

**CAP MANUAL**

# **EMERGENCY SERVICES**



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**15 APRIL 1983**

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**Training**

**EMERGENCY SERVICES**

This manual contains Civil Air Patrol operating concepts and policies which govern supervisory, ground, and flight personnel in the accomplishment of the CAP Emergency Services mission.

	Paragraph	Page
<b>Chapter 1 - Civil Air Patrol Policies</b>		
Section A - General Policies		
General .....	1-1	1
Information Releases .....	1-2	1
Training .....	1-3	1
Mission Funding .....	1-4	1
Section B - Mission Commitment Policy		
General .....	1-5	1
Interstate Assistance .....	1-6	2
Patient Transfer and Medical Evacuation .....	1-7	2
Law Enforcement .....	1-8	2
Entering Upon or Seizure of Private Property .....	1-9	2
Legal Implications of Emergency Services .....	1-10	3
Withdrawal of CAP Forces .....	1-11	3
Prevention of Fatigue .....	1-12	3
Criteria for SAVE Credit .....	1-13	3
<b>Chapter 2 - Organization, Qualifications and Alerting Systems</b>		
Section A - Organization		
General .....	2-1	5
Responsibilities .....	2-2	5
Emergency Services Organization .....	2-3	5
Resume or Checklist for Functions .....	2-4	7
ES Team Composition .....	2-5	7
Section B - Qualifications		
Emergency Services Qualifications Cards (CAP Form 101) .....	2-6	7
Qualifications .....	2-7	7
Currency Requirements .....	2-8	7
Requalification Procedures .....	2-9	7
Section C -Alerting System		
General .....	2-10	8
Alerting Procedures .....	2-11	8
<b>Chapter 3 - Briefings/Debriefings</b>		
General .....	3-1	9
Mission Briefings .....	3-2	9
Search Crew (Air/Ground) Briefings and Debriefings .....	3-3	9
Crew and Passenger Briefings .....	3-4	9
Debriefings .....	3-5	9

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	Paragraph	Page
<b>Chapter 4 - Search and Rescue</b>		
General .....	4-1	11
Liaison and Coordination .....	4-2	11
How a Mission is Initiated .....	4-3	11
Other Methods of Activation .....	4-4	11
SAR Mission Coordinators .....	4-5	12
Organizing Resources .....	4-6	12
Aircrew Requirements .....	4-7	12
Additional Resources .....	4-8	12
Situation Map and Mission Status Board .....	4-9	12
Air Search .....	4-10	13
VFR Transponder Codes .....	4-11	13
Standardization Map Gridding System .....	4-12	13
Civilian Volunteers .....	4-13	13
Relatives .....	4-14	14
Daily Mission Reports/Future Plans .....	4-15	14
Suspending the Mission .....	4-16	14
Closing the Mission .....	4-17	14
Mission Records .....	4-18	14
<b>Chapter 5 - Ground Operations</b>		
General .....	5-1	15
Mission Data Collection Teams .....	5-2	15
Interviewing Techniques .....	5-3	15
The SAR Ground Team .....	5-4	15
Mission of the Ground Team .....	5-5	16
Generalized Ground Search .....	5-6	16
Concentrated Ground Search .....	5-7	17
Working with Air Cover .....	5-8	18
Procedures on Entering the Scene .....	5-9	18
Evacuation .....	5-10	19
Discipline and Control .....	5-11	19
Vehicles Used by Ground Teams .....	5-12	19
Vehicle Operators .....	5-13	20
Ground-to-Air and Air-to-Ground Signals .....	5-14	20
<b>Chapter 6 - Civil Defense</b>		
<b>Section A - General Policies</b>		
General .....	6-1	21
CAP/Emergency Management (EM) Agreements .....	6-2	21
CAP/EM Assignments .....	6-3	21
<b>Section B - Emergency Management</b>		
General .....	6-4	21
<b>Section C - The Mission</b>		
How a Mission is Initiated and Mission Designators .....	6-5	24
Control of CAP Resources .....	6-6	26
State and Regional Disaster Airlift (SARDA) .....	6-7	26
CAP SARDA Organizational Structure .....	6-8	26
Air Missions Under SARDA .....	6-9	28
Radiological Monitors and Decontamination Teams .....	6-10	29
Aircraft Decontamination Procedures .....	6-11	30
Security Control of Air Traffic and Air Navigation Aids (SCATANA) .....	6-12	31
<b>Chapter 7 - Natural Disaster Relief Operations</b>		
General .....	7-1	33
Terms .....	7-2	33
Basic Policies .....	7-3	33
Responsibilities for Military Support .....	7-4	33
Concept of Operations .....	7-5	33
Mission Authorization .....	7-6	33
Air Force Reserve (AFRES) Coordination .....	7-7	34
Directing the Mission .....	7-8	35

with other activities being conducted to assist the person or property in distress.

f. Only CAP members certified in accordance with this manual, or as trainees under a qualified supervisor, will be allowed to participate in CAP ES missions.

g. Qualified CAP cadets are to be used as much as possible on appropriate ES missions. Cadets should be trained in the various functions of mission operations and ground support that are available to them, and then assigned meaningful duties. CAP cadets may be assigned these duties only when directly supervised by a qualified senior member. With the exception of transportation to and from mission base, cadets are not authorized to fly on any aircraft involved in official Air Force operational mission activity. Cadets who are to perform official functions at mission bases may be flown as passengers only between home base and mission bases (see attachment 13). No SAR or DR activities or other operational activity will be performed with cadets on board.

h. When CAP forces are committed to a mission controlled by another agency such as the American Red Cross or state ES agency, it will be performed in accordance with existing joint agreements. However, the basic policies of this manual will still apply.

**1-6. Interstate Assistance.** Once mission coordinators are appointed by the proper authority they should not hesitate to request, through proper channels, additional assistance from other CAP units, if needed.

a. In many instances, a mission will occur on or near the border of another CAP wing possessing the capability to give assistance. In these cases, the best course of action may be for the mission coordinator to: (1) augment from the adjacent CAP wing(s) or (2) appoint a sub-mission coordinator(s) from the adjacent state(s) to carry out a portion of the mission within a defined area.

b. In some instances where a mission includes several states, it may be more effective for the appointing authority to designate a mission coordinator, with sub-mission coordinators representing the other participating wings. Overall control and coordination would still rest with the mission coordinator.

c. All CAP personnel, regardless of unit or rank, will give the appointed mission coordinator complete support.

d. The mission coordinator will coordinate with the appointing authority while sub-mission coordinators will coordinate with the mission coordinator. Unless relieved of command by proper authority, the mission coordinator will be the final decision on all matters pertaining to CAP participation in the mission.

e. In order to extend CAP's capabilities to the maximum, region commanders should establish "Joint Agreements of Cooperation" between their wings and bordering regions. Formalized agreements of cooperation and assistance will reduce duplication of effort, enabling missions to be performed promptly and efficiently.

**1-7. Patient Transfer and Medical Evacuation.** The CAP will not normally be used for routine patient transfer or medical evacuation; however, CAP may be used for transport of persons seriously ill, injured, or in distress from locations where proper facilities are not suitable, or where other modes of patient transportation are not readily available. Prior to dispatching an aircraft or vehicle on this type of mission, the best medical evaluation will be obtained to determine the need for assistance. This is not to be interpreted to mean that decisions of medical authorities are final in deciding whether a mission will be performed. This type of mission should normally be categorized as a rescue mission and authorization obtained through the Air Force Rescue Coordination Center (AFRCC).

**1-8. Law Enforcement.** Law enforcement is not an authorized activity for CAP under Title 36, Sections 201-208 of the U.S. Code. However, should CAP personnel happen to notice illegal activity or have reason to suspect that a crime is being committed, such observations should be reported to the appropriate law enforcement authority. CAP personnel may not take any enforcement or investigative actions, either in the air or on the ground. Similarly, when requested by the Federal Aviation Administration (FAA) or military authorities, CAP members may provide crash site surveillance. Again, they may not act as law enforcement officers and have no authority to use force to restrict access to wreckage. If assistance is required, the senior CAP member present will contact the nearest law enforcement agency available.

**1-9. Entering Upon or Seizure of Private Property:**

a. As a general rule of law, CAP members have *no* greater rights than any other citizen, and entry upon private property without permission is a trespass. See CAPR 900-3, CAP Assistance to Law Enforcement Officers and Agencies, for details.

b. Entry upon private property by civilians is normally justified, if such an act is for the purpose of saving life or personal property. There must be a reasonable certainty, however, that the persons or personal property are actually upon the land and that entry upon that land is necessary in order to save life or personal property.

c. Under no circumstances may a civilian seize property or engage in searches beyond the exceptions set out above.

	Paragraph	Page
Reporting .....	7-9	35
Peacetime Radiological Monitoring .....	7-10	36
American Red Cross (ARC) .....	7-11	37
Salvation Army .....	7-12	37

#### Attachments

1. Emergency Services Function with Duties and Checklists .....	39
2. Emergency Services Qualifications .....	55
3. Track Analysis Program .....	60
4. Scanning Techniques and Procedures .....	61
5. Aircraft Crash Sighting Characteristics .....	63
6. Determination of Search Areas and Establishing Priorities .....	65
7. Search Probability of Detection .....	69
8. Visual Search Patterns .....	72
9. Electronic Search Patterns .....	74
10. Ground-to-Air and Air-to-Ground Signals .....	77
11. Hand Signals .....	79
12. U.S. Army and Numbered AF Reserve Headquarters Areas .....	82
13. Authorization to Fly Cadets to and from Emergency Services Mission Base .....	83
14. Abbreviation .....	84
15. Gridding .....	85

#### Figures

2-1. Emergency Services Organizational Chart .....	6
6-1. FEMA Organization Chart .....	22
6-2. FEMA Region Boundaries .....	23
6-3. SARDA Organization Chart .....	25
6-4. SARDA Civil/Military Control Relationships .....	27
7-1. Flow Requests for Military Assistance (Natural Disasters) .....	34
7-2. TEMPEST RAPID I .....	36
A4-1. Clock Position .....	62
A6-1. Possibility Area .....	65
A6-2. Probability Area 1 .....	66
A6-3. Probability Area 2 .....	67
A7-1. Track Spacing .....	69
A7-2. Probability of Detection Chart .....	70
A7-3. Cumulative POD Chart .....	71
A8-1. Trackline Search Pattern .....	72
A8-2. Parallel Track Search .....	72
A8-3. Creeping Line Search .....	72
A8-4. Expanding Square Search .....	73
A8-5. Contour Search .....	73
A8-6. Topographical Map .....	73
A9-1. Wing Shadow Method .....	74
A9-2. Aural Search .....	75
A9-3. Aural Method using Squelch .....	75
A10-1. Body Signals .....	77
A10-2. Search and Rescue Signals .....	77
A10-3. Air-To-Ground Signals .....	78
A10-4. Message Drops .....	78
A11-1. Hand Signals for Fixed Wing Aircraft .....	79
A11-2. Hand Signals for Rotary Wing Aircraft .....	81

#### Table

A6-1. Parachute Drift Table .....	68
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## Chapter 1

## CIVIL AIR PATROL POLICIES

## SECTION A - GENERAL POLICIES

**1-1. General.** The Civil Air Patrol (CAP) is a non-combatant auxiliary of the United States Air Force (USAF) that has volunteered its services to conduct various emergency services (ES) missions. These missions are in support of personnel in distress and should, therefore, be conducted professionally and expeditiously. Proper organization, thoroughness, and timeliness cannot be over emphasized. Although CAP is a volunteer organization, its responsibility to do a job well is not lessened. By accepting these missions, CAP assumes a public responsibility.

a. This manual should be used as a guide in the preparation and execution of search and rescue (SAR) and disaster relief (DR) operations. Situations may dictate variations in the procedures contained in this manual. There's no substitute for common sense in the effective management of ES resources. The main concern is to accomplish the mission with safety and speed. Safety should never be sacrificed to save time.

b. The definitions of commonly used abbreviations found in this manual are listed in attachment 14.

c. Unless otherwise stated, "CAP aircraft" or "CAP vehicle" includes both CAP corporate and privately owned.

d. Unless otherwise stated, "missions" in this manual include SAR activities coordinated by the Air Force Aerospace Rescue and Recovery Service (ARRS); DR activities in support of local, state, and national DR organizations, authorized by the Air Force Reserve, numbered Air Force; and ES evaluation/training missions approved by National Headquarters CAP.

e. CAP continually seeks better methods to improve its capability. Suggested revisions or additions to this manual should be addressed through channels to National Headquarters CAP, Attention DOS, Maxwell AFB AL 36112.

**1-2. Information Releases.** Information that is releasable on CAP/ES missions should be given promptly to news media representatives. In addition to keeping the public informed, releasing certain information could lead to public assistance in reporting data that may assist in search missions.

a. Responsibilities. CAP unit commanders are responsible for public affairs activities concerning their unit's operations. Each unit commander will appoint a public affairs officer (PAO) to discharge these responsibilities. Unit PAOs at all levels are responsible for providing all releasable information to news media as quickly as possible.

b. PAOs will use CAPM 190-1 and attachment 1 to this manual as the guide for all media relations concerning ES missions.

**1-3. Training.** Except during actual missions, the primary responsibility of ES personnel is training. Commanders must insure that an adequate upgrade, currency, and standardization program is maintained to provide for qualification and proficiency of unit personnel.

**1-4. Mission Funding.** CAP members and units may be reimbursed for fuel, oil, partial aircraft maintenance, and communications expenses incurred during Air Force-authorized missions. CAPR 173-3, USAF Payments for Civil Air Patrol Support, must be reviewed for current reimbursement policies and procedures. State, Red Cross, and other agencies may provide limited mission funding according to prearranged agreements.

## SECTION B - MISSION COMMITMENT POLICY

**1-5. General.** The determination to commit CAP ES forces during adverse conditions is a difficult decision. A calculated risk in the use of these forces may be justified during hazardous missions involving people in distress. Unit commanders and mission coordinators should rely upon the decisions of the on-scene commander, if unable to personally be there.

a. Upon locating survivors, all personnel must assume that immediate assistance is necessary and act accordingly. The condition of survivors cannot be determined accurately through aerial observation alone.

b. Before a mission coordinator or ground team leader commits their forces to provide assistance to distressed personnel, known capabilities of personnel and equipment, and the urgency of the situation must be weighed carefully against the chance of mission success.

c. The initiative or aggressiveness of CAP personnel to save lives through use of approved operating procedures by qualified personnel should not be restricted. After the mission coordinator or on-scene commander has made a sound evaluation and decided to commit resources, all echelons will support the decision to attempt the mission.

d. Commanders will conduct a continuous training program to insure that all personnel thoroughly understand and apply the policies in this manual. Training programs will clearly define responsibilities, stressing the need for thorough knowledge of the capabilities and limitations of equipment and personnel.

e. CAP ES forces may be deployed whenever they can be effectively used. They should not interfere

**1-10. Legal Implications of Emergency Services.** There are certain legal principles which CAP members participating in ES activities should be aware of to protect themselves and the corporation from legal liability. While it is impossible to have specific rules which will be valid in all the states and territories, we can mention several general principles of law that might assist in the quality of CAP service and decrease the risk of individual and corporate liability. The legal officer of each wing should review the following guidelines to insure they are in accord with the laws of the state and add suggestions to assist the CAP members in avoiding legal liability arising out of ES activities.

a. **First Aid and Emergency Medical Care.** Whether or not a CAP member who injured a person while giving medical aid will be held legally liable for such actions normally depends upon his/her degree of training and the type of medical aid. Generally speaking, however, persons with adequate medical training as determined by the state and who perform necessary first aid to the best of their ability run a minimal risk of liability. Exactly how far an individual may go in administering medical treatment without running a serious risk of liability varies from state to state and depends upon a number of factors. For instance, numerous states have "Good Samaritan" laws or legal doctrines providing that a person will not be held liable for damages arising out of the emergency medical treatment unless recklessness can be proved. To avoid legal problems, study local laws and legal precedents to determine your individual situation. Some suggested areas include:

- (1) What constitutes an "emergency?"
- (2) What amount/type of medical training is needed?
- (3) Is there an age restriction?
- (4) Is there a licensing requirement?

b. The use CAP may make of its ambulances is detailed in CAPR 77-1, CAP Vehicles. Whether or not CAP vehicles may use sirens or flashing lights will depend on state and local ordinances. There is no corporate prohibition against CAP ambulances using sirens or flashing lights, as long as such use is in accord with local laws.

c. CAP personnel may assist the American Red Cross (ARC) in providing manpower for ARC first-aid stations at public events; however, they should not wear CAP uniforms or participate under the auspices of CAP. Instead, they can offer their services as private citizens who have received the requisite Red Cross medical training.

d. **Emergency Services Missions.** CAP members, while acting within the scope of their duties on ES

missions, will be given protection from liability claims by the United States Government for AF-authorized missions or the CAP liability insurance program for non-AF-authorized missions. Specific and current information on CAP insurance can be found in CAPR 900-5. Additionally, non-ES rated personnel may not participate in ES missions in a manner contrary to CAP directives. There are no exceptions to this policy. Mission coordinators deliberately violating CAP directives may find themselves and the CAP corporation exposed to liability.

e. **Summary.** In any ES situation, a person should perform only those services in which he/she is qualified and which are essential in order to save a life. Again, keep the following in mind:

- (1) Follow CAP directives.
- (2) Impose a higher standard of conduct than the directive requires under appropriate circumstances.
- (3) Do not engage in devious plans to circumvent the directives, even if the end seems justified.
- (4) If an error is to be committed, let it be on the side of caution and not risk.

**1-11. Withdrawal of CAP Forces.** Once CAP forces have been committed to a mission controlled by another agency, they will not be withdrawn except upon authorization of the controlling agency or decision of the CAP unit commander. CAP commanders must have reasonable justification and use proper tact when withdrawing their forces. Notification will be given to the controlling agency prior to withdrawal.

**1-12. Prevention of Fatigue.** Commanders and mission coordinators will insure that personnel being sent on flights have had sufficient rest to enable them to safely complete the proposed flight. CAP crews will make a conscientious effort to avoid or reduce fatigue while flying, by:

- a. Periodic separation from flight duty station.
- b. Periodic light refreshments of moderate amounts of hot foods, soup, fruit juice, etc.
- c. Avoidance of excessive smoking.
- d. Periodic sleep.

**1-13. Criteria for SAVE Credit:**

a. A SAVE is the preservation of a human life as the result of actions taken by ES forces. The determination as to whether or not a SAVE is made rests with

the reporting agency (for example, AFRCC for SAR, NAF for DR) based on the recommendation of the appropriate mission coordinator or participating ES element. In the case of a medical evacuation, the attending physician must attest to the SAVE. Normally, a SAVE will be credited to the element of the ES force making the recovery; however, a search force may be credited

with a SAVE if it singularly locates the SAR objective and directs the retrieval force to a successful recovery.

b. Although considerable latitude is allowed in determining SAVE credit, some element of jeopardy to the life of the individual must be present either by reason of physical condition or the situation from which rescued, or both.



## Chapter 2

## ORGANIZATION, QUALIFICATIONS AND ALERTING SYSTEMS

## SECTION A — ORGANIZATION

**2-1. General.** The purpose of ES activities is to save lives and relieve human suffering while protecting the lives and equipment of those involved in providing these services. Thus, it is essential that all efforts be consistent with the capabilities of CAP personnel, equipment, facilities, climate conditions, etc. CAP forces must be organized, trained and equipped to respond rapidly to emergency requirements. Thoroughness in planning and executing the mission cannot be overly emphasized. Rapid reaction in response to a mission request could mean the difference between life or death. Professionalism, organization and training are key factors in realizing quick response and successful mission accomplishment.

**2-2. Responsibilities:**

a. **Wing Commanders.** The wing commander is responsible for proper use and control of all CAP ES personnel and equipment assigned to the wing. It must be emphasized that requirements listed in this manual are minimal. To properly use ES assets assigned to the wing, the commander should supplement these requirements to suit the specific mission needs; that is, mountain search, remote desert search, swamp search, etc. The wing commander will:

(1) Publish an ES directive in the form of either an operations plan, standard operating procedure, wing letter, or supplement to this manual in order to insure control during all ES missions. These directives should explain the specific requirements and procedures established by the wing for its personnel during ES missions; that is, mission procedures, qualifications, wing alerting procedures, required reports, and forms, cadet participation, and communication procedures, etc.

(2) Establish a wing directive in writing which will insure that the minimum training requirements listed in attachment 2, and any additional requirements desired by the wing are *accomplished* and *documented* before any member is certified as qualified and issued a CAPF 101.

(3) Insure a roster of ES qualified personnel is maintained at unit and wing level to assist in timely personnel notification and response.

(4) Provide maximum assistance within existing policies and their unit's capability to requesting agencies.

(5) Develop procedures for relaying required and pertinent operational information to the appropriate controlling agency (for example, state ES agency).

(6) Coordinate with state and local ES official for training, equipment, and for the establishment of integrated ES plans and exercises that will satisfy state ES requirements.

b. **Wing Directors of Operations (DO).** The wing DOs will accomplish the following, some of which may be delegated to the wing ES officer:

(1) Monitor ES activities including training and actual missions.

(2) Coordinate ES training with other staff agencies.

(3) Develop state/CAP wing ES plans and coordinate with appropriate officials.

(4) Maintain records containing the status of personnel, vehicles, aircraft, radios and other emergency equipment available for emergency missions.

(5) Insure that sufficient, trained personnel, including qualified mission coordinators, are available for ES mission accomplishment.

(6) Develop mission coordinator kits and insure they are available for CAP mission coordinators. This kit should contain required regulations, manuals, maps, forms, checklists, resource directories, etc., normally needed to conduct any ES mission.

(7) Insure that procedures are developed and used to determine that mission pilots are current and qualified as outlined in CAPR 60-1 before they begin any mission flying.

(8) Insure that any aircraft used on a mission has met all FAA inspection requirements.

c. **Unit Commanders.** Unit commanders will:

(1) Train their members to insure the qualification of ES personnel before issuance of CAP Form 101.

(2) Coordinate with local ES agencies for training, equipment, joint exercises, and plans. Do not over obligate your unit.

(3) Train their members in measures to insure survival of CAP personnel and protection of CAP equipment.

**2-3. Emergency Services Organization.** Wing commanders, through their designated representatives should assure that sufficient, trained personnel and equipment are available to carry out ES missions effectively.

a. The CAP coordinator for the mission will be selected by the wing commander, or his/her designated representative, from a list of qualified personnel. The selected mission coordinator will serve in this capacity until relieved by the appointing authority. Extensive ES operations may require the assignment of one or more sub-mission coordinators. Sub-mission coordinators will report to, and be directly responsive to the mission coordinator.

b. The mission coordinator and sub-mission coordinators, if assigned, will organize personnel under their control for maximum efficiency and economy of operations. Qualified assistants should be provided to help with planning and operations so that the mission coordinator may direct all efforts toward the mission. Sub-area mission coordinators are direct representatives

of the mission coordinator and have the same duties, responsibilities and specialty qualification as the mission coordinator. The functional chart (figure 2-1) indicates functions or duties that *normally* have to be performed. Although assignment of a separate individual to each function may not be possible, the tasks in each function normally must be accomplished. For example, the briefing officer and the debriefing officer may be the same individual; the PAO may also be the administrative officer; or, the majority of the functions may be performed by two or three individuals on a non-distress ELT ground search at an airport. The scope of the mission, and the availability of people and equipment will determine how the mission staff is organized. The functional chart shown *is not* intended to be a manning structure but simply lists the functions that may be required and suggests how they should be grouped and supervised.

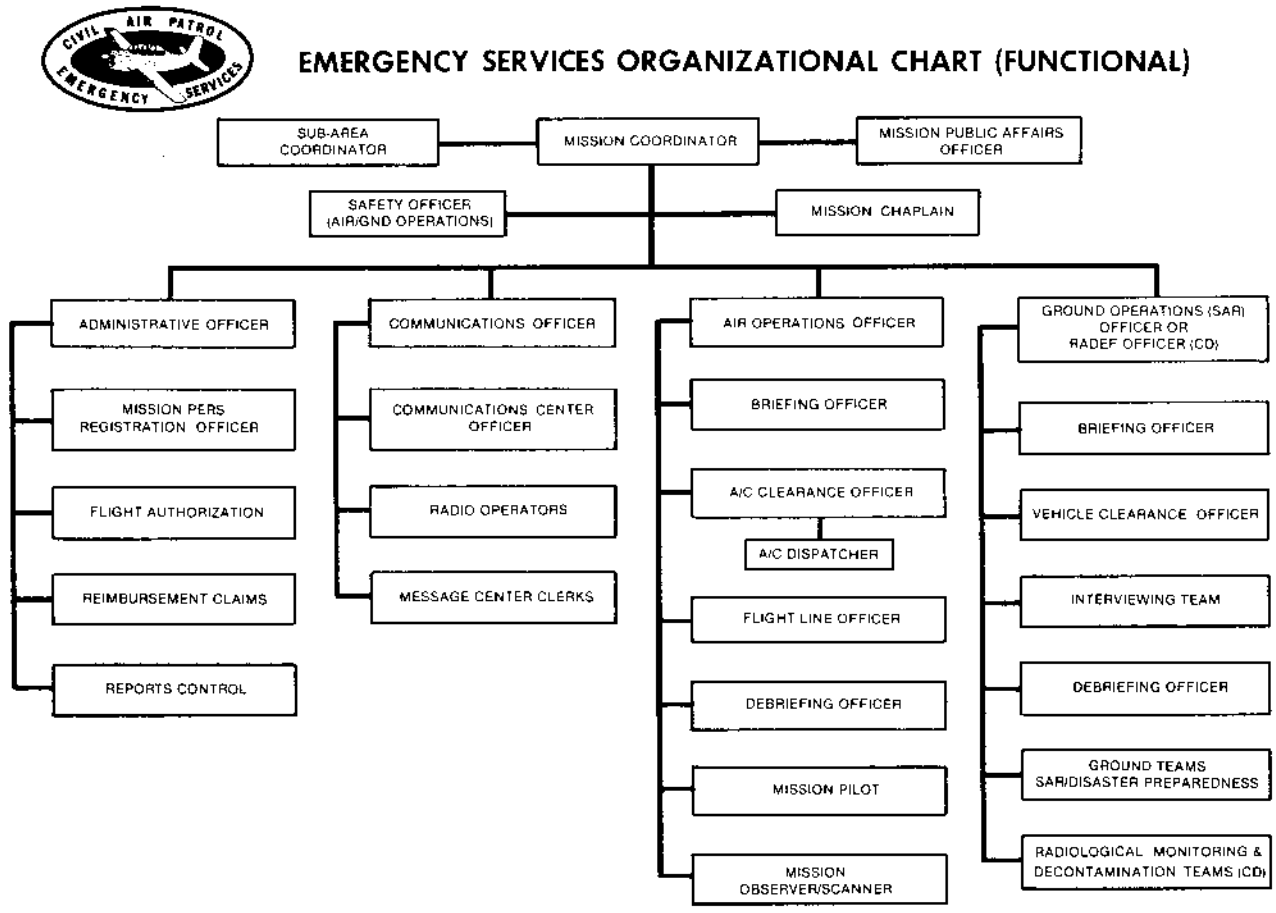


Figure 2-1. Emergency Services Organizational Chart.

**2-4. Resume or Checklist for Functions.** Because those involved in ES missions are frequently required to fill more than one function, a ready-reference (checklist) must be available covering the responsibilities of specific functional tasks. Attachment 1 provides such a basic resume to help in selecting those best qualified to accomplish each function and a brief check list to use in carrying out functional responsibilities. Additional checklist items should be added as required to suit local situations.

**2-5. ES Team Composition:**

a. **Mission Pilots, Observers and Scanners.** Sufficient mission-qualified crewmembers to form two complete aircrews for each aircraft is desirable. More than one scanner/observer per aircraft is also desirable if aircraft configuration permits.

b. **Ground Crews.** Sufficient ground crew personnel should be present on each mission to service and dispatch aircraft promptly. Cadets, properly supervised by a senior member, may be used in ground crews.

c. **Ground Team.** A ground team will normally consist of 6 to 12 qualified CAP members, cadets, or seniors. Medical personnel, if available, will be included in each land rescue team. See chapter 5 for additional information concerning ground teams.

d. **Interviewing Team.** This extremely important team should consist of two or more CAP members whose purpose is to interview knowledgeable people and investigate leads. These teams may also be referred to as data collection teams. Interviewing teams should be provided with vehicles and radio communication equipment.

e. **Decontamination Teams.** For civil defense missions, a decontamination team will normally consist of four to six qualified CAP members, one of which must be a qualified RADEF monitor.

f. **Aerial Damage Assessment (ADA)/Aerial Radiological Monitoring (ARM).** All observers and scanners should qualify for these specialties if they are members of a squadron with a disaster preparedness mission.

**SECTION B — QUALIFICATIONS**

**2-6. Emergency Services Qualifications Cards (CAP Form 101).** This card identifies specialties or functions in which CAP members may participate during ES missions.

a. The CAP Form 101 will remain valid for a period not to exceed three years from the date issued and must be accompanied by a current CAP membership card.

b. Wing or unit commanders will recall the CAP Form 101 from unit personnel for the following reasons:

(1) Serious or willful violation of federal, state, local, or CAP regulations.

(2) Committing any other action or omission which could bring discredit upon CAP while performing an ES function.

(3) If a member's qualifications are doubted by the unit commander for any reason, he or she will not be allowed to participate in a CAP mission in that specialty.

**2-7. Qualifications.** Missions conducted by ES personnel are, by nature, hazardous and should be accomplished with a maximum degree of safety as well as proficiency. A life may depend on skillful performance of each individual. Because of this, minimal training must have been completed before a member participates in a mission.

a. An ES card is issued to current CAP members who have knowledge and experience in a given specialty. When the qualification requirements have been met, the wing commander or designated (in writing) representative will sign and issue the ES card to the member. Each commander must carefully evaluate the individual's qualifications before recommending the issue of an ES card. Designated representatives will inform the wing of the ES card issue date and the specialty in which each individual is qualified. This information will also be recorded on the unit ES qualification roster.

b. The training requirements in attachment 3 are *minimums* and should be treated as such. Training should not stop with initial qualification since professional performance demands continuous training. Examples of continuation training programs available are: AFRCC Search Management Course, National Search and Rescue School, Federal Emergency Management Agency (FEMA) home study courses and USAF-authorized ES training missions.

c. In addition to the specialty training requirements of this manual, members must comply with all local, state, and federal laws including those pertaining to vehicle, aircraft, and ground equipment operations.

**2-8. Currency Requirements.** ES personnel must perform their duties periodically to assure maintenance of skills required of that specialty. As a minimum, ES qualified personnel must participate in at least one ES mission (actual or practice/training) each three years in each ES rating held to maintain their current ES specialty/rating. The only exception is additional mission pilot qualification requirements in CAPR 60-1 and the biennial mission pilot flight check.

**2-9. Requalification Procedures.** If an individual fails to meet the three-year minimum listed in paragraph 2-8 above, he or she will be considered unqualified to participate on ES missions without supervision of a qualified instructor. To regain qualification, the in-

individual must participate in training (usually on an ES training mission) under the supervision of a qualified instructor, and then demonstrate performance of the required duties for that specialty. Instructors, when satisfied with the individual's performance, will make their recommendation known to the unit commander, in writing. If approved by the commander, a new ES card will be issued.

### SECTION C — ALERTING SYSTEM

**2-10. General.** Operational readiness is mandatory for the successful accomplishment of the CAP ES mission. Personnel and equipment must be available and ready at all times. Preparations and procedures will be established to insure prompt and effective deployment. A CAP wing and unit alerting system will be published to provide immediate response on a limited basis at all times, and full-scale operations as soon as possible.

**2-11. Alerting Procedures.** CAP wing commanders will insure that a roster of personnel through which CAP can be contacted for ES assistance is published. This list will be sent to the AFRCC, the applicable numbered Air Force Headquarters, and other interested agencies that may desire CAP services. This list should

be updated and redistributed as changes occur, at least annually.

a. When a request for assistance has been received and the decision has been made for CAP to participate, personnel will be alerted in accordance with established wing and unit alerting procedures. Individuals qualified to perform ES should be listed on the ES qualification roster.

b. Speed-into-action. The alert system will assure ES personnel becoming operational as soon as possible. The safety of personnel and equipment will not be jeopardized, however. Inadequate preparations and unauthorized short cuts will not be tolerated. Alert system procedures should provide sufficient time for crew briefing, flight planning, and normal operation of all equipment.

c. If the AFRCC has reason to believe a mission may be opened subsequent to further investigation of a SAR incident, they may exercise a pre-alert. A pre-alert will allow ES officers time to begin an initial assessment and organization of resources and personnel; however, until the mission is formally initiated by the AFRCC, no Air Force mission number will be issued.

## Chapter 3

## BRIEFINGS/DEBRIEFINGS

**3-1. General.** Formal and complete briefings/debriefings are extremely important for safe and effective mission accomplishment. They must be comprehensive, but concise and specific. Inadequate briefings may lead to aircrew complacency, incomplete mission accomplishment, and compromise of safety. Briefings and debriefings will be conducted in a formal atmosphere and in a suitable briefing room. Professionalism and compliance with directives will be stressed. Detailed checklists should be used to prevent deletion of important data. Briefings also must be scheduled to allow aircrews ample time for pre-departure activities.

**3-2. Mission Briefings.** A general group briefing is normally accomplished at the beginning of the mission and updated as necessary. Actual time of the briefing will be established by the mission coordinator. The briefing should present important information and bring air/ground crews up-to-date on developments in the mission. Participating personnel must be kept fully informed of operational plans and status of the mission so that individual aircrews and ground teams may make sound decisions and assist in providing information to the mission coordinator.

**3-3. Search Crew (Air/Ground) Briefings and Debriefings.** In addition to the requirement for a general mission briefing, an individual detailed briefing for each aircrew/ground team will be given by the briefing officer prior to each sortie. This will include areas to be searched, type of mission, altitudes, search patterns, communications frequencies and procedures, and other information considered pertinent. Since the briefing officer may change from mission to mission, or even during the same mission, folders should be prepared to assist the briefer. These folders should contain items listed below, plus any others required by the unit.

a. For Aircrew:

- (1) CAP Form 104, Mission Flight Plan/Briefing, or appropriate wing form.
- (2) CAPM 50-15, Emergency Services.
- (3) Gridded aeronautical sectional charts should be prepared on a permanent basis and always available in mission coordinator and aircrew mission folders. Current charts must be used for navigation and obstruction clearance. These current charts may, but need not, be gridded.
- (4) Specialized unit briefing checklists, if prepared by the unit.
- (5) Any other material appropriate for aircrews.

b. For Ground Teams:

- (1) CAP Form 109, Vehicle Clearance.
- (2) CAP Form 106, Ground Interview.
- (3) Road maps.
- (4) Aeronautical sectional charts for the area are desirable to aid with air/ground coordination.
- (5) Specialized unit briefing checklist if prepared by the unit.
- (6) CAPM 50-15, Emergency Services, or applicable parts of manual.
- (7) Any other appropriate material for ground teams.

