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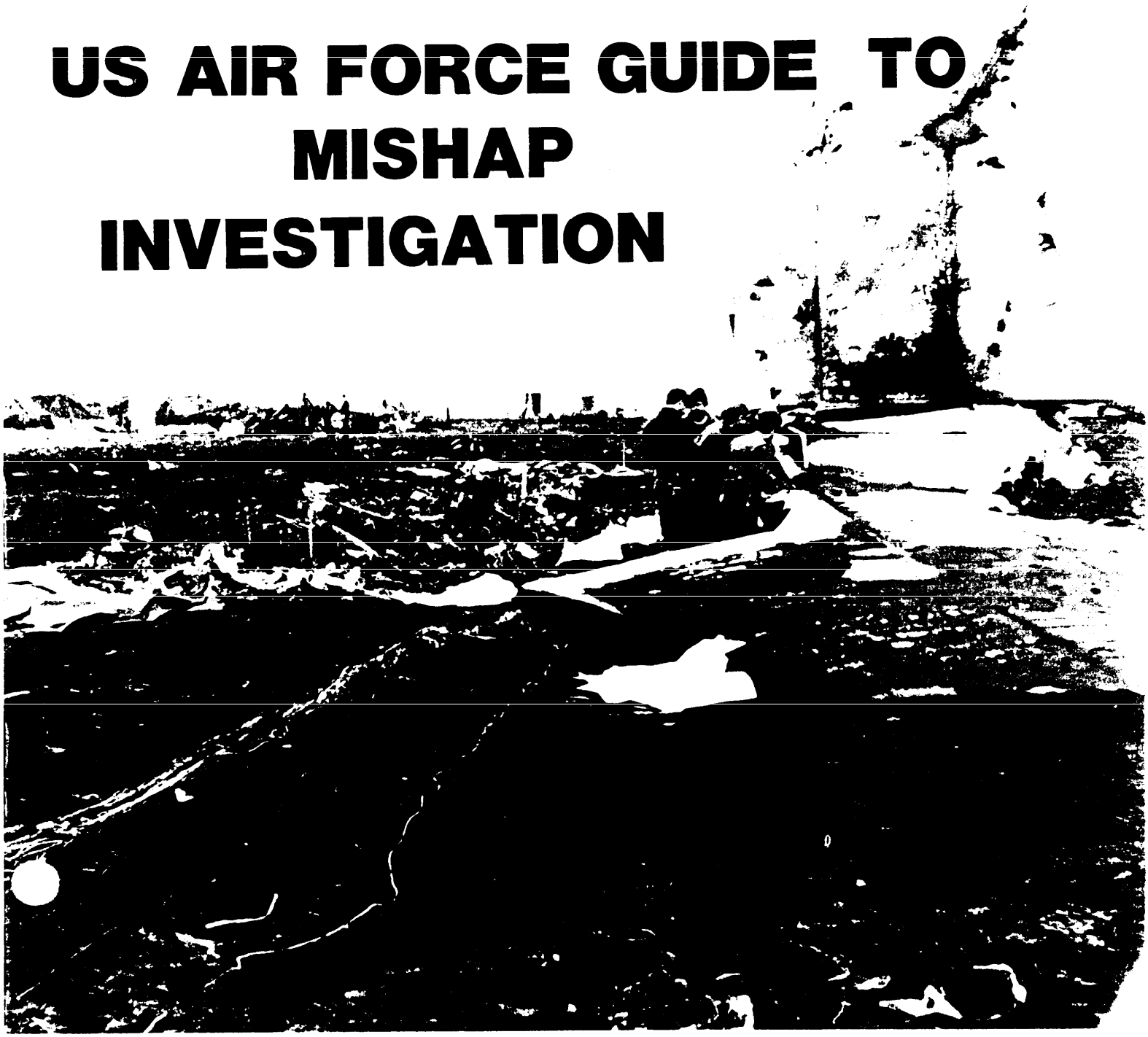
Safety

US AIR FORCE GUIDE TO MISHAP INVESTIGATION



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Volume I
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Safety

SAFETY INVESTIGATION

US AIR FORCE GUIDE TO MISHAP INVESTIGATION

This pamphlet provides guidance for developing mishap response plans, actions required by interim safety boards, organization and management of safety investigation boards, and covers general investigative topics. It applies to all personnel involved in the investigation of US Air Force, US Air Force Reserve, and Air National Guard mishaps.

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Chapter 1

THE US AIR FORCE SAFETY INVESTIGATION

1-1. Investigation Overview. Each year the Air Force trains over 400 mishap investigators through the Aircraft Mishap Investigation Course (AMIC), Flight Safety Officer's (FSOs) Course, Life Support Officer's Course, and others. Most of the people trained will never have to investigate a class A mishap. Most bases will go years without having a mishap. Disaster response force plans, mishap response plans, interim board training, etc., become low priority items.

a. Unfortunately, several trained investigators will get that fateful call in the middle of the night, "We've lost a bird, pack your bags and catch an 0 dark thirty flight to point X." Then it's panic time; what do you take, what kind of support can you expect in the field, where are your notes from the FSO course, etc.? Frequently it's the first investigation for most of the board members and they are faced with the awesome responsibility of digging through the rubble for clues and sifting through literally thousands and thousands of bits of information to determine the cause of the mishap.

b. Investigations can be fairly straightforward, or they can be jigsaw puzzles. If the crew survives, the aircraft is equipped with a flight data recorder, or an inflight emergency declared, the safety investigation board at least has a place to start. Much of the time, the clues lay in the wreckage, the morgue, or in the perceptions of family and associates, and it's up to the investigator to discover them, analyze them, and put the puzzle together.

1-2. Expert Assistance. Although the stakes in any aircraft safety investigation are extremely high, there are few experts in the world, and written material covering the subject is limited. The National Transportation Safety Board (NTSB) and International Civil Aviation Organization (ICAO) manuals are perhaps the best around, but they are outdated and don't cover many military-unique situations. The low experience levels of investigators, the difficulty and criticalness of investigations, and the limited guidance available all contributed to the decision to develop this pamphlet. While a lot of it was written using in-house expertise, we also had a lot of help from noted investigation experts. Sam Taylor, Mel Underwood, and the personnel from Oklahoma City Air Logistics Center developed our chapter on instrument analysis. Sam has been digging through wreckage for the last 30 years. Mr. Dick Wood, who has a broad background in both military and civilian investigation (see biography, paragraph 9-19), has helped us in several areas. The life support volume was contributed by Mike Grost, who is a well known expert in life support and egress investigations. The majority of volume II was written by members of the University of Southern California safety staff. They are retired Air Force for the most part, with years of investigative experience behind them and currently instructing in our safety investigation courses. Their biographies are included at the end of their respective chapters. We gratefully acknowledge their contributions to this pamphlet.

1-3. Policy on Mishaps. The Air Force spends a lot of time and money to stop the needless waste of human and materiel resources. Mishaps cost millions of dollars a year in equipment alone. People killed or injured cannot be replaced. Although management is responsible for protecting resources, everyone must be familiar with safety concepts. The investigation of all mishaps is an important part of the Air Force mishap prevention program. The safety investigation is not complete until all facts and causes are identified and recommendations are developed. AFR 127-4, Investigating and Reporting US Air Force Mishaps, lists the kinds of mishaps that must be investigated by an investigation board or an investigating officer. Sometimes the only difference between a minor mishap and a class A mishap is luck.

Therefore, all mishaps should be investigated thoroughly enough to identify factors which could result in a more serious mishap next time.

1-4. Purpose of a Safety Investigation. The purpose is to determine all factors, human, materiel, and environmental, which directly or indirectly contribute to the mishap. This information can be used by aircrew, equipment operators, supervisors, commanders, staffs, and designers to eliminate the cause factors and thus help prevent recurrence of similar mishaps. Each mishap investigation adds to the overall Air Force mishap experience, providing a basis for corrective action. The proper use of mishap experience is reducing mishap potential. Mishap history can be used to determine the requirements for additional training, establish realistic maintenance requirements, improve materiel, establish future design criteria, and achieve many other long-range results. The accuracy and thoroughness of investigation determines the adequacy of ultimate action taken to remove or eliminate factors that cause or contribute to mishaps.

1-5. Using This Pamphlet:

a. The key to an effective investigation is the proper organization and management of the many tasks and skills required to determine mishap causes. This pamphlet is designed to provide a basic outline for Air Force safety investigators. If AFP 127-1 seems a little redundant—it is. By making the pamphlet as comprehensive as it needed to be, we realized the investigator couldn't sit down and read it from cover to cover after a mishap. With that in mind, we attempted to place all the information the planner, the interim safety board member, or the safety board member needed to know about their particular phase of the investigation in one place. Since responsibilities overlap, so does the guidance on occasion. The important thing is to be sure each area is covered and all evidence is collected and protected.

b. This pamphlet is written for you, the safety investigator. Although it is written as an investigation guide for flight mishaps, the principles and methodology apply equally to missile, explosive, space, or ground mishaps. When the mishap occurs, you become the instant expert on anything even remotely connected with mishap actions. Public relations, security, search, and recovery are but some of the unusual challenges you will face. AFP 127-1 is designated as a pamphlet to keep it nondirective in nature. It also provides the bureaucratic latitude to give you the benefit of years of experience and literally hundreds of investigations. Hopefully, the tips we give you on premishap planning, investigative organization and methodical "tin kicking" will enhance your investigation and help you locate the elusive "Golden BB" that caused the mishap.

c. Past experience shows that safety investigating board efficiency depends on each member's knowledge of the investigative process before participating in an investigation. While qualified board members may be proficient in their own functional area, they often waste valuable time in determining how to proceed with an investigation. The procedures outlined in this pamphlet have proven successful in minimizing this problem, and form a sequence of events that will lead to a thoroughly investigated mishap and a properly completed report. Each board member must determine which portion of this pamphlet applies to his particular situation. Nothing in this pamphlet is intended to restrict use of other techniques or alteration of the sequence of the investigative process to fit a specific situation.

d. The safety board composition and required actions will be tailored to the situation and scope of the mishap to be investigated. Safety boards can be composed of a minimum of five members (for a class A flight mishap) or have many additional members. The complexity of cause factors normally dictates the size of the board. Whatever the board's composition, the investigation objectives and conduct remain unchanged.

e. The attachments and figures in this pamphlet contain additional information that will be helpful to a safety board during an investigation. Figures in this pamphlet are examples of situations investigators should be aware of, and need no further explanation or reference in the text.

f. It is intended that this pamphlet be a useable source of informative guidance. We recommend copies be kept in a loose-leaf binder, so that pertinent and additional information may be included. Safety offices are encouraged to maintain printed material of importance along with this pamphlet. Many timely and valuable tips relating to mishap investigation are published from time to time by various Air Force and civilian organizations.

g. We encourage comments from field investigators to keep this pamphlet current and to make it a better product.

1-6. Investigation Phases. The safety investigation can be divided into six phases: preparation, notification, interim board action, arrival, investigation and analysis, and writing.

a. Preparation Phase. This is the period between the time potential board members are selected and their actual assignment to a safety board. If possible, selectees should attend one of the formal Air Force safety investigation courses. In addition, they should study the regulations that describe board actions and attend local safety investigation board training sessions.

b. Notification Phase. When a mishap occurs, individuals are selected to serve on a board. This phase cannot be planned because the specific mishap circumstances vary.

c. Interim Safety Board Phase. Units with a full-time safety staff are tasked to identify and train personnel to serve on interim safety investigation boards; most units assign primary and alternate members. Smaller units may have only one or two trained people. Regardless of size, *the interim board plays a vital role in the first few hours after a mishap.* They must be ready to assume control of the mishap scene when the initial disaster response force (firefighters, etc.) and on-scene commander declares the site safe. The interim board continues working until the formal safety board arrives at the scene. Timeliness during this phase is important, and is possible only when interim board members know their duties. Occasional practice of actions required by board members can be a great aid in increasing this capability. The interim board makes sure perishable evidence is not lost, and that fluid samples, tower and RAPCON voice tapes, and aircraft and crew records are secured. They make sure such evidence is safe and available to the formal safety investigation board when it arrives. The interim board must also do everything possible to help the investigation board get organized and started once they arrive. Interim board procedures are covered in chapter 3.

d. Arrival Phase. This is the time immediately after the board arrives at the mishap location. Board members should resist the desire to rush to the mishap scene. It is important at this time to plan the board members' actions to reduce duplication of effort. A plan of attack is needed to get as much done as quickly as possible. The time spent ensuring board members are assigned proper duties and knowing what is expected helps develop a good investigation and report. See chapters 6 and 7 for details.

e. Investigation and Analysis Phase. The board spends most of its time in this phase. Evidence is gathered, sorted, and evaluated. Detailed instructions and ideas on how to accomplish this phase are available in chapter 7 and volume II.

f. Writing Phase. While gathering and analyzing evidence is an ongoing effort, there is a point in every investigation when board members must sort out their notes, memos, and evidence and compile a clearly written and well documented report. It is just as important to discard unneeded material as it is to include meaningful evidence and a careful analysis. For example, it is not necessary to detail all of the board discussions, but it is necessary to show that apparent cause factors were considered at some time during the investigation. This is done as briefly as possible without leaving out important material. Writing the report is hard work, but if done properly and carefully, it results in a report of great value to the Air Force.

Chapter 2

THE MISHAP RESPONSE PLAN

Section A—Base Disaster Response Force (DRF)

2-1. Planning for the Mishap Investigation. Mishaps generally occur where and when they are least expected. The disordered atmosphere at the mishap scene is generally aggravated by confusion. The first few hours immediately following a mishap are of utmost importance. Often valuable time and important evidence are lost during the period from mishap occurrence to the beginning of the organized investigative effort. A well conceived and thoroughly executed mishap response plan may make the difference between success and failure of the investigation.

2-2. Disaster Response Force (DRF) Responsibilities. Base DRF actions, while not the responsibility of the safety staff, are included to provide a feel for what other base agencies should be doing in case of a mishap. Although the DRF is not specifically a safety responsibility, we strongly recommend active participation in developing and testing DRF procedures. It will be instrumental in determining what assets will be available, in educating DRF members in investigative DO's and DON'Ts, and in providing a more unified mishap response plan.

2-3. The Disaster Response Force. The DRF normally consists of four elements: Command Post, Control Centers, Disaster Control Group (DCG), and specialized teams. Membership in the three elements varies due to the resources available at the installation and the location of the mishap. The key element of the DRF is the Disaster Control Group (DCG), because this is the group headed by the on-scene commander that responds to the scene of mishaps. The DCG in turn is separated into three elements, initial response, follow-on response, and support. The following describes these elements for both on-base and off-base responses.

a. On-Base or Near-Base Response:

(1) The initial response element consists of the following representatives who respond directly to an on-base or near-base mishap site:

(a) Firefighting.

Figure 2-1. Mishap Response Plan Effectiveness. A good mishap response plan has personnel notified, briefed, and data being gathered even before the fires are out. Note afterburner nozzle crushed and in the open position in this mishap.

(b) Medical.
(c) Security Police.
(d) Additional representatives as directed by the on-scene commander (OSC) and depending on the situation:
1. Maintenance.
2. Civil Engineer.
3. Munitions/EOD.

(2) The follow-on response element consists of the following representatives who respond directly to a preplanned assembly point for a directed response. The follow-on response element departs when directed by the OSC.
(a) Disaster Preparedness.
(b) Civil Engineering.
(c) Bioenvironmental Engineer.
(d) Maintenance.
(e) Munitions/EOD.
(f) Public Affairs.
(g) Additional Medical.
(h) Additional Security.
(i) Safety Officer.

(3) The support response element consists of the following representatives who respond when the OSC requests their presence:
(a) Mortuary Affairs.
(b) Transportation.
(c) Chaplain.
(d) Procurement.
(e) Tenant unit representatives (to include information systems).
(f) Finance.
(g) Judge Advocate (JA).
(h) Alert Photographer.

b. Off-Base (Remote) Reponse. If the mishap site is off base and its exact location is unknown, or expeditious travel to the site is in doubt, the initial response elements should proceed to the

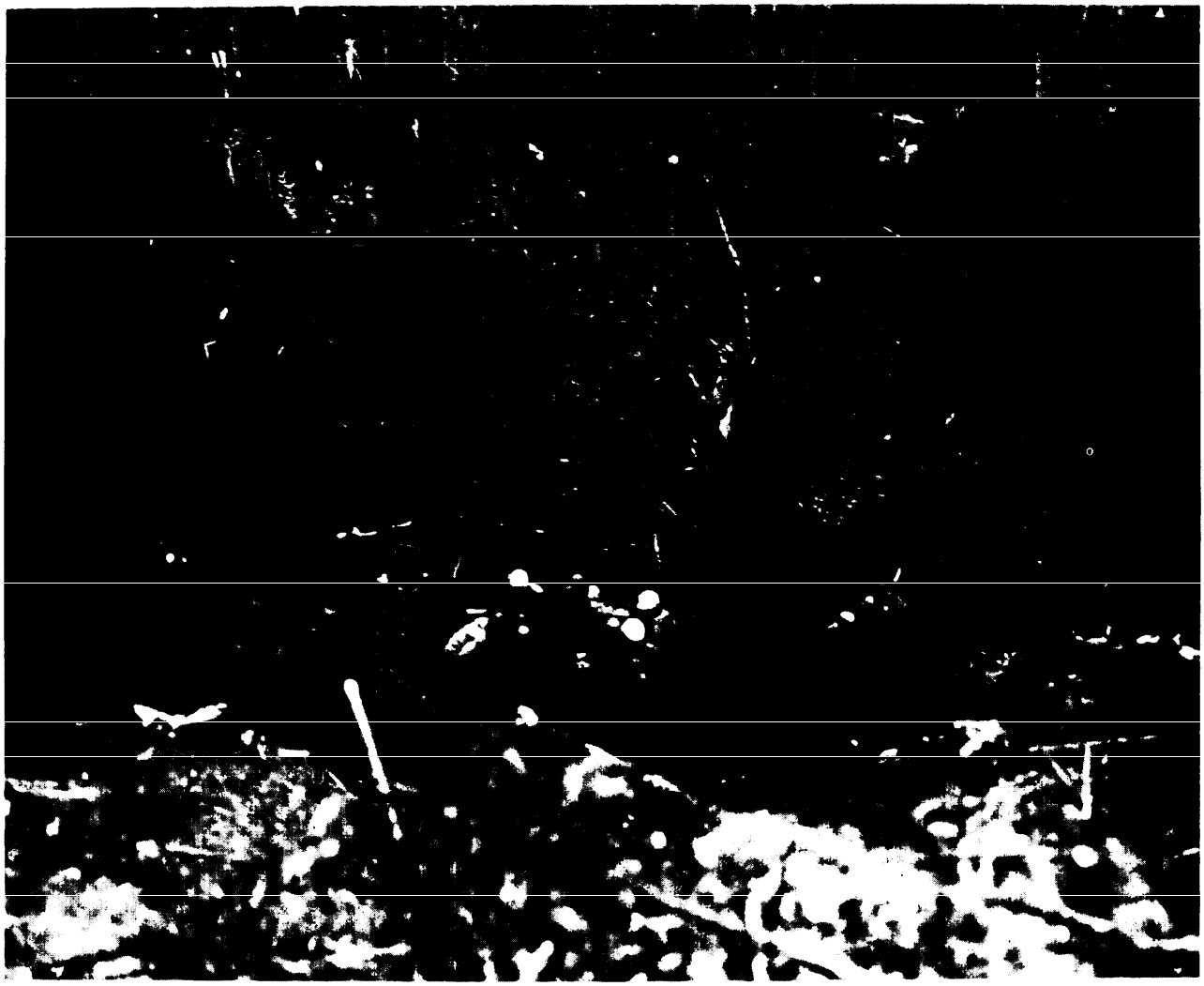


Figure 2-2. Site Logistics. The logistics of an off-base remote response require careful planning and a real-time assessment of the situation to ensure the right people and support are dispatched. Note high impact angle and lack of post crash fire evidence in this mishap.

predesignated assembly point and await further instructions. If helicopter support is available, it should be scrambled to support the initial response team and OSC.

(1) The initial response element consists of the following representatives who respond to the designated rendezvous point when the mishap requires an off-base remote response. The first helicopter scrambled (if available) or the first vehicle to depart transports the medical representative and any of the asterisked members of the initial and follow-on elements that are ready for departure. Once the medical representatives are aboard, do not delay departure for other personnel. Remaining personnel in their elements will convoy to the site when sufficient information is obtained or when directed by the on-scene commander.

*(a) Medical.

*(b) Fire Chief (if fire is extinguished, delete).

*(c) On-Scene Commander.

*(d) Security Police (2 persons).

*(e) Safety Officer.

(f) Maintenance.

(g) Civil Engineer.

*(h) Alert Photographer.

(2) Follow-on and support element response members are exactly the same as those in the on-base or near-base response, except that the PA and Mortuary Officers are designated to helicopter to the off-base remote mishap site.

2-4. Locating the Wreckage. A system for locating and reaching an off-base mishap in the minimum time should be established. There is nothing more frustrating than to know that a

mishap has occurred, then learn that the fire trucks and ambulance are unable to reach the scene because the location has not been properly identified. Base civil engineering normally prepares the base grid map and keeps it current. Off-base maps should cover the base's response area. Off-base maps should also have a grid system for easy location of any point within the map area. Detailed specialty maps, such as US Forest Service maps, are of special value when available.

a. Copies of the map should be posted at base operations, control tower, crash rescue and fire sections, hospital, security police office, wing command post, and control centers. They should also be in all vehicles and search aircraft or helicopters which will be used in the event of an off-base crash.

b. Only by the frequent testing of the crash alarm circuits, training of the responding personnel, and review and revision of the area maps can the commander be assured that all essential personnel will be alerted and able to react efficiently whenever and wherever a mishap occurs.

2-5. Proceeding to the Scene. When a mishap occurs on an airfield, the crash crew can usually proceed to the scene with minimum delay. In many cases, in the event of an off-base mishap, delays which should have been foreseen can cause unnecessary loss of life and material. Even though the probability exists that the fire will have done its damage by the time the first trucks arrive, there is still a possibility that a badly burned or shocked crew needs medical attention. The safety officer should ensure procedures are developed to minimize the delay involved. Essential personnel normally depart for the scene in two separate elements. These are the crash rescue and fire crews and the personnel in the initial response element.

a. Crash Rescue and Ambulance. Immediately on notification, the crash fire equipment and the ambulance should proceed directly to the scene, using a grid map for directional instructions. Additional medical personnel would also go directly to the scene by helicopter if one is available. It is essential that a training program be established to ensure that crash rescue personnel accomplish their primary task with the least possible disturbance to the wreckage.

b. Other Essential Personnel. To minimize confusion, make arrangements to convoy essential personnel not in the immediate reaction group to the scene. An assembly point such as base operations should be designated. The person leading the convoy should be well acquainted with the roads and have a radio-equipped vehicle.

2-6. Command and Control at the Mishap Site:

a. The fire chief (FC) or senior on-duty firefighter is in command of the mishap scene until the fire is extinguished and rescue efforts complete, or until relieved by the assigned on-scene commander. The crash site responsibilities of the FC include fire and damage control, rescue, and first aid.

b. Once any fire is extinguished and casualties are under the care of qualified medical staff, the FC should brief the on-scene commander (OSC) on mishap site status and subsequent priorities. The OSC then assumes control of the mishap scene.

c. The OSC should establish a control point and communications with the parent base, and direct the activities of support and supplementary services which include the following:

(1) Casualty clearance—coordinate assistance for rescue and medical personnel at the casualty site.

(2) Helicopter and ambulance—select and control helicopter and ambulance site for casualty evacuation.

(3) Police—traffic and crowd control, security of wreckage, and support vehicle locations.

(4) Other fire services—civil auxiliary fire service assistance.

(5) Engineering—specialist engineering support if required.

(6) Heavy equipment—for removal or recovery of aircraft wreckage if required.

(7) Public Affairs—to handle information requests from the news media.

NOTE:

1. If the occupants of the aircraft are confirmed fatalities, leave them in the wreckage until the interim safety investigators arrive. Remains should not be disturbed without the approval of the interim safety board president or medical member.
2. Ensure that all personnel likely to be at the crash site are aware of the necessity to leave the wreckage undisturbed.

2-7. Interference With the Wreckage. At the end of the emergency phase, the interim safety investigation board (SIB) makes sure that all available evidence is collected or preserved. Unless such action is taken, it may be impossible to determine the causes of the event, or the investigation may be delayed. During the emergency phase, a crashed aircraft or weapon system, or its com-

ponents may be moved for any of the following reasons:

a. To rescue the injured.

b. To prevent or minimize fire damage to the wreckage.

c. To remove wreckage obstructing essential air or ground traffic or rescue and firefighting services.

d. To recover salvageable wreckage or components from an aircraft which has crashed or alighted on water.

e. When weapons, pyrotechnics, ejection seats, etc., fitted to or carried in the aircraft need to be made safe.

f. When hazardous substances such as hydrazine or radioactive components must be dealt with (consult bioenvironmental engineering).

Except in these circumstances, no personnel are to move or interfere with the wreckage without the express permission of the interim or formal safety board president, or in the case of potential mission degradation, the wing commander.

2-8. Security of the Mishap Scene. The on-scene commander is responsible for security of the mishap scene. If the mishap site is either on base or in a remote area there will be no real problem in maintaining security. However, if the mishap is in an area where the general public can get to the site and the wreckage, the on-scene commander may have difficulty keeping the area clear of unauthorized personnel. If there is a possibility that classified information, equipment, or priority resources are involved, the proper course of action may be to declare the mishap site a National Defense Area (NDA) under the authority of the Internal Security Act, 10 U.S.C. 797, DOD Directive 5200.8, and AFR 207-1. If a NDA has been declared (boundary marked and posted) reasonable force can be used to prevent any actions inside the NDA by unauthorized personnel. Check with your local JAG and security police on what is "reasonable force." If it is not reasonable to believe that there is classified equipment or material in the crash site or if there are no priority resources there, then a NDA is not a viable option. What you can do in that situation is limited to your ability to persuade. If you can persuade local civilian law enforcement officials to establish and guard a perimeter your job will be much easier. (The possibility of unexpended ordnance or toxic substances in the site is a very effective persuader in this respect.) If you can't persuade the local peace officer, you should try to persuade individuals not to enter the site or take pictures. At the very least, cover any human remains and identify priority assets with tarps, etc., so that they can't be seen.

a. As an aid to security, consider having special badges made up for the disaster response force and SIB members (keep in investigator kit). Also consider security police maintaining access rosters for verification of access to the scene.

b. The security police at the base should have guards on an alert status ready to proceed to the scene. Personnel assigned to guard wreckage should be thoroughly briefed so that they will effectively accomplish their duties. Some suggested items which should be included in their duties follow:

(1) Protect all military and civilian property and personnel.

(2) Keep spectators at a safe distance.

(3) Admit only authorized personnel to the crash scene.

(4) Prevent handling or disturbance of parts.

(5) Take all precautions to prevent obliteration of any ground marks made by the aircraft.

(6) Remain on duty until properly relieved.

(7) Know the responsibilities and specific instructions concerning news reporters and photographers, and release of information.

(8) Prepare for nighttime operations.

c. Guards themselves, being only human and naturally curious, have often been known to disturb wreckage during a lonely vigil at night. Their instructions must be complete to prevent this type of occurrence.

d. Supervisors in charge of guards must see to it that adequate food, water, and shelter are available and that relief is provided at reasonable intervals.

e. If the mishap should occur at a great distance from the base or if for any other reason military guards are not available, arrangements must be made for civilians to guard the wreckage. Before employing civilians under mutual support agreements or who must be paid for their services, every effort should be made to obtain the services of the police or local military reserve personnel.

2-9. Public Affairs. Mishaps are news which often produces adverse public opinion that must be anticipated and cannot be disregarded. Public reaction, however, can be minimized by a well planned and sustained public affairs program. This effort informs the public of prevention and safety measures in being as well as the story of the mishap. This method is not intended to prevent wide coverage of mishaps in the public media, but

often can be converted into opportunities to relate to the public a comprehensive, highly professional Air Force mishap prevention program in all areas of safety. Media and other inquiries are always handled by the base public affairs officer. Paragraph 3-21 discusses public relations. The release of information of speculation concerning the possible cause of mishaps can be detrimental to the service, the investigation, and to individual personnel. Accordingly, statements to the media must not include information on the possible causes. To state that a mishap is "under investigation" is sufficient. Confirmation of the facts surrounding a mishap, however, should be released as soon as possible but only through authorized personnel. Consult AFR 190-1, Public Affairs Policies and Procedures, for guidance.

Section B—The Safety Plan

2-10. Base Responsibilities. Each base develops a mishap response plan as required by AFR 127-2. The base plan follows the format established by the major command, and is practiced periodically to test the plan and train the people involved. Although circumstances vary, most plans address at least the following areas:

a. Notifying all pertinent agencies that a mishap has occurred. This should include a checklist which provides for:

(1) Notification of persons and units.

(2) The names and locations of safety investigators.

(3) The required reports, including sample formats and addressees.

b. Ensuring that all investigators are familiar with this publication and all other directives or publications which will expedite their investigation.

c. Planning for the organization of the investigation and general procedures to be followed. This should include an outline for investigation with tentative delegation of responsibilities for each board member. There are numerous details which will be encountered. To avoid duplicated effort, board members should be assigned specific duties.

d. Prearranging for vehicles, transport aircraft, or helicopters which may be required to proceed to the scene. Heavy duty equipment should be identified to be used for wreckage recovery.

e. Preparing investigation kits.

f. Identifying a photographer to go to the scene of the mishap on short notice.

g. Precoordinating security arrangements.

h. For wreckage which must be removed from the mishap scene, identifying suitable locations that can be protected from unauthorized entry and affords shelter from the elements.

i. Designating a central location where people and equipment can assemble before going to off-base mishap scenes.

j. Establishing liaison between security police and local police authorities to ensure prompt reporting of off-base mishaps, adequate traffic control to mishap scene, security at the scene, and help in communicating with people at remote mishap locations. (Use of police radio nets can initially speed communications.)

k. Getting maps for all concerned with suitable grid or coordinate systems, to accurately pinpoint the mishap scene.

l. Establishing liaison with local news media to ensure understanding of policies governing release of mishap information. (Work with the base public affairs officer on this.)

m. Planning communication requirements between the mishap site and support facilities.

n. Supply requirements of the SIB and support personnel.

The mishap response plan should also include enumerated responsibilities for each operational and support element to which tasks are assigned. These include the information systems officer, the control tower, command post, base operations, fire department, base hospital (to include bioenvironmental engineering for hazardous substance evaluation), safety office, wing and squadron operations staff, including the supervisor of flying, chief of maintenance, security police, rescue mission units, photographic units, weather officer, transportation officer, disaster preparedness officer, public affairs officer, safety investigation board (SIB) members and on-scene commander.

2-11. Additional Requirements. Special needs of tenant organizations regularly operating aircraft or other weapons systems from the host base will be considered in the mishap response plan. Commands owning aircraft that are regularly operated in detached status (leased or loaned aircraft, test aircraft, etc.) at non-Air Force locations will ensure that procedures for securing crash sites and for promptly dispatching investigation teams are established. Such procedures are established in mishap response plans.

2-12. Investigation Funding. Major commands provide the funds necessary to ensure mishaps are

Figure 2-3. Safety Board Response. Safety board on-scene responsibilities do not start until the fires are out and the site is declared safe.

thoroughly investigated as required by AFR 127-4.

2-13. Preparing the Base Mishap Response Plan. Use the guidance provided by this pamphlet, AFR 127-2, and AFR 355-1 to develop the base mishap response plan. Take the following into consideration:

a. The type, number and role of aircraft or weapon systems operating from the base (including deployment of other aircraft types).

b. The geographical location of the base and the operational flying areas.

c. The proximity of the base to other flying bases and emergency response services.

2-14. Witness Statements. Observations by witnesses to a mishap can form an important part of subsequent investigations. It is important to reach witnesses as soon as possible and record their observations. If witnesses are given time to think about what they saw, they will modify their observations to what they think they should have seen. See chapter 8 for details.

a. Don't conduct any indepth interviews at this time. Just tell them who you are, the purpose of your investigation, that their information could help with the investigation, and ask if they would mind telling you what they saw. Some of the content will sound rather strange, and some you will know to be wrong. Don't correct or question the witness. Finish up by asking "Is there anything else you would like to say?" Be sure to thank the witnesses for their help.

b. If possible, use a portable cassette recorder to record the information. Record the name, address, and phone number of the witness and identify his or her observation position both on tape either before or after the statement, and record the same information on a map. Present the collected material to the investigator.

2-15. Photographic Requirements. The mishap response plan should include arrangements with the photographic section for a photographer to proceed to the mishap scene with the lead personnel. The photographer should be instructed to take photographs of the wreckage as soon as possible, even while crash rescue operations are in progress, provided he or she does not interfere with the operations or endanger himself or herself. This is necessary because the position of the

Figure 2-4. Aerial Photographs. They provide valuable information on wreckage destruction, fire pattern, impact forces, etc.

wreckage before its having been moved may prove to be a valuable bit of evidence. Photogrpahs can be discarded if they are found to be of no value in the investigation, but they can never be obtained once the wreckage has been moved.

a. The duty (standby) photographer should have at least one camera and both black and white and color print film. If possible, general photos of the wreckage site should be taken as soon as possible. If there has been fire damage or anything else that may only show the contrast in color, then use color film. These photos could be very important as rain, dew, swampy land, etc., may change the wreckage appearance before the SIB arrives. Photography is discussed in chapters 7 and 9.

b. A full photographic coverage of a mishap site, including wreckage and victims, is required for safety investigation and reporting. This is vitally important if victims and wreckage are to be moved before the investigation starts.

c. Photographs of human victims and remains are to be taken in color when possible, classified as for medical use only, and placed in the custody of the medical officer. Photographs should be given identifying captions or labels to aid in subsequent identification and investigative efforts (see chapter 10).

2-16. Documentary and Recorded Evidence. All documentary and recorded evidence associated with aircraft or personnel involved in a mishap is to be impounded and placed in safe custody until released to investigation authorities (see paragraph 3-2).

2-17. Medical and Pathological Examination of Personnel. The medical and pathological examination of victims and survivors of a mishap is essential to effective safety investigation. The requirement for the medical examination of and subsequent medical reporting on personnel involved in aircraft mishaps is stated in chapter 10.

2-18. Support for Safety Investigations. The mishap response plan should ensure that the support requirements listed in AFR 127-4 are provided to the safety investigation board. This support includes the following:

a. Safety investigation kits and other equipment necessary to conduct the investigation.

b. Regulatory documents and directives pertaining to mishap investigation and reporting.

c. Assistance to the president of the board in obtaining administrative support, e.g., work space, typist, etc.

d. Civil engineers surveying and mapping the debris pattern and preparation of required sketches.

e. Photographic assistance and communication.

