Aircrew & Flightline Tasks

This Task Guide has been edited to include only the tasks for *Mission Pilot*

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Developed as part of the
National Emergency Services Curriculum Project

O-2001

OPERATE THE AIRCRAFT AUDIO PANEL

CONDITIONS

You are a Mission Observer trainee and must demonstrate how to operate the aircraft audio panel.

OBJECTIVES

Demonstrate and discuss the use of the aircraft audio panel.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Observer trainee, knowing how to set up and use the aircraft audio panel is essential.

2. An audio panel serves as the "hub" for the aircraft's communication and navaid equipment. Whatever type of audio panel is installed in the aircraft, it serves two basic functions:

a. Selecting the 'active' radio (COM 1, COM 2, etc.). This is the radio over which you will transmit when you use the push-to-talk switch or the hand mike.
b. Allows communication and navigational instruments to be directed to the aircraft's overhead speaker or to the headphones.

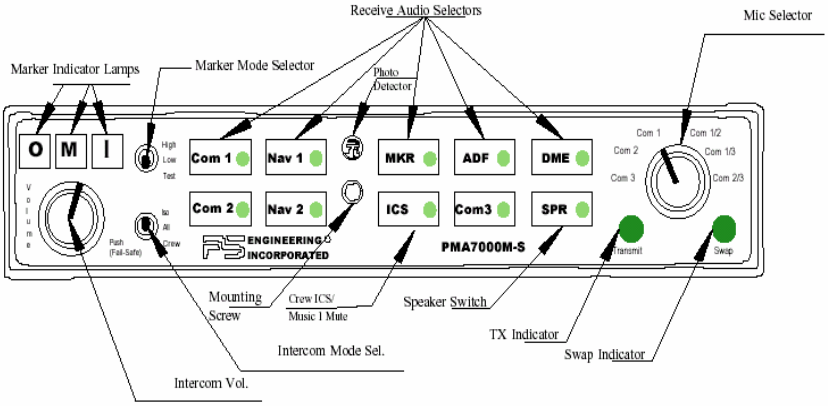
3. The position of the switch and the pushbuttons on the audio panel should be checked as part of each preflight. There is no set rules on how they should be set, and settings may vary according to the mission and the airspace you will be flying in. *The important thing is to realize how the panel is set up so that your equipment will function as you need and expect them to function*.

4. KMA 24. One of the most common older audio panels, the KMA 24 is still found in many CAP aircraft. The switch on the right-hand portion of the panel determines which radio you will transmit on; also, if none of the pushbuttons are depressed, the switch setting (e.g., COM 1) determines which radio you are listening to. The pushbuttons are arranged in two rows: the upper row is associated with the aircraft's overhead speaker, and depressing these pushbuttons will direct their associated equipment to the speaker (e.g., press the ADF pushbutton and the ADF will be heard on the speaker); the bottom row is associated with the headphones and serves the same function.

Depressing a pushbutton routes the signal from the associated instrument (e.g., a com radio or the ADF) to the speaker or your headphones, *regardless* of the setting on the COM switch. This comes in handy when you want to monitor two frequencies at the same time. For example, you have Center on the #1 radio and the COM switch in the COM 1 position. You will be flying near a local airport and want to listen to its CTAF. Set the CTAF in the #2 radio and depress the COM 2 PHONE pushbutton. You will now be able to hear both frequencies, but still will only be able to transmit on Center frequency. The CAP FM radio is usually routed through the TEL pushbuttons, and the DF unit is often routed through the ADF pushbuttons.

The two most common mistakes made with this type of audio panel include: transmitting on the wrong frequency because you set the desired frequency in one radio but failed to select the corresponding COM channel; and failing to hear a message over the FM radio because you failed to depress the appropriate pushbutton (usually the TEL pushbutton) to direct the call to the overhead speaker or headphones.

5. PMA7000MS. The PMA7000MS is CAP's newest audio panel, and is installed in conjunction with the new FM radio (TDFM-136). This audio panel was custom-designed to meet CAP SAR operational requirements. In addition to normal audio panel functions, this unit contains an automatic voice-activated (VOX) stereo intercom system with automatic squelch control.



Unit power is turned on and off by pushing the Volume knob. In the Off (or Fail-Safe) position the pilot is connected directly to Com 1 to allow communication capability regardless of unit condition (any time power is removed or turned off the audio selector will be placed in the fail-safe mode). The power switch also controls the audio selector panel functions, intercom, and marker beacon receiver. Unless the Mic Selector is in Com 3 mode, at least one of the selected audio LEDs will be on (Com 1 or Com 2).

The Volume control knob adjusts the loudness of the intercom for the pilot and observer only; it has no effect on selected radio levels or crewmembers' volume level. Adjust the radios and intercom volume for a comfortable listening level for the pilot. [Most general aviation headsets today have built-in volume controls; therefore, crewmember volume can be adjusted on the headset. For best performance your headset microphone must be placed within ¼ inch of your lips, preferably against them. It is also a good idea to keep the microphone out of a direct wind path.]

Mic Selector switch and receiver switches. Receiver audio is selected through two momentary and six latched, push-button, backlit switches. Because the rotary Mic (microphone) Selector switch controls what transceiver is being heard, the Com l and Com 2 push-buttons are of the momentary type and do not remain in when selected. Because of this, you will always hear the audio from the transceiver that is selected for transmit by the rotary Mic Selector switch (in other words, you can't transmit without listening to the receiver). You can identify which receivers are selected by noting which of the switch LEDs are illuminated. Push buttons labeled Nav 1, Nav 2, COM 3, DME, MKR (Marker), ADF and SPR (Speaker) are "latched" type switches. When one of these buttons is pressed, it will stay in the "in" position; press the switch again and it will be in the "out" position and remove that receiver from the audio. When selected, the SPR button will place all selected audio on the aircraft's overhead speaker (Note: the speaker amplifier is not active in the split mode).

When the Mic Selector switch is in the Com 1 position, both pilot and observer will be connected to the Com l transceiver. Only the person that presses their Push-to-Talk (PTT) will be heard over the aircraft radio. Turning the rotary switch to the Com 2 position will place pilot and observer on the Com 2 transceiver. The PMA7000MS gives priority to the pilot’s PTT; if the observer it transmitting and the pilot presses her PTT, the pilot’s microphone will be heard over the selected transmitter.

Split Mode. Turning the rotary switch to Com 1/2 places the PMA7000MS into "Split Mode." This places the pilot on Com 1 and the observer on the Com 2 transceiver. An example of this useful feature is when the pilot may want to talk to Air Traffic Control while the observer is checking weather with Flight Watch. Switching to Com 1/3, the pilot will be on Com 1 and the observer will be on Com 3 (the FM radio). In Com 2/3, the pilot is on Com 2 and the observer on Com 3. [Note: In split mode the pilot and observer are usually isolated from

each other on the intercom, simultaneously using their respective radios. Depressing the ICS button in split mode will activate VOX intercom between the pilot and observer positions; this permits intercommunication when desired between the crew. Pressing the ICS button again disables this crew intercom function.]

The table below summarizes the transmitter combinations (substitute Observer for Copilot):

	Normal		Swap	
Mic Selector	Pilot	Copilot	Pilot	Copilot
Com 1	Com 1	Com 1	Com 2	Com 2
Com 2	Com 2	Com 2	Com 1	Com 1
Com 3	Com 3	Com 3	No Swap	No Swap
Com1/2	Com 1	Com 2	Com 2	Com 1
Com 1/3	Com 1	Com 3	Com 3	Com 1
Com 2/3	Com 2	Com 3	Com 3	Com 2

Intercom Mode. A 3-position toggle switch ("Intercom Mode Sel." in the figure) allows the pilot to tailor the intercom function to best meet the current cockpit situation. The following description of the intercom mode function is valid only when the unit is not in the "Split" mode (as mentioned before, the pilot and observer intercom is controlled with the ICS button when in the split mode).

ISO (up position): The pilot is isolated from the intercom and is connected only to the aircraft radio system. She will hear the aircraft radio reception (and side tone during radio transmissions). The observer will hear the crewmembers' intercom and the back seat scanners will hear the observer's intercom; neither will hear aircraft radio receptions or pilot transmissions.

ALL (middle position): All crewmembers will hear the aircraft radio and intercom.

CREW (down position): The pilot and observer are connected on one intercom channel and have exclusive access to the aircraft radios. Back seat scanners can continue to communicate with themselves without interrupting the pilot or observer.

The following table summarizes the intercom modes (substitute Observer for Copilot):

Mode	Pilot Hears	Copilot Hears	Passengers Hear	Comments
Isolate	A/C Radios Pilot Sidetone (during radio transmission) Entertainment 1 is Muted	Copilot and passenger intercom Entertainment #1	Passenger and Copilot intercom Entertainment #2	This mode allows the pilot to communicate without the others bothered by the conversations. Copilot and passengers can continue to communicate and listen to music
All	Pilot Copilot A/C Radio Passengers Entertainment #1	Copilot Pilot A/C Radio Passengers Entertainment #1	Passengers Pilot Copilot A/C Radio Entertainment #2	This mode allows all on board to hear radio reception as well as communicate on the intercom. Music and intercom is muted during intercom and radio communications
Crew	Pilot Copilot A/C Radio Entertainment #1	Copilot Pilot A/C Radio Entertainment #1	Passengers Entertainment #2	This mode allows the pilot and copilot to concentrate on flying, while the passengers can communicate amongst themselves.

Because improper setup of the audio panel can lead to confusion and missed radio calls, *do not reposition the switch or any of the pushbuttons without consulting with the Pilot-in-Command*!

Additional Information

More detailed information on this topic is available in Chapter 4 and Attachment 2 of the MART.

Evaluation Preparation

Setup: Provide the student access to the aircraft audio panel.

Brief Student: You are a Mission Observer trainee asked about setting up and using the aircraft audio panel.

NOTE: The performance measures are designed for the PMA7000MS; adjust as necessary for your aircraft.

Evaluation

Performance measures	Results	
1. Set up and use the audio panel:		
a. Power and volume controls.	P	F
b. Microphone selector switch and receiver switches (describe all positions).	P	F
c. Split mode (describe all transmitter combinations).	P	F
d. Intercom modes (describe all modes).	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-2003
GRID SECTIONAL CHARTS

CONDITIONS

You are a Mission Observer trainee and must grid and use gridded sectional charts.

OBJECTIVES

Grid a sectional chart using the CAP and the Standardized Lat/Long Grid systems.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Observer trainee, knowing how to grid a sectional chart and use grids is essential in order to assist the mission pilot in planning a search, and to maintain situational awareness during a search.

2. CAP gird system. The sectional grid system used by Civil Air Patrol divides each sectional's area into 448 smaller squares. The latitude and longitude boundaries of each sectional chart are shown below. The St. Louis chart, for example, covers an area that is bounded by the following latitudes and longitudes: North 40° 00' (north boundary), North 36° 00' (south boundary), West 91°-00' (west boundary), and West 84°-00'(east boundary).

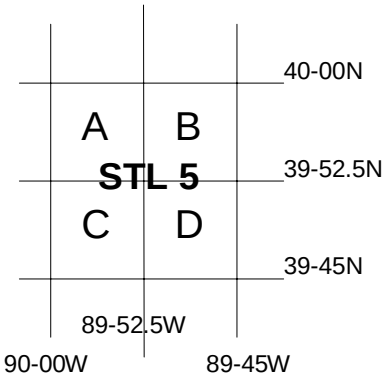
Chart	Identifier	North Grid Limit	South Grid Limit	West Grid Limit	East Grid Limit	Total Grids
Seattle	SEA	49-00N	44-30N	125-00W	117.00W	576
Great Falls	GTF	49-00N	44-30N	117-00W	109-00W	576
Billings	BIL	49-00N	44-30N	109-00W	101-00W	576
Twin Cities	MSP	49-00N	44-30N	101-00W	93-00W	576
Green Bay	GRB	48-15N	44-00N	93-00W	85-00W	544
Lake Huron	LHN	48-00N	44-00N	85-00W	77-00W	512
Montreal	MON	48-00N	44-00N	77-00W	69-00W	512
Halifax	HFX	48-00N	44-00N	69-00W	61-00W	512
Klamath Falls	LMT	44-30N	40-00N	125-00W	117-00W	576
Salt Lake City	SLC	44-30N	40-00N	117-00W	109-00W	576
Cheyenne	CYS	44-30N	40-00N	109-00W	101-00W	576
Omaha	OMA	44-30N	40-00N	101-00W	93-00W	576
Chicago	ORD	44-00N	40-00N	93-00W	85-00W	512
Detroit	DET	44-00N	40-00N	85-00W	77-00W	512
New York	NYC	44-00N	40-00N	77-00W	69-00W	512
San Francisco	SFO	40-00N	36-00N	125-00W	118-00W	448
Las Vegas	LAS	40-00N	35-45N	118-00W	111-00W	476
Denver	DEN	40-00N	35-45N	111-00W	104-00W	476
Wichita	ICT	40-00N	36-00N	104-00W	97-00W	448
Kansas City	MKC	40-00N	36-00N	97-00W	90-00W	448
St. Louis	STL	40-00N	36-00N	91-00W	84-00W	448
Cincinnati	CVG	40-00N	36-00N	85-00W	78-00W	448
Washington	DCA	40-00N	36-00N	79-00W	72-00W	448
Las Angeles	LAX	36-00N	32-00N	121-30W	115-00W	416
Phoenix	PHX	35-45N	31-15N	116-00W	109-00W	504
Albuquerque	ABQ	36-00N	32-00N	109-00W	102-00W	448
Dallas-Ft. Worth	DFW	36-00N	32-00N	102-00W	95-00W	448
Memphis	MEM	36-00N	32-00N	95-00W	88-00W	448
Atlanta	ATL	36-00N	32-00N	88-00W	81-00W	448
Charlotte	CLT	36-00N	32-00N	81-00W	75-00W	384
El Paso	ELP	32-00N	28-00N	109-00N	103-00W	384
San Antonio	SAT	32-00N	28-00N	103-00W	97-00W	384
Houston	HOU	32-00N	28-00N	97-00W	91-00W	384
New Orleans	MSY	32-00N	28-00N	91-00W	85-00W	384
Jacksonville	JAX	32-00N	28-00N	85-00W	79-00W	384
Brownsville	BRO	28-00N	24-00N	103-00W	97-00W	384
Miami	MIA	28-00N	24-00N	83-00W	77-00W	384

The process begins by dividing the whole area into twenty-eight *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 as shown in Figure 8-22. Finally, each of the 30-minute grids is divided into four *15-minute* grids, using the 15- and 45-minute latitude and longitude lines.

Next, the grid squares are numbered 1 through 448 beginning usually with the most northwest square on the entire sectional, and continuing straight east through number 28. The numbering resumes in the second row, with number 29 placed beneath number 1, 30 beneath 2, and so on through 56. The third row begins with number 57 beneath numbers 1 and 29, and continues through 84. Numbering continues through successive rows until all 448 squares have a number.

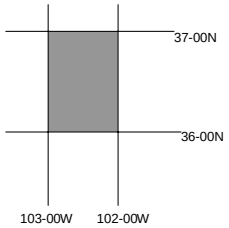
In cases where two sectionals overlap one another, the Civil Air Patrol always uses the numbering system for the western-most chart of the two in question. You can see this where the overlap area between 90° 00’ and 91° 00’, shown in the first 4 vertical columns, is identified with Kansas City (MKC) grid numbering, not St. Louis. Note too that, since the Kansas City grid numbering is used in this overlap area, the first 4 columns of the St. Louis grid numbering system are omitted. Several other such overlaps exist within the grid system.

When circumstances require, a 15-minute grid can be divided into 4 more quadrants using 7 1/2 minute increments of latitude and longitude, creating 4 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, as shown below. A search area assignment in the southeast quadrant may be given as "Search STL 5D."

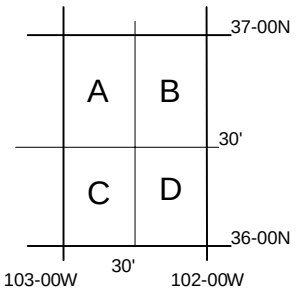


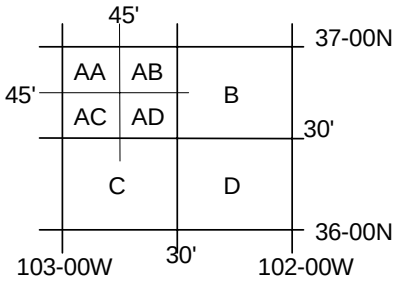
Pinpointing an area within the grid system becomes easy once you gain familiarity with the grids' many uses. You soon will be able to quickly plot any area on a map and then fly to it using the basic navigation techniques already discussed.

3. 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. In the figure below, the gray shading identifies section 36/102.



