Merced Composite Squadron 147
Mission Scanner Course

Capt. Blake R. Kreitzer

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Earning your Mission Scanner Qualification

- You are to have completed your General Emergency Services qualification first.

- Upon completion of this course you will earn Mission Scanner Qualification and it will be recorded on your 101 card.
  - A 101 card is required to enter any Mission Base regardless if it is a real mission or just training.

- What do I do to earn my Mission Scanner Qualification
  - Have commander assign you as a MS trainee on E services.
  - Read CAP Regulation CAPR 60-1
  - Read Specialty Qualification Training Record
    - Sample enclosed
    - Attain one from your ES Officer
  - Read Mission Scanner Familiarization and Preparatory Training
  - Get with ES officer or his Designee and have them sign you off on the F&P subjects
  - Have commander approve you for advanced MS Training
  - Read Mission Advanced Training
  - Get with ES officer or his Designee and have them sign you off on the Advanced subjects
    - Some have to be done in the air.
  - Participate in 2 sorties

- Then you will be issued your updated 101 card

- **Continue to your next ES Specialty!!!**

Capt Blake R Kreitzer

NATIONAL HEADQUARTERS CIVIL AIR PATROL

CAP REGULATION 60-1

5 JANUARY 2009

INCLUDES CHANGE 1 (CORRECTED COPY), 2 FEBRUARY 2009

Operations

CAP FLIGHT MANAGEMENT

This regulation prescribes the responsibilities of all Civil Air Patrol (CAP) personnel as applicable to the control and management of CAP flying programs, aircraft, and aircrews. Federal Aviation Administration (FAA) requirements are minimum standards; however, in some instances CAP has established higher standards than FAA minimums. The practices, procedures, and standards prescribed in this regulation are mandatory.

SUMMARY OF CHANGES. The entire regulation is completely revised, to eliminate information duplicated in other CAP regulations and improve readability.

Table of Contents **Page**

Supersedes CAPR 60-1, 20 February 2008. OPR: DO

Distribution: National CAP website. Approved by: CAP/CC

CHAPTER 1 – GENERAL INFORMATION

1-1. Scope. This regulation does not apply to CAP Corporate aircraft flown by CAP-USAF personnel, aircraft released for repair to an approved FBO/aircraft maintenance facility, or other non-CAP member use as approved by CAP-USAF/XO.

1-2. Supplements and Waivers. Supplements to this regulation cannot be issued below the wing level (except Congressional Squadron) and require region commander, NHQ CAP/DO, and CAP-USAF/XO approval. Requests for waivers or supplements must be submitted via chain of command to the region commander and then to NHQ CAP/DO for further distribution.

1-3. Definition of Terms. All terminology is in accordance with FAA 14 CFR Part 1 or Part 61 except as follows:

a. Air Force Assigned Mission (AFAM) – Any CAP flight activity authorized by the Air Force to use an A or B mission symbol (see CAP-USAF 10-2701 for details).

b. CAP Aircraft - Any aircraft (either member owned/furnished or CAP Corporate) used in a CAP flight activity. “CAP Airplane” or “CAP Glider” refers to CAP Aircraft of a certain category.

c. CAP Check Pilot – Qualified to administer a CAP Pilot Flight Evaluation (CAPF 5) to members using CAP aircraft.

d. CAP Corporate Aircraft - Any aircraft owned by and registered to CAP and any aircraft under an exclusive lease to CAP.

e. CAP Corporate Mission – All CAP flight activities that are not Air Force assigned missions.

f. CAP Flight Activity - Any flight activity governed by this regulation.

g. CAP Instructor Pilot – Qualified to give flight instruction and FAA endorsements to other members using CAP aircraft.

h. CAP Instrument Pilot – Qualified to operate as Pilot in Command of CAP aircraft in Visual or Instrument Meteorological Conditions.

i. CAP Solo Pilot – Qualified to solo CAP aircraft. Solo is limited to Gliders or Single Engine Land Airplanes that are not Complex, High Performance (except C182 airplanes), tailwheel, or ski/float equipped.

j. CAP Tow Pilot – Qualified to use a CAP airplane to tow CAP gliders.

k. CAP VFR Pilot – Qualified to operate as Pilot in Command of CAP aircraft in Visual Meteorological Conditions.

l. Current – Meets 14 CFR 61.57 (recent flight experience) for the designated operation.

m. Examiner – Authorized to endorse the CAPF 5 (if a Check Pilot Examiner) or CAPF 91 (if a Mission Check Pilot Examiner) of other pilots for check pilot privileges.

n. Mission Symbol – The code letters and numbers used to denote the type of mission a CAP Flight is released under.

o. MOU – Memorandum of Understanding – an approved agreement with another organization that may define CAP flight activities in support of that agency’s mission. They may contain provisions and restrictions that supersede those found in this regulation.

p. National Check Pilot Standardization Course (NCPSC) - This course is required for all CAP check pilots and mission check pilots. NCPSC is an instructor led course for airplane check pilots and an online course for glider check pilots.

q. NHQ CAP/DOV website – The CAP website where materials in support of CAP aviation are located - (http://members.gocivilairpatrol.com/emergency_services/stanevalflight_ops/).

r. OPS Quals – The CAP online database for entering pilot information. Access to OPS Quals is via the e-Services section at www.capnhq.gov.

s. Qualified – Meets all FAR and CAP requirements except 14 CFR 61.57 (recent flight experience).

t. Supervised Mission – A CAP Flight Activity that is under the direct control of a current and qualified incident commander (IC) IAW CAPR 60-3 or counterdrug mission director (CMD) IAW CAPR 60-6.

u. WMIRS – The CAP website used to track mission sorties and all CAP flights – (https://missions.cap.af.mil/wmirs/index.cfm).

v. Written Designation – Includes electronic approval in eServices.

CHAPTER 2 – RULES OF OPERATION

2-1. Basic Rules.

a. CAP aircraft will be used only for official CAP business and not for personal use.

b. Smoking, aerobatic flight, spins (except instruction for a flight instructor certificate), parachuting and dropping of objects (except to save a life) from CAP aircraft are prohibited.

c. Formation flying with CAP aircraft is prohibited.

d. The use of night vision devices by the pilot flying CAP aircraft is prohibited.

e. Only CAP pilots may start, taxi, or otherwise operate CAP aircraft unless the aircraft is released for repairs (see paragraph 1-1). Hand propped starts are prohibited.

f. All CAP airplanes shall carry a working fire extinguisher.

g. All occupants shall wear seat belts and shoulder harnesses (if available) unless such wear interferes with pilot or crew member duties.

h. No more than 8 persons, including crew members, are permitted on any CAP aircraft.

i. For flight beyond gliding distance of land, each occupant will wear an individual flotation life vest. Other requirements apply for flight more than 10 nautical miles from land – consult the NHQ CAP/DOV website for the latest requirements.

j. No charge may be made by any person for any ground or flight training or flight checks accomplished in accordance with this regulation, except examiner fees for issuance of an FAA pilot certificate or rating.

k. Simulated emergency procedures are prohibited during Instrument Meteorological Conditions or at night. Exception: partial panel instrument training and inflight discussion of emergency procedures may be conducted during night VMC conditions.

l. Sterile Cockpit procedures, to include passenger briefings, will be used on all CAP flights. Accepted procedures are specified on the NHQ CAP/DOV website.

m. Use of approved aircraft or operational checklist(s) are mandatory in all CAP aircraft.

n. Minimum flight visibility of 3 statute miles is required for all VFR flights unless the PIC is a current and qualified instrument pilot.

o. The maximum crosswind limit for operating CAP aircraft is that which is stated in the Pilot Operating Handbook (POH) as the maximum demonstrated crosswind velocity or 15 knots if the POH does not specify a limit.

p. Assistance to law enforcement officers using CAP Aircraft is restricted to those missions coordinated and approved through the CAP National Operations Center (NOC).

2-2. Operation Limits.

a. An FAA flight plan must be filed and activated for every flight of a CAP Aircraft beyond 50 nautical miles distance from point of origin. Those flights that are part of a Supervised Mission may be exempted from this requirement by the mission incident commander (IC) or counterdrug mission director (CMD).

b. Only civilian airports in the current FAA Airport/Facility Directory and military airfields (if approved by the military organization supported during a Supervised Mission or by CAP-USAF for all other flights) are authorized for CAP Aircraft. Unlisted civilian airfields may be approved by a wing or higher commander with written permission from the airfield owner/operator. For CAP-USAF approvals, advance notice of 5 days (Corporate aircraft) or 45 days (member owned/furnished aircraft) is required to obtain a Military Airfield approval from the CAP-USAF State Director where that airfield is located.

c. Flight to destinations outside a wing's boundaries requires the authorization of an IC or CMD (during Supervised Missions), wing or higher commander unless permitted under an approved MOU. Flight across an international border requires N/DO approval unless part of an FAA IFR procedure to a US airport.

d. The maximum crew duty day for pilots is 14 hours of official CAP duty. Pilots will not plan to serve as PIC past the end of their crew duty day. Pilots will not flight plan to exceed 8 hours PIC time between periods of crew rest. Pilots must have 10 hours of crew rest between the last official CAP duty and the first official CAP duty in the next duty period. A wing or higher commander may authorize exceeding the 8 hour PIC time limit, provided each flight in excess of the requirements is individually approved and an appropriate risk assessment is made by the commander involved.

e. Sustained flight below an altitude or lateral distance from any object of 1,000 ft during the day or 2,000 ft at night is prohibited except for takeoff and landing or in compliance with ATC procedures (such as IFR flight). At no time will the pilot allow the aircraft to come within 500 feet of terrain or obstructions unless taking off or landing.

f. IFR flights will not depart unless the weather is at or above landing minimums at the departure airport. A wing commander may publish an authorization for different minimums at specific airports if, after review, a safe alternate airport with lower IFR landing minimums is in the immediate area.

g. Night VFR is permitted; however, if the PIC and aircraft are IFR qualified and current then the flight should be conducted under IFR, if practical.

h. Except for flight instruction, only a qualified CAP pilot may handle the controls below 1,000 ft AGL.

i. When taxiing within 10 feet of any obstacle, pilots shall proceed at a pace not to exceed a slow walk until clear. During taxi maintain at least 50 feet behind light single-engine aircraft, 100 feet behind light multi-engine or light jet aircraft, and 500 feet behind helicopters or heavy multi-engine or heavy jet aircraft.

j. Except for glider towing operations within 5 nautical miles of the departure airport, all flights will be planned and flown such that a minimum of one hour of fuel (at normal cruise speed) remains upon landing.

2-3. Passenger Requirements. Passengers and crew members must be current CAP members, CAP employees, AFROTC/AFJROTC cadets (AFROTC/AFJROTC flight orientation program), International Air Cadet Exchange (IACE) cadets and escorts, Emergency Services (ES) or Rescue workers engaged in a Supervised Mission (if approved by the mission approval authority), FAA designated pilot examiners during flight checks, or U.S. government employees/military conducting official duties in conjunction with CAP. Other individuals require advance approval by the CAP NOC, NHQ CAP/DO, or CAP-USAF (5 working days notice requested for approvals).

a. CAP members will wear an appropriate CAP uniform and carry proof of CAP membership. Only occupants of CAP gliders and crew members requested not to wear uniforms by the customer of a CD Mission are exempt from the CAP uniform requirement.

b. All non-CAP members other than Military/Federal employees must execute a CAPF 9, *Release*, and leave the form in a secure location on the ground known to the flight release officer (FRO) or mission IC/CMD.

c. Except for Tow Pilot training, no passengers may be carried in a CAP tow plane that is towing a glider.

d. Only pilots that are qualified as CAP Instructors, Cadet/AFROTC/AFJROTC Orientation Pilots, or SAR/DR or Transport Mission Pilots (during Supervised Missions) may carry CAP cadets as passengers or crew members. At no time may a pilot who is a CAP Cadet carry another CAP Cadet as a passenger or crew member.

e. Aircraft will not carry CAP or AFROTC/AFJROTC cadets on board during the first 10 tach hours following an engine change, major overhaul, or replacement of cylinders/magnetos.

f. CAP has two exemptions granted by the FAA for flying non-CAP passengers. An exemption to 14 CFR 61.113 allows our pilots to obtain reimbursement as a private pilot and an exemption to 14 CFR 91.501 provides a tool for CAP to comply with specific FAA requirements regarding transportation flights. The exemptions are located on the NHQ CAP/DOV website and should be consulted prior to flying non-CAP passengers to ensure any special requirements and restrictions are adhered to.

2-4. Aircraft Requirements.

a. Ultralight, aerolight, hang glider and similar aircraft, rotorcraft, lighter-than-air, experimental, primary category, and home-built aircraft are not authorized for use on any CAP flight activity.

b. Airplanes used for solo, flight training, or flight checks must have an operating two way radio and dual controls (except single seat airplanes).

c. CAP aircraft must have a current FAA airworthiness certificate. Except for ferry permits, the use of a FAA special flight permit is prohibited.

d. Each wing and region shall report all aircraft flying time totals monthly using the NHQ CAP on-line Form 18 Reporting System no later than the 20th day of the following month.

e. A standard CAP Aircraft Information File shall be maintained in all Corporate aircraft. The NHQ CAP/DOV website will be consulted for the latest requirements.

f. The use of member owned/furnished aircraft requires wing or higher commander approval for corporate missions and CAP-USAF Liaison Region or higher approval for AFAMs. A hold harmless agreement (see NHQ CAP/DOV website) must also be executed annually for each member owned/furnished aircraft and be on file with the State Director.

2-5. Flight Release. The FRO is responsible for authorizing a CAP pilot to fly as pilot-in-command in CAP aircraft. The FRO is expected to use his/her best efforts to verify appropriate information prior to giving a flight release, including reliance on information verbally provided by the CAP pilot requesting a flight release. The FRO is not a dispatcher and is not responsible for the actual conduct of the flight. They are responsible for confirming the aircraft safely arrived at its destination if an FAA flight plan is not used (see paragraph 2-5e).

a. A flight release is required for all CAP flight activities.

b. FROs are CAP senior members designated in writing as Flight Release Officers by the Executive Director, region or wing commander, or their designee. FROs must have passed the on-line CAP FRO training course and possess a sound knowledge of the CAP flight management program prior to being appointed as an FRO.

c. FROs may not release a flight on which they are PIC, crew or passenger.

d. Flights may be released on a CAPF 99, *CAP Flight Release Log*, CAPF 104, *Mission Flight Plan/Briefing Form*, or CAPF 84, *Counterdrug Mission Flight Plan/Briefing Form*, (as appropriate). For Supervised Missions the IC or CMD is also considered a FRO and may release any flight related to that mission.

e. All flights released on CAPF 99 require the date, N-number, Mission Symbol, PICs, passengers, estimated flight time and route of flight recorded prior to release. The FRO must be notified of any changes made prior to departure. If an FAA flight plan will not be used, the following additional steps are required:

(1) An estimated landing time must be recorded on CAPF 99 prior to release.

(2) The FRO is responsible for initiating missing aircraft procedures two hours after the estimated landing time if not notified the flight was safely concluded.

f. Flight activities involving multiple flights at the same location and on the same day may be released on CAPF 99 without passenger, flight time and estimated landing time information provided each participating aircraft and PIC combination is identified in advance and that someone on the ground at the activity site tracks aircraft occupants and flight times for reporting back to the FRO at day's end.

g. At the conclusion of all flights, the PIC (or IC/CMD of a Supervised Mission) is responsible for ensuring all flight hours have been recorded in the NHQ CAP WMIRS System.

h. The appropriate Mission Symbol must be used on all flight release documents, logs and entries into WMIRS or other electronic systems. Currently approved Mission Symbols are listed on the latest CAPF 99.

i. A copy of each CAPF 99 will be forwarded to the wing DO and State Director by the 5th of the following month. FROs not releasing any flights during the month will forward a negative report to the wing DO and State Director.

2-6. Re-evaluations and Special Flight Checks. Flying CAP aircraft is a privilege, not a right of membership. Commanders have the responsibility for flying safety and compliance with this regulation.

a. Wing or higher commanders may require re-evaluation of CAP pilots transferring into their respective commands. Also, members wishing to take a CAPF 5 flight evaluation in a wing other than his/her assigned wing must obtain approval from the wing standardization and evaluation (Stan/Eval) officer of the wing to which the member is assigned.

b. Commanders may require any CAP pilot under their command to complete a special flight check. The commander shall designate the CAP check pilot who will administer the flight check. Pending completion of a directed special flight check and any action by the commander as provided in paragraph 2-7 of this section, the individual pilot will be suspended as pilot in command on all flight activities except to train for re-evaluation with a CAP instructor.

2-7. Grounding and Mishaps.

a. Grounding means a member cannot act as pilot in command, crewmember, or passenger in CAP aircraft. In the case of grounding away from home base, the member may be permitted to return to home base as a passenger in a CAP aircraft.

b. Any commander in the chain of command (from squadron to National Commander) of a CAP member, or an IC/CMD during a Supervised Mission, may ground that member for cause.

c. Commanders or IC/CMDs exercising this authority shall notify the affected aircrew member in writing within 7 days of the date grounded, including the reason(s) this action was taken. The written notification must include a statement telling the aircrew member that he/she has the right to seek reconsideration of this action under the provisions of paragraph 2-7f of CAPR 60-1. A copy of this notification will be filed with the region commander and all intermediate commanders within 14 days of the grounding.

d. Any pilot operating a CAP aircraft who is involved in an aircraft mishap (as defined in CAPR 62-2) while on a CAP flight activity is automatically grounded until reinstated to flight status.

e. Once grounded, only a wing or higher commander in the individual's chain of command may reinstate a member to flight status. Commanders may set any condition for reinstatement, including completion of a new CAPF 5, *CAP Pilot Flight Evaluation*.

f. A member may submit a written appeal to his/her region commander if he/she remains grounded after 90 days. Such an appeal may only be filed one time and must be filed within one year of the initial grounding. Upon receipt of the appeal, the region commander will appoint a review board of at least three CAP check pilots to review the appeal. The review board will examine the facts of the case and make a recommendation to the region commander. The region commander will issue a final decision within 60 days of receipt of the appeal. All such decisions are final and not subject to review by filing a complaint under CAPR 123-2.

g. CAP members may be assessed some or all of the damages due to negligent operation or movement of CAP Corporate aircraft. CAPR 62-2 governs the conduct of mishap investigations. Guidance for commanders to use in assessing damages has been published separately.

2-8. Pilot Training.

a. CAP cadets and qualified SAR/DR mission pilots are authorized to use CAP airplanes for flight instruction toward any FAA certificate or rating.

b. All CAP members are authorized to use CAP gliders for flight instruction toward any FAA certificate or rating.

c. CAP senior members that are not current SAR/DR mission pilots must obtain permission to receive flight instruction in CAP airplanes toward FAA certificates or ratings as follows:

(1) Senior members who hold a Private Pilot Airplane Certificate or higher and have been an active CAP member for at least 1 year – Wing commander written permission.

(2) All other senior members – Written permission from the wing commander, region commander and the CAP Executive Director is required and may be granted provided the members lives more than two hours driving time from a commercial training facility.

d. Self conducted proficiency flight guidelines are available for use by all CAP pilots to maintain currency and improve pilot confidence. These recommended guidelines are located on the NHQ CAP/DOV website.

e. Additional mission pilot training flights are authorized under mission pilot proficiency flight profiles located on the NHQ CAP/DOV website. These training flights are Air Force assigned non-reimbursed missions authorized by the State Director, and may be flown only by pilots holding the qualifications stated in the specific profile.

CHAPTER 3 – PILOT QUALIFICATIONS AND REQUIREMENTS

3-1. CAPF 5 Check Ride. A completed CAPF 5 denotes qualification to fly a particular model of CAP aircraft. It consists of ground and flight evaluations, and is valid for 12 calendar months from the date it is completed. CAPFs 5 may contain one or more endorsements for certain types of aircraft operation (instrument, cadet o-ride, instructor, check pilot or other). All pilots except CAP Solo pilots must complete a check ride. To be complete, the following must be accomplished as part of the CAPF 5 check ride:

a. Completion of an Aircraft Questionnaire for the model aircraft flown within 60 days prior to the flight check.

b. Pass the annual CAPF 5 online written examination (power or glider as applicable) within 60 days prior to the flight check.

c. Members must be current in accordance with FAA 14 CFR 61.57(a)(1) to carry passengers in the same category and class as the CAPF 5 aircraft prior to the flight check.

d. Evidence of qualifications (membership card, medical and pilot certificates, log book, questionnaire[s], and on line written exam results) must be presented to the check pilot at the time of the CAPF 5 flight check.

e. For airplanes only, the minimums are 1 hour flight time and 3 takeoffs and landings.

3-2. CAPF 5 Administration.

a. A CAPF 5 flight check may be administered by a CAP check pilot, or it may be administered by a FAA Inspector, FAA designated check airman, FAA designated pilot examiner, or CAP-USAF flight examiner provided the individual administering the flight check completes and signs the CAPF 5 and the CAP specific items are verbally covered by a CAP Check Pilot who also signs the CAPF 5.

b. Written approval is required from a wing or higher commander for a CAP pilot to complete more than two annual CAPF 5 flight checks in a row with the same CAP check pilot.

3-3. Abbreviated CAPF 5 Check Rides. For the purpose of adding additional endorsements or aircraft models in the same category and class, an Abbreviated CAPF 5 may be taken to update those endorsements or models on the current CAPF 5. The Abbreviated CAPF 5 only requires completion of a new Aircraft Questionnaire in the model flown within 60 days prior and such maneuvers as necessary during the flight check for the new endorsement. There is no flight time or landing minimums required for these types of check rides. An Abbreviated CAPF 5 merely updates the last completed annual CAPF 5 and does not result in a new expiration date for any pilot privileges.

3-4. CAPF 5 for Multiple Aircraft Models. A CAPF 5 may also denote qualification to fly other aircraft models in the same category and class as the model used for the CAPF 5 check ride provided the following have been completed:

a. A previous CAPF 5 or Abbreviated CAPF 5 was completed for those aircraft model(s) any time in the past.

b. A new Aircraft Questionnaire for those model(s) is completed within 60 days prior to the CAPF 5.

c. To renew airplane models that are complex or high performance, the check ride model flown must be either a complex or high performance airplane.

d. To renew tailwheel airplanes, the check ride model flown must be a tailwheel airplane.

e. To renew Cessna models equipped with the G1000, the check ride model flown must be Cessna Nav III G1000 equipped.

f. All endorsements given on the CAPF 5 for aircraft operations will apply to all qualifying models.

3-5. Equivalent Make and Models. Certain models of aircraft are considered equivalent to one another. A CAPF 5 in any model grouping below counts as a CAPF 5 for all models listed in the grouping:

- C-172 (all models except 180 hp constant speed, C-R172 or C-172 Nav III G1000)
- C-182 (all models except C-R182 or C-182 Nav III G1000)
- T-41 (145hp, 180hp fixed pitch), C-172 (145,150,160 and 180 hp fixed pitch)
- T-41 (180 hp constant speed), C-172XP, C-172 (180 hp constant speed), C-175
- T-41C/D (210 hp constant speed), C-182 (all except C-182 Nav III G1000 or C-R182)
- C-150, C-152
- C-R182 counts for C-R172 (C-R172 does not court for C-R182)
- C-205, C-206, C-207, U-206
- PA28-140, PA28-160, PA28-161, PA28-180, PA28-181
- PA28R-200, PA28R-201, PA28R-180
- PA28-235, PA28-236
- PA32-300, PA32-301, PA32-260
- Kachina 2150, 2180
- Mooney M20, M21
- T-34A, T-34B
- BE33, BE35
- AA5, AA5A, AA5B
- SGS 2-33, SGS 2-22
- Schleicher K-7, K-13

3-6. Airplane Qualifications. In order to operate certain CAP Airplane models, pilots (other than CAP Solo pilots) must meet one or more of the following requirements:

a. Single Engine Airplane.

(1) High Performance Airplanes – 100 hours total time.

(2) Complex Airplanes – 100 hours total PIC time of which at least 10 hours PIC and 25 takeoffs and landings are in complex airplanes.

(3) Gippsland GA-8 – In addition to High Performance requirements:

(a) Be a qualified SAR/DR mission pilot with an instrument rating and 300 hours of PIC fixed wing aircraft time.

(b) Complete the NHQ CAP/DOV on-line course "GA8 Airvan Familiarization Course".

(c) Complete the prescribed flight training and receive a check ride recommendation from a GA-8 qualified CAP instructor.

(d) Complete the first CAPF 5 flown in a GA-8 with a CAP check pilot different from the CAP instructor recommending the check ride.

(4) Cessna Nav III G1000 Airplanes – In addition to other requirements:

(a) Complete the CAP Cessna G1000 transition syllabus for VFR operation.

(b) For instrument operating privileges in G1000, complete the CAP Cessna G1000 transition syllabus for Instrument operation. To remain current for instrument privileges in G1000 airplanes, a pilot must take an Instrument Proficiency Check using a G1000 airplane or the pilot must complete three of the approaches required for ongoing FAA Instrument currency in a G1000 airplane.

(c) For flight instructor privileges in G1000, complete the CAP Cessna G1000 transition syllabus for Flight Instructors that is given by a Cessna factory trained instructor.

(d) G1000 check pilots must be Cessna factory trained or have provided a minimum of 15 hours dual instruction in G1000 equipped airplanes.

(5) Tailwheel Airplanes – 25 hours and 50 takeoffs and landings in tailwheel airplanes.

b. Multi-Engine Airplanes – 250 hours total PIC airplane time of which at least 50 hours PIC and 50 takeoffs and landings are in multi-engine airplanes.

3-7. Classification of CAP Pilots. CAP pilots may operate a CAP aircraft according to the classification of their experience and skills as follows:

a. CAP Solo Pilot.

(1) Possess a current student pilot certificate with solo endorsements in accordance with 14 CFR Part 61 from a CAP Instructor Pilot in the make and model aircraft flown.

(2) For gliders, a minimum of 30 dual glider instruction flights prior to solo. Glider encampment/academy students are restricted from completing solo the first time they attend.

(3) For C182 airplanes, 25 (including cross wind, short, soft and simulated engine failure) dual takeoffs & landings with a CAP instructor in C182 airplane prior to solo.

(4) For G1000 equipped airplanes, complete the CAP Cessna G1000 transition syllabus for VFR operation.

b. CAP VFR Pilot. Must be qualified in accordance with FAA regulations to operate the CAP aircraft flown at the private pilot level or higher and satisfactorily complete a CAPF 5 flight check within the previous 12 calendar months.

c. CAP Instrument Pilot. Must be a qualified CAP VFR pilot that is FAA rated to fly Instruments and satisfactorily complete an Instrument endorsement on a CAPF 5 within the previous 12 calendar months. FAA Instrument currency is not required for this endorsement.

d. Cadet and AFROTC/AFJROTC Orientation Pilots.

(1) Current CAP senior member.

(2) CAP VFR Pilot at least 21 years of age (or have a valid FAA CFI certificate).

(3) For powered airplanes have 200 hours PIC time.

(4) For gliders have 100 flights as PIC or be a qualified CFIG.

(5) For AFROTC/AFJROTC Orientation Pilots have 300 hours PIC time and completed the exam for “Orientation Pilot – Powered for ROTC”.

(6) For Cadet Orientation Pilots completed the exam for “Orientation Pilot – Powered” if a power pilot and “Orientation Pilot – Glider” if a glider pilot.

(7) Satisfactorily complete a Cadet Orientation Flight endorsement on a CAPF 5 within the preceding 12 calendar months and be designated in writing as an AFROTC/AFJROTC or Cadet Orientation pilot by the Executive Director, region or wing commander, or their designee.

e. CAP Instructor Pilot.

(1) Qualified CAP VFR Pilot in the aircraft model flown if a Corporate CAP aircraft.

(2) Qualified IAW FAA regulations to operate as an Instructor in the CAP aircraft flown.

(3) Satisfactorily complete an Instructor endorsement on a CAPF 5 within the preceding 12 calendar months and designated in writing as a CAP Instructor Pilot by the wing or region commander, Executive Director, or their designee.

f. CAP Check Pilot.

(1) Qualified as a CAP Instructor Pilot in the CAP aircraft flown. The Executive Director or National Commander may waive this requirement to cover unusual circumstances.

(2) Satisfactorily complete the National Check Pilot Standardization Course prior to initial appointment and every 4 years thereafter. CAP Check Pilots only qualified in gliders may take the online CAP Glider National Check Pilot Standardization Course.

(3) Satisfactorily complete a Check Pilot endorsement on a CAPF 5 given by a CAP Check Pilot Examiner within the preceding 12 calendar months and designated in writing as a CAP Check Pilot by the wing or region commander, Executive Director, or their designee.

g. CAP Check Pilot Examiner. Qualified as a CAP Check Pilot and designated in writing as a CAP Check Pilot Examiner by the wing or region commander, Executive Director, or their designee.

h. CAP Tow Pilot.

(1) Qualified CAP VFR Pilot at least 21 years of age.

(2) Qualified in accordance with 14 CFR 61.69 to tow Gliders.

(3) Minimum 500 hours PIC time, 250 hours of which is in single engine airplanes.

(4) Satisfactorily completed the CAP/SSF online Tow Pilot Course.

(5) Designated in writing as a CAP Tow Pilot by the wing or region commander, Executive Director, or their designee.

(6) Must have completed 10 tows of gliders within the preceding 12 calendar months. For initial qualification or later re-currency, pilots may accomplish these tows in CAP aircraft under the instruction of another CAP Tow Pilot.

i. CAP SAR/DR Mission Pilot.

(1) Must meet the requirements for SAR/DR mission pilot in accordance with CAPR 60-3.

(2) Must satisfactorily complete a CAPF 91, *CAP Mission Pilot Checkout*, within the preceding 24 calendar months.

j. CAP Mission Check Pilot.

(1) Must be a qualified SAR/DR mission pilot.

(2) Have participated in 25 mission sorties as a SAR/DR mission pilot.

(3) Must satisfactorily complete a CAPF 91 mission check pilot check ride given by a CAP Mission Check Pilot Examiner within the preceding 24 calendar months IAW CAPR 60-3.

(4) Satisfactorily complete the National Check Pilot Standardization Course prior to initial appointment.

(5) Must be designated in writing as a CAP Mission Check Pilot by the wing or region commander, Executive Director, or their designee.

k. CAP Mission Check Pilot Examiner. Qualified as a CAP Mission Check Pilot and designated in writing as a CAP Mission Check Pilot Examiner by the wing or region commander, Executive Director, or their designee.

3-8. Pilot Records.

a. All pilot data must be entered into the CAP OPS Quals system by the member or authorized unit Stan/Eval and validated by the unit commander or designee. Data entered shall include all relevant FAA pilot qualifications, CAPFs 5, aircraft questionnaire(s), commander written designations, and other items needed to establish CAP aircraft operating privileges under this regulation.

b. All CAP pilots must sign a one time copy of the CAP Statement of Understanding, which will be maintained on file with the authorized unit Stan/Eval. The latest copy of this document is located on the NHQ CAP/DOV website.

3-9. Trend Analysis Reporting. This will help CAP target areas that need more emphasis during training. Each wing will report check ride statistics on a semi-annual basis. The January to June period will be reported by 31 July and the July to December period will be reported by 31 January. The report will include:

a. The number of CAPF 5 evaluations administered, the number of failures, and the areas of the CAPF 5 failed.

b. The number of CAPF 5G evaluations administered, the number of failures, and the areas of the CAPF 5G failed.

c. The number of CAPF 91 evaluations administered, the number of failures, and the areas of the CAPF 91 failed.

The report may be e-mailed to dov@capnhq.gov, faxed to 800-555-7902, or entered directly on-line.

NATIONAL HEADQUARTERS CIVIL AIR PATROL

CHANGE 1 (CORRECTED COPY)

CAP REGULATION 60-1

2 FEBRUARY 2009

Operations

CAP FLIGHT MANAGEMENT

CAP Regulation 60-1, 5 January 2009, is changed as follows:

Page-Insert Change.

Remove	**Insert**
11/12	**11/12**

Note: Shaded areas identify new or revised material.

Supersedes CAPR 60-1, Change 1, 30 January 2009. OPR: DO
Distribution: National CAP website. Approved by: CAP/CC

SPECIALTY QUALIFICATION TRAINING RECORD (SQTR)
Mission Scanner

NAME (Last, First, MI)	CAPID	DATE ISSUED

Prerequisites

Item	Date Completed
Qualified GES	
At least 18 years of age	

The above listed member has completed the required prerequisite training for the mission scanner specialty.

UNIT/WING/REGION COMMANDER OR AUTHORIZED DESIGNEE'S SIGNATURE

DATE

Familiarization and Preparatory Training

Task	Evaluator's CAPID and Date Completed
Complete Task O-2015 Demonstrate Ground Operations and Safety	
Complete Task O-2017 Demonstrate Post-Crash Actions	
Complete Task O-2019 Demonstrate Proper Number and Character Pronunciation	
Complete Task O-2020 Use Prowords and Code Words	
Complete Task O-2021 Interpret Emergency Signals and Demonstrate Air/Ground Team Coordination	
Complete Task O-2024 Demonstrate Use of Sectional Charts	
Complete Task P-2013 Discuss Mission Scanner Duties and Responsibilities	
Complete Task P-2014 Discuss CAP Liability Coverage and Mishap Reporting	
Complete Task P-2015 Enter Data into CAP Forms	
Complete Task P-2016 Identify and Discuss Major Aircraft Controls	
Complete Task P-2017 Identify and Discuss Major Aircraft Instruments	
Complete Task P-2018 Discuss Aircraft Weight and Balance	
Complete Task P-2019 Identify Items Checked During an Aircraft Pre-Flight Inspection	
Complete Task P-2020 Discuss the Dangers of Wake Turbulence	
Complete Task P-2021 Discuss how Atmospheric and Lighting Conditions Effect Scanning Effectiveness	
Complete Task P-2022 Identify Visual Clues and Wreckage Patterns	
Complete Task P-2023 Discuss how Reduced Visibility and Turbulence Effect Search Operations	
Complete Task P-2024 Discuss Strategies to Combat High Altitude Effects	
Complete Task P-2025 Discuss Common Search Terms	
Complete Task P-2026 Identify what to Look For and Record during Damage Assessment Missions	
Complete Task P-2027 Describe CAP Search Patterns	
Complete Task P-2028 Discuss Crew Resource Management	

The above listed member has completed the required familiarization and preparatory training requirements for the (insert specialty name) specialty qualification and is authorized to serve in that specialty while supervised on training or actual missions.

UNIT/WING/REGION COMMANDER OR AUTHORIZED DESIGNEE'S SIGNATURE

DATE

Advanced Training

Task	Evaluator's CAPID and Date Completed
Complete Task O-0204 Locate a point on a Map using Latitude and Longitude	
Complete Task O-0205 Locate a point on a Map using the CAP Grid System	
Complete Task O-2016 Demonstrate Safety While Taxiing	
Complete Task O-2018 Operate the Aircraft Communications Equipment	
Complete Task O-2022 Demonstrate Scanning Patterns and Locate Targets	
Complete Task O-2023 Demonstrate Techniques to Reduce Fatigue	
Complete Task O-2025 Track and Record Position on Sectionals and Maps	
Complete Task P-0101 Keep a Log	
Complete the appropriate portion of CAPT 117, *Emergency Services Continuing Education examinations*	

Exercise Participation

The above listed member satisfactorily participated as a mission scanner trainee under my direct supervision on mission number ____________________.

______________________________ ____________________
QUALIFIED SUPERVISOR'S SIGNATURE DATE

The above listed member satisfactorily participated as a mission scanner trainee under my direct supervision on mission number ____________________.

______________________________ ____________________
QUALIFIED SUPERVISOR'S SIGNATURE DATE

Unit Certification and Recommendation

The above listed member has completed the requirements for the mission scanner specialty qualification and is authorized to serve in that specialty on training or actual missions.

______________________________ ____________________
UNIT/WING/REGION COMMANDER OR AUTHORIZED DESIGNEE'S SIGNATURE DATE

Mission Scanner
Familiarization and Preparatory Training

Capt. Blake R. Kreitzer

Capt. Blake R. Kreitzer

O-2015
DEMONSTRATE GROUND OPERATIONS AND SAFETY

CONDITIONS

You are a Mission Scanner trainee and must demonstrate safety around an aircraft on the ground.

OBJECTIVES

Demonstrate ramp safety, moving and loading aircraft, entry/egress, and basic fuel management.

TRAINING AND EVALUATION

Training Outline

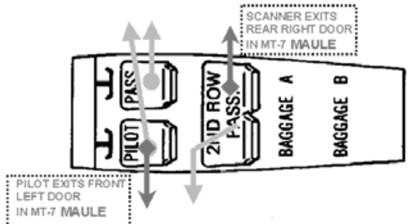
1. As a Mission Scanner trainee, knowledge of aircraft ground operations and safety is essential.

2. Ramp safety:
   a. Don't wear headgear, don't run, and always look out for moving aircraft and spinning propellers.
   b. No smoking within 50 feet of aircraft or fuel trucks/tanks.
   c. Keep clear of aircraft, especially the propeller or turbines. A propeller spins at over 2000 rpm, so you may not be able to see it. If you see an aircraft sitting on the ramp with a rotating beacon or strobe light on, the pilot may be about to start the engine. Also, the trailing edges of the wings, flaps and ailerons may be sharp and are often at head level.
   d. In case of a fire on the ground, get clear of the aircraft. Know where the nearest large fire extinguisher is. But, if fuel is spilling and it isn't necessary to help people clear of the fire, get away and call the fire department.

3. Moving aircraft. Never push or pull an aircraft without a pilot being present, and don't rotate, hold or move a propeller. Never push or stand on any part of the aircraft labeled "No Push."

4. Loading aircraft. Ensure all loose items are stowed and secured (e.g., under the cargo net). Loose objects can become projectiles during turbulence, hurting occupants or damaging equipment. Also, if you are about to load something that wasn't discussed prior to the flight (e.g., during the weight and balance calculations), tell the pilot.

5. Entry and egress:
   a. Be careful where you step. Watch for "No Step" or "No Handhold" placards.
   b. As a rule, never enter or exit an aircraft while the engine is running. If you must, always ensure the pilot knows your intentions and approach from the rear.
   c. Always wear your seatbelt and shoulder harness. Once above 1000 AGL you may remove your shoulder harness, but it's a good idea to keep it on unless performing an activity such as aerial imaging.
   d. Part of every pre-flight should include a briefing on emergency egress in order to avoid confusion. Crewmembers will remove their headsets. In most CAP aircraft, the pilot will leave his seat full forward so those in the back seat can exit out the left door. The pilot will then follow the observer out the right door.



6. Fuel management. The pilot is responsible for ensuring enough fuel is available to complete the flight safely with sufficient reserves left for diversions or emergencies. She should brief you on the fuel situation before the flight, including her assumptions on how much fuel will be needed (usually expressed in hours and minutes) and where you will refuel if necessary. Fuel status should be checked once an hour. Never feel hesitant to ask about your fuel status.

Additional Information

More detailed information on this topic is available in Chapter 2 of the MART.

Evaluation Preparation

Setup: The evaluation should be conducted with an aircraft on the ramp, with a PIC present.

Brief Student: You are a Scanner trainee asked about safety around aircraft on the ground.

Evaluation

Performance measures	Results	
1. Discuss ramp safety.	P	F
2. Demonstrate moving and loading an aircraft.	P	F
3. Demonstrate entry and emergency egress from **all** seats in the aircraft.	P	F
4. Discuss the scanner's role in basic fuel management.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

O-2017
<u>DISCUSS POST-CRASH ACTIONS</u>

CONDITIONS

You are a Mission Scanner trainee and must discuss basic post-crash actions, and discuss survival equipment and urgent care.

OBJECTIVES

Discuss basic post-crash actions, identify and discuss survival equipment and urgent care.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, knowledge of basic survival techniques and urgent care is essential.

2. In the event of an off field landing, the crew will follow aircraft emergency procedures prior to the landing.
   a. The pilot will review emergency egress procedures, the observer (right seat) will prop open the right door (headsets work nicely), and all crewmembers will tighten their seatbelts and shoulder harnesses. If the doors become jammed after the landing, kick them open or exit through the windows.
   b. Afterwards, get clear of the aircraft if there is any danger (e.g., a fire). Check everyone for injuries and, as a precaution, sip some water to prevent shock.

3. Once the immediate danger is past, turn your attention to rescue. Hopefully the pilot or observer was able to communicate your position. In any case don't become impatient and leave the site, *as your best chance of discovery is to stay near the aircraft*. If rescue isn't expected shortly turn your attention to water, shelter and food (in that order). Remember, **your will to survive is your greatest asset**.

4. Survival. Water is your most important survival resource; always carry some with you plus a means to purify water (if water is available in the terrain you're flying over). Signaling equipment is also essential. For daytime use, nothing outperforms a signal mirror; at night a beacon or strobe works best. Handheld radios and personal ELTs are also very helpful. If you have no signaling device and you need to improvise, remember the "CLASS" acronym:
   a. <u>C</u>olor: make it an unnatural or highly contrasting one (not some color seen in your terrain).
   b. <u>L</u>ocation: put it where it can be seen most easily, usually high and in open areas.
   c. <u>A</u>ngles: use angles not found in your terrain.
   d. <u>S</u>ize: make it large, at least 12 feet in height.
   e. <u>S</u>hape: make it eye-catching.

5. Survival equipment. Know what is in your aircraft's survival kit. As a minimum it should include:
   a. Water or a means of purifying water.
   b. Signal mirror and a strobe light.
   c. Space blankets for each crewmember.
   d. Rations (e.g., MREs).
   e. First aid kit and manual.
   f. Survival manual (matched to your terrain).
   g. Matches or fire starter.
   h. Compass.
   i. Knife.

6. It is also a good idea to carry a personal survival kit, particularly if you routinely fly over difficult or desolate terrain. Some items are:

   a. Multi-function tool such as a *Leatherman*.
   b. Matches or fire starter.
   c. Pocket compass.
   d. Plastic or metal container.
   e. Sewing needles and thread.
   f. Chapstick and sun block.
   g. Bar surgical soap (or soap containing *physohex*).
   h. A small shelter.
   i. Personal medicine(s).
   j. Nice to have items are:
      1) Hand held radio
      2) Portable GPS
      3) Personal ELT
      4) Plastic water bottle
      5) Aluminum foil

7. Urgent care. The only type of medical aid that should be administered is reasonable urgent care deemed necessary to safe a life or prevent human suffering. However, if you are prepared to help others you will be better prepared to care for yourself. Urgent care courses are readily available so take advantage of them. Always limit your actions to those for which you have been trained. That said, the following are four important measures to take in the event of injury:

   a. Do not move an injured person unless it is absolutely necessary to save their life (e.g., fire, smoke or noxious fumes, falling, or flooding).
   b. Ensure the victim has an open airway and give mouth-to-mouth respiration if necessary.
   c. Check for a pulse and perform CPR if necessary.
   d. Locate and control severe bleeding.

8. Once urgent care has been administered, the following can be done:

   a. Do not move an injured person unless it is absolutely necessary.
   b. Do not let the victim get up and move around.
   c. Protect the victim from unnecessary manipulation and disturbance.
   d. Avoid or overcome chilling by using blankets or cover.
   e. Determine all injuries and administer care.
   f. Plan actions according to the nature of the injuries, the needs of the situation, and the availability of human and material resources.

Additional Information

Some more information on this topic is available in Chapter 3 of the MART.

Evaluation Preparation

Setup: Provide the student access to an aircraft with survival gear.

Brief Student: You are a Scanner trainee asked about post-crash actions, basic survival and urgent care.

Evaluation

Performance measures	Results	
1. Discuss actions to take before and immediately after an off field landing.	P	F
2. Identify and discuss basic survival techniques and equipment.	P	F
3. Discuss basic urgent care, including four important measures for treating injuries.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

O-2019
USE PROPER NUMBER AND CHARACTER PRONUNCIATION

CONDITIONS

You are a Mission Scanner trainee and must demonstrate proper pronunciation of numbers and characters when talking on the radios.

OBJECTIVES

Demonstrate proper pronunciation of numbers and characters when talking on the radios.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, knowledge of proper number and character pronunciation is essential for communicating on the radios.

2. Numbers. The table shows how to pronounce numbers over the radio:

Number	Pronounced	Number	Pronounced
0	ZERO	9	NINE ER
1	WUN	10	WUN ZERO
2	TOO	11	WUN WUN
3	TREE	33	TREE TREE
4	FO WER	136	WUN TREE SIX
5	FI YIV	500	FI YIV HUN DRED
6	SIX	1478	WUN FO WER SEVEN ATE
7	SEVEN	2100	TOO WUN ZERO ZERO
8	ATE	128.1	WUN TOO EIGHT POINT ONE

3. Characters. The audio panel serves as the 'hub' of radio communications in the aircraft, and is normally set up by the pilot or observer. The scanner needs to know how to select the 'active' aircraft communications radio for transmission. The active radio is selected with the switch on the right-hand side of the panel. Select either COM 1 or COM 2 to transmit and receive on the frequency displayed in the associated radio's primary display.

Letter	Word	Pronunciation	Letter	Word	Pronunciation
A	Alpha	AL FAH	N	November	NOE VEM BER
B	Bravo	BRAH VOH	O	Oscar	OSS CAH
C	Charlie	CHAR LEE	P	Papa	PAH PAH
D	Delta	DELL TAH	Q	Quebec	KEH BEK
E	Echo	ECK OH	R	Romeo	ROW ME OH
F	Foxtrot	FOKS TROT	S	Sierra	SEE AIR AH
G	Golf	GOLF	T	Tango	TANG GO
H	Hotel	HOH TELL	U	Uniform	YOU NEE FORM
I	India	IN DEE AH	V	Victor	VIK TAH
J	Juliet	JEW LEE ETT	W	Whisky	WISS KEY
K	Kilo	KEY LO	X	X-Ray	EKS RAY
L	Lima	LEE MAH	Y	Yankee	YANG KEE
M	Mike	MIKE	Z	Zulu	ZOO LOO

Additional Information

More detailed information on this topic is available in Chapter 4 of the MART.

Evaluation Preparation

Setup: Provide the student access to a radio (may be simulated).

Brief Student: You are a Scanner trainee asked to correctly pronounce numbers and characters as you would when using a radio.

Evaluation

Performance measures	Results	
1. Demonstrate how to pronounce numbers while talking on a radio.	P	F
2. Demonstrate how to pronounce characters while talking on a radio.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

O-2020
USE PROWORDS

CONDITIONS

You are a Mission Scanner trainee and must demonstrate proper use of prowords when talking on the radios.

OBJECTIVES

Properly use prowords when talking on the radios.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, knowledge of proper use of prowords and code words is essential for communicating on the radios.

2. Prowords. Prowords are pronounceable words and phrases that have been assigned a meaning for the purpose of expediting communications on radiotelephone circuits. The table shows samples of the most common prowords.

TERM	DEFINITION or MEANING
AFFIRMATIVE	Yes.
ALL AFTER	The portion of the message that follows (word).
ALL BEFORE	The portion of the message that precedes (word).
BREAK	I hereby indicate the separation of the text from other portions of the message.
COPY	I understand.
CORRECT	You are correct, or what you have transmitted is correct
CORRECTION	An error has been made in this transmission. Transmission will continue with the last word correctly transmitted.
DISREGARD	The last transmission was in error. Disregard it.
DISREGARD THIS TRANSMISSION	This transmission is in error. Disregard it. This proword should not be used to cancel any message that has been completely transmitted and for which receipt or acknowledgment has been received.
EXEMPT	The addresses immediately following are exempted from the collective call.
FIGURE(s)	Numerals or numbers follow.
FROM	The originator of this message is the address designator that follows.
I READ BACK	The following is my response to your instructions to read back.
I SAY AGAIN	I am repeating transmission or portion indicated.
I SPELL	I shall spell the next word phonetically.
I VERIFY	That which follows has been verified at your request and is repeated. To be used only as a reply to VERIFY.
INFO	The addressees immediately following are addresses for information.
INITIALS	Personal initials shall be spoken phonetically prefixed by the word “INITIALS.”
MESSAGE FOLLOWS	A message that requires recording is about to follow. Transmitted immediately after the call. (This proword is not used on nets primarily employed for conveying messages. It is intended for use when messages are passed on tactical or reporting nets.)
MORE TO FOLLOW	Transmitting station has additional traffic for the receiving station.
NEGATIVE	No or “permission not granted” or “that is not correct.”
OUT	This is the end of my transmission to you and no answer is required or expected.
OVER	This is the end of my transmission to you and a response is necessary. Go ahead; transmit.
PRIORITY	Precedence PRIORITY.
READ BACK	Repeat my message back to me. A request to repeat instructions back to the sender, for the purpose of confirmation. Also, the receiver's reply, repeating the instructions, as in: "Read back is as follows..."
RED CAP	Precedence RED CAP.
RELAY (TO)	Re-transmit this message to...

TERM	DEFINITION or MEANING
ROGER	I have received and understand all of your last transmission. This should not be used to answer a question requiring a yes or no answer.
ROUTINE	Precedence ROUTINE.
SAY AGAIN	Repeat all of your last transmission. Followed by identification data means "Repeat __________ (portion indicated)."
SPEAK SLOWER	Your transmission is at too fast a speed. Reduce speed of transmission.
SPELL, or I SPELL	Please spell, or "I shall spell the next word phonetically."
STANDBY	I must pause for a few seconds.
THIS IS	This transmission is from the station whose designator immediately follows.
TIME	That which immediately follows is the time or date-time group of the message.
TO	The addressees immediately following are addressed for action.
VERIFY	Verify entire message (or portion indicated) with the originator and send correct version. To be used only at the discretion of or by the addressee to which the questioned message was directed.
WAIT	I must pause for a few seconds.
WAIT OUT	I must pause longer than a few seconds.
WILCO	I have received your signal, understand it, and will comply. To be used only by the addressee. *Since the meaning of ROGER is included in that of WILCO, these two prowords are* never *used together*.
WORD AFTER	The word of the message to which I have reference is that which follows _______.
WORD BEFORE	The word of the message to which I have reference is that which precedes ______.
WORDS TWICE	Communication is difficult. Transmit each phrase or each code group twice. This proword may be used as an order, request, or as information.

Additional Information

More detailed information on this topic is available in Chapter 4 of the MART.

Evaluation Preparation

Setup: Provide the student access to a radio (may be simulated).

Brief Student: You are a Scanner trainee asked to correctly use prowords, and discuss why code words may be used.

Evaluation

Performance measures	Results	
1. Demonstrate understanding and use of prowords while talking on a radio.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

O-2021

INTREPRET EMERGENCY SIGNALS AND DEMONSTRATE AIR/GROUND TEAM COORDINATION

CONDITIONS

You are a Mission Scanner trainee and must interpret emergency signals and demonstrate how to coordinate with ground teams.

OBJECTIVES

Interpret emergency signals and demonstrate and discuss air and ground team coordination plans and techniques.

TRAINING AND EVALUATION

Training Outline

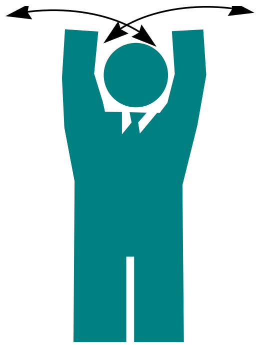
1. As a Mission Scanner trainee, the ability to interpret emergency signals plus the ability to coordinate with ground teams is essential.

2. While you are on a mission, nonverbal signals may be the only available method of communication (e.g., with a crash survivor or with ground units). Scanners have to interpret these nonverbal messages and must be able to do so accurately regardless of the method used. [Note: You are not required to have these signals memorized, but should be familiar with their use. These tables and figures should be carried in each CAP aircraft; see Attachment 2 of the *Mission Aircrew Reference Text* for examples.]

Light gun signals. If the radio in your aircraft fails, it is still very important for you to follow instructions from the tower at a controlled airport. In this case, you may have to rely on light gun signals from the control tower in order to receive the necessary landing and taxi clearances previously described. These clearance requirements still apply despite an inoperative radio. The table shows each light gun signal, followed by its meaning.

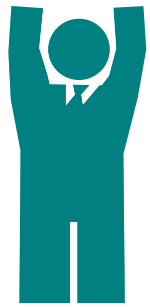
Color and Type of Signal	**On the Ground**	**In Flight**
Steady Green	Cleared for takeoff	Cleared to land
Flashing Green	Cleared to taxi	Return for landing
Steady Red	Stop	Give way to other aircraft and continue circling
Flashing Red	Taxi clear of runway area	Airport unsafe—Do not land
Flashing White	Return to starting place on airport	Not applicable
Alternating Red and Green	General warning — exercise extreme caution	

Body signals. The use of the body is one of the most common means of sending messages. These signals are called "body signals" since they involve the whole body, not just arm movements. They are easy to use because no special materials are needed.



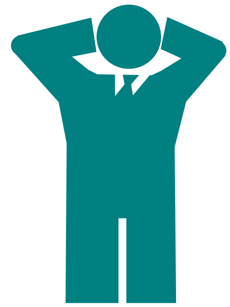
Wave Both arms across face

DO NOT ATTEMPT TO LAND



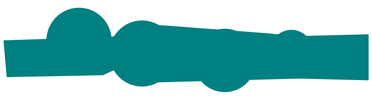
Both arms held over head

PICK UP - PLANE IS ABANDONED



Cup hands over ears

OUR RECEIVER IS WORKING



Lie flat on back with hands above head

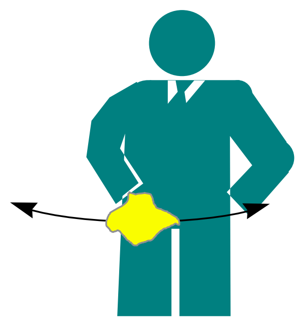
NEED MEDICAL ASSISTANCE

Both arms horizontal

NEED MECHANIC HELP or PARTS

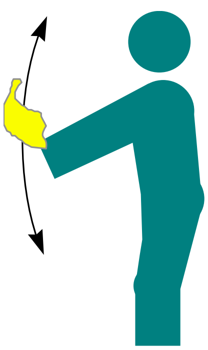
Wave one arm over head

ALL OK - DO NOT WAIT



Wave cloth horizontally

NEGATIVE – NO

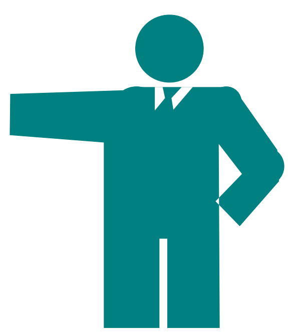


Wave cloth vertically

AFFIRMATIVE – YES

Both arms pointing in the direction of landing while squatting

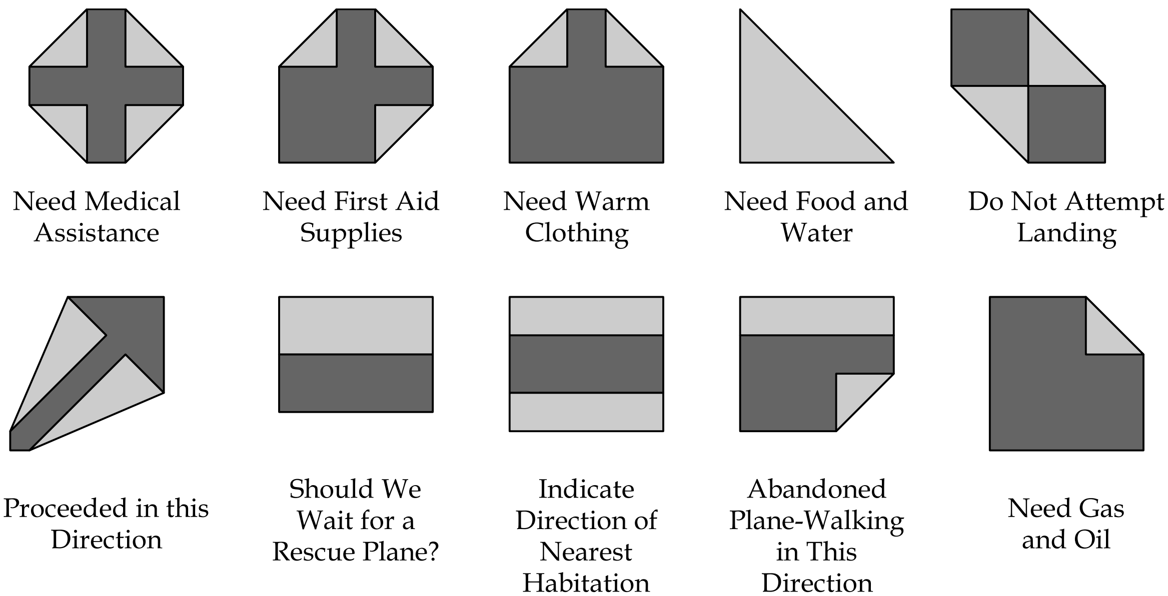
LAND IN THIS DIRECTION



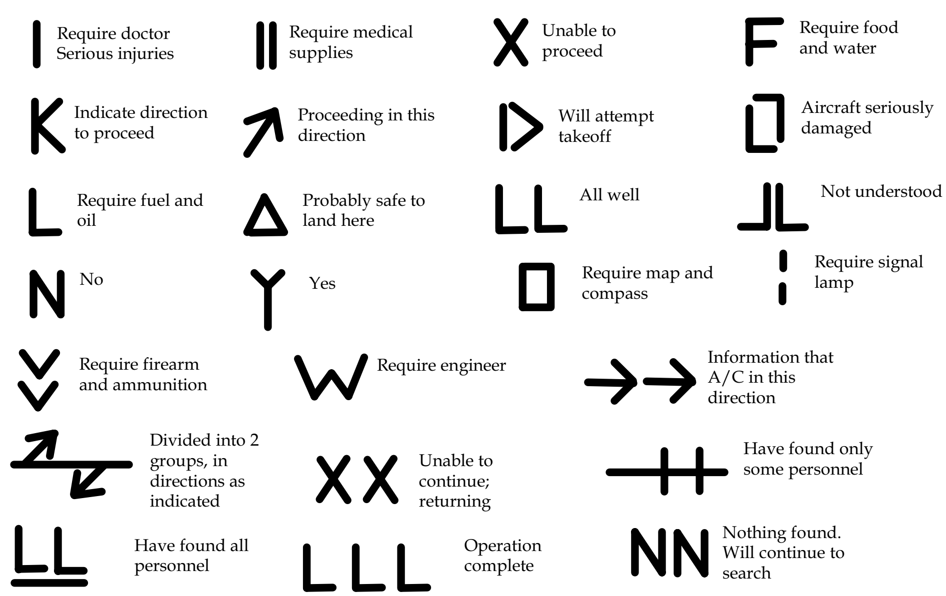
One arm horizontal

WAIT IF PRACTICAL

A “Paulin” is a short form of tarpaulin, which means waterproof canvas. If the victims of an accident are fortunate enough to have some paulin material, they may be able to aid the rescuers greatly by sending signals with it. If the paulins are laid in clear areas wherein their colors cause high contrasts, they can be seen from substantial distances.