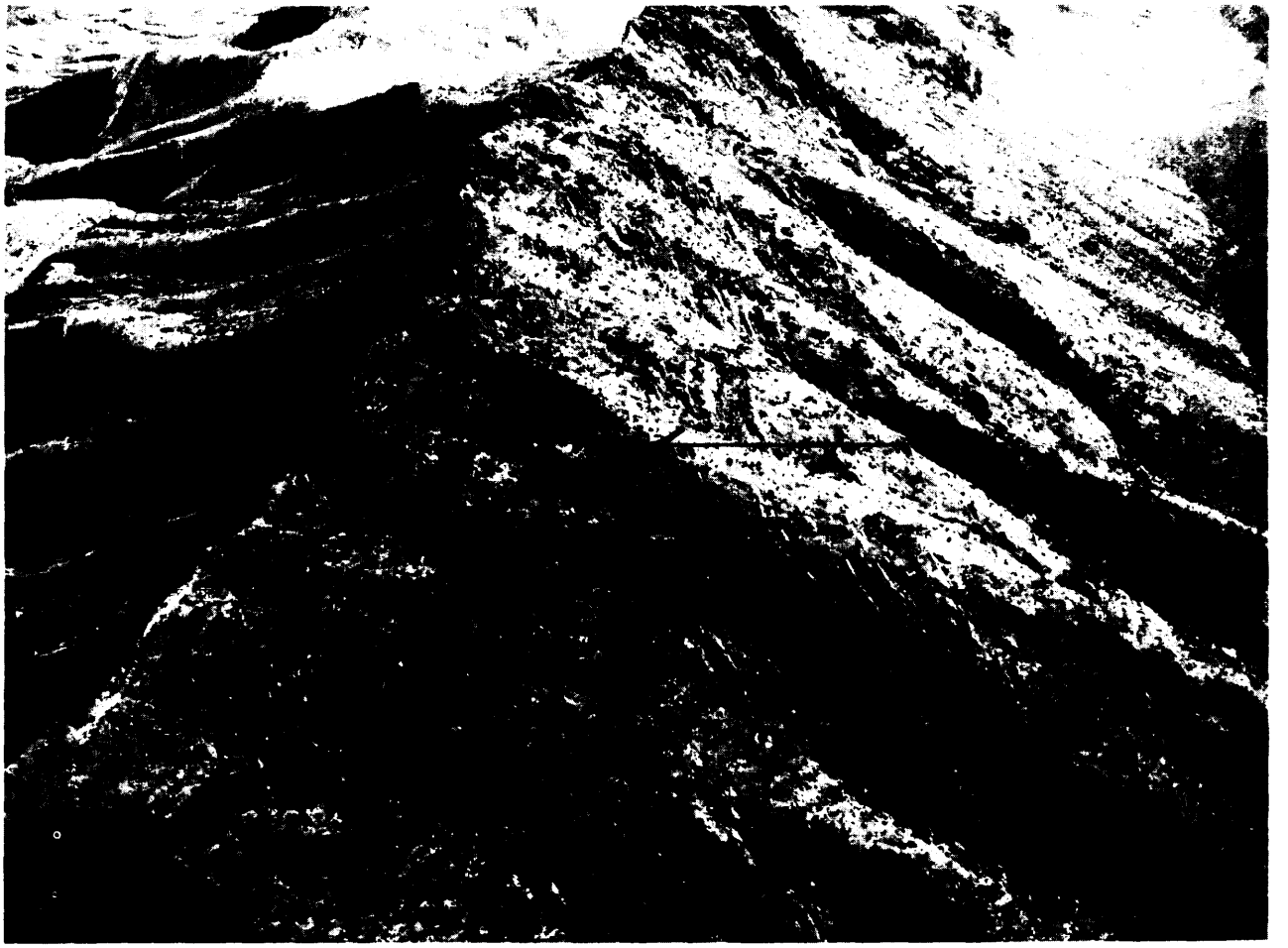


Figure 2-5. For this investigation it is critical that the investigation kits be as lightweight and portable as possible. Be sure to equip the investigators with adequate environmental, communications, medical, and support equipment to ensure their safety.

f. Public affairs office—handling press representatives and public information releases.

g. Hospital commander—treatment and examination of personnel, identification of the dead, facilities and support for conducting autopsies, lab support, bioenvironmental engineering for evaluation of hazardous substances, and other medical support as necessary.

h. Security police—providing guards, traffic control, and security.

i. Weather officer—obtaining complete weather information at the time and location of the mishap.

j. Maintenance officer—recovery of wreckage, disassembly and removal of components, and preparing for shipment of those items selected for teardown analysis. Also, preparation of estimated cost of damage to assist in classifying the mishap.

k. Transportation officer—assistance in transportation to and from the crash site, and expeditious shipment of components selected for teardown analysis.

2-19. Safety Investigation Kits. Kits should be outfitted and kept ready for immediate response. The safety office is responsible for providing and safekeeping of these kits. Because of the value and attractiveness of many of the items, a member of the investigation team is responsible for the kit when it is in use. Kit items may be varied to suit local circumstances; however, the suggested items listed below are recommended as a result of past experiences:

a. Individual Kits. Mishap sites vary considerably. They may be in mountainous terrain, isolated areas, etc. Wreckage may be confined to a small area or scattered over several ridge lines. Whatever situation, each investigator must have the equipment he or she needs to work with and be able to operate autonomously. Each investigative

specialty (investigative officer, pilot member, life support, etc.) should have his own kit. basic contents for the kits may include the following:

(1) Documentation Supplies. With these items, you can adequately document and diagram any mishap:

—Quad-ruled paper
—Notebook (a 1/2 steno notebook is very useful—it fits hip pocket)
—Plotter (serves as a ruler, protractor, and inclinometer)
—Dividers (useful for transferring measurements)
—100-foot tape measure
—Pencils, pens, grease pencils, felt-tip pens (indelible type for anything which may be exposed to moisture)
—Lensatic compass (the more accurate, the better)
—E6-B (CPU-26A/P) computer for wind problems
—Calculator
—String (this and a weight turns plotter into an inclinometer)

(2) Evidence Gathering and Evaluating Equipment. These are basic items every investigator needs:

—Clean containers for fluid samples and evidence
—Magnifying glasses (5× and 10×)
—Small tape measure
—Flashlight and batteries
—Mirrors (dentist's and regular)
—Tags with ties for tagging parts and evidence
—Labels and 3- by 5-inch index cards
—Sealable plastic bags (assorted)
—Wrenches (including adjustable)
—Pliers, wire cutters, and vice grips
—Screwdrivers (several, including Phillips)
—Knife
—Small stiff and soft bristled brushes
—Masking tape

(3) Miscellaneous Items:

—List of contents
—Small first-aid kit
—Clipboard
—Syringes
—Large tweezers
—Wood or metal stakes
—Leather gloves
—Suntan lotion

b. Specialized Individual Kits. They contain specific material for specific investigators, and can vary depending on if the mishap is in the local area or requires a TDY effort.

(1) President's Kit:

(a) Set of Air Force regulations with supplements:

1. AFP 127-1.
2. AFR 127-4.

(b) Sample mishap report forms.

(c) Telephone list with key numbers (see chapter 3):

1. Nearest base telephone directory.

(d) Technical assistance resource list.

(2) Investigator or Recorder's Kit:

(a) Two sets draft and final file folders (tabs A through Z with extra forms 711, 711a, 711b, 711c, 711d, 711e, 711f, 711gA and B).

(b) Masters or clear copies as masters:

1. Mishap report cover.
2. Index tabs A through S; T through Z.
3. Releasable blank sheets.
4. Nonreleasable blank sheets.

(c) File folders for inbound and outbound messages:

1. Blank message forms (DD Form 173).
2. Blank duplication forms (DD Form 844).

(d) Telephone log.

(e) Safety board progress chart.

(f) Maps (grid, country, road).

(g) General administration supplies (see paragraph 4-55).

(3) Pilot Officer's Kit:

(a) Aircrew standardization and training regulations.

(b) Operational regulations.

(c) Appropriate flight and weapons manuals.

(4) Maintenance Officer's Kit:

(a) Tools (as required).

(b) Publications. Ensure a copy of the following TOs are available for checkout and use from the base TO library:

— -2 Technical Orders
— -3 Technical Orders
— -4 Technical Orders
— -5 Technical Orders
— -6 Technical Orders

(5) Medical Officer's Kit:

(a) Covered in chapter 10.

(6) Witness Interview Equipment:

—Tape recorder
—Microphone with switch on mike
—AC adapter
—Tapes (60-minute tapes maximum to increase durability and resist stretching)
—Spare batteries
—Statement forms
—Model aircraft

Figure 2-6. Mishaps in Swamp Areas. They make wreckage recovery especially difficult. If the water remains undisturbed (i.e., no one walking through it), AFIP infrared photography may be used to spot key components. (Photograph by AFIP Aerospace.)

(7) Photographic Equipment. If the investigators need to photograph the wreckage, paragraph 9-8 contains a list of what is needed to do a professional job.

c. Community Kits. They contain items that may be needed by investigators, but are not required to be immediately accessible, and are too bulky or heavy to be conveniently carried. The community kit should be centrally located and contain the following types of items:

(1) Survey Equipment:

—1,000 feet of light rope or heavy cord, marked at 50-foot intervals
—12-inch steel rule
—50 lightweight stakes

(2) Miscellaneous Items:

—Hammer, chisel
—Hacksaw with spare blades
—Small wood saw
—Small shovel
—Spray lube
—Rags or paper towels
—Hand cleaner
—Hatchet
—Scale models of UE aircraft
—Base telephone directory and list of local civilian authority addresses and telephone numbers
—Spare flashlights, batteries, zip lock bags, tags and labels, etc.
—water jug or cases of drinking water

(3) Contingency Equipment. The following will be needed only under certain conditions. Arrange to have the following items available for issue to investigators when required, and arrange to have the equipment transported to the crash scene:

—Tents, bedding, rations, cooking gear, etc.
—Emergency and portable lighting, portable latrines
—Coveralls, boots, parkas, rainsuits, and other protective clothing
—Emergency funds, foreign currency if applicable
—Axes, machetes, power chain saws, floodlights, and other heavy equipment
—Assorted sieves (up to 3-foot square) for sifting evidence from mud, etc.
—Portable, lightweight means of on-site communications, e.g., field telephone, walkie-talkie sets or loud hailers, etc., and spare batteries

—Protective packing materials, containers, and string for shipping evidence from the site, plastic bags, sheets and tape

—Crash site access passes
—Weather specific and terrain specific protective equipment

Chapter 3

WING STAFF AND INTERIM BOARD PROCEDURES

Page

Section A—General

3-1. Interim Safety Investigation Board (SIB). SIB member participation in base disaster plan activities are of little or no value in the initial actions stage. This time is better spent in organizing the safety board and assigning immediate tasks. As soon as the on-scene commander concludes that the fire has been extinguished, survivors have been removed or located, the fire chief has cleared on-site hazards, and explosives ordnance disposal (EOD) personnel have sufficiently cleared the area of dangerous materials, the interim SIB president can assume control of the mishap scene. Disaster response plan activities should not directly involve SIB members. Their work starts when the disaster response ends. This chapter outlines the immediate steps needed to limit damage and protect resources, as well as the steps local commanders, safety officers, and interim SIB members must take in the event of a mishap. While the assignment of responsibilities may vary due to available resources and the type of mishap, the responsibilities stay essentially the same. The items discussed apply to the most serious, disastrous, or catastrophic type of mishap. The degree of response and specific actions required in each case will vary, and can only be determined by accurate and timely on-the-scene judgment. Nothing in this chapter is intended to replace good judgment, or imply that all actions must be taken in every case.

3-2. Initial Actions. A well written and executed mishap response plan will have the various participants executing their functions simultaneously under the direction of the wing or base commander and the interim SIB president. The number and complexity of initial actions required following a mishap require all participants to have a firm knowledge of their responsibilities and investigative priorities. Valuable time and evidence can be lost by personnel awaiting specific direction, searching for needed equipment, or duplicating tasks that have already been accomplished. This paragraph provides an overview of actions to be taken immediately following a mishap. Later paragraphs will outline and amplify individual responsibilities.

a. The wing commander (CC) and battle staff or contingency support staff should immediately assemble, receive a status briefing, select and notify interim board members, review the mishap response plan, and take necessary actions. Wing safety should bring investigation kits, tape recorders, maps, etc., for issue to investigators as they arrive.

b. Secure records and tapes. It will take a while for fires to be put out and the mishap site declared safe. This time can be used to ensure all documents pertaining to the mishap are impounded. The following items, though not an inclusive list, are to be secured for the board:

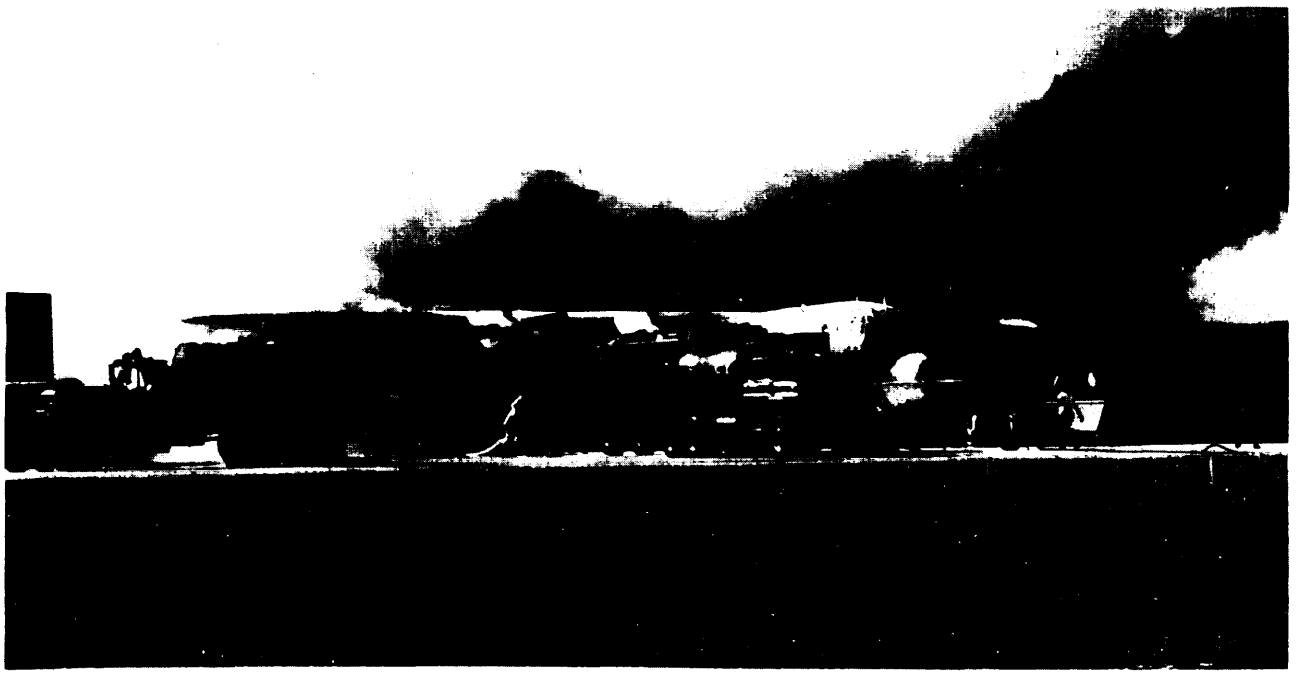


Figure 3-1. Responding to the Scene. Resist the urge to run to the mishap scene and become a spectator. It is dangerous, unproductive, and may even hamper firefighting and rescue efforts.

(1) Flight plan. (DD Form 175-1, Flight Weather Briefing, DD Form 1801, DOD International Flight Plan, DD Form 365-4, Weight and Balance Clearance Form F, and other mission paperwork.) Director of Operations (DO).

(2) Base operations, command post, and crew log(s) and tapes. (DO)

(3) All aircraft and support equipment and records, including engine records. Deputy Commander for Maintenance (DCM)

(4) Passenger manifests. (DO)

(5) Cargo manifest and related documents. (DO)

(6) Crew records. (DO)

(7) Documentation of locally disseminated weather information: (DO)

(a) Ensure special weather observation is taken.

(b) Otain weather sequence closest to time of mishap.

(8) Tower and Radar Approach Control (RAPCON) tapes. (DO)

(9) Also request, if applicable: (DO)

(a) AWACS tapes.

(b) ARTCC tapes.

(c) GCI—range tapes and records.

(d) Tapes from surrounding area (ships, other airports, etc.) that may have recorded the mishap.

(e) Global aeronautical station tapes.

(f) Departure base tower and departure tapes.

(10) Record status of navigation aids and other AFCC equipment. (DO)

(11) Obtain NOTAM information. (DO)

(12) Any other records related to the mission. (DO)

(13) TCTO status. (DCM)

(14) Maintenance records such as MMICS and technician qualification training data. (DCM)

Figure 3-2. Site Hazards. Use extreme caution in wreckage area. Impact damage renders many parts unrecognizable.

(15) Fuel, oil, hydraulic fluid samples, etc., used by mishap aircraft for contamination check. Take sample from fuel truck, cart, or oil stocks that were used to service mishap aircraft, vehicle or missile. (MA) See TO 42B-1-1 for procedures.

3-3. Site Safety. When mishaps occur, the natural tendency is to rush to the scene to either help or to observe the scene. While this attitude may be commendable, it is also quite dangerous. Aircraft mishaps contain numerous hazards which can turn investigators into casualties. The best way to protect personnel during the initial phases of a mishap is to be aware of potential hazards, stay upwind of mishaps, and stay well clear of the mishap until professional guidance is available (see paragraph 7-2 for additional guidance). Most mishaps involve hazardous materials. Hazardous materials are substances which can produce injury during mishaps in any of the following ways:

a. Chemical injury—when the substance is ingested, inhaled, or comes in contact with the skin.

b. Thermal injury—when the substance freezes or burns.

c. Asphyxiation—when the substance displaces oxygen needed to breathe.

d. Radiation injury—when a radioactive material emits ionizing energy or particles that can harm personnel.

e. Disease—from microbiological agents.

f. Mechanical injury—injury by explosive fragments, rocketing containers, explosive overpressures, etc.

NOTE: Many normally benign items, such as tires, batteries, beryllium mirrors, parachute oxygen bottles, hydraulic accumulators, etc., can become lethal in a post crash context.

Figure 3-3. Natural Hazards. Mishap scene hazards are not restricted to wreckage. (Photograph by AFIP Aerospace.)

3-4. Injury Avoidance. To avoid such injuries to investigators in mishaps, the following four steps are suggested:

Expect!
Wait!
Follow!
Don't!

a. *Expect* hazardous materials (HM) to be present in any mishap until its presence has been *ruled out*. An investigator should always search for *indications* of the possible presence of HM in any mishap. These materials may be indicated by warning placards or signs, labels on packages, shipping papers, or verbal information from people at the scene. Look for HM such as freight cargo, ejection seats, ordnance, fluids, and propellants. Also be alert to the presence of fuels propelling the vehicles. HM may be dangerous while they are still in their containers, or if they have escaped from their containers. The principle is to scan the wreckage to *rule out* their presence: assume that HM can be present until it is conclusively established that they are not.

b. *Wait* until potential energy transfers (such as fires, explosions, vapors, breached radioactive materials containers, etc.) have been eliminated if HM are present. HM can be emitted in many ways for many reasons. Even worse, it is almost impossible to tell precisely when they will activate and envelope the danger zone with the investigator in it. Unless there is a compelling reason to enter the crash site area while the HM containment systems are under mechanical or thermal stress, wait for those potential energy transfers to be eliminated. Alternative methods for acquiring evidence in the wreckage can be used. For example, aerial photographs, interviews with witnesses whose duties require them to go into the wreckage

Figure 3-4. Digging at the Scene. Components can be buried deep in the ground, and so can all types of hazardous material—Beware!

area, or subsequent examination of physical debris may provide the evidence you need. Consider the trade off between the value of the data needed immediately from the wreckage area, and the safety risks. Stressed containers should be considered to have the potential for abrupt rupture, and the contents should be considered to have the potential for an explosion, until clear and convincing evidence to the contrary from informed experts exists.

c. *Follow*, rather than lead others into the wreckage. A good rule of thumb is to stay away from the wreckage containing HM until a competent expert is available. Ask the expert to predict the behavior of the HM in that emergency to be sure he or she is truly knowledgeable. From the predictions, ensure the expected behavior poses no threat to personal safety. In those circumstances, it may be permissible to follow him or her into the wreckage area. (Investigator ability to predict how the HM will behave is very limited, because this is not his or her role in a mishap.) If assistance or information is requested, refer the person making the inquiry to emergency response agencies to contact the CHEMTREC emergency toll free telephone number (800-424-9300) for expert advice and assistance. Obey evacuation instructions of EOD, police, and firefighters. In no event follow firefighters or other emergency or rescue personnel into the wreckage area. A rule of thumb is to stay at least 2,000 feet upwind from any fires burning in wreckage where HM are present, and stay out of any plume of smoke from the site.

d. When in doubt, *don't take chances.* If uncertainty about potentially destructive HM behavior in a mishap area exists, don't take chances by entering the mishap site. There is very little to be gained, and much to be lost, by risking personal safety. Remember, the investigator's role is to determine what happened, and not to be a part of what is happening.

3-5. Actions at the Site. Although many variable circumstances will dictate your best plan of action, the time of arrival at the mishap site will be the most important. Ideally the following order should be considered:

Figure 3-5. Component Recovery. Experienced maintenance folks are a valuable asset in locating, identifying, and recovering components. (Photograph by TSgt Coker, AFIP Aerospace.)

a. The interim board should go to the mishap site and ensure that the area is adequately guarded and safe. All explosives, including ejection seat cartridges, tip tank ejectors, tires, and all munitions, should have been made safe. Photograph the wreckage "as found" before disturbing.

b. The extent and disposition of any aircrew or civilian casualties should be determined, along with the names and addresses of all casualties.

c. After the site is declared safe, it should be inspected by the interim board. Each interim board member should "walk through" the wreckage to become familiar with the mishap scene. This should be completed as soon as practical, so members who do not require further information from the mishap scene can proceed with their duties. Take care to prevent loss of valuable data in the area. If power is still available to the aircraft, ensure that cockpit voice and crash data recorders are shut off so the systems do not overwrite critical mishap evidence. Consider removing these recorders to a safe, secure area to prevent further damage from the elements. The maintenance officer and investigating officer, accompanied by a photographer, may begin a detailed walk-through. An expert maintenance NCO may be a valuable asset in this plan. If practical, start this walk-through before the initial impact point. Make notes or tape record general impressions (these could be very important when talking to witnesses). Ensure that both general area and specific photos are taken (you can't take too many). Carefully record where and when each photo was taken. Studying the initial ground impact, tree scars, and broken branches can provide information about aircraft attitude at time of impact. For example, presence of green glass in the initial ground scar might indicate that the right wing impacted first, if the glass is identified with the wing light. Since rescue and investigation efforts in inclement weather may obliterate ground scars, take photos and measurements as soon as possible. By moving through the area slowly and evaluating aircraft parts and impact angles, the actual path of the aircraft can be determined. Make a preliminary wreckage diagram sketch showing major components with critical distances and compass angles. One very effective technique is aerial photos of the scene. By noting discolorations of the terrain, much valuable information can be obtained and can be used to plot wind direction at the time of the mishap. Chapter 7 contains information which may be very valuable during this phase of the investigation. Take required photos of deceased crew members and passengers during this phase.

NOTE: All photos will be turned over to the SIB. The board president will ensure that all photos, negatives, and prints of deceased persons are turned over to the SIB medical officer for proper disposition when no longer required for the investigative process.

Figure 3-6. Searching for Clues. Sometimes clues are located upstream from the mishap scene. Note torque arm pin on runway.

3-6. Preserving Evidence:

a. If a formal board is going to conduct the investigation, evidence should not be disturbed before their arrival and inspection. In addition, reasonable steps should be taken to protect key pieces of evidence. Actions such as covering initial ground scars and cockpit areas during inclement weather are appropriate. Small items that may be blown away, lost in mud or water, or covered with snow or blowing sand should be staked, marked, photographed, and recorded.

b. If the mishap occurred in an area that must be cleared immediately, such as a busy freeway or a housing area, an initial walk-through and the initial photographs or video tape may be the only chance the board has to view some of the wreckage in its original condition. If it appears that the wreckage must be moved immediately, aerial photography should be requested from the nearest military base possessing the capability. Both vertical and oblique low altitude pictures should be taken. Infrared or photoflash pictures should be taken if photography cannot be delayed until daylight. For mishaps where wreckage is located on hard surfaces, such as highways, where the wreckage must be moved immediately, mark the location for future analysis. The following actions must be accomplished if the wreckage must be removed immediately:

(1) Record, photograph, etch, and diagram positions of actuators, cockpit instruments, switches, and impact areas, as applicable, and when tagging components list their location in the wreckage.

(2) Photograph the position and components of the wreckage as well as the impact areas.

Figure 3-7. Capturing Transitory Evidence. Standing water at mid-point of mishap runway. Weather phenomenon is very transitory, requiring special observation and documentation.

3-7. Initial Meeting. When the initial walk-through is completed and the board members agree on which items are perishable or are of immediate importance, they return to a central point and hold their first formal meeting. This is the best time for the president to outline responsibilities. The president establishes the investigating officer as his or her representative and the unit safety officer as the primary advisor for the investigation. The maintenance officer or investigator remains and directs the other immediate actions such as drawing fluid samples, removing the flight data recorder, arranging for illumination, accomplishing photography, and ensuring mishap scene security.

3-8. Witness Information. Eyewitnesses can be a very perishable commodity and therefore should be identified and interviewed as quickly as possible. Investigating officers, pilot members, and other trained operations members should use the procedures and forms outlined in chapter 8 to get necessary witness statements.

3-9. News Media. Mishaps not occurring on a military installation are under the control of state and local authorities except at established National Defense Areas (NDAs). If local officials rope off the area to protect the public or to protect government property, then the on-scene commander must coordinate with civilian officials regarding news media access to the mishap site. If possible, civilian media will be briefed on safety hazards of the area and the need to preserve the site for investigation. The Disaster Control Group (DCG), along with providing command and control functions, should contain a Public Affairs Officer (PAO). Regional Response Force (RRF) or Service Response Force (SRF) units responsible for emergency actions in the event of a nuclear mishap, will also contain Public Affairs representatives. Public Affairs is the on-scene commander's representative, and is charged with the timely release of unclassified facts about mishaps. Refer all questions from news media to Public Affairs. The on-scene commander should not be hampered, or kept from his or her duty as the commander by granting innumerable interviews that can easily be accomplished by Public Affairs.

a. Classified Information. Federal law and Executive Order 12065 requires Air Force personnel to protect classified information. However, there are limits to Air Force authority at a mishap site, particularly away from an Air Force installation. The civil police are responsible for enforcing federal, state, and foreign criminal law. Air Force officials must ask local law enforcement officials for help at mishaps away from Air Force installations. Air Force officials must also remind civil officials that unauthorized photography, publication, or possession of classified information may be prosecuted as criminal acts under 18 U.S.C. 793(e), 795, and 797.

b. Survivor Information. Care must be taken when releasing the names of both survivors and casualties of mishaps. The responsible base PAO will release the names of the survivors after coordination with the casualty officer. Names of casualties will not be identified until the notification of the next of kin. If, in the judgment of the commander, releasing survivors' names would reveal the identity of a fatally injured companion before the next of kin are notified, the commander may withhold the survivors' names pending this notification. It is impractical to grant news media access to the surviving crew or passengers for interviews immediately following an aircraft mishap for reasons

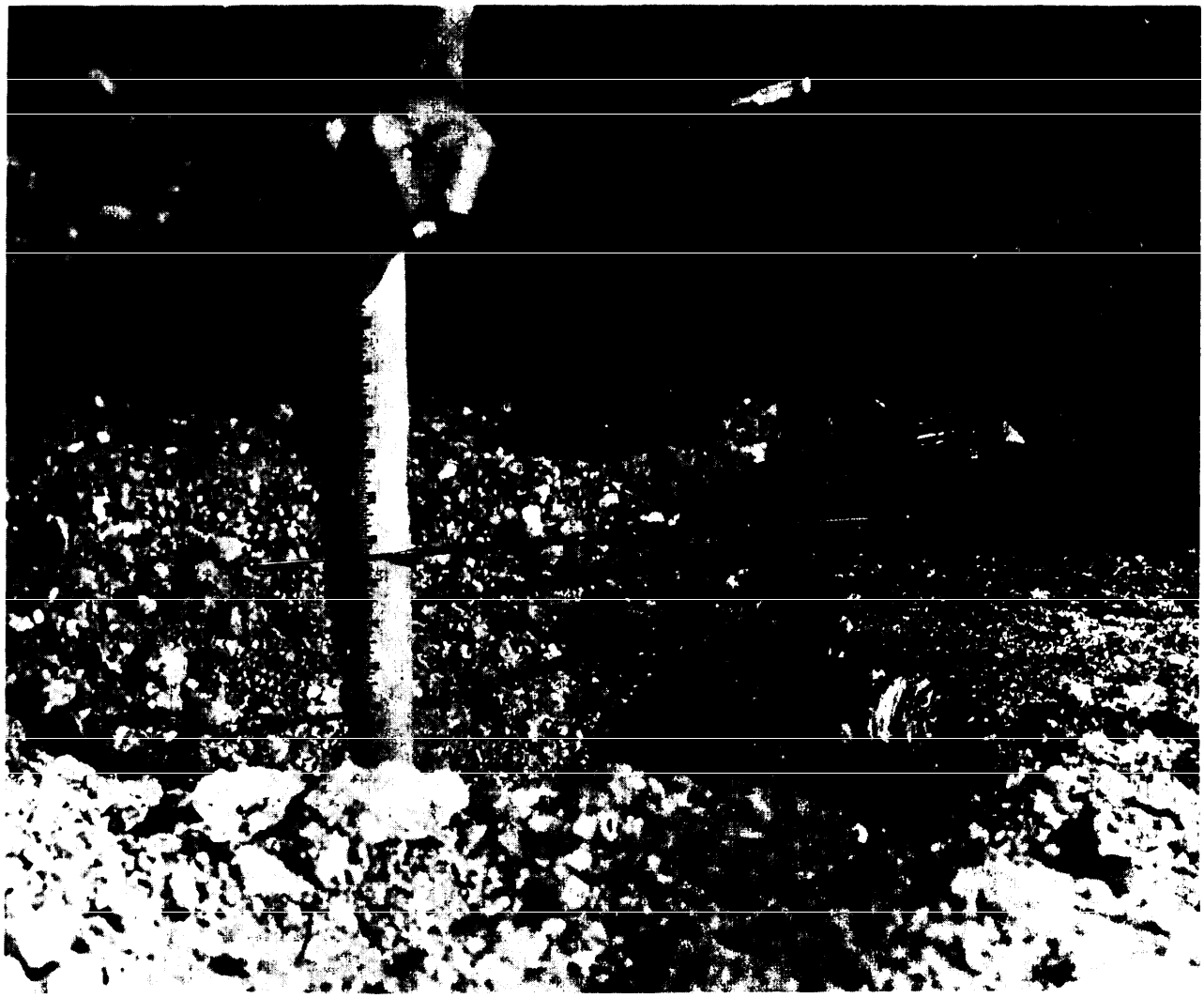


Figure 3-8. Impact Marks. Impact point of right wheel on access road. Ground scars can be quickly destroyed by weather, rescue or support equipment, or bystanders. Protect, analyze, and document as soon as possible.

of medical care, trauma, and security. The personal privacy of these people must be considered.

c. Mishap Cause. Never speculate about the cause of a mishap, even if the cause seems obvious. If pressed by a reporter, explain that only a safety board is qualified to determine the cause. Take care not to imply that all safety board findings will be made available to the public. Explain the purpose of the board is to prevent mishaps, not place blame. The safety board's findings are privileged, and must be protected. Releasable portions are generally not available until 45-60 days after a mishap.

d. Munitions. The presence of nuclear weapons or radioactive nuclear weapon components at any specified location can neither be confirmed or denied except in the interest of public safety, or to reduce or prevent widespread alarm. Before any action, clearance with OASD/PA must be obtained. If public safety considerations are a factor because an aircraft was carrying HM (nonnuclear munitions, chemical or biological material) then the PAO should immediately release this fact. NDAs are normally established in the United States for the protection or security of DOD resources (50 U.S.C. 797) in emergency situations. Air Force commanders of major commands, numbered air forces, air divisions, wings, groups, or installations have authority to establish NDAs, discontinue them, or change their boundaries as necessary to provide protection or security for DOD resources. (Also see paragraph 2-8.) NDAs must only encompass the area necessary to protect security of these resources.

e. Photography. The authority of Air Force public affairs personnel, on-scene commanders, safety boards, and security police is limited when

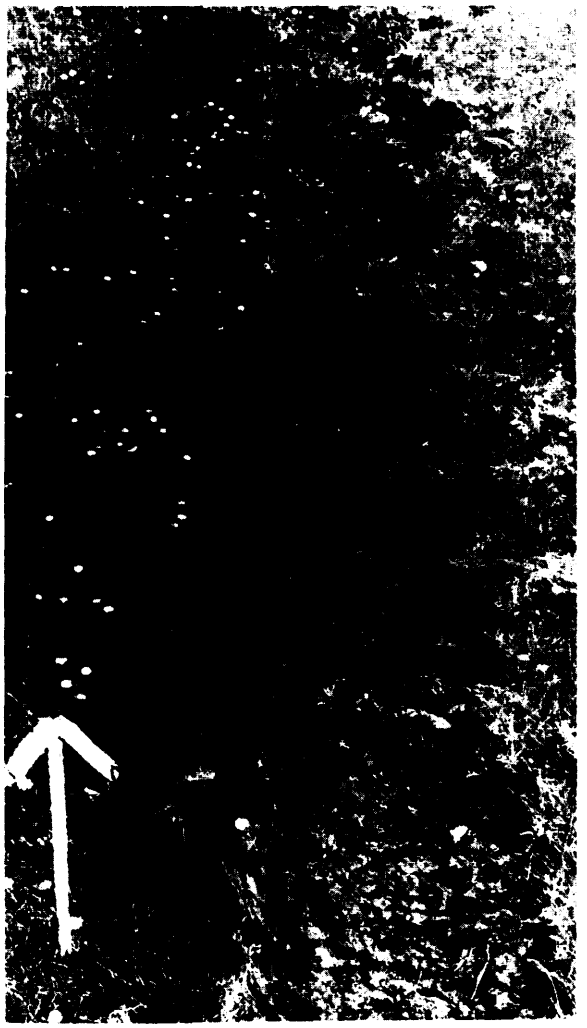


Figure 3-9. Ground Scars. This photograph shows the rut of a main gear, and the characteristics of heavy braking being applied.

dealing with news media, particularly at a mishap site outside an installation. If it is determined that classified information cannot be readily covered, the senior Air Force representative should explain the situation and ask news people to cooperate, and explain that federal law prohibits photography when official permission is expressly withheld (18 U.S.C. 795 and 797). Do not use force if they persist. Ask for help from civil authorities if off base, and immediately contact the media representative's employer and explain the situation. The PAO may not release Air Force mishap photographs that show classified information, bodies, or parts of bodies. This applies only to official photographs. It does not mean that the presence of bodies is in itself a reason to stop civilian media photography.