Next, the 1-degree grid is divided into 4 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 as shown in the figure below (left). 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, as shown the figure below (right). This grid system works on any chart that has latitudes and longitudes printed on it.





Additional Information

More detailed information and figures on this topic are available in Chapter 8 of the MART. Attachment 1 of the MART is a reproduction of Attachment E of the *U.S. National SAR Supplement to the International Aeronautical and Maritime SAR Manual*.

Evaluation Preparation

Setup: Provide the student with Appendix E of the *U.S. National SAR Supplement to the International Aeronautical and Maritime SAR Manual* (Attachment 1 of MART), a sectional chart and a plotter. Give the student a sectional (may be out-of-date) and a gridding assignment.

Brief Student: You are an Observer trainee asked grid a sectional chart, using both the CAP and the Standardized Latitude and Longitude Grid systems.

Evaluation

Performance measures	Results	
Given Appendix E of the *U.S. National SAR Supplement to the International Aeronautical and Maritime SAR Manual* (Attachment 1 of MART), a sectional chart, and a plotter:		
1. Grid a sectional using the CAP grid system.	P	F
2. Given coordinates, draw a grid on the sectional using the Standardized Latitude and Longitude Grid System.	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-2004
USE A POD TABLE

CONDITIONS

You are a Mission Observer trainee and must demonstrate basic knowledge of search planning and the use of the POD table.

OBJECTIVES

Demonstrate basic knowledge of how search planners determine the Maximum Area of Possibility and Probability Area. Use a POD table to discuss the advantages and disadvantages of various search altitudes and speeds over various types of terrain.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Observer trainee, basic knowledge of search planning and being able to use the POD table is helpful.

2. The first task in planning a search and rescue mission is to establish the most probable position of the crash site or survivors. If witnesses or other sources provide reliable information concerning an accident, the location may be established without difficulty. If there is little or no information, the planning section chief faces a more difficult task. Regardless of the information available, the planning section chief always prepares a chart to assist in focusing the search and locating the crash site or survivors as quickly as possible.

3. When defining search area limits, the planning section chief first sketches the maximum possibility area. This can focus the initial search in the most likely area and allows use of the charted area to help screen sightings and other reports. Again, the area is roughly circular, centered on the last known position of the missing aircraft. The radius approximates the distance the objective aircraft might have traveled, given the amount of fuel believed aboard at its last known position, and the wind direction and speed. The area is circular because it's always possible the missing pilot may have changed directions following his last known position and flown until his fuel was exhausted.

4. To chart the Maximum Area of Possibility, the planning section chief requires the missing aircraft's last known position, wind direction and velocity, and an estimate of the missing aircraft's fuel endurance and airspeed. If none of this information is available the task is much more difficult, and the search plan is usually based on an assumption that the missing aircraft is located along or near its intended course.

5. Plotting the probability area, the area in the possibility circle where the searchers are most likely to find the aircraft, is the second major factor in search planning. The probability area is determined by the accuracy of the last known position (LKP) in the possibility circle. When this information is not available, the planning section chief must rely on less specific secondary sources of information.

Based on experience and the accuracy of available information, the planning section chief defines an area of highest priority to initiate the search. The first search area may be called probability area one: this area begins around the last known position, extends along the intended route, and ends around the intended destination. If a search of probability area one produces negative results, the search may be expanded to cover probability area two, an extension of area one. If this search is unsuccessful, the search area is adjusted once more.

6. Organization is an important element in search planning. The time it takes to locate downed aircraft or survivors could depend on the definition and charting of the search area. As an observer, you should become familiar with each designated search area before the mission is launched. You should use current charts and maps which will enable you to provide additional navigational assistance in accurately positioning the search aircraft over the properly designated area.

7. The size of the search objective, weather, visibility, and ground cover in the search area must be considered when determining the altitude and airspeed for a visual search. Over non-mountainous terrain, a search altitude between 800 and 2000 feet above the terrain is normally used for a visual search. The search visibility and the terrain conditions may affect this selection. As altitude decreases below 500 feet, search effectiveness may actually decrease, due to the "rush effect" of objects on the ground passing through the scanner's field of view more rapidly.

Depending upon the number of search aircraft available, planners may also consider the desired probability of detection when selecting an altitude for the search pattern. Although a probability of detection chart is normally used to estimate POD *after* a search, its use here allows planners to predetermine a mission's chance of success. The POD table shows data for: open, flat terrain; hilly terrain and/or moderate ground cover; and very hilly and/or heavily covered terrain. To the right in the columns beneath "Search Visibility" you see what are, in this case, the desired probabilities of detection. Looking at the open/flat terrain and using 1-mile track spacing, you can see that all three altitudes give at least 50% POD, but a search at 1000 feet above the terrain gives 60%, or 10% *more* POD, than does a search at 500 feet. Over open terrain, where flight and search visibility are not limiting factors, the table demonstrates that a higher altitude is more likely to yield positive results on a single sortie. Notice that the highest POD, 85%, is obtained when flying at 1,000 feet above the ground using a track spacing of 0.5 nm.

OPEN, FLAT TERRAIN				
SEARCH ALTITUDE (AGL)	SEARCH VISIBILITY			
Track Spacing	1 mi	2 mi	3 mi	4 mi
500 Ft				
.5 mi	35%	60%	75%	75%
1.0	20	35	50	50
1.5	15	25	35	40
2.0	10	20	30	30
700 Ft				
.5 mi	40%	60%	75%	80%
1.0	20	35	50	55
1.5	15	25	40	40
2.0	10	20	30	35
1000 Ft				
.5 mi	40%	65%	80%	58%
1.0	25	40	55	60
1.5	15	30	40	45
2.0	15	20	30	35

MODERATE TREE COVER AND/OR HILLY				
SEARCH ALTITUDE (AGL)	SEARCH VISIBILITY			
Track Spacing	1 mi	2 mi	3 mi	4 mi
500 Ft				
.5 mi	20%	35%	50%	50%
1.0	10	20	30	30
1.5	5	15	20	20
2.0	5	10	15	15
700 Ft				
.5 mi	20%	35%	50%	55%
1.0	10	20	30	35
1.5	10	15	20	25
2.0	5	10	15	20
1000 Ft				
.5 mi	25%	40%	55%	60%
1.0	15	20	30	35
1.5	10	15	20	25
2.0	5	10	15	20

HEAVY TREE COVER AND OR VERY HILLY				
SEARCH ALTITUDE (AGL)	SEARCH VISIBILITY			
Track Spacing	1 mi	2 mi	3 mi	4 mi
500 Ft				
.5 mi	10%	20%	30%	30%
1.0	5	10	15	15
1.5	5	5	10	15
2.0	5	5	10	10
700 Ft				
.5 mi	10%	30%	30%	35%
1.0	5	10	15	20
1.5	5	5	10	15
2.0	5	5	10	10
1000 Ft				
.5 mi	15%	20%	30%	35%
1.0	5	10	15	20
1.5	5	10	10	15
2.0	5	5	10	10

If weather or visibility are not limiting factor, why then don't you just always elect to fly *that* track spacing at 1,000 feet, and always try to obtain that highest of probabilities of detection? You should recall, from the earlier maximum probability area, that you start with a very large area and then try to focus your efforts on smaller probability areas within that larger area. If the incident commander has received a number of leads that have reduced the probable area to a small size, he might task you to fly exactly that track spacing and altitude. If the area is not so small, and you try to fly 1/2- rather than 1-mile track spacing, you will obviously take *twice* as long to cover the whole area.

8. Execution of search patterns. The incident commander and his staff take into consideration many variables including weather, visibility, aircraft speed, and availability of aircraft and crew resources, experience, and urgency of the situation when developing the search plan. Similarly, the planning section chief considers many variables when selecting the search pattern or patterns to be used. Individual search patterns are covered in

chapters that follow. All questions about how the search is to be conducted must be resolved at the mission briefing. When airborne, crews must focus on executing the briefed plan instead of second-guessing the general staff and improvising. If, for whatever reason, you deviate from the planned search patterns it is imperative that you inform the staff of this during your debriefing.

Additional Information

More detailed information and figures on this topic are available in Chapter 9 of the MART.

Evaluation Preparation

Setup: Provide the student with search planning figures (e.g., Chapter 9 of the MART) and a POD table.

Brief Student: You are an Observer trainee asked to discuss basic search planning and use a POD table.

Evaluation

Performance measures	Results	
1. Discuss how search planners determine the Maximum Area of Possibility and the Probability Area.	P	F
2. Using a POD table, discuss the advantages and disadvantages of various search altitudes and speeds over the three major types of terrain.	P	F
3. Discuss the importance of proper execution of search 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.

O-2005

OPERATE THE AIRCRAFT DIRECTION FINDER

CONDITIONS

You are a Mission Observer trainee and must operate the aircraft Direction Finder.

OBJECTIVES

Operate the aircraft Direction Finder (DF) in both the Alarm and DF modes, and discuss how the DF should respond during a typical mission.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Observer trainee, knowing how the aircraft DF works and how to operate it is essential.

2. L-Tronics DF. The L-Tronics LA series Aircraft Direction Finder, the most common DR unit found in CAP aircraft, consists of VHF and UHF receivers, two- or three-element yagi antennas (normally mounted on the bottom of the aircraft) and circuitry. The controls consist of a frequency selector switch, an alarm toggle switch (works like a light switch), and a dual-knob control switch for volume (inner knob) and sensitivity (outer knob). There are two indications: a DF meter and a signal Strength meter. [Note: Some have only the DF meter, but the operation is the same.]

The DF unit is normally connected to the aircraft audio system. This connection allows an audible as well as a visual alarm when an ELT signal is detected in ALARM mode.

The Alarm mode is the normal mode for routine conditions. It enables the pilot to monitor the emergency frequency (121.5 MHz) without dedicating a communications radio to the task. DO NOT USE THIS MODE DURING A DF SEARCH because the DF function is disabled in the Alarm mode.

a. Normal setup. To select the Alarm mode, place the Alarm toggle switch on (up). Set the SENSitivity so that the needle just comes on-scale and the VOLume to a comfortable level (the ear will detect a weak signal far sooner than the alarm). [Note: The Alarm mode is designed to work with weak signals; if an ELT is transmitting nearby and the unit is set to full sensitivity, the receiver may overload.]

b. DF setup. If an ELT activates the Alarm, turn the Alarm toggle switch off (down) and verify or select 121.5 on the frequency switch. This activates the DF function and allows you to track the signal. Set the SENSitivity to maximum and the VOLume to a comfortable level. **The Alarm mode must not be used during a DF search because the DF function is not operable in the Alarm mode (toggle switch up).**

c. Searching for an ELT signal. The pilot should climb to an altitude of *at least* 3000 to 4000 feet AGL, if possible, and fly to the area of the reported ELT signal (but remember, an ELT search begins the minute you take off). If the ELT cannot be heard in the expected area, climb to a higher altitude. If this fails to acquire the signal, start a methodical search (e.g., area or expanding square). Unless the beacon is known to be a 406 MHz

EPIRB or a military beacon (which uses 243 MHz), switch between 121.5 and 243 MHz at least once each minute until a signal is heard. All civil beacons and some military beacons transmit on both frequencies.

d. Phases of a typical ELT search:

Initial heading. When first heard, the ELT signal will probably be faint and will build slowly in strength over a period of several minutes. Continue flying until a reasonable level of signal is acquired. The DF needle should deflect to one side and the Strength needle should come on-scale. Resist the urge to turn immediately and follow the needle; instead, make a 360° turn at no more than a 30° bank to ensure you get two needle centerings (approximately 180° apart) to verify the heading. When the turn is complete, center the DF needle and fly toward the ELT. Note your heading (write it down) for reference.

If the ELT is heard on both 121.5 and 243.0 MHz, compare the headings. If they differ by more than 45° or if the turn produces multiple crossovers, try a new location or climb to a higher altitude to escape from the reflections.

While flying toward the ELT the DF needle may wander back and forth around center at 10- to 30-second intervals. This is caused by flying through weak reflections and should be ignored. Fly the heading that keeps needle swings about equal in number, left and right.

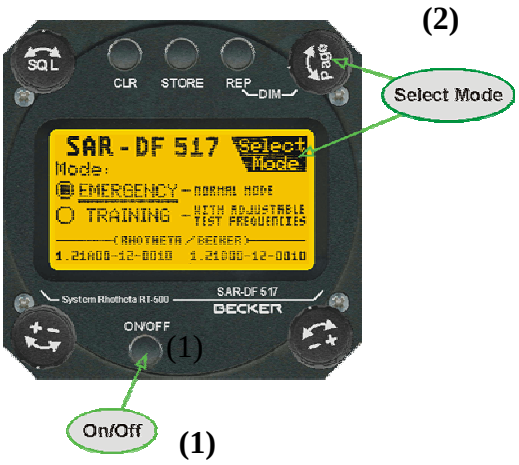
Signal fade. Don't become concerned if the signal slowly fades out as you fly towards the ELT. If this happens, continue on your heading for at least six minutes. If you are still headed toward the ELT the signal should slowly build in strength in three or four minutes and be somewhat stronger than before the fade. If the signal does not reappear, return to where the signal was last heard and try a different altitude.

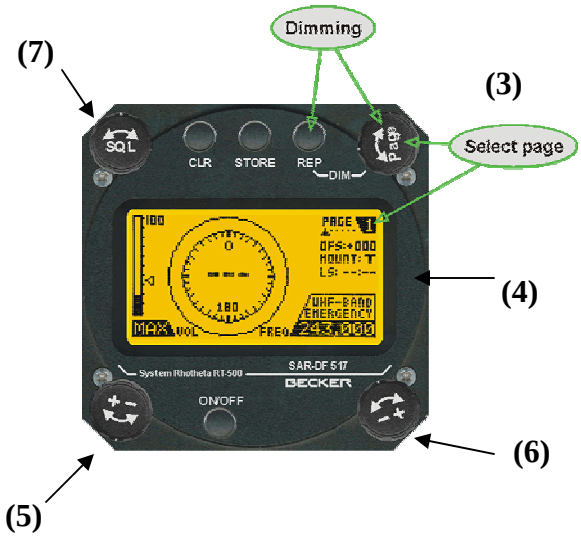
Getting close. As you get close to the ELT the signal will get stronger, and you will have to periodically adjust the SENSitivity control to keep the signal strength needle centered (*do not* decrease the VOLume control as this could overload the receiver). You also need to do this if the DF needle gets too sensitive. Periodically yaw the aircraft and observe the DF needle respond (left and right).

Passing over the ELT. A "station passage" is often seen as a rapid fluctuation in signal strength and confused DF readings. Yaw the aircraft to see if the course has reversed (needle goes in the direction of the aircraft turn). If the course has reversed, continue on your heading for a few minutes. Then turn and make several confirmation passages from different angles while continuing your visual search.

3. Becker SAR DF 517. The SAR DF 517 is a precision direction finder was developed for professional SAR (search and rescue) purposes. It has the ability to bear and analyse traditional 121.5 MHz and 243.0 MHz emergency frequencies in the VHF and UHF bands, maritime radio channel 16, and the new digitally encoded 406.025 MHz COSPAS/SARSAT emergency signal. This system incorporates a newly developed and patented antenna (small, rugged and wideband), as well as sophisticated bearing analysis algorithms, allowing delivery of a quick and steady indication for both the 121.5 and 406.025 MHz signals. It also has the ability to track a wide range of training frequencies for training exercises. The direction finder was developed for working under stressful mission conditions such as in an aircraft, helicopter or vehicle. The SAR DF 517 has two modes of operation:

a. Emergency Mode. This mode is used for actual SAR missions. In this mode the unit will search for 121.5 MHz, 406.025 MHz, Marine Channel 16 and COSPAS/SARSAT Emergency Signal Transmissions. Depending on selection, the unit will either SCAN all of these frequencies or search on a single selected frequency. To operate the unit in the emergency mode, follow the checklist below:





1) Turn ON

2) Select EMERGENCY

3) Select PAGE 1

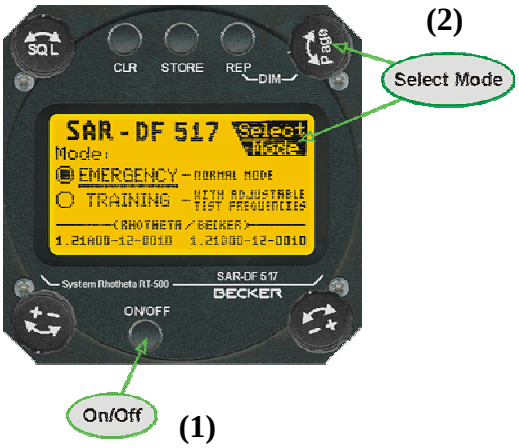
4) Verify Correct Antenna Mounting

5) Turn Volume ON

6) Select EMERGENCY Frequency or SCAN mode.