The standard emergency distress signals shown below may be constructed using strips of fabric, pieces of wood, stones, wreckage parts, or any other available material. Each letter should be two to three feet wide and six to twelve feet long, with colors that contrast with the background, if possible.



3. Coordinating with ground teams. Naturally, the best means of working with a ground team is to use the radio. As a scanner you should continuously have your eyes on the ground team; this frees the pilot to fly the aircraft and allows the observer to work the radio to execute the coordination. The observer will likely also have to be the one who keeps track of where you “left” your target. Sometimes you may be the one using the radio.

a. It is important to understand that you have the advantage of perspective; the long-range visibility that is inherent to flying is absent from the ground. You can see over the hills, trees, and other obstacles that are blocking the ground team member's sight, so you may have to explain the situation to the ground pounder in painstaking detail.
b. Another perspective problem is time: time seems to pass very slowly while waiting for a ground team, and it is easy to get impatient and leave station prematurely.
c. Sometimes the ground team member (non-CAP, of course) may not understand radio jargon, so use plain English. For example, if you wanted a ground team to take a left at the next intersection, what would you say? How about "Ground Team 1, CAP Flight 4239, turn left at the next intersection, over." Most often the plain English answer is the correct way to say it in radioese, anyway.

4. It is important to brief the mission with the ground team, if possible, and at least agree on communications frequencies and lost-comm procedures, maps/charts to be used by *both* teams, determine what vehicle the ground team is driving (e.g., type, color, and any markings), determine what the ground team members are wearing (highly visible vests are preferred), and a rendezvous point and time window for rendezvous (+/- 15 minutes). One tried-and-true method is to rendezvous at a landmark that both the aircrew and the ground team can *easily* identify. A common rendezvous point is an intersection of prominent roads; these are easily identifiable by both the aircrew and ground team. The rendezvous location should be set up before you leave.

5. Also, ground teams that have a hand-held GPS can radio their latitude and longitude coordinates to you and say, "Come and get me!" If you are unable to loiter over the target and bring the ground team to it, you can simply radio the coordinates to the ground team and let them navigate to it on their own. This is not nearly as efficient, however, as when you lead them to it. Note that two pieces of technology have to be working properly to make this work: 1) both air and ground operators need to be proficient with their GPS units and 2) two-way radio communication must be established and maintained.

6. It is important to plan for a loss of communications during the briefing. The teams should agree on pre-arranged signals such as: stopping the vehicle means lost comm; blinking headlights indicate the message has been received; and operating the flashers means the message hasn't been received. The pilot has some techniques that can be used to guide a ground team during lost communications.

Additional Information

More detailed information on this topic is available in Chapter 4 of the MART.

Evaluation Preparation

Setup: Provide the trainee with an aircrew and ground team.

Brief Student: You are a Scanner trainee asked to interpret emergency signals and coordinate with ground units.

Evaluation

Performance measures	Results	
1. Interpret the following emergency signals (may be performed on the ground):		
a. Light gun signals	P	F
b. Body signals	P	F
c. Paulin signals	P	F
d. Distress signals	P	F
1. Discuss scanner responsibilities during a combined air/ground team mission.	P	F
2. Discuss factors to consider before you or the ground team leaves mission base.	P	F
3. Demonstrate basic ground team coordination.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

O-2024
USE SECTIONAL CHARTS

CONDITIONS

You are a Mission Scanner trainee and must discuss the information displayed on a sectional chart and determine heading and distance

OBJECTIVES

Discuss the information displayed on a sectional chart and to determine heading and distance.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, basic knowledge the information contained on a sectional chart and its use is essential. The most important tool you will use in both mission flight planning and execution is the chart. Highway road maps are usually not acceptable for air navigation, since most don't have detailed terrain depiction and also lack the superimposed reference system. Many aeronautical charts have such small scales that the makers are unable to show required levels of detail when trying to put a large area into a small chart space. The most useful chart that has been widely accepted for visual, low-altitude navigation is the *sectional aeronautical chart,* sometimes simply referred to as the *"sectional".*

2. Sectional chart. Sectionals use a scale of one to five hundred thousand, or 1:500,000, where all features are shown 1/500,000 of their actual size (1 inch = 6.86 nm). This allows accurate depiction of both natural and cultural features without significant clutter. Sectionals portray the following:
   a. Physical, natural features of the land, including terrain contours or lines of equal elevation.
   b. Man-made or cultural development, like cities, towns, towers, and racetracks.
   c. Visual and radio aids to navigation, airways, and special-use airspace.
   d. Airports and airport data, lines of magnetic variation, controlled airspace, obstructions and other important information.
   e. VFR waypoints.
   f. Obstructions to flight.

3. Legend. An often overlooked but vital part of the sectional is the 'Legend.' This is a written explanation of symbols, projections, and other features used on the chart. Other important areas of the chart are its title page or "panel", and the margins around the chart edges. The margins contain supplemental radio frequency information, details about military or *special use airspace,* and other applicable regulations. The title panel identifies the region of the country shown by the chart, indicates the scale used in drawing the chart, explains elevations and contour shading, and shows the expiration date of the chart and effective date of the next issue of that chart. *It is vitally important that you keep current charts in the aircraft at all times*.

4. Interpretation. A significant part of air navigation involves interpreting what one sees on the chart, then making comparisons outside the aircraft. Basic chart symbols can be grouped into cultural features, drainage features, and relief features.

Understanding *cultural features* is straightforward, and they usually require little explanation. Villages, towns, cities, railroads, highways, airports or landing strips, power transmission lines, towers, mines, and wells are all examples of cultural features. The chart legend explains the symbols used for most cultural features, but if no standard symbol exists for a feature of navigational significance, the cartographer frequently resorts to printing the name of the feature itself, such as *factory* or *prison,* on the chart.

Drainage features on charts include lakes, streams, canals, swamps, and other bodies of water. On sectional charts these features are represented by lightweight solid blue lines for rivers and streams; large areas of water, such as lakes and reservoirs, are shaded light blue with the edges defined by lightweight solid blue lines. Under most conditions, the drainage features on a map closely resemble the actual bodies of water. However, certain bodies of water may change shape with the season, or after heavy rains or drought. Where this shape change occurs with predictability, cartographers frequently illustrate the maximum size expected for a body of water with light-weight, blue, dashed lines. If you intend to use drainage features for navigation, you should consider recent rains or dry spells while planning and remember the body of water may not appear exactly as depicted on the chart.

Relief features indicate vertical topography of the land including mountains, valleys, hills, plains, and plateaus. Common methods of depicting relief features are contour lines, shading, color gradient tints, and spot elevations. Contour lines are the most common method of depicting vertical relief on charts. The lines do not represent topographical features themselves, but through careful study and interpretation, you can predict a feature's physical appearance without actually seeing it. Each contour line represents a continuous imaginary line on the ground on which all points have the same elevation above or below sea level, or the zero contours. Actual elevations above sea level of many contour lines are designated by a small break in the line, while others are not labeled. Contour interval, or vertical height between each line, is indicated on the title panel of sectionals. Contour lines are most useful in helping us to visualize vertical development of land features. Contour lines that are grouped very closely together indicate rapidly changing terrain, such as a cliff or mountain. More widely spaced lines indicate more gentle slopes. Absence of lines indicates flat terrain. Contour lines can also show changes in the slope of terrain.

Shading is added to sectional charts to help highlight and give contrast to the contour lines. These tiny gray dots are applied adjacent to selected contour lines and give the contours a three-dimensional appearance. This makes it easier to imagine the physical appearance of the shaded topographical feature. Gradient tints, the "background" colors on charts, indicate general areas of elevation. The height range assigned to each gradient color is indicated on the title panel of each sectional chart. Areas that are near sea level are pale green, while *high terrain is color-coded a deep red/brown*. Intermediate elevations are indicated by brighter shades of green, tan, or lighter shades of red/brown.

5. Aeronautical data. The aeronautical information on the sectional charts is for the most part self-explanatory. An explanation for most symbols used on aeronautical charts appears in the margin of the chart. Additional information appears at the bottom of the chart.

Information concerning very high frequency (VHF) radio facilities such as tower frequencies, omnidirectional radio ranges (VOR), and other VHF communications frequencies is shown in blue. A narrow band of blue tint is also used to indicate the centerlines of Victor Airways (VOR civil airways between omnirange stations). Low frequency-medium frequency (LF/MF) radio facilities are shown in magenta (purplish shade of red).

Runway patterns are shown for all airports having permanent hard surfaced runways. These patterns provide for positive identification as landmarks. All recognizable runways, including those that may be closed, are shown to aid in visual identification. Airports and information pertaining to airports having an airport traffic area (operating control tower) are shown in blue. All other airports and information pertaining to these airports are shown in magenta adjacent to the airport symbol that is also in magenta.

The symbol for obstructions is another important feature. The elevation of the top of obstructions above sea level is given in blue figures (without parentheses) adjacent to the obstruction symbol. Immediately below this set of figures is another set of lighter blue figures (enclosed in parentheses) that represent the height of the top of the obstruction above ground-level. Obstructions which extend less than 1,000 feet above the terrain are shown by one type of symbol and those obstructions that extend 1,000 feet or higher above ground level are indicated by a different symbol (see sectional chart). Specific elevations of certain high points in terrain are shown on charts by dots accompanied by small black figures indicating the number of feet above sea level. The chart also contains larger bold face blue numbers that denote Maximum Elevation Figures (MEF). These figures are shown in quadrangles bounded by ticked lines of latitude and longitude, and are represented in thousands and hundreds of feet above mean sea level. The MEF is based on information available concerning the highest known feature in each quadrangle, including terrain and obstructions (e.g., trees, towers, and antennas). Since CAP aircraft regularly fly at or below 1000' AGL, aircrews should exercise extreme caution because of the numerous structures extending up as high as 1000' – 2000' AGL. Additionally, guy wires that are difficult to see even in clear weather support most truss-type structures; these wires can extend approximately 1500 feet horizontally from a structure. Therefore, all truss-type structures should be avoided by at least 2000 feet (horizontally and vertically).

6. Determining heading and distance. To determine a heading, locate the departure and destination points on the chart and lay the edge of a special protractor, or *plotter*, along a line connecting the two points. Read the true course for this leg by sliding the plotter left or right until the center point, or grommet, sits on top of a line of longitude. When the course is more to the north or south, you can measure it by centering the grommet on a parallel of latitude, then reading the course from the inner scale that's closer to the grommet. To determine distance, use the scale that's printed on the plotter's straight edge: one edge measures nautical miles and the other statute miles.

7. Grids. CAP has adopted a standard grid system built upon the matrix of parallels of latitude and meridians of longitude and the sectional aeronautical chart. Sectional charts cover a land area approximately seven degrees of longitude in width and four degrees of latitude in height. Information pertaining to gridding can be found in Attachment E of the *U.S. National SAR Supplement to the International Aeronautical and Maritime SAR Manual* (or Attachment 1 of the MART).

The sectional grid system used by Civil Air Patrol divides each sectional's area into 448 smaller squares. This process begins by dividing the whole area into 28 *1-degree* grids, using whole degrees of latitude and longitude. Then each 1-degree grid is divided into four *30-minute* grids, using the 30-minute latitude and longitude lines. Finally, each of the 30-minute grids is divided into four *15-minute* grids, using the 15- and 45-minute latitude and longitude lines.

When circumstances require, a 15-minute grid can be divided into four more quadrants using 7 1/2 degree increments of latitude and longitude, creating four equal size grids that are approximately 7 1/2 miles square. The quadrants are then identified alphabetically - A through D - starting with the northwest quadrant as A, northeast as B, southwest as C and southeast as D. [If needed, a 7 1/2 degree grid can be further subdivided into four quadrants using the same methodology: using the 7 1/2 degree grid 'A', the quadrants would be labeled AA, AB, AC and AD.]

Another means of designating a grid system is the *Standardized Latitude and Longitude Grid System*. It has an advantage over the sectional standardized grid in that it can be used on any kind of chart that has lines of latitude and longitude already marked. In this system, 1-degree blocks are identified by the intersection of whole numbers of latitude and longitude, such as 36-00N and 102-00W: these points are always designated with the latitude first, such as 36/102, and they identify the area north and west of the intersection of these two lines. Next, the 1-degree grid is divided into four quadrants using the 30-minute lines of latitude and longitude. Label each quadrant A through D; the northwest quadrant being 36/102A, the northeast 36/102B, the southwest 36/102C, and the southeast 36/102D. Each quadrant can also be divided into four sub-quadrants, labeled AA, AB, AC, and AD, again starting with the most northwest and proceeding clockwise.

Additional Information

More detailed information and pictures on this topic are available in Chapter 8 of the MART.

Evaluation Preparation

Setup: Provide the student with a sectional chart and a plotter.

Brief Student: You are a Scanner trainee asked to discuss the information displayed on a sectional chart, and to determine heading and distance.

Evaluation

Performance measures	Results
1. Identify and discuss the following on an aeronautical sectional chart:	P F
a. Physical features such as topographical details.	P F
b. Towns, cities, highways, roads, and towers (MSL and AGL).	P F
c. Airways, radio aids, airports and airport data.	P F
d. Maximum Elevation Figures.	P F
e. Legend and margin information.	P F
2. Given a sectional and plotter, determine a heading and measure distances.	P F
3. State the size of a full and one-quarter CAP and Standardized grids.	P F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

P-2013

DISCUSS MISSION SCANNER DUTIES AND RESPONSIBILITIES

CONDITIONS

You are a Mission Scanner trainee and must discuss scanner duties and responsibilities.

OBJECTIVES

Discuss scanner duties and responsibilities.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, understanding your duties and responsibilities is essential. Additionally, a basic knowledge of the Mission Observer's duties and responsibilities is helpful.

2. The scanner's primary role is performing an effective visual search, maintaining constant eye contact with the ground while flying over the search area.

3. A scanner must report to duty in accordance with the "IM SAFE" criteria of CAPR 60-1. This covers illness, medication, stress, alcohol, fatigue, and emotion.

4. Other duties and responsibilities include:

   a. Wear appropriate clothes for a mission.
   b. Carry and properly use equipment. Return borrowed or assigned equipment.
   c. Carry current credentials.
   d. Assist in avoiding obstacles during taxiing.
   e. Obey sterile cockpit rules.
   f. Report observations accurately and honestly, and report all sightings.
   g. Keep accurate sketches and notes.
   h. Properly complete all pertinent paperwork.
   i. Report availability for additional assignments.

5. Review and discuss observer duties and responsibilities:

   a. Report with the mission pilot for briefings.
   b. Assist in planning the mission.
   c. Assist in avoiding collisions and obstacles during taxiing.
   d. Assist in setting up and operating aircraft and CAP radios.
   e. Assist in setting up and operating aircraft navigational equipment.
   f. Assist enforcing sterile cockpit rules.
   g. Maintain situational awareness at all times.
   h. Assist in monitoring fuel status.
   i. Monitor the electronic search devices aboard the aircraft and advise the pilot when making course corrections in response to ELT signals.
   j. Keep mission base and/or high bird appraised of status.
   k. Coordinate scanner assignments and ensure proper breaks for the scanners; monitor the crew for fatigue and dehydration.

l. Maintain a chronological flight log of all observations of note, including precise locations, sketches and any other noteworthy information.
m. Report with the mission pilot for debriefing; assist in completing the reverse of CAPF 104.
n. Keep track of assigned supplies and equipment.

Additional Information

More detailed information on this topic is available in CAPR 60-1 and in Chapter 1 of the Mission Aircrew Reference Text (MART).

Evaluation Preparation

Setup: Provide the student with a current copy of CAPR 60-1 and the MART.

Brief Student: You are a Scanner trainee asked about your duties and responsibilities, and to discuss the Scanner's job.

Evaluation

Performance measures	Results	
1. State the primary role of the scanner.	P	F
2. Discuss the "IM SAFE" criteria.	P	F
3. Discuss other scanner duties and responsibilities.	P	F
4. Review the observer duties and responsibilities.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

P-2014

DISCUSS CAP LIABILITY COVERAGE AND MISHAP REPORTING

CONDITIONS

You are a Mission Scanner trainee and must discuss CAP liability coverage and mishap reporting.

OBJECTIVES

Discuss liability coverage provided to CAP personnel and mishap reporting.

TRAINING AND EVALUATION

Training Outline

1. As a mission aircrew member there is a small chance that you may be involved in an accident during a mission. A basic knowledge of liability coverage provided to you, and its applicability and limitations, is essential.

2. Using the current CAPR 900-5 discuss the following, including when the coverage applies and what is covered:

   a. Federal Employee Compensation Act (FECA).
   b. Federal Tort Claims Act (FTCA).
   c. CAP corporate insurance.

3. Using the current CAPR 62-2 and CAPF 78 (Mishap Report Form), discuss what constitutes an accident, when it must be reported, what information is needed, and who it is given to.

4. Using the current CAPR 60-1, discuss assessments that can be made for damage to CAP aircraft.

Additional Information

More detailed information on this topic is available in Chapter 1 of the Mission Aircrew Reference Text (MART).

Evaluation Preparation

Setup: Provide the student with current copies of CAPR 900-5, 62-2 (with a copy of CAPF 78), and 60-1.

Brief Student: You are an aircrew member asked to discuss FECA, FTCA and CAP corporate coverage, reporting requirements in case of an accident, and assessments that may be made for aircraft damage.

Evaluation

Performance measures	Results	
1. Discuss FECA, including what types of missions afford this coverage and what is covered.	P	F
2. Discuss FTCA, including what types of missions afford this coverage and what is covered.	P	F
3. Discuss the various assessments that can be made for damage to CAP aircraft.	P	F

3. Discuss CAP corporate insurance, including what types of missions afford this coverage and what is covered. P F

4. Discuss CAP mishap reporting, including what must be reported, how, and to whom. P F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

P-2015
ENTER DATA INTO CAP FORMS

CONDITIONS

You are a Mission Scanner trainee and must enter data into a form.

OBJECTIVES

Accurately and legibly enter data into forms and show how to correct mistakes.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee you must know how to enter data into forms and how to correct mistakes.

2. CAP and our partner agencies rely on accurate and complete paperwork. CAP strives to maintain a professional image, and providing data that is legible is essential to this image.

3. Filling out forms and other paperwork is an essential part of any mission. Time and effort must be given to this part of the mission.

4. Some general rules to follow:

   a. It is important not to obliterate a mistake (i.e., a person should still be able to read the mistaken entry). To correct mistakes, draw a single line through the error, enter the correct data, and initial.
   b. Do not use of "liquid paper" when making corrections.
   c. Do not use signature labels or stamped signatures.
   d. Attachments (e.g., maps or sketches) should have your name, the date, aircraft 'N' number, mission and sortie numbers, and Hobbs time on them so they can be tied to the CAP form if they become separated.
   e. Do not leave blanks; enter N/A in the blank.
   f. Always have another crewmember review the form before submittal.

Additional Information

More detailed information on this topic is available in Chapter 1 of the MART.

Evaluation Preparation

Setup: Provide the student with a current copy of CAPF 104.

Brief Student: You are a Scanner trainee asked general rules for entering data into forms, marking attachments to forms, and correcting mistakes.

Evaluation

Performance measures	Results	
1. Show how to correct a mistake.	P	F
2. Show how to mark a map that you will attach to a form.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

P-2016
IDENTIFY AND DISCUSS MAJOR AIRCRAFT CONTROLS

CONDITIONS

You are a Mission Scanner trainee and must identify and describe the major aircraft control features.

OBJECTIVES

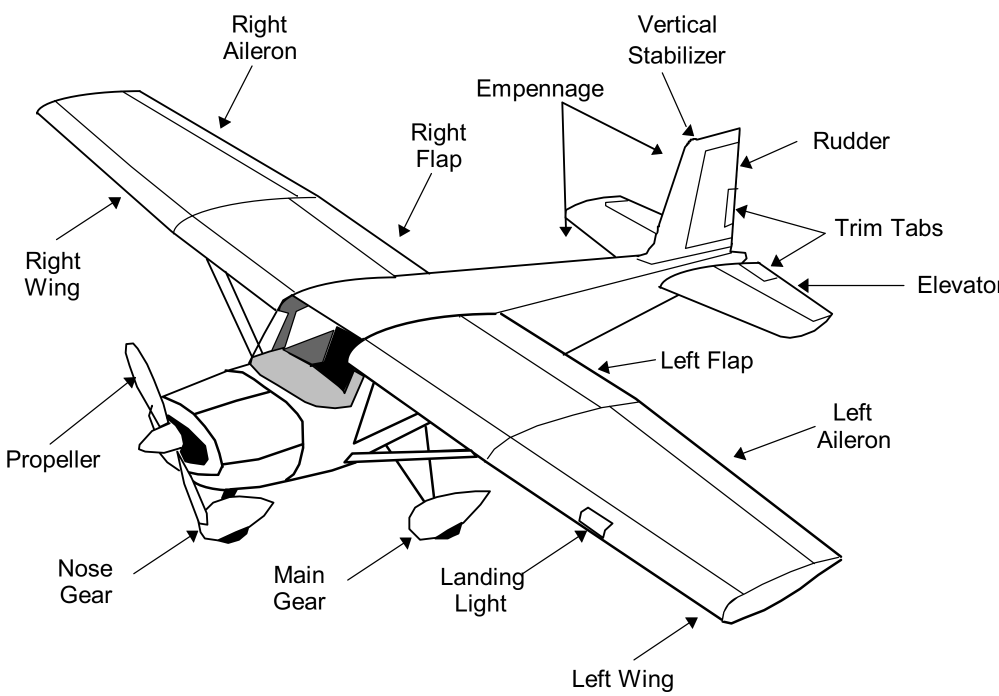
Identify and discuss major aircraft controls.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, basic knowledge of how a typical CAP aircraft is controlled is helpful, particularly during emergencies.

2. The basic structure is the fuselage, and all other parts are attached to it. The primary source of lift is the wing, while other parts provide stability and control. The tail (empennage) consists of the horizontal stabilizer with its attached elevators and the vertical stabilizer with its attached rudder.



3. Aileron, elevator, flap and rudder movements control the aircraft in flight:

   a. Ailerons are movable surfaces attached to the trailing edge of the wing, toward the wing tip from the flaps, that control roll (movement around the longitudinal axis). For example, if a pilot wants to turn to the right he turns the yoke to the right. This causes the right aileron to move up (creating a loss of lift on the right wing) and the left aileron to move down (creating lift on the left wing). The combined effects cause the aircraft to "roll" to the right.
   b. The elevator is a movable surface attached to the trailing edge of the tail's horizontal stabilizer that controls pitch (movement of the nose up or down). For example, if a pilot wants to climb she pulls the yoke toward her. This causes the elevator to move up, creating a downward force on the tail and thus raising the nose.

c. The flaps are electrically driven movable surfaces attached to the trailing edge of the wing, inboard of the ailerons. Deflection of the flaps (to a certain point) significantly increases lift. The pilot uses them during takeoff and landing.
d. Rudders are movable surfaces attached to the trailing edge of the tail's vertical stabilizer that control yaw (side-to-side movement around the vertical axis). For example, if a pilot pushes the left rudder pedal the rudder swings to the left, creating a force that pushes the tail in the opposite direction (i.e., to the right). The nose of the aircraft then moves (yaws) to the left. [Note: the rudder pedals also move the aircraft nose wheel. When taxiing, to steer to the left the pilot would depress the left rudder pedal.]
e. Although not a control surface, the throttle is a push rod with a black knob, located on the panel, that controls aircraft engine power. Pushing the knob in (towards the panel) increases power and pulling it out (towards you) decreases power.

Additional Information

More detailed information on this topic is available in Chapter 2 of the MART.

Evaluation Preparation

Setup: Provide the student access to an aircraft (or picture or model that shows aircraft control surfaces).

Brief Student: You are a Scanner trainee asked to identify and discuss the major aircraft control surfaces.

Evaluation

Performance measures	Results	
1. Demonstrate and discuss how the pilot turns (rolls) the aircraft left or right.	P	F
2. Demonstrate and discuss how the pilot makes the aircraft climb or dive.	P	F
3. Demonstrate and discuss how the pilot moves the aircraft's nose to the left or right.	P	F
4. Demonstrate and discuss how the pilot steers the aircraft to the left or right while taxiing.	P	F
5. Demonstrate and discuss how the pilot increases or decreases engine power.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

P-2017
IDENTIFY AND DISCUSS MAJOR AIRCRAFT INSTRUMENTS

CONDITIONS

You are a Mission Scanner trainee and must identify and discuss major aircraft instruments.

OBJECTIVES

Identify and discuss major aircraft instruments.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, basic knowledge of typical CAP aircraft instruments is helpful, particularly during an emergency.

2. Refer to MART Chapter 2 for pictures of the following instruments. The basic instruments are:

   a. The *magnetic compass* shows the aircraft's heading in relationship to earth's magnetic North Pole.
   b. The *heading indicator* is set to the magnetic compass. A gyroscope, it provides a steady reading that is easier for the pilot to read than the magnetic compass.
   c. The *altimeter* shows altitude above mean sea level.
   d. The *airspeed indicator* shows the speed at which the aircraft is moving through the air.
   e. The *attitude indicator* (artificial horizon) is highly reliable and provides a very realistic picture of the attitude of the aircraft (turning, climbing or diving).
   f. Other engine instruments provide fuel level and engine performance.
   g. The global positioning system (*GPS*) is a satellite-based system that provides highly accurate position and velocity information (altitude, heading and speed).
   i. The nav/comm (navigation/communications) *radios* allow the pilot or observer to communicate with air traffic control and other agencies.
   j. The *audio panel* acts as the communications 'hub' of the aircraft. It allows the pilot or observer to select which radio is active, and directs other communication and navigation instruments to the crew headsets or the overhead speaker.
   k. The *transponder* provides a signal to air traffic control that lets them know the aircraft's identification, position and altitude.

3. **Do not reposition any aircraft instrument's settings or controls without first asking the pilot**.

Additional Information

More detailed information on this topic is available in Chapter 2 of the MART.

Evaluation Preparation

Setup: Provide the student access to an aircraft (or a picture or model that shows aircraft instruments).

Brief Student: You are a Scanner trainee asked the basics about aircraft instruments.

Evaluation

Performance measures	Results	
1. Identify and describe the basic function of the following aircraft instruments:		
a. Magnetic compass	P	F
b. Heading indicator	P	F
c. Altimeter	P	F
d. Airspeed indicator	P	F
e. Attitude indicator	P	F
f. GPS	P	F
g. Radios	P	F
h. Audio panel	P	F
i. Transponder	P	F
2. State the rule on repositioning any aircraft instrument's settings or controls.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

P-2018
DISCUSS AIRCRAFT WEIGHT AND BALANCE

CONDITIONS

You are a Mission Scanner trainee and must discuss aircraft weight and balance.

OBJECTIVES

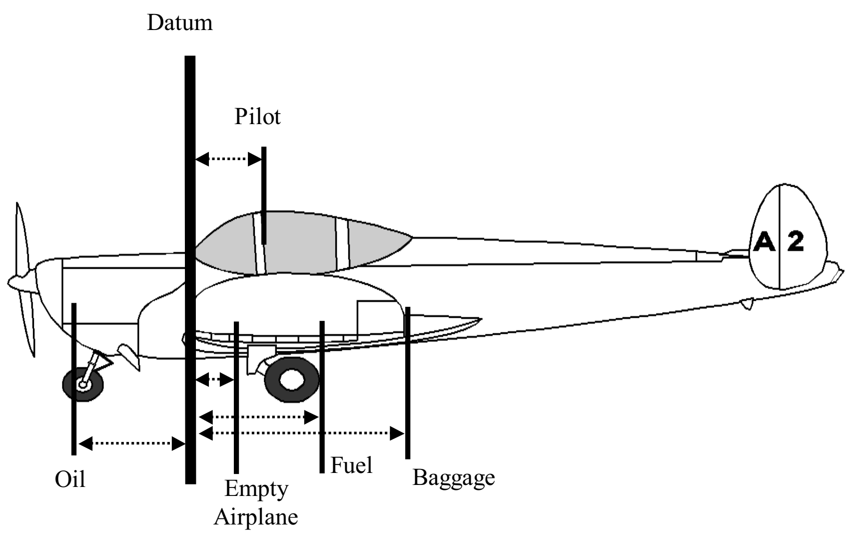
Discuss aircraft weight and balance criteria and describe the potential consequences of exceeding gross weight limits, and being "tail heavy" or "nose heavy."

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, a basic knowledge of aircraft weight and balance and the consequences of exceeding weight and balance limits are essential.

2. The amount of lift produced by the aircraft is limited, so you must not load the aircraft beyond set limits. An overloaded aircraft may not be able to take off or may exhibit unexpected and potentially lethal flight characteristics. *Be honest about your weight and the weight of your luggage when loading the aircraft*.



3. The weight of the aircraft and its instruments is called the "empty weight." For each flight the pilot computes further increases in weight for the items required for the flight. Examples are:

   a. Fuel and oil. Fuel weighs approximately six pounds per gallon, so this is an important factor. On larger aircraft carrying a heavy load, the pilot may not fill the fuel tanks completely in order to meet weight limits. *This limits range and must be done carefully; re-check fuel status every hour*.
   b. Pilot and crew, and everything they carry onboard.
   c. Extra equipment that is permanently stowed in the aircraft. This includes tow bars, chocks, and survival gear.

4. Balance refers to the location of the center of gravity (c.g.) of an aircraft and is critical to stability and safety of flight.

a. If the aircraft is loaded "tail heavy" the c.g. moves aft and the aircraft becomes less stable. In the worst case, this can make it difficult or impossible to recover from a stall.
b. If the aircraft is loaded "nose heavy" the c.g. moves forward. This can lead to a condition where the pilot cannot raise the aircraft's nose in slow flight conditions such as takeoff and landing.

5. The pilot computes the aircraft c.g. as part of the "Weight & Balance" calculations done before each flight. She then checks the c.g. to ensure it is within manufacturer's limitations.

Additional Information

More detailed information on this topic is available in Chapter 2 of the MART.

Evaluation Preparation

Setup: Access to an aircraft is desirable.

Brief Student: You are a Scanner trainee asked the basics about aircraft weight and balance and limits.

Evaluation

Performance measures	Results	
1. Discuss the consequences of exceeding the aircraft's weight limit.	P	F
2. Discuss the potential consequences of a "tail heavy" and a "nose heavy" aircraft.	P	F
3. Discuss the importance of being accurate and honest about your and your luggage weight.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

IDENTIFY ITEMS CHECKED DURING AN AIRCRAFT PRE-FLIGHT INSPECTION

CONDITIONS

You are a Mission Scanner trainee and must identify the items checked during an aircraft pre-flight inspection.

OBJECTIVES

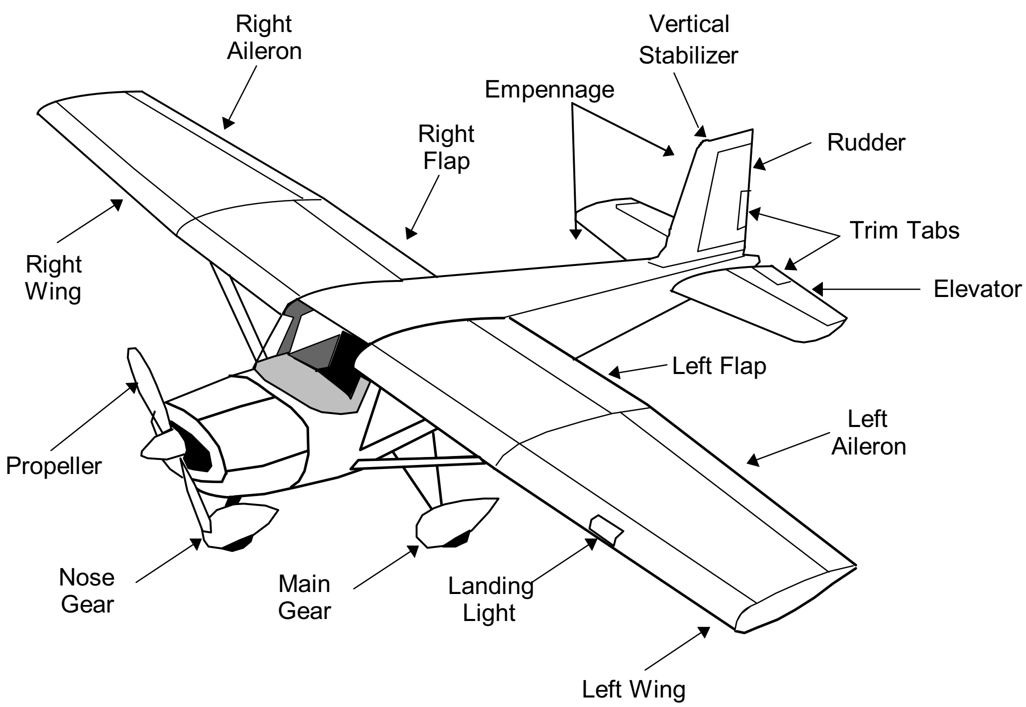
Successfully identify the items checked during an aircraft pre-flight inspection.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, basic knowledge of the purpose of and the items checked during an aircraft pre-flight inspection is helpful.

2. A pre-flight inspection is a safety check and evaluation of the aircraft's condition for flight. This is the pilot's responsibility and should be performed with the aid of a checklist supplied by the manufacturer. If you are asked to help, you will probably read out each item on the checklist and the pilot will examine the item and acknowledge.



3. The "walk around" portion is an inspection of structural components and equipment. Other items are:

   a. Fuel and oil. This includes "sumping" fuel and visually checking fuel levels in the tanks.
   b. Landing, taxi, navigation and anti-collision lights.
   c. Tires and brakes.

4. More pre-flighting takes place after the crew is buckled in, and other checklists are used for the various phases of flight (e.g., taxi, takeoff, climb, cruise, descent and landing).

Additional Information

More detailed information on this topic is available in Chapter 2 of the MART.

Evaluation Preparation

Setup: Provide the trainee access to an aircraft (or detailed model) and a typical pre-flight checklist.

Brief Student: You are a Scanner trainee asked the basics about pre-flight inspection.

Evaluation

Performance measures	Results	
1. Discuss the purpose of an aircraft pre-flight inspection.	P	F
2. Identify the major items checked during an aircraft pre-flight inspection.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

P-2020
DISCUSS THE DANGERS OF WAKE TURBULENCE

CONDITIONS

You are a Mission Scanner trainee and must discuss the dangers of wake turbulence.

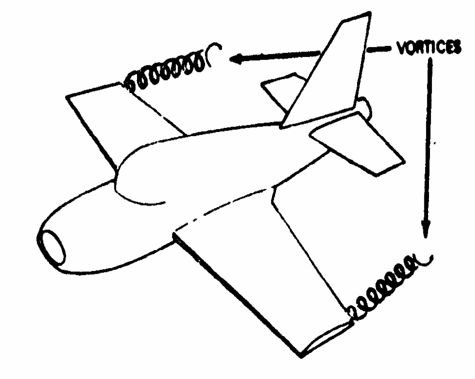
OBJECTIVES

Discuss wake turbulence, including where it is most likely to be encountered.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, knowledge of wake turbulence is helpful. *All crewmembers should assist the pilot in avoiding wake turbulence*. Wake turbulence is the disturbance of air caused by a large aircraft's movement. A spiral vortex is created around the aircraft wing tips.



2. Large jets create the most severe wake turbulence when they are taking off or landing. In a no-wind situation the vortices spread outward and away from the wing tips, and sink beneath the aircraft. Vortices may remain active well after the aircraft that spawned them has passed.

   a. When taking off behind a large jet, the pilot should wait several minutes to take off. Also, she will try to lift off the runway before the point where the large jet lifted its nose wheel.
   b. When landing behind a large jet, the pilot should stay well above the jet's flight path and land beyond the point where the jet landed.

3. *All crewmembers should be alert to prevent the aircraft from taxiing too closely behind any large aircraft or helicopter*. The thrust produced by the engines can blow a small aircraft out of control, and can even flip it over. Rotor downwash from a helicopter can have a similar effect.

Additional Information

More detailed information on this topic is available in Chapter 2 of the MART.

Evaluation Preparation

Setup: Paper for drawings.

Brief Student: You are a Scanner trainee asked about wake turbulence.

Evaluation

Performance measures	Results	
1. Discuss where wake turbulence is normally encountered.	P	F
2. Discuss basic takeoff and landing precautions taken to avoid wake turbulence.	P	F
3. Discuss the dangers of taxiing to close behind large jets or helicopters.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

P-2021

DISCUSS HOW ATMOSPHERIC AND LIGHTING CONDITIONS EFFECT SCANNING EFFECTIVENESS

CONDITIONS

You are a Mission Scanner trainee and must discuss how atmospheric and lighting conditions effect scanning effectiveness.

OBJECTIVES

Discuss how atmospheric and lighting conditions effect scanning effectiveness.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, knowing how atmospheric and lighting conditions effect scanning is essential. During daylight there are many factors that can affect the scanner's ability to spot the search target. The following table shows the (approximate) distance at which the scanner can sight various objects under average visibility conditions; factors that can alter these distances are discussed below.

Object	Distance
Person in life jacket (open water or moderate seas)	1/2 mile
Person in small life raft (open water or moderate seas)	3/4 mile
Person in open meadow within wooded area	1/2 mile or less
Crash in wooded area	1/2 mile
Crash on desert or open plain	2 miles
Person on desert or open plain	1 mile or less
Vehicle in open area	2 miles or less

During darkness, scanners make fewer fixations in their search patterns than during daylight because victims in distress are likely to use lights, fires, or flares to signal rescuers. Contrast between signal light and surrounding darkness eliminates the need for scanners to concentrate on making numerous eye fixations. An attentive scanner or observer should be able to see a light, flare, or fire easily during night operations. Search aircraft interior lighting should be kept to the lowest possible level that still allows normal chart reading. This will help the eyes adjust to the darkness and reduce glare on windshield and window surfaces. Red lights are used when flying at night because that color has little or no affect on the low-light adaptation of the human eye. Regardless of light conditions, a scanner should always maintain a systematic scanning pattern with fixations every few seconds. Darkness merely lengthens the interval between fixations.

2. Atmospheric conditions. All aircrews hope for perfect visibility during a SAR mission, but this atmospheric condition rarely exists. Most of the time the atmosphere (especially the lower atmosphere) contains significant amounts of water vapor, dust, pollen, and other particles. These items block vision according to their density. Of course, the farther we try to see the more particles there are and the more difficult it is to sight the objective.

3. Position of the sun. Flying “into the sun,” soon after it rises in the morning or before it sets in the afternoon, poses visibility problems. No doubt you have had this experience while driving or riding as a crewmember in an automobile. Recall how difficult it is to distinguish colors and to detect smaller objects.

4. Clouds and shadows. Shadows produced by clouds can reduce the effective scanning range. This is due to the high contrast between sunlit area and shadows. Our eyes have difficulty adjusting to such contrasts. The same effect occurs in mountainous areas where bright sunlight causes the hills and mountains to cast dark

shadows. Heavy cloud cover can "wash out" colors on the ground, making wreckage and colored clothes or signal devices harder to sight.

5. Terrain and ground cover. The more intensive search efforts occur over terrain that is either mountainous or covered with dense vegetation, or both. Mountainous area searches demand frequent variation in the scanning range. This you can visualize fairly easily; at one moment the mountain or hill places the surface within, say 200 feet of the aircraft. Upon flying past the mountain or hill the surface suddenly may be a half-mile away. Forested areas can reduce the effective scanning range dramatically. This is especially true during spring, summer, and fall when foliage is most pronounced. The situation doesn't change for the better in the winter where trees are of the evergreen types-pine, spruce, etc.-because the height of the trees plus their foliage masks the search objective very effectively. Frequently the only way for a scanner to actually spot an objective under such circumstance is to be looking down almost vertically. There are other signs to look for in such areas, but we will discuss them later.

6. Surface conditions. Here we are thinking of snow, primarily. Even a thin covering of new snow will change the contour, or shape, of a search objective. Also, the light-reflective quality of snow affects visual effectiveness. The net result is a need to bring the scanning range nearer to the aircraft.

7. Cleanliness of windows. This might seem to be a very minor factor. On the other hand, it is estimated that the scanner's visibility can be reduced up to 50 percent if the aircraft window isn't clean. If you discover this to be the case in your aircraft, clean the window yourself. However, aircraft windows are made of plastic and they are easily scratched. Ask the pilot what cleaning materials and methods are acceptable before cleaning the window. Window cleaning is a normal part of pre- and post-flight activities.

8. Use of binoculars, cameras, and sunglasses. Binoculars rapidly bring on eye fatigue when used in an aircraft, and may lead to disorientation and airsickness. They should only be used for *brief* periods to check sightings or for detailed viewing of an assessment area or target. Looking through a camera or camcorder viewfinder for extended periods can be equally as discomforting. Take breaks whenever possible. Sunglasses are an important tool for aircrew, reducing eye fatigue and glare: however, sunglasses do have some negative aspects. Looking through the aircraft windshield with polarized lenses can result in a reduced retinal image. Also, color discrimination is reduced while wearing dark lenses. And, of course, if you are looking for a lost person wearing a blue jacket, don't wear sunglasses with "blue-blocking" lenses. Finally, no matter how cool it may look, don't wear sunglasses while flying in low visibility conditions (i.e., overcast and at dawn, dusk or night).

Additional Information

More detailed information on this topic is available in Chapter 5 of the MART.

Evaluation Preparation

Setup: None.

Brief Student: You are a Scanner trainee asked about how atmospheric and lighting conditions effect scanning.

Evaluation

Performance measures	Results
1. Discuss how atmospheric and lighting conditions effect scanning effectiveness.	P F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

P-2022

IDENTIFY VISUAL CLUES AND WRECKAGE PATTERNS

CONDITIONS

You are a Mission Scanner trainee and must identify and discuss typical visual clues and wreckage patterns.

OBJECTIVES

Identify and discuss typical visual clues and wreckage patterns.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, knowing what to look for in the search area is essential. If you have not had much experience at "looking down" while flying, there are some surprises in store for you. Objects appear quite different when they are seen from above and at a greater distance than usual. Even if you are very familiar with the territory as seen from the surface, scanning it from the air will reveal features and objects you had no idea were there.

2. Typical visual clues. Anything that appears to be out of the ordinary should be considered a clue to the location of the search objective. In addition to this piece of advice, the following are specific clues for which scanners should be looking: [refer to the Scanner slides for pictures]

Light colored or shiny objects - Virtually all aircraft have white or other light colors as part of their paint schemes. Some aircraft have polished aluminum surfaces that provide contrast with the usual ground surface features and will "flash" in bright sunlight. Aircraft windshields and windows also have a reflective quality about them: if the angle of the sun is just right, you will pick up momentary flashes with either your central or peripheral vision. A flash from any angle deserves further investigation.

Smoke and fire - Sometimes aircraft catch fire when they crash. If conditions are right, 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.

Blackened areas - Fire causes blackened areas. You may have to check many such areas (see false clues), but finding the search objective will make the effort worthwhile.

Broken tree branches - If an airplane goes down in a heavily wooded area, it will break tree branches and perhaps trees. The extent of this breakage will depend on the angle at which the trees were struck. The primary clue for the scanner, however, will be color. As you no doubt realize, the interior of a tree trunk or branch and the undersides of many types of leaves are light in color. This contrast between the light color and the darker foliage serves as a good clue.

Local discoloration of foliage - Here we are talking about dead or dying leaves and needles of evergreen trees. 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.

Fresh bare earth - An aircraft striking the ground at any angle will disturb or "plow" the earth to some degree. An overflight within a day or so of the event should provide a clue for scanners. Because of its moisture content, fresh bare earth has a different color and texture than the surrounding, undisturbed earth.

Breaks in cultivated field patterns - Crop farmlands always display a pattern of some type, especially during the growing season. Any disruption of such a pattern should be investigated. A crop such as corn could mask the presence of small aircraft wreckage, but the pattern made by the crashing airplane may stand out as a break in uniformity.

Water and snow - Water and snow are not visual clues, but they often contain such clues. For example, 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 readily shows clues. Any discoloration caused by fire, fuel or debris will be very evident.

Tracks and signals - Any line of apparent human tracks through snow, grass, or sand should be regarded as possibly those of survivors.

Birds and animals - Scavenger birds (such as vultures and crows), wolves, and bears may gather at or near a crash site. Vultures (or buzzards) sense the critical condition of an injured person and gather nearby to await the person's death. If you see these birds or animals in a group, search the area thoroughly.

False clues - Examples are campfires and other purposely set fires, oil slicks that may have been caused by spillage from ships; and trash piles or pits. Aircraft parts may not have been removed from other crash sites, although some of the aircraft parts may have been marked with a yellow "X" (you may not be able to see the mark until near the site because the paint has faded or worn off with age).

Survivors and Signals - If there are survivors and if they are capable of doing so, they will attempt to signal you. The type of signal the survivors use will depend on how much they know about the process and what type signaling devices are available to them.

Nighttime signals - For various reasons, nighttime air searches are very infrequent. Light signals of some type will be the only clue to the search objective location. A fire or perhaps a flashlight will be the survivor's means of signaling. On the other hand, a light signal need not be very bright: one survivor used the flint spark of his cigarette lighter as a signal and he was rescued.

3. Wreckage patterns. Frequently, there are signs near a crash sight that the aircrew can use to locate the actual wreckage. The environment plays a major role in sighting the signs from the search aircraft. In crashes at sea, searchers may be unable to locate the crash site as rough seas can scatter wreckage or signs quickly. On land, the wreckage may be in dense foliage that can obscure it in a matter of days. By knowing signs to look for, the scanner can improve the effectiveness of each sortie. In general, don't expect to find anything that resembles an aircraft; most wrecks look like hastily discarded trash. However, certain patterns do result from the manner in which the accident occurred.

The *hole in the ground* is 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 will sometimes cause very little damage to the surrounding foliage, and sometimes only a day or two is needed for the foliage to repair itself.

The *corkscrew* (auger) is caused from uncontrolled spins. Wreckage is considerably broken 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 areas, damage to branches and foliage is considerable, but is confined to a small area.

Creaming (smear) is often caused from low-level "buzzing" or an attempted crash landing. The wreckage distribution is long and narrow with heavier components farthest away from the initial point of impact. The tail and wings remain fairly intact and sheared off close to the point of impact. 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.

The *four winds* result from mid-air collisions, explosion, or in-flight break up. 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.

Hedge trimming is caused when an aircraft strikes a high mountain 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 wreckage 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.

A *splash* is caused when an aircraft has gone down into water: oil slicks, foam, and small bits of floating debris are apparent for a few hours after the impact. With time, the foam dissipates, the oil slicks spread and streak, and the debris become widely separated due to action of wind and currents. Sometimes emergency life rafts are ejected but, unless manned by survivors, will drift very rapidly with the wind. 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 offshore oil wells or natural oil seepage. Most aircraft sink very rapidly after ditching.

Additional Information

More detailed information on this topic is available in Chapter 5 of the MART.

Evaluation Preparation

Setup: Provide the student with pictures of typical crash clues and wreckage patterns (e.g., Scanner slides).

Brief Student: You are a Scanner trainee asked what to identify and discuss typical crash clues and wreckage patterns.

Evaluation

Performance measures	Results
1. Identify and discuss typical visual crash clues and wreckage patterns.	P F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

P-2023
DISCUSS HOW REDUCED VISIBILITY AND TURBULENCE EFFECT SEARCH OPERATIONS

CONDITIONS

You are a Mission Scanner trainee and must discuss how reduced visibility and turbulence effect search operations.

OBJECTIVES

Discuss reduced visibility and turbulence, and how they effect search operations.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, understanding the causes of reduced visibility and turbulence and how this effects search operations is very useful.

2. Reduced visibility. One of the most common hazardous-weather problems is loss of visibility. Visibility may be reduced by many conditions including clouds, rain, snow, fog, haze, smoke, blowing dust, sand, and snow. A similar condition called "white out" can occur where there has been snowfall.

3. Effects. This can happen either suddenly or very insidiously, depriving the pilot of his ability to see and avoid other aircraft, and reducing or depriving him altogether of his ability to control the aircraft, unless he has had training and is proficient in instrument flying. In reduced visibility, the crew's ability to see rising terrain and to avoid towers, power transmission lines, and other man-made obstacles is diminished.

Frequently, as the sun warms the cool, hazy air and causes it to expand and rise, visibility at the surface will improve and appear acceptable. What initially appeared to be ample visibility can, after takeoff, become almost a complete obstruction to lateral or forward visibility several hundred feet above the surface. Downward visibility is satisfactory, but pilots may feel apprehensive about the loss of a visible horizon to help judge aircraft control, and about what might come out of the murk ahead. Visibility at this altitude may actually be more than the minimum three miles, yet the pilot may interpret this visual range as a wall just beyond the airplane's nose.

When haze and smoke are present, the best measure a flight crew can take to minimize risk of such an encounter is to get a thorough weather briefing before flying, and update the briefing by radio with *Flight Watch* as required.

Each member of the aircrew must be vigilant during all phases of the flight when visibility is less than perfect. Crew resource management requires that each member of the crew be assigned an area to search during the takeoff, transit and approach-to-landing phases of the flight in order to help the pilot "see and avoid" obstacles and other aircraft. The aircrew must also characterize visibility in the search area so as to establish the proper scanning range (see Chapter 5). Search visibility may be different than expected, and your search pattern may have to be adjusted accordingly. Be sure to cover this during your debriefing.

4. Turbulence. Turbulence is irregular atmospheric motion or disturbed wind flow that can be attributed to a number of causes. Turbulence can be inconsequential, mildly distracting, nauseating, or destructive depending on its intensity. Turbulence can often be avoided by changing altitudes. Aircraft manufacturers publish "maneuvering speeds" in the operating handbooks: if the aircraft stays below the maneuvering airspeed no structural damage should occur.

Just as a tree branch dangling into a stream creates continuous ripples or waves of turbulence in the water's surface, obstructions to the wind can create turbulence in the air. This type of turbulence occurs mostly close to the ground, although depending upon wind velocity and the nature of the obstruction, it may reach upward several thousand feet. In an extreme case, when winds blow against a mountainside, the mountain deflects the wind upward creating a relatively smooth updraft. Once the wind passes the summit, it tumbles down the leeward or downwind side, forming a churning, turbulent down draft of potentially violent intensity. The churning turbulence can then develop into *mountain waves* that may continue many miles from the mountain ridge. Mountain waves may be a factor when surface winds are as little as 15 knots.

5. Effects. Turbulence can become a major factor in search effectiveness. Any scanner who is uncomfortable or nauseous cannot perform her duties at a very high level of effectiveness. If you experience these sensations, inform the pilot immediately. If turbulence detracted from your concentration during the search, be sure to mention this during debriefing.

Additional Information

More detailed information on this topic is available in Chapter 6 of the MART.

Evaluation Preparation

Setup: None.

Brief Student: You are a Scanner trainee asked to discuss turbulence and its affects on search operations.

Evaluation

Performance measures	Results	
1. Discuss the causes of reduced visibility.	P	F
2. Discuss how reduced visibility effects search operations, and related precautions.	P	F
3. Discuss the causes of turbulence.	P	F
4. Discuss how turbulence effects search operations, and precautions.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

P-2024
DISCUSS STRATEGIES TO COMBAT HIGH ALTITUDE EFFECTS

CONDITIONS

You are a Mission Scanner trainee and must discuss how to recognize and combat high altitude effects.

OBJECTIVES

Discuss high altitude effects and demonstrate strategies to deal with them.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, knowing how high altitude effects you and your crew and strategies to deal with the effects is essential.

2. Dehydration. When operating in high altitudes or temperatures, body water is continuously expired from the lungs and through the skin: this physiological phenomenon is called insensible perspiration or insensible loss of water. Water loss is increased in flight because of the relatively lowered humidity at altitude, particularly on extended flights. Typical dehydration conditions are: dryness of the tissues and resulting irritation of the eyes, nose, and throat, and fatigue relating to the state of acidosis (reduced alkalinity of the blood and body tissues). A person reporting for a flight in a dehydrated state will more readily notice these symptoms until fluids are adequately replaced.

When operating in high altitudes or temperatures, crewmembers should make every effort to drink plenty of water, juice, or caffeine-free soft drinks prior to, during, and after each mission to help prevent dehydration. Consumption of coffee, tea, cola, and cocoa should be minimized since these drinks contain caffeine. In addition, tea contains a related drug (theophyline), while cocoa (and chocolate) contain theobromine, of the same drug group. These drugs, besides having a diuretic effect, have a marked stimulating effect and can cause an increase in pulse rate, elevation of blood pressure, stimulation of digestive fluid formation, and irritability of the gastrointestinal tract.

Increasing the flow of outside air through the aircraft interior by the use of vents, or opening windows or hatches can usually remedy heat-related problems. If sufficient airflow cannot be gained, cooler air can usually be located by climbing the aircraft to a higher altitude. This may be inconsistent with search altitudes assigned by the incident commander or may be beyond the performance capability of the aircraft.