NOTE: If an AFR 110-14 accident investigator has been identified, press inquiries should be referred to the accident investigator rather than to the safety board president. If necessary, attach a PAO representative to the investigation to handle media queries. PAO tenure with the SIB or the AFR 110-14 board depends on media interest.

3-10. Site Security. Prompt posting of guards (as discussed in chapters 2 and 6) is important both to protect onlookers from danger and to safeguard evidence, property, and classified information. Security forces working with local law enforcement agencies should quickly define broad limits of the site. A site access roster and security plan for at least 30 days should be prepared. Access to the mishap site should be restricted to essential medical, EOD, rescue, and fire fighting personnel until the site is declared safe.

3-11. Removing Human Remains. This begins with the approval of the interim board medical members or board president after survivors are removed. The medical member, in conjunction with Mortuary Affairs, will record position, placement, and posture of the remains. Photography is the best way to do this, but special care must be exercised in controlling these photos. Chapter 10 discusses movement of remains and the identification process. The life sciences team will document the location and use of life-support equipment during the removal process.

NOTE: For off-base mishaps, removing human remains normally has to be coordinated with Mortuary Affairs and local authorities such as coroner or medical examiner. See paragraphs 4-44 and 4-47a.

Section B—Individual Wing Staff Responsibilities and Procedures

3-12. General Information. AFR 127-4 requires the nearest Air Force installation, regardless of size, to respond to and provide support for mishaps occurring on or near the base. The following sections contain basic individual procedures and checklists for the wing staff. The procedures and checklists should be tailored to the organization, and are divided into the four major phases: preparatory, response, initial, and investigation. Each phase lists specific procedures that each individual should accomplish.

a. Each individual wing staff member uses his or her specific checklist to determine appropriate procedures and to ensure that the procedures are performed in a logical, chronological sequence. The paragraphs contain basic guidance, and should be adjusted as the situation dictates.

Figure 3-10. Meet the Press. The initial meeting with the press can set the tone for future cooperation. Be positive and diplomatic. The more they think you are trying to hide, the more they will harass you. (Photograph by MSgt Moats, AFIP Aerospace.)

b. The wing staff and SIB members should review their procedures and checklists after mishaps or at least annually to ensure the procedures are technically correct, properly arranged, and contain required deletions or additions.

3-13. Wing Staff Procedures and Checklist. In general, these pertain to procedures performed on base during the initial phase. The only exception is the on-scene commander whose procedures and checklist are performed at the mishap site. Except for broad support of the SIB during the investigation phase, the wing staff responsibilities are complete when the SIB assumes control of the investigation.

3-14. Wing Commander (CC) Procedures and Checklist:

a. Preparatory Phase:

(1) Prepare to provide support personnel and facilities for an SIB as outlined in AFR 127-4, chapter 1.

(2) Coordinate required base support for tenant unit mishaps with the unit commander.

(3) Ensure the wing Flight Safety Officer (FSO) develops a viable mishap response plan, and coordinates its actions with those actions contained in the Base Disaster Preparedness Operations Plan and AFR 355-1.

(4) Ensure the deputy commander for operations (DO), deputy commander for maintenance (MA or DCM), deputy commander for resources (RM) and hospital commander (SG) submit a sufficient number of names of eligible individuals to the wing FSO so they can be trained as qualified SIB members. Make sure the "eligible" individuals are also the ones they really will send if asked to.

Figure 3-11. Reconstruction Analysis. Reconstruction of the right windscreen showed bird entry point as determined by stress and crack lines. Careful preservation of evidence and documentation of location made this analysis possible.

(5) Ensure the wing FSO briefs the wing staff concerning the chronological order of actions and the staff officer responsible for the actions.

(6) Ensure the wing safety officer coordinates with disaster preparedness (DP) to include an aircraft mishap scenario as one of the scheduled DP exercises to familiarize the battle staff or disaster control group, disaster response force, and SIB members with their mishap response plan procedures.

b. Response Phase. Wing CC reports to the command post (or other predesignated area).

c. Initial Phase:

(1) Obtain a situation briefing from the command post duty controller, OSC, battle staff and disaster control group.

(2) Ensure the first available helicopter is immediately dispatched with a medical team if mishap site is remote.

(3) Confirm key personnel (DO, MA, SG, SE) have assembled at the command post or assembly area.

(4) Notify the commander of the unit where the mishap aircraft or aircrew is assigned (if applicable).

(5) Ensure response forces are aware of dangerous materials, if aboard, such as nuclear or explosive armament, or toxic chemicals, i.e., F-16 hydrazine.

(6) Appoint, in conjunction with the DO, MA, SG and SE, the interim SIB members from the SE list of qualified and trained individuals.

(7) Ensure the appointed interim SIB members assemble at the designated area assume

board duties, and are relieved of all other duties until released by the SIB board president.

(8) Direct battle staff or disaster control group and interim SIB to initiate their procedures and checklists.

(9) Ensure casualty notification procedures have begun. In the event of a fatality, coordinate with the flight surgeon, chaplain, base personnel officer, mortuary affairs officer, and other necessary personnel (i.e., local pastor, etc.), for a personal visit to relatives of the deceased in the local area (designated on DD Form 93 Record of Emergency Data). This should be accomplished as soon as feasible after the mishap to preclude possibility of erroneous or thoughtless information from reaching next of kin and causing further distress. For next of kin not located in the local area, coordinate with the casualty reporting services of CBPO on procedures for notification.

(10) Direct emergency assistance.

(11) Direct community relations aspects of the mishap. Designate authorization to release information to the news media in accordance with AFRs 127-4 and 190-1.

(12) Ensure Public Affairs:

(a) Establishes procedures to handle the flow of information concerning mishaps as outlined in AFRs 127-4 and 190-1.

(b) Coordinates all requests for photo and news releases and coordinates with civilian news media personnel.

3-15. Combat Support Group Commander (CSG/CC) Procedures and Checklist. On-scene commander (OSC) procedures and checklist:

a. Preparatory Phase:

(1) Ensure disaster preparedness (DP) develops a viable disaster preparedness operations plan according to AFR 355-1, and coordinates it with the host chief of safety so that procedures are identical or compatible.

(2) Incorporate an aircraft mishap scenario as one of the scheduled major accident response exercises to familiarize the battle staff or disaster control group, disaster response forces, and SIB members with their mishap response plan procedures.

(3) Use critiques of the exercises to find and correct deficiencies.

(4) Comply with all requirements of AFR 127-4, paragraph 1-2.

(5) Be familiar with the following publications:

(a) AFR 355-1, Disaster Preparedness, and OP 355-1, Base Disaster Preparedness Operations Plan.

(b) OP 127-1, Aircraft Mishap-Response Plan.

b. Response Phase. (Member of initial support element.) Obtain situation briefing from the duty controller while en route to the mishap site.

(1) If on base or near base, report as prescribed by the Disaster Preparedness Operations Plan.

(2) If off base remote, report directly to assembly point and determine, in coordination with the wing commander, whether to take a helicopter to the site or to lead a convoy of the members of the initial, follow-on, and support elements to the mishap site. Obtain exact directions to the mishap site before convoy departure.

(a) Ensure security police advise state and local law officers when off-base convoy response is required or civil involvement exists.

(b) Ensure emergency response agencies initiate mutual support agreements.

(c) Coordinate with the command post to obtain helicopter support (if available) for airlift to the mishap site.

c. Initial Phase:

(1) Approach the mishap site from upwind and from other than the impact direction to avoid smoke or toxic vapors and to avoid destroying evidence.

(2) Deploy men to walk in front of vehicles and search for injured survivors who may be hidden from the driver's view by underbrush or tall grass.

(3) Ensure personnel accomplish the tasks described in general in this plan but described in detail in the Base Disaster Preparedness Operations Plan and implementing checklist.

(a) Fire department begins rescue of survivors and the firefighting operations.

(b) Medical personnel treat and evacuate survivors and injured.

(4) Assume on-scene command and control of the scene after coordinating with the fire chief to determine the survivors have been rescued and the fire extinguished.

Figure 3-12. Cockpit Photography. F-4 front cockpit, left side indicates external stores, emergency release switch not used, and that the gear handle is down.

(5) Determine the location of the mishap and transmit the coordinates to the base command post.

(6) Determine which members of the follow-on or support elements are required, and direct them to convoy to the mishap site.

(7) Direct security personnel to establish a cordon around the mishap site and establish a control entry point upwind from the site.

(8) Direct disaster preparedness personnel to establish a mobile on-scene command post and communications net with the base.

(9) Direct public affairs personnel to prepare and coordinate news release with OSC. News releases may be made through command post PA representatives versus the on-scene PA representative.

(10) Direct EOD personnel to "safe" or remove all explosive cartridges, initiators, and weapons ordnance after firefighting operations have ceased.

(11) Direct maintenance personnel to deflate tires to prevent explosion, if applicable.

(12) Ensure all exposed fatalities are covered.

(13) Ensure all potential classified equipment or information is covered.

(14) Coordinate actions of the military, public, and members of the press.

(15) Brief all personnel at the site concerning the following standard policies:

(a) Use extreme courtesy when talking to the public or news media personnel. Each individual's conduct must enhance rather than degrade community relations.

(b) Abstain from any speculation as to the cause of the mishap.

(c) Refer all questions from the public or news media to the Public Affairs Officer.

(d) Politely direct members of the news media to please contact the base PAO.

(e) Direct potential claimants to the base claims officer, who will assist the claimant in getting reimbursed for their losses.

NOTE: If the "potential claimant" has an obviously good claim, Air Force image is enhanced by making sure the claims officer goes to him or her rather than forcing the civilian to try and contact the claims officer. That's frustrating even for someone in the Air Force. It is helpful for the Board President to have a feeling for what the claims officer can and cannot do in accordance with AFR 112-1, Claims and Tort Litigation. Basic policy is to settle claims promptly and fairly. Anything else hurts the image and the investigation. There is, incidentally, a claims response team at HQ USAF/JAG which can deploy to the scene of real disasters to help out—if someone remembers to tell them what's going on.

(f) Politely ask civilians and news media personnel not to photograph deceased personnel.

(g) Politely ask civilians and news media personnel not to photograph classified equipment or information. If they persist, do not try to stop them, but simply inform them that it is a criminal offense for anyone to photograph, publish, or refuse to surrender classified information to proper military authorities.

(h) Restrict entry to the cordoned mishap scene to authorized personnel only.

(16) Ensure the remains are photographed if the wreckage must be disturbed to facilitate removal.

(17) Ensure security and preservation of wreckage in original state to preclude further injuries or loss of evidence.

(18) Ensure the following actions are accomplished if the wreckage must be removed immediately:

(a) Record, photograph, etch, diagram positions of actuators, cockpit instruments, switches, and impact areas, as applicable, and when tagging components list their location in the wreckage.

(b) Photograph the position and components of the wreckage as well as the impact areas.

(c) Obtain fuel, oil, hydraulic, and oxygen samples, if possible.

Figure 3-13. On-Scene Logistics. Mobile Communications shelter and sanitary facilities should be established as quickly as possible. (Photograph by TSgt Coker, AFIP Aerospace.)

(d) Inform crash removal crews they may begin removing the wreckage after all actions are complete if applicable.

(19) Monitor emergency assistance to civilians and next-of-kin to ensure they receive adequate help and information.

d. Investigation Phase:

(1) Transfer control of the mishap site to the interim or permanent SIB president.

(2) Ensure quarters and transportation are available for inbound board members.

(3) Maintain disaster preparedness personnel, mobile command post, and communications net at the site until the requirement is deleted by the SIB president.

(4) Maintain site security until the requirement is deleted by the SIB president.

(5) Provide a civil engineering team to survey the site and draft the wreckage diagram if requested by the board.

(6) Ensure board members under his or her command are relieved from normal duties for the duration of the board.

(7) Provide additional assistance as necessary.

3-16. DCO Procedures and Checklist:

a. Preparatory Phase. Participate in mishap response and disaster preparedness plan exercises.

b. Response Phase. (Member of battle staff or disaster control group.) Wing DCO reports to the command post unless otherwise directed.

c. Initial Phase:

(1) Obtain a situation briefing from the command post (DOC) duty controller, OSC, and other battle staff members and ensure he or she has alerted key wing and tenant unit personnel.

(2) Coordinate and ensure transmission of the OPREP-3.

(3) Ensure the command post maintains a log of all information and actions pertaining to the mishap.

(4) Coordinate to obtain helicopter support (if available) for search and rescue operations as well as transportation of the initial support element or interim or permanent investigation board to the mishap site.

(5) Alert base weather detachment to take an immediate observation and impound copies of actual and forecast weather records given to the crew of the mishap aircraft. Request the detachment forward this data to the command post for delivery to the DCO or interim or permanent SIB.

(6) Direct the squadron commander of the mishap crew to impound the following records and forward them to the command post for delivery to the DCO or interim or permanent SIB:

(a) Individual Flight Records with following information closed out. (Note: Ensure flight records not already processed are included in calculating time of sorties.)

1. FSC.
2. RPIC.
3. Total time.
4. UE time.
5. Time last 30____ 60____ 90____ days.
6. Sorties last 30____ 60____ 90____ days.
7. Date of last check ride.

(b) Flight Orders:

1. Local Form 6, Local Flight clearance.
2. DD Form 175, Military Flight Plan.

(c) Weather Briefing:

1. Squadron weather flimsy.
2. DD Form 175-1, Flight Weather Briefing.

(d) Flight Records:

1. Student grade folder (if applicable).
2. Training record (if applicable).
3. Weapons qualification record.
4. FCIF.
5. Crew rest history.

(e) Weapons Crew Records (if applicable):

1. Standardization and evaluation records.
2. Training records.

(7) Select, in coordination with SE, and nominate to CC the pilot or crewmember and life support members for the interim and permanent board from the available trained individuals, and alert them to assemble at the preplanned point.

(8) Ensure DCO board member personnel are relieved of normal duties until the investigation is completed or released by the board president.

(9) Ensure all DCO personnel involved in the mishap, crew, squadron commander, supervisor of flight, runway supervisor unit officer, etc., are advised that they will probably have to give witness-type testimony to the SIB when they arrive at the mishap scene.

(10) Forward available information to the wing CC or the board president and SE for the 8-hour preliminary report.

(11) Retain, for as long as feasible, the same command post duty controller during whose shift the mishap occurred, to provide continuity. Ensure that any replacements or augmentees are thoroughly briefed.

(12) Alert the flight facilities and communications squadron commander to impound the tower and approach control tapes and to prepare a transcript according to his or her regulations (if applicable to the mishap).

(13) Alert the FAA ATC facilities to impound voice tapes and radar scope duplications, if applicable to the mishap.

(14) Help the wing CC notify next-of-kin (if desired) in the event of fatality or injury to personnel.

d. Investigation Phase:

(1) Provide a copy of the command post log to the SIB.

(2) Support the SIB with sorties for flightpath reenactments and with simulator sorties as necessary.

3-17. DCM Procedures and Checklist:

a. Preparatory Phase:

(1) Participate in mishap response plan exercises.

(2) Place EOD personnel on 24-hour call.

b. Response Phase. (Member of battle staff or disaster control group.) Wing DCM reports to the command post unless otherwise directed.

c. Initial Phase:

(1) Evacuate or protect aircraft or other systems close to the mishap site according to standard maintenance procedures.

(2) Obtain a situation briefing from the command post, OSC, and other battle staff or disaster control group and ensure the key wing and tenant unit personnel have been alerted.

(3) Impound all aerospace ground equipment (AGE) or operational ground equipment (OGE) that may have played a role in the mishap sequence. Do not release this equipment until it is determined that it was not involved in the mishap or until the board president releases it.

(4) Obtain fuel, oil, hydraulic, and oxygen samples (one pint minimum) from units that last serviced the mishap aircraft. Label with cart or truck number, and date and time sample obtained. Get mishap aircraft tail number if applicable.

(5) Direct maintenance personnel to impound maintenance and engine records, forward them to the command post, and deliver to the command post or the interim or permanent SIB.

(6) Select, in coordination with SE, and nominate to the CC the maintenance and egress members for the interim SIB from the available trained individuals, and tell them to assemble at the command post.

(7) Ensure personnel are relieved of normal duties until the investigation is completed or released by the board president.

(8) Ensure a list of all maintenance personnel involved in the mishap (crew chief, team chief, line chief, etc.) is prepared and forwarded to the command post for delivery to interim or permanent SIB.

(9) Coordinate the following through EOD personnel:

(a) Dispatch personnel and equipment as necessary to base operations to convoy as part of the support element to the mishap site.

(b) Obtain information concerning the type and amount of explosive cargo according to AFR 55-14.

(c) Evaluate hazardous cargo, determine the best course of action, and advise the on-scene commander.

(d) Perform procedures to ensure potential explosive ordnance, cartridges, and systems at the mishap site are either disarmed or removed.

(e) Notify the on-scene commander or interim or permanent board president when the mishap site is safe.

(10) Coordinate with crash reclamation personnel. If the mishap occurs in a location that requires immediate removal of the wreckage, obtain permission from the on-scene commander or interim or permanent board president to remove the wreckage. Be extremely careful to preserve wreckage in as close to the original condition as possible.

d. Investigation Phase. Support the SIB with personnel and equipment for the duration of the investigation.

3-18. Chief of Safety (SE) Procedures and Checklist:

a. Preparatory Phase:

(1) Ensure safety office personnel develop a viable mishap response plan, and coordinate this plan with disaster preparedness (DP) so that procedures are identical or compatible.

(2) Coordinate with DP to include a mishap scenario as one of the scheduled DP exercises to familiarize the battle staff or disaster control group, disaster response force, and SIB members with their mishap response plan procedures.

(3) Use critiques of the exercises to find and correct deficiencies.

(4) Coordinate mishap response plan responsibilities, authority, and procedures with tenant units to ensure proper support is provided if a tenant is involved in a mishap.

(5) Maintain sample message formats, addresses, and address indicating groups (AIG) for reporting mishaps.

(6) Maintain a list of trained personnel who can serve as SIB members. Include, on the SE roster only, their home phone numbers for recalling personnel and their service numbers for publishing orders on short notice. Update the list periodically, and train replacement personnel.

(7) Place a safety officer on 24-hour alert duty to perform the safety procedures and checklist in response to a mishap.

(8) Comply with all requirements in AFR 127-4, paragraph 1-2.

(9) Be familiar with the following:

(a) OP 127-1, Aircraft Mishap-Response Plan.

(b) OP 355-1, Base Disaster Preparedness Operations Plan.

(c) AFR 127-4.

b. Response Phase:

(1) *On Base or Near Base.* Take extra copies of the mishap response plan, report directly to command post and obtain a situation briefing from the duty controller. Dispatch safety officer with portable tape recorders, investigation kit briefcases and tool kit, and the safety truck to the mishap site.

(2) *Off Base Remote.* Take extra copies of the mishap response plan, report directly to command post, and obtain a situation briefing. Dispatch safety officer with portable tape recorders, mishap kit briefcases and tool kit, and safety truck to base operations for helicopter transport to the site as part of the initial support element or, if this is not possible, convoy to the site.

c. Initial Phase:

(1) Obtain a situation briefing from the command post duty controller or designated individual.

(2) Help the wing CC initiate the mishap response plan, and help monitor its progress using these checklists.

(3) Help the wing CC or interim or permanent board president initiate and monitor the preparation, coordination, and transmission of messages.

(4) Determine external alerting requirements (FAA/NTSB/NON-USAF DOD). Coordinate with Air Force Operations Center.

(5) Ensure CV, DO, MA, SE of the organization or tenant unit that experienced the mishap have been alerted to respond to the command post.

(6) Ensure photographic support has been alerted and is available.

(7) Coordinate with unit CC, DO, MA, SG to select interim or permanent board members from the list of trained personnel.

(8) Brief interim SIB members concerning their duties. Point out the individual procedures and checklists.

(9) Help the interim board president or investigator prepare, coordinate, and transmit the preliminary message within 8 hours of the mishap.

(10) Coordinate with public affairs and personnel on news release and casualty messages, to avoid release of privileged information.

d. Investigation Phase:

(1) Serve as single point of contact for all SIB requests.

(2) Coordinate with interim board members to brief the permanent SIB on actions completed and information obtained.

3-19. Hospital Commander (SG) Procedures and Checklist:

a. Preparatory Phase:

(1) Become familiar with the mishap response plan, OP 127-1, especially the SG procedures and checklist.

(2) Participate in mishap response and disaster preparedness plan exercises.

(3) Ensure medical personnel and equipment maintain a 24-hour on-call status.

b. Response Phase. Hospital commander reports to the command post unless otherwise directed.

c. Initial Phase:

(1) Obtain a situation briefing from the command post duty controller, OSC, and other battle staff or disaster control group members.

(2) Ensure the prescribed samples are taken, and order tests required by chapter 10 be accomplished.

(3) Ensure medical personnel impound crew and team medical records, forward them to the command post and deliver them to the hospital commander or the interim or permanent board.

(4) Select, in coordination with SE, and nominate to the CC the medical members for the interim or permanent board from the available trained individuals, and tell them to prepare and to assemble at the command post.

(5) Ensure medical board member personnel are relieved of normal duties until the investigation is completed or released by the board president.

d. Investigation Phase:

(1) Provide medical support for the SIB. The board flight surgeon is assigned full time to the SIB.

(2) Alert bioenvironmental engineering if hazardous substances may be suspected.

3-20. FSO Procedures and Checklist:

a. Preparatory Phase. Develop a viable mishap response plan. Coordinate this plan with disaster preparedness so that procedures are identical or compatible.

b. Reponse Phase:

(1) *On Base or Near Base.* Take portable tape recorders, investigator/recorder mishap kit briefcase, tool kit, and the safety truck, and report directly to the mishap site or predesignated area.

(2) *Off Base Remote.* Take portable tape recorders, investigator/recorder mishap kit briefcase, the safety truck, and report directly to base operations. NOTE: If only one safety (SE) officer is available, he or she should report to the command post, since it is essential that SE personnel help the wing CC direct and monitor the progress of the command post and base procedures in the initial phase. The on-scene commander can direct and monitor the progress of the on-site procedures in the initial phase.

c. Initial Phase. Frequently the FSO is designated as the interim investigation officer. Whether operating in that capacity, or as an advisor to the interim safety board, the FSO should be ready to provide the following support:

(1) Assist the on-scene commander as required.

(2) Help obtain eyewitness statements using the portable tape recorder, witness statement worksheet, and memory-jogging questions.

(3) Be ready to begin investigation after the site is secure, safe, and the mobile command post and communications nets have been established. NOTE: Climatic conditions of rain or snow may make it impossible for the SIB to record evidence if photos are not taken immediately.

(4) Brief all personnel concerning the critical do's and don'ts of mishap investigation (see paragraph 6-14).

(5) Ensure witness statements are obtained.

(6) Ensure pilot member records cockpit switch positions and instrument indications.

(7) Ensure maintenance officer:

(a) Obtains fuel, oil, hydraulic and oxygen samples (one pint minimum) from the aircraft systems, if possible.

(b) Begins identifying and tagging pertinent parts for the wreckage diagram.

(8) Ensure medical officer performs appropriate tests on aircrew survivors and manages fatalities according to chapter 10.

(9) Transmit pertinent information to the command post for Chief of Safety's use in the preliminary report.

d. Investigation Phase:

(1) Brief interim or permanent investigators on status of required actions.

(2) Assist SIB as needed.

3-21. Public Affairs Officer (PAO) procedures and Checklist:

a. Preparatory Phase:

(1) Become familiar with the mishap response plan, AFR 127-4, safety related directives, and AFRs 12-30, 12-35, 30-25, 55-30, 110-14, 127-11, 207-1, and 355-1.

(2) Participate in mishap response and major accident response exercises.

b. Response Phase. Chief of public affairs usually reports to the command post, while one office member reports according to follow-on element instructions. If only one PAO is available, coordinate with the wing CC to decide the best location, on site or command post.

c. Initial Phase:

(1) Obtain a situation briefing from one command post (DOC) duty controller, OSC, or other battle staff members.

(2) Serve as the only individual authorized by the wing CC to release information to news media.

(3) Coordinate news releases with wing CC and Chief of Safety before releasing them to the news media.

(4) Maintain responsibility for controlling news media access to the mishap site.

(5) Coordinate with SE to ensure information or photographs released to the press, public, next-of-kin, or representatives will not show or indicate the following:

(a) Any information which speculates as to the cause of the mishap.

(b) Mishap responsibility on the part of any person.

(c) Failure of equipment or facilities.

(d) Statements that tend to indicate legal liability of the government or persons involved in the mishap.

(e) Classified information.

(f) Cause factors.

(g) Photographs of casualties (see paragraph 3-9e).

(6) If information is requested which cannot be released, refer requester to Directorate of Aerospace Safety (AFISC/SER), telephone (714) 382-4192.

(7) Issue press releases according to existing public affairs directives in AFRs 127-4 and 190-1.

(8) If classified information is involved, advise newsmen and photographers of federal laws (18 U.S.C., 793(e), 795 and 797) which make it a criminal offense for anyone to photograph, publish, or refuse to surrender classified information to the proper military authorities.

d. Investigation Phase:

(1) Coordinate with news media personnel to help identify and request witnesses or individuals who possess knowledge, photographs, film, wreckage parts, etc.

(2) Support the SIB for the duration of the investigation.

Section C—Interim SIB Duties and Responsibilities

3-22 Using Checklist. The following sections contain interim or permanent SIB member procedures and checklist. The SIB member should use his or her specific section to determine procedures and to ensure the procedures are performed in a logical, chronological sequence. Each section contains basic guidance which should be adjusted as the situation dictates. Procedures should be reviewed after every mishap or at least annually to ensure that they are technically correct and properly arranged. Change as needed to fit local situations.

3-23. The SIB Member Procedures and Checklist. In general, they pertain to procedures performed on site rather than on base during the initial phase. The only exception is the medical officer, who must perform a number of tests on the survivors or fatalities when he or she returns to base. After the interim board members complete their on-site initial phase actions, they should ensure their wing staff counterparts (president vs. wing commander, maintenance officer vs. deputy commander of maintenance, and medical officer vs. hospital commander) have accomplished their on-base initial phase actions. As the permanent SIB members arrive to supplant the interim members and the investigation progresses into the investigation phase, the permanent members should ensure all previous procedures of the interim board and the wing staff counterpart have been accomplished before continuing with the investigation. Detailed SIB responsibilities are discussed in chapter 4.

3-24. Interim Board President:

a. Initiate interim mishap investigation board notification if not previously accomplished by the chief of safety. Members report as directed to the mishap scene, base operations convoy, or the command center.

b. Organize the investigation and assign duties to board members.

c. Assume control of mishap scene after containment and control actions are complete.

(1) Ensure that ordnance has been rendered safe by EOD personnel. Do not interfere. Monitor from a safe distance. Record, insofar as possible, damage and relocation of parts resulting from firefighting and rescue operations.

(2) Ensure security of the wreckage from the public and souvenir hunters.

(3) After damage and injury assessment, establish a time and place for the first interim board meeting.

d. Initiate plotting. Accomplish aerial photography, if appropriate.

e. Initiate planning for removing wreckage if required. NOTE: Do not move any part of the wreckage unless absolutely necessary, i.e., on a runway, highway, railroad track, etc. Coordinate with convening authority if in doubt.

f. Initiate required safety reports.

g. Determine what technical representatives or assistance may be required.

h. If the public affairs officer is not on the scene, check with the ranking officer for news releases. Do not offer information other than acknowledging the mishap, but add that a qualified team will conduct a thorough investigation. If necessary, advise that a press officer will arrive soon and have a statement.

3-25. Flight Surgeon. Flight surgeon responsibilities are outlined in chapter 10, and in the medical board member investigation guide.

3-26. Investigating Officer:

a. Ensure responsibilities have been assigned to board members and required data is being collected by wing staff (see paragraph 3-2 for listing). NOTE: It is not the board's responsibility to recover or account for classified documents or equipment. The investigating commander will assign an officer who is not on the board for this purpose. Any classified documents or equipment collected by the board should be inventoried and turned over to this officer.

Figure 3-14. Relocating Wreckage. If wreckage must be removed from the scene, it should be stored in a securable area out of the weather. Allow enough room for analysis and any reconstruction that may be necessary.

b. In conjunction with the pilot or operations member, maintenance member, and recorder, ensure the following are accomplished:

(1) Obtain names, phone numbers, and addresses of witnesses. Explain interim actions and the possibility of giving witness statements later to the permanent board. If witnesses are unable to remain in the immediate area, ensure they are interviewed before their departure. The following individuals will more than likely be interviewed by the SIB on their arrival:

(a) Crew (tape record and transcribe).

(b) Fire and crash rescue personnel.

(c) Tower personnel.

(d) Flight line personnel.

(e) Crewmembers of other aircraft.

(2) Wreckage examination and documentation:

(a) Record position of following:

1. Flaps synchronized? Leading edge flaps? Inlet flaps?

2. Landing gear.

3. Speed brakes or spoilers.

4. Engines.

5. All cockpit switch positions.

(b) Determine aircraft configuration.

(c) Evaluate aircraft structural integrity of following:

1. Inflight breakup.

2. Presence of fatigue.

(d) Examine fire patterns to determine inflight vs. postimpact fires.

(e) Analyze flight controls.

(f) Analyze the following systems:

1. Hydraulic.

2. Electrical.

3. Avionics and navigation aids.

4. Instruments.

5. Fuel.

6. Others as assigned.

(2) Ensure required fluid samples are taken.

(3) Ensure telemetry data is obtained.

(4) Coordinate egress systems with flight surgeon, life support and egress specialist.

c. Direct activities of photographer (see chapter 7 and 9). The medical member has priority on use of the photographer. After the Doc is finished, the investigating officer supervises for all other board members.

(1) Photograph general scene from four directions at ground level (include positions of bodies where possible).

(2) Order aerial photographs of scene and preimpact swath.

(3) Order photographs showing preimpact swath (through trees, obstructions, etc.) and postimpact swath.

(4) Photograph positions of fatalities and human remains in the wreckage before removing

them or the wreckage, if this has not previously been accomplished. Also photograph all life-support equipment.

(5) Photograph impact, especially initial, marks on the ground, trees, buildings, poles, etc.

(6) Photograph cockpit switch positions and instrument indications.

(7) Photograph original positions of flight-control surfaces and hydraulic actuators.

(8) Photograph outer significant parts of the wreckage found at the site or separated from the site (engines, landing gear, large pieces of wreckage, etc.).

(9) Photograph wreckage with reference markers in position, if used.

(10) Obtain and review copies of photographs taken by eyewitnesses.

(11) Request two copies of contact proof sheets of all photographs taken to this point be delivered to the board.

d. Record ground scars (distance, patterns, etc.).

e. Plot wreckage. Investigating and maintenance officers:

(1) Select type of diagram that best suits wreckage distribution.

(2) Obtain survey team support from base civil engineers.

(3) Set up the surveyor's transit in the centerline of the initial point of impact.

(4) Sight along the centerline of the path of the wreckage.

(5) Determine and record the true and magnetic course of the path of the aircraft and wreckage.

(6) Determine and record the true and magnetic heading of the aircraft if different from the true and magnetic course.

NOTE: If wreckage must be moved, it can be done at this time with the consent of the OSC.

Figure 3-15. Determining the Impact Angle. Trees which received initial impact as viewed along impact angle are valuable in determining impact parameters.

3-27. Pilot Member. The pilot member works very closely with the investigating officer, and assists in accomplishing investigating officer duties. In addition, the pilot member is responsible for collecting and analyzing the "operations" portion of the mission. Coordinate with the investigating officer to determine priorities, but ensure the following areas are covered.

a. Secure aircrew and operations records (see paragraph 3-16).

b. Obtain permission from medical officer to interview the aircrew and obtain witness statements. Use the witness statement worksheet and memory-jogging questions. Reviewing chapter 8 will aid in preparing a list of nonleading questions arranged in a logical order.

c. Review history of flight:

(1) Review flight planning documentation.

(2) Review ATC documents and tapes.

(3) Check, in conjunction with maintenance officer, weight, balance, and loading data, DD Form 365-4.

(4) Check aircraft fuel log and servicing documents.

(5) Check crew activity before the mishap.

(6) Calculate mishap flight path.

3-28. Maintenance Member:

a. Ensure maintenance records are secured, and the actions listed in paragraph 3-17 have been completed.

b. Commence on-scene evaluation:

(1) Locate and identify engine(s).

(2) Locate and identify auxiliary components, as applicable:

(a) Flight controls.

(b) Environmental.

(3) Locate and identify all systems components and instruments:

(a) Fuel system.

(b) Oil system.

(c) Cooling system.

(d) Engine and ancillary controls.

(4) Determine position, condition or reading of system components at impact.

(5) Examine power plant structure to determine preimpact integrity.

3-29. Board Recorder:

a. Report to operations center.

b. Accept and control all impounded records from:

(1) Operations.

(2) Maintenance.

(3) Operations center (command post).

(4) Base operations.

(5) RAPCON, tower tapes.

c. Obtain message formats from chief of safety or advisor.

d. Manage the preparation and retention of mishap documentation and correspondence.

e. Coordinate all administrative requirements for the investigation.

3-30. Formal Interim Board Meeting. Between 4 and 7 hours after the mishap, the interim board president should call a meeting of the investigators and other involved parties to review progress and assign further duties. Immediate response items should be complete or nearly so by this time, and the magnitude of the mishap known. Determine any additional support requirements and assign responsibility for each item. Support planning should include the arrival of the formal SIB board or advisors. Also attempt to determine required technical support so the technicians can be alerted. At the end of this meeting, the interim board president contacts the investigating commander, the chief of safety, or the formal SIB president and apprises them of support requirements and any special equipment which the formal board may require.

3-31. Formal Board Arrival. The investigating commander's safety staff should be able to give an estimated time of the SIB arrival. When the formal safety board arrives on the scene, actions for turning the safety investigation over to the formal board include:

a. Briefing on all known information (see paragraph 6-2).

b. List of local area contacts and their involvement in the mishap.

c. List of witnesses.

d. Status of all actions started and persons contacted (for example, FAA/ATC tapes secured or transcribed, requests for maintenance or aircrew records, etc.).

e. List of local accommodations, that is, quarters, meals, working area, office space, etc. (see paragraphs 4-59, 4-60, 6-15).