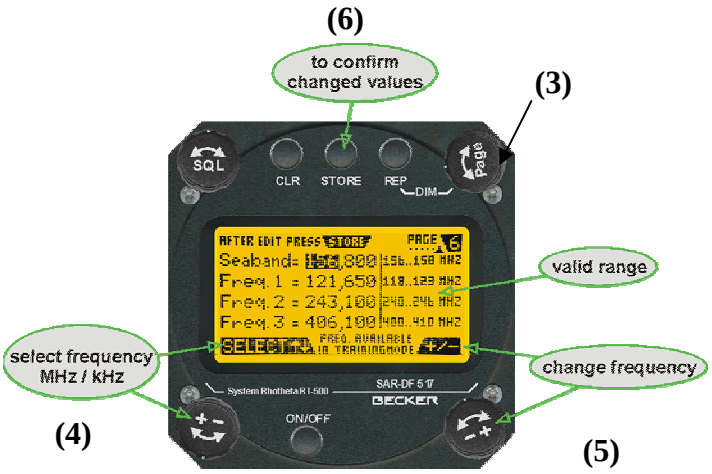
7) SET SQUELCH LEVEL! (Set just above noise level.)

b. Training Mode. This mode is used for practice exercises. In this mode the unit will search for specific training frequencies entered by the operator, can also SCAN a group of training frequencies, but **EMERGENCY frequencies are ignored when in the training mode**. To operate the unit in the training mode, follow the checklist below:



1) Turn ON

2) Select TRAINING

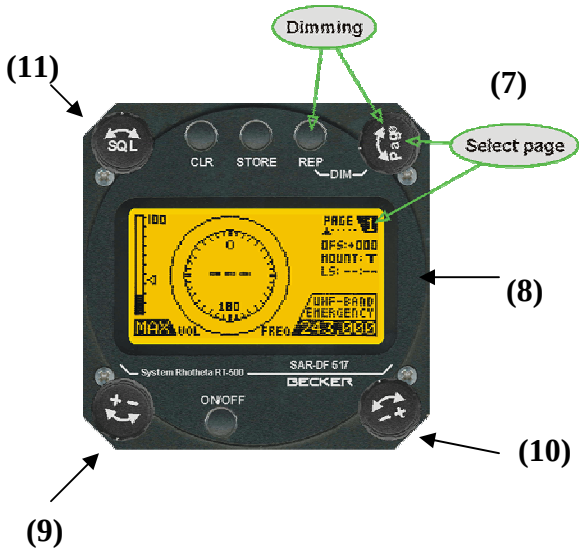


3) Select PAGE 6

4) Select Training Frequency Band

5) Set/Verify Training Frequency. Change only if needed.

6) Press STORE button to save any changes made to training frequency. Not necessary if no changes made.



7) Select PAGE 1

8) Verify Antenna Mounting

9) Turn Volume ON

10) Select Training Frequency or SCAN mode.

11) SET SQUELCH LEVEL! (Set just above noise level.)

c. Becker SAR DF 517 Highlights:

1) SQUELCH Adjustment. It takes some practice to learn the correct setting of the squelch control. If the squelch is set to high, you may not be able to receive the ELT signal. If the squelch is set to low (in the noise level) you will receive erroneous ELT signals that may tend to “bounce” around the screen.

2) Don’t be afraid to play with the squelch adjustment while in flight. You will quickly learn how to tell the difference between a valid ELT signal and an erroneous signal cause by noise.

3) Be sure to monitor your COMM radio also. Listen for the characteristic ELT “whooping” signal on the correct frequency (usually 121.5 MHz for EMERGENCIES or 121.775 for TRAINING). If you can hear the ELT on your COMM radio, but it is not being indicated on the DF-517, your squelch setting is probably too high.

4) The PILOT should not be watching the DF-517 display. The OBSERVER should be watching the display and giving bearing directions to the pilot. The pilot’s job is to provide the crew a safe flight environment. FLY SAFE!

Additional Information

DF is covered in Task O-2108, *Assist in ELT Searches*, and may be performed concurrently with this task. More detailed information and figures on this topic are available in Chapter 10 and Attachment 2 of the MART as well as the User Manual for the Becker SAR-DF 517.

Evaluation Preparation

Setup: Provide the student with an aircraft and pilot, and a practice beacon.

Brief Student: You are a Mission Observer trainee asked to set up the aircraft DF unit and assist in locating a practice beacon.

Evaluation

Performance measures	Results	
1. Describe how the aircraft DF works.	P	F
2. Set up the DF.	P	F
2. Use the DF during a typical ELT search. Discuss how the DF should respond during the initial phase (include signal fade), when you are getting close, and when you pass over the practice beacon.	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-2006
PERFORM ELT SEARCHES

CONDITIONS

You are a Mission Pilot trainee and must perform ELT searches.

OBJECTIVES

Locate an Emergency Locator Transmitter (practice beacon) using the homing and wing null ELT search methods. Discuss the aural and metered search methods, and reflection and interference.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Pilot trainee, knowing how to plan for and locate an Emergency Locator Transmitter (ELT) is essential. There are several methods that can be used, the most common of which are the homing and wing null methods. You should also be familiar the aural and metered search method, and how reflections and signal interference can affect the search.

2. *Homing* is an electronic search method that uses the Direction Finder (DF) to track the ELT signal to its source. Tune the direction finder (DF) to the ELT operating frequency; the pilot will fly the aircraft to the transmitter. ELT's may transmit on either 121.5 MHz VHF, 243.0 MHz UHF, or both frequencies simultaneously. These emergency frequencies are *usually* the ones monitored during a search, but homing procedures can be used on any radio frequency to which *both* a transmitter and DF receiver can be tuned.

a. L-Tronics DF Unit. First you have to determine the direction to the ELT. When you fly directly toward a signal, the left/right DF needle remains centered. However, when you head directly *away* from the signal, the needle also centers. A simple, quick maneuver is used to determine if you are going toward or away from the signal. Starting with the left/right needle centered, the pilot turns the aircraft in either direction so that the needle moves away from center. If he turns left, and the needle deflects to the right, the ELT is in front. If the pilot turns back to the right to center the needle, and then maintains the needle in the center, you will eventually fly to the ELT. If, in the verification turn, the pilot turns left and the needle swings to the extreme left, then the ELT is behind you. Continue the left turn until the needle returns to the center. You are now heading toward the ELT, and as long as the pilot maintains the needle in the center, you will fly to the ELT.

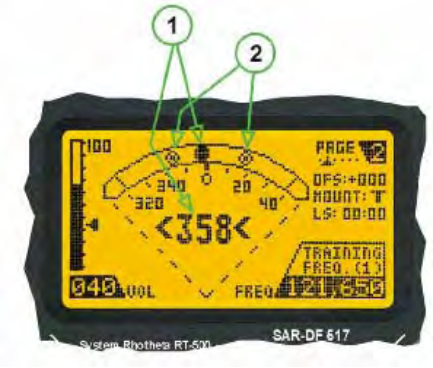
Flying toward the ELT, maintaining the needle in the center of the indicator *is* the actual homing process. If the needle starts to drift left of center, steer slightly left to bring the needle back to the center. If it starts to drift right, turn slightly back to the right. Once you have completed the direction-verification turn, you will not need large steering corrections to keep the needle in the center.

When passing over the ELT or transmission source, the left/right needle will indicate a *strong* crossover pattern. The needle will make a distinct left-to-right or right-to-left movement and then return to the center. This crossover movement is *not* a mere fluctuation; the needle swings fully, from one side of the indicator to the other and then returns to the center.

During homing you may encounter situations where the needle *suddenly* drifts to one side then returns to center. If the heading has been steady, and the needle previously centered, such a fluctuation may have been caused by a signal from a second transmitter. Another aircraft nearby can also cause momentary needle fluctuations that you might not hear, but the needle in the DF will react to it. Signal reflections from objects or high terrain can also cause needle fluctuations at low altitudes in mountainous terrain or near metropolitan areas.

b. Becker SAR-DF 517. Just like when using the L-Tronics DF, you will need to determine the bearing to the target. With the Becker DF, you will essentially follow the directions on pages of the display.

Page 1: 360°bearing



Page 2: expanded ±45°

Page 3: bearing text

1) Relative Bearing value. It is very important to realize that this is a relative bearing that is relative to the nose of the aircraft, NOT the heading to be flown.

2) Spread Maximum deviation of un-averaged bearing. Good bearing results even with a spread of 45°as a result of the averaging procedure. Note: as you approach near the ELT and the signal becomes very strong, the spread will narrow.

3) Receive level Field strength. Page 1 shows approximately 50%, Page 2 shows approx. 75%

4) Squelch level Squelch level must be above the noise level without a received signal.

5) Offset Corrects for antenna alignment (adjusted in the edit-menu).

6) Mounting Page 1 shows a BOTTOM mounted antenna. Page 3 shows TOP mounted.

7) LS: ---:--- Internal timer (LS meaning last signal) indicating the time since the last signal was received, displayed in min /sec

How do I read the above displays?
- Page 1 indicates that the target is 2 degrees to the right, so the observer would tell the pilot to turn 2 degrees right to center the ball at the top of the display.
- Page 2 indicates that the target is 2 degrees to the left, so the observer tells the pilot to turn two degrees to the left to center the ball at the top of the display.
- Page 3 indicates that the target is 6 degrees to the right, so the observer tells the pilot to turn 6 degrees to right (there is no ball displayed on this page).

How do you know when you are over the target?
- The “ball” will swing to the 180 degree position on PAGE 1 just after you pass over the target.

- When you are exactly over the target you may notice a “cone of influence” similar to passing over a VOR during which the signal may be lost momentarily before it swings to 180 degrees.

3. *Wing null*. The wing null (or wing shadow) method is based on the assumption that the metal skin of the search aircraft’s wing and fuselage will block incoming ELT signals from the receiving antenna during steep-banked turns.

Due to the length of the description of this search method and the number of figures, refer to the "Wing Shadow method (wing null)" section of the Mission Aircrew Reference Text (MART) for details.

4. The *aural* (or hearing) search technique is based on an assumption that an ELT's area of apparent equal signal strength is circular.

Please refer to the "Aural (or hearing) search" section of the MART for details.

5. To employ the *metered* search method, the observer uses a signal strength meter to monitor the ELT signal. Once the aircraft enters the search area, the observer plots two positions of equal meter strength.

Please refer to the "Metered search" section of the MART for details.

6. Signal reflection and interference. Radio signals reflect off terrain and manmade objects, and this can be a problem for search and rescue teams. In an electronic search, it is vitally important to know if the equipment is reacting to reflected signals and what you can do to overcome the problem.

Please refer to the "Signal Reflection and Interference" section of the MART.

Additional Information

Using the DF is covered in Task O-2005 (Operate the Aircraft DF), and may be performed concurrently with this task. More detailed information and figures on this topic are available in Chapter 10 and Attachment 2 of the MART and the user’s manual for the Becker SAR-DF 517..

Practice

Setup: The student needs access to an aircraft with an operable DF, a sectional and or a map of the practice area. Place a practice beacon in a suitable location for each type (method) of DF search. [Note: If you normally operate in or near congested airspace, you should conduct some of these practice sorties under ATC control inside the congested airspace.]

For the first lesson it is best if the trainer flies the aircraft and let the student concentrate on the DF unit. Where possible, have the student direct the pilot (particularly for headings) by interpreting DF signals. Thereafter the trainer should let the student perform as much of the search duties as is practical.

As a minimum, the student should practice the homing and wing null search methods. Demonstration of the aural and metered search methods is desirable, but they may be simulated. [Note: It is highly desirable to have a ground crew available during practice. The observer can then lead the ground crew to the area where the practice beacon is located and let the ground crew find the beacon.]

The student should start out searching for a practice beacon located in an open area where the signal will not be reflected. At first, the practice beacon's location should be clearly marked (e.g., using an adjacent signal panel or wreckage simulations) so the student can see the results of his efforts.

After the student has successfully demonstrated basic proficiency, place the practice beacon in an open area but do not mark its location. Have the student locate the beacon and tell you its approximate location. This provides a good simulation of a night search. After the student has demonstrated proficiency, practice at least one DF (using the homing and wing null methods) at night.

After the student has mastered the basic ELT search methods, place a practice beacon in locations where the signal is weakened or reflected (e.g., inside a hanger, along a metal fence, or near a power transmission line).

Evaluation Preparation

Setup: Provide the student with an aircraft and pilot, a sectional and/or map of the local area. Place a practice beacon in a suitable location for each type of ELT search.

Brief Student: You are a Mission Pilot trainee asked to perform ELT searches.

NOTE: The performance measures are designed for the L-Tronics DF; adjust as necessary for your aircraft.

Evaluation

Performance measures	Results	
1. Locate a practice beacon using the following search methods:		
a. Homing to a non-reflected signal.	P	F
b. Homing to a non-reflected signal at night (combine with 1.d, if possible).	P	F
c. Homing to a reflected signal.	P	F
d. Wing null to a non-reflected signal (one during the day and one at night).	P	F
2. Locate a practice beacon using the following search methods (may be simulated):		
a. Aural.	P	F
b. Signal.	P	F
3. Discuss night and IFR searches, with particular emphasis on the hazards and precautions.	P	F
4. Discuss signal reflection and interference.	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-2007
LOCATE AND SILENCE AN ELT ON THE GROUND

CONDITIONS

You are a Mission Observer trainee and must locate and silence an ELT on the ground.

OBJECTIVES

Locate and silence an ELT on the ground, and discuss the legal issues involved.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Observer trainee, knowing how to locate and silence an Emergency Locator Transmitter (ELT) on the ground is essential. If you don't have a ground crew and you have determined the ELT signal is coming from an airfield, you can land and find the offending aircraft. You can use a hand-held DF unit (Little L-Per or Tracker) and/or a hand-held radio to locate the aircraft.

NOTE: Aircrews will not conduct searches off the main airport property as they are not normally equipped to do so. If aircrews conducting an airport search suspect an aircraft crash off the field, they should request additional assistance from local authorities and support from a CAP ground or urban direction finding team to locate the crashsite.

2. Sometimes you locate the hanger where the signal is coming from and find it is full of aircraft. Two methods are very useful in locating the ELT under these circumstances:

Signal-offset method
You can take advantage of the fact that reflected signals are generally weaker by tuning a hand-held radio further away from the primary frequency (signal-offset). Assuming the ELT is transmitting on 121.5, tune the radio to 121.55. Toggle back and forth between the two frequencies as you approach the suspected location until you hear a signal on 121.55. As you home in make 121.55 the primary and set 121.6 on the radio and repeat the process (you may even work up to 121.7). As you get further away from the initial frequency the area where the signal will break through the squelch becomes smaller and smaller (you can even turn up the squelch to get further isolation).

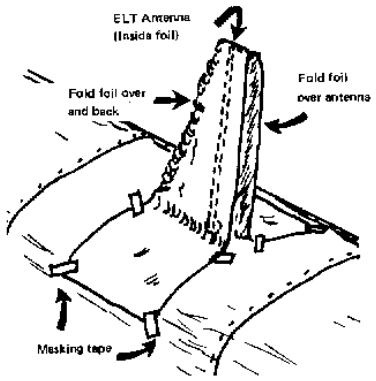
Use a hand-held radio without its antenna
Hold the radio by one of the suspect aircraft (its ELT antenna, if mounted on the exterior) and turn the volume down until you can just hear the signal, then move to the next suspect aircraft and hold the radio next to its antenna. If the signal is stronger you probably have it; if it is weaker or cannot be heard it's probably the other aircraft. If needed, repeat with the radio's antenna removed (*Warning*: Do not key the radio's transmitter while it's antenna is removed!). [Note: You may also incorporate portions of the signal-offset method with this method.] Another technique is to slip an aluminum foil "sleeve" over the suspect ELT antenna while holding the radio by the antenna; if the signal fades significantly, you have found the signal.

3. Once you have determined which aircraft the signal is coming from, you have to find the (physical) ELT. Most are located in the rear of the aircraft; also look for remote switches. The following gives some general locations:

a. Single-engine Cessna: right side of the upper baggage area immediately aft of the baggage door.
b. Multi-engine Cessna: left side of the fuselage just forward of the horizontal stabilizer. Accessed through a small push-plate on the side of the fuselage.

c. Single- and multi-engine Piper: in the aft fuselage. Accessed through a small access plate on the right side of the fuselage (need a screwdriver).
d. Single- and multi-engine Bonanza: in the aft fuselage. Accessed through a small access plate on the right side of the fuselage (need a screwdriver).
e. Large piston twins (e.g., King Air) or small jets: if installed its probably in the rear section. No visible antenna. May have a small round push-plate that gives you access to the switch with your finger.