3. Ear block. As the aircraft cabin pressure decreases during ascent, the expanding air in the middle ear pushes the Eustachian tube open and, by escaping down it to the nasal passages, equalizes in pressure with the cabin pressure. But during descent, passengers must periodically open their Eustachian tube to equalize pressure. This can be accomplished by swallowing, yawning, tensing muscles in the throat or, if these do not work, by the combination of closing the mouth, pinching the nose closed and attempting to blow through the nostrils (valsalva maneuver).

4. Sinus block. During ascent and descent, air pressure in the sinuses equalizes with the aircraft cabin pressure through small openings that connect the sinuses to the nasal passages. Either an upper respiratory infection, such as a cold or sinusitis, or a nasal allergic condition can produce enough congestion around the opening to slow equalization and, as the difference in pressure between the sinus and cabin mounts, eventually plug the opening. This "sinus block" occurs most frequently during descent. A sinus block is prevented by not flying with an upper respiratory infection or nasal allergic condition. Adequate protection is usually not provided by

decongestant sprays or drops to reduce congestion around the sinus openings. Oral decongestants have side effects that can impair pilot performance. If a sinus block does not clear shortly after landing, a physician should be consulted.

5. Hypoxia. Hypoxia is a state of oxygen deficiency in the body sufficient to impair functions of the brain and other organs. Hypoxia from exposure to altitude is due only to the reduced barometric pressures encountered at altitude, for the concentration of oxygen in the atmosphere remains about 21 percent from the ground out to space. *The body has no built-in warning system against hypoxia.* Although deterioration in night vision occurs at a cabin pressure altitude as low as 5,000 feet, other significant effects of altitude hypoxia usually do not occur in the normal healthy person below 12,000 feet. From 12,000 to 15,000 feet of altitude, judgment, memory, alertness, coordination and ability to make calculations are impaired. Headache, drowsiness, dizziness and either a sense of euphoria or belligerence may also occur. In fact, pilot performance can seriously deteriorate within 15 minutes at 15,000 feet.

Hypoxia can be prevented by: heeding factors that reduce tolerance to altitude, by enriching the inspired air with oxygen from an appropriate oxygen system and by maintaining a comfortable, safe cabin pressure altitude. For optimum protection, pilots are encouraged to use supplemental oxygen above 10,000 feet during the day, and above 5,000 feet at night. The Federal Aviation Regulations require that the minimum flight crew be provided with and use supplemental oxygen after 30 minutes of exposure to cabin pressure altitudes between 12,500 and 14,000 feet, and immediately on exposure to cabin pressure altitudes above 14,000 feet. Every occupant of the aircraft must be provided with supplement oxygen at cabin pressure altitudes above 15,000 feet.

Additional Information

More detailed information on this topic is available in Chapter 7 of the MART.

Evaluation Preparation

Setup: None.

Brief Student: You are a Scanner trainee asked to discuss the effects of high altitude on the body and strategies to deal with the conditions.

Evaluation

Performance measures	Results	
1. Discuss the symptoms and dangers of the following:		
a. Ear block.	P	F
b. Sinus block.	P	F
c. Hypoxia.	P	F
2. Discuss strategies used to combat these symptoms.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

P-2025
DISCUSS COMMON SEARCH TERMS

CONDITIONS

You are a Mission Scanner trainee and must discuss the common search terms used during a typical mission.

OBJECTIVES

Discuss common search terms used during a typical mission.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, basic knowledge of search terms is helpful. A number of terms and planning factors should be understood in order to better understand search and rescue missions.

2. Ground and Search Track. Ground track is an imaginary line on the ground that is made by an aircraft's flight path over the ground. The search track is an imaginary swath across the surface, or ground (the scanning range and the length of the aircraft's ground track forms its dimensions).

3. Maximum Area of Possibility. This normally circular area is centered at the missing airplane’s (or search objective's) last known position (LKP), corrected for the effect of wind. The circle's radius represents the maximum distance a missing aircraft might have flown based on estimated fuel endurance time and corrected for the effects of the wind over that same amount of time. The radius may also represent the maximum distance survivors might have traveled on foot, corrected for environmental or topographical conditions, such as snow, wind, mountains, and rivers.

4. Meteorological and Search Visibility. Meteorological visibility refers to the maximum range at which large objects (such as a mountain) can be seen, whereas search visibility refers to the distance at which an object the size of an automobile on the ground can be seen and recognized from an aircraft in flight. Search visibility is always less than meteorological visibility. [Note: The maximum search visibility listed on the POD chart is four nautical miles.]

5. Probability Area. This is a smaller area, within the maximum possibility area, where there is an increased likelihood of locating the objective aircraft or survivor. Distress signals, sightings, radar track data, and the flight plan are typical factors that help define the probability area's boundaries.

6. Probability of Detection. The likelihood, expressed in a percent, that a search airplane might locate the objective. Probability of detection (POD) can be affected by weather, terrain, vegetation, skill of the search crew, and numerous other factors. When planning search missions, it is obviously more economical and most beneficial to survivors if we use a search altitude and track spacing that increases POD to the maximum, consistent with the flight conditions, team member experience levels, and safety. Note: POD will be decreased if only one scanner is on board and the search pattern is not adjusted accordingly.

7. Scanning Range. Scanning range refers to the lateral distance from a scanner's search aircraft to an imaginary line on the ground parallel to the search aircraft's ground track. Within the area formed by the ground track and scanning range, the scanner is expected to have a good chance at spotting the search objective. Scanning range can be the same as or shorter than the search visibility.

8. Search Altitude. This is the altitude that the search aircraft flies above the ground (AGL). [Remember, routine flight planning and execution deals in MSL, while searches and assessments are referenced to AGL.]

9. Track Spacing. This is the distance (S) between adjacent ground tracks. The idea here is for each search track to either touch or slightly overlap the previous one.

Additional Information

More detailed information on this topic is available in Chapter 9 of the MART.

Evaluation Preparation

Setup: Provide the student with a sectional chart and a mission scenario that uses all the search terms.

Brief Student: You are a Scanner trainee asked to demonstrate and discuss search terms used during a typical mission.

Evaluation

Performance measures	Results	
1. Use and discuss search terms used during a typical mission:		
a. Ground and Search track.	P	F
b. Maximum Area of Probability, Probability Area, and Probability of Detection.	P	F
c. Meteorological and Search visibility.	P	F
d. Scanning range.	P	F
e. Search altitude and Track spacing.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

P-2026

IDENTIFY WHAT TO LOOK FOR AND RECORD DURING DAMAGE ASSESSMENT MISSIONS

CONDITIONS

You are a Mission Scanner trainee and must identify things to look for and record during damage assessment missions.

OBJECTIVES

Discuss damage assessment missions, including what questions you should ask, what you should look for, and what information you should record over the site.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, basic knowledge of damage assessment missions is essential. Flying damage assessment sorties is not much different than flying search patterns. The big difference between a search for a downed aircraft and damage assessment is *what you look for* in the disaster area. Different types of emergencies or disasters will prompt different assessment needs, as will the nature of the operations undertaken.

The conditions that created the emergency or disaster may affect CAP operations. Extreme weather is an obvious concern, and must be considered in mission planning. The disaster may affect the physical landscape by erasing or obscuring landmarks. This may make navigation more difficult and may render existing maps obsolete.

Disasters may also destroy or render unusable some part of the area's infrastructure (e.g., roads, bridges, airfields, utilities and telecommunications). This can hamper mobility and continued operations. Also, road closures by local authorities or periodic utility outages can reduce the effectiveness and sustainability of CAP operations in the area.

2. Most often you will be given specific tasking for each sortie. However, you must always be observant and flexible. Just because you have been sent to determine the condition of a levy doesn't mean you ignore everything else you see on the way to and from the levy. Examples of questions you should be asking are (but are certainly not limited to):

a. What is the geographical extent of the affected area?
b. What is the severity of the damage?
c. Is the damage spreading? If so: how far and how fast? It is particularly important to report the direction and speed of plumes (e.g., smoke or chemical).
d. How has access to or egress from important areas been affected? For example, you may see that the southern road leading to a hospital has been blocked, but emergency vehicles can get to the hospital using an easterly approach.
e. What are the primary active hazards in the area? Are there secondary hazards? For example, in a flood the water is the primary hazard; if the water is flowing through an industrial zone then chemical spills and fumes may be secondary hazards.
f. Is the disaster spreading toward emergency or disaster operating bases, or indirectly threatening these areas? For example, is the only road leading to an isolated aid station about to be flooded?
g. Have utilities been affected by the emergency or disaster? Look for effects on power transmission lines, power generating stations or substations, and water or sewage treatment facilities.
h. Can you see alternatives to problems? Examples are alternate roads, alternate areas to construct aid stations, alternate landing zones, and locations of areas and facilities unaffected by the emergency or disaster.

3. It is very important to have local maps on which you can indicate damaged areas, as it is difficult to record the boundaries of large areas using lat/long coordinates.

4. Some specific things to look for during a damage assessment sortie are:
a. Breaks in pavement, railways, bridges, dams, levees, pipelines, runways, and structures.
b. Roads/streets blocked by water, debris or landslide (same for helipads and runways).
c. Downed power lines.
d. Ruptured water lines (this may have a major impact on firefighting capabilities).
e. Motorists in distress or major accidents.
f. Alternate routes for emergency vehicles or evacuation.
g. Distress signals from survivors.

5. At each site, besides sketching or highlighting the extent of the damage on local maps and identifying access/egress routes, you should record:
a. Lat/long and time.
b. Description.
c. Type and extent of damage.
d. Photo number or time reference for videotape.
e. Status (e.g., the fire is out, the fire is spreading to the northeast, or the floodwaters are receding).

6. An individual is very difficult to spot from the air, but CAP aircraft can do well in some situations:
a. Persons who are simply lost and are able to assist in their rescue. Persons who frequent the outdoors are often trained in survival and have the means to signal searching aircraft.
b. Persons who may be wandering along roads or highways, such as Alzheimer's patients.
c. Persons trapped or isolated by natural disasters such as floods. These persons often can be found on high ground, on top of structures, along a road or riverbank.
d. Persons who were driving. Their vehicle may be stopped along a road or highway.

Lost children and people with diminished capacities can be especially difficult to find. By the time CAP is called the police have probably already looked in the obvious places. Often, these individuals will be hiding from their searchers. Route and grid searches must be done with great care and with full, well-rested crews. Knowledge of what they are wearing and how they may respond to over-flying aircraft is especially valuable in these instances. Lost persons often fight topography and are likely to be found in the most rugged portion of the surrounding country (persons who follow natural routes are seldom lost for long periods). Children under five years old frequently travel uphill; they also may hide from searchers (except at night).

Additional Information

More detailed information on this topic is available in Chapter 9 of the MART.

Evaluation Preparation

Setup: Provide the student with typical damage assessment mission scenarios and pictures.

Brief Student: You are a Scanner trainee asked to discuss damage assessment missions.

Evaluation

Performance measures	Results	
1. Discuss how a disaster can effect CAP operations.	P	F
2. Discuss the types of questions you should ask yourself during DA sorties.	P	F
3. Identify and discuss the typical things you should look for during DA sorties.	P	F
4. State the information you should record during DA sorties.	P	F
5. Discuss the limitations of an air search for a missing person.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

P-2027
DESCRIBE CAP SEARCH PATTERNS

CONDITIONS

You are a Mission Scanner trainee and must describe CAP search patterns.

OBJECTIVES

Describe the four most common CAP search patterns.

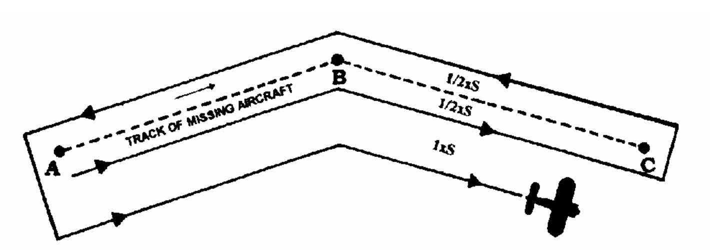
TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, understanding CAP search patterns is very helpful. This allows you to anticipate events.

2. Route search pattern. The route (track line) search pattern is normally used 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 assumed that detection may be aided by survivor signals or by electronic means. The track line pattern is also 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.

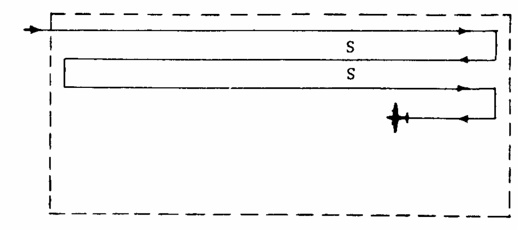
Search altitude for the track line pattern usually ranges from 1000 feet above ground level (AGL) to 2000 feet AGL for day searches, while night searches range 2000 to 3000 feet AGL (either depending upon light conditions and visibility). Lat/long coordinates for turns are determined and then entered into the GPS as waypoints, which may then be compiled into a flight plan.



The search crew begins by flying parallel to the missing aircraft's intended course line, using the track spacing (labeled “S”) determined by the incident commander or planning section chief. On the first pass, recommended spacing may be one-half that to be flown on successive passes. Flying one-half “S” track spacing in the area where the search objective is most likely to be found can increase search coverage.

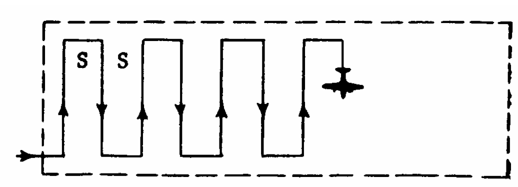
3. Parallel track search pattern. The parallel track (sweep) search pattern is normally used when one or more of the following conditions exist: a) the search area is large and fairly level, b) only the approximate location of the target is known, or c) uniform coverage is desired. This type of search is used to search a grid.

The aircraft proceeds to a corner of the search area and flies at the assigned altitude, sweeping the area maintaining parallel tracks. The first track is at a distance equal to one-half (1/2) track spacing (S) from the side of the area.



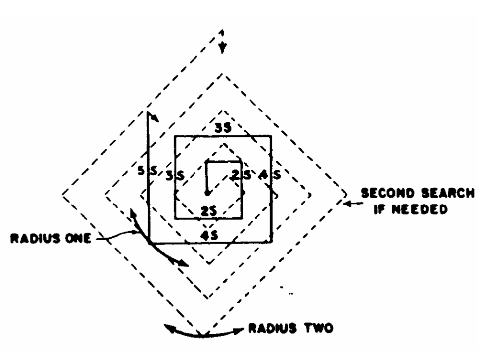
4. Creeping line search pattern. The creeping line search pattern is similar to the parallel patterns. The parallel pattern search legs are aligned with the major, or longer, axis of the rectangular search areas, whereas the search legs of the creeping line pattern are aligned with the minor or shorter axis of rectangular search areas. The creeping line pattern is 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 search track within two points, or c) there is a need for immediate coverage of one end of the search area.

The creeping line is a succession of search legs along a line. The starting point is located one-half search track spacing inside the corner of the search area.



5. Expanding Square search pattern. The expanding square search pattern is used when the search area is small (normally, areas less than 20 miles square), and the position of the survivors is known within close limits. This pattern begins at an initially reported position and expands outward in concentric squares. If error is expected in locating the reported position, or if the target were moving, the square pattern may be modified to an expanding rectangle with the longer legs running in the direction of the target's reported, or probable, movement.

If the results of the first square search of an area are negative, the search unit can use the same pattern to cover the area more thoroughly. The second search of the area should begin at the same point as the first search; however, the first leg of the second search is flown diagonally to the first leg of the first search. Consequently, the entire second search diagonally overlays the first one. The bold, unbroken line in the figure illustrates the first search, while the dashed line represents the second search. Track spacing indicated in the figure is "cumulative," showing the total width of the search pattern at a given point on that leg. Actual distance on a given leg from the preceding leg on the same side of the pattern is still only one "S," the value determined by the incident commander or planning section chief.



Additional Information

More detailed information and figures on this topic are available in Chapter 11 of the MART.

Evaluation Preparation

Setup: Provide the student with a sectional and descriptions of each search pattern.

Brief Student: You are a Scanner trainee asked to describe the most common CAP search patterns.

Evaluation

Performance measures	Results	
1. Describe the following search patterns:		
a. Route	P	F
b. Parallel	P	F
c. Creeping line	P	F
d. Expanding square	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

P-2028

DISCUSS CREW RESOURCE MANAGEMENT

CONDITIONS

You are a Mission Observer trainee and must discuss Crew Resource Management (CRM).

OBJECTIVES

Discuss how CRM is used in CAP activities and missions.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Observer trainee, knowing how to employ effective crew resource management is essential to safety.

2. *Situational Awareness*. Simply put, situational awareness (SA) is "knowing what is going on around you at all times." SA is not restricted to just pilots -- everyone must exhibit SA at all times. Each crewmember must have their SA at peak levels while flying because it takes everyone's awareness to keep the plane safe in flight. Scanners and observers have their own unique positions and functions that require full attention, so their SA is essential to the safe operation of any CAP flight.

Examples of good SA attitudes are:
Good mental health, where each crewmember is clear and focused.
Good physical health: this includes fatigue, sickness, hydration, and stress factors.
Attentiveness: keep your attention on the task at hand.
Inquisitiveness: always asking questions, challenging ideas, and asking for input.

Examples of SA skills:
Professional skills developed through training, practice and experience.
Good communication skills. These are necessary to effectively get your point across or receive valid input.
Interpersonal skills such the basic courtesies factor greatly into how a crew will get along, and this will greatly impact crew effectiveness and performance.

To help prevent a loss of SA, use the "IMSAFE" guidelines. This checklist was developed for the FAA as a quick memory guide for aviators to run through and make self-determination as to their fitness to fly. If a crewmember says yes to any of these, they really shouldn't fly.

There are a number of standardized tools that can help improve CRM and overcome a loss of situational awareness. When a crew loses SA it is critical to reduce workload and threats:

a. Suspend the mission. [Remember to "Aviate, Navigate and Communicate."]
b. Get away from the ground and other obstacles (e.g., climb to a safe altitude).
c. Establish a stable flight profile where you can safely analyze the situation.

Once we have lost situational awareness, or recognized the loss in another crewmember, how do we get it back? A few methods are to:

a. Listen to your gut feelings. If it acts like an idiot and talks like an idiot, then its probably an idiot.

b. *Use terms like "Time Out" or "Abort" or "This is Stupid."* Once terms like these are called, the pilot should terminate the task or maneuver, climb away from the ground if necessary, establish straight-and-level flight and then discuss the problem. [The term you use should be agreed upon before the flight.]
c. *Keep the cockpit sterile* -- keep talk to the minimum necessary for safety, particularly during taxi, takeoff, departure, low-level flying, approach, and landing. This helps remove distractions and keep everyone focused on the important things.

3. *Barriers to Communication*. Rank, gender, experience level, age, personality, and general attitudes can all cause barriers to communication. You may occasionally be hesitant to offer an idea for fear of looking foolish or inexperienced. You may also be tempted to disregard ideas that come from individuals that have a lower experience level. If you are committed to teamwork and good crew coordination, you must look through such emotions and try to constructively and sensitively adapt to each personality involved.

You can deal best with personalities by continually showing personal and professional respect and courtesy to your teammates. Criticism will only serve to build yet another barrier to good communication. Nothing breaks down a team effort faster than hostility and resentment. Always offer opinions or ideas respectfully and constructively. Instead of telling the pilot, "You're wrong," tell him what you *think* is wrong, such as "I think that new frequency was 127.5, not 127.9."

Personal factors, including individual proficiency and stress, may also create barriers to good communication. Skills and knowledge retention decrease over time, and that is why regular training is necessary. If you don't practice regularly, you very likely will spend a disproportionate amount of time on normal tasks, at the expense of communication and other tasks. Civil Air Patrol, the FAA, commercial airlines, and the military services all require certain minimum levels of periodic training for the sole purpose of maintaining proficiency.

Stress can have a very significant, negative effect on cockpit communication. An individual's preoccupation with personal, family, or job-related problems distracts him or her from paying complete attention to mission tasks and communication, depending upon the level and source of stress. The flight itself, personalities of the individuals, distractions, flight conditions, and individual performance can all be sources of communication-limiting stress. When stress reaches very high levels, it becomes an effective barrier to communication and job performance. Many fliers and medical specialists advocate refraining from flying or other complex tasks until the stress is removed.

Part of your job is also to recognize when others are not communicating and not contributing to the collective decision-making process. Occasionally, other crewmembers may need to be actively brought back into the communication process. This can often be done with a simple "What do you think about that?" In a non-threatening way, this invites the teammate back into the communication circle, and, in most cases, he or she will rejoin the information loop.

4. *Task Saturation*. At times, crews or individual members may be confronted with too much information to manage, or too many tasks to accomplish in the available time. This condition is referred to as *task saturation*. This will most likely happen when a crewmember is confronted with a new or different situation such as an emergency, bad weather, or motion sickness. Preoccupation with the different situation may then lead to a condition of "tunnel vision," where the individual can lose track of many other important conditions. In an advanced state, comprehension is so far gone that partial or complete *situational awareness* is lost. When individuals are task saturated to this extent, communication and information flow usually ceases.

If you begin to feel overwhelmed by information or the sheer number of things to do, it's time to evaluate each task and do only those tasks that are most important. If you ever feel over-tasked, you have an obligation to tell the other crewmembers *before* becoming task-saturated and losing your situational awareness. If others know your performance is suffering, they may assume some of the workload, if they are able. Once the most important tasks are accomplished and as time permits, you can start to take back some of those tasks that were neglected earlier. Allocation of time and establishing priorities is known as *time management*.

Most people can recognize task saturation and understand how it can affect performance. However, you should also watch for these symptoms in other members of your crew and take over some of their responsibilities if you have the qualifications and can do so without placing your own duties at risk.

The pilot's job is to safely fly the aircraft, and you should be very concerned if he or she becomes task saturated, or spends an excessive amount of his time with tasks other than flying the airplane. No crewmember should ever allow the work management situation to deteriorate to such an extent as to adversely affect the pilot's ability to continue to safely operate the aircraft. Many preventable accidents have resulted from crews' entire involvement in other areas or problems, while the airplane literally flew into the ground. If any crewmember suspects pilot task saturation to be the case, nonessential discussion should cease, and the crew as a whole should discontinue low-priority aspects of the job, and even return to the mission base if necessary.

5. *Assignments and Coordination of Duties*. Assignment of aircrew duties is based on CAPR 60-3. All flight-related duties are conducted under the supervision of the aircraft commander. Mission-related duties may also be conducted under the supervision of the aircraft commander, but a properly trained observer can also fill the role of mission commander. The key is that positive delegation of monitoring duties is as important as positive delegation of flying duties. As previously discussed, it is very important for each crewmember to know what they are supposed to be doing at all times and under all conditions. Aircraft safety duties vary with the start up, taxi, takeoff, departure, transit, approach and landing phases of flight. Mission duties are related to the mission objective, primarily to fly the aircraft safely and precisely (the pilot) and to scan effectively (scanners and observers).

Close attention should be paid during the pilot's briefing. The pilot will establish flight-specific safety "bottom lines" at this time, such as emergency duties and division of responsibilities. Each individual must again clearly understand his specific assigned duties and responsibilities before proceeding to the aircraft.

Other phases of the flight also require that distractions be kept to a minimum. Recent air transport industry statistics show that 67% of airline accidents during a particular survey period happened during only 17% of the flight time -- the taxi, takeoff, departure, approach and landing phases. The FAA has designated these phases of flight as critical, and has ruled that the cockpit environment *must* be free of extraneous activity and distractions during these phases to the maximum extent possible (the sterile cockpit).

In assigning scanning responsibilities to the scanners, mission observers must be receptive to questions and suggestions from the scanners. Carefully consider suggestions and understand that suggestions are almost always offered constructively, and are not intended to be critical. Answer questions thoroughly and openly, and don't become defensive. All doubts or questions that you can't answer should be resolved as soon as possible. It is critical to remember that CRM encourages the flow of ideas, but the Mission Pilot must make the final decision based on the crew's input.

Additional Information

More detailed information on this topic is available in Chapter 14 of the MART.

Evaluation Preparation

Setup: None.

Brief Student: You are a Mission Observer trainee asked to discuss CRM.

Evaluation

Performance measures	Results	
1. Discuss situational awareness and how to regain SA once it is lost.	P	F
2. Describe barriers to communication.	P	F
3. Discuss task saturation and strategies to minimize it.	P	F
4. Discuss crew assignments and coordination of duties.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

Mission Scanner
Advanced Training

Capt. Blake R. Kreitzer

Capt. Blake R. Kreitzer

O-0204
LOCATE A POINT ON A MAP USING LATITUDE AND LONGITUDE

CONDITIONS

Given an aeronautical chart, road map, or topographical map with latitude and longitude lines. You are away from mission base, mounted or dismounted, and must locate your location on map in order to report your location to mission base, an aircraft or another ground element using latitude and longitude. Or, you are coordinating with another search element (ground or air) who has told you his location using the latitude and longitude. You want to plot this point on your map.

OBJECTIVES

Within 1 minute, the team member announces the correct latitude and longitude of the marked point (using the smallest gradiations of latitude and longitude printed on the map), using correct terminology, and, within 1 minute, can plot a point on the map given the latitude and longitude orally.

TRAINING AND EVALUATION

Training Outline

1. Latitude and longitude are the objective position measurements used on aeronautical charts. Many road maps and topographical maps also are gridded using this system.

a. Lines of longitude run north-south on the map. Lines of latitude run east-west.

b. Both latitude and longitude are measured in degrees, minutes and seconds. One minute is 1/60th of a degree, and one second is 1/60th of a minute. In the continental US, latitude numbers are read from south to north (bottom to top), and longitude numbers are read from east to west (right to left)

c. Each line of latitude is labeled as either North (if it is above the equator) or South (if it is below the equator). Each line of longitude is labeled as East (if it is east of a longitude line called the Prime Meridian) or West (if it is west of the Prime Meridian)

d. To read a lat-long coordinates the symbol " ° " means degrees, an apostrophe (" ' ") means minutes, and a double apostrophe (" " ") means seconds. Always read the latitude before the longitude.

e. Example: 32° 33' 44" N, 45° 12' 52" E means "32 degrees, 33 minutes, and 44 seconds North Latitude, 45 degrees 12 minutes and 52 seconds East Longitude"

f. On larger scale maps, or when pinpoint accuracy is not required, seconds are not used. For example, 45° 12' N, 22° 36 W is read as "45 degrees, 12 minutes North Latitude, 22 degrees 36 minutes West Longitude."

2. To find the lat-long designation of a known point on the map

a. Find the latitude:

1) Find the numbers of the latitude degree lines to the immediate north and south of the point. Write down the lower of the two. (For example, if the point is between 45° and 46° North latitude, write down

“45°“. Also write down if that latitude line is labeled as “North” or “South” (above the equator it will always be “North”).

2) From latitude line chosen above, count up the number of minutes that the point is from the line using the tick marks on the edge of the map (or in the grids if the map is gridded) until you reach the last minute marking before your point. Write down the number of minutes.

3) From the last minute mark, count up the number of seconds to your point (if the map is of a large scale, such as an aviation chart, it will not have marks for seconds. Either stop with the minute measurement, or estimate seconds). Write down the number of seconds.

b. Find the longitude.

1) Find the numbers of the longitude degree lines to the immediate east and west of the point. Write down the lower of the two. (For example, if the point is between 22° and 23° West latitude, write down “ 22° “). Also write down if that latitude line is labeled as “East” or “West” (in the western hemisphere it will always be “West”).

2) From longitude line chosen above, count left the number of minutes that the point is from the line using the tick marks on the edge of the map (or in the grids if the map is gridded) until you reach the last minute marking before your point.   Write down the number of minutes.

3) From the last minute mark, count left the number of seconds to your point (if the map is of a large scale, such as an aviation chart, it will not have marks for seconds. Either stop with the minute measurement, or estimate seconds). Write down the number of seconds.

c. NOTE: If the map is not marked with minutes or seconds, you will have to estimate. Remember, there are 60 minutes in a degree and 60 seconds in a minute. So, if the point is halfway between two degrees, it is at the 30 minute point. If it is one quarter the distance from one degree to another, it is at the 15 minute point. Use the same logic to determine seconds if the map is only gradiated in degrees and minutes.

c. Make sure the lat-long coordinate you have written down is in the format Degrees°, Minutes’, Seconds” (North or South) Latitude,   Degrees°, Minutes’, Seconds” (East or West) Longitude,

3. To plot a point given the lat-long coordinate:

a. Find the correct latitude line and count up the correct number of minutes and seconds (below the equator you would count down, not up).

b. Find the correct longitude line and count left the correct number of minutes and seconds (in the eastern hemisphere you would count right, not left).

c. Mark the point.

Additional Information

More detailed information on this topic is available in the Ground Team Member and Leader Reference Text and Mission Aircrew Reference Text.

Evaluation Preparation

Setup: Mark a point on a map or chart gridded with latitude and longitude, and give the map to the student. . Tell him whether or not he must report seconds, or just degrees and minutes (depends on the scale of the map). Pick a different grid location from the point and write down the latitude and longitude coordinates. Ensure you have a timer. Because this task is timed, it is necessary to make sure that the student and work area is prepared for testing. The map should be open and complete. If copies of maps are used, they should include all references normally available on the full map to take the exam.

Brief Student: Ask the student if he is prepared. Tell the student to tell you the latitude and longitude of the point. Then orally give him the latitude and longitude you wrote down and tell him to show you where that point is on the map.

Evaluation

Performance Measures	Results	
Determining the grid of a known point. The student:		
1. Announces the correct latitude degrees, minutes and seconds within tolerance (see below)	P	F
2. Announces the correct latitude designation "North" or South"	P	F
3. Announces the correct longitude degrees, minutes and seconds within tolerance (see below)	P	F
4. Announces the correct longitude designation "East" or "West"	P	F
5. Performs the above steps within 1 minute of time	P	F

NOTE: The minimum accuracy for this task is to be within 30 seconds of the correct answer for a map gradiated in minutes. If the map is large enough scale to be gradiated in seconds, then the needed accuracy should be increased. For dismounted work, a ground team with proper maps should be able to plot positions within 10 seconds.

The individual determines the location of a designated grid:		
6. Plots a point on the map within 1 minute using the correct latitude and longitude degrees, minutes and seconds within tolerance (see accuracy note above).	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

O-0205

LOCATE A POINT ON A MAP USING THE CAP GRID SYSTEM

CONDITIONS

Given an aeronautical chart, road map, or topographical map gridded with the CAP grid system. You are away from mission base, mounted or dismounted, and must plot your location on a CAP gridded map in order to report it, an aircraft or another ground element. Or, you are coordinating with another search element (ground or air) who has told you his location using the CAP grid system. You want to plot this point on your map.

OBJECTIVES

Within 1 minute, the team member announces the CAP grid and sub-grid that the point is located in, using correct terminology, and can plot a point on the map given the CAP grid coordinates orally.

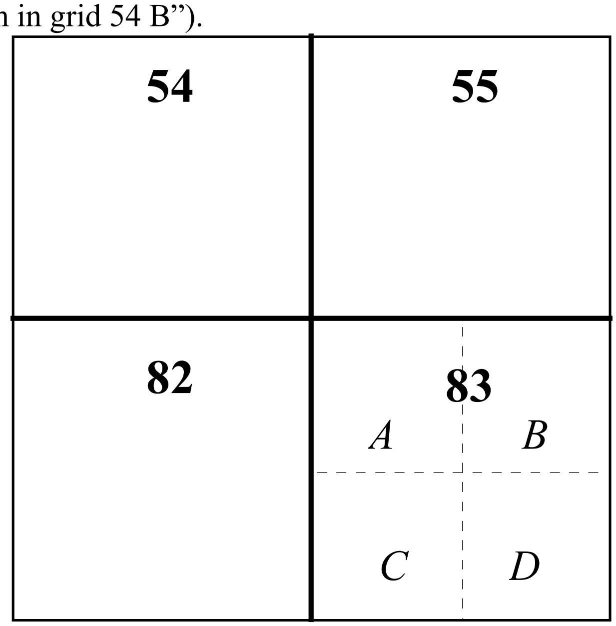
TRAINING AND EVALUATION

Training Outline

1. The CAP grid system is designed for use on aeronautical charts, but can be adapted to any map with latitude/longitude markings around the edge.

2. A grid is a 15 minute latitude by 15 minute longitude box. This is done by dividing the 30 minute by 30 minute boxes already on the aeronautical chart into fourths. Each grid is identified with a number. (For example "I am located in Grid 54").

3. To locate a position more precisely, mentally divide each grid into four quadrants. The Northwest quadrant is "A", the Northeast is "B", the Southwest is "C", and the Southeast is "D". Say the quadrant letter after the grid number (for example, "I am in grid 54 B").



Example of CAP grids (54,55,82 and 83) and lettered quadrants (83A, 83B, 83C, and 83D)

4. To find the grid designation of a known point on the map

    a. Find the grid number the point is in.

b. Determine which quadrant of the grid the point is in (A, B, C, or D)

5. To plot a point given a grid number and quadrant letter:

a. Find the appropriate grid on the map (the grid numbers increase as you look left to right and top to bottom on the map.

b. Mark the point in the appropriate lettered quadrant of that grid.

Additional Information

More detailed information on this topic is available in the Ground Team Member and Leader Reference Text and the Mission Aircrew Reference Text.

Evaluation Preparation

Setup: Mark a point on a CAP gridded map or chart and give the map to the student. Pick a different grid location from the point and write down the grid and quadrant. Ensure you have a timer.

Brief Student: Tell the student to tell you the CAP grid and quadrant designation of the point. Then orally give him the grid and quadrant of the point you wrote down and tell him to show you where that point is on the map.

Evaluation

Performance Measures	Results	
The individual determines the grid of a known point:		
1. Announces the correct grid number and quadrant within 1 minute	P	F
The individual determines the location of a designated grid:		
2. Finds the correct numbered grid and quadrant within 1 minute	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

O-2016

<u>DEMONSTRATE SAFETY WHILE TAXIING</u>

CONDITIONS

You are a Mission Scanner trainee and must demonstrate safety techniques while taxiing in an aircraft.

OBJECTIVES

Demonstrate safety while taxiing, including airport signs and markings and flightline hand signals.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, knowledge of safety during taxiing is essential. *All crewmembers should assist the pilot while taxiing*. The pilot should brief each crewmember on what direction he or she should look out the aircraft. Sterile cockpit rules are in effect, so the crew should limit their conversation to the task at hand. Report conflicts to the pilot immediately, using the "clock position" method.
    a. Maintain adequate clearance from obstacles.
    b. When taxiing within 10 feet of obstacles stop, and then proceed no faster than a slow walk.
    c. If available, use marshallers or a "wing walker."
    d. Potential collisions with other aircraft or vehicles.
    e. Stay on or find the taxiway. At night or under low visibility conditions, assist the pilot. Some smaller airports do not mark their taxiways or the paint may be faded.

2. Runway markings are white and taxiways are yellow. Taxiway centerlines are solid yellow. Some taxiway boundaries are marked with double yellow lines while others have blue lights or cones.

3. Mandatory signs have a red background with a white inscription, and are used to denote an entrance to a runway or critical area where an aircraft is prohibited from entering without ATC permission:
    a. Holding position for a runway. Do not cross without ATC permission.
    May have a row of red stop bar lights, embedded in the pavement and extending across the taxiway at the runway holding position. When illuminated they designate a runway hold position: never cross a red illuminated stop bar, even if cleared by ATC.
    

    b. Holding position for approach area. Do not cross without ATC permission.
    

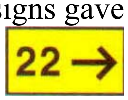
    c. Holding position for instrument landing system. Do not cross without ATC permission.
    

    d. No entry. Typically placed on a one-way taxiway or at the intersection of vehicle roadways that can be mistaken for a taxiway.
    

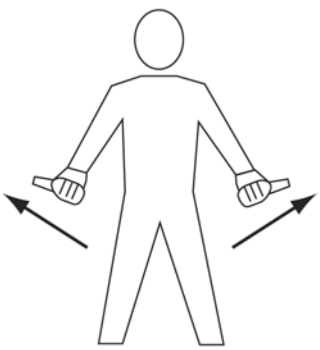
4. Holding position marking for runway boundary. Four yellow lines: two solid and two dashed. The aircraft approaches the dashed lines and stops behind the solid lines (ensures you do not enter the runway). Do not cross without ATC permission. When exiting the runway, the pilot should cross the dashed lines to make sure the aircraft is completely clear of the runway.
May have yellow clearance bar lights embedded in the pavement to indicate a hold point. May have flashing yellow guard lights elevated or in-pavement at runway holding positions.

5. Location signs are used to identify either a taxiway (letters) or runway (numbers) on which an aircraft is located, or to provide a visual clue to the aircrew when the aircraft has exited an area:

6. Direction signs gave a yellow background with a black inscription.

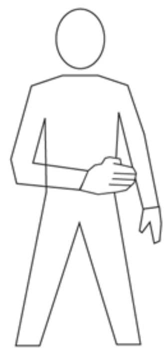


7. Ground crew use hand signals to help direct pilots during taxi operations. The scanner should be familiar with these signals in order to increase safety during taxiing and parking:

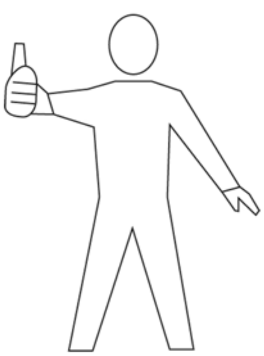


Outward motion with thumbs.
PULL CHOCKS

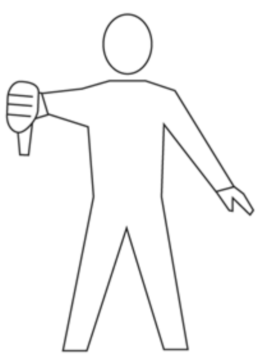
Circular motion of right hand at head level with left arm pointing to engine.
START ENGINE



Raise arm, with fist clenched, horizontally in front of body, and then extend fingers.
RELEASE BRAKE

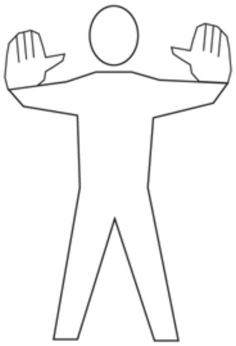


Thumb Up.
OK or **YES**

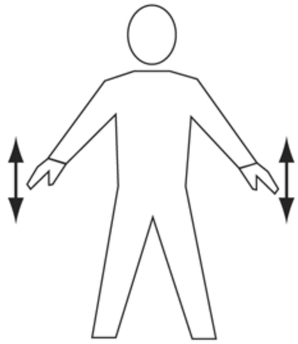


Thumb Down.
NOT OK or **NO**

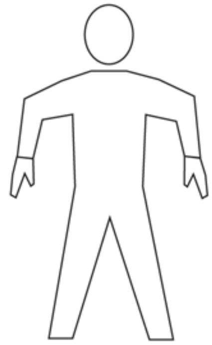
Arms above head in vertical position with palms facing inward. **THIS MARSHALLER**



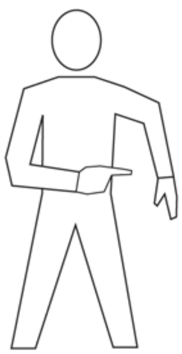
Arms a little aside, palms facing backwards and repeatedly moved upward and backward from shoulder height. **MOVE AHEAD**



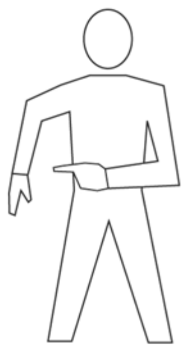
Arms down with palms toward ground, then moved up and down several times. **SLOW DOWN**



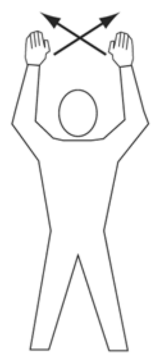
Arms extended with forearm perpendicular to ground. Palms facing body. **HOT BRAKES**



Arms extended with forearm perpendicular to ground. Palms facing body. Gesture indicates right side. **HOT BRAKES - RIGHT**

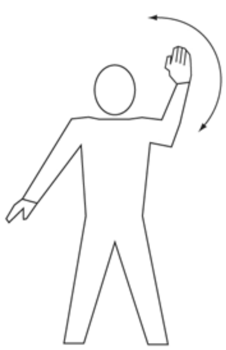


Arms extended with forearm perpendicular to ground. Palms facing body. Gesture indicates left side. **HOT BRAKES - LEFT**

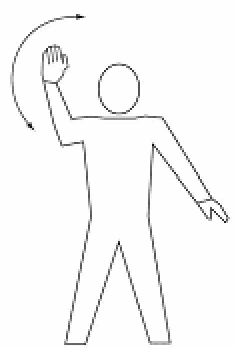


Waiving arms over head. **EMERGENCY STOP**

Right or left arm down, other arm moved across the body and extended to indicate direction of next marshaller. **PROCEED TO NEXT MARSHALLER**

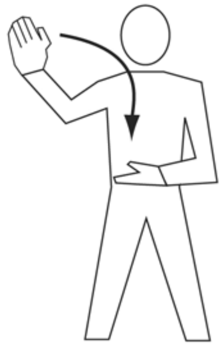


Point right arm downward, left arm repeatedly moved upward-backward. Speed of arm movement indicating rate of turn. **TURN TO THE LEFT**

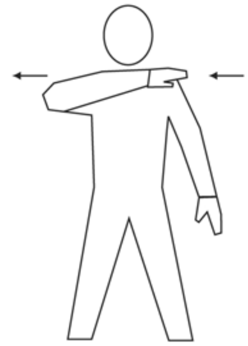


Point left arm downward, right arm repeatedly moved upward-backward. Speed of arm movement indicating rate of turn. **TURN TO THE RIGHT**

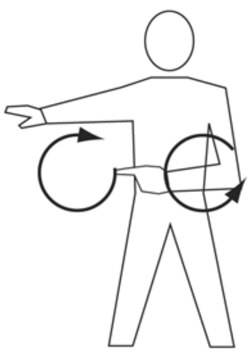
Arms crossed above the head, palms facing forward. **STOP**



Make a chopping motion with one hand slicing into the flat and open palm of the other hand. Number of fingers extended on left hand indicates affected engine.
FEATHER / FUEL SHUT-OFF

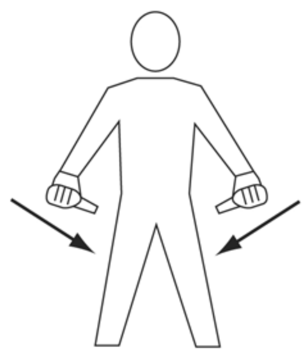


Either arm and hand level with shoulder, hand moving across throat, palm downward.
CUT ENGINES

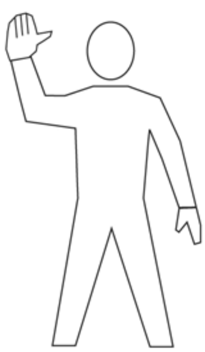


Make rapid horizontal figure-eight motion at waist level with either arm, pointing at source of fire with the other.
FIRE ONBOARD

Raise arm and hand, with fingers extended horizontally in front of the body, then clench fist.
ENGAGE BRAKE



Inward motion with thumbs.
INSERT CHOCKS



Right arm raised with elbow at shoulder height with palm facing forward.
MARSHALLER

Additional Information

More detailed information on this topic is available in Chapter 2 and Attachment 2 of the MART.

Evaluation Preparation

Setup: Provide the trainee access to airport signs and markings (pictures may be used) and someone to give flightline hand signals.

Brief Student: You are a Scanner trainee asked about safety during taxiing.

Evaluation

Performance measures	Results	
1. Discuss the safety rules used to avoid obstacles during taxiing.	P	F
2. Discuss the sterile cockpit rules and how you would point out an obstacle.	P	F
3. State the difference between runway and taxiway markings.	P	F
4. Identify mandatory signs and discuss their meaning.	P	F
5. Identify holding position markings and discuss their meaning.	P	F
6. Identify location and direction signs and discuss their meaning.	P	F
7. Recognize flightline hand signals.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

O-2018
OPERATE THE AIRCRAFT COMMUNICATIONS EQUIPMENT

CONDITIONS

You are a Mission Scanner trainee and must operate and discuss the aircraft communications equipment.

OBJECTIVES

Demonstrate basic knowledge and use of the aircraft communications radios and the CAP FM radio.
Demonstrate how to set up the audio panel to use the radios.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, basic knowledge of aircraft communications equipment is essential. Although you will probably only use the FM radio during missions, knowledge of how to use the other communications equipment could prove very important during emergencies.

2. Aircraft radios. The radios used in CAP aircraft are normally combined with navigation receivers, and so are often referred to as "nav/comm" radios. Each radio (there are usually two) has a 'primary' and a 'standby' function (called "flip-flop"): the primary frequency is displayed on the left and the standby frequency on the right. To use a frequency it must be in the primary display; to change a frequency, it must be in the standby display. The frequencies are normally tuned in increments of 50 kilocycles, for example 119.70 or 119.75 (the last '0' is not displayed).
They can also be tuned in increments of 25 kilocycles by pulling out on the tuning knob and turning, but the last '5' will not be shown in the display (e.g., 119.775 will be displayed as 119.77). Sometimes, for brevity, air traffic controllers assign such frequencies as "one-one nine point seven seven," meaning 119.775, not 119.770. The operator cannot physically tune the radio to 119.770, and this may be confusing.

3. Before transmitting on any radio, first *listen* to the selected frequency. An untimely transmission can "step on" another transmission from either another airplane or ground facility, so that *all* the transmissions are garbled. Next, mentally prepare your message so that the transmission flows naturally without unnecessary pauses and breaks (think "Who, Where and What"). You may even find it helpful to jot down what you want to say before beginning the transmission. When you first begin using the radio, you may find abbreviated notes to be a convenient means of collecting thoughts with the proper terminology. As your experience level grows, you may find it no longer necessary to prepare using written notes.

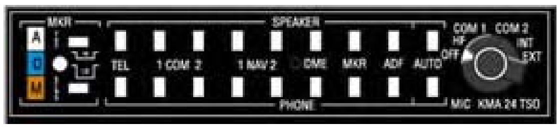
4. CAP aircraft callsigns are pronounced "Cap Flight XX XX," where the numbers are those assigned to each Wing's aircraft. *The numbers are stated in 'group' form*. For example, the C172 assigned to Amarillo, Texas is numbered 4239, where 42 is the prefix identifying it as a Texas Wing aircraft. The callsign is thus pronounced "Cap Flight Forty-Two Thirty-Nine." It is important to use the group form of pronunciation because FAA air traffic controllers expect it of us.

5. CAP VHF FM radio. This radio is dedicated to air to ground communications, and is normally operated by the observer or scanner. Several of the frequencies programmed into the radio are frequencies assigned to CAP by the U.S. Air Force, and are used to communicate with CAP bases and ground teams. Others are

programmed at the direction of the Wing Communications Officer (e.g., mutual aid, fire, police, park service, forest service, and department of public service); these frequencies almost always require prior permission from the controlling agency before use.

There are currently three types of FM radios in use in the CAP fleet at this time. Refer to your aircraft's operating manual for specific details for its use. Chapter 4 of the *Mission Aircrew Reference Text* provides directions on the use of the TDFM-136.

6. Audio panel. The audio panel serves as the 'hub' of radio communications in the aircraft, and is normally set up by the pilot or observer. The scanner needs to know how to select the 'active' aircraft communications radio for transmission. The active radio is selected with the switch on the right-hand side of the panel. Select either COM 1 or COM 2 to transmit and receive on the frequency displayed in the associated radio's primary display.



Additional Information

More detailed information on this topic is available in Chapter 4 of the MART.

Evaluation Preparation

Setup: Provide the student access to aircraft radios or detailed figures.

Brief Student: You are a Scanner trainee asked about using the aircraft radios.

Evaluation

Performance measures	Results	
1. Demonstrate how to enter a frequency and use the aircraft communications radios.	P	F
2. Discuss the importance of listening before transmitting, and basic message format.	P	F
3. Demonstrate proper use of the CAP aircraft callsign.	P	F
4. Demonstrate how to select a frequency and use the CAP FM radio.	P	F
5. Demonstrate setting up the audio panel to transmit on an aircraft radio.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

O-2022
DEMONSTRATE SCANNING PATTERNS AND LOCATE TARGETS

CONDITIONS

You are a Mission Scanner trainee and must use scanning patterns to locate targets.

OBJECTIVES

Use proper scanning patterns to locate an object and a person on the ground.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, the ability to use proper scanning patterns to locate objects on the ground is essential. Scanning is the process of investigating, examining, or checking by systematic search. In search and rescue operations, the scanner visually searches for distress signals or accident indications by using a systematic eye movement pattern. Refer to Chapter 5 of the MART for figures.

2. Vision. The brain actively senses and is aware of everything from the point outward to form a circle of 10 degrees (visual acuity outside of this cone of vision is only ten percent of that inside the cone). This is central vision, produced by special cells in the fovea portion of the eye's retina. Whatever is outside the central vision circle also is "picked up" by the eyes and conveyed to the brain, but it is not perceived clearly. This larger area is called peripheral vision; cells less sensitive than those in the fovea produce it. For example, an object that is visible one mile away using central vision would only be visible 500 feet away using peripheral vision. However, objects within the peripheral vision area can be recognized if mental attention is directed to them.

Note that peripheral vision is very important at night, and is also important in picking up structures such as towers.

3. Fixation area. The fixation area is the area in which "concentrated" looking takes place. If the search objective happens to come within this fixation area, you probably will recognize it. For central vision to be effective, the eye must be focused properly. This focusing process takes place each time the eyes, or head and eyes, are moved. When you are not actively focusing while looking outside the aircraft, your focal point will be a point about 30 feet out. Thus, daydreaming or thinking about other things while you are supposed to be looking for the target will guarantee you will not see the target even if your eyes are pointed right at it!

4. Fixation points and lines of scan. When you wish to scan a large area, your eyes must move from one point to another, stopping at each point long enough to focus clearly. Each of these points is a fixation point. When the fixation points are close enough the central vision areas will touch or overlap slightly. Spacing of fixation points should be 3 or 4 degrees apart to ensure the coverage will be complete. Consciously moving the fixation points along an imaginary straight line produces a band of effective "seeing."

5. Fixation area. The goal of scanning techniques is to thoroughly cover an assigned search area. Reaching this goal on a single overflight is not possible for a number of reasons. First, the eye's fixation area is a circle and the search area surface (ground) is flat. Coverage of a flat surface with circles requires much overlapping of the circles. This overlapping is not possible on a search mission because of the aircraft's motion. Also, the surface area covered by the eye's fixation area is less for the area near the airplane and increases with distance from the airplane. The net result is relatively large gaps in coverage near the airplane and some overlap as distance from the airplane increases. Angular displacement is the angle formed from a point almost beneath the airplane outward to the scanning range, or beyond. By this definition, the horizon would be at 90 degrees

displacement. Although the fixation area may be a constant 10-degree diameter circle, the effectiveness of sighting the objective decreases with an increase in this angular displacement. Said another way, your ability to see detail will be excellent at a point near the aircraft, but will decrease as the angular displacement increases. At the scanning range, at which the angular displacement may be as much as 45 degrees, the resolution of detail area probably will have shrunk to a 4-degree diameter circle. This is why having scanners looking out both sides of the aircraft is optimal. With track spacing (explained later) proper for the given search visibility, each scanner will look at roughly the same area (i.e., double coverage).

6. Field of scan. The area that you will search with your eyes in lines of scan is called the field of scan. The upper limit of this field is the line that forms the scanning range. The lower limit is the lower edge of the aircraft window, while the aft (back) limit is usually established by the vertical edge of the aircraft window. The forward (front) limit for a field of scan will vary. It might be established by a part of the airplane (such as a wing strut). Or, when two scanners are working from the same side of the airplane it might be limited by an agreed-upon point dividing the field of scan.

7. Scanning range. We are using the term "scanning range" to describe the distance from an aircraft to an imaginary line parallel to the aircraft's ground track (track over the ground.) This line is the maximum range at which a scanner is considered to have a good chance at sighting the search objective.

Scanning range sometimes may be confused with search visibility range. Search visibility range is that distance at which an object the size of an automobile can be seen and recognized. Aircraft debris may not be as large as an automobile and may not be immediately recognizable as aircraft debris, particularly when the aircraft is flying at 100 mph. Therefore, scanning range may be less than but never greater than the search visibility (in CAP searches, we rarely credit a search visibility of greater than three or four nautical miles).

If your pilot states that the search altitude will be 500 feet above the ground level (AGL), you can expect your scanning range to be ¼ to ½ mile. If the search altitude is 1,000 feet AGL, you can expect a scanning range of between ½ and 1 mile. Even so, there are many variables that affect both the effective scanning range and your probability of detecting the search objective. These issues are discussed later.

8. Scanning patterns. To cover the field of scan adequately requires that a set pattern of scan lines be used. Research into scanning techniques has shown that there are two basic patterns that provide the best coverage. These are called the *diagonal pattern* and the *vertical pattern.* The diagonal pattern is the better of the two.

The diagonal pattern begins with the first fixation point slightly forward of the aircraft's position, and the scanner moves her fixation points sequentially back toward the aircraft. The next scan line should be parallel to the first, and so on. Each succeeding scan line is started as quickly as possible after completing the previous one. Remember, the duration of each fixation point along a scan line is about 1/3 second: how long it takes to complete one scan line depends on the distance at which the scanning range has been established. Also, the time required to begin a new scan line has a significant influence on how well the area nearest the airplane is scanned. In other words, more time between starting scan lines means more space between fixation points near the airplane.

The vertical pattern is somewhat less effective. You should use this pattern only from a rear seat position, and the first fixation point should be as near to underneath the airplane as you can see. Subsequent fixation points for this first scan line should progress outward to the scanning range and back. This scanning pattern traces a "sawtooth" shape on the surface.

Note: If there are two scanners on the same side of the airplane, it is good practice to combine the diagonal and vertical patterns. As agreed between scanners, one would use the diagonal pattern and the other the vertical pattern. However, the scanner using the vertical pattern *would not* scan to the scanning range. Some distance short of the scanning range would be selected as the vertical pattern limit. This technique provides good coverage of the surface area near the search aircraft.

Additional Information

More detailed information and pictures on this topic are available in Chapter 5 of the MART.

Evaluation Preparation

Setup: Provide the student with an aircraft and aircrew (scanning techniques may be simulated on the ground).

Place a target (preferably to simulate aircraft wreckage) in the search area, and have a person (or mannequin) in the same general area. Fly the search area at 1000' AGL and 90-100 knots.

Brief Student: You are a Scanner trainee asked to demonstrate scanning patterns and locate targets in a search area.

Evaluation

Performance measures	Results	
1. Define "scanning" and "fixation," and describe how aircraft motion effects scanning.	P	F
2. Demonstrate knowledge of central and peripheral vision, and describe where your focal point is when your eyes are relaxed.	P	F
3. Demonstrate knowledge of fixation points and lines of scan, and define "scanning range."	P	F
4. Demonstrate diagonal and vertical scanning patterns.	P	F
5. Locate a target in a search area.	P	F
6. Locate a person in a search area.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

O-2023

DEMONSTRATE TECHNIQUES TO REDUCE FATIGUE

CONDITIONS

You are a Mission Scanner trainee and must demonstrate and discuss how to minimize fatigue.

OBJECTIVES

Demonstrate techniques to minimize fatigue, and how you would direct the pilot during flight.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, knowing how to minimize fatigue is essential. The art of scanning is more physically demanding and requires greater concentration than mere sight seeing. In order to maintain scanning effectiveness you must be aware of your own fatigue level. The following can help maintain scanning effectiveness:

a. Change scanning positions at 30- to 60-minute intervals, if aircraft size permits.
b. Rotate scanners from one side of the aircraft to the other, if two or more scanners are present.
c. Find a comfortable position, and move around to stretch when necessary.
d. Clean aircraft windshields and windows. Dirty windows accelerate the onset of eye fatigue, and can reduce visibility by up to 50 percent.
e. Scan through open hatches whenever feasible.
f. At night, use red lights and keep them dimmed to reduce reflection and glare.
g. Use binoculars (sparingly) to check sightings.
h. Focus on a close object (like the wing tip) on a regular basis. The muscles of the eye get tired when you focus far away for an extended period of time.
i. Rest during turns outside the search area.

