTS

4. Mission PYM 3578, C-5A 218, departed Travis AFB on 1 April 1975 at 0647Z. (Unless otherwise stated, all times are Greenwich Mean time designated by the letter "Z".) (TAB 72) The mission itinerary directed a flight to Warner Robins AFB, Georgia for onload of 45.9 tons of cargo, thru flight return to Travis, enroute stops at Hickam AFB, Hawaii, Andersen AFB, Guam and Clark AB, with subsequent offload at Tan Son Nhut Air Base, Saigon and return to Clark AB. (TABS 71 and 72)

5. The aircraft arrived at Warner Robins AFB at 1058Z (TAB 72) and after onload, departed at 1710Z (TAB 72). During the time the aircraft was on the ground, refueling and routine maintenance was performed. It arrived at Travis AFB at 2242Z (TAB 72). After refueling and routine ground maintenance the aircraft departed, with a new crew, for Hickam AFB at 0505Z, 2 April, arriving at 1020Z (TAB 72), where the aircraft was again refueled, routine maintenance performed and a new crew enplaned. During the flight from Travis to Hickam it was noted that the copilot's windshield was arcing. Because of the high priority of the mission, it was not replaced but a windshield was placed aboard the aircraft for subsequent installation at Clark AB. (TAB 89, p. 19)

6. The aircraft commander for the remainder of the mission (departure from Hickam until accident) was Captain Dennis W. Traynor, 257-70-7773, 22 Military Airlift Squadron (MAS), Travis AFB. The remainder of the 15-man crew, all assigned to the 22 MAS, constituted an augmented crew consisting of 4 pilots, 2 navigators, 3 flight engineers and 6 loadmasters. The identity of the flight crew members, their flight authorizations, qualifications and flying experience are described in TABS 53, 54 and 56 thru 70.

7. C-5A 218 departed Hickam on 2 April at 1524Z and after a routine flight, landed at Andersen AFB, Guam at 2315Z, 2 April. (TAB 72) The aircraft was refueled at Andersen, routine ground maintenance performed and the mission proceeded with departure from Andersen at 0239Z on 3 April and arrival at Clark Air Base at 0637Z, (TAB 72), where the crew went into crew rest. Enroute to Clark, the #2 engine was shut down because of high vibration readings on the Malfunction Detection Analysis and Recording System (MADAR). (TAB 3 and TAB 89, p. 25)

8. Following 12 hours crew rest, Captain Traynor's crew was alerted at 1900Z, 3 April (0300 local/4 April) and informed that they would take C-5A 218 into Saigon, offload and return to Clark. The crew reported to the Clark AB Operations Center at 2000Z, 3 April (0400 local/ 4 April) for flight-planning and pre-mission briefing, which was accomplished. At that time, maintenance was in progress on the installation of the copilot's windshield and the inspection on the #2 engine. Prior to departure from Clark AB, it was determined, after inspection, that the #2 engine discrepancy was due to a malfunction in the indicating system. The faulty vibration pick-up discrepancy was carried forward. (TAB 89, p. 27) Additionally, the copilot's windshield was replaced. (TABS 3, 4 and 89, p. 19)

9. At approximately 2200Z, 3 April (0600 local/4 April), Captain Traynor was advised in a telephone call from 22 AF Operations Center, Travis AFB, that, after offloading the cargo at Tan Son Nhut Air Base, he was to onload as many Vietnamese orphans together with their "attendants" or "escorts" as were then available and processed, and return on a primary special mission basis to Clark AB. Additionally the floorloading of passengers in the cargo compartment was authorized as necessary. (TAB 3)

10. At 2000Z, 3 April, 22 AF Operations Center was advised by the MAC Operations Center that the Commander MAC directed the movement of as many Vietnamese orphans as were available out of Tan Son Nhut Air Base on C-5A 218 to Clark AB and the floorloading of passengers in the cargo compartment, if necessary. (TAB 73) The authorization by the Commander, MAC was given pursuant to the direction of higher Air Force authority as reflected by entries made in the MAC Contingency Support Staff log.

11. The mission departed Clark for Tan Son Nhut Air Base at 0213Z, 3 April (1013 local/4 April). In addition to the 15 members of the flight crew noted in paragragh 6, above, nine additional Air Force personnel joined the crew in the flight from Clark to Tan Son Nhut Air Base. They included a loadmaster, SMSgt Snedegar; 2 flight nurses, 1st Lt Aune and Wirtz; 3 medical technicians, SSgt Hadley, Sgt Wise and Sgt Gmerek; 2 photographers, MSgt Castro and Sgt Nance; and a MAC mission observer, Lt Col Willis. The flight authorization, qualifications and flying experience of the loadmaster, SMSgt Snedegar, are described in TABS 53, 54 and 62. Flight authorizations for remaining 8 crew members are found at TAB 53. The departure from Clark, the enroute flight and the arrival at Saigon were routine. No engine problems were experienced. Arrival time at Saigon was 0451Z (1251 local) 4 April. (TAB 72)

12. Upon arrival at Tan Son Nhut Air Base, the off-loading of the cargo was completed through the aft ramp complex in a rapid and orderly manner. In preparation for the onload of Vietnamese children and escorts, numerous support items had been placed aboard the aircraft at Clark AB to include blankets, pillows, extra restraining straps, milk, juice, baby bottles, disposable diapers and box lunches. Additionally, a second medical crew, consisting of 2 flight nurses, Captain Klinker and Lt Goffinet and 3 medical technicians, MSgt Boutwell, SSgt Paget and TSgt Johnson, which had been transported from Clark to Tan Son Nhut in a following C-141, joined the first medical crew aboard the aircraft to assist in the onload and subsequent flight to Clark. Their flight authorizations are found at TAB 53.

13. The C-5 has three compartments for the crew and passengers: the flight deck (consisting of the cockpit, crew bunks, relief crew area, galley and courier compartment); the upstairs troop compartment; and the downstairs cargo compartment. (See TAB 86, Drawings of C-5A) Onloading of passengers by flight and medical crew personnel was accomplished through the left troop door. A human chain was formed and the Vietnamese infant children were handed from the left troop door, up the troop compartment ladder into the troop compartment where they were placed two to a seat. Pillows and blankets were placed between the infants and their seat belts in order to allow for comfort and to insure that the infants were securely fastened. After the troop compartment's aft-facing seats were fully occupied with infants, 145 in all, the loading of passengers to include older Vietnamese children, their adult escorts and a few U. S. National dependent children was completed in the cargo compartment, again through the left troop door. Since there were no seats in the cargo compartment, a double layer of blankets was placed on the floor of the cargo compartment and the passengers either laid or sat upon the blankets facing forward in an area which was located aft of the crew entry door and forward of the main landing gear. They were secured by means of tie-down straps. Additionally, passengers were seated and secured by means of straps along the "catwalks" on both sides of the cargo compartment in the same area. Baggage was loaded through the paratroop door and by means of a conveyor belt positioned at the center of the aft ramp. Baggage was placed in rows on the deck of the cargo compartment from approximately fuselage station 1700 aft to the aft edge of the aft ramp. See TABS 3 thru 20, Statements of the flight and medical crew members.

14. The selection of those Vietnamese children who were transported to Tan Son Nhut AB for evacuation aboard C-5A 218, as well as their U. S. and foreign national adult "attendants" or "escorts", was coordinated by personnel of the American Embassy, Saigon, as well as personnel of the U. S. Defense Attache Office (USDAO) and the U. S. Agency for International Development (USAID), both elements thereof. No manifest of Vietnamese children was ever presented to the

crew of C-5A 218, although the crew was informed they would receive one, and that there was an "accurate master copy of the passenger manifest on file." Additionally, the crew was told that "the orphanage or some agency had accurate manifests." (See TABS 3 and 4, Statements of Captains Traynor and Harp) A copy of a passenger manifest containing 43 names, which later proved to be those of 35 U. S. National Department of Defense civilian employees of USDAO and 5 dependents thereof as well as 3 dependents of an U. S. Army E-7 was given to the crew. (TAB 39) An additional handwritten list containing 10 names which later proved to be those of a USAID physician, three private U. S. citizens and 6 foreign nationals was provided to members of the Aircraft Accident Investigation Board by officials of USDAO in Saigon on 6 April 1975. At the bottom of the list, the following appears: "There was no manifest of orphans. They came from various orphanages in the Saigon area. Those agencies who put children on the airplane are attempting to compile lists, but none was available as of 6 April 1975." (TAB 40) The Accident Investigation Board was also given the name of Dorothy Howard, a USDAO employee who was not listed on the manifest given to the crew, but was known to be a passenger aboard C-5A 218 upon its departure from Saigon.

15. Prior to departure from Tan Son Nhut, normal pre-flight planning was accomplished. A takeoff weight of 464,000 pounds and fuel weight of 96,200 pounds was computed. (TAB 75) A clearance was filed via Track 4, Casong, PE-9, R-68, Lubang, T-23, Clark AB. (TAB 74) After the onload of passengers and satisfactory indications of a locked aft loading complex, (TABS 4, 8, 11 and 81) the engines were started and a TRT (maximum power) rolling takeoff was subsequently made at 0803Z (1603 local/4 April) on Runway 07R.

16. After takeoff, a right-hand turn was initiated and the aircraft proceeded directly to Vung Tau. (See TAB 77, Map, Route of Flight) The aircraft passed Vung Tau at 0812 (1612 local), climbing through 20,000 feet. All indicators on the flight deck were normal for takeoff and climb. At 0815Z (1615 local), a rapid decompression occurred without warning as the aircraft was climbing through 23,300 feet, with airspeed of 254 knots and a heading of 136 degrees. The aircrew donned oxygen masks and established interphone contact. Immediately following the decompression, the number one and number two hydraulic systems were lost including pressure and fluid quantity. Additionally, the pilot noted that the rudder pedal kicked hard right but the aircraft did not yaw and the control column chattered momentarily. The pedals were centered with no reaction. Approximately 45 seconds after the decompression, a shallow descending left turn was begun for an emergency return to Saigon. (See statements of crew members)

17. As the damage was being assessed, the pilot realized he had no pitch control. He asked the copilot to assist him with the pitch. However, the copilot's pitch was also

inoperative. All pitch trim, elevator and rudder cables had been severed at the time of rapid decompression. During the descent, the airspeed increased to 300 knots, the nose of the aircraft began to rise and the airspeed began to rapidly decrease. To prevent the aircraft from entering the stall speed range, a right bank of 30-40 degrees was made and power reduced. The aircraft then entered a steep dive. The wings were leveled and the pilot observed a rapid increase in airspeed. Realizing that his only means of pitch control was power and bank, he added power to avert the dive. As the airspeed increased through 326 knots, the nose of the aircraft began to rise. From this point on the pilot developed techniques for some limited control of pitch through continuous use of power and bank and established a controllable rate of descent at 250-260 knots. (See statements of crew members)

18. The initial assessment of damage by the crew revealed that the aft pressure door, a large portion of the aft ramp, and aft center cargo door had departed the aircraft. Initially, both aft side cargo doors were observed to be attached to the aircraft but subsequent observations revealed the right-hand aft side cargo door was missing. A large portion of the sloping torque deck was missing and numerous cables were separated and hanging from the remaining torque deck area immediately aft of the pressure bulkhead. (See statements of crew members)

19. An emergency was declared and the aircrew was briefed to prepare for an emergency landing at Tan Son Nhut. At this time, aircrew and medical crew personnel became aware that a crash landing was a possibility. The six medical crew and three flight crew members in the troop compartment, maintaining complete composure, carefully checked the seat belts, pillows and blankets of each infant to insure maximum security. After that was accomplished, these nine crew members and the seven "escorts" in the troop compartment sat or laid in the aisles or between the seats, since the seats in the troop compartment were fully occupied by infants. Four medical crew and seven flight crew members comforted and prepared the passengers in the cargo compartment for possible crash landing. (See statements of crew members)

20. The undivided attention of the pilots was directed to aircraft control. While the pilot, Captain Traynor, maintained power requirements, the copilot, Captain Harp, flew the ailerons. In order to ascertain the approach pitch and power requirements at the earliest time, extension of the landing gear was initiated at approximately 10,000 feet and 260 knots. The aircraft commander called for the "Gear Down, Before Landing Checklist." The forward main landing gear extended normally. The nose gear was extended by use of the emergency extend switch. The aft main gear was then extended using the emergency extend switches. The aircraft had previously been placed on a heading of 310 degrees to position it for a VFR final to Runway 25L at Tan Son Nhut.

Approaching 6 nautical miles from the end of the runway, approximately 4,000 feet mean sea level and 230 knots airspeed, a shallow 15 degree bank left turn was begun for landing. Approximately one-half way through the turn, the aircraft nosed down at a rapid rate. Seeing that they would be unable to reach the runway, the pilots rolled the wings level and applied power to the full throttle capability. All landing gear was noted in the down and locked position by the flight engineer. Immediately prior to impact, the pilot retarded the throttle to idle. The aircraft touched down at 0830Z (1630 local) on its main landing gear in a marshy area, in use as a rice paddy, approximately 2 nautical miles northeast of the runway. The aircraft was in a slightly left wing low, level flight attitude with an airspeed above 269 knots. It rolled and skidded along the ground for approximately 1,000 feet and became airborne. The aircraft continued in flight for approximately 2700 feet during which time the Saigon River was crossed. The second impact was on the western bank of the river at which time the aircraft skidded and began to tear and shed parts. After approximately 1200 feet of travel the aircraft separated into four major sections; empennage, flight deck, troop compartment and entire wing section. These sections assumed different trajectories and came to rest in separate locations. The cargo compartment totally disintegrated as the aircraft progressed down the touchdown path. (See statements of crew members; TAB 78, Impact and Wreckage Map; TAB 79, Wreckage Diagram and TAB 80, Photographs)

21. That portion of the flight deck just forward of the courier compartment came to rest in an almost totally inverted position on its right side (TAB 80). There was no fire. Four of the crew in the cockpit at the time of impact - the pilot, copilot, a flight engineer and a third pilot - exited through the pilot's left window. The navigator, who had been in the cockpit, escaped through a hole in the relief crew area, as did other crew members - a second navigator, a flight engineer and two loadmasters who had been in the relief crew area at the time of impact. These nine crew members suffered only very minor injuries. (See statements of crew members and TAB 80)

22. The troop compartment, in its entirety, came to rest in an upright position, reasonably well intact both inside and out after skidding over 1,000 feet. There was no fire. (TAB 80)

23. The primary wing structure and the pylons remained intact until the final separation of the aircraft when they came to rest at the farthest point forward in the wreckage path in an inverted position. (See statements of crew members and TAB 80, Photographs)

24. Rescue activity was immediate. The nine crew members (paragraph 21 above) who had escaped from the inverted flight deck, quickly proceeded across the marshy area to the upright troop compartment where the two aft emergency exits had already

been opened by members of the flight and medical crews therein. All crew members and civilian escorts then worked together, some despite painful injuries of their own, to evacuate the infant children from the troop compartment through the emergency exits to an area outside the compartment. (See statements of crew members)

25. At the time of the crash landing, several Air America and Vietnamese Air Force (VNAF) helicopters were in the immediate area and within five minutes a number of helicopters converged on the accident scene. They immediately began shuttling survivors to Tan Son Nhut Air Base where they were subsequently taken to the Seventh Day Adventist Hospital and other hospitals in the Saigon area. The helicopter rescue operation was completed in one and one-half hours. (See statements of crew members)

26. A representative from the Casualty Services Branch, Air Force Military Personnel Center, Randolph AFB, Texas (CWO W-4 Leo F. Scott) attempted to determine the number and category of persons aboard C-5A 218 upon its departure from Saigon and the number and category of survivors/fatalities as a result of the accident. He compiled data from crew testimony, existing manifests and discussions with both the Joint Casualty Resolution Center Liaison Office (JCRC) in Saigon and Army Pathologists at Camp Samae Sam, Thailand. His report is attached at TAB 45. He estimated that there were 330 persons aboard C-5A 218 upon departure from Saigon, with 155 fatalities and 175 survivors.

27. Evidence which was not available at the time of Mr. Scott's report, but which is the best evidence available at the time of this writing, demonstrates that there were in fact 314 persons aboard C-5A 218 upon departure from Saigon and that of that total, 138 perished as a result of the accident, leaving 176 survivors. The totals are arrived at as follows:

a. Crew Members - 29 Air Force crew members were aboard to include 16 flight crew, 10 medical crew, two photographers and a MAC Mission Observer. An exhibit found at TAB 55 has been compiled to identify the entire crew, their locations both at the time of rapid decompression and at impact and their injuries. The testimony of the surviving crew members may be found at TABS 3 through 20. DD Forms 1300, Report of Casualty, for each of the 11 deceased crew members may be found at TAB 46.

b. Passengers Other Than Vietnamese Children - There were 56 passengers aboard who did not fall into the category of crew members or Vietnamese children. Of the 56, 48 perished, leaving eight survivors.

(1) Eight of the 56 were third country nationals: five Germans, two Australians and one Malaysian. None survived.

Their identities and nationalities are shown at TAB 50, which also contains Department of the Army Forms 3565, Certificate of Death (Overseas) for the eight third country nationals.

(2) The remaining 48 passengers were U. S. Nationals, 40 of whom were fatalities.

(a) Of the 40 fatalities, 35 were Department of Defense personnel employed by the United States Defense Attache Office, Saigon. Copies of Travel Orders (DD Form 1610), directing departure from Saigon on or about 4 April 1975, for 30 of the 35 may be found at TAB 41. The purpose of travel stated in the orders is "To direct employee to escort Vietnamese orphans out of Vietnam on Humanitarian Flight to the United States." Copies of the Travel Orders of the remaining five USDAO fatalities (Helen Drye, Marilyn P. Eichen, Vera S. Hollibaugh, Barbara J. Kavulia and Orin J. Poulton) were not located, although evidence derived from interviews with USDAO personnel officers indicated that Travel Orders were issued to those five in the same format as those described for the 30 above. Department of the Army Forms 3565, Certificate of Death (Overseas), for the 35 USDAO employees may be found at TAB 47.

(b) The remaining five U. S. National fatalities included the dependent wife (Nova L. Bell) and 10 year old son (Michael E. Bell) of U. S. Army E-7 Garnett E. Bell, assigned to USDAO (See Travel Order, TAB 42, which specifies the purpose of travel is "To evacuate dependent(s) and to permit dependent to escort Vietnamese orphans out of Vietnam on an Humanitarian Flight to the United States"); Rohn F. Drye III, dependent son of USDAO employee, Helen Drye (also a fatality, see above) (no Travel Order located); Marta Moschkin, dependent wife of Utschur Moschkin, a USDAO employee, who was not aboard the aircraft (see Travel Order at TAB 44); and Laurie Stark, adult daughter of Dr. Merrit W. Stark, a Public Health Physician assigned to the U. S. Agency for International Development (USAID) and stationed with that agency in Saigon. (See TAB 25 for Dr. Stark's testimony) Dr. Stark, who was officially aboard the aircraft as a medical advisor (See TAB 43, Travel Order) and who was one of the eight U. S. National survivors, requested his daughter, who apparently had no official dependent status in Vietnam, to "serve as an escort on this flight," which she did. Department of the Army Form 3565, Certificate of Death (Overseas), for the first four named fatalities can be found at TAB 48. The Special Consular Services Branch of the State Department has indicated that their Form FS-192, Report of Death of an American Citizen, will be issued to reflect the death of Laurie Stark.

(3) The eight United States National survivors were Dr. Merrit W. Stark; Thelma L. Thompson, USDAO civilian employee (see Statement at TAB 21); Linda Adams, 18 year old dependent daughter of deceased USDAO employee, Barbara L.