4. The preferred method of silencing a transmitting ELT is to have the owner (or a person designated by the owner) turn it off and disconnect the battery; second best is just turning it off. Some owners will take the switch to OFF and then back to ARMED; monitor the emergency frequency for several minutes afterwards to ensure the ELT doesn't resume alarming. If you cannot find the owner (or designee), you may have to install an aluminum foil 'tent' to limit the ELT signal range.



Take a piece of foil about one foot wide by about five feet long. Place the tip of the ELT antenna in the center of the foil and fold the foil down on both sides of the antenna. Let the ends lay flat against the fuselage; the flaps *must* extend at least 18" beyond the antenna. Fold the two sides of the 'tent' together to completely enclose the antenna and *securely* tape the foil to the fuselage (use a tape that won't damage the paint, such as masking tape).

5. Whatever you do, *do not leave an ELT/EPRIB in the alarm state unless ordered to do so by the IC/AFRCC.* You will have to consult your IC, AFRCC, and/or law enforcement to silence the ELT if the above methods are not practical. Last but not least, ensure the aircraft owner is notified that the ELT was disabled. If you can't obtain a phone number, you can put a sticker on the aircraft (not a window) stating that the ELT has been disabled.

6. AFRCC information. You need to keep a log of the ELT search in order to provide certain information to AFRCC. This information will be given to the Incident Commander, and is required before AFRCC will close out the mission:
a. Date and time (Zulu) you left on the sortie.
b. Date and time the ELT was first heard.
c. Time in the search area and time enroute (hours and minutes; Hobbs).
d. Area(s) searched.
e. Actual location of the ELT, including latitude and longitude.
f. Date and time the ELT was located and silenced.
g. ELT model, manufacturer, serial number and battery expiration date.
h. Position in which you left the ELT switch: On, Off, or Armed.
i. Other (not required): 'N' or vessel number, make and model, owner information, and how the ELT was actuated.

7. *Legal issues*. Per CAPR 60-3 Chapter 1, CAP members will not enter private property and should not do anything that could cause harm or damage to the distress beacon or aircraft/boat. If entry is required the owner/operator or local law enforcement officials will make it.

A transmitting ELT is under the legal authority of the FCC, and federal law requires that it be deactivated ASAP. However, CAP members *do not have the authority to trespass onto private property*, either to gain access to the aircraft or to enter the aircraft to gain access to the ELT. You must gain permission from the owner before you enter a private hanger or an aircraft. In some cases, especially at an airport, FBO personnel have permission to enter aircraft on the premises and can assist you.

Normally, local law enforcement officials are happy to assist you. If they are not familiar with CAP and your responsibilities, a simple explanation often suffices. If this doesn't work, try calling AFRCC and have them explain the situation.

That said, when searching under the tasking of the AFRCC, CAP forces are "assisting" the FCC and no one else. If a local law enforcement officer prevents a CAP ground team from going on to an accident scene to deactivate the ELT, the deputy is in the wrong. Now, that does not mean you just shove your way past the deputy. You call your IC, who calls the AFRCC, who calls the Sheriff at home at 3:00 a.m. and explains that the Sheriff really doesn't want to get crosswise with the FCC. The Sheriff is usually only too happy to call the deputy and allow the ground team to enter the scene to deactivate the ELT.

NOTE: A *crashed* aircraft is under the authority of the National Transportation Safety Board (NTSB) *and no one else*. Federal law permits the NTSB to request assistance from federal, state and local agencies (including CAP) to secure a crash site.

Practice

Setup: The student needs a hand-held DF unit, a hand-held radio, and aluminum foil and tape.

First, place a practice beacon in an open location where it is visible to the student. Have the student use the hand-held DF unit and the hand-held radio to locate the beacon.

After the student is comfortable with the DF and radio indications, place the practice beacon in an open location but not visible to the student. Have the student DF to the beacon using both the DF unit and the radio.

Next, place the practice beacon in an area where the signal will be reflected, preferably in an aircraft that is inside a hanger. Have the student locate the beacon using the DF and/or the radio.

Have the student install an aluminum foil 'tent' over an ELT antenna on an aircraft.

Additional Information

More detailed information and figures on this topic are available in Chapter 10 of the MART.

Evaluation Preparation

Setup: Provide the student with a hand-held DF unit, a hand-held radio, a practice beacon, and aluminum foil and tape.

Brief Student: You are a Mission Observer trainee asked to locate and silence an ELT (practice beacon), and discuss the legal issues involved.

Evaluation

Performance measures	Results	
1. Locate a practice beacon in an open area on the ground.	P	F
2. Locate a practice beacon in an aircraft inside a hanger.	P	F
3. Discuss the typical physical location of ELTs in various types of aircraft.	P	F
4. Demonstrate (may simulate) how gain access to and silence an aircraft ELT.	P	F
5. Install an aluminum foil 'tent' over an aircraft's ELT antenna.	P	F
6. List information (required by AFRCC) that you should record during an ELT search.	P	F
7. Discuss the legal issues involved in silencing an ELT.	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-2008
COMPLETE A MISSION SORTIE

CONDITIONS

You are a crew member trainee and must demonstrate how to complete a mission sortie.

OBJECTIVES

Obtain general and aircrew briefings with the mission pilot, assist in filling out the front page of a CAPF104, ensure releases are obtained, inventory sortie supplies, and give the scanners their sortie assignments.

Perform or describe mission duties during a sortie, actions upon return to mission base, fill out the remainder of the CAPF104, and perform a sortie debriefing.

TRAINING AND EVALUATION

Training Outline

1. The ability to complete a mission sortie is essential. A well prepared and thorough aircrew will help ensure the success of the mission.

2. *General briefing*. Soon after sufficient data have been assembled, and the mission base is functioning, there will be an initial general mission briefing that everyone must attend. The incident commander (or designee) introduces the staff and covers mission base and safety procedures. The IC then summarizes the situation, including a description of the search objective. A map may be displayed, and the areas to be searched (or the object or area to be assessed) will be outlined on the map. Usually, someone provides a time hack.

Other items covered include current and forecast weather conditions, the communications, flightline, taxi, and safety plans, status boards (for updates), logistics, and supply. You may be handed a sortie packet at this time, or the Briefing Officer may make assignments individually.

Thereafter, the general briefing is normally given each morning (or at the beginning of each operational period). Updates are posted regularly or after a significant development.

3. *Aircrew briefing*. A detailed briefing will be given to each aircrew (and ground team) prior to each sortie. Depending on the circumstances, the mission pilot may receive the briefing or the entire aircrew may be briefed together. It is important that you pay attention and ask questions. In this briefing, there are no stupid questions.

A. During the briefing, ensure you get enough information to fill out the left front of the CAPF 104:
   1) Objectives and Search Area/Route
   2) Terrain/Ground cover
   3) Direction of tracks, track spacing, search altitude and airspeed
   4) Hazards to flight and military routes (local and search area)
   5) Aircraft separation
   6) Weather (local and search area)
   7) Communications call signs, frequencies and procedures
   8) Actions to be taken if target sighted
   9) Estimated time of departure and time enroute
   10) Inbound and Outbound headings and altitudes
   11) Whether using Local (preferred) or Zulu time

B. *CAPF 104*. A CAP flight plan and a sortie briefing form are required for each sortie flown by your aircrew. The front of the CAPF 104 serves both purposes.

MISSION FLIGHT PLAN/BRIEFING FORM

MISSION NO.	DATE	SORTIE NO.
MAS01-001	20-Jul-01	1

INSTRUCTIONS: *Pilot completes section pertaining to aircraft and crew (items above double line), and then gives form to Briefing Officer. Remaining items will be completed as required prior to flight. Complete reverse side after mission.*

CREW QUALIFICATION
PILOT: Acft Type X Night X
Instrument X Mountain X
CO-PILOT: Mission ___ Trainee ___
OBSERVER: Mission X Trainee ___
OBSERVER: Mission ___ Trainee X

Aircraft Equipment
☒ CAP RADIO FREQ ☐ SIGNAL FLARES
☒ POLICE RADIO FREQ ☐ FLARES
☒ VOR ☒ MESSAGE DROPS
☒ ADF ☒ SURVIVAL KIT
☒ ELT ☒ TRANSPONDER
☒ NIGHT FLIGHT ☒ DIRECTION FINDER
☒ INSTRUMENT FLT ☒ GPS
☒ FIRE EXTINGUISHER ☐
☒ FIRST AID KIT

FLIGHT PLAN INFO
CAP ☒
FILED FAA ☐
IFR ☐ VFR ☒
AIRCRAFT NUMBER N99545
AIRCRAFT TYPE C172P

MISSION OBJECTIVES:
Details here, such as route, grid, creeping line or expanding square search area.

TRUE AIRSPEED 110 KIA
POINT OF DEPARTURE BAK

SEARCH AREA/ROUTE (DESCRIPTION)
Describe in sufficient detail that mission base knows exactly where you are going and in what sequence.

ETD/ATD 1300 Z /1310 Z
OUTBOUND/INBOUND ALTITUDE
2,000 F 2,500 F
ROUTE OF FLIGHT
Flight plan detail of route

TERRAIN/GROUND COVER
Describe. Use descriptors from reverse

TYPE OF SEARCH PATTERN(S)
Route, creeping line, etc.

DIRECTION OF TRACKS	TRACK SPACING
N/S or E/W	1 nm, 1/2 nm, etc.
SEARCH ALTITUDE	SEARCH AIRSPEED
1,000 F	90

HAZARDS TO FLIGHT
Towers, water fowl, parachuting, etc.

MILITARY LOW ALTITUDE TRAINING ROUTES
VR 1617

AIRCRAFT SEPARATION (ADJOINING AREAS)
As applicable

EMERGENCY FIELDS
OVO, SER

WEATHER CURRENT LOCAL	FORECAST LOCAL
Describe	Describe
WEATHER CURRENT SEARCH AREA	FORECAST SEARCH AREA
Describe	Describe
MISSION BASE CALL SIGN	FREQUENCIES FM - VHF - HF
Columbus base	Channel 4
MOBILE CALL SIGN	FREQUENCIES FM - VHF
Ground Team 1	Channel 1

MOBILE LOCATIONS
North side of Seymour

WHO TO CONTACT AND WHEN
Mission base every 30 minutes for Ops Normal

ACTIONS TO BE TAKEN IF SAR OBJECTIVE IS LOCATED
Call Ground Team 1 and direct to site

CODE WORDS
RECALL ET Phone Home FIND Here it is!

DESTINATION AIRPORT BAK
CITY Columbus, IN
ESTIMATED TIME ENROUTE HRS. 1 MIN. 30
FUEL ON BOARD HRS. 4 MIN. 10
ALTERNATE AIRPORT SER
PILOT'S NAME Lance Largewatch
PILOT'S ADDRESS Roswell New Mexico
PILOT'S PHONE NO. Classified
NO. OF PERSONS ABOARD 3
COLOR OF AIRCRAFT W/B/R
PROPOSED LDG TIME 14:30 Z
ACTUAL LDG TIME 14:40 Z
FAA FLT PLAN CLOSED ☐

PILOT'S SIGNATURE	BRIEFING OFFICER'S SIGNATURE	OPS/CLEARANCE/DISPATCH SIGNATURE

CAP Form May 84 104 PREVIOUS EDITION IS OBSOLETE.

CAP Flight Plan

The right side of the front of the CAPF 104 serves as the CAP flight plan. It lists details of your aircraft, your intended route of flight, anticipated flight time, fuel available versus fuel you intend to use (plus reserve), and souls on board -- all meant to let the mission staff know where you are going and when you should return and to facilitate rescue efforts in case of an emergency.

The mission pilot must consider many things as she fills out the flight plan. Since the primary purpose of the plan is to let mission staff know where your aircraft is going and when it will return, the "Route of Flight" is one of the most important blocks on the flight plan: ensure it clearly describes your intentions, including any fuel or rest stops. The "Estimated Time Enroute" is also very important: if a sortie isn't back within a reasonable time past this estimated time of return, mission base will attempt to contact you and a search may be started.

As you plan the sortie, the pilot should consider Inbound/Outbound headings and altitudes; if no altitudes are assigned and you will be flying below 3000' AGL use 'odd' altitudes, such as 1300' or 2300' if the terrain and obstacles allow, in order to avoid normal traffic during your transits.

Once you have planned the route and have a time estimate, add some time to drop down and verify sightings (normally 15 minutes to descend to 500' AGL, circle, and return to 1000' AGL).

Now the pilot should double-check "Estimated Time Enroute" against "Fuel Onboard." If the time enroute exceeds fuel load *minus reserve* (e.g., a "round robin" sortie or extended sortie where you plan to refuel), ensure the "Route of Flight" thoroughly explains your intentions and lists your fuel stop.

CAP Briefing Form

The left side of the front of the CAPF 104 serves as the sortie briefing form. It lists mission objectives, describes the search area or route, defines terrain and ground cover (try to use the terminology from the POD chart on the bottom of the reverse side), gives details of the search pattern to be used, lists hazards to flight, defines current and forecast weather in the search area, and lists other mission details. Be thorough and thoughtful as you fill out this form. It is very important. [If possible, the aircrew should hold an informal group briefing as you complete this form. Crew resource management demands prior agreement on details of the search.]

Your briefing kit should contain:
1) CAPF 104 and CAPR 60-1
2) Airport diagram, taxi plan/procedures, emergency-landing areas
3) Current and Gridded sectionals (if gridded sectionals are not current, mark "Not for Navigation")
4) Maps (road atlas, county maps, topo maps)
5) Checklists

If flying grids and no aircraft will be in the adjacent grids, plan your turns outside the grid for breaks.

Finally, review your planning aids (marked-up charts and notes) for accuracy and legibility. Also, you should write in your Cap Flight number on the form, in the "Flight Plan Info" section. This helps the communications personnel. Ensure you have the (operable) equipment to accomplish the objective.

After reviewing the plan with the crew, the mission pilot signs the form.

4. *Operational Risk Management (ORM).* Operational Risk Management (ORM) is a practical way to accomplish the mission with the least possible risk. It is more than just common sense (although plain common sense is very important) and more than just a safety program. It can be used to identify and assess anything that might have a negative impact on a mission. ORM is a method of getting the job done by identifying the areas that present the highest risk, then taking action to eliminate, reduce or control the risks. It can be very flexible and can take from a few seconds to a few hours or days.

The Air Force uses a six-step "building block" approach:

Identify the hazards
Assess the risks
Analyze risk control measures
Make control decisions
Implement risk controls
Supervise and review

Accept no unnecessary risks. Unnecessary risk comes without a commensurate return in terms of real benefits or available opportunities. All CAP missions and our daily routines involve risk. The most logical choices for accomplishing a mission are those that meet all mission requirements with the minimum acceptable risk.

Make risk decisions at the appropriate level. Making risk decisions at the appropriate level establishes clear accountability. Those accountable for the success or failure of the mission *must* be included in the risk decision process. The appropriate level for risk decisions is the one that can allocate the resources to reduce the risk or eliminate the hazard and implement controls. Levels include the incident commander, aircraft or mission commander, ground team leader, or individual responsible for executing the mission or task.

Accept risk when the benefits outweigh the costs. All identified benefits should be compared to all identified costs. The process of weighing risks against opportunities and benefits helps to maximize unit capability. Even high-risk endeavors may be undertaken when there is clear knowledge that the sum of the benefits exceeds the sum of the costs. Balancing costs and benefits may be a subjective process and open to interpretation. Ultimately, the balance may have to be determined by the appropriate decision authority.

Integrate ORM into CAP practices, procedures and planning at all levels. Risks are more easily assessed and managed in the planning stages of an operation (this includes planning for a sortie). Integrating risk management into planning as early as possible provides the decision maker the greatest opportunity to apply ORM principles. Additionally, feedback (lessons learned) must be provided to benefit future missions/activities.

5. *Preparing to leave*. Once you have been briefed and the front of the CAPF 104 is complete and signed, the briefing officer will sign the CAPF 104 and direct the pilot to air operations. Here, the chief or director will inform the crew of any changes and release the flight by signing the CAPF 104.

Now is the time for final preparations for the flight. Check the crew equipment and supplies (e.g., headset, charts, maps, plotter, log, checklists, camera, drinking fluids and snacks) and review flightline rules. The final visit to the restroom is made.

The pilot presents the CAPF 104 to the flightline supervisor for final release, and then begins the aircraft pre-flight. Check the aircraft's mission-related equipment and supplies such as binoculars, charts and maps, flashlights, survival equipment, and airsick bags. All windows should be cleaned, if necessary.

[NOTE: If you are assigned an unfamiliar aircraft (not the one you usually fly), the pilot should perform a *very* thorough preflight. Look at (and touch) all antennas, check the struts carefully, check the tires and brakes carefully, and note any significant scratches and dents. You don't want to be blamed for someone else's mistakes.]