**3-4. Crew and Passenger Briefings.** Prior to each flight, the pilot in command will brief the search crew and passengers. This briefing will include essential information regarding each flight such as route, weather, altitudes, duties, and specific information concerning the aircraft such as survival equipment, emergency exits, inflight emergency procedures, etc. When more than one flight is accomplished by the same crew and passengers during the day, subsequent briefings are not required except to note changes from the previous briefing.

**3-5. Debriefings:**

a. Debriefings permit the collection and recording of information which aids any successive activities. A crew cannot search and have "negative results." Even if the objective is not located, important information can be obtained; such as weather, turbulence, ground cover.

b. The search crew may prepare their own debriefing comments on the flight plan while relaxing between sorties. The debriefing officer can then review this and interview the crew for additional information.

c. Some of the most important information the search crew can provide is where they searched and how effective the search was. This should include weather, turbulence, shadows, ground coverage, visibility, primary search direction, etc. At the end of each search day, the mission coordinator and staff should review the appropriate forms for the complete search picture and determine search area priorities for the next day's activities.

d. The percentage of coverage for each sortie must be determined for each area searched. This percentage, expressed as a percentile and termed probability of

detection (POD), is the probability of the aircrew detecting an object within those areas actually searched. The factors that influence POD include visibility, terrain, ground cover, search altitudes, etc. A simplified chart for estimating POD is included in attachment 7.

e. CAP Form 104 may be used to assist the debriefer. Additional items may be added at the unit's discretion.

## Chapter 4

## SEARCH AND RESCUE

## 4-1. General:

a. Search and Rescue (SAR) response in the United States is based on a humanitarian principle which compels people to help those in distress. These distress situations range from a local search for a lost child to an extended search for a missing aircraft in an area covering several thousand square miles. Each situation is unique and requires investigation to determine the last known location, urgency of the situation, and the number of people involved.

b. Although there are many agencies involved in SAR, the ARRS, through its AFRCC, is the single federal agency responsible for coordinating SAR activities in the 48 contiguous states. The AFRCC prime mission is the coordination of SAR for both military and civilian personnel. The United States Coast Guard (USCG) is assigned SAR coordinator responsibilities for the Maritime SAR Region and for overseas Unified Commands in the Overseas Regions. Note: The CAP, as an auxiliary of the USAF, provides primary SAR resources to the AFRCC for search in the United States.

4-2. **Liaison and Coordination.** Accomplishment of SAR operations may require the cooperation and assistance of many agencies with a variety of missions and widely dispersed facilities. Organizations whose main purpose is to conduct SAR operations are called primary SAR agencies. Those organized for a primary purpose other than SAR, but capable of assisting in SAR are called secondary SAR agencies. CAP units must coordinate and cooperate closely with both primary and secondary agencies, whether military, civilian, or foreign. The primary purpose of liaison and coordination is to plan mutual assistance in order to eliminate duplication and confusion.

a. CAP commanders and operations personnel should be thoroughly familiar with the responsibilities and capabilities of primary and secondary SAR agencies within their area of operation. Direct liaison and coordination with these agencies on SAR matters are essential.

b. Joint area SAR plans are encouraged but, if impractical, agreements and operating procedures with individual agencies should be made. The overall responsibility for development of SAR plans and agreements rests with the CAP wing.

## 4-3. How a Mission is Initiated:

a. For aircraft on FAA Flight Plan. When an aircraft is one-half hour overdue its estimated time of arrival (ETA) at the proposed destination, the FAA Flight Service Station (FSS) attempts to contact the aircraft via radio. Next, if there is a control tower at the

destination, a check is made to determine if tower personnel have seen or talked with the overdue aircraft. The departure FSS forwards the entire flight plan to the designation FSS, to include the pilot's name, address, number of persons on board, alternate airports, etc. Contact is also made with FSS along the intended route of flight to determine if the pilot indicated a delay or reported position.

b. At one hour after the elapsed ETA on a VFR flight and 30 minutes on an IFR plan, the FAA issues an information request (INREQ) to the AFRCC. An area communications check is made by contacting, via radio or direct phone line, airports and FSS's regarding the overdue aircraft. A check is also made of nearby ramps to see if the pilot may have landed and failed to close his/her flight plan.

c. At one and one-half hours past the ETA, or at fuel exhaustion time, or any time there is serious doubt as to the safety of the aircraft or its occupants, an Alert Notice (ALNOT) is issued. This notice is sent to the AFRCC and to all FAA facilities within fuel range of the aircraft, and a communications check is again made. Ramp checks are expanded (normally 50 miles either side of the intended route of flight from last-known position to the designation) and small, uncontrolled airstrips are now checked. The FAA uses its NAVAID broadcasts to alert all pilots of the overdue aircraft. Relatives, friends, and business associates of the pilot and passengers of the overdue aircraft are contacted by the AFRCC and questioned to obtain information about the pilot's intentions, flying habits, personal situation, and the possibility of the flight to other than the announced destination.

d. After the AFRCC has sufficient information to believe the aircraft is missing or has met with an accident, a search is initiated and SAR agencies, such as the CAP, are alerted. The mission coordinator and search bases are tentatively selected and then the information, including phone numbers, is called into the AFRCC before alerting the wing commander.

## 4-4. Other Methods of Activation:

a. Under other circumstances, a search may be initiated differently. If a MAYDAY is broadcast, in-flight deteriorating weather conditions are reported, aircraft disappearance from a radar scope is observed, or an emergency locator transmitter signal is heard, a search may be called immediately without preliminary checks.

b. If a flight plan is not filed, several days could pass before family or friends realize the aircraft is lost. In such situations, concerned persons may contact a CAP member to request assistance after which the AFRCC should be notified. In these cases, a thorough

investigation is usually made before SAR forces are activated. The CAP member will contact the AFRCC and the wing commander or have the individual requesting the assistance do so. *No unit may initiate emergency services missions without first obtaining permission from the wing commander or designated representative and normally without an Air Force authorized mission member.*

#### 4-5. SAR Mission Coordinators:

a. The designation of mission control for a particular SAR mission will be determined by AFRCC. For a military incident, usually the military installation nearest to the last known position will be so designated. If a civil incident, mission control will be in accordance with the agreement between AFRCC and the appropriate state authority. Usually CAP is specified as the mission coordinator but, in some instances, the state director of aeronautics or the AFRCC retains mission control.

b. The AFRCC mission controller will determine the validity of a report of a missing aircraft or person prior to alerting CAP forces.

c. The mission coordinator will contact the AFRCC for a mission briefing as soon as validity of the report is determined. Through this contact, the mission coordinator will be able to determine the facts for use in pursuing in unknowns.

d. Familiarization with all aspects of the mission is essential. Time, money, and effort can be wasted when once completed actions are repeated. Repetition of ramp checks, however, is normally not considered a waste of effort.

e. Although CAP may be designated mission coordinator, assistance of other agencies can be requested through the AFRCC.

f. In order to obtain reimbursement and to ensure coverage under the Federal Employees Compensation Act, Air Force authorization, including an Air Force mission number, must be received by the wing from the AFRCC before any mission travel begins.

g. The mission coordinator exercises full authority for matters pertaining to the mission and makes all final decisions relative to the mission relating to the employment of CAP forces. The mission coordinator exercises operational control over all involved CAP forces and should offer assistance to other forces. In dealing with other agencies, tact and courtesy will be exercised to the fullest. A mission coordinator must not permit strained relations between organizations to hinder the mission.

#### 4-6. Organizing Resources:

a. The mission coordinator will organize personnel for maximum efficiency and economy of opera-

tions. Qualified staff personnel must be provided to assist with the details of planning and operations, and enable the mission coordinator to direct his efforts toward the mission. Sub-mission coordinators are directly responsible to the mission coordinator and have the same duties, responsibilities, and specialty qualifications as the mission coordinator.

b. The chart in figure 2-1 indicates functions to be performed. This chart is not intended to be a manning structure, but lists the functions that may be required and how they should be generally grouped together and supervised. The resume of duties and checklists in attachment 1 will assist in determining who is best qualified to accomplish each function.

#### 4-7. Aircrew Requirements:

a. A successful search requires standards of proficiency, professionalism, and safety for aircrews. Once qualified, proficiency must be maintained through participation in actual, training, or evaluation missions.

b. To become an aircrew mission-qualified member, the minimum qualifications listed in attachment 2 must be attained. Fully qualified mission personnel will be issued the CAP Form 101.

#### 4-8. Additional Resources:

a. The successful completion of a mission will depend upon the maximum effort of all SAR forces. Search safety and prompt location of the target must never be sacrificed by individuals or organizations competing for the "Find." CAP responsibility usually ends when the target is located and *positively identified*. CAP may assist in subsequent rescue and recovery, but unless delegated to CAP, primary responsibility for these operations usually rests with the sheriff of the county in which the wreckage is located or, if a military incident, the Surgeon General.

b. The role of the mission coordinator must be understood by non-CAP forces, especially civilian organizations, clubs, and commercial entities, before they are used. This can be eased by responsible organizations reaching agreements beforehand concerning assistance required, control of the operation, methods of communications, alternate actions and, if commercial sources are used, who is to pay for the service. At any time the mission coordinator feels that non-CAP resources are jeopardizing the mission, assistance should be requested from the AFRCC or responsible agency. For example, if non-CAP pilots are creating a hazard to the CAP search effort by penetrating assigned search grids or prearranged boundaries, the mission coordinator may be forced to withdraw CAP aircraft or request FAA to declare the search area a disaster area in accordance with FAR 91.91. This is a last resort, and every effort should be made to work the problem at a local level.

#### 4-9. Situation Map and Mission Status Board:



a. **Situation Map.** The progress of the mission will be plotted on a current dated map, preferably an aeronautical sectional chart. All leads and areas of probability should be posted to the map. A clear plastic overlay may be placed over the map to keep track of each day's search activities. Adding a new overlay each day will permit a look at that day's activities as well as the total effort.

b. **Mission Status Board.** The following should be posted and updated on a mission status board. Additional information pertinent to the mission may be included.

(1) Copy of CAP Form 102 with current information about the missing person(s).

(2) Hazards to flight in the search area; terrain, weather, towers, military flying areas, restricted areas, etc.

(3) Search base (airport) facilities and hazards; new construction, congested areas, facilities available, communications, refueling, taxi instructions, parking plan, etc.

(4) Other airfields in the search area; distance, types of airfield operations, facilities available, communications, refueling, etc.

(5) Search base(s) radio frequencies and emergency communications plan.

(6) Debriefing information.

(7) Information on the mission progress.

**4-10. Air Search.** The search may be divided into the preliminary phase and the concentrated phase.

a. **Preliminary Search.** During the early part of a mission, all of the territory in which the target could have disappeared should be covered as quickly and safely as possible. Normally route searches are recommended for this phase. When judged safe and necessary by the wing, an initial search at night may be warranted. Night search air or ground teams should be alert for unexplained lights, fires, or possible distress radio communications. Weather information for daylight search efforts may also be gained from these missions.

b. **Concentrated Search.** If the target is not found during the preliminary search, areas of highest probability in which the target may have disappeared are determined. This may be done by studying the flight or trip plan, the weather, the terrain, and various other factors connected with the incident (see attachments 6 through 8).

c. Aircrews will insert the word "Rescue" in their normal call sign when they are engaged in a USAF or USCG authorized SAR mission (that is, Cessna

Rescue 1234X). The use of the call sign "Rescue" when not engaged in an actual SAR mission is not authorized.

**4-11. VFR Transponder Codes.** VFR aircraft which fly authorized SAR missions for the USAF or USCG may be advised to squawk 1277 in lieu of 1200 while enroute to/from or within the designated search area. Aircrews will not squawk 1277, or any other discrete code, except at the specific direction of the controlling radar facility.

**4-12. Standardized Map Gridding System.** The AFRCC uses a standardized gridding system, which is explained in attachment 15.

**4-13. Civilian Volunteers:**

a. During many missions, non-CAP civilian pilots will offer their services. They may be relatives or friends of the missing persons, or may be "bounty hunters" looking for a reward. Although usually sincere, these volunteers are often unskilled in search flying and air operations and may create a safety hazard. Without the search area being declared a disaster area in accordance with FAR 91.91, CAP cannot keep civilians out of the search area; however, by offering operational suggestions to them, the mission coordinator will know where they are and avoid sending CAP planes into the same areas.

b. If the mission coordinator cannot convince the volunteers their services are not required, efforts should be made to cooperate with them, not only for the benefit of the missing crew, but for subsequent community relations and safety of all SAR personnel. Most important to *remember is that the CAP cannot make assignments to these civilian volunteers, but certain advice and services can and should be offered.* These volunteers should be shown the mission status board for information about the search objective, weather, and other pertinent data. They should be shown the situation map and the gridding system and briefed on the importance of staying within the designated search area suggested. The volunteers should then be informed of CAP active search areas and asked to stay clear of those areas. The civilians can then select from those suggested the areas they wish to search. It should be marked off immediately so CAP aircraft will not be assigned. The mission coordinator may try to discourage a pilot who wishes to fly an area that may be above his or aircraft capabilities, such as a Cessna 150 in 9,000-ft. mountains.

c. Services can be offered by asking the pilots to monitor 123.1 so liaison can be maintained with the base, other search aircraft, and ground teams. Dispatching services should also be offered, with a separate Operations Control Log. The pilot should be encouraged to come into the search base for debriefing.

d. Air Force reimbursement or insurance is not authorized these volunteers.

e. For ground search activities, such as for a lost child, civilian volunteers can be used to augment regular SAR forces by working with CAP personnel in non-flying capacities.

#### 4-14. Relatives:

a. When relatives and friends of missing persons visit the mission base, they may pose a problem but their concern must be understood. The conduct at the mission base should reflect an organized, efficient, and professional operation.

b. These persons should sign the guest roster, be given identification tags, and escorted to the mission coordinator. If they are unfamiliar with the CAP and search operations, the PAO should give them background information on CAP and the AFRCC. The PAO can answer questions and escort them on a tour of the base. Staff officers should be introduced and answer questions pertaining to their positions, time permitting. If weather is hampering the search, explain how this limits air search and what alternatives are being pursued, such as ground search and information gathering. A chaplain should be available to visit with the family and to encourage them to leave the mission base by perhaps accompanying them to his own home. Family presence at the base often leads to emotionally upsetting experiences and can cause SAR personnel discomfort, especially if weather or other circumstances limit search activity.

c. Active participation in the search by the family should be discouraged. Emphasis should be made that CAP personnel are especially trained and doing all they can. Mission staff personnel should become familiar with CAPM 60-1 guidelines concerning who may ride in CAP aircraft. When the family wishes to rent or use their aircraft and fly a search on their own, procedures apply as outlined for civilian volunteers.

d. Relatives should definitely be discouraged from offering a reward for locating the plane. They should be told that CAP does all it can for every lost airman and offering a reward might well jeopardize the safety of the SAR personnel in the field. Rewards invariably bring out "bounty hunters" who seldom let the search base know where they are working, thereby creating serious hazards to search aircraft.

**4-15. Daily Mission Reports/Future Plans.** The AFRCC must have periodic (at least three) mission activity reports: beginning a day's activity, at mid-day, and the formal report upon ending a day. Ideally, the AFRCC would like information reports every three hours during mission activity. Expense to the USAF or lack of activity is not sufficient reason to disregard these

reports. Upon arriving at the operating location, two telephones should be acquired, making one of them a "restricted phone" and divulging its number only to AFRCC, wing staff, and other essential contacts. A relatively open phone line for important calls would then be available. CAP Form 122, SAR Mission Report, provides an outline of the data the AFRCC requires.

**4-16. Suspending the Mission.** All reasonable efforts will be made to locate the search objective, determine the status, and rescue or recover the objects. The decision to conduct extended operations must be based upon the probability of finding survivors. After all probability of locating survivors has been exhausted, extended operations become unwarranted.

a. When extensive SAR coverage has produced negative results, or climatic conditions, lack of information, or other circumstances justify suspension of the mission, the coordinator will recommend to AFRCC that the mission be suspended. Only after coordination with AFRCC will rescue activity cease.

b. If the recommendation to suspend the mission is not approved by AFRCC, active SAR coverage will continue until the mission is closed or until circumstances arise which justify another recommendation to suspend the mission.

c. Use CAPM 50-21 to assure all actions necessary to suspend a mission have been accomplished.

**4-17. Closing the Mission.** The mission coordinator may close a mission when:

a. Rescue/recovery has been completed.

b. Positive determination of location has been made and continued use of CAP forces could be of no value.

NOTE: Use information provided in CAPM 50-21 to assure all actions necessary to close a mission have been accomplished.

**4-18. Mission Records.** Wing commanders will ensure that records pertaining to each authorized mission are filed at wing headquarters. These records should include the mission coordinator's log, copies of news releases, reports to the AFRCC/NAF, and any other information that may be needed to answer inquiries relating to the mission. Records should be maintained in accordance with state statute of limitations time requirements or for at least two years after the mission has been closed or suspended.

## Chapter 5

## GROUND OPERATIONS

**5-1. General:**

a. This chapter discusses the various phases of ground operations, from mission data collection to evacuation. The success of ground operations in any SAR, CD, or natural disaster mission is geared to the performance of duties by the ground teams. Activities of ground teams are governed by state and local laws, as well as by CAP regulations and policies.

b. Numerous searches are started during or immediately following bad weather. Cloud cover, frontal activity, icing, poor visibility, and turbulence are frequently contributing factors in aircraft incidents and may also pose problems to air search activities. When search aircraft cannot be launched, other ES personnel should be prepared to assume mission-data collection and ground search activities to assure that a maximum search force is in the field during the critical period following the incident.

c. Like SAR missions, many DR missions are initiated during or immediately following bad weather. Floods, snowstorms, tornados, and hurricanes can create extensive damage, preventing normal operations such as communications and travel. ES personnel should be qualified and equipped to provide maximum assistance to the community and other ES agencies until the disaster area can again assume normal operations.

d. The two basic ground teams are distinguished by those which are lightly equipped and are for mission data collection, and those which are fully equipped and manned for all activities.

**5-2. Mission Data Collection Teams:**

a. The mission data collection team is small, usually only two members. Members must be selected on the basis of professional qualifications, experience, aviation background (for aviation-related searches) and personal discretion. They should come from professions adept at interviewing, such as clergy, counselors, law enforcement officers, etc. Cadets may be included in the team but must be accompanied by a senior with a valid driver's license. Once experienced as a mission data collection team member, they should be used for that on other ES missions. To be effective, team members should look and conduct themselves in a professional manner.

b. The team mission is to conduct interviews to find new information and to investigate leads. Information collection should be considered one of the most important functions of a search. Without accurate data collection, air and ground teams waste valuable search time.

c. Information vital to the mission must be relayed to the CAP mission coordinator as soon as possible. For this, mission data collection teams should have two-way radio contact with the mission base. Equipment and operators must be properly licensed. Teams should also have a list of all telephone numbers which might be needed to relay information.

**5-3. Interviewing Techniques:**

a. Checklists, CAP forms or other aids should be used by interview team members to make sure all applicable items are covered. Some suggestions for conducting an interview are:

(1) Properly identify yourself before beginning. Present your CAP membership card to assist in identification. Always leave your name and telephone number should they later recall other information.

(2) Be careful not to relate any details about the mission not essential to fact-finding. Offer as few facts concerning the mission as possible as it may tend to "put words in their mouths." Give enough information, however, to help them recall the incident. For example, "We are searching for a small plane believed to have flown over this area late yesterday afternoon."

(3) If your witnesses have seen or heard something they feel might be important, let them tell it in their own words. Validity of the details can be established through discussion. CAP Form 106 provides a list of suggested data needed and a place to record the information.

(4) Be skeptical of statistical information given by untrained persons. If a person tells you he saw an aircraft flying at 1200 feet, find out if they have had flying experience. Should he tell you that the aircraft was only a couple hundred feet above the trees, this may be a reliable statement.

(5) Courtesy and patience are essential while interviewing. Do not force yourself on anyone unwilling to talk as you may provoke them into giving you false information in order to get rid of you.

(6) Question children carefully and let them repeat their story several times. Follow up by questioning the parents concerning the child's reliability.

**5-4. The SAR Ground Team:**

a. A CAP ground team will ideally consist of between six to twelve qualified CAP members with at least two vehicles, but smaller teams are not uncom-

mon. Cadets may be ground team members. All senior and cadet personnel must hold current ES cards qualifying them for their specialty. Vehicles carrying cadets must carry at least one senior. Those carrying trainees must carry a minimum of one fully qualified trainer.

b. The team leader must be a senior member who has completed the requirements listed in attachment 3 for that specialty. The team leader's responsibility is to carry out those tasks assigned the team by the mission coordinator, within the required safety constraints. Ideally, each team will have one or more qualified ground team leaders who can serve as assistant team leader and take charge in the absence of the leader or take charge of a sub-element if it becomes necessary to split the team.

c. The remaining personnel in the team will be ES qualified members to assist in the performance of ground search, interviewing, and rescue/evacuation activities. Team members with specialty skills may assist in training of others. Ground team members must have completed requirements listed in attachment 3 for that specialty, except as noted in paragraph 5-4a above.

d. Non-CAP members (such as guides, law enforcement officers and doctors) may be included in the team only if needed to contribute to the success of the mission. The mission coordinator must approve such assistance, and CAP Form 9 must be properly completed prior to travel in any vehicle. ES qualified radio operators should also be included in a ground team. They may not, however, perform ground team duties unless qualified.

#### 5-5. Mission of the Ground Team:

a. Upon arrival at a mission base, a ground team should become immediately available for deployment. Ground teams will be dispatched by the mission coordinator or designated ground operations officer.

b. Prior to departure from a mission base, the team leader will be briefed on all known aspects of the mission and, in turn, brief all team members. Briefing data should include information posted on the mission-status board, mission base telephone numbers, and radio call signs and codes. The leader should inspect team members, equipment, and vehicles. CAP Form 109, Vehicle Clearance, must be checked to see if it has been properly filled out and filed, with one copy at the base and one with the vehicle. Only persons listed on the form should be aboard the vehicles. The team should have an adequate supply of CAP forms which may be required.

c. Simply, the mission of the ground team is to:

- (1) Find.
- (2) Identify.

(3) Give life-saving first aid.

(4) Safeguard. (See paragraphs 1-9 and 5-5f.)

(5) Give assistance requested by authorities, which may include first aid, assistance to the doctor or coroner, help the mission-data collection teams, and aid to evacuation teams.

d. No team member should give an opinion as to the probable cause of the accident or discuss conditions found at the site to anyone but the mission coordinator, or designated representative, or to the officer in charge of a law enforcement or military team at the scene. These topics should not become general conversation to anyone outside CAP.

e. Do not evacuate casualties without the request and approval of authorities in control of the incident. Never evacuate deceased except at the request of the appropriate authority under whose jurisdiction the incident occurred or the Surgeon General in a military incident.

f. *No CAP member has any authority to act as a police officer*, nor physically restrain or threaten any citizen who may desire to enter the area of an incident site. All that can legally be done is to ask for the support of the public and request they not enter until authorities finish their work.

g. Although the carrying of firearms on ES missions is discouraged, they may be included in a survival kit during ES missions if the wing commander determines that they are a necessary part of the survival equipment and not in violation of CAP regulations and state and local law.

#### 5-6. Generalized Ground Search:

a. When the search area is large, ground team effectiveness becomes limited. Teams may be sent to high-probability areas along the route of flight, such as mountain passes and near omni stations, for the purpose of search and data collection. When the high-probability area is small, teams can converge for more thorough search and information gathering.

b. Selection of areas to be covered by ground teams should be made by the ground operations officer and the team leader. Factors to be considered are: (1) areas of high probability for search or data collection; (2) weather and road conditions with respect to the team vehicles, equipment, and experience; and, (3) accessibility of areas.

c. Before entering remote areas, teams should contact the Forest Service or Park Ranger station to advise of their intentions, determine closed or restricted areas, get necessary keys, check on fire regulations and conditions of roads, obtain maps, and obtain any information relative to the mission.

d. Vehicles should travel in pairs where possible. Those dispatched alone should be equipped with a radio to summon assistance and report findings. When two or more teams work together, one person must be designated the overall leader, either by the base or upon agreement of those teams involved. The remainder of the team leaders will be considered assistant leaders. The team leader should be receptive to suggestions, but is responsible for all decisions and actions.

e. When possible, conversation in the vehicle should be kept to a minimum, radio volume down, and windows left open. All personnel must be alert for any indication of the objective, such as:

- (1) Pieces of wreckage.
- (2) Presence of smoke.
- (3) Unusual sounds.
- (4) Disturbed trees or underbrush.
- (5) Presence of scavengers (animals or birds).
- (6) Fuel, lubricants, etc., by smell or sight.
- (7) Decomposition odors.
- (8) Signs of human passage or occupancy or an area.
- (9) Landslides.
- (10) Unusual drifts caused by the wind blowing loose snow or sand over an obstruction.
- (11) Unexplained break in terrain contour or condition.
- (12) Persons obviously dazed, wandering, or not dressed for the conditions.
- (13) Blackened areas, even a single tree, among green trees.
- (14) Local discoloration of foliage.
- (15) Signals. Survivors may use any signal possible, depending upon their training, physical condition, and signaling devices on hand. Other signals to be alert for include banging or thumping, shouting, whistles, signal mirrors, flags, kites, fires, etc. Be alert for anything that might be a clue. Binoculars or a spotting scope can be helpful.

f. Whenever a possible lead is found but cannot be identified, the team can take several actions:

- (1) If air cover is available and contact can be made, have the aircraft attempt identification. The plane may save hours of work.

(2) Try to get a better look from another angle. If not possible, or if the object still cannot be identified and is suspicious, several alternatives are available:

(a) Get coordinates or compass headings from a prominent point, reporting back to search base by radio, telephone, or in person. If daylight permits, request air cover and remain at the scene for assistance.

(b) Walk into the area only if personnel are in good physical condition, the team can be back at the vehicle prior to darkness, and the object is suspicious enough that identification cannot wait for air cover.

h. Whenever the team decided to leave the vehicle, the following precautions should be observed:

(1) Never send one person out alone, even with a radio.

(2) One member should remain at the vehicle to attend to radios and to be available for assistance. Inform the base of intentions prior to departure from the vehicle.

(3) Radio contact between the team and vehicle is recommended.

(4) Team members should take water, minimum survival rations, and clothing to remain overnight in the field if necessary.

(5) Team members must stay together. Each member is responsible for the others in the team, and if one member has to slow down or stop, the entire team should. Under no conditions should the team members split, unless going for help for an injured member. All team members should be accounted for before any vehicle leaves the area.

(6) If a member becomes disabled and unable to reach the vehicle even with assistance, someone must stay with the disabled while the others go for help. If only two members are in the team and the vehicle is not within sight of the injured, the second member should consider waiting for assistance from the base. This is why the base should keep track of all units, air and ground, and why units should keep the base informed of its activities. When a unit does not meet its scheduled check-in or close its vehicle clearance, the base will dispatch another team or aircraft to investigate.

#### 5-7. Concentrated Ground Search:

a. Concentrated ground search patterns are used by personnel on foot to locate missing objects or persons. In thick vegetation, visual and vocal contact must be maintained between all team members to ensure full coverage and to protect team members. When con-

tact with an individual is lost, the team leader will be notified immediately and the search halted until contact is regained. Inexperienced personnel should be teamed with experienced.

b. Some factors to consider in the concentrated ground search are:

(1) Natural and artificial boundaries such as rivers, creeks, mountain ridges, timber lines, roads, firebreaks, etc., should be used as search boundaries whenever possible. Areas void of definable boundaries or landmarks should be divided by compass lines and artificial barriers such as string, paper markers, etc.

(2) Area marking can be accomplished by attaching pieces of colored paper to branches or pinning them to the ground. Assign different colors to each operating unit. The paper will bleach and deteriorate in a few days, leaving the area clear. Squares of bathroom tissue will work well. Paint or any method that will permanently damage or scar the environment should not be used.

(3) A contacting system using whistles or light signals should be agreed upon before beginning the search. Walkie talkies may be used but channel congestion and long antennas in brush are a problem.

(4) At the command "Freeze," which may be given by anyone who might have heard or seen something, everyone will instantly stop all motion and noise until told to "Proceed."

(5) The progress of search teams in dense underbrush can be followed from the air to ground if a team member carries a long pole with a bright cloth on the end. Orange or red hats and jackets are also helpful.

(6) Smoke and flare signals should be used with extreme caution due to fire hazards. A red flare will be used only to signal distress.

c. The parallel sweep pattern is most effective on level terrain. This requires the use of searchers, as needed, spaced abreast at intervals which permit adequate search of the ground between them. Upon searching a pre-determined length, the line pivots or shifts laterally and then moves in the opposite direction.

d. The contour search pattern is effective in hilly or mountainous areas. Similar to the parallel sweep, it permits 360 degree encirclement, starting with the highest levels to be searched. The line moves down after completing the first circle of the area.

e. The expanding square search pattern is restricted to covering a very small area with few ground team personnel. It is useful in locating objects in known approximate locations.

#### 5-8. Working with Air Cover:

a. A search plane can save the ground team many hours by identifying a sighting from the air or providing radio relay if contact with the mission base cannot be maintained from the ground. Conversely, the pilot may have to call upon the ground team to help identify sightings not identifiable from the air.

b. Ground teams can also assist the pilot in area evaluation of ground wind conditions, power lines, descent/approach and departure/escape routes. Two-way communications between aircraft and ground teams enable maximum use of both.

c. When requesting air support, be alert for the arrival of the search aircraft and assist it in sighting you by being out in the open and using brightly colored panels and signal mirrors. Once the aircraft is sighted, the team can instruct the pilot what to investigate and its location, either in clock position or magnetic heading. Contact is maintained until the object is identified. The team should also alert the search aircraft immediately of other aircraft which enter the search area.

d. Teams without radio contact with the aircraft may sometimes relay information through the mission base. A walkie-talkie in the aircraft is also effective for short distances. If radio contact is not established, lay out a large arrow on the ground to indicate the direction of the object. When an aircraft wishes to attract the attention of a ground team without radio contact, the pilot should fly in front of the team and change propeller pitch or speed and then fly in the direction they should proceed. When over the target, it should circle. The pilot should exaggerate turns in roads or ridges to assure the team does not take a wrong turn. The pilot should fly across the back of the vehicle to turn a team around. Additional signal guidance is in attachment 10.

#### 5-9. Procedures on Entering the Scene:

a. Approach the area of a crash by walking and not running. When approaching, look for, but do not disturb, any parts pertaining to the incident. Do not smoke at or near the site.

b. Establish identity of the aircraft. If there are no survivors, proceed no farther. Establish security of the scene and contact the mission coordinator. CAP ground teams cannot legally declare death. If death is suspected, the mission coordinator will contact the county coroner or the county sheriff. Relaying information concerning injuries is acceptable. Take thorough notes and make sketches or photographs of everything noted at the site, especially the position and condition of valuables, human remains, etc. Retain all information for the mission coordinator.

c. If there are survivors, immediately provide first aid. Determine from the survivors how many were on board and locate all personnel. At least one team member should be sent to make a report to the mission

coordinator. Survivors should be made comfortable until authorities indicate whether to provide further medical assistance or to prepare the survivors for evacuation.

d. Do not move or disturb anything at or near the site except as necessary to provide aid to survivors. Photographs, preferably Polaroid, should be taken before moving anything. Written accounts of all actions, including the time, should be made. Action taken to prevent fire, including disconnecting the battery, shutting down fuel lines, etc., should be recorded. Also, record the condition, position, or readings of the following if there is a possibility of subsequent accidental destruction: control systems, instruments, oxygen systems, canopies, doors, ejection devices, parachutes, harnesses and belts, lights, ELT arming switches, etc.

e. If fire is in progress, survivor rescue is of prime importance. Safety of CAP personnel will not be unduly jeopardized.

#### 5-10. Evacuation:

a. Evacuate survivors by means that would cause the least chance of discomfort or further injury. Helicopter evacuation is a good method, but may not be possible because of limitations such as altitude, darkness, and weather.

b. When requesting helicopter support, provide cite information concerning altitude, location (grid coordinates and/or nearest landmark in miles and direction), wind direction/velocity, temperature, number of persons to be evacuated, probability of helicopter landing, and the nearest medical facility if known.

c. When possible, the helicopter should land. This may require the movement of survivors a short distance to the landing site. When the helicopter is approaching the site, the ground crew should signal the pilot with a mirror or smoke flare. A smoke flare should also be ignited when the helicopter is closer to show the pilot the wind direction and velocity. *Smoke devices should be used with caution because of fire hazards.*

d. Three types of hoist devices may be used during hover pickup. When the stokes litter or wire stretcher is used, the survivor should be strapped securely and advised that his head will be swung away from the helicopter for a feet-first entry. The "horsecollar" looks very much like its namesake. It should be worn like a jacket, one arm then the other in with the padded collar around the back and the cable attachment toward the front. The arms and hands should be locked together in front of the body. The third, a "forest penetrator," is a metal cylinder with three seats that fold down. It is weighted and has a pointed end for it to penetrate heavy brush and trees. The seats fold down, and the attached straps are secured around the body and under the arms. When the hoist is raised, the head should be tucked in and down to prevent injuries from trees and brush. Before touching any hoist device, let it contact the ground to discharge static electricity.

e. For surface evacuation, remember the following: Be sure the victim is secured to the stretcher and is protected from further injury from brush, dirt, etc., do not walk in cadence with a stretcher; have one crew carry the stretcher, while a second crew moves forward and rests; vehicles carrying injured should be driven slowly to avoid patient discomfort and stop if travel becomes too painful for the injured.

#### 5-11. Discipline and Control:

a. The accomplishment of a systematic and thorough ground search depends upon a high degree of discipline among the personnel assigned. A few rules to be observed are:

(1) Do not allow the search party to split into separate groups without a plan of action to include rejoining. Except for short periods, communication between groups should be maintained. Individual actions should be discouraged.

(2) Prevent damage to private property.

(3) Private property should not be entered without the permission of the owner. This may be done in advance by data-collection teams.

(4) Experienced and inexperienced personnel should be evenly distributed along the search line and in search vehicles.

(5) Tact and diplomacy must be exercised when CAP personnel are augmented by other volunteers or agencies.

(6) The team leader is in charge and, although advice from other members may be solicited, the leader's decision is final and must be followed.