Adams (see testimony at TAB 24); Theresa Drye, 17 year old dependent daughter of deceased USDAO employee, Helen Drye, whose brother, Rohn III was also killed (see transcript of interview at TAB 23); Andrea C. Bell, 5 year old dependent daughter of Army E-7 Garnett E. Bell, whose mother, Nova and brother, Michael, were killed; Kunsang Moschkin, 9 year old dependent son of USDAO employee, Utschur Moschkin, whose mother Marta, was killed; Susan Elizabeth Derge, 19 year old daughter of Esso Eastern employee, R. P. Derge (see statement at TAB 22); and Christine Leivermann, 23 year old nurse employed by "Friends for All Children" in Saigon with an office in the United States at Boulder, Colorado. (See Statement at TAB 26)

c. Vietnamese Children

(1) As was stated in paragraph 14 above, no manifest of Vietnamese children was ever presented to the crew of C-5A 218. After the accident, personnel of the American Embassy, Saigon attempted to confirm the number and identity of the Vietnamese children aboard the flight, but were unsuccessful. The Boulder, Colorado headquarters of "Friends for All Children", a child placement agency, was contacted by the Investigating Officer since it appeared that a number of the children had come from institutions in Saigon which were affiliated with their organization. (See TABS 22, 25 and 26) On 23 July 1975 information was received from the Director of the agency, Wende I. Grant, which indicates that the affiliates of "Friends for All Children" in Saigon placed a total of 228 children aboard the aircraft, of which 150 survived and 78 perished. (See TAB 52) It should be noted that two of the children who perished, namely David Bui and Michael Bui, were in fact children of German National, Theodora Bui, and have been categorized as third country nationals in paragraph 27b(1) above. (See also TAB 49) Of the 150 survivors, 9 were injured; however, the extent of their injuries are unknown and likely to remain so.

(2) The day following the accident the bodies of all of the deceased were flown to U-Tapao Royal Thai Air Base, Thailand and turned over to the U. S. Army Mortuary Thailand at nearby Camp Samae Sam, where the task of identification of remains was accomplished. Information received from the Disposition Program Director, Army Directorate of Memorial Affairs, Washington, D.C., indicates that Army pathologists identified the remains of 81 Vietnamese children, to include David and Michael Bui. (See TAB 51 for Department of the Army Forms 3565, Certificate of Death (Overseas) for 79 Vietnamese children; Certificates of Death for David and Michael Bui are found at TAB 50)

(3) In attempting to determine the number of Vietnamese national children survivors/fatalities, Mr. Scott relied (a) upon the testimony of Sergeant Philip R. Wise, a medical technician and one of the few survivors of those on

board in the cargo compartment at the time of the accident; and (b) upon the information he received from Army pathologists at Camp Samae Sam who reported they had what appeared to be the remains of 93 children. (See TAB 45, Scott's report)

(4) In my 17 April 1975 interview with Sgt Wise at the USAF Hospital, Clark Air Base, a verbatim transcript of which may be found at TAB 20, he testified that there were no children in the cargo compartment, only adults (see TAB 20, pp 4 and 5), "well over a hundred" (page 6) although "there could have been small little kids", he doesn't "remember seeing any" (page 7). In light of the injuries he received as a result of the accident and considering his demeanor and the manner in which he answered questions, I have concluded that his testimony with regard to the number and category of passengers in the cargo compartment is not reliable.

(5) Subsequent information received from Army pathologists at Camp Samae Sam indicate that although 93 remains bags thought to contain the bodies of 93 Vietnamese children were originally received from Saigon, the identification process demonstrated that in fact the 93 bags contained the remains of 81 children.

28. The aircrew was briefed on weather at 2101Z, 3 April 1975 by the Clark Duty Weather Forecaster. The weather was briefed as visual meteorological conditions (VMC) with no significant weather from Clark to 112 degrees East; isolated thunderstorms and associated weather, tops at FL 400 from 112 degrees East to 110 degrees East; no significant weather from 110 degrees East to Saigon; landing weather at Saigon was forecasted to be 4000 feet scattered, 13,000 feet broken, 28,000 feet broken, visibility 7 miles, wind direction at 340 degrees at 8 knots; altimeter 29.79. The crew called via pilot-metro service for a re-brief at 0150Z, 4 April 1975. Minimum changes were given in arrival weather but enroute weather was not changed. On the flight to Saigon the weather encountered was essentially as briefed except that the cirrus associated with the isolated thunderstorms off the coast was more dense than expected and light turbulence was experienced at FL 310 while in instrument meteorological conditions from 112 degrees East to 110 degrees East. On the return flight to Clark the takeoff weather was 2600 feet scattered, 4000 feet scattered, 30,000 feet broken, visibility 7 miles, wind direction from 130 degrees at 14 knots, altimeter 29.79. There were isolated towering cumulus between Saigon and the coast but the aircraft was in visual meterological conditions from takeoff until impact. Saigon weather at impact was 2600 feet scattered, 30,000 feet broken, visibility 7 miles, wind direction from 120 degrees at 15 knots, altimeter 29.76. Crew interviews and an analysis of meteorological information (See TAB 37) demonstrate that weather was not a factor in the events leading up to the rapid decompression or in the attempted recovery of the aircraft. (See also TAB 76)

29. Examination of the records of the crew members aboard C-5A 218 at the time of the accident demonstrates that the primary crew members were current and fully qualified in their flying duties in accordance with Air Force and

Military Airlift Command directives. (AFM 60-1 and MAC Supplement thereto and MACR 51-1, 51-5 and 60-1). Additionally, those crew members who were flying in an authorized student status were under the proper supervision of currently qualified instructor personnel. Further, interviews with the crew and a review of AF Forms 1042 "Medical Recommendation for Flying Duties" indicate that all crew members were in good health, on no medication and with no irregularities during the 72 hour period preceding the accident. (See TABS 56 through 70 for pertinent flight records of crew members and TAB 35, Statement of Major DiFerdinando.)

30. Because of the political situation in South Vietnam at the time of the accident and thereafter there was no way to achieve complete security of the accident site. While security was provided against the Viet Cong, there was no security against pilferage, which had begun immediately after the crash and continued at a tremendously high rate. The Aircraft Accident Investigation Team reported that their initial survey of the site revealed that the aircraft avionics and communications equipment had been removed from the aircraft and the crash site by the local populace. Additionally, Vietnamese civilians were continually in the process of removing remaining pieces of wreckage. Attempts to prevent the removal of wreckage met with resistance. In an effort to retrieve as many aircraft components as possible, three programs were implemented.

a. United States Navy assistance was requested in locating aircraft components that departed the aircraft at the time of rapid decompression which occurred over water. As a result of Naval efforts, a piece of the torque deck frame was recovered on 20 April; a part of the actuating mechanism for the pressure door toes and left-hand radius driver arm for the aft center cargo door was recovered on 24 April; two cargo roller sets normally mounted on the ramp as well as the ramp cargo winch were recovered on 25 April; both a 20 ft by 12 ft by 4 ft section of the aft ramp and a 7 ft by 12 ft section of the pressure door were recovered on 26 April. Salvage operations were terminated on 27 April.

b. Funds were obtained in an attempt to purchase or "buy back" components that had been pilfered from the crash site by Vietnamese locals. Handbills depicting aircraft components and avionics components were developed and distributed among the local populace. The handbills offered monetary awards for return of components. On 19 April, the Maintenance Data Recorder (MDR) tape was recovered by this method. The effectiveness of this program was limited due to the fall of the South Vietnamese government.

c. Further digging and probing of the crash site was accomplished and several components were recovered. When it became evident that no further components were to be found

and military activity was beginning to increase, the remaining wreckage was abandoned on 19 April.

The aircraft components were returned to Clark AB where they were crated and on 20 April 1975 were shipped by air to the San Antonio Air Logistics Center, Kelly Air Force Base, Texas for laboratory analysis. (See TAB 33, Statement of Captain Bixler)

31. Interviews and statements of the flight crew demonstrate that a security watch was established during the time the aircraft was on the ground at Tan Son Nhut. Additionally, the aircraft was inspected by crew members prior to its departure for explosive devices and none were found. Further, crew members stated that prior to the rapid decompression they neither heard nor saw anything that might be associated with an explosive; but, on the contrary, testified that what they heard and felt was identical to the sound and feel of prior rapid decompressions which they had experienced during training in the altitude chamber. There is also no evidence that the decompression had occurred as a result of the detonation of an explosive device contained in the passengers' baggage. There is no evidence that the aircraft had taken ground fire during departure, and at the time of the rapid decompression it had departed the area of small arms effectiveness.

32. On three separate occasions, Air Force Explosive Ordnance Disposal (EOD) personnel searched the accident site for evidence of explosive detonations as follows:

a. On 5 April 1975 an EOD team from the 635 Munitions Maintenance Squadron, U-Tapao AB, Thailand failed to uncover any damage that may have been caused by an explosive.

b. On 5 April 1975 another EOD team from the 3 Munitions Maintenance, Clark AB arrived and searched the area with negative findings.

c. A third search of the area was made by 3 Munitions Maintenance Squadron EOD personnel on 6 April 1975 with the assistance of an explosive detector dog, also with negative results.

33. All aircraft components which were airlifted to Clark AB were checked at that location by a detector dog and by two other detector dogs upon their arrival at San Antonio Air Logistics Center, Kelly AFB, Texas. At the latter location the dogs alerted on 3 components which were subsequently sent to the FBI laboratory for an analysis which proved negative. (for paragraphs 31, 32 and 33 see TAB 34, Statement of MSgt Johnson and also TAB 87, Laboratory reports and other materials concerning explosive damage.)

34. Data from the Maintenance Data Recorder (MDR) tape of C-5A 218, recovered as a result of the "Buy Back" program described in paragraph 30b above, was transmitted to the Central Data Bank at the Oklahoma City Air Logistics Center. Ground Processing System (GPS) Program 67220, Flight Segment Parameter Listing (FSPL), was then extracted for use in verifying operational conditions of the aircraft on the flight legs prior to the accident and until the time of the accident itself. An analysis of GPS Program 67220 FSPL revealed that the aircraft had been operating normally since departure from Travis AFB on 1 April 1975 until arrival at Saigon on 4 April. No unusual maintenance malfunctions that could be related to a rapid decompression or aft ramp system failure were recorded. Critical engine, flight control, air frame and aircraft system parameters all indicated normal operations. Further analysis of the program revealed that climbout of the aircraft from Tan Son Nhut was normal with all engines operating within limits. Approximately 12 minutes after takeoff with the aircraft in climb power, all engine parameters within limits, at an air speed of .610 mach and an altitude of 23,424 feet, the reported rapid decompression occurred and hydraulic pressure to the pitch and yaw augmentation systems was lost. Almost immediately afterwards hydraulic pressure to the lateral augmentation system was lost, the aircraft began descending and extremely erratic throttle usage was recorded. Further, airspeed was continually increasing and decreasing in direct relationship to throttle manipulation, verifying the testimony of the flight crew that descent of the aircraft was being controlled through use of engine power. 14 minutes after rapid decompression (27 minutes after takeoff) program analysis indicates loss of power to the MDR and no subsequent recordings. The aircraft, at that time, was at 537 feet pressure altitude which was the same altitude recorded at takeoff. (See TAB 88)

35. An analysis of the historical records of C-5A 218 reveals that it was the 21st aircraft produced by the Lockheed Aircraft Corporation. The aircraft was originally delivered to Charleston AFB, South Carolina, on 5 September 1970 and was subsequently transferred to Travis AFB on 22 January 1972. The aircraft entered depot update maintenance at Lockheed-Georgia Company on 21 September 1974 and was redelivered to Travis AFB on 19 December 1974. There were no recorded flights between 20 December 1974 and 2 January 1975. During January 1975, the aircraft logged 8 sorties and 33.1 hours flown; for February, the totals were 14 and 74.2; for March, 10 and 47.8; and for April 6 and 29.4. Total airframe hours on C-5A 218, up to the time of the accident, were 2388.5 and total landings 1109.

36. All AFTO Forms 781A, Maintenance Discrepancy and Work Document, as well as associated maintenance data for the period 29 January 1975 through the date of the accident (AFTO Forms 781A for 31 March 1975 through date of accident are at TAB 89) were reviewed for significant maintenance discrepancies or maintenance actions on components of the aft cargo loading system of C-5A 218. This review was made

in light of the sworn testimony of 11 members of the flight crew of the aircraft and 35 metallurgical analysis reports concerning parts recovered from C-5A 218, accomplished by the San Antonio Air Logistics Center Metallurgical Laboratory (Air Force Logistics Command), Kelly Air Force Base, Texas. (See paragraph 37, following) Expert maintenance testimony establishes that there were three significant entries reflected in the AFTO Forms 781A that could be related to the aft cargo loading system failure. (See TAB 36) They are as follows:

a. Removal of a tie rod assembly between #2 and #3 right aft cargo ramp locks (hook bellcranks #2 and #3) on 16 March 1975 for use in another aircraft and subsequent replacement of that part, which was obtained from a third aircraft, on 24 March 1975 (see TABS 30, 32 and 90).

b. Removal of a tie rod assembly between #3 and #4 right aft cargo ramp locks (hook bellcranks #3 and #4) on 16 March 1975 for use in another aircraft and subsequent replacement of that part, which was obtained from a third aircraft, on 24 March 1975 (see TABS 30, 32 and 90).

c. The requirement for a rig check of the aft ramp locks as a result of the replacement of tie rod assemblies between hook bellcranks #2 and 3 and 3 and 4 (a and b above). Since at the time of replacement of the tie rod assemblies the hydraulic systems were inoperative, the rig check requirement could not be accomplished on 24 March, but was subsequently cleared on 29 March 1975. (See TABS 29, 31, 91 and 92)

37. Various part of the aft ramp, aft ramp locking mechanism, empennage flight control cables, and tail section hydraulic lines, which were recovered as described in paragraph 30 above, were submitted to the Metallurgical Laboratory, San Antonio Air Logistics Center, for metallurgical analysis. It should be noted that all components of the above systems were not submitted since they were not recovered. This is especially true of the aft ramp locking system where less than half of the components were finally recovered. TAB 94 contains 35 reports prepared by the Metallurgical Laboratory which reflects the results of their metallurgical analysis. A summary of these reports may be found at TAB 95.

IV. DISCUSSION

38. At the time of rapid decompression, the crew was faced with multiple system failures resulting in a catastrophic situation. Technical Order guidance does not address an emergency of the magnitude involved. Loss of pitch and yaw control resulted in an essentially uncontrollable vehicle. The aircraft commander made two major decisions which exhibited outstanding judgment, timely analysis, innovativeness and pilotage skills and which allowed for a semi-controlled crash landing and the survival of the majority of the passengers and crew.

a. During the initial loss of pitch control, the pilots determined that very basic aerodynamics would be necessary to control the aircraft and that the only way to stop the rapidly descending, accelerating aircraft was to add power in order to provide a pitch up moment. The stabilizer trim (.5 nose down) was set for 254 knots and therefore the aircraft was seeking that airspeed as its point of pitch stability. The power application, even though foreign to normal procedures when accelerating to a higher airspeed, insured that the aircraft would again have a pitch up moment. These techniques, along with banking the aircraft, were developed and used by the crew to regain limited pitch control.

b. Halfway through the turn to final approach, the pilots observed a rapid drop in the nose of the aircraft. Recognizing they were not going to be able to reach the runway, they elected to roll the wings level and land straight ahead. This extremely important decision, along with full application of power, in order to arrest the rate of descent, again alien to normal pilot reaction, resulted in a lower rate of vertical velocity immediately prior to impact and greatly enhanced the survival potential of those aboard. (See TABS 35 and 84)

39. In a ceremony at Travis Air Force Base on 21 July 1975, Air Force Crosses were awarded to Captain Traynor, the aircraft commander and Captain Harp, the copilot, for extraordinary heroism and airmanship while engaged in a humanitarian mission on 4 April 1975. Distinguished Flying Crosses were awarded to Captain Malone, copilot; Captain Langford, navigator; Senior Master Sergeants Perkins and Snedegar, loadmasters; and Master Sergeant McAtee and Technical Sergeant Engles, flight engineers, for extraordinary achievement while participating in aerial flight on 4 April 1975. (See press report, TAB 85)

40. No specific rigging, adjusting or operational checking instructions for tie rod installation are provided in Technical Order 1C-5A-2-12. Paragraph 3-81b of the Aft Ramp Lock Subsystem Installation instructions states, "Rig aft ramp locks in accordance with rigging instructions provided in Figure 3-44". Paragraph 3-168, Aft Ramp Rigging Instructions, includes 3-44. Paragraph 3-168d states, "Instructions are sequenced for complete ramp rigging. If a particular maintenance effort requires performance of only a portion of the rigging procedure, use the following tabulation to isolate the applicable steps." This following tabulation does not contain steps for checking, rigging or adjusting the tie rods that had been replaced on 24 March 1975 (see paragraph 36 above). Considering the lack of specific tie rod rigging and adjustment instructions in Technical Order 1C-5A-2-12 the actions of maintenance personnel became a matter of personal judgment and experience. As such the maintenance personnel involved decided to use the guidance contained in Paragraph 3-173, Aft Ramp Mechanical

Rigging Verification, to verify the proper rigging and adjustment of the tie rods (See TABS 29 and 31). While the title of paragraph 3-173 may well indicate that accomplishing the instructions of that particular paragraph would verify that the ramp locking system is properly rigged, in fact such accomplishment would not verify that all adjustments, measurements, pull forces and over center positions are correct, as required by the total ramp rigging procedures contained in paragraph 3-168, "Aft Ramp Rigging Instructions." (See TAB 93)

41. Visual observation of the recovered components together with the results of the 35 metallurgical laboratory analysis reports referred to in paragraph 36 above, confirm a failure sequence wherein the aft ramp came loose from the right side. (All directions are from the aft of the aircraft looking forward.) The ramp was then torn right to left across the front of ramp station (RS) 33 bulkhead and rotated downward from its normal horizontal position to a near vertical position about the left side locking system before departing the aircraft.

a. The above failure sequence is supported by observation of the failure pattern of the recovered left hand side ramp locking hardware (floor brackets and yoke assemblies). All left hand floor brackets and yokes failed in a manner that indicates they were carrying load and the ramp rotated about a hinge line formed by these seven locks. Laboratory analysis of the recovered right side ramp locking hardware, in lock positions 4, 5 and 7 revealed failure due to excessive overload in the vertical direction. The hardware from lock positions 2, 3 and 6 were in good condition and the laboratory analysis of this hardware did not reveal signs of excessive overload. The hardware from lock position 1 was not recovered.

b. This evidence indicates that some of the right side locks were not carrying their share of the load. The direction of failure of the locks that were carrying load places the ramp in the normal horizontal position at the start of the failure sequence. In addition, the ramp rotation is confirmed by visual evidence found on the exterior skin of the recovered mating ramp to fuselage sloping longeron section. This evidence consisted of scratches on the fuselage skin that match button head fasteners that are on the ramp floor. In order to cause scratches on the fuselage skin, the ramp would have had to rotate approximately 90 degrees about the left side locking system. This also supports the sequence of initiation occurring in the right side locking system of the ramp. Additionally, the laboratory analysis of the fracture surfaces at ramp station (RS) 33 support the direction of ramp tearing from right to left. (See TAB 95, Letter from SAALC)

42. Evidence derived from visual and laboratory analyses does not conclusively demonstrate a definite point or exact cause of failure initiation. The evidence does, however, point in the direction of a "most probable" cause that supports the failure progression, referred to in paragraph 41 above, involving the numbers 1, 2 and 3 right side locking mechanisms as follows: A sudden dumping of the load from numbers 1, 2 and 3 locks on the BL 84 ramp hinge could cause a simultaneous compressive failure of the hinge and failure of the lower beam cap at ramp station (RS) 33. This is supported by the laboratory analysis of the BL 84 hinge. The remaining load carrying locks on the right side (4, 5 and 7) failed in overload and the ramp was forced down from the right, tearing completely across at the RS 33 bulkhead. (See TAB 95, Letter from SAALC)

43. Since the pressure door is attached to the ramp, its motion was influenced by the ramp movements. Visual inspection of the recovered parts verify a downward right to left rotating of the pressure door. It is assumed that the pressure door struck the sloping torque deck area of the aircraft fuselage, causing the empennage flight control cables and hydraulic lines for systems 1 and 2 to separate, which in turn caused the loss of all empennage flight controls, i.e., pitch trim, elevator and rudder systems. The laboratory failure analysis of these items supports this type of sequence, although not conclusively. (TAB 95, Letter from SAALC)

44. While the laboratory evidence conclusively establishes that fatigue failure was not a factor in any of the components that were analyzed, evidence was derived that indicate a stress-corrosion problem with the bellcranks. However, expert testimony reveals that a situation can exist where the hook tip impinges on the bottom side of the yoke shaft during the locking sequence. If that be the case, the hook tip is set on a hair trigger unstable arrangement where it can slip into either the locked or the unlocked position, depending on just where the hook tip has engaged the yoke shaft. When the hook tip does slip into either the locked or unlocked condition, there is a dynamic shock release of the binding force that is transmitted into the bellcrank. This sudden shock impact can be of sufficient magnitude to crack the bellcrank in the identical manner and in the same location as those bellcranks recovered from C-5A 218 and subsequently subjected to metallurgical analysis. If this situation occurs, and the bellcranks are not inspected, a cracked condition in the bellcrank would go unnoticed. In time, the surfaces of the crack would then be exposed to corrosion. This corrosion and resulting discoloration of the cracked surfaces could easily be misinterpreted as stress-corrosion and the evidence of the overload failure would be reduced due to the corrosion effects. In view of the above, the evidence of stress-corrosion is inconclusive. (TAB 95, Letter from SAALC)

45. On 12 June 1975, a "Summary Report of C-5A Accident," based upon the Report of Investigation of the Aircraft Accident Investigation Board convened under Air Force Regulation 127-4, was publicly released by the Air Force. The text of the "Summary Report" may be found at TAB 97 and a press account at TAB 98.