Prior to each flight, the pilot will brief the crew. This briefing will include specific information concerning the aircraft such as how to use the seat belts and shoulder harnesses (both must be used at or below 1000' AGL), emergency exit/egress procedures including the order of emergency egress, the no smoking policy, the fuel management plan, and startup and taxi emergency procedures. Duties for each crewmember during the start up, taxi, takeoff, and transit phases of the flight will be assigned. The pilot should inform you when the "sterile cockpit" rules will be in effect. [When more than one flight is accomplished by the same crew during the day,

subsequent briefings are not required to be so detailed but must, at a minimum, highlight differences and changes from the original briefing.]

During the actual search or assessment, the aircrew must be completely honest with each other concerning their own condition and other factors affecting search effectiveness. If you missed something, or think you saw something, say so. If you have a question, ask. If you spot the target, the most important thing to do is *notify mission base immediately*. The recovery must be started as soon as possible.

The mission pilot must take current flight conditions into consideration (e.g., gross weight, turbulence, and terrain) and perhaps add a margin of safety to the assigned search altitude and airspeed. Log these deviations from the assigned search parameters; when you get back from your sortie you can debrief what you did and why.

A. Transit to the Search Area
   1) Relax sterile cockpit rules
   2) Maintain situational awareness
   3) Double-check navigational settings to be used in the search area
   4) Review search area terrain and obstacles
   5) Update in-flight weather and file PIREP
   6) Review methods to reduce fatigue or combat high altitude effects during the search

B. Approaching the Search Area
   1) Exterior lights on (maximize your visibility so others can "see and avoid")
   2) Review search objectives
   3) Double-check radio, audio panel and navigational settings
   4) Check navigational equipment against each other (detect abnormalities or failures)
   5) Pilot stabilizes at search heading, altitude and airspeed (not < Vy) at least two miles out

C. In the Search Area
   1) Log (time and Hobbs) and report "In the Search Area"
   2) Enter deviations from assigned search parameters in Observer Log
   3) Hourly Updates - Altimeter setting (closest source) and fuel assumptions
   4) Report "Operations Normal" at assigned intervals
   5) Pilot limits time spent below 800' AGL (no lower than 500' AGL) during daylight
   6) Pilot maintains at least 2000' AGL during nighttime
   7) Monitor for crew fatigue and high altitude effects
   8) If you sight the objective, notify mission base at once
   9) Log all "negative result" sightings

D. Departing the Search Area
   1) Log (time and Hobbs) and report "Out of the Search Area"
   2) Pilot double-checks heading and altitude assigned for transit to next search area or return to base

6. *Return from the sortie*. After a short break you will assemble the crew to complete the CAPF 104 and prepare for debriefing. Any drawings or markings made on charts or maps should be transferred onto the CAPF 104 or attached to it. Make sure everything is clear and legible. [NOTE: *The two most common entries overlooked* when completing the CAP flight plan (front side of the CAPF 104) are "*ATD*" and "*Actual LDG Time*."]

Form
May 84

MISSION DEBRIEFING FORM

TYPE OF SEARCH: Visual: X Electronic: ___	SEARCH PATTERNS USED: Track Crawl (route)		
SEARCH VISIBILITY: *(Distance you can see an auto clearly)* 1 NM	SEARCH ALTITUDE: *(Above ground)* 1000 AGL	SEARCH SPEED: 90 Kts	TRACK SPACING: 0.0 NM
SECTIONAL GIRDS SEARCHED: *(Lat/Long)* N W A B C D	N W A B C D	N W A B C D	N W A B C D
SEARCHED: Route/ Electronically BAK	to SER	to	to
TIME OF DAY: 13:10 Z to 14:40 Z	Crew Comments about Effectiveness: Exec ___ Good ___ Fair X Poor		
OBSERVERS/ SCANNERS: Number 2	Crew Remarks of SAR Effectiveness: Route was easy to follow, but haze reduced contrast and washed out colors		

TERRAIN: Flat X	Rolling Hills ___	Rugged Hills ___	Mtns ___	TURBULENCE: Light: ___	Mod ___	Heavy ___
COVER: Open X	Moderate ___	Heavy ___	Light Snow ___	Deep Snow ___		
COORDINATES OF SIGHTINGS: *(Lat/Long)* N W	N W	N W	N W	VOR Radials		
FLYING TIME: Enroute. *(To/From Grid)* 0.4 Hrs	Search Time *(In Grid)* 1.1 Hrs	Total 1.5 Hrs				

NOTE: If part of a grid was searched, draw area covered below in relation to landmarks. Indicate sightings.

No sightings.

Also use for drawings or sketches, and to list attachments.

OPEN, FLAT TERRAIN

SEARCH ALTITUDE (AGL) / Track Spacing	SEARCH VISIBILITY 1 mi	2 mi	3 mi	4 mi
500 Ft				
.5 mi	35%	60%	75%	75%
1.0	20	35	50	50
1.5	15	25	35	40
2.0	10	20	30	30
700 Ft				
.5 mi	40%	60%	75%	80%
1.0	20	35	50	55
1.5	15	25	40	40
2.0	10	20	30	35
1000 Ft				
.5 mi	40%	65%	80%	58%
1.0	25	40	55	60
1.5	15	30	40	45
2.0	15	20	30	35

MODERATE TREE COVER AND/OR HILLY

SEARCH ALTITUDE (AGL) / Track Spacing	SEARCH VISIBILITY 1 mi	2 mi	3 mi	4 mi
500 Ft				
.5 mi	20%	35%	50%	50%
1.0	10	20	30	30
1.5	5	15	20	20
2.0	5	10	15	15
700 Ft				
.5 mi	20%	35%	50%	55%
1.0	10	20	30	35
1.5	10	15	20	25
2.0	5	10	15	20
1000 Ft				
.5 mi	25%	40%	55%	60%
1.0	15	20	30	35
1.5	10	15	20	25
2.0	5	10	15	20

HEAVY TREE COVER AND OR VERY HILLY

SEARCH ALTITUDE (AGL) / Track Spacing	SEARCH VISIBILITY 1 mi	2 mi	3 mi	4 mi
500 Ft				
.5 mi	10%	20%	30%	30%
1.0	5	10	15	15
1.5	5	5	10	15
2.0	5	5	10	10
700 Ft				
.5 mi	10%	30%	30%	35%
1.0	5	10	15	20
1.5	5	5	10	15
2.0	5	5	10	10
1000 Ft				
.5 mi	15%	20%	30%	35%
1.0	5	10	15	20
1.5	5	10	10	15
2.0	5	5	10	10

CAP **104 Reverse**

Most of the information required on the reverse of the debriefing form is self-explanatory and serves to emphasize the need to take good notes during the sortie (e.g., the observer log).

The "Time of Day" section requires you to enter the time you were in the search area; this helps debriefers and planners to determine if the weather or the sun's position affected search effectiveness.

The "Flying Time" section requires you to insert transit time [(Enroute (to/from grid)], the time you spent actually searching or assessing [Search Time (in grid)], and the "Total" time. These times are easily determined if you noted your takeoff, in search area, out of search area, and landing times and Hobbs readings in your log.

The total time should correspond to the Hobbs time that is recorded in your aircraft flight log (e.g., a Hobbs time of 2.4 corresponds to 2 hours and 24 minutes).

Two items are of utmost importance -- "Crew Comments about Effectiveness" and "Crew Remarks of SAR Effectiveness":

a. The first involves a quantitative assessment (excellent, good, fair or poor) of how well you accomplished your mission. Factors affecting search visibility (e.g., visibility, lighting, and sun position) and the crew (e.g., turbulence, fatigue, and how well the pilot covered the area) must be considered. Planners take these comments into consideration when determining POD, so *it is vital that you give the mission staff your honest input*!

b. The second gives the crew a chance to comment on the effectiveness of the sortie in general. Were north/south tracks appropriate, or would east/west be better? Was one-mile track spacing adequate, or was the terrain so broken that half-mile spacing would be better? Were you at the optimal search altitude? Did the terrain you were briefed to expect match what you saw? Was the sortie too long or too short, and should a rest break have been included in the flight planning? These are just a few of the things that aircrews can comment upon. Planners use this feedback to improve POD, so *it is vital that you give the mission staff your honest input*.

There is a large blank section labeled "NOTE" for you to insert drawings, sketches and other supporting information. If necessary, you can also use this space for additional comments. If you are attaching a drawing or other information to the CAPF 104, state something like "drawing attached" in this space. Be sure to label the attachment so it can be related to the CAPF 104 if it accidentally becomes separated (e.g., mission and sortie number). Rather than leave this section blank, enter "No Sightings."

Finally, make sure all entries and sketches/drawings are clear and legible (doing the form on a computer is preferred).

7. *Aircrew debriefing*. During the briefing everything that is known about the mission was passed along to the air and ground teams. In the debriefing, the reverse is true. Each search team (air and ground) tells how it did its job and what it saw. This type of information is given in detail and is in the form of answers to specific questions asked by the debriefer. The information is then passed on the planning section for analysis, and the information may then be passed on, in turn, to departing search crews. [Note: An aircrew or ground team cannot search and have "negative results". Even if the objective is not located, important information can be obtained, such as weather, turbulence, ground cover, and false clues.]

The debriefer uses the information you filled in on the reverse side of the CAPF 104 as a starting point for the debriefing. For example, more information on search area and weather conditions may be needed, and you should be ready to volunteer your observations. Perhaps you noticed an increase in cloud shadows. Perhaps visibility seemed to deteriorate because of the haze that developed after you arrived in the search area. Perhaps turbulence developed during the last one-third of your grid search. Any number of weather or personal factors could have changed during your sortie. To make the best contribution to the debriefing requires that you remember these changes and be prepared to tell the debriefer about them:

Did you make any changes to the planned search procedure? The debriefer's primary concern is to determine adequate search coverage. If, for example, you diverted frequently to examine clues, there is a good possibility that search coverage was not adequate and that another sorties is justified. If you become excessively tired and rested your eyes frequently, tell the debriefer. Everyone understands the degree of fatigue a scanner can experience. But, frequent rest-eye periods will reduce the level of good scanning coverage, and also could be justification for another sortie.

O-2009

DEMONSTRATE AIR/GROUND TEAM COORDINATION TECHNIQUES

CONDITIONS

You are a Mission Observer trainee and must demonstrate how to coordinate with ground teams.

OBJECTIVES

Demonstrate and discuss air and ground team coordination plans and techniques.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Observer trainee, the ability to coordinate with ground teams is essential.

2. Naturally, the best means of working with a ground team is to use the radio. The observer and scanner should continuously have their eyes on the ground team; this frees you to fly the aircraft. The observer and/or scanner will 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.

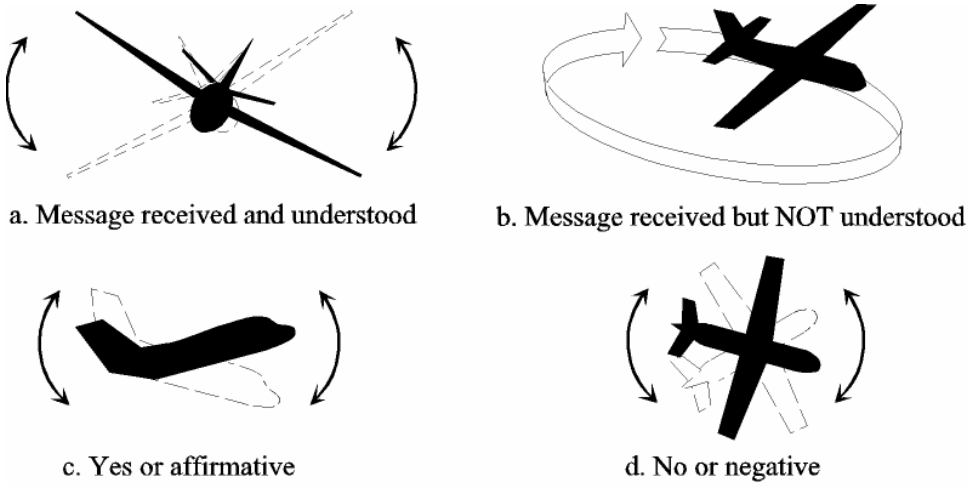
a. It is important to understand that you have the advantage of perspective; the long-range visibility that is inherent to flying is absent from the ground. You can see over the hills, trees, and other obstacles that are blocking the ground team member's sight, so you may have to explain the situation 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.

3. 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.

4. 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.

5. 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.

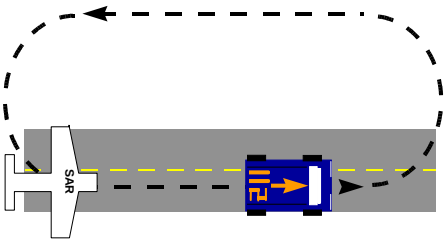
If communications are lost, you have a limited number of signals that can be given using the aircraft itself, as illustrated below. These signals serve as a standard means to acknowledge receiving and understanding signals from the ground. An "affirmative, I understand" response to a survivor's signal can often be a morale booster, and renew hope for imminent rescue.



In addition to the four signals shown above, there are two more that you can use to communicate with ground rescue teams. First, if you believe a ground team should investigate an area, you may fly over the team, "race" the engine or engines, and then fly in the direction the team should go. Repeat this maneuver until the ground team responds or until another means of communication is established.

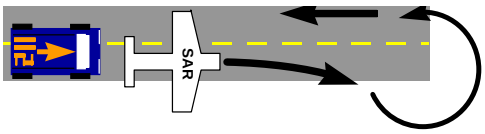
Second, you may pinpoint an area for investigation by circling above the area, continuing to do so until the ground team reaches the area and begins the search. The better the communication from ground-to-air and air-to-ground, the more coordinated the search will be and the greater the chances for success. Below are some patterns you may use to guide a ground team:

<u>Keeping contact with the ground team</u>.



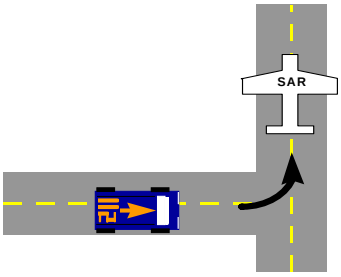
- Aircraft action: Aircraft approaches the vehicle from the rear and turns in a normal manner right (or left) to re-approach the vehicle from the rear. Circle back as necessary using oval patterns and flying over the team from behind, indicating that they should continue. This process may be referred 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.

<u>Turning the ground team around.</u>



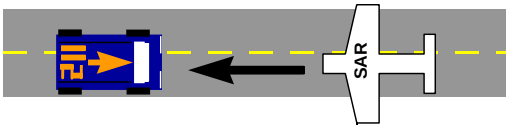
- Aircraft action: Aircraft approaches the vehicle from the rear and then turns sharply right (or left) in front of the vehicle while in motion. Circle back as necessary, flying against the team's direction of travel, and then take up the 'keeping up' procedure outlined above.
- Desired team action: 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.

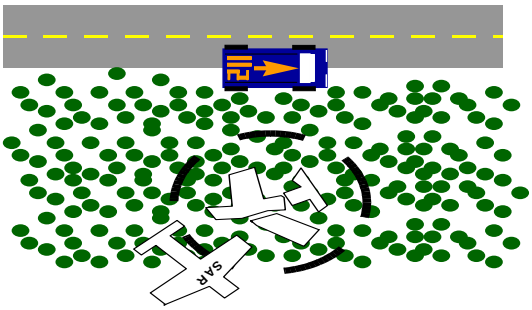
Stop or Dismount.



- 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.

- Aircraft action: Aircraft makes two (or more) passes in same direction over a stopped ground team.
- Desired team action: 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.

Additional Information

More detailed information on this topic is available in Chapter 4 and Attachment 2 of the MART.

Evaluation Preparation

Setup: The trainee needs an aircrew and a ground crew.

Brief Student: You are a Mission Observer trainee asked to guide ground units with and without comm.

Evaluation

Performance measures	Results	
1. Discuss crew 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, with and without comm.	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-2101
DESCRIBE HOW ELTs ARE DETECTED

CONDITIONS

You are a Mission Observer trainee and must describe how ELTs are detected and a search is launched.

OBJECTIVES

Describe how ELTs are detected and a search is launched.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Observer trainee, knowing the types of Emergency Locator Transmitters (ELTs), how they can be detected, and how a search is launched is essential. While the observer's role seems to be concentrated in visual searches, her contributions in electronic searches are no less important. The observer's understanding of electronic search techniques, and her ability to assist the pilot, can substantially increase both search effectiveness and the timeliness of recovering accident victims.

2. Types of ELTs. The Federal Aviation Administration (FAA) requires most U.S.-registered aircraft to have operable ELTs installed, which activate automatically when sensing acceleration forces during an accident. An active ELT transmits a continuous radio signal on a specific frequency until it’s either deactivated or its battery discharges: most transmit on 121.5 MHz at 60-100 milliwatts (less power than a small flashlight). [Note: After 01FEB09, advanced ELTs that transmit on 406.025 MHz at 25 milliwatts are to be used. They are specifically designed to operate with the Cospas-Sarsat satellite system, and transmit data that contains a unique identifier number that links them to a database containing information on the vessel or aircraft and emergency points of contact. Some advanced 406 MHz beacons also transmit GPS coordinates.]