(7) Always keep the search base advised of team location and intentions. Request a new assignment when finished with the current duty, and never leave an area without advising the base. Follow the orders of the search base.

#### 5-12. Vehicles Used by Ground Teams:

a. CAP Corporate vehicles used by ground teams will be in good condition and where possible equipped with four-wheel drive. They should also be radio equipped, preferably with single-sideband. The tops of all vehicles used for ground search and rescue will be marked for easy identification from the air.

b. All CAP vehicles will be operated in strict compliance with all state, commonwealth, and local laws, regulations, and ordinances.

c. No Corporate vehicle will be used on a CAP mission unless properly licensed and insured.

d. The CAP does not prohibit CAP vehicles using sirens or red lights as long as there is no conflict with local laws.

### 5-13. Vehicle Operators:

a. Corporate vehicles should be operated in accordance with CAPR 77-1, Civil Air Patrol Vehicles. All personnel operating Corporate or private vehicles will have proper credentials for the duty they are performing when on an ES mission.

b. Drivers are responsible for the safe operation of their vehicles and should complete the following:

(1) Prior to being dispatched, make a pre-departure check to include:

(a) Mechanical condition of brakes, steering gear, tires, transmission, ignition and fuel systems, lights, horn and wipers.

(b) Fuel and oil, fueling authorization, radiator and battery water, and antifreeze or coolant.

(c) Emergency equipment, including spare tire properly inflated, jack, tire wrench, tow chain, tire chains, or lugs, battery jumper cables, tool kit, flares, first-aid kit, and drinking water.

(2) Obtain applicable maps (auto club, state, forest service, etc.) and check on weather and road conditions for the assigned area.

(3) Record mileage and time on the vehicle clearance form at the start and completion of each sortie.

(4) Observe all highway regulations and safe-driving practices. Wear seat belts.

**5-14. Ground-to-Air and Air-to-Ground Signals.** At times, ground teams and aircrew must communicate without the use of radios. Attachment 10 provides signals that may be used in the event radio contact is lost or not established.



## Chapter 6

## CIVIL DEFENSE

## SECTION A — GENERAL POLICIES

## 6-1. General:

a. This chapter is a guide for providing CAP assistance to civil and military authorities in support of civil defense (CD) activities, and it presents the concepts, principles, and policies that govern the use of CAP resources during national CD emergencies.

b. The United States Congress has supplemented the military defense of the United States with a CD system for the protection of life and property in the event of an attack (national CD emergency). It has defined CD emergency to include those activities and measures designed or undertaken to:

(1) Minimize the effects of an attack on the civilian population of the United States.

(2) Deal with the immediate emergency conditions created by any such attack.

(3) Expedite the restoration of vital utilities and facilities destroyed or damaged by an attack.

c. The term *attack* includes "any attack or series of attacks by an enemy of the United States causing, or which may cause substantial damage or injury to civilian property or persons in the United States in any manner by sabotage, or by the use of bombs, shellfire, or atomic, radiological, chemical, bacteriological, or biological means, or other weapons or processes."

d. The Department of Defense will provide military support to CD to minimize the effects upon the civilian population caused by an enemy attack upon the United States, its territories or possessions. Authority for this assistance is contained in DOD Directive 3025.10, Subject: Military Support of Civil Defense (MSCD). This directive states: "The national civil defense program is an integral part of national security and is an essential element of the deterrent posture of the United States." It further assigns the Secretary of the Air Force the responsibility to "furnish appropriate assistance to units of CAP engaged in missions related to MSCD."

e. One of the noncombatant duties of the Air Force during a national emergency is to assist civil government when requested by proper authority. In AFR 46-5 the United States Air Force has authorized CAP to assist in this noncombatant mission. Primary CAP activities in support of MSCD are to provide: search, rescue and emergency evacuation; radiological monitoring and decontamination, to include identifying contaminated areas, and reporting information through the national warning system; movement control, to include plans and procedures for essential movement;

assessment; and provision of interim communications to provide command and control.

**6-2. CAP/Emergency Management (EM) Agreements.** Each wing should annually review its "Memorandum of Understanding" with respective EM officials. This document should detail conditions, policies, and agreements pertaining to CAP support. Additional agreements based on the wing/state agreement should be made by CAP units with each level of government which they directly support. Supporting plans/procedures should be reviewed and updated on a similar basis.

**6-3. CAP/EM Assignments.** The following tasks should be incorporated into the CAP/EM agreement, in addition to items contained in paragraph 6-7c.

a. Provide available fixed, mobile and airborne communications to support recovery operations during CD emergencies.

b. Provide teams to accomplish radiological monitoring and decontamination of aircraft and surface support facilities.

c. Support state SARDA plans by:

(1) Airlifting urgently needed personnel and supplies.

(2) Visual and photographic aerial damage assessment.

(3) Airborne communications and other non-governmental aeronautical radio facilities as are available.

(4) Air support to priority commercial, corporate, industrial, health, welfare, and agricultural requirements in military and CD survival and recovery actions.

(5) Air support of the "Continental US Airborne Reconnaissance for Damage Assessment" (CARDA) plan.

(6) Aerial radiological monitoring.

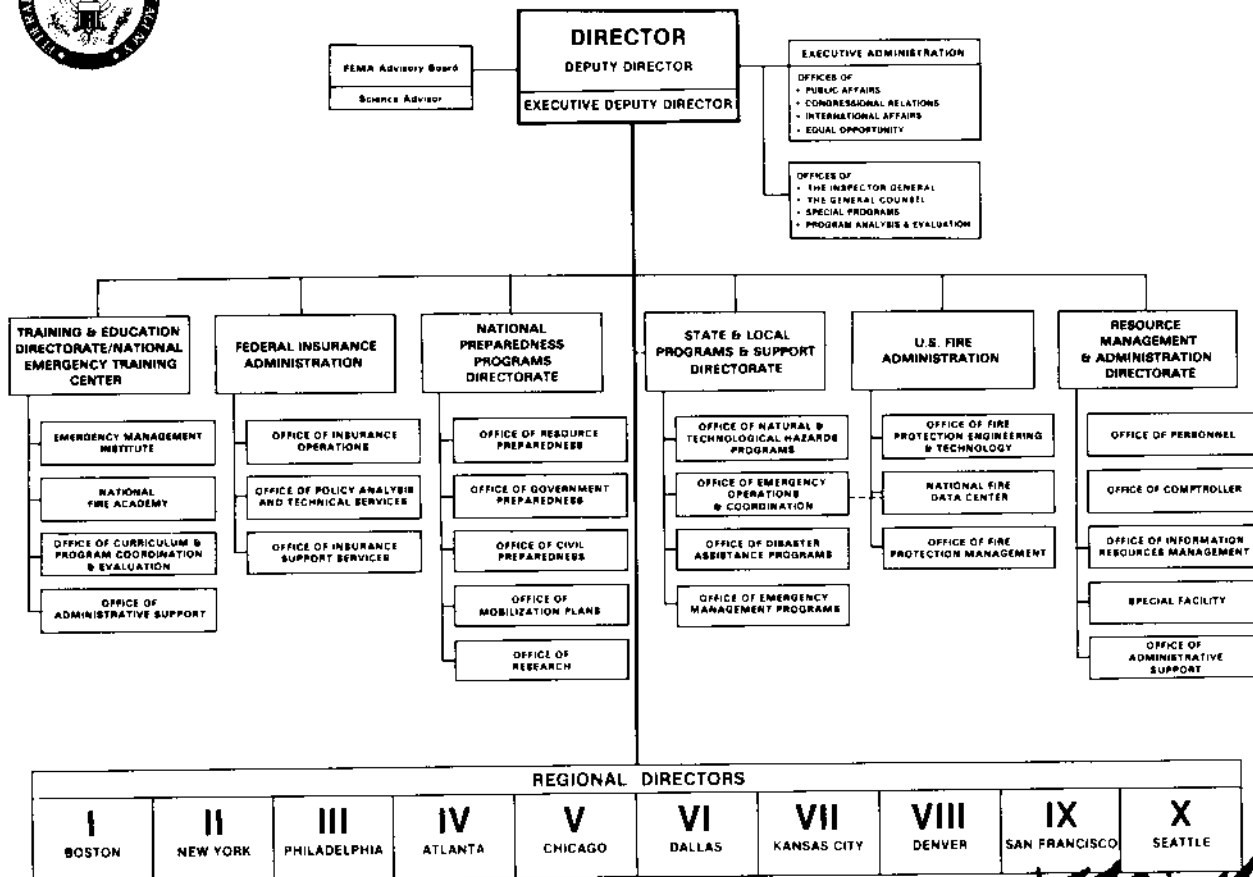
d. Search and Rescue.

## SECTION B — EMERGENCY MANAGEMENT

**6-4. General.** The ability to effectively support civil authority will depend in part upon the CAP members' understanding of the mission, structure, and individual responsibilities at each level of civil government. The following is essential for an effective understanding of CAP's relationship to civil government during an emergency.



**ORGANIZATION  
FEDERAL EMERGENCY MANAGEMENT  
AGENCY**



*Asst. Director*  
Date: *10 Oct 81*

**ORGANIZATION**

The Director of FEMA reports to the President and works closely in emergency management matters with the National Security Council, the Cabinet, and the White House staff.

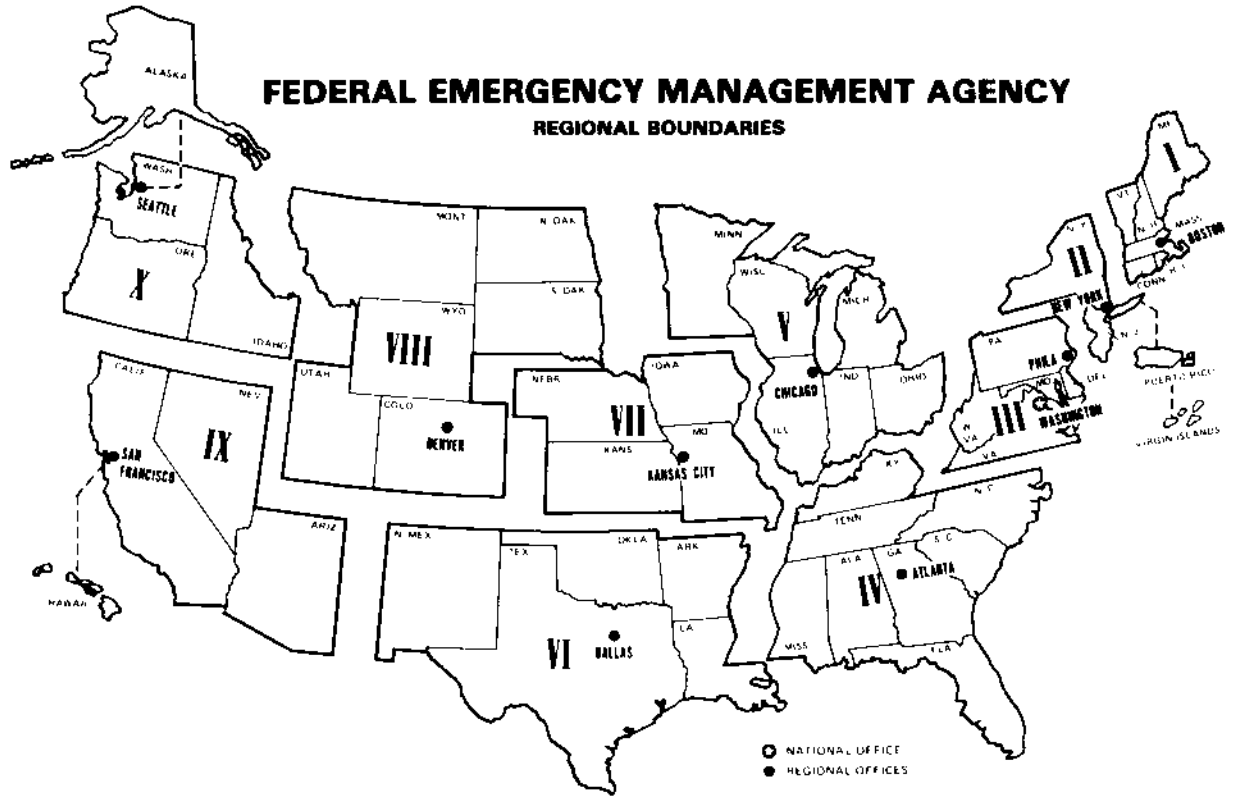
**PERSONNEL**

FEMA has a staffing level of approximately 2,500.

**NATIONAL HEADQUARTERS**

FEMA Headquarters is located at 500 C Street, S.W., Washington, D.C. 20472.

**Figure 6-1. FEMA Organization Chart**



**REGIONAL OFFICES**

There are 10 FEMA Regional Offices. Each office is headed by a Regional Director who reports to the FEMA Director and is responsible for all FEMA programs in the region.

**FEMA Regional Offices are:**

Region I (Boston)  
442 J.W. McCormack, POCH  
Boston, MA 02109  
(617) 223-4741

Region II (New York)  
26 Federal Plaza  
New York, NY 10278  
(212) 264-8980

Region III (Philadelphia)  
Curtis Building, 7th Floor  
6th & Walnut Streets  
Philadelphia, PA 19106  
(215) 597-9416

Region IV (Atlanta)  
Gulf Oil Bldg, Suite 664  
1375 Peachtree Street, N.E.  
Atlanta, GA 30309  
(404) 881-2400

Region V (Chicago)  
300 South Wacker Drive  
(24th Floor)  
Chicago, IL 60606  
(312) 353-1500

Region VI (Dallas)  
Federal Regional Center, Rm. 206  
Denton, TX 76201  
(817) 387-5811

Region VII (Kansas City)  
Old Federal Office Bldg., Rm. 300  
Kansas City, MO 64106  
(816) 374-5912

Region VIII (Denver)  
Federal Regional Center, Bldg. 710  
Denver, CO 80225  
(303) 234-6542

Region IX (San Francisco)  
211 Main Street, Rm. 220  
San Francisco, CA 94105  
(415) 556-8794

Region X (Seattle)  
Federal Regional Center  
Bothell, WA 98011  
(206) 481-8800

**Figure 6-2. FEMA Regional Boundaries**

a. The Federal Emergency Management Agency (FEMA) is an executive agency that serves as a single point of contact within the Federal government for EM activities. It is dedicated to the establishment and maintenance of a comprehensive and coordinated EM capability in the United States to plan and prepare for, respond and recover from and, most importantly, mitigate the effects of emergencies, disasters, and hazards, ranging from safety and protection in the home to nuclear attack. FEMA responsibilities include development of policy guidance and plans to ensure that government at all levels is able to cope with emergencies. Protection of people is a prime concern. Programs include in-place shelter planning, population relocation planning, shelter identification, and information which informs people what to do in a variety of emergency situations. As a means of measuring readiness and improving planning, FEMA designs and conducts national and international, state and local government tests and exercises. FEMA has its headquarters in Washington, DC (figure 6-1) and has ten regional offices covering the United States and its territorial possessions. FEMA regional offices (figure 6-2) work with State Emergency Management Agencies and, through them, with local EM organizations.

b. State and Local EM Agencies. Federal agencies, including the military, work with states and their political subdivision through channels established in state emergency plans. The state EM agency and local EM organizations serve as coordinators of pre-attack development of CD capabilities and of post-attack emergency operations.

c. Chief Executives(s). This includes all key officials of local government. For some forms of local government, chief executives include the mayor or the mayor and city manager. Joint city-county executives include the mayor, city manager, county board chairman or county manager. Local governments vary greatly throughout the United States, and because of this the individual or individuals serving as key executive must be determined locally. The executive is responsible for the formulation or approval of policy and operational guidelines in the conduct of emergency operations. Another responsibility is the overall management of the community's survival and recovery efforts in coordination with community government departments. In fulfilling this role, the chief executive will be assisted by the emergency management coordinator (EMC) acting as chief of staff and by other staff personnel. *The basic qualification of the chief executive is to be the elected or appointed government official vested with emergency powers of the greatest scope.*

d. The EMC is responsible for the overall coordination of survival activities within the community. The EMC is located in the Emergency Operations Center (EOC) and acts as chief of staff for the Chief Executive(s), coordinating the activities of the Operations Group, the Disaster Analysis Group, and the Resources Group. This person must also monitor and coordinate

the activities of the public information officer, the military liaison officer, the communications chief, and the message controller. The EMC ensures that situation briefings are presented to key personnel throughout the community; interprets displays and technical reports for these executives; and monitors operational activity for responsiveness and adherence to existing policy. As the situation develops, the EMC must ensure that survival and recovery planning takes place in anticipation of shelter activation.

e. The military liaison officer is responsible for communicating local government requests for military support of emergency operations to the State Area Command (STARCOM) and/or a designated military commander. Although responsible only to a superior in the military chain of command, the military liaison officer may act as the military advisor to local government officials, providing them information on available military resources and about other operational activities.

f. Emergency Operating Centers. During an emergency, civil officials at municipal, county, and state levels, and the federal government must exercise direction and control. A key element of civil defense readiness is the capability of local and state chief executives and officials to direct government agencies and key activities in an emergency and to provide assistance to citizens. An enemy attack would create the need for greatly accelerated governmental decision-making and action. This requires existing governmental plans, procedures, and facilities differing slightly from those required for peacetime operations. As a result, many states and communities have established EOCs. The EOC is a fallout-protected facility designed and equipped to facilitate the gathering, evacuation, and transmission of essential information to key officials.

## SECTION C — THE MISSION

### 6-5. How a Mission is Initiated and Mission Designators:

a. CAP units may participate in CD missions under the following circumstances:

(1) When asked to participate in training or evaluation missions by the state, if Air Force reimbursement is to be sought, the request will be forwarded to the USAF-CAP liaison officer for processing.

(2) Upon declaration of a national CD emergency, a USAF-mission number will be obtained from the NAF(R) for CAP CD operations. The wing staff, operating at the state level, will receive operational requests from the state emergency management office usually through the State Director of SARDA (figure 6-3).

These missions will be assigned to subordinate CAP units as appropriate. Local CAP units will respond to mission requests from local government only after ap-

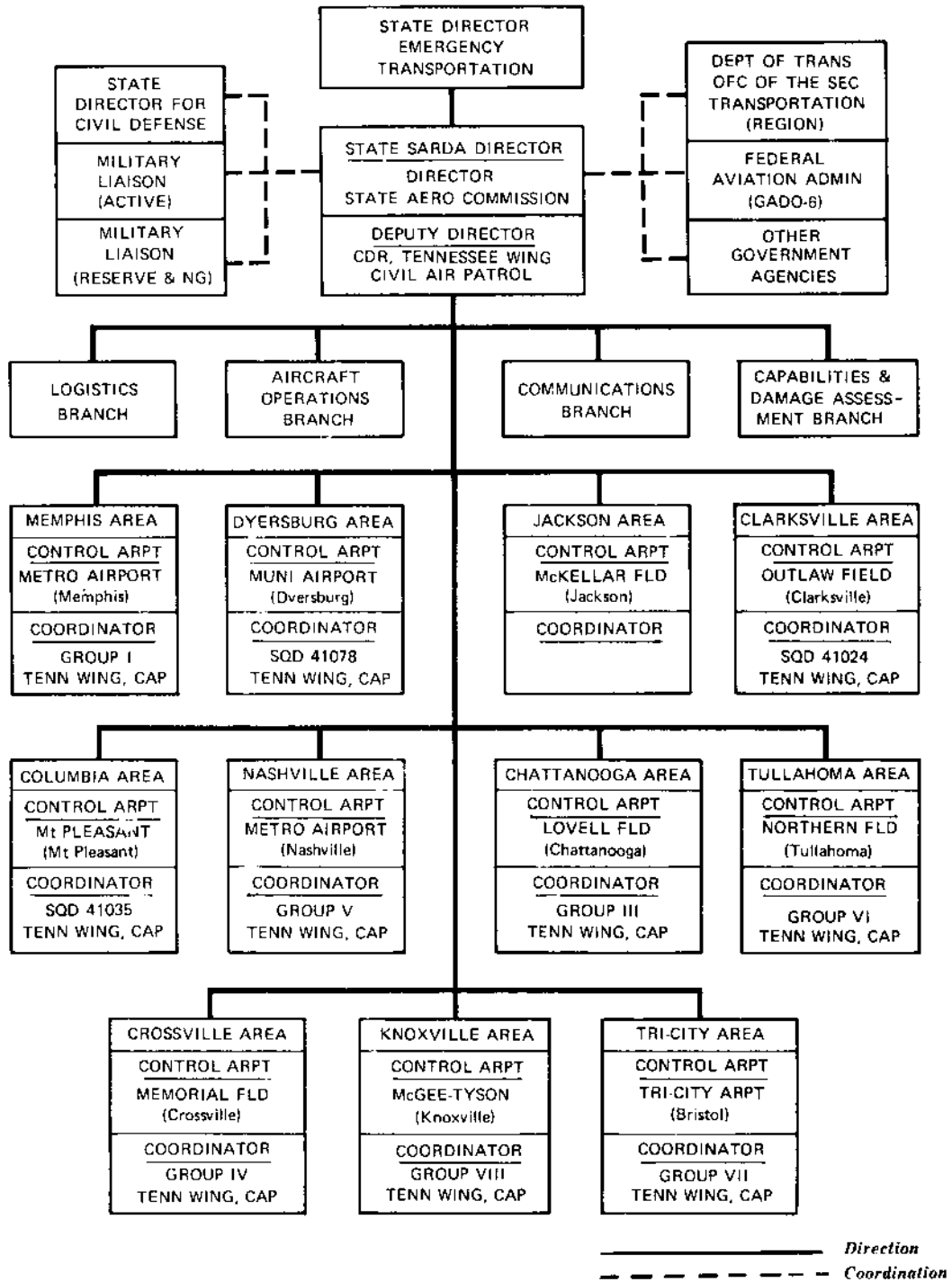


Figure 6-3. SARDA Organization Chart

proval by the wing/state staff. Local CAP units may, however, respond to local government requirements if or when communication with the wing/state staff has been disrupted.

b. Military operational missions will normally have first priority on national resources. Military requirements for CAP support will be routed through the State Adjutant General/State Area Command (STARC). The Air Force State Preparedness Liaison Officer (SPLO) would then pass requirements for CAP or SARDA support to the EOC for tasking. In cases of extreme urgency, military commanders may contact local CAP units or EM organizations direct. In such cases these units should keep the wing staff informed of actions taken.

**6-6. Control of CAP Resources.** CAP personnel are subject only to the authority of their superiors in the CAP chain of command. The CAP will retain its organizational integrity while receiving overall direction in the form of requests from civil authorities. The CAP wing commander, or designated representative, will act as the planning and action agent between the CAP wing and the state EM agency. Deployment of CAP resources (in close cooperation with the EMC) will be the responsibility of the wing commander or representative.

**6-7. State and Regional Disaster Airlift (SARDA):**

a. During a national emergency, General Aviation aircraft (non-air-carrier) and pilots will become a vital national asset and will play an important role in supporting *both* military and civil defense missions. To properly use this resource during an emergency, the FAA has developed, and each state has incorporated, the "State and Regional Disaster Airlift" (SARDA) plan into its "Emergency Resource Management" plan. The SARDA operations center will normally be activated upon the NORAD declaration of ESCAT (Emergency Security Control of Air Traffic) through the FAA Air Route Traffic Control Center (ARTCC). Figure 6-4 illustrates the civil/military chain of command affecting SARDA.

b. The State Director of Aviation is usually the SARDA director. Managers of designated control and host airports have basic responsibility for SARDA operations at those levels. During a CD emergency, however, because of the expected increase in operational functions, the CAP has agreed, in a Memorandum of Understanding with the FAA, to provide an operational staff at these airports. The CAP wing should ensure that proper coordination has been made with the state SARDA director to incorporate CAP as an integral part of the SARDA organization. Figure 6-3 illustrates how this has been accomplished in one state where key CAP personnel have accepted operational staff responsibilities under SARDA and where CAP organizational integrity has been maintained.

c. The state EM director is responsible for pre-attack and post-attack planning for missions which would require SARDA support. Where CAP has ac-

cepted SARDA responsibilities, commanders should coordinate the following with EMCs and SARDA directors.

(1) Developing emergency notification procedures for key CAP staff members.

(2) Assigning of CAP air and ground crews who have had special CD training in aerial radiological monitoring, aerial damage assessment, etc., to protected fallout shelters near their point of operation. Special equipment such as monitor kits, radios, etc., needed for their participation should also be pre-positioned at these shelters.

(3) CAP liaison support at state and other appropriate EOCs where CAP is to participate.

(4) Assigning CAP communications teams and equipment to locations where CAP will be supporting EM operations.

(5) Assisting in the identification of targets which are vital to national survival so that pre-canned flight plans for damage assessment and aerial monitoring can be pre-filed with FAA and assigned a Security Control of Air Traffic and Air Navigation Aids (SCATANA) priority.

(6) Ensuring procedures are established for emergency contact with the appropriate FAA agency for the filing of IFR and DVFR flight plans during a post-attack period when SCATANA is in effect.

(7) Establishing procedures for obtaining major items of equipment, materials, and supplies for the CAP support of CD operations through the Federal Contribution Program. CAP should be given appropriate priorities in relation to other EM agencies for obtaining the specialized equipment.

(8) Any other special coordination needed to provide better working relationships and operations with personnel and agencies having responsibility for the survival of the nation, state, and community.

**6-8. CAP SARDA Organizational Structure:**

a. Under the wartime conditions that SARDA would primarily operate, a large number of trained CAP ES members would not be available for operations because of other critical civilian and military job requirements. Therefore, only a small functional CAP operations staff should be established to assist at the state EOC and at the selected low-risk control airports. Commanders should consider using the suggested organization structure and selecting and training these key individuals from persons WHO WOULD BE AVAILABLE IN A PERIOD OF NATIONAL EMERGENCY. CAP crew members trained as observers in aerial damage assessment and aerial radiological monitoring would assist non-CAP aircrews in accomplishing selected military related missions where

### STATE AND REGIONAL DISASTER AIRLIFT (SARDA) CIVIL/MILITARY CONTROL RELATIONSHIPS

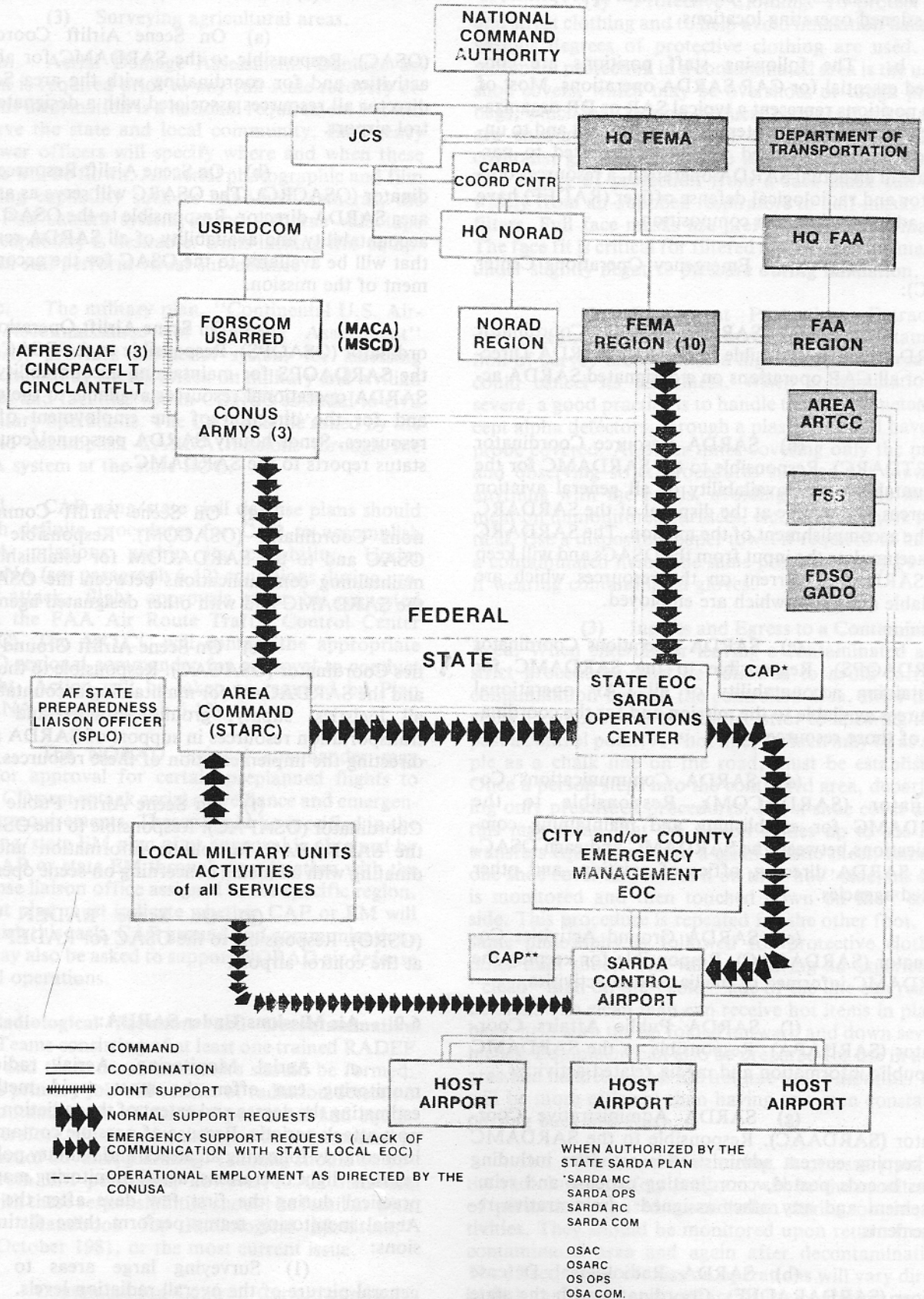


Figure 6-4

CAP aircraft were not available. Upon notification, through the CAP pyramid alert system, that SARDA had been implemented, SARDA personnel, their equipment and families, would relocate, when appropriate, to pre-assigned operating locations.

b. The following staff positions are considered essential for CAP SARDA operations. Most of these positions represent a typical SAR or DR organization; however, due to potential nuclear threat and to untrained and unorganized volunteers expected to participate in an actual SARDA operation, a resource coordinator and radiological defense officer (RADEF) have been added to the team composition.

(1) State Emergency Operations Center (EOC):

(a) SARDA Mission Coordinator (SARDAMC). Responsible to the state SARDA Director for all CAP operations on a designated SARDA activity.

(b) SARDA Resource Coordinator (SARTDARC). Responsible to the SARDAMC for the accountability and availability of all general aviation resources that will be at the disposal of the SARDARC for the accomplishment of the mission. The SARDARC will accumulate the input from the OSACs and will keep the SARDAMC current on the resources which are available and those which are employed.

(c) SARDA Operations Coordinator (SARDAOPS). Responsible to the SARDAMC for maintaining accountability of all CAP operational resources available to the mission and for the coordination of those resources.

(d) SARDA Communications Coordinator (SARDACOM). Responsible to the SARDAMC for establishing and maintaining communications between the SARDAMC and each OSAC, state SARDA director, office of aviation, and other related agencies.

(e) SARDA Ground Activities Coordinator (SARDAGAC). Responsible for keeping the SARDAMC informed of media related activities.

(f) SARDA Public Affairs Coordinator (SARDAPA). Responsible to the SARDAMC for public information and media related activities.

(g) SARDA Administrative Coordinator (SARDAAC). Responsible to the SARDAMC for keeping current administrative activities including status boards posted, coordinating expense and reimbursement and any other assigned administrative requirements.

(h) SARDA Radiological Defense Officer (SARDARDEF). Coordinates with the state

RADEF staff to ensure missions assigned to control airports are feasible and so advises the SARDAMC.

(2) Control Airport Staff:

(a) On Scene Airlift Coordinator (OSAC): Responsible to the SARDAMC for all CAP activities and for coordinating with the area SARDA director all resources associated with a designated control airport.

(b) On Scene Airlift Resource Coordinator (OSACRC). The OSACRC will serve as assistant area SARDA director. Responsible to the OSAC for the accountability and availability of all SARDA resources that will be available to the OSAC for the accomplishment of the mission.

(c) On Scene Airlift Operations Coordinator (OSAOPS). Responsible to the OSAC and to the SARDAOPS for maintaining accountability of all SARDA operational resources available to the mission and for the direction of the employment of those resources. Sends hourly SARDA personnel/equipment status reports to the SARDAMC.

(d) On Scene Airlift Communications Coordinator (OSACOM). Responsible to the OSAC and to the SARDACOM for establishing and maintaining communications between the OSAC and the SARDAMC and with other designated agencies.

(e) On Scene Airlift Ground Activities Coordinator (OSAGAC). Responsible to the OSAC and the SARDAGAC for maintaining accountability of all logistics, supply, ground support and general transportation resources in support of SARDA and for directing the implementation of these resources.

(f) On Scene Airlift Public Affairs Coordinator (OSAPAC). Responsible to the OSAC and the SARDAPAC for public information and coordinating with all media concerning on-scene operations.

(g) On Scene RADEF Officer (OSRO). Responsible to the OSAC for RADEF activity at the control airport.

#### 6-9. Air Missions Under SARDA:

a. Aerial Monitoring. Aerial radiological monitoring can offer the most rapid method of estimating the degree and extent of the radiation in early post-attack periods. Because of possible contamination immediately following an attack and military policy that restricts flight operations, aerial monitoring may not be practical during the first few days after the attack. Aerial monitoring teams perform three distinct missions:

(1) Surveying large areas to gain a general picture of the overall radiation levels.



(2) Surveying roads, bridges, reception areas, and other key facilities which may be required for emergency operations.

(3) Surveying agricultural areas.

b. **Aerial Damage Assessment.** Damage assessment is required prior to any full-scale recovery effort. This information is a national requirement but will also serve the state and local community. Emergency Manpower officers will specify where and when these missions will be flown. An aerial photographic and film processing capability such as hand-held cameras, the Enviro-Pod camera system, or an airborne videotape system capability is desirable. Units lacking this equipment can still perform visual surveillance.

c. The military plan, "Continental U.S. Airborne Reconnaissance for Damage Assessment" (CARDA), provides an aerial system for assessing damage caused by enemy attack on military and civilian resources and facilities within CONUS essential to civil and military operations. The CAP may be asked by the USAF to accomplish CARDA missions through the SARDA system at the state EOC.

d. CAP wing/state civil defense plans should establish definite procedures for CAP to accomplish CARDA missions within its capability. Under SCATANA (see paragraph 6-12) conditions during pre- or post-attack, flight approvals must be requested through the FAA Air Route Traffic Control Center (ARTCC). The ARTCC will contact the appropriate NORAD regional commander for approval to conduct the flight. Action will be taken as required by Plan SCATANA (see paragraph 6-12).

e. The NORAD regional commander may give prior approval for certain preplanned flights to support CD post-attack aerial surveillance and emergency airlift requirements. These should be specified in the CAP wing/state EM plan after approval is obtained by either CAP or state EM through coordination with the air defense liaison office assigned to the specific region. The joint plan must indicate whether CAP or EM will accomplish this task. CAP ground and communications teams may also be asked to support NORAD air defense dispersal operations.