2. The "clock position" system is used to describe the relative positions of everything outside the airplane, with the nose of the aircraft being "12 o'clock." The system considers positions to be on a horizontal plane that is centered within the cockpit, and any object above or below this plane is either "high" or "low."

Additional Information

More detailed information on this topic is available in Chapter 5 of the MART.

Evaluation Preparation

Setup: Provide the student access to an aircraft (may simulate on the ground).

Brief Student: You are a Scanner trainee asked how to minimize fatigue during searches.

Evaluation

Performance measures	Results	
1. Discuss fatigue effects and demonstrate how to minimize fatigue.	P	F
2. Describe how to direct the pilot using the "clock position" method.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

O-2025
TRACK AND RECORD POSITION ON SECTIONALS AND MAPS

CONDITIONS

You are a Mission Scanner trainee and must demonstrate basic use of navigational terms, determine heading and distance, and determine the position of the aircraft and ground features.

OBJECTIVES

Demonstrate basic knowledge and use of navigational terms. Determine the aircraft's heading and the distance between two points. Given a sectional chart, record a ground feature and transfer that location to a map.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Scanner trainee, a basic knowledge of navigational terms, the ability to determine heading and distance, and the ability to record a ground feature on a sectional and a map is essential. In order to effectively communicate with the pilot and ground units, the mission scanner must have a clear understanding of various terms that are used frequently when flying aboard CAP aircraft. These are not peculiar to search and rescue, but are used by all civilian and military aviators. The scanner must also be able to track the aircraft's position, and relay the location of ground features to both the pilot and observer and units on the ground.

2. Course. Course refers to the planned or actual path of the aircraft over the ground. The course can be either *true course* or *magnetic course* depending upon whether it is measured by referencing true north or magnetic north. The magnetic north pole is *not* located at the true North Pole on the actual axis of rotation, so there is usually a difference between true course and magnetic course.

3. Heading. Heading is the direction the aircraft is *physically* pointed. True heading is based on the true North Pole, and magnetic heading is based on the magnetic north pole. Most airplane compasses can only reference magnetic north without resorting to advanced techniques or equipment, so headings are usually magnetic.

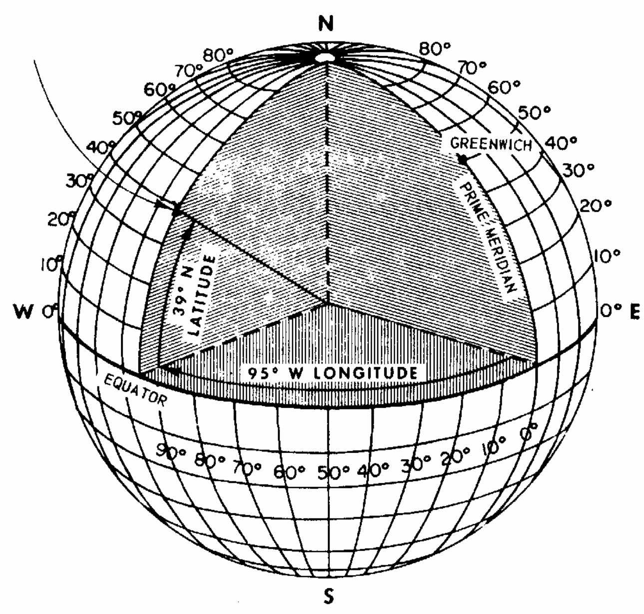
6. Drift is the effect the wind has on an aircraft. The motion of the airplane relative to the surface of the earth depends upon the fact that the airplane is moving relative to an air mass and the air mass is moving relative to the surface of the earth. Adding these two gives the resultant vector of the airplane moving relative to the surface of the earth. The angle between the heading and the actual ground track is called the drift angle. Drift is corrected by changing the aircraft's heading just enough to negate drift.

5. Ground track. The actual path of the airplane over the surface of the earth is called the ground track. An airplane's track over the ground doesn't always correspond with the direction it's pointed (heading). This is due to the effect of wind (drift). All GPS units will display ground track.

6. A nautical mile is about 6076 feet (sometimes rounded to 6080 feet), compared to 5280 feet for the statute mile. Most experienced aviators simply refer to a nautical mile as a mile. *Scanners and Observers should remain aware of this difference when communicating with ground search teams because most ground or surface distances are measured using statute miles or kilometers*. To convert nautical miles into statute miles, multiply nautical miles by 1.15. To find kilometers, multiply nautical miles by 1.85. Also, one nautical mile is equal to one minute of latitude: this provides a convenient scale for measuring distances on any chart. Nautical miles are abbreviated "nm".

7.   A knot is the number of nautical miles flown in one hour. Almost all airspeed indicators measure speed in terms of knots, not miles per hour. One hundred knots indicates that the aircraft would fly one hundred nautical miles in one hour in a no-wind condition. Knots can be used to measure both *airspeed* and *ground speed.*

8.   Latitude and Longitude. Navigation begins with is a common reference system or imaginary grid "drawn" on the earth's surface by *parallels of latitude* and *meridians of longitude.* This system is based on an assumption that the earth is spherical. In reality, it's slightly irregular, but the irregularities are small, and errors caused by the irregularities can be easily corrected. The numbers representing a position in terms of latitude and longitude are known as the coordinates of that position. Each is measured in degrees, and each degree is divided into 60 smaller increments called minutes. Each minute may be further divided into 60 seconds, or tenths and hundredths of minutes.



Latitude is the angular distance of a place north or south from the equator. The equator is a great circle midway between the poles. Parallel with the equator are lines of latitude. Each of these parallel lines is a small circle, and each has a definitive location. The location of the latitude is determined by figuring the angle at the center of the earth between the latitude and the equator. The equator is latitude 0º, and the poles are located at 90º latitude. Since there are two latitudes with the same number (two 45º latitudes, two 30º, etc.) the letter designators N and S are used to show which latitude is meant. The North Pole is 90º north of the equator and the South Pole is 90º south of the equator.

Longitude is counted east and west from the Greenwich (zero) meridian through 180º. Thus the Greenwich Meridian is zero degrees longitude on one side of the earth, and after crossing the poles it becomes the 180th meridian (180º east or west of the 0º meridian). Therefore all longitudes are designated either E or W.

Using latitude and longitude, any position on a map or chart can be identified. When identifying a location by its position within this latitude/longitude (lat/long), you identify the position's coordinates *always indicating latitude first* and then longitude. For example, the coordinates N 39° 04.1', W 95° 37.3' are read as "North thirty-nine degrees, four point one minutes; West ninety-five degrees, thirty-seven point three minutes." If you locate these coordinates on *any* appropriate aeronautical chart of North America, you will *always* find Philip Billard Municipal Airport in Topeka, Kansas.

9.   Heading and distance. To determine a heading, locate the departure and destination points on the chart and lay the edge of a special protractor, or *plotter*, along a line connecting the two points. Use a marker to trace the

route. Read the true course for this leg by sliding the plotter left or right until the center point, or grommet, sits on top of a line of longitude. When the course is more to the north or south, you can measure it by centering the grommet on a parallel of latitude, then reading the course from the inner scale that's closer to the grommet. [As a "stupid check," note the heading in terms of cardinal points (e.g., N, NW, NNW), and see if this agrees with your first result.]

To determine the distance you're going to travel, lay the plotter on the route and read the distance using the scale that's printed on the plotter's straight edge: one edge measures nautical miles and the other statute miles.

10. Tracking current position. Knowing how to track the aircraft's progress on a sectional chart and a map is essential in order to maintain situational awareness. This, in turn, allows you to accurately mark targets. We previously discussed how to use navigational aids and a sectional chart to plot and navigate a course; the same principles are used during flight to keep track of the aircraft's current position and to record sightings. Besides tracking you position by looking at ground features and following along on your sectional, the pilot or observer can use the VORs, DME and the GPS to update you on current position.

There are a number of ways you can add information to your chart that will help during the flight. Tick marks along the course line at specific intervals will help you keep track of your position during flight (situational awareness). Some individuals prefer five- or ten-nautical mile (nm) intervals for tick marks, while others prefer two- or four-nm intervals. Four-nautical mile spacing works well for aircraft that operate at approximately 120 knots. Since the 120-knot airplane travels 2 nm every minute, each 4 nm tick mark represents approximately two minutes of flight time. On the left side of the course line you have more tick marks, at five-nm intervals, but measured backward from the destination. In flight, these continuously indicate distance remaining to the destination, and you can easily translate that into the time left to your destination.

The next step in preparing the chart is to identify *checkpoints* along the course; you can use these to check your position on- or off-course, and the timing along the leg. Prominent features that will be easily seen from the air make the best checkpoints, and many like to circle them or highlight them with a marker in advance. You should select easy (large) targets such as tall towers, cities and towns, major roads and railroads, and significant topological features such as lakes and rivers. Try not to select checkpoints that are too close together. During a mission, checkpoint spacing will be controlled by the search altitude and weather conditions and visibility at the time of the flight.

11. Recording and reporting position. Being able to record and report the position of a ground feature is a critical skill in all CAP ES missions. Once an aircrew locates a downed aircraft or determines the location of a breech in a levy, they must be able to pinpoint the location on the sectional and report that position to others. Since the details on the sectional chart are often not detailed enough to be useful to ground units, the scanner usually has to transfer that information to a map (e.g., road or topographical).

Using all available tools (i.e., VOR, DME, GPS, and visual references), record the position of the target (e.g., aircraft, levy, spill, or damaged plant) on the sectional. Using lat/long coordinates or the target's relation to observable ground features (e.g., roads, rivers, towns, etc.), transfer the target's position to a road or topo map. [Remember, an important part of planning a mission includes ensuring that you have the same kind of map that the ground units are using, so the position you give them will be easily understandable.]

Additional Information

More detailed information on this topic is available in Chapter 8 of the MART.

Evaluation Preparation

Setup: Provide the student with a plotter, a sectional chart and a map.

Brief Student: You are a Scanner trainee asked to discuss navigation terms, determine a heading and the distance between two points, and given a sectional and a map, locate an aircraft's current position and record the position of a ground feature.

Evaluation

Performance measures	Results
1. Discuss the use of the following navigational terms:	P F
a. Course, heading and ground track.	P F
b. Nautical mile and knot.	P F
2. Given a plotter and a sectional, determine a route's heading and distance.	P F
3. Given a sectional, record a ground position by its latitude/longitude and then record that position on a road or topo map.	P F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

KEEP A LOG

CONDITIONS

You have been assigned to keep a log on a mission, and must log the actions of your unit, section or team on the ICS Form 214 for use during debrief after the mission.

OJECTIVES

Correctly maintain a log of actions during an incident.

TRAINING AND EVALUATION

Training Outline

1. When working an incident, staff members are required to maintain a log of all significant actions. This is important for record keeping of the accomplishments and setbacks, determining search effectiveness during debriefing, and as a legal record of CAP actions amongst many other things.

2. The mission log is started once a unit or section is opened and maintained until personnel are called in and at home safely to the incident commander. A separate log should be maintained for each varying unit or section that is assigned to the incident, and subordinate units at varying levels will normally also keep a log. This log is turned in with the debriefing paperwork and becomes part of the official mission record.

3. The following actions are always recorded in the log:

FOR GROUND OPERATIONS

a. Departure and return times to mission base.

b. Routes taken to and from the search area.

c. Times of entering and leaving search areas.

d. Any time the search line changes direction.

e. Times/locations of clue detections or witness interviews.

f. Time/location of find.

g. Time/Location of communications checks.

h. Any event or action related to the team's ability to complete the sortie requirements (natural hazards encountered, injuries to team members, etc.).

i. Encounters or instructions from local authorities.

j. Encounters with the media.

k. Mileage/Flight time at key intersections, when leaving pavement, at other key locations, etc.

l. Time of distress beacon or other emergency signal acquisition.

m. Times distress beacon located and silenced. Also, if available, include the name(s) and organization(s) of person(s) involved in silencing the distress beacon, the manufacturer, serial number, dates of manufacture and battery expiration, vehicle information (type, vehicle registry, description), and the name of the owner.

n. Personnel assignments to and from the team/unit.

Note: This log (ICSF 214) may be kept as an attachment to the CAPF 109

FOR AIRCREW OPERATIONS

a. Briefing details

b. Names of crew members

c. Engine start time

d. Take Off time

e. Communications checks

f. Time beginning assigned grid or route

g. Time departing grid or route

h. Significant weather, turbulence, other

i. Time of landing

j. Time of engine shutdown

k. Crew changes if any

Note: this log (ICSF 214) may be kept as an attachment to the CAPF 104

FOR MISSION BASE STAFF OPERATIONS

a. Time/date unit or log started or activated

b. Name of unit, supervisor, and individual keeping the log

c. Notes from initial briefing

d. Time and noted from staff meetings

e. Significant events, actions taken, direction received or provided

4. For each log entry, the log keeper writes down the following on the ICSF 214:

a. The time.

b. The event taking place (see list above)

c. Mileage and/or location as appropriate.

d. Name of individual annotating the log each time there is a change.

Additional Information

More detailed information on this topic is available in each emergency services reference text.

Evaluation Preparation

Setup: Prepare narrative of 10 events/actions and times. Provide the individual with the list, a pen, and an ICS Form 214.

Brief Student: Tell the student that he is the log keeper for his unit, and that the 10 events listed in the narrative have occurred. Tell him to log the events/actions on the on team log form.

Note: this evaluation can be accomplished during a training exercise by observing the events taking place and checking the log to see that they are properly annotated.

Evaluation

Performance measures	Results	
For each of the 10 events/actions, the student:		
1. Logs the time and event	P	F
2. Writes legibly and completely	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

CAP Mission Aircrew

Scanner Course

Introduction

Administrative Items

CAPR 60-series Review

Mission Scanner Requirements

- Trainee
  - Qualified General Emergency Services (GES)
  - At least 18 years of age (minimum; should be mature)
  - 101T-MS familiarization and preparatory training
  - Commanders authorization
- Qualification
  - 101T-MS requirements
  - Exercise participation (two separate missions)
  - Unit certification and recommendation

Scanner/Observer Duties and CAP Missions

(Chapter 1)

Objectives

- ***Throughout these slides, each objective is followed by*:**
- **The mission specialty rating to which the objective applies (S = Scanner; O = Observer; P = Pilot)**
- **The section in the *Aircrew Reference Text* where the answer to the objective may be found**

Objectives

- State mission scanner duties and responsibilities. {S; 1.1}
- State mission observer duties and responsibilities. {O; 1.2}
- Discuss CAP missions {S; 1.4}
- Discuss liability coverage and applicability {S; 1.5}
- List the general rules for entering data into forms. {S; 1.7.1}

Scanner Duties & Responsibilities

- PRIMARY RESPONSIBILITY: Visual Search
- IMSAFE (next slide)
- Be prepared to fly the mission — clothing, equipment, credentials, etc.
- Assist in avoiding obstacles during taxiing
- Obey 'sterile cockpit' rules – limit conversation to mission- and safe-related topics during critical phases of flight, or anytime the crew is executing high-load tasks
- Employ effective scanning techniques.
- Report observations accurately and honestly.
- Keep accurate sketches and notes.
- Complete all required paperwork.
- Conduct the mission as planned & report availability.
- Return borrowed or assigned equipment.

"IMSAFE"

- **I***llness*
- **M***edication*
- **S***tress*
- **A***lcohol*
- **F***atigue*
- **E***motion*

Observer Duties & Responsibilities

- Primary Responsibility during searches: <u>Visual Search</u>
- Report for briefings
- Assist in planning – may be mission commander
- Check necessary equipment aboard (checklists)
- Assist in avoiding obstacles during taxiing
- Assist in setting up and operating radios
- Assist in setting up and operating nav equipment
- Maintain situational awareness
- Assist in monitoring fuel status

Observer Duties & Responsibilities (continued)

- Assist enforcing the sterile cockpit rules
- Assist pilot during searches, particularly ELT
- Keep mission base/high bird apprised of status
- Coordinate scanner assignments, schedule breaks, monitor crew for fatigue & dehydration
- Maintain observer's log
- Report for debriefing
- Assist with **all** post-mission paperwork
- Keep track of assigned equipment and supplies

CAP Missions

- Aerospace Education
- Cadet Program
- Emergency Services
  - Civil Defense / Wartime
  - Disaster Relief
  - Search and Rescue
  - Emergency Communications
  - National Security

CAP Civil Defense/Wartime Missions

- **CAP OPLAN 1000**
  - Provide emergency communications network
  - Provide damage assessment
  - Support state and regional disaster airlift (SARDA)
  - Provide radiological monitoring and decontamination teams
  - Airlift of high priority resources
- **Security Control of Air Traffic and Air Navigation Aids (SCATANA) Plan**

CAP Peacetime Missions

- Peacetime disaster relief as a component of FEMA Urban Search and Rescue program
  - Damage Assessment, Communications, Transportation
- Search and Rescue (SAR)
  - USAF is SAR coordinator
  - AFRCC implements national search and rescue plan
  - CAP conducts 4 out of 5 searches
- Counterdrug Operations (CD)
  - Support is limited to: reconnaissance, transportation and communications
  - US Customs, DEA, US Forest Service and others

Peacetime Missions (con't)

- Homeland Security
  - TBD
- Partner Agencies
  - Red Cross
  - Salvation Army
  - Federal Emergency Management Agency (FEMA)
  - Department of the Interior (DOI)
  - Federal Highway Administration (FHA)
  - Federal Aviation Administration (FAA)
  - National Transportation Safety Board (NTSB)
  - U.S. Coast Guard (USCG)

Liability

- Federal Employee Compensation Act (FECA)
  - Worker's compensation
  - Injured or killed on Air Force-assigned missions
  - Commercial insurance for corporate missions
  - Coverage varies depending on the type of mission
    - Know your coverage for the missions you are on

Liability (con't)

- Federal Tort Claims Act (FTCA)
  - Liability protection
  - CAP members acting within the scope of their duties on CAP operational missions
  - Air Force assigned missions (including 911T)
  - CAP corporate missions
- CAPR 900-5, CAP Insurance/Benefits Program

Liability (con't)

- Wing and Region Commanders may assess CAP members for the cost of repairs due to damage to CAP Aircraft (CAPR 60-1):
  - Negligence – up to $500
  - Gross negligence – up to $5,000
  - Willful or intentional misconduct – beyond $5,000
  - CAP corporate missions
- CAPR 62-2, Mishap Reporting
  - CAPF 78, Mishap Report Form
- Avionics lock

Operational Agreements

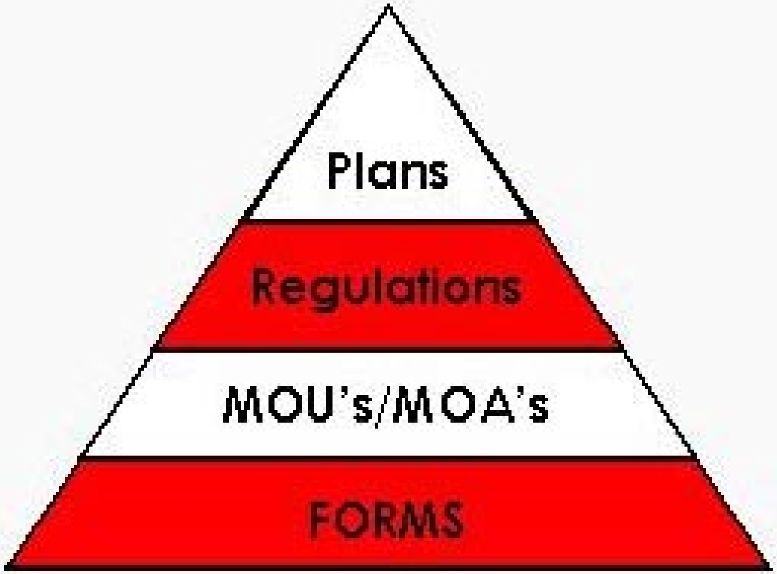
- National, regional and state levels
  - In accordance with CAPR 60-3
  - Formalized through agencies chain of commands
  - Facilitates OPLAN implementation
  - Agreements are approved and signed at all levels
    - Contents
    - Limitations
    - Reimbursements
    - Liability

Forms

- OPLANS and CONPLAN's – contingency actions
  - Regulations – supervise and direct

  -- MOUs and Agreements – facilitate understanding

  ---- Forms – facilitate implementation and recording



CAP Forms 104 and 108

- CAPF 104 Mission Flight Plan / Briefing / Debriefing Form
  - Completed for each mission sortie
  - Complete and legible
- CAPF 108 CAP Payment / Reimbursement Document for Aviation / Automotive / Miscellaneous Expenses
  - CAPR 173-3
  - Use current form (previous editions are obsolete)
  - Completed for each mission
  - File within 30 days after mission completion
  - Complete and legible

Entering Data onto Forms

- **Data must be accurate and legible**
  - Print, or have another crewmember fill out the form.
  - Electronic

- **General rules:**
  - Corrections: line through and initial (no “Liquid Paper”)
  - No signature labels or stamped signatures
  - Attachments: Name, Date, Mission & Sortie number, ‘N’ Number, Hobbs time
  - Review the form. Make sure blanks or “N/A” are intentional.

Summary

- **Wartime or peacetime tasking**
- **Plans, MOU's, agreements and regulations**
- **Forms: Complete, accurate and *legible***
- ***You* implement the CAP mission**
- **Know the source regulations**
  - **CAPR 60-1 (flying operations)**
  - **CAPR 60-3**
  - **CAPR 60-4**
  - **MOUs**

QUESTIONS?

Aircraft Familiarity

(Chapter 2)

Objectives

- State the basic function of the aircraft ailerons, elevator, rudder, trim tabs and fuel selector. {S; 2.1}
- Discuss the relationship between the magnetic compass and heading indicator. {S; 2.2.1 & 2.2.2}
- State the basic function of the airspeed indicator, attitude indicator, GPS, nav/comm radios, audio panel, and transponder. {S; 2.2.3 - 2.2.11}
- Discuss the consequences of exceeding the gross weight limit. {S; 2.3.1}

Objectives (con't)

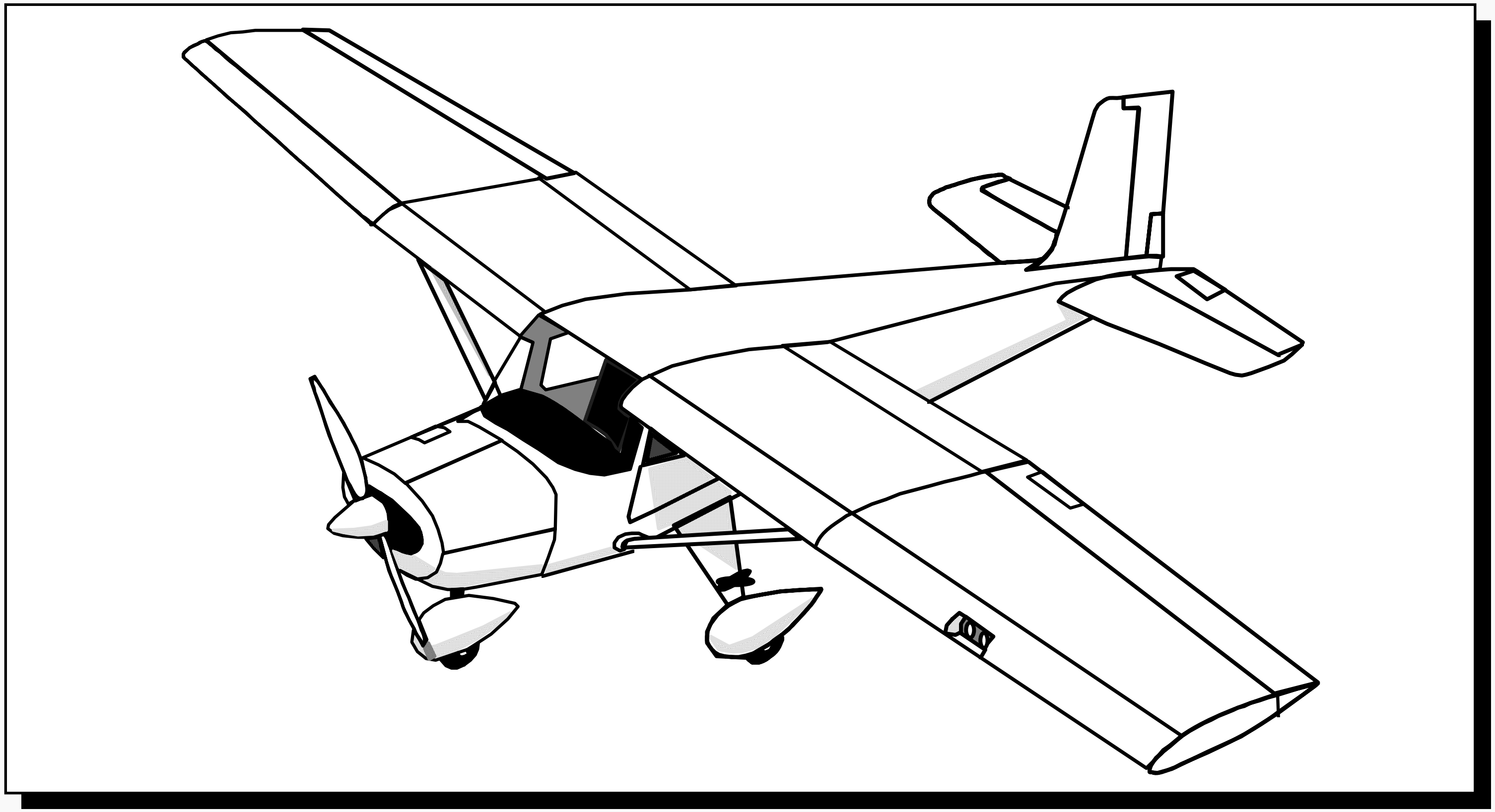
- Discuss the importance of maintaining proper balance (c.g.), and factors in computing weight & balance {S; 2.3.2}
- State the purpose of the pre-flight inspection, and discuss the items checked during the pre-flight inspection. {S; 2.4}
- Discuss ground operations and safety, including: {S; 2.5}
  - Ramp safety
  - Moving and loading an aircraft
  - Entry and egress
  - Fuel management
  - Taxiing, including airport signs and markings
- Discuss wake turbulence, including where it is most likely to be encountered. {S; 2.6}

Aircraft Familiarization

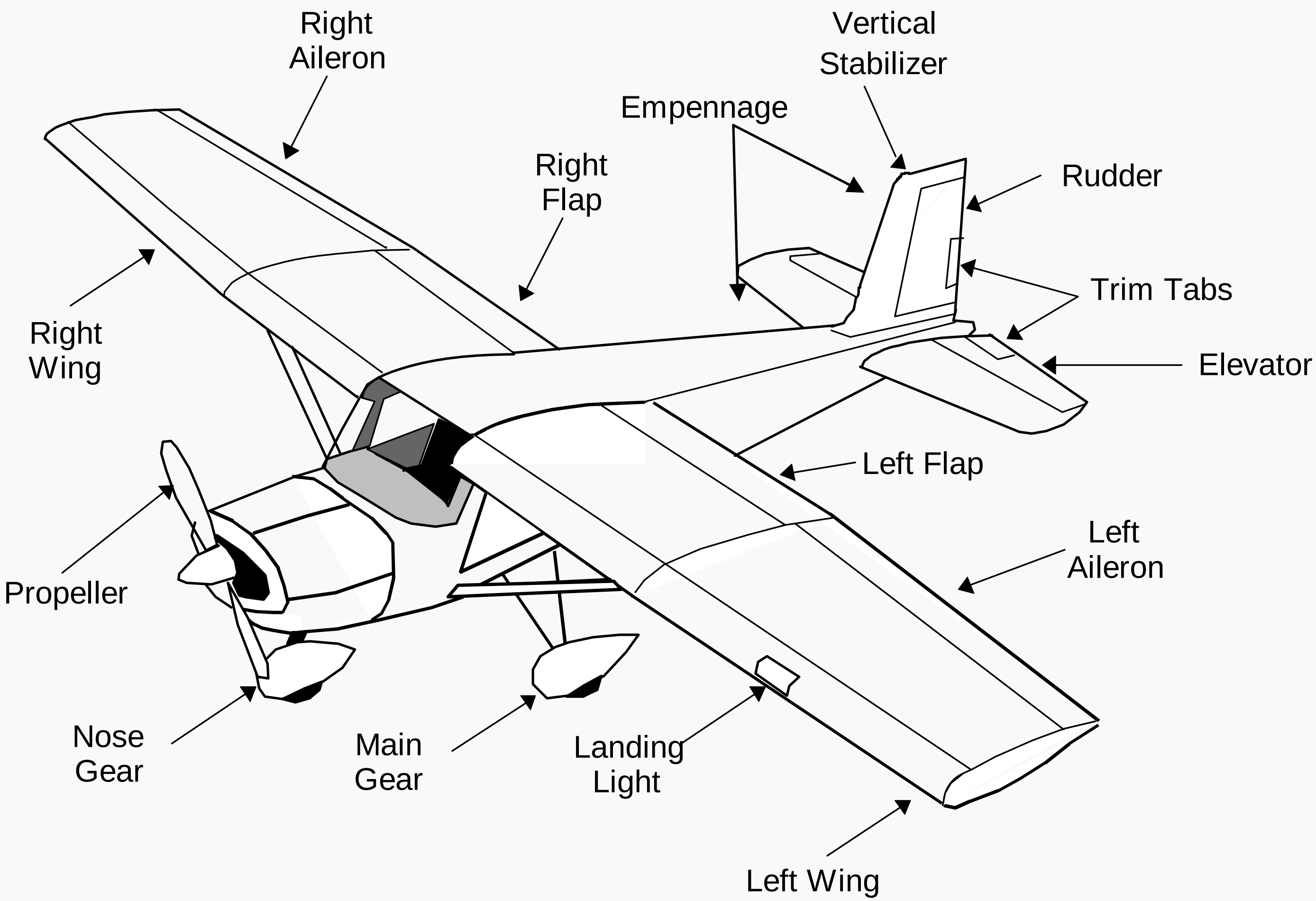
- Why do I need to know this stuff anyway?
- Structure
- Instrumentation
- Weight & Balance
- Pre-flight inspection
- Safety
- Ground operations
- Wake turbulence
- Flightline signals

The Airplane

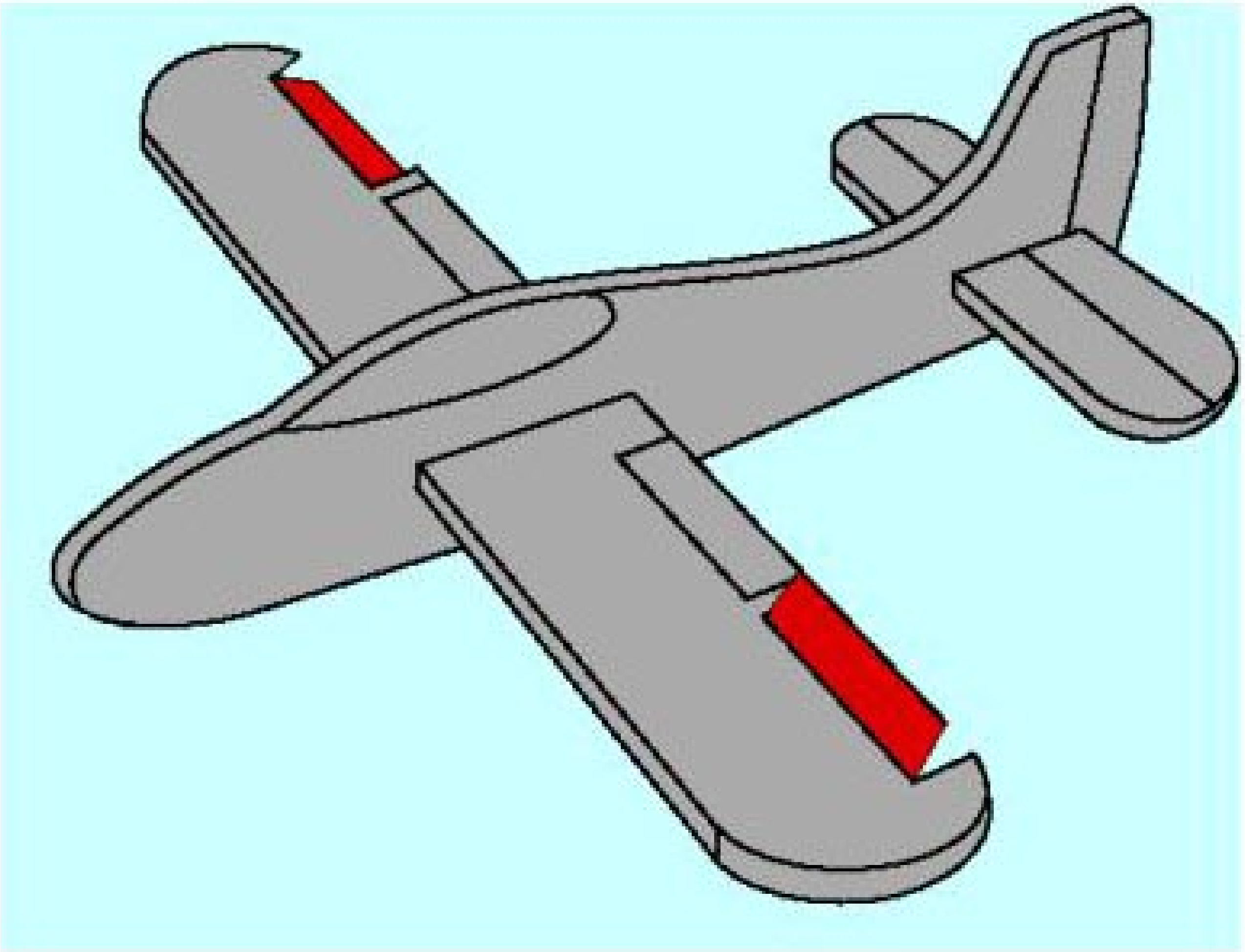
- CAP typically uses C172 and C182.



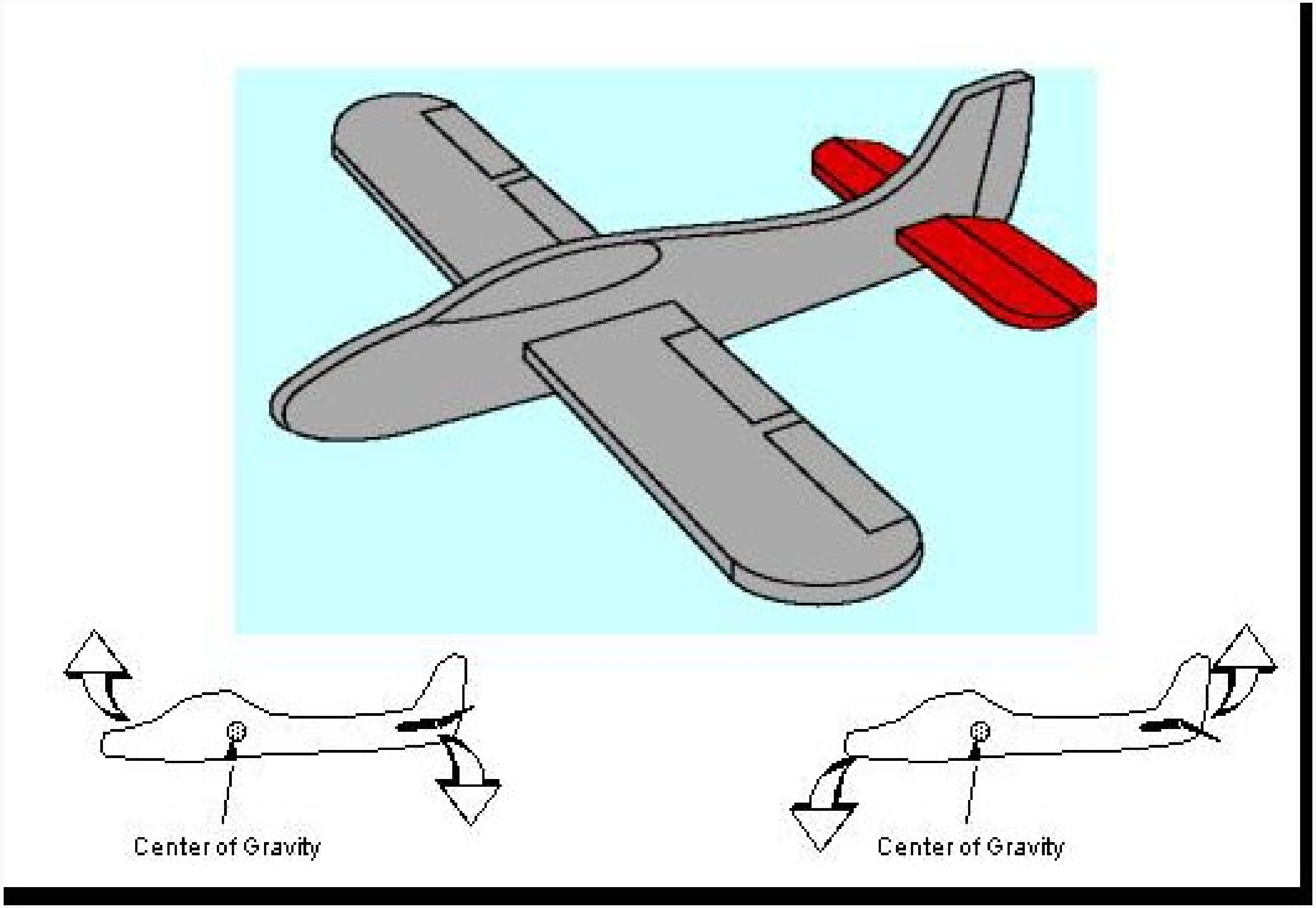
Basic components



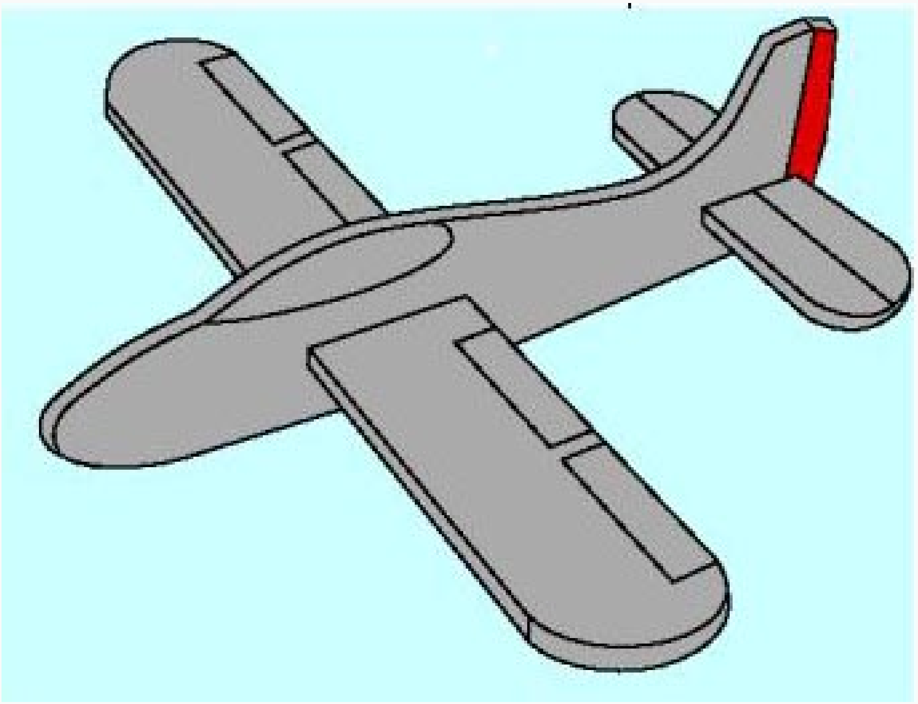
Ailerons provide roll control

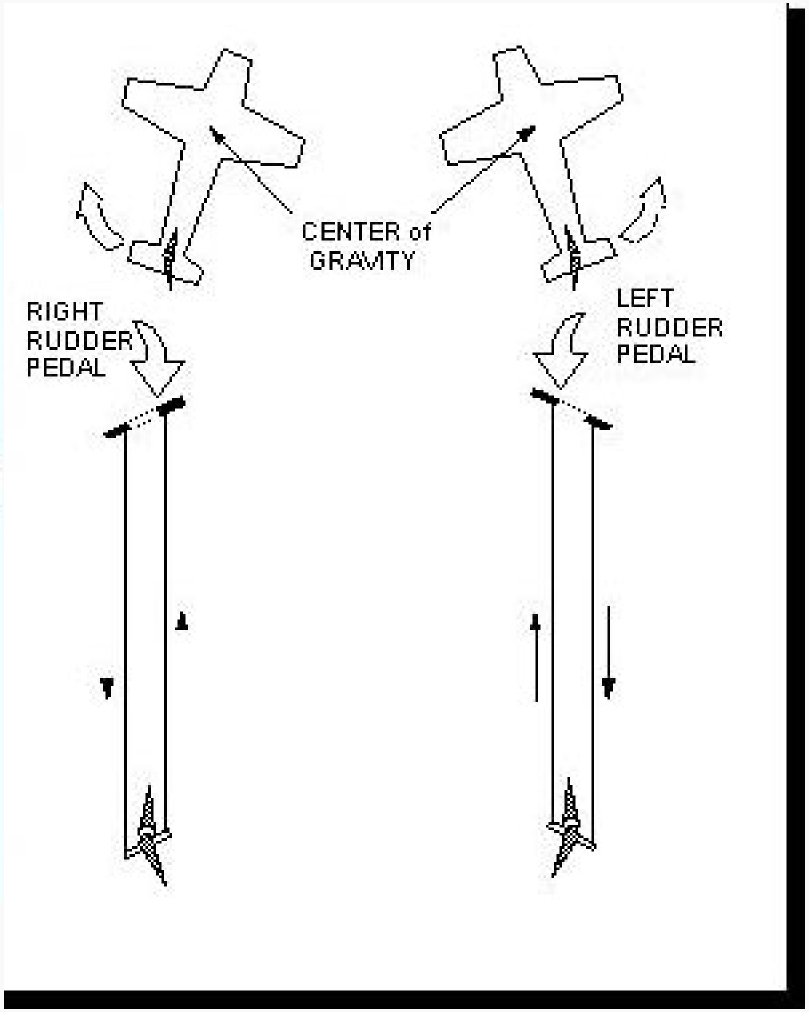


Elevators provide pitch control



The rudder controls yaw





Trim tabs neutralize control pressures

Fuel selector

Typical Instrument Panel

Magnetic Compass

- Primary
  - Doesn't require any power
  - Used to set HI (DG)
  - Installation problems
  - Bank angles and speed changes can cause a compass to show the wrong heading

Heading Indicator

- Vacuum gyro (Directional gyro)
  - Stable indications
  - Quick response to turns
  - Electrical or vacuum-driven
  - Will drift, requires periodic re-alignment

Altimeter

- Static pressure
  - Usually set to show pressure altitude above Mean Sea Level (MSL)
  - Accurate altitude is dependent on the altimeter setting.

Turn Coordinator

- Electric
  - Really two instruments
  - Miniature aircraft shows turn rate only - does <u>not</u> show bank angle
  - Inclinometer shows quality of turn - Coordinated, slip, skid

Attitude Indicator

- Vacuum gyro
  - Highly reliable & useful
  - Provides a horizon reference
  - Hash marks indicate bank angle
  - Climb/descent marks

Airspeed Indicator

- Static & Ram pressure
  - Knots (and/or MPH)
  - Colored markings show ranges
  - Shows aircraft speed through the air

Vertical Speed Indicator

- Static pressure rate of change
  - Climb or descent rate
  - Has a lag due to design
  - Use with altimeter

Tachometer

- RPM
  - Markings — green arc
  - Indicates power

Other Instruments

- Gauges
  - Fuel (accurate at empty)
  - Manifold pressure
  - Fuel flow
  - Oil Temperature and Pressure
  - Vacuum and Generator
  - Exhaust Gas Temperature
  - Instruments vary from aircraft to aircraft

Nav/Comm

Communications

Navigation

- Primary and Standby Frequencies (flip-flop)

Comm Antennas

- Normally mounted on top
- One for each radio

Nav Antennas

- “Cat whisker” style
- One for each nav
- May be dual blade (Bonanza)

Static "wicks"

- Mitigate buildup of static electricity (interferes with comm)
- Wings, elevators, vertical stabilizer
- Take care when walking around

Other Antennas

Loop
(directional)
ADF

Marker
Beacon

GPS

- Apollo GX55
- ARNAV Star 5000

GPS Antenna

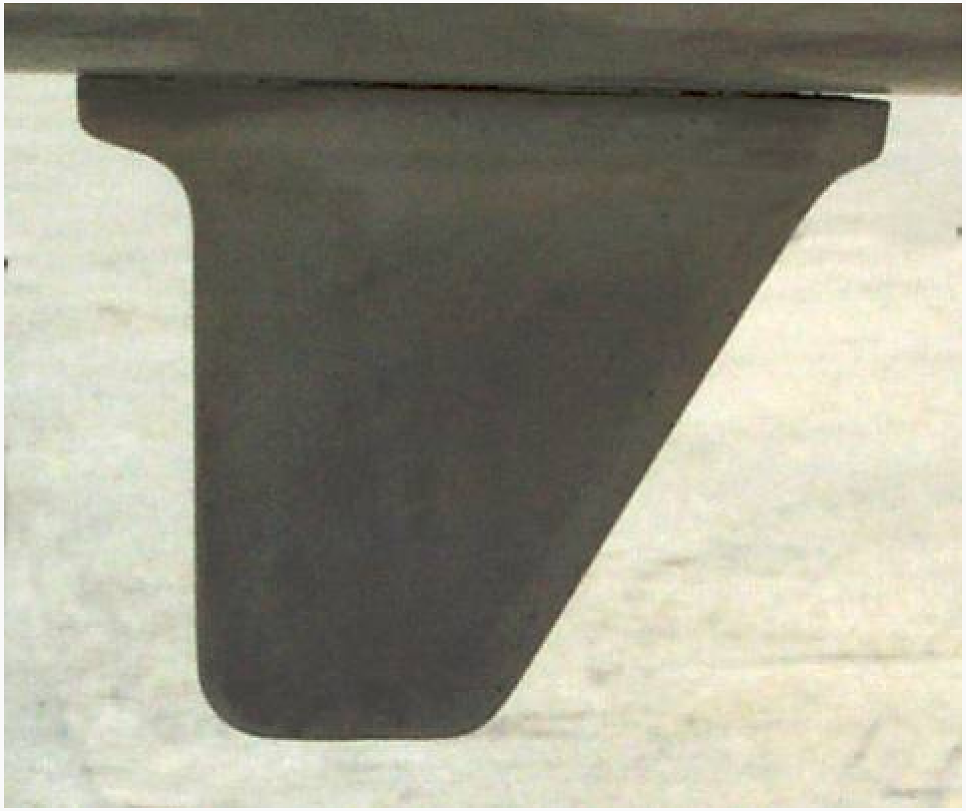
- Line of sight, so mounted at the very top
- Comm antennas can interfere with the weak signals, so they are tested for interference

Audio Panel


O
M
I
High
Low
Test
Com1
Nav 1
MKR
ADF
DME
Com 1
Com 1/2
Com 2
Com 1/3
Com 3
Com 2/3
Volume
Iso
All
Crew
Com2
Nav 2
ICS
Com3
SPR
Push
(Fail Safe)
PS ENGINEERING INCORPORATED
PMA7000M-S
Transmit
Swap

Transponder

UHF Antenna



Blade type (may be spike)
Transponder & DME
[If mounted up front, may interfere with DF]

Navigation Instruments

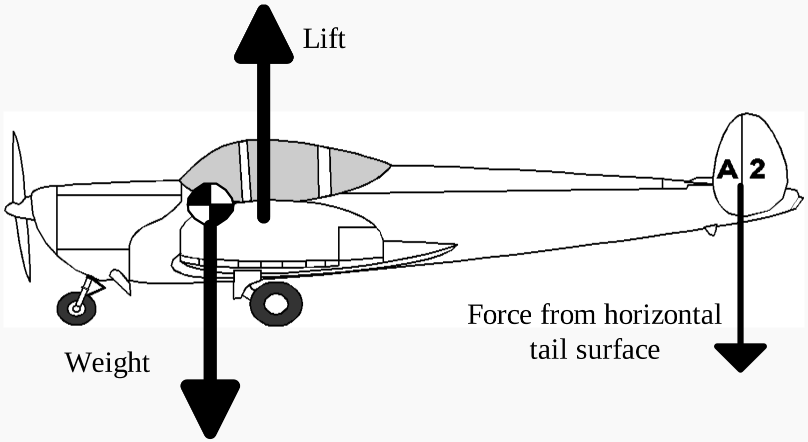
VOR

ADF

- VHF Omnidirectional Range (VOR-DME, VORTAC)
  - Indicates direction to/from ground transmitter relative to magnetic North
- Automatic Direction Finder (NDB)
  - Direction toward ground transmitter relative to airplane nose

QUESTIONS?

Weight and Balance



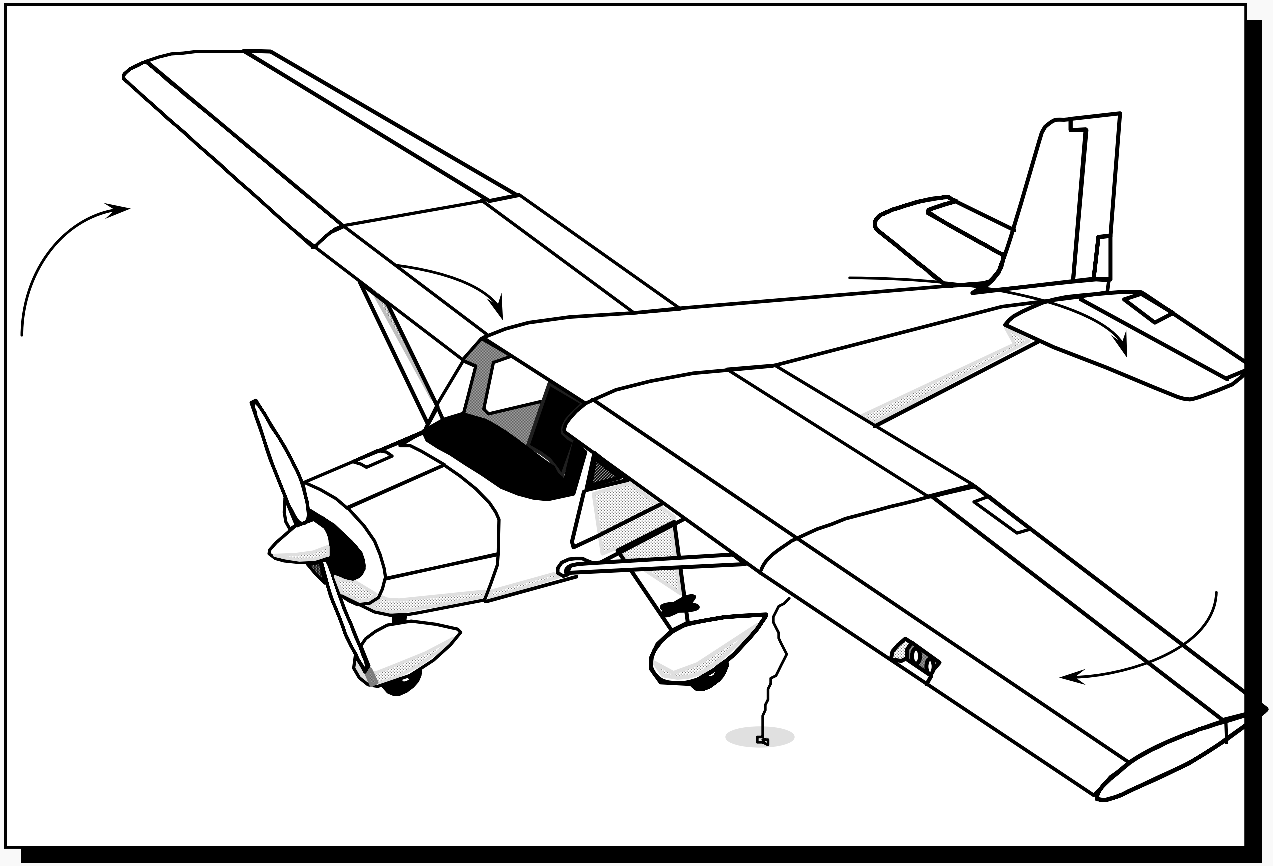
- The wings generate a limited amount of lift
- Maximum weight for an aircraft is set by the manufacturer
- Pitch stability is affected by the location of the center of gravity
- The pilot computes weight and balance and controls it by loading the aircraft correctly

Weight and Balance

- Excessive weight adversely impacts performance:
  - Longer take off and landing distance
  - Reduced climb performance
  - Reduced ability to withstand turbulence and wind shear forces
- Out of Forward C.G. limits can cause:
  - Reduced up-elevator authority (ability to raise the nose)
  - Can eliminate the ability to flare for landing
- Out of Rear C.G. limits can cause:
  - Reduced down-elevator authority (ability to lower the nose)
  - Can make stall recovery difficult or impossible

Aircraft Pre-flight

- WALK AROUND
- WINGS
- FUSELAGE
- PROPELLER
- CONTROLS
- LIGHTS
- TIRES
- OIL
- FUEL
- COWLING
- TIE DOWNS
- CHOCKS



Safety — Three Rules

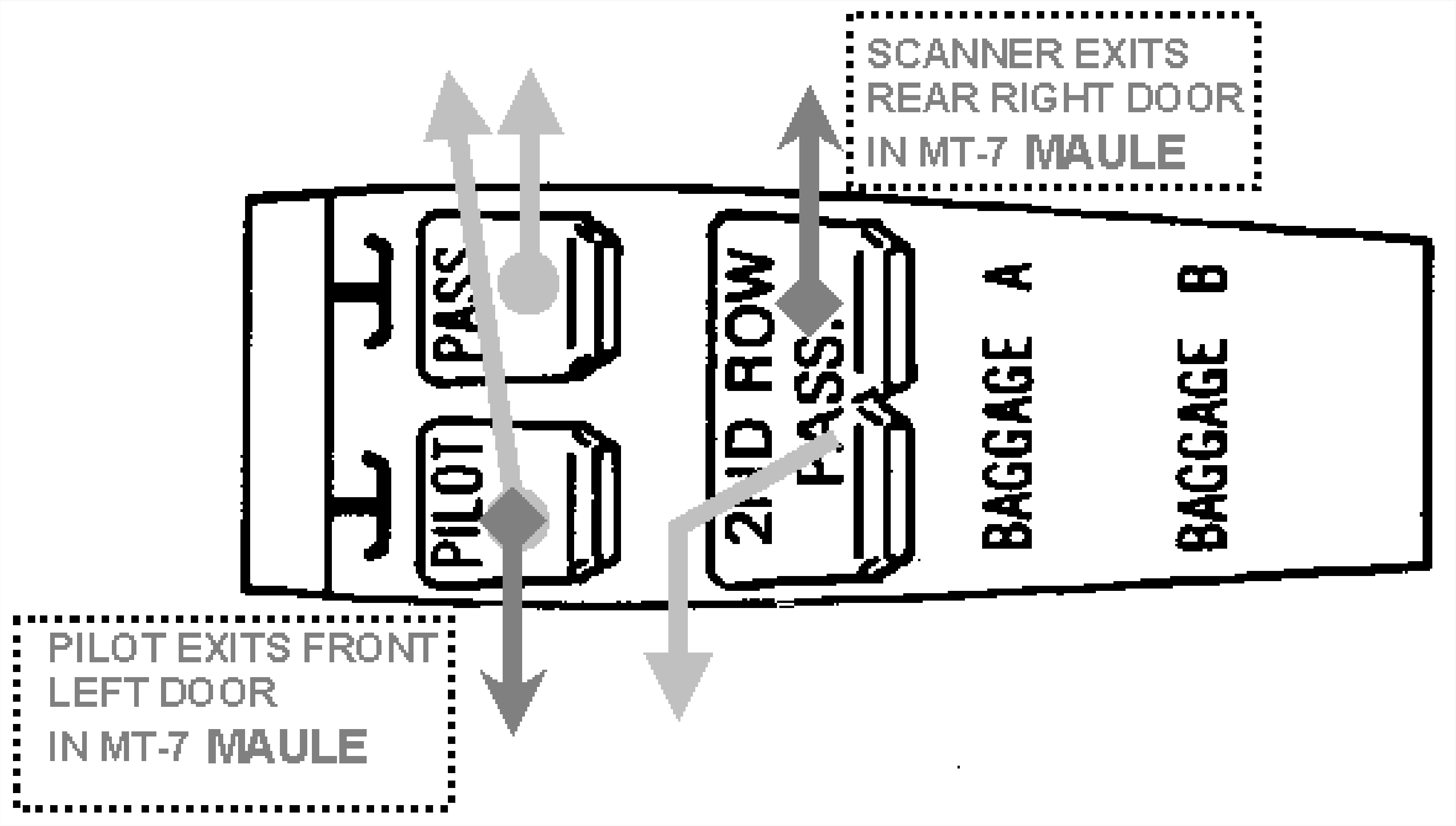
- NEVER sacrifice safety to save time
- Use established procedures and checklists
- You may have to deviate from common procedures — if you do, use common sense and prudent judgment (see Rule #1)

- The most dangerous part of a mission is driving to and from the airport or mission base!