NOTE: After turning the investigation over to the formal board, interim board members should remain available until released by the SIB president.

3-32. Safety Board Telephone Listing Sample. As a minimum, the following telephone numbers should be available to the SIB for quick reference:

a. Wing:

—CC/CV

—Safety Office

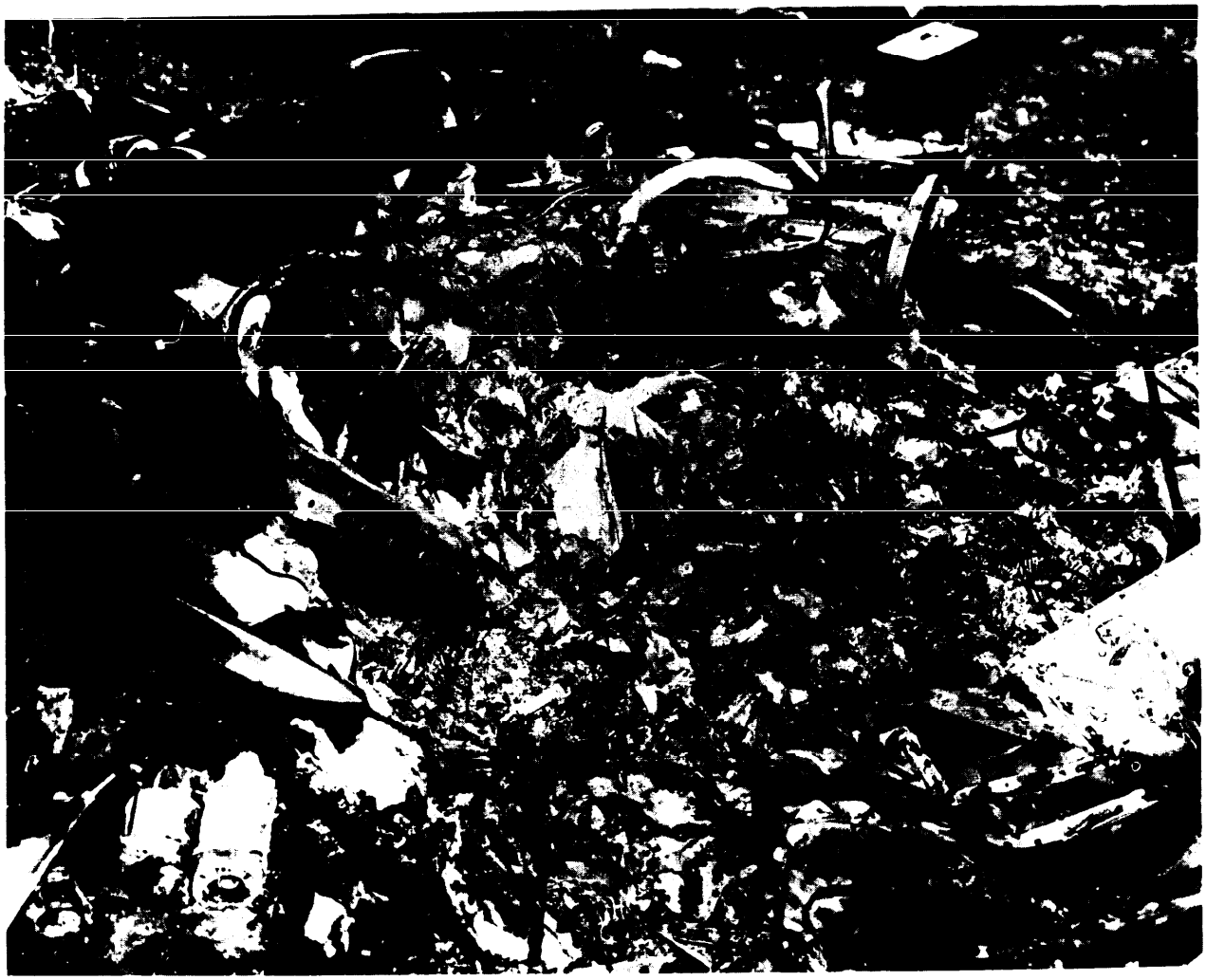


Figure 3-16. Plan Ahead. What appears to be a hopeless pile of trash is frequently full of valuable clues. A valid game plan and a methodical approach are necessary for success.

b. Operations:
- —DO
- —Command Post
- —Individual Flight Records Section (flying time data)
- —Operations Training
- —Squadrons

c. Maintenance:
- —MA
- —Crash Recovery Team
- —Job Control
- —Quality Control
- —Maintenance Squadrons
- —Technical Engineering
- —Servicing shops, as required

d. Support Organizations:
- —Aero Club
- —Airfield Management Office
- —Approach Control
- —Base Administration
- —Base Operations Dispatch
- —Base Reproduction
- —Billeting—BOQ Reservations
- —CBPO Personal Affairs
- —Communications Squadron
- —Disaster Preparedness
- —EOD
- —FAA Liaison
- —Fire Department
- —Graphics
- —Helicopter Unit
- —Public Affairs Office
- —Inflight Kitchen
- —Judge Advocate
- —Life Support
- —Motor Pool
- —Photo Lab
- —Reclamation, Wreckage, and Storage

—Security Police
—Weather

e. Hospital:
—Emergency Room
—Bioenvironmental Engineering
—Flight Surgeon

f. Tenant Units.

g. Local Civilian Organizations:
—City and County Police
—City hospitals and ambulance service
—Coroner or Medical Examiner

h. MAJCOM or NAF Safety Office.

i. HQ AFISC/SEP.

Chapter 4

THE SAFETY INVESTIGATION BOARD

Page

Section A—Types of Boards

4-1. Levels of Investigative Effort. There are two levels of investigative effort which are characterized by the varying numbers of investigators involved, both as voting and nonvoting members.

a. The first level is the single investigating officer. This level is seldom selected by the investigating commander for class A or B mishaps because of the inherent complexity of mishap investigation. The choice of a single investigator could be based on the simplicity of the circumstances and limited damage, but should not be influenced by the degree of operator error involved.

b. The second level of investigative effort is the SIB. The size and membership of the board depends on the kind of mishap being investigated. For a class A mishap this board consists of the mandatory membership (see AFR 127-4) and may be augmented by observers and additional members serving in specialized capacities in either voting or nonvoting status. It may also be supported by specialists in maintenance, materiel, or life sciences. These specialists work for the board president through individual board members.

4-2. Basic Board Composition. Figure 4-1 shows basic board composition and structure for a flight mishap. Depending on the type and complexity of mishap being investigated, the investigating commander or board president should organize the SIB to fit their investigative and reporting needs.

4-3. Single Investigating Officer:

a. Certain mishaps may be investigated by an investigating officer instead of investigating board (see AFR 127-4). However, an investigating officer must conduct his or her investigation with the same thoroughness and objectivity as a board. Accordingly, investigating officers must be well trained for the job, and possess a good working knowledge of directives and techniques. (See AFR 127-4 for qualifications.)

b. In determining whether to use a single officer or board, commanders should consider the following important points:

(1) Investigation of most mishaps imposes a heavy workload on one individual.

(2) A formal investigation of an apparently simple mishap often requires the same amount of investigative work as a class A or B mishap.

(3) A single investigator often tends toward tunnel vision, especially when faced with report deadlines.

(4) Preparation of a formal safety investigation report can be a major effort requiring a recorder and administrative duties comparable to the typical mishap report produced by a full board.

(5) The value of brainstorming and investigator cross-tell for possible cause factors is lost when a single investigator is used.

(6) Many items of evidence, such as witnesses' availability and witnesses' ability to remember facts and circumstances, are perishable and must be obtained as soon as possible. One person may not be able to accomplish the early phases of an investigation without the help of other investigators.

c. During a class A or B investigation, the investigating officer will be relieved of all other duties. The investigating commander must provide the support necessary to accomplish the investigation.

d. It is essential for the investigating officer to remember that he or she works for the investigating commander. Findings and recommendations must be impartial, direct, and appropriate. They should also realize that their report is an official document that will receive command-wide interest. The report must be clear, concise, and complete.

e. This pamphlet is oriented to safety investigation by a board of five or more officers with little specific guidance given to a single investigating officer. The investigating officer is in effect the board and, except for required medical expertise, assumes all functions and responsibilities of a full board. With a sound working knowledge of safety investigation as conducted by a board, the investigators can shape their investigation to fit most situations.

4-4. Investigation Boards. Mishaps that result in significant damage or loss of life usually are investigated by a formal board. It is composed of a board president, an investigating officer, an operations (pilot) member, a maintenance member, and a medical officer. The host base normally supports the board by providing the recorder to assist with administrative details. This board can be supplemented by commanders' representatives and experts in various disciplines. The qualifications for basic board members are in AFR 127-4. Figure 4-1 describes the basic organizational and functional relationships of the board members.

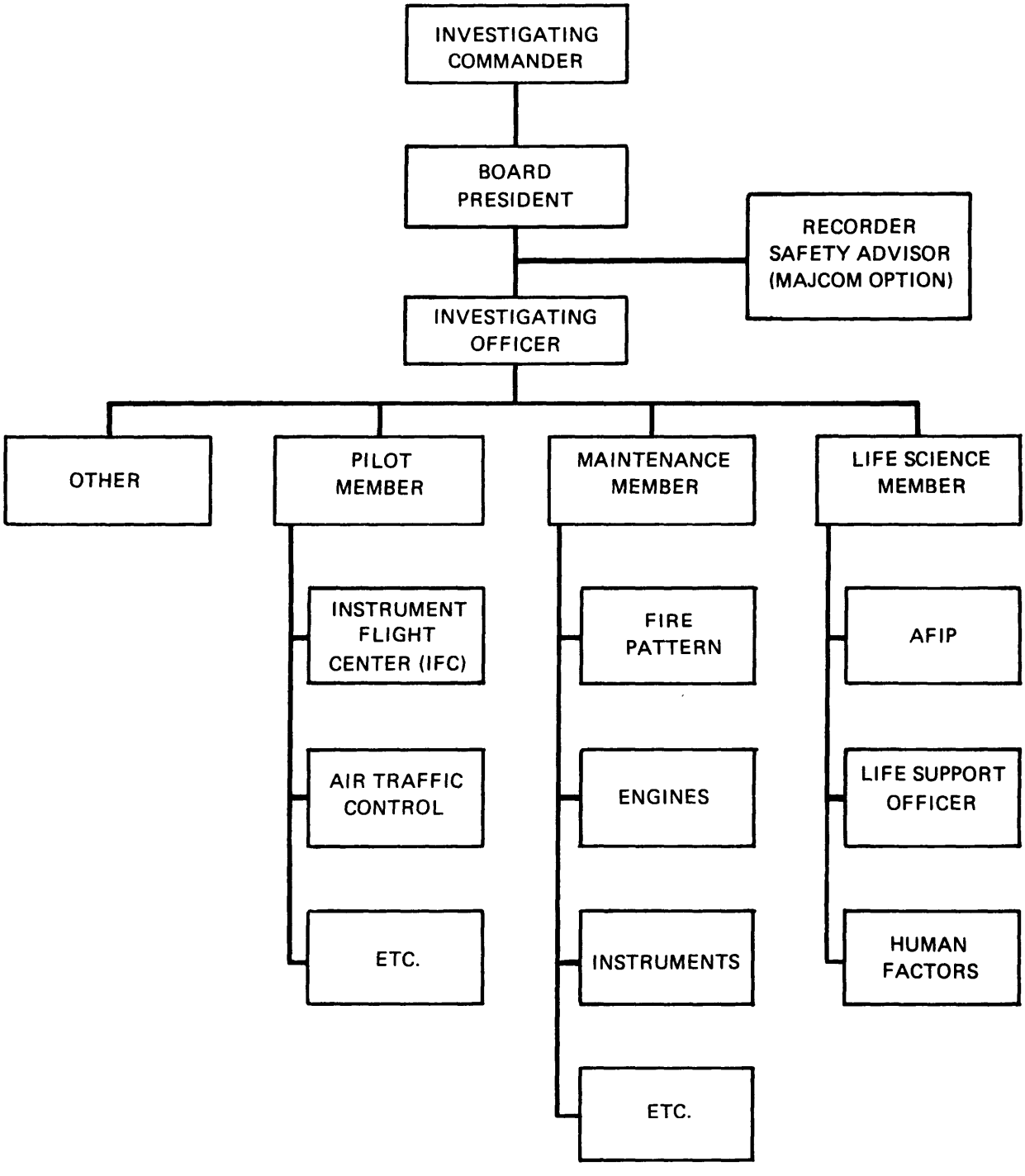


Figure 4-1. Basic SIB Composition.

Figure 4-2. Type of Mishap Which May Be Suited for a Single Investigating Officer.

4-5. The Convening Authority:

a. SIB members work directly for the convening authority and are his or her direct representatives. While in most instances the board functions at the base where the mishap occurred, the host base commander has no direct function associated with the investigation or report except to assist the SIB in every possible way.

b. The wing commander experiencing the mishap is vitally interested in what you are doing and the outcome of your investigation. The wing/CC is aware that the sole purpose of investigating and reporting mishaps is to prevent similar mishaps in the future. While you are both working toward the same goal, you call the shots. It's your investigation, conducted under the charter given you by the investigating commander.

c. The convening authority makes the aircraft and crew available to the SIB for the investigation. With the board president's concurrence, the medical member generally controls and recommends release of the crew, and the maintenance officer recommends the release of the wreckage. The convening authority is concerned that the investigation gets off to a good start and that the staff has a good understanding of the circumstances surrounding the mishap. To achieve these objectives, representatives from the numbered Air Force (NAF) or MAJCOM staff may participate in the investigation. They will present you with a letter of introduction and assist you in any way they can. They may request your assistance in getting access to the mishap scene, developing photographs, etc. They strive not to interfere with your board's activity, but if they see a problem developing they will advise you and may propose recommendations. In general, they are available to assist in getting the investigation started and not to evaluate the board's performance.

Section B—The Board President

4-6. Purpose and Responsibilities. The board president convenes the board, organizes and orients the investigation, directs the activities of the board, presides over meetings and critiques, ensures an impartial and complete investigation, and otherwise coordinates all board activities. In addition, he or she acts as a buffer for the SIB members, ensuring they have the required technical assistance, equipment, and logistics support to conduct their investigation. The following sections are designed to provide basic guidance on board actions. A detailed listing of each board member's duties and responsibilities are covered under each member's section.

4-7. Board Pedigree. The investigating commander, with the counsel of his or her safety staff, selects board presidents based on their qualification and background. Each member of the board is also selected because of special qualifications. The investigating officer normally has formal training in mishap investigation, and may have experience in investigating other mishaps. The investigating officer can provide advice on almost any aspect of the investigation. The pilot member is knowledgeable in all aspects of aircraft operation and crew qualification. The maintenance officer is a qualified maintenance officer. This officer may not have the detailed expertise in each specific aircraft system, but can rapidly acquire necessary assistance. The medical member evaluates all the physical aspects of the mishap, and has a variety of sources for additional help. The recorder is on the board to handle administrative tasks.

4-8. Preparing for Investigation. The board president should read and become familiar with AFRs 127-4, 127-11 (if NTSB or FAA participation is involved), 127-18 (for F-16 mishaps), 110-14, and any command-specific guidance available.

4-9. Getting Started. See Organizing to Investigate, chapter 6.

4-10. Human Factors Analysis. While the flight surgeon is tasked with performing the human factors analysis, he or she will need to draw heavily on each board member's experience to complete his or her analysis. Topic areas to be investigated and discussed with the flight surgeon may include supervisory and institutional concerns. Supervisory problem areas include command and control, discipline enforcement, behavior modeled by supervisors, and pressure or tasking on the aircrew Institutional concerns address selection, evaluation, promotion, workload (including "additional duties"), conditions of the local or military lifestyle, and internalization of unit or organizational values. The flight surgeon will integrate these inputs into an overall human factors analysis, using consultation guides.

4-11. The Paperwork. The president is responsible for reviewing and approving all tabs, A through Z, of the formal mishap report before

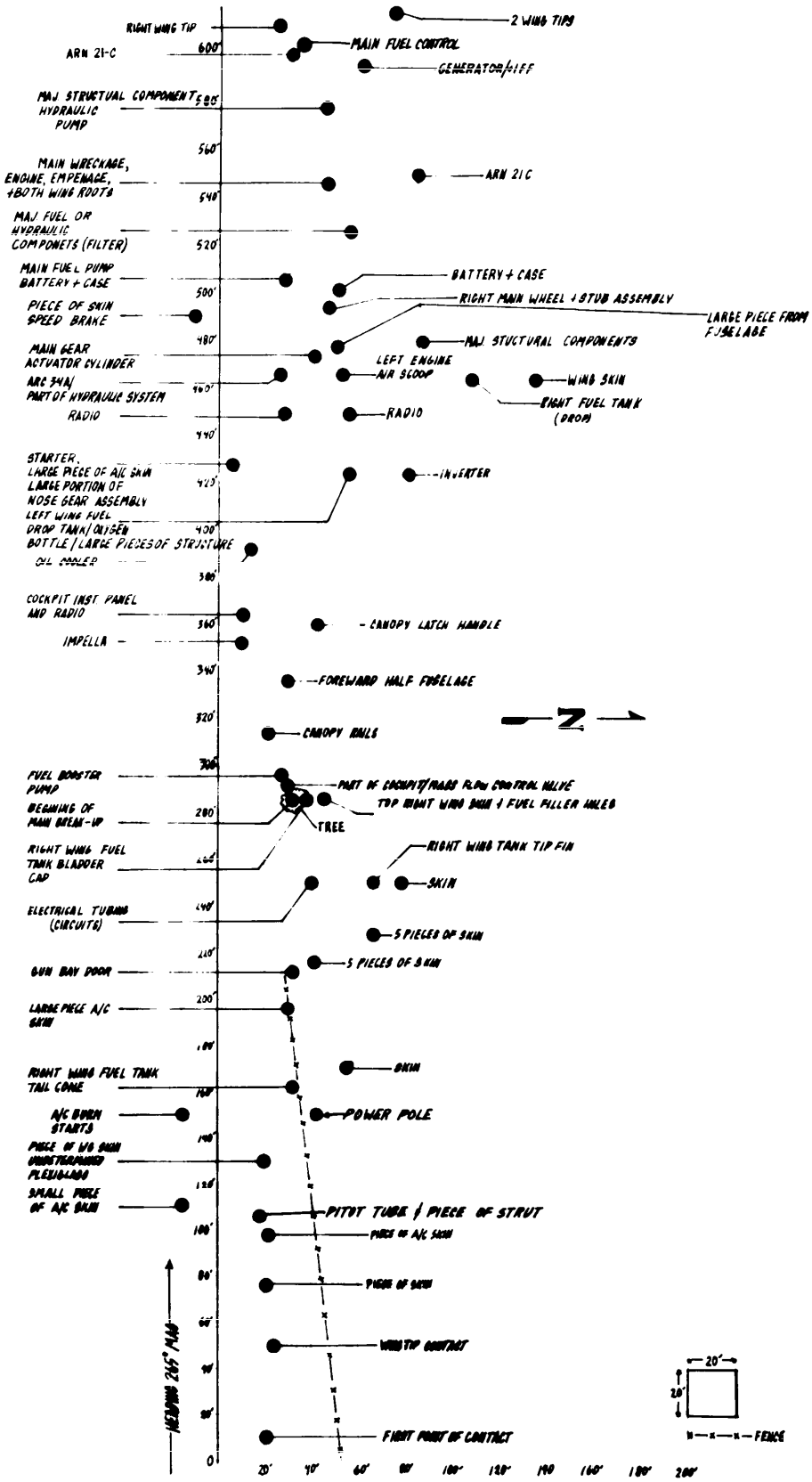


Figure 4-3. Wreckage Diagrams. There is no standard format for wreckage diagrams. Use the method which best depicts the mishap circumstances.

they are typed or completed in final form for publication. Although not responsible for any specific tab, the board president will make major contributions to the following tabs:

a. Cover Letter of Transmittal.

b. 711h—USAF Mishap Report Checklist and Index.

c. Tab R—Diagrams.

d. Tab S—Photographs.

e. Tab T—Investigation.

f. Tab U—Statements and Testimony of Witnesses and Persons Involved.

Section C—The Investigating Officer

4-12. Role of the Investigating Officer. The investigating officer, working singly or under the direction of the safety board president, manages the investigation. Many times the quality of the investigation depends on the judgment, hard work, and integrity of the investigator. The investigating officer controls communications; directs and coordinates the efforts of other investigators and support people; and helps with investigation techniques, evidence gathering, and writing the report. The investigator usually oversees the making of diagrams, maps, and photographs. The investigator must not concentrate in one area and lose the ability to manage the overall investigation. The investigating officer makes sure the analysis, findings, causes, and recommendations are properly developed and evaluated by the safety board.

4-13. Selection Process. You were selected based on your ability to conduct an in-depth analysis of all facts and events involved in a mishap. If you are investigating a flight mishap you are a rated officer and should have experience with the type equipment involved in the mishap. You should also have formal training in mishap investigation, and be familiar with your duties as well as those of other board members.

a. Whether you are serving as a single investigating officer or a member of an SIB, the same basic principles and procedures apply. The only major difference is the number of man-hours available and the depth of the analysis. You should realize that relatively few mishaps are caused by complicated sets of circumstances, events, or mechanical failures. Most occur from simple and basic cause factors. Even the most complex weapon system in the Air Force inventory reacts to the basic laws of physics and aerodynamics. A detailed and complex search for exotic cause factors often results in frustration and fruitless efforts.

b. You should recognize in the beginning that you are not expected to be an expert in all the complicated skills and disciplines related to equipment design, construction, and operation. If, in the process of investigation, it appears the mishap precipitated from an event, circumstance, or other cause outside your ability to analyze, ask for help. There's virtually an unlimited resource of talent within the Air Force and related civilian agencies to assist you in your task. You need only make the request. For assistance in specific areas, contact the safety personnel at your next higher level of command.

4-14. Individual Preparation. The investigating officer should read and become familiar with AFRs 127-4, 127-11 (if NTSB or FAA participation is involved), 127-18 (for F-16 mishaps), 110-14, and any command-specific guidance available.

4-15. Individual Responsibilities. Your duties as investigator are many and varied. Generally, you are responsible for managing the investigation within the scope and parameters set down by the board president. Your knowledge and background provide invaluable counsel to other members of the board. These people are experts in their fields, such as weather, maintenance, and operations, but not necessarily in the process of safety investigation. You must work closely with each member to provide guidance, suggest approaches to particular problems, and keep everybody on the same track. It's not an easy task. You must be prepared to help individual members in organizing evidence, putting that evidence into meaningful format, and preparing diagrams and forms. Individual responsibilities include preparing a wreckage diagram, the maps and charts used to explain certain aspects of the mishap, and supervising photographic coverage. You must, throughout the entire process, avoid involving yourself in one aspect of the investigation at the expense of other portions of the investigation. Keep in mind that a mishap investigated by a board or group is a team effort. It is only through the skills and contributions of all members that an acceptable final product can be realized.

a. In the absence of an advisory safety officer, you also assume added responsibilities for conforming to report schedules and formats.

b. Depending on the type of mishap, experience of the various board members, and investigating

officers' assessment of the situation, pay particular note to the following areas:

(1) Supervise photographer.

(2) Supervise recording, marking, and photographing of hydraulic actuators.

(3) Supervise obtaining of fuel, oil, hydraulic, oxygen samples (one pint minimum).

(4) Supervise recording, tagging, and photographing of significant parts.

(5) Supervise recording and photographing cockpit switch positions and instrument indications.

(6) Supervise survey team and preparation of wreckage diagram.

(7) Note, record, and photograph impact marks.

(8) Obtain witnesses' names and statements.

c. You are responsible for compiling and accomplishing the following specific sections of the formal mishap report:

(1) 711h—USAF Mishap Report Checklist and Index.

(2) Tab A—USAF Mishap Report.

(3) Tab J—Technical and Engineering Evaluations of Material (DOD).

(4) Tab O—Any Additional Substantiating Data Reports.

(5) Tab P—Statement of Damage to Private Property.

(6) Tab R—Diagrams.

(7) Tab S—Photographs.

(8) Tab T—Investigation.

(9) Tab U—Statements and Testimony of Witnesses and Persons Involved.

d. You, along with the board president, are responsible for reviewing and approving all tabs, A through Z, of the Formal Safety Report before they are typed or completed in final form for publication. You must ensure each tab presents unbiased findings, and these findings are incorporated into a grammatically correct, logical, comprehensive explanation of the Investigation, Analysis, Findings and Recommendations (Tab T), of the mishap. You are responsible for the high quality standards, and that the explanations of the evidence support the board's findings and recommendations, per AFR 127-4.

4-16. Getting Started. Through well meaning but disjointed efforts, you can destroy or overlook more evidence than you uncover. It is extremely important that you begin with a plan and follow it through to completion, altering, of course, when new situations dictate. Your plan must start as soon as you are notified a mishap has occurred and that you have been selected as investigating officer. Obviously, each mishap requires a slightly different approach, depending on circumstances, location, and other unpredictable factors. To ensure success, a general plan must be conceived from the very start.

a. There are many items of evidence pertaining to a mishap that are perishable. Fluid samples of engine oil, fuel, and hydraulic fluid are only a few examples of this category of evidence. Another can be the flight data recorder. Flight data recorders usually stop operating following the crash of an aircraft and can be recovered at any time, but the voice function of most recorders is a 30-minute continuous loop which erases if power continues to be applied to the unit. This fact is most important in mishaps where the aircraft is damaged, but continues to operate after the occurrence. If the aircraft continues to fly following a mishap, a portion of your evidence could be lost. Ground personnel have been known to inadvertently erase pertinent voice evidence following a mishap by applying ground power to the aircraft, without disconnecting the recorder. Take immediate steps to remove the recorder from aircraft power. On some aircraft, this is as simple as pulling a circuit breaker.

b. Do's and Don'ts of mishap investigation (chapter 6) should be briefed and understood by all personnel before the mishap scene is investigated.

4-17. Safety Investigation Kits. Transportation to a distant site normally is arranged by the host base operations section, but you have the responsibility of ensuring not only that you are adequately prepared for the trip, but also that certain necessary equipment is transported to the mishap location. The host base should have a complete safety investigating kit available for immediate transport.

a. For mishaps that occur in remote jungle, arctic, or desert locations, individual equipment is available for your use. It is obvious by now that unles you are well organized beforehand, your actions immediately following notification will be hectic to say the least. A word to the wise is sufficient—PREPARE!

b. Section J and chapter 2 discuss mishap kits.

4-18. Initial Actions. After arrival at the mishap scene and a general plan of organization is developed, organize a walk-through of the

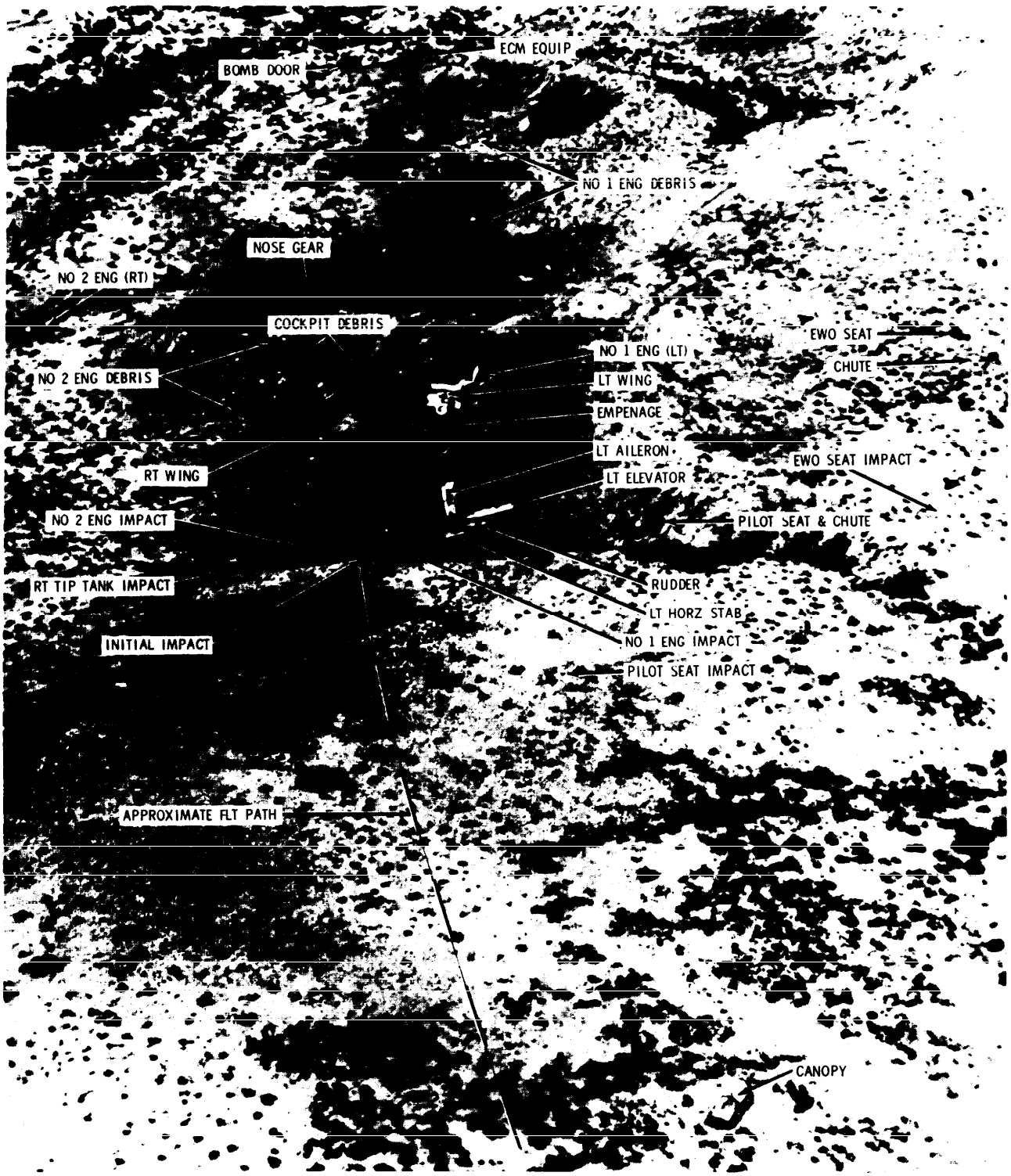


Figure 4-4. Wreckage Photographs. Photographs with labels depicting various components and events are effective if the crash pattern is not too large.

wreckage or visual inspection of damage by the board members. If possible, a photographer should accompany the board members. If available, include a highly experienced maintenance specialist in the walk-through. Past experience has proven their expertise extremely valuable in parts identification. The position and relationship of parts should be disturbed as little as possible at this time. (Take general area photographs before portions of the wreckage are disturbed.) Once initial wreckage orientation is complete, board members can be assigned specific areas of responsibility. It may be necessary to move the wreckage immediately from locations such as highways, runways, or populated areas. In these cases, obtain immediate aerial photography with as much close-in coverage as possible made before the wreckage is removed. These photographs may be your only documented evidence of the crash scene. Portions of the wreckage may have been disturbed during rescue operations. Interview firefighting and rescue personnel in these cases to determine which portions were moved.

a. The position, posture, and condition of any crash victims is valuable evidence. Questions often can be cleared up with photographic evidence of the location of human remains. (See chapter 10 for specific details on treatment of human remains.) An example is the location of crew members in relation to the cockpit to determine who occupied each crew position. In the case of aircraft without voice tapes, it is often difficult to determine who was flying the aircraft.

b. It is extremely important that you understand the special requirements for handling photographs of crash victims. Photographs of human remains will not be included as part of the formal mishap reports. All copies of prints and negatives are controlled by the medical member of the board. As investigating officer, be aware that the medical member has certain report requirements outside of the safety investigation. For these reports, photographs of deceased crew members may be required.

4-19. Witness Interviews:

a. Eyewitness accounts of past mishaps have proven to be valuable evidence. However, in some instances they were unreliable and unusable. Mishap history is replete with eyewitness stories which turned out to be grossly inaccurate. A human failing is that at times we see what actually occurs; at others, we see only what we wish to see. Our perception of an event is clouded and colored by our prejudices, our past experience, and by what we expect to see. While generalization usually is dangerous, be aware that eyewitness accounts of mishaps by persons unfamiliar with the particular operation are not always reliable. Witnesses unfamiliar with aircraft operations confuse fuel or water vapor for smoke, sudden bursts of engine thrust as explosions, and otherwise mistakenly identify aircraft maneuvers. We do not want to discourage using eyewitness accounts, but to make you aware of some pitfalls. Eyewitness testimony is a normal part of safety investigations, but an experienced investigator does not accept a lone witness statement at face value without supporting data collected from other sources.

b. Eyewitness accounts are most valuable when taken immediately after an occurrence. The longer the time frame between the mishap and interview, the higher the likelihood of inaccuracies. People naturally forget, they confuse what they saw with what they heard from others, and some tend to embellish their story with accounts seen on television or published in newspapers. Normally such distortions are not deliberate. Being an eyewitness to a major aircraft disaster is a frightening and unnerving experience. By the same token, view crew survivor testimony taken immediately after a crash in the context of persons who not only are deeply involved, but perhaps are emotionally and physically affected by the experience. The medical member should approve such testimony before it is taken, and review the statements for reliability. If possible, separate all witnesses and crew members until their individual statements are taken.

c. During interviews, it is best to allow the witness to describe the event with little or no prompting. Allow the witness to relate the whole story without interrogration on the first portion of the interview. Subtly jot down your questions and ask after the entire story has been related. Avoid a trial-type cross-examination. Witnesses may relate what they believe you want to hear, if pressed for a certain answer. Avoid statement questions such as, "The aircraft was on fire before the crash, wasn't it?" Such questions are likely to be answered affirmatively, especially when the witness is uncertain, but feels your questions confirm a suspected situation. Immediate post-crash interviews may be conducted by using a tape recorder. A model of the aircraft may help a witness to describe what occurred. When the accounts are short and to

the point, transcribing these accounts to written documents is not difficult. Statements in this category do not have to be signed after typing; sworn statements are not used in mishap reports. A statement by the investigation officer or board recorder attesting the document to be a true copy is sufficient. Interviews that follow days after the mishap may be handled through written statements. Be aware that some may feel limited by their writing ability, and are personally constrained without considerable help. In general, extemporaneous interviews provide the more usable evidence.