**6-10. Radiological Monitors and Decontamination Teams.** Teams consisting of at least one trained RADEF monitor and three decontaminators should be formed. A team's primary job will consist of radiation detection and decontamination of mission personnel and equipment; therefore, thorough training of these personnel is a vital part of advance planning. Training should be obtained from EM personnel; however, CAP members tasked with these responsibilities should be familiar with the CD "Handbook for Radiological Monitors," SM5.1, October 1981, or the most current issue.

a. **Contamination Control.** Certain common-sense rules should be followed to prevent contamination

of personnel and equipment. Some of the details of working in contaminated areas follow:

(1) **Protective Clothing.** To protect skin and street clothing and to help avoid inhalation hazards, various degrees of protective clothing are used. The minimum protection in a contaminated area is the use of shoe covers, which may be overshoes or tough plastic bags, which may require frequent changes if gritty areas are encountered. If particle re-suspension is likely, coveralls, gloves, and a face mask may be necessary. The degree of protection from a face mask can vary widely from air-supplied respirators to half-masks with filters. Full face masks are preferred over half-masks. The face fit is critical for filtered masks since the mask is under slightly negative pressure during inhalation.

(2) **Equipment Protection.** Extraordinary precautions should be taken to avoid contamination of survey meters since a high background reading could cancel its usefulness. When contamination is severe, a good practice is to handle the survey meter, except alpha detectors, through a plastic bag and have the probe covered. At other times covering only the probe and observing strict procedures such as not touching anything with the hands, avoiding placing the instrument on unmonitored surfaces, etc., may be more practical. Use a disposable paper towel if required to handle a contaminated item. The same procedure may be used if wearing contaminated gloves.

(3) **Ingress and Egress to a Contaminated Area.** When entering or leaving a contaminated area, strict procedures must be followed to avoid carrying contamination beyond the controlled area. Brief those going from one area to another prior to allowing them past a control point. A "hot line," which may be as simple as a chalk line on the road, must be established. Once a person steps into the controlled area, depart using only prescribed procedures. For a shoe cover area, this may mean that the person comes up to the line, transfers equipment onto a clean plastic sheet, removes one shoe cover and leaves it on the "hot" side; his shoe is monitored and then touched down on the "cold" side. This procedure is repeated for the other foot. The same philosophy is followed for protective clothing other than shoes. The value of having an experienced "clean" man on the "cold" side of the line can readily be seen. The clean man can receive hot items in plastic bags, held with the lip folded outward and down several inches. Equipment can also be prepared for use in a hot area and handed across the hot line to the monitor. This will be more efficient than having two men constantly passing back and forth.

b. **Personnel Monitoring.** A necessary part of the radiological safety program will be the monitoring of personnel exposed to radiation during outside activities. They should be monitored upon return from a contaminated area and again after decontamination. The effectiveness of mission operations will vary directly with the health and welfare of the operating personnel.

c. Ground Crews. Aircraft operating in the early post-attack period will probably be contaminated to some extent, which will create a need for RADEF and decontamination personnel to handle aircraft. These trained personnel should perform all ground-handling functions, including servicing, until aircraft are no longer contaminated.

d. Ground Teams. The CAP CD mission is primarily air operations oriented. There will, however, be demands for surface rescue teams and decontamination/RADEF personnel. Plans and trained people should be ready for employment to respond to requests whenever possible, but not at the expense of the air operations.

(1) Briefing. Prior to departure from the base/dispersal base, mission coordinator or briefing officer will brief the team about all known aspects of the mission. The team leader will in turn brief the rescue team members. Briefings will include the following, if available:

- (a) Specific requirement, extent, and importance of mission.
- (b) Known areas of contamination, radiation levels, and plans for controlling accumulative dose by rotation of personnel.
- (c) Protective clothing needed for mission.
- (d) Equipment needed for mission (including communications).
- (e) Procedures for gamma monitoring.
- (f) Reports required.
- (g) Communications schedule and/or frequencies.
- (h) Primary and alternate methods of communications for air-to-ground, ground-to-air, and ground-to-ground.
- (i) Other pertinent information.

(2) Inspection. Before departure the team leader should perform an inspection to ensure the availability of essential equipment and transportation.

**6-11. Aircraft Decontamination Procedures.** Aircraft decontamination consists of gross and detailed monitoring. Gross is a quick overall estimate of the radiation while the detail monitoring is to determine more complete information. Detailed procedures for aircraft are found in FAA Manual, "Radiological Protection and Decontamination of Civil Aircraft." This manual may be ordered from the Superintendent of Documents, U.S. Government Printing Offices, Washington, D.C.

(1) Aircraft Area. Decontaminate a hard-surface area large enough to accommodate aircraft by sweeping and flushing with water, extending outwards at least 10 feet in all directions beyond the aircraft.

(a) Monitor, with a gamma/beta discriminating instrument with shield closed (CD V-720), portion of decontaminated area to be occupied by aircraft, and note exposure rate reading.

(b) Open beta shield of instrument and monitor same area. If there is any significant increase in exposure rate reading, decontaminate again and monitor until properly decontaminated. (Range of beta in open air is about 10 feet.)

(2) When an aircraft returns from a mission and is suspected of being contaminated, the following procedures should be taken:

(a) Immediately upon landing, aircraft suspected of being contaminated should be parked in an area away from traffic, hangars, equipment and other aircraft.

(b) Notify decontamination personnel.

(c) Examine the aircraft, crew's clothing, and their personal items if you suspect they are contaminated.

(d) After determining the degree of radiation hazard, establish specific radiological safety precautions. (Exposure time for workers, closest distance non-workers will be allowed to approach, etc.)

(e) Most contamination will be found in and around air intakes such as engine cowling, air vents, etc. When an aircraft has been found to be contaminated, enter the levels of contamination in the aircraft logbook and not on discrepancy sheets. Place a placard showing the standard radiation warning symbol in a conspicuous place on both sides of the fuselage, the vertical stabilizer, and other places that would warn approaching personnel.

(2) If aircraft decontamination will be delayed, an isolation area to park the anticipated number of contaminated aircraft should be designated in an unused part of the field and marked with appropriate signs.

(3) Initial Decontamination of Exterior. Solvent-emulsion cleaning and scrubbing is usually the most effective method. During tests or training, only water should be used. Thorough coverage of the exterior is especially important. If initial monitoring discloses loosely held radioactive contaminant on the exterior, the exterior may be firehosed before workers use one of the more detailed methods. Decontaminate glass, plastic, and fabric with materials and procedures normally used.

(4) After initial decontamination, monitor the radiation level of the interior and exterior of the aircraft. Compare these readings with those initially obtained to determine the effectiveness of decontamination.

(5) Contamination of the aircraft interior will occur if canopies and hatches were open during fallout or if the aircraft became contaminated in flight. Monitor the various surfaces in the cockpit and cabin for contamination and take wipe samples. If the aircraft was contaminated in flight, monitor the areas where contamination is most likely to have entered, such as through the ventilation ducts. *If the gamma background radiation in the cockpit due to exterior surface contamination is initially too high for accurate measurement, take these readings after the exterior of the aircraft has been contaminated.*

(6) Initial Decontamination of Interior:

(a) Interior decontamination is difficult. Take out all removable components to improve accessibility to hidden locations. Overall decontamination of the aircraft interior can start with vacuum cleaners to remove loose radioactive dirt and dust, especially in hard-to-reach areas. Clean machines after each use. Handle the disposal bag containing the material as radioactive and dispose of it as solid waste material. After the interior has been vacuumed, it should be scrubbed with a solvent using soft fiber brushes or wiping rags. A reliable dry cleaning solvent may also be used.

(b) Do not use steam or water in the cockpit area because of possible damage to mechanical components and instruments.

(c) Monitor components removed from the aircraft and decontaminate them if necessary. Those that are contaminated must be disassembled and decontaminated by trained personnel.

**6-12. Security Control of Air Traffic and Air Navigation Aids (SCATANA):**

a. This plan describes actions to be taken by appropriate military authorities, FAA, and the Federal Communications Commission (FCC) in the interest of national security.

(1) For security control of civil and military aircraft entering, departing, or moving within the United States areas and coastal approaches.

(2) For control of accurate air navigation systems defined as follows: VOR, VORTAC, TACAN, and LORAN.

b. The general provisions of this plan are:

(1) To carry out the air defense mission, NORAD region commanders will plan security control

of air traffic and air navigation aids. Such directions will be issued to appropriate FAA ARTCCs for implementation. Unless operational requirements dictate otherwise, directed SCATANA actions will be consistent throughout an individual FAA ARTCC area.

(2) Military offense and defense operations are to be given priority over other military and civil activities.

(3) Under emergency SCATANA rules, the NORAD region commander may require a security control authorization for civil and military aircraft prior to takeoff. Such security control authorization is different from an operational or air traffic control clearance; however, *receipt of an air traffic control clearance constitutes issuance of a security control authorization.*

(4) Minimum interference with normal air traffic which is consistent with the requirements for operation of the air defense system should occur.

(5) NORAD region commanders, in collaboration with the FAA regional directors, will supplement this plan, as required, with agreements to permit maximum allowable operation of essential military and civil air traffic within the NORAD area. These agreements will take into consideration special requirements of organized CD and DR flights, agricultural and forest fire flights, border patrol flights, and other essential civil air operations.

(6) CAP wing commanders in coordination with state EM officials should insure that appropriate agreements include CAP/EM considerations. CAP wing commanders should also ensure that CD mission coordinators are familiar with the provisions of the SARDA and SCATANA plans.

c. FAA ARTCCs will:

(1) When "SCATANA" is implemented:

(a) Notify all VFR traffic that SCATANA has been implemented and advise aircraft to land at the nearest suitable airport and file an IFR/DVFR flight plan.

(b) Direct the landing, grounding, diversion, or dispersal of military and civil air traffic and the control of air navigation aids as specified by the NORAD region commander. Landing, diversion, or dispersal will be to airports outside of metropolitan areas or suspected target complexes whenever possible and will be accomplished as follows:

1. IFR Flights: by specific security control instructions to each aircraft over air/ground radio.

2. VFR Flights: by radio broadcast of security control instruments over air/ground radio.

(c) As directed by the NORAD region commander, direct the control of VOR, VORTAC, TACAN, and LORAN as follows:

1. Shut down the above navigation aids in accordance with the time(s) specified in NORAD and FAA region supplemental agreements, which should permit time to land or disperse airborne aircraft.

2. Direct the control of air navigational aids to ensure that required aids, as indicated in flight plans, will be available for authorized aircraft flights.

(2) When directed to reduce or remove SCATANA restrictions, authorize resumption of air traffic and operation of air navigation aids as specified by the NORAD region commander.

d. Civil and military air traffic control facilities, flight service stations, and other appropriate aeronautical facilities shall:

(1) Maintain current information on the status of restrictions imposed on air traffic.

(2) Approve or disapprove filed flight plans in accordance with current instructions received from ARTCCs.

## Chapter 7

## NATURAL DISASTER RELIEF OPERATIONS

**7-1. General.** This chapter outlines CAP responsibilities during natural disasters.

**7-2. Terms:**

a. **Natural Disaster.** Emergencies resulting from floods, storms, drought, fire, earthquake, or similar catastrophes. As used here, the term does not include emergencies resulting from the loss of control over radioactive or hazardous materials, enemy attack, or unlawful violence by civilians.

b. **Major Disaster.** Any natural disaster which:

(1) Occurs in any part of the United States.

(2) Is, or threatens to be, in the determination of the President, of sufficient severity and magnitude to warrant federal disaster assistance under the Disaster Relief Act to supplement local government resources and efforts in alleviating damage, hardship, or suffering.

c. **Local Disaster.** Any natural disaster which the President has not declared a "major disaster" but in which assistance is provided to civil authorities.

d. **Imminently Serious Condition.** When a situation, whether or not previously declared a "major disaster" or "threatened major disaster," is of such imminent seriousness that immediate action is required to save human lives, prevent human suffering, and avoid property damage or destruction.

**7-3. Basic Policies.** The primary responsibility of alleviating the conditions created by a natural disaster rests with individuals, families, private industry, local and state governments, the American Red Cross, and various nonmilitary federal agencies having available resources. When civil resources are inadequate, military assistance may be given local authorities to save lives, prevent starvation and suffering, and to minimize property damage.

**7-4. Responsibilities for Military Support:**

a. DOD Directive 3025.1 assigns the primary responsibility for military support to civil authorities in natural disasters within the CONUS to the Department of the Army. It also states that the Departments of the Navy and Air Force will coordinate with the Department of the Army in DR operations. The Department of the Army is responsible for ensuring the effective use of Air Force and Navy resources.

b. The Department of the Army has delegated this responsibility to the commanding generals of the three CONUS Armies (CG CONUSA).

c. The Department of the Air Force has assigned the Commander, Air Force Reserve (AFRES), the overall responsibility for coordinating Air Force participation in natural DR operations. These responsibilities include, but are not limited to:

(1) Establishing the Air Force Reserve Numbered Air Force (NAF) as the point of contact with the CG CONUSA on matters related to the employment of Air Force resources in natural disasters. (See attachment 12-1 for geographical boundaries.)

(2) Providing or designating, as required, on-scene commanders to exercise operational control over Air Force resources employed in the disaster area.

(3) Establishing procedures required for authorizing and coordinating the employment of the CAP in DR operations.

**7-5. Concept of Operations:**

a. Natural disasters may vary widely in scope, urgency, and degree of destruction. A single point of control for employment of CAP personnel and resources in any type of disaster is essential to prevent duplication of effort and to ensure commitment and proper use of a minimum amount of CAP resources. This applies whether disaster relief support is provided by a single CAP unit or several CAP units or wings.

b. Wing commanders should ensure that plans are ready for all possible situations that could occur. Historical disaster information will help determine the plans required. In some situations, such as hurricanes and floods, the deployment of personnel prior to the disaster in order to react with speed and efficiency, or to protect the force from initial damage, may be necessary.

c. Wing commanders should ensure also that a current alert roster is on file with the appropriate NAF, the local Red Cross, State Emergency Management office, sheriff, and that other authorities know how to request CAP assistance.

**7-6. Mission Authorization:**

a. A NAF must approve the mission request and issue a mission authorization *before* CAP can be considered as participating on behalf of the Air Force. Two procedures for obtaining the Air Force mission authorization (mission number) for CAP assistance in natural disaster missions are:

(1) Local authorities (city, county, etc.) should direct initial requests for assistance to appropriate state civil authority (emergency management office), which will then request military assistance from

the FEMA Regional Office, who will pass the request to the CONUS Army and NAF as indicated in figure 7-1. Using any other procedure to request military assistance may result in unnecessary delay. This does not prohibit local authorities from requesting military assistance from the CONUS Army or NAF in extreme situations when communications cannot be established with the state disaster preparedness office.

(2) If a disaster strikes without warning (tornado, flash flood, fire, etc), the CONUS Army may be bypassed and the request made directly to the appropriate NAF.

b. The request for CAP assistance must contain:

(1) Date and time for starting the mission.

(2) Specific information on the mission CAP will perform; that is, personnel transport, damage assessment, surveillance, communications, ground teams, etc.

(3) The designation of CAP units desired to perform the mission.

(4) Duration of the mission (time limit).

(5) Name and phone number of individual making the request.

c. The wing commander will ensure that the USAF-CAP liaison officer is advised promptly of all missions approved and completed, using the TEMPEST RAPID reporting format.

d. Upon completion of an Air Force authorized mission, the requesting agency must inform the appropriate NAF of the date and time at which the mission was terminated. If the information is passed by telephone, written confirmation should follow immediately.

**7-7. Air Force Reserve (AFRES) Coordination:**

a. The Air Force State Preparedness Liaison Officer (SPLO) is the Area Planning agent to the State

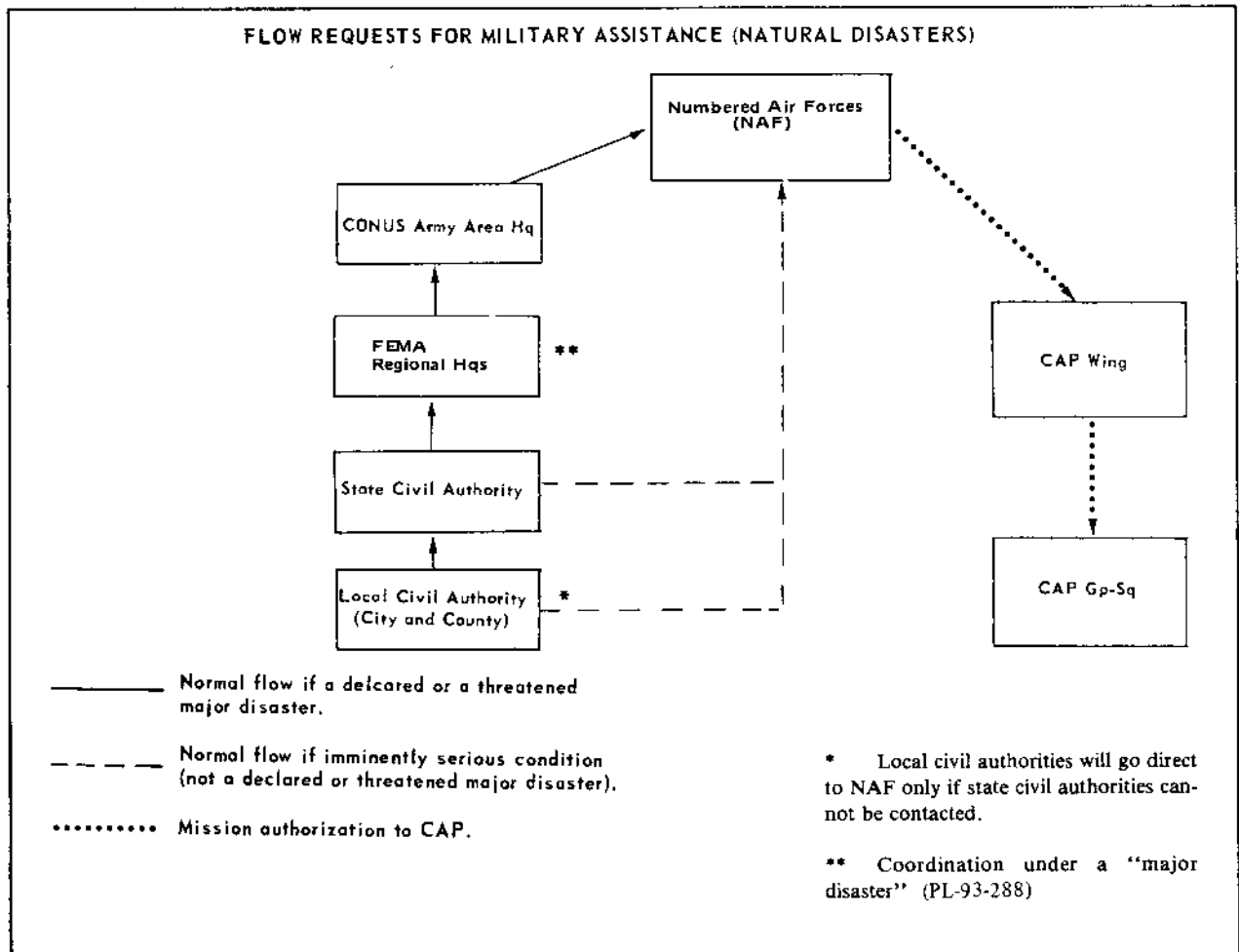


Figure 7-1

Adjutant General (AG)/State Area Commander (STARC) for Air Force activities within the state. Among their peacetime duties, they are to:

(1) Annually visit the state CAP wing Commander. This visit will be coordinated through the USAF-CAP liaison officer.

(2) Brief the wing commander and his/her staff on AF policy and current procedures affecting the CAP for assistance to civil authorities in natural DR operations to include TEMPEST RAPID reporting requirements.

b. The SPLO should be kept informed of, and included in:

- (1) CAP Air Force evaluations.
- (2) CAP training missions.
- (3) Wing and regional conferences.

**7-8. Directing the Mission.** To initiate CAP participation, the CAP commander, or designated representative, will appoint the CAP mission coordinator, who will exercise operational control of all CAP resources involved in the mission. The mission may require a full team response or, if specialized, require only communications assistance, first aid, vehicles, airlift, ground transportation, etc.

a. The mission coordinator must know the status of all resources available. The NAF and local authorities must also be kept informed in order to plan effectively.

b. Safety considerations become more significant with the demanding requirements of a DR operation.

**7-9. Reporting.** Accurate reporting of all CAP DR activity to HQ CAP-USAF (DOS) is essential if CAP is to receive deserved credit for all of their emergency services effort. This includes missions performed under state or local government requests, American Red Cross, Salvation Army, or other organizations requiring CAP support, in addition to those Air Force-approved missions. THE DESIGNATED MISSION COORDINATOR RESPONSIBLE FOR OVERALL CAP ACTIVITY WILL FURNISH THE USAF-CAP LIAISON OFFICER THE INFORMATION REQUIRED IN THESE REPORTS, AS FOLLOWS:

a. Natural Disaster Resource Employment Report (TEMPEST RAPID) submitted to the wing LO upon initiation OF AN AIR FORCE AUTHORIZED MISSION.

(1) When submitted:

(a) Initial report - Immediately upon employment of CAP resources.

(b) Daily report - As of 2100Z, dispatched to reach the wing LO no later than 2400Z. (Wing LO may vary time of report if authorized by the NAF(R).)

(c) Interim report - Any time the situation changes and warrants immediate action.

(d) Termination report - Whenever resources support is terminated.

(2) How submitted by CAP mission coordinator:

(a) Telephone

(b) Radio

(3) Report Instructions:

(a) TEMPEST RAPID reports will be submitted *as long as CAP resources are being used.*

(b) The first daily report will reflect pertinent facts, figures, or other data. Subsequent daily reports will reflect CUMULATIVE figures.

(c) "NC" will be entered after the paragraph number if no change has occurred in that paragraph since the last report.

(d) "NA" will be entered in those paragraphs which do not pertain to the operation.

(4) Report Content. TEMPEST RAPID is in narrative format with each paragraph containing information relating to the topics specified. *Ensure the information submitted conforms to the numbered paragraphs in figure 7-2.*

b. Natural Disaster Relief Final Report (TEMPEST RAPID III). This final written report will be submitted for *both* Air Force or non-Air Force missions engaged in by CAP and consolidate all information concerning CAP activity in the DR operation. Resources used, total cost involved, pictures and news releases depicting CAP activity, letters of appreciation, and any other significant data should be included.

(1) Submitted to the wing LO.

(2) When submitted: A written report must reach the USAF-CAP liaison officer within six (6) working days following termination of CAP activity.

(3) Report content:

(a) Indicate the location, cause, and duration of the disaster.

(b) Include the name of the requestor, exact time and date of initial request for CAP assistance. If requested from a civil official, state his/her position in the civil government.

<p>PART ONE - NA  PART TWO - NATURAL DISASTER RECOURSE EMPLOYMENT REPORT</p> <p>(TEMPEST RAPID 1)</p> <ol style="list-style-type: none"> <li>(1) Narrative statement covering the type of natural disaster location, extent of damage, and estimated duration of CAP support operations.</li> <li>(2) Source and time of request for CAP assistance. Provide full name, official position and address of requestor.</li> <li>(3) Casualties and fatalities of CAP personnel involved in disaster relief operations.</li> <li>(4) Type(s) of mission being conducted.</li> <li>(5) Peak number of CAP members committed.</li> <li>(6) Number of CAP aircraft committed that are member-owned and corporate-owned.</li> <li>(7) Number of sorties and hours flown by member-owned and corporate-owned aircraft.</li> <li>(8) Number of fixed communications stations committed.</li> <li>(9) Other CAP equipment committed by type and amount.</li> <li>(10) Assigned CAP mission number.</li> <li>(11) Other remarks. In final daily report, show the termination date/time of CAP assistance.</li> </ol>
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Figure 7-2

(c) Provide a chronological summary of the principal CAP actions from the initial operation. This summary should show the type forces, equipment, and supplies used.

(d) Include the highlights of the operation, outstanding support given, unusual actions or occurrences that would assist in promoting the CAP image.

(e) State whether any damage to CAP facilities or casualties resulted from the disaster itself or in the disaster operations.

(f) Include a discussion of problem areas encountered and actions recommended to avoid future occurrences and to improve procedures used in natural disaster operations. NOTE: Enclosures should include photographs of CAP assistance which should be captioned, dated, and identified as to location and activity.

#### 7-10. Peacetime Radiological Monitoring:

a. CAP is a support agency and cannot be *primarily* responsible for peacetime radiological monitoring. Types of support CAP can provide during a peacetime incident includes:

(1) The use of CAP aircraft as a monitoring and communications platform, a means of transportation, etc.

(2) The use of CAP ground vehicles to transport personnel and equipment.

(3) The use of CAP personnel to pilot aircraft, drive vehicles, operate the communication stations, and support responsible officials.

(4) Mission coordination assistance for the responsible agencies.

(5) Collection of air samples and/or meter readings, providing the provisions of paragraph b, below, are met.

b. Prior to becoming involved in peacetime radiological monitoring activities, CAP must have an established written agreement with the state agency responsible. This agreement should provide specific guidance concerning:

(1) Functions to be performed and by whom.

(2) The type of equipment needed for various kinds of incidents.



(3) The minimum qualifications of CAP personnel involved in various aspects of a radiological monitoring mission.

(4) Training of CAP personnel.

(5) Alerting or notification of a peacetime radiological mission.

(6) Provisions for liability coverage for CAP members.

(7) Provisions for health insurance for CAP members.

#### 7-11. American Red Cross (ARC):

a. The ARC provides assistance to persons in need as a result of disasters. Cooperation and support between the military services, Federal agencies, CAP, and the ARC is authorized in: 42 USC 5146 (reference c); Department of Defense Directive 3025.1; and in the ARC/CAP Agreement of October 1982.

b. The Air Force, on occasion, requests the assistance of the CAP during national and local emergencies. Whenever the CAP is supporting the Air Force during any emergency, assistance to the ARC may also be provided. In this instance, the ARC representative will request support from the designated mission coordinator. Assistance will be provided at the discretion of the NAF and the mission coordinator. Reimbursement to the CAP will be made by the USAF in accordance with CAPR 173-3.

c. On occasion, the ARC needs emergency transportation by air of medical supplies, materials, and ARC employees to conduct ARC operations. The emergency may not warrant Air Force participation and its use of CAP resources. In such instances, CAP wing commanders are authorized to provide, on a voluntary basis, ES to any authorized representative of the ARC who makes application for this service.

d. The ARC will provide reimbursement to CAP for costs expended on non-Air-Force-authorized missions, in accordance with the AF reimbursement schedule. The ARC representative will obtain from the

pilot, driver, or unit commander, a request for reimbursement which will be processed through the ARC office for payment.

e. This voluntary ES may include air transport or assistance with:

(1) Communications equipment and personnel.

(2) Ground transport.

(3) Shelter manpower to work as volunteers in Red Cross shelters; CAP cadets and other personnel may assist, if qualified, in ARC first-aid stations, feeding units, supply operations, etc.

f. The ARC will provide necessary pre-disaster training and operational supervision in cooperation with local CAP unit commanders or their designees.

g. Should the CAP be engaged in search or DR operations in remote or devastated areas, the mission coordinator may request ARC support in:

(1) Feeding of CAP members engaged in such operations.

(2) Use of ARC disaster vehicles.

(3) Notifying next of kin.

(4) Providing medical teams.

#### 7-12. Salvation Army (SA):

a. One of the responsibilities of the SA, and recognized in Public Law 93-288, 42 USC 5152, is to assist persons in need as a result of disaster and local emergencies.

b. Cooperation between CAP and SA will ensure that maximum potential of both will be realized when participating in emergency operations. An agreement between the SA and CAP was adopted in November 1973. This agreement has many of the same provisions listed under paragraph 7-11, ARC. Copies may be obtained from HQ CAP-USAF (DOS).

OFFICIAL

DAVID L. PATTON, Brig Gen, USAF  
Executive Director

*Michael D. Duto*

MICHAEL D. DUTO, Lt Col, USAF  
Director of Administration

**EMERGENCY SERVICES FUNCTION WITH DUTIES AND CHECKLISTS****1. Mission Coordinator:****a. Duties:**

(1) Directs and controls all CAP air and ground operations for a specific mission, either training or actual.

(2) Determines mission base(s).

(3) Determines the readiness of available aircraft with aircrews, ground personnel, and ground teams.

(4) Maintains liaison with other participating agencies and keeps appropriate authorities (AFRCC, NAF, CD, etc.,) advised of mission activity.

(5) Maintains a mission coordinator's kit that is immediately available to provide the basic items necessary for the proper execution of the mission, including such items as: mission coordinator's checklist; CAPM 50-15, Emergency Services Manual; CAPM 50-21, Mission Coordinator's Training Manual; unit ES directory; telephone directory; maps of the wing area and subareas; grid overlay, if appropriate; pencils, paper, computer, plotter, an adequate supply of CAPFs 9, Release (for Adult Non-CAP Members); 102, Initial Alert and General Briefing Form; 103, Mission Personnel Register; 104, Mission Flight Plan/Briefing Form; 106, Ground Interrogation Form; 107, Flight Operations Log; 108, Reimbursement Document; 109, Vehicle Clearance; 110, Air/Ground Point to Point Log; 121, Aircraft/Vehicle Register; 122, SAR Mission Report; message control log; and other forms produced at wing level.

(6) Assumes responsibility for information released by the mission PAO.

**b. Mission Checklist:**

(1) Obtain as much information as possible about the SAR objective or mission from:

(a) The person that appointed the mission coordinator.

(b) The AFRCC, NAF, or the state ES agency.

(c) The wing alerting officer. (Note: CAP Form 102 will assist in obtaining and recording much of the information needed to conduct the mission.)

(2) Initiate a mission coordinator's log.

(3) Determine if other agencies or wings are involved and what search areas they are responsible for.

(4) Correlate additional reports or information that is available from other sources (FAA Flight Service Stations, etc.) with that received from the AFRCC.

(5) Complete CAP Form 102.

(6) Analyze the mission and make preliminary estimate of requirements. Alert mission staff, determine location of mission headquarters, and primary base of operations.

(7) Call the AFRCC, NAF, etc., as soon as a base of operations has been established.

(8) Alert personnel for duty.

(9) Select assistant mission coordinators, as required.

(10) Lay out the problem and plot it on a map.

(11) Brief the mission staff and assign functions (use CAP Form 102 as a guide).

(12) Determine the number of aircraft, vehicles, personnel, ground equipment, communications, and subarea bases needed. If additional forces or assistance beyond current capability is needed, advise the appropriate controlling agency.

(13) After proper coordination, alert other agencies required: FAA, highway patrol, sheriff's department, forest service, game protection, airport operators, etc. (See subparagraph c of this section for Checklist of Local Agencies and Phone Numbers.)

(14) Brief subarea mission coordinators simultaneously, if possible.

(a) Cover mission details and assign search areas.

(b) Provide mission control number.

(c) Give any special instructions not covered in wing publications.

(15) Maintain contact with mission chaplain.

(16) Telephone an informal report on current status of mission to the appropriate controlling agency. (See paragraph 4.15.)

(17) Review action taken to this point. Make certain each item has been completed and all appropriate personnel kept informed.

(18) Reevaluate mission, considering the following:

(a) Have all areas of high probability been covered? (Multiple flights over area with different crews flying different time of day in different directions.)

(b) How effective was the coverage?

(c) Have all leads been checked out?

(d) Are search areas properly assigned to assure best possible results?

(e) Are adequate communications established?

(f) Is the mission proceeding as an integrated effort by all activities and agencies?

(g) Have all areas of high radiation been plotted? (CD)

(h) Has an informal verbal report of current activities and immediate plans been sent to the AFRCC or other appropriate controlling agency? Contact the AFRCC every two or three hours with a mission update. Discuss your plans, resources, and overall situation. *Keep the coordinating/controlling agency informed.*

(19) Review action of mission staff. Is it being properly completed?

(20) Continue to follow progress of mission — analyze; reevaluate; take appropriate action.

(21) Send daily progress report to the AFRCC no later than 2000 hours. (Use CAP Form 122.)

(22) Send closing report information within two hours after termination or suspension of mission. (For reports see paragraphs 4-16 or 4-17. Use CAPF 122.) NOTE: Use checklist in CAPM 50-21, page 7-1 (Closing) and 8-1 (Suspending) to assure all actions necessary to close/suspend a mission have been accomplished.

(23) Notify all assisting agencies previously alerted when the mission is closed or suspended.

(24) Send supplemental report if closing one was not complete or in case of additional mission information.

(25) Have mission DA contact local media and wire services.

**c. Checklist — Local Agencies and Phone Numbers:**

(1) FAA/FSS \_\_\_\_\_ (May be done at time of initial briefing from FSS.) Inform the flight service station where search aircraft will be working. Request relay of aircraft communications from search

areas to mission area if necessary. Obtain weather briefing and arrange for weather updates. See attachment \_\_\_\_\_, paragraph \_\_\_\_\_, for air traffic coordination.

(2) FAA Tower — \_\_\_\_\_. Advise that search aircraft will be working and of any search aircraft arriving from other areas that need taxi and parking instructions.

(3) Fixed Base Operator (FBO) — \_\_\_\_\_. Notify FBO of the fuel needed. Determine if fuel or oil supply is adequate and discuss aircraft parking. The air operations officer and flight line officer should assist the MC.

(4) Vehicle Service Station — \_\_\_\_\_. Arrange for vehicle fuel if needed. Make certain station attendants are briefed on fueling procedures.

(5) County Sheriff's Office — \_\_\_\_\_. Advise that a mission has been activated and that ground teams may be working remote areas.

(6) Local Emergency Management Officials — \_\_\_\_\_. (If applicable.)

(7) Local Police Department — \_\_\_\_\_. See guidance in "5" above.

(8) Local Red Cross Officials — \_\_\_\_\_. (If applicable.)

(9) Forest Service (dispatcher) — \_\_\_\_\_. Advise if searching in the forest. They may have airplanes, helicopters, vehicles, and personnel available, as well as contact with lookouts in remote areas who may be able to provide leads.

(10) Highway Patrol — \_\_\_\_\_. Advise of possible personnel movement and of general search or relief activity area.

(11) U.S. Coast Guard — \_\_\_\_\_. If possible offshore operations would be involved.

