

**BASIC
AIRCRAFT ACCIDENT
INVESTIGATION
PROCEDURES & TECHNIQUES**

TRAINING MANUAL



October 1971

**DEPARTMENT OF TRANSPORTATION
OFFICE OF THE SECRETARY OF TRANSPORTATION**

TRANSPORTATION SAFETY INSTITUTE

Oklahoma City, Oklahoma

BASIC
AIRCRAFT ACCIDENT INVESTIGATION
PROCEDURES AND TECHNIQUES

TRAINING MANUAL

FIRST EDITION

FIRST PRINTING

TRANSPORTATION SAFETY INSTITUTE

Published and Printed by
The Printing Branch
FEDERAL AVIATION ADMINISTRATION AERONAUTICAL CENTER
Oklahoma City, Oklahoma
October 1971

FOREWORD

The purpose of this manual is to provide the student with consolidated study material which directly relates to the classroom and laboratory instruction presented in basic aircraft accident investigation procedures and techniques at the Transportation Safety Institute.

This text and the basic instruction relate to the objective tasks, functional organization, and investigative approach used in civil aircraft accident investigations in the United States.

This manual is not a complete reference for accident investigation. It is designed to include only the basic, seldom-changing information necessary for study while attending the basic course. Since the nature of investigation is seldom clearly procedural, TSI instruction and this text have provided for cross reference of subject material.

Extensive additional reference material is used during the course which pertains primarily to Government organizational and procedural rules and regulations, and to technical support material. Information from these references is included in this manual only if it is basically unchanging in nature and directly applicable to investigation procedures and techniques instruction.

Acknowledgement is hereby given to all contributors for their ideas, knowledge, experience, time, and effort for the advancement of training, accident investigation, and transportation safety.



CONTENTS

	Page
Foreword.....	i
PART A: GENERAL PRINCIPLES AND PROCEDURES OF AIRCRAFT ACCIDENT INVESTIGATION	
CHAPTER I. FUNDAMENTAL CONCEPTS	1
1. Basic Investigation Nomenclature.....	1
2. Purpose of the Investigation.....	3
CHAPTER II. AUTHORITIES AND RESPONSIBILITIES	
1. Legislative Framework.....	5
2. Accident Investigation Responsibilities of NTSB.....	5
3. Accident Investigation Responsibilities of FAA.....	5
4. Pertinent Federal Regulations.....	6
5. Authority Vested in the Investigator.....	7
6. Role of Interested Parties.....	7
7. Legal Implications of the Investigation.....	10
CHAPTER III. THE INVESTIGATION PROCESS	
1. NTSB Functional Organization.....	11
2. FAA Functional Organization.....	11
3. Interested Party Organization.....	12
4. The Team Investigation Concept.....	12
5. Field Office Investigations.....	16
6. The Public Hearing.....	17
CHAPTER IV. GENERAL PROCEDURES	
1. The Preaccident Plan.....	21
2. Initial Investigation Procedures.....	22
3. Conduct of the Investigation (NTSB).....	23
4. Release of Information (NTSB).....	23
5. Conclusion of the Field Phase (NTSB).....	24

	Page
PART B: OPERATIONS INVESTIGATION	
CHAPTER I. FLIGHT OPERATIONS – GENERAL	27
CHAPTER II. FLIGHT OPERATIONS	29
1. Flight Planning and Dispatching.....	29
2. Weight and Balance.....	37
3. Crew History.....	42
4. History of Flight.....	44
CHAPTER III. AIR TRAFFIC CONTROL AND NAVIGATION AIDS	47
1. Airborne Equipment Availability.....	47
2. Ground Facilities	48
3. Facilities Flight Inspection.....	48
CHAPTER IV. WEATHER	51
1. Crew Briefing.....	51
2. Forecasts.....	52
3. Hazardous Weather.....	53
4. Actual Weather	56
5. Weather Conditions vs. Pilot or Aircraft Capability.....	57
CHAPTER V. WITNESSES	59
1. Philosophy.....	59
2. Locating Eyewitnesses.....	59
3. Expediting the Interviewing of Witnesses.....	62
4. A Successful Interview.....	63
5. The Report.....	71
6. Analysis.....	71
CHAPTER VI. HUMAN FACTORS	73
1. Inflight Incapacitation.....	73
2. Crash Injuries.....	74
3. Post-Accident Survival.....	75
CHAPTER VII. OTHER FACTORS FOR CONSIDERATION	77
1. Wake Turbulence.....	77
2. Aquaplaning.....	78

	Page
PART C: AIRCRAFT AIRWORTHINESS INVESTIGATION	
CHAPTER I. AIRWORTHINESS – GENERAL	85
1. Airworthiness Defined.....	85
2. Structures.....	85
3. Propulsion.....	86
4. Aircraft Systems.....	86
5. Manufacturing, Modifications, and Maintenance.....	87
6. Flight Characteristics.....	87
CHAPTER II. FLIGHT CHARACTERISTICS	89
1. Aerodynamics and Performance.....	89
2. Stability and Control.....	115
CHAPTER III. STRUCTURES	127
1. Structures – General.....	127
2. Materials.....	129
3. Design.....	137
4. Failure Analysis – Fatigue.....	146
5. Wreckage Distribution.....	165
6. Wreckage Mock-Ups.....	166
7. Inflight Breakup.....	167
8. Midair Collision Analysis.....	176
9. Fire Analysis – General.....	196
CHAPTER IV. POWERPLANTS	203
1. Reciprocating Powerplants.....	203
2. Turbine Engines.....	216
3. Propellers.....	222
4. Controls and Accessories.....	231
CHAPTER V. SYSTEMS	237
1. Systems – General.....	237
2. Hydraulic Systems – General.....	255
3. AC and DC Electrical Systems – General.....	279
4. Instrumentation – General.....	301

	Page
5. Radio Equipment – General.....	314
6. Pneumatic Systems.....	326
7. Fire Detection and Protection – General.....	334
8. Oxygen Systems – General.....	341
CHAPTER VI. MANUFACTURING, MODIFICATION, AND MAINTENANCE.....	343
1. Methods and Procedures – General.....	343
2. Compliance with Federal Aviation Regulations – General.....	344
3. Maintenance Records.....	345
4. Quality Control.....	346
CHAPTER VII. HELICOPTERS.....	349
1. General.....	349
2. Helicopter Aerodynamics.....	349
3. Flight Characteristics.....	352
PART D: SPECIAL CONSIDERATIONS	
CHAPTER I. INVESTIGATION EQUIPMENT.....	355
CHAPTER II. PHOTOGRAPHY IN ACCIDENT INVESTIGATION.....	357
1. Photography as a Tool in Accident Investigation.....	357
2. Photographic Equipment – Size and Weight Consideration.....	358
3. Exposure.....	358
CHAPTER III. RECORDERS AND READOUTS.....	363
1. General – History.....	363
CHAPTER IV. ACCIDENT PREVENTION RECOMMENDATIONS.....	379
CHAPTER V. CAUSAL FACTORS CHECKLIST.....	381
PART E: INVESTIGATION REPORT	
CHAPTER I. PURPOSE AND REQUIREMENTS.....	389
1. Purpose of Aircraft Accident Report.....	389
2. Requirements.....	389
CHAPTER II. TYPES OF REPORTS.....	391
1. Accident Report.....	391
2. Group Chairman Report.....	394

	Page
3. Report of the Investigation.....	394
4. Technical Specialist Report.....	394
5. Briefs of Accidents.....	394
6. FAA Reports.....	394
CHAPTER III. REPORT CONTENT.....	417
1. Accident Report.....	417
2. Group Chairman Report.....	417
3. Report of the Investigation.....	418
4. Technical Specialist Report.....	418
5. Briefs of Accidents.....	418
6. FAA Reports.....	418
CHAPTER IV. PREPARATION OF THE REPORT.....	419
1. General Principles and Procedures.....	419
CHAPTER V. PROCESSING THE AIRCRAFT ACCIDENT REPORT.....	425
1. Coding and Analysis.....	425
2. Availability.....	425
LIST OF ILLUSTRATIONS.....	427
INDEX.....	433

PART A—GENERAL PRINCIPLES AND PROCEDURES

CHAPTER I

FUNDAMENTAL CONCEPTS

1. Basic Investigation Nomenclature

The key to successful aircraft accident investigation is *communication*. The members of the investigating team must speak the same language; each must have the same definition or meaning in mind when accident investigation terms are used. Clarity is particularly essential in writing aircraft accident reports since the written words preclude any immediate opportunity for explanation or clarification.