4-20. Daily Activity. The typical board (if there is such a thing) will spend the first 1 to 2 weeks digging through wreckage, interviewing witnesses, analyzing records, etc. Because the board tends to be fragmented, it is very important to have daily meetings to keep each board member updated on the latest findings and any new change in direction. The following guidance is suggested:

a. Conduct a daily board meeting to debrief individual progress and determine what is known and unknown (use blackboard).

b. Establish specific tasks, priorities, schedules, and support required for the next day.

c. Determine, in conjunction with the president, if technical assistance is required, and contact Air Force Inspection and Safety Center to request technical assistance.

d. Prepare, coordinate, and transmit required reports.

e. Determine areas of special interest so board members can be alert to evidence in these areas (use blackboard).

f. Assign responsibility for specific tasks as well as formal report tabs. Normally, assignments of primary responsibility are:

(1) Investigator—Tabs A, J, O, R, S, T.

(2) Pilot Officer—Tabs C, G, K, N, P.

(3) Maintenance Officer—Tabs D, H, I, L, M, W.

(4) Medical Officer, Life Support and Egress Specialist—Tab Y.

(5) Recorder—Tabs Q and Z.

(6) Joint Responsibility—Tab U.

4-21. Human Factors Analysis. While the flight surgeon is tasked with performing the human factors analysis, he or she will need to draw heavily on your experience and that of the other board members to complete the medical analysis. Topic areas—such as the sequence of events, supervisory issues, communication problems, peer influences, and access to adequate facilities and services—should be investigated. Supervisory issues include discipline enforcement, command and control, appropriate supervisory model behavior, and expressed pressure in tasking. Communication problems include those within the cockpit, between personalities, outside the cockpit, communications, and equipment failure. Peer influences include verbal comments, commonly held beliefs based on unspoken or unwritten learning, and perceptions of equipment concerns. Adequacy of access to quarters, nutrition, exercise, recreation, and health care must be examined. More directly, however, facilities of an airfield or air traffic control services may have an impact. The flight surgeon will integrate these inputs into an overall human factors analysis (see AFP 127-1, volume III).

4-22. Plan Ahead. In the normal course of the investigation, you will be called on many times to provide guidance on the specific aspects of reporting. If you have not clearly delineated each board member's responsibility and continued to update daily work assignments and suspense goals, your board may bog down in confusion. The result is days of unproductive and inefficient work. Work closely with the board president to ensure all areas of potential interest are covered thoroughly and a continual crosstell of daily happenings is exchanged between board members. Set a schedule that fills your requirements. A daily progress meeting with all board members is an excellent management tool.

4-23. Wreckage Diagram. Depending on the mishap, one of your duties may be to construct a wreckage diagram. The style you choose to use depends on the circumstances and situation of the particular investigation. The diagram can be as simple or complicated as the situation dictates. For mishaps in which structural integrity is in question, or the crash pattern weighs heavily on possible cause factors, the diagram requires more detail to substantiate the findings. In other mishaps, it may be necessary to show just the relationship of the aircraft to the surrounding terrain. Some topographic or structural features may be illustrated if their positions have a strong relationship to the mishap. Normally photographs are adequate (see figure 6-6), but if necessary, base civil engineers can

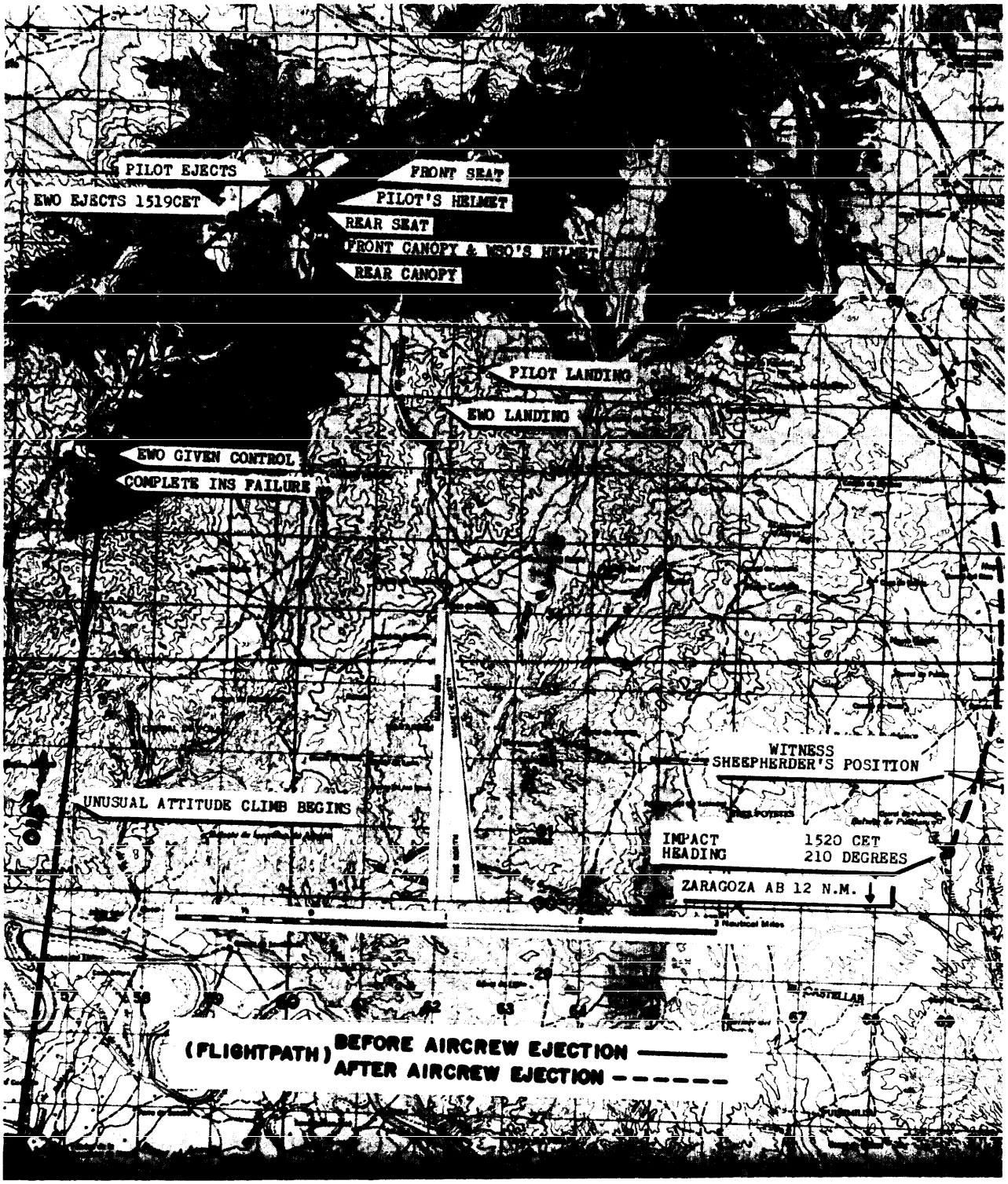


Figure 4-5. Labeled Charts. Using the above approach gives the reader a birds-eye view of the mishap and ties together aircrew testimony, witness testimony, and post mishap analysis.

be called on to provide surveyors and equipment. They also can provide a draftsman to draw the final diagram.

4-24. Supervising Photography. You have the responsibility to supervise the photographic coverage of the cause-related evidence. See chapter 9 for details.

Section D—Pilot Member

4-25. Selection as Pilot Member. The pilot member is selected based on expertise and experience in the aircraft operations involved. In certain instances, he or she may be the only member of the board currently qualified in the aircraft. His or her advice on aircrew procedures and operational matters is invaluable to the board during its investigation and deliberation.

4-26. Preparation and Study. The pilot member should read and become familiar with AFRs 127-4, 127-11 (if NTSB or FAA participation is involved), 127-18 (for F-16 mishaps), 110-14, and any command-specific guidance available.

4-27. Pilot Officer Responsibilities. The pilot officer is responsible for analyzing all factors involving flight operations of the aircraft, including flight planning, preflight, and inflight actions. The pilot member investigates aircrew training, experience, qualification, operating instructions, command and unit operating directives, briefings, crew activities for the previous 14 days (with the medical officer), flight path, navigational aids, controlling agency recordings, aircrew use of weather services, airfield facilities, and crash rescue activities. He or she obtains statements from crewmembers, persons who witnessed the mishap, and duty controllers at involved controlling agencies. The pilot member usually prepares the history of flight, and calculates applicable performance and weight and balance data.

a. One of the first duties after interviewing witnesses and examining the mishap aircraft is to assess the situation to determine if additional expert assistance is required. Advise the board president of additional required expertise as soon as the need is apparent. The board president then coordinates with the convening authority to obtain the assistance. In some cases, it may be apparent that the board is unable to determine the cause without outside help. One of the most important lessons taught in professional mishap investigation courses is that with today's complex equipment and associated subsystems, no one individual or group is expert in all aspects of aircraft operations, but specialized experts are available. If help is needed, ask for it!

b. The pilot member is usually responsible for compiling and accomplishing the following specific sections of the formal mishap report:

(1) Tab C—Aircraft Mishap Report.

(2) Tab G—Flight and Personnel Records.

(3) Tab K—Flight Plan or Authorized Substitute Flight Plan Forms.

(4) Tab N—Transcripts of Recorded Communications.

(5) Tab P—Statement of Damage to Private Property.

(6) Tab U—Statements and Testimony of Witnesses and Persons Involved (Joint Responsibility).

4-28. Initial Actions. As soon as you are notified of assignment as pilot member of a safety board, ensure that all recorded evidence relating to the occurrence is secured for the board's use. This includes (but is not limited to) all radio transmission tapes, all crew and personnel records, flight data recorders, tapes, and weather data. Your responsibility lies mainly in the area of aircrew, other personnel, and operations, but you must work closely with other members of the board.

a. As soon as the board convenes, get a situation briefing from your interim board counterparts to determine what is known, and then check on the status of records collections. Your first priority should be to visit the mishap site and evaluate the mishap scene. Priorities there include:

(1) Determine, record, and photograph cockpit switch positions and instrument indications.

(2) Identify, photograph, and tag significant parts, especially cockpit control and instrument panels.

(3) Take notes—don't trust important facts to memory.

(4) Review Do's and Don'ts of mishap investigation (chapter 6).

b. Your next priority, normally, is to obtain witnesses' names and statements from witnesses who will not be available for later interviews (i.e., truck drivers, passing tourists, etc.). Statements from aircrew members in the flight

and statements from the aircrew involved in the mishap may also be advisable, depending on the circumstances. Interview aircrew only with medical officer approval. Clear the room of all excess personnel while you record or tape the survivors' statements. Too many people in the room during this time is detrimental as they cause confusion by asking extraneous questions, causing apprehension, moving, smoking, etc. Use Witness Statement Worksheet and Memory Jogging Questions (see chapter 8).

c. Your primary task is reconstructing the events and circumstances that led to a mishap. Flight simulators are available for reconstructing the sequence of events. In circumstances where the desired conditions cannot be adequately simulated, an actual aircraft may be used. Keep in mind that mishap-producing situations have been recreated right up to and including the crash. Duplicate all known factors (except the mishap) as accurately as possible, including airspeed, altitude, weather, sunlight or shadow display, and other details important to the event.

4-29. Interviews and Statements. A major duty assigned to the pilot member is to obtain statements from persons involved in the operational sequence of the mishap or who witnessed the mishap. Documentation of statements and interviews is covered in chapter 8. Familiarize yourself with the problems that can arise in this area (see paragraph 4-19).

4-30. Human Factors Analysis. The Flight Surgeon coordinates determination of the various human factors which affected the mishap sequence of events. The Doc will need your expertise and perceptions to properly complete the evaluation. Primary information that should be discussed with the flight surgeon includes topic areas such as the range of flight specific concerns, communication, peer influences, cockpit design, and training. The details of planning, briefing, special stresses of flight pertinent to the mishap aircraft mission, and factors such as night or weather conditions should be reviewed. Emergency sequences and procedures, technical data, and basic or upgrade training that may be pertinent to the sequence are part of this analysis. Special problems with the particular aircraft, toxic exposure history, and the potential for in-the-cockpit trauma may well be better evaluated by someone experienced, current, and proficient in the mishap aircraft. No one but the pilot member could better comment on seat position, visibility, instrumentation, automation, switch or control location, and possible physical task saturation. The flight surgeon will integrate these inputs into a total human factors analysis (see AFP 127-1, volume III).

4-31. Writing the History of Flight. When all evidence is gathered, the pilot member writes the factual History of Flight for the AF Form 711, USAF Mishap Report. (See AFR 127-4, for guidance on this narrative.) Input from other board members is necessary for this section to be an accurate description of the events. The History of Flight need only be as detailed as necessary to describe pertinent points. Remember this section includes only factual data, not analysis. A mishap that involves a series of operator errors is more definitive in the History of Flight portion than one involving material deficiencies. Don't bog your report down with extraneous and unrelated facts. Complete background and detailed information need not be included in this section; include it instead as required in exhibits and other portions of the report.

4-32. The Goal of Reporting. Findings correctly identified and accompanied by purposeful recommendations for corrective action are your assigned goal. Your recommendations will be reviewed by many different staff agencies, ranging from the organization involved to HQ USAF. Unworkable recommendations, or those which misaddress the problem, very likely will not be implemented, and potential mishap cause factors may go uncorrected. Diligent application of professional knowledge, coupled with your sound judgment and counsel with your fellow board members, is the key to a successful investigation.

Section E—Maintenance Member

4-33. Selection as the Maintenance Member. Selection to a safety investigation board is based on thorough knowledge of maintenance practices, general aircraft systems, and aircraft records. The board relies heavily on the maintenance officer's ability to analyze all materiel, mechanical, or maintenance-related factors that may have contributed to the mishap.

Figure 4-6. Using Acetate Overlays. Use of an acetate overlay on a mishap scene photograph is a quick, effective method of providing information to the reader.

4-34. Pertinent Regulations. Maintenance members should become familiar with AFRs 127-4, 127-18 (if F-16's are involved), 127-11 (if NTSB or FAA participation is involved), 110-14, and any command-specific guidance available.

4-35. Scope and Responsibilities. The maintenance officer is responsible for determining the pre-mishap status of the aircraft, and supervising the investigation of all aircraft systems for failures that could have contributed to or caused the mishap. He or she reviews records for adequacy of inspections and correction of discrepancies; prepares a list of technical order noncompliance items on the aircraft, and determines whether noncompliance was contributory; and investigates wreckage distribution for evidence of inflight engine failure, structural failure, or fire. He or she obtains statements from the ground crew who prepared the aircraft for flight, initiates materiel deficiency reports as required, and evaluates technical orders, command, and unit maintenance instructions that may have contributed to the mishap. The maintenance officer reports the estimate for repair and cost data on the aircraft, and submits an analysis on the AF Form 711c if maintenance or materiel factors are involved. He or she must work closely with other board members on making all determinations.

a. Because mishaps can be the result of commission as well as omission, the investigation may possibly extend into maintenance management. These areas include:

(1) Standards and procedures.

Figure 4-7. Foreign Objects. Look for objects that shouldn't be in the wreckage (screwdrivers, sockets, bolts, etc.). This propeller blade tip was found in a fighter fuselage after a midair collision.

(2) Quality assurance.
(3) Equipment and facilities.
(4) Personnel and training.

The collected data from all areas of interest should be studied to determine the effectiveness of the complete maintenance system. The significance of improper or inadequate maintenance, servicing, or inspection, becomes evident on review of the records collected by the safety board.

b. The maintenance member is responsible for compiling and accomplishing the following specific sections of the formal mishap report:

(1) Tab D—Aircraft Maintenance and Materiel Report.
(2) Tab H—AFTO Form 781 Series.
(3) Tab I—Materiel Deficiency Report.
(4) Tab J—Technical and Engineering Evaluations of Materials (DOD).

(5) Tab L—Weight and Balance Clearance Form F.

(6) Tab M—Certificate of Damage.

(7) Tab W—Technical and Engineering Evaluations of Materiel (Contractors).

(8) U—Statements and Testimony of Witnesses and Persons Involved (Joint Responsibility).

4-36. Technical Assistance. You, the maintenance member, need help. In the average mishap, the other board members deal largely in subjective things like witness statements, flight techniques, psychological factors, and the like. While they can often muddle along on their own backgrounds and opinions, this is not so for the maintenance member. You deal in facts. As owner of the wreckage, you're the resident "tin-kicker," and you're supposed to be an instant expert on engines, instruments, flight controls, and structures, not to mention fire pattern, metallurgy, electronics, records, and maintenance practices.

a. To get your part of the job done, you need to extend your abilities. You need to accumulate people technically qualified in specialized areas, and you need to manage their efforts. Some things need to be done on every mishap, and the more of this "busy work" you can farm out, the more time you can personally spend on the important aspects of the mishap.

b. You can get a jump on the problem by deciding NOW who you'd like to help you. At the time people are running around trying to put together a board, emotion is high, and your chances of getting so-and-so assigned to help you are pretty good if you already know their name. Later, enthusiasm may have waned, and so-and-so's boss may be reluctant to part with him or her.

SUGGESTION: It is always necessary to collect and examine all maintenance records on the aircraft. This is a time-consuming job best done by someone who reviews, audits, or inspects maintenance records for a living. Who's the best person?

SUGGESTION: Chances are good that there are one or more people in your outfit who have gone through the Jet Engine Mishap Investigation School. Do you know who they are?

SUGGESTION: If you have a Field Training Detachment at your base, they can be very helpful with their mockups of systems and cutaway parts. Their instructors tend to be very sharp on both theory and specific hareware. Don't overlook them as a source of assistance.

SUGGESTION: Keep your own mental list of other top-notch people who are available and might be helpful in an investigation.

c. Now that you've put together your own team, are you going to need technical help from other sources? Probably. The system manager is tasked with providing technical assistance to safety boards, and they budget funds for this purpose. Almost all major mishaps get some sort of technical assistance. The AFLC system manager expects to be asked for help and expects to furnish it. HQ AFISC/SEP should be contacted for technical assistance. Their resources go beyond the system manager to AFSC, other government agencies, and industry if necessary. If you go out and scrounge up your own "experts," you may be on thin ice due to Air Force contractual obligations and privileged status of mishap report material.

d. The quality of help you get will vary directly with how much you can tell the convening authority safety office about the mishap. Many calls for assistance are just that: "Request technical specialists to assist SIB investigation of a mishap." As a rule, its a good idea to wait until things settle down and you can see where your problems are. Stay in touch with the safety office, and try to be as specific as possible in your request.

e. When the technical assistance arrives, the question of who they work for occasionally arises. With one or two exceptions, all technical assistance furnished to a board is there to work for the board. The president can't tell them how to do their jobs (or they wouln't have been needed in the first place), but can keep them working at it and require regular updates. In cases where the board was disappointed in the technical assistance they received, it sometimes turns out that the technicians were equally disappointed in the guidance furnished by the board. If the board president is not satisfied with the technicians' report, it should be returned to be reworked. The facts or the technicians' conclusions can't be changed, but the report must lay out those conclusions in an orderly fashion, substantiate them, and eliminate (or at least address) other reasonable possibilities. In short, the work of the technical assistants should meet the standards set for the other board members. An exception involves personnel from the Direc-

torate of Aerospace Safety. Although they usually come when requested, they sometimes come on their own. In this case, they are there as official observers of the investigation because of some particular interest of the Directorate of Aerospace Safety in that mishap. Regardless of their status, though, maintenance and engineering personnel from the Directorate will normally leave a written report with the board.

f. In summary, it could be said that the maintenance investigation of a mishap is a management process, and it's more important to manage people than wreckage. All normal functions of management are present, including planning, organizing, staffing, directing, coordinating, controlling, and decision making. All mishaps are different, and all boards work under pressure, but don't let these differences and pressures lead you to the idea that unique mishaps are solved by unique methods. No matter what happened, the problem of getting the facts out of the wreckage and into the report doesn't change much. It's a matter of putting the right people to work on it and managing their collective efforts.

g. Plan ahead for assistance. In most cases, good advanced planning can be the key to a thorough and effective mishap investigation. Time and money can be saved by preventing little things like the rearranging or removal of the wreckage before the expert arrives, or the loss of valuable investigational information because of failure to initially analyze the possible cause factors. After evaluating the mishap, analyze the possible cause factors and determine the type of assistance the board will require. Then use your command channels to get the experts on the scene quickly while the evidence is still hot. Also, you may call AFISC/SEP direct at AUTOVON 876-2244 for assistance. (Chapter 5 also discusses technical assistance.)

4-37. Initial Actions. Before visiting the mishap scene, the board members should have an initial meeting to obtain a situation briefing, determine what is known and not known, and determine which actions have been completed by the interim board. When visiting the mishap site, the first duty should be to become familiar with the overall scene and wreckage dispersal. The initial evaluation at this time may indicate the need for additional expert assistance. If in-flight breakup or systems malfunctions appear to be contributors or are suspect, immediately advise the board president. There is plenty of technical assistance available; ask for it. Following your orientation of the mishap scene your duties include, but are not necessarily limited to:

a. Review Do's and Don'ts of Safety Investigation (see paragraph 6-14).

b. Take notes—don't trust important facts to memory.

c. Record, mark, and photograph hydraulic actuator positions and flight control positions (including trim tabs).

d. Ensure samples (fuel, oil, hydraulic, oxygen) from mishap aircraft and servicing aerospace ground equipment have been obtained and marked (indelibly) with the source of the sample (Engine #2, Tail #XXX, etc.).

e. Ensure cockpit switch positions and instrument indications have been recorded and photographed, and were not changed before review by the SIB.

f. Identify, photograph, and tag significant parts (use indelible ink since it may rain at the most inopportune times).

g. Direct protection of essential parts from the elements.

h. Direct removal, reassembly, TDR, etc., of suspected components, provided photographic documentation is complete. NOTE: You will normally have only one opportunity to evaluate a component before important evidence is destroyed. If you are unsure of local capabilities or expertise, send it to the ALCs for analysis. Contact the local Quality Control (QC) shop for help, and follow the guidance in TO 00-35D-54. Additional guidance is in AFP 127-1, volume II.

i. Compile a list of deficiency reports; determine if any of these areas may have contributed to the mishap.

j. List all technical order noncompliances against the aircraft, and determine if noncompliance may be contributory.

k. Survey aircraft discrepancies on previous flights, or since the aircraft departed home station, for corrective action and possible evidence of cause factors.

l. Make sure deficiency reports are prepared on failed parts.

m. Prepare AFTO Forms 22, Technical Order System Publication Improvement Report and Reply, when appropriate.

n. Prepare a statement of aircraft damages.

o. Complete appropriate AF Forms 711.

p. Release wreckage to reclamation, or to the AFR 110-14 investigating officer or board as appropriate.

q. Initiate AFR 65-110 action to change accountability for destroyed aircraft.

4-38. Search for Evidence. Mishaps almost never occur from a single cause factor. Even when crew error is considered the main cause, additional factors invariably are present. These factors may include system malfunction, maintenance malpractice, or other events which compounded the crew's problems at a very critical point in flight. Don't rule out any possibilities until you exhaust all investigative avenues available to you. In determining if a system did or did not malfunction, it may be necessary to make certain assumptions and then follow a logical course of reasoning in a fault-type analysis. For example, if a system consists of three component parts (A, B, C) you may have to model possible failures and their predictable consequences. What happens to B and C if A fails? What happens if B fails, but not A or C? It may be necessary to presume a malfunction did occur in each aircraft system and then attempt to disprove that presumption through system analysis. The fact that a system was working may be as important as the fact that it was not. This is one place where negative reports have value and must be included. To assist you in such an analysis the following list is offered:

a. Look at each component and system for indicators of condition, position, or movement.

b. Check maintenance records and logs. They are your best source of evidence of chronic conditions or recent troubles. Look for reasons of past complaints or previous corrections.

c. Look for evidence of "usual" malfunctions. Almost every part or system has a history of repeated or predictable failures. Requesting an AFISC computer search for failure history can also provide valuable help.

d. Look for missing components, incorrect parts, or incorrect installation.

e. Are there too many parts, foreign objects, or evidence of FOD damage?

f. Determine if the part, component, or system was airworthy.

g. Observe the color, shape, smell, location, position, or appearance for potential clues of proper operation or possible malfunction. When possible, make a visual comparison with a part of known quality or function.

h. Compare your analysis with that of other board members. Two or three persons working on the same problem often can shed more light on a difficult area than a lone individual.

4-39. Human Factors. The maintenance member functions as a part of the human factors team analysis when some equipment, maintenance, or support problem is shown to be involved in the mishap. Topics that include the psychological, psychosocial, or anthropometric dimensions of personnel, or perhaps issues such as field quality assurance, and field working conditions at the local level, may be investigated and discussed with the board. The maintenance member may also be called on to comment on depot quality assurance, design deficiency, depot management, and overhaul, acquisition, or modification philosophies. Although "human" factors apply to those levels, the level more accessible to field mishap investigation is local. Psychological concerns include issues of maintenance staff training or skill and knowledge. Issues of drug use, perception, attention, perceived stresses, fatigue, or coping styles, may warrant investigation. Psychosocial concerns might include supervisory issues, communication, peer influences, and various personal and community factors. Even ergonomic concerns may come to light, such as inadequate strength or inappropriate tool design to properly accomplish a task. These are the kinds of issues that will come to light in the course of assessing local maintenance quality assurance or field working conditions. The flight surgeon will integrate these inputs into a total human factors analysis.

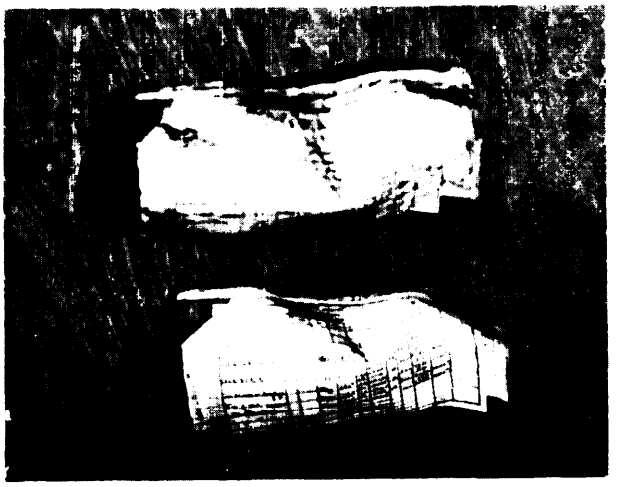
4-40. Wreckage Records. After the safety board has packed its collective bag and gone home, the question of what do do with the leftover paperwork has stumped many a maintenance officer. As it turns out, the safety officer didn't know what to do with it either, but solved the problem by returning the records to maintenance. There they gather dust awaiting someone who will take responsibility for destroying them. Sometimes that takes a lot of dust. Let's face it. We're a nation of cowardly stringsavers. In the mishap business, there are exceptions to everything, but this is the way the system is supposed to work.

a. The safety board gets first crack at the records; all of them. They review them and *make copies* of those they wish to include in the mishap report.

b. The safety board releases the original records to the AFR 110-14 accident investigation board, specifying which copies of the records that the safety board kept for itself. If no accident board has been appointed, the records are given to the MAJCOM custodian responsible for the accident investigation.

c. Records are disposed of per AFR 12-50, volume II.

A. LOW LEVEL MAP FOLDER FOUND AT CRASH SITE IN MOST PROBABLE POSITION LODGED BETWEEN CONTROL STICK AND EJECTION SEAT COMMUNICATIONS BLOCK



B. LOW LEVEL MAP FOLDER FOUND AT CRASH SITE (A) AND SIMILAR FOLDER (B) USED TO DUPLICATE MOST PROBABLE POSITION AT TIME OF CRASH

Figure 4-8. Cockpit FOD. Photographs illustrate the type of FOD that may cause a mishap. Analysis of all wreckage, interviews with other squadron pilots, and a lot of intuitive thinking can solve the puzzle. Also see figure 6-2.

Section F—Flight Surgeon

4-41. Flight Surgeon Training. The medical member of the safety board is a fully trained physician who has been granted a rating of "flight surgeon" after attending a 9-week Aerospace Medicine Primary course at the USAF School of Aerospace Medicine, Brooks AFB TX. The course includes 13 hours of instruction on medical safety investigation, combined with 4 hours of field exercise, as part of an overall orientation to preventive and aerospace medicine.

4-42. Flight Surgeon Experience. In many cases, the flight surgeon assigned to a safety board will not be experienced in investigation, but will likely be familiar with the mishap-type aircraft and mission based on personal squadron exposure. In more difficult cases, a physician who chose to continue training on a longer term basis in the USAF Aerospace Medicine residency (often called a RAM) may be assigned. These individuals are often highly experienced before entering the RAM program, and are exposed to a broad range of Air Force military medical concerns. They include a few former pilots who may or may not hold dual rated positions (both pilot and flight surgeon). Tactical Air Command maintains a listing of "weapons system flight surgeons" who are expected to be more knowledgeable in special concerns of their assigned aircraft than others. The flight surgeon assigned to a safety board may consult any of these physicians directly through MAJCOM or through HQ AFISC/SEL. Because of physician turnover and an overall low number of mishaps, highly experienced physician mishap investigators are few.

4-43. Response Requirements. The director of base medical services is directed in AFRs 161-33, 127-4, and 355-1 to maintain the capability to respond to an aircraft mishap as well as other disasters. This task is delegated to the chief of aeromedical services or aerospace medicine who ensures that a state of response readiness is maintained.

4-44. Response Planning. Response readiness is defined by the mission, geographical location, and resources available at a given facility. What is adequate at a remote overseas location may be totally inadequate in an urban environment where aircraft containing many crew and passengers are at risk for a mishap. Readiness is not defined by mishap frequency (based on experience) but rather by mishap impact on available disaster response capacity should it occur. The flight surgeon is responsible to assess this and direct local preparations and coordinated planning. This planning should include local authorities such as mortuary

affairs, the coroner or medical examiner, and hospitals.

4-45. Priorities at the Scene. The flight surgeon is often present in crash-response ambulances that have all-terrain capability and respond regularly to inflight or other emergencies. His or her primary duty is to support the on-scene commander (OSC) in dealing with casualties. As such, he or she is the on-scene medical commander and directs triage, stabilization care, and evacuction of the injured who are recovered by fire or rescue personnel. He or she coordinates with the OSC and the medical command post in this task. Only after activities in stabilizing and transporting survivors have been completed or turned over to competent medical reinforcement can the flight surgeon become a mishap investigator. Hopefully, he or she will be one who has been preidentified as an investigator and given periodic local training per AFR 127-2.

4-46. Preserving the Mishap Site. Because of the immediate proximity of medical response, the flight surgeon may be the first trained mishap investigator to reach the mishap scene, even if it is off base. It is important that he or she be well aware of the responsibility to be shouldered in that event. The flight surgeon may need to assert the need for not disturbing any of the site except that required to evacuate it and ensure its safety. Issues not necessarily medical, such as site security and recording of witness information, may need to be initiated by someone not trained to do so pending arrival of appropriate assistance.

4-47. Mishaps Involving Fatalities. The initial medical investigative effort addresses any human remains in a speedy yet thorough fashion. The flight surgeon should seek help from aeromedical support staff experienced in dealing with such unpleasant tasks. It may be helpful to gather all staff to brief them on what not to do, and to reassure various site workers that it is unpleasant work that is emotionally demanding and that breaks may be required. Some may prove entirely unsuited to the task. Professional conduct of those at the scene should be enforced if needed by the flight surgeon.

a. Jurisdiction. The human remains are under the control of the local coroner or medical examiner if the mishap is off base. An immediate attempt to obtain release should be initiated if not previously coordinated. Mortuary affairs should be briefed and used where necessary (i.e., in an area search). Remains cannot be released to mortuary affairs until after complete evaluation, to include post mortem and identification (with which the flight surgeon may call on them to assist). The Armed Forces Institute of Pathology (AFIP) should be notified when a fatal mishap has been confirmed, to expedite their response.

b. Preserving Evidence. Before moving any human remains, the flight surgeon is responsible for detailed site diagramming coordinated with specific clearly labeled stakes and photographs showing pertinent detail. Because personal life support and escape equipment is intimate with the remains, these items, too, must be carefully photographed and examined before moving the remains. Only after complete scrutiny of all surfaces of remains with on-scene photography can the remains be removed. This is perhaps the most important part of the flight surgeon's responsibilities, and it must be done immediately without the benefit of time to review textbooks, old notes, or to call consultants. As a result, training is vital. A safety investigation workbook (AFP 127-1, volume III) is available and should provide assistance as a field working document. It is not a substitute for attentiveness to detail, and makes no attempt to describe all possible findings.

4.-48. Starting the Investigation. The on-scene flight surgeon assumes the role of interim safety board medical member until he or she is either assigned to the duty or relieved. As a result, the Doc is responsible from the time of notification to follow some basic protocols outlined in detail in chapter 10. The flight surgeon will be responsible in evaluating the area of human-centered concerns, including the physiological, biodynamic, anthropometric, psychological, and psychosocial. He or she is the focal point on the board for assessing the broader range of environmental human factors concerns, such as mission demands; equipment maintenance or logistics; institutional issues, facilities, and services; passenger or crew space design; life-support equipment; and egress, survival, and rescue.

a. Other board members must work closely with the flight surgeon to get the most benefit of the expertise of each one. A multidisciplinary approach (which is an Air Force tradition in quality safety investigation) is critical in providing what is necessary for an adequate analysis of the human element of a mishap. Because the flight surgeon's background is in a broad range of human concerns combined with operational exposure, he or she is the catalyst for compiling, and eventually

Figure 4-9. Tagging, Staking, and Photographing. Exhibits should be tagged, staked, and photographed before disturbing. Because there were several investigators tagging their own evidence, a system of using the first letter of the investigator's last name, and then the number was used to prevent confusion.

the author of the human factor analysis. It may come together much as connecting numbered dots do in drawing a picture. Every dot must be connected or the final image will be distorted. The final image may be late in taking shape.

b. The safety investigation workbook is designed to facilitate complete data gathering in time-sequenced portions until the time comes to report. Assistance aids, including board member consultation guides, interview guides, general survey guidance, and a glossary of some pertinent terms, are provided to help the flight surgeon in this likely unfamiliar but challenging undertaking.

4-49. Technical Assistance. As is the case with all safety board members, specialized consultant expertise is available through a variety of Air Force agencies. However, there is no such thing as a "human factors" expert who knows all about each of the human factors concerns. The flight surgeon must evaluate and determine the area of concern and then initiate a request through the board president to the MAJCOM and HQ AFISC/SEL/SEP for the needs assistance. In the early days of the investigation, several people may be needed to handle the workload. In fatal mishaps the AFIP response team functions as a consultant to the board in the area of the flight surgeon's responsibilities. Chapter 10 and section H, this chapter, delineates in some detail these concerns.