(12) U.S. Coast Guard Auxiliary — \_\_\_\_\_. May provide ground teams, communications assistance or offshore transportation/search.

(13) Harbormaster — \_\_\_\_\_. May be required for offshore operations.

(14) Local minister or priest — \_\_\_\_\_. May assist mission personnel in dealing with persons concerned with the missing crew, especially at conclusion of mission.

**2. Air Operations Officer:**

**a. Duties:**

(1) Coordinates all air activity under supervision of the mission coordinator.

(2) Supervises all air-related activities during training, evaluation, and actual missions.

(3) Supervises the briefing of both aircrews and ground teams.

(4) Knows status of personnel, aircraft, radios, and emergency equipment normally available for missions.

(5) Assures that all personnel assigned jobs in the air operations area are adequately trained.

(6) Maintains a status board for mission information. This board, when kept up to date, will provide needed information to all mission participants.

**b. Checklist:**

(1) Receive briefing on the mission from the mission coordinator.

(2) Complete CAPF 102 if not already accomplished, and post a copy on the mission-status board.

(3) Initiate a CAPF 107.

(4) Assist the mission coordinator in plotting the mission on the map.

(5) Insure that the various duties required of the briefing/clearing officer, dispatcher, flight line officer, and debriefing officer are being accomplished.

(6) With the mission coordinator and other staff personnel, select tentative search areas (primary and secondary) as well as the areas of highest probability based on the best information available. Plot them on the search map overlay.

(7) Prepare a briefing on the hazards in the search area for the mission coordinator. Include terrain, weather phenomenon, towers, and any other possible hazard that could affect the safety of the search crews. Post the information on the mission status board and give a copy to the mission coordinator and the briefing/clearing officer. On Civil Defense missions, determine areas of high radiation level, etc.

(8) Provide the mission coordinator with an alert list of available rated mission pilots, observers, scanners, and ground crews.

(9) On searches where more than one base of operations is being used, obtain needed information on aircraft, air and ground crews, and facilities from the operations staff at the subarea mission headquarters.

(10) Mark coverage of all searched areas on the map overlay.

(11) Check weather throughout the search area — current and forecast. Post the information on the mission status board, and notify the mission coordinator. Obtain weather from the local FAA Flight Service Station or other reliable source.

(12) If complete weather information is not available from FAA, consider sending out a weather reconnaissance flight with a carefully selected crew. Trained mobile ground observers may also provide weather information.

(13) With the help of the communications officer, prepare a plan for communicating with air and ground personnel and other agencies. Provide an alternate method if primary communications should fail.

(14) Prepare a list of available airfields suitable for use by search crews. Provide distances between airports and information such as airport facilities to include communications, fueling, etc. This information may be obtained from the Airman's Information Manual and should be posted on the mission status board. Make certain the briefing/clearing officer also has this information.

(15) Determine if fuel is available at airports and procedures for purchase of fuel and lubricants.

(16) Prepare aircraft movement message or make calls directing the move when the mission coordinator decides that aircraft should move to another location. Be sure that flight orders are issued by the unit of assignment or at mission headquarters.

(17) Assign aircraft and crews to specific search areas as directed by the mission coordinator. Work closely with the briefing/clearing officer in this function, if one is assigned, to avoid duplication and confusion.

(18) Follow the progress of the mission and keep the mission coordinator advised of significant changes. Make recommendations to the mission coordinator on actions to assist in the prosecution of the mission. Work closely with the briefing/clearing officer.

(19) Post mission progress on the mission status board. (Include debriefing information.)

(20) Assist the mission coordinator in planning the next day's search effort.

(21) Check that a supply of CAPF 106 is on hand for use at all telephones and in the radio room for recording mission leads.

**3. Safety Officer:**

**a. Duties:**

(1) Analyzes search environment and ensures that mission participants are briefed regarding

specific hazards of operation, such as winds, current and projected weather, and appropriate emergency procedures.

(2) Inspects aircraft for appropriate inspection compliance and general condition.

(3) Assists operations personnel with ensuring pilot currency and qualification in accordance with CAP and FAA directives.

(4) Ensures Mishap Report Form (CAP Form 78) completion and appropriate agency notification in the event of a mishap.

(5) Corrects on the spot or informs appropriate agency regarding hazards, unsafe acts, or other safety problems related to the mission. If necessary, informs the mission coordinator and/or commander in charge of safety problems noted. Performs follow-up as necessary to see that problems are corrected.

(6) Assists mission coordinator and/or operations officer as required in matters regarding safety.

**b. Checklist:**

(1) Obtain the following information regarding the mission:

- (a) Nature and location of search.
- (b) Airfields and aircraft to be used.
- (c) Name of mission coordinator and local commander.
- (d) Facilities to be used.
- (e) Present and forecast weather and winds.

(2) Analyze search area and facilities for potential safety hazards.

(3) Analyze mission and make estimate of safety requirements.

(4) Ensure pilots and emergency services personnel are briefed regarding information obtained.

(5) Check aircraft for general condition and appropriate survival gear, 100-hour and annual inspection requirements, and ELT currency. (If to be used IFR, check for pitot static system altimeter check and VOR checks completed.)

(6) Inform emergency services officer of any aircraft problems.

(7) Assist operations personnel with checking pilots for compliance with CAPR 60-1 currency and check ride equipment.

(8) Correct problems on the spot if possible. If not possible, inform appropriate agency or officer in charge as appropriate. Follow up to ensure action has been taken to correct problem.

**4. Mission Pilot:**

**a. Duties:**

(1) Pilots an aircraft engaged in a authorized CAP mission and participates in actual, test, and training ES missions as the pilot in command of an aircraft.

(2) Accomplishes assigned tasks and completes required reports.

**b. Checklist:**

(1) Dress appropriately for the mission, that is, gloves, sunglasses, appropriate CAP clothing for climate and terrain.

(2) Obtain special equipment that may be needed on the flight, such as adequate maps, flashlights, and survival equipment. Check that valid emergency services card, pilot's license, CAP membership card, and medical certificate are in your possession.

(3) If flying to the search base, initiate a flight plan, using CAPF 104 or FAA flight plan.

(4) Upon reaching the search base, report to the administration section. Sign in on the Mission Personnel Register (CAPF 103) and log your aircraft on the Aircraft/Vehicle Register (CAPF 121).

(5) Start a CAPF 104, completing as many known items as necessary, then report to the briefing officer to obtain mission briefing where the appropriate remainder of CAPF 104 will be completed. Your flight plan will be approved by the air operations officer.

(6) FLY THE MISSION AS BRIEFED AND PLANNED.

(7) Report to the debriefing officer immediately upon return to the search base, and complete the debriefing portion of CAPF 104.

(8) Report your availability for another sortie to the debriefing officer.

(9) Complete all refueling invoices for fuel delivered to your aircraft before departing on the next sortie.

(10) Upon completion of the day's mission, return all supplies and equipment borrowed or assigned.

(11) File a flight plan for return to base. Close your flight plan on arrival.

(12) Upon return, service your aircraft immediately.

**5. Mission Observer:****a. Duties:**

- (1) Looks for search objective.
- (2) Participates in actual, test, and training ES missions as an aircraft observer.
- (3) Assists pilot in navigation and compiles information concerning each flight.
- (4) Plots observed radiation level on CD missions.
- (5) Maintains a flight log listing chronologically all observations, that is, other aircraft in search area, ground parties in area, density and variation of foliage, etc.
- (6) Reports all observations upon completion of each sortie.

**b. Checklist:**

- (1) Dress properly for the mission, that is, gloves, sunglasses, appropriate CAP clothing for climate and terrain.
- (2) Obtain special equipment that may be needed on the flights, such as adequate maps, a flashlight, notebook, pencils, and survival equipment. Check that current CAP membership card and current emergency services care are in your possession. Other equipment needed may include field glasses, message drops, strobe lights, survival kits, etc.
- (3) Proceed to the operating base and report to the administration section. Sign in on the Mission Personnel Register (CAPF 103).
- (4) Report with your mission pilot to the briefing officer for mission briefing.
- (5) Assist the pilot in preparations for the mission. Check RADEF equipment for operation on civil defense missions.
- (6) Maintain a flight log of all observations on your sortie. Record all sightings to include the time of the sighting and geographic location. Include such things as other aircraft in your search area, ground parties sighted, descriptive information concerning your search areas (areas covered by clouds, etc.), old wrecks, and possible targets sighted.
- (7) Fly the mission as briefed and planned.
- (8) Report to the debriefing officer with your pilot immediately upon return to the search base.
- (9) Assist the mission pilot in completion of reports.

(10) Report your availability for another sortie to the debriefing officer.

(11) Return all supplies and equipment borrowed or assigned to you upon completion of the day's mission.

**6. Mission Scanner:****a. Duties:**

- (1) Looks for search objective.
- (2) Participates in actual, test, and training ES missions as an aircraft observer.
- (3) Reports all observations upon completion of each sortie.

**b. Checklist:**

- (1) Dress properly for the mission, that is, gloves, sunglasses, appropriate CAP clothing for climate and terrain.
- (2) Obtain special equipment that may be needed on the flights, such as adequate maps, a flashlight, notebook, pencils, and survival equipment. Check that current CAP membership card and current emergency services card are in your possession. Other equipment taken may include field glasses, message drops, strobe lights, survival kits, etc. No firearms will be carried on the person. (See paragraph 5-5g.)
- (3) Proceed to the operating base and report to the administration section. Sign in on the Mission Personnel Register (CAPF 103).
- (4) Report with your mission pilot to the briefing officer for mission briefing.
- (5) Relay all pertinent sightings to your mission pilot.
- (6) Report to the debriefing officer with your pilot immediately upon return to the search base.
- (7) Assist the mission pilot in completion of reports.
- (8) Report your availability for another sortie to the debriefing officer.
- (9) Return all supplies and equipment borrowed or assigned to you upon completion of the day's mission.

**7. Briefing Officer:****a. Duties:**

- (1) Sets up briefing area.

(2) Briefs both air and ground crews on mission objective, tasks, weather, communications, safety, and reporting requirements.

(3) Keeps all briefing information current through constant monitoring of activities and information from mission coordinator, air operations officer, debriefing officer, communications officer, ground operations officer, RADEF officer, and mission status board.

(4) Completes necessary briefing forms, and sends crews to aircraft clearance or vehicle clearance sections.

(5) Maintains records of extent and degree of coverage of areas by aircrews and ground teams.

(6) Provides for direct briefing of air or ground units by CD personnel when required.

**b. Checklist:**

(1) Complete CAPF 102 if not already completed by the mission coordinator or air operations officer, and post on mission status board.

(2) Obtain pilot and observer mission kits from supply or operations for issue to search crews, if applicable. Issue gridded charts and maps and any other equipment, if crews fail to have them. Be sure material is returned at the end of each day.

(3) Secure a supply of CAPFs 104, 106, and 109.

(4) Set up briefing area and flight planning section in a quiet area.

(5) Secure parking, fueling, and taxi plans from flight line or operations officer. Post on mission status board.

(6) Secure maps of search area and routes to and from area from mission coordinator.

(7) Work closely with mission coordinator, air and ground operations officers, and debriefing officer.

(8) Secure aircrew and ground parties search area assignments, type of patterns to be used, and search altitudes from air and ground operations. Determine, also, routes and altitudes to be used to and from search areas.

(9) Obtain information on hazards to aircraft operations from air operation officer and flight line officer to be used in briefings. This should include hazards around the airport while taxiing, obstructions, traffic patterns, landing and taxi surface conditions, surrounding terrain, etc.

(10) Have each crew fill out CAPF 104, one per sortie.

(11) Add any pertinent warning information that may not be listed on CAPF 104 concerning safety.

(12) Brief air and ground crews, using all available information. Have the pilot or team leader sign the completed forms. The ground operations officer signs for the ground teams.

(13) Send briefed flight crews to flight planning area and then to clearance officer.

(14) Maintain records of coverage of areas searched. Keep the mission coordinator informed of progress. Check that this information is shown on the overlay map.

(15) Constantly update briefing information.

**8. Aircraft Clearance Officer:**

**a. Duties:**

(1) Monitors any factor that might affect participating aircraft and aircrews while on the mission.

(2) Clears mission pilots and assigned aircraft.

(3) Completes clearance forms.

(4) Assures that aircrews have the latest weather, hazard reports and NOTAMS.

**b. Checklist:**

(1) Supervise the aircraft dispatcher, if one is used; otherwise, perform these functions.

(2) If inbound aircraft has files a CAP flight plan, prepare an arrival message to notify home base on the arrival of each aircraft. Aircraft are required to file FAA or CAP flight plans.

(3) Direct crews to register, if not already done.

(4) Check CAP membership card, emergency services card, pilot's license, and medical certificate for all pilots and CAP membership and emergency services card for observers/scanners. **NO CREW WILL BE CLEARED WITHOUT CURRENT VALID DOCUMENTS IN POSSESSION.**

(5) Check for required equipment.

(a) Appropriate CAP dress, gloves, sunglasses, etc.

(b) Warm clothing in winter.

- (c) Adequate maps.
- (d) Adequate survival equipment.

(6) Ask about other necessary equipment: pencil and paper, computer, survival kit, etc.

(7) Check for complete CAPF 104. If a non-CAP member is to be flown, CAPF 9 must be completed and the mission coordinator MUST approve the flight plan prior to aircraft departure.

(8) Approve flight plan.

(9) Provide operations officer with information to post on mission status board to keep mission coordinator and participants current on progress of the mission.

(10) When pilots return to home bases, make sure they file flight plans.

#### 9. Aircraft Dispatcher:

##### a. Duties:

(1) Assists clearance officer as required.

(2) Initiates and maintains CAPF 107.

(3) Assists pilots in completing flight plans. Files and closes flight plans with the appropriate agency when required.

(4) Maintains cumulative radiation exposure records for each aircrew member during CD mission.

(5) Maintains a progressive register indicating flight numbers, types of aircraft, total hours flown, and the hours flown by individual aircrew members. Monitors aircrew crew rest status.

(6) Notifies the mission coordinator when a mission aircraft has passed its ETA. Continues to notify the mission coordinator at regular intervals until the mission coordinator terminates the requirement, or the aircraft is located.

##### b. Checklist:

(1) Initiate flight operations log (CAPF 107).

(2) Post all flight plans on CAPF 107. Each sortie is posted to include flights to the search base and return to home base.

(3) Complete actual departure times and landing time entries on CAPF 107 when received from the flight line officer of arriving crews.

(4) Enter the total time flown on CAPF 107 for each flight.

(5) Continually check CAPF 107 to assure no aircraft is overdue. THIS IS YOUR MOST IMPORTANT FUNCTION. A CREW'S LIFE MAY DEPEND ON YOUR ALERTNESS. If any aircraft is found to be overdue (10 minutes or more), make an immediate check with the flight line officer and, if the aircraft is not on the ramp, report the fact IMMEDIATELY to the mission coordinator. Continue to notify the mission coordinator at regular intervals until the mission coordinator terminates the requirement or the aircraft is located.

#### 10. Flight Line Officer:

##### a. Duties:

(1) Exercises direct supervision of all aircraft maintenance and flight line personnel.

\* (2) Maintains security over all aircraft and equipment in parking area.

\* (3) Directs the parking and refueling of aircraft.

(4) Coordinates parts and fuel requirements with the operations officer.

\* (5) Performs daily inspections of approaches, taxiways and runways to be used.

(6) Maintains records of fuel and oil used by aircraft and vehicles.

(7) Assist in accumulation of data for obtaining authorized reimbursements from the Air Force. (CAPF 108, Reimbursement Document.)

(8) Maintains records of all aircraft and vehicles assigned to the mission, including dates received and released, preventive maintenance accomplished, and recommendations for heavy maintenance.

(9) Directs radiological monitoring of aircraft and vehicles, (CD).

(10) Directs hangaring or covering of aircraft or related ground equipment to prevent fallout contamination (CD).

(11) In coordinating with the RADEF officer, maintains accumulative radiation dose records for all ground support personnel (CD).

\* Qualified cadets may be used to perform those functions marked with an asterisk.

##### b. Checklist:

(1) Survey the airport for hazards; that is, new construction, blind runways and approaches, congested areas, patches of water or ice, etc. Advise the air operations officer and note on mission status board.



- (2) Mark any hazards.
- (3) Survey the airport for best parking areas and taxi routes. Try to arrange for a "follow me" vehicle to park aircraft from either a fixed based operator or Civil Air Patrol.
- (4) Mark taxi routes and parking areas for mission aircraft use. The FAA tower, if available, may give pilots taxi instructions by radio at the mission base airport. On civil defense missions, survey for a contaminated aircraft isolation area.
- (5) Map out the taxi routes and parking areas on maps of the airport to be used in the briefing of search crews.
- (6) Report or establish a procedure to report departure and arrival times of search aircraft to the aircraft dispatcher.
- (7) Brief the flight line personnel on duties and responsibilities of wing walking, parking of aircraft, starting of aircraft, and control of personnel on the ramp. NOTE: If cadets are used as assistants on the flight line, be sure they are supervised *at all times* by a responsible senior CAP member. Only personnel with emergency services cards, qualified for flight line duties, or in a training status, will be used. A fire guard who is trained in aircraft starting and fire-fighting procedures should be posted with a fire extinguisher.
- (8) Try to establish a security post at the vehicle entrance to the ramp so that unauthorized personnel and equipment are not allowed on the ramp. Cadets may be assigned to this function.
- (9) Insure adequate wheel chocks and aircraft tie-down are on hand and used.
- (10) Insure no smoking is allowed on the flight line.
- (11) Insure adequate static lines are available and used during the refueling of aircraft.
- (12) Report any unsafe taxiing or other aircraft operations to the mission coordinator or air operations officer.
- (13) Make arrangements for aircraft and vehicle fuel.
- (14) Flight line helpers (qualified cadets) may be used in the following functions:
  - (a) Marshalling the parking aircraft (prior training required).
  - (b) Standing fire guard for starting (prior training required).

- (c) Assisting in refueling by assuring that static lines are used, proper grade of fuel and oil are dispensed, and correct amounts entered into appropriate forms.
- (d) Assist the vendor in paper work required for reimbursement by CAP.
- (e) Cleaning windscreens and canopies of aircraft.
- (f) Assist in reporting take-off and landing times to aircraft dispatcher or runner.
- (g) Assure aircraft are tied down and chocked between sorties. All aircraft should be tied down during windy conditions and for overnight parking.
- (h) Assure no smoking is allowed on flight line.
- (i) Assist in the wing-walking of aircraft in congested areas (prior training required).

## 11. Debriefing Officer:

### a. Duties:

- (1) Debriefs both aircrews and ground teams.
- (2) Sets up debriefing area complete with maps covering search area. Obtains CAPFs 104, 106, and 109 from returning crews and ground teams.
- (3) Interviews aircrews and ground teams. Obtains all information possible from mission personnel.
- (4) Passes important information immediately to the air operations officer.
- (5) Determines areas searched and effectiveness of coverage.
- (6) Passes debriefing information to mission coordinator and operations officer without delay.

### b. Checklist:

- (1) Upon return of each search aircrew, obtain their CAPF 104. Confirm landing time with dispatcher. From ground crews, obtain CAPF 106 and 109, and confirm their return with the vehicle dispatcher.
- (2) Interview the search crews and write debriefing information on CAPF 104. Be as detailed as possible. Review the ground team interviewing forms and obtain a resume of mission accomplishment. (On CD missions, note unusually high radiation areas, signs

of life or activity in remote areas, conditions of roads, etc.)

(3) Determine the area actually searched by the assigned search crew. Have crews be realistic. Be sure air operations officer or mission coordinator indicates areas searched on overlay map.

(4) Determine the percentage of search effectiveness, using the probability-of-detection chart per downed aircraft in attachment 7.

(5) Determine the time en route to and from the search area.

(6) Determine the time spent in the search area.

(7) Determine the availability of the crew for additional sorties (air or ground).

(8) Assure the crew's aircraft or vehicle is being refueled.

(9) Pass on extremely important information immediately to the operations officer or mission coordinator before excusing the crew from debriefing. Determine if the mission coordinator wishes to talk with the search crew.

(10) Pass results of debriefing to operations officer or mission coordinator without delay.

(11) If crew is available for additional sortie, send them to the briefing section before return to search. (On CD missions, check accumulative dose rate.)

(12) Work closely with the mission coordinator, air operations officer, ground operations officer, and briefing officer.

(13) Log information of interest on the mission status board.

## 12. Communications Officer:

### a. Duties:

(1) Acts as communications supervisor and advisor to the mission coordinator and staff.

(2) Establishes communication nets for the mission.

(3) Insures efficient processing of incoming and outgoing messages.

(4) Assigns communications personnel at advance base. Records advance base call numbers and the names of operators.

(5) Prepares briefing material for all pilots, rescue teams, and radio operators on procedures, including base station call sign. Monitors radio communications.

(6) Assures that messages, complete and legible, are delivered to the proper addressee.

(7) Assures that stand-by power is available for radios and headquarters lighting.

(8) Insures all radio operators have in their possession an FCC Restricted Radio-Telephone Operator Permit and a CAP Radio Operator Permit (CAPF 76).

b. **Checklist:** (NOTE: The mission communications officer should relieve the mission coordinator of the burden of organizing and supervising the overall communications effort during the conduct of the mission.)

(1) Obtain a briefing from the mission coordinator, and determine what the communications equipment and personnel requirements are.

(2) Alert personnel and radio stations. Keep a current roster of all unit personnel with CAP radios and emergency services cards for communications duties. Remember that cadets and seniors can assist if under the direction of a rated operator.

(3) Establish communications centers. The mission base will normally be the communications center, but use other land stations for backup and assistance.

(4) Establish procedures for inflight reporting to search base or advance base. Be sure these procedures are covered in the general briefing. Work with the briefing officer and mission coordinator on establishing primary and alternate frequencies.

(5) Keep the radio log current and complete.

(6) Assure that any long distance phone calls made and received are logged with time and charges and confirm them with the mission coordinator at the end of each day.

(7) Make sure messages are delivered immediately to the addressee or staff member concerned. Insure all incoming flight plans are forwarded immediately to the aircraft dispatcher.

(8) Assure that stand-by power is available for radios and headquarters lighting. Check the emergency generator for fuel, oil, water, and battery charge. Review the procedures on starting the generator and then start it to test its reliability. Starting procedures should be posted in a conspicuous location.

(9) Check for required number and type of extension cords.

(10) Assure that all radio equipment is properly grounded.

(11) Assure that interviewing forms (CAPFs 106) are near telephone used for inbound information.

(12) Check availability of portable and mobile equipment. Try to have back-up equipment available for immediate use.

(13) Assure that adequate message forms are available and distributed to anyone who may need them.

(14) Maintain a communications status board to show the operational condition of all frequencies.

(15) Monitor communications center functions. Assure that it is constantly manned and that no operator has to be on duty for long periods. If more than one operator is working in the same immediate area provide headphones for each.

(16) Have advance base radio equipment, including proper gear, antennas, power cords, power supplies, etc., ready to be dispatched.

(17) Be sure the daily mission reports normally prepared by the mission coordinator are dispatched each day.

### 13. Ground Operations Officer:

#### a. Duties:

(1) Under the supervision of the mission coordinator, coordinates all ground team activity.

(2) Assures that all personnel performing duty in the ground operations section are adequately trained.

(3) Supervises training of ground team personnel within own unit.

(4) Maintains status of personnel, vehicles, ground team specialized gear, and emergency equipment that is normally available for wing emergency services missions.

(5) Maintains alert roster of all qualified ground teams.

(6) Keeps mission coordinator and air operations officer advised of all ground activity and needs.

b. **Checklist:** (Vehicles Clearing Officer will assist, if assigned.)

(1) Receive briefing on the mission from the mission coordinator.

(2) Assist the mission coordinator in determining the number of ground teams that will be needed.

(3) Alert team leaders and find out the availability of personnel and equipment. See that necessary ground personnel are alerted. Schedule a briefing.

(4) Be sure the following CAP forms are available: CAPF 106, 108, 109, and 121.

(5) Check with the mission coordinator and communications officer to secure ground and airborne communications frequencies and secondary methods of communications in case of emergency.

(6) Get assignments for SAR, interviewing, and mobile communications teams from mission coordinator.

(7) Brief ground teams, if briefing officer hasn't, and assign missions. Be sure ground team briefing includes:

(a) Complete description of the search object.

(b) Type, N-number, and color or distinctive markings and number of people on board if object is an aircraft.

(c) Probable number and condition of survivors.

(d) Expected terrain and weather to be encountered.

(e) Suggested ground search patterns and techniques of penetration.

(f) Other agencies involved in mission or requiring contact.

(g) Probable air coverage.

(h) Communications schedule and frequencies.

(i) Primary and alternate methods of communications; air-to-ground, ground-to-air, and ground-to-ground.

(j) Probable method of survival evacuation team recovery.

(k) Other pertinent information using data from the CAPF 102.

(8) Stress safety precautions.

(9) Check individual members for proper personal equipment.

(10) Check required team equipment for proper operating condition.

(11) Insure required vehicles and communications equipment.

(12) Insure that at least one qualified emergency services senior member is available to lead each team, and is present in any vehicle carrying cadets.

(13) Insure that each team has at least two members qualified in first aid.

(14) Insure that all team members except trainees have a current emergency services card for ground team functions. Team leaders must be at least 21 years old. Check also for current CAP membership cards, driver's licenses, etc.

(15) Insure that personnel know emergency air-to-ground and ground-to-air signals, and have maps, charts, CAPF 106, and any other information including wing rescue SOPs.

(16) Insure that personnel assigned to operate the mobile radios have an FCC Restricted Radio-Telephone Permit or higher, and a CAPF 76, Radio Operator's Proficiency Permit.

(17) Insure that rescue personnel are familiar with legal procedures regarding deceased personnel that may be found.

(18) Insure that personnel are familiar with reporting procedures in the event their vehicle is involved in an accident.

#### 14. Public Affairs Officer (PAO):

##### a. Duties:

(1) Directs and monitors the release of news, information and photographs to concerned agencies, newspapers, wire services, and radio and TV stations with the approval of the mission coordinator.

(2) Acts as staff advisor to the mission coordinator on public affairs and public relations matters and keeps him advised of the PAO's activities.

(3) Provides for adequate and efficient news coverage concerning missions, real or simulated, and assists the controlling agency, if other than CAP, during actual emergencies.

(4) Communicates directly with the Director of Public Affairs at Civil Air Patrol National Headquarters and forwards news stories for national release, if the mission involves a notable person or is of greater than passing interest.

(5) Keeps higher-echelon PAOs informed of high interest missions. Works closely and cooperates fully with the public relations officers of federal, state, or local controlling agencies and does not release information to the news media without coordinating with controlling agencies.

##### b. Checklist:

(1) Secure information on the mission and participating agencies.

(2) Expedite the preparation of information to be released at the beginning of the mission.

(3) Check information to be released to be sure that:

(a) There is no derogatory statement concerning the aircraft, personnel, or ability of personnel missing or crashed.

(b) There is no derogatory statement toward other agencies or individuals participating in the mission.

(c) There are no personal opinions or theories expressed as to why the individual or persons became involved in the accident, crash, etc., nor as to how it could have been averted.

(d) The names of personnel on board (in case of a crash or other accident) are not released until the next-of-kin have been notified.

(4) If deemed advisable, include in the news release a request that persons who might have information on the SAR objective call the search base, collect if necessary. Include the telephone number.

(5) Assure that all information released is cleared with the mission coordinator prior to release.

(6) Prepare news releases and disseminate information to news media. Be sure to keep track of what release has been sent to whom to avoid duplication and omissions. News releases may be phoned to the media, but should be written out first and read to news media personnel, with a written story as a follow-up. Do not give painstaking details in your story. Clear, sharp facts sell a story.

(7) The members of the news media may wish to visit the site of the mission to write, film or tape their own news releases/broadcasts. If this happens, be sure to accompany the news personnel at all times. If there is more than one person, enlist others as escorts.

(8) Keep a complete list of all news media with which you might need to deal — newspapers, radio and TV stations, wire services, including names of persons to contact, telephone numbers, addresses, direct newsroom lines, if any.

(9) Prepare follow-up releases giving credit where due to other agencies which may be involved in the mission. Include information on the progress of the mission.

(10) Assure that all photographs, TV pictures, etc., are in good taste. Stress the work of rescue teams, not the wreckage nor severely injured or deceased persons.

(11) Make arrangements with the mission coordinator for news media personnel to accompany ground rescue teams, if they so request. News media personnel cannot fly on any aircraft, including privately owned, if it is participating in a U.S. Air Force — authorized mission, actual or simulated. (See CAPM 190-1, Handbook for Public Affairs Officers.)

(12) Keep the public informed so that they will know something is being done.

(13) Do not make excuses for not locating the crash or missing persons. No one is perfect; you cannot find everyone. If poor weather or the large size of the search area is hampering the mission, stress that fact.

(14) If a CAP aircraft or vehicle is involved in an accident, do not release any information on the cause of the incident. Rather say, "A board of qualified officers will investigate the accident."

(15) If a CAP aircraft or vehicle is involved in an accident, release of names of those involved will be in accordance with CAPM 190-1.

(16) Retain copies of all mission news releases and photographs for possible use by the AFRCC or CAP National Headquarters/PA.

(17) Handle news media personnel in a friendly, cooperative manner, but ensure that they do not impede or interfere with the mission.

(18) Work closely with members of the news media. Do not withhold information from one news medium and then release it to others. An explanation as to why certain information cannot be released will be made. The news media are the friends of CAP; your cooperation and assistance will do much to assure a favorable report on CAP.

(19) Prepare a news summary as soon after the mission closes as possible, but not later than 48 hours later. Keep this copy for your own files. If the missing person is a prominent individual or the crash is of interest to the national news media, you should send a copy to the PA section at CAP National Headquarters. Address your report to: National Headquarters, CAP, Attention: PA, Maxwell AFB, AL 36112. These reports are not required after every mission — only those which are of national significance. In such cases, it might be well to telephone such informa-

tion to National Headquarters/PA at the beginning of the mission.

(20) Try to monitor news broadcasts. If erroneous information is being broadcast, correct it immediately. If a radio/TV station calls you to tape your words for rebroadcast, try to pick a quiet spot to speak the words, speaking clearly and distinctly.

## 15. RADEF Officer:

### a. Duties:

(1) Coordinates with CD personnel for the training of aerial radiological monitors; ground radiological monitors; aircraft decontamination teams; and shelter managers.

(2) Coordinates with CD personnel for the acquisition of radiological equipment needed for CAP to perform its SARDA/CD mission.

(3) Advises the mission coordinator on aircrew flight procedures relating to a nuclear detonation and/or aerial radiological monitoring procedures.

(4) Supervises the RADEF aspects of ground party emergency services activities for training, evaluation, and actual missions.

(5) Prepares detailed procedures for:

(a) Radiological monitoring of aircraft and equipment.

(b) Radiation dosimetry and maintenance of individual exposure records as a basis for exposure control in conjunction with CD personnel.

(6) Coordinates radiological portions of ground party activity under supervision of the mission coordinator.

(7) Provides staff support to the mission coordinator on radiological matters.

(8) In coordination with CD personnel, advises on maximum total exposure and mission dose and dose rate.

### b. Checklist:

(1) Receive briefing on mission from the mission coordinator.

(2) Assist mission coordinator in determining the number of ground teams.

(3) Alert air crews and ground personnel and schedule a briefing on radiation conditions and procedures.

(4) Assure an adequate supply of forms is

available (Aircraft/Vehicle Register, Vehicle Clearance, and reimbursement forms).

(5) Check with the mission coordinator and communications officer to secure ground and airborne communications frequencies and procedures for CARDA reporting.

(6) Get assignments for RADEF and mobile communications teams.

(7) Brief ground teams and ARM qualified Observers/Scanners, and assign missions.

(8) Stress safety precautions required.

(9) Check individual members for proper personal equipment.

(10) Check airborne and ground equipment for proper operation and battery supply.

(11) Ensure that all aircrews and ground teams include RADEF personnel when operating in a contaminated area.

(12) Ensure that each team has at least two members qualified in first aid with a standard Red Cross or equivalent certificate.

(13) Ensure that personnel have emergency air-to-ground signals, maps and charts, and CAPF 106.

(14) Ensure that rescue vehicles are marked for easy identification from the air.

(15) Ensure that personnel assigned to operate mobile radios have an FCC Restricted Radio-Telephone Operator's Permit, or higher, and a CAPF 76.

(16) Set up a vehicle dispatch section for the mission.

## 16. The Ground Team Leader:

### a. Duties:

(1) Assists ground operations officer in evaluating mission requirements.

(2) Advises ground operations officer concerning the availability of personnel and equipment.

(3) Assist in qualifying team members in SAR and interviewing procedures.

(4) Operates various types of rescue equipment.

(5) Administers current Red Cross first aid.

(6) Be knowledgeable of:

(a) Survival techniques appropriate to the local Wing area.

(b) Panel signals.

(c) Map reading.

(d) Ground search procedures, including patterns.

(e) Radiological monitoring equipment and decontamination procedures.

### b. Checklist:

(1) The team leader will brief the rescue team members on the following:

(a) Type, serial number, and color or distinctive markings of objective.

(b) Number of personnel aboard a missing aircraft, ground vehicle, or boat.

(c) Probable number and condition of survivors.

(d) Expected terrain and weather to be encountered (en route and search area.)

(e) Suggested ground search pattern and technique of penetration.

(f) Other agencies involved in mission or requiring contact.

(g) Probable search area coverage.

(h) Communications schedule and/or frequencies.

(i) Primary and alternate methods of communications; air-to-ground, ground-to-air, and ground-to-ground.

(j) Proposed resupply schedule.

(k) Probable method of survivor-evacuation team recovery.

(l) Other pertinent information.

### (2) Preparations:

(a) If possible, obtain mobile communications support.

(b) Have a definite plan for transmission of position reports and other information to the mission coordinator.

(c) Determine the schedule of position reports prior to the deployment of the team.

(d) Check vehicle for fuel, extra fuel, flashlight, spare tire, extra water, etc.

(e) Obtain telephone number of command post, state police, local sheriff, and participating agencies.

(f) Obtain the assistance of a local guide, if required.

(g) Obtain necessary road and county maps.

(h) Check weather conditions and dress accordingly.

(i) Keep an accurate account of area searched, using landmarks, and report same to mission coordinator.

(3) Safety Considerations:

(a) *Observe state highway traffic laws.*

(b) Be alert when approaching homes in isolated areas at night.

1. Be alert for vicious dogs.

2. Identify yourself by use of flashlight beamed on your person or vehicle which may prevent frightening residents.

(c) Be alert for possible illicit operations near or at search objective.

(4) Typical Visual Clues to Locate Search Objectives:

(a) Minute bits of wreckage.