The following selected terms are included in this manual as a guide toward eliminating some of the confusion in aircraft accident investigation caused by ambiguous terminology. This list is not all-inclusive, and it is expected that investigators will use additional reference sources, e.g.:

- a. Federal Aviation Act of 1958, Title One
 - b. Federal Aviation Regulations, Vol. I, Part I
 - c. Current aeronautical dictionaries
 - d. Updated glossaries issued by specific organizations such as the National Aeronautics and Space Administration, United States Weather Bureau, FAA Air Traffic Service, and aircraft manufacturers
 - e. National Transportation Safety Board Investigation Regulation, Part 430.
- (1) *Administrations* — The organizations assigned to the Department of Transportation: Federal Highway Administration; Federal Railroad Administration; Federal Aviation Administration; Coast Guard; St. Lawrence Seaway; Urban Mass Transportation Administration.

- (2) *Adversary Procedure* — A procedure governed by defined rules of evidence and procedure in which opposing parties attempt to resolve rights, responsibilities, and liabilities.
- (3) *Air Carrier* — Any citizen of the United States who undertakes, whether directly or indirectly or by a lease or any other arrangement, to engage in air transportation: *Provided*, That the Board may by order relieve air carriers who are not directly engaged in the operation of aircraft in air transportation from the provisions of the Federal Aviation Act to the extent and for such periods as may be in the public interest.
- (4) *Aircraft* — Any contrivance, now known or hereafter invented, used, or designed for navigation of or flight in the air.
- (5) *Aircraft Accident* — An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which:
- (a) Any person suffers death or serious injury as a result of being in or upon the aircraft or by direct contact with the aircraft or anything attached thereto, or
 - (b) The aircraft receives substantial damage.
- (6) *Appliances* — Instruments, equipment, apparatus, parts, appurtenances, or accessories, of whatever description, which are

- used, or are capable of being or intended to be used, in the navigation, operation, or control of aircraft in flight (including parachutes, communication equipment, and any other mechanism(s) installed in or attached to aircraft during flight), and which are not a part or parts of aircraft, aircraft engines, or propellers.
- (7) *Bureau of Aviation Safety* – That Bureau of the National Transportation Safety Board assigned the responsibility for the investigation of all civil aircraft accidents.
- (8) *Cause* – That, which in a continuous sequence unbroken by any intervening cause, produces an accident, and without which the accident would not occur.
- (9) *Chairman* – One of the members of the National Transportation Safety Board designated by the President as the chief executive and administrative officer of the Board who shall exercise the responsibility of the Board with respect to (1) the appointment and supervision of personnel employed by the Board; (2) the distribution of business among the Board's personnel; and (3) the use and expenditure of funds.
- (10) *Civil Aircraft* – Any aircraft other than public aircraft.
- (11) *Civil Aircraft of the United States* – An aircraft registered as provided by the Federal Aviation Act of 1958.
- (12) *Department* – An executive department established at the seat of government, known as the Department of Transportation and referred to as the *Department*.
- (13) *Department of Transportation* – A Department established by Congress by the Department of Transportation Act of 1966 to assure the coordinated, effective administration of the transportation programs of the Federal Government; to facilitate the development and improvement of coordinated transportation service, to be provided by private enterprise to the maximum extent feasible; to encourage cooperation of Federal, State, and local governments, carriers, labor, and other interested parties toward the achievement of national transportation objectives; to stimulate technological advances in transportation; to provide general leadership in the identification and solution of transportation problems; and to develop and recommend to the President and the Congress for approval national transportation policies and programs to accomplish these objectives with full and appropriate consideration of the needs of the public, users, carriers, industry, labor, and the national defense.
- (14) *Department of Transportation Act* – Public Law 89-670, 89th Congress, H. R. 15963, October 15, 1966: An Act to establish a Department of Transportation, and for other purposes.
- (15) *Deposition* – The taking of sworn testimony from either an Air Safety Investigator, or a person allegedly having knowledge of circumstances concerning an aircraft accident. (Federal Aviation Act of 1958, sec. 1004(e)).
- (16) *Fact-finding Procedure* – A study of facts, conditions, and circumstances where defined rules of evidence are not applicable and no attempt is made to resolve rights, responsibilities, or liabilities.
- (17) *Factor* – A term used to reflect those elements of an accident which further explain or supplement the probable cause.
- (18) *National Transportation Safety Board (Safety Board)* – A Board established within the Department of Transportation by the Department of Transportation Act of 1966.
- (19) *Federal Aviation Act of 1958* – An Act to continue the Civil Aeronautics Board as an agency of the United States, to create a Federal Aviation Agency, to provide for the regulation and promotion of civil aviation in such manner as to best

- foster its development and safety, and to provide for the safe and efficient use of the airspace by both civil and military aircraft, and for other purposes.
- (20) *Federal Aviation Administration (Agency)* — A component established within the Department of Transportation by the *Department of Transportation Act of 1966*.
 - (21) *Operation of Aircraft* — The use of aircraft for the purpose of air navigation and the navigation of aircraft. Any person who causes or authorizes the operation of aircraft, whether with or without the right of legal control (in the capacity of owner, lessee, or otherwise) of the aircraft, shall be deemed to be engaged in the operation of aircraft within the meaning of this Act. (FA Act 1958)
 - (22) *Operator* — Any person who causes or authorizes the operation of an aircraft, such as the owner, lessee, or bailee of an aircraft.
 - (23) *Part 430* — NTSB Investigation Regulation, defining rules pertaining to aircraft accidents, incidents, overdue aircraft, and safety investigations.
 - (24) *Participating Parties* — Those organizations or persons who are designated by the Investigator-in-charge to participate in the field phase of an aircraft accident investigation.
 - (25) *Parties to the Investigation* — Those organizations or persons who are designated by the Hearing Officer to participate in the Public Hearing phase of an aircraft accident investigation.
 - (26) *Probable Cause* — Those events or circumstances which evolved in a sequence conducive to an aircraft accident.
 - (27) *Public Aircraft* — An aircraft used exclusively in the service of any government or of any political subdivision thereof including the government of any State, Territory, or possession of the United States, or the District of Columbia, but not including any government-owned aircraft engaged in carrying persons or property for commercial purposes.
 - (28) *Public Hearing* — A fact-finding proceeding under the provisions of *NTSB Investigation Regulation Part 431*, in which Parties to the Investigation examine the facts, conditions, and circumstances related to a civil aircraft accident.
 - (29) *Recommendations* — Suggestions to the Administrator from the Board and other sources that specific action be taken in either operational or airworthiness areas to promote safety in air commerce.
 - (30) *Secretary* — The head of the executive Department of Transportation, appointed by the President, by and with the advice and consent of the Senate.

2. Purpose of the Investigation

The objective of aircraft accident investigation is the prevention of future accidents. Obviously it is too late to prevent those which have occurred, but perhaps through the finding of cause and the effecting of remedial action others may be prevented.

The purpose of each investigation is to determine what happened, why it happened, and how the accident was caused. Once this is determined, it is the responsibility of the National Transportation Safety Board to make this information public, their purpose being to apprise the public of the efforts of the Federal Government to promote aviation safety in air travel.



PART A — GENERAL PRINCIPLES AND PROCEDURES

CHAPTER II

AUTHORITIES AND RESPONSIBILITIES

1. Legislative Framework

The aircraft accident investigator must be aware of the legal source of his investigating authority. Situations arise during investigations that require the investigator to cite authority for ordering autopsies, taking possession of wreckage, testing components, or taking depositions.

All Federal Government authority for aircraft accident investigation is based on the Constitution, specifically, the Commerce Clause, article 1, section 8, clause 3. This is a general provision that gives Congress the power to regulate commerce between the States. This provision is amplified and dealt with more specifically in the Federal Aviation Act of 1958.

The Federal Aviation Act of 1958 defines the role of the National Transportation Safety Board and the Federal Aviation Administration in aircraft accident investigation. Their duties are further explained in the Department of Transportation Act of 1966 (Public Law 89-670). Both of these Acts were more explicit than the Constitution, but additional and more specific information was needed by investigators of aircraft accidents. The NTSB issued additional instructions in the form of investigation and organization regulations.