46. At this writing, six lawsuits arising out of the accident are known to have been filed against Lockheed Aircraft Corporation. The summary of the pleadings in these six actions may be found at TAB 99.

47. At this writing, five claims arising out of the accident are known to have been asserted and are being processed under the provisions of 10 USC 2733, Military Claims Act (Chapter 7, AFM 112-1) as follows:

a. Susan Derge v. U.S., QD/XDAT/75-00904/N: Claim presented for personal injury in the amount of $50,000 and for loss of personal property in the amount of $3,068.80. The claim was forwarded from Hq 22AF/JA to Hq MAC/JA on 28 July 1975.

b. Darwin E. Maier v. U. S., QD/XDAT/76-00057/N: Claim presented for wrongful death of claimant's wife, a DOD civilian employee, in the amount of $1,950,000 and for loss of personal property in the amount of $5,011.00. The claims file was received by Hq 22AF/JA for review on 29 July 1975, and was forwarded to Hq MAC/JA on 31 July 1975.

c. Garnett E. Bell v. U. S., QD/XDAT/76-00085/N: Claim for $1,500,000 for alleged severe spinal injuries was filed by Garnett E. Bell on behalf of his daughter, Andrea C. Bell, age 5. The file was forwarded to Hq 22AF/JA for processing on 1 August 1975 by the Claims Office, Los Angeles Air Force Station. Extensive investigation will be required, including a review of medical records before the file can be forwarded.

d. Garnett E. Bell and Andrea C. Bell v. U. S., QD/XDAT/76-00093/N: Claim for $3,000,000 for wrongful death of Mrs. Nova L. Bell (wife of Garnett E. Bell) and her son, Michael Bell, age 10. The file was forwarded by Los Angeles Air Force Station Claims Office on 1 August 1975 and will be forwarded to Hq MAC/JA following valuation of the wrongful death claims which should be completed in the near future.

e. Merrit W. Stark v. U. S., QT/PPBXUR/75-01295/N: Claim presented for wrongful death of claimant's daughter, Laurie Jean Stark, non-government connected U. S. citizen, in the amount of $125,000 and for loss of personal property in the amount of $1500.00. Claim was filed at Bolling AFB, Washington, D.C., on 16 June 1975 and has not yet been received by Headquarters 22 Air Force.

V. SUMMARY OF EVIDENCE

48. USAF Aircraft C-5A Serial Number 68-218 crash landed 2 nautical miles northeast of Runway 25L, Tan Son Nhut Air Base, Vietnam at 0830Z (1630 local) 4 April 1975.

49. During climbout, the aft pressure door and ramp departed the aircraft causing hydraulic lines and flight control cables to the empennage section of the aircraft to be severed. Because of the lack of any normal pitch control system, the pilot had extremely limited control of the aircraft which resulted in a crash landing and total aircraft destruction.

50. As a result of the accident, 138 of the 314 persons aboard the aircraft were fatally injured, to include 11 U. S. Air Force crew members; 40 U. S. citizens (35 Department of Defense civilian employees of the United States Defense Attache Office, Saigon and 5 others to include 2 dependent wives, 2 dependent children and 1 private citizen); 79 Vietnamese National children; and 8 third country nationals (5 German, 2 Australian, 1 Malaysian). The total of those who survived is 176, to include 18 crew members; 8 U. S. citizens (2 U. S. Government civilian employees, 4 dependent children and 2 private citizens); and 150 Vietnamese National children.

51. The records of the crew members aboard C-5A 218 disclose that the primary crew members were current and fully qualified in their flying duties in accordance with applicable directives. Those crew members who were flying in an authorized student status were under the proper supervision of currently qualified instructor personnel.

52. The aircraft commander faced with a catastrophic situation involving multiple system failures and resulting in an essentially uncontrollable vehicle, a situation which technical order guidance does not address, made two major decisions, both of which, exhibited exceptionally outstanding judgment and allowed for a semi-controlled crash landing and the survival of the majority of the passengers and the crew. The first decision was to add power in order to provide a pitch up moment to the rapidly descending, accelerating aircraft; and the second was to roll out and land straight ahead with full application of power halfway through the turn to final when it became evident that because of a rapid drop in the nose of the aircraft the runway could not be reached.

53. Witness testimony, visual and metallurgical evaluation of recovered components, explosive ordnance disposal analysis and FBI laboratory reports failed to disclose any evidence of sabotage, small arms ground fire, air burst or on-board explosives as a cause of the accident.

54. Analysis of the data derived from the Maintenance Data Recorder (MDR) tape revealed no significant maintenance malfunction that could be related to a rapid decompression or aft ramp system failure.

55. Maintenance records for the aircraft reflected three significant entries that could be related to the aft cargo loading system failure. They included removal on 16 March 1975 and subsequent replacement on 24 March 1975 of tie rod assemblies between #'s 2 and 3 and 3 and 4 right aft cargo ramp locks and the requirement for a rig check as a result thereof, which was performed on 29 March 1975.

56. The accomplishment of the instructions contained in paragraph 3-173, Aft Ramp Rigging Verification, Technical Order 1C-5A-2-12 would not necessarily verify that the ramp locking system is properly rigged, in that it would not necessarily verify that all adjustments, measurements, pull forces and over center positions are correct.

57. Visual observation of the recovered structual and mechanical components as well as laboratory analysis thereof confirm a failure sequence wherein the aft ramp came loose from the right side. The ramp was then torn right to left across the front of ramp station 33 bulkhead and rotated downward from its normal horizontal position to a near vertical position about the left side locking system before departing the aircraft.

58. Laboratory analysis of the failure pattern of the recovered left hand side ramp locking hardware (floor brackets and yoke assemblies) disclose that they were carrying load at the time of failure. Analysis of the recovered right side ramp locking hardware in lock positions 4, 5 and 7 revealed failure due to excessive overload in the vertical direction. The hardware from lock positions 2, 3 and 6 were in good condition and did not reveal signs of excessive overload.

59. The "most probable" cause of failure initiation is the sudden dumping of the load from numbers 1, 2 and 3 right side locks on the BL 84 ramp hinge, which in turn caused a simultaneous compressive failure of the hinge and failure of the lower beam cap at ramp station 33. This resulted in the remaining load carrying locks on the right side (4, 5 and 7) to fail in overload and the ramp was forced down from the right, tearing completely across at the ramp station 33 bulkhead.

60. The laboratory evidence conclusively establishes that fatigue failure was not a factor in any of the components analyzed. There was inconclusive evidence of a stress-corrosion problem with the bellcranks.

61. The movement of the ramp influenced the movement of the pressure door to which it is attached. Visual and laboratory evidence demonstrates, although not conclusively, a downward right to left rotating of the pressure door, which struck the sloping torque deck area of the fuselage, causing the empennage flight control cables and hydraulic lines for systems 1 and 2 to separate. This separation caused the loss of all pitch trim, elevator and rudder flight controls.

BERNARD A. WAXSTEIN, JR., Colonel, USAF
Investigating Officer

15 AUG 1975

1089

Received 3/7/80

THE ETIOLOGY, PATHOGENESIS AND CLINICAL FINDINGS IN 34 CHILDREN INVOLVED IN THE C5A AIRPLANE CRASH

: A Preliminary Report

I. INTRODUCTION

10:00-10:10 Dr. Michael Cohen

Introduction

II. LIFE IN AN FFAC NURSERY

10:10-10:30 Christie Lievermann and Michael Marcus

Q & A Interview

10:40-11:00 Dr. Jack C. Redman

Discussion of life circumstances in the FFAC nurseries in Vietnam

III. THE CRASH

11:10-11:30 Mr. William Timm

Description of the C5A accident on April 4, 1975 near Saigon, Vietnam

11:40-12:00 Dr. Richard Snyder

Impact tolerance to the human brain

12:10-12:30 Dr. J. Kenneth Mason

Introduction to Aviation Pathology

Lunch 12:30-1:00

1:00-1:20 Dr. Y. King Liu

Film of head injury in monkeys

IV. CLINICAL FINDINGS

1:30-1:50 Dr. Itzhak Brook

Pediatrician's View

2:00-2:20 Dr. Eric Denhoff

General Introduction to the condition of MBD and related disorders

Neurological findings in the survivors of the C5A aircrash accident: A comparative study to Wendel's Monkey Model

DEFT. EX. DD- Cromack Exh 5
DATE: 10-27-81
REPORTER: ALBERT J. GASDOR

Elements of future rehabilitative efforts on behalf of the surviving children

Coffee Break 3:00-3:15

3:15-4:05 Dr. Bruce Copeland and Dr. C. Keith Connors

Psychological evaluation and diagnostic aspects

Psychiatric correlates of the psychological evaluation

4:15-4:35 Dr. Thomas Lustberg and Marcia Robinson

Psychiatric aspects

4:45-5:05 Dr. Marianne Schuelein

Pediatric Neurological and EEG aspects

V. CONCLUSION

5:10-5:30 Dr. Michael Malone

Summary and Conclusions

The Workshop will be held at the Hyatt Rosslyn, Saturday, March 8, 1980, Room 411, 1325 Wilson Boulevard, Arlington, Virginia, 703-841-9595.

Coffee will be provided beginning at 9:30 a.m.

6/19/80

Proj 1089

SARPMA

SAT

PHOTOS OF DAMAGED PARTS

1 - White piece - casting cover
2 - D-ring
3 - Olive pc #7-4
4 - I beam
5 - Rt BL 84 Hinge - yellow & olive w/ white paper attached
6 - Rt side Aft ramp lock - grey & olive
7 - Fwd ramp Winch well - long - grey & olive
8 - ⅄ pc olive
9 - 4-6 silver
10 - RH Pres. Door Seal 3-20
11 - Flat dusty pc - Ramp STA 54R #3
12 - Large pc w/ cyl
13 - RH FWD MLG Fuselage Fairing STA 1632
14 -
15 - Burned Fabric
16 - Burned Parts
17 - Burned silver I-beam
18 - Burned metal w/ threaded pc
19 - " flat section
20 - L Shaped pc
21 - Burned metal parts long w/ holes

DEFT. EX. DD-Cromack Exh 6
DATE: 10-27-81
REPORTER: ALBERT J. GASDOR

6/19 Proj 1089

0737 Dr. Cohen out 0740

Mr. Tim & D need instr on where to go —

Cohen will notify Call.

Lena 0749 in — 0754

Kelly AFB main Gate

Bldg 105 at 0800 Hrs.

John Fricker —

Arr made by Pat Piper — Atty for Dept of Justice

Mr. Frazier — call John Fricker at earliest opp

Trial is being postponed

Possibility that parts can/should be tested

Ray Reinnels — Deputy Ch. Security KAFB

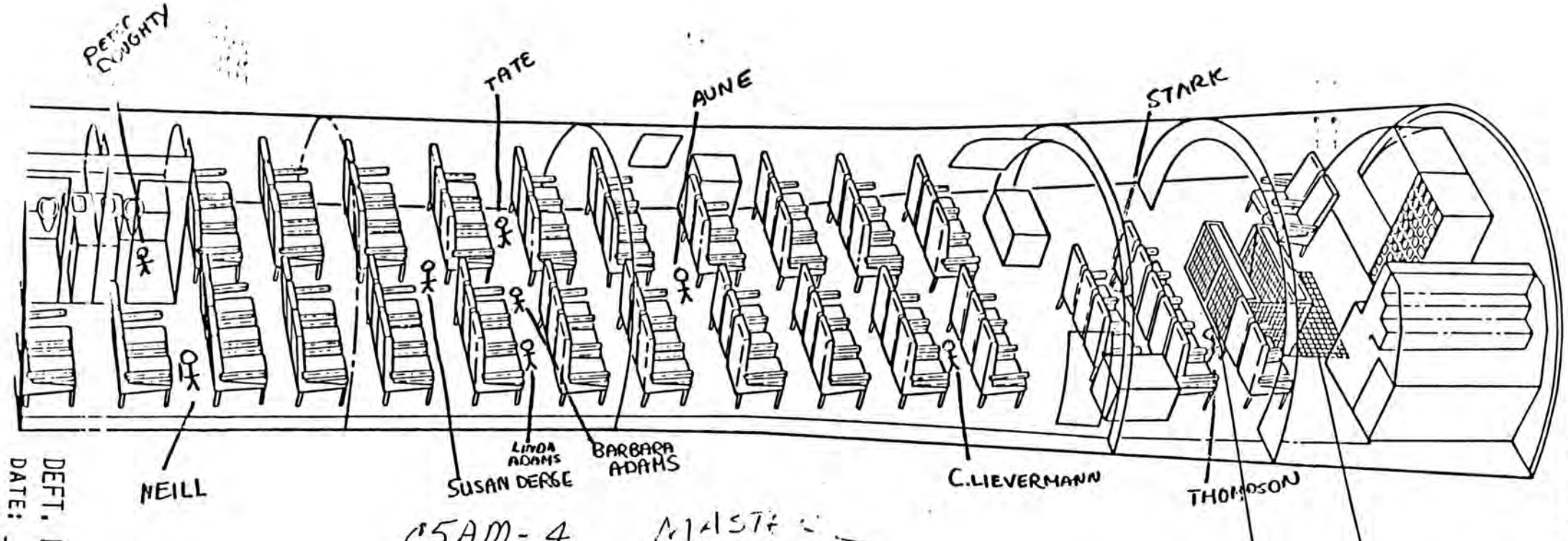
Piper — Justice Dept. atty

Edwards — Lockheed Engr

Bill Tinn

Tom Frazier

Gary Mosely — setting up visit — MAB



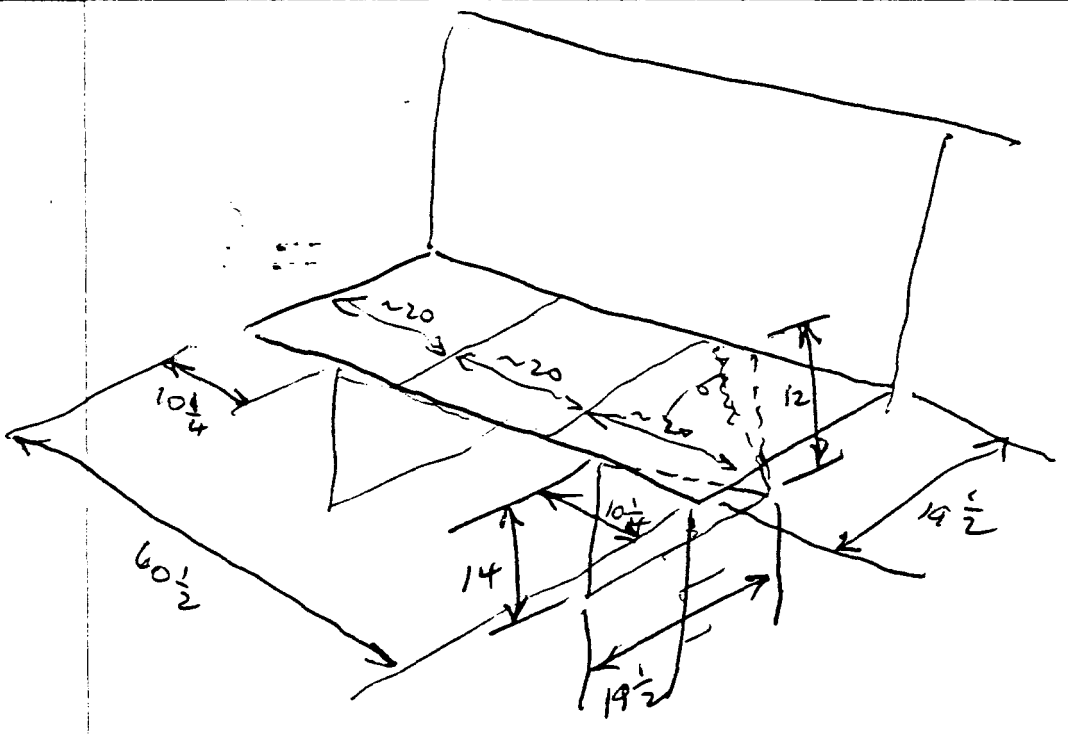
C5AM-4 MASTER

DEFENDANT'S EXHIBIT DD1210

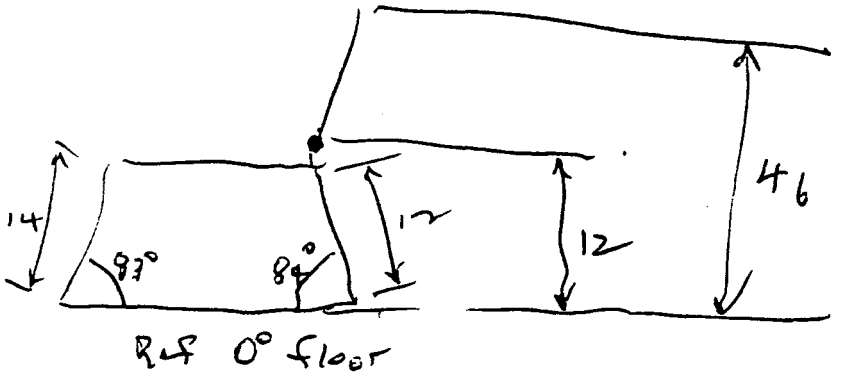
DEFT. EX. DD-Cromwell Ex. 7
DATE: 10-27-82
REPORTER: A. J. GASDOR

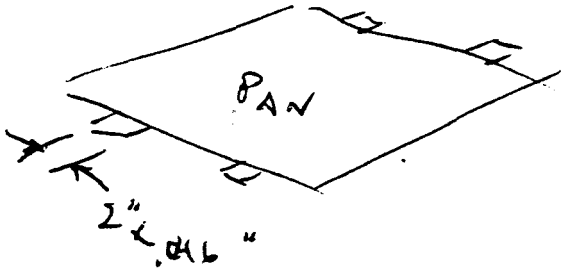
6/19/80
Proj 1089

SEAT DIMS.