Section G—The Recorder

4-50. Recorder Duties. The recorder is the administrative manager and coordinator of the Safety Investigation Board (SIB). The primary task is to pull every facet of the investigation together into a final report that is complete and accurate per AFR 127-4. This section provides hints or guidelines that are intended to make the ad-

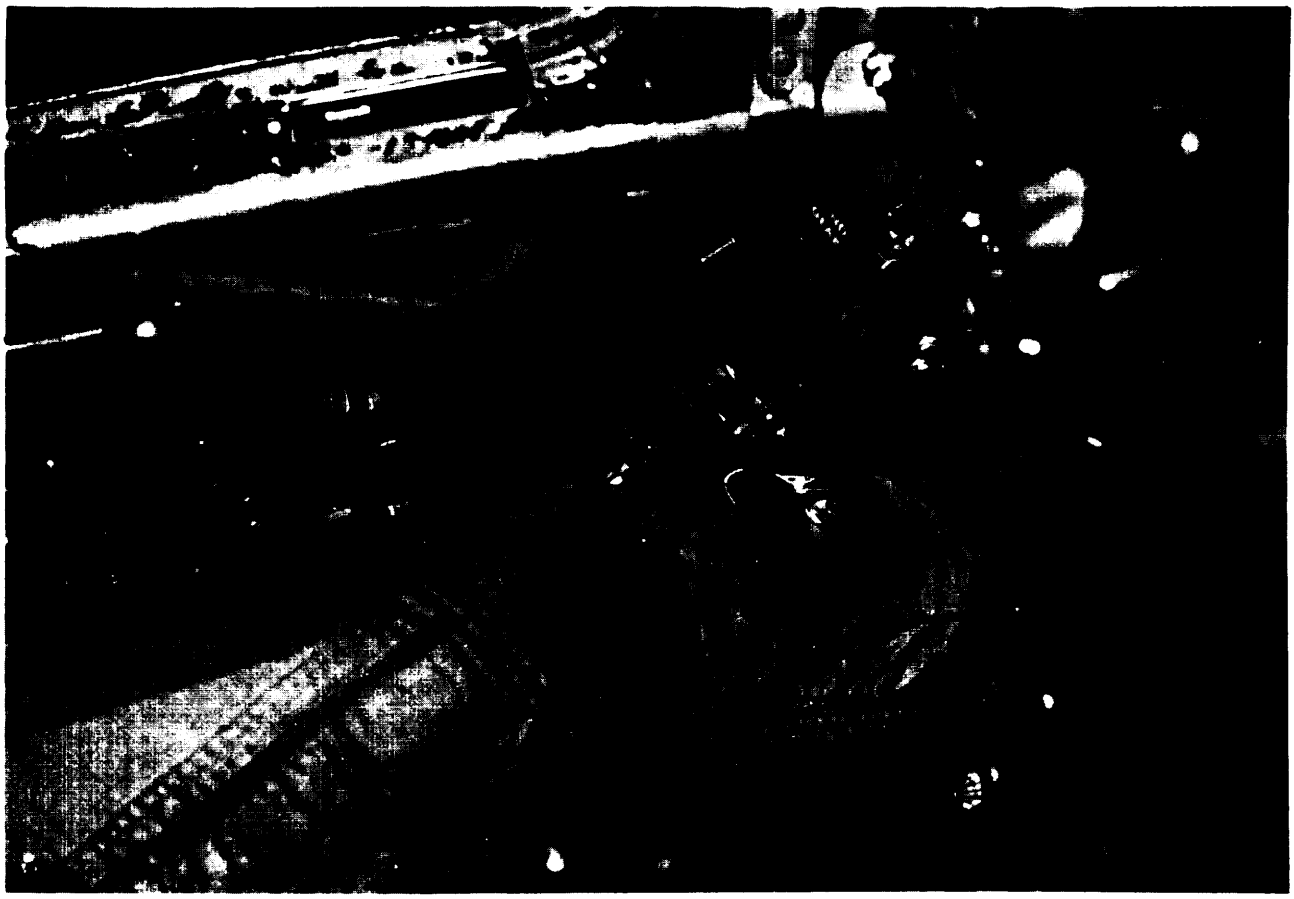


Figure 4-10. Analysis of Crew Flight Equipment. Posed photo of pilot wearing "G" suit and the same items in lower left pocket as in the mishap aircraft. Feet are on rudder pedals, throttle is full forward. Analysis of personal equipment, injury patterns, and flight clothing damage can be traced back to the cause of a mishap.

ministrative task much easier. Only minimum requirements are covered here, leaving plenty of opportunity for additional effort and initiative.

4-51. Applicable Documents. The recorder should read and become familiar with AFRs 127-4, 127-18, (for F-16 mishaps), 110-14, and any command-specific guidance available.

4-52. Recorder Responsibilities. The recorder is responsible for the administrative requirements of the investigation, to include compilation, reproduction, and assembly of the AF Form 711. He or she supervises an administrative section of selected airmen and secretarial help. The recorder is the temporary custodian of records and documents given to him or her by board members. Upon completion of the SIB investigation, the records are released to the accident investigation board as explained in paragraph 4-40. The recorder arranges necessary support required by the president (security passes, transportation, messing, billeting, office facilities, working materials, recording equipment, etc.). He or she is responsible for compiling and accomplishing the following specific sections of the formal mishap report:

a. Tab Q—Orders Appointing Investigation Board.

b. Tab Z—Board Proceedings.

c. Tab U—Statements and Testimony of Witnesses and Persons Involved (Joint Responsibility).

4-53. Assignment as Recorder. In the past, the recorder has been assigned from the base providing support to the safety board. However, since mishaps can and do occur at locations remote from Air Force bases, no set rule can be established. Many safety boards investigate a mishap at an isolated or overseas location and then return to a centrally located Air Force facility to finish and publish the report. Ideally, assignment of a

recorder is based on the ability to function with the board from the beginning until distribution of the final report.

4-54. Recorder Preparation. As soon as you are notified that you are a potential safety board recorder, you must prepare for this assignment. This can best be done by studying this pamphlet and other publications associated with reporting an Air Force aircraft mishap. AFR 127-4, as supplemented, contains detailed information on message and telephonic report requirements and guidance on the format for AF Form 711-series documentation. Your knowledge of these requirements is a must in the fast pace of activities during the first days following an aircraft mishap.

4-55. Initial Action. Once the initial investigative efforts are organized and underway, your assignment depends primarily on directions from the president and investigation officer. Each investigation varies according to many unpredictable factors, but certain requirements are common to all mishap inquiries. You need to ensure the availability of office supplies and other equipment for use by each board member and your clerical staff. A partial list of suggested items follows:

—Word processor (WP) or computer with WP capability if possible
—Typewriters, extra ribbons
—Typing paper (8½- by 11-inch)
—Note pads
—Note paper
—Pencils, pens
—Erasers
—Portable blackboard
—Chalk and eraser
—Graph paper
—Felt-tip markers
—Bulletin board
—Drawing supplies—compass, dividers, ruler, tracing paper, etc.
—Tape recorder, tapes, and spare batteries
—Current forms, AF Form 711-series; letterhead
—Blank message forms
—A file of pertinent publications
—Envelopes
—File folders
—Work tables
—Stapler, staples, and staple remover
—Classified cover sheets
—Four-drawer, lockable, legal-size cabinet
—Enough desks or tables and chairs for each board member
—Coffee pot

4-56. Getting Organized. Organization is the key to your success as an investigation board recorder. Part of your responsibility is to supervise the typing assignments for all the board members. Unless you prepare a list of priorities in the beginning, your typists surely will be deluged with disorganized work requests. Near the completion of the investigation phase, numerous requests for short suspense typing assistance also appear. They cannot possibly be completed without a definite set of priorities. Your need for clerical assistance at the beginning of the investigation most probably is light. Once the report begins to take shape, you may find that you need two or three full-time typists. Proofreading of drafts is another area to be controlled and organized. If possible, assign final proof responsibility to one well-qualified individual.

4-57. SIB Records. By the time the appointed board arrives on the scene, several things may have already been accomplished, so the first task is to find out what has been done, and begin collecting the records and tapes listed in chapter 2 and the following records:

a. Record copy of all message traffic that has been transmitted or received.

b. Any ATC tapes or transcripts involving the mishap flight.

c. Telemetry tapes and data.

d. Diagrams of the mishap area.

e. Photography of the mishap area.

f. File system for evidence.

g. Public releases that the Public Affairs Office (PAO) may have made. Establish with the PAO a clear understanding that any future releases will be coordinated with the board president.

h. Contact CBPO Personnel Systems Management (PSM/DPMD), by written request, for a comprehensive printout of personnel data available on aircrew victims. (Ten days after fatalities, this information is purged from the personnel system.)

4-58. Support for the SIB. Immediately start securing office space, transportation, and billeting for the investigation team. It is highly preferable that all the board members be billeted in the same area. There will probably be some late working meetings and being billeted in the same area will make this much easier. It can also ease the transportation problem. If possible, rooms should have class A phones installed.

4-59. SIB Transportation. The board president, investigator, and medical officer should each have their own vehicle due to the diversity of the ter-

ritory each has to cover. Beyond that, one vehicle per every two board members is normally adequate. Provide additional transportation for technical assistance personnel as required.

4-60. Office Space. A suitable work area must be obtained. A room with a large conference-style table has been found to be most suitable. Two or three smaller rooms for typing and interviews are also desirable. If one is not available at a convenient Air Force or government site, action should be taken to secure space from a civilian source. Care must be taken in either case to ensure that all privileged documents and papers can be protected. (While most mishaps do not fall into a classified category, all safety reports and associated board proceedings are considered privileged. Consult AFR 127-4 for restrictions.) Don't skimp on rooms! You and other board members may feel in the beginning that it is possible to get by with a small working space. Don't believe it! As the board nears completion of its work, space is at a premium. Completed forms, portions of the report, including photographs, AF Forms 711, completed pages, and other documents (including items of evidence), require ample organized storage space. It pays to arrange for this required space in the beginning. All rooms must be capable of being locked.

4-61. Telephone Requirements. A minimum of four telephone lines are suggested. Two should be class A and the others may be class C. Have phone instruments put into each area with all numbers. When giving the number out for people to call, give out the class C so the class A will be available for outgoing calls. If commercial phone calls are made, ensure an AF Form 1072, Authorized Long Distance Telephone Calls, is filled out for accounting purposes.

a. From the beginning, start writing down telephone numbers and maintain a complete list of important numbers. Keep a current list on the board president's and investigator's desks.

b. Post on the wall and complete, if necessary, the safety board telephone listing of agencies routinely called by the board.

c. Prepare a folder for the AF Forms 1072. Print the format, consisting of the date, time, name of caller, office symbol, base, AUTOVON number, and message at the top of the folder. Instruct all board members to use this format, and to obtain all of the information listed in the format for telephone calls to the investigation board. If used in this manner, a review of the telephone log at the daily board meeting provides an excellent recap of the day's activities while the board members were at the mishap site. This will save being extremely embarrassed because someone can't find the slip of paper he or she wrote that important message or telephone number on earlier during the day.

4-62. Administrative Help:

a. This one is a judgment call. One person will probably be needed early the second or third day to answer phones and take messages, but the typing load will not start until later. Identify a couple of typists and place them on standby to await a call for help.

b. When identifying typists, try to find some who are familiar with aeronautical and aircraft or missile engineering terms. If the typist is not familiar with these terms, it will make that job and the recorder's that much more difficult.

c. Once the actual need for typing arises, the task can be approached a couple of ways. The administrator hired earlier to answer the phone, etc., can do a lot of the smaller items, but once the heavy typing begins, it will simply be too much for one person. Now is the time to make a decision. Do you hire full-time typists or do you arrange to use typists at their own desks where they generally will be happier? Some recorders have found it easier to farm the work out to a couple of the best typists on the base (i.e., the DCO, DCM secretaries) so they can do the work at their desks. There has to be an understanding that the safety report takes number one priority, and provisions must be made to protect the sensitive information contained in the report. It is very hard to do this in a busy traffic area, such as a typist's office. Other boards tend to prefer having the secretary move into the board's working area. If the latter method is chosen, arrange for the secretaries to bring their own typewriters. They will tend to do much better work with familiar equipment. Arrangements can be made for the typists to do their normal work during slack periods. The one thing to remember is not to have the typists sitting around doing nothing.

d. One of the smartest things a recorder could do is scout the base to see if there is a word processing center (WPC); ideally, a WPC with more than one station. If you are fortunate enough to be on a base with such a luxury and can get their support, typing problems have just been solved. The turnaround time for such items as Tabs J, T, U, and W will be two to three times faster. Also, you can be assured of the uniformity of typing. A

word of caution about WPCs: special controls are necessary to protect privileged information from inadvertent or premature disclosure. Ensure that all documents are identified so they can be retrieved easily from the memory.

e. The typist can usually begin typing handwritten drafts as double-spaced drafts. In some cases the typist may be able to go final from some drafts, but you should recommend a double-spaced draft for all but the simplest tabs, such as A, C, H, K, L, and M. Ensure all typists use the same IBM element font and the same pitch (10 to 12). Ensure they use the same 1-inch side margins and 1½-inch top and bottom margins.

f. Manage the paperwork to keep a smooth flow. Have the typist type "President," "Investigator," "Pilot," "Maintenance," "Medical," and "Recorder," on the last sheet of double-spaced typed drafts so each can initial after reading for content, grammar, and spelling errors. For final copies, have the typist type the titles on a small 2- by 3-inch sheet of paper and paper clip it to the final typed sections. If small errors are discovered, tell the individual to place a paper clip horizontally on the right edge of the paper opposite the line in which the error was discovered. This will draw the typist's attention to the page and line that requires correction without marking on the original.

4-63. Establish a Filing System. Place set of 26 (A through Z) draft tab folders in one drawer and the second set of final tab folders in the second drawer. Keep draft and final typed sections in their respective folders. Maintain strict control of the sections; no one should remove or insert sections without the recorder's knowledge. Establish folders for copies of inbound and outbound messages.

a. Begin notes for Tab Z, Board Proceedings.

b. Contact numbered Air Force or convening commander's headquarters to request board orders, Tab Q.

4-64. Posting a Sign-Out Chart. Post on the wall. Ensure each board member fills in his or her departure time, estimated return time, destination, and remarks. This saves embarrassment when trying to remember each member's destination.

4-65. Posting a Progress Log. Most board members have several tabs they are responsible for. By developing a progress log that indicates the tabs, responsible individual, date to typist, draft complete, tab complete, comments, etc., it will help both you and the board member stay organized.

4-66. Additional Items. Items such as foul weather clothing should be arranged for through the local safety office.

4-67. Witness Statements. Throughout the investigation there are requirements to document statements from individuals directly or indirectly involved with the mishap. These vary from a simple statement of an eyewitness to a lengthy narrative of a crewmember. There are several important points to consider. First, no statement in reference to a safety investigation is taken as sworn testimony. (Figure 8-2 illustrates a sample statement to be used for your activities. The caveat on the sample identifies the investigation as having the sole purpose of mishap prevention.) One of your first actions should be to reproduce the sample statements on 8½- by 11-inch paper. This saves many hours of retyping later. No portion of a witness statement may be used outside the Air Force, and the statements are protected within the Air Force from use for purposes other than mishap prevention. Sworn statements or depositions can be subpoenaed by civilian courts, and should not be taken or included in the report. Unsworn statements generally fall in the category of hearsay evidence, and are not admissible. If any questions or problems arise in this area, you should consult the convening authority safety shop or HQ AFISC/SER.

a. There are two general methods of obtaining usable statements. The first (and least effective) is to request a written statement from a desired source. The second is to interview a witness or participant and document the results. In many cases, written statements are the easiest to obtain, but often contain inadequate information. We don't intend to discuss at length in this chapter the philosophy of interview techniques, but only to identify the problems facing the recorder in transcribing testimony into usable form. Written statements are sometimes used to obtain relatively uninvolved statements, such as establishing a simple fact through an eyewitness account. Interview-style statements are frequently used for persons involved in the facts and events. Crewmember participants fall into this category, although it may be unnecessary to interview every crewmember in detail.

b. Oral testimony is the most difficult to document, and you must adequately prepare yourself and the board in this area or the results will surely

be less than desirable. The most immediately available method for documenting an interview is a tape recorder. However, do not be quick to decide to use this method without considering possible consequences. It has been estimated that a rule of thumb for the amount of work required to transcribe tape recorded interviews into typed form is seven to one; that is, seven hours of labor for each hour of recording, perhaps a conservative estimate. For inexperienced persons, it can be much longer. As a rule, lengthy interviews should be summarized by the interviewer unless the exact wording is important. Oral testimony is most useful for short statements, especially in remote locations, at the crash scene, or where time is an important factor.

4-68. The Final Report. AFR 127-4 is your bible when it comes to developing the final report. Occasionally, safety boards will use old copies of safety reports as a guide, but beware, AFR 127-4 guidance changes through the years. After you are familiar with the appropriate sections of AFR 127-4 you can start getting organized and ready for the flurry of activity that is ahead.

a. A suitable folder and cover has to be procured and constructed along with reproduction of unusual inclosures. The use of staff graphic artists should be coordinated with staff supervisory personnel. Normally, the crash diagram is larger than standard page size, and not within the capabilities of an Air Force reproduction section. Most Air Force CE offices have the capability of reproducing large-size drawings similar to blueprints.

b. Determine from AFR 127-4 the total numbers of copies that are required, and which tabs will be required for your particular mishap. Then contact base reproduction with your printing request. Add extra copies of each to offset mistakes. Accomplish this task early, as most reproduction sections only print on the card-stock-type materials for the tabs once a week.

c. The two-part report described in AFR 127-4 makes possible the release of nonprivileged information to concerned persons without extensive sanitation of the whole report. Part I is the information which may be released; Part II may not. The two-part format necessitates using a cover large enough to attach the two parts side-by-side. Part I is placed on the right, Part II on the left. Each page in Part II is marked according to AFR 127-4. Normally the local safety office has rubber stamps for such markings. If stamps are not available, have blank pages printed with the markings on the bottom of the sheet. Then use these blanks to type, affix photos, etc.

d. To conserve paper, print pages on both sides, head to toe. Leave a 1½-inch space at the top of the page, and a 2-inch margin at the bottom.

4-69. Report Format Hints. Different investigators prefer different styles and different formats. The style of the report should be determined early in the investigation, so you might have a sample prepared and handed out to all participants. Handouts should establish how inputs will be numbered and formatted. Now that you have established the format for the writers, you must establish the format for the typists.

a. First thing to consider is that the report will be on 8½- by 11-inch bond paper. The report will be bound at the top, so you must have a 1½-inch margin at the top to allow for binding. Maintain a 1-inch margin on each side. Since each page will be numbered and stamped according to the requirements of AFR 127-4, you should establish a 2-inch margin at the bottom of each page to allow adequate space.

b. Some items that will go into the report are previously prepared forms, letters, etc., which are 8½- by 14-inch. They must be used until the existing supplies are exhausted.

c. All your masters must be neat, dark, and copy-capable. A poor master will make even poorer copies. Sometimes it may be possible to improve light copies by processing them through a copy machine before reproduction.

4-70. Reproduction Requirements. Right away the recorder should get out and do a little diplomatic work. Locate and visit the base photo lab and base reproduction shop. These folks are going to be doing a lot of work for the board. The recorder should introduce himself or herself and let them know what will be needed in the way of support. This gives them time to ensure they have the proper amount of stock on hand. More important, it ensures a friendly relationship. There isn't anything worse than popping into a base reproduction shop with 400 pages of a report and requiring 20 copies as of yesterday. Don't wait until the last minute. As soon as any part (Tab) is ready, take it to reproduction and have it printed. There will probably be an AFR 110-14 board running concurrently. All of the originals from Part I of the safety report must be turned over to that board as soon as possible (with the concurrence of the board president).

Figure 4-11. Life-Support Equipment Distribution With Seat-Impact Crater in the Foreground.

4-71. Report Copies. Do not give out copies of the report. This not only applies to a copy of the final, but the draft and handwritten inputs. The contractor representatives to the board must be satisfied with reconstructing their notes for any report they must turn into their employers. If the Air Force is to maintain the confidentiality that has been promised to all witnesses and contractors, the recorder must enforce the rules. Simply explain to anyone who asks for copies of their inputs that if the right to deny releasing Part II of the report is to be maintained, everyone must stick by the rules.

4-72. Photographic Support. The last-minute rule also applies to photographic support. Decide early enough what photographs will be needed for the report so the photo lab won't be thrown into a panic. The more time they have, the better product they will produce.

4-73. Disposing of Evidence. When the investigation and reporting job of the board is complete, you will have in the board's possession numerous documents, records, and other items of evidence. AFR 127-4 provides guidance on evidence disposition, though AFR 12-50, volume II is the records disposition authority. Don't forget to dispose of ribbon cartridges and erase computer discs and cassette tapes, provided the discs and tapes data was transcribed into hard copy records.

Section H—Life-Support Officer

4-74. SIB Responsibilities. A life-support officer is normally appointed to the board any time aircrew equipment, egress, or survival is involved in a mishap. You work directly with and for the medical member of the board. Your basic duty during the investigation is to help the Doc to understand what life-support equipment was available during the mishap sequence, whether it was used, and if it worked properly. You will also help him or her understand the environment in which the aircrew operates (i.e., operations, pressures, equipment limitations, attitudes, etc.) to help better evaluate any human factors implications involved in the mishap.

4-75. Getting Organized. Your job, and that of the flight surgeon, are among the most sensitive and most critical of any board function. Initial photographs and evidence must be gathered quickly, because it is very perishable. In the case of deceased personnel, remains must be processed as quickly as possible to minimize the anguish of the families. Medical procedures are covered extensively in chapter 10. The following outline will help you to get your thoughts organized, but it is imperative that you be well organized and "hit the deck running" when a mishap occurs. The flight surgeon's investigation checklist contains a life-support officer consultation guide which also gives general typical guidance.

a. Proceed to the mishap scene and obtain required photographs. Photographs need to be accomplished without delay, since the wreckage may be moved to facilitate the investigation. You probably will have the services of a base photographer, but be prepared to take your own photos. Chapter 9 of this pamphlet gives general guidelines on photography. Keep a log of photos you take.

Figure 4-12. Crew Impact Clues. Rudder imprints on flight boots can indicate who was at the controls at the time of impact, or whether the pilot was conscious.

b. Properly label and mark body locations. If in doubt, take the picture; the crash site may not look the same the following day.

c. If possible, be present at the autopsy with the medical member. If a photographer is not available, take required photos and notes. The pathologist's worksheet is often of little value to the life-science team. You bring special equipment expertise to this evaluation.

d. Coordinate with the medical member to ensure required biochemical testing is performed on all survivors and fatalities.

e. Assist the medical member, if required, with preparing and shipping specimens.

f. With the board president's concurrence, remove all serviceable equipment and flares from the crash site. NOTE: Ensure that all pyrotechnic and high-pressure vessels are rendered safe by explosive ordnance disposal personnel before disturbing.

g. Obtain inspection records on all life-support equipment from the life-support facility.

h. Obtain training records or extract information of all crew members involved in the mishap.

i. Obtain listing of all witnesses and crew members who were involved in the mishap.

j. Obtain a tape recorder for use during interviews. Ensure the witnesses are informed of the privileged status of the statements they submit.

k. Interview participating fire departments and obtain a listing of type of fire and crash equipment employed during the crash or rescue effort and the time the equipment was dispatched and arrived at the crash scene. This information is required for the AF Form 711gA.

l. Interview all participating law enforcement agencies. They normally are the first at the scene, are generally excellent witnesses, and they take photos of the crash site.

m. Prepare a written list of questions for the board president or interviewer to use during the interview. During interviews with hospitalized crew members, space is often limited and the number of board members that can attend is limited.

NOTE: All interviews should be coordinated with the investigating officer to save both SIB time and effort, and to facilitate witness cooperation.

n. Perform an operational check of all aircraft doors and hatches, and record the results for inspection in the AF Form 711gA during your final report.

o. Begin preparing draft AF Form 711gA. Normally, the responsibility for the various sections of the AF Form 711gA are divided up between the medical member and the life-support officer. (See chapter 10, section F.)

p. Help the Doc prepare a daily progress report for use during the daily board meeting. You will perform a key roll in the analysis of human factors pertinent both to personal equipment before the mishap and to egress and survival after the point of the mishap. Review chapter 10 concerning these issues.

q. Address questions regarding the proper completion of the AF Form 711gA to the Life Science Division, Norton AFB CA, AUTOVON 876-3458.

Figure 4-13. Life-Support Evidence. Seat belt in the locked position with gold key installed.

r. Obtain weather information at the time of the mishap.

s. When required toxicological and autopsy reports have been received, determine causes of injuries or fatalities in conjunction with the medical member.

t. In conjunction with the medical member, determine if the impact was survivable. If so, aspects of fire control, restraint, and egress must be considered in analysis.

u. Evaluate the egress training program if it appears that it was a contributing factor that resulted in injury or death. Query other squadron members, not just training personnel.

v. Prepare a written statement of your findings and analysis of the mishap. Include all details you feel are significant. Your report is combined with the medical member's report for insertion into the final report. An outline of your topics is included in chapter 10, section F, under life-support and personal equipment and egress and survival concerns. Follow it in assembling the narrative.

NOTE: If your investigation is completed before the final safety board meeting, and you are released by the board president, be certain that you sign a sufficient number of AF Forms 711gA before you return to your duty station.

Section I—Other Potential Board Members

4-76. Weather Officer. Qualified weather officers are appointed to assist the board when weather or weather services was (or may have been) a factor in the mishap. The weather officer should possess expertise in the weather phenomenon suspected of being a cause factor; for example, turbulence, induction icing, warm fog, tropical storms, arctic weather, etc. The job includes:

a. Providing an analysis of the weather for the analysis section of the report.

b. Ensuring that the board receives a copy of the DD Form 175-1, Flight Weather Briefing, provided the crew before flight.

c. Determining from the DD Form 175-1 if the aircrew were provided all the necessary weather information, and if it was accurate.

d. Completing AF Form 711b, item 16.

e. Preparing exhibits for the formal report.

4-77. Weather Analysis. When weather is a factor in the mishap, the analysis section of the report should mention what the weather was and how it affected the sequence of events. There are two primary areas where weather affects the mission: the actual weather phenomenon encountered, or the weather services provided the crew. Your analysis of these factors may require one sentence or several pages. For example, a suspected wind shear during a final approach which results in an aircraft landing short, requires all of your skills as a meteorologist to determine whether a shear actually existed. You may also need to prepare charts, maps, and other exhibits needed to support your analysis.

4-78. Collecting Weather Evidence. Obtaining the forms needed for the report is your least time-consuming responsibility. This type of information normally is secured by the interim investigation board during the first few hours after the mishap. Usually, the local weather unit will have taken a special surface observation as soon as they were notified of a mishap. Also, they may have taken a special radar observation. You should check to see that this weather file has been

prepared. When a mishap occurs in a remote area not served by an Air Force weather detachment, you may have to contact the local flight service station. Outside the CONUS, you may have to rely on the weather information available through the nearest airport to the mishap scene. In this situation you may be forced to reconstruct the weather at the time of the mishap based on observations taken in the area near the scene, or from the consensus of witnesses.

4-79. Reporting Weather Conditions. Use the AF Form 711b, item 16, Weather at Time and Place of Mishap. Give the most authentic information on the weather existing at the onset of the mishap sequence. If the scene of the mishap is within the observation range of a weather reporting station, use its records; otherwise, it is better to obtain a consensus from witnesses. If a consensus is not available, estimate existing conditions from the closest weather reporting station. Make all entries in a standard time from the Hourly Sequence Report (Airways Code).

a. Sky Conditions. Give as clear, scattered clouds, multiple cloud layers, obscurations, etc. State ceiling in feet.

b. Visibility. Record visibility in statute miles, and if there were restrictions, show cause.

c. Wind Direction and Velocity. Record the direction by the 16-point compass, and give the velocity in knots.

d. Temperature. Record in degrees Fahrenheit.

e. Dew Point. Record in degrees Fahrenheit.

f. Altimeter Setting. Record in inches of mercury.

g. Other Weather Conditions. Record any pertinent entries normally covered in the remarks section of the Airways Code.

Detailed discussion and analysis of unusual weather phenomena is placed in Tab T.

4-80. Safety Advisor. The convening authority may provide the board with a safety advisor from his or her staff. This advisor normally has experience in both investigating and the intricacies of all the required paperwork. The advice of this trained safety officer is often invaluable. Safety advisor assistance is especially needed when a board is composed of members who are stationed elsewhere and perhaps even assigned to a different command. He or she should provide and help interpret regulations and manuals, supply materials, and assist in obtaining local base support. A safety advisor serving an investigating commander may help prepare special command briefings. He or she can point out investigative techniques, and assist in evaluating requirements for technical support.

4-81. Air Traffic Control (ATC) Officer. This officer may be selected to assist the board when ATC procedures, navigation aids, communications, or air traffic and landing systems were (or may have been) a factor in the mishap. He or she should possess special expertise in the ATC function suspected as cause factor; that is, GCA, ILS, ICAO procedures for the geographical area, etc. The following list outlines some of the duties of an ATC member or advisor:

a. Collect, review, and analyze all data relevant to applicable ATC operations.

b. Review and analyze ATC training qualifications and experience.

c. Collect, review, and analyze applicable SOPs.

d. Determine status of navigational aids, communications equipment, and airfield facilities as applicable.

e. Review and analyze ATC tapes in conjunction with pilot member.

f. Assist the board president, as required.

4-82. Commander's Representatives. AFR 127-4 provides for a commander's representative to the board. The convening authority may provide this option to the commander possessing the aircraft or the commander to whom the crew is assigned if that commander so requests. If MAJCOM headquarters assumes investigative responsibility, numbered Air Forces may be provided this option. Commander's representatives are designated voting members.

4-83. Additional Representatives. Specially qualified people (i.e. human factors, air rescue, etc.) are appointed for their expertise and objectivity when required to ensure a thorough and efficient investigation (see AFR 127-4). The board president is responsible for getting any additional members needed to conduct the investigation. To assist the president in this duty, the other board members must determine when assistance is required, and so advise the president. Additional members may come from the organization which had the mishap, other Air Force or federal government organizations, or private industry. Higher headquarters may also appoint other individuals. The board president should recognize the additional members' responsibility to inform their commanders of their opinions on progress and

events. Those so appointed, in turn, should observe the president's need to be informed on the content of their reports. Requests for assistance from sources other than the convening authority will be made through HQ AFISC/SEP.

a. If missiles, nuclear components, explosives or other hazardous materials are involved in the mishap, an appropriate officer may be added to the investigating board structure.

b. Civilian agencies directly involved in the mishap (that is, aircraft or aircraft component, manufacturers' representatives) may be invited to participate in the investigation. They are the responsibility of the board president. In no case are such representatives voting members, or allowed access to the completed mishap report.

c. If the FAA, other services, or governmental agencies (federal, state, and local) are directly involved in the mishap, they may be allowed to provide a nonvoting representative to the board. This invitation should also be extended to foreign governments directly involved in the mishap per NATO STANAG 3531. In no case are these representatives voting members, or allowed access to the completed mishap report without the expressed approval of the disclosure authorities specified in AFR 127-4.

d. Human factors assistance protocols are outlined as part of chapter 10. Such assistance is sought based on expert knowledge within the particular human factors topic area of concern.

e. A representative of any rated crewmember position may be appointed to the SIB if that crew position is believed to be a possible factor in the mishap. (For example: An F-4 WSO could be appointed for an F-4 mishap involving collision with the terrain.) He or she is responsible for investigation and analysis of all aspects of that crew position.

f. Other specially qualified officers (communications, rescue services, etc.) are responsible for investigation and analysis of possible cause factors involving their area of expertise.

Section J—Personal Survival Kits

4-84. Investigator Survival. Chapter 2 discusses safety investigation kits in general, and discusses some specifics required for each discipline. These items should be provided by the safety shop. In this section we want to concentrate on investigator survival. Aircraft mishaps often occur in inaccessible places. They may happen, for example, on the top of a mountain in winter, in remote desert country, or in a tropical swamp. Thorough investigation requires detailed work at the mishap scene, and it is often necessary to crawl around in crushed or burnt wreckage. You will frequently be subjected to long hours in the field, hours away from the closest support facilities and even a considerable distance from any on-site base camp. To conduct your investigation you must remain healthy and able to effectively operate in the given environment. The following basic principles apply:

a. Ensure your own survival first. No one is going to take care of you.

b. Take what you need for your part of the investigation.

c. Be prepared to carry what you take.

4-85. Personal Items. Keep these handy and up-to-date:

—Expense record
—Orders or authorization to investigate
—Immunization record (PHS-731)
—Blank checks
—Credit cards
—Identification card (DD Form 2 AF)
—International or government drivers license, QF 346, US Government Motor Vehicle Operator's identification Card
—Passport

4-86. Personal Survival Items. Come prepared to stay—and survive! These are basic items you may need at any mishap investigation:

—Boots—a good, sturdy pair
—Gloves—heavy leather
—Hat—keeps you cooler in the summer and warmer in the winter
—Insect repellent—when you need it, you *really* need it
—First-aid kit—handle minor cuts yourself
—Whistle—good communication device. May save your life!
—Moist towelettes—you'll use these
—Water container—saves a long walk to the source
—Ear plugs—for investigations near airports
—Collapsible cup—takes up little room, lots of uses
—Knife, screwdriver, can opener—basic tools
—Food bars—throw in a few of these

Not covered, of course, are your work clothes and the equipment you would need for severe weather conditions; parka, thermal underwear, rain gear, etc.

4-87. Kit Portability. How are you going to carry all this? Don't bring anything you are not prepared to carry. Aircraft mishaps do not always happen in convenient places. Consider a lightweight backpack.

Chapter 5

TECHNICAL ASSISTANCE

5-1. Types of Technical Assistance. There are three basic types of technical assistance. First is on-site evaluation by technicians and engineers. These specialists come from Air Force Logistics Command, Air Force Systems Command, civilian contractors, and other areas within and outside the Air Force. The second is analysis or teardown that can be done by the base supporting the investigation. These can be done by local technicians or the experts mentioned above. Finally, some investigative techniques are only possible at such places as air logistics centers and laboratories. This requires sending the subject of the analysis to the proper facility. Technical support can also include such things as simulation. A flight or computer simulator can be used to refly a profile to determine an aircraft or missile reaction to a given situation. Damage assessment is a logistics function, not a safety function, and should be provided by the responsible logistics organization.

5-2. How To Determine the Types of Assistance Required. Thoroughly evaluate the type of technical assistance required before making a request. Technical assistance is expensive, and should be requested only when actually necessary to determine cause factors. For example, there is no need to request assistance in analyzing the flight control system in an aircraft safety investigation when it is apparent the aircraft crashed due to a catastrophic engine fire. Investigators should interview survivors and witnesses, examine the mishap scene employing their judgment and expertise, and then decide what type of technical assistance is needed to ensure a thorough and objective investigation. Ordering a full menu of technical assistance before the pieces have cooled wastes a lot of valuable time and money.