Summarizing briefly, authority for aircraft accident investigation is founded in the Constitution, enlarged upon in the Federal Aviation and Department of Transportation Acts, and dealt with specifically in NTSB Investigation and Organization Regulations.

Two Federal organizations within the DOT are responsible for transportation safety in aviation, the National Transportation Safety Board and the Federal Aviation Administration.

2. Accident Investigation Responsibilities of the National Transportation Safety Board

The National Transportation Safety Board is responsible for the investigation of civil aircraft accidents, and it shall be the duty of the Board to:

- a. Make rules and regulations governing notification and reporting of accidents involving civil aircraft.
- b. Investigate these accidents and report the facts, conditions, and circumstances relating to each accident and its probable cause.
- c. Make recommendations to the Administrator that, in NTSB's opinion, will tend to prevent similar accidents in the future.
- d. Make reports public in a form that the NTSB deems to be in the public interest.
- e. Determine what will best tend to reduce or eliminate the possibility of accidents or their recurrence by conducting special studies and investigations on matters with regard to safety in air navigation and accident prevention.

3. Accident Investigation Responsibilities of the Federal Aviation Administration

The Federal Aviation Administration responsibility to promote safety of flight of civil aircraft in air commerce is defined in the Federal Aviation Act of 1958. FAA specific responsibility in the investigation of all accidents involving civil aircraft is to determine whether or not:

- a. A violation of the Federal Aviation Regulations exists.
- b. Performance of FAA facilities or functions is involved.
- c. The airworthiness of FAA-certificated aircraft is involved.
- d. Competency of FAA-certificated airmen, air agencies, commercial operators, or air carriers is involved.

The NTSB has delegated to the FAA the sole responsibility for the investigation and reporting of the majority of civil aircraft accidents. In these delegated accidents the FAA performs the dual function of reporting the facts to the NTSB, and fulfilling the Administrator's responsibilities stated in the Federal Aviation Act. The NTSB, however, retains the responsibility for assigning probable cause of all civil aircraft accidents.

4. Pertinent Federal Regulations

The Board's authority for the investigation of aircraft accidents originates in the United States Constitution, article I section 8, clause 3. Additional federal regulations governing aircraft accident investigation define in greater detail the authority of federal agencies in investigating and reporting aircraft accidents. Figure A II-1 lists and summarizes these regulations.

The following regulations are guides to conducting an aircraft accident investigation: Investigation Regulation Part 430 — *Rules Pertaining to Aircraft Accidents, Incidents, Overdue Aircraft and Safety Investigations*; Organization Regulation Part 400 — *Statement of Organization and Functions of the Board and Delegation of Authority*; Investigation Regulation Part 431 — *Rules of Practice in Aircraft Accident Investigation Hearings*; Investigation Regulation Part 435 — *Disclosure of Aircraft Accident Information*; Organization Regulation Part 401 — *Public Availability of Information*.

NTSB Investigation Regulation, Part 430 — *Rules Pertaining to Aircraft Accidents, Incidents, Overdue Aircraft, and Safety Investigations* is, as its title indicates, of primary con-

cern to the aviation public. It defines aircraft accidents and incidents. It cites the responsibility of the operator regarding notification of an accident, what constitutes a reportable occurrence, what information is to be included in the accident notification, what action is required in establishing wreckage security, what authorization is required to move accident wreckage, and what reports are to be filed by the operator. Additional information is included regarding authority of Board representatives to inspect aircraft records, to conduct special studies, and to question persons having knowledge of an aircraft accident. The authority of the Director, Deputy Director, and Hearing Officers regarding aircraft accident investigations is listed.

NTSB Organization Regulation Part 400 describes the organization, functions, and operation of the National Transportation Safety Board. Subpart B of Part 400 defines the various delegations of authority to staff members where these delegations do not appear in other Board Procedural and Organization Regulations, e.g.: Delegations to the Executive Director, Hearing Examiners, General Counsel, Director and Hearing Officers of Bureau of Aviation Safety.

Section 400.45 of Part 400 is the National Transportation Safety Board's delegation of authority to the Federal Aviation Administration to investigate and report on certain aircraft accidents. This delegation by the Board to the FAA was made necessary by the Board's manpower shortage, and the rising number of accidents involving civil aircraft. The Board still investigates certain aircraft accidents involving air carriers, air taxi flights, and certain fatalities. The Board also retains the exclusive right to determine *probable cause* of all civil aircraft accidents.

NTSB Investigation Regulation Part 431 defines the rules of practice in aircraft accident investigation hearings. The nature of a Public Hearing and its conduct are discussed; functions of the Board of Inquiry, Parties to the Investigation, and the technical staff are defined; procedures are cited for the examination of witnesses, the admissibility of evidence, the

A II — AUTHORITIES AND RESPONSIBILITIES

withholding of information, and the conduct of the prehearing conference.

NTSB Investigation Regulation Part 435 prescribes the policies and procedures governing release of aircraft accident investigation information. Responsibility of the Board's regional field offices and the Washington office of the Board are explained. Both may release certain aircraft accident investigation information, Washington being allowed somewhat greater latitude than the Board field offices. Procedures are covered concerning employees' disclosure of information when testifying in suits or actions for damages arising out of aircraft accidents. Board regulations are defined governing testimony of Board employees and former employees in civil suits. The use of Board reports in civil suits is covered, and procedures are defined for requesting the testimony of a Board employee.

FAA Regulation (FAR Part 185) is comparable to the NTSB Investigation Regulation Part 435. FAR Part 185 defines FAA policy and procedure regarding testimony of its employees as witnesses in legal proceedings, the release or disclosure of FAA files or documents, and the serving of legal process and pleadings. FAA Handbook 1200.2, Public Availability of Information, cites basic FAA policies governing the public disclosure of FAA records and establishes guidelines for the release of information by FAA employees.

NTSB Organization Regulation Part 401 implements section 3 of the Administrative Procedure Act, 80 Stat. 250, 5 U.S.C. 552, and prescribes rules governing the availability to the public of the records and other written information held by the NTSB. This regulation explains Board policy in making information and records available to the public and the procedure for requesting such information.

Part 401 also cites fees for special services such as the copying of records and documents, certification of copies of documents, subscriptions to Board publications and procurement of Hearing transcripts.

Subpart D of Part 401 cites material exempted from public disclosure. Subpart E pro-

vides that an administrative review be conducted, citing reasons for an employee's refusal to make Board information available to the public.

5. Authority Vested in the Investigator

The Investigator-in-charge of an aircraft accident investigation has, as an investigative aid, all of the statutes, laws, and regulations associated with accidents involving civil aircraft. His authority includes: taking possession of the aircraft wreckage upon his arrival at the accident site, authorizing moving the wreckage, citing the responsibility of the operator to establish wreckage security, requesting the issuance of a subpoena, and citing legislation containing penalties and punishment for unauthorized movement of the wreckage. In the case of any fatal accident, investigators are authorized to examine the remains of any deceased person aboard the aircraft at the time of the accident, who dies as a result of the accident, and to conduct autopsies or such other tests thereof as may be necessary to the investigation of the accident. Authority provided the investigator via existing legislation is practically unlimited.

Aircraft accident investigators are aware of this authority, but are encouraged to enlist the cooperation of the aviation industry through the common objective of both government and industry, accident prevention. The Investigator-in-charge is solely responsible for the performance of the investigation team, and the success or failure of the investigation reflects his ability as an investigator and manager.

6. Role of Interested Parties

Interested Parties, or as they are sometimes called, *Interested Participating Parties*, denote those organizations or persons who are designated by the Investigator-in-charge to assist in the field phase of the investigation. They represent manufacturers, pilot organizations, air traffic experts, navigation facility technicians, operators, pathologists, government agencies, etc. Participating Parties are involved in all aspects of the field phase of the investigation.