Military Beacons (e.g., URT-33/C) operate on 253 MHz. Personnel ejecting/parachuting from a military aircraft have this beacon; some pilots may be able to communicate via two-way radio on 243 MHz using a PRC-90 or later military survival radio (this radio also has a beacon mode).

Marine Emergency Position Indicating Radio Beacons (*EPIRBs*) are primarily found on boats and ships. Similar to ELTs, some are automatically activated while others can only be activated manually.

Personal Locator Beacons (PLBs) and Personal Emergency Transmitters (PETs) are currently illegal for general use in the U.S., but the law is about to be changed and they are presently used by some government agencies. They transmit on 121.5 MHz, 243 MHz and 406 MHz or a combination: the new law proposes to license only the 406 MHz version.

Test stations or *practice beacons* like those used by CAP transmit on 121.775 MHz. Some organizations still operate practice beacons on 121.6 MHz, but all CAP practice beacons should be converted by now. [NOTE: ***Avoid calling the practice beacon an "ELT"*** while communicating on the radio; this can cause confusion. The term "practice beacon" is very clear to all concerned and should be used on all drills and exercises.]

3. Approximately 97% of all received ELT signals turn out to be false alarms. For 121.5 MHz ELTs only 1 in 1000 signals is an actual emergency! False alarms cause problems because SARSAT can only monitor 10 ELT signals at a time and because they block the emergency frequencies (thus blocking a real emergency signal). However, you must *always treat an ELT signal as an emergency* because you can't know whether the signal is real or false.

4. In a cooperative effort among several nations, search and rescue-dedicated satellites (SARSAT and COSPAS) orbit the earth and alert to ELT transmissions. Upon receiving an ELT signal, the SARSAT derives the approximate lat/long coordinates of the ELTs position, and the coordinates are passed through the Air Force Rescue Coordination Center (AFRCC) to the incident commander.

5. AFRCC will not launch a search until the signal is picked up by at least two satellites. Also, system accuracy in pinpointing the location varies. For a typical 121.5 MHz ELT, accuracy is limited to a 12 nm radius (452 square nm); a 406 MHZ ELT can be narrowed down to a 2 nm radius (12.5 square nm) and one with GPS can be narrowed down to a 0.05 nm radius (0.008 square nm).

6. Upon receiving SARSAT coordinates, or determining that an ELT was aboard a missing aircraft, the incident commander may launch a combined ELT/visual route search. Search success may depend upon several factors. The fact that an ELT was aboard a missing aircraft does not necessarily guarantee that electronic search procedures will locate it because the unit may have been inoperative or the batteries totally discharged. Also, the crash forces may have been insufficient to activate the ELT or so severe that it was damaged. Incident commanders may attempt to maximize the search effort by conducting an electronic search and a general visual search simultaneously when weather and other circumstances permit.

Additional Information

More detailed information and figures on this topic are available in Chapter 10 of the MART.

Evaluation Preparation

Setup: Provide the student access to an aircraft ELT (or pictures).

Brief Student: You are a Mission Observer trainee asked to describe how ELTs are detected and a search launched.

Evaluation

Performance measures	Results	
1. Discuss the various types of ELTs.	P	F
2. Describe how an ELT is detected and a search is launched.	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-2102
DEMONSTRATE PLANNING AND FLYING A ROUTE SEARCH

CONDITIONS

You are a Mission Pilot trainee and must demonstrate how to plan and fly a route search.

OBJECTIVES

Demonstrate how to plan and fly a route search.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Pilot trainee, the ability to plan and perform a route search pattern is essential.

2. General. Because of the accuracy and reliability of the present Global Positioning System and GPS receivers, CAP aircrews are now able to navigate and fly search patterns with unprecedented effectiveness and ease. The GPS has become the primary instrument for CAP air missions, and it is vital that observers know how to setup and use the GPS. However, observers must also be familiar with the other navigational instruments onboard CAP aircraft: these instruments complement the GPS and serve as backups in case of GPS receiver problems.

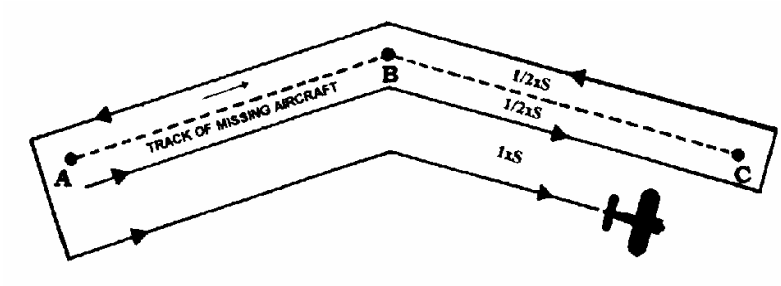
The pilot (or the observer acting as mission commander) must be aware of how many scanners will be on board in order to assign which side of the aircraft they should scan. *Planning and executing a search pattern with only one scanner on board is quite different from one where you have two scanners*. Likewise, having an observer and two scanners on board will allow the observer to spend more time assisting the pilot without seriously decreasing search effectiveness.

When you are planning and flying search patterns, always perform a stupid check -- as in "Hey! Wait a minute. This is stupid." Use this to see if your headings, waypoint positions, lat/long coordinates and distances look sensible. At a minimum, perform this check after you finish planning, when you start your pattern, and periodically thereafter. For example, you've just entered a set of lat/long coordinates into the GPS and turned to the heading shown on the GPS. You know the coordinates represent a lake southwest of your position, so check the heading indicator to see you're actually traveling in a southwesterly direction. Or, you know the lake is approximately 25 miles away; check the distance indicated on the GPS! You'd be surprised how many mistakes this method will catch.

Pre-planning (plotting) your search pattern results in the most effective search. Pre-planning sets the details of the sortie in your mind and makes entering your data (correctly) into the GPS much easier. This allows the pilot and observer to concentrate on their primary task by minimizing navaid setup time and reducing confusion. Worksheets can be used (see the *Flight Guide*, MART Attachment 2) to pre-plan your search patterns, but they are just one method.

3. 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.

4. 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.

5. You may use a worksheet to draw the route and to log coordinates and distinctive features. As a backup, note applicable VOR radials and cross-radials. The GX55 has a function called "parallel track offset" that is very handy for route searches. This function allows you to create a parallel course that is offset to the left or right (up to 20 nm) of your current flight plan. This function can also be useful on when you wish to search a 'corridor' of airspace.

Additional Information

Search patterns are covered in Tasks O-2102 thru O-2105 and may be combined in any fashion. More detailed information and figures on this topic are available in Chapter 11 of the MART.

Practice

Setup: Give the student a route search to plan and fly. The student should have a sectional chart, plotter, and worksheets as needed.

The route may be along a highway (to avoid straight lines) and should be of sufficient length (out and back) to allow the student time to demonstrate proficiency in all aspects of the search. Search altitude, airspeed and track spacing should be selected to match terrain and conditions: 1,000’ to 2,000’ AGL, 100 knots, and one mile track spacing is recommended.

Depending on the level of proficiency of the pilot, one or more of these tasks may be practiced simultaneously:

Planning. All mission sorties must be thoroughly planned: this ensures the pilot and crew can accomplish the sortie objectives safely and precisely. Treat each sortie as if it were an actual mission. Each time the student practices a sortie all required paperwork should be completed as part of the drill. The student should sign herself and the aircraft into the mission, receive her assignment from you (the briefing officer), plan the sortie, and complete the flight plan and preliminary mission data portions of the CAPF 104. Review the weight and balance, fuel assumptions, and information entered onto the CAPF 104 thoroughly.

Preflight and pilot briefings. Ensure the student performs a thorough preflight of the aircraft. Acting as a crewmember, receive pilot safety and mission briefings from the student. Perform safety assignments as directed by the student (e.g., collision avoidance during taxi and in flight).

Equipment. To the extent possible, the student should operate the communications and navigation equipment. The student should set up and enter information into the equipment (especially the GPS) prior to taxi. [Where necessary for safety or training, the training pilot should take over the aircraft controls while the student sets up navigation equipment (particularly the GPS) in flight.]

Initial training. Depending on the proficiency and skills of the student, the training pilot may need to demonstrate all aspects of a route search with the student sitting in the right seat. This gives the student time to absorb the information and work on such skills as setting up, entering data, and using the navigational equipment without the added responsibilities of the PIC.

For each practice sortie, watch for:

1) Proper setup of the navigational equipment, particularly the GPS. [Depending on whether or not the student has access to a GPS simulator, the training pilot may fly the aircraft while the student practices setting up and entering information into the GPS. However, by the time the student is ready for evaluation he must be able to fly the aircraft safely while accurately entering the required information into the GPS.]

2) Stabilized entry into the search area. The aircraft should be at search altitude and airspeed 3-5 miles before entering the search area.

3) Accurate and precise navigation. The student should maintain altitude, airspeed and track in the search area. Watch for proper wind drift correction and airspeed adjustments. Ensure the turns are started soon enough to stay inside the search area without requiring steeply banked turns (standard rate turns are preferred, but no more than 30º bank should be used). While the emphasis is on the use of the GPS, ensure the student can navigate using the VOR(s) or other means.

4) Safety. The student should spend most of her time looking outside the aircraft (see and avoid). Initially, the student will spend too much time with her eyes inside the aircraft (e.g., manipulating the GPS) until she is comfortable and proficient with the equipment. Get the student into the habit of *not looking inside the aircraft for more than five seconds at a time* to manipulate communications and navigational equipment.

Evaluation Preparation

Setup: Give the student a route search to plan and fly. The student should have a sectional chart, plotter, and worksheets as needed.

The route may be along a highway (to avoid straight lines) and should be of sufficient length (out and back) to allow the student time to demonstrate proficiency in all aspects of the search. Search altitude, airspeed and track spacing should be selected to match terrain and conditions: 1,000’ to 2,000’ AGL, 100 knots, and one mile track spacing is recommended.

Run the sortie as it would be during an actual mission. Have the student sign in, sign in the aircraft, and complete all required paperwork. Brief the sortie as if you were the Briefing Officer during a mission.

Brief Student: You are a Mission Pilot trainee asked to plan and fly a route search.

Evaluation

Performance measures	Results	
1. Sign yourself and your aircraft into the mission.	P	F
2. Receive a sortie briefing, asking questions as necessary.	P	F
3. Plan a route search from Point A to B and back. Include:		
a. Estimated time enroute and fuel requirements.	P	F
b. Position coordinates for the route (lat/long and VOR radials/cross-radials).	P	F
c. Altitude restrictions, obstacles and other hazards (e.g., MTRs and SUAs).	P	F
d. Discuss observer/scanner assignments for all possible combinations.	P	F
4. Fill out the flight plan and preliminary mission data on the CAPF 104.	P	F
5. Preflight the aircraft and perform pilot safety and mission briefings.	P	F
6. Demonstrate and discuss safety during each critical phase of the flight. In particular, demonstrate collision avoidance and enforce sterile cockpit rules.	P	F
7. Demonstrate proper ATC communications.	P	F
8. Setup the CAP FM radio and perform all required radio reports (may be simulated).	P	F
9. Perform the route search. Demonstrate:		
a. Proper use of navaids (GPS as primary; VOR as backup).	P	F
b. Proper use of radios (ATC as required, and CAP FM radio reports).	P	F
c. Entry at the proper point, stabilized at search altitude and speed.	P	F
d. Accurate altitude and speed control in the search area.	P	F
e. Turns accomplished accurately using less than 30º bank angle.	P	F
f. Accurate navigation and track spacing.	P	F
g. Proper observer/scanner direction (may be simulated).	P	F
10. Demonstrate proper attention to fuel management.	P	F
11. Properly secure the aircraft at the end of the sortie (ready for next sortie).	P	F
12. Fill out the remainder of the CAPF 104 and debrief the sortie.	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-2103
DEMONSTRATE PLANNING AND FLYING A PARALLEL TRACK SEARCH

CONDITIONS

You are a Mission Pilot trainee and must demonstrate how to plan and fly a parallel track search.

OBJECTIVES

Demonstrate how to plan and fly a parallel track search.

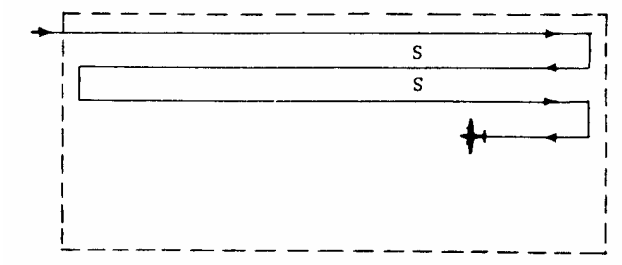
TRAINING AND EVALUATION

Training Outline

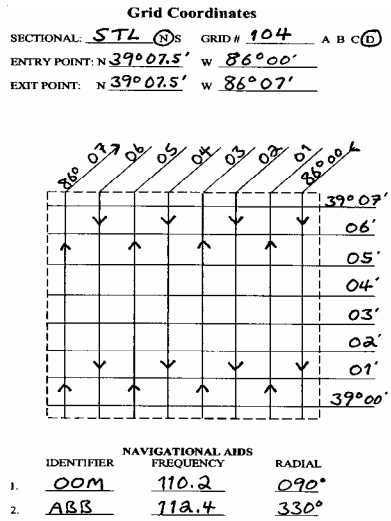
1. As a Mission Pilot trainee, the ability to plan and fly a parallel track search pattern is essential.

2. 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.

3. 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. You may use a worksheet to draw the route and to log coordinates and distinctive features. As a backup, note applicable VOR radials and cross-radials. You can use this to enter the latitudes and longitudes that define the entry point and bound the grid, or to generate a flight plan.



5. In the worksheet example, you will be searching STL Grid #104-D, which is a quarter-grid measuring 7.5' x 7.5'. Plot the grid's coordinates and draw the pattern starting at the entry point (northeast corner); include track spacing (one nm) and the direction of the legs (north/south). You will enter the entry point coordinates as a waypoint (N 39º 07´ W 86º 00´; northeast corner). As you fly to the entry point, set up at search altitude and speed about 3-5 miles out.

You may fly the pattern using the GPS' continuous latitude/longitude display (e.g., present position). Remember, latitude increases as you go north; longitude increases as you go west. Even though you are using the GPS lat/long display, it's still helpful to note your headings for the legs (in the example, north and south). Once you have flown a couple of legs you will have two headings that you can shoot for that will correct for any wind; it's easier to use the heading indicator as your primary indicator and check your accuracy with the GPS. [Note: if you're not using your VOR heads, set the top OBS with one heading (e.g., north) and the lower OBS to the other heading -- use all available equipment.]

Also, always enter relevant VOR cross-radials onto your worksheet and use them as a backup and to verify important positions.

6. All the data you need set up this search pattern in the GX55 is on the worksheet:
   - Type of Grid and Sectional (US grid, STL).
   - Type of pattern (Parallel Line).
   - Grid 104D2, where '2' indicates entering the northeast corner of D quadrant. *
   - Spacing (1 nm).
   - Direction of Travel (N/S).

   * The GX-55 identifies the corners of quadrants by numbers: 1 = enter the NW corner; 2 = NE corner; 3 = SE corner; and 4 = SW corner. In our example you would enter "104D2."

   Note: If you wish, record this data separately (e.g., a list or table) to make it even easier to enter into the GX-55. The example, above, has the data listed in the sequence that you enter into the GX-55.

Additional Information

Search patterns are covered in tasks O-2102 thru O-2105 and may be combined in any fashion. More detailed information and figures on this topic are available in Chapter 11 of the MART.

Practice

Setup: Give the student a one-quarter-grid search to plan and fly. The student should have a sectional chart, plotter, and worksheets as needed.

This search method is most often used inside a grid, and the student has to master several tasks in order to be proficient in flying a parallel track inside a grid.

Depending on the level of proficiency of the pilot, one or more of these tasks may be practiced simultaneously:

Planning. All mission sorties must be thoroughly planned: this ensures the pilot and crew can accomplish the sortie objectives safely and precisely. Treat each sortie as if it were an actual mission. Each time the student practices a sortie all required paperwork should be completed as part of the drill. The student should sign herself and the aircraft into the mission, receive her assignment from you (the briefing officer), plan the sortie, and complete the flight plan and preliminary mission data portions of the CAPF 104. Review the weight and balance, fuel assumptions, and information entered onto the CAPF 104 thoroughly.

Preflight and pilot briefings. Ensure the student performs a thorough preflight of the aircraft. Acting as a crewmember, receive pilot safety and mission briefings from the student. Perform safety assignments as directed by the student (e.g., collision avoidance during taxi and in flight).