Single bolt attachment to floor fitting – 3/8"





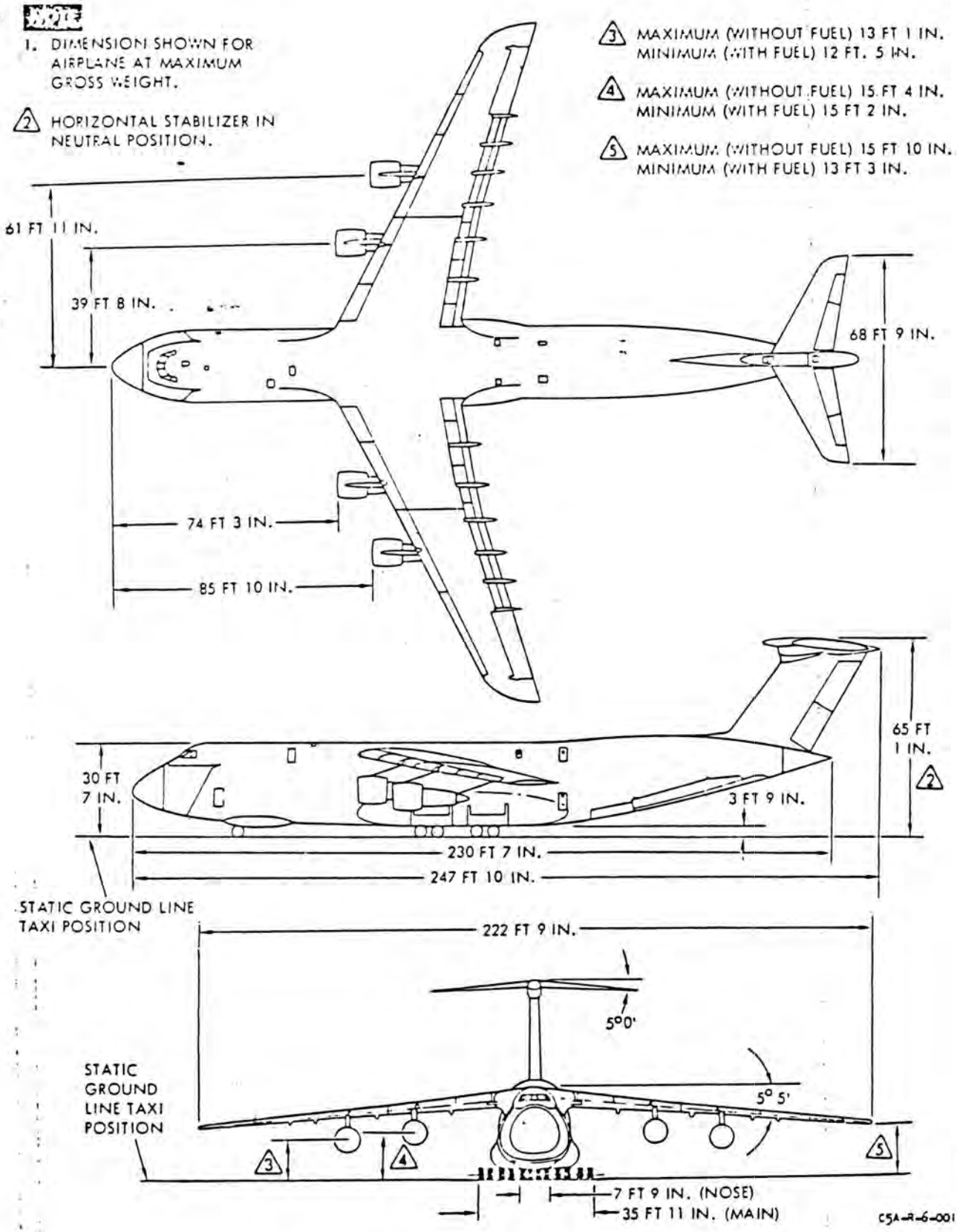


Figure 1-1. Airplane Dimensions

DEFENDAN. S EXHIBIT

DEFT. EX. DD-Cromack Eth 8a
DATE: 10-27-81
REPORTER: A. J. GASDOR

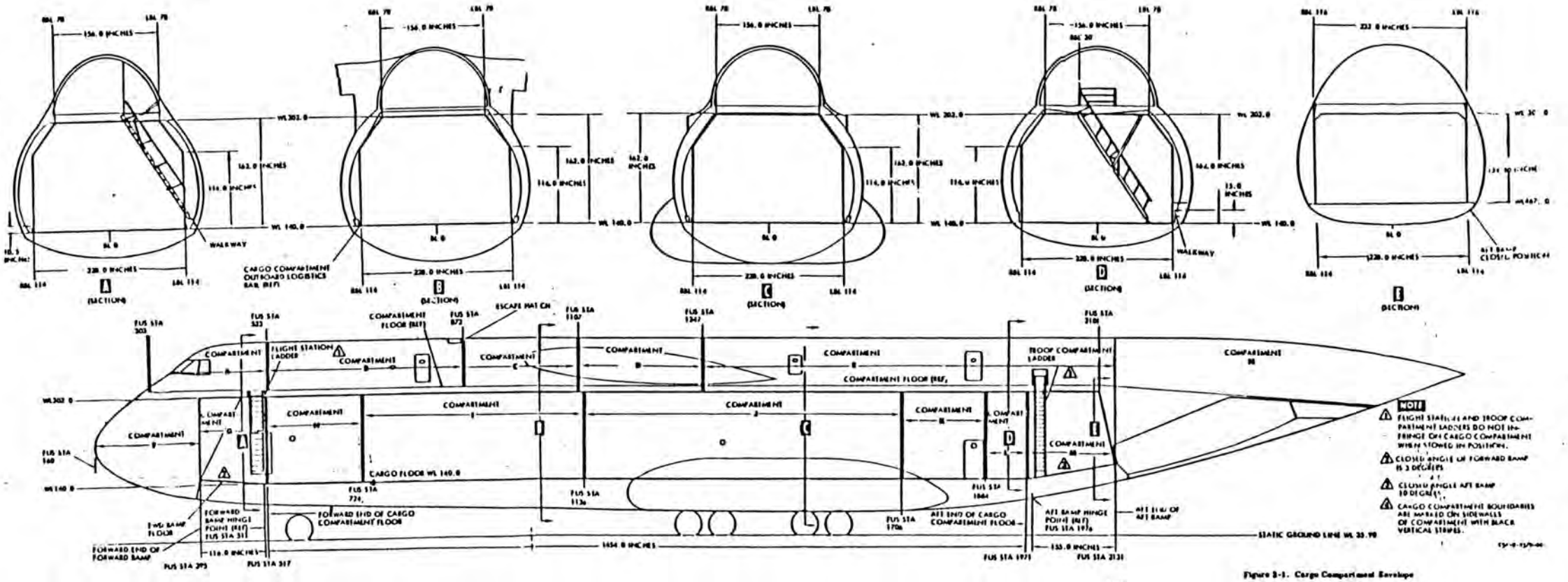


Figure 3-1. Cargo Compartment Envelope

DEFT. EX. DD- Gomack Exh 86
DATE: 10-27-81
REPORTER: ALBERT J. GASDOR

DEFENDANT'S EXHIBIT

Decoding of SLRP (05) messages on record 11977

LOCKHEED-GEORGIA COMPANY
A DIVISION OF LOCKHEED AIRCRAFT CORPORATION

OCTAL X_1 X_2	X_3 X_4	X_5 X_6	X_7 X_8	X_9 X_{10}	X_{11} X_{12}	$(X_3 X_4)$ HEX/CON DEC	SEC/20	$(X_5 X_6)$ HEX/CON DEC	X_7 HEX	PCODE	X_8 HEX/DEC	$(X_9 X_{10})$ HEX/CON DEC	COUNTS	ENGINEERING INTERPRETATION	PARAMETER
05	34 54	16 24				1C 14	14	2C 22	0	44	E 14	14 10	-22	22, DISENGAGED	INFLIGHT REFUELING
05	34 42	56 12				1C 14	14	22 17	2	35	E 14	0A 5	-27	-0.027 RAD/SEC²	PITCH ACCELERATION
05	36 14	16 22				1E 15	15	0C 6	0	12	E 14	12 9	-23	1.03 G'S	VA/CG
05	36 12	24 34				1E 15	15	0A 5	1	10	4 4	1C 14	78	0.24 G'S	LAT/CG
05	36 42	62 04				1E 15	15	22 17	3	35	2 2	04 2	34	0.034 RAD/SEC²	PITCH ACCELERATION
05	40 14	16 02				20 16	16	0C 6	0	12	E 14	02 1	-31	0.96 G'S	VA/CG
05	40 12	26 17				20 16	16	0A 5	1	10	6 6	0F 0	96	0.30 G'S	LAT/CG
05	40 06	02 40				20 16	16	06 3	0	6	2 2	20 16	-208	537 FT	PRESS ALTITUDE
05	40 42	62 34				20 16	16	22 17	3	35	2 2	1C 14	46	0.046 RAD/SEC²	PITCH ACCELERATION
05	42 14	20 17				22 17	17	0C 6	1	12	0 0	0F 0	0	1.25 G'S	VA/CG
05	42 12	24 14				22 17	17	0A 5	1	10	4 4	0C 6	70	0.22 G'S	LAT/CG
05	42 56	20 64				22 17	17	2E 23	1	46	0 0	34 26	26	-26, NOT DEPLOY	AIR DROP
05	42 42	56 66				22 17	17	22 17	2	35	E 14	36 27	-5	-0.005 RAD/SEC²	PITCH ACCELERATION
05	44 12	12 50				24 18	18	0A 5	0	10	A 10	28 20	-76	-0.24 G'S	LAT/CG
05	44 60	16 74				24 18	18	30 24	0	48	E 14	3C 30	-2	+2, UNKNEELED	FORWARD KNEEL
05	44 42	52 32				24 18	18	22 17	2	35	A 10	1A 13	-103	-0.103 RAD/SEC²	PITCH ACCELERATION
05	46 14	16 46				26 19	19	0C 6	0	12	E 14	26 19	-13	1.13 G'S	VA/CG
05	46 10	14 12				26 19	19	08 4	0	8	C 12	0A 5	-59	0.41	MACH NO.
05	46 42	46 56				26 19	19	22 17	2	34	6 6	2E 23	-137	137, RETRACTED	GROUND SPOILERS
05	50 14	16 26				28 20	20	0C 6	0	12	E 14	16 11	-21	1.05 G'S	VA/CG
05	50 12	20 74				28 20	20	0A 5	1	10	0 0	3C 30	30	0.09 G'S	LAT/CG
05	50 62	16 74				28 20	20	32 25	0	50	E 14	3C 30	-2	2, UNKNEELED	LEVEL KNEEL
CLOCK MESSAGE,	27	17	52	62	46	SKIP TO NEXT SLRP MESSAGE ('05' FLAG)									
05	02 14	16 17				02 1	1	0C 6	0	12	E 14	0F 0	-32	0.95 G'S	VA/CG
05	02 12	22 62				02 1	1	0A 5	1	10	2 2	32 25	57	0.18 G'S	LAT/CG
05	02 42	50 70				02 1	1	22 17	2	35	8 8	38 28	-100	-0.100 RAD/SEC²	PITCH ACCELERATION
05	04 14	16 22				04 2	2	0C 6	0	12	E 14	12 9	9	1.33 G'S	VA/CG
05	04 12	22 24				04 2	2	0A 5	1	10	2 2	14 10	42	0.13 G'S	LAT/CG
05	04 42	54 46				04 2	2	22 17	2	35	C 12	26 19	-45	-0.045 RAD/SEC²	PITCH ACCELERATION
05	06 42	56 66				06 3	3	22 17	2	35	E 14	36 27	-5	-0.005 RAD/SEC²	PITCH ACCELERATION
05	10 12	24 04				08 4	4	0A 5	1	10	4 4	04 2	66	0.20 G'S	LAT/CG

LOCKHEED-GEORGIA COMPANY
A DIVISION OF LOCKHEED AIRCRAFT CORPORATION

OCTAL X_1X_2	X_3X_4	X_5X_6	X_7X_8	X_9X_{10}	(X3 X4) HEX/CON DEC	SEC/20	(X5 X6) HEX/CON DEC	X_7 HEX	P CODE	X_8 HEX/DEC	(X9 X10) HEX/CON DEC	COUNTS	ENGINEERING INTERPRETATION		PARAMETER
05	10	42	60	30	08 4	4	22 17	3	35	0 0	18 12	12	0.012	RAD/SEC²	PITCH ACCELERATION
05	12	14	16	06	0A 5	5	0C 6	0	12	E 14	06 6	-26	1.01	G'S	VA/CG
05	12	12	22	52	0A 5	5	0A 5	1	10	2 2	2A 21	53	0.16	G'S	LAT/CG
05	14	14	16	26	0C 6	6	0C 6	0	12	E 14	16 11	-21	1.05	G'S	VA/CG
05	14	30	26	44	0C 6	6	18 12	1	24	6 6	24 18	114	-14.7	DEG	RT AILERON POSITION
05	16	14	14	70	0E 7	7	0C 6	0	12	C 12	38 28	-36	0.91	G'S	VA/CG
05	16	12	20	62	0E 7	7	0A 5	1	10	0 0	32 25	25	0.08	G'S	LAT/CG
05	20	12	22	30	10 8	8	0A 5	1	10	2 2	18 12	44	0.14	G'S	LAT/CG
05	22	14	16	16	12 9	9	0C 6	0	12	E 14	0E 7	-25	1.02	G'S	VA/CG
05	22	12	24	34	12 9	9	0A 5	1	10	4 4	1C 14	78	0.24	G'S	LAT/CG
05	22	42	60	54	12 9	9	22 17	3	35	0 0	2C 22	22	0.022	RAD/SEC²	PITCH ACCELERATION
05	24	12	22	60	14 10	10	0A 5	1	10	2 2	30 24	56	0.17	G'S	LAT/CG
05	26	14	16	30	16 11	11	0C 6	0	12	E 14	18 12	-20	1.06	G'S	VA/CG
05	26	42	56	74	16 11	11	22 17	2	35	E 14	3C 30	-2	-0.002	RAD/SEC²	PITCH ACCELERATION
05	30	14	16	16	18 12	12	0C 6	0	12	E 14	0E 7	-25	1.02	G'S	VA/CG
05	30	12	22	24	18 12	12	0A 5	1	10	2 2	14 10	42	0.13	G'S	LAT/CG
05	30	42	56	42	18 12	12	22 17	2	35	E 14	22 17	-15	-0.015	RAD/SEC²	PITCH ACCELERATION
05	32	14	16	02	1A 13	13	0C 6	0	12	E 14	02 1	-31	0.96	G'S	VA/CG
05	34	14	14	72	1C 14	14	0C 6	0	12	C 12	3A 29	-35	0.92	G'S	VA/CG
05	36	14	16	02	1E 15	15	0C 6	0	12	E 14	02 1	-31	0.96	G'S	VA/CG
05	40	30	26	60	20 16	16	18 12	1	24	6 6	30 24	120	-15.2	DEG	RT AILERON POSITION
05	40	06	20	44	20 16	16	06 3	1	6	0 0	24 18	18	25646	FT	PRESS ALTITUDE
05	42	14	16	32	22 17	17	0C 6	0	12	E 14	1A 13	-19	1.07	G'S	VA/CG
05	42	12	22	17	22 17	17	0A 5	1	10	2 2	0F 0	32	0.10	G'S	LAT/CG
05	42	42	56	06	22 17	17	22 17	2	35	E 14	06 3	-29	-0.029	RAD/SEC²	PITCH ACCELERATION
05	46	14	16	17	26 19	19	0C 6	0	12	E 14	0F 0	-32	0.95	G'S	VA/CG
CLOCK MESSAGE			27	17	52	6	50								

MR. LEWIS: No, sir.

THE COURT: Major, thank you very much. You are excused.

(Witness excused.)

THE COURT: Call your next witness.

MR. DUBUC: I would call John Edwards.

MR. LEWIS: Your Honor, may I address counsel privately?

THE COURT: Yes, you may.

(Consel conferring privately.)

MR. LEWIS: Thank you.

Whereupon,

JOHN W. EDWARDS

was called as a witness and, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. DUBUC:

Q Good morning, Mr. Edwards.

A Good morning.

Q State your full name, address and occupation for us, please.

A My name is John W. Edwards. I live at [redacted] Marietta, Georgia. I am employed at Lockhood-Georgia Company in the capacity as Deputy Chief Project Engineer.

Q And in connection with that employment and that description, what are your duties as Deputy Chief Project Engineer?

A My duties,and this is a new job that I just came into in January, in project engineering, we are responsible for the design -- engineering design aspects of all airplanes now in manufacture at the Lockheed-Georgia Company. And, at the present time, this consists of four different aircrafts, those four aircrafts being: - the C-130, a four-engine prop jet aircraft, used primarily by the military. The commercial version of that aircraft, which is called the L-100 series; the C-141, which a a four-engine jet cargo transport aircraft, used primarily by the United States Air Force. The C-5-A aircraft, which is undergoing a wing modification; and, lastly, a new aircraft that we call Model L-400, which is an engine very similar to the C-130 except that it is a two-engine airplane rather than a four-engine airplane.

Q Now, could you tell us your educational background and professional experience up until this time?

A All right. Starting off chronologically, I began my engineering career after I graduated from high school as a mining engineer in Eastern Kentucky, doing essentially surveying type work; very similar to what you see the civil engineers doing -- measuring, et cetera.

World War II, I entered the Service of the Navy, and I continued in this engineering field, and went through two electrical engineering type schools in the Navy, and, finally finishing the last school, I became a professor in the school. Then I was transferred into the Navy college training program, in World War II. I went to Duke University in 1944. And I graduated from Duke University in 1948 with a degree in engineering.

After graduation, I was employed by the Arabian-American Oil Company, with headquarters in San Francisco. My duties there were the initial stages of design of an electrical power plant in the desert in Arabia. I decided not to go live in the desert. And I left Arabian-American Oil Company and ended up marrying a Southern girl in Georgia, and moved down there and got a job with a local outfit called Boiler Equipment Service Company.

In this job, I was essentially dealing in design, sales, installation and service of facilities for power plants; primarily, steam generating power plants. We dealt with the instrumentation systems, the electrical, electronic systems; design of those systems, control systems, et cetera. This was a travelling job. I was away from home quite a bit. I went to Lockheed in 1951, primarily to get off the highway. And I have been at

Lockheed since 1951, which is almost 29 full years. It will be 29 years in August.

I started work at Lockheed on the B-29 aircraft. The B-29 was a World War II bomber, a four-engine bomber, a prop type aircraft.