5-3. When to Request Technical Assistance. Investigators can often determine the mishap materiel and human factors by using the experience of others involved in the investigation and experienced maintenance and life-sciences personnel, contractor field representatives, and other specialists within the investigating command's organization. Occasionally, specialized technical assistance is needed on mishaps involving possible structural failure, fire, engine failure or performance, control system, human factors, hydraulic system, or electrical or electronic system failure. Often almost total destruction of complex equipment prevents a meaningful teardown report (TDR). In such cases, on-site analysis is better because the analyst has access to known or suspected conditions not available to TDR facility personnel. Remember, technical assistance is time-consuming, and should be requested as soon as a valid need is identified to make sure that the investigation is not delayed.

5-4. How To Request Technical Assistance. HQ AFISC/SEP, Norton AFB CA 92409-7001, AUTOVON 876-2244 or commercial (714) 382-2244, coordinates and tasks all technical assistance to Air Force safety investigations. During nonduty hours, HQ AFISC has a standby Supervisor of Safety on call through the Norton AFB Command Post to assist in obtaining assistance. The convening authority safety staff calls AFISC/SEP after getting a request from the investigator. The request is discussed to make sure the assistance is really needed and there is no misunderstanding of the exact expertise required. When these decisions are made, AFISC requests assistance from the appropriate agency. The primary source for all technical assistance is the system manager for the weapon system or item. The system manager

decides who best to send to the scene, or whether the analysis could best be done at an Air Logistics Center or contractor facility. By-name requests may not always be honored.

5-5. The Technical Expert and the Investigator. Once the specialists arrive, technically they work for the board president. Practically, the investigator is responsible for their activities and reports and makes sure that they are working in the board's interest. In past cases where the board was unhappy with the technical support, board guidance as to what was needed was often somewhat sketchy. The bottom line is: Require the same performance from the technical specialists as you do from the rest of the board members. If you are not satisfied with the analysis, have it reworked. Although you can't force the specialist to change facts or conclusions, you can insist that the report substantiate them in a thorough, logical fashion. One other point—the investigator is responsible for providing the same support for the technical specialists (billeting, food, transportation, etc.) as for the rest of the board. For DOD civilians and contractor technicians, your recorder can verify overseas privileges.

5-6. Technical Reports. When any technical assistance has been rendered the board, a report containing the analysis of the expert should be made for the board. Before the technical expert is allowed to leave, his or her report should be examined for content and applicability considering its intended location in the formal report. Obtain the technical expert's duty phone before departure, to answer future questions if required.

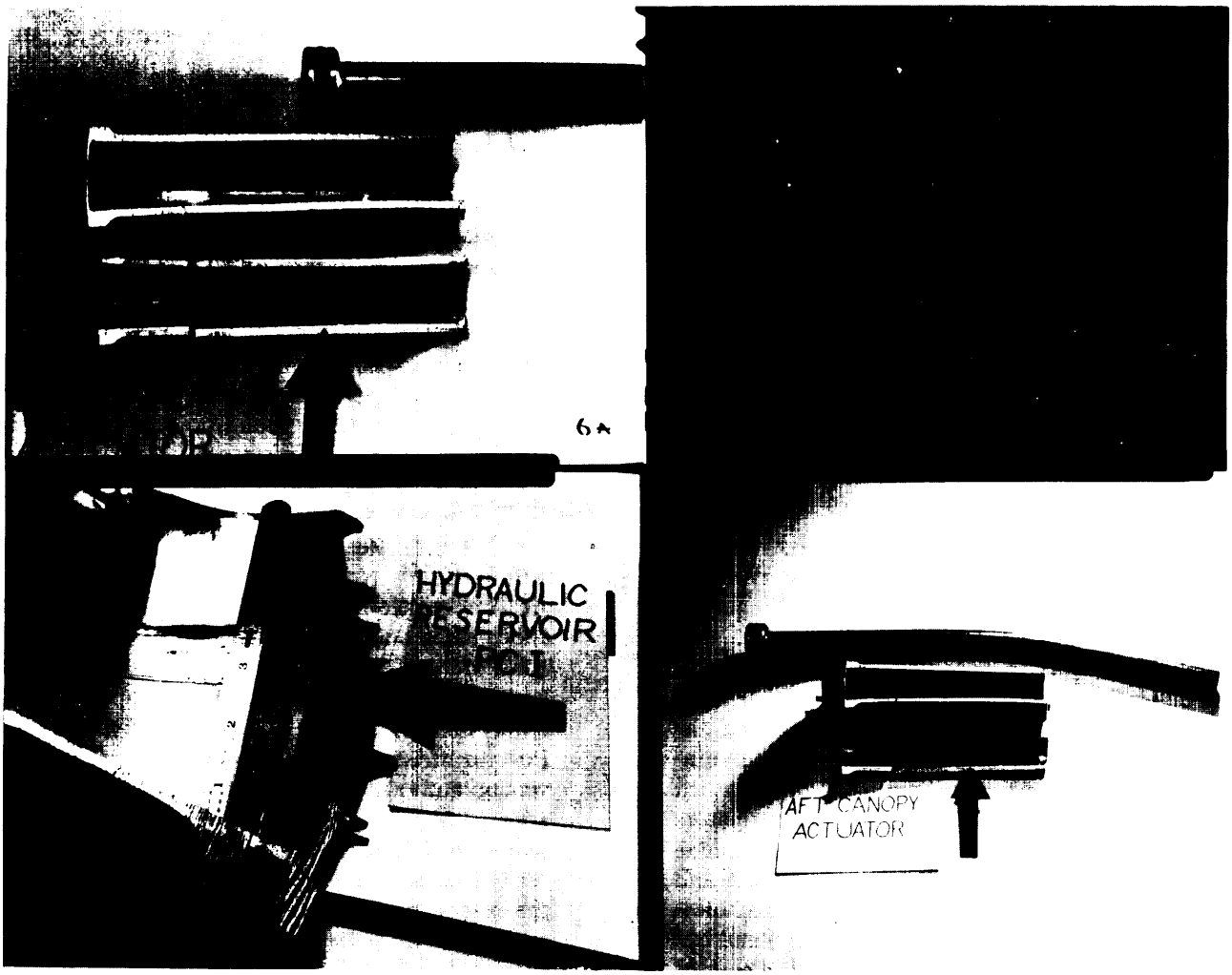


Figure 5-1. Strike Marks. Photographs illustrate analysis on various components. Be careful not to move or cycle an exhibit before submitting for TDR. To do so may erase marks.

Analysis made by US governmental agencies may be placed in Part I of the report; analysis by contractors or others is placed in Part II. Content of the reports in Part I are releasable, and therefore must be closely scrutinized for privileged information. Contractors performing analysis at their factory or laboratory should be advised to complete only one copy of their report until the report has been quality controlled at HQ AFISC. They then can request a copy from HQ AFISC/SER if the report is in Part I.

5-7. How To Use the Experts. The technical experts will usually know the best way of conducting their analysis, and should be allowed to proceed with only limited board intrusion as necessary. They should, however, always be informed formally of the purpose of the investigation and their responsibility to provide a written report before departure. When the technical expert has reached a conclusion, the board may accept the position, or, on the basis of conflicting evidence or additional analysis, disagree with the report and draw a conclusion based on the total weight of evidence, circumstances, and simulations. This option is termed, "the professional judgement of the investigating board," and carries great weight in the final evaluation of the mishap.

5-8. Analysis of Possibly Deficient Materiel. If the board suspects that materiel is deficient, the proper method of obtaining an analysis of that materiel is the Service Report (SR) or Materiel Deficiency Report (MDR). Using the SR or MDR is determined by the management agency responsible for the system or component—MDR for AFLC responsibilities and SR for AFSC responsibilities. The Quality Control (QC) organization supporting the investigation should know which agency is responsible, and help in completing the necessary paperwork.

a. Use of the MDR or SR system is important for several reasons. First, it identifies the component(s) to those responsible for their management. It also requests their support in analyzing the component for failures. The systems also serve to notify the proper agencies of how the component is to be moved to the site of analysis (or document that it has already been moved), and subsequently notifies the board of their findings. The MDR or SR is the only method available to control all the actions underway so that the end result will be a timely and usable product that will assist the board in arriving at a logical conclusion.

b. Even if the materiel is handcarried to the laboratory designated by the responsible management agency (the SPO or SPM), it will be necessary to fill out the paperwork that is used to perform the tasks identified above. Without the MDR or SR paperwork the probability of losing the component or the report is greatly increased. In fact, the board might never receive a report of the condition of the item in question if the MDR or SR is not submitted. Make sure the laboratory understands what the board wants to know. If possible, the individual carrying the item should stay with it and observe what the laboratory is doing. *Don't assume they will know what to do.*

c. If the item requires analysis by the contractor that built it due to limitations of Air Force laboratories, the services of the SPO or SPM to arrange that service should still be used. Doing this without their involvement may result in less than desired service to the Air Force. In the worst case, it could even result in a total lack of response from the contractor.

d. There is very little new ground to plow in the area of what procedure to use to obtain the required support to the mishap investigation. Refer to TO 00-35D-54 for the procedures to use when reporting the deficiency, and contact the responsible agency for advice when trying to decide who should do the analysis.

Chapter 6

ORGANIZING TO INVESTIGATE

Section A—Initial Actions

6-1. Status Briefing. After a mishap, many actions and events take place before the formal investigation begins. A board president seldom responds to a mishap with the first crash-response personnel, and therefore needs to know what actions have taken place before his or her arrival, who was responsible for them, and what facts were discovered. Only then can he or she effectively organize the investigative effort. The best sources for this information are the commander, safety officer, and interim board of the base supplying crash response. The base disaster preparedness operations plan and mishap response plan delineate post-mishap activities and responsible agencies. Normally, the mishap site will be secured, fires extinguished, explosive devices removed or rendered safe, casualties removed, some witnesses identified, and general view photographs taken before board arrival. Transportation requirements should have been identified and provided.

6-2. Actions on Arrival. The first thing to do is to assemble the SIB and meet with base officials and interim board members. They will provide a briefing covering what they know about the mishap, actions they have taken, and areas they are still working. The following areas cover things you need to know before you can get properly organized:

a. Wreckage:

(1) Where is it?

(2) What's the general layout?

(3) Who's guarding it?

(4) What is the local authority structure?

(5) Who owns the property?

(6) Was there any civilian property damage?

(7) Who wants the wreckage moved or held in place?

(8) Was there any classified material on the aircraft? NOTE: It is not the board's responsibility to investigate accountability of classified documents. This is not a function of the investigation. The investigating commander will assign an officer who is not on the board for this purpose. Any classified documents the board recovers should be inventoried and turned over to this officer.

(9) Did the fire department personnel move any wreckage, saw or chop, change any switch positions, etc., during their actions?

(10) Are munitions (including initiators) or hazardous materials or cargo involved?

(11) Are there any composite materials involved?

b. Survivors:

(1) Where are they?

(2) What is their condition?

(3) Have they had medical exams?

(4) Who's talked to them?

(5) Have they given a statement?

(6) When will they be released by medical people?

c. Deceased:

(1) Have remains been located?

(2) Recovered?

(3) Identified?

(4) Autopsied?

(5) Jurisdiction (coroner, medical examiner)?

d. Records. Who's collecting or impounding:

(1) Aircraft (maintenance, weight and balance, etc.)?

(2) Aircrew (training, flight, etc.)?

(3) Mission (flight plan, orders, manifest, etc.)?

(4) Weather (forecast)?

(5) FAA/AFCS tapes (tower, radar, command post, etc.)?

(6) Servicing (fuel, oil, oxygen, etc.)?

(7) Medical (physicals, waivers, medication, etc.)?

(8) Personnel?

(9) Voice tapes (aircrew recorders)?

e. Witnesses:

(1) Were there witnesses?

(2) Who are they (names, addresses, and telephone numbers)?

(3) Who has talked with them?

(4) Will they be available?

f. Logistics:

(1) What transportation do we have or need?

(2) Communications with mishap site?

(3) Nearest phone or work area to mishap site?

(4) On-base board work area?

g. News Media:

(1) What news releases have been made?

(2) What news representatives are present?

h. Initial Reports:

(1) OPREP-3.

(2) Preliminary (8-hour) message.

6-3. Assuming Control. On arrival, control of the safety investigation and scene passes from the interim board to the SIB. After the SIB has received the situation briefing the board president should discuss priorities and develop a preliminary plan of action. Consider:

a. What is the principle "thrust" of this mishap?

(1) Operations?

(2) Maintenance/materiel?

(3) Tactical?

b. What are the priorities for the principle areas of investigation?

(1) Wreckage?

(2) Survivors?

(3) Witnesses?

(4) Records?

c. What is my biggest immediate problem?

d. What kind of a board do I want?

e. What do I do first?

6-4. Getting Started. Because mishap locations and circumstances vary considerably, there is no stock answer to the best plan of action. You should evaluate the circumstances—daylight remaining, weather, distance, and site locations—to determine feasibility of reaching the site, accomplishing tasks and returning to base by 1600 hours, at the latest. Returning by 1600 hours allows enough duty hour time to arrange with various agencies for the support required for the next day. If rain or snow is not anticipated, not enough daylight remains, and the site is remote, consider postponing the initial inspection. Use the remainder of the duty day to make detailed arrangements, retire early, and schedule arriving at the mishap site at first light. If similar conditions exist, but the site is in the middle of a community, conducting the initial inspection with insufficient daylight may be the only alternative. If time and circumstances permit, the best plan of action is to view the wreckage as a group to form

initial impressions. This visit will satisfy the curiosity of all members, and allow them to then concentrate on their assigned tasks. A walk through the area, taking field notes, should be conducted, but members should only look and not touch. NOTHING SHOULD BE DISTURBED BY ANYONE, even if comprehensive photography has already been carried out.

a. The immediate concern of the board should be to establish methods for preserving perishable evidence. Much of it is located at the mishap site, and the team walk-through provides general familiarization and allows investigators to note conditions of instruments, controls, switches, egress equipment, etc. A photographer should accompany the team to record conditions as required by board members.

b. The entire board should meet after the initial walk-through. This is the best time for the president to outline responsibilities and establish that the investigating officer is his or her representative and primary advisor for the investigation.

6-5. Team Effort. A successful investigation is a team effort. It requires daily planning, meticulous attention to detail, and a high degree of professionalism on the part of each board member. The SIB president is responsible for the way the board is organized and the way in which the investigation is conducted.

a. When developing your plan, keep in mind that while the working hours will be long, members must get adequate rest. The president must supervise and direct the activities of the members of the board and devise a realistic working schedule. On a long and complex investigation it is no good finishing up with overtired members whose thinking is confused and whose argument is illogical. Devise a realistic working schedule which includes a daily conference, preferably late afternoon or after dinner, where all members of the board can gather. At this meeting the members can recount their activities for the day, discuss any discoveries and theories, and plan the activities for the next day. This meeting will prove invaluable and encourage discussion and debate. The cohesiveness of the team will be enhanced, as all members will be aware of the activities of other members. Map out the course you plan the investigation to take, and get your people started.

b. Remember your board members are experts in their particular fields, but not necessarily in mishap investigation. Once they know where to start, they require little individual supervision. Work with the recorder to organize the administrative and logistics requirements. Areas requiring immediate attention include quarters, meeting rooms, clerical assistance, etc.

6-6. Securing the Wreckage. The local authorities must be acquainted with the absolute necessity for guarding wreckage and ensuring no spectators or other unauthorized personnel are allowed into the area. The location of pieces of wreckage, their position on the ground, and their very appearance may be vital clues to any technical cause or malfunction.

a. As soon as the mishap scene is declared safe for entry, the next task is to ensure the wreckage and other physical evidence are safeguarded from bystanders and sightseers. This includes military and civilian personnel who have no official business at the scene. The board must ensure the guards remain on duty to keep these unauthorized personnel outside the roped off area. An entry point will be established where authorized personnel can present their identification for entry clearance. Authorized personnel entering the immediate wreckage area before the arrival of the permanent board should be escorted by the interim board. The access list must be approved by the board president, should be limited to the board or technical experts, and must be under board control. All others, including local commanders, should have a board escort to prevent inadvertent loss of evidence. Because ground scars or marks in vegetation are easily destroyed, one purpose of limiting access is to protect physical evidence.

b. Security police from the nearest military base will normally be used as guards under the supervision of the security police commander or the investigating officer in the absence of their own commander. Responsibilities of guards and specific instructions to them concerning rights of news reporters and photographers must be clearly established. Guards may be released by proper authority after the requirements of security are met, or when the wreckage is to be abandoned. Positive instructions should be provided to the security police unit to guard and protect the wreckage and to preserve its condition from alteration by trampling or handling by unauthorized persons until it is completely removed or destroyed by proper authority according to AFR 127-4. Hired civilian guards should be procured through the closest base contracting office. They will initiate an emergency AF Form 9, Request for Purchase, for required services and take care of the necessary paperwork. This coordination can

be done by phone in time-critical situations. Ideally, a member of the team should brief the guards on their duties and the importance of mishap site security.

6-7. Mishaps With Fatalities. With a fatal mishap, the coroner for the area where the aircraft crashed normally owns the remains, and is responsible for ascertaining cause of death. Bodies should not be removed without his or her consent. While the medical officer is carrying out an initial examination of bodies, the mortuary officer should clear the removal of the remains with the coroner. The flight surgeon will also arrange for an autopsy by an aviation pathologist and any biochemical, toxicological, and histological studies required. The matter of autopsy, tissue collection, and analysis is obviously a sensitive issue, and the sooner this is achieved the better. Tact and diplomacy will be required when dealing with both the coroner and next-of-kin.

6-8. The Flight Surgeon. The Doc will be extremely busy during the first few days of the investigation. He or she should visit the mishap scene as quickly as possible due to the perishability of medical evidence, and must be given priority support of a photographer. If search and recovery operations are still underway, the Doc will ensure proper procedures are being employed and evidence is being properly documented and handled. If remains have been located, he or she will be supervising handling of the remains. While the SIB controls the remains of mishap victims as long as necessary to complete the investigation, every effort should be made to expedite the recovery and analysis of mishap victims so that they may be released to mortuary affairs. Medical procedures are covered in detail in chapter 10.

6-9. Initial Organization. With the initial actions completed, all the members of the team should meet, and the plan of action developed. The details of this plan will, obviously, depend on the type of mishap. If the crew are injured and in a nearby hospital, it is prudent to interview them as soon as possible and record their impressions before time, discussion, and rationalization begin to color their memory. Ensure you determine and note on the interview tape or transcript whether or not the individual is on medication, and what type of medication.

6-10. Setting Priorities. In formulating your plan and assigning initial duties, three important tasks emerge. These are reconstructing the flight, or the last few seconds of the flight (including impact data), collecting witness statements, and ensuring any human remains are expeditiously recovered and analyzed. Task priorities should be set with collecting fleeting or ephemeral evidence (impact marks, soot deposits, etc.) taking precedence. Ensure that all explosive devices, pyrotechnics, etc., have been accounted for. If they haven't, EOD personnel must be contacted and the site made safe before any investigation can begin. The need for care, security, and preserving wreckage takes on an additional meaning where other unique substances may be involved. If the aircraft contains composite materials, personnel must be aware of the problems associated with breakdown of carbon and graphite fibers from composite materials. Certain aircraft, such as the F-111, and B-52 use beryllium compounds which produce deadly beryllium oxide when exposed to crash fire. The medical officer or the bioenvironmental engineer should be able to brief investigators on unique components and the associated hazards.

6-11. Taking Good Notes. Everyone should be briefed to "write it down." Impressions, ideas, and questions will come to mind in quantity. These will be rapidly followed by further impressions, ideas, and questions. There is no way you will remember all these, and most will be useful later. Don't throw any of these notes away—review them daily. They will be valuable in directing your part of the investigation, and will help later in writing the report. If someone had a question on day two of the investigation, someone else will undoubtedly have the same question when reading the report.

Section B—Organization

6-12. Managing the Investigation. The success and value of any investigation depends on many things. It is impossible to list them all here; however, there are certain fundamentals to keep in mind. The first is that organization of the investigation probably affects the outcome more than any other single factor. Peak effectiveness of the entire team can best be achieved when all board members understand the sequence of events and can observe progress toward conclusion of the task. Understanding the process will help each member resist the temptation to form premature conclusions. Premature conclusions degrade investigation effectiveness by diverting attention from facts.

6-13. Board President Duties. The board president assigns responsibilities and establishes controls which will enable efficient operation throughout the investigation. He or she ensures the investigators have all available facts, and decides whether a requirement exists or may exist for additional voting members, other operational assistants, or technical support. The president advises board members of the responsibilities and functions of any representatives from higher headquarters or other agencies or services. He or she ensures requirements for meeting rooms, transportation, communications, civil engineering services, clerical assistance, and other support functions are established and communicated to the commander or staff officer. The following paragraphs provide some ideas to help you get started. Each mishap has its own set of challenges, so stay flexible. If you keep your board members informed and keep the lines of authority clear, you can make a tough job easier.

6-14. Investigation Do's and Don'ts:

a. Brief each person involved in mishap investigation on the following basic guidance:

(1) Don't rely on memory—make notes as you go.

(2) Don't indiscriminately drive or trample on the ground near the scene, you may ruin valuable ground scars.

(3) Don't flip parts about, since you may ruin valuable evidence. Don't touch it, merely ensure its location is marked for study later.

(4) Don't release wreckage until you are sure that it will not be needed for further examination.

(5) Don't decide that you are able to establish the cause of a mishap until you are sure you have considered all relevant aspects of the available evidence, and that you have all the evidence that is available.

(6) Don't jump to a conclusion as to the cause of a mishap—vital evidence is often lost through investigators trying to take short cuts.

(7) Don't dismantle any components of the aircraft without inscribing reassembly marks on them. This applies also to cutting spars, strut wires, etc., that you may need to examine later—always mark them first.

(8) Don't dismantle small components on a dirty surface. Always lay clean material under them.

(9) Don't put two fractured surfaces together so that they touch, if there is any likelihood of their having to be micro-examined; keep such fractures protected by wrapping.

(10) Don't let it be thought that the purpose of a safety investigation is to apportion blame; make your status clear.

(11) Don't look for only one cause. Most mishaps are due to a number of causes. All factors should be stated so that they may be analyzed and form the basis of all subsequent action to provide remedies.

(12) Don't discuss the mishap with persons not directly related to the investigation.

(13) Do talk to witnesses as soon as possible after the mishap.

(14) Do visit the scene. Get as much first-hand information as you can possibly get. Make sketches, take measurements, and write down all information.

(15) Do remember that this is your full-time, primary duty until the investigation is complete.

b. Brief all members on the following standard policies:

(1) Use extreme courtesy when talking to the public or news media personnel. Each individual's conduct must enhance rather than degrade community relations.

(2) Abstain from any speculations as to the cause of the mishap.

(3) Refer all questions from the public or news media to the Public Affairs (PA) Officer.

(4) Politely ask civilians and news media personnel not to photograph deceased personnel.

(5) Politely ask civilians and news media personnel not to photograph classified equipment or information. If they persist, do not try to stop them, but simply inform them that it is a criminal offense for anyone to photograph, publish, or refuse to surrender classified information to proper military authorities.

(6) Restrict entry to the cordoned mishap site to authorized personnel only.

NOTE: If a "potential claimant" has an obviously good claim, Air Force image is enhanced by making sure the claims officer goes to him or her, rather than forcing the civilian to try and contact the claims officer. That's frustrating even for someone in the Air Force. It's helpful for the board president to have a feeling for what the claims officer can and cannot do per AFR 112-1. Basic policy is to settle claims promptly and fairly. Anything else hurts the image and the investigation.

6-15. SIB Logistics. While the SIB is reviewing the type of information listed in paragraph 6-2, action should be initiated to arrange for or gather whatever equipment may be needed to accomplish

Figure 6-1. Mishap Site Logistics. Aircraft flight path shown from point of impact. Photo illustrates potential difficulties of transportation, communications, etc.

the on-site investigation. This task is normally assigned to the board recorder. However, it is occasionally necessary for the board president to back up the recorder's efforts with some horsepower. The team will not only be able to work harder if they are well equipped and their routine needs satisfied, they will want to work harder. The site investigation requirements have been broken down into three general areas—transportation, communications, and equipment and supplies. Supplies are further broken down into two sub areas—personal and investigative. The subject of supplies, although discussed in general in the following paragraphs, will also be mentioned periodically throughout this chapter.

a. Transportation. The trip to and from the crash site can drain the physical resources of the investigation team. If the crash site is in a remote location or distant from the nearest Air Force base, try to get helicopter support. Attempt to enlist the aid of the Guard, Reserve, or similar Army or Navy organizations. Quite often they will

be glad to help, since they will be getting excellent training. Sheriffs' posses, equipped to travel through the roughest local terrain in all seasons, have been known to provide "volunteer" assistance for gas and a nice letter of appreciation from the appropriate "brass."

b. Communications. If the site is remote, a reliable link with the outside world is almost a necessity. Not only will it facilitate changes in plan if the investigation takes an unusual turn—it provides a safety valve if injuries should occur or if the weather should suddenly take a turn for the worse. Single-frequency bricks are quite useful when the wreckage is spread over a large area. They allow communication between physically separated team members as the investigation progresses. Secure systems are particularly valuable during off-base response. Check with nearest base information systems officer for availability of equipment.

NOTE: For mishaps in remote locations AFCC has developed a lightweight, portable communication system called HAMMER ACE which can be quickly deployed anywhere in the world and provide secure communications between safety boards and any organization they need to contact. The system consists of suitcase-sized communication equipment (which is air transportable) and two to five technicians to operate the system. The mobile equipment is deployed to the mishap site and bounces secure, long-range radio signals off a satellite to control headquarters at Scott AFB IL. Calls are then transferred on military or civilian phone lines to the final destination. HQ AFCC keeps three complete HAMMER ACE packages on alert around the clock, and they can be requested by contacting HQ AFCC/XORCP, Command Post, Scott AFB IL, AUTOVON: 576-2591, commercial (618) 256-2591.

c. Supplies—Personal:

(1) *Clothing.* Gloves are a minimum. Heavy leather gloves with a draw band at the wrist are recommended. Without them there will be guaranteed cut hands on the jagged metal being handled. Decaying flesh on the metal can cause a fatal combination. Also consider heat, cold, vegetation (briars eat flight suits and the legs in them), precipitation, and the condition of the terrain (muddy or swamp). White floppy hats are worth the money if you are picked to investigated a crash in the desert in the summar. Protective equipment is normally available through the nearest base. Additional items are discussed in chapter 4.

(2) *Water.* Each team member should have a canteen. A large jug (10 gallon) of water at a central location serves for resupply. If the wreckage spreads over a large area, especially during summer in a desert or tropical location, place several jugs along the wreckage pattern. Two quarts per person per day is a minimum, even in cold weather. In hot deserts you need a minimum of one gallon of water per day. If you're walking in the desert's daytime heat you'll be lucky to get 10 miles to the gallon. Plan accordingly. Headache and dark urine indicate dehydration—drink water!

(3) *Medical.* An appropriate first-aid kit is a must. The Doc (medical officer) can check one out from the base hospital. If sun or wind are severe, lotions or creams should be included.

(4) *Food.* The team will work better if its stomach is satisfied. Box lunches (or snacks) are usually adequate. C-rations are better than they were 15 years ago.

(5) *Sanitation.* Latrine facilities, garbage collection.

(6) *Extra.* Experienced investigators (those who do this type of thing on a regular basis) may want to make up their own personal kit.

d. Supplies—Investigative. Chapter 2 lists the type of kits each investigator should have access to. All this stuff should be put together on day one, before the team goes to the site. It's a formidable task, and the recorder will be hard pressed to get it all done without some help. But, if the detailed site investigation is to be started as soon as the "walk-through" and the following coordination meeting are completed, the necessary supplies (personal and investigative) will have to be there waiting.

6-16. SIB Administration. The following is a list of routine management actions which may be useful from the start; the recorder is available to assist you with these details:

a. Establish communications with the mishap site as soon as possible with on-site telephone service or a mobile radio net. Assistance from the base communications office will be necessary.

b. Establish a personnel access list for control of mishap site and board working areas.

c. Post an organizational chart showing functional responsibility, name, and phone and BOQ number of all members, advisors, observers, etc.

d. Assign a board member to each section of the formal report; use an AF Form 711h, USAF Mishap Report Checklist and Index. The column labels can be changed to reflect status, such as first draft completed, coordinated, final draft proofed,

photo ready copy, reproduced, etc. Post this where everyone on the board can refer to it.

e. Prepare a folder for each tab of the report. Include all required blank forms. These folders are for working papers.

f. Consider having a sign-in/sign-out board. Include technical advisors, industry representatives, etc.

g. Establish vehicle controls.

h. Establish inventory controls for supplies, mishap kit items, personal technical references, etc.

i. Obtain a bulletin board to announce such things as dining hall hours, bus schedules, meeting times, phone calls, etc.

j. Obtain workroom, preferably a conference room (with a large table at least 6 feet long), to provide working space for members, a meeting area, a place to lay out photos and to assemble the report. If you are working away from a military base, obtain a hotel or motel conference room.

k. Locate a separate room for typing; this is essential for both the typists and board members.

l. Obtain one or two rooms for writing, small conferences, and interviews.

m. Obtain a separate room for the president, preferably large enough to conduct meetings of the board and for interviewing witnesses.

n. Obtain a separate room for the flight surgeon, due to the sensitive nature of his or her work and evidence.

o. Provide each of these rooms with telephone service, with phone numbers identified as assigned to the safety board.

p. Obtain a vertical file for each member's working papers.

q. Establish clerical priorities early. Coordinate all typing priorities through a single manager, usually the recorder, to prevent confusion and uneven workloads.

6-17. Assigning Responsibilities. Assign responsibility for specific tasks as well as formal report tabs. Normally, assignments of primary responsibility are:

a. Investigator—Tabs A, J, O, R, S, and T.

b. Pilot officer—Tabs C, G, K, N, and P.

c. Maintenance officer—Tabs D, H, I, L, M, and W.

d. Medical officer, life-support and egress specialist—Tab Y.

e. Recorder—Tabs Q and Z.

f. Joint responsibility—Tab U.

g. Aircrew, maintenance, or supervisory personnel involved—Tab V.

h. Normally not applicable—Tabs B, E, F, and X.

6-18. Daily Activities. Meet at least once a day with all the board members. It is generally best to have this meeting at the close of the workday, however early morning meetings are also successful. At these meetings, each member briefs the day's activities and highlights the significant facts learned. A cross-tell of information between board members is particularly valuable in eliminating nonproductive or duplicative work. Each member should brief their intentions for the next day's activities. This also helps one member complement the other. For example, if the operations member is planning to interview the crew the following day, others also may have questions to be answered. Time is saved by a joint interview. A similar teamwork approach is also the only route to an adequate human factors analysis.

a. Informal minutes of these daily meetings may be taken by the recorder. (A review of these minutes at the next day's meeting acts as a reminder and enhances continuity.)

b. Organize the initial daily board meeting as follows:

(1) Obtain a situation brief to determine what is known and unknown. (Use blackboard.)

(2) Review initial phase, to determine degree of accomplishment.

(3) Determine areas of special interest so board members can be alert for evidence in these areas.

(4) Review schedule, workload, etc., and plan future activities.

(5) Determine, in conjunction with the investigating officer, if technical assistance is required, and contact Air Force Inspection and Safety Center through command channels to request technical assistance.

NOTE: If sabotage is suspected, immediately notify HQ USAF/OSI. (See AFR 127-4.)

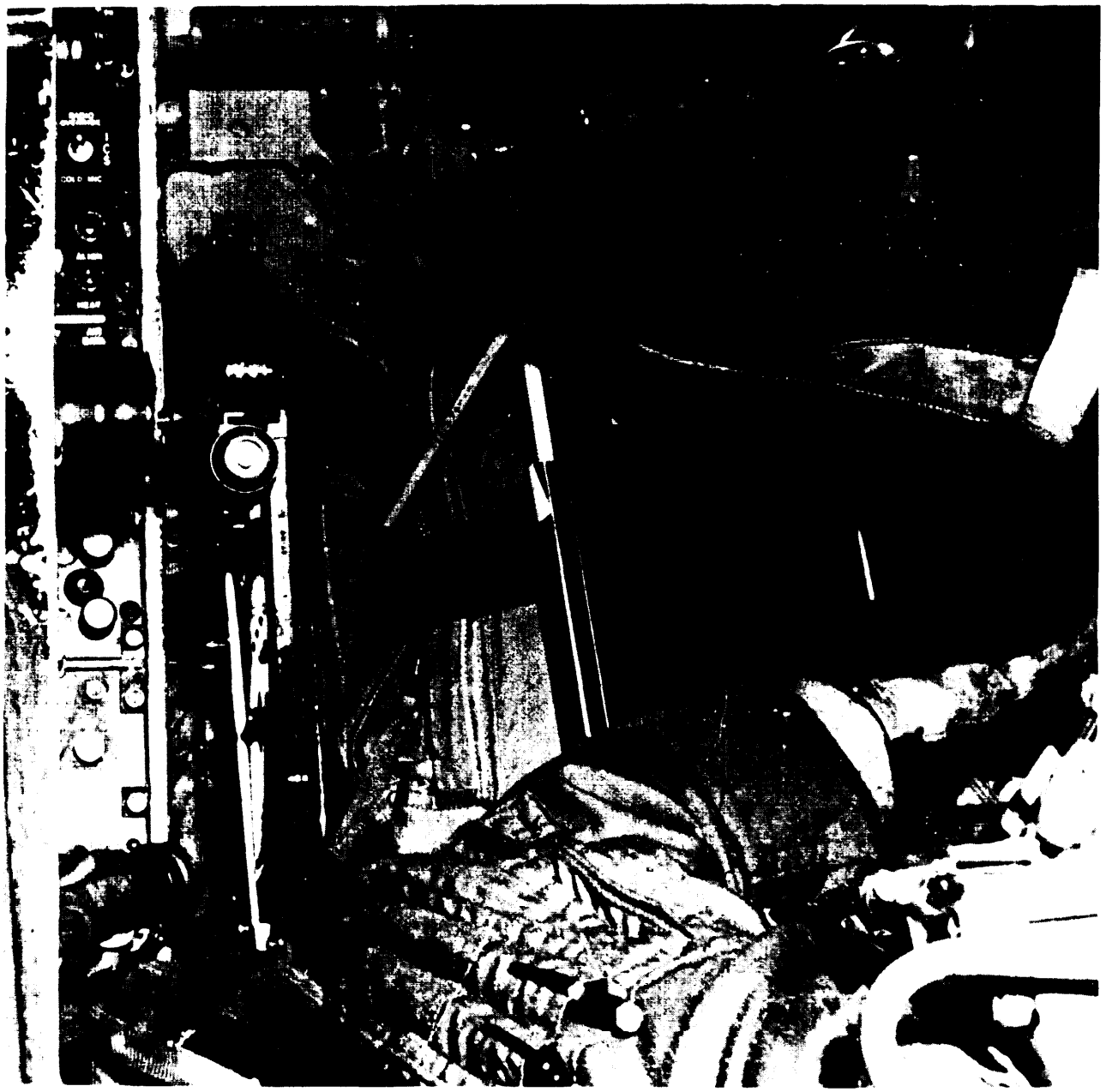
(6) Ensure all reports pertaining to the mishap are prepared, coordinated, and transmitted before their suspenses.