Equipment. To the extent possible, the student should operate the communications and navigation equipment. The student should set up and enter information into the equipment (especially the GPS) prior to taxi. [Where necessary for safety or training, the training pilot should take over the aircraft controls while the student sets up navigation equipment (particularly the GPS) in flight.]

Initial training. Depending on the proficiency and skills of the student, the training pilot may need to demonstrate all aspects of a parallel track search with the student sitting in the right seat. This gives the student time to absorb the information and work on such skills as setting up, entering data, and using the navigational equipment without the added responsibilities of the PIC.

For each practice sortie, watch for:

1) Proper setup of the navigational equipment, particularly the GPS. [Depending on whether or not the student has access to a GPS simulator, the training pilot may fly the aircraft while the student practices setting up and entering information into the GPS. However, by the time the student is ready for evaluation he must be able to fly the aircraft safely while accurately entering the required information into the GPS.]

2) Stabilized entry into the search area. The aircraft should be at search altitude and airspeed 3-5 miles before entering the search area.

3) Accurate and precise navigation. The student should maintain altitude, airspeed and track in the search area. Watch for proper wind drift correction and airspeed adjustments. Ensure the turns are started soon enough to stay inside the search area without requiring steeply banked turns (standard rate turns are preferred, but no more than 30º bank should be used). While the emphasis is on the use of the GPS, ensure the student can navigate using the VOR(s) or other means.

4) Safety. The student should spend most of her time looking outside the aircraft (see and avoid). Initially, the student will spend too much time with her eyes inside the aircraft (e.g., manipulating the GPS) until she is comfortable and proficient with the equipment. Get the student into the habit of *not looking inside the aircraft for more than five seconds at a time* to manipulate communications and navigational equipment.

Evaluation Preparation

Setup: Give the student a one-quarter-grid search to plan and fly. The student should have a sectional chart, plotter, and worksheets as needed.

The student will enter and fly the grid using the parallel track search method long enough to demonstrate proficiency in all aspects of the search. Search altitude, airspeed and track spacing should be selected to match terrain and conditions: 1,000’ AGL, 90 knots, and one mile track spacing is recommended.

Run the sortie as it would be during an actual mission. Have the student sign in, sign in the aircraft, and complete all required paperwork. Brief the sortie as if you were the Briefing Officer during a mission.

Brief Student: You are a Mission Pilot trainee asked to plan and fly a parallel track search of a grid.

Evaluation

Performance measures	Results	
1. Sign yourself and your aircraft into the mission.	P	F
2. Receive a sortie briefing, asking questions as necessary.	P	F
3. Plan a parallel track search of a grid. Include:		
a. Estimated time enroute, time in the grid, and fuel requirements.	P	F
b. Position coordinates for the entry and exit points (lat/long & VOR radials/cross-radials).	P	F
c. Position coordinates for the grid legs (lat/long and VOR radials/cross-radials).	P	F
d. Altitude restrictions, obstacles and other hazards (e.g., MTRs and SUAs).	P	F
e. Discuss observer/scanner assignments for all possible combinations.	P	F
4. Fill out the flight plan and preliminary mission data on the CAPF 104.	P	F
5. Preflight the aircraft and perform pilot safety and mission briefings.	P	F
6. Demonstrate and discuss safety during each critical phase of the flight. In particular, demonstrate collision avoidance and enforce sterile cockpit rules.	P	F
7. Demonstrate proper ATC communications.	P	F
8. Setup the CAP FM radio and perform all required radio reports (may be simulated).	P	F
9. Fly the grid search. Demonstrate:		
a. Proper use of navaids (GPS as primary; VOR as backup).	P	F
b. Proper use of radios (ATC as required, and CAP FM radio reports).	P	F
c. Entry at the proper point, stabilized at search altitude and speed.	P	F
d. Accurate altitude and speed control inside the grid.	P	F
e. Turns accomplished accurately using less than 30º bank, and stays inside the gird.	P	F
f. Accurate navigation and track spacing.	P	F
g. Proper observer/scanner direction (may be simulated).	P	F
10. Demonstrate proper attention to fuel management.	P	F
11. Properly secure the aircraft at the end of the sortie (ready for next sortie).	P	F
12. Fill out the remainder of the CAPF 104 and debrief the sortie.	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-2104
DEMONSTRATE PLANNING AND FLYING A CREEPING LINE SEARCH

CONDITIONS

You are a Mission Pilot trainee and must demonstrate how to plan and fly a creeping line search.

OBJECTIVES

Demonstrate how to plan and fly a creeping line search.

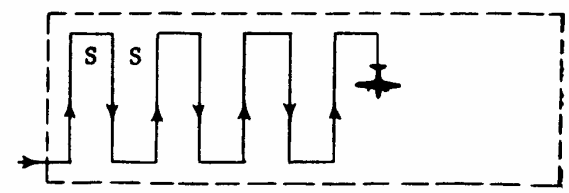
TRAINING AND EVALUATION

Training Outline

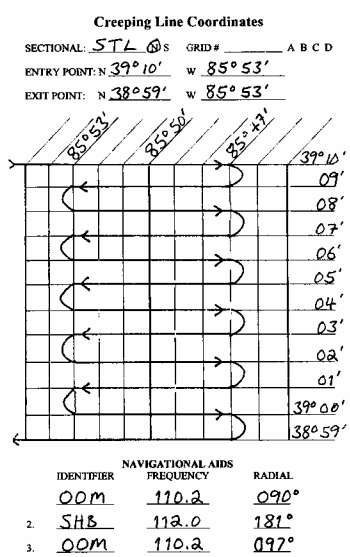
1. As a Mission Pilot trainee, the ability to plan and fly a creeping line search pattern is essential.

2. 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.

3. 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.

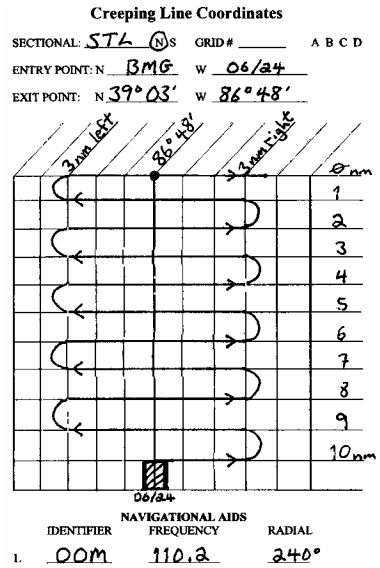


4. You may use a worksheet to draw the pattern and to log coordinates and distinctive features. As a backup, note applicable VOR radials and cross-radials. [Note: You may also create a flight plan for the pattern.]



5. In the worksheet example (above), assume you will be searching along a highway between two towns. Draw the pattern starting at the entry point; include track spacing (one nm) and make each leg extend three nm east and west of the highway. You will enter the entry point coordinates as a waypoint (N 39º 10´ W 85º 53´). As you fly to the entry point, set up search altitude and airspeed three to five miles out, then fly the pattern using the GPS' continuous lat/long display. In this example, you will initially fly a constant latitude line of N 39º 10´ until you reach W 85º 47´ where you will turn right 180º and stabilize on a constant latitude line of N 39º 09´; repeat this process until the search is completed.

If the route is along a cardinal heading such as the highway example above, then the pilot will simply fly the creeping line using continuously displayed latitude and longitude. However, when the route is not a straight line aligned with a cardinal heading, another method may be used to fly a creeping line search pattern.



Assume that the aircraft will be flying a creeping line for ten miles southwest along an (imaginary) extended runway centerline (06/24 at BMG), and it is desired to fly three miles to either side of the extended runway centerline with one-mile track spacing. Draw the pattern starting at the entry point (Runway 06, BMG); include track spacing (one nm) and make each leg extend three miles either side of the extended centerline. In the right column enter the distance from the waypoint for each leg, starting at ten miles and counting down. Enter the exit point's lat/long (N 39º 03´ W 86º 48´; ten miles southwest of the end of runway 06) in the GPS as a waypoint.

Enter the airport (BMG) as a destination and fly to it. Set the aircraft up at search altitude and airspeed three to five miles from the airport. Select the waypoint you created as your new destination.

When you fly over the end of Runway 06, zero (reset) the CDI display on the GPS. This sets up a *route* in the GPS that represents a direct line between the entry (end of runway 06) and exit points. The GPS should show ten miles to the destination, and the CDI will be centered.

Use the distance to the destination to establish and maintain one-mile track spacing; use the CDI deviation indication to indicate when you have gone three miles to either side of the line.

The pilot begins his first turn, for example to the right. By maintaining the distance from the destination constant (e.g., ten miles) the aircraft will be flying *almost* perpendicular to the extended runway centerline. Watch the CDI, which will begin showing that the aircraft is deviating from the intended route to the right. When the aircraft has deviated by almost three miles (the length of your right leg) the pilot will begin a turn to

the left. The turn will be completed so that the aircraft will now be flying in the opposite direction at a distance of nine miles from the destination (the one-mile track spacing).

Now watch the CDI begin to return to center while maintaining a constant nine-mile distance from the destination. Continue as the CDI begins to deviate to the left, and the next turn (to the right) will begin as you approach a three-mile deviation. Continue this pattern until you have completed your search.

Note: By using this technique you will actually be flying arcs instead of the usual squared (rectangular) legs. This is of little concern since the purpose is to cover the entire search area in a methodical manner.

This method is very handy when you are assigned a creeping line while airborne. It's easy to plan, set up and perform once you have mastered the technique.

You can also fly this pattern along a Victor airway. You can fly a similar pattern using the DME; it will be like flying a series of DME arcs.

This method can also be used along a winding river or a road, but the pilot must plan a line that roughly bisects the winding route and then vary the length of the legs as conditions warrant on the ground below.

6. In the GX55, the creeping line is similar to the parallel line pattern, but the starting point is a selected waypoint rather than a grid. The pattern will straddle the center of your flight plan. All the data you need set up this search pattern in the GX55 is on the worksheet:

- Type of Grid and Sectional (US grid, STL).
- Type of pattern (Creeping Line).
- Starting Waypoint (the airport, BMG).
- Spacing (1 nm).
- Direction of Travel (the runway heading, 060º).
- Leg Length (3 nm *).
- Start Side (Right).
  * 9.9 nm is the longest leg length you can select on the GX-55.

Additional Information

Search patterns are covered in tasks O-2102 thru O-2105 and may be combined in any fashion. More detailed information and figures on this topic are available in Chapter 11 of the MART.

Practice

Setup: Give the student a creeping line search to plan and fly. The student should have a sectional chart, plotter, and worksheets as needed.

Two kinds of creeping line searches should be practiced: one along a highway and the other along the imaginary extended centerline of an airport runway. The highway will demonstrate how to do a creeping line along a route with curves, where the student will have to make constant adjustments in order to ensure proper leg length. The extended runway centerline will demonstrate how to do a creeping line without regular ground references.

The student will enter and fly the pattern long enough to demonstrate proficiency in all aspects of the search. Search altitude, airspeed and track spacing should be selected to match terrain and conditions: 1,000’ AGL, 90 knots, three mile legs, and one mile track spacing is recommended.

Depending on the level of proficiency of the pilot, one or more of these tasks may be practiced simultaneously:

Planning. All mission sorties must be thoroughly planned: this ensures the pilot and crew can accomplish the sortie objectives safely and precisely. Treat each sortie as if it were an actual mission. Each time the student practices a sortie all required paperwork should be completed as part of the drill. The student should sign herself and the aircraft into the mission, receive her assignment from you (the briefing officer), plan the sortie, and complete the flight plan and preliminary mission data portions of the CAPF 104. Review the weight and balance, fuel assumptions, and information entered onto the CAPF 104 thoroughly.

Preflight and pilot briefings. Ensure the student performs a thorough preflight of the aircraft. Acting as a crewmember, receive pilot safety and mission briefings from the student. Perform safety assignments as directed by the student (e.g., collision avoidance during taxi and in flight).

Equipment. To the extent possible, the student should operate the communications and navigation equipment. The student should set up and enter information into the equipment (especially the GPS) prior to taxi. [Where necessary for safety or training, the training pilot should take over the aircraft controls while the student sets up navigation equipment (particularly the GPS) in flight.]

Initial training. Depending on the proficiency and skills of the student, the training pilot may need to demonstrate all aspects of a creeping line search with the student sitting in the right seat. This gives the student time to absorb the information and work on such skills as setting up, entering data, and using the navigational equipment without the added responsibilities of the PIC.

For each practice sortie, watch for:

1) Proper setup of the navigational equipment, particularly the GPS. [Depending on whether or not the student has access to a GPS simulator, the training pilot may fly the aircraft while the student practices setting up and entering information into the GPS. However, by the time the student is ready for evaluation he must be able to fly the aircraft safely while accurately entering the required information into the GPS.]

2) Stabilized entry into the search area. The aircraft should be at search altitude and airspeed 3-5 miles before entering the search area.

3) Accurate and precise navigation. The student should maintain altitude, airspeed and track in the search area. Watch for proper wind drift correction and airspeed adjustments. Ensure the turns are started soon enough to stay inside the search area without requiring steeply banked turns (standard rate turns are preferred, but no more than 30º bank should be used). While the emphasis is on the use of the GPS, ensure the student can navigate using the VOR(s) or other means.

4) Safety. The student should spend most of her time looking outside the aircraft (see and avoid). Initially, the student will spend too much time with her eyes inside the aircraft (e.g., manipulating the GPS) until she is comfortable and proficient with the equipment. Get the student into the habit of *not looking inside the aircraft for more than five seconds at a time* to manipulate communications and navigational equipment.

Evaluation Preparation

Setup: Give the student a creeping line search to plan and fly. The student should have a sectional chart, plotter, and worksheets as needed.

The student will enter and fly the pattern long enough to demonstrate proficiency in all aspects of the search. Search altitude, airspeed and track spacing should be selected to match terrain and conditions: 1,000’ AGL, 90 knots, three mile legs, and one mile track spacing is recommended.

Run the sortie as it would be during an actual mission. Have the student sign in, sign in the aircraft, and

complete all required paperwork. Brief the sortie as if you were the Briefing Officer during a mission.

Brief Student: You are a Mission Pilot trainee asked to plan and fly a creeping line search.

Evaluation

Performance measures	Results	
1. Sign yourself and your aircraft into the mission.	P	F
2. Receive a sortie briefing, asking questions as necessary.	P	F
3. Plan a creeping line search. Include:		
a. Estimated time enroute, time in the search area, and fuel requirements.	P	F
b. Position coordinates for the entry and exit points (lat/long & VOR radials/cross-radials).	P	F
c. Position coordinates for the legs (lat/long and VOR radials/cross-radials).	P	F
d. Altitude restrictions, obstacles and other hazards (e.g., MTRs and SUAs).	P	F
e. Discuss observer/scanner assignments for all possible combinations.	P	F
4. Fill out the flight plan and preliminary mission data on the CAPF 104.	P	F
5. Preflight the aircraft and perform pilot safety and mission briefings.	P	F
6. Demonstrate and discuss safety during each critical phase of the flight. In particular, demonstrate collision avoidance and enforce sterile cockpit rules.	P	F
7. Demonstrate proper ATC communications.	P	F
8. Setup the CAP FM radio and perform all required radio reports (may be simulated).	P	F
9. Fly the creeping line search. Demonstrate:		
a. Proper use of navaids (GPS as primary; VOR as backup).	P	F
b. Proper use of radios (ATC as required, and CAP FM radio reports).	P	F
c. Entry at the proper point, stabilized at search altitude and speed.	P	F
d. Accurate altitude and speed control inside the search area.	P	F
e. Turns accomplished accurately using less than 30º bank angles.	P	F
f. Accurate navigation and track spacing.	P	F
g. Proper observer/scanner assignment (may be simulated).	P	F
10. Demonstrate proper attention to fuel management.	P	F
11. Properly secure the aircraft at the end of the sortie (ready for next sortie).	P	F
12. Fill out the remainder of the CAPF 104 and debrief the sortie.	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-2105

DEMONSTRATE PLANNING AND FLYING A POINT BASED SEARCH

CONDITIONS

You are a Mission Pilot trainee and must demonstrate how to plan and fly point based searches.

OBJECTIVES

Demonstrate how to plan and fly an expanding square search.

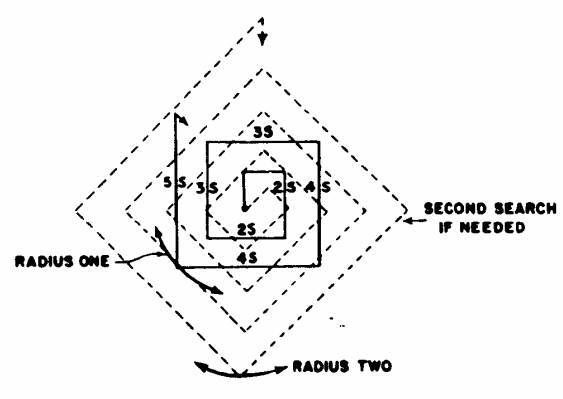
TRAINING AND EVALUATION

Training Outline

Point-based searches are organized around a point on the ground. These patterns are used when the approximate location of the target is known and are not intended to cover large areas. Examples are the expanding square, sector and circle search patterns.