Our responsibilities were to renovate this aircraft right at the beginning of the Korean War. My job in the Engineering Department was primarily the electrical and electronic systems, and the design and assisting the manufacturing people in getting these systems back into operation from these mothballed aircraft.

At the conclusion of that program, I can't remember the dates exactly, but I went to the B-47 aircraft program. The B-47 is a six-engine jet bomber. Here, again, my background being primarily in electrical and electronics, I was in the engineering roup assigned to des gn changes on the B-47 aircraft in all the electrical and electronic type systems.

In 1959, the Air Force decided they needed a target aircraft to test their ground-to-air missiles. And they wanted to know if they could take a B-47 bomber and convert it to a drone aircraft -- an aircraft without a pilot. It was a pilotless aircraft.

I was put in charge of the design of that program. And in the design of a drone aircraft, everything

had to operate automatically or by remote radio control. This program took approximately a year to get the design completed and the hardware installed on the aircraft. And at that time when the first aircraft was completed, the design was essentially over, the aircraft was moved to a remote site, a remote test site in Florida.

I was pulled out of design and was made the test program director at Eglin Air Force Base in Florida. And the testing of this pilotless B-47 aircraft took approximately one year.

I came back to the plant and this is about the time that we started the design effort on the C-141, which is a four-engine cargo transport.

I was the electrical group engineer on the initial design of that aircraft, in charge of all electrical systems, starting with the generator, electricity, all of the controls that utilized the electric system, to control those systems.

This was from '61 to '65.

In 1965, I went to the C-5-A program. The C-5-A is the four-engine cargo transport. I advanced one step in the management chain. I was at that time a department manager. As department manager, I had under me two groups: I had the electrical group, which I had been formerly in charge of, and also had the electronics

group.

So, during the initial design stages of the C-5-A, I was department manager, in all, approximately two years. At the end of the two-year period, in late 1967, I advanced one more step in the supervisory chain, and became the Deputy Systems Design Engineer -- still with the C-5. But, as Deputy Systems Design Engineer, I now had under me all of the department managers who have the detailed design responsibility for all the functional systems on the aircraft. By "functional systems", I mean the systems that move and do things as opposed to, say, the structure of the aircraft. That was starting 1967.

And, here, again, I am not too clear on the exact dates, but approximately 1970, the engineering effort had diminished to the point, and the number of people in the Engineering Department had reduced so we changed everybody's classifications down one step. I went back down to department manager because we had fewer people in 1970, and continued, more or less, with that title and the same responsibilities up until January of this year. In January of this year, the Company decided to combine all of the various aircraft project engineering groups into one project; and this one project is called just Project Engineering. And I was made the Deputy Chief Project Engineer of all of the aircraft now under design and in

manufacture at Lockheed-Georgia.

Q Now, in the course of your 29 years at Lockheed, have you at anytime participated in any accident investigations?

A Yes, I have, quite a few, and in varying capacities. But project engineering is the logical group being most familiar with all of the technical aspects of the aircraft and also the logical group to do investigation anytime there is an incident or an accident on the aircraft.

These responsibilities on a day to day basis will be just assisting some manufacturing guy in trying to make some system work on the flight line which he can't solve. But then, getting into the actual incidents, I remember, I guess the first one involved the B-47, six-engine jet bomber we talked about.

THE COURT: Do you expect to elicit a review of all of that?

MR. DUBUC: No, that wasn't my intent.

THE COURT: Okay, Just ask the questions a little more direct.

MR. DUBUC: I am sorry.

THE COURT: And let's move this along.

MR. DUBUC: I was trying to avoid any objections being made, Your Honor.

THE COURT: Go ahead and ask the questions.

BY MR. DUBUC:

Q Approximately how many accident investigations have you participated in?

A Just guessing, six or eight.

Q All right.

A Incidents and accidents.

Q And have you participated in an accident investigation in connection with the investigations run by the Air Force?

A Yes, I have.

Q And on what basis would you participate in such investigations?

A In some cases, I would be the contact back in the project for the team who is off-site. I would receive all technical requests for investigation analyses. I would get those done and get the information back to them. I was the at home contact.

In other cases, I was actually off-site, as technical supervisor. On two occasions, I was the off-site technical supervisor. In other cases, I worked at home.

Q Now, specifically, with respect to the accident in Saigon on April 4, 1975, what, if any, connection did you have in that investigation?

A That investigation, I was assigned the responsibility of being technical supervisor of the Lockheed

portion, you know, the technical advisor to the Accident Board.

Q And under what circumstances does Lockheed, under connection with a case like this, provide technical advisors to the Air Force?

A When something like this happens, Lockheed's Management, of course, contacts the Air Force and says, "We will be glad to be of any service that you so desire." And, in this case, the Air Force did desire technical assistance from Lockheed, and asked Lockheed to put together a team of technical people.

Q And you were one of them; is that correct?

A I was one of those, yes,sir.

Q CAn you tell us briefly what happened, how you got to the accident scene, and what you did?

MR. LEWIS: If he is finished with his qualification, I am anxious to do some voir dire on his qualifications.

THE COURT: I haven't been asked to qualify him. Are you in the process of qualifying him?

MR. DUBUC: First, I am in the process of an on-scene witness. I would like to finish that.

THE COURT: You will have an opportunity.

MR. LEWIS: I understand, Your Honor. I have the contentions but as long as we are in that area, it is

possible for me to anticipate perhaps some areas that are not covered. So, if he is offering him as an expert, at some point I would appreciate notice.

THE COURT: When that time comes, you'll know it.

MR. LEWIS: Thank you, Your Honor.

BY MR. LEWIS:

Q Mr. Edwards, you said you were one of the technical advisors to the Air Force in this accident investigation. When were you first contacted?

A I was first contacted on the morning of April 4th, 1975.

Q And what did you do?

A I went to my immediate boss' office, and we discussed what information we had regarding the accident. At that time, I offered my services to the Company if they so desired.

Q And what happened after that?

Where did you go?

A After that, I was chosen to be a member of the off-site technical team. And we went from Lockheed to Scott Air Force Base in MIssouri; picked up some other groups; went from there to Travis to pick up other groups, and flew from Travis to Hickham Air Force Base in Hawaii; and from there went to Clark Air Force Base in the Philippines. And, after five or six hours, departed from

Clark and went to Saigon.

Q Do you recall when you got to Saigon?

A It was about 46 hours after the accident that we arrived on-site in Saigon.

Q And when you say "on-site", are you talking about the accident site?

A I am talking about the accident site, yes.

Q What did you do when you first got to the accident site?

A We went out to the accident site by helicopter. The helicopter flew over the general accident area; the first impact point, the second impact point -- both sides of the river. We flew over and looked the area over, and selected a landing spo and landed the aircraft off the side of the major area.

Q What did you do in the area after you landed?

A We broke into small groups of two people. And we had previously made a systematic assignment for these various groups, as to what areas to go to, what to do and what to look for. And the various groups spread over the whole area and observed the condition of the terrain; observed the skidmarks; observed the location of the major components; looked at the condition of the components; took photographs; listed, tagged, what you will, those components that were of sufficient interest that we felt

we ought to bring them back for further analysis.

Q Who was in charge of the overall investigation?

A The President of the Accident Board was General Newby -- N-E-W-B-Y.

Q And how many Air Force personnel were involved in the accident investigation?

A I guess I really never stopped to count them. I would say probably 20 Air Force people.

Q And how many Lockheed technical advisors?

A There were four people from Lockheed on-site.

Q Now, you mentioned what you did on-site that first day. Did you visit the site more than one time?

A The team visited the site on several occasions. We came back the second day with the entire group of people and did essentially the same thing that had been done the previous day. We would go over the whole area and look for key parts, et cetera, and take more photographs.

On the third day, as I recall, I stayed back at Clark because we had some things we wanted to look up in the way of paperwork and tech orders. I did not accompany the group the third day.

Q When you say "accompanied"; when you say "they went back", what are you referring to?

A We were headquartered in the Philippine Islands, some two and a half flight hours away from the accident

site. We were not allowed to spend the night in the local area, or even in Saigon, by orders of the State Department. Some political things like the United States is withdrawing from Vietnam, and we don't anyone to say we are sending people in and we will have a head count overnight. We would go in during the day and come back out at night.

That was pretty much the rule except one time a group of our people left the on-site and were stranded and had to spend the night. But, other than that, we had to fly back to the Philippine Islands every night.

Q All right. Now, approximately how many visits to the site did you make, total?

A I was on-site four or five different days.

Q And you mentioned you did some work in the Philippines where you were headquartered. What kind of investigation went on there

A Well, the second -- the third day that I spent in the Philippines and the rest of the team went back to Saigon, I gathered together the various aircraft tech orders, and arranged to have an aircraft hangar set aside so that we could set up the recovered parts that were flown back to the Philippines.

By that time, the parts were arriving in the Philippines. And we set the parts up in this hangar to simulate the position these parts would have had on the

airplane.

Q All right. And was some analysis of that made?

A Yes, we made analysis of these parts. After we set them all up in the positions they would have had on the aircraft, we observed the condition of each of these parts, and we observed any marks, any score marks, any damage, and labelled these parts. We took photographs of these parts for future reference, things of that nature. We recorded each one of these observations -- physical observations of the recovered wreckage, et cetera.

Q What ultimately happened to those parts that you looked at in the Philippines? What happened to the parts?

A Well, after about three weeks in the Philippines, it was decided to relocate this team back in San Antonio, Texas, where we had laboratory facilities to do further engineering analysis on these parts. So the entire team, technical team that is, moved to San Antonio in the third week, and all of the parts that we recovered from the accident site were moved to San Antonio, Texas.

Q Do you know whether they are still there?

A I personally do not know. I assume that they area.

Q Were there further analyses performed there?

A In San Antonc, the technical group would consult and decide what we would like to see done on each one of these various parts. We would remove this particular part from the wreckage, and carry it to the metallurgical lab and after certain metallurgical evaluations would be done on each of these various parts.

Q And did the investigation end there at San Antonio?

A No, sir. We still did not have enough key parts of the wreckage. We dispatched a crew of Navy personnel out in the ocean, in the South China Sea, to search and see if they could find any of the key parts in the ocean. That was going on while we were still back in San Antonio.

About that time, they were fortunate enough to find two key parts of the aircraft. So we waited in San Antonc for those parts to come in. At the same time while we were waiting for those parts to come, we had a lot of other engineering analyses going on in addition to the laboratory analyses.

Q Where was that going on?

A That was going on primarily back at Lockheed.

Q Did there come a time when the investigation shifted back to Lockheed for certain additional analyses?

A Yes, it did.

THE COURT: Just a moment.

MR. LEWIS: Your Honor, could we have a brief recess?

THE COURT: In place. Why don't you come up here?

(Whereupon, the following took place at the bench out of the hearing of the jury:)

MR. LEWIS: I am sorry to disturb the progress of the examination, but Mr. Marcus, who did much of this work, told me that he is about to pass out. He feels very bad.

THE COURT: Excuse the jury.

(The jury left the courtroom.)

THE COURT: I will let him go to the health unit right away. Does he know where it is?

MR. LEWIS: As long as he is here--

THE COURT: Why don't you send somebody with him.

MR. LEWIS: We will.

THE COURT: I am sorry, Mr. Dubuc.

MR. DUBUC: Your Honor, how long will it be?

THE COURT: I don't know. I will see what we can find out about this. You heard what he said.

MR. DUBUC: Yes, I did.

THE COURT: Mr. Lewis, are you suggesting that you wouldn't want to proceed with this examination in

Mr. Marcus' absence?

MR. LEWIS: If the Court could give me just a very short time, I will try to assess the situation. The problem is that this man was examined by a number of peopl for many days. This is a technical area. And, while I am overall familiar with the witness' testimony, it may get into some very technical areas and a relationship with many thousands of documents, and I would like, if it is just a very short time, to have him with me. If it is not, I wouldn't ask the Court.

THE COURT: Mr. Dubuc, have you got some way you can bridge around technicalities?

MR. DUBUC: Well, I am, at this point, Your Honor, Mr. Lewis says he is going to give some kind of challenge to Mr. Edwards as an expert. I am really in a preliminary stage of getting through what he did and what his experience is on this accident as well as others and so on, and I haven't gotten to anything technical yet. I am trying to keep it general.

MR. LEWIS: I am willing to proceed if the Court would understand that if it looks like a technical area, and I will stand up and the Court will note my position then.

THE COURT: Bring back the jury.

MR. LEWIS: Thank you, Your Honor.

(The jury enters the courtroom.)

(Whereupon, the following took place in open court:)

THE COURT: You may continue.

BY MR. DUBUC:

Q Mr. Edwards, I believe we were discussing the fact that the investigation was in progress and you were participating. You mentioned something about tests going on back at Lockhood and the investigation going back to Lockheed; is that correct?

A We had analyses going on at Lockheed at the same time we had these tests going on in the lab in San Antonio.

Q Did there come a time when the analyses, tests and observations came to an end?

A In San Antone, we had pretty much exhausted the possibilities. We had gotten all the lab reports back, et cetera. We still needed some key points. We put the final conclusions together and we decided we needed to do further analyses, and the team should relocate to Lockheed-Georgia, where we had more technical facilities regarding the C-5-A.

Q Did you work on all of these, or most of these from time to time, analyses and tests; observe them and exchange information with other accident investigation

people?

A I either personally requested that these analyses be done. In some cases I supervised some of the analyses. I reviewed every one of the analyses, whether they were engineering analyses done at Lockheed or the laboratory analyses done in San Antonio.

Q And, subsequently, did there come a time when the Air Force accident part of the investigation came to a conclusion and some reports were written?

A Yes, that's true.

After the team relocated to lockheed, and after about three weeks at Lockheed, and most of the technical information had been concluded, the team relocated to Travis Air Force Base, and the Air Force there put together the final accident report document.

Q And did you participate in the actual final accident report document?

A No, I did not. I stayed back at home at the time. I was at the Board's disposal to again get technical investigations done for them back at Lockheed, but I did not participate in the final writing and issuance of the final accident report.

Q Did you participate in the writing of many of the support documents which preceded the final document?

A Oh, yes. In the final three weeks at Lockheed,

we put together all of our bits and pieces of information, put it together in a systematic form. We made the initial draft of what later became the technical section of the accident report. We put that together in the initial draft, and we passed it out to all of the technical members. They edited it, and made changes. We gathered it back up and re-did it and reissued it. We went through two or three reiterations to get the final version of that to give to the Accident Board.

Q Now, could you tell us the distinction between yourself as a technical advisor in an accident investigation by the Air Force and a member of the Board, as it was called?

A As a contractor, as a civilian, and as a technical advisor, I was just exactly that. I could advise the Board. I could work for them. I could give them my opinion, but I had no vote per se in the final Board action; and I was not privy to attend those meetings of the Board.

Q Now, after the accident investigation with the Air Force concluded, at the request of Lockheed and myself, did you do some additional work on this investigation?

A Yes, starting in mid-75, I had been heavily involved in many activities regarding this accident, starting with such simple tasks as trying to gather up data to supply to counsel. We were requested to gather this information

for use by the Plaintiffs.

This covered many hours and many months.

Q Can you tell us what documents and information you have either reviewed or worked on or assessed and looked at in connection with the investigation you have just described?

A Yes. Of course, as I said previously, I did not participate in making up the actual accident report that was issued. When this report was issued, then Lockheed got a copy as other people did. And, for the first time, I got to see the complete report. Prior to that time, all Ihad seen was the technical portion that I had helped prepare. So I reviewed the entire accident report.

Shortly thereafter, there was a collateral report on the same accident. This was a three-volume document. I reviewed that document in detail.

When I say I reviewed these documents, I reviewed the document and all documents referenced therein that were included in those reports -- the entire book. And, in some cases, the accident report attached all of the metallurgical tests done at San Antone. And a great many of the analyses done at Lockheed. I re-reviewed all of those. I wouldn't even hazard a guess as to what the total documents referenced in those reports was, but it was a hundred or two hundred reports, within those two reports.

Q Have you reviewed any other documents?

A Yes, in the preparation of the collection of data for submission, I supervised the search for all versions of the aircraft tech words, the present uptodate version and past superceding copies. And, after gathering these documetns together, all that could be found within the confines of Lockheed, I guess if you could stack all of those up on the table, it would be a stack this high (indicating).

Q Now, if you -- I am sorry; go ahead.

A We stacked those up and I got a group of people together and we made a history, a summary type history of this document.

Q Now, you mentioned that you reviewed the accident report of the Air Force. Was all of that report, the released portion, or what? Did you review the released portion?

A I reviewed the portion that was released to Lockheed and to the Plaintiffs. I never did see the complete accident report. I still haven't.

Q Now, with respect to other documents, in response to my request for you to review those prior to your coming here today, what other documents have you looked at in the course of this investigation?

A Well, I have reviewed the depositions of some

85 to 90 -- 80 to 95 volumes. Included in those depositions were the very first deposition, I believe taken, and that was Captain Gregory. And I personally sat in on many of these depositions. I started with Captain Gregory, and I reviewed the depositions of Captain Harp and Major Malone, which were dated in late February.

And, again, I have gone back and re-reviewed--

Q You say "late February"; what year are you referring to?

A February, 1980. February 13, if my memory serves me.

Q Okay. How about other documents, reports and so on; can you give us any estimate of that without going over each single one of them, what you have reviewed and the extent of your investigation?

A Well, I reviewed a listing of the Plaintiff's Exhibit for this trial. I only reviewed about 14 of those. The only ones I reviewed were those that pertained to the engineering or technical aspects. There are many exhibits here that may deal with people, names, persons and so forth; I did not see those.

Q And have you reviewed any other documents or exhibits?

A In the course of the depositions, I reviewed many analyses that are commonly referred to as APEX reports, some

8 or 10 of those, reports dealing with various aspects of the C-5-A aircraft. Further engineering analyses requested by counsel. And, again, I have gone back over the accident report several times.

Q Okay. Now, specifically, I would like to focus for the purposes of the next few questions -- I would like to focus, if I could, on the accident scene itself. You said you were there several times; is that correct?

A That is correct; four or five at least.

Q And did you observe the location of the parts of the airplane and the terrain around the parts and whatever was indicated located near the airplane and the location of things like water bodies and dikes and things of that nature in the accident area?

A Yes, I did in some detail several times.

Q I show you what has been marked as Exhibit D-9 for identification, and ask you if you have ever seen that document before?

A Yes, I have seen this document on several different occasions. I did not personally prepare this document, but I have seen it many times. It fairly accurately depicts--

THE COURT: Excuse me a moment. He just asked if you have seen it.

THE WITNESS: Yes.

Q I show you another exhibit, Exhibit 4 for identification, and ask you if you have seen that before?

A Yes, I have seen this.

Q I wonder if you could tell us with respect to what you observed at the accident scene, and tell us whether, from your observations, you, in the course of your investigation and study, and the review of the documents that you made, had determined the sequence of certain events with respect to the airplane landing at Saigon or near Saigon on April 4, 1979?

THE COURT: There is an objection.

MR. LEWIS: I would like to do a voir dire.

THE COURT: I assume you are offering -- he would have to have some expert qualifications to answer that question.

MR. DUBUC: Very well.

THE COURT: Are you now offering him?

MR. DUBUC: Yes.

First, I was going to have him describe these things based on what is already in evidence, Your Honor.

THE COURT: Why don't you finish that?

MR. DUBUC: That does involve--

THE COURT: But you asked about the sequence.