AIRCRAFT ACCIDENT INVESTIGATION LAWS & DIRECTIVES

ITEM	SOURCE	TITLE	CONTENTS
U.S. Constitution (Article I, Section 8, Clause 3)	The People	(Regulation of Commerce)	Gives Congress exclusive power to regulate commerce internationally and among the States. Is the basis for Congressional enactment of aeronautical statutes.
Public Law 85-726	Congress	Federal Aviation Act of 1958	Basic aeronautical statute establishing aircraft accident investigation powers and duties of FAA and NTSB.
Public Law 89-670	Congress	Department of Transportation Act, 1966	Establishes the National Transportation Safety Board and transfers to it the former functions of the CAB Bureau of Aviation Safety. Act also adopts the aircraft accident investigation procedures contained in the Federal Aviation Act of 1958.
Federal Tort Claim Act	Congress	Federal Tort Claim Act of 1946	Prescribes liability of Federal Government for wrongful or negligent acts of its personnel.
Investigation Regulation, Part 430	National Transportation Safety Board	Rules Pertaining to Aircraft Accident, incidents, overdue aircraft and safety investigations (Jan. 1968)	Rules pertaining to giving notice of and reporting aircraft accidents, incidents, and certain other occurrences to civil aircraft of the United States. General: Definitions; Notification; Wreckage Preservation; Reporting Occurrences; Investigations; Special Studies.
Organization Regulation Part 401	National Transportation Safety Board	Public Availability of Information (July 1967)	Implements section 3 of the Administrative Procedure Act, 80 Statute 250, 5 U.S.C. 552, and prescribes rules governing the availability to the public of the records and other written information of the NTSB.
Investigation Regulation Part 431	National Transportation Safety Board	Rules of Practice in Aircraft Accident Investigation Hearings (July 1965)	Procedures governing Public Hearings conducted under the authority of Title VII of the Federal Aviation Act of 1958. Part explains nature of Hearing, Hearing Officer, Notice of Hearing, Board of Inquiry, Pre-Hearing Conference, Parties to the Investigation, etc.

Investigation Regulation Part 435	National Transportation Safety Board	Disclosure of Aircraft Accident Information (July 1965)	1. Policies and procedures of the Board regarding release of information obtained during the investigation of aircraft accidents
			2. Procedures for the disclosure of aircraft accident information via testimony of Board employees in suits or actions for damages arising out of aircraft accident investigations
Department of Transportation Regulation Part 9	Department of Transportation	Testimony of Employees of the Department and Production of Records and Legal Proceedings	Prescribes DOT policies and procedures with respect to testimony of employees as witnesses in legal proceedings, the acceptance of service of legal process, and the production of records pursuant to subpoena.
Organization Regulation Part 400, Sec. 400.45	National Transportation Safety Board	Statement of Organization and Functions of the Board, and Delegation of Authority (April 1968)	Describes those relatively minor accidents which the NTSB has requested that the FAA investigate and report the facts, conditions and circumstances.
Part 185	Federal Aviation Administration	Federal Aviation Regulations Part 185	Prescribes FAA rules with respect to testimony of employees and the release or disclosure of FAA materials and records in legal proceedings, and the serving of legal process and pleadings.
FAA Handbook 1200.2	Federal Aviation Administration	Public Availability of Information	Basic FAA policies governing the public disclosure of FAA records, and guidelines for the release of information by FAA employees.

TSI

They are assigned to specific groups at the organizational meeting; they work side by side with government investigators; they contribute to the daily progress meetings; they may suggest areas of investigation; they review their Group Chairman's report for accuracy and completeness. Participating Parties are so designated because they are in a position to contribute specific technical information and skills to the general knowledge of the Board investigators. Participating Parties are as much a part of the investigating team as the Board investigators.

7. Legal Implications of the Investigation

The increasing number of aircraft accidents resulting in litigation concern both the NTSB and FAA. Suits brought against the FAA for their alleged part in contributing to aircraft accidents amount to thousands of dollars annually. Judgments sometimes result from the courts' lack of familiarity with FAA areas of control and responsibility, i.e., aircraft certification, wheels-up landings, structural breaks, and, of course, the entire area of Air Traffic Control.

Legal implications are also evident in other facets of aircraft accident investigation, such as failure of an operator to report an accident, concealing accident information, unauthorized removal of accident wreckage, autopsy authorization, wreckage custody, and investigative jurisdiction.

Imagine the legal implications in the following situation: A four-engine Canadian-registered civil transport crashes near Honolulu in the State of Hawaii.

The aircraft and its engines were manufactured in England.

The crew was certificated in Canada.

The aircraft was owned and operated by a Canadian corporation.

The plane crashed on private property.

Deceased passengers included citizens of Canada, England, United States, Japan, and Mexico.

Hawaiian residents were killed on the ground.

An appointed county coroner is at the scene of the accident.

Some of the questions arising in the mind of an investigator assigned to investigate this hypothetical accident are:

- a. Have Canada, Japan, and Mexico any right to enter United States territory to investigate the cause of the death of their citizens?
- b. The wrecked aircraft is the private property of a Canadian Corporation; can it be claimed immediately by the owner?
- c. Does Canadian certification of the crew invest Canada with a right or duty to investigate the crew's performance?
- d. Since the English manufacturer may be sued if design defects or manufacturing negligence is discovered, has that nation any right to investigate the accident?
- e. Does the State of Hawaii have exclusive jurisdiction to investigate the death of its residents within its territorial boundaries?
- f. Since the owner of the private property has an exclusive right to the use and possession of his land, can he prevent foreign or even United States Government officials from trespassing during investigation of the accident?

Obviously the legal implications inherent in aircraft accident investigation are many and varied. The TSI attempts to apprise investigators of ways to deal with legal problems. Investigators are encouraged to call on General Counsel for advice, should they require legal assistance involving an aircraft accident investigation.

PART A — GENERAL PRINCIPLES AND PROCEDURES

CHAPTER III

THE INVESTIGATION PROCESS

1. NTSB Functional Organization

Public Law 89-670, *Department of Transportation Act*, enacted by Congress October 15, 1966, establishes the *Department of Transportation* and its *Administrations*. Established within the Department of Transportation by the Department of Transportation Act was the *National Transportation Safety Board*. The Board, while within the DOT for administrative purposes, reports directly to Congress concerning the investigation of accidents, and the determination of their probable cause.

The five-man NTSB is made up of four Members and a Chairman. They have the exclusive responsibility for the determination of probable cause of all civil aircraft accidents. Two Bureaus within the NTSB are responsible for accident investigation, the Bureau of Surface Transportation Safety, and the Bureau of Aviation Safety. The Bureau of Aviation Safety, with which we are concerned in this training manual, is comprised of approximately 100 investigators. About 50 are assigned to BAS headquarters in Washington, D.C., and the remainder are dispersed among the NTSB field offices. Primary responsibility of both contingents of investigators is in the realm of aircraft accident investigation. Washington headquarters also codes, analyzes, and files the original of all civil aircraft accident reports; fills public requests for accident data; compiles aircraft accident statistics; publishes, and makes such recommendations to the FAA and industry as in the Board's opinion will enhance accident prevention.

The Board's many accident-investigation-related functions include:

- a. Determination of probable cause of aircraft accidents.

- b. Reviewing on appeal the suspension of any certificate issued by the Administrator of the FAA.
- c. Recommendations for accident prevention.
- d. Special studies for accident prevention.
- e. Recommendations for rules and regulations for the conduct of accident investigations.
- f. Arrangements for participation of the Administrator in accident investigations.
- g. Making public the accident reports, special studies results, recommendations, and actions pursuant to air safety.

2. FAA Functional Organization

The Federal Aviation Agency was created by the Federal Aviation Act of 1958. Under the Department of Transportation Act of 1966, the Agency was redesignated the *Federal Aviation Administration* and assigned to the Department of Transportation.

The Administrator of the FAA has delegated his accident investigation functions to the Flight Standards Service. To perform these duties the Flight Standards Service has a structure consisting of a headquarters in Washington, 12 regional offices, and numerous district offices.

The district offices, general aviation (GADO) and air carrier (ACDO), conduct the FAA field investigations. These investigations are to fulfill the Administrator's responsibilities which are separate from those of the NTSB. The report submitted by the FAA coordinator/investigator is the basis for corrective action by the FAA.

In those accidents where the FAA conducts the investigation for the NTSB, a separate report is prepared and forwarded to the Board for their use in determining probable cause. (Part A, Ch. II par. 3a)

3. Interested Party Organization

A catastrophic air carrier accident involves not only government investigators but numerous Interested Parties. Certain Interested Parties, such as the FAA, pilot organizations, operators, and manufacturers, participate in all large accidents where their personnel or their products are involved. These Interested Parties usually have an accident team organized awaiting an accident notification. The team, with their specialized technical knowledge, is headed by an experienced accident investigator. An organizational meeting is held to make Interested Parties aware of what the Board expects of them upon arrival at the accident. The Investigator-in-charge invites them to participate in the field phase of the investigation, and assigns them to specific groups.