(b) Smoke and fire.

(c) Unusual sounds.

(d) Broken or disturbed trees or underbrush.

(e) Presence of scavengers.

(f) Drops of oil or fuel.

(g) Decomposition odors, scavenger bird, or animal activity.

(h) Signs of human passage or occupancy of an area.

(i) Landslide.

(j) Horsetails (caused by wing blowing loose snow over an obstruction such as an aircraft's empennage).

(k) Unexplained break in terrain contour.

(5) Interviewing of Individuals:

(a) Select qualified individuals who have the ability to collect, correlate, standardize, and evaluate information. Individuals should also be selected on the basis of professional qualifications (clergy, policemen, etc.), aviation background, and personal discretion. Once qualified as mission interviewers, individuals should be encouraged to remain in this extremely important function.

(b) General guidelines for conducting an interview include:

1. Look and act professional.

2. Properly identify yourself and your purpose.

3. Create a comfortable atmosphere and start with nonthreatening questions. Consider their feelings.

4. Use a guide of CAPF 107 to make sure all areas are covered.

5. Use unstructured questions to get the interviewee thinking and talking about the subject.

6. Use structured questions to clarify a point, requiring a one- or two-word answer.

7. Once you get the person talking, LISTEN!

8. To probe an area of interest, restate their words or summarize what you perceived was said.

9. Attempt to have individuals volunteer information. Evaluate leads as to relative merit, but never discard any information received. When information gathered does not sound reasonable, ask verification questions.

(c) Leads requiring investigation may originate from:

1. Next of kin, close friends, and business contacts.

2. FAA units: Towers, flight service stations, approach controls and centers.

3. Law enforcement agencies.

4. Local airfield managers and Fixed Base Operators.

5. Individuals in the area who may have heard or seen low-flying aircraft, flashes, explosions, etc.

(6) Team Equipment Suggested for Use on Land Rescue Missions:

- (a) First aid kit to include splint sets.
- (b) Electric lanterns.
- (c) Shovels.
- (d) Ax.
- (e) Cooking implements.
- (f) Mosquito netting.
- (g) Insect repellent.
- (h) Survival manual.
- (i) Halazone tablets.
- (j) Paper, pencil, appropriate CAP forms and publications.
- (k) Oxygen unit (if procurable).
- (l) Radio-equipped vehicle.
- (m) Searchlights on vehicles.
- (n) Machete.
- (o) Road maps and aeronautical sectional charts.
- (p) Food and water.
- (q) Cable cutters.

(7) Individual equipment suggested for use on land rescue missions:

- (a) Compass.
- (b) Signal panels.
- (c) Gloves.
- (d) Signal mirror.
- (e) Water and rations for one day.
- (f) Extra socks, trousers, and shirts.
- (g) Insect repellent.
- (h) Individual tent or shelter half.
- (i) Pancho.

- (j) Flashlight.
- (k) Mosquito net.
- (l) Individual first aid kit.
- (m) Halazone tablets.
- (n) Matches in waterproof case.
- (o) Hunting knife.

17. **The Mission Administrative Officer.**

a. **Duties:**

- (1) Handles administrative matters for the mission coordinator.
- (2) Records the names of those participating in the mission on CAPF 103.
- (3) Maintains a record of "Individual Dose Accumulation of Participants in Mission." (For CD missions.)
- (4) Maintains a record of the names, addresses, or phone numbers of the next of kin of participants in case of accident.
- (5) Assists the mission coordinator in the assignment of duties.
- (6) Publishes mission authorization orders.
- (7) Assists in the processing of reimbursement claims, CAPF 108.
- (8) Assists others in preparing and submitting reports on time.

b. **Checklist:**

- (1) Assemble administrative personnel.
- (2) Maintain the mission personnel register, CAPF 103. Log in members on CAPF 103 as soon as they report to the operating location, including personnel from other squadrons. Print names legibly, last name first, black ink preferred. Be sure each person reporting to base has an ES and current membership card.
- (3) Maintain a record of the names, addresses, and phone numbers of the next of kin of participants in case of accidents.
- (4) Monitor the submission of required reports.
  - (a) Keep a record of recurring reports required by the controlling agency, and assure that required reports are submitted on time, either verbally by the mission coordinator or in writing.



(b) The opening report, verbal, will be initiated by the mission coordinator within two hours after action is taken.

(c) The daily mission report should be forwarded to the AFRCC or the controlling agency by the mission coordinator prior to 2000 daily.

(d) Forward closing/suspending report information from the mission coordinator within two hours after the termination of mission. If some information is unavailable, include it in a supplemental report. The mission coordinator is responsible for this report.

(e) Use cadets to maintain a courier service.

(f) Assist the mission coordinator in assignment of duties.

(g) Keep a functional task chart so mission personnel know who is performing staff functions.

(h) Where necessary, assist others in report preparation and ensure that all reports are submitted on time.

(i) Forward all personnel registers to Wing or other appropriate authority.

(j) For CD missions, maintain a record of "Individual Dose Accumulation of Participants in the Mission."

## EMERGENCY SERVICES QUALIFICATIONS

1. An Emergency Services (ES) Card, CAP Form 101, listing the specialties in which an individual is qualified, is issued to those members who have met the necessary training and experience. Only members with an ES card may participate in a USAF authorized mission unless they are working toward an ES specialty rating and accompanied by a qualified instructor. More on ES qualifications is included in section B, chapter 2.

2. The qualification requirements outlined in this manual are designed to qualify CAP members to participate in all ES missions. Therefore, unless otherwise stated, a "mission" includes SAR, and disaster preparedness missions authorized by the appropriate authority. The term "mission" will also include AF authorized ES evaluations and training missions approved by the wing commander.

### 3. Emergency Services Questionnaires:

a. This open book questionnaire (CAP Form 116) is designed to guide CAP ES personnel through a systematic study of CAPM 50-15. All CAP ES members must complete part 1 of CAPF 116, and all aircrew must complete parts 1 and 2.

b. The questionnaire will be administered by the unit training officer or appropriately designated officers. Appropriate documentation showing completion of this questionnaire will be filed in the individual's master record. Answers to the questions will not be provided to the individual prior to taking the exam. Questions missed should be corrected and explained to the examinee when the answer sheet is checked. The information gained from the study of CAPM 50-15 through this open book questionnaire should materially assist in the overall qualification, safety, and effectiveness of mission personnel. This ES questionnaire may be reproduced by CAP wings or units or it may be requisitioned from National Headquarters.

4. Requirements for ES Specialties/Ratings. The following requirements are the minimum an individual must complete before the member can perform in an ES specialty, Wing commanders may add additional requirements or require additional participation as a trainee before qualifying an individual.

#### a. Mission Coordinator:

- (1) Complete ES questionnaire.
- (2) Be an active Senior Member.
- (3) Be a mission pilot or observer.
- (4) Possess Radio Operator's Permit (CAPF 76) trained in ground and aerial radiological monitoring.
- (5) Knowledge and understanding of:

- (a) FAA regulations.
- (b) ES SOPs and forms.
- (c) State/local traffic regulations.
- (d) State ES agreements/plans, to include the State SARDA Plan.
- (e) SCATANA Procedures.
- (f) CAP Publications (CAP Manuals 50-5, 50-15, 50-21 and CAP Regulations 55-10, 60-1, 62-1, 77-1, and CAPP 355-1).

(6) Satisfactory participation in a minimum of:

- (a) One mission as a ground team member or leader.
- (b) One mission as an air or ground operations officer.
- (c) One mission as a briefing or clearance officer.
- (d) Two missions as a mission coordinator trainee.
- (e) Attend a SMC course presented by AFRCC personnel, if available.

#### b. Air Operations Officer:

- (1) Complete ES questionnaire.
- (2) Be an active Senior Member.
- (3) Be a mission pilot or observer.
- (4) Possess Radio Operator's Permit (CAPF 76) trained in ground and aerial radiological monitoring.
- (5) Knowledge and understanding of:
  - (a) FAA regulations.
  - (b) ES SOPs and forms.
  - (c) State/local traffic regulations.
  - (d) State ES agreements/plans, to include the State SARDA Plan.
  - (e) SCATANA Procedures.
  - (f) CAP Publications (CAP Manuals 50-5 and 50-15; CAP Regulations 55-10, 60-1, 62-1, 77-1; and CAPP 355-1).

(6) Satisfactory participation in a minimum of:

(a) One mission as briefing or clearance officer.

(b) One mission as air operations trainee.

**c. Air Clearance Officer:**

(1) Complete ES questionnaire.

(2) Be an active Senior Member.

(3) Be a mission pilot or observer.

(4) Possess Radio Operator's Permit (CAPF 76).

(a) Satisfactory participation in at least one mission as an aircraft clearance officer trainee.

**d. Briefing/Debriefing Officer:**

(1) Complete ES questionnaire.

(2) Be a mission pilot or observer.

(3) Possess Radio Operator's Permit (CAPF 76).

(4) Knowledge and understanding of:

(a) Interviewing procedures.

(b) ES SOPs and forms.

(c) Radiation and fallout rate forecasting.

(d) State ES agreements/plans.

(5) Satisfactory participation in at least one mission as a briefing/debriefing officer trainee.

**e. Mission Pilot:**

(1) Complete ES questionnaire.

(2) Be a qualified CAP Pilot in accordance with CAPR 60-1.

(3) Be an active senior member.

(4) Have a minimum of 200 flying hours, 25 of which must be crosscountry (navigation) flying.

(5) Knowledge and understanding of:

(a) FAA regulations.

(b) CAPR 60-1 and CAPM 50-15.

(c) ES SOPs and appropriate forms.

(d) State SARDA Plan.

(e) SCATANA Procedures.

(6) Complete the classroom instructions listed in paragraph 5a of this attachment.

(7) After completion of the classroom instructions, fly at least two demonstrations/familiarization flights (training, test, or actual) with a qualified and experienced mission pilot. These flights will allow the pilot an opportunity to ask questions and to be shown the special techniques of air search. Emphasis should be placed on scanning techniques, pilot-observer, scanner coordination, use of ground features for establishing search patterns, low altitude safety and other search mission procedures. The most experienced unit mission aircrew members should be used for these demonstration flights.

(8) Be given an evaluation check ride by a mission check pilot using CAPF 91. The flight check ride may be accomplished in conjunction with the second demonstration/familiarization flight required above. The CAPF 91 will be maintained in the individual flight records in accordance with CAPF 60-1. NOTE: The decisions made by the mission check pilot and operations officer as to mission pilot qualification is a judgment factor encompassing the pilot's attitude towards safety. When desired, CAP commanders may add additional requirements before declaring a pilot mission qualified, to assure a safe and adequate performance of the mission. Professionalism and safety are mandatory.

**f. Mission Observer:**

(1) Complete ES questionnaire.

(2) Be an active Senior Member.

(3) Possess FCC restricted radio-telephone permit.

(4) Complete the training required in CAPM 50-15 and ECI course 02130A and 01230B.

(5) Complete the classroom instructions listed in paragraph 5a of this attachment.

(6) Desirable: Appropriate first aid knowledge.

(7) Knowledge and understanding of ES SOPs and appropriate forms.

**g. Mission Scanner:**

(1) Complete ES questionnaire.

(2) Be an active Senior Member.

(3) Complete ECI course 02130A.

(4) Complete the classroom instruction listed in paragraph 5a of this attachment that is applicable to scanners.

(5) Knowledge and understanding of ES SOPs and appropriate forms.

(6) Desirable, appropriate first aid knowledge.

**h. Ground Operations Officer:**

(1) Complete ES questionnaire.

(2) Be an active Senior Member.

(3) Possess the following:

(a) Advanced first aid card.

(b) FCC restricted radio-telephone operator permit.

(c) Radio Operator's Permit (CAPF 76).

(4) Knowledge and understanding of:

(a) CAP directives.

(b) ES SOPs and forms.

(c) State and local traffic regulations.

(d) State ES agreements/plans.

(5) Have previously been rated as a ground team member/leader.

(6) Satisfactory participation in at least one mission as a ground operations officer trainee.

**i. Ground Team Leader:**

(1) Complete ES questionnaire.

(2) Be a senior member at least 21 years old.

(3) Hold a current ground team member rating.

(4) Possess the following:

(a) Current advanced first aid card or equivalent training.

(b) Current state driver's license.

(c) FCC restricted radio-telephone operator permit.

(d) Radio Operator's Permit (CAPF 76).

(5) Complete the classroom instructions listed in paragraph 5c this attachment.

(6) Satisfactory participation in a minimum of two missions as a ground team leader trainee.

**j. Ground Team Member:**

(1) Complete ES questionnaire.

(2) Possess the following:

(a) Current standard first aid card.

(b) FCC restricted radio-telephone operator permit.

(c) Radio Operator's Permit (CAPF 76).

(d) Current state driver's license if a senior member, or cadet 18 through 20 years of age who has met the provisions of CAPR 77-1 to operate general purpose vehicles.

(3) Complete the classroom instructions listed in paragraph 5c, this attachment.

(4) Satisfactory participation in a minimum of two missions as a ground team trainee.

**k. Interviewing Team Member:**

(1) Complete ES questionnaire.

(2) Possess the following:

(a) Current state driver's license if a senior member, or a cadet 18 through 20 years of age who has met the provisions of CAPR 77-1 to operate general purpose vehicles.

(b) Radio Operator's Permit (CAPF 76).

(3) Complete training in interviewing techniques.

(4) Satisfactory participation in at least one mission as an interviewing team trainee.

(5) NOTE: If the interviewing team member is also to be used as a ground team member, he must meet the additional requirements listed under ground team member.

**l. Flight Line Officer:**

(1) Complete ES questionnaire.

(2) Complete the classroom instructions listed in paragraph 5b, this attachment.

(3) Desired: FAA rated mechanic.

(4) Satisfactory participation in at least one mission as a flight line officer trainee.

**m. Aircraft Dispatcher:**

(1) Complete ES questionnaire.

(2) Desired, Operational clerical experience.

(3) Satisfactory participation in at least one mission as an aircraft dispatcher trainee.

**n. Communications Officer:**

(1) Complete ES questionnaire.

(2) Possess a Radio Operator's Permit (CAPF 76).

(3) Possess an FCC restricted radio-telephone operator permit.

(4) Satisfactory participation in at least one mission as a communications officer trainee.

**o. Radio Operator.** The same as communications officer, except participate in at least one mission as a radio operator trainee.

**p. Administrative Officer:**

(1) Complete ES questionnaire.

(2) Preferred:

(a) Experience in journalism.

(b) Clerical experience.

(3) Knowledge of ES SOPs and procedures to complete and administer required ES forms.

(4) Satisfactory participation in at least one mission as administrative officer trainee.

**q. Public Affairs Officer:**

(1) Complete ES questionnaire.

(2) Possess Knowledge of:

(a) CAP history.

(b) Constitution and Bylaws.

(c) CAP's SAR, CD, and disaster relief activities as they pertain to state and national level. These items, a, b, and c above, are needed to

enable the PAO to present an accurate and knowledgeable picture of CAP in any news release, and to properly inform any visitors/relatives at a mission base.

(d) Journalism.

(e) News media in his/her state and local area.

(f) CAPM 190-1.

(3) Satisfactory participation in a minimum of two missions as a PAO trainee.

**r. RADEF Officer:**

(1) Complete ES questionnaire.

(2) Possess an advanced first air card.

(3) Completion of formal radiological monitoring course.

(4) Complete training on radiological decontamination procedures and equipment.

(5) Satisfactory participation in at least one mission as an RADEF officer trainee.

**5. Classroom Instructions.** Classroom instructions for the following specialties should cover *at least* the items listed below:

**a. Mission Pilots and Observers:** (Scanners are required items with asterisk only)

(1) Search patterns.

(2) Map reading and grid system.

(3) Weather — wing, current, etc.

(4) High altitude limitations.

(5) Fueling procedures.

(6) Flight plans and other paper work.

(7) Air communications.

\* (8) Coordination with ground teams to include air-to-ground and ground-to-air signals (see attachment 14).

\* (9) Flight line hand signals (see attachment 14).

(10) Airborne radiological monitoring.

\* (11) Use of safety and survival equipment and basic medical self-help.

**b. Flight Line Officer and Helpers:**

- (1) Fueling procedures.
- (2) Aircraft firefighting, especially engine starting fires and spilled flammable liquids.
- (3) Flight line hand signals (see attachment 14).
- (4) Starting and taxiing procedures.
- (5) Radiological decontamination procedures and equipment.
- (6) Hazard's briefing concerning aircraft ground operations.

c. Ground Teams:

- (1) Basic firefighting techniques.
- (2) Use of forcible entry tools, if available.
- (3) Use of ground rescue equipment, rescue techniques.

- (4) Team safety.
- (5) Survival techniques.
- (6) Radiological monitoring.
- (7) Radiological decontamination procedures and equipment.
- (8) Radio and auxiliary ground equipment.
- (9) Interviewing techniques.
- (10) Map reading and use of compass.
- (11) Ground search techniques.
- (12) First aid.
- (13) Local laws applicable to ground search, rescue, and administration of first aid.
- (14) Local traffic laws.

### TRACK ANALYSIS PROGRAM

The Track Analysis Program (TAP) is an FAA innovation in search and rescue that has made search planning for the Air Force Rescue Coordination Center (AFRCC) more effective and efficient. The TAP program was conceived to assist search planners in locating lost aircraft by recalling computer-generated records of radar signals. The retrieval of stored radar data at the Air Route Traffic Control Centers (ARTCC) makes it possible, in many cases, to pinpoint a missing aircraft's last location, thus allowing the rescue coordinator to dispatch rescue forces to the most probable distress location.

All ARTCCs have at least a limited TAP capability. ARTCC controller training and workload greatly affect TAP availability. Other limitations involve target

degradation due to the position of the ARTCC's antenna, mechanical blocks inserted in the system, terrain, atmospheric conditions, altitude of the aircraft, and aircraft equipment. While target aircraft are not required to be transponder equipped, transponder codes are much easier to track. Key items for a successful TAP are the objective's takeoff time, route of flight, and transponder capability, if obtainable.

FAA has requested that the AFRCC be the only agency to request TAP from the ARTCCs. To accomplish this, standardized TAP request and reporting forms have been developed by FAA and the AFRCC. CAP mission coordinators will direct all TAP requests to the AFRCC.

## SCANNING TECHNIQUES AND PROCEDURES

1. The successful search of an assigned area by aircraft depends upon the skill of all the aircrew; the pilots, observers and scanners. The pilot's basic job is to put the observer or scanner in a position to use their eyes to maximum effectiveness. *The pilot's primary job is flying the aircraft*, not sightseeing or searching. Flying so high that surface detail is invisible or so low that the countryside is a blur is not effective. Rough flying which makes the aircrew so sick or terrified that they lose all interest in their search job is a complete waste of time and fuel. Inaccurate navigation and flying poor search patterns may leave large parts of the search area uncovered. Conversely, a scanner or observer that doesn't scan the terrain properly isn't any help either. Search from the air is hard work when done properly.

2. To achieve maximum effectiveness during an aerial search, it is imperative that the observers and scanners be properly trained. They are also urged to fly at every available opportunity to practice and develop their search skills. Familiarity with the search objective and crash patterns discussed in the next attachment will help a great deal.

3. Fatigue greatly affects crewmember's efficiency. Effort must be taken to reduce or delay fatigue, which is normally associated with prolonged search operations. Under favorable conditions, trained scanners and observers can maintain good visual efficiency for two or three hours. The following tend to reduce or postpone fatigue:

a. Change seat positions at intervals of 30 minutes to one hour if the size of the aircraft permits. This includes changing sides in the aircraft.

b. Comfortable scanning positions.

c. Clean aircraft windows or scanning through open hatches.

d. Keeping lights inside the aircraft dim to reduce reflections and contrast.

e. Frequent light snacks and drink.

f. A reasonable amount of communication between crew members.

g. Using binoculars only to check sightings made by the naked eye.

h. Ideally, enough observers and scanners should be available to permit adequate rest between flights.

4. A routine scanning pattern should be used when searching. The eyes should move and pause for each three or four degrees of lateral and/or vertical distance, at a rate which will cover about 10° per second. The aircraft movement causes the field of view to be moved along, making this scanning pattern most applicable to

the front or pilot positions in the aircraft. In the waist or side windows the scanner's eye movement should be away from the aircraft to a point as near under the aircraft as can be comfortably seen. A scanner searching for a survivor is performing a task in a manner which is similar to that of a proofreader. The proofreader hunts from top to bottom and from left to right; the observer looks from left to right and back again, or from top to bottom and from bottom to top. A sighting is most likely to occur in an area limited by a 5° radius in all directions from the fixation point at which the eyes are focused. Therefore, the good observer does not jump his/her eyes too far between fixation and will pause only briefly between fixations during daylight search. If the search is being made at night with the expectation of finding light signals or flares, the eyes need not pause so frequently in sweeping the visual field either to right or left, or up and down. A good scanner adopts a routine which covers a sector systematically and brings every portion of the sector to view in the central part of his/her visual field at intervals of a few seconds, that is, the observer takes a look at the extreme right-hand side of his/her sector about every three or four focus points, which if plotted, would represent a series of diagonal lines making a pattern like coarse saw teeth.

a. When searching in areas of little or no contrast, that is, over large expanses of water, desert, or snow, a scanner's eyes have a tendency, after prolonged scanning, to focus short of the surface being searched. The scanner may not realize this when it occurs and, as a result, could possibly miss the search target. To preclude this the scanner should periodically focus his/her eyes on some specific object which may appear in the "no contrast" area, such as whitecaps, trees, debris, etc. A second method is to focus his/her eyes on a nearby object within the aircraft or an exterior part of the aircraft (wing tip, etc.). It requires only a second to break this "inward" focus and when the eyes are returned to scanning, they will focus properly.

b. The eyes require about 30 minutes of dark adaption before becoming efficient for any duties which will require their use during low levels of illumination. Scanning during night time can be accomplished by using any systematic geometrical pattern, providing the area is scanned frequently and thoroughly. The pattern used during scanning should be planned to make the best use of off-center vision. Following each complete scan of his/her sector, the scanner should close his eyes for a period of two or three seconds to allow them to rest. When binoculars are used for scanning at night, the principle of off-center vision applies. Binoculars should be held straight forward and the eyes turned off-center toward the perimeter of the field. It will require practice to learn to do this effectively, but the final results obtained will more than justify the effort.

5. The observer or scanner will report the sighting of all objects of a suspicious nature to the pilot immediately, giving relative bearing (in terms of clock position),



and approximate range. See clock positions in figure A4-1 below.

6. The observer should keep open a gridded sectional chart, reorientating it with the terrain at frequent intervals. He may wish to progressively sketch in the approximate search track, noting all objects sighted including old wrecks, other search aircraft in the area, etc. Poloroid type cameras can improve the thoroughness of the search by providing finished prints of suspicious objects and finds.

7. With trained observers and scanners and favorable flight conditions, search efficiency can be maintained for a maximum of about three hours. Any adverse conditions will seriously reduce this endurance. A 30-minute to one-hour rest with light snacks and drink between sorties will help in combating fatigue as well as boost morale during prolonged missions. Two flight crews may be assigned to one aircraft to fly alternate sorties.

8. See CAPM 50-5 and ECI course 02130A for the basic guidance required to train scanners and observers.

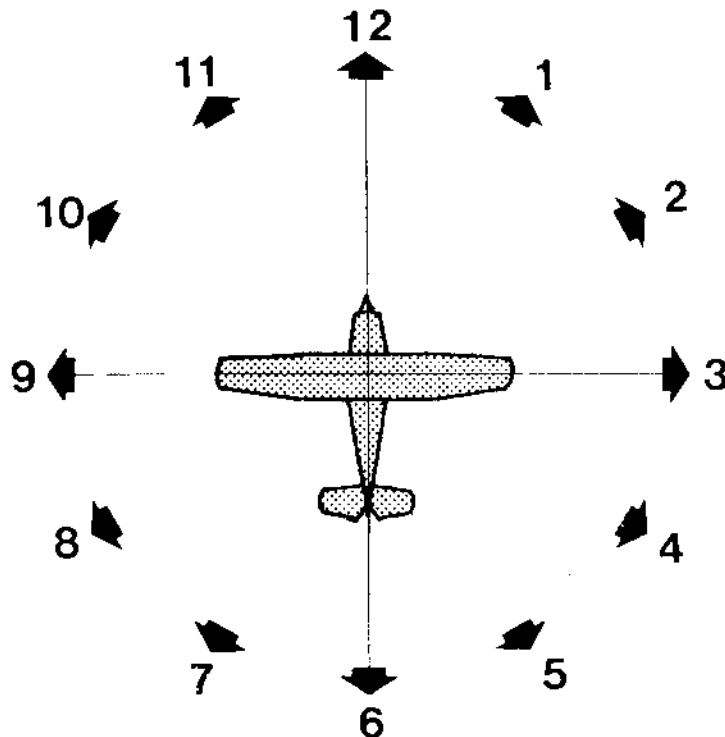


Figure A4-1.

## AIRCRAFT CRASH SIGHTING CHARACTERISTICS

1. **Typical Visual Clues.** Anything which appears to be out of the ordinary should be considered a clue to the location of the search objective. The following are specific clues scanners should look for:

a. **Light colored or shiny objects.** Virtually all aircraft have white polished aluminum or other light colors as part of their paint schemes. These lighter paints usually contrast with surface features. Also, bright sunlight will "flash" from aluminum surfaces. Aircraft windshields and windows, like aluminum, have a reflective quality about them. A flash from any angle deserves further investigations.

b. **Smoke and fire.** Sometimes aircraft catch fire when they crash. The burning airplane may cause forest or grass fires. Survivors of a crash may build a fire to warm themselves or to signal search aircraft. Campers, hunters, and others also build fires for their purposes, but no matter what the origin or purpose of smoke and fire, each case should be investigated.

c. **Blackened Areas.** Fire may cause blackened areas.

d. **Broken tree branches.** If an airplane goes down in a heavily wooded area, it will break trees and branches. The extent of this breakage will depend on the angle at which the trees were struck.

e. **Local discoloration of foliage.** A crash that is several days old may have discolored a small area in the forest canopy. This discoloration could be the result of either a small fire or broken tree branches.

f. **Fresh bare earth.** An aircraft striking the ground at an angle will disturb or "plow" the earth to some degree. Because of its moisture content, fresh bare earth has a different color and texture than the surrounding, undisturbed earth.

g. **Breaks in cultivated field patterns.** Crop farmlands display a pattern of some type, especially during the growing season. Any disruption of such a pattern should be investigated.

h. **Clues in water and snow.** When an aircraft goes down in water its fuel and probably some oil will rise to the water's surface making an "oil slick" discoloration. Other material in the aircraft may also discolor the water or float as debris. If the aircraft hasn't been under the water very long, air bubbles will disturb the surface. Snow also shows clues. Any discoloration caused by fire, fuel or debris will be very evident. However, fresh snow since the aircraft was reported missing may hide all clues.

i. **Tracks and signals.** Any line of apparent human tracks through snow, grass, or sand should be regarded as possibly those of survivors.

j. **Birds and animals.** Scavenger birds (such as vultures and crows), wolves, and bears may gather at or near a crash site.

2. **Aircraft Wreckage Patterns.** In general, don't expect to find anything that resembles an aircraft; most wrecks look like hastily discarded trash. However, certain patterns result from the manner in which the accident occurred. These patterns may be described as:

a. **Hole-in-the-Ground.** Caused from steep dives into the ground or from flying straight into steep hillsides or canyon walls. Wreckage is confined to a small circular area around a deep, high-walled, narrow crater. The structure may be completely demolished with parts of the wings and empennage near the edge of the crater. Vertical dives into heavily wooded terrain may cause very little damage to the surrounding foliage, and sometimes only a day or two is needed for the foliage to repair itself.

b. **Corkscrew or Auger.** Caused from uncontrolled spins. Wreckage is considerably broken and contained in a small area. There are curved ground scars around a shallow crater. One wing is more heavily damaged and the fuselage is broken in several places with the tail forward in the direction of the spin. In wooded area, damage to branches and foliage is considerable, but is confined to a small area.

c. **Creaming or Smearing.** Caused from high speed, near level contact with the ground. The wreckage distribution is long and narrow with heavier components farthest away from the initial point of impact. The tail and wings fairly intact and shear off close to the point of impact. With power on or a windmilling propeller, there is a short series of prop bites in the ground. Ground looping sometimes terminates the wreckage pattern with a sharp hook and may reverse the position of some wreckage components. Skipping is also quite common in open, flat terrain. In wooded areas, damage to the trees is considerable at the point of impact, but the wreckage travels among the trees beneath the foliage for a greater distance and may not be visible from the air.

d. **The Four Winds.** Caused from mid-air collisions or explosions. Wreckage components are broken up and scattered over a wide area along the flight path. The impact areas are small but chances of sighting them are increased by the large number of them.

e. **Hedge-Trimming.** Where an aircraft strikes a ridge or obstruction but continues on for a considerable distance before crashing. Trees or the obstruction are slightly damaged or the ground on the crest is lightly scarred. Some aircraft components may be dislodged; usually landing gear, external fuel tanks, cockpit canopy, or control surfaces. The direction of flight

from the hedge-trimming will aid in further search for the main scene.

f. **Splash.** Where aircraft has gone down into water, oil slicks, foam, and small bits of floating debris are apparent for a short time after impact. With time, the foam dissipates, the oil slicks spread and streak, and

the debris becomes widely separated due to action of wind and currents. Oil slicks appear as smooth, slightly discolored areas on the surface and are in evidence for several hours after a splash; however, they are also caused by ships pumping their bilges and by off-shore oil wells or natural oil seepage. Most aircraft sink very rapidly after ditching.

## DETERMINATION OF SEARCH AREAS AND ESTABLISHING PRIORITIES

1. **General.** The planning of a search normally involves: (1) estimating the most probable position of a distress incident or of its survivors; (2) determining a search area large enough to assure that the survivors are somewhere within the area; (3) choosing the equipment to be used in the search; and (4) selecting search patterns to be used in covering the area. The first two of these four phases will be dealt with in this attachment and the last two in attachments 7 and 8.

a. Some SAR operations present little or no difficulty in defining the search area. The incident may have been witnessed, or its location might otherwise be known accurately enough to preclude the need for a large scale search.

b. In most cases, however, the determination of a search area assumes a very different character. Lack of sufficient information as to the position of the incident or survivors will make it difficult to determine the areas which should be search first. This will be discussed

in the following paragraphs.

### 2. The Possibility Area:

a. The possibility area is roughly a circle with its center at the last known position of the aircraft and a radius equal to the endurance of the aircraft at the time of its last position, expressed in terms of distance as affected by wind velocity. It involves the assumption that the aircraft may have flown from its last known position until its fuel exhausted, on any course, even at right angles to, or the reciprocal of that specified in the flight plan.

b. Systematic search of such a large area would not be efficient since it would not permit the mission coordinator to concentrate the initial search effort in the area or areas that the aircraft would most likely be. Determination of the maximum possibility area will, however, enable the MC to screen hearing and sighting reports coming in as leads.

Flight Level Winds: 330/20kts  
Aircraft Speed: 100kts  
Endurance: 2 hours

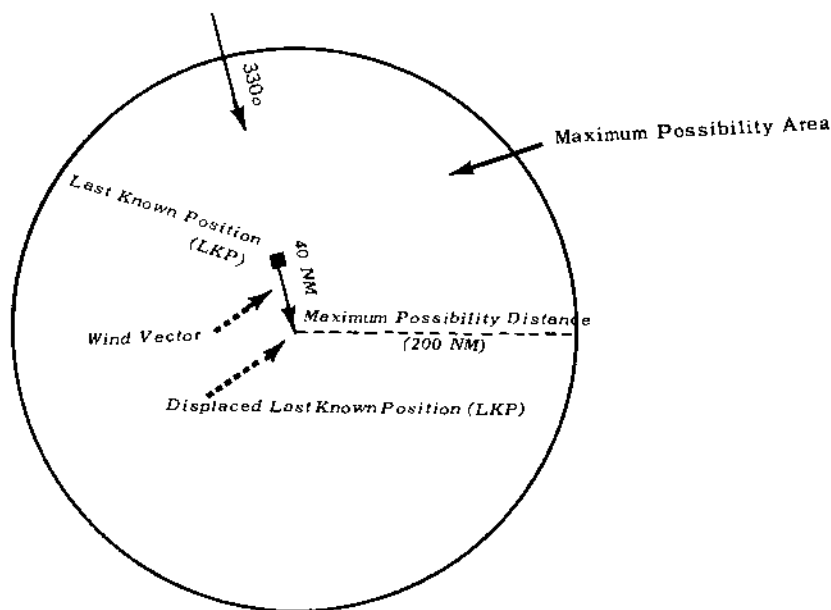


Figure A6-1.

**EXAMPLE:** By using the last known position, the aircraft's remaining endurance at the last known position, and the average wind direction/velocity at flight level, the maximum area of possibility can be determined as shown in figure A6-1. Suppose the average flight level winds were 330 degrees at 20 knots, the cruising airspeed of the missing aircraft was 100 knots and the endurance remaining on board the aircraft at last known position was 2 hours. Compute a WIND VECTOR. (The wind vector is the total distance of applied wind from 330 degrees for the endurance period of 2 hours). In this case then, the wind vector equals 330 degrees at 40 NM.

(20 knots wind velocity x 2 hours endurance.) Draw the wind vector on the chart from the last known position. The vector thus established, represents the displacement due to the wind on the aircraft during the time of the remaining endurance (2 hours). Next draw a circle around the corrected displaced last known position, using the maximum possibility distance (200 NM). The maximum possibility distance is computed by multiplying the aircraft's airspeed (100 knots) by the endurance (2 hours). The circle formed represents the area of maximum possibility.

### 3. The Probability Area:

a. Determination of the probable area, that is, the area in which the aircraft is most likely to be, is based on the degree of accuracy that can be attributed to the aircraft's last known position. The position of a distress incident can be determined within fairly narrow limits when information such as the following is received:

- (1) Position where aircraft disappears off radar. (Approach control, ITAP, etc.).
- (2) Bearing or fix is provided by a ground station or emergency radio aids.
- (3) Dead reckoning (DR) position based on time of last known position.
- (4) Reports of sightings.

b. When the above information is not available, the probable position may be narrowed if information on one or more of the following items can be obtained and assessed:

- (1) Flight plan or proposed route of object.
- (2) Complete information on weather along intended track or route.
- (3) Proximity of aerodromes along the track.
- (4) Aircraft performance.
- (5) Information about the pilot to include experience, habits, etc.
- (6) Radar coverage along intended track (as a limiting factor).

(7) Nature of terrain along intended track.