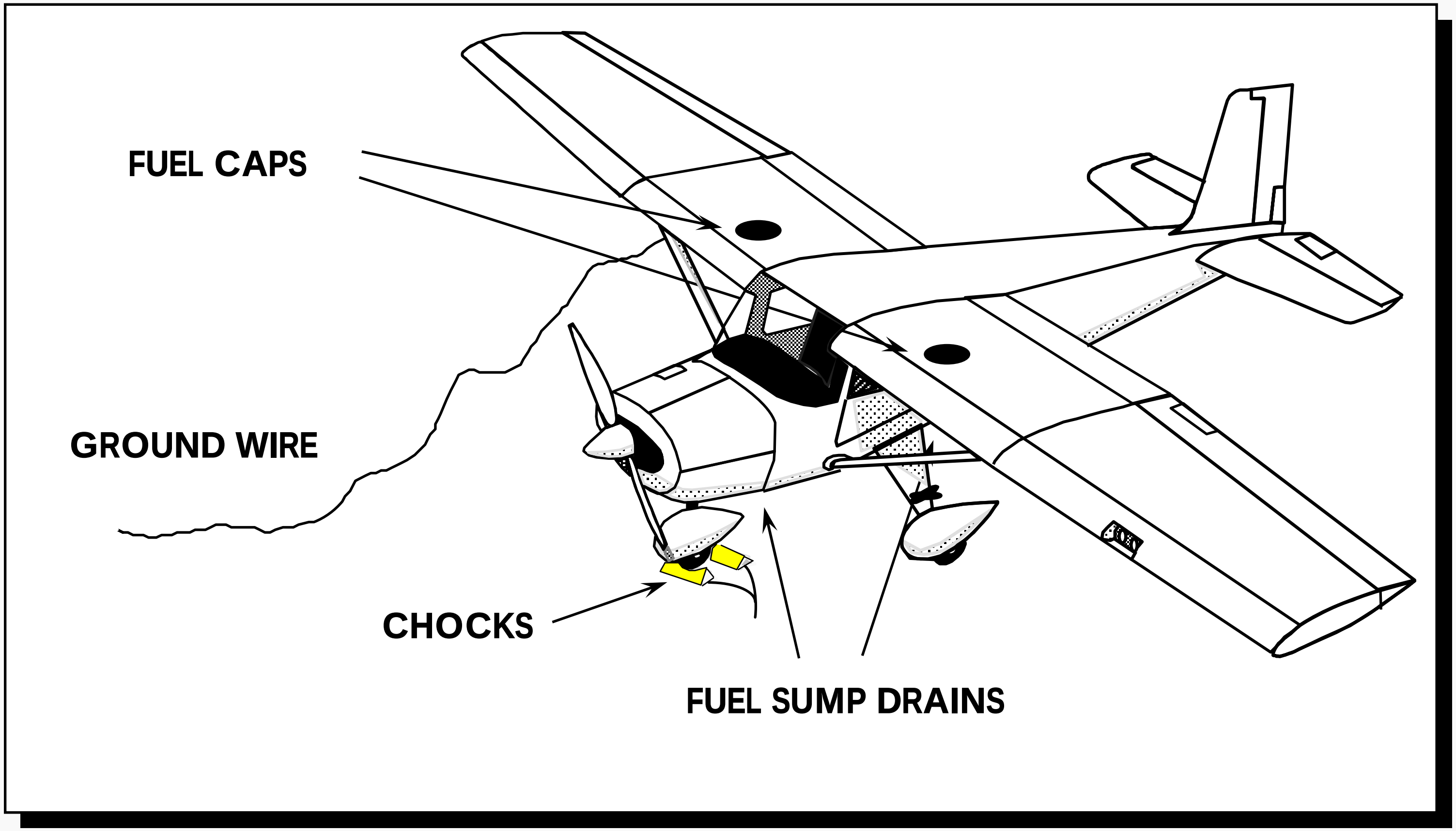
Safety In/Around Aircraft

- No smoking
- Keep clear
- Fire on the ground
- Moving and loading the aircraft
- Entry/Egress - normal and emergency
- Seat belts and shoulder harnesses (≤1,000’)
- Fuel management – *you* have an interest in making sure you don’t run out of fuel. The pilot should brief the crew on how much fuel will be needed and where you’ll refuel, if necessary.

Emergency Egress



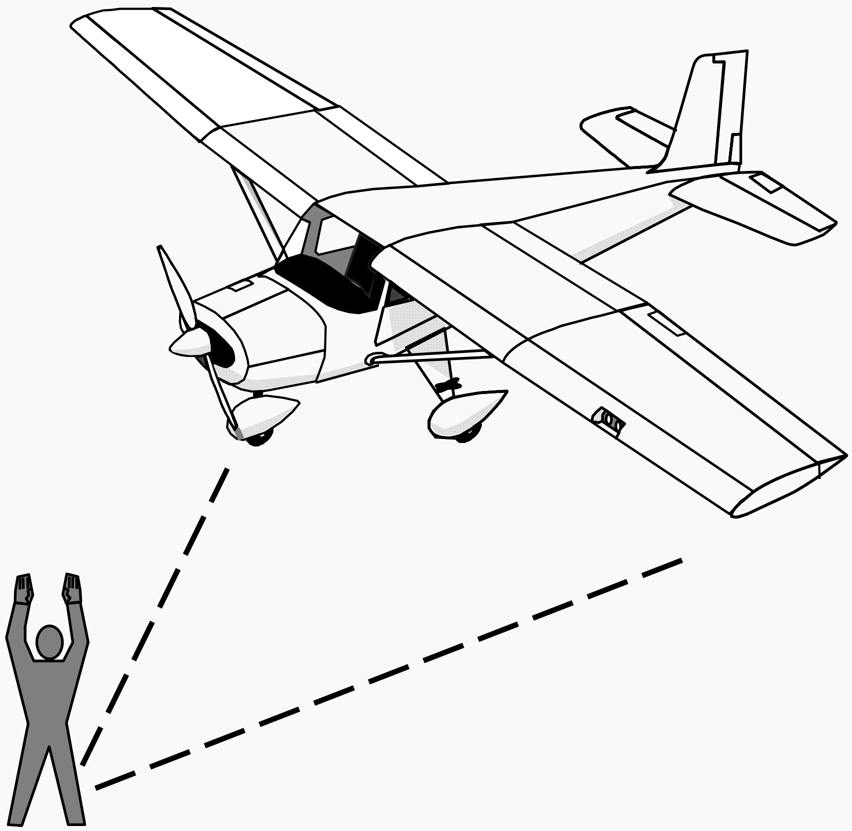
Aircraft Refueling Procedures



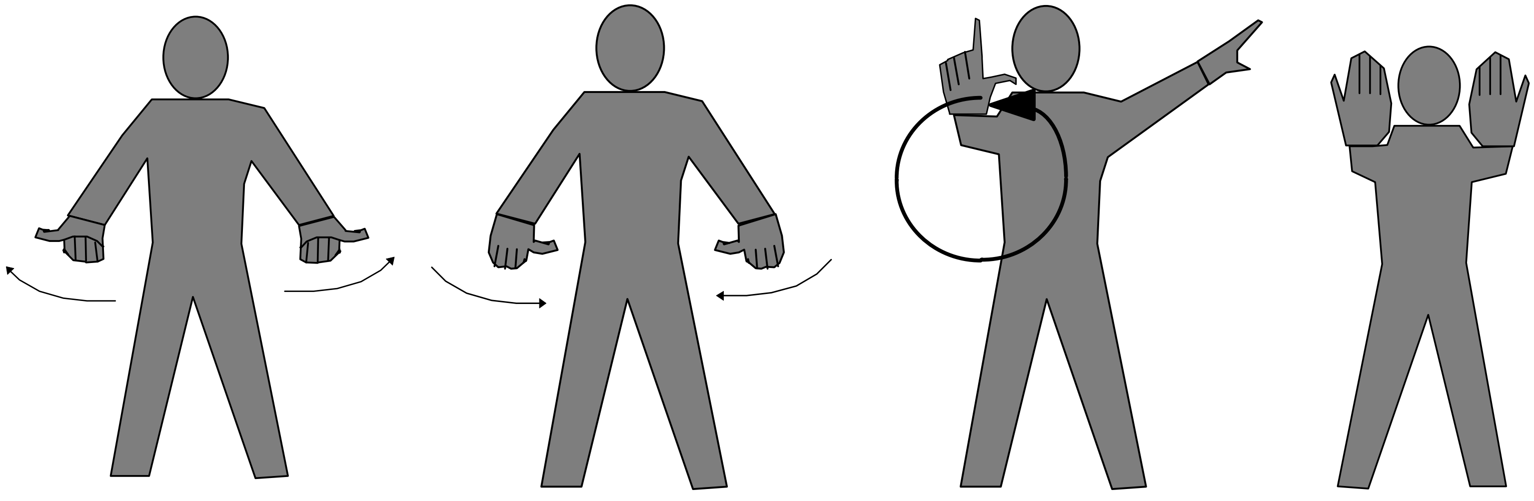
Safety during Taxiing

- Taxiing – *all* crewmembers looking for obstacles
  - Obstacle within six feet – get out and push
  - Obstacle within 6 to 10 feet – get a marshaller or “wing walker”
  - No unnecessary talk (sterile cockpit)
- Obey flightline hand signals
  - But use common sense – many linemen are inexperienced

Signalman’s Position



Flightline hand signals



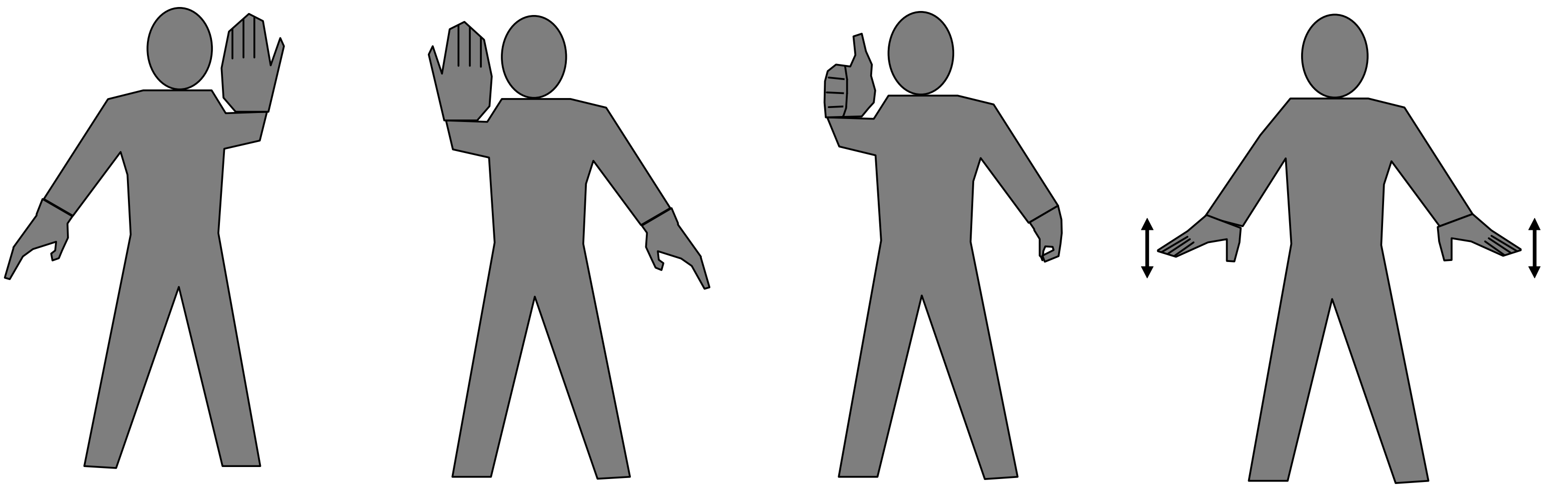
Outward motion with thumbs
PULL CHOCKS

Inward motion with thumbs
INSERT CHOCKS

Circle with hand
START ENGINE

Hands out making a pulling motion
COME AHEAD

Flightline hand signals



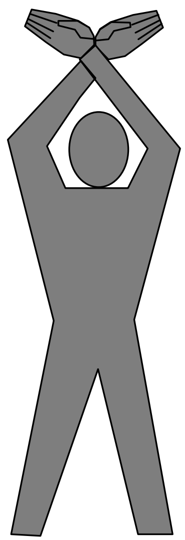
Motion forward, pointing left
TURN LEFT

Motion forward, pointing right
TURN RIGHT

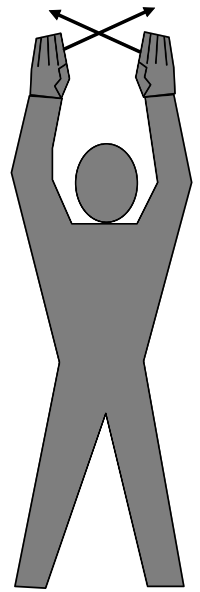
Thumb up
ALL CLEAR - O.K.

Downward motion with palms
SLOW DOWN

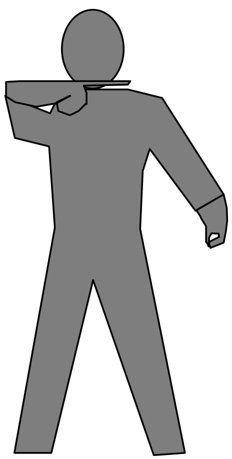
Flightline hand signals



Hands crossed above head
STOP

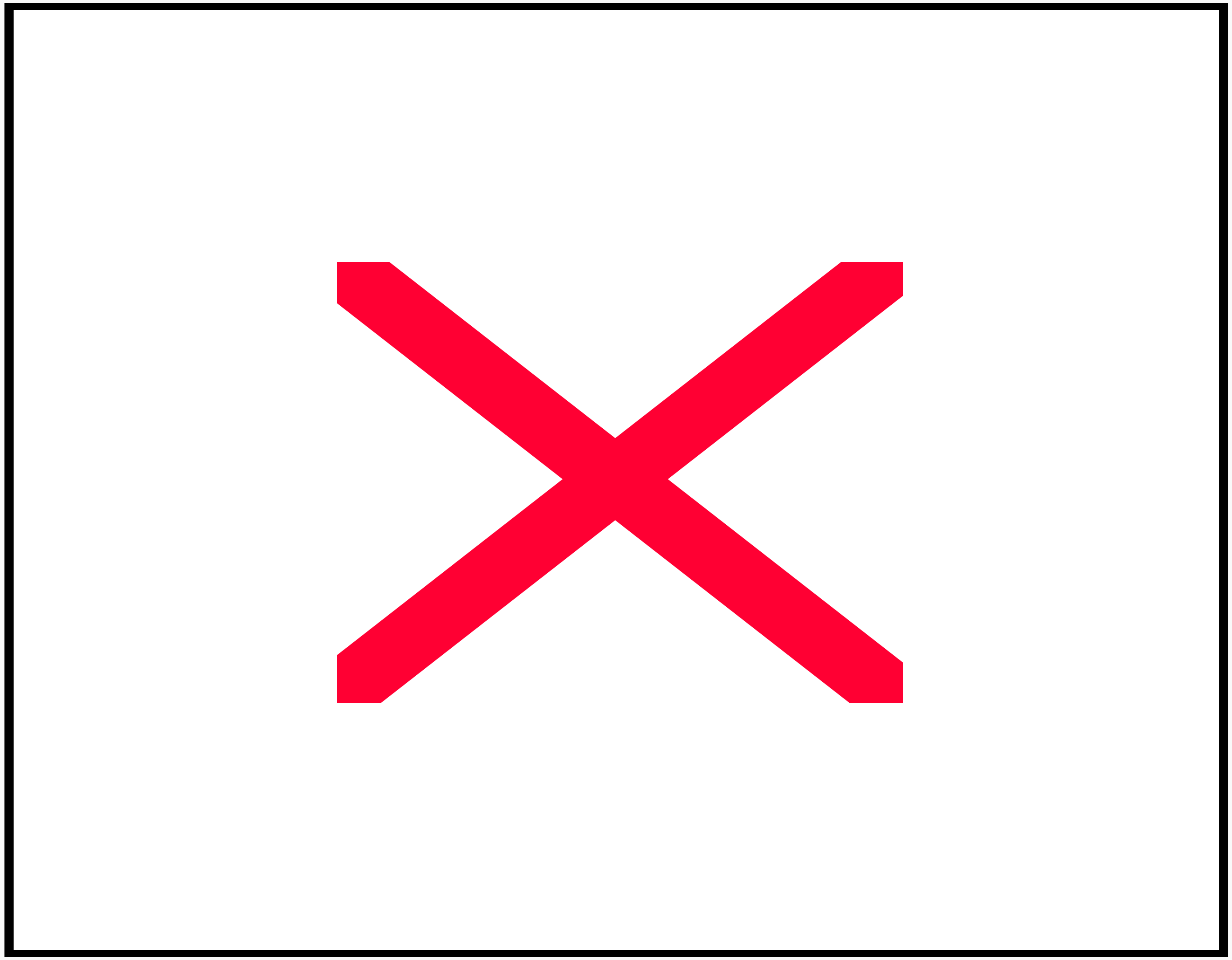


Crossing hands over head
EMERGENCY STOP



Slash throat with finger
CUT ENGINE

Flightline



Safety during Taxiing

- **Taxiing – *all* crewmembers assist the pilot**
  - **Prevent collisions with other aircraft and vehicles**
  - **Help the pilot find and stay *on* the taxiway (bad weather, low visibility, night on an unlighted airport)**
- **Be familiar with airport signs and markings**
  - **Runway markings are white and taxiway markings are yellow**

Airport Signs and Markings

Follow the yellow lines

Stay behind the dashed lines

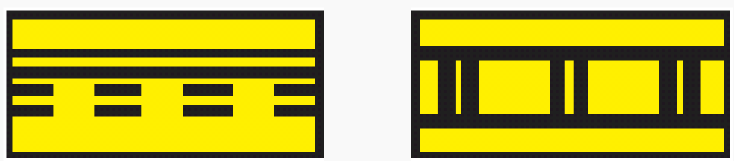
Need ATC permission to cross the solid lines

Airport Signs and Markings

Mandatory signs have a red background with a white inscription

May have a row of red stop bar lights embedded in the pavement.
When illuminated, do not cross (even if given permission by ATC)

Location boundary signs have a yellow background with a black inscription

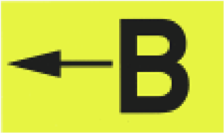


Visible from the runway
Visual clues to determine when you’re clear of the runway

Airport Signs and Markings

Location signs have a black background with a yellow inscription

Direction signs have a yellow background with a black inscription



Airport-related ATC Clearances

- Be familiar with ATC ground clearances that involve the airport signs and markings
  - Back up the pilot when taxiing
- Controllers are required to get acknowledgement of all “hold short” instructions
- Pilot/Observer should read back *all* clearances
  - “Cleared to taxi” or “Taxi” (implied clearance)
  - “Cleared for takeoff runway 22”

Airport-related ATC Clearances

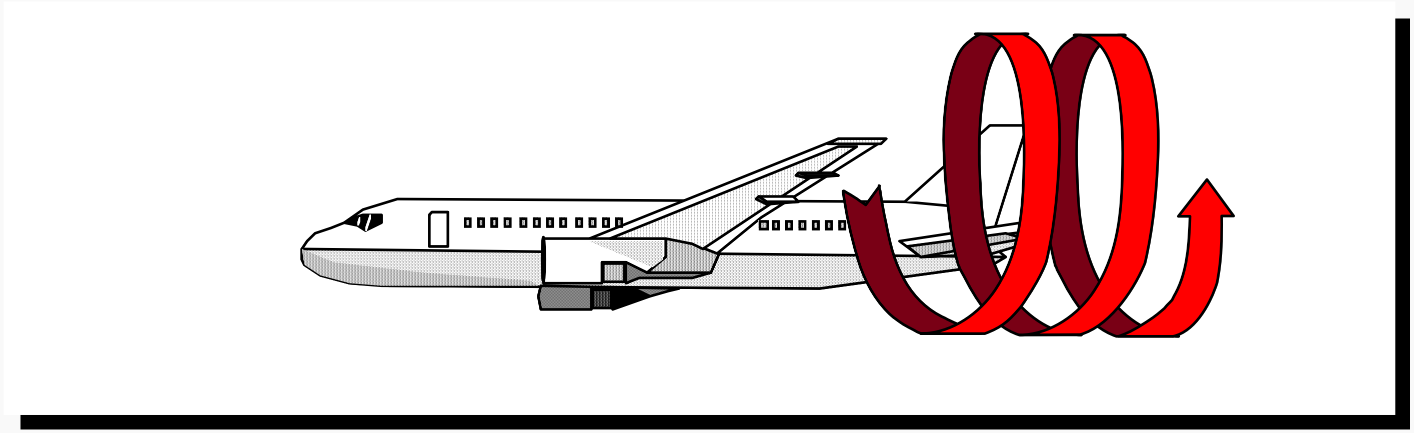
- **Meaning of clearances:**
  - **"Taxi to ..." Cleared to taxi to any point other than assigned takeoff runway. Cleared to cross all runways that intersect the taxi route. *Does not* authorize taxiing onto or crossing assigned runway.**
  - **"Taxi to ... hold short of ..." Cleared to taxi, but enroute to taxi clearance limit *must hold short* of another taxiway or crossing runway.**

Airport-related ATC Clearances

- **Meaning of clearances:**
  - **"Cross runway …" Cleared to cross the runway crossing your taxi route and continue to taxi clearance limit.**
  - **"Hold short …" *Do not enter or cross* the taxiway or runway specified by the controller. If there is a painted hold line, *do not cross* it.**
  - **"Report position" Identify your location on the airport.**

Wake turbulence

- Caused by aircraft moving through the air generating lift (proportional to weight)
- Settle 500 to 800 feet below the flight path
- Drift out slowly (5 mph) on the ground
- Takeoff before, land after other aircraft



Wake turbulence

QUESTIONS?

Survival and Urgent Care

(Chapter 3)

Introduction

- The purpose of this section is to introduce you to the fundamentals of aircrew survival.

- It is <u>not</u> to teach you how to build a shelter out of parachutes and garbage bags.

Objectives

- Discuss basic post-crash actions. {S; 3.1}
- Concerning survival equipment, discuss: {S; 3.2}
  - The importance of water
  - Types of signaling devices (CLASS)
  - Basic survival equipment
- Concerning urgent care, discuss: {S; 3.3}
  - Moving the victim; airway; pulse; and bleeding
  - Post-urgent care directions

What is your most important survival tool?

Your attitude!

Having a positive mental attitude is often the difference between life and death in a survival situation. Be mentally prepared to survive in the wilderness for the rest of your life, or it might be the rest of your life!

Preparation

- Carry a survival kit in the aircraft and be sure all crew members know what is in the kit and how to use it. Inspect contents periodically
- *Rhoda's Rule* states, "If you cannot walk from the end of the runway to the terminal without getting cold then you are not dressed properly!"
- Consider the weather over the worst conditions you are flying over
- Carry your cell phone (fully charged)

Emergency Egress

- Prior preparation is important. Follow the checklist to prop open doors, tighten seat and shoulder belts, secure cargo, and turn off the electricity and fuel.
- If doors jam, kick them open or kick out the windows. May also exit through the baggage door.
- Can't move the front seats from the rear, so agree on who does what and in what sequence.
- Discuss what to do if one or more of the crew is incapacitated.

Post-Crash Actions

- Get clear of the aircraft if there is any danger of fire or having it fall on you.
- Treat yourself for shock by sipping water.
- Check everyone for injuries and apply first aid.
- Try your cell phone or radio. Activate the ELT.
- Stay with the aircraft if in a remote area - we can find an aircraft but its easy to miss a survivor.
- Finally, consider water, shelter and food (listed in order of importance -- you can go for days without food).

Survival Equipment

- Water is the most important resource - If in desert areas staying still during the heat of the day and working when it is cooler conserves water
- Carry water or have purification tablets
- Have a container for water and consider a metal cup for boiling (purification)

Survival Equipment

- Signaling equipment is critical
- Some of the signals you might use include…
  - Signal Mirrors (best method when the sun is out)
  - Flares
  - Tarps
  - Compact Disks (akin to the signal mirror)
  - Strobes
  - ELT
  - Smoke or other man-made signals

Survival Equipment

- If you make your own signal, use the "CLASS" acronym:
  - Color - Make it unusually colored
  - Location - Put it where it can be seen; best is high and open
  - Angles - Because they do not occur in nature
  - Size - Make them visible from the air
  - Shape - Make them an eye-catching shape

Survival Equipment

- Ensure all crewmembers know the location and operation of the Emergency Locator Transmitter
- If possible, have a small survival manual in your equipment kit with suggestions on food gathering, shelter construction, and other survival techniques

Survival Equipment

- You can also include…
  - A good knife
  - Fire starters and matches
  - A space blanket
  - A small first aid kit
  - Rations
  - Anything else that would make you stay more comfortable

Remember...

- A little planning and a few pieces of equipment could be the difference between life and death! Prepare for the area and conditions you will operating in and update your survival kit seasonally. Finally, remember your most important tool is your WILL TO SURVIVE!

Urgent Care

- About 60% of crash survivors are injured
- Affect a prompt rescue
  - Don't become the second victim
- Do not move the victim unless necessary
- Ensure the airway is open
  - Clear the airway
  - Rescue breathing
- Check for pulse (CPR)
- Locate & control bleeding
  - Use point pressure on the injury to stop bleeding
- Treat for shock

Urgent Care

General Instructions

- Do not move a victim except for safety
- Do not let a victim get up and walk around
- Protect the victim
- Use blankets as needed
- Do not discuss anyone's condition with bystanders or reporters
- Administer urgent care
  - Determine injuries; get help
  - Know your limits
  - Good Samaritan Law

Biohazards

Blood Borne Pathogens

- The hazards associated with exposure to blood necessitate training for personnel who might be exposed to blood or body fluids
- Included in Red Cross First Aid training now
- Know the associated risk before you attempt to administer aid
- Obtain and use protection kits

QUESTIONS?

Communications

(Chapter 4)

Objectives

- Describe how to use an aircraft radio: {S; 4.1.1}
  - Frequency increments & numbers displayed
  - Listening before transmitting
  - Basic message format
  - The CAP callsign (group format)
- Describe how numbers are pronounced {S; 4.1.4}
  - Discuss survival equipment
- Describe how characters are pronounced. {S; 4.1.4}
- Discuss the use of “prowords” {S; 4.1.5}
- Discuss the use of code words {S; 4.1.6}

Objectives (con't)

- Identify signals: {S; 4.2.1 – 4.2.5}
  - Light gun
  - Body
  - Paulin
  - Emergency distress
  - Air-to-ground
- Discuss air-to-ground coordination techniques. {S; 4.2.6}
- Discuss air drop procedures and safety concerns. {S; 4.2.7}

Radio Communications

- There are many radios in aircraft
  - ALL have similar features, tuning, volume, squelch
  - Learn how to operate the radio you will be using
- Keep radio transmissions brief and clear
  - Use “Code words”
  - Use “Prowords”
  - Figures
  - Time
  - Phonetic Alphabet

Using the Aircraft Radio

- On/off/ volume, squelch, flip-flop
- 50 kHz (pull for 25 kHz) increments
- Listen before transmitting
- Transmit symbol (T)
- Push-to-talk (PTT) switch
- Microphone

CAP Aircraft Callsigns

- FAA has authorized CAP to use "group" callsign "CAP Flight"
  - CAP Flight 4239 pronounced "CAP Flight Forty-Two Thirty-Nine"
  - Just like the airlines
- *Only* use "Rescue" when priority handling is necessary
  - "CAP Flight Forty-Two Thirty-Nine Rescue"
- Who, Where and What

CAP FM Radio

- Official business only!
  - Frequencies assigned to CAP by the Air Force
  - Other frequencies only used when authorized
- Maintain communications discipline
- Follow the communications plan
- Report unauthorized use

Air-to-Air

- General aviation aircraft (including CAP)
  - 122.75 and 122.85 MHz can be used for air-to-air communications
  - Also used by private airports that are not open to the general public
- Multicom
  - 122.90 or 123.1 MHz can be used for SAR
  - Other activities of a temporary, seasonal or emergency nature
  - Also used for by airports that don't have a tower, FSS, or UNICOM (check sectional for airports nearby that use 122.90)
- Follow the communications plan
- Listen before transmitting
- Maintain communications discipline

Numbers

- Numbers, Figures , and Time

Numeral	Spoken As	Numeral	Spoken As
0	Zero	7	Seven
1	Wun	8	Ate
2	Too	9	Niner
3	Tree	10	Wun Zero
4	Fo Wer	x00	Hun Dred
5	Fi Yiv	x000	Thow Zand
6	Six		

Characters

- Phonetic Alphabet

Letter	Word	Letter	Word	Letter	Word
A	Alpha	J	Juliet	S	Sierra
B	Bravo	K	Kilo	T	Tango
C	Charlie	L	Lima	U	Uniform
D	Delta	M	Mike	V	Victor
E	Echo	N	November	W	Whiskey
F	Foxtrot	O	Oscar	X	X-Ray
G	Golf	P	Papa	Y	Yankee
H	Hotel	Q	Quebec	Z	Zulu
I	India	R	Romeo		

Prowords

- **All after, All before, Word after, Word before**
  - Used to identify a part of a communication
- **Break, Correct, Correction**
  - Used to identify a break in the flow of a transmission
- **Over, Out, Roger, Wilco**
  - Used to pass control to another station
- **Say again, I say again**
  - Used to request retransmission of a message
- **Wait, Wait out**
  - Used to indicate a pause is expected

Prowords

- **Affirmative – "Yes"**
  - **Permission granted or "that is correct"**
- **Negative – "No"**
  - **Permission <u>not</u> granted or "that is <u>not</u> correct"**
- **Figures**
  - **Numerals or numbers follow**
- **Out**
  - **End of transmission to you (<u>no</u> answer required <u>nor</u> expected)**
- **Over**
  - **End of transmission to you (response is expected, go ahead)**
- **Read back**
  - **Repeat my message back to me ("Read back is as follows")**

Prowords

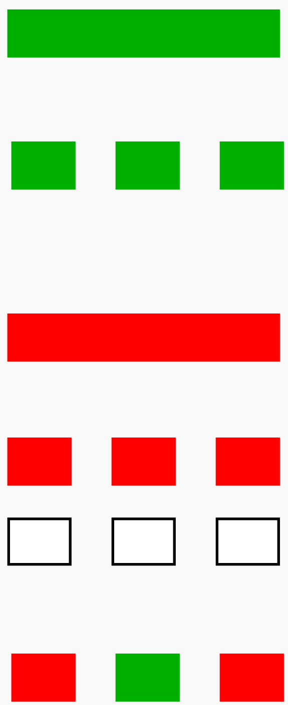
- Red Cap
  - Precedence Red Cap
- Roger
  - I have received and understood all of your last transmission
  - Don’t use to answer a question requiring a ‘yes’ or ‘no’
- Say Again
  - Repeat all of your last transmission
- Wilco
  - I have received your transmission, understand it, and will comply
  - Don’t use “Roger” and “Wilco” together (Roger included in Wilco)

Code Words

- CAP frequencies are not secure
  - Anyone can (and does) listen (e.g., media, ham operators)
- Sometimes mission staff issues code words for:
  - Sighting made
  - Condition of occupants
  - Location of sighting

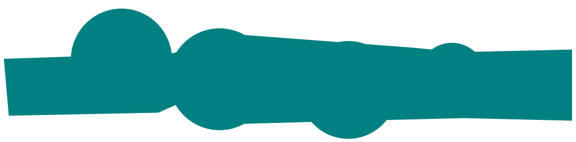
QUESTIONS?

Tower Light-Gun Signals

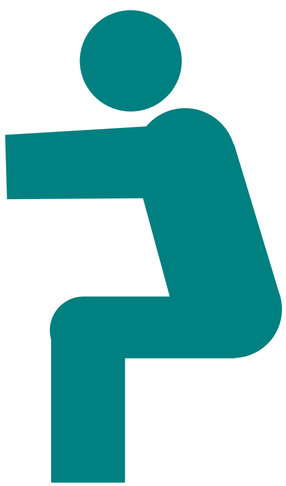


On the Ground	In Flight
Cleared for take-off	Cleared to land
Cleared to taxi	Return for landing (followed by s steady green at proper time)
Stop	Give way to other aircraft
Taxi clear of landing area	Airport unsafe-Don’t land
Return to starting point on airport	
General Warning - Exercise extreme caution	

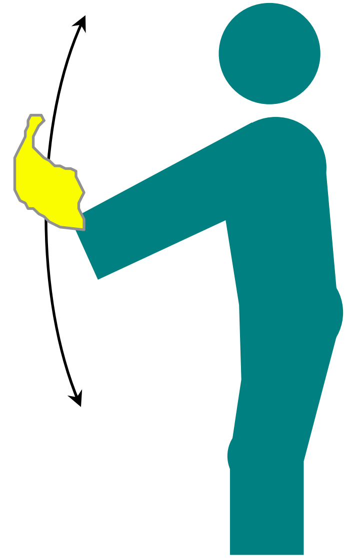
Body Signals



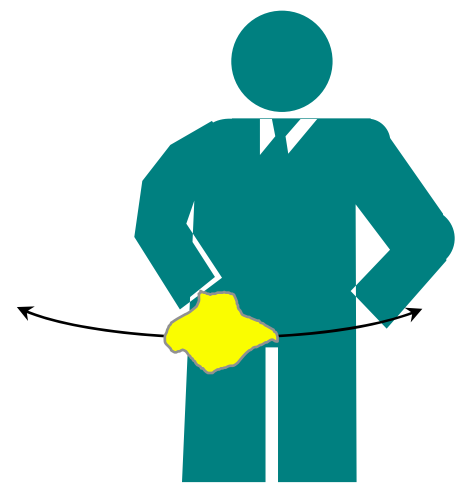
Lie flat hands over head
NEED MEDICAL ASSISTANCE



Both arms pointing in the direction of landing while squatting
LAND IN THIS DIRECTION



Wave cloth vertically
AFFIRMATIVE — YES



Wave cloth horizontall y
NEGATIVE — NO

Body Signals

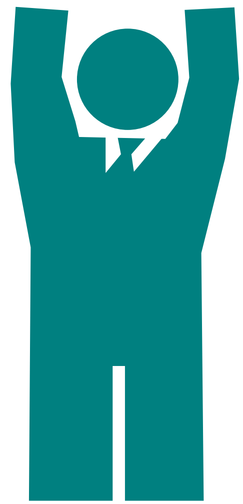
Wave one arm over head
ALL OK
DO NOT WAIT

One arm horizontal
CAN PROCEED
SHORTLY WAIT
IF PRACTICAL

Both arms horizontal
NEED MECHANIC
HELP or PARTS
LONG DELAY

Body Signals

Wave Both arms across face
DO NOT ATTEMPT TO LAND



Both arms held over head
PICK UP PLANE IS ABANDONED

Cup hands over Ears
OUR RECEIVER IS WORKING

Paulin Signals

Emergency Distress

Require doctor Serious injuries

Require medical supplies

Unable to proceed

Require food and water

Indicate direction to proceed

Proceeding in this direction

Will attempt takeoff

Aircraft seriously damaged

Require fuel and oil

Probably safe to land here

All well

Not understood

No

Yes

Require map and compass

Require signal lamp

Require firearm and ammunition

Require engineer

Information that A/ C in this direction

Divided into 2 groups, in directions as indicated

Unable to continue; returning

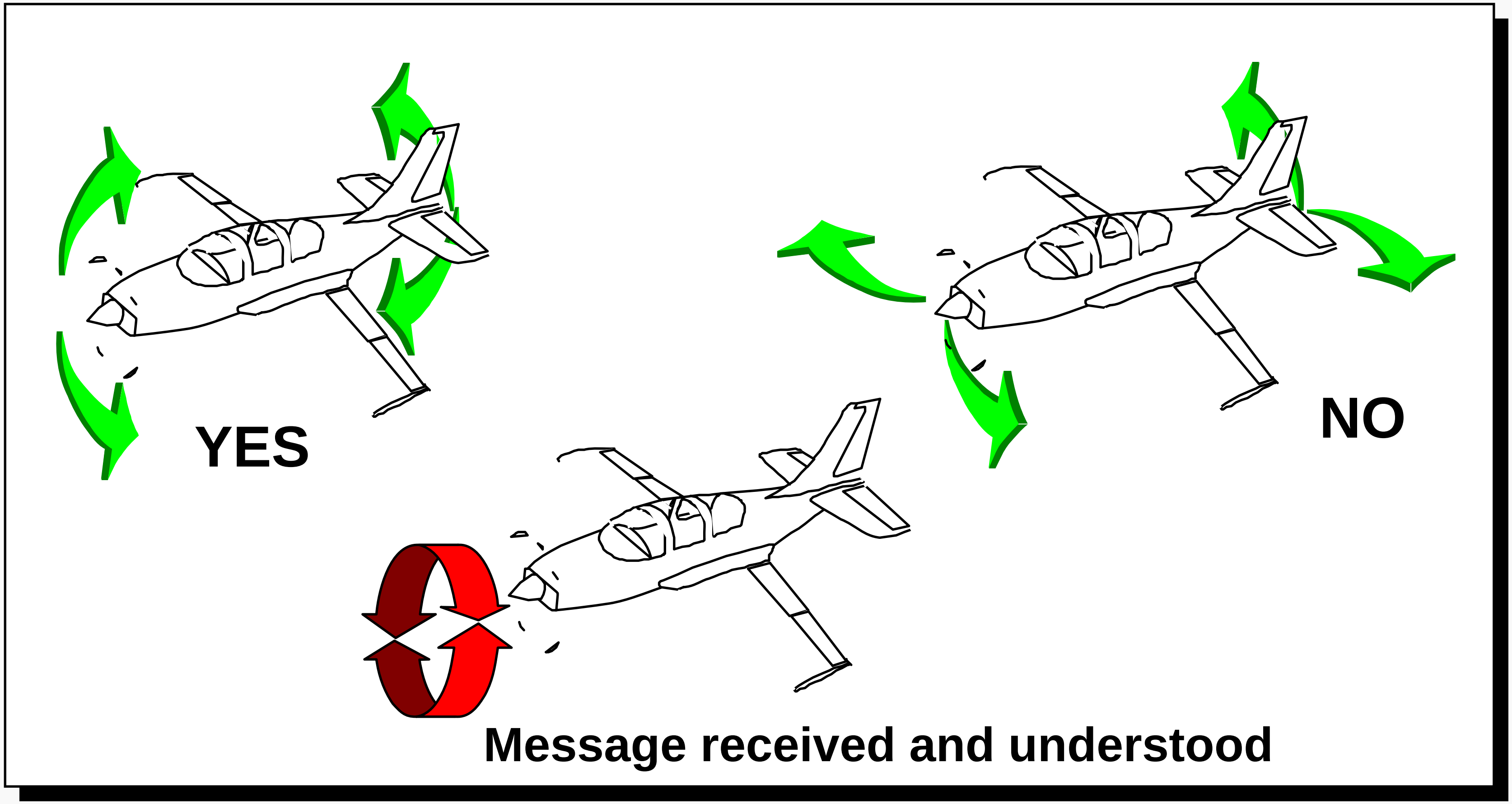
Have found only some personnel

Have found all personnel

Operation complete

Nothing found. Will continue to search

Aircraft Motion Signals

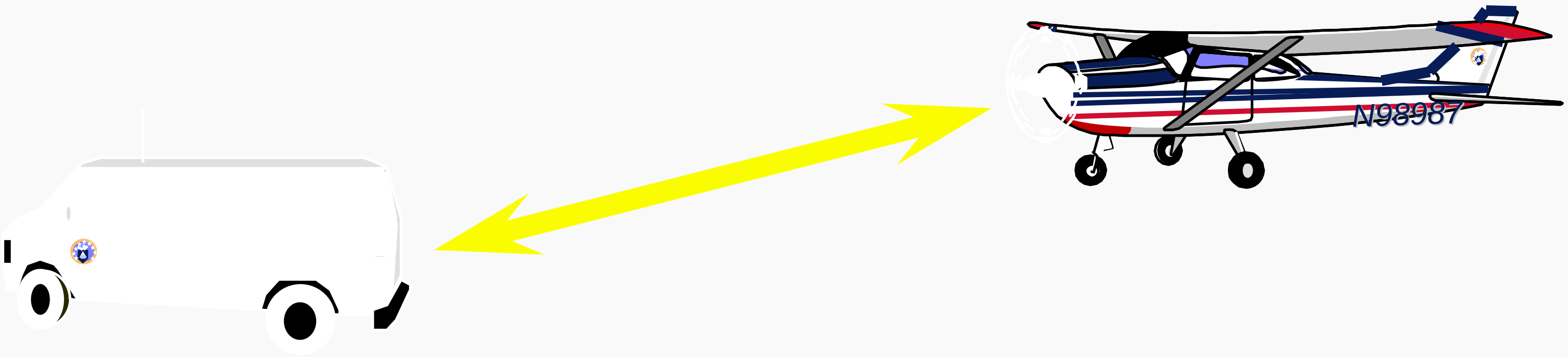


QUESTIONS?

Air-to-Ground Coordination Techniques

Introduction

- The importance of air-to-ground coordination in CAP missions cannot be overstated.
- The purpose of this block is to teach appropriate techniques and avoid common air-to-ground coordination pitfalls.



Why Air-To-Ground Coordination?

- **Air-to-Ground Coordination is a core competency:**
  - It is the best way to keep CAP in the SAR business!
  - CAP is the nation's premier air-to-ground coordination SAR organization: in fact, we are the only nationwide organization that practices it!
  - CAP must continue to specialize in this area to eliminate duplication of resources with other organizations.
  - CAP capitalizes upon this strength during interagency (ICS) operations for the mutual benefit of all.

Staging

- If aircraft are the primary search resource, ground units should be placed on standby at the same time, or preferably dispatched to advance positions.
  - Sudden weather changes may force suspension of the air search. If ground units aren't staged, considerable time may be lost.
  - Should the aircrew make a sighting and ground units aren't immediately available, valuable time is lost.
- If ground units are the primary search resource but aircrews may be needed, the air units should be alerted at the beginning of the search.
  - Time is needed to locate aircraft and aircrews, brief them, plan and preflight, launch, and fly to the scene.

The Briefing

- Often, aircrews will ignore the importance of the ground team and will not brief with the team prior to launch. Although this is not always possible, the opportunity to establish ground rules can be the difference between success and failure on an actual mission.

The Briefing

- Air and ground teams should agree on...
  - Communication frequencies
  - A rendezvous location and time window
  - Pre-coordinated signals
  - Lost communications procedures
  - The type of support the aircraft can provide the ground team

The Briefing

- Air and ground teams should use the same maps:
  - Sectionals are not detailed enough for ground search, but are necessary when ground units work with aircraft.
  - Medium-scale maps, such as U.S. Forest Service, Bureau of Land Management, U.S. Geological Survey intermediate scale (1:100,000), and local maps are the most versatile for air/ground coordination.
  - Topographic maps are difficult for aircrews to use but are needed when low-level and contour searches are flown.

The Basic Plan

- The aircrew locates the search objective.
- The aircrew then must bring the ground team to the objective to complete the mission.
- There are several ways to accomplish this.
- A combination of techniques is also effective.

GPS Coordination

- An aircrew can mark the target using GPS (or LORAN) equipment.
- The crew can then radio the Lat/Long coordinates to the ground team.
- Even if the ground team is not GPS-equipped, they can mark the coordinates on a map and navigate to them.

Getting It Together

- It is often difficult to get the aircrew and ground team within positive visual contact of one another.
- A common rendezvous point may be used
  - e.g., “Bill’s Gas Station at the corner of I-15 & Hwy 66”
- Ground team can also radio their current GPS coordinates to the aircrew, and the aircrew then navigates to the GT.
- Aircrews must know what the ground team members are wearing (high visibility).
- Orange panel or ID on top of vehicle helps.

Wreck With CAP On-Scene

What Did You See on the Last Slide?

- There were four people in the previous slide
  - Did you see them all?
  - Two individuals are wearing orange vests
  - Two aren't
- Conclusion:
  - Ground Team Members need to wear highly visible vests!
  - Aircrews can't help Ground Teams very well if they can't see them!

Who Does What?

- Once positive visual contact is established, one of the most challenging tasks is to maintain sight of the ground team.
- Distinctive vehicle markings of the roof of the vehicle aid in this task (e.g., panel or ID).
- The scanner is usually the best choice to keep sight of the ground team.

QUESTIONS?

Leading the Team by Radio

- The most common method of coordination is also the easiest:
  - Example:
    - Aircraft leads GT to site (*i.e.*, aircraft to ground team: “CAPPER 112, CAPFLIGHT 4239; turn left at the next dirt road”).
    - Transmit the lat/longs from the GPS unit: *i.e.*, aircraft to ground team: “CAPPER 112, CAPFLIGHT 4239, the target is at coordinates N 45º 23.72’, W 106º 47.32’, the ground team then may self-navigate to the target or may also continue to be led by the aircrew.

Common Pitfalls

- **Problem: The aircraft is working from a aeronautical chart and the ground team is working from a road map.**
- **Solution: The aircrew and ground team can have two copies of identical road atlases which will provide a common set references. Crews can also photocopy each other's maps. This communications failure (which occurs *before* either crew leaves mission base) can be the first link an a chain of errors.**

Common Pitfalls

- **Problem: The aircraft flies much faster than the vehicle, which only averages around 45 miles per hour on the highway.**
- **Solution: The aircraft can fly a daisy chain or creeping line over the aircraft to increase its over ground distance, allowing it to stay with the vehicle.**

Common Pitfalls

- Problem: The ground team was supposed to establish contact at 1000 local time and it is now 1001 L. The aircraft leaves station and the ground team arrives at 1010 L with no support.
- Solution: Brief a rendezvous window, plus or minus 15 minutes, to compensate for any unexpected delays encountered by the ground team.

Common Pitfalls

- The problem of the aircraft leaving a rendezvous point before the ground team arrives is a frequent occurrence on CAP missions. Remember, time seems to pass very slowly while waiting for a ground team, so it is easy to become impatient and depart station too early.

Common Pitfalls

- Problem: The handheld radio being used by the ground team goes dead because the battery has not been fully charged.
- Solution: The ground team can stop their vehicle to indicate communications failure (or use a prearranged signal) and monitor 121.5 or 122.775 on their L-per. The aircraft then has one-way communication on the selected frequency. You can also use another radio capable of Air-Band receive, or an Air-Band (VHF-AM) transceiver.
- Remember, the signal may be hard to receive from within the vehicle, especially at long distances.

Common Pitfalls

- Problem: If the GT radio fails, how can we use ground-to-air signals at night?
- Solution: Pre-brief simple signals like:
  - stopping means lost comm
  - blinking headlights indicate the message has been received
  - flashers indicate the message has *not* been received

Common Pitfalls

- A common misconception of ground teams is that a circling aircraft has the ground team in sight 100% of the time.
- In wooded areas the aircraft can see the ground team for only a few seconds during each orbit. It is important that the ground team realizes the aircraft's limitations.

Common Pitfalls

- As an aircrew you may have have to impose radio discipline on another station during an operation. Often, multiple stations will be transmitting but fail to hear each other because they are not line-of-sight. The ground team will not know they are being 'stepped on.'
- Be direct and ensure everyone makes short, concise radio transmissions while avoiding stepping on each other.

Common Pitfalls

- As an aircrew you may have have to impose radio discipline on the ground stations during an operation, especially if you are in busy airspace. For those aircraft without the new Audio Panel (which lets the observer or scanner talk on the FM radio while isolating the pilot), be direct and ensure everyone understands the situation and keeps their transmissions short and concise.

QUESTIONS?

Air-to-Ground Coordination Signals

- Air-to-ground coordination is an art that should be practiced regularly, both during daylight and at night.
- There are a number of standard air-to-ground visual signals we will cover in the following slides.
- Air and ground teams can also use non-standard signals if the mission requires, as long as they are pre-briefed.

Ground Team Coordination

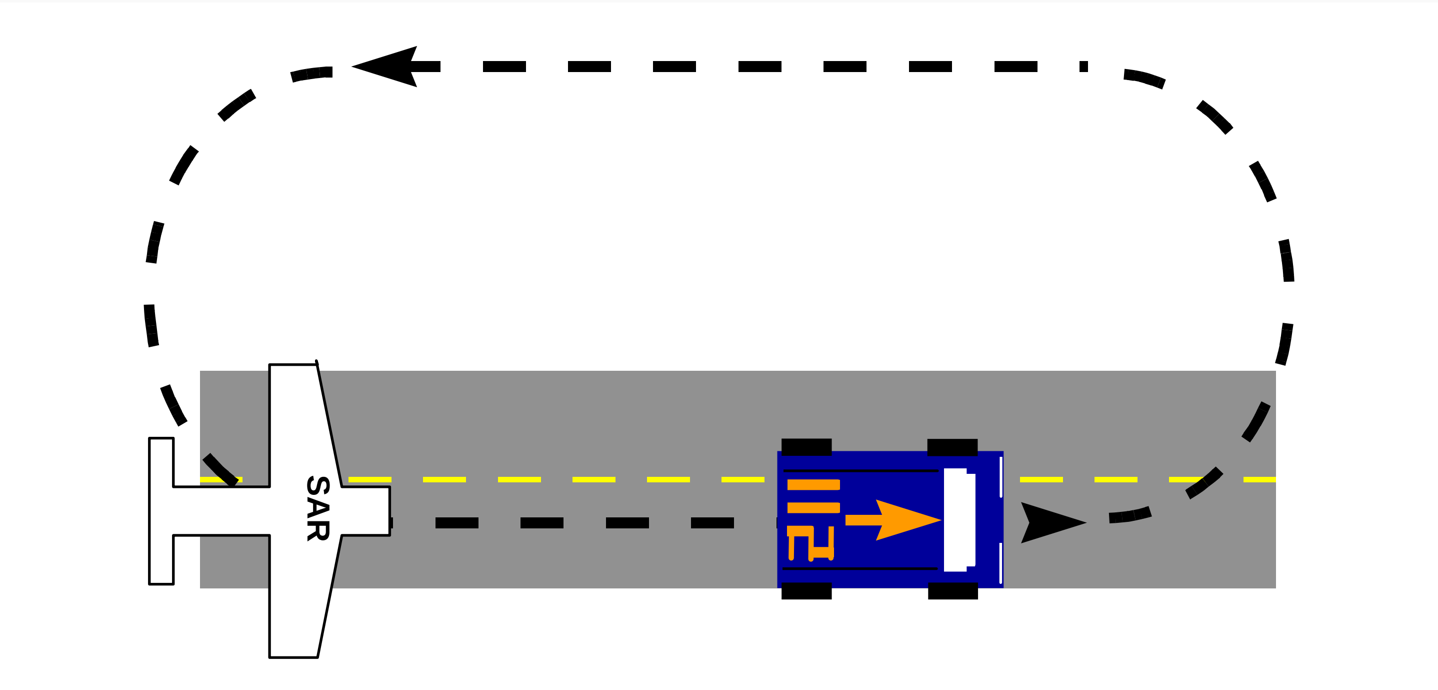
- Ground-to-Air Signals
  - Size equals visibility
  - Natural materials (contrast is important)
  - Body signals
  - Paulin signals
- Air-to-Ground Signals
  - Aircraft motion
  - Circling and heading
  - Racing the engine
  - Message drop

Think BIG!

General Air-to-Ground Coordination Points to Consider

- Remember that the ground team may not have your perspective. Allow plenty of room for your maneuvers or you may confuse the ground team. Do not rush your signals.
- Consider dropping flaps to reduce your groundspeed and overtake on the ground team.