MR. DUBUC: Well, all right. I guess maybe let's hear--

THE COURT: You are proffering him--

MR. DUBUC: As an expert as well as--

THE COURT: An expert what?

MR. DUBUC: An expert in the field of aircraft accident matters; investigation matters, and an expert on the recreation or reconstruction of certain events relating to the landing of the airplane, and the location of parts and, ultimately, with respect to calculation of certain numbers; and not as to any causation or anything of that nature.

THE COURT: Mr. Lewis, are you prepared to conduct your voir dire right now?

MR. LEWIS: Yes, sir. I think so.

THE COURT: All right.

MR. DUBUC: Your Honor, shouldn't it be out of the presence of the jury?

THE COURT: We will excuse the jury for lunch. We will reconvene at 1:45, ladies and gentlemen. Remember all the rules, including don't pay any attention to what you see in the papers.

(The jury leaves the courtroom.)

THE COURT: Close the door.

Mr. Salmon, I have a message -- you all sit down. I have a message from the Marshal that you are going to have difficulty this week staying after 5:00 o'clock?

JUROR SALMON: That is correct.

THE COURT: I am going to have to excuse you from further service. Thank you very much for being here. I know you have made a sacrifice. I understand. Can you go out without talking to any jurors?

JUROR SALMON: Right.

THE COURT: Just walk right by them.

MR. DUBUC: I might note before we start, we have received no objection to Mr. Edwards, who was listed as an expert on the original filing with the Court of witnesses.

And I was not advised by counsel that he was challenging Mr. Edwards.

THE COURT: I don't think he said he was going to challenge him. He said he wanted to have a voir dire examination.

MR. LEWIS: Your Honor, after reviewing the proffered testimony and what counsel says, I find a vast difference. And if counsel is offering him for these areas, I am surprised in this regard.

THE COURT: You are surprised that he is being offered for testimony as to sequence of the breakup of the airplane?

MR. LEWIS: Well, let me read it to you, Your Honor, if I may.

THE COURT: Just a moment. Let's hear what he

has to say.

MR. LEWIS: John Edwards will testify as an expert as to his activities as a technical advisor in the Air Force accident investigation. And, specifically, the condition of the crash site, the condition of the troop compartment, the distribution of the aircraft components, the estimated pressure differentials in the aircraft before and after decompression, and the underlying information from which they estimate the G forces generated at the time of landing.

Now, I want to inquire, and I will know whether I have an objection after I have made my inquiry. That's the best I can tell you.

THE COURT: I am going to let him inquire.

Do you have something you want to proffer?

MR. DUBUC: That is what I am in the process of proffering him for.

THE COURT: The sequence I think is a little--

MR. DUBUC: All right. The sequence, of course, relates to the G forces. We have been through that with another witness.

THE COURT: Well, also the construction of the various members, I suppose.

MR. DUBUC: Well, I am basically -- we are not going to get into the design of the airplane. Your Honor

has already advised us on that. This is going to based upon, for the most part, all the exhibits either in evidence or identified, and the exhibits to which Mr. Timm has already testified, who was their expert.

THE COURT: You go ahead, Mr. Lewis.

MR. LEWIS: Thank you, Your Honor.

BY MR. LEWIS:

Q Mr. Edwards, I want to ask you first about your education. Do I understand that you are an expert in structural matters?

A No, sir. I believe I stated that my degree was in electrical engineering.

Q But you don't feel qualified to speak as an engineer in any detail on structural questions, do you?

A Not on structural questions in great detail. I am, of course, familiar with overall structure requirements, et cetera.

Q You are. Then, we will explore that.

A The general requirements.

Q We will explore that.

Could you tell us how much force it takes to break the landing gear off the airplane?

Is this an area, for example, that you are competent to do the calculations on and tell us about it?

A I don't feel competent to do the calculations.

I do recall the general requirements as to what the landing gear must sustain.

Q We are talking about design requirements?

A Right.

Q You don't know -- it could have been over-designed, but you couldn't tell us from actual knowledge the metal that was used and what it took to break it? Is that right?

A No, I can't. But the very fact that the landing gear passed the required test that the Air Force mill specs require you to design them to indicates that it met those requirements.

Q As a minimum?

A Right.

Q What was the design requirement? How much force should the landing gear be able to sustain?

A I can't say in terms of force, but the landing gear has to be designed to withstand a certain sink rate of the airplane; the sink rate being the rate at which the airplane would contact the ground at a certain gross weight.

Q Tell us that then.

A The particular gross weight they were concerned with on this accident, that is the gross weight at touch-down which was, in round numbers, 450,000 pounds; the landing gear would have withstood a sink rate of some 11 to

16 feet per second. These numbers are in evidence in the engineering section of the accident report.

Q How much is that a minute? What does that sink rate translate into?

A Eleven to 16 feet per second?

Q Yes.

A You multiply by 60 to get seconds into minutes and 60 times 11 is 660 feet per minute. 60 times 16 is 960.

Q So it should exceed that without breaking?

A If the sink rate is the thing that is going to break it.

Q Now, the tail specs, and the empinnage, or whatever you call that area of the stern where it fractured, are you familiar with the structure of that?

A I know generally what it looks like. I, of course, was not involved in the detailed design of that structure.

Q Do you know what kind of forces are required to be present when it broke off in the landing, or cracked?

A We have a data recording system on the aircraft that records many, many perameters. This data recording system also analyzes these forces and prints out a signal whenever a certain force has been exceeded, whether the aircraft is flying, landing, or whatever. And this level that -- wherein it prints out is at 2 Gs,

so the 2 Gs that print this out, what this really means is that you have got to go do certain inspections. This doesn't really mean that anything is going to break, but it means that you have got some kind of a hard landing or something like that, I mean you ought to at least go over and lookand see if you have got any troubles.

Q Does it tell you how many G's were actually exercised there?

A Exactly how many G's, this sensing, yes, it does.

Q How many G's did that sensening element see?

A How many did it see?

Q Yes.

A Do you mean in this accident?

Q Yes.

A The evidence--

Q Let me show you the exhibit here.

MR. DUBUC: Let him finish his answer, Your Honor, please.

THE COURT: Let him finish his answer and you may go on to another.

MR. DUBUC: Certainly.

BY MR. LEWIS:

Q Are you going to tell me about the sensing element or some other element?

A No, sir, that is not correct. I will explain to you--

Q It was designed to record the force of impact, wasn't it?

A It was designed to record the forces. This system was not designed to be an accident investigation type recording system. It was designed to be a maintenance aide and, therefore, the type of recording system, in order to keep from having miles and miles of mag tape, the tape, as you see on television, a tape just runs in spurts. It runs in spots.

Q I understand that, sir.

A I have got to finish this, sir, since you asked me. This buffer station, which records the data, the memory, and when it gets full, then it turns the tape on and the tape runs for a few inches and it records that information on a tape. And then the memory is cleared and the memory records more. The tape sits there and stops for awhile, or else, if the tape ran all the time, you couldn't get enough tape on the airplane. So, it records in spurts.

Now, this data that was in the memory bank at the point in time when the airplane touched down, and there was an electrical transit, and this memory was wiped out and never got recorded, to say that this is a maintenance device,

it was never intended to do all these things during accident; but it worked out very well; and the Air Force uses it every chance they get because it turned out to be a tremendous aide.

THE COURT: Mr. Lewis, this is very interesting, but what has it got to do with his qualifications?

MR. LEWIS: If it please the Court, he is an electrical man; he was in charge of the eledtrical part of the airplane.

THE COURT: Yes.

MR. LEWIS: If a part of the airplane which he was responsible for didn't work as it was supposed to work, it goes to, in this instance, his bias or interest in explaining away a problem.

THE COURT: Well, that is not his qualification.

MR LEWIS: All right.

BY MR. LEWIS:

Q Sir, on the tail section, can you tell me how, as qualified as you are, if you are, can you describe what it would take to break the tail off of this airplane, in terms of force?

A No, I don't know. I certainly cannot -- and I don't know if anyone ever analyzed what it takes just to break the tail off -- maybe there are people who could look that up and figure it out for you.

Q Were static tests done on the wings of this aircraft?

A Yes, they were.

Q How much force did it take to break the wings off of this aircraft?

A The aircraft is required to carry 150 percent of its highest load; and this initial wing design carried about, O forget, it was something slightly less than that, under the ultimate load test.

Q Were these wings stressed to failure -- they were just deliberately stressed to failure.

A That's the type of test you do.

Q I just want to know how many pounds, or whatever the engineering expression would be, it took to break the wings off the airplane.

Please tell me.

A I guess I don't have the figures.

Q Is that part of the work that you checked into when you were doing your accident investigation?

A No, sir. No one felt that that had anything to do with the accident.

Q Well, the wings did break off?

A The wing, fuselage section, which the wing attaches to, separated from the main fuselage; but that was because of the ripping and tearing and shredding of the metal

as they went down through the rice paddy; not necessarily because of any alleged deficiency in the structure. The structure was eroding away as it was sliding down through the rice paddy.

Q Did the wings break off or not?

A The fuselage section that attaches to the front and rear beams separated vertically. The wings didn't break. The fuselage rupped up and down.

Q All right.

A And , if you want, I can maybe use some of these exhibits you have got here--

Q I am interested in your qualifications, sir; I want you to tell me what part of your training or your background enables you to predict that.

A If you took a complete airplane -- a complete fuselage, a complete plane, et cetera, structural engineers could probably tell you how much force you have to use--

Q Excuse me, sir, please answer my question. I want to know are you qualified -- that's all I'm asking -- are you qualified to talk about the force that is necessary to tell us what would break a piece off that broke off, or not?

A No, I'm not qualified.

Q All right.

Now, you say that you are an experienced accident

investigator; is that so?

A I have investigated several accidents, yes -- and incidents.

Q We heard some testimony the other day about a C-5-A that broke up on impact; did you investigate that?

A What accident are you referring to?

Q I haven't any idea. All I know is that some witness said that one broke up on impact in somewhat the same way that this one did. Do you know anything about that?

A I believe you are referring to C-5 that we refer to as the Clinton Sherman accident.

Q The?

A Clinton Sherman -- Oklahoma.

THE COURT: The question is whether you--

THE WITNESS: Yes, I was involved in it. I was the back home team on that.

BY MR. LEWIS:

Q When did that occur, approximately?

A Approximately September of '76.

Q Now, did the airplane break up into pieces when it struck the ground?

A Can I give you a full answer on that? The full answer would be that the airplane touched down on the end of a runway. It turns out, he landed on the wrong runway. It was only 3,000 feet long.

Q Please tell me. Please give me a direct answer.

MR. DUBUC: Your Honor, please, if he is going to ask him about this--

THE COURT: Repeat the question.

MR. LEWIS: Your Honor, I am not trying to cut the witness off. I am trying to save time. I am just interested in the highlights , as opposed to a full company explanation.

THE COURT: He knows his answer, if he isn't careful, could--

MR. LEWIS: I appreciate that, Your honor.

THE COURT: --could be quoted out of context.

MR. LEWIS: I don't want to do that either and I will steer clear in that regard.

THE COURT: Do you want to restate your question?

MR. LEWIS: Yes. May I?

BY MR. LEWIS:

Q Now, sir, did the aircraft break up?

A Yes.

Q All right. Are you familiar with the speeds involved?

A I don't recall exactly, but I am generally familiar, yes.

Q How fast was the airplane going at the time it broke up? Or began to break up?

A As best I recall, when it got to the end of the

short runway, the ground speed, or whatever you want to call it when it was on the ground, was about 130 or 140 knots when it went out into the field.

Q Now, the field that it went out into was the kind of terrain one expects to find off the end of the runway plowed ground, but not trees or houses or hills?

A This was a terraced type farmland.

Q Terraced farmland.

A Terrached type farmland.

Q Against or with the -- away from or towards the end of the runway?

A Well, it was crossing the runway.

Q Was it going uphill or downhill?

A I don't recall the level of the terrain. But I do recall the landing gear went through one of these terraces, and it started to disrupt construction.

Q And the landing gear broke off and the structure began to come part; is that correct?

A As the fuselage went on through with a landing gear and broken structure, yes, it started to separate.

Q All right. Did the tail break off?

A The tail separated at a, more or less, major structural assembly point.

Q t about the same place that this one did?

A I don't recall exactly; but probably the same

general area, plus or minus 20 feet.

Q Did the bow break off?

A The bow?

Q I call it the bow; whatever you call it?

A The crew compartment, in this case, stayed attached to the front.

Q All right. Did the wings break off?

A The wings did not break off.

Q Did the engines come off the wings?

A I really don't recall'

Q Did any other major part of the airplane break off?

A The aft troop compartment separated vertically at the rear beam of the wing. And it is already separated. So the aft troop compartment did separate into a separate little piece.

Q Did the cargo compartment go with it?

A I don't recall about the cargo compartment. I think the cargo compartment had pretty much shredded away similar to the Saigon accident, as it went out through the farmland.

Q Was anybody hurt or killed?

A There were no injuries, no deaths.

Q Were there passengers on the airplane?

A Strictly Air Force crew members.

Q So, the so-called troop compartment didn't have a lot of people on it?

A I don't recall.

Q And were there passengers in the cargo compartment?

A As I recall, it was strictly a training flight, and there were flight crews on board and they were all up forward.

Q All right, sir.

THE COURT: Mr. Lewis, we will have to adjourn for lunch sometime. Is this a convenient point?

MR. LEWIS: Yes, it is.

THE COURT: We will reconvene--

MR. DUBUC: Your Honor, I might add, we are getting pretty far afield.

THE COURT: Yes, I thought so, for qualification. See if you can hone in on what it is you want to find out.

MR. LEWIS: Yes, sir.

THE COURT: We will reconvene at 1:45.

(Whereupon, at 12:35 p.m. the hearing was recessed to reconvene at 1:45 the same afternoon.)

AFTERNOON SESSION

THE COURT: Do you have much more of this?

MR. LEWIS: Not much, Your Honor.

May I say just a little bit in further explanation of that?

THE COURT: Do you want it in the presence of the witness?

MR. LEWIS: No.

THE COURT: Would you step out just a moment, sir?

You can go out the back door there, if you want.

[Whereupon, the witness left the courtroom.]

MR. LEWIS: Your Honor, in our discovery process we asked who their expert witnesses are and what they were going to say. We were referred to Mr. Edward's deposition and I will have that citation for you instantly.

We were referred to that as to what he was going to say.

The deposition did not go into any accident reconstruction. And it is my understanding that this witness is going to be called for accident reconstruction.

The Court will recall with respect to Mr. Timm, that he could use the documents and explain what they said, but that he couldn't give an independent opinion.

I have several references, although I don't have

that completely.

But that seems to be the gist of what my recollection says and some of the transcripts that I can cite to you on that.

Now, this witness, Your Honor, is essentially a company man who was sent to sort of keep an eye on the proceedings. There were very qualified people along with him. I am talking about mechanical engineers, people who really know this airplane, as opposed to the kind of role that he had.

He sat through many of the depositions. Obviously he had a right to do so. And he was the point man, sort of the company representative, when it came to the discovery process and the liability phase.

The parts that he was responsible for on the airplane, there were various failures.

For example, the voice recorder failed, the MADAR tape failed. The hydraulic system failed.

Now, I certainly don't wish to expand the scope of the trial. I have been doing my best to keep it within the purview of the Court's instructions on that.

If the man goes in and gives his opinion as to what happened to the airplane and what sequence and all that sort of stuff, I, then, arguably would have a right to show bias and his own personal motivation, motivation in

justifying the kind of work that he did and things of that kind.

I am concerned with that, Judge. I am just sharing it with you. I don't want to get into that area.

I think if he comes in and he explains, like Timm did, what the Air Force report says, and if he differs with Timm as to what the Air Force report says, that may well be a legitimate area of inquiry. But for the man to come in and talk about what is essentially an accident reconstruction goes far beyond their discovery answers and beyond what they say in their proffer.

I concede that some of my questions, Your Honor, were not precisely on the question of his qualifications. And I agree that I wasn't as well organized as perhaps I might be. I can only say in mitigation Mr. Marcus was gone and now he is back.

THE COURT: How is he?

MR. LEWIS: He is much better, Your Honor.

Thank you.

I had an opportunity during lunch time to sort of understand this a little better.

THE COURT: I understand your argument, but what more evidence do you need to make your argument?

MR. LEWIS: Well, what I would like to do, Your Honor, I would like an opportunity to do these things.

If the witness can be induced to give me a relative brief answer, complete, but brief, as opposed to the longer answer, I would like to find out the source that he says -- in other words, is it his opinion on the subject of the "G" forces and the things that he is going to testify about or is it something that he got from somebody that I can't cross-examine? I want to find out that.

I want to find out his qualifications for doing that.

I want to find out a little bit about his prior accident investigation experience, Your Honor, because apparently he is being billed as somebody the Air Force selected or nominated as a marvelously fine person to help them in this important matter. And I would like to inquire into that because that seems to be the representation that is implicit in the long list of how did the Accident Investigation Board operate and what did you do.

So, I would like to talk about that and I would like to do enough voir dire to find out and to demonstrate to the Court, as I am positive that I can, with only a little leeway, that this man essentially is a gatherer of facts supplied by other experts, and is no doubt competent to report some things, but certainly is not an accident reconstruction man that can talk about the forces that the airplane struck the ground with. I am talking about as far

as "G" forces go and things of that kind.

I have some accidents that I want to ask him about.

THE COURT: Why do you need that to qualify him? That is what I don't see.

There may be some merit in asking that in front of the jury but you are not helping me with all that to decide if he is qualified. I have some problems with whether he is qualified to talk about what it takes to take apart a wing. I have some problems about Timm too. He came in here and put in a lot of secondhand information that he wasn't expert about.

In that case I thought Mr. Dubuc brought the thing into perspective with cross-examination and you could be able to do that, too.

I think the jury understands the limitations on Mr. Timm's testimony.

MR. LEWIS: My problems is twofold.

One, it is going beyond their proffer.

Two, when we asked them to identify what he was going to say, they referred us to the deposition, which doesn't cover these points.

I truly don't think I have to with such an experienced witness, have to venture for the first time into unchartered waters on cross-examination.

THE COURT: That is a different point. That is not qualification for an expert.

Let me hear what Mr. Dubuc has to say about what you just said and then I will rule.

MR. LEWIS: Yes, sir.

MR. DUBUC: Your Honor, I think it is clear that Mr. Edwards is not only familiar with this accident, but he has investigated several.

I do not proffer him to reconstruct all aspects of this accident. I proffer him in our listing of witnesses to testify as to his activities on the Board; to show his background and connection and expertise. I have proffered him to testify as to the condition of the crash site, which he is certainly qualified to do. He was there four or five times. He was on the investigation itself.

As to the condition of the troop compartment, he was there, and saw it and inspected it.

The distribution of the components.

Pressure differentials in the aircraft before and after decompression. He worked on those reports for the Accident Board. And he testified to that at length in his deposition.

They took his deposition I think six or seven days.

THE COURT: Let's get to the point, Mr. Dubuc.

MR. DUBUC: And the information that pertains to the landing of this airplane and the calculation of "G" forces. I am not talking about forces on components. I am talking about the "G" forces that have been mentioned by two or three witnesses, which are the measure of the affect and the impact of the energy that Mr. Timm testified about.

He testified as to a computation, gave an opinion as to connectic (sic) energy involved here. And I'm offering Mr. Edwards, who I believe, if he is asked, will tell you he can compute connectic (sic) energy as all engineers can and he can make computations on "G" forces, as engineers can and he can explain what that connectic energy means in the context of the same sequence that Mr. Timm went through as far as "G" forces on this airplane.

That is all I am proffering him for.