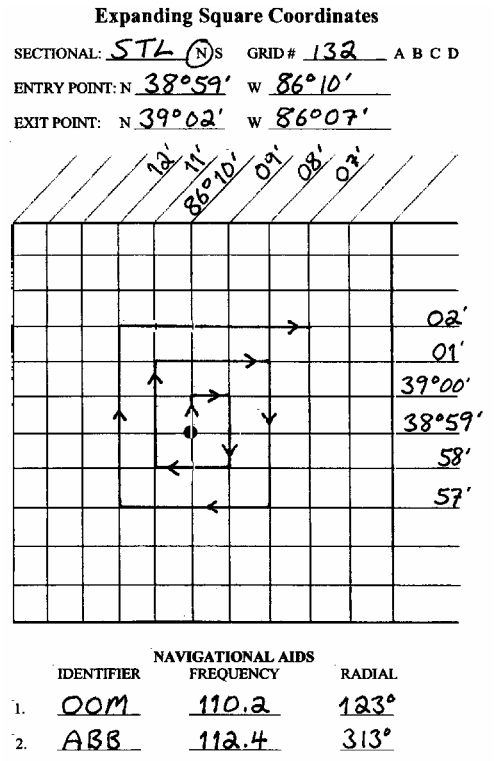
1. Expanding Square search pattern. The expanding square search pattern is used when the search area is small (normally, areas less than 20 miles square), and the position of the survivors is known within close limits. This pattern begins at an initially reported position and expands outward in concentric 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.



2. The GPS is used because this pattern requires precise navigation and is affected by wind drift. Even using the GPS, it is helpful for the pilot to orient the expanding square pattern along the cardinal headings to reduce confusion during turns. [Or, you can enter the pattern as a flight plan and it will direct your turns.]

3. You may use a worksheet to draw the pattern and to log coordinates and distinctive features. As a backup, note applicable VOR radials and cross-radials.



4. Fill the worksheet with the lat/longs that describe the expanding square. Starting at the entry point (e.g., a 483´ AGL tower), draw the square by going one mile north, then one mile east, then two miles south, and so on. You set it up this way because it is best to fly the square by first flying due north and then making all subsequent turns to the right; right turns are used because they allow the observer and scanner(s) to see the ground during the turns. You use cardinal headings because they are easiest for the pilot to fly. Length and width of the pattern may be modified to suit the requirements and conditions of the individual search.

Enter the lat/long of the starting point (N 38º 59´ W 86º 10´) into the GPS and save it as a waypoint. As you fly to the entry point, the pilot should set up at search altitude and speed about 3-5 miles out (this ensures a stabilized entry so that you can begin searching immediately). The pilot should fly the pattern using the heading indicator and continuously displayed latitude and longitude on the GPS.

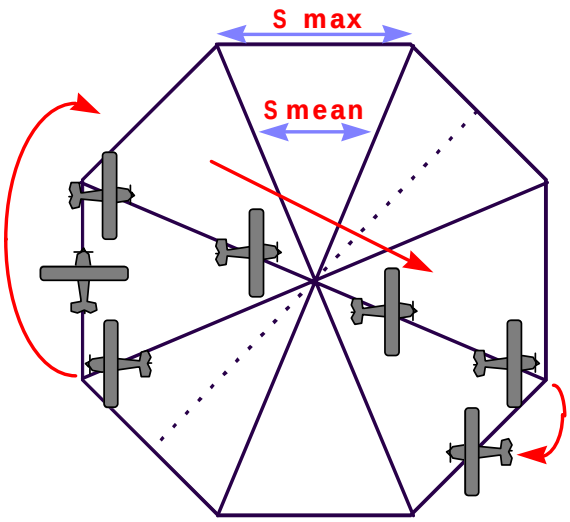
Note: If the aircraft doesn't have an operable GPS the first leg should be flown directly into or directly with the wind. Every other leg will thus be affected by the wind in a relatively consistent manner.

5. In the GX55, the expanding square will radiate from a starting waypoint according to the spacing between lines and at an angle selected by you. All the data you need set up this search pattern in the GX55 is on the worksheet:

- Type of Grid and Sectional (US grid, STL).
- Type of pattern (Expanding Square).
- Starting Waypoint (483´ AGL tower, N 38º 59´ W 86º 10´).
- Spacing (1 nm).
- Direction of Travel (due north, 000º).

* 9.9 nm is the longest leg length you can select on the GX-55.

6. Sector search pattern. A sector search pattern is also best planned on the ground, as it involves multiple headings and precise leg lengths. The pilot will fly over the suspected location and out far enough to make a turn, fly a leg that is equal to the maximum track spacing, and then turn back to fly over the point again. This continues until the point has been crossed from all the angles.



This search pattern provides concentrated coverage near the center of the search area and provides the opportunity to view the suspected area from many angles (this minimizes terrain and lighting problems).

7. Circle search pattern. A circle search pattern may be used when you have a prominent ground reference. The pilot executes a series of 'turns around a point' (circles of uniform distance from a ground reference point). Once the first circle is flown, the pilot moves outward by the desired track spacing and repeats the maneuver. This pattern is usually only used to cover a very small area, which is dependent upon search visibility (the pilot must be able to see the ground reference). Its benefit is that you only need to be able to locate and see the ground reference point, and no prior planning is needed. However, the pilot must constantly correct for the wind.

Additional Information

Search patterns are covered in tasks O-2102 thru O-2105 and may be combined in any fashion. More detailed information and figures on this topic are available in Chapter 11 of the MART.

Practice

Setup: Give the student an expanding square or sector search to plan and perform. The student should have a sectional chart, plotter, and worksheets as needed. A qualified Mission Pilot should be available to assist the trainee.

Brief the pilot. The pilot should fly the pattern long enough to allow the student time to demonstrate proficiency in all aspects of the search. Search altitude, airspeed and track spacing should be selected to match terrain and conditions: 1,000' to 2,000' AGL, 90 knots, and one mile track spacing is recommended.

Depending on the level of proficiency of the student, one or more of these tasks may be practiced simultaneously:

Planning. All mission sorties must be thoroughly planned: this ensures the pilot and crew can accomplish the sortie objectives safely and precisely. Treat each sortie as if it were an actual mission. Each time the student practices a sortie all required paperwork should be completed as part of the drill. The student should sign

herself into the mission, ensure that the pilot signs in the aircraft, receive her assignment from you (the briefing officer), plan the sortie, and assist the pilot in completing the flight plan and preliminary mission data portions of the CAPF 104.

The pilot should review the weight and balance, fuel assumptions, and information entered onto the CAPF 104 with the student.

Preflight and pilot briefings. Ensure the student receives pilot safety and mission briefings from the pilot. The student will perform safety assignments as directed (e.g., collision avoidance during taxi and in flight).

Equipment. To the extent possible, the student should operate the communications and navigation equipment. The student should set up and enter information into the equipment (especially the GPS) prior to taxi. [Where necessary for training, the trainer should assist the student in setting up navigation equipment (particularly the GPS) in flight.]

Initial training. Depending on the proficiency and skills of the student, the trainer may need to demonstrate all aspects of a point-based search. This gives the student time to absorb the information and work on such skills as setting up, entering data, and using the navigational equipment.

For each practice sortie, watch for:

1) Proper setup and use of the navigational equipment, particularly the GPS. Ensure that the student does not change any navigational or communications equipment setting without the knowledge of the PIC.

2) Proper ATC and CAP FM communications technique and terminology. Initially, have the student tell the pilot and/or trainer what she intends to say *before* she transmits.

3) Proper and attentive collision avoidance practices during the critical phases of flight.

4) Safety. The student should spend most of her time looking outside the aircraft (see and avoid) when enroute to the search area, and most of her time acting as a scanner while in the search area. Initially, the student will spend too much time with her eyes inside the aircraft (e.g., manipulating the GPS) until she is comfortable and proficient with the equipment. Get the student into the habit of *not looking inside the aircraft for more than five seconds at a time* to manipulate communications and navigational equipment.

5) Accurate situational awareness at all times.

Evaluation Preparation

Setup: Give the student an expanding square or sector search to plan and perform. The student should have a sectional chart, plotter, and worksheets as needed. A qualified Mission Pilot should be available to assist the trainee during the planning and flying stages.

A search target should be positioned in the search area, if possible.

The pilot will enter and fly the pattern long enough to allow the student to demonstrate proficiency in all aspects of the search. Search altitude, airspeed and track spacing should be selected to match terrain and conditions: 1,000’ AGL, 90 knots, three mile legs, and one mile track spacing is recommended.

Run the sortie as it would be during an actual mission. Have the student sign in, sign in the aircraft, and complete all required paperwork. Brief the sortie as if you were the Briefing Officer during a mission.

Brief Student: You are a Mission Observer trainee asked to assist a Mission Pilot in planning and performing a point-based search.

Evaluation

Performance measures	Results	
1. Sign into the mission.	P	F
2. Receive a sortie briefing, asking questions as necessary.	P	F
3. Assist in planning a point-based search (expanding square or sector). Include:		
a. Estimated time en route, time in the search area, and fuel requirements.	P	F
b. Position coordinates for the entry and exit points (lat/long & VOR radials/cross-radials).	P	F
c. Position coordinates for the legs (lat/long and VOR radials/cross-radials).	P	F
d. Altitude restrictions, obstacles and other hazards (e.g., MTRs and SUAs).	P	F
e. Discuss observer/scanner assignments for all possible combinations.	P	F
4. Assist in filling out the flight plan and preliminary mission data on the CAPF 104.	P	F
5. Receive pilot safety and mission briefings, asking questions as necessary.	P	F
6. Demonstrate and discuss safety during each critical phase of the flight. In particular, demonstrate collision avoidance and enforce sterile cockpit rules.	P	F
7. Demonstrate proper ATC communications.	P	F
8. Setup the CAP FM radio and perform all required radio reports (may be simulated).	P	F
9. Perform the point-based search (expanding square or sector). Demonstrate:		
a. Proper use of navaids (GPS as primary; VOR as backup).	P	F
b. Proper use of radios (ATC as required, and CAP FM radio reports).	P	F
c. Proper scanner assignment (may be simulated).	P	F
d. Ability to spot the search target (if applicable).	P	F
10. Demonstrate proper attention to fuel management.	P	F
11. Ensure the aircraft is secured at the end of the sortie (ready for next sortie).	P	F
12. Assist in filling out the remainder of the CAPF 104 and debrief the sortie.	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-2106
PLAN AND COMMAND A CAP FLIGHT

CONDITIONS

You are a Mission Pilot trainee and must plan and command a CAP flight.

OBJECTIVES

Plan and command a CAP flight. Perform preflight tasks and briefings, check and fill out applicable aircraft logs, perform briefings for all critical phases of flight, and perform after-landing tasks.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Pilot trainee, knowing the mission pilot's responsibilities during each phase of flight so as to command the flight is essential. In all cases follow the aircraft checklists: the observer should read each item to you and then you will perform the item and repeat back performance of the item.

2. ***Prior to Startup***

One of the most overlooked assets you have in the aircraft is the glove box. This area is ideal for items such as small, laminated sheets for the crew and passenger briefing, crosswind chart, public relations cards (like those from the CD program), FM radio frequencies and callsigns, ELT deactivation stickers, and a GPS cheat-sheet. Other items could include a small cleaning rag (like for glasses) to clean the GPS display and a backup flashlight. Check the glove box periodically and purge unnecessary stuff.

For every CAP flight the PIC must ensure the crew is wearing a proper CAP uniform (CAPM 39-1) and is carrying a current CAP Membership card. For non-CAP passengers, refer to CAPR 60-1.

a. After you have obtained a flight release, fill in all required information on the aircraft Flight Log. Ensure proper entries for mission symbol, mission number, crew names, and FRO name.
b. It is important for the mission pilot to understand how to find data in aircraft logbooks. Familiarize yourself with your aircraft's engine, propeller, airframe, and avionics logbooks so that you can identify items such as the time of the last mid-cycle oil change (40-60 hours, not to exceed four months), last 100-hour inspection or annual, and instrument requirements (i.e., ELT battery, pitot-static system, transponder and altimeter current). Also, check other items such as the expiration dates on the carbon monoxide detector and fire extinguisher, and the date of the last VOR check.
c. Check the Discrepancy and Maintenance Logs to ensure the aircraft is airworthy and mission ready. When you preflight, verify these discrepancies; if you find a new discrepancy, log it and assess airworthiness and mission readiness. [Document and Minimum Equipment requirements are in the *Flight Guide*.]
d. Perform a Weight & Balance and determine fuel assumptions (e.g., fuel burn, winds, power setting, and distance) and reserve (CAPR 60-1 requires a minimum of one hour of fuel remaining upon landing, computed at normal POH/AFM cruise fuel consumption).
e. During loading, ensure that all supplies and equipment correspond to what you used in your Weight & Balance.
f. Ensure your aeronautical charts are current.
g. Make sure the parking area is clear of obstacles; arrange for a wing-walker if one will be needed to clear obstacles.

3. ***Engine Startup and Taxi***

Aircraft checklists

a. *Always* use checklists in CAP aircraft. Whenever possible, have the right-seat crewmember read the checklist items to you while you check the items and repeat back accomplishment of each item.
b. Make sure you or the right-seat crewmember keeps the checklist close at hand so that it can quickly be opened to confirm and complete emergency items. Brief the right-seat crewmember on how to use the emergency checklists (e.g., read the bold face items first and then continue with the rest of the items).
c. Perform the passenger briefing, brief fuel assumptions, and brief crewmembers on taxi, takeoff and departure assignments, and enter navaid settings (e.g., GPS destination or flight plan).
d. All crewmembers must wear their seat belts at all times. Although CAPR 60-1 only requires that the shoulder harness be worn at or below 1000' AGL, but all crewmembers should wear them at all times unless other duties require their removal (e.g., observer taking photos).

Startup

a. Turn the Rotating Beacon ON and signal the marshaller before starting the engine.
b. Include the DF unit's Alarm light self-test in your scan during startup. The light should blink for several seconds; if it doesn't your unit may be inoperative. Also ensure the Audio Panel and FM radio are set up properly (normally, the DF is set in the 'Alarm' mode).
c. When >3000' DA (typical Cessna), lean the engine immediately after starting and for maximum power before takeoff.
d. Obtain ATIS and Clearance (read back all clearances and hold-short instructions). Then verify you are within the Crosswind Limitation. For VFR in Class G airspace, you must have 3 statute miles visibility (unless you are current IFR; if this is an IFR flight, verify weather is at or above landing minimums and check that a VOR check was performed within the last 30 days).
e. Remember to check your brakes as you begin your roll.

Taxi

a. Review crew assignments for taxi, takeoff and departure. Make sure each crewmember knows in which direction they should be looking.
b. Once you begin taxiing *the sterile cockpit rules begin; all unnecessary talk is suspended and collision avoidance becomes the priority of each crewmember*. Sterile cockpit rules focus each crewmember on the duties at hand, namely concentrating on looking outside the aircraft for obstacles and other aircraft. The rules will *always* be used during the taxi, takeoff, departure, approach, and landing phases of flight; but the pilot or observer may declare these rules in effect whenever they are needed to minimize distractions.
c. Follow CAPR 60-1 requirements for taxi operations (taxi no faster than a slow walk when within 10 feet of obstacles; and maintain at least 50' behind light single-engine aircraft, 100' behind small multi-engine and jet aircraft, and 500' behind heavies and taxiing helicopters). Remember to read back all clearances and hold-short instructions.

4. ***Takeoff, climb and departure***

Takeoff

a. Ensure you are within crosswind limits of the aircraft's POH (or the CAP limit of 15 knots if none is given in the POH).
b. *Remind the crew that midair collisions are most likely to occur in daylight VFR conditions within five miles of an airport at or below 3,000' AGL*! This means that most midair collisions occur in the traffic pattern. Since the pilot has only one set of eyes, this (and aircraft design) leaves several 'blind spots' that the observer and scanner must cover -- particularly between your 4 and 8 o'clock positions.
c. *Always* look for landing traffic before taking the active runway!

d. The FAA's "operation lights on" encourages pilots to keep aircraft lights on when operating within 10 miles of an airport, or wherever flocks of birds may be expected.

Climb

a. Make shallow S-turns and lift your wing before turns when climbing to increase your chances of spotting conflicting aircraft.
b. Keep your emergency checklist close at hand and open to the Emergency Procedures section.

Departure

a. Collision avoidance! Maintain sterile cockpit until well clear