Interested Parties participate as equals in the investigation with access to all factual information available to the Board. The Board asks only for cooperation and encourages free exchange of ideas. The aim of government investigators and Interested Parties alike is the prevention of accidents through accident investigation.

4. The Team Investigation Concept

The varying conditions, locations, and circumstances under which aircraft accidents occur preclude establishing a rigid investigation pattern. The *Team Concept*, described in this text, is one method sufficiently flexible to effect a workable accident investigation plan. Accidents can be placed in two basic categories, the catastrophic air carrier occurrence involving numerous fatalities, and the comparatively minor occurrence usually involving general aviation. The catastrophic accident usually involves the *Team Concept*.

The *Team Concept* involves a Washington, D.C., nucleus of Bureau of Aviation Safety Air Safety Investigators. This nucleus is supplemented by Bureau of Aviation Safety field personnel. The *Team* is headed by an Investigator-in-charge; Bureau of Aviation Safety technical specialists, acting as Group Chairmen, direct the investigation activities within their technical area. These specialists are assisted by Interested Parties, e.g., FAA, operators, owners, manufacturers, industry and unions. Interested Parties are selected to participate in the investigation on the basis of the expert knowledge they possess relative to the specific investigation.

4.1. Investigator-in-Charge Responsibility

The organization of the aircraft accident investigation is the responsibility of the Investigator-in-charge. He will coordinate the activities of all personnel associated with the investigation. An organizational meeting is held to fulfill this responsibility. The Investigator-in-charge, assisted by the Assistant Investigators-in-charge for airworthiness and operations, assigns Bureau of Aviation Safety personnel as Group Chairmen. Interested Party coordinators, at the request of the Investigator-in-charge, assign their personnel to participate as Group Members.

During the organizational meeting, the need for coordination among groups is stressed, specific problems inherent with the investigation are pointed out, the need for a thorough investigation is stressed, Board investigation policy is reviewed, regulations are cited governing release of investigation findings, and the purpose of aircraft accident investigation is stated.

Operational control of the aircraft accident investigation throughout the various phases (wreckage recovery, field investigation, public hearing, and report writing) is effected by Bureau of Aviation Safety personnel.

The Investigator-in-charge will establish operations and airworthiness as the two basic investigation areas. These two areas will be subdivided into groups according to the demands of the accident. Personnel will be as-

signed in accordance with their technical specialty, e.g.:

Operations Groups	Airworthiness Groups
Operations	Structures
Air Traffic Control	Systems
Weather	Powerplants
Witnesses	Maintenance Records
Human Factors	Flight Recorder
Cockpit Voice Recorder	

See Figure A III-1.—Team Organization.

Assigned Assistant Investigators - in - charge for operations and airworthiness relieve the Investigator-in-charge of solving many in-house problems in these areas.

Normally, Board technical specialists will head the investigation Groups. These Group Chairmen may be assisted by technical specialists representing the State of Registry, the operator, crew organizations, manufacturers, and other selected experts who can contribute to the investigation. The prime function of the Group is to examine all facts within their specialized areas. A secondary function of the Group is the apprising of all *Team* members of specific Group findings. Frequently one Group uncovers information which will serve as a lead to another Group. Apprising *Team* members of investigative findings is accomplished through daily progress report meetings.

4.2. Functions of Investigative Groups — Operations Area

The operations area of an aircraft accident investigation includes a study of:

- a. Operations in general.
- b. Air Traffic Control involvement.
- c. Human factors.
- d. Witness information.
- e. Meteorological conditions.
- f. Cockpit voice recorder.

The operations investigation can best be conducted by assigning separate Groups. Each Group, headed by a Group Chairman, can then concentrate on a specific portion of the operations investigation. Coordination is effected among Group Chairmen to insure investigative coverage in areas where more than one Group may have a responsibility. For example, the Operations Group may coordinate their questioning of the crew with the Witness, Human Factors, and ATC Groups.

4.2.1. Operations Group

The Operations Group is responsible for investigating:

- a. Flight planning.
- b. Dispatching procedures.
- c. Airport data.
- d. Possible psychological factors affecting crew performance.
- e. Probable flight path based on performance data.
- f. Crew history, training, competency.
- g. Crew interview.

4.2.2. Weather Group

The Weather Group is responsible for collecting relative meteorological data, e.g.:

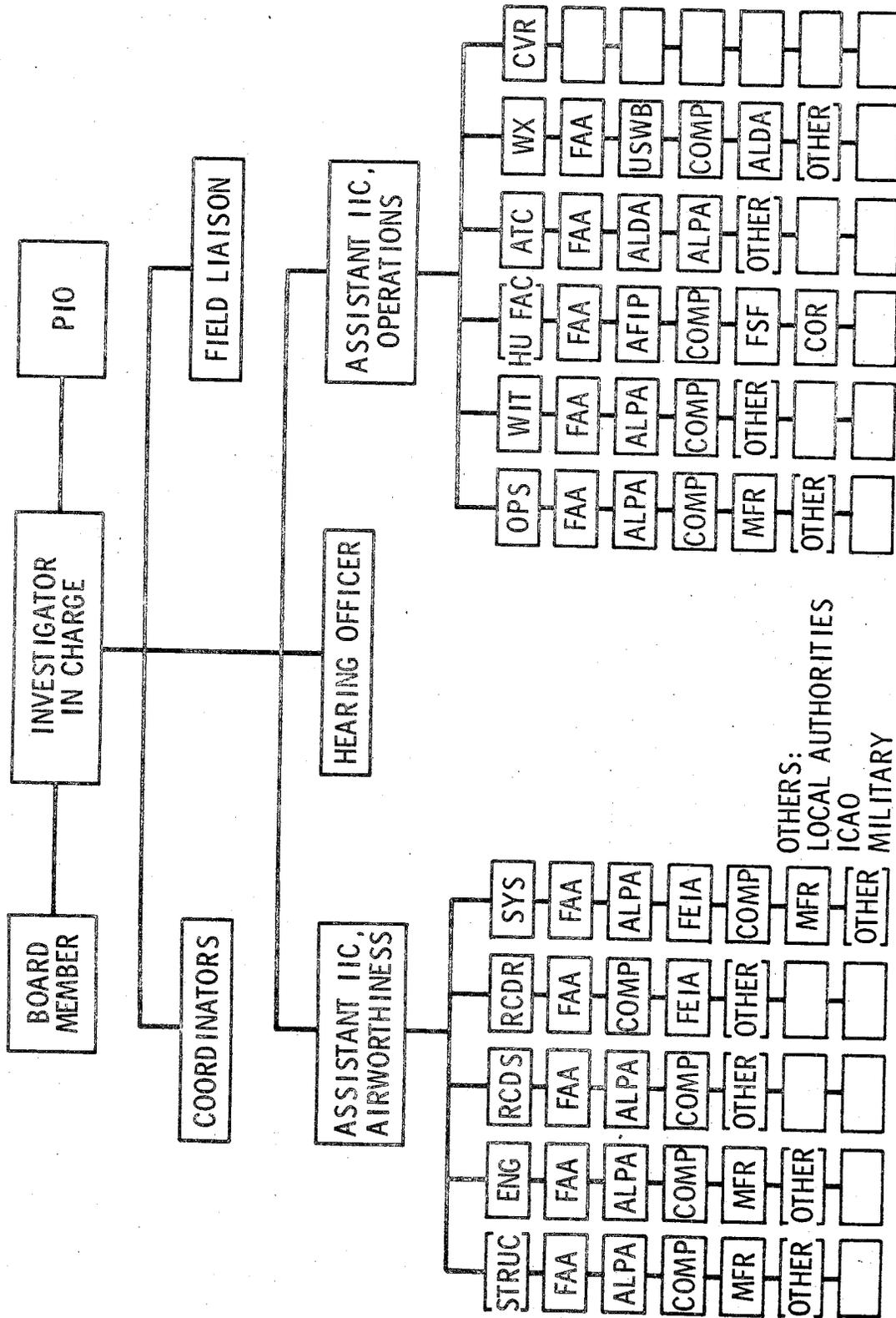
- a. Synoptic situation.
- b. Aviation weather observations.
- c. Pilot reports.
- d. Upper air information.
- e. Radar weather observations.
- f. Forecasts.
- g. Weather briefing services.