(8) Position and ground reports.

c. When information vital to determining the most probable position of the incident or survivors is not available, search planning becomes a difficult matter. Because it may be impractical and time consuming to search the entire area in which the incident may have occurred or in which survivors might be located, the mission coordinator must reconstruct the incident with whatever information is available. The search plan, in such cases, is usually based on the presumption that the aircraft met with an accident, became lost, or was forced down near its intended course. The initial phase of search is normally confined to the intended course and its surrounding area. If no results are obtained, the MC must either extend this search area or determine other areas based on any information available.

d. In absence of information to the contrary, it is generally assumed that the most likely area within which a missing aircraft will be found is along the intended track from the last known position to the intended destination and within a reasonable distance either side of a track. At any position, however, the probable error in a dead reckoning estimate is assumed to be 10% of the distance from the last known position.

### 4. Basic Determination of the Probability Area:

a. Probability Area Number 1. A circle of radius 10 NM is drawn around last known position (LKP); that is, a fix en route or the airport of departure. A circle of radius equal to 10% of the total track distance in nautical miles from the LKP to each turning point and to the destination, that is, airport of next intended landing, or circle of radius of 10 *nautical miles* whichever is the greater, is drawn around each turning point and at the destination. These circles with lines drawn tangential to them form probability area number 1. The whole or any part of this may be given first priority for search dependent upon information available (figure A6-2).

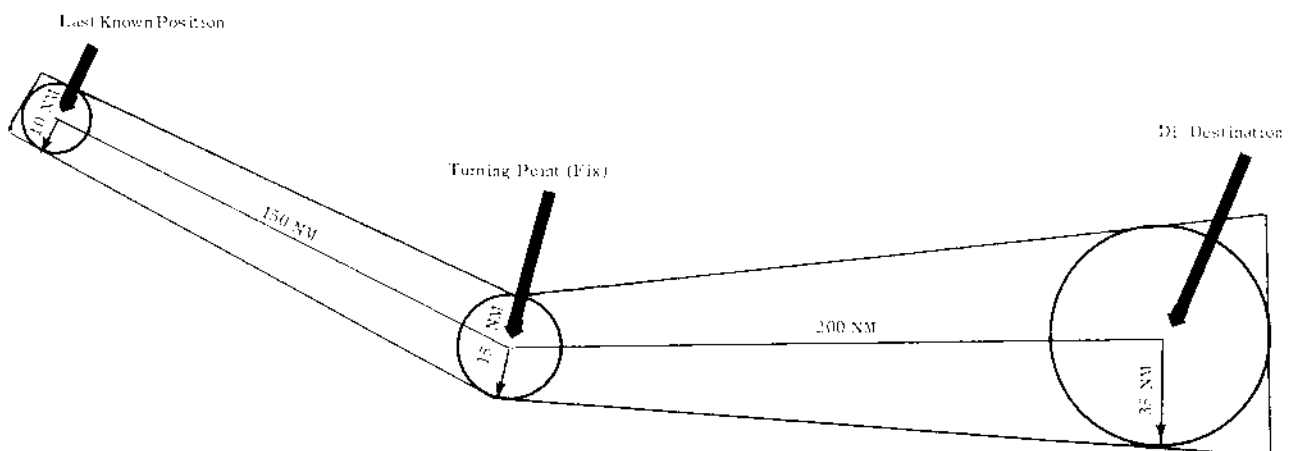


Figure A6-2.

b. Probability Area Number 2. Plotted as in figure A6-2 with radius of circle increased to 15 NM at LKP, with 15% of track distance. Area 2 is the area then between the boundary of area 1 and this boundary (shaded area in figure A6-3).

c. Probability Area Number 3. Plotted as in figures A6-2 and A6-3 except circles of 20 NM and 20% of track distance are used. The area between the boundary of area 2 and the tangential lines thus produced forms area number 3.

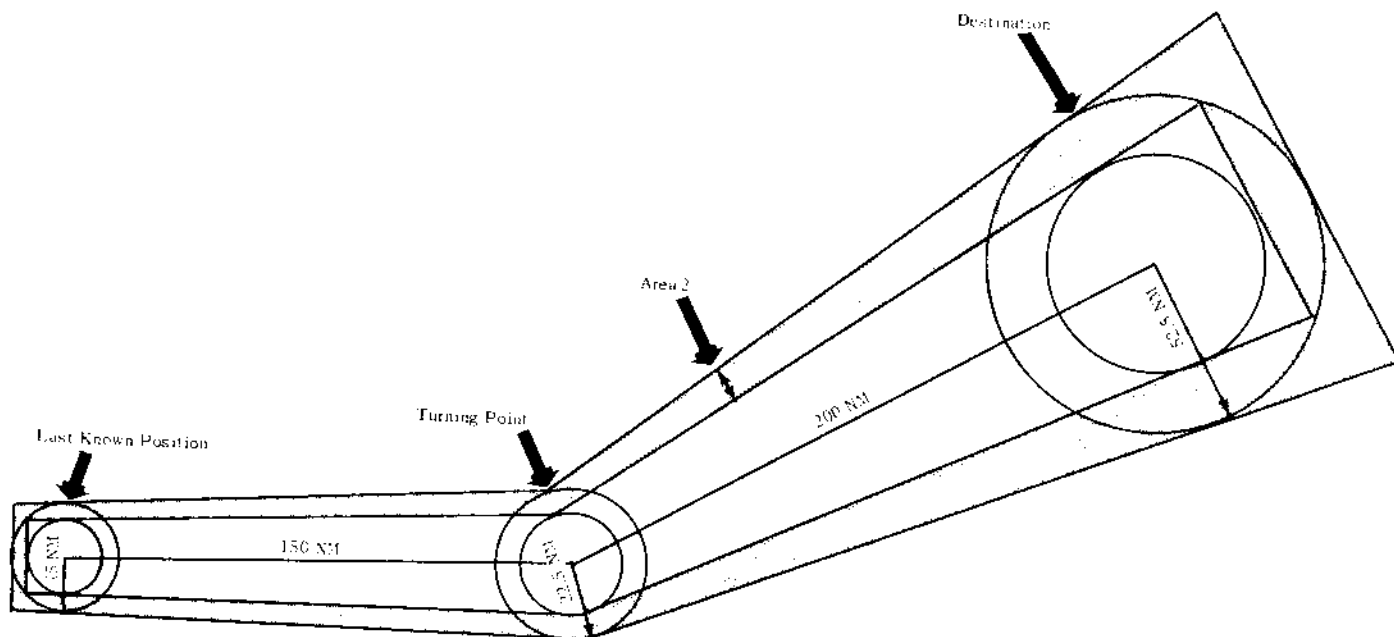


Figure A6-3.

## 5. Establishing Search Priorities:

a. As mentioned in chapter 4, establishing search areas for either a missing aircraft or person generally can be divided into two phases, the initial search phase and the subsequent search phase. Underlying both phases is the unending quest for information which starts with initial notification. Continually, information which may or may not help in finding the survivors will be received. Each piece of information must be reviewed and placed in perspective; asking the following questions may be of some assistance:

Is the information **RELEVANT**? Will the information be of any assistance in helping find the survivor?

Is the information **TIMELY**? Did the lead occur at a time that is within the realm of possibility?

Is the information **RELIABLE**? Look at the reporting source for sincerity and motivation.

Is the information **COMPLETE**? If not, do what is necessary to gather complete information. Note, the process of gathering data is one of the most important functions in any search effort and should never stop.

b. Initial Search Phase. Early in any mission, the MC is faced with the problem of assigning a limited number of resources to search areas. Frequently, this decision must be made base on little information which

is sometimes contradictory and may be unreliable. But, because of the urgency of the situation the MC may be compelled to start the search even if he would rather wait for additional information or more appropriate search personnel and equipment. At this time the most probable areas are probably around the last known position and along the most probable routes. Survivors are most often found during the initial search effort and the MC should attempt to cover as much area as rapidly as possible. During this stage, searchers are looking for the cooperative survivor, one who will signal or respond to your presence, and for obvious crash sites or anything unusual which may lead you to the survivor. It might be appropriate to use a wider track spacing than you'd use for an unresponsive victim or a hidden crash site. During this phase, information is changing rapidly and things are happening too fast to really establish formal search priorities. Common sense is probably the best tool an MC has.

### c. Subsequent Search Phase.

(1) Sometime during the first day or night the MC is going to think about what must be done next, and it is at this point that the second phase of search area planning is entered.

(2) When planning for subsequent searches the MC must take into account all of the facts and consider all of the assumptions that are pertinent to the case. One method of distilling the information into a

useful product is to start a list of possibilities and facts as they come to your attention. This list should be started at the time of initial notification, and items such as possible routes, weather, difficult terrain, probable reaction of the individual to various possibilities, historical pattern of others lost in the area and anything else that might have a bearing on where the survivors may be found should be added as discovered during the initial phase. These items will be brought out by the many individuals who will be involved and it is important that nothing is lost or overlooked due to the confusion inherent in the initial response. If the MC maintains a list he can be confident that all of the information that was available to him will be considered when establishing subsequent search area priorities.

(3) When the MC is ready to plan for the next search he should consult the list and discuss the information with others who are experienced, knowledgeable and involved in the search effort. Additional items will most likely be added since it is probably the first time that many of the major participants will meet. Next, the possible routes, positions and areas where the survivors may be found should be listed, and thoroughly discussed.

(4) When deciding on priority for search areas, assess the information as outlined in paragraphs 3a and 3b plus the following:

- (a) Areas of thunderstorm activity, severe turbulence, icing, and frontal conditions.
- (b) Areas where low clouds or poor visibility may have been encountered.

(c) Deviations in wind velocities from those forecast (any of these weather factors may have influenced a pilots action).

(d) Areas of high ground.

(e) Any part of track not covered by radar surveillance.

(f) Any related reports of ground sightings or hearing of low flying aircraft.

(g) Survival factors.

(h) Point of last reported voice contact or MAYDAY broadcast.

(i) Areas where aircraft historically have problems.

6. **Parachute Drift.** When a survivor bails out of an aircraft, the position when he ultimately lands may differ considerably from the position his parachute opened. Landing location is influenced by the force and direction of the wind on the parachute during descent. Since wind force and direction may vary considerably at different altitudes, the average wind between parachute opening altitude and landing should be used. It should also be remembered that bail out and parachute opening altitudes are usually not the same, especially during high altitude ejections. Military authorities can give the approximate opening altitude when asked. Table A6-1 is provided to estimate landing locations.

PARACHUTE DRIFT TABLE							
Distance in nautical miles of landing position downwind from position of parachute - opening							
PARACHUTE OPENING HEIGHT	WIND IN KNOTS						
	10	20	30	40	50	60	70
30,000 ft	3.7	7.4	11.1	14.7	18.4	22.1	25.8
20,000 ft	2.7	5.3	8.0	10.7	13.3	16.1	18.7
14,000 ft	1.9	3.8	5.7	7.7	9.5	11.4	13.3
10,000 ft	1.4	2.8	4.2	5.7	7.0	8.3	9.7
8,000 ft	1.2	2.3	3.5	4.6	5.8	6.9	8.1
6,000 ft	.9	1.7	2.6	3.5	4.4	5.2	6.1
4,000 ft	.6	1.2	1.8	2.4	3.0	3.5	4.1
2,000 ft	.3	.6	.9	1.2	1.5	1.8	2.1

Table A6-1.

## SEARCH PROBABILITY OF DETECTION

1. **General.** Once the search area has been determined, a systematic search for the objective must be planned. When developing a search plan, the MC must carefully weigh the limitations of time, terrain, weather, navigational aids, search target detectability, suitability of available search units, search area size, distance between search area and base, and the particular probability of detection desired under the circumstances. Of all the factors involved in search planning, one or more may prove so important in a particular situation that the others can generally be regarded as secondary or even disregarded entirely.

2. **Probability of Detection.** The probability of detection is the probability, stated in percent, that the

search object will be detected under given conditions if it is in the area searched. Experience has shown that factors affecting detection capability can be generally reduced to four interrelated items: track spacing, search visibility, search altitude and type of terrain.

a. **Track Spacing.** Track spacing is the distance between adjacent search tracks as shown in figure A7-1. Factors affecting track spacing are type of search objective (person, aircraft, etc.), visibility, altitude of search aircraft, position of sun and other miscellaneous factors such as rain showers, clouds, etc. The probability of detection is increased by decreasing the track spacing, at the expense of decreasing the overall area searched in a given time. It should never exceed the distance equal to twice the search visibility.

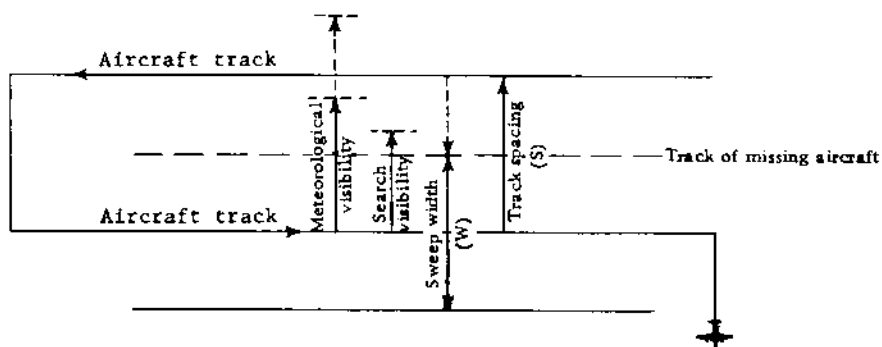


Figure A7-1.

b. **Search Visibility.** Search Visibility, simply stated, is the distance at which an object can be seen and recognized at the height the search aircraft is flying. Search visibility will therefore, always be less than meteorological visibility.

c. **Search Altitude.** It is impossible to prescribe an optimum search altitude for all conditions. Under conditions of good visibility and open terrain, an altitude of 500 feet to 1500 feet is recommended when searching for a light aircraft crash. Flying at lower altitude has certain disadvantages, such as the rapidity

with which an object passes the field of vision, the more acute angle presented by the search object and the increased demands placed on the pilot. For night search, an altitude of 3,000 feet above the terrain is considered suitable because the primary search objects are pyrotechnics, lights, fires, etc.

d. **Type of Terrain.** To keep the POD chart relatively simple, types of terrain are broken down into general categories; open, flat terrain; moderate tree cover and/or hilly; heavy tree cover and/or very hilly.



3. **Probability of Detection Chart.** The following POD chart will assist searchers and mission coordinators to estimate the probability of finding the search objective.

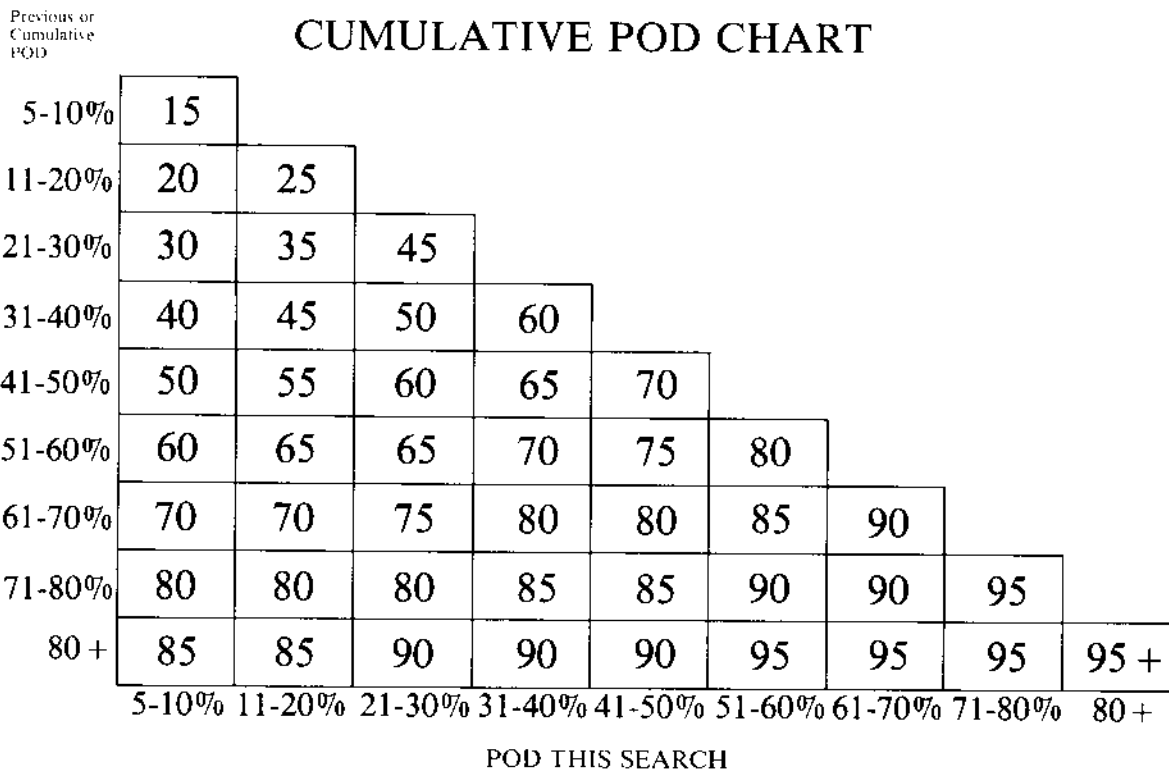
dinators to estimate the probability of finding the search objective.

OPEN, FLAT TERRAIN					MODERATE TREE COVER AND/OR HILLY					HEAVY TREE COVER AND OR VERY HILLY				
SEARCH ALTITUDE (AGL)	SEARCH VISIBILITY				SEARCH ALTITUDE (AGL)	SEARCH VISIBILITY				SEARCH ALTITUDE (AGL)	SEARCH VISIBILITY			
	Track Spacing	1 mi	2 mi	3 mi		4+mi	Track Spacing	1 mi	2 mi		3 mi	4+mi	Track Spacing	1 mi
500 Ft					500 Ft					500 Ft				
.5 mi	35%	60%	75%	75%	.5 mi	20%	35%	50%	50%	.5 mi	10%	20%	30%	30%
1.0	20	35	50	50	1.0	10	20	30	30	1.0	5	10	15	15
1.5	15	25	35	40	1.5	5	15	20	20	1.5	5	5	10	10
2.0	10	20	30	30	2.0	5	10	15	15	2.0	5	5	10	10
700 Ft					700 Ft					700 Ft				
.5 mi	40%	60%	75%	80%	.5 mi	20%	35%	50%	55%	.5 mi	10%	20%	30%	35%
1.0	20	35	50	55	1.0	10	20	30	35	1.0	5	10	15	20
1.5	15	25	40	40	1.5	10	15	20	25	1.5	5	5	10	15
2.0	10	20	30	35	2.0	5	10	15	20	2.0	5	5	10	10
1000 Ft					1000 Ft					1000 Ft				
.5 mi	40%	65%	80%	85%	.5 mi	25%	40%	55%	60%	.5 mi	15%	20%	30%	35%
1.0	25	40	55	60	1.0	15	20	30	35	1.0	5	10	15	20
1.5	15	30	40	45	1.5	10	15	20	25	1.5	5	10	10	15
2.0	15	20	30	35	2.0	5	10	15	20	2.0	5	5	10	10

Figure A7-2.

4. **Cumulative Probability of Detection.** Many times multiple searches or repeated searches over the same probability area are required. The MC may want to search one area numerous times because of the high probability that the search objective is there and/or

initial search efforts were not effective as desired because of search visibility, type of terrain, etc. The cumulative POD chart is provided below so the mission staff can easily estimate the cumulative probability of finding the search objective with more than one search of the same area.



**Instructions for chart use**

1. Find the previous cumulative POD on the left.
2. Find the POD for this search on the bottom.
3. Locate the box where the row and column meet.

**Example**

1. Previous cumulative POD = 45%
2. POD this search = 15%
3. New cumulative POD = 55%

**Figure A7-3.**

5. **Miscellaneous Search Effectiveness Factors.** Other factors that must be considered when estimating aircrew search effectiveness are:

- a. Ability to maintain optimum altitude and airspeed.
- b. Favorable meteorological visibility and weather conditions.
- c. Nature of terrain or sea conditions.
- d. Optimum track spacing maintenance.

- e. Qualification of scanning personnel.
- f. Accuracy of navigation.
- g. Enough time permitted in search area to allow for a thorough search.
- h. Attitude and physical condition of search crew.
- i. Quality of aircrew support to include food, drink, etc.

## VISUAL SEARCH PATTERNS

1. **General.** Search patterns range from the most simple, a straight line, to the more complex, radar coordinated air searches. The navigational accuracy with which an aircraft is able to reach a search area and fly a search pattern has an important bearing on the attainable coverage in the area and, in turn, the probability of detection. Experience has shown that dead reckoning navigation alone results in poor coverage unless prominent landmarks are available and frequent compass readings are taken. Since navigational accuracy is essential in the execution of search patterns — the simpler patterns should be allocated to the least experienced crews.

### 2. Visual Search Patterns:

a. **Track line (Route) search.** Search planners will normally use the track line (route) search pattern when an aircraft has disappeared without a trace. This search pattern is based on the assumption that the missing aircraft has crashed or made a forced landing on or near its intended track (route). It is also assumed that detection may be aided by survivor signals. The track line pattern may be used for night searches in suitable weather. A search aircraft using the track line pattern flies a rapid and reasonably thorough coverage on either side of the missing aircraft's intended track. At the beginning point of a search, the aircraft begins with one-half search track spacing from the trackline. The search altitude for the track line pattern usually ranges from 1000 feet above ground level (AGL) up to 2000 AGL for day searches while night searches range 2000 to 3000 AGL. Figure A8-1 shows the method of initiating the trackline search pattern.

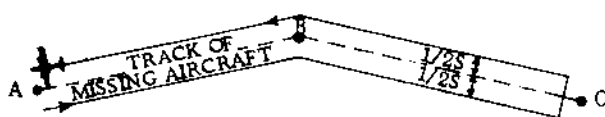


Figure A8-1.

#### b. Parallel Track Search:

(1) This procedure is normally used when:

(a) the search area is large and fairly level.

(b) only the approximate location of the target is known.

(c) a uniform coverage is desired.

(2) The aircraft proceeds to a corner of the search area and flying at the assigned altitude, sweeps the area maintaining parallel tracks, the first of which is at a distance equal to  $\frac{1}{2}$  track spacing (S) from the side of the area.

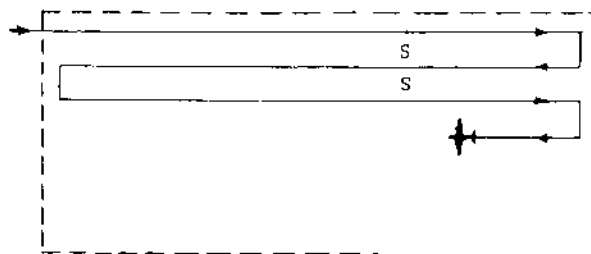


Figure A8-2.

#### c. Creeping Line Search:

(1) This procedure is normally used when:

(a) the search area is narrow, long, and fairly level.

(b) the probable location of the target is thought to be on either side of the track within two points.

(c) immediate coverage of the most probable area, followed by rapid advancement of successive search legs along the track, is desired.

(2) The search aircraft proceeds in the same manner as for a parallel search but uses the following pattern:

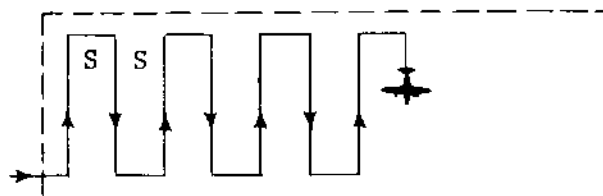


Figure A8-3.

d. **Expanding Square Search.** This pattern is used when the approximate position of the downed aircraft/survivors is known. It is a very precise pattern and requires close attention to navigation. If a repeated expanding square search is made, the center position should be made diagonally from the first leg.

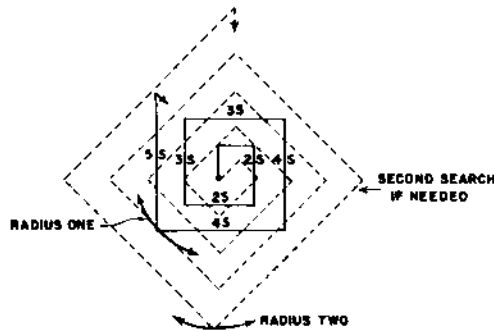


Figure A8-4.

## e. Contour Search:

(1) This procedure allows mountain slopes and valleys to be searched thoroughly and is used when the sharp changes in elevation make use of other patterns impracticable. The aircraft starts the search above the highest peak by completely circling it at that level, it descends 500 to 600 feet while making a 360 degree turn opposite to the direction of search, makes another circuit of the mountain, and repeats this maneuver as often as necessary. Alternatively, the search may be made by spiralling downwards around the mountain with a similar rate of descent. If the mountain is too large or cannot be circled for other reasons, successive sweeps at the same intervals should be flown along its side (figure A8-5).



Figure A8-5.

(2) Contour searches are extremely dangerous and the following conditions must be met:

(a) The crew must be experienced in this type of flying and well briefed. *Before* takeoff, study large scale maps indicating terrain elevations and contour.

(b) *The pilot must devote complete attention to the aircraft and evaluating terrain for hazards to flight.* Exercise caution when searching valleys or canyons and plan ahead to insure that the aircraft can always climb out or turn around. *Also always know which way to turn in the event of an emergency.*

(c) The weather conditions in the search area must be good and constantly evaluated for visibility, gustiness, downdrafts, and turbulence. Don't fly in the mountains when winds across the peaks exceed 30 knots. Downdrafts can exceed 2000 fpm.

(d) The aircraft used should be suitable, that is, be highly maneuverable, and have good power available.

(e) Check your density altitude. On a hot summer day the density altitude of your airport may be higher than the service ceiling of your aircraft.

(f) Check weight and balance and be sure that all passengers and baggage are secured.

(g) If you encounter a severe downdraft use full power and maintain best rate of climb speed for the altitude at which you are operating.

(h) Your flight should as much as possible be made along routes that include populated areas and well traveled mountain passes.

(i) Don't fly up a canyon at any time. Always fly down canyons. Beware, many canyons have abandoned cables stretched from rim to rim. Better yet, stay out of canyons.

(j) Approach passes and ridges at a 45 degree angle with all the excess altitude possible.

(k) Realize that the actual horizon is near the base of the mountains.

(l) **FILE A FLIGHT PLAN and FOLLOW IT.** The FBO, the local GADO, and the FSS can advise you on the best routes to travel.

(3) It is imperative that an accurate record be kept of the area searched because some mountain peaks or valleys may be shrouded in fog or clouds. The best method to accomplishing this is to shade in the area searched and to outline unsearched areas on a large topographical map. The unshaded areas are then searched as soon as conditions permit.

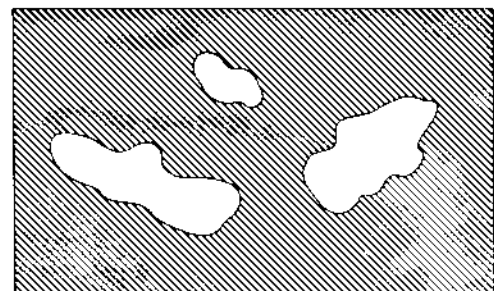


Figure A8-6.

3. **Navigational Aids in Search.** Areas without distinctive landmarks to identify sweeps can be searched using a VOR, VORTAC, NDB, or other radio navigational aids to improve the accuracy of track spacing, area location, and reporting of possible finds.

## ELECTRONIC SEARCH PATTERNS

1. Search Based on Emergency Locator Transmitter (ELT). An electronic search can be instrumental in rapidly locating survivors; however, its success will depend on such things as battery life and survivability of the ELT itself. The initiation of an electronic search should not preclude getting prepared and organized for a concentrated general area search. It is also important that aircraft designated to be equipped with ELT homing detectors be selected based on SAR needs, aircraft reliability/capability, and pilot availability/capability.

2. A track line (route) or parallel track search are most effective when initiating an electronic search. Original flight should be at high altitude (5000 to 9000 feet above the terrain if possible) to intercept the ELT signal at the greatest distance or as soon as possible.

3. Procedures for an electronic search:

a. Search aircraft with homing capability. With this capability, the search aircraft homes on the beacon as soon as it detects the signal. If the probability area is over relatively flat terrain, the beacon signal will probably be picked up long before the aircraft reaches the area. In mountainous country or heavy vegetation, the detection range will be considerably lowered because of interception or attenuation of beacon signals caused by topography or vegetation, unless the search is conducted at a very high level. If this procedure is unsuccessful, a systematic beacon search will have to be made.

b. Search aircraft without any homing capability. If the search aircraft has no homing capability, one of the following procedures should be adopted:

(1) Wing Shadow method: (figure A9-1).

(a) This method is accomplished by banking the search aircraft at a sufficiently steep angle to permit the aircraft's wing to interpose between the emergency locator transmitter and the aircraft's reception antenna. Since most VHF reception antennas are forked-shaped elements placed high on the aircraft's rudder, spurious or varied nulls would be ordinarily received. A special antenna, if placed exactly in line with the wings of the search aircraft and centered on the fuselage, will obviate these errors and will produce a sharp null when the wing blocks off the beacon's signal. On a low wing monoplane, the lowered wing in a bank, when blocking the signal (null received), points directly at the beacon. When the signal (null) suddenly breaks, the heading indicated on the directional gyro (DG) can be easily read.  $90^\circ$  should be added to the DG reading if the turn is to the right and  $90^\circ$  should be deducted if the turn is to the left to obtain a bearing to the target. On a high wing aircraft the procedure would be reversed. The high wing in a turn would point to the beacon when the null signal is received and  $90^\circ$  would be deducted if in a right turn and  $90^\circ$  added if in a left turn. The bearing thus obtained gives a line of position (Null Vector) to the target. When the same maneuver is performed at a new location, a new bearing (Null Vector) can be found. Where these two lines of position intersect is the target location.

(b) The wing shadow procedure is very accurate and the most rapid of any aural methods in locating a downed target. However, it does require the installation of a special use antenna.

NOTE: Antenna must be in line with wings. Wings must be metal.

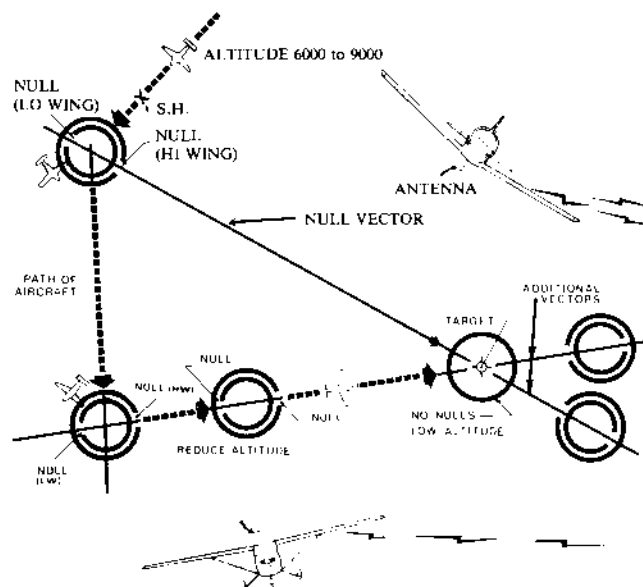


Figure A9-1.

(2) Aural Search (figure A9-2). In this procedure the aircraft flies a "Boxing in" pattern on the assumption that the area of equal beacon signal strength is circular. No special antenna is required. This method uses the aircraft's existing VHF radio equipment.

(a) The position of the search aircraft is plotted as soon as the signal is heard for the first time. The pilot continues on the same heading for a short distance, then turns 90° either left or right and proceeds until the signal fades. This position is noted. Now turn 180° and once again the positions where the signal is heard and where it fades are noted. *During these procedures receiver volume must not be readjusted.*

(b) The *approximate* position of the beacon can now be found; first, by drawing chord lines between each set of "signal heard" and "signal fade" positions and then by drawing the perpendicular bisectors of each chord. The aircraft now proceeds to this position and descends to an appropriate level for sighting (for example, below clouds). However, since the area of equal signal strength on which this procedure is based is seldom, if ever, circular, the intersections of the bisectors will seldom be exactly over the target. If it is not sighted a further search must be conducted at a lower level. They may be another aural search or a visual search using the above intersections as the center position of the search area.

(3) Alternate Aural Method Using Squelch (figure A9-3): There is another aural method using

receiver squelch if the receiver is not equipped with a signal strength meter. This method is illustrated in figure A9-3 and is performed as follows:

(a) When the ELT signal is first heard, adjust the receiver volume control for normal listening. Adjust the squelch control to the point where the squelch cuts off the audio and then back the squelch off to where the audio just cuts back in. Note your position over the ground.

(b) Continue on course. If the signal from the ELT immediately cuts out, you are flying away from the ELT signal source; in which instance make a 180° turn and fly back along the same track, at which time the signal should return. Continue along the reverse track, sometimes as much as 10 miles, until the signal again cuts out and note your position over the ground.

(c) Again make a reverse turn and fly back about halfway. At that point, the ELT is approximately 90° right or left of your position.

(d) Make a 90° right or left turn and if the signal again cuts off, you are flying away from the ELT, thereby requiring another 180° turn back toward the transmitter. Again, it may be required that you detune your search receiver if it is sensitive and appears to overload as you approach the ELT.

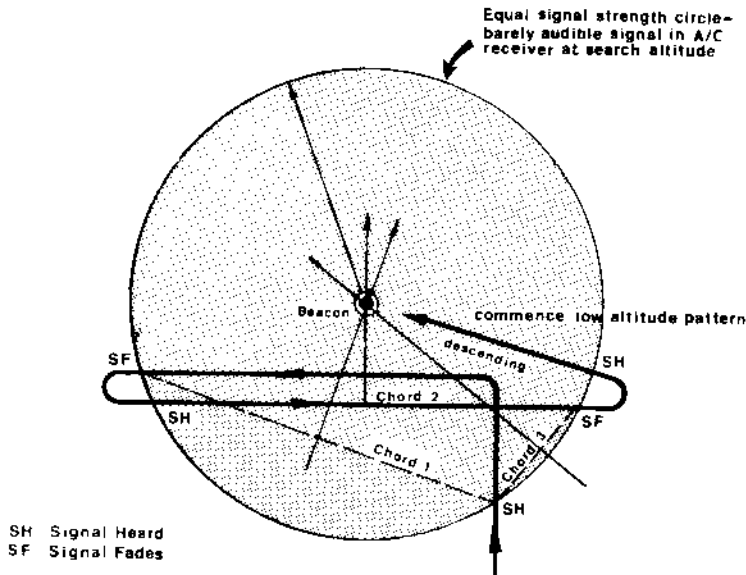


Figure A9-2.