THE COURT: Well, the question that pulled the switch for me was the sequence of the breakup of the airplane.

Now, that is a hotly disputed issue. I heard your pilot say that the wings were still on the plane until the troop compartment came to a rest, which makes me go all the way back to some other place.

MR. DUBUC: Well, Mr. Edwards was on the Accident Board and they did investigate that and that is in some of

the reports that have been already marked.

THE COURT: He is going to tell us what the report says?

MR. DUBUC: And he can tell us from that and from his participation what the reports say as to the way the airplane broke up.

THE COURT: He is not going to say it is my opinion based upon my independent calculations that the sequence was something different?

MR. DUBUC: The calculations are only going to be as to "G" forces, which he is qualified for.

THE COURT: What is he going to say about the sequence?

MR. DUBUC: He is going to take the wreckage diagram; use his information that he gathered from the investigation; and he is going to take those pictures that show where all the parts were; and he is going to tell us what he and those participating with him from Lockheed at the investigation site and the Investigation Board activities, he is going to tell us what they found to be a breakup pattern from the wreckage distribution chart and the pictures we have seen.

THE COURT: Now, am I receiving a representation that this is what the Accident Board found?

MR. DUBUC: Well, I can't state that because the

actual findings and conclusions of the Board are -- Your Honor will recall that that hasn't been released.

The accident report does talk about what things happened.

THE COURT: In what sequence?

MR. DUBUC: In some sequence, yes.

THE COURT: Well, I don't remember that I had testimony from Mr. Timm as to what broke up when.

MR. DUBUC: Well, we have a picture in evidence, which was permitted in evidence, where he testified that there was an impact. I will show you the picture.

THE COURT: Where everything flew off at once?

MR. DUBUC: Yes.

He testified as to that sequence.

THE COURT: Okay.

Thank you.

I am going to let this witness testify, Mr. Lewis, and give you the same scope on cross-examination that you had with respect to the pilot and the scope that Mr. Dubuc just had with this kind of witness.

MR. LEWIS: All right, Your Honor.

May I inquire just so that I can be sure I don't step out of line?

May I ask the witness about whether the wings had cracks in them before this, you know, whether they had

a history of cracks in the wings?

THE COURT: If he knows.

MR. LEWIS: All right.

THE COURT: That is in the same category as parasites in children.

MR. LEWIS: All right, sir.

May I ask him, if it please the Court, just a very little more on the voir dire and on his qualifications?

THE COURT: Yes.

Bring in the witness.

MR. DUBUC: Your Honor, on the business of cracks in the wings, if that is going to the factor of the breakup, I think he perhaps has directed that, but if it going beyond that --

THE COURT: Sequence.

MR. DUBUC: If it is going beyond that to Senator Proxmire, and this sort of thing --

THE COURT: No.

It has to do with the sequence.

MR. LEWIS: I am familiar with the Court's desire to move the case along and I will do my absolute best to do that.

I have truly the same desire, Your Honor.

THE COURT: I know you do.

No problem.

WHEREUPON,

JOHN EDWARDS

a witness on behalf of the defendant, resumed the witness stand, and having been previously duly sworn, was examined further and testified further as follows:

VOIR DIRE EXAMINATION (Cont'd)

BY MR. LEWIS:

Q Mr. Edwards, did you calculate or make any calculations with respect to the "G" forces by means of any engineering method known to the engineering science?

A Yes, I did.

Q What methods did you use?

A Well, you start off with some rather simple arithmethic.

For example --

Q No. No.

I want you to describe the method, if there is a word for it, using somebody's theory or some process or some formula.

A I believe it was Mr. Newton, Sir Issac Newton, who talks about distances, function of the velocity, and the time. And then it goes on from there to say that on an accelerating or decelerating body the distance that this body would travel would be a function of the accele-

ration, multiplied by the square of the time involved, and divided by two, I believe.

Q Did you do the calculation yourself or did somebody at Lockheed do it?

A I did the calculation myself initially. And since engineering, as in law, is --

Q Please just tell me: Did you do it yourself?

A I did it myself initially.

Q Does any of your testimony include the work of others in this calculation?

A My testimony will include my work.

THE COURT: The question is: Did it include the work of others?

THE WITNESS: It includes my works. I asked somebody else to check it for me.

BY MR. LEWIS:

Q None of it, none of the process except for checking, is beyond your work; is that correct?

A That is correct.

Q All right.

Now, how did you arrive at the times involved?

A At the times involved?

Q Yes, sir.

I understand that is an essential element of the formula.

A It is a very essential element.

Q How did you compute that?

A Well, we know the distance involved.

Q Yes.

A We can scale that from one of the exhibits I saw just before the break for lunch.

Q Yes.

A We know the velocity of the aircraft involved from the recorded data as documented in the engineering section of the accident report.

Q What was the velocity that you used?

A The velocity that I used from recorded information was 270 knots.

Q 270.

You used the 270 knots?

A Right.

Q Now, did you take into consideration the fact that the pilot gunned the engines just before the airplane touched down in an effort to try to keep it going to the airport?

A [No response.]

Q In other words, I don't know what the engineering word is, but I understand that if something is picking up momentum it has a different value in engineering.

MR. DUBUC: I don't believe that was part of the

testimony.

THE COURT: I don't recall that there was any acceleration.

Are you talking about after the first impact?

MR. LEWIS: I think that he said that there was an acceleration before the first impact.

THE COURT: All right.

Is that what you are talking about?

MR. LEWIS: Yes.

THE COURT: But after the speed was clocked at 270?

MR. LEWIS: I don't think it was clocked, Judge. I think these are estimates of people, whatever that is.

THE COURT: All right.

BY MR. LEWIS:

Q Did you take into consideration any acceleration momentum other than the 270 estimate?

A The 270 knots that I'm referring to, I took that information from the recorded data, which is also listed in the engineering section of the accident report.

And the report states --

Q When you say "recorded data" --

MR. DUBUC: Can he finish the answer, Your Honor? Mr. Lewis seems to be interrupting him frequently.

THE COURT: Go ahead with the examination, Mr.

Lewis.

BY MR. LEWIS:

Q Is the "recorded data" something that is recorded on a machine or something that somebody says?

A It is recorded on a machine.

Q Is that in the MADAR tape?

A In the MADAR tape, yes, sir.

Q Now, is this the MADAR tape?

A That is a printout of certain data from that tape, not all of the data.

Q The data that you used, has it all been made available to us, in reasonable or recognizable form?

A I believe so, yes.

Q And would you tell me where I would find the recorded data on the speed of the aircraft at the time of the first touchdown and the time of the second impact?

A First of all --

THE COURT: Let's have one question at a time.

MR. LEWIS: All right.

BY MR. LEWIS:

Q The first touchdown.

Where would I find that recorded? On what document?

A The first reference I would like to make to you is the engineering analysis.

THE COURT: Just a moment, Mr, Edwards.

You have a question before you. The question is where would he look to find that number.

A I forget the exhibit number, but it is in the engineering analysis of the accident report.

BY MR. LEWIS:

Q And it says that the MADAR tape shows a speed of 270 knots?

A 270 knots.

To be very specific, 270 knots was the last recorded speed, and that was 3.6 seconds prior to the initial touchdown.

Q All right.

A The figure may have been 269, but 269 and 270 is the same thing.

Q Was there a recorded speed after that?

A Yes, there was.

Q Can you tell me where I would find that?

A That is in the same MADAR information, the same number. The 270 appears in that same engineering analysis of the accident report.

Q And it says -- this is after the first touchdown -- how fast the airplane was going through the air between the first and second touchdowns; is that correct?

A That is right.

Q And how fast was that?

A 270 knots.

Q So, it didn't slow down a bit from the first touchdown until the time it sprang back in the air? Is that your testimony?

A From recorded data, 270 was actually 3.6 seconds prior to the initial touchdown. So, within that lapse of 3.6 seconds there was no change in speed from the last recorded before the impact until the last recorded second impact.

Q I am sorry. I don't understand.

After the first impact, after it touched down, and it bounded into the air, is there recorded data as to how fast the airplane was going at that point?

A Yes, there is.

Q And that is the 270 figure again?

A That is the 270 figure again.

Q So, we see 270 before; it plowed to the ground; it rose into the air; and the speed is again 270; is that right?

A The only thing I'm going to answer on it was that the speed was 270 in both cases.

Q That is what I want to make sure of. I want to understand that.

And it struck the ground the second time at 270

knots; is that correct?

A That is correct.

Q And that is on the MADAR tape?

A It is on the MADAR tape and it is in the accident report.

Q Now, the MADAR tape also has the capacity to show "G" forces; doesn't it?

A Yes, it does.

Q And it showed 270 knots speed just before the second impact.

And did it show the "G" forces at that time?

A It showed the "G" forces at that time.

Q What were they?

A I don't recall.

Q Approximately?

A I could look at the data and tell you.

Q There it is right in front of you.

A I will have to explain.

As I said before, this is a printout of certain data on the MADAR tape. This printout, the computer was asked to print out things like altitude and speed. But this wasn't asked to print out the --

THE COURT: Mr. Edwards, he asked you a question and you refer to that document. You said that is where you will find it. It seems to me that you ought just to

find it.

THE WITNESS: Sir, we were talking about speed. The speed is in this document.

THE COURT: No. He asked you about the "G" forces.

THE WITNESS: "G" forces I don't believe are in this type of a printout. It is another printout coming from the same tape.

BY MR. LEWIS:

Q Now, you were Lockheed's liaison representative for this case, is that corrrect, sir?

A I don't know about the word "liaison". I was the senior technical member.

Q I am talking about during the litigation.

You attended the depositions with Mr. Dubuc; isn't that right?

A Whatever name you want to hang on me.

Q You knew, didn't you, that the plaintiff had inquired of Lockheed for all the information with respect to "G" forces and information regarding the way the airplane broke off and the forces involved?

I don't know whether the word "G" was used, but the forces involved.

Isn't that correct?

A I believe that is correct, yes, sir.

Q All right.

Now, did you look up and ask the computer to print out the "G" forces so that you could give the plaintiffs an honest answer to that question?

THE COURT: There is an objection.

You don't have to say "honest answer".

MR. LEWIS: I apologize, Your Honor.

THE COURT: Accurate answer.

MR. LEWIS: Accurate answer.

MR. DUBUC: He is referring to the computer, Your Honor.

THE COURT: Are you telling me that you asked for data on the "G" forces?

MR. LEWIS: I do.

THE COURT: Are you asking him something?

MR. LEWIS: It is my impression that he signed the answer to the interrogatory. But I don't warrant that. I can find out very quickly.

THE COURT: The question is: What are you trying to elicit from him?

MR. LEWIS: I am trying to elicit from the witness, Your Honor, as to whether or not the information with respect to "G" forces was inquired of the computer to the extent that it knew.

We asked, Your Honor --

MR. LEWIS: I don't want to keep the jury back a minute longer than we have to, sir.

I would just say this in response to the Court.

We asked for specifically for information about that data. They didn't give it to us.

THE COURT: He says they did.

Now, that is not a jury question.

MR. LEWIS: But if he didn't give it to us and we did ask --

THE COURT: That still has nothing to do with the qualifications. Maybe we can put somebody in jail, but that has nothing to do with his qualifications.

MR. LEWIS: I would move, Your Honor, that he not be permitted to testify because they referred us to the depositions. This is not in the depositions. And I would ask that he not be permitted to testify on that point.

THE COURT: As a sanction for failing to supplying you with the information?

MR. LEWIS: Yes, sir.

THE COURT: Well, he says he supplied it to you.

MR. LEWIS: We were told on Friday, Your Honor --

MR. PATRICK: This morning.

MR. LEWIS: -- this morning that the "G" forces were in this book that he has got.

MR. DUBUC: I'm afraid I told him that, Your Honor, and I am not an expert. I looked at that and thought they were there.

THE COURT: Off the record.

[Discussion off the record.]

MR. DUBUC: Your Honor, I might also mention, if it would help refresh plaintiff's recollection --.

THE COURT: By "plaintiff's" do you mean Mr. Lewis?

MR. DUBUC: Mr. Lewis and his counsel.

In addition to this MADAR that was produced, in addition to the other MADAR which was the subject of discussions Friday by Mr. Keith, there was also produced by the Air Force a group of technical reports, which were called Tab T and No. 43 of Tab T is an analysis of the MADAR and it includes a number of things Mr. Lewis is asking Mr. Edwards about at the present time. And if he wants to look at Tab T-43 I'm sure he will find it. And, again, if he wants to borrow mine, he can do it.

THE COURT: Would it include the "G" forces, Mr. Dubuc?

MR. DUBUC: It shows some diagrams and some analyses that, at least Mr. Edwards tells me assists in determining "G" forces.

THE COURT: It doesn't show the "G" forces?

MR. DUBUC: You mean written out?

THE COURT: Right.

MR. DUBUC: No. It is diagrams. It does require interpretation of some kind.

It also refers to what it was.

MR. LEWIS: I am confident that I can demonstrate to the Court that we asked questions.

MR. DUBUC: That was produced January 5, 1979, Your Honor, produced by the Government January 5, 1979, in response for a request for production of documents, including attachment 43, among others.

MR. LEWIS: I don't know that I have all of it before me, Your Honor, but we had a request for production of documents that would show us that data. We also had an inquiry as to information with respect to forces. We did not get that data.

THE COURT: Mr. Lewis, I am sure there are lots of trials where in the middle of them things will come up that haven't been produced and there are other ways to deal with that besides keeping the jury in the jury room when we have only so many hours.

I will have to deal with this some other way.

MR. LEWIS: All right, sir.

THE COURT: All right.

You don't seem to know what Tab E of No. 43 is.

MR. DUBUC: Tab T, Your Honor.

THE COURT: Tab T.

MR. LEWIS: From memory, Your Honor, there are hundreds of them.

THE COURT: I understand that. But I can't stop the trial every time memory fails, any more than I can stop it every time a computer fails.

MR. LEWIS: May I just for the record, and I will be very brief and then I will subside, sir.

We asked on request for documents all documents pertaining to the acts, events, facts and circumstances which occurred to, in and on the aircraft from the moment of the failure of the aft cargo door system until the aircraft came to rest on the ground pertaining to the condition of the aircraft as to each such act, event, fact or circumstance.

Then we also asked for all documents pertaining to the nature and quantum of the forces, to which each of the persons on board of the aircraft were subjected from the moment of the failure of the aft cargo door system until the aircraft came to rest on the ground pertaining to the medical and physical consequences of each such person from such forces.

THE COURT: Mr. Lewis, I assume you asked for the "G" forces. I have a representation from counsel that

he thinks that this particular Tab T is responsive to that request.

I am not going to hold this trial in suspense while that issue of the compliance with your request is tried out. You can't run a case that way.

MR. LEWIS: If I could have one sentence, then I will sit down.

THE COURT: All right.

MR. LEWIS: The one sentence is this: Their response to these requests did not cite Tab T.

THE COURT: All right.

Well, that still has nothing to do with this witness. If it's around, we will find it.

MR. LEWIS: Thank you, sir.

MR. DUBUC: It did refer to previously produced documents. We didn't reproduce all of the hundreds of documents.

THE COURT: All right.

Bring back the jury.

[Jury enters.]

THE CLERK: Would Alternate Juror No. 3 please take Alternate Juror's seat No. 2; Alternate Juror No. 4 take seat 3; Alternate Juror 5 take Alternate seat No. 4; Alternate Juror 6 take Alternate's seat No. 5.

THE COURT: You may inquire.

MR. DUBUC: Thank you.

DIRECT EXAMINATION (Cont'd)

BY MR. DUBUC:

Q Now, Mr. Edwards, following all of your activities in connection with this investigation, did I ask you to look at some of the documents that had been generated as a result of the investigation to determine certain things, such as air speed, aircraft altitude, things of that nature?

A Yes.

Q I am going to be asking you some questions and I would like you to tell me, first of all, before we begin, did I ask you to look and determine from the accident investigation records, and also your own participation from those records, from reports produced in connection with those records, to determine the airplane's speed at the first impact?

A Yes.

Q And did you look for that for me?

A Yes, I did.

Q And did you find it?

A Yes, I did.

Q And what was it?

A 270 knots, 3.6 seconds prior to the first impact.

Q And did you also look at my request at the

records that you examined and the reports to determine the speed of the aircraft at the second impact?

A Yes, I did.

Q And for purposes of some of the questions I am going to be asking you, I would also like you to assume as a fact that the descent rate just prior to the first impact was approximately 500 to 600 feet per minute.

MR. LEWIS: I am sorry.

Could I ask Mr. Dubuc to repeat that?

MR. DUBUC: 500 to 600 feet per minute, as indicated.

MR. LEWIS: What was the assumption?

MR. DUBUC: That the descent rate just prior to the first impact was 500 to 600 feet per minute.

BY MR. DUBUC:

Q Did I also ask you to look at the records and review the documentation and determine the aircraft weight at the time of takeoff and at the time of the first impact?

A Yes, you did.

Q And did you do that?

A Yes.

Q And what did you find?

A The records show that the gross weight at takeoff was 464,000 pounds.

Q And how about at the time of landing, the first landing?

A At the time of the landing the weight was 451,000 pounds.

Q All right.

And did I also ask you to either recall from your own participation in the accident investigation and the time you were at the scene or if you couldn't recall to check certain records in the investigation report to determine the distance of various components of the aircraft as they were found located after the accident?

A Yes.

Q And did I ask you to check the distance from the point of the second impact in which the cockpit and crew compartment area was found?

A Yes.

Q And do you recall what that distance was?

A All these numbers I'm giving you are kind of rounded numbers because I can't remember all those.

Q Is there anything that would help you remember them?

A Yes.

I actually wrote these numbers down on one of these exhibits, this wreckage distribution diagram, whatever that exhibit number is.

Q And when did you do that?

A Oh, in the last week or so.

Q Okay.

Would that help you remember exactly what distances they were?

A Yes.

Q Why don't you take a look at that?

Is that Exhibit 9 you are talking about, the wreckage diagram?

A The wreckage diagram.

Q Is this the exhibit that you are talking about?

A That is the exhibit.

Q Now, can you tell me the distance that you determined from reviewing the records or from your actual on-site inspection as to where, how far from the point of impact, the cockpit crew area came to rest?

A I scaled this diagram from the point of second impact to the final location of the flight deck. And as my memory serves me, it was 2209 feet.

Q Did you do the same thing with respect to the point of first impact and distance that the troop compartment came to rest?

A Point of impact, second impact, to where the troop compartment came to rest was 2012 feet.

Q All right.

And did you do the same thing with respect to the major portion of the cargo floor that was found at the accident scene?

A Yes, I did.

Q And can you tell us what that distance was from the point of second impact?

A As I recall, this was 850 feet. 853, I believe.

Q All right.

Did you also, in connection with either while you were at the scene or subsequently by scaling it, as you just indicated, determine the distance from which the wing was located from the point of second impact?

A Yes, I did.

Q How far was that?

A I can't remember that number.

There's one figure that sticks in my mind. It is an easy way to remember things. I remember that --

MR. LEWIS: Your Honor, if he doesn't remember --

THE COURT: That is right.

Answer the question. If you don't remember, don't answer it.

A I don't remember that number close enough to say really.

BY MR. DUBUC:

Q Do you have your scale copy of this Exhibit D-9

with you?

A Yes, I do.

Q Would that help refresh your recollection?

A It would.

Q Would you look at it?

A [Witness complies.]

The only thing I scaled --

THE COURT: Just answer the question, Mr. Edwards.

BY MR. DUBUC:

Q I was referring to the wing area.