4.2.3. Human Factors Group

The Human Factors Group is responsible for investigating:

- a. Crash-worthiness factors.
- b. Restraint devices and systems.

MAJOR AIR CARRIER ACCIDENT INVESTIGATION (TEAM CONCEPT)



TSI

FIGURE A-III-1

- c. Cockpit and cabin environmental hazards.
- d. Energy absorption loads.
- e. Post-crash factors.
- f. Psychological factors (crew).
- g. Physiological factors.

Both pathological and toxicological studies are used by the Human Factors Group in fulfilling their investigation responsibilities.

4.2.4. Air Traffic Control Group

The Air Traffic Control Group is responsible for:

- a. Determining status of ATC facilities.
- b. Reviewing tower and ARTCC tapes.
- c. Interviewing ATC personnel.
- d. Studying ATC flight handling.
- e. Determining whether or not ATC personnel or facilities were at fault.
- f. Reviewing ATC procedures.

4.2.5. Witness Group

The Witness Group is responsible for:

- a. Questioning persons who may have information concerning the accident.
- b. Obtaining witness statements.
- c. Preparing a witness location chart.
- d. Establishing a probable flight path based on witness observations.
- e. Interpreting lay witness observations and applying them to the accident.

4.2.6. Cockpit Voice Recorder

Voice recorder examination is made by NTSB CVR specialists.

- a. Document recorder crash damage.
- b. Remove tape from recorder.
- c. Audition original tape and make re-recording of complete tape.

- d. Make re-recording of pertinent section of tape.
- e. Make transcript of pertinent section of tape. (Only this information is entered in the public record.)

4.3. Functions of Investigative Groups — Airworthiness Area

The airworthiness area of an aircraft accident investigation includes a study of:

- a. Structures.
- b. Systems.
- c. Powerplants.
- d. Maintenance records.
- e. Flight recorders.

The airworthiness area, like the operations area, can be most effectively investigated using the separate Group system. Each Group headed by a Group Chairman, investigates their technical specialty. Coordination is effected by Group Chairmen to assure investigative coverage in areas where more than one Group may have a responsibility. For example, the Systems, Structures and Powerplants Groups would coordinate their activity in examining the wing wreckage of a large jet aircraft.

4.3.1. Structures Group

The Structures Group is responsible for:

- a. Examining the airframe and flight controls and accounting for all parts.
- b. Plotting the wreckage distribution.
- c. Preparing a mock-up or a partial layout of the wreckage when necessary.

4.3.2. Systems Group

The Systems Group is responsible for:

- a. Examining the various aircraft systems, i.e., hydraulic, electrical, fire detection and protection, oxygen, de-icing, pneumatic, air-conditioning, etc. (The fuel system is

usually investigated by the Powerplants Group.)

- b. Obtaining cockpit instrumentation and control readings (coordinated with the Operations Group).
- c. Accounting for system components and insuring system continuity.
- d. Determining system operational capability prior to impact.

4.3.3. Powerplants Group

The Powerplants Group is responsible for:

- a. Examining the fuel system.
- b. Conducting the on-site powerplant investigation.
- c. Removing of powerplants from the site for further study and teardown.
- d. Determining operational capability of powerplants prior to impact.
- e. Examining powerplant accessories.

4.3.4. Maintenance Records Group

The Maintenance Records Group is responsible for:

- a. Reviewing the aircraft's maintenance records.
- b. Documenting compliance with specified maintenance practices.
- c. Studying history of aircraft for possible accident cause.
- d. Documenting compliance with Airworthiness Directives.

4.3.5. Flight Recorder Group

The Flight Recorder Group is responsible for readout of the flight recorder tape.

4.4. Logistics and Support

The liaison investigator assigned from the local field office inherits the bulk of the logis-

tics and support responsibilities. He is usually the first NTSB representative at the accident site and is the acting Investigator-in-charge.

His primary function is to establish security; he should arrange for security prior to his arrival and take charge of it personally when he first visits the accident site. His knowledge of the area and awareness of available manpower simplifies obtaining guards. Security goes further than merely obtaining guards, however. Coordination must be effected with the coroner to prevent loss of human factors information; rescue personnel must be cautioned against unnecessary wreckage disturbance; aircraft papers, logs, and charts scattered throughout the area must be secured; souvenir hunters must be discouraged; and measures must be taken to preserve impact marks.

Prior to the arrival of the *Team* and the Public Information Officer, the field liaison investigator must also deal with the press. Care must be taken to release only factual information instead of theories or opinions concerning accident cause.

When the liaison investigator has established security, he can devote his time to alerting wreckage-recovery groups. Cranes, flatbeds, flotation gear, digging equipment, bulldozers, trucks, etc., may be required. The liaison investigator's study of the accident site and his experience as an investigator will confirm what equipment is needed. His knowledge of equipment and personnel available in the area will assist the IIC in organizing the investigation.

5. Field Office Investigations

Approximately 10 air carrier accidents occur annually in the United States that the Board classifies as catastrophic, and orders a formal *Team* investigation. The remaining air carrier and all general aviation accidents (over 5000 in 1970) are investigated by Board and FAA field office personnel. Board personnel act as Investigators-in-charge of about 15% of these 5000 accidents. The FAA, by Board delegation, investigates and reports the facts, conditions and circumstances of the remaining 85%.

In the comparatively minor general aviation accident, one or two investigators conduct airworthiness and operations phases of the investigation. Occasional technical assistance may be requested from participants, specialists in the airworthiness or operations areas. Additional assistance is sometimes available from aircraft manufacturers, but this is usually contingent upon company accident prevention interest, publicity given the accident, and the possibility of future litigation involving the manufacturer.

Despite the difference in size of the group investigating a catastrophic accident versus a comparatively minor accident, the same thoroughness and attention to detail prevails. Field personnel are encouraged to apply the same procedures in their investigations as those used in the *Team* investigations:

- a. Notify Interested Parties.
- b. Expedite arrival at the site.
- c. Conduct an organizational meeting.
- d. Establish wreckage security.
- e. Expedite the human factors investigation.
- f. Apprise headquarters.

6. The Public Hearing

NTSB Investigation Regulation Part 431, *Rules of Practice in Aircraft Accident Investigation Hearings*, governs all aircraft accident investigation hearings conducted by the Board under the authority of Title VII of the Federal Aviation Act of 1958.

Public Hearings are held by the Board as a part of the investigation of certain accidents involving civil aircraft. The Director of the Bureau of Aviation Safety may, on behalf of the Board, order a Hearing whenever he deems it coincident with public interest or conducive to accident prevention.

The Public Hearing is attended by a Board of Inquiry (Board Member, General Counsel Representative, Director of the Bureau of Aviation Safety, and Hearing Officer), Technical Panel (Board Investigators who participated in the field phase of the investigation), Parties to the Investigation (manufacturers, operators,

union representatives, government agencies, technical experts), the public, the press, and witnesses. The purpose of the Hearing is to obtain sworn testimony from accident witnesses, and to elicit information from technical experts who could assist in determination of probable cause.

Witnesses summoned to the Public Hearing may be questioned by the Board of Inquiry, the Technical Panel, and Parties to the Investigation.

A Hearing is intended as a fact-finding rather than an adversary proceeding, and is conducted without formal pleadings, issues, or adverse parties.

Materiality, relevancy and competency of witness testimony, exhibits, or physical evidence will not be the subject of objections at the Hearing by a Party to the Investigation; such matters will be governed by the presiding officer ruling on his own motion. Should a Party to the Investigation be interrupted by the presiding officer, during witness questioning, the party will be given opportunity to show materiality, relevancy, or competency of the evidence. Recommendations, as to proper conclusions to be drawn from Hearing testimony and exhibits, may be submitted to the Board within 30 days following adjournment of the Public Hearing.