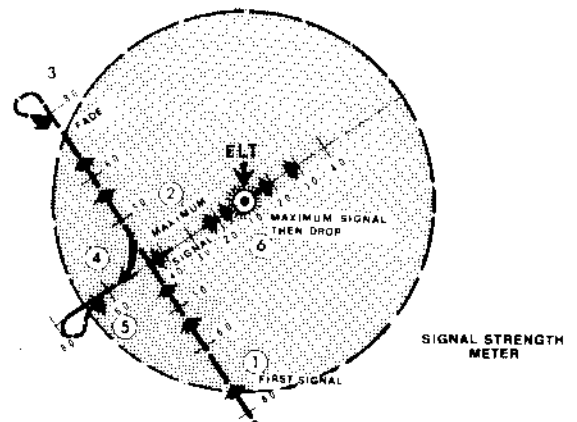


Figure A9-3.

(4) Metered Search (figure A9-3). In this procedure the volume of the beacon is measured on a signal strength meter. On the initial heading of the aircraft into the search area two positions of equal meter reading are plotted and the mid-point between the two determined. (This point will coincide with the point of maximum signal strength. See figure A9-3). The pilot now turns the aircraft 180° and upon reaching mid-point makes a 90° turn left or right. If the signal fades he is obviously heading in the wrong direction and turns the aircraft on the reciprocal. Two points of equal meter reading are also plotted on this reading. This time the point of maximum reading, if accurately established, is also the location of the beacon. After passing the second point of equal reading the pilot makes a 180° turn and descends to an appropriate altitude.

4. Aural methods pose several problems. Rarely is the terrain perfectly level; any hills or valleys may distort the ELT signal or block it entirely. The signal radiation circle, therefore, is rarely circular and plotted centers may be many miles or several valleys away from the actual distress incident. NOTE: This may be true of all ELT searches including aircraft with homing devices installed. Position errors of up to 15 miles have been experienced. An even greater problem evolves in obtaining a reasonable "signal fade." "Signal fade" can become a matter of opinion if the volume control is constantly adjusted. The automatic volume controls on most radios will tend to "build up" the signal at fringe areas then clip off entirely at an unusable level.

#### 5. Coordination with Air Traffic Control (ATC):

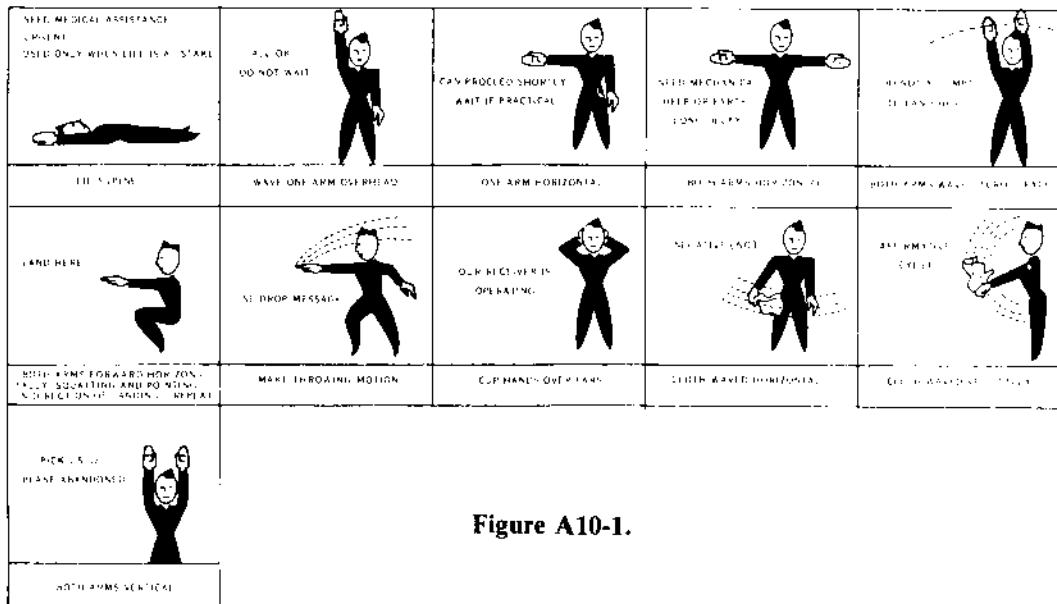
a. Air search will usually be effective only in VFR weather conditions. However, electronic search may well be carried out in marginal conditions, night, or IFR with proper training and aircrew qualification. The mission coordinator must, therefore, coordinate search plans with ATC and submit flight plans for approval, so that separation from other traffic may be provided while the search aircraft enters and departs the search area at the desired altitude and carries out the search at that altitude. This is particularly important where more than one aircraft will carry on search operations at varying altitudes.

b. During large scale searches on busy air routes, the mission coordinator would be well advised to obtain temporary air space reservation from the appropriate Air Route Traffic Control Center (ARTCC). It will be the mission coordinator's responsibility to provide separation within the reservation if the search aircraft cannot be relied upon to provide their own. This is particularly important in marginal conditions when, because of deteriorating weather, the aircraft may find themselves operating inadvertently below VFR conditions. Crews of search aircraft must, therefore, be protected by a method of separation or have the assurance that no conflict with other aircraft exists rather than have them rely on forward visibility in marginal conditions. Vertical separation is probably the most practical method since lateral separation may not be practical for search tracking spacing.

**GROUND-TO-AIR and AIR-TO-GROUND SIGNALS**

**1. Ground-To-Air:**

a. **Body Signals.** Although body signals are not easily interpreted from an aircraft, the signals illustrate in figure A10-1 can be used to transmit messages to the pilot of an aircraft as he circles overhead. Stand in the open when you make the signals. Be sure the background, as seen from the air, is not the same coloring as your clothing. Go through the motions slowly and repeat each signal until you are positive that the pilot understands you.



**Figure A10-1.**

b. **Search and Rescue Signals.** Figure A10-2 shows standard SAR ground-to-air signals. These signals should be as large as possible, 2-3 feet wide and 6-12 feet long, using colors that contrast to the background if possible. Some of these signals are for use by survivors and ground teams to communicate with the aircraft.

1 REQUIRE ASSISTANCE	✓
2 REQUIRE MEDICAL ASSISTANCE	X
3 NO or NEGATIVE	N
4 YES or AFFIRMATIVE	Y
5 PROCEEDING IN THIS DIRECTION	↑

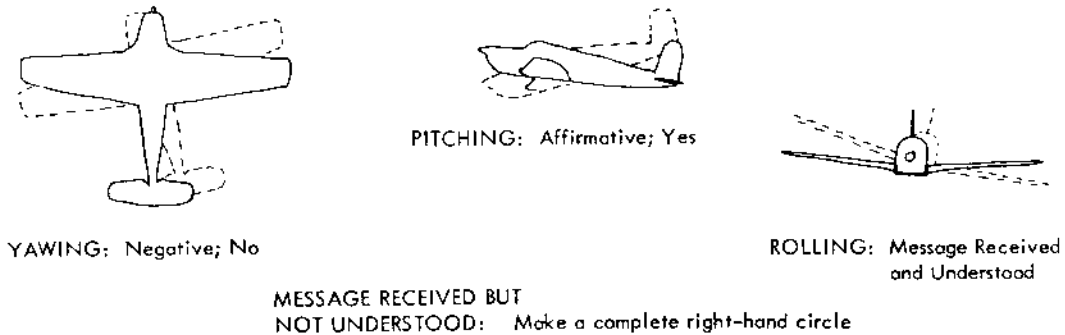
**Figure A10-2.**

**INSTRUCTIONS:**

1. Lay out symbols by using strips of fabric, pieces of wood, stones, etc.
2. Provide as much color contrast as possible between material used and background.
3. Symbols should be at least 10 feet high or larger.
4. Use addition signals such as some flares, radio, etc. to attract attention.
5. When ground is covered with snow, signals may be made by dragging, shoveling, or tramping the snow. The depressed areas appear darker from the air.
6. The pilot should acknowledge the message by rocking wings side to side.

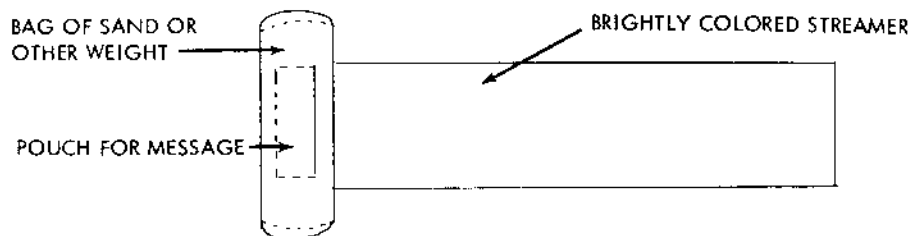


2. **Air-To-Ground Signals.** In order to acknowledge messages sent by ground personnel or survivors, standard aircraft acknowledgement signals have been adopted and are shown in figure A10-3. These signals may be augmented by message drops if direct radio communication has not been established. In addition to these four signals, two others are often used to communicate with ground teams. If the pilot wishes the team to investigate an area, he should fly over the team, "jazzing" the engine, then fly in the direction he wishes them to go. Repeat this maneuver until the team responds or other communications are established. To pinpoint the area to be investigated, or to indicate the target area, the aircraft should circle over it.



**Figure A10-3.**

3. **Message Drops.** Air crews can establish communications with ground teams or survivors by use of the message drop. Instructions, maps, and photographs of areas for the ground team to investigate and signal codes and messages on intentions to survivors can be dropped by search aircraft. Aircrew members should carry message drops with them for such use. A message drop is shown in figure A10-4. The drop contains a pouch filled with sand or other material for weight, a pocket for the message, and a streamer 3-4 inches wide and about 2 feet long, usually made of canvas. Before making the message drop the pilot should determine approximate wind direction and velocity to determine his drop point. The drop should be made in an open area if possible. Needless to say, personnel shall have safety belts and/or harnesses fastened securely before canopies or doors are opened. **WARNING:** Restrictions pertaining to airborne objects drop in CAPR 60-1 apply.

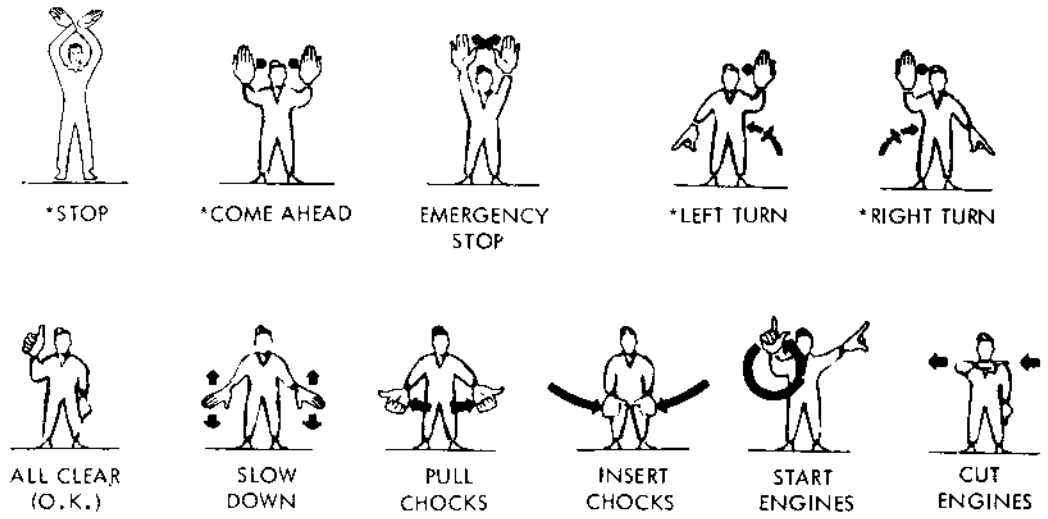


**Figure A10-4.**

### HAND SIGNALS

1. **Hand Signals.** Many hand signals for marshalling fixed wing and rotary aircraft are the same. Fixed wing signals, listed first, are kept to the minimum needed while helicopter signals are more extensively shown in figure A11-1. It must be remembered by the ground crews using these signals that some pilots may not know these signals.

2. **Hand Signals for Fixed Wing Aircraft.**



\* NEVER stand in front of an aircraft.



Figure A11-1.

3. **Hand Signals for Rotary Wing Aircraft (Helicopters).** These signals are advisory, the pilot is under no obligation to obey them. Conditions beyond the control of the pilot or factors unknown to the ground marshaller may make it necessary to disregard the signals.

**PROCEED TO NEXT MARSHALLER**

Right or left arm down, other arm moved across the body and extended to indicate direction of next marshaller.



**NEGATIVE (NOT CLEAR)**

Hand raised, thumb down.



**THIS MARSHALLER**

Arms above head in vertical position with palms facing inward.



**AFFIRMATIVE (ALL CLEAR OR "OK")**

Hand raised, thumb up.



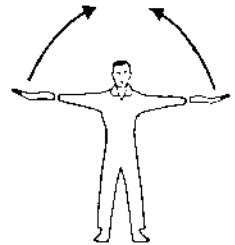
**START ENGINE(S)**

Circular motion of right hand at head level with left arm pointing to engine.



**VERTICAL MOVEMENT—MOVE UPWARD**

Arms extended horizontally sideways beckoning upwards, with palms turned up. Speed of movement indicates rate of ascent.



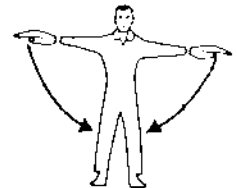
**ENGAGE ROTOR(S)**

Circular motion in horizontal plan with right hand above head.



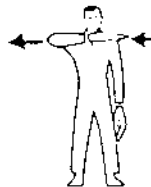
**VERTICAL MOVEMENT—MOVE DOWNWARD**

Arms extended horizontally sideways beckoning downwards with palms turned down. Speed of movement indicates rate of descent.



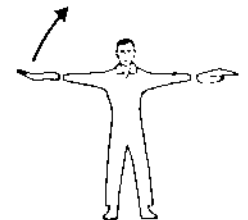
**CUT ENGINE(S)/ROTORS**

Either arm and hand level with shoulder, hand moving across throat, palm downward.



**HORIZONTAL MOVEMENT—MOVE TO RIGHT (STARBOARD)**

Left arm extended horizontally sideways in direction of movement and other arm swung over the head in same direction, in a repeating movement.



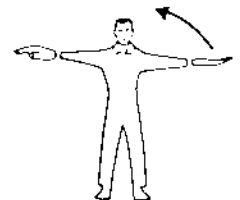
**ABANDON AIRCRAFT**

Marshaller first gives signal to cut engines, followed by signal simulating unfastening seat belt and shoulder straps and throwing them up and off.



**HORIZONTAL MOVEMENT—MOVE TO LEFT (PORT)**

Right arm extended horizontally sideways in direction of movement and other arm swung over the head in the same direction, in repeating movement.



**CLEARANCE FOR PERSONNEL TO BOARD/EXIT HELICOPTER.**

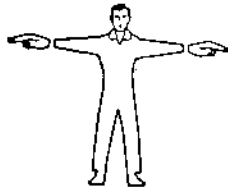
Pilot will look at person and give a "thumbs up" for clearance to board/exit helicopter.



**SAFETY WARNING:** Eye protection will be worn by the ground marshaller when marshalling helicopters.

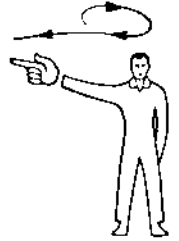
**HOVER**

Arms extended horizontally sideways, palms downward.



**TAKE OFF THIS WAY (at pilot's discretion)**

Marshaller conceals left hand and makes circular motion of right hand over head in horizontal plane ending in a throwing motion of arm towards direction of takeoff.



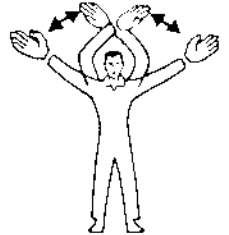
**SPOT TURN**

Left or right hand moving upward and backward, from a horizontal position, to indicate direction of tail movement. Other hand pointing to center of spot turns. Marshaller must remain in full eye-view with pilot.



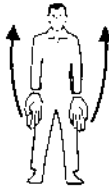
**WAVE OFF**

Waving of arms over the head.



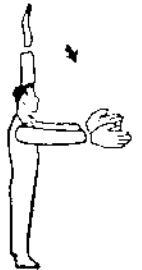
**MOVE BACK**

Arms by sides, palms facing forward, arms swept forward and upward repeatedly to shoulder height.



**LANDING DIRECTION**

Marshaller turns and faces toward point where aircraft is to land, the arms are lowered repeatedly from a vertical position to a horizontal position, stopping finally in the horizontal position.



**TURN TO PORT (LEFT)**

Point right arm downward, left arm repeatedly moved upward-backward. Speed of arm movement indicating rate of turn.



**LAND**

Arms crossed and extended downwards in front of the body.



**TURN TO STARBOARD (RIGHT)**

Point left arm downward, right arm repeatedly moved upward-backward. Speed of arm movement indicating rate of turn.



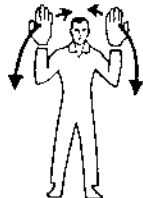
**STOP**

Arms crossed above the head, palms facing forward.



**MOVE AHEAD**

Arms a little aside, palms facing backwards and repeatedly moved upward-backward from shoulder height.



**MARSHALLING FINISHED**

Right arm raised with elbow at shoulder height with palm facing forward.



**SLOW DOWN**

Arms down with palms toward ground, then moved up and down several times.

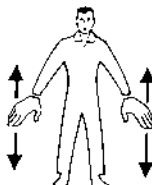


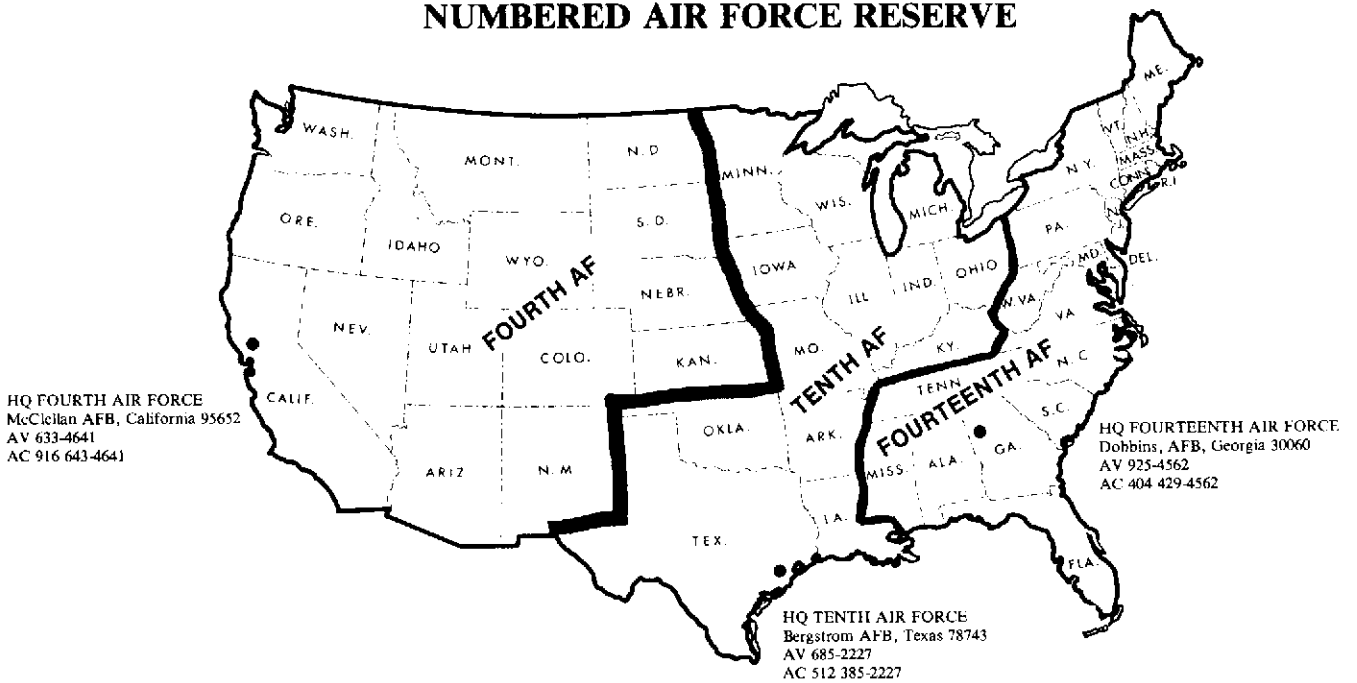
Figure A11-2.

U.S. ARMY AND NUMBERED AF RESERVE HEADQUARTERS AREAS

U.S. ARMY AREAS



NUMBERED AIR FORCE RESERVE



**AUTHORIZATION TO FLY CADETS  
TO AND FROM EMERGENCY SERVICES MISSION BASE**

Cadets are authorized to fly as passengers on CAP aircraft which are enroute from home base to mission base and returning to home base during Air Force-authorized evaluation, training, or actual emergency services missions. To permit this, the following requirements must be met:

- a. Cadets can only be flown from home base to the mission base and then returned from the mission base.
- b. No searching or performance of any other emergency services mission can be conducted with a cadet on board a CAP aircraft.
- c. Cadets can only be flown by CAP senior members who are cadet orientation flight and emergency services mission qualified in accordance with CAPR 60-1 and this manual.
- d. Cadets cannot fly themselves to and from the mission base.
- e. Cadets must be needed as a mission team member or trainee at the mission base.
- f. Cadets must have written parental permission and CAPR 60-1 release of liability (CAP Form 9).
- g. Cadets can only be transported on aircraft which are needed at mission base for mission operations. Flights solely for cadet transportation will not be conducted.

## ABBREVIATIONS

ADA	Aerial Damage Assessment
AFRCC	Air Force Rescue Coordination Center
AFRES	Air Force Reserves
ALNOT	Alert Notice (FAA)
ARM	Airborne Radiological Monitor
ARRS	Aerospace Rescue and Recovery Service
ATA	Actual Time of Arrival
ATC	Air Traffic Control
ATD	Actual Time of Departure
CAP	Civil Air Patrol
CAPF	Civil Air Patrol Form
CAPM	Civil Air Patrol Manual
CAPR	Civil Air Patrol Regulation
CARDA	Continental U.S. Airborne Reconnaissance for Damage Assessment
CD	Civil Defense
CONUSA	Continental United States Army
ELT	Emergency Locator Transmitter
EOC	Emergency Operations Center
ES	Emergency Services
ESCAT	Emergency Security Control of Air Traffic
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
ETE	Estimated Time En Route
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency (absorbed DCPA)
FSS	Flight Service Station (FAA facility)
IFR	Instrument Flight Rules
INREQ	Information Request
MC	Mission Coordinator
NAF(R)	Numbered Air Force (Reserve)
NUDET	Nuclear Detonation
RADEF	Radiological Defense
REDCOM	US Readiness Command
SAR	Search and Rescue
SARDA	State and Regional Disaster Airlift
SAREX	Search and Rescue Exercise
SCATANA	Security of Air Traffic and Air Naviga- tional Aids
SPLO	State Preparedness Liaison Officer (USAF)
STARC	State Area Command
USAF	United States Air Force
USCG	United States Coast Guard
VFR	Visual Flight Rules
VHF	Very High Frequency
ZULU	Proword for Greenwich Mean Time

## GRIDDING

1. **General.** The standard sectional aeronautical chart and the following grid identifications system is used by the AFRCC. This sectional grid system will be the standard used when coordinating a mission with the AFRCC. It is recognized that many missions will be "local" in nature, and local procedures may be highly efficient and effective in the management of SAR resources within a defined geographical boundary. The gridding procedures described do not preclude the use of local procedures where they are deemed necessary or more practicable; however, when coordinating with other SAR agencies, use the standardized system outlined in this attachment.

2. **Standardized Sectional Aeronautical Chart Grid and Identification System:**

a. The Sectional Aeronautical Chart (scale: 1-500,000) is divided into 30 minute intervals. Consider both the north and south sides of a sectional chart as one unit. Identify the northern and southern most latitude limits, and the western and eastern most longitude limits from table A15-1. The rectangular area thus formed is the area to be gridded. Line off each 15 minutes of latitude and longitude within this area. Start with the first full 15 minute quadrangle in the northwest corner of the chart as number one (1) and number in sequence from west to east. Continue in this manner until reaching the southeast corner of the gridded area which serves as the last full 15 minute quadrangle. The number of quadrangles in each respective chart is scheduled in column 7, table A15-1.

b. The basic 15 minute quadrangle (grid) is further broken down into quarter sections. The northwest quarter is labeled "A"; the northeast is "B"; the southwest is "C"; and the southeast is "D". This breakdown is used when concentrated search is required and as a means of identifying 7 ½ minute quadrangles, they need not be annotated on the charts but should be understood to exist and used in mission assignment and reporting.

c. Where charts overlap (the same grid is located on two or more charts) the grids on all charts *will be assigned the number and identifier of the primary chart (the most westerly chart will be designated as the primary chart)*. Consider the Kansas City and St. Louis charts as an example. The Kansas City chart will be numbered in accordance with paragraph 2a above; that portion of the St. Louis that is overlapped by the Kansas City chart will be labeled with the number identical to the same grid on the Kansas City chart preceded by the

letters "MKC" to identify the origin of the grid numbers. (See figure A15-1.) The normal sequential numbers on the overlap areas that are displaced by the primary chart will simply be omitted for use.

(1) The Los Angeles chart has a 15 minute latitude overlap on the Las Vegas chart within the area defined by 36°-00N to 35°-45 'N, and 118°-00W. (Total of 12 grids)

(2) The Los Angeles chart has one (1) degree longitude overlap on the Phoenix chart within the area defined by 35°-45 'N to 32°-00N, and 116°-00W to 115°-00W. (Total of 60 grids)

(3) The Denver chart has a 15 minute latitude overlap on the Albuquerque chart with the area defined by 36°-00N to 35°-45N, and 109°-00W to 104°-00W. (Total of 12 grids)

(4) The Kansas City chart has one (1) degree longitude overlap on the St. Louis chart within the area defined by 40°-00N to 36°-00N, and 91°-00W. (Total of 64 grids)

(5) The St. Louis chart has one (1) degree longitude overlap on the Cincinnati chart within the area defined by 40°-00N to 36°-00N, and 85°-00W to 84°-00W. (Total of 64 grids)

(6) Cincinnati has one (1) degree longitude overlap on the Washington chart within the area defined by 40°-00N to 36°-00N, and 79°-00W to 78°-00W. (Total of 64 grids)

d. Chart identifiers will be listed in column 2, table A10-1.

e. On these charts with inserts over oceanic areas, number consecutively through the insert just as would be accomplished were the insert not published.

3. **Geographical Coordinates.** Using geographical coordinates is an acceptable alternate method; however, it has the disadvantage of being somewhat lengthy, slow to locate for reference, and subject to errors in transmission. In this method all corners of an area are given in geographical coordinates of longitude and latitude. An advantage of this system is that irregular shaped areas can be easily designated.

EXAMPLE: Search area 4115N 11525W to 410N 11425W to 4020N 11425W to 4025N 115125W to origin.



SECTIONAL AERONAUTICAL CHART GRIDS						
Chart	Identifier	North Grid Limit	South Grid Limit	West Grid Limit	East Grid Limit	Total Grids
Seattle	SEA	49-00N	44-30N	125-00W	117-00W	576
Great Falls	GTF	49-00N	44-30N	117-00W	109-00W	576
Billings	BIL	49-00N	44-30N	109-00W	101-00W	576
Twin Cities	MSP	49-00N	44-30N	101-00W	93-00W	576
Green Bay	GRB	48-15N	44-00N	93-00W	85-00W	544
Lake Huron	LHN	48-00N	44-00N	85-00W	77-00W	512
Montreal	MON	48-00N	44-00N	77-00W	69-00W	512
Halifax	HFX	48-00N	44-00N	69-00W	61-00W	512
Kalmath Falls	LMT	44-30N	40-00N	125-00W	117-00W	576
Salt Lake City	SLC	44-30N	40-00N	117-00W	109-00W	576
Cheyenne	CYS	44-30N	40-00N	109-00W	101-00W	576
Omaha	OMA	44-30N	40-00N	101-00W	93-00W	576
Chicago	ORD	44-00N	40-00N	93-00W	85-00W	512
Detroit	DET	44-00N	40-00N	85-00W	77-00W	512
New York	NYC	44-00N	40-00N	77-00W	69-00W	512
San Francisco	SFO	40-00N	36-00N	125-00W	118-00W	448
Las Vegas	LAS	40-00N	35-45N	118-00W	111-00W	476
Denver	DEN	40-00N	35-45N	111-00W	104-00W	476
Wichita	ICT	40-00N	36-00N	104-00W	97-00W	448
Kansas City	MKC	40-00N	36-00N	97-00W	90-00W	448
St. Louis	STL	40-00N	36-00N	91-00W	84-00W	448
Cincinnati	LUK	40-00N	36-00N	85-00W	78-00W	448
Washington	DCA	40-00N	36-00N	79-00W	72-00W	448
Los Angeles	LAX	36-00N	32-00N	121-30W	115-00W	416
Phoenix	PHX	35-45N	31-15N	116-00W	109-00W	504
Albuquerque	ABQ	36-00N	32-00N	109-00W	102-00W	448
Dallas - Ft. Worth	GSW	36-00N	32-00N	102-00W	95-00W	448
Memphis	MEM	36-00N	32-00N	95-00W	88-00W	448
Atlanta	ATL	36-00N	32-00N	88-00W	81-00W	448
Charlotte	CLT	36-00N	32-00N	81-00W	75-00W	384
El Paso	EIP	32-00N	28-00N	109-00W	103-00W	384
San Antonio	SAT	32-00N	28-00N	103-00W	97-00W	384
Houston	HOU	32-00N	28-00N	97-00W	91-00W	384
New Orleans	MSY	32-00N	28-00N	91-00W	85-00W	384
Jacksonville	JAX	32-00N	28-00N	85-00W	79-00W	384
Brownsville	BRO	28-00N	24-00N	103-00W	97-00W	384
Miami	MIA	28-00N	24-00N	83-00W	77-00W	384

Table A15-1.

ALBUQUERQUE

	109W	108W	107W	106W	105W	104W	103W	102W																					
36N DENVER	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	21	22	23	24	25	26	27	28	36N
	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	
	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	
35N	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	35N
	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	
	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	
	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	
34N	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	34N
	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	
	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	
	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	
33N	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	33N
	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	
	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	
	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	
32N	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	32N

ATLANTA

	88W	87W	86W	85W	84W	83W	82W	81W																					
36N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	36N
	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	
	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	
35N	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	35N
	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	
	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	
	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	
34N	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	34N
	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	
	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	
	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	
33N	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	33N
	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	
	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	
	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	
32N	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	32N



CHARLOTTE

		ATLANTA																												
		82W	81W	80W	79W	78W	77W	76W	75W	82W	81W	80W	79W	78W	77W	76W	75W													
36N		25	26	27	28	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	36N
		53	54	55	56	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	
		81	82	83	84	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	
35N		109	110	111	112	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	35N
		137	138	139	140	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	
		165	166	167	168	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	
		193	194	195	196	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	
34N		221	222	223	224	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	34N
		249	250	251	252	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	
		277	278	279	280	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	
		305	306	307	308	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	
33N		333	334	335	336	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	33N
		361	362	363	364	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	
		389	390	391	392	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	
		417	418	419	420	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	
32N		445	446	447	448	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	32N

CHEYENNE

		109W	108W	107W	106W	105W	104W	103W	102W	101W	109W	108W	107W	106W	105W	104W	103W	102W	101W															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
44S		33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	44S
		65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	
		97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	
43S		149	150	151	152	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	43S
		161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	
		193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	
		225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	
		257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	
42S		289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	42S
		321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	
		353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	
		385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	
41S		417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	41S
		449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	
		481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	
		513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	
40S		545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	40S



DALLAS - FT WORTH

	102W	101W	100W	99W	98W	97W	96W	95W																					
36N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	36N
	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	
	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	
35N	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	35N
	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	
	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	
	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	
34N	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	34N
	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	
	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	
	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	
33N	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	33N
	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	
	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	
	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	
32N	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	32N
	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	
	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	
	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	
	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	
	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	
	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	
	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	
	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	
	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	
	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	
	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	
	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	
	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	
	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	
	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	
	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	
	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	
	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	
	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	
	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	
	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	
	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	
	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	
	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	
	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	
	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	
	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	
	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	
	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	
	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288	
	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	
	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344	
	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	137			











KLAMATH FALLS

		125W				124W				123W				122W				121W				120W				119W				118W				117W					
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32						
44N	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64							
	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96							
	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128							
43N	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160							
	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192							
	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224							
42N	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256							
	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288							
	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320							
41N	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352							
	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384							
	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416							
40N	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448							
	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480							
	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512							
	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544							
	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576							

LAKE HURON

		85W				84W				83W				82W				81W				80W				79W				78W				77W					
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32						
48N	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64							
	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96							
	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128							
47N	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160							
	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192							
	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224							
46N	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256							
	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288							
	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320							
45N	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352							
	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384							
	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416							
44N	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448							
	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480							
	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512							









**PHOENIX**

		116W		115W		114W		113W		112W		111W		110W		109W																																																																				
		<b>LOS ANGELES</b>																																																																																		
		49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84																																															
35N		101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140																																											
		127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168																																									
34N		231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280																																	
		283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336																													
33N		361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420																							
		421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503

**SALT LAKE CITY**

		117W		116W		115W		114W		113W		112W		111W		110W		109W																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32		
44N		33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64		
		65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96		
43N		97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128		
		129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160		
42N		161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192		
		193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224		
41N		225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256		
		257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288		
40N		289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320		
		321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352		
40N		353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384		
		385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416		
40N		417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448		
		449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480		
40N		481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512		
		513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544		
40N		545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576		







TWIN CITIES

	101W	100W	99W	98W	97W	96W	95W	94W	93W																								
49N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	49S
	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	
	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	
48N	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	48S
	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	
	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	
	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	
47N	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	47S
	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	
	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	
	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	
46N	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	46S
	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	
	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	
	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	
45N	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	45S
	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	
	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	

WASHINGTON

	79W	78W	77W	76W	75W	74W	73W	72W																									
40N	CINCINNATI								40S																								
	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	
	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	
39N	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	39S
	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	
	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	
38N	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	38S
	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	
	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	
	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	
37N	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	37S
	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	
	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	
36N	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	36S

WICHITA

	104W	103W	102W	101W	100W	99W	98W	97W																					
40N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	40N
	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	
	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	
39N	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	39N
	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	
	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	
	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	
38N	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	38N
	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	
	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	
	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	
37N	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	37N
	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	
	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	
	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	
36N	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	36N
	104W	103W	102W	101W	100W	99W	98W	97W																					