THE COURT: How far was the wing area from the second impact, if you know.

THE WITNESS: The wing area was 24,049 feet.

BY MR. DUBUC:

Q Now, in making these computations, did I also ask you to compute the connectic (sic) energy that would have been stored in the C-5A prior to the first impact?

A Yes.

Q And did you do that?

A Yes, I did.

Q And are you familiar with how to do that?

A Yes, I am.

Q Are you also familiar with how to make computations with respect to relating connectic (sic) energy into "G" forces?

A It is kind of difficult to get from connectic (sic) energy to "G" forces. "G" force is a function of acceleration.

Q Well, assuming that connectic (sic) energy -- are you qualified and do you know how to make a computation of showing how "G" forces react on the energy stored in an airplane as it decelerates?

A Yes, I do.

Q And did you make some of those calculations?

A Yes, I did.

Q Could you tell me before we start what you computed the connectic (sic) energy to be prior to the airplane's first impact?

A Not from memory, no.

Q Well, do you have anything with you that would assist you?

A Yes, I do.

Q Well, if you do, would you please look at it, sir?

A [Witness complies.]

MR. LEWIS: Your Honor, may I make a point of inquiry.

Is this an explanation of the accident report?

MR. DUBUC: Pardon?

MR. LEWIS: Or an independent opinion?

THE COURT: Is this an explanation of the accident

report or an independent opinion?

MR. DUBUC: Well, this is an explanation of something related to Mr. Timm's testimony on computation of connectic (sic) energy, which I believe was put in evidence earlier.

BY MR. DUBUC:

Q Have you got what you needed now, sir?

A Yes, I do.

Q Are these your notes?

A These are my notes, right.

Q Can you tell us what you did as far as that?

Can you tell us what you found as far as connectic energy is concerned?

A The connectic energy of the C-5 at either the first impact or the second impact is the same because the velocity was the same.

The connectic energy was 1.4547 times 10 to the 9th power and the units are foot pounds.

Q All right, sir.

Now, can you tell us --

MR. LEWIS: I didn't hear the answer.

BY MR. DUBUC:

Q Was that the end of your answer?

A That is the answer.

MR. LEWIS: It was supposed to come out in some

figures.

THE COURT: Let him testify. You develop it in cross-examination. If he doesn't give an answer, you shouldn't worry.

BY MR. DUBUC:

Q Is that your answer, sir?

A That is my answer.

Q Now, did I ask you to make a computation using the figures we have just discussed, the distances, using the aircraft speed and weight, and using times that are recorded either in the MADAR tape or recorded as part of the accident report, technical subsections, or full report, in order to come to a calculation of the "G" forces that were operative on various sections of this aircraft?

A Yes.

Q Can you tell us what you did and how you went about that?

A Yes, I can.

Q All right.

Would you do so?

A There are certain things that I had to do in this thinking process. I could probably best do this by using some of the exhibits that have already been used in this case, if I would be permitted to do that.

Q All right.

Which one would you like first?

A I would like to start off with the records distribution diagram. That is D-9.

Q All right.

A And, if I could, would it be permissible to put it on the chart board? Could I talk from there?

MR. DUBUC: Is that all right with Your Honor?

THE COURT: Is there any objection?

MR. LEWIS: I thought the question, Your Honor, was did he calculate the "G" forces.

MR. DUBUC: I'm asking how he went about doing it.

THE COURT: He is now asking for permission to use exhibits to explain that.

MR. DUBUC: That is correct.

MR. LEWIS: I have no objection to him doing the mathematical calculation on the board.

THE COURT: He wants to use the exhibits.

I gather you didn't object.

In any event, he may.

MR. LEWIS: Not for the mathematical calculations, Your Honor.

THE COURT: He may use the exhibits in evidence to aid him in making his calculation.

MR. DUBUC: Thank you, Your Honor.

BY MR. DUBUC:

Q Now, what is it you wanted to do, Mr. Edwards?

A I would like to use Exhibit D-9 and some of the other artist sketches and photographs, et cetera, that I understand have been used in this case.

Q All right.

A And to save time, if you could just get these exhibits in this order:

D-9 first.

D-4.

P-26.

P-34.

P-27.

3-F.

3-B.

3-C.

Q 3-F, B and C?

A Correct.

Q And G; is that correct?

A I am not sure what the exhibit is on this, but there is a color photograph, an overhead view looking down at the major sections of the airplane; aft troop compartment, troop compartment, wing section.

I'm not sure what that number is.

Q All right, sir.

You have D-9.

Would you like to have that board moved over here?

A Wherever it is convenient.

D-9 is kind of small.

I want to use this one first to kind of set the stage, so to speak, so that you can get an overall view of the first situation.

I am going in this direction now.

First, impact point; a river; second impact point, and then the major distribution, general area.

Some of the other exhibits that I have asked for are more detailed views of the first impact point.

Another view is a color picture taken looking across the river, pictures looking down on this area, et cetera.

As stated before, I walked this area a period of four or five days in the hot burning sun.

THE COURT: Are you responding to the question?

Let's have the question.

MR. DUBUC: I asked what he did and how he did it on the "G" forces.

A (Continuing) It is important to know the type of terrain here and the type of terrain over here. It is very important in these calculations.

This is farm land. It is a rice field. The rice field on this side had not been tilled. It was flat, almost perfectly flat, because rice fields you have to put water in them. It has to stand level. This was a rice field, but it was dry. There were dikes, periodically. You will see those in later pictures.

On this side, again, rice fields with small dikes around containing and controlling the water.

The terrain on this side was almost perfectly flat.

This field was wet. They were getting ready to soften the ground and dig it up. This was very wet. Standing in water all the way up.

There was a lot of green grass growing and things like that, but essentially perfectly level.

On this side at first touchdown point, down here, you see some things called broken trees. There were three or four trees that were clipped off in an ascending manner. The airplane after touchdown climbed an altitude again and cut these trees at varying heights as the airplane progressed through the area.

There was some debris from the airplane left at this first impact point and some of the landing gear broke off and stopped around one of these trees.

Another landing gear stopped over way down in

this area.

Some more components from the aircraft, primarily from the aft end of the aircraft were on this side of the river.

As the airplane touched down, became airborne -- and we have spoken previously of the 270 knots -- the airplane was still flying 270 knots at some point between here and here.

The remaining gear on the airplane drug through the dike, in this area, and one of the gear ended up over about in this spot, another gear over in here, and I think you will see those in some of the pictures.

As quick as the airplane went through this dike, some of the pictures will show the tracks as the airplane was skidding through the rice paddy, digging tracks through the rice paddy. You will see those very quickly after you come across the rice paddy.

At about this point you see the track diverging, the tracks of two major compartments.

We have the flight deck, which is in front, which is where the pilot sits.

We have the wing section and then after that is the troop compartment. We will see that on another picture.

About this point is where the airplane separated into four major sections. The T tail is in this area. The

flight deck went further and stopped at this point. The aft troop compartment, where most of the people were, is here. The wing, the best evidence says that the wing actually went up in the air and landed upside down in this area.

If we can go to the next exhibit, I don't recall what number. I will try to save time.

BY MR. DUBUC:

Q Did you say D-4?

A D-4 is correct.

Let's get an understanding of the aircraft to go along with what I told you about the major sections.

This is looking into the airplane to the side.

You can't tell it here, but this is where the wing comes into the airplane and from here forward is what we call the flight deck. The pilot sits here.

After the wing is the aft troop compartment. You can see the seats. There are other pictures that show you more about that later.

This is the T tail.

Now, it is a little far away to see, but there are some dimensions on this.

For people sitting on this upper level, be they at this level up in the flight deck or back here, the dimension shown here are 13 feet down to the floor. There

is no dimension on this drawing from here down to the ground. But that is an additional eight or nine feet all the way down to the ground.

It is easy to remember this. It is about 22 feet from this point down to the ground.

Now, 22 feet is easy to remember if you think of living in an apartment building and if you live on the first floor, your feet would be, say, ten feet off the ground. If you lived on the second floor, your feet would be twenty feet off the ground.

So, for people sitting up here, you are almost like living on the third floor of an apartment building and your feet are twenty feet above the ground.

Now, that is important in what I am going to develop later also.

Okay. Let's go to the next exhibit.

This is Exhibit P-26.

This, obviously, is an artist rendition of the first impact. I don't have a great deal of quarrel with the picture.

As we will see from one of the latter photographs, as the airplane came in from the first impact point, based on what we saw on the ground, the scratches on the ground and the debris that was left on the side of the river, et cetera, the airplane was coming down and it appears as if

the pilot had pulled it out. This kind of looks like it is nose down. The airplane was either essentially level or, if anything, nose up.

These two engines got fairly close to the ground and you will see some gouge marks where the landing gear contacted the dry farm soil.

This shows a lot of dust. I don't know. I guess when you come down like this, the airplane would push the air out and probably blow whatever loose dust is around.

I think another picture will show some evidence of some dust just being blown like this. It disturbs the normal dust pattern on the soil.

Do you have the next exhibit.

This is another artist rendition of the first impact point, the airplane becoming airborne, and the second impact point and the distribution.

Now, I have reason to believe that the airplane kind of touched down here with the nose slightly up because at least the nose gear did get to this side and the nose gear was found to be over here and so was the right forward main gear found over here.

This kind of indicates that the plane was nose down at this point and my opinion is that that really didn't happen. I don't think the main fuselage struck the

dike. I think it went over and the gear went through that dike and we will see a couple of scratches in that area.

I won't dwell on this, sir, because we have better photographs later.

Okay.

MR. LEWIS: Counsel, would you announce the exhibit numbers just for the record?

MR. DUBUC: This is 3-G.

A (Continuing) This is the first impact point. The direction of flight and across here is the second impact point.

You can see some of the major areas, like the empennage here, and the F troop compartment here and the flight deck there. The wing was over in that area.

Now, I told you about the dry soil and I told you that there was some evidence that the left-hand two engines were close to the ground. You see these two marks here. It wasn't too evident from looking at it on the site that this engine actually touched the ground. This engine is 40,000 horsepower and when it gets close to the ground it is going to pull up dust and everything else.

So, I am not sure it really touched the ground or it just got within a few feet of the ground and disturbed the soil.

But this was definitely a gouge mark left by

the gear at this point.

Now, down in here is where I talk about the disturbance of the soil and I'm not sure whether the airplane touched there or whether it was a blast of air as the airplane was close and it pushed away.

THE COURT: Don't repeat yourself, Mr. Edwards, please. You said that three times.

THE WITNESS: All right.

A (Continuing) It is kind of hard to see right here, but here are some of those trees that are clipped off. You just can't see well enought to see that this tree was cut close to the ground.

THE COURT: You covered that, too.

A (Continuing) And again the picture doesn't really show some of the landing gear that were deposited about in this area and in this area.

Across the river these are really the tracks of the airplane. This is a normal ditch for the drainage system for the area.

If we could go to the next one, which is another color picture, the other color picture was taken right about here in the river and you are looking in that direction, so we are a little closer at that point.

THE COURT: Mr. Dubuc, I recall the question was, what did Mr. Edwards do.

MR. DUBUC: How did he do it.

THE COURT: Let's keep it moving.

THE WITNESS: All right.

A (Continuing) Here are a couple of gouge marks that went through the dike and here are the tracks of the aircraft as it went down to here.

At some point in here I believe the airplane separated into major sections. The troop compartment went essentially straight from this point right to there. That is the aft troop compartment. It curved a little bit.

The flight deck curved a little bit more and this is the flight deck. Here, again, is the empannage and the wing. It doesn't show the wing very well.

We have another photograph --

THE COURT: Did you identify that?

MR. DUBUC: This one here is 3-F.

Which one is this?

MR. RADCLIFFE: 3-E.

MR. DUBUC: 3-E.

A (Continuing) This is an aerial view. The angle is different.

We have been flying in this direction and skidding in this direction.

Here, again, you can see the tracks right there. This is the aft troop compartment. This is the forward

end. This is the aft end. The forward end is pointed in a direction toward this area where the wing is.

In walking around this area and going in and out of these various areas, there was no fire near the aft troop compartment.

The troop compartment there was no fire in that area.

The wing area was pretty much destroyed by fire. The wing, when it separated, it ended up on its back. This is the only area we saw the fire.

BY MR. DUBUC:

Q Mr. Edwards, you referred to the bottom section there as the troop compartment.

A This is the aft troop compartment. This is the flight deck. This is where the pilot, co-pilot and the flight crew was.

Q You mentioned some distances before.

What were the distances as you looked at them while you were there or as you subsequently measured them between the troop compartment and the fire?

A The distance from this point to the closest point of the fire was about a football field and a half, 437 feet, which is about a football field and a half.

THE COURT: That is the distance?

THE WITNESS: From the very forward most end of

A (Continuing) We are looking at the aft troop compartment.

So, I pointed out a while ago that this was the forward end and it is now open because when it separated from the wing it was open ended.

If you are sitting here you can look through that hole, and I did. This is the aft end of the troop compartment. Most of the structure back here is shell structure. The actual end of the compartment containing people is somewhere along here.

Of particular importance is this area right here. This is what I call the side of the fuselage.

Now, normally from this point this fuselage goes down and ties to the floor, the heavy cargo floor. As the floor structure erroded away these fuselage side panels -- that is the reason for these tracks that you see here -- they gradually just kind of folded out to the side like wings.

I walked in this troop compartment, aft troop compartment, the first day that I was there. This compartment was essentially structurally intact. I am talking about the interior. These side panels were bolted up on both sides.

As I said before, there was no fire in this area.

I would assume that anyone sitting in here when it came to rest could have looked through this hold and could have seen the fire, which is essentially straight ahead.

MR. LEWIS: Objection.

THE COURT: Sustained.

BY MR. DUBUC:

Q Just what you did.

MR. LEWIS: Excuse me, Your Honor.

The pending question, the last time that I heard the question, was what calculations did he make.

MR. DUBUC: And how did he do it.

THE COURT: I don't want this witness to argue the case.

MR. DUBUC: I understand that.

BY MR. DUBUC:

Q Mr. Edwards, does one of the reasons you are showing these things have anything to do with the tracks we are seeing and the tracks that are repeated on this exhibit as well as prior exhibits?

A Yes, it does.

MR. LEWIS: May I respectfully ask the Court to restrict counsel to hard data? I have no objection to that, but not to comments beyond it.

BY MR. DUBUC:

Q Please try to do that.

A (Continuing) I mentioned in the very first exhibit we used the wreckage diagram, the type of terrain was very important in my considerations.

THE COURT: You said that and we want to get to the calculations.

A (Continuing) I guess now I want to go back to the wreckage diagram.

So, we saw the general area. We saw some detailed view here. We looked down on this and then we took a detailed view of this troop compartment.

This was dry soil, flat and level.

THE COURT: You covered that.

I am sorry, Mr. Edwards, but I am not going to allow this to be repeated four times.

BY MR. DUBUC:

Q Could you get to how you computed the "G" forces, please?

A All right.

I took this diagram and I scaled the distances that various sections traveled.

The aft troop compartment traveled a total distance to 2,012 feet.

MR. LEWIS: I respectfully object, Your Honor. He said this several times.

THE COURT: Yes.

We have that date, Mr. Edwards.

THE WITNESS: All right.

A (Continuing) Knowing the distance and knowing the velocity from the recorded data as in Tab T, all you have to do to get the deceleration is to go through a couple of simply physic formulas.

Now, I can either go through those formulas or I can tell you what the answer was.

BY MR. DUBUC:

Q Go ahead and tell us either way.

THE COURT: You ask him a question.

BY MR. DUBUC:

Q Tell us what you calculated, what the "G" forces were that you calculated?

A For the aft troop compartment I calculated an average of "G" force of 1.60.

When I say "average" I had to consider that this terrain was relatively constant. It was mud, soft mud. There was no reason to believe there was any major obstacles in there that would all of a sudden as you were going down would run up against something that slows the airplane down drastically.

THE COURT: You were asked a question. If you can't answer questions more directly we will have to get

another witness.

BY MR. DUBUC:

Q Tell us what calculations you made for troop compartment "G" forces, the cockpit flight deck "G" forces, and "G" forces as they pertain to the lower cargo compartment area that is part of that diagram?

A The flight deck came out to 1.45 "Gs", the section of the flight deck which went the furthest and it had the lowest "G" forces.

The major section of the cargo floor, which came to rest the soonest, 3.77 "Gs".

Q And the troop compartment?

MR. LEWIS: Asked and answered.

THE COURT: Yes.

The only thing missing is the wing.

BY MR. DUBUC:

Q Did you compute the wing?

A I did not compute the wing.

Q Now, can you tell us basically how you computed this?

A Yes, I can.

Q Will you do that for us?

A Is it all right to write on this?

Q That is fine.

A Okay.

The distance is equal to one-half AT squared.

This is one of Sir Issac Newton's formulas. There is also another Newton formula that says that the distance is a function of the velocity times the time. And if you have a constant velocity, it is just the velocity times the time.

An automobile traveling at 60 miles an hour, in one hour he will travel 60 miles.

MR. LEWIS: May we approach the bench?

THE COURT: Yes.

Ladies and gentlemen: We will now take our recess. I will excuse the jury.

[Jury leaves.]

THE COURT: Yes, Mr. Lewis.

Do you want the witness in the room?

MR. LEWIS: No. I prefer he not be in the room.

THE COURT: Would you excuse yourself, please, Mr. Edwards?

[Whereupon, the witness leaves.]

MR. LEWIS: Your Honor, this is so far beyond what we were advised by answer to interrogatory, proffer, or otherwise, that this man was going to do. It is, I am sure, not intentionally dishonest, but the affect of it is dishonesty.

May I just briefly touch on why?

If you talk about average, Your Honor, obviously taking his example -- and bear with me because I am not a great mathematician -- but if the machine was traveling at 310 miles an hour, using statute miles an hour at any point, and it decelerates from that speed to zero, you have a constant varying situation. And if the speed and the time are important, Your Honor, the "G" forces would vary from presumably a high force to nothing.

THE COURT: The assumption of the constant speed is an impossible assumption.

MR. LEWIS: It can't be. Yes, sir.

I can't sit there and act to the jury as though I'm trying to keep the truth from them, Your Honor. And I think this engineer has to know that, Your Honor. He just has to know that that is half truth of the worst kind. And I don't know how to correct it, sir, but it is a very serious problem in a case that we have gone this long on.

The assumption of the constant speeds is just scandalously wrong, as I understand engineering, and I don't proffer this to the Court because I don't have an engineer present. But common sense and my understanding of the situation suggests that is true.

I think the man has been allowed to give opinions, Your Honor, far beyond what, you know, he says he could. In fact, I thought he said in my voir dire that he really

can't give, you know, serious opinions on "G" forces.

Furthermore, the proffer, the proffer, Your Honor, was not that this man was going to give an answer for "G" forces, but he was going to give the underlying data, which is what it says precisely.

THE COURT: Well, of course, we are dealing in the context here where the other side of the coin was cast in terms of the first impact as if it were terminal impact, a collision between two railroad trains, each going 55 miles an hour, at which the force is that times 25.

So, we are dealing with apples and oranges here to begin with.

I don't know what the jury can do with it.

MR. LEWIS: He doesn't disagree with that, Judge.

THE COURT: Of course not, but it has nothing to do with the case.

MR. LEWIS: Well, the connectic (sic) energy does, Your Honor.

THE COURT: That is another thing.

MR. LEWIS: He calculated the connectic (sic) energy.

May I have the figure?

I had somebody at the counsel table, not myself, do the calculation. And the formula that he gave, and he didn't give the answer, the formula, interestingly enough,