A verbatim transcript of the Hearing may be obtained upon payment of fees fixed by the Board. The Board docket of the Public Hearing contains the Hearing transcript, exhibits, and all other information concerning the accident not ordered withheld from the public by the Board. A copy of the docket is available for public review at the Washington office of the Board. The docket may be supplemented by subsequent information presented following issuance of the *Accident Report*. Accident investigations remain open for submission of new and pertinent evidence. The Director of the Bureau of Aviation Safety may elect to make relative evidence a part of the docket.

6.1 Prehearing Conference

A member of the Board of Inquiry presides at the prehearing conference, usually held dur-

ing the afternoon of the day preceding the Public Hearing. At the conference, Parties to the Investigation are afforded an opportunity to: request amendments and corrections to the proposed Hearing exhibits, recommend that additional witnesses be summoned, and to indicate whether or not they wish to question specific witnesses at the Hearing. At this time the Board summarizes the area of questioning of each Hearing witness and establishes witness credibility. Any party at the conference who fails to avail himself of the opportunity to request alteration of any portion of the Hearing, will be precluded from introducing such amendments or testimony at the Public Hearing, the exception being if the presiding officer rules good cause is shown.

The Public Hearing is convened following final ruling by the presiding officer on any amendments or testimony introduced at the prehearing conference.

6.2. Depositions

The Federal Aviation Act of 1958, section 1004, provides that "the Board may order testimony to be taken by deposition in any investigation. Such depositions may be taken before any person designated by the Board."

Depositions are taken when the accident does not meet the criteria for a Public Hearing. The procedure is less formal than in the Public Hearing. The Hearing Officer, the Investigator-in-charge, and usually one or two other investigative team members comprise a Board of Inquiry and examine the witnesses.

A court reporter records the testimony, and the procedure is much the same as that of the Public Hearing. The Hearing Officer may allow Parties to the Investigation to examine each witness directly when the Board has completed its questioning, or he may require that their questions be submitted in writing, and ask the questions if he considers them pertinent and proper. Whenever questions are asked by the Parties to the Investigation, the Hearing Officer will apply to the questions the same test that is used in Public Hearings. The Hearing Officer will not allow cross-examination

in the legal sense, questions calculated to establish liability, questions which are unnecessarily cumulative, or questions which are immaterial.

Parties to the Investigation are designated, and act with the same responsibilities and privileges as in the Public Hearing.

6.3. Questioning Witnesses

Witnesses summoned to appear at a Public Hearing are questioned concerning their factual observations relative to the aircraft accident. The expert witness however, may at the discretion of the Presiding Officers, be asked for an expert opinion. It is the policy of the Board to avoid intimidating witnesses or allowing cross-examination in the legal sense.

Board representatives assigned to interview Hearing witnesses prepare in advance to insure professionalism in questioning. Every attempt is made to avoid errors common to the non-professional interviewer:

- a. Multiple questions
- b. Repeat questions
- c. Inattention to witness answers
- d. Opinion questions
- e. Questions answerable by a simple yes or no reply
- f. Technical questions beyond the witness' knowledge.

6.4. The Accident Report

The final result of a catastrophic aircraft accident investigation is the publication of the *Accident Report*. It is the responsibility of the Hearing Officer to write the Board's formal report of the investigation. The *Accident Report* is prepared following completion of the field phase of the investigation, and after adjournment of the Public Hearing. A meeting of Board technical experts, the Investigator-in-charge, and the Hearing Officer is called to decide what information is to be emphasized in the *Accident Report*, and what an analysis of the factual evidence indicates. The Hearing

Officer has this information available to prepare the *Accident Report*, plus Group Chairmen factual and analysis reports, the Public Hearing transcript, and his personal observations made during the field phase of the investigation.

The *Accident Report* is released to the public following Safety Board approval and assignment of probable cause.

The *Accident Report* contains essential information which fulfills the requirements of the majority of persons using these reports. Persons having a need for more detailed information may obtain copies of the original factual reports of the Group Chairmen, any

supplements to these reports, plus all Public Hearing exhibits; a reproduction fee is charged.

6.5. The NTSB Docket

The National Transportation Safety Board Docket Section is located in Washington, D.C. All transcripts of Public Hearings are maintained there and are numbered for quick reference. Anyone who does not wish to purchase a copy of a transcript may read it in the Docket Section. Transcripts may not be removed from the Docket Section.

Transcripts of depositions are also available; these are maintained in the Bureau of Aviation Safety.

PART A — GENERAL PRINCIPLES AND PROCEDURES

CHAPTER IV

GENERAL PROCEDURES

1. The Preaccident Plan

A preaccident plan for the investigation of civil aircraft accidents must be based on statutes drafted by Congress, and on regulations and directives issued by the NTSB and FAA. The Federal Aviation Act of 1958 assigns the Board general duties pertaining to aircraft accident investigation:

- a. Make rules and regulations governing notification and report of accidents involving civil aircraft.
- b. Examine and test to the extent necessary any civil aircraft, etc.
- c. Examine the remains of any deceased person aboard the aircraft at the time of the accident, who dies as a result of the accident, etc.
- d. Conduct special studies and investigations on matters pertaining to safety in air navigation and the prevention of accidents.

These duties are assigned generally, and it is the responsibility of field investigators to devise specific means of implementing them. The successful performance of these duties often depends on the adequacy of the preaccident plan.

The preaccident plan for a *Team* Concept investigation is prepared by the Central Investigation Division of the Bureau of Aviation Safety. Consideration is given to such items as:

- a. Assigning "on call" *Team* members.
- b. Notification of the "on call" *Team*.
- c. Coordinating *Team* travel to the accident site.
- d. Coordination with FAA Flight Standards Service.

- e. Notification of aircraft and other pertinent manufacturers.
- f. Notifying and apprising operator of his accident responsibilities.
- g. Apprising coroner of need for preservation of human factors evidence.
- h. Guarding of wreckage.
 - i. Initiation of records phase of the investigation.
 - j. Preparedness of *Team* members, e.g., proper clothing, investigation equipment, identification, accident investigation forms, adequate funds, investigation safety.
 - k. Briefing of field liaison man.
 - l. Procedure upon initial arrival at the accident site.
 - m. Wreckage recovery.
 - n. Release of accident information.

Preplanning for investigation of accidents to U.S.-registered aircraft occurring on foreign soil entails:

- a. Possessing a current passport.
- b. Understanding how to obtain visas.
- c. Checking of vaccinations with U.S. Public Health Service and the carrier selected.
- d. Requesting pertinent aircraft and airman records from the FAA and operator.
- e. Advising Washington (NTSB-FAA) of departure time, mode of travel, and estimated time of arrival, to insure that the foreign government involved and the U.S. State Department will be advised.
- f. Reporting to State Department representative and local government officials.

- g. Placing the investigator at the disposal of the proper local officials.
- h. Advising BAS of local contact point.
- i. Apprising Washington of nature and circumstances of the accident.

The preaccident plan for relatively minor accidents demands the same degree of preparedness as the catastrophic accident. The field office supervisor prepares this preaccident plan, guided by directives from the NTSB and FAA.

2. Initial Investigation Procedures

The type of accident, the persons involved, the location of the site, and the aircraft involved will all govern the investigator's initial actions upon his arrival at the scene of the accident. Generally, his first concern is to insure that the wreckage is properly guarded either by the operator or personnel hired locally. If fees for guarding the wreckage have been previously arranged, valuable investigation time will not be wasted in negotiating payment.

If the accident resulted in fatalities, the investigator will insure that the coroner, who should have been previously contacted, has not prematurely released the bodies of victims to local undertakers. Contact the local aviation medical examiner (AME) or the volunteer doctor for an autopsy or toxicology progress report. Autopsies ordered and accomplished are paid for by the Federal Aviation Administration. Opposition in obtaining autopsies may be overcome by quoting the authority provided the Board in the Federal Aviation Act of 1958. If necessary, General Counsel may be contacted for guidance.

An investigator's awareness of the State's autopsy regulations may simplify the autopsy problem. Many states require autopsies in violent or unexplained deaths. The autopsy laws of the United States are summarized in an Armed Forces Institute of Pathology publication, *The Medico-Legal Autopsy Laws of the Fifty States and the District of Columbia*.

Upon arrival at the site, the Investigator-in-charge should inform local officials and In-

terested Parties of his plan of action. Many an investigation with a well-planned foundation has suffered discredit when the IIC was not available to answer questions concerning the conduct.