KEEPING UP WITH THE GROUND TEAM

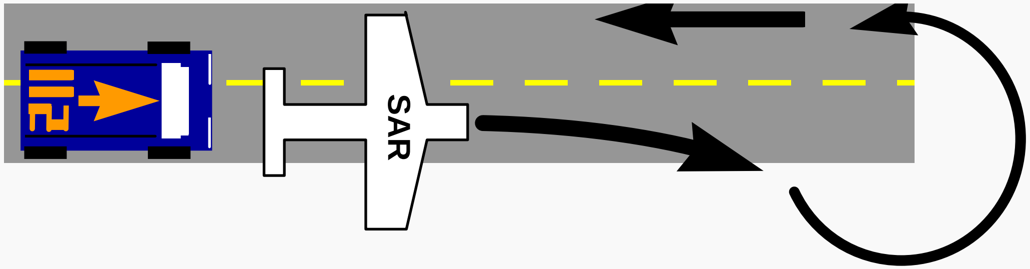


- **AIRCRAFT ACTION: Aircraft approaches the vehicle from the rear and turns in a normal manner right (or left) to re-approach the vehicle from the rear. Circle back as necessary using oval patterns and flying over the team from behind, indicating that they should continue. This process may be referred to as a "Daisy Chain." Daisy Chain over the ground team as long as necessary.**
- **DESIRED TEAM ACTION: Continue driving in indicated direction along this road.**

Loss of Radio Communications

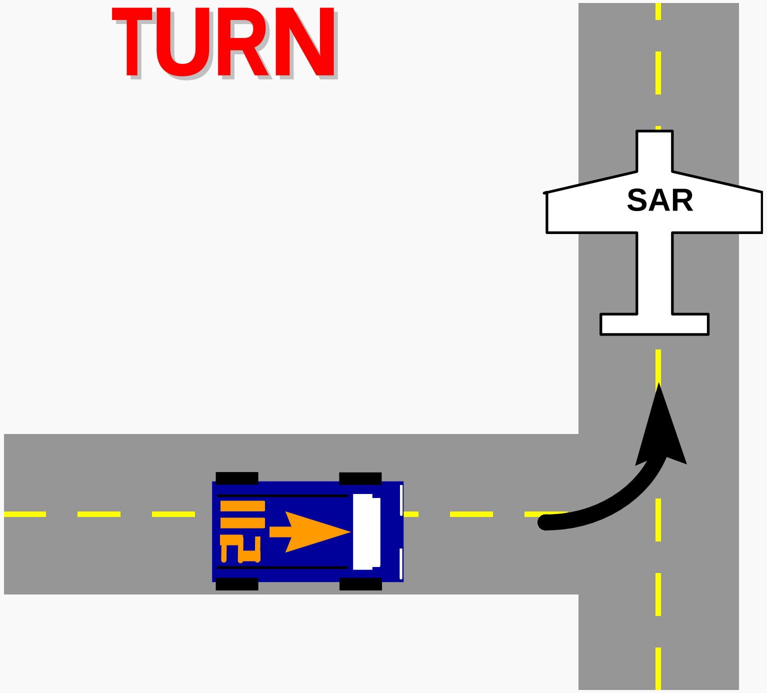
- These signals are designed to be used if two-way radio communication cannot be established
- They may also be used as a standard to be followed in addition to two-way radio communication
- This adds to the clarity of coordination
- This practice also enables you and the ground team to keep proficiency in these signals

TURNING THE GROUND TEAM AROUND



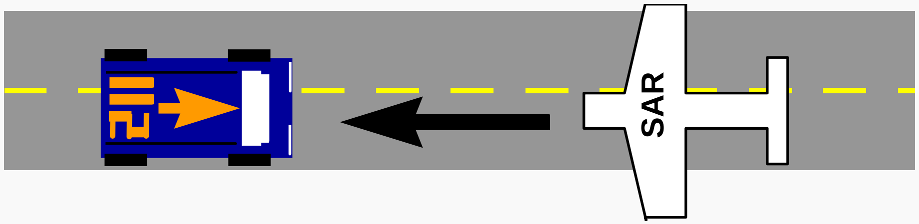
- **AIRCRAFT ACTION :Aircraft approaches the vehicle from the rear and then turns sharply right (or left) in front of the vehicle while in motion. Circle back as necessary flying against the team's direction of travel, then take up the 'keeping up' procedure outlined above.**
- **DESIRED TEAM ACTION: Turn vehicle around.**

TURN



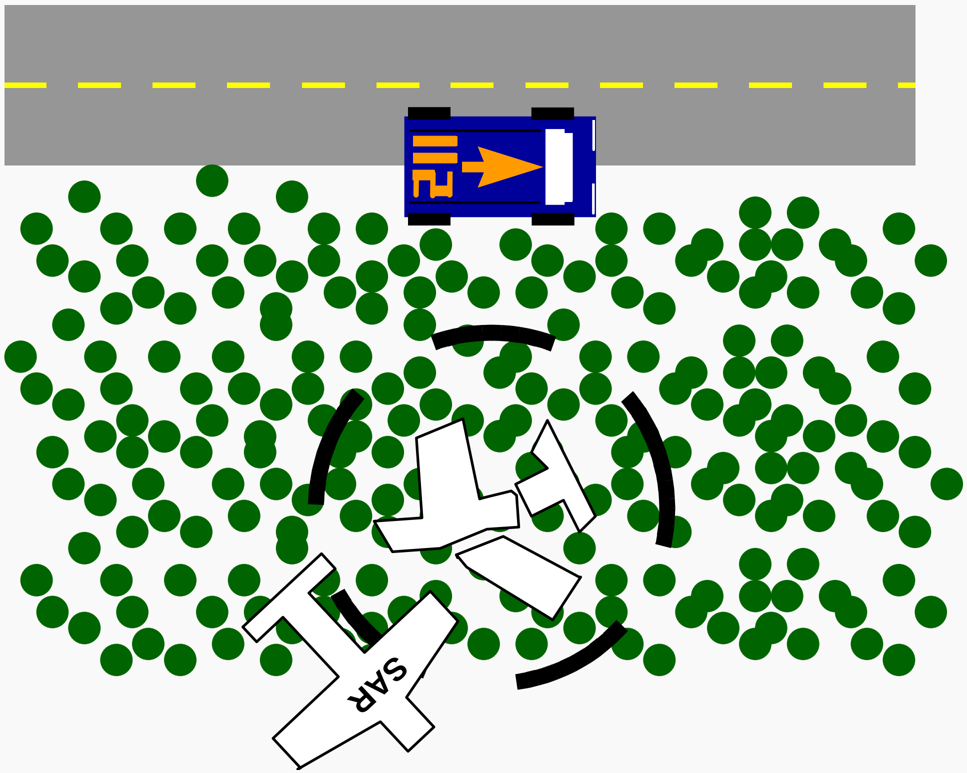
- AIRCRAFT ACTION: Aircraft approaches the vehicle from the rear and then turns sharply right (or left) in front of the vehicle while in motion. Circle back as necessary using oval patterns and flying over the team from behind, indicating that they should continue.
- DESIRED TEAM ACTION: Turn vehicle to right (or left) at the same spot the aircraft did and then continue in that direction until further signals are received.

STOP or DISMOUNT



- STOP
  - AIRCRAFT ACTION :Aircraft approaches the vehicle low and head-on while the vehicle is moving
  - DESIRED TEAM ACTION: STOP the vehicle and await further instructions
- DISMOUNT
  - AIRCRAFT ACTION: Aircraft makes two (or more) passes in same direction over a stopped ground team
  - DESIRED TEAM ACTION: DISMOUNT (get out of) the vehicle, then follow the aircraft and obey further signals (proceed on foot)

OBJECTIVE IS HERE



- **AIRCRAFT ACTION : Aircraft circles one geographic place.**
- **DESIRED TEAM ACTION: Proceed to the location where the low wing of the aircraft is pointing; that is the location of the target.**

QUESTIONS?

AIRDROP

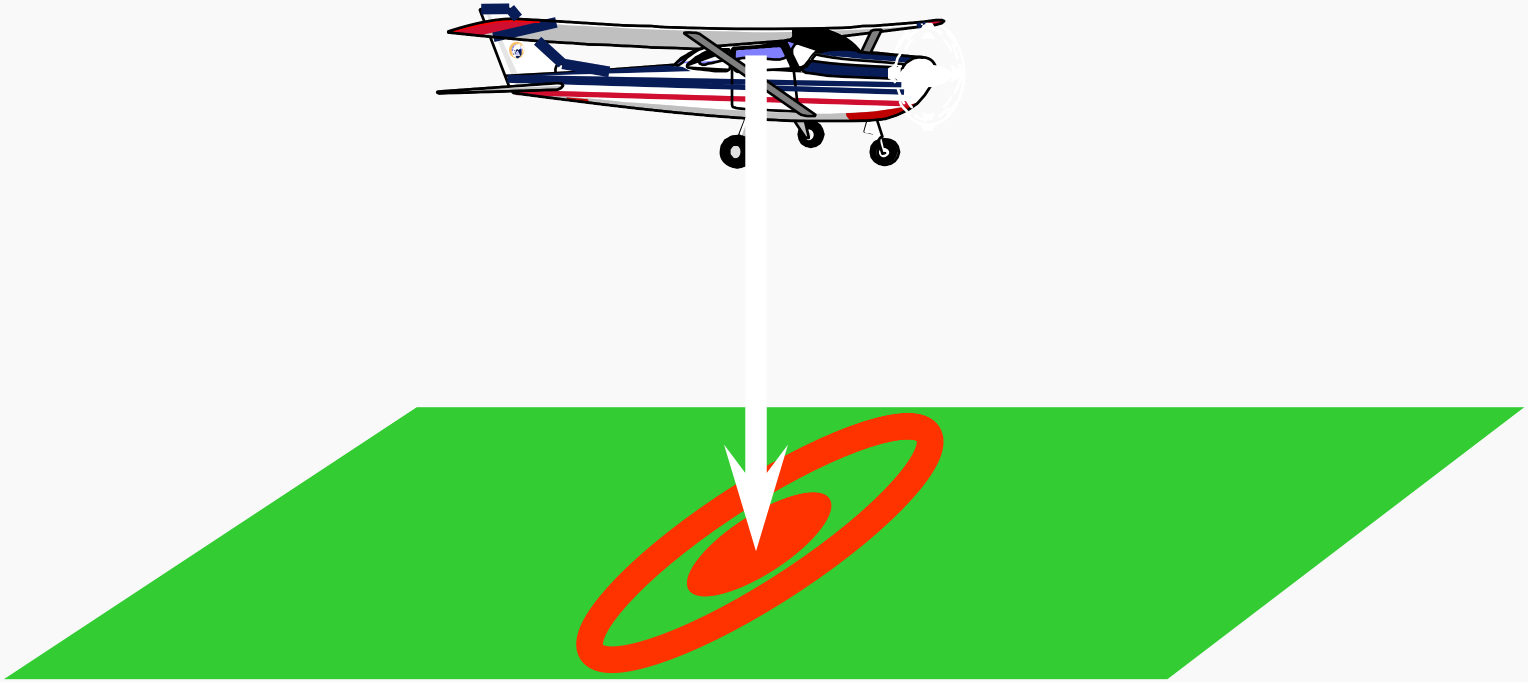
- Airdrops are an uncommon event, but not inherently dangerous.
- Dropping objects from a CAP aircraft is prohibited except to prevent loss of life.

- Prepare the container with a short streamer
  - Keep the drop as light as possible

- Drop the container when slightly ahead of or directly over the target
  - Observer gives verbal directions to pilot
  - Pilot must not maneuver the aircraft at the drop point

AIRDROP

- **Configure the aircraft:**
  - **10 degrees flaps and 80 knots**
  - **Fly a right-turn pattern at 800 AGL**
  - **Fly a two-mile final into the wind**
  - **Descend to 500 AGL, open the window and drop**



AIRDROP SAFETY CONCERNS

- The pilot must fly the aircraft! Don't worry about what the observer is doing.
- Do not pull back hard or pull negative Gs after the release – this could cause the package to hit the tail of the aircraft.
- The pilot should not look back after the drop – this could cause a pitch up (and lead to a stall/spin).
- After the drop, climb to a safe altitude and circle until you confirm receipt of the message or package.

IN-FLIGHT SERVICES

- Air Traffic Control (ATC)
- Flight Service Stations (FSS) depicted on sectional
- Flight Watch (122.0)
- Broadcasts over NDB or VORTAC
- Automatic Terminal Information Services (ATIS)
- Hazardous In-Flight Weather Advisory Service (HIWAS)
- Automated Weather Observation System (AWOS)
- Pilot Weather Report (PIREP)

QUESTIONS?

Scanning Techniques and Sighting Characteristics

(Chapter 5)

Objectives

- Define “scanning” and “fixation,” and describe how aircraft motion effects scanning. {S; 5.1}
- Discuss central and peripheral vision, and describe where your focal point is when you’re relaxed. {S; 5.2}
- Discuss fixation points and lines of scan; define “scanning range” {S; 5.3}
- Describe the diagonal and vertical scanning patterns. {S; 5.4}

Objectives

- Discuss how atmospheric and lighting conditions affect scanning. {S; 5.5}
- Discuss common visual clues and wreckage patterns. {S; 5.6 & 5.7}
- Discuss tips on reducing fatigue while scanning. {S; 5.8}
- Describe how to give directions to the pilot while in flight. {S; 5.9}

Scanning

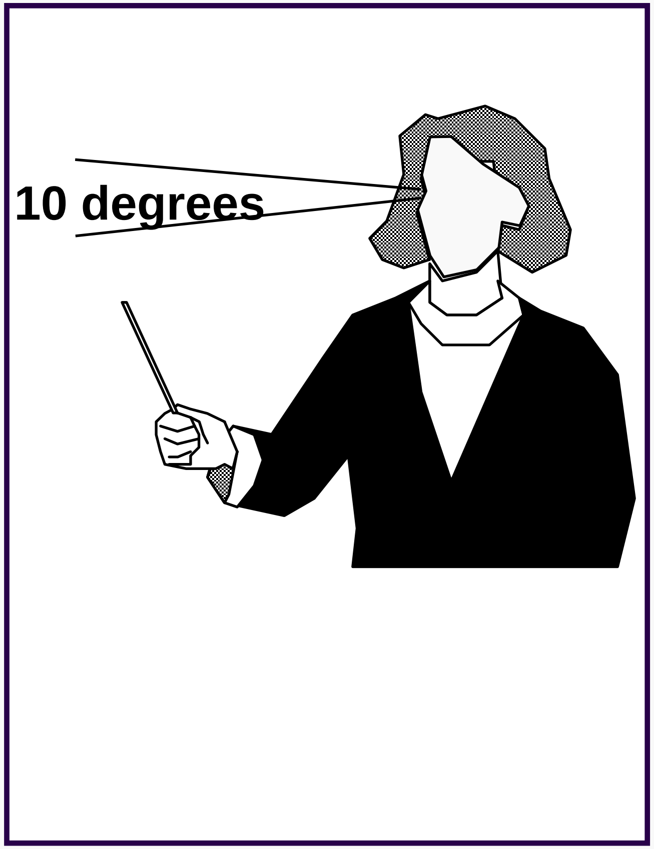
- Scanning is the process of investigating, examining, or checking by systematic search
- The scanner uses a systematic eye movement pattern
- Most commonly used eye movement pattern involves moving the eyes and pausing every few degrees – this is known as “fixation”and should cover about 10 degrees a second

Vision

- For central vision to be effective, the eye must be focused properly
- When you are not actively focusing, your focal point will be about 30 feet out
- Peripheral vision is not as sharp, but can be effective if you concentrate (especially at night)
- For example: with central vision you may see an object one mile (5000 feet) away, but peripheral vision could only pick up the object 500 feet away

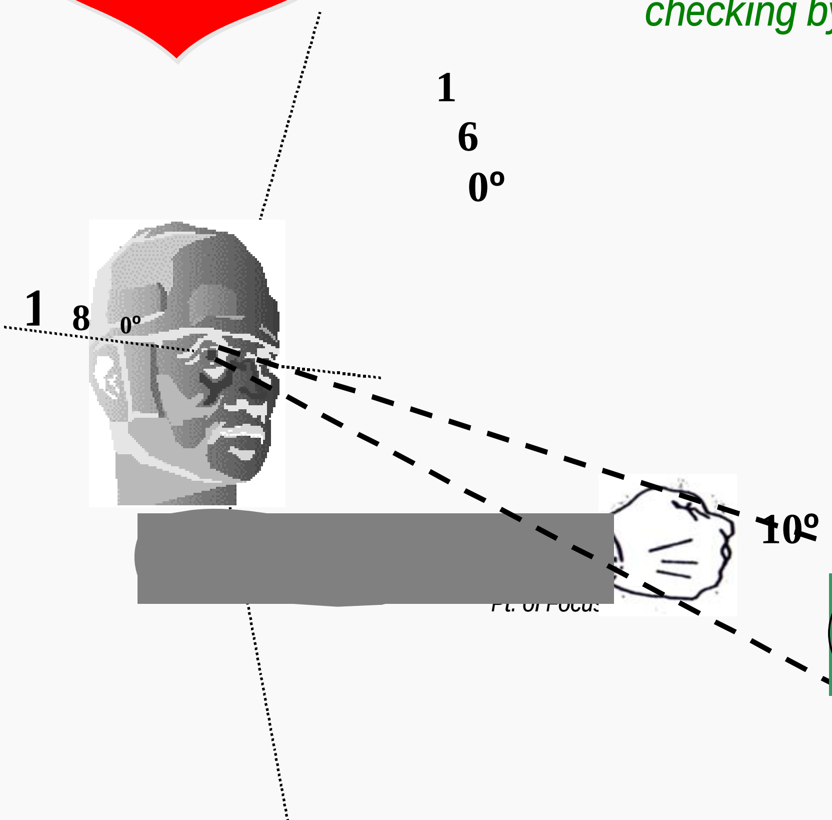
Vision Physiology

- The maximum visual acuity is a circle 10° in diameter around a fixation point
- Dark adaptation requires 30 minutes (and can be lost in seconds)
- At night
  - Use peripheral vision
  - Fewer scans
  - Rest between scans
- Lighting conditions
- Shadows



Scanning

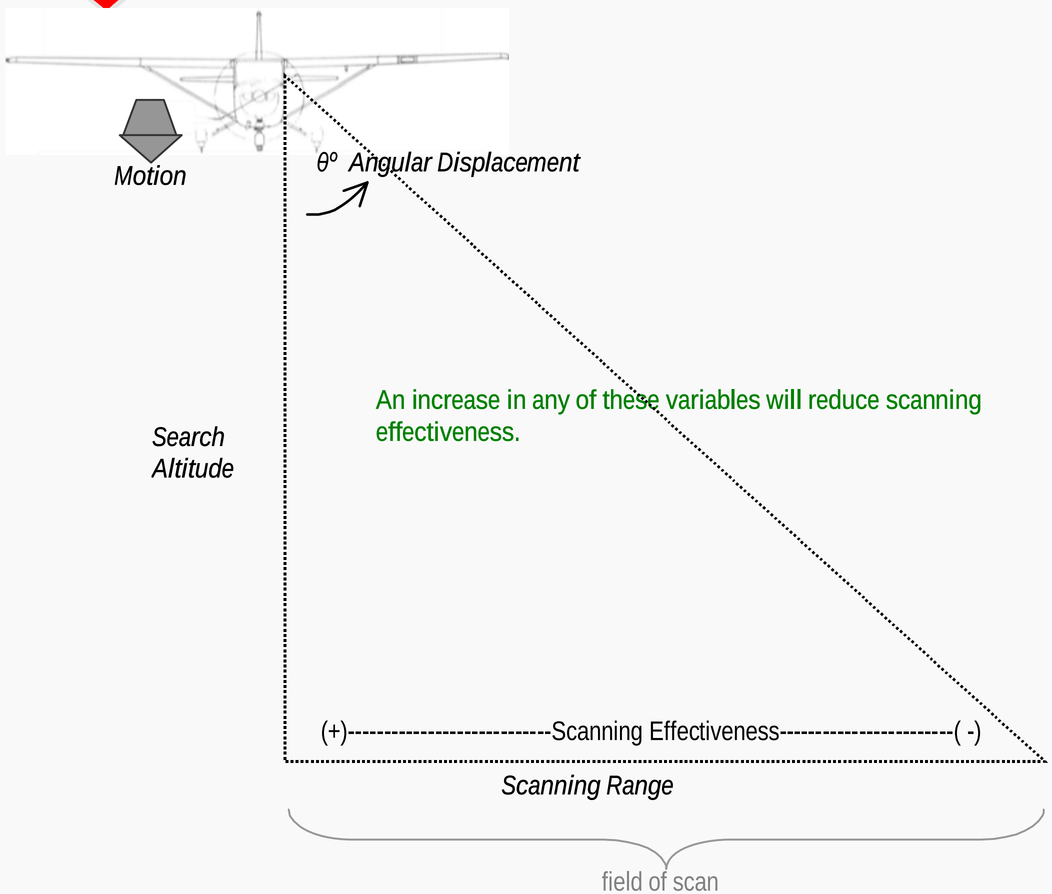
Scanning is the process of investigating, examining, or checking by systematic search: methodical looking.

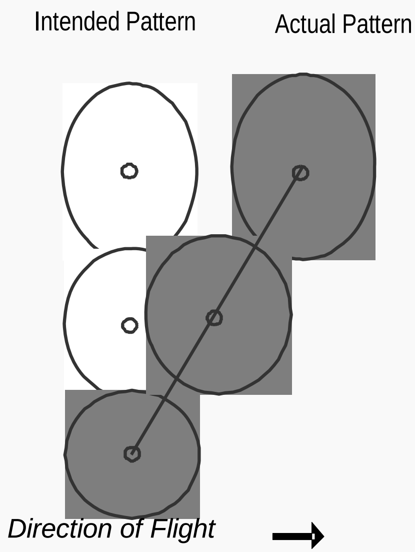


The *fixation area* becomes more elliptical (or eccentric) with distance: the effect of *angular displacement*.

Maximum Scanning Effectiveness:
3º - 4º between pts. of focus with 1/3 sec. per focus ˜ 10º/ sec.

Effects of Vision & Motion



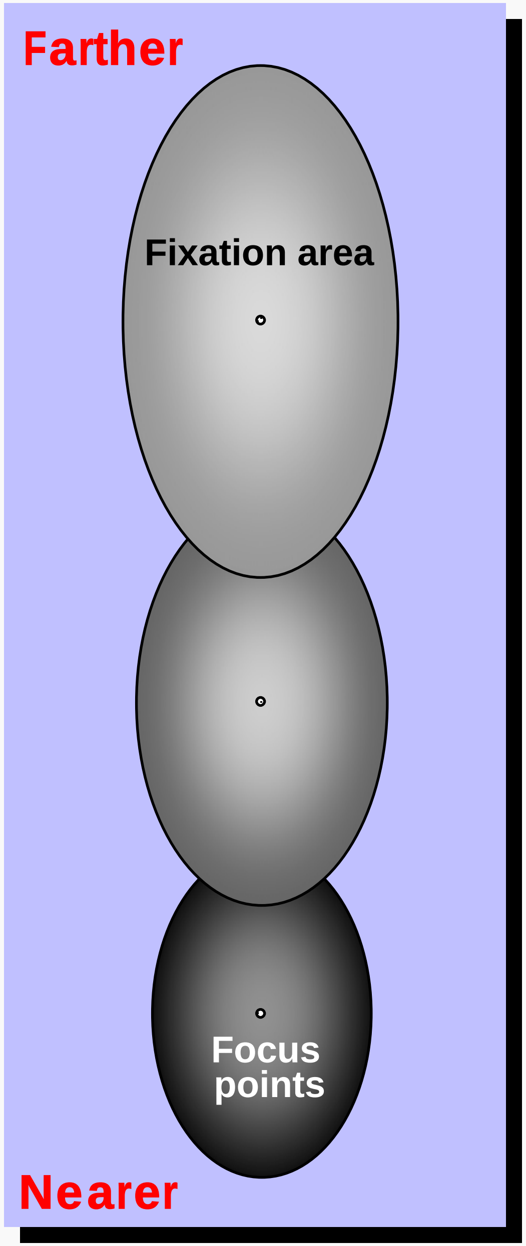


Scanning Range

- The distance from a moving aircraft at which a scanner has a good chance to sight the search object
- Don't confuse with "search visibility"
  - Distance at which an object on the ground (CAP uses a car as an example) can be seen and recognized from a particular height
  - CAP rarely credits a search visibility greater than three or four nm
- Scanning range can be the same as or shorter than search visibility range
- Debris is usually not as large as a car and may not be recognizable, especially from an aircraft going 100 mph. Therefore, scanning range may be less than but never greater than the search visibility

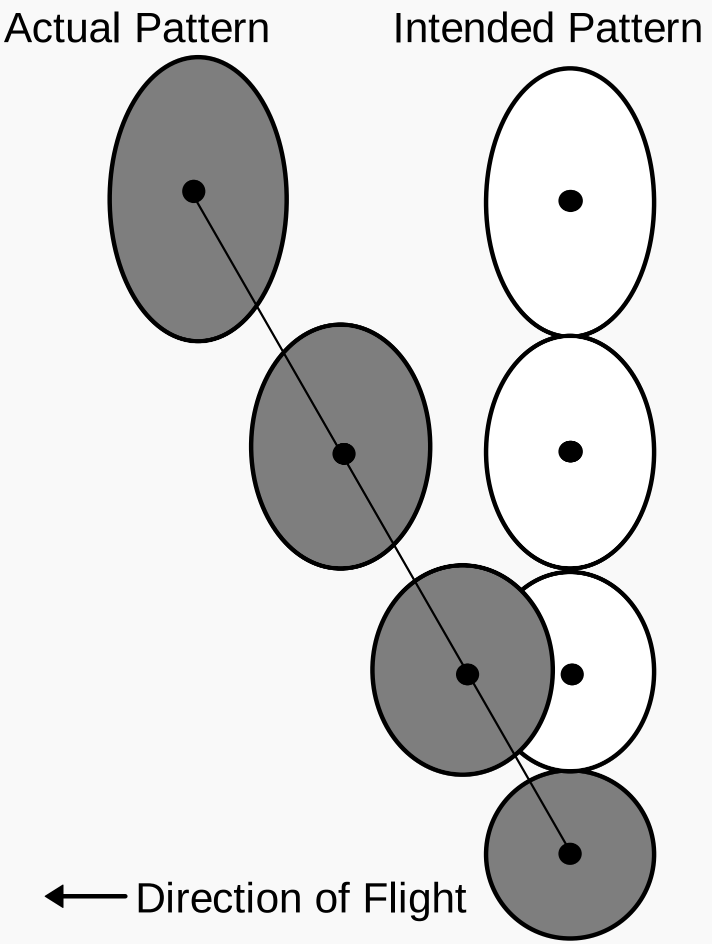
Scanning Technique

- Follow a routine pattern
- Cover area systematically
- Pause to "fix" on a point every 3° to 4°
- Cover 10° per second
- Lateral pattern
- Vertical pattern
- Limitations
  - Weather
  - Altitude
  - Windows
  - Fatigue

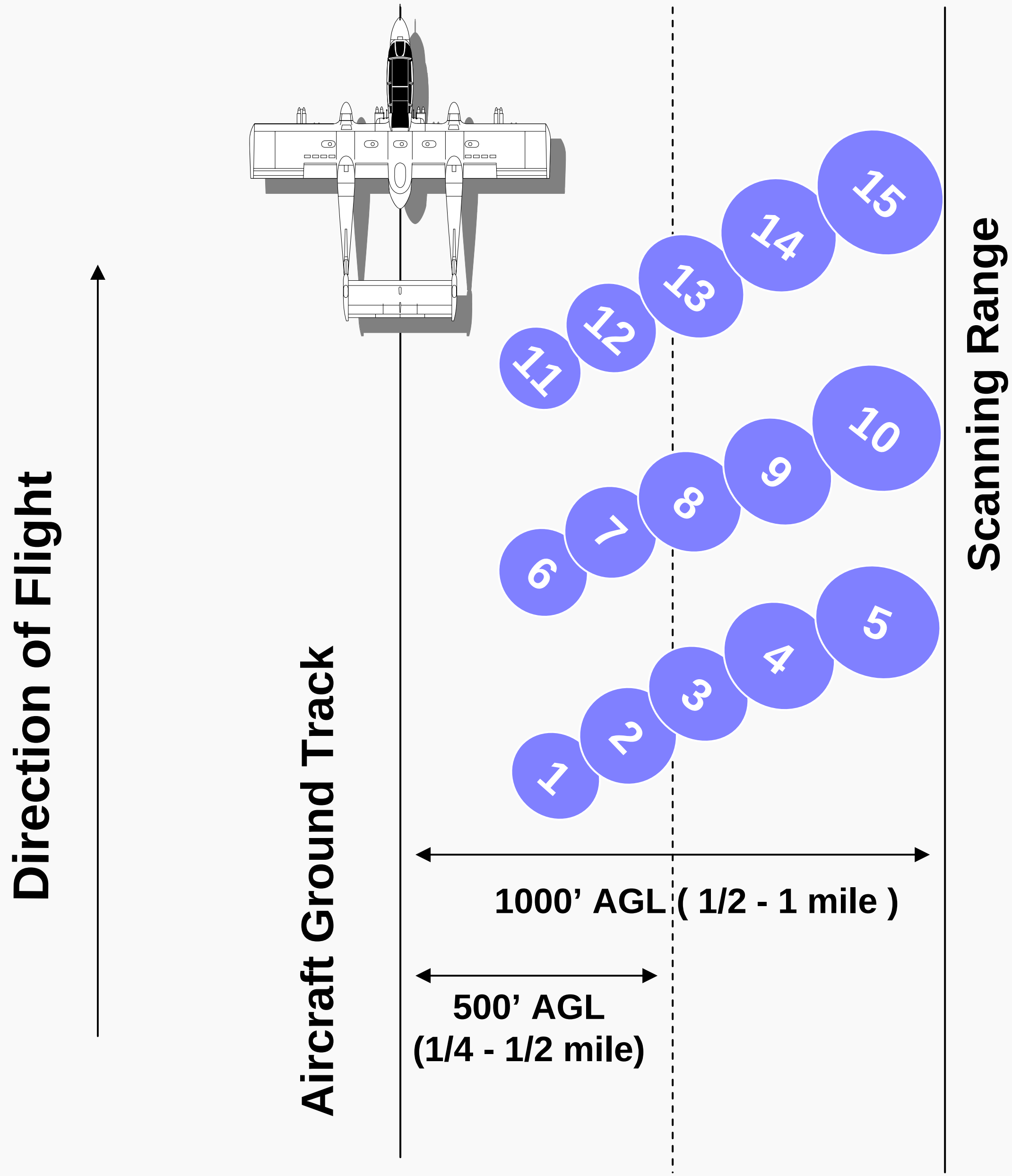


Effect of flight path

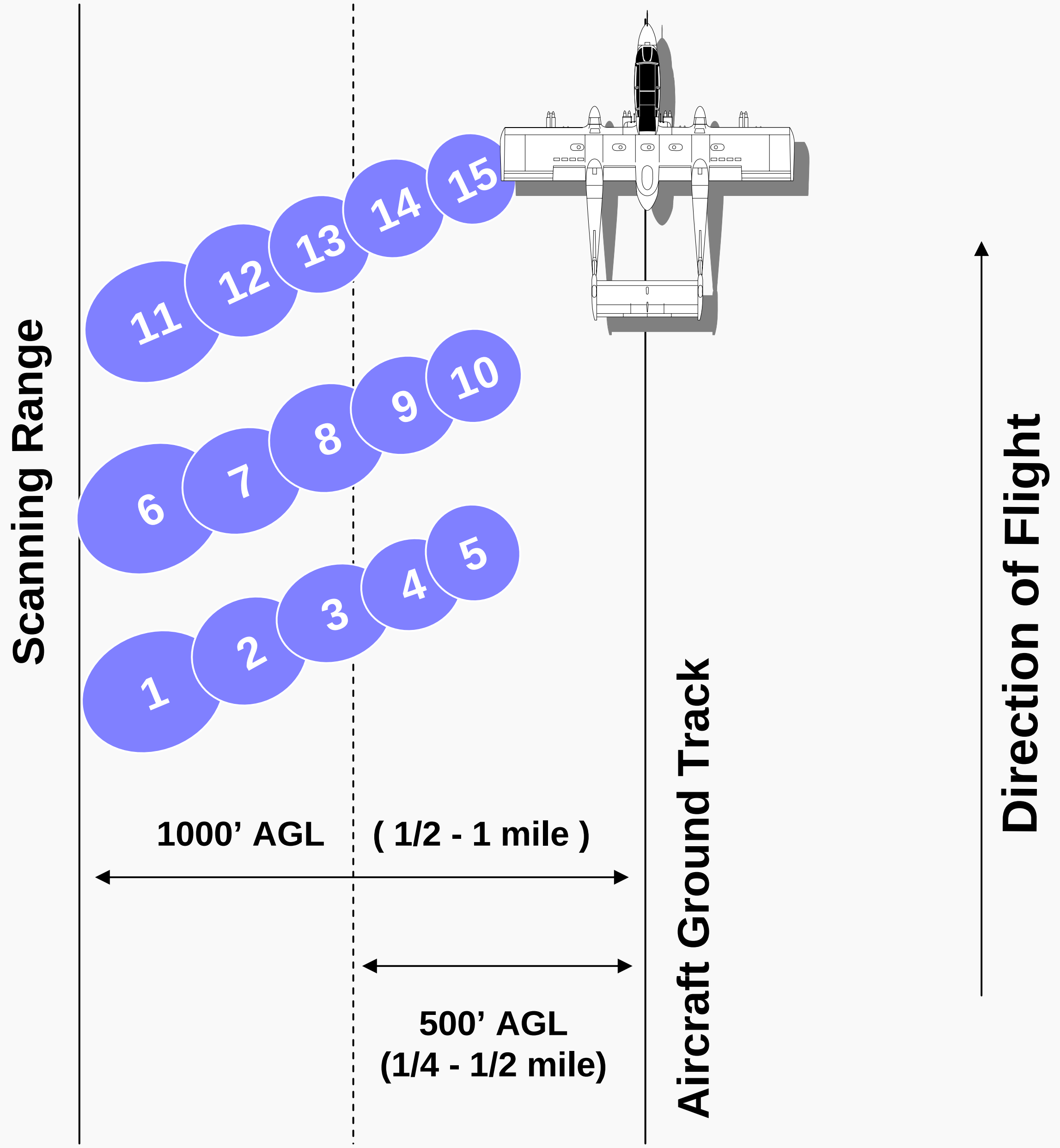
- **Movement of the aircraft across the ground can adversely affect coverage**



Scanning from RIGHT REAR Window



Scanning from the LEFT REAR WINDOW



Putting It Together in the Aircraft

QUESTIONS?

Sighting Distance
Average Visibility

Object	Distance
Person in life jacket (open water or moderate seas)	1/2 mile
Person in small life raft (open water or moderate seas)	3/4 mile
Person in open meadow within wooded area	1/2 mile or less
Crash in wooded area	1/2 mile
Crash on desert or open plain	2 miles
Person on desert or open plain	1 mile or less
Vehicle in open area	2 miles or less

Atmospheric and Lighting Conditions

- Position of the sun
- Clouds and shadows
- Terrain and ground cover
- Surface conditions
- Cleanliness of the windows
- Use of binoculars
- Use of sunglasses

Atmospheric and Lighting Conditions

FOG

Atmospheric and Lighting Conditions

CLOUD SHADOWS

Atmospheric and Lighting Conditions

DUST STORM

Atmospheric and Lighting Conditions

HAZE

Atmospheric and Lighting Conditions

CLOUDS & HAZE

Atmospheric and Lighting Conditions

HAIL (AVOID IT)

Lighting Conditions

- Use of binoculars can rapidly bring on eye fatigue and lead to disorientation and even airsickness.
  - Use only for brief periods to check sightings and for detailed viewings of an assessment area or target.
- Looking through a camera or camcorder viewfinder for extended periods can be equally as discomforting. Take breaks.
- Sunglasses reduce eye fatigue and glare, but can:
  - lead to reduced retinal image.
  - lead to reduced color discrimination.
- Don't wear sunglasses under reduced visibility conditions!

Visual Clues

- Light colored or shiny objects
- Smoke, fire, blackened areas
- Disturbed or discolored foliage
- Fresh bare earth
- Breaks in cultivated field patterns
- Disturbances in water and snow
- Birds and animals
- Signals and messages

Wreckage Patterns

- Hole in the ground
- Cork screw or auger
- Creaming or smear
- The four winds
- Hedge-trimming
- Splash

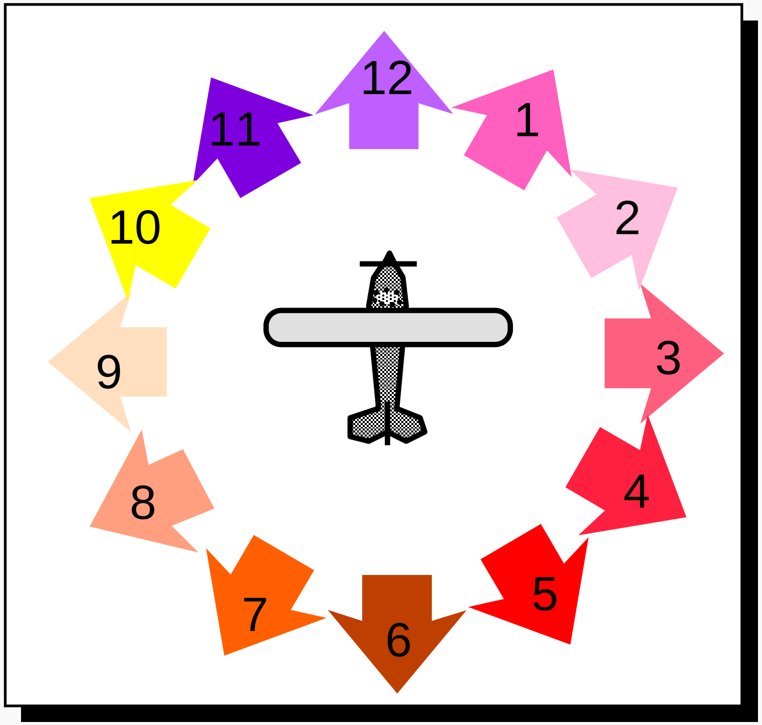
Fighting Fatigue

- Change positions every 30 minutes if the size of the aircraft permits
- Switch sides of the aircraft (rear seat)
- Find a comfortable scanning position
- Ensure aircraft windows are clean
- Scan through open hatches when possible
- Keep inside lighting low to reduce reflections
- Only use binoculars to check sightings
- Focus on close objects periodically

QUESTIONS?

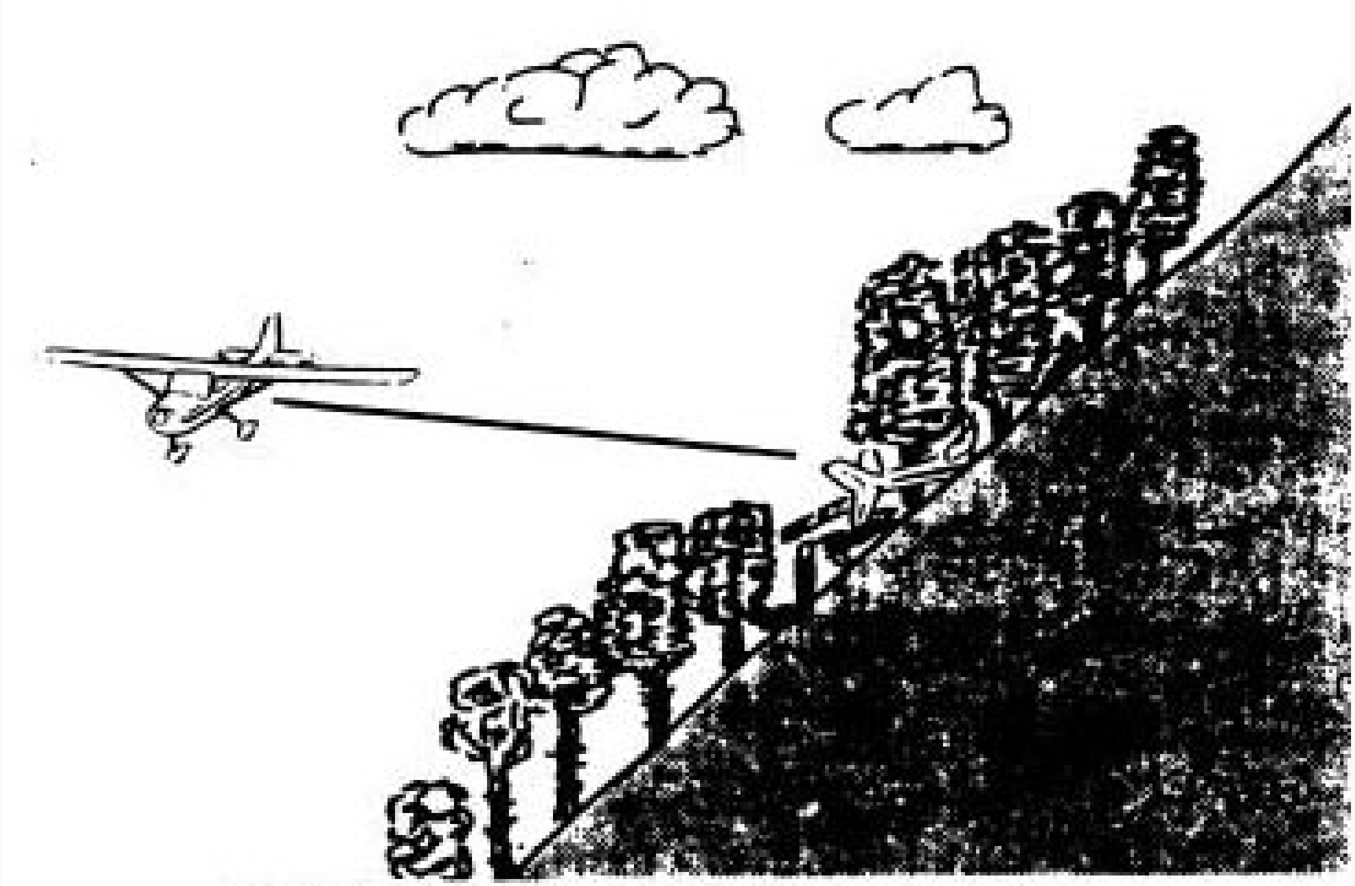
Directing the Pilot

- Clock Position
  - High, Low, Level
- Maneuvers
  - Straight ahead
  - Stop turn
- Small Corrections
  - 5 degrees right
  - 10 degrees left bank
- External References



Scanning sloping terrain

Scanning sloping terrain



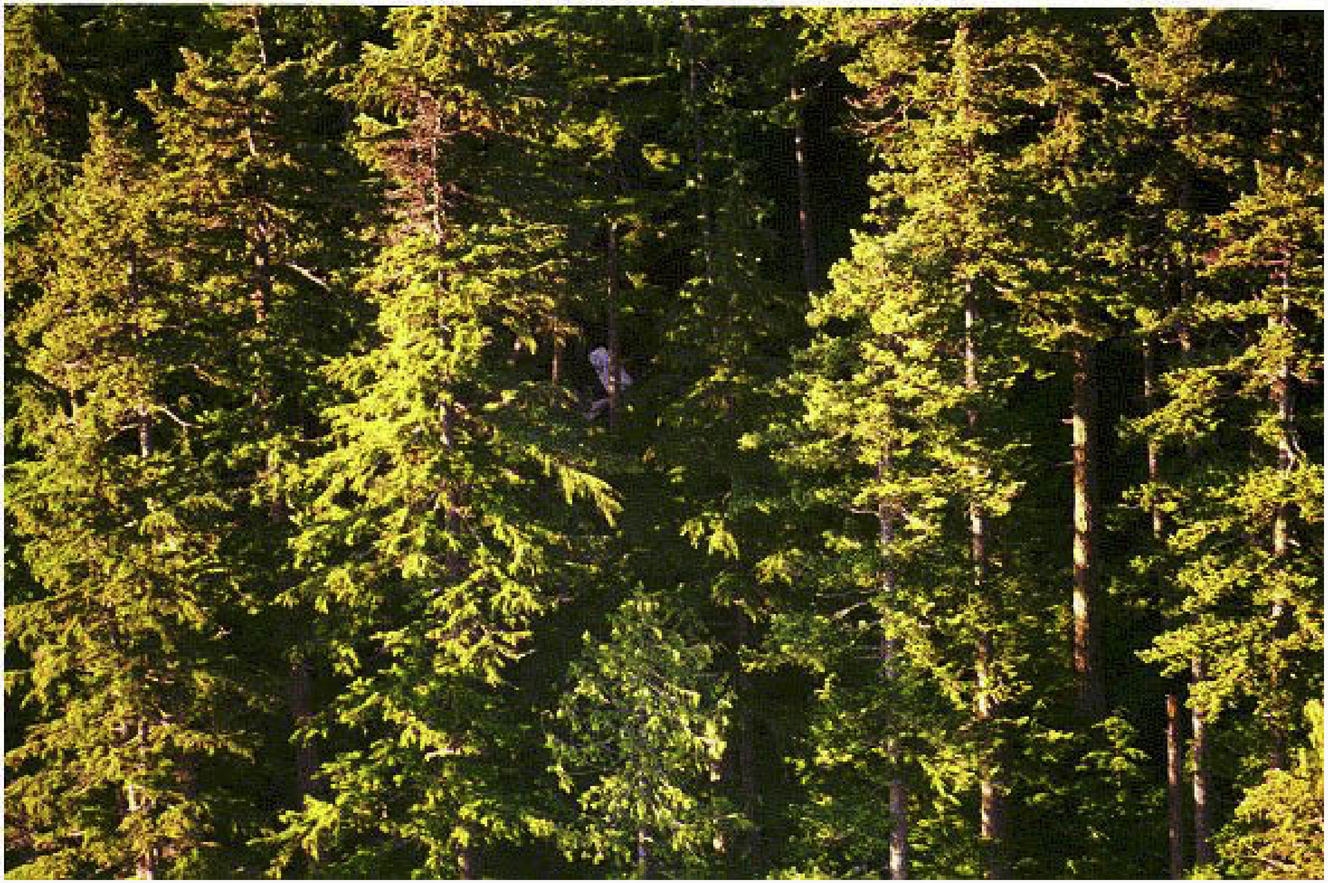
SOMETIMES THE SEARCH OBJECT
IS VISIBLE HORIZONTALLY

Side of mountain

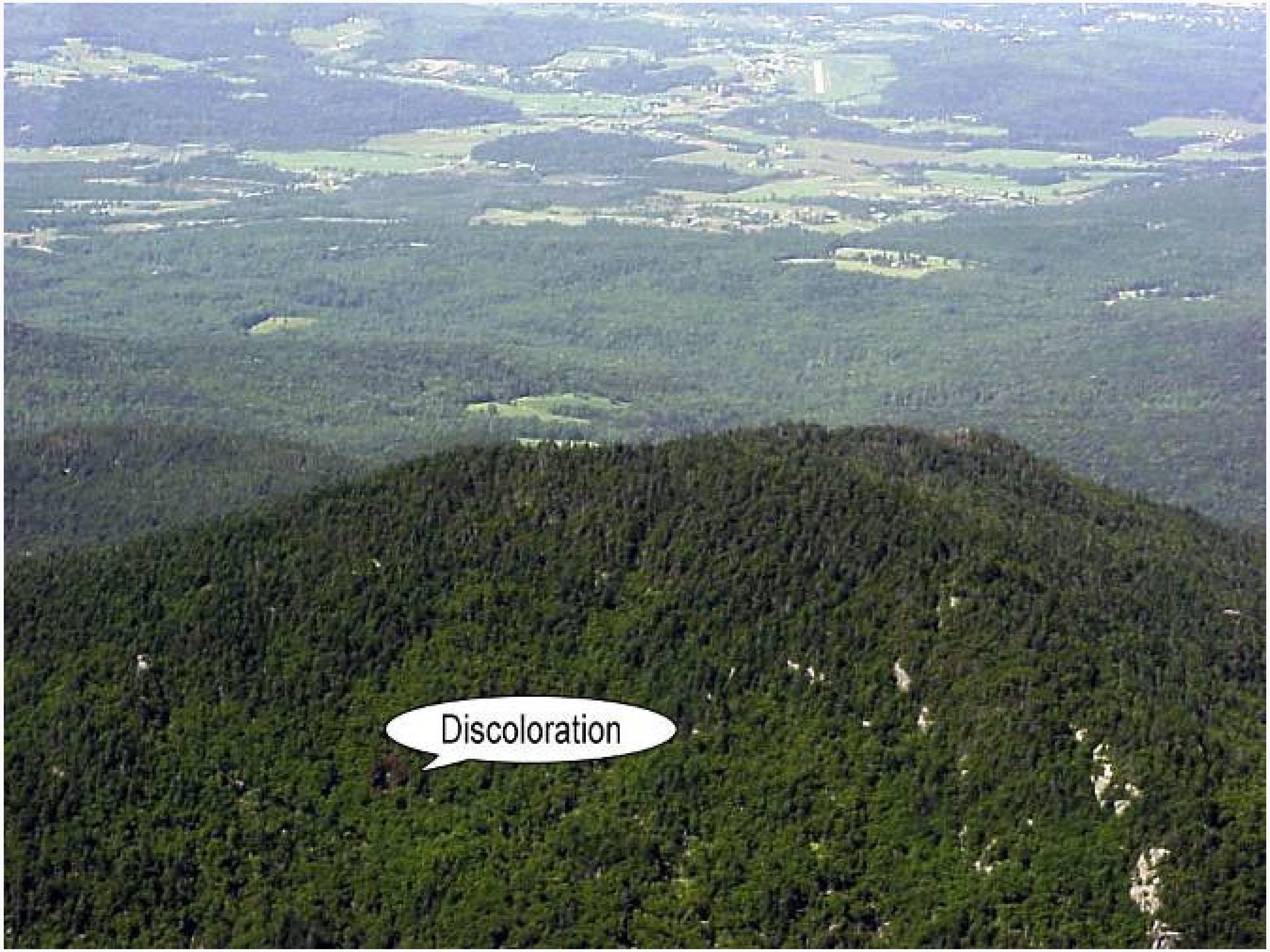
Side of mountain

Forest

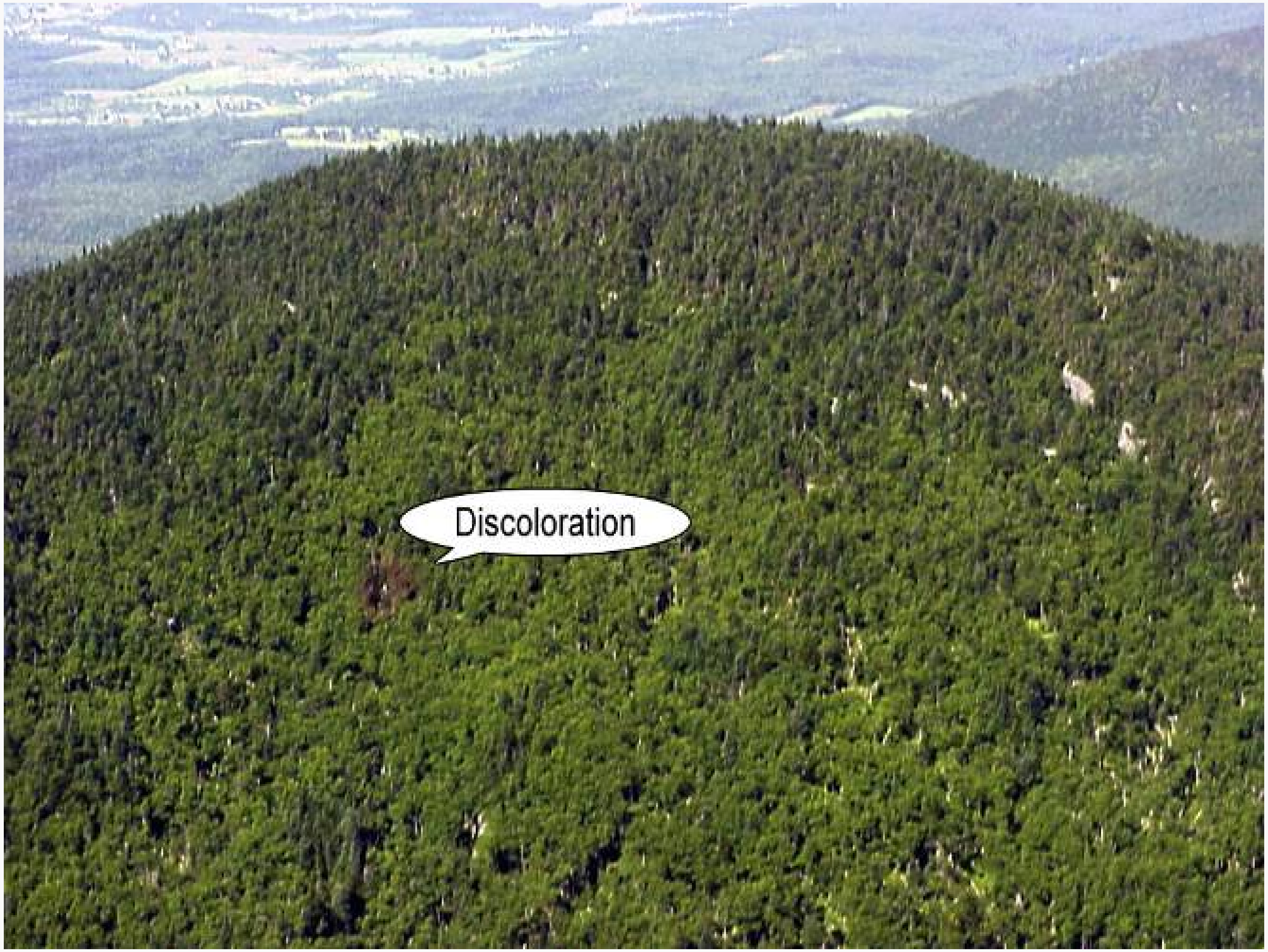
Forest



Side of hill (blackened)



Side of hill

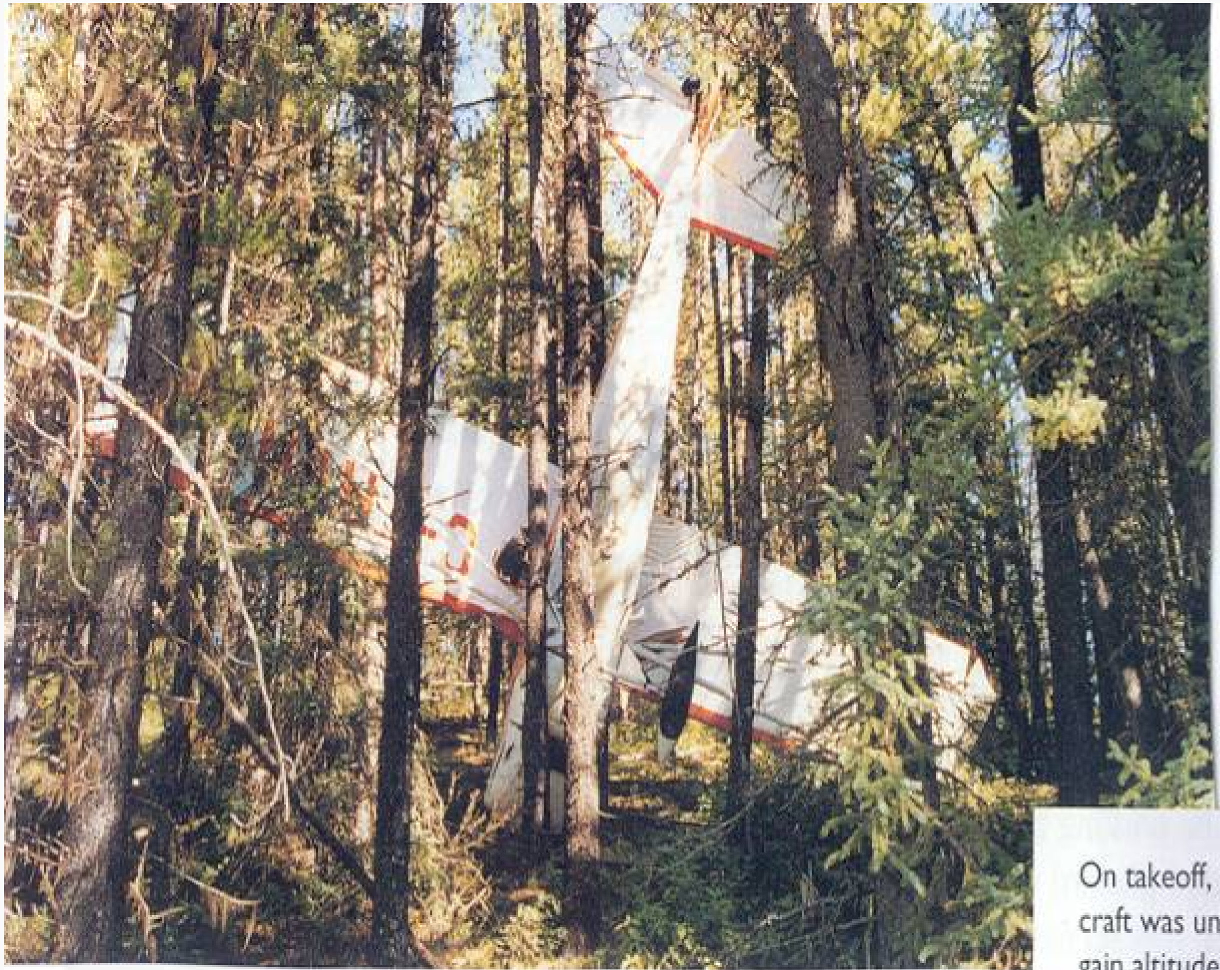


Side of hill

Side of hill

Side of mountain

Straight down into trees



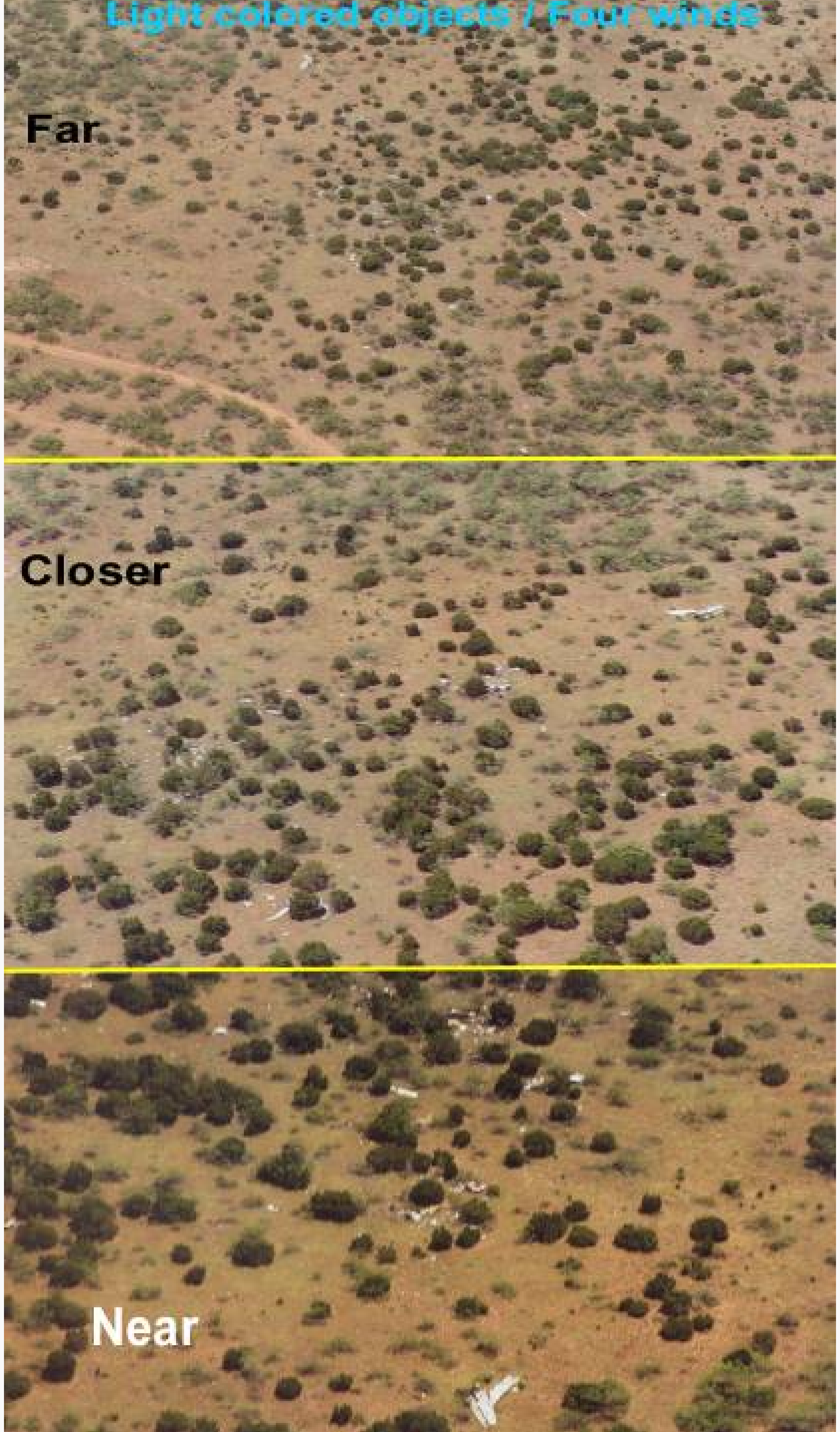
On takeoff, this aircraft was unable to gain altitude and crashed in the trees.