NOTE: The president should immediately advise the convening authority when circumstances which compromise operational effectiveness, security, or resources are discovered.

6-19. SIB Objectivity. An equally important aspect of the investigation is to approach the investigation with an open mind. Conclusions should be the result of the investigation, rather than a search for facts to support prejudged con-

a. Photo of Navigator's Clipboard in Normal Position.

Figure 6-2. Series of Photos Depicting Reconstructed Mishap Sequence of Events.

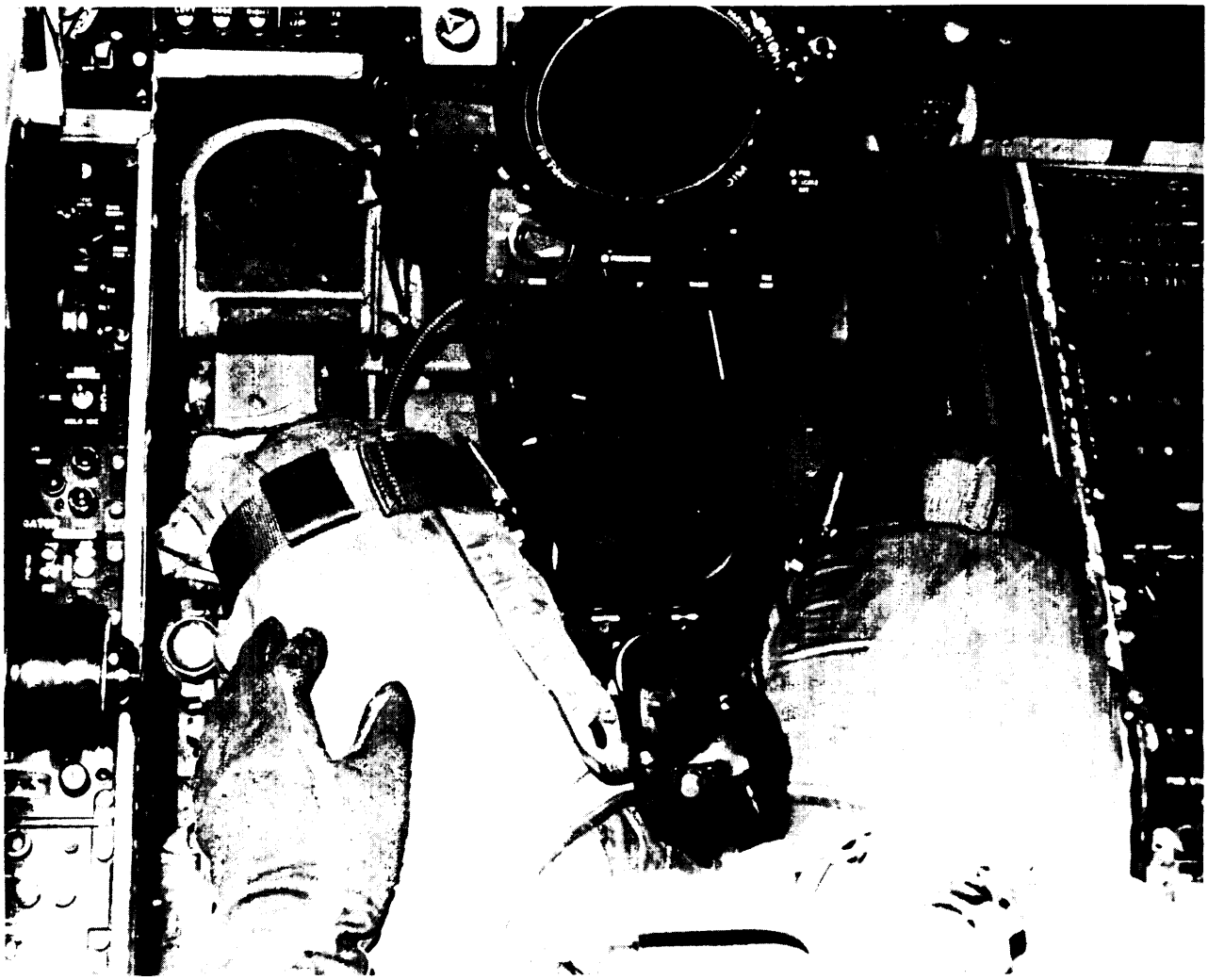


b. Pencil Points at Latch Mechanism.

Figure 6-2. Continued.

clusions. Your job is to determine the events that resulted in the mishap in their order of occurrence. Avoid prejudging events or circumstances before all the facts are known. There are two basic approaches which the board may take—inductive and deductive. The nature of the mishap and the number of readily available facts dictate the best approach. Most conclusions result from both inductive and deductive reasoning. The following is a brief discussion of each method.

a. Inductive Approach. After the facts are known, list possible events which may have led to the mishap, and systematically prove or disprove them one by one in logical sequence. In this approach, it is important not to eliminate seemingly slim possibilities too early in your examination. Here is one hypothetical example of the inductive approach: An airplane crashes 20 seconds after



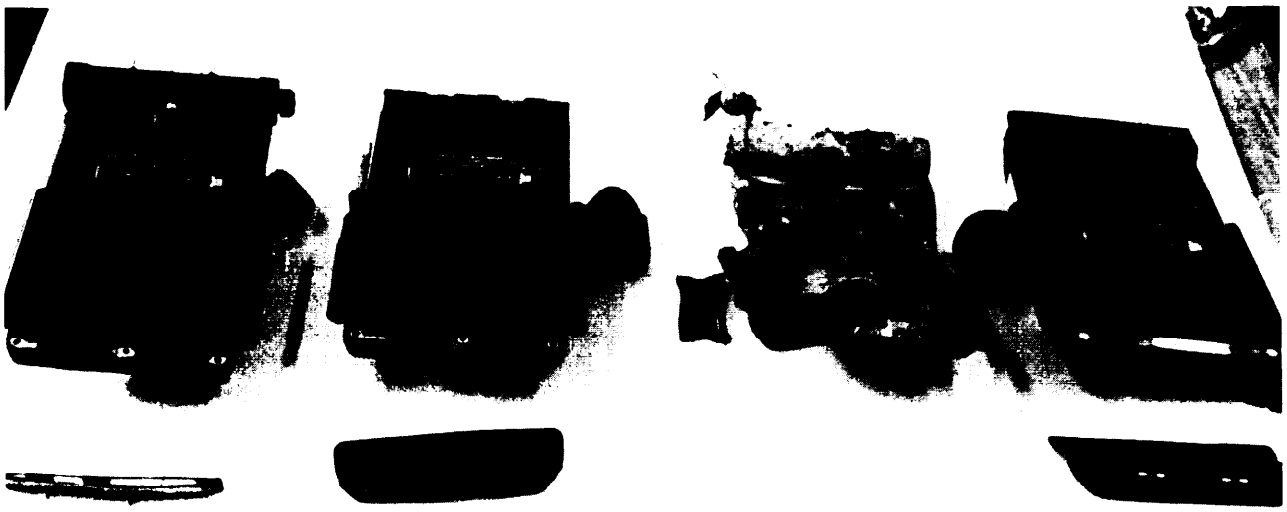
c. Clipboard in Position Before Crushing Aft Spring-Loaded Clip.

Figure 6-2. Continued.

liftoff; a partial list of possible events includes:

(1) Engine failure.
(2) Unwanted thrust reverser deployment.
(3) Primary structural failure of the wing.
(4) Induction icing.
(5) Pilot's incapacitation.

If the investigation reveals all engines were developing maximum thrust at the time of impact, you can cross out engine failure. If the thrust reverser actuators and valves were all in the fully closed and locked position the second possible event is eliminated. If the maintenance officer or structures expert concludes that no evidence can be found to support structural failure before impact, the third item becomes highly improbable. If the meterological conditions were not favorable for ice formation and the engines were developing maximum thrust, the fourth event also is improbable. The life-sciences group concludes from the autopsy that the pilot had cardiovascular obstructions sufficient to cause coronary occlusion and in a tense situation, a heart attack was possible. Further, x-rays of the pilot indicate numerous fractures of the hand and wrist bones, which may indicate the pilot was flying the aircraft at the time of the impact. No such injuries were found on the copilot. It becomes apparent that indeed the pilot may have experienced an incapacitating heart attack near the rotation point on takeoff. Deeper investigation, of course, would have to be made to substantiate this hypothesis. This is a very simplified inductive approach, but



d. View of Actual Clipboard Beside Test Clipboards.

Figure 6-2. Continued.

illustrates how to use it. One of the dangers of using such an approach is that it tends to channel your thinking.

b. Deductive Approach. In the deductive approach, all known evidence is listed and the sequence of events determined through detailed examination. Using the preceding example, the possible causes and the evidence would be reversed. A problem with the deductive approach is that a great deal of time may be consumed before zeroing in on the possible causes. Additionally, it is possible that too much extraneous evidence may act as chaff, obscuring the true cause. In actual practice it is necessary to employ both approaches in your search for your findings.

6-20. Managing Technical Advisors. Technical experts (air logistic specialist, contractor, systems specialist, engineers, human factors analyst, etc.) work directly for the board president. They normally work closely with the appropriate board member, and are just as eager to solve the mishap as you are. Many of the technical advisors who assist you have been in the business for several years and have seen numerous mishaps. Their ideas and advice should be sought by the board, and they should be included in SIB meetings and discussions under most circumstances. The technical expert is normally requested to investigate a specific area (i.e., power plant, flight controls, instruments, etc.). When he or she finishes the analysis, a written report will be provided to the board president and he or she will outbrief the board on findings. If the expert represents a company involved in the design, manufacture, or maintenance of the product, the report is acquired under the promise of confidentiality and is placed in Part II and Tab W of the formal report. This is essential to protect the information from disclosure (see AFR 127-4, chapter 1). Ensure the board president has the only copy of the report. If the person takes a copy of the report back to his or her employer, we may not be able to protect the report from subsequent litigation. The technical advisor should be released when his or her investigation is complete. Chapter 5 discusses technical assistance in greater detail.

6-21. Recording Physical Evidence. Several methods are available for recording evidence at the mishap site. Photographs, maps, diagrams, written descriptions, and listings each present certain advantages depending on the subject. Photography is often the first method considered, because it is convenient and expedient, but its limitations should be considered. For example, an investigator who needs to record the position of cockpit controls, switches, and circuit breakers would require several views of the cockpit area. He or she should bear in mind that the limitations of field photography (i.e., restricted depth of focus, variations in shadow definition, and inaccurate framing) may present difficulties in ascertaining all the needed information from photographs at a later date. It may be advisable to employ the more laborious method of preparing a

listing of each item with its position and using supplementary photographs of particularly significant areas.

a. Photographs. Aerial photographs are often useful for overall orientation of impact or fallout wreckage patterns. In instances where unusual wreckage patterns exist, or where there is evidence of midair collision or collision with trees, power lines, or buildings, using color film is advantageous for definition and clarity. Color photographs are especially useful in differentiating between metal areas discolored in varying shades by fire and to illustrate paint smears which provide clues to collision or the sequence of aircraft breakup. Usually, many more photographs are obtained than are required for the final report. Each photograph used in the final report should be carefully selected to illustrate a specific point made in the analysis. Each picture caption should call attention to the area of interest. Remember to document what each photograph depicts at the time it is taken to aid proper identification after development. (See chapter 9.)

b. Maps. A mishap report in which the flight path reveals clues to the cause or in which terrain considerations may have affected the pilot's decisions should contain a descriptively annotated map. Aerial photographs seldom illustrate the incisive features as effectively as maps, and are more difficult to scale. (See figures 4-5 and 6-5.)

c. Wreckage and Profile Diagrams. Diagrams aid in minimizing the descriptive text by illustrating the position of key items or terrain features relative to the impact point or final flight path. It is seldom necessary to record all of the collected data on the diagram although efforts to collect data should not be spared for this reason. Draft working diagrams should be refined to a form that is as simple and uncluttered as possible for use in the formal report. (See figure 4-3.)

(1) The techniques used in developing wreckage diagrams vary with the nature of the mishap. A runway mishap is usually best illustrated on an airfield diagram showing the points of initial touchdown or tire failure, ground roll track, stopping point, and debris scatter. In high-altitude disintegration mishaps where the fallout is extensive and across a large area, it is convenient to divide the fallout area into several smaller areas using roads, creeks, fences, and other landmark features to define the designated areas in the field. Each designated area is assigned a letter of the alphabet with the letter "A" representing the earliest area in the fallout. Other letters are assigned to the designated areas along the fallout path in the order of progression. All numbers assigned to aircraft pieces in any one area are written with the letter of the area followed by the sequence number for that area. Tagging has proven more reliable and permanent than merely writing the number on the piece with a grease pencil. This procedure permits more than one salvage crew to work simultaneously in the field, one crew for each designated area. The letter in the piece number helps considerably in wreckage evaluation after reconstruction, because the letter gives quick approximate information as to where the piece was found in the fallout pattern.

(2) For flight mishaps, a profile diagram is useful for illustrating evidence of the flight path angle before ground impact. The height and position of several power lines or tree tops relative to the impact point can be correlated with wreckage distribution and aircraft attitude and aerodynamic regime. Photographs may illustrate this information, but the angles are not always apparent. Intervening objects may obstruct a clear portrayal of conditions. A series of maneuvers which occurred preceding an out-of-control or midair collision mishap may require illustration by use of a profile diagram.

Section C—Developing the Report

6-22. Board Deliberations. This is perhaps the hardest part of the investigative process. The field investigation phase is complete, the "Golden BB" has been found (if you are lucky), or else you have to use your corporate knowledge to explain the most likely sequence of events. You have to analyze dozens of factors that *may* have affected the sequence of events and determine their importance. Then you have to *agree* on how to record these findings so they are crystal clear to the reader and don't imply the wrong information. You have a tough audience to please; you must convince the guy in the field that you have covered all the bases and that your analysis is accurate, otherwise any lessons learned will be disregarded. You must also resist the urge not to attack any command "sacred cows." Your charter is to "tell it like it is" and recommend changes you honestly feel are plausible and which will prevent future mishaps.

a. It frequently takes several days for the board to agree on a sequence of events, and the exact wording of the findings and of cause. This process is normal, healthy, and frequently leads the board to reexamine their evidence and their logic. Normally, the closer you get to the end of the in-

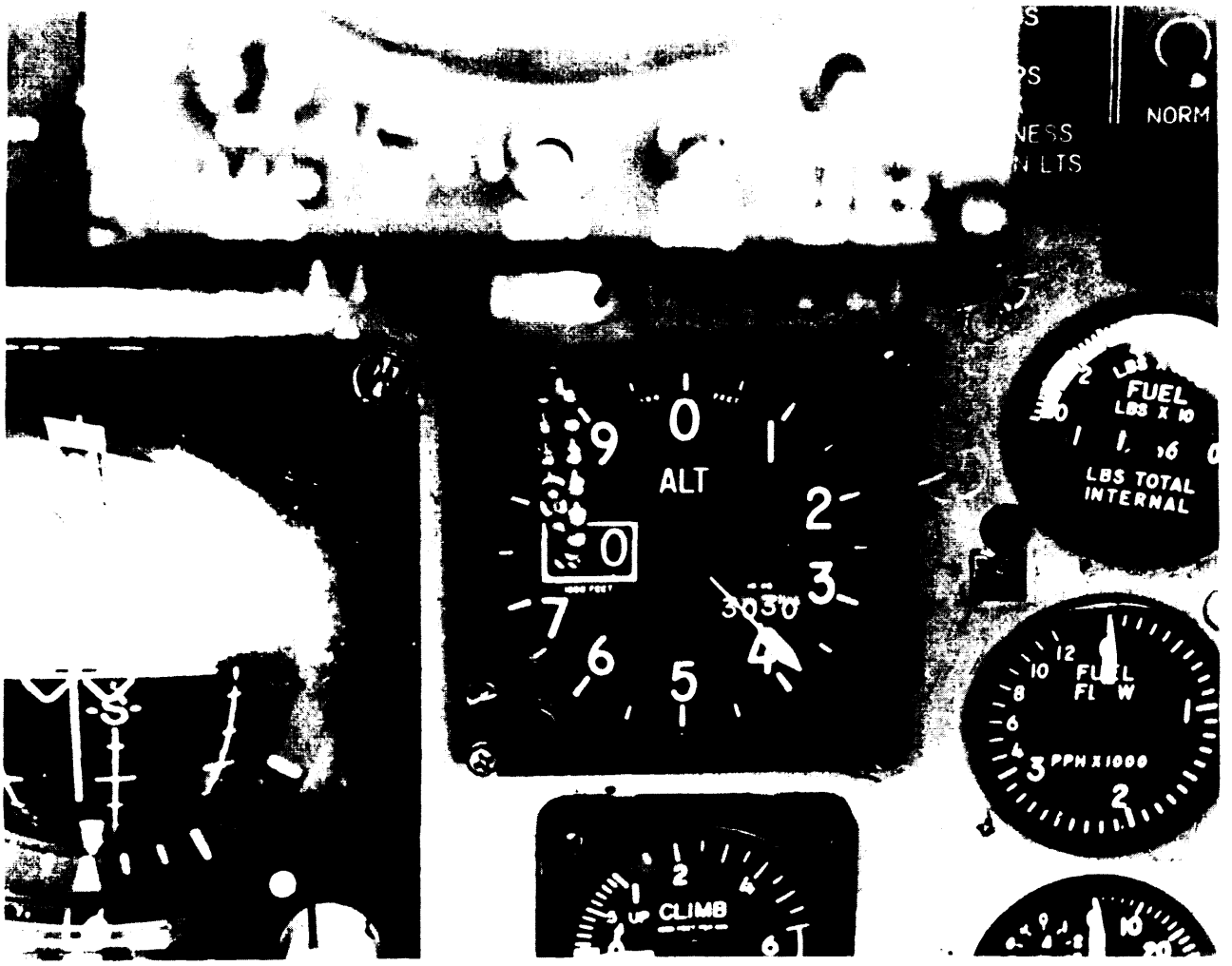


Figure 6-3. Overlooking the Obvious. A highly qualified pilot flys a perfectly good jet into the dirt at night. Why? Sometimes we have been looking through (or around) the problem for years.

vestigation, the greater the spirit of compromise becomes. Be careful not to let "get home-itis" interfere with the quality of the report.

b. Deliberations of the board need not be recorded. Generally the president or investigating officer prepares drafts of the proposed findings for all members. Differences of opinion over the relative influence of factors and shades of meaning are resolved. The president is an arbitrator as well as an evaluator. He or she may find it necessary to resort to polling the members to resolve differences. Even then, the majority has an obligation to consider the objections of the minority and to persuade them to change their point of view. An adamant minority has the responsibility for preparing a minority report. Tab T of the formal report contains the analysis which the board adopted. Conflicting opinions recorded elsewhere in the report need not be altered to conform. It is sometimes convenient to itemize conclusions at the end of the analysis to summarize the board judgments not reflected in the finding statements.

6-23. Writing the Report. The formal report is the only official record of the safety investigation. It will be read, dissected, analyzed, and shot at by all levels of your command as well as several other Air Force agencies. In addition to explaining your current mishap, formal reports are frequently reanalyzed in later years as trends develop or the command seeks data to support changes in training, hardware, or mission. As such it must be a comprehensive, well-organized product that supports your findings, causes, and recommendations.

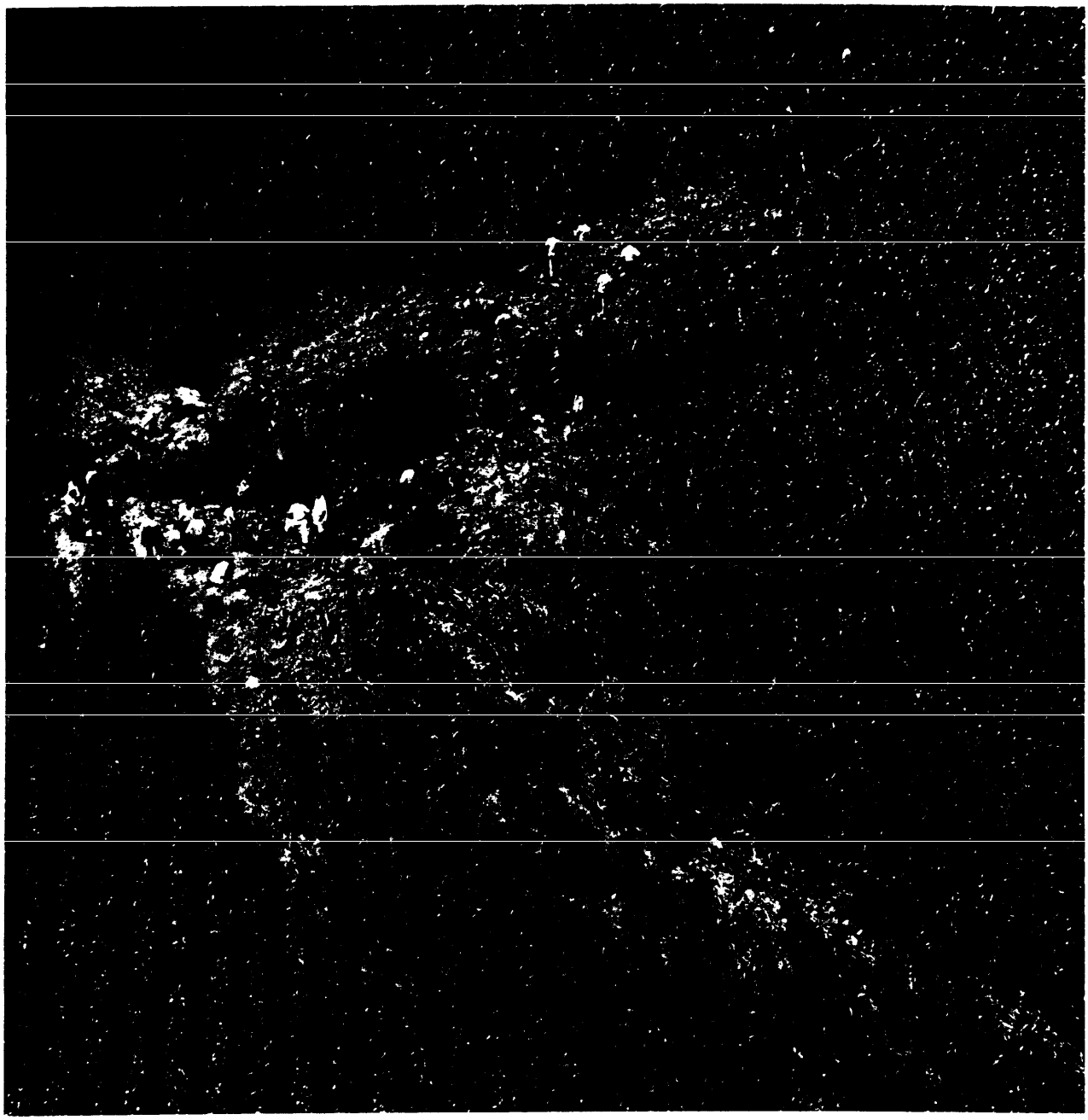


Figure 6-4. High-Speed, High-Impact Angle Mishap. Reference Paragraph 7-5 and volume II.

a. In most situations, limited typing support drives the need to type as much as possible, as early as possible. While typists will be busy typing witness testimony, tower tape transcripts, etc., they must also have time to type any tabs that may be ready. During the last week of the investigation, typists will be tied up with typing Tab T as it evolves, as well as any other unfinished tabs. They will also have to type letters of appreciation, letter of transmittal, and the final progress report. Once these products are typed, they have to be carefully proofed and changed as necessary. If you are fortunate enough to have access to word processing equipment it will expedite the process considerably.

b. Tab T will probably provide your greatest writing challenge. It ties together the entire report, and provides the reader a complete picture of what happened, board analysis and logic, and the findings, causes, and recommendations. Pick your

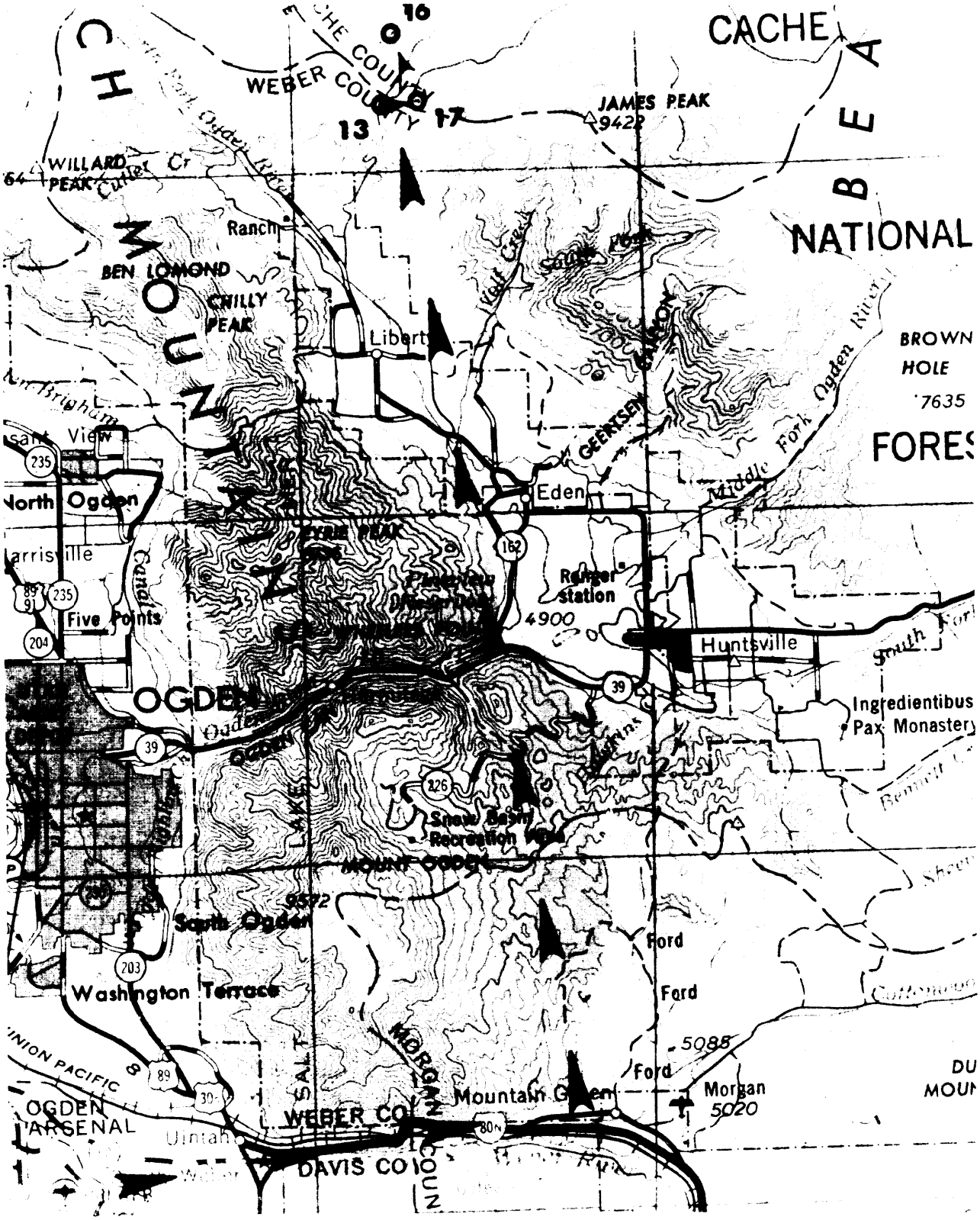


Figure 6-5. Illustrating Flight Path to Mishap Scene (Map).

good writers early, and have them start thinking about how they want to structure the tab, outline it, and then fill in sections as data becomes available. Portions pertaining to human factors should correspond to the guidance in chapter 10, perhaps providing pertinent excerpts from the overall human factors analysis. It is essential that the analysis support the finding, causes, and recommendations. AFR 127-4 and chapter 12 of this pamphlet discuss the formal report in greater detail.

6-24. Wrapping It Up. The formal report and, more precisely, the findings, causes, and subsequent recommendations, are "what it's all about." Your sole purpose is to identify and record the mishap causes in the sequence of occurrence and to make positive recommendations to prevent recurrence. Findings must have adequate support from the report. Supporting data without a finding is meaningless. Recommendations must be related to causes or significant injury and provide proper and lasting corrective action. A recommendation to brief all aircrews is not lasting, it is done whether or not you recommend it. However, an AF Form 847, Recommendation for Change of Publication, change to the Dash One results in lasting corrective action. If the need

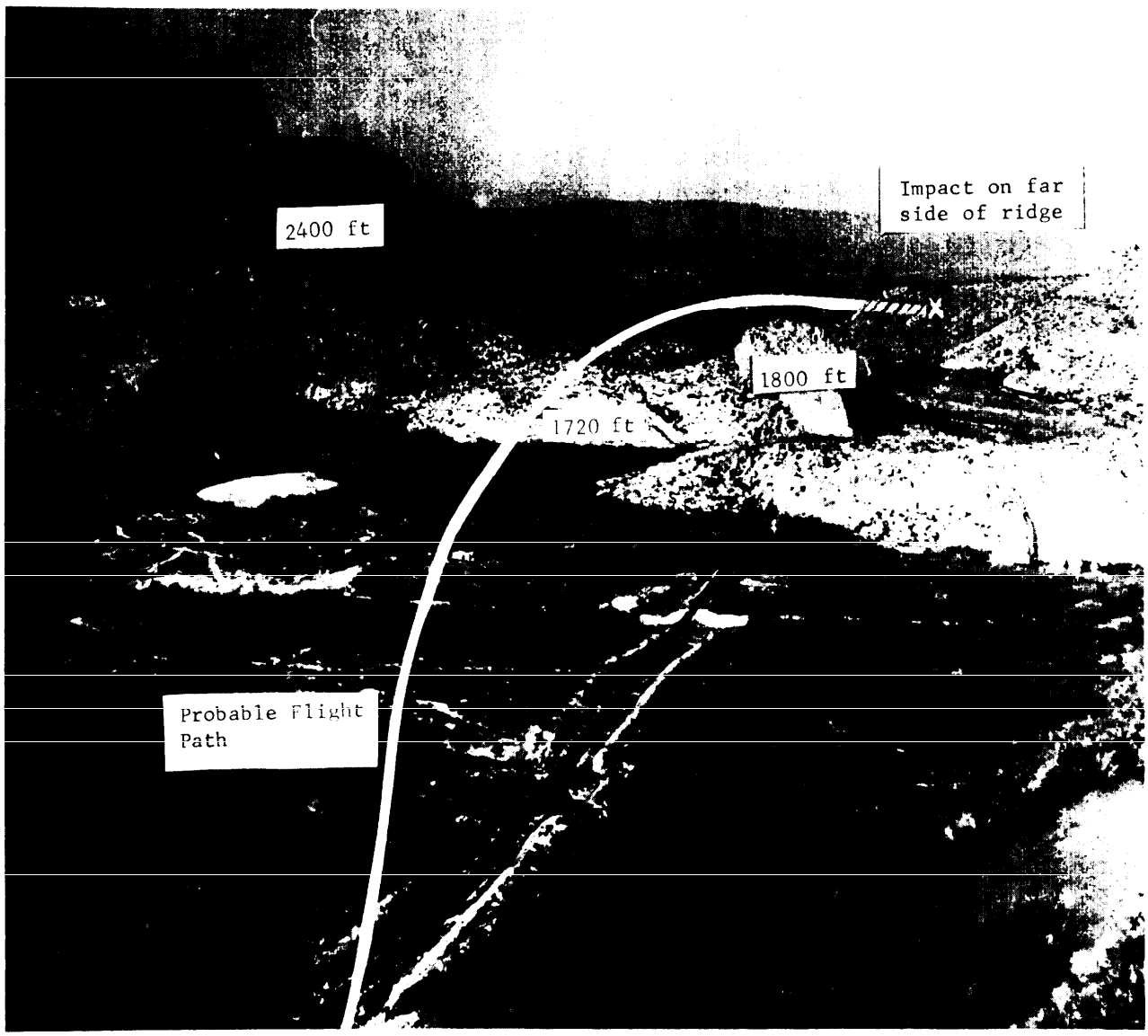


Figure 6-6. Illustrating Flight Path to Mishap Scene (Photo Overlay). This type of illustration quickly acquaints the reader with the terrain around the mishap area.

for action is evident before completing the investigation, take the required action immediately and mention it in the report. An example is an immediate suspension of flight activities at a facility with obvious hazards bearing on the mishap, such as malfunctioning ILS, or an obstacle on final approach.

a. You have 30 days to complete the investigation and report. This deadline may be extended (at your request) in unusual circumstances. In any case, it means that you and your board must work long hours, possibly through weekends and holidays, to meet the suspense. It is possible that all evidence is not available by the time you are ready to write your report. Flight data recorder readout, lab, and teardown reports sometimes require several days or weeks. With few exceptions, the report must be published within the required deadline; therefore, it may be necessary to reconvene your board at a later date to revise the report. To expedite analysis of components, consider sending a courier to hand-carry exhibits.

b. Near the end of the investigation some board members may complete their sections of the report before others. They become anxious to get home, but releasing some members earlier than others may leave you shorthanded. This could result in a hurried (possibly less professional) report by the remaining members. Remember, you also have to brief the convening authority before you are through. The decision on when to release the board members is the board president's. You probably are under pressure to get back home to your job. You still must keep in mind that until your report is published, your single purpose is the safety investigation.

c. At the completion of your investigation you may have found some problems that had no impact on the mishap, but which should receive command attention. Such findings frequently reveal trends and deficiencies that can be corrected only at higher command levels. These items should be reported as other findings and recommendations of significance. See AFR 127-4 for details.

d. Finally, the authentication page (Tab T) report must be signed by all voting members. The president should ascertain their agreement before releasing the board members. Rebuttal statements should be offered if required, and included when available. The board president customarily signs the letter of transmittal which accompanies the report.