A press conference is an essential step in the accident investigation. It is the policy of the Board and the FAA that all factual evidence be released as quickly as possible. Factual information should be released in the interest of a thorough, accurate reflection of the accident investigation progress.

Wreckage recovery steps must be effected in the early stages of an accident investigation. Recovery equipment can usually be obtained via the field liaison man in team investigations. In light aircraft accidents the Investigator-in-charge is familiar with the local area and the location of recovery equipment. A brief visit to the accident site should alert the investigator as to what recovery equipment is needed. He may draw equipment from the military, civil defense groups, the operators, local city or county governments, or private industry. Location of equipment, such as flatbeds, cranes, trucks, bulldozers, diggers and loaders, should be available in the local Board field office.

The welfare of investigating personnel is the concern of the Investigator-in-charge. Proper clothing, adequate equipment, and identification badges must be provided. Briefings should be conducted concerning the danger to personnel from pressurized systems or components aboard the aircraft, radioactive or other dangerous cargo, toxic fumes from fires at the crash site, and the hazards in moving wreckage. Accidents frequently occur in dangerous or inaccessible areas, and provision must also be made for safely transporting investigation personnel.

Communication is essential during the investigation, particularly in the early stages. A telephone should be installed at the site; two-way radio communication between the site and the local command post is desirable, and can be

effected with the FAA portable accident investigation kit, or by local telephone personnel. Headquarters must be informed of the progress of the investigation. Press conferences must be called to keep the news media current concerning investigative findings.

3. Conduct of the Investigation (NTSB)

The Investigator-in-charge presides at an organizational meeting and states briefly the policy of the Board in aircraft accident investigation. The meeting is attended by all personnel assigned to the investigation, and by the Interested Parties. The press is excluded from this meeting, and a press conference is held later for their edification.

Representatives of the Interested Parties are assigned to the investigation groups under the supervision of Board Group Chairmen. The investigation is ready to get underway with each Group investigating within their area of specialization.

The type of accident dictates which groups will be assigned; a representative air carrier accident investigation would be made up of the following Groups: Operations, Air Traffic, Meteorology, Witnesses, Human Factors, Voice Recorder, Powerplants, Structures, Systems, Flight Recorder, and Maintenance Records.

Each Group investigates in the area of their specialty and makes a report of their findings to the other Team members at daily progress meetings. For detailed functions of the various Groups see Part A IV-3.

To facilitate managing the aircraft accident investigation, the IIC is assisted by two Assistant Investigators-in-charge, Airworthiness, and Operations. It is their responsibility to relieve the Investigator-in-charge of some of the minor details of a large air carrier accident investigation. Specifically they:

- a. Supervise the Group Chairmen in their respective technical area.
- b. Insure that adequate technical assistance is available to Group Chairmen.

- c. Apprise the IIC of equipment, supplies and services required to expedite the investigation.
- d. Insure complete exchange of information between the Airworthiness and Operations Groups.
- e. Request aircraft and airmen records.
- f. Coordinate with IIC any dismissal of prejudicial personnel from investigating Groups.
- g. Coordinate with IIC any release of Group personnel to their parent employer upon completion of their portion of the field phase of the investigation.
- h. Supervise preparation of Group Chairmen reports.

Upon completion of the field phase of the investigation Interested Party personnel return to their respective organizations. They may be recalled briefly if the testing of a component or a special study is conducted by their Group Chairman.

Group Chairmen prepare factual reports of their accident-site findings, and assist the Hearing Officer in collecting exhibits for use in a Public Hearing. Group Chairmen with technical specialties within the causal area are appointed to the Public Hearing Technical Panel to question witnesses on behalf of the Board. The IIC of the accident investigation is the spokesman for the Technical Panel.

Following the Public Hearing, the Group Chairmen prepare the Analysis, Part II of their report, analyzing only their specific area of investigation. Investigators whose technical investigation was within the causal area assist the AHC's, the IIC, and the Hearing Officer in preparing the Board's *Accident Report* and statement of *probable cause*.

4. Release of Information

NTSB Organization Regulation 401 — Public Availability of Information, states: It is the policy of the Board to make its information and records available to the public to the greatest extent possible in keeping with the

Congressional intention expressed in Section 3 of the Administrative Procedure Act.

NTSB Investigation Regulation Part 435 — Disclosure of Aircraft Accident Information. is consistent with the requirements of the Freedom of Information Act, 5 U.S.C. 552. and designates by whom information concerning accidents may be released: Requests for preliminary or final factual information in the Board's possession, which the Board can make public in accordance with Part 401 of its organization regulations, should be directed to the Board's Office of Public Affairs, the General Manager of the Board, the Director of the Board's Bureau of Aviation Safety, the investigator in charge of any Board accident investigation, the supervisory investigators in charge of the Board's regional field offices, or such other persons as the Director of the Board's Bureau of Aviation Safety may designate.

Upon receipt of such written or oral requests, the information will be made available to the applicant: Provided, That the furnishing of the written or oral information will not disrupt the course of the accident investigation or otherwise interfere with the Board or its employees in the performance of the accident investigation and accident prevention functions.

. . . The applicant should also note that all public information in the Board's public file of the accident ultimately is made available for inspection and copying.

The Board realizes the fact that aircraft accidents are newsworthy, and considers it an obligation to maintain friendly community relations, and to assist news media personnel in reporting the facts as early as possible. Inaccurate or unconfirmed information will not be released, precluding premature speculation concerning the accident cause.

Release of information to officials and to news media is primarily through the Bureau of Aviation Safety Public Information Officer, who will coordinate any release with the IIC. Members of the Board also may release information, it is important that they be kept informed of the findings and progress of the investigation.

The Board encourages the Public Information Officer to arrange access to the accident site for news media personnel after providing appropriate identification badges. Newsmen and photographers enter the accident site under the stipulation that they will not disturb the wreckage; if such an attempt is made, BAS personnel will insure that the newsman is escorted from the scene.

Joint interviews will not be arranged with representatives of other organizations participating in the investigation (over whom the Board exercises no authority, and for whom the Board assumes no responsibility for information released).

5. Conclusion of the Field Phase (NTSB)

The field phase of the aircraft accident investigation is considered complete when, in the judgment of the IIC, all relevant accident site information has been documented. Occasionally, supplemental investigation of the aircraft, its components or systems, is made after completion of the on-site investigation. This supplemental investigation may also be considered as part of the field phase. The field phase of the investigation includes all fact-finding activities exclusive of those associated with the Hearing or the conduct of special studies deriving from the investigation.

In accidents where no Public Hearing is held, the field phase of the investigation may be considered complete when, in the judgment of the IIC, all relevant accident-site information has been documented. Supplemental investigation of the aircraft, its components or systems is also considered part of the field phase. The field phase is considered complete when the investigator determines that he has sufficient information to write his report of the investigation. In all investigations it is recommended that either the Group Chairmen or the Investigator-in-charge confer with the Interested Parties prior to concluding the field phase, and ascertain whether or not further investigation in any area is advisable. This is to preclude any future complaints or inferences that the investigation was inadequate.

The decision to discontinue the on-site investigation is made by the IIC. His decision

A IV – GENERAL PROCEDURES

is based primarily on information from the assistant investigators-in-charge who keep him apprised of the progress of the investigation. Once the decision is made to discontinue the on-site investigation, the IIC inherits certain responsibilities.

- a. The IIC will inform the Interested Parties of any additional investigation activity.
- b. Interested parties will be informed whether or not the Board intends to hold a Public Hearing. A tentative date will usually be set.
- c. The IIC will thank the Interested Parties for their contribution to the investigation.
- d. Group chairmen will be given a due date for their factual reports. The group chairmen should then assemble their respective groups, review their findings, summarize the content of their intended report, and ask for suggested additions or deletions.
- e. The IIC is responsible for the release of wreckage to the owner or operator.
- f. Arrangements for the retention of parts or components for further study is often necessary.
- g. The IIC will coordinate with the PIO to insure that the press is briefed on the status of the investigation and informed as to a tentative date for release of the *probable cause*.
- h. The Investigator-in-charge will arrange to satisfy incurred financial obligations:
 - a. Guard services
 - b. Services of personnel hired to assist in the investigation
 - c. Rental equipment used in the investigation
 - d. Damages to personal property
 - e. Headquarters and command-post rental
 - f. Use of communication facilities
 - g. Storage or transportation of parts for further study.