Smear

Scattered

Broken

Four Winds

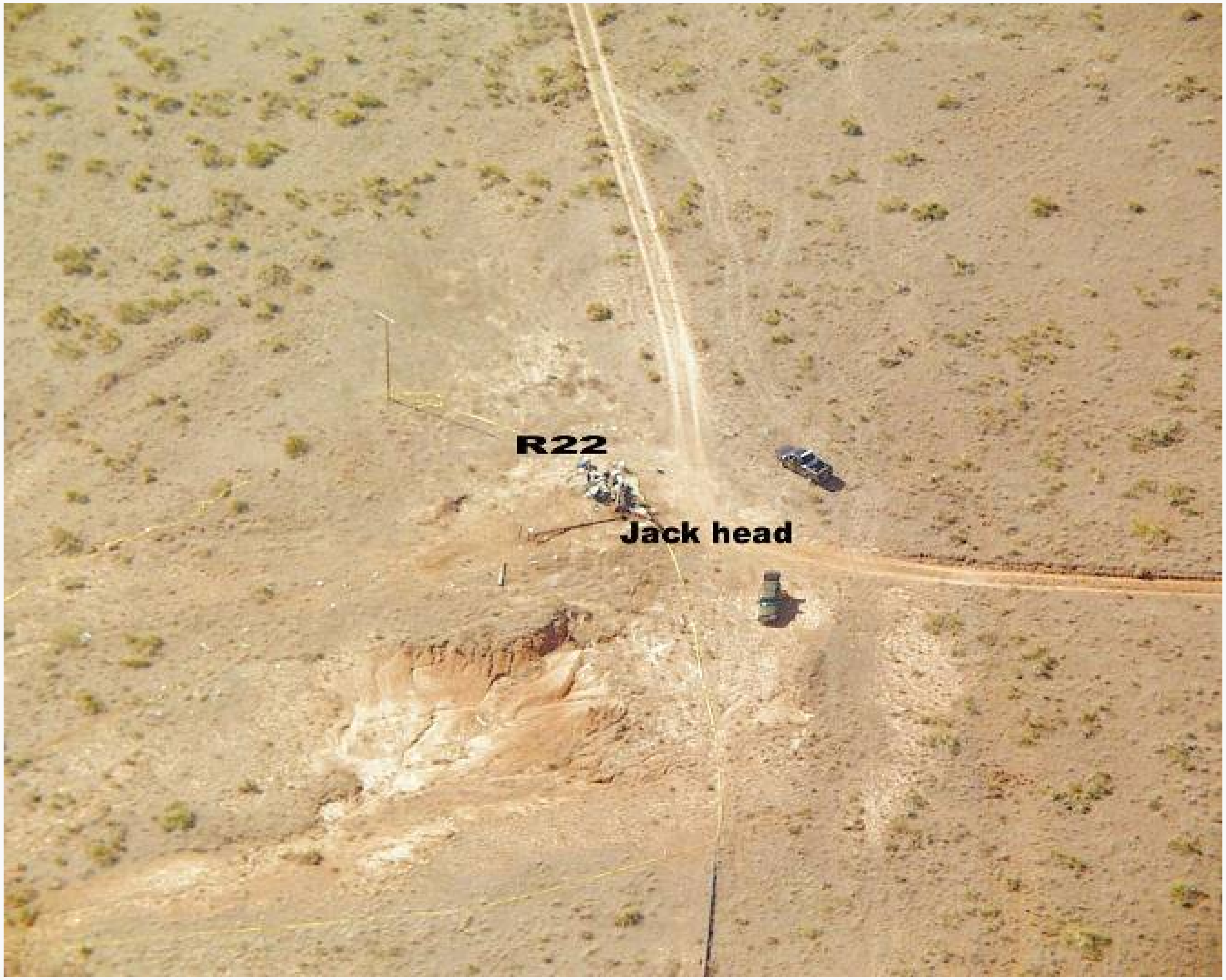


Crash in Corn Field …

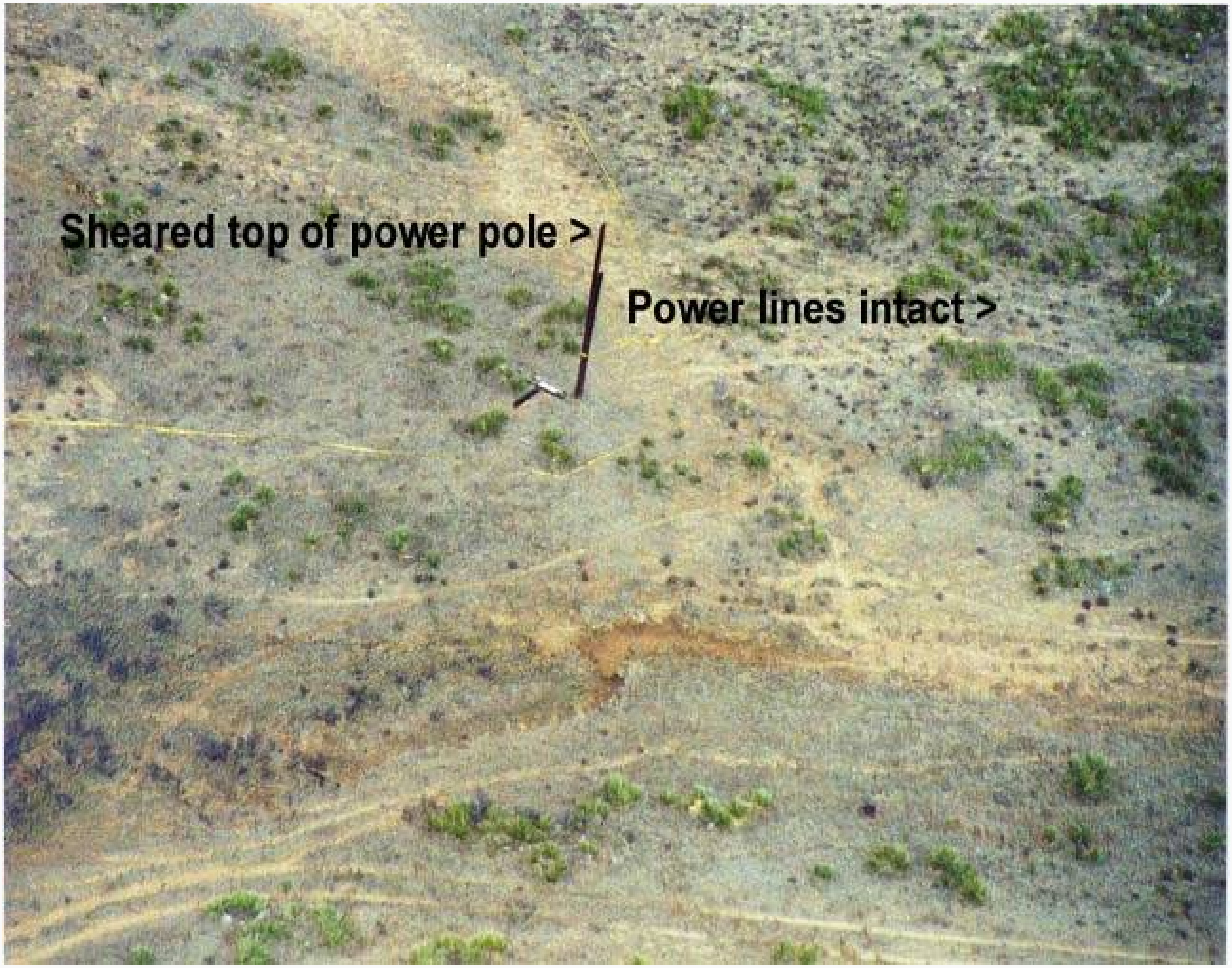
... occurred where the majority of crashes occur (note runway in background)

R-22 crash site

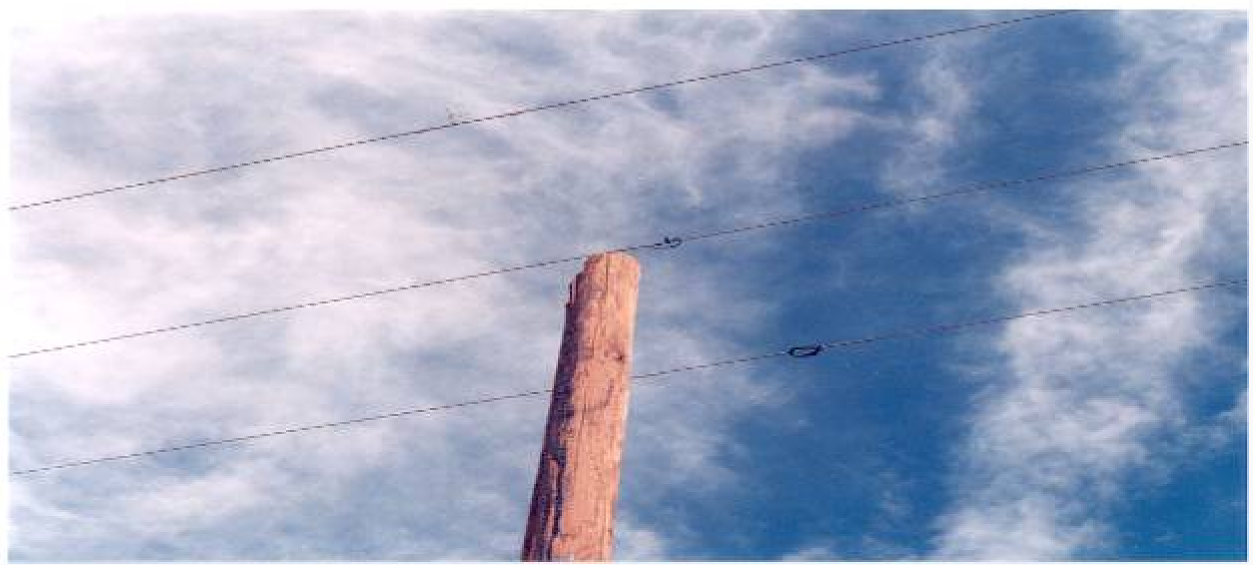
Closer to site



Pole sheared by R-22



Close-up of pole



Close-up of track

Close-up of R-22 against well jack

Crash site in fog

Close-up of site

Close-up of site

Crash by runway

Close-up of site

Aircraft in snow

Aircraft in snow

Aircraft in snow and tree line

Helicopter in open field

Close-up of helicopter

QUESTIONS?

Weather

(Chapter 6)

Objectives

- Discuss how reduced visibility affects search operations, and precautions for flight during reduced visibility conditions. {S; 6.4}
- Describe how turbulence can affect search operations. {S; 6.5}

Weather

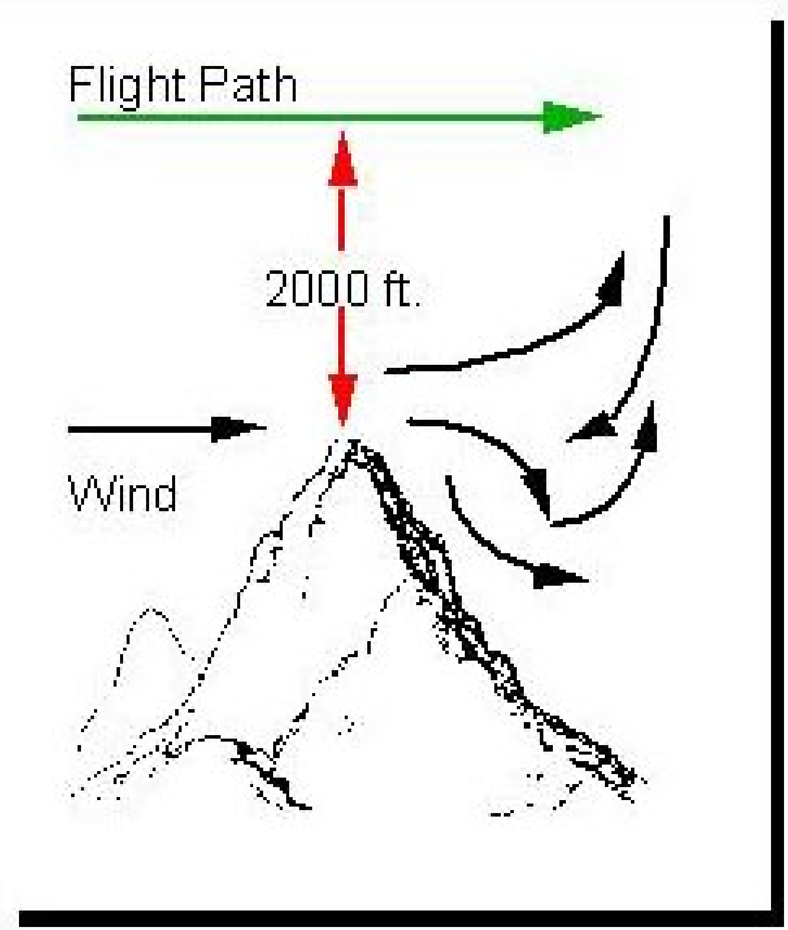
- The most important aspect of weather is its impact on flight conditions
- Safety is paramount
- Details in the observer course
- Effects on Search
  - Prevailing visibility
  - Search visibility
  - Search patterns and altitudes

Reduced Visibility

- Fog
- Haze
- Snow
- White out
- Blowing dust
- Affected by sun angle and direction

Turbulence

- Can reduce scanning effectiveness
  - Increases fatigue
  - Interferes with scan
- Plan flights around high terrain carefully
- Wind on downwind side can be very strong
- Clear ridges and peaks by 2000 feet



Flight precautions

- Each member of the aircrew must be vigilant during all phases of flight
  - Assign each an area to watch
- Characterize visibility in the search area to establish the proper scanning range
  - May be different than assumed
- Visibility conditions or turbulence may increase fatigue

QUESTIONS?

High Altitude and Terrain Considerations

(Chapter 7)

Objectives

- Discuss the symptoms and dangers of dehydration, and strategies used to combat its effects. {S; 7.3}
- Discuss the symptoms and dangers of ear block, sinus block and hypoxia, and strategies used to combat their effects. {S; 7.3.1 – 7.3.3}

Dehydration

- The loss of water through the skin, lungs and kidneys never ceases
  - Loss increases as the humidity drops with increasing altitude
- Symptoms are dryness of the tissues and resulting irritation of the eyes, nose and throat
- Minimize intake of coffee, tea, cola or cocoa since they contain caffeine and other chemicals
- Strategies
  - Drink plenty of fluids
  - Increase air flow (vents and windows)
  - If the search objective allows, reduce temperature by climbing to higher altitude

Other Effects of Altitude

- Ear Block
  - Congestion around the Eustachian tube makes pressure equalization difficult
  - Can produce severe pain and a loss of hearing that can last from several hours to several days (can rupture eardrum)
- Sinus Block
  - Sinus congestion makes pressure equalization difficult, particularly during descent
  - Can produce severe pain
- Hypoxia
  - Normally not a concern for non-mountainous CAP operations (usually below 12,000 MSL)
  - Can have loss of night vision as low as 5,000 feet
  - Body has no built-in warning system against hypoxia

Strategies

- Ear Block
  - Yawn, swallow, tense muscles in throat
  - Valsalva maneuver
- Sinus Block
  - Don’t fly if you’re not well
  - Medication usually not effective and has side effects
- Hypoxia
  - Avoid smoking, alcohol and depressants
  - Supplemental oxygen

QUESTIONS?

Navigation and Position Determination

(Chapter 8)

Objectives

- Define the following navigation terms: {S; 8.1}
  - Course, heading and ground track
  - Nautical mile and knot
  - Latitude and Longitude
- Given a map or sectional: identify an object given its latitude and longitude; and given a position determine its latitude and longitude. {S; 8.2.3}
- Given a sectional chart, locate and discuss: {S; 8.6}
  - Physical features such as topographical details
  - Towns and cities
  - Highways and roads
  - Towers; determine height in both MSL and AGL
  - Airways and radio aids to navigation
  - Airports and airport data

Objectives (Con't)

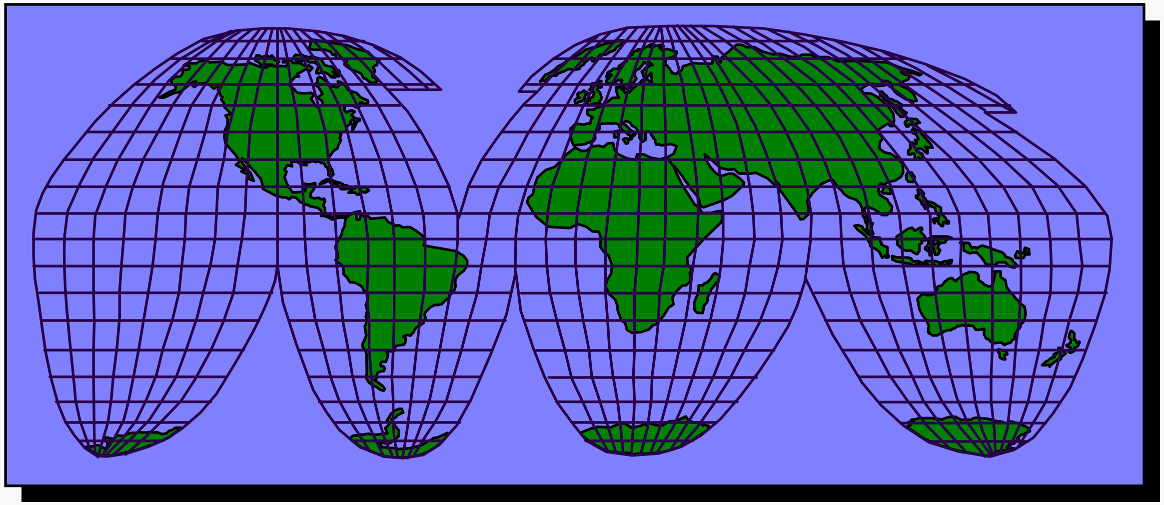
- Given a sectional chart, discuss the information found in the Legend. {S; 8.6}
- Given a sectional chart, locate Maximum Elevation Figures and state their meaning. {S; 8.7.2}
- Given a sectional chart, a plotter, and two points on the chart: {S; 8.8}
  - Determine the cardinal heading
  - Determine the distance between the two points (nautical and statute miles)
- Given data from navaids, track the current position of an aircraft and determine the position of a ground feature (sectional and map). {S; 8.9}
- State the size of a full and a one-quarter standardized grid. {S; 8.10}

Navigation Terms

- Course - planned or actual path of the aircraft over the ground
  - True course
  - Magnetic course
- Heading - direction the aircraft is pointing
- Ground track – actual path of the aircraft over the ground
- Nautical mile (nm) - measurement used in air navigation
- Knots (kts) - nautical miles per hour

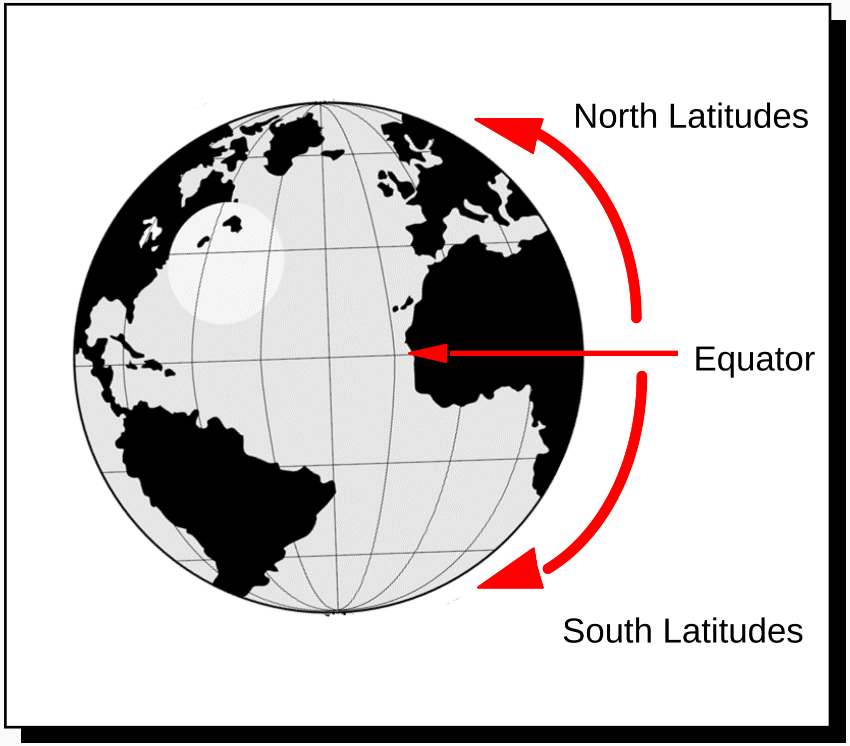
Locating a Position

- Use a system of imaginary lines
- Some run north and south (latitude)
- Others run east and west (longitude)
- Where they cross defines a point on the earth
- *By convention*, latitude is stated first



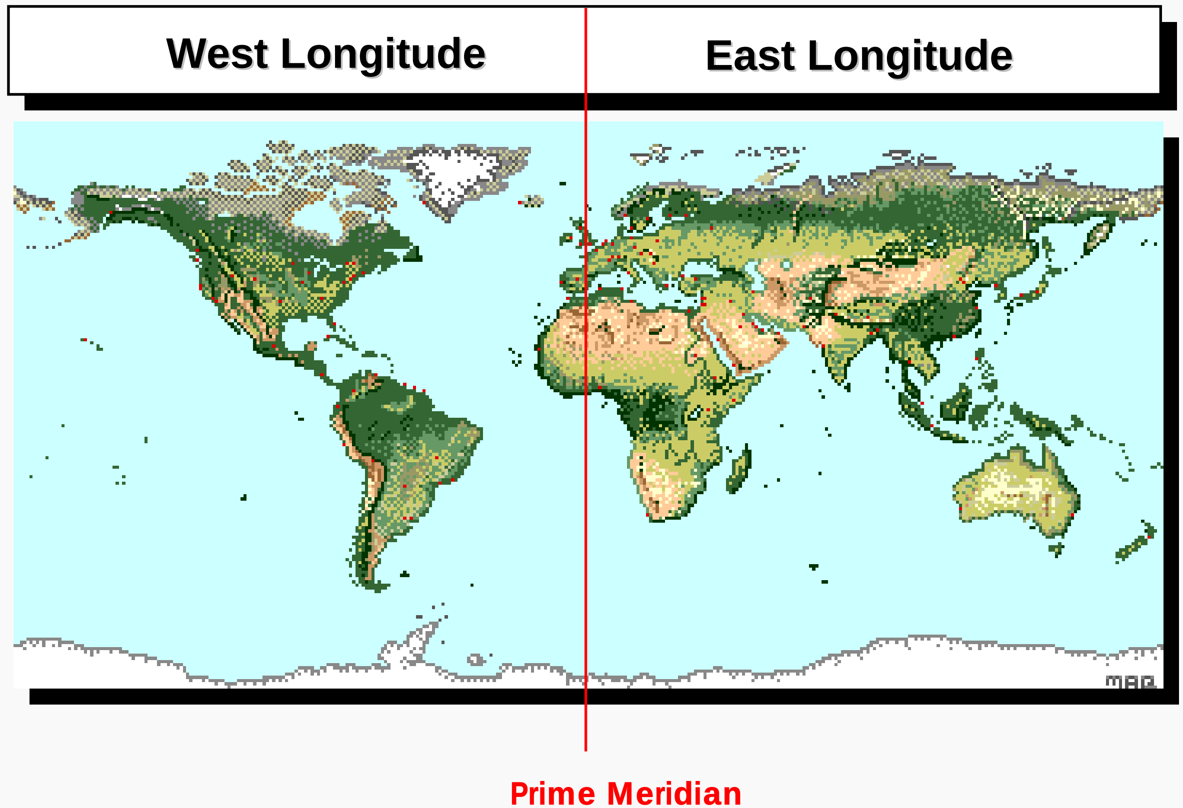
Latitude

- Lines of latitude run east and west
- Latitude starts with 0°at the equator
- Latitude increases to 90°north at the North Pole and 90°south at the South Pole
- Great Circle and Lesser Circles



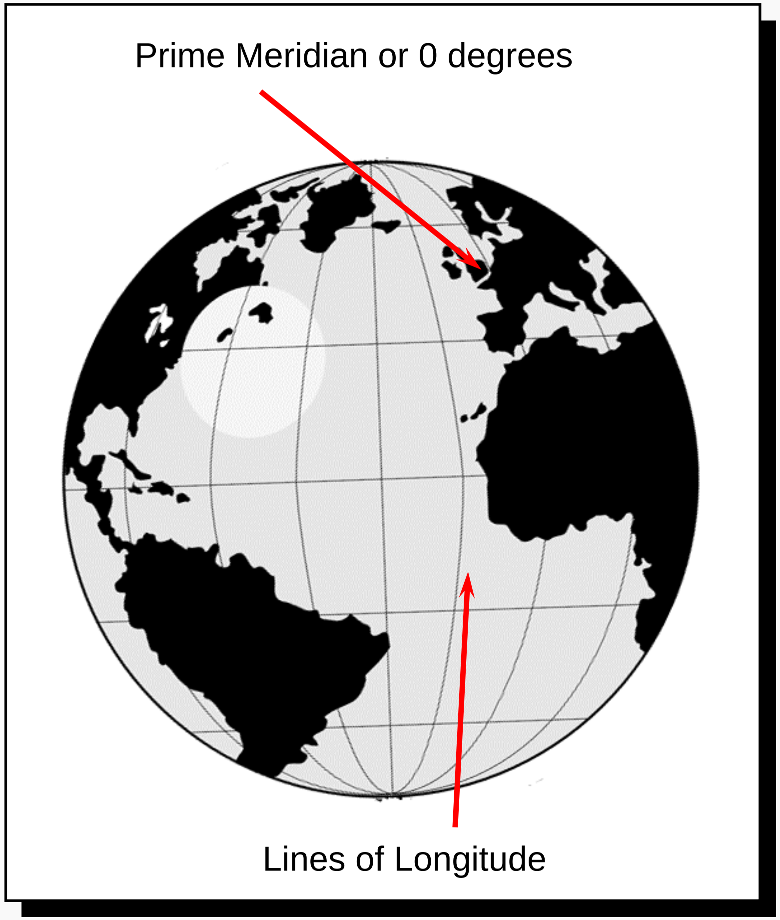
Longitude

- Longitude has to start someplace
- So 0° is in Greenwich England
- East and west longitude increase as you move away from the Prime Meridian



Longitude

- Greenwich (Prime) Meridian is zero degrees longitude on one side of the earth
- East and west longitude increase until they meet at 180° on the other side of the earth
- All line of longitude are great circles (same length)

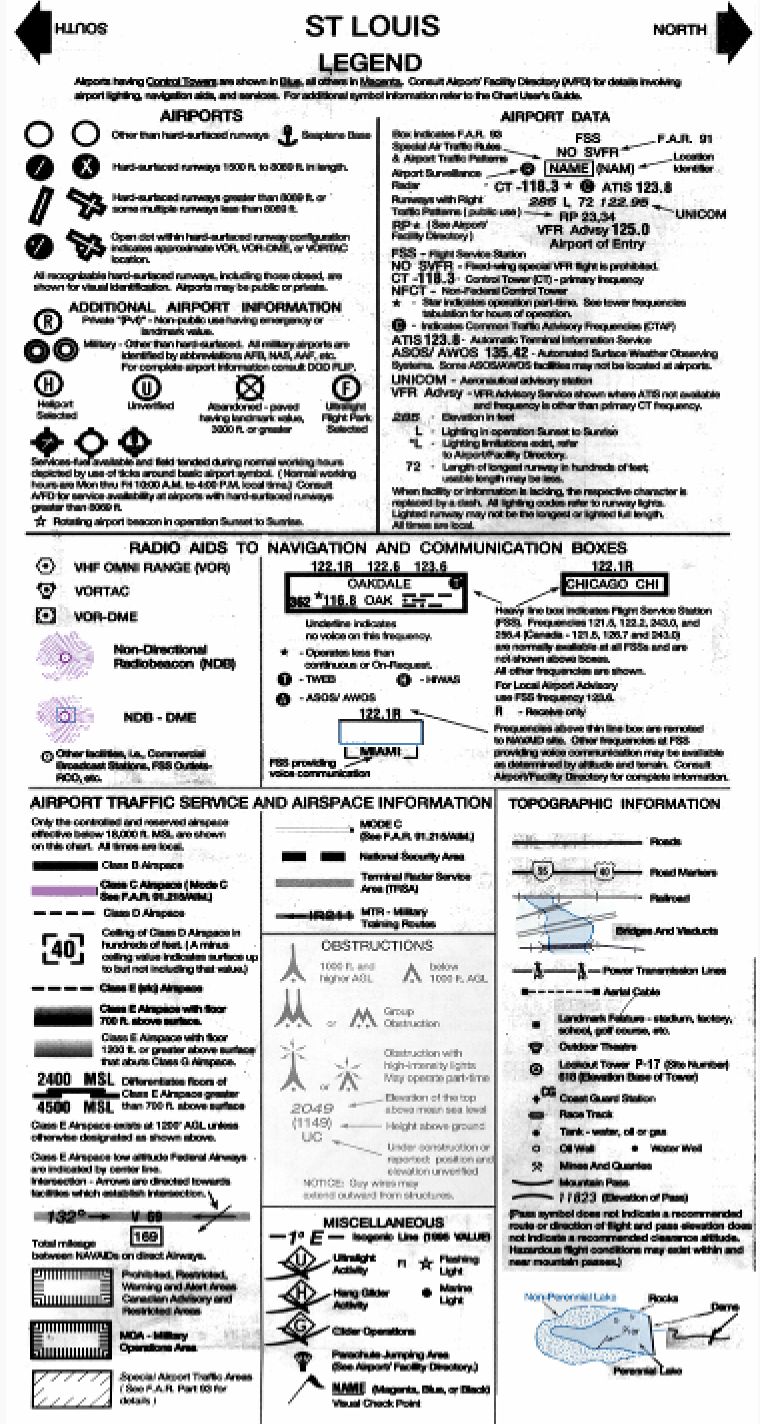


QUESTIONS?

Sectional Aeronautical Charts

- 1 to 500,000
- Medium to slow speed aircraft
- Types of Information: Legend, Aeronautical, Topographical

Legend


SOUTH
ST LOUIS
NORTH
LEGEND
AIRPORTS
AIRPORT DATA
ADDITIONAL AIRPORT INFORMATION
RADIO AIDS TO NAVIGATION AND COMMUNICATION BOXES
VHF OMNI RANGE (VOR)
VORTAC
VOR-DME
Non-Directional Radiobeacon (NDB)
NDB - DME
OAKDALE
CHICAGO CHI
MIAMI
AIRPORT TRAFFIC SERVICE AND AIRSPACE INFORMATION
TOPOGRAPHIC INFORMATION
OBSTRUCTIONS
MISCELLANEOUS

Legend

CLASS B, CLASS C, TRSA AND SELECTED RADAR APPROACH CONTROL FREQUENCIES

FACILITY	FREQUENCIES	SERVICE AVAILABILITY
CINCINNATI CLASS B	119.7 363.15 (RWY 09/27 090°-269°) (RWY 18R/36L 180°-359°) 123.875 254.25 (RWY 09/27 270°-089°) (RWY 18L/36R 360°-179°)	CONTINUOUS
ST LOUIS CLASS B	124.2 388.0 (NORTH/EAST) 126.7 254.3 (SOUTH/WEST)	CONTINUOUS
CHAMPAIGN CLASS C	121.35 291.0 (313°-133°) 132.85 285.65 (134°-312°) O/T 121.35 353.95 ZAU CNTR	0600-2400; O/T CLASS G; E 700' AGL & ABOVE
DAYTON CLASS C	127.65 294.5 (360°-090°) 118.85 327.1 (091°-180°) 134.45 316.7 (181°-359°)	CONTINUOUS
EVANSVILLE CLASS C	126.4 338.4 (041°-219°) 127.35 267.9 (220°-040°) O/T 128.3 284.65 ZID CNTR	0600-2300; O/T CLASS G; E 700' AGL & ABOVE
INDIANAPOLIS CLASS C	127.15 317.8 (EAST OF ACTIVE RWY) 124.65 317.8 (WEST OF ACTIVE RWY)	CONTINUOUS
LEXINGTON CLASS C	120.15 239.3 (040°-220°) 120.75 298.9 (221°-039°)	CONTINUOUS
LOUISVILLE CLASS C	132.075 (EAST) 123.675 (WEST)	CONTINUOUS
NASHVILLE CLASS C	128.45 360.7 (019°-199°) 119.35 385.55 (200°-018°)	CONTINUOUS
SPRINGFIELD CLASS C	118.6 307.0 (041°-219°) 126.15 323.0 (220°-040°) O/T 127.275 327.5 ZKC CNTR	0600-2300; O/T CLASS E
CAMPBELL AAF RADAR	118.1 255.6	CONTINUOUS
GODMAN AAF RADAR	132.075 (EAST) 123.675 (WEST) 271.2	CONTINUOUS
SABRE AHP RADAR	118.1 255.6	CONTINUOUS

ZAU – Chicago, ZID – Indianapolis, ZKC – Kansas City.
O/T indicates Other times

SPECIAL USE AIRSPACE ON ST LOUIS SECTIONAL CHART

Unless otherwise noted altitudes are MSL and in feet; time is local.
Contact nearest FSS for information.
†Other time by NOTAM contact FSS

The word "TO" an altitude means "To and including."
"MON-FRI" indicates "Monday thru Friday"
FL – Flight Level
NO A/G – No air to ground communications

U.S. P–PROHIBITED, R–RESTRICTED, A–ALERT, W–WARNING, MOA–MILITARY OPERATIONS AREA

NUMBER	LOCATION	ALTITUDE	TIME OF USE	CONTROLLING AGENCY**
R-3401 A	ATTERBURY RESERVE FORCES TRAINING AREA, IN	TO 40,000	CONTINUOUS MAY 1 THRU SEPT 30 0800-2300 TUE-SAT OCT 1 THRU APR 30†	ZID CNTR
R-3401 B	ATTERBURY RESERVE FORCES TRAINING AREA, IN	1200 AGL TO 14,000	CONTINUOUS MAY 1 THRU SEPT 30 0800-2300 TUE-SAT OCT 1 THRU APR 30†	ZID CNTR
R-3403 A	JEFFERSON PROVING GROUND, IN	TO 40,000	0630 TO 2400	ZID CNTR
R-3403 B	JEFFERSON PROVING GROUND, IN	1200 AGL TO FL 180	0800 TO 2300	ZID CNTR
R-3404	CRANE, IN	TO 2500	SR-SS, MAY 1 THRU NOV 1 †24 HR IN ADVANCE	TERRE HAUTE CON TWR
R-3701 A	FORT CAMPBELL, KY	TO 5000	BY NOTAM 24 HRS IN ADVANCE	FT CAMPBELL RAPCON
R-3702 A	FORT CAMPBELL KY		BY NOTAM 24 HRS [illegible]DVANCE	ZME CNTR
R-3702 B	FORT CAMPBELL, KY	6000 TO FL 220	BY NOTAM 24 HRS IN ADVANCE	ZME CNTR
R-3704 A	FORT KNOX, KY	TO 10,000	0600 TO 2400 EST †24 HR IN ADVANCE	LOUISVILLE INTL-STANDIFORD CON T[illegible]
R-3704 B	FORT KNOX, KY	10,000 TO 20,000	BY NOTAM 24 HRS IN ADVANCE	LOUISVILLE INTL-STANDIFORD CON T[illegible]
A-371	FORT CAMPBELL, KY	TO 2000	CONTINUOUS	NO A/G

ZID – Indianapolis, ZME – Memphis

MOA NAME	ALTITUDE OF USE*	TIME OF USE†	CONTROLLING AGENCY**
[illegible]KEYE	5000	0900-1600 TUE, FRI & SAT 0900-2200 WED & THU	ZID CNTR
[illegible]AMPBELL 1	500 AGL TO 10,000	INTERMITTENT 0700-2000	ZME CNTR
	1500 AGL TO 10,000	INTERMITTENT 0700-2000	ZME CNTR
[illegible]OWARD EAST	9000	0700-2200 TUE-SUN	ZKC CNTR
[illegible]NDBERGH B	7000	0900-1030 & 1300-1430 MON-FRI INTERMITTENT BY NOTAM	ZKC CNTR
[illegible]NDBERGH D	8000	0900-1030 & 1300-1430 MON-FRI INTERMITTENT BY NOTAM	ZKC CNTR
[illegible]UITT A	500 AGL TO 6000	0900-1200 & 1300-1600 TUE-SAT	ZKC CNTR
[illegible]UITT B	500 AGL TO 3000	0900-1200 & 1300-1600 TUE-SAT	ZKC CNTR
[illegible]D HILLS	6000	INTERMITTENT 0830-1630 TUE, WED, SAT & SUN 0830-2100 THU & FRI	ZID CNTR
[illegible]LEM	TO BUT NOT INCL 7000	INTERMITTENT BY NOTAM	ZKC CNTR

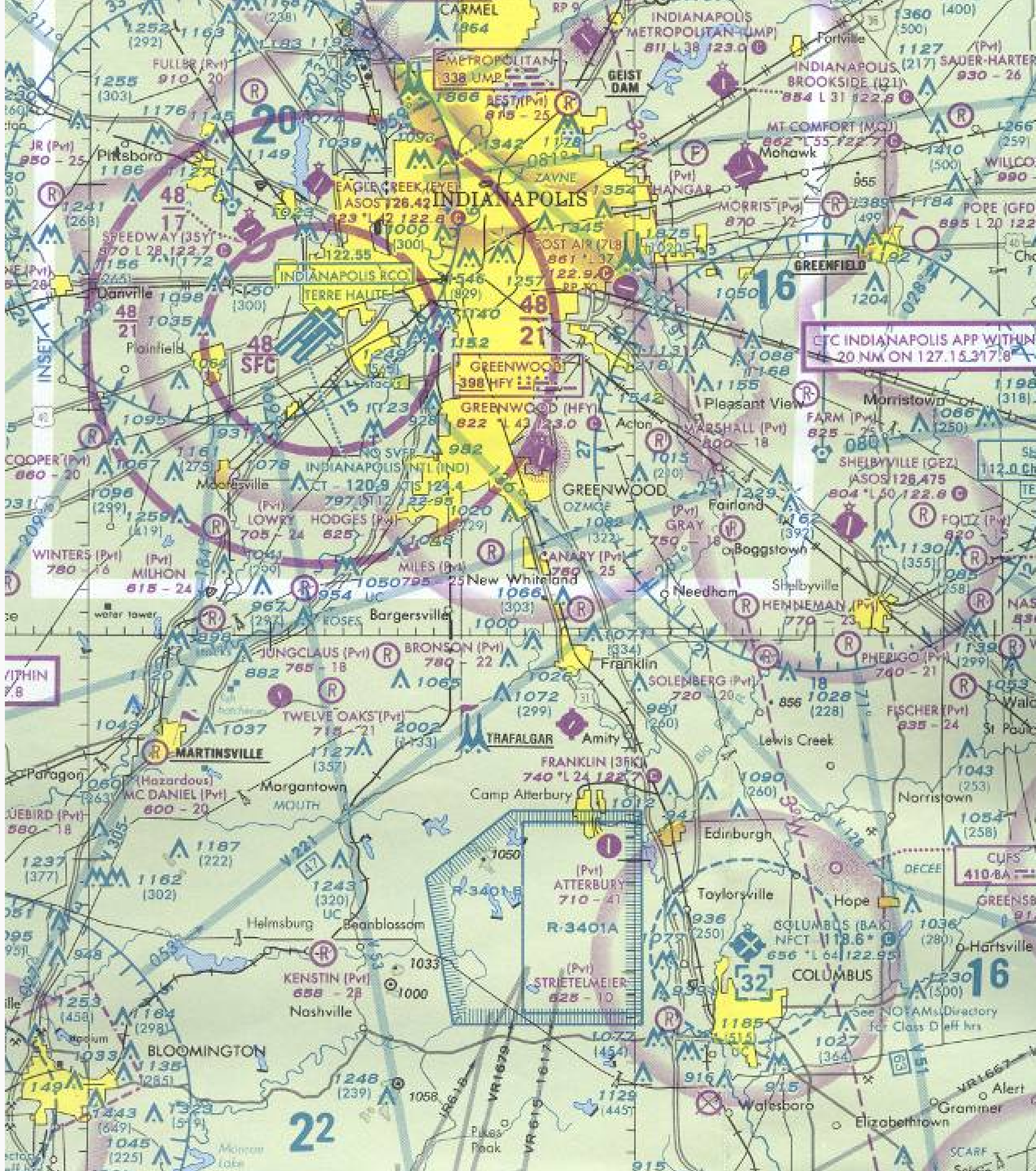
Sectional

Airports

Airspace

Navaids

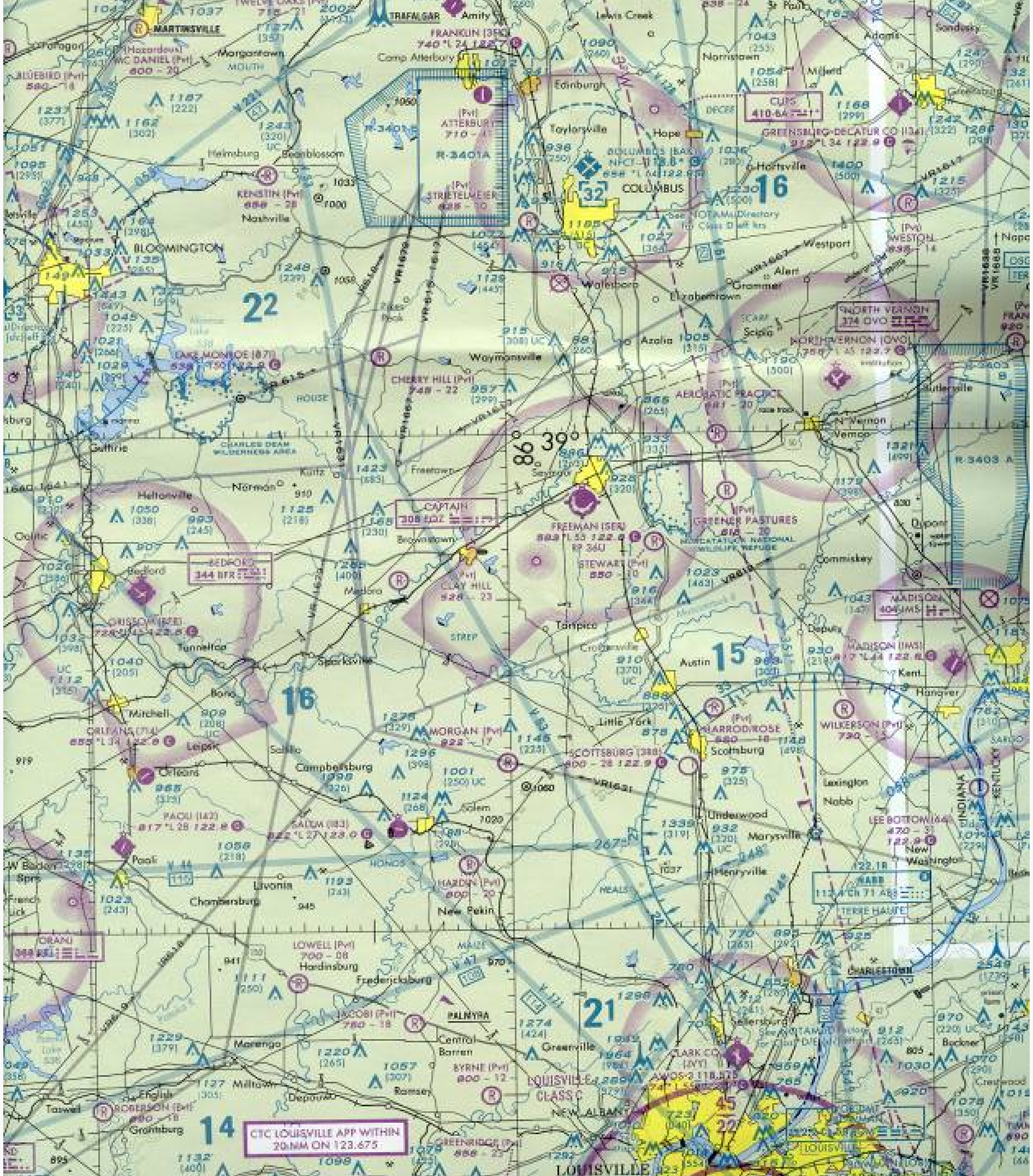
MEFs



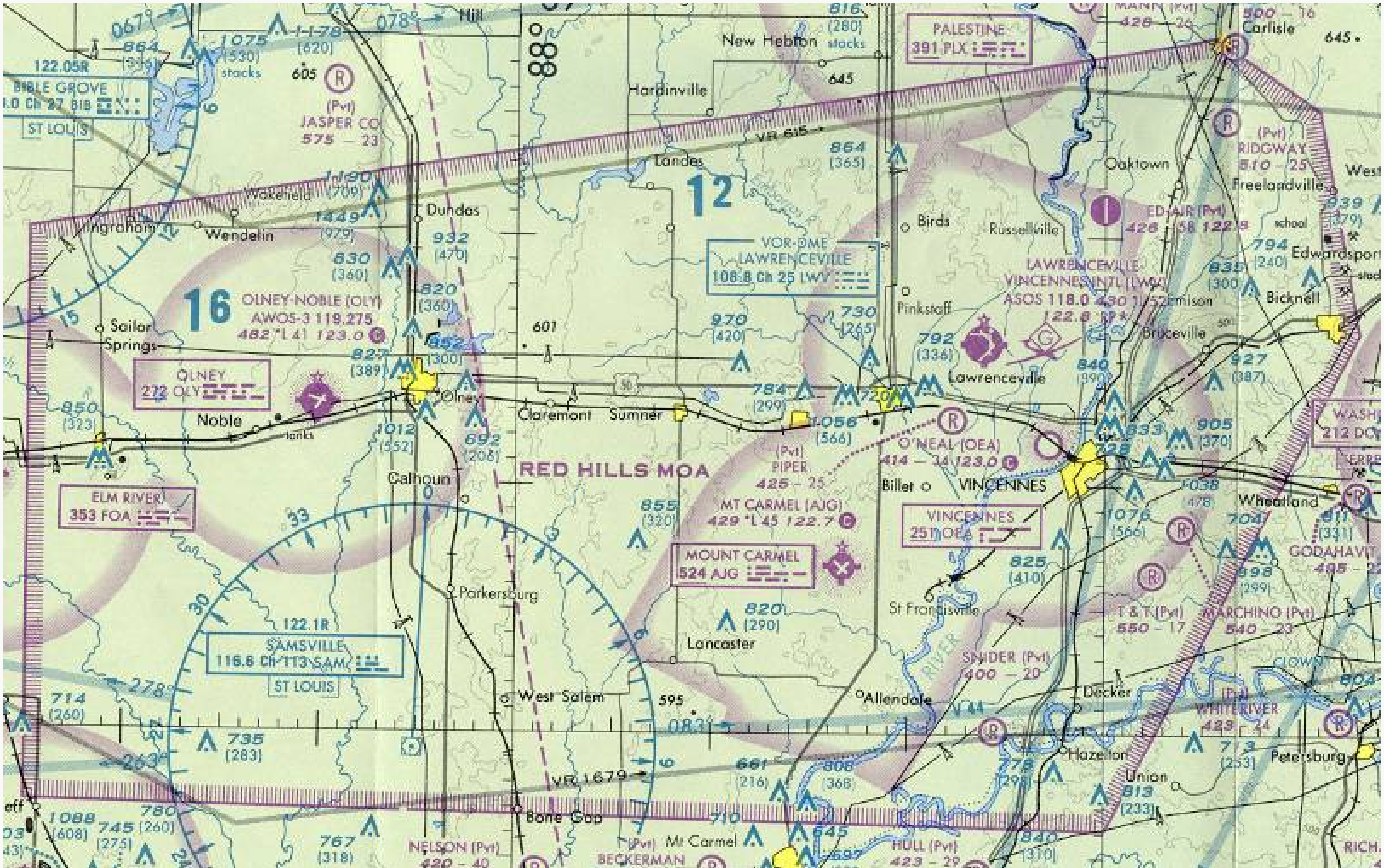
Sectional

Restricted Area

Military Training Routes



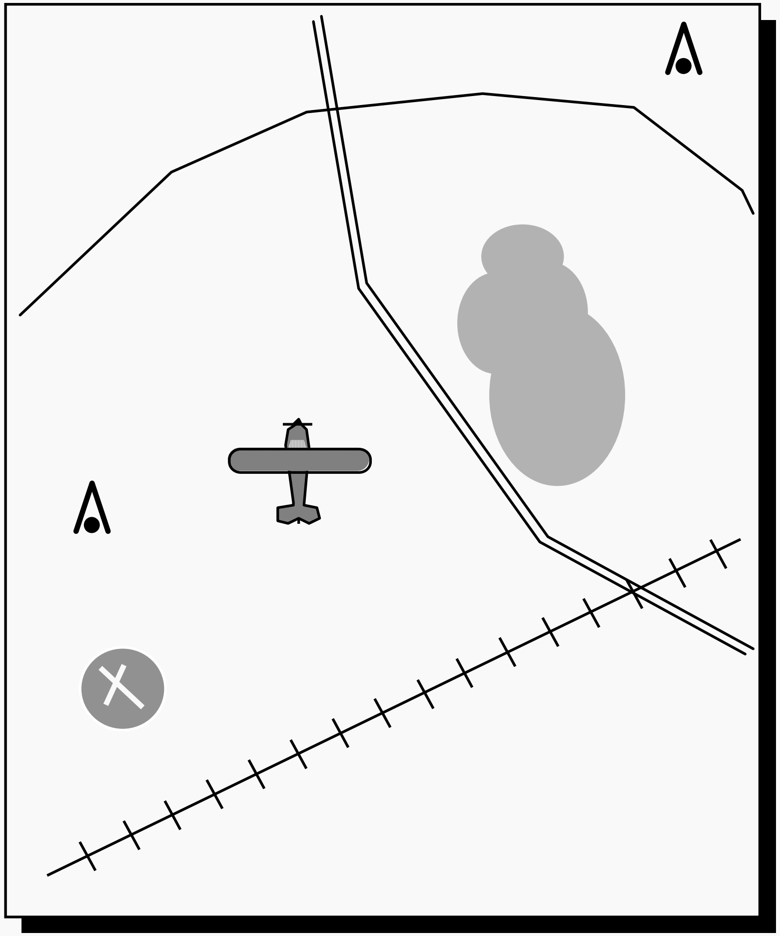
MOA



RED HILLS MOA
OLNEY-NOBLE (OLY)
AWOS-3 119.275
LAWRENCEVILLE
VINCENNES
MT CARMEL (AJG)
MOUNT CARMEL
524 AJG
OLNEY
272 OLY
ELM RIVER
353 FOA
SAMSVILLE
116.6 Ch 113 SAM
ST LOUIS
PALESTINE
391 PLX
VOR-DME
LAWRENCEVILLE
108.8 Ch 25 LWV
BIBLE GROVE
VR 615
VR 1679
Olney
Noble
Claremont
Sumner
Calhoun
Parkersburg
West Salem
Bone Gap
Lancaster
Allendale
Dundas
Wendelin
Wakefield
Landes
Hardinville
New Hebron
Birds
Russellville
Oaktown
Carlisle
Freelandville
Bicknell
Bruceville
Wheatland
Decker
Hazelton
Petersburg
St Francisville
Billet
Pinkstaff
Sailor Springs
Ingraham

Position Determination

- Sectional or Map
  - Work from larger to smaller
  - Work from a known location to present location
  - Watch the scale on maps
  - Remain suspicious if all points don't seem to line up right
  - Use groups of 3 characteristics to verify position



Tracking & Recording Position

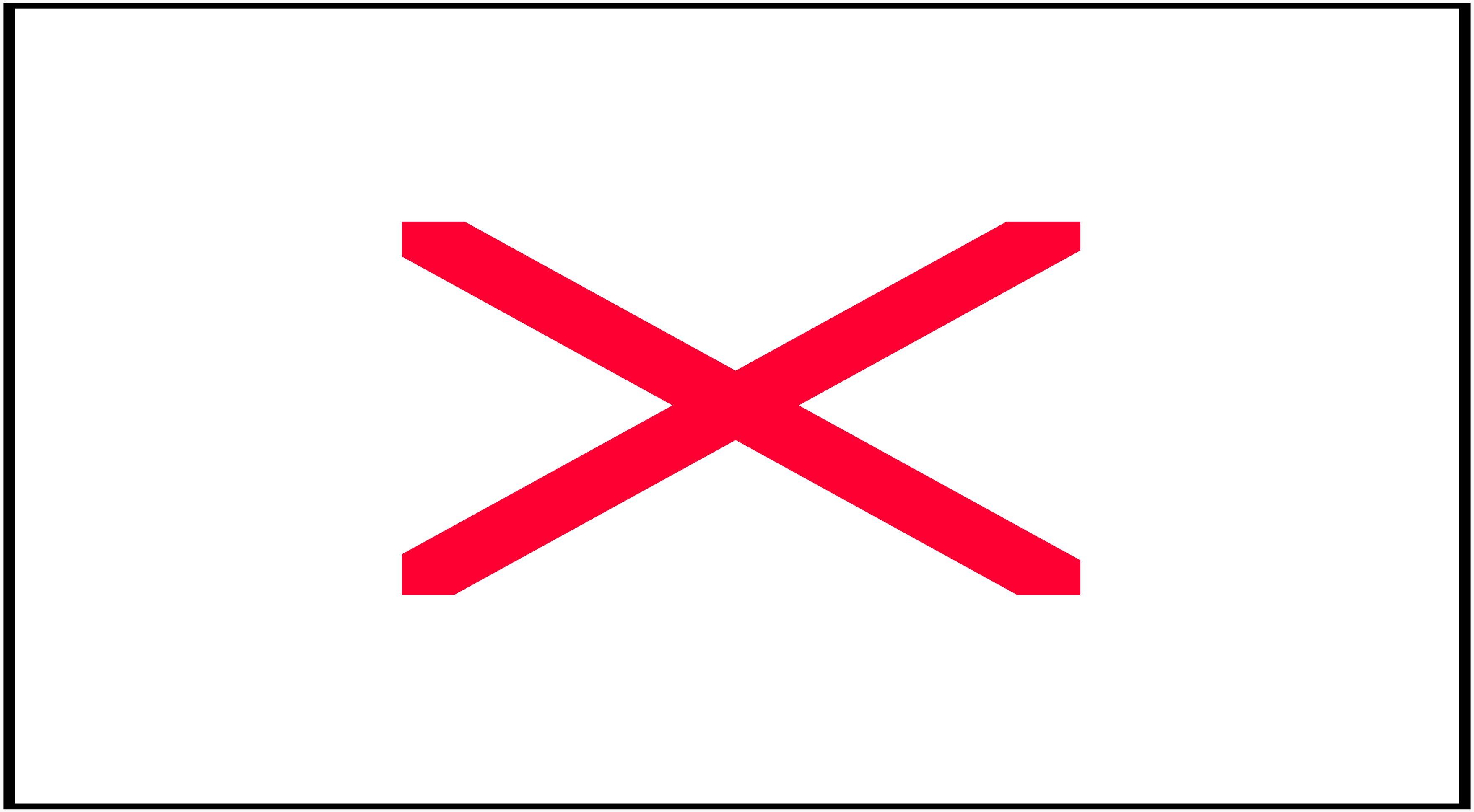
- Maintain positional awareness from takeoff to landing
- Finger on the map method using visual landmarks
- Ask the pilot or observer to determine position using GPS and/or VOR/DME
- Once you locate a downed aircraft or determines the location of a breech in the levy, you must be able to pinpoint the location on the sectional and report that position to others. Since the details on the sectional chart are often not detailed enough to be useful to ground units, you have to transfer that information to a map (e.g., road or topographical).
- Knowing the aircraft's position at all times is essential if an in-flight emergency should occur. Equipment malfunctions, an electrical fire, or a medical emergency can necessitate landing at the nearest airport: if you don't know where you are, how can you find the nearest airfield?

Obstacles and Other Dangers

TALL TOWERS

Obstacles and Other Dangers

GUY WIRES



Obstacles and Other Dangers

POWER LINES

Obstacles and Other Dangers

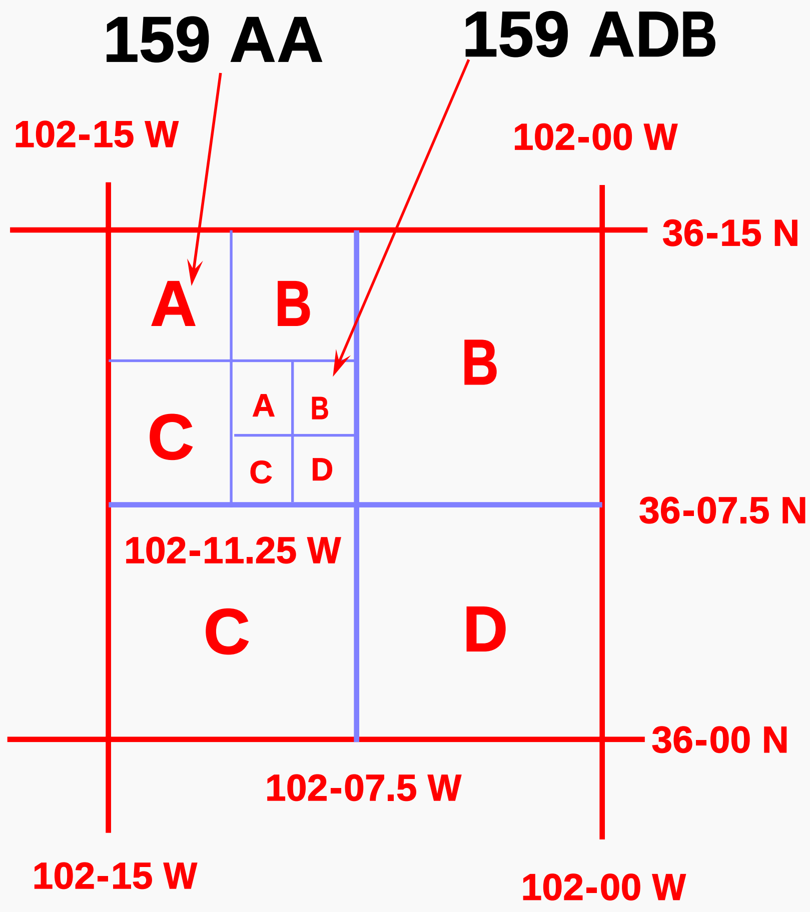
LOW-FLYING, HEAVY AIRCRAFT

CAP Standard Grid System

- Overlays standard sectional maps
- Subdivides the map into distinct working areas
- Each grid is 1/4° (15 minutes) of latitude by 1/4° of longitude and is assigned a number
- Grids are further divided into sub-grids labeled A, B, C, and D
- Each sectional has a standard for assigning grid numbers — for areas of overlap the grid number of the most westerly chart is used

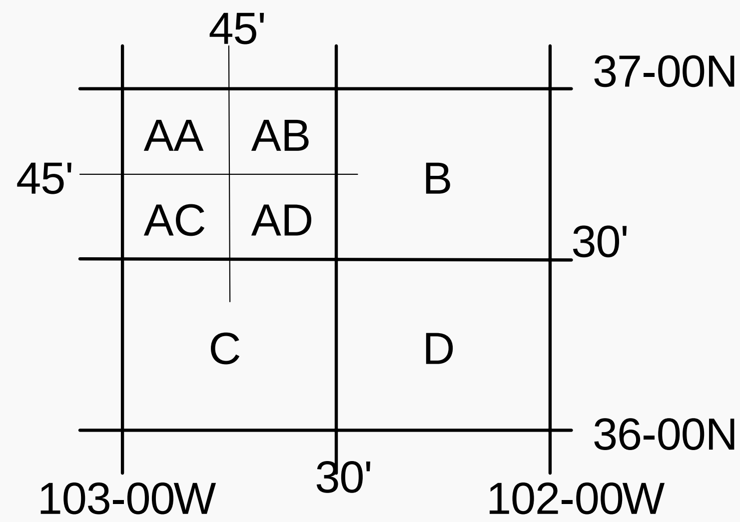
CAP Standard Grid System

- Each grid on the sectional is assigned a number
- In this example, the grid depicted is numbered **159**
- Grids are subdivided into smaller sections
- Letters are used to define sub-grids



Standardized Latitude & Longitude Grid System

- Can be used on any kind of chart that has lines of lat/long
- 1° blocks identified by the intersection of whole numbers of lat/long, such as 36-00N and 102-00W
- Points are designated with the latitude first (36 /102) and they identify the area north and west of the intersection of these two lines
- Grids can be subdivided into smaller sections
- Letters are used to define sub-grids



Marking Grid Charts

- You can use a new sectional — normally not updated unless it gets worn out
- Use a Hi-Lighter (not pink) to mark grid boundaries on the chart using a long ruler
- Mark grid identification in black ink for easy visibility
- You should always keep a current sectional with you even if you have a sectional which is marked with grids

QUESTIONS?

Search Planning and Coverage

(Chapter 9)

Objectives

- Define the following search terms: {S; 9.1}
  - Ground and Search Track
  - Maximum Area of Possibility
  - Meteorological and Search Visibility
  - Probability Area
  - Probability of Detection (POD)
  - Scanning Range
  - Search Altitude
  - Track spacing (S)

Objectives (Con't)

- Discuss how a disaster can effect CAP operations. {S; 9.4.1}
- Discuss the types of questions you must always be asking yourself during damage assessment missions. {S; 9.4.5}
- List typical things you are looking for during a damage assessment mission. {S; 9.4.5}
- List the information you should obtain when over a damage assessment site. {S; 9.4.5}
- Discuss the limitations of an air search for a missing person. {S; 9.5}

Search Terms

- *Ground track* is an imaginary line on the ground that is made by an aircraft's flight path over the ground
- *Maximum Area of Possibility* is normally a circular area centered at the search objective's last know position, with certain corrections
- *Meteorological visibility* is the maximum distance at which large objects (e.g., a mountain) can be seen
- *Probability Area* is a smaller area, within the maximum area of possibility, where there is an increased likelihood of locating the search objective
- *Probability of Detection* (POD) is the likelihood, expressed in percent, that a search airplane might locate the objective

Search Terms

- *Scanning range* is the lateral distance from a scanner's aircraft to an imaginary line on the ground, parallel to the ground track, that a scanner is expected to have a good chance at spotting the search objective
- *Search Altitude* is the altitude the aircraft will fly above the ground (AGL)
- *Search track* is an imaginary swath across the surface formed by the scanning range and the length of the aircraft's ground track
- *Search visibility* is the distance at which an object on the ground can be seen and recognized from a particular height
- *Track Spacing* (S) is the distance between adjacent visual or electronic search legs

Disaster Assessment

- Natural and man-made
- Examples of CAP services:
  - Air and ground SAR services
  - Air and ground visual and/or video imaging
  - Flood boundary determination
  - Air and ground transportation
  - Courier flights
  - Radio communications support

How Disasters Can Effect CAP Operations

- Effects of extreme weather
- Physical landscape may be so altered as to make maps obsolete or make navigation difficult
- Damage or destruction of area infrastructure
- Effects of biological, chemical or radiological terrorism (or accidental release)

Assessment

- Flying damage assessment sorties is not much different from our SAR search patterns
- The big difference is *what you look for*
- Should be asking questions such as:
  - What is the geographical extent and severity of the damage?
  - Is the damage spreading? If so, how far and how fast?
  - How has access/egress been affected?
  - What are the primary and secondary hazards?
  - Is the disaster threatening critical structures or areas?
  - Have utilities been affected or are they threatened?
  - Can you see alternatives to problems?

Assessment

- Some specific things to be looking for are:
  - Breaks in pavement, railways, bridges, dams, levees, pipelines, runways and structures
  - Roads/streets blocked by water, debris or landslide
  - Downed power lines
  - Ruptured water lines
  - Motorists in distress or major accidents
  - Alternate routes for emergency vehicles or evacuation
  - Distress signals from survivors

Assessment

- At each site, besides sketching or highlighting the extent of the damage and identifying access and egress routes, you should record:
  - Latitude and longitude
  - Description
  - Type and extent of damage
  - Photo number, or time reference for videotape
  - Status and trends

Aerial survey of WTC

Aerial survey of WTC

Aerial survey of WTC

Aerial survey of WTC

Aerial survey of WTC

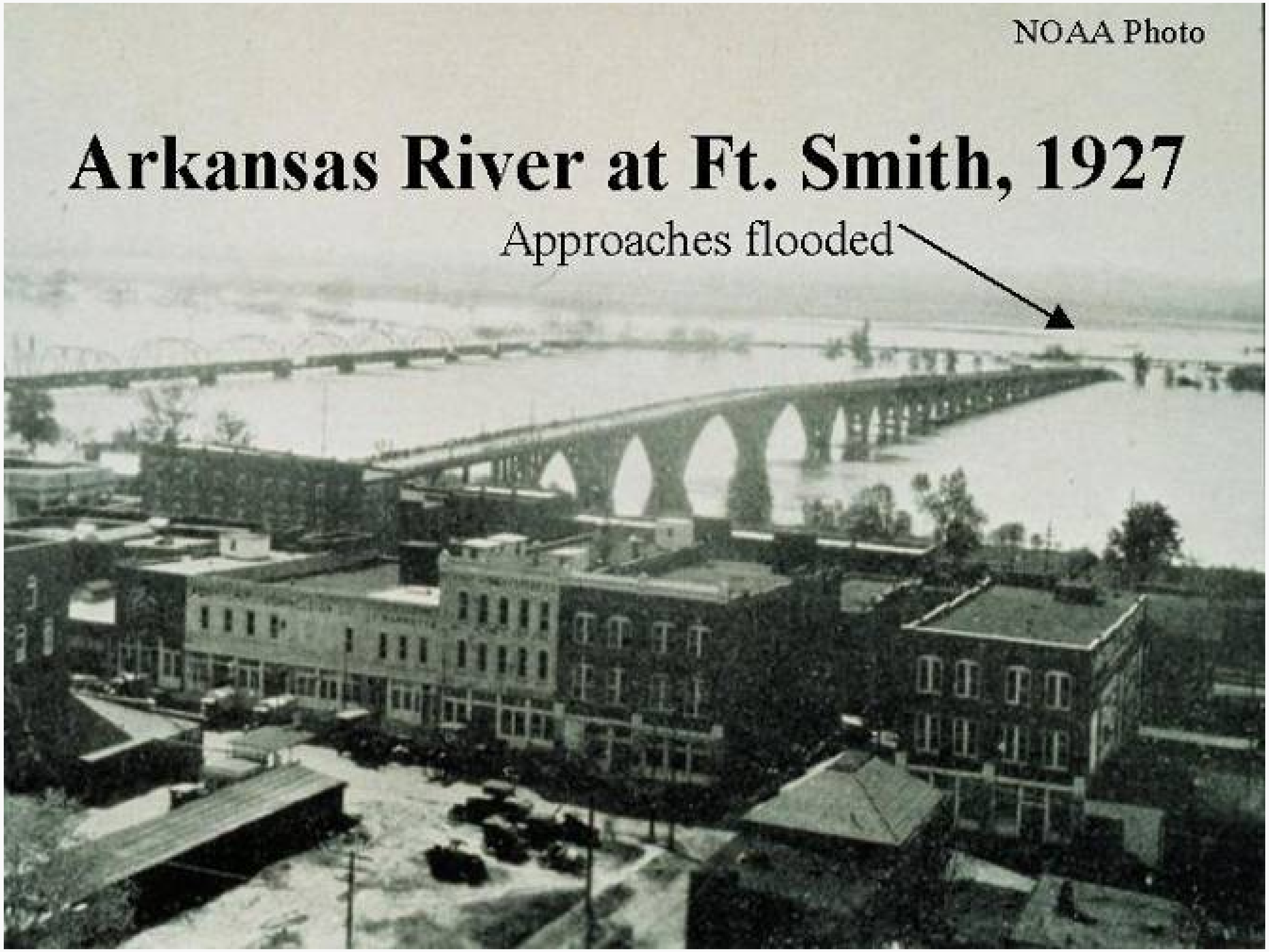
Aerial survey of WTC

Aerial survey of WTC

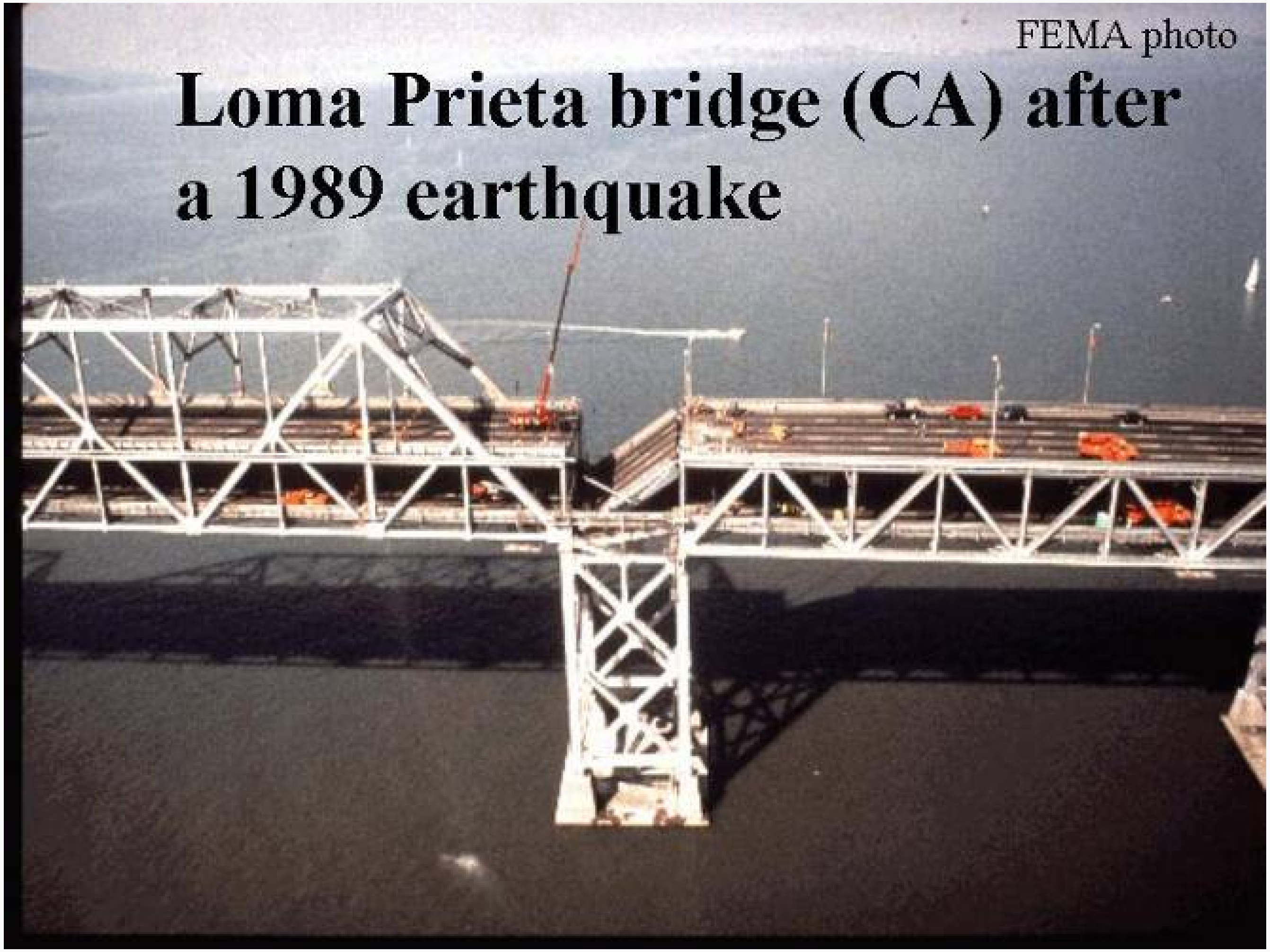
Flooding over levee

Seeping behind levee

Flooded approach



Bridge damage



Tornado

Owensboro, KY - The tornado hit hard in Tamarack Park. Some homes received relatively minor damage, while adjacent homes were completely blown off their foundations.

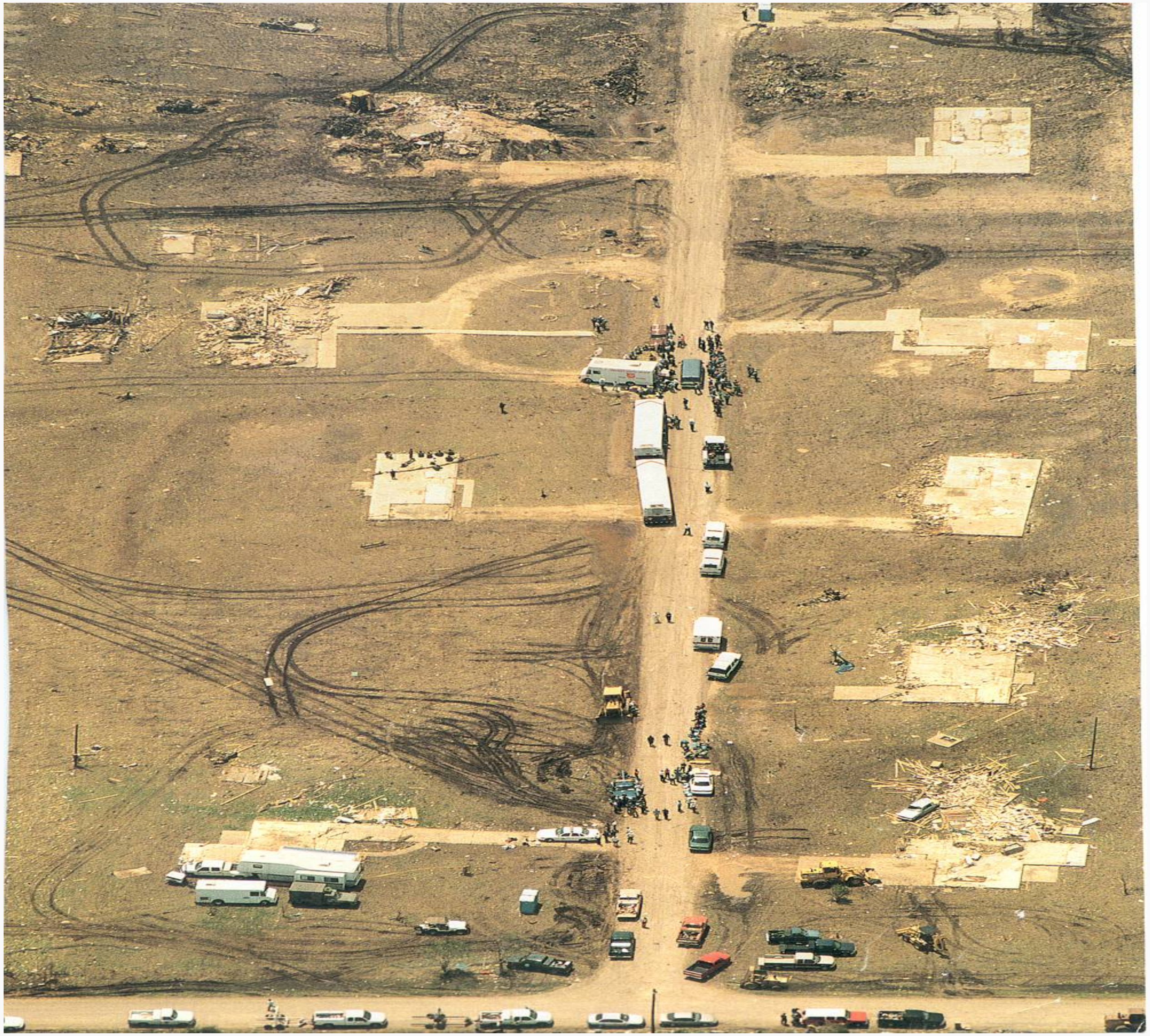
Owensboro Municipal Utilities Photo/Dale Harris

Tornado

Camilla, Ga. -- Disaster crews clean up at a chicken farm that sustained a direct hit from an F3 tornado on February 14.

Photo by Jason Pack/**FEMA News Photo**

Tornado leaves slabs



Close-up of tornado damage

Wide image of train wreck

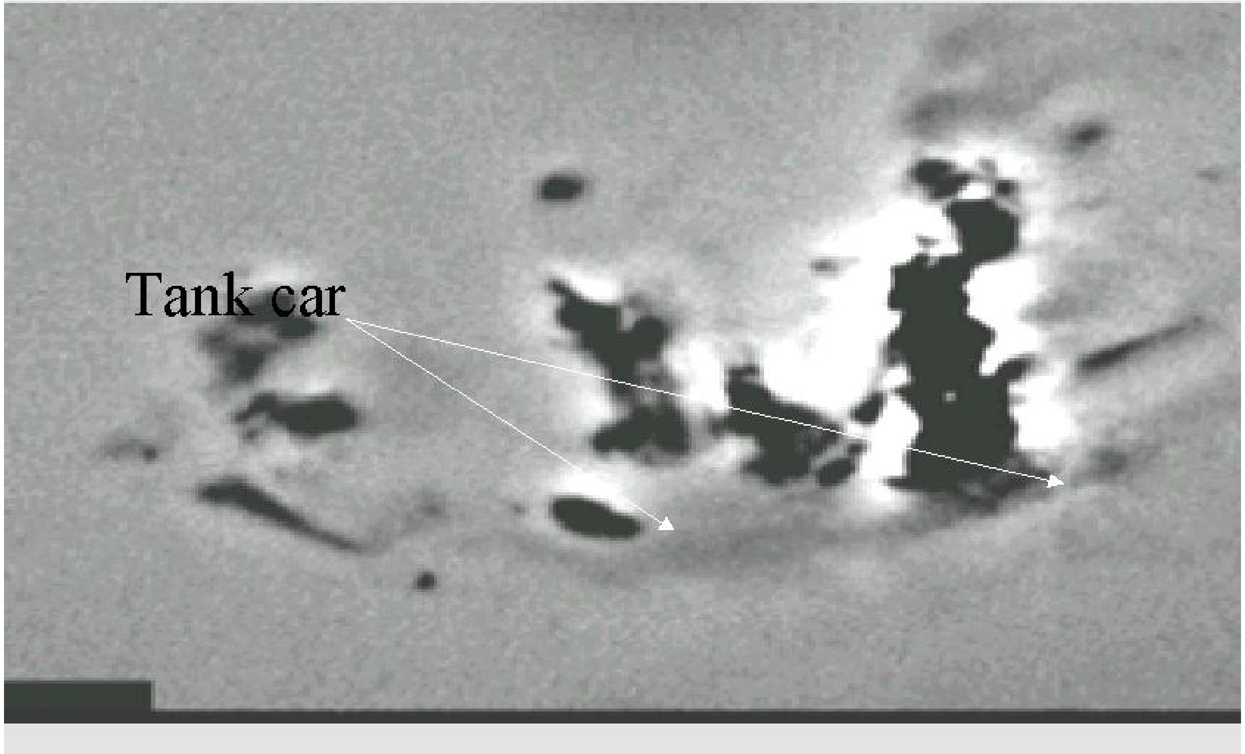
Chemical spill (hazmat)

Close image of train wreck

Close image of train wreck

Infrared image of train wreck

I/R Image burning tank car at 03:30 28 May 00



Real Time Thermal Imaging Black Hot

Plume from train wreck

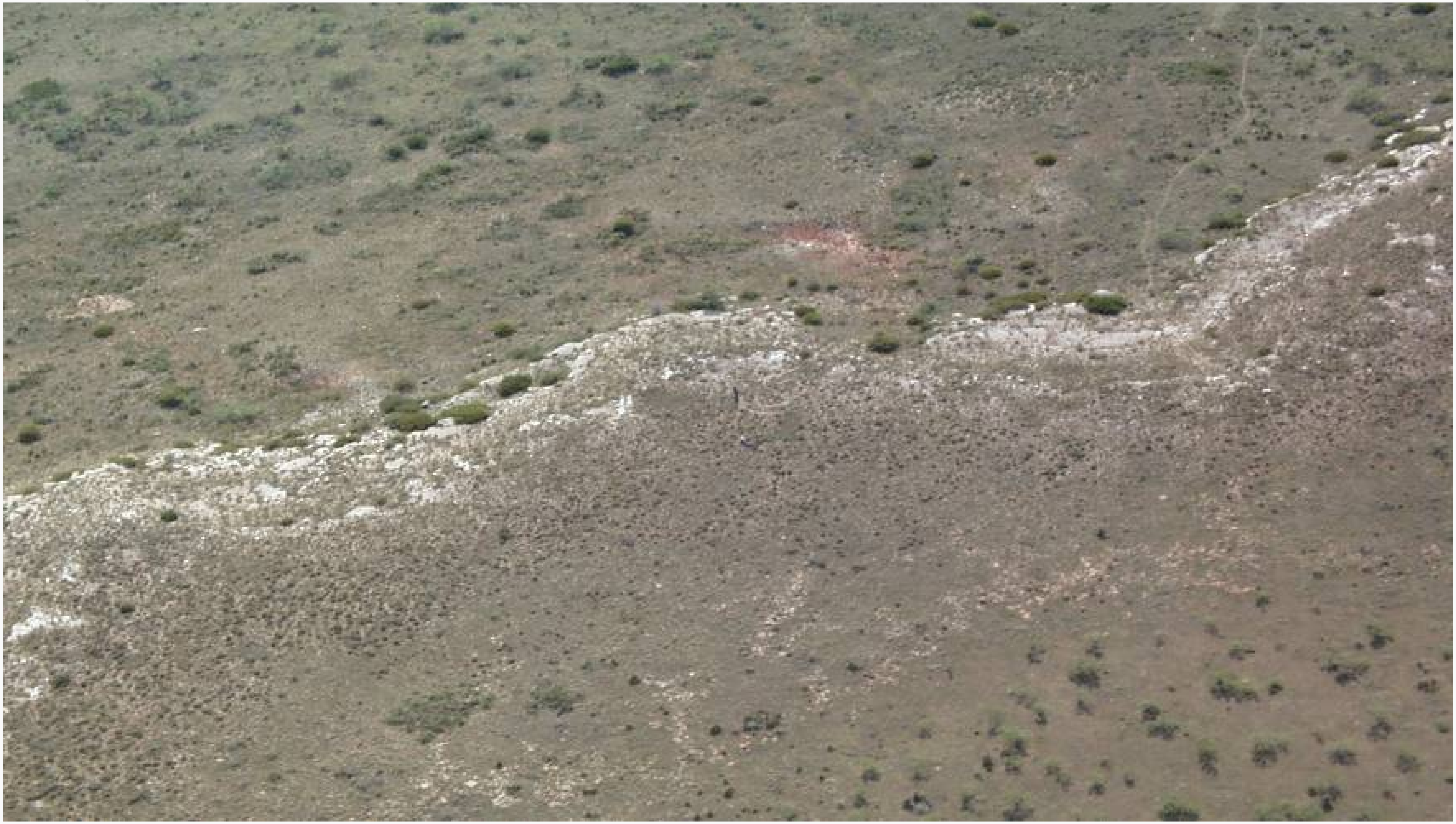
QUESTIONS?

Missing Person Search

- A person is very difficult to spot from the air if they are not actively trying to be spotted
- Lost children and people with diminished capacity can be especially difficult to spot from the air; often they will hide from searchers
- Lost people often fight topography; children under five years frequently travel uphill
- Important to know what color clothes they were wearing (not just the outer clothes) and their habits

Person on the Ground

PLAIN SHIRT, 1000 AGL



Person on the Ground

PLAIN SHIRT, 500 AGL

Person on the Ground

CAMO SHIRT, 500 AGL

Person on the Ground

YELLOW SHIRT, 500 AGL

Person on the Ground

BLUE SHIRT, 500 AGL

Person on the Ground

ORANGE SHIRT, 500 AGL

Person on the Ground

SIGNAL MIRROR, 500 AGL

QUESTIONS?

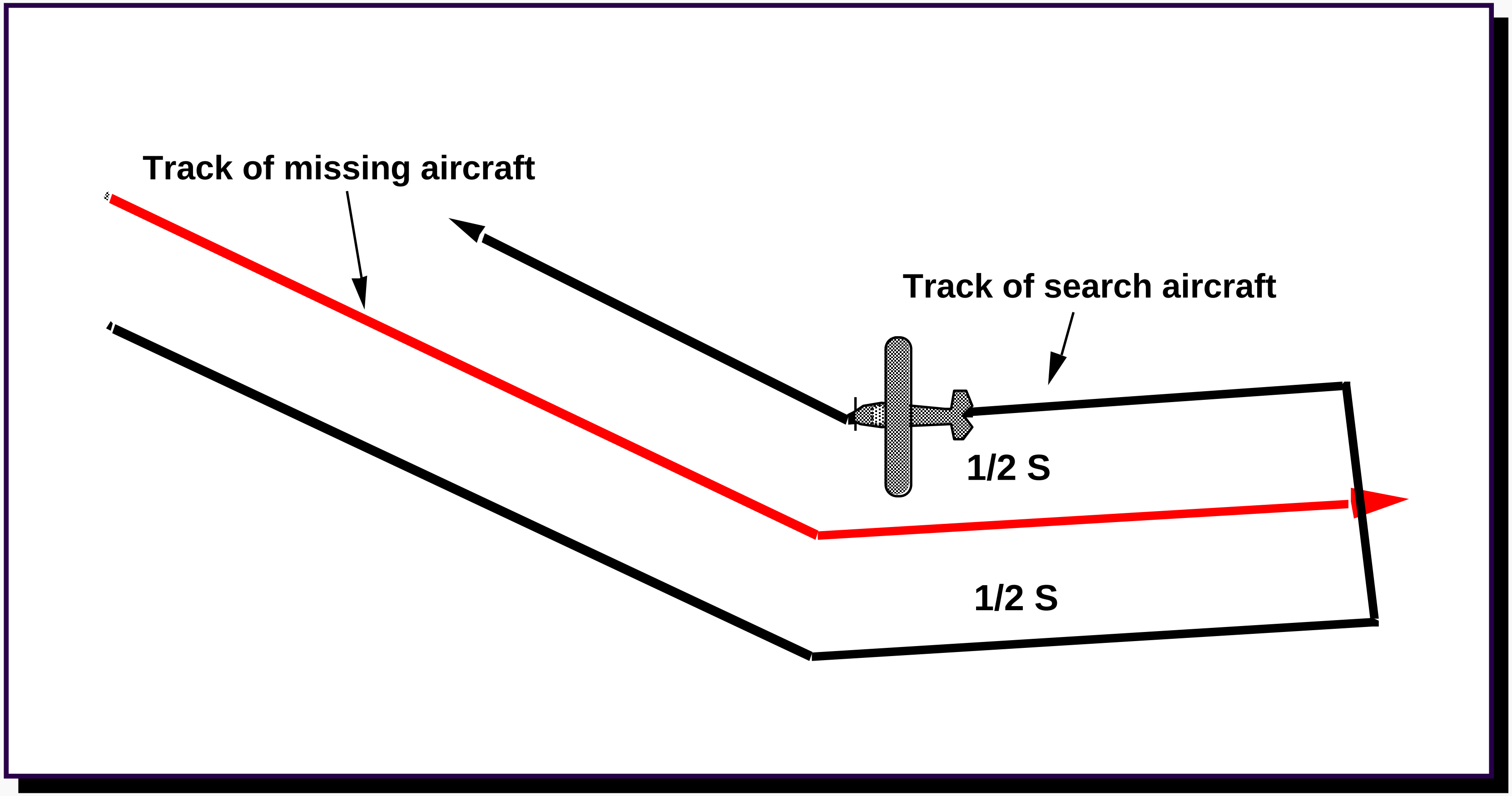
Visual Search Patterns and Procedures

(Chapter 11)

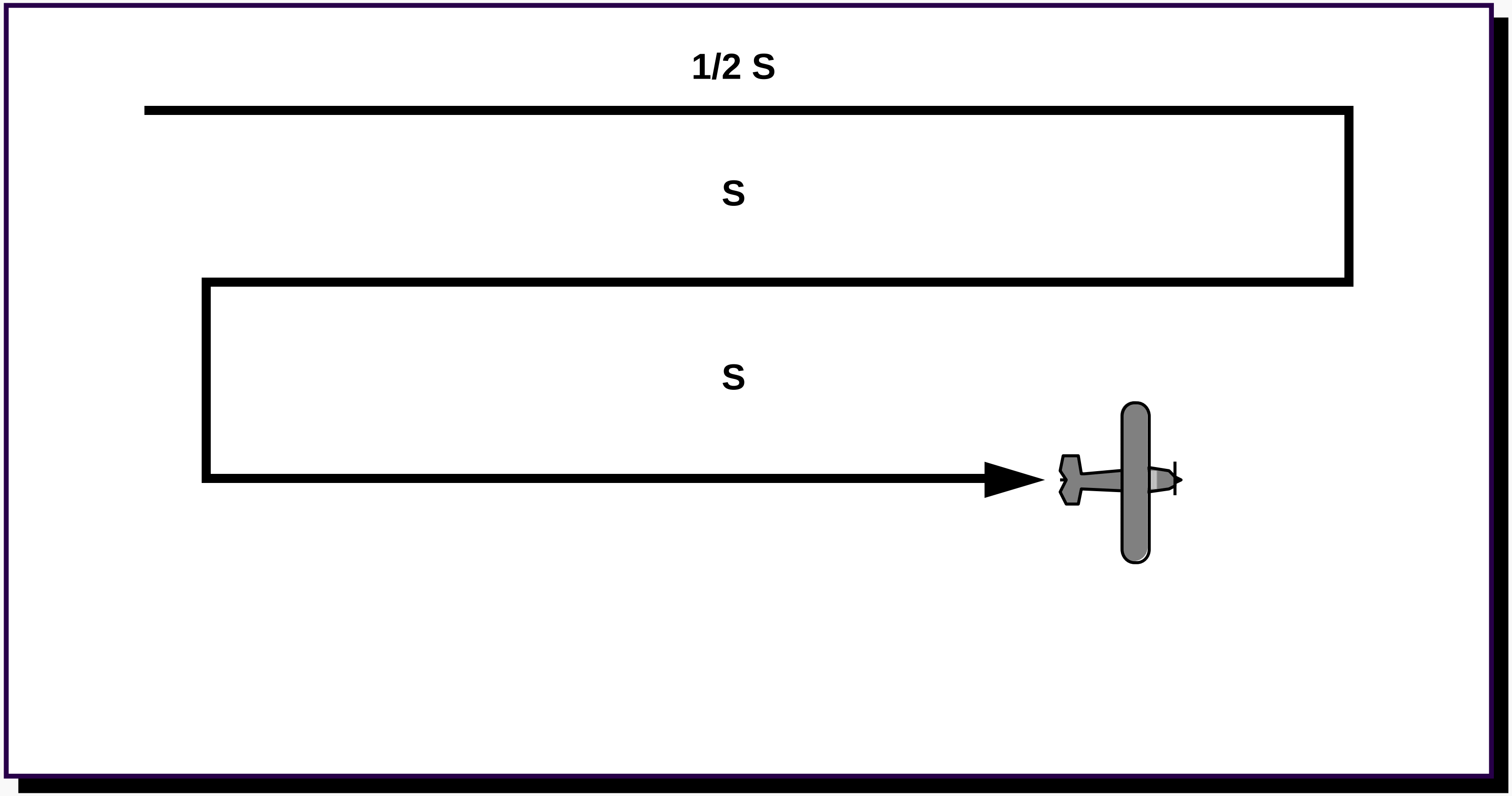
Objectives

- **Describe, in basic terms, the following search patterns: {S; 11.1}**
  - **Route (track crawl)**
  - **Parallel track (sweep)**
  - **Creeping line**
  - **Expanding square**
  - **Sector**
  - **Contour**

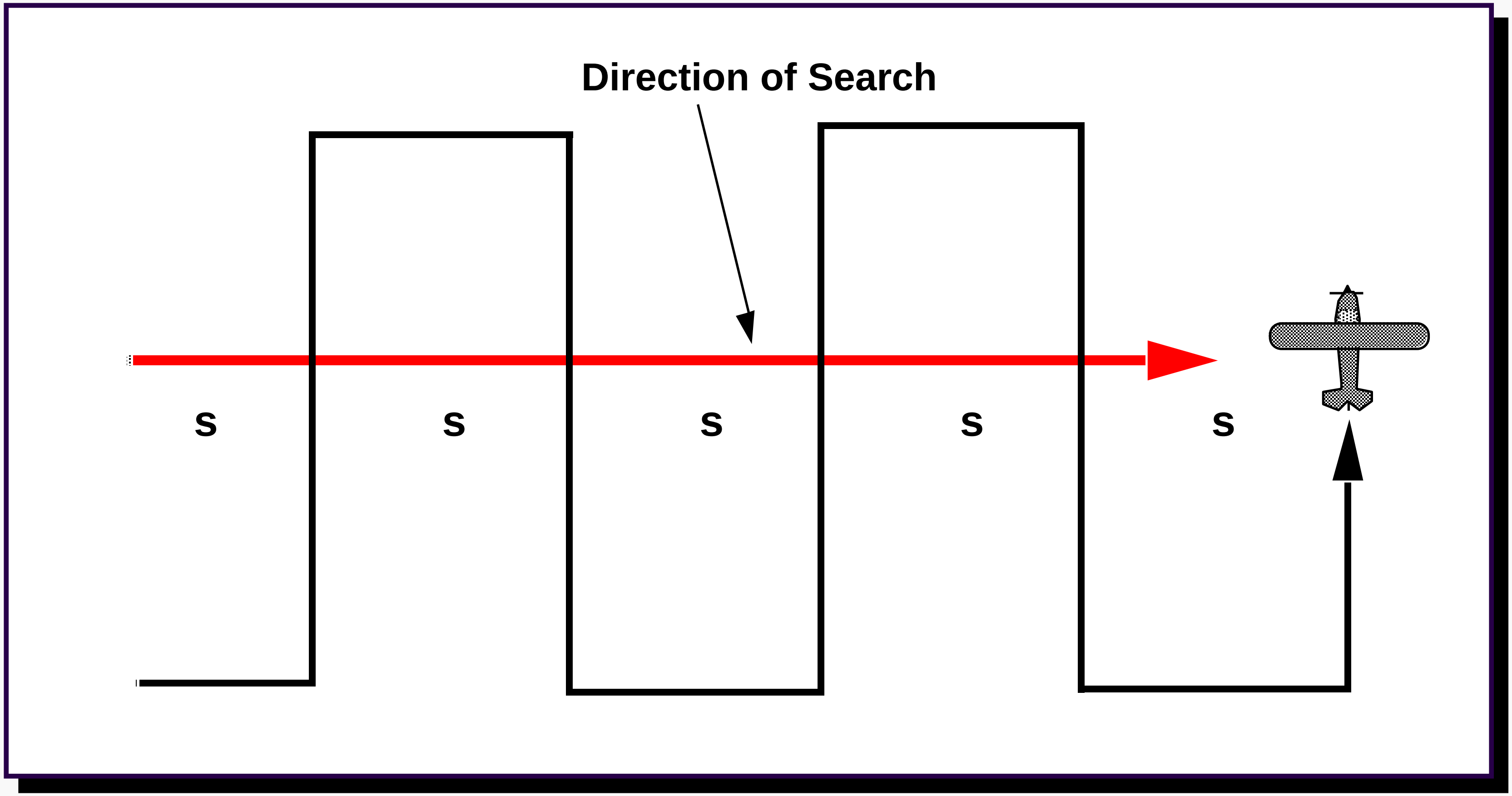
Route



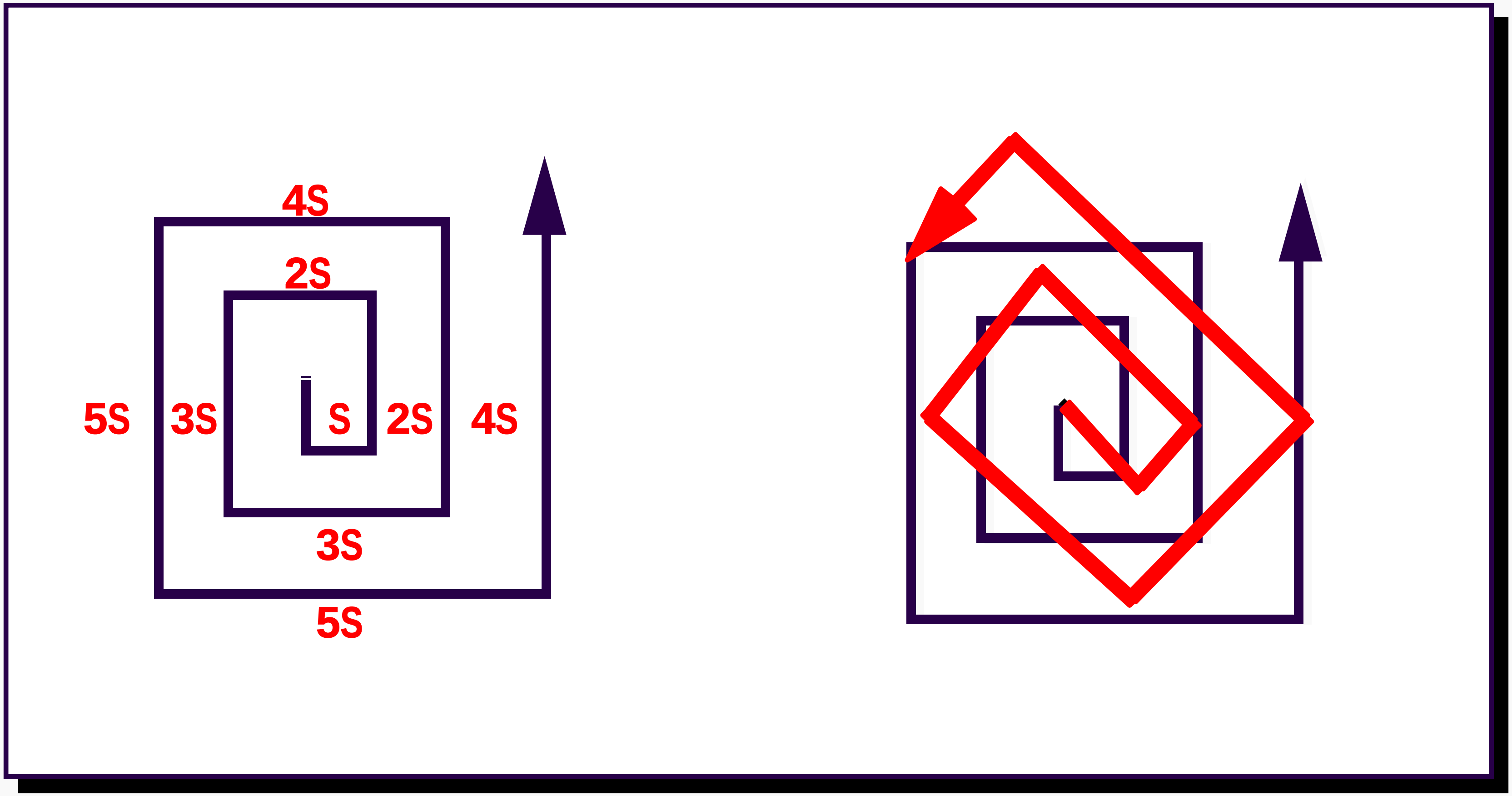
Parallel Track



Creeping Line



Expanding Square
(second pass rotated 45°)



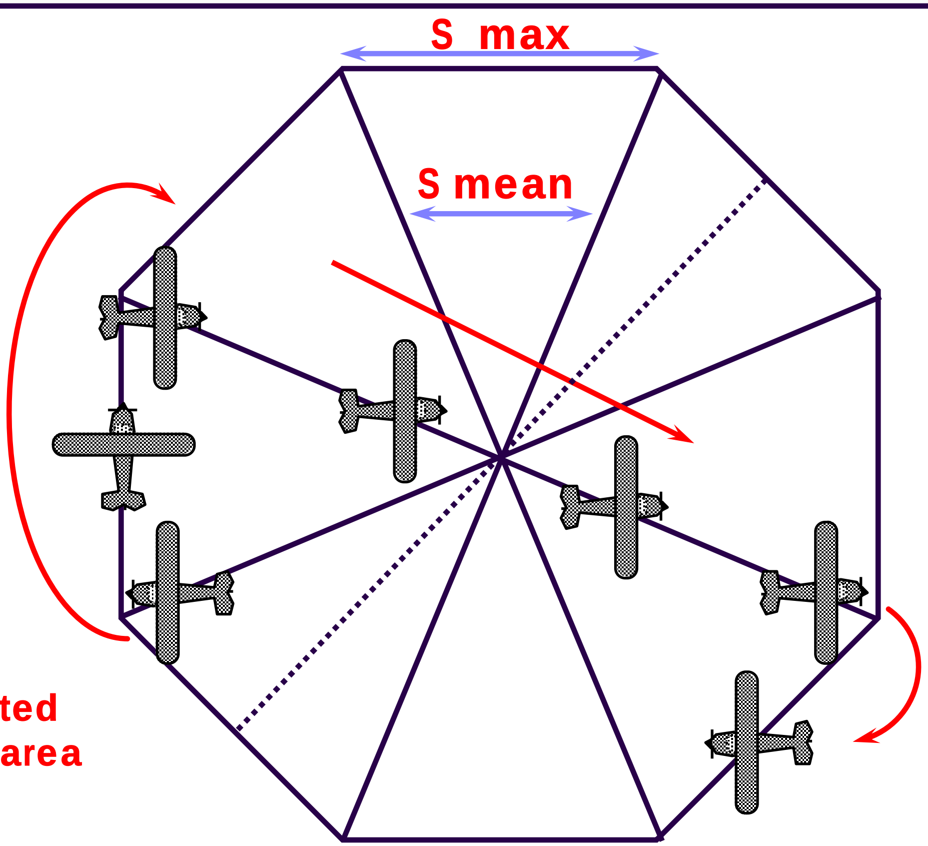
Sector

The pattern and headings are planned in advance

Sector search is easier to fly than expanding square

This pattern is used when an electronic search has led the crew to a general area to find the exact location visually

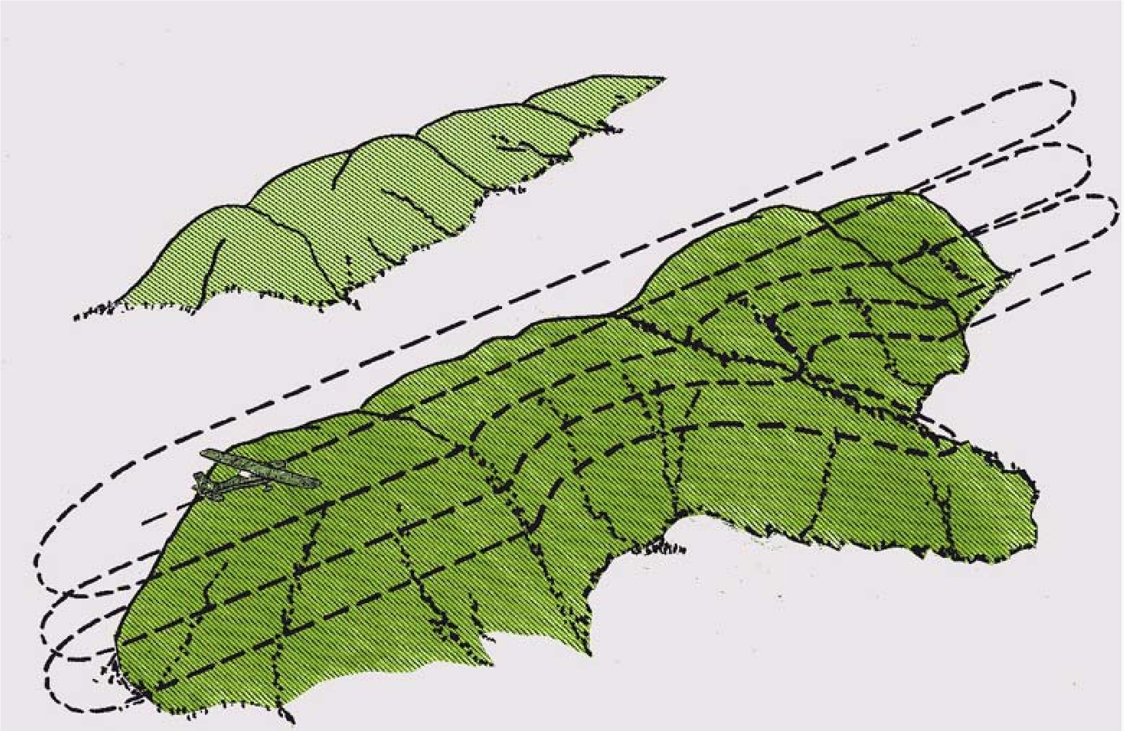
The pattern provides concentrated coverage near the center of the area



Contour search pattern

This is a difficult and dangerous pattern to fly.

Requires special training such as the *Mountain Flying* course.



QUESTIONS?

Crew Resource Management

(Chapter 14)

Objectives

- Discuss the fundamentals of Crew Resource Management (CRM)

Why CRM?

- Properly trained aircrew members can collectively perform complex tasks better and make more accurate decisions than the single best performer on the team.
- An untrained team's overall performance can be significantly worse than the performance of its weakest single member.
- We will cover CRM in more depth in the Observer course.

Situational Awareness

- Know what is going on around you at all times
- Requires:
  - Good mental health
  - Good physical health
  - Attentiveness
  - Inquisitiveness

Task Saturation

- Too much information at one time
- Too many tasks to accomplish in a given time

- Usually occurs when an individual is confronted with a new or unexpected situation. Loses SA.

Assignment of Duties

- CAPR 60-3
- Flight-related -- aircraft commander
- Mission-related -- mission commander

Crew Coordination

- Understand and execute your assignments
- Communicate
- Question

Summary

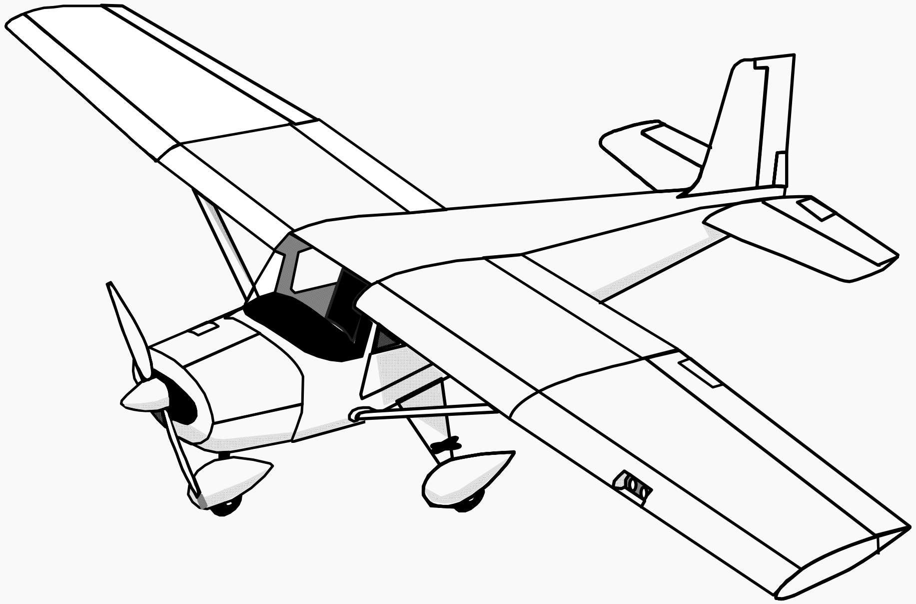
- Pay close attention to all briefings.
- Understand the “big picture.”
- Watch for task overload in yourself and other crewmembers.
- 67% of air transport accidents occur during 17% of the flight time - taxi, takeoff, departure, approach and landing. Keep casual conversation and distractions to a minimum during these phases of flight.
- Begin critical communications with instructions, then explain.

Summary

- Successful missions hinge on each and every crewmember
- Learn how to use the procedures and tools available to you, and use them correctly
- Never stop learning
- Don’t be afraid to ask questions
- Never criticize someone for asking questions
- Anyone can call “Time Out,” “Abort,” or “This is Stupid”
- Practice, practice, practice!

"Wait! Wait! . . . Cancel that, I guess it says 'helf.'"

QUESTIONS?



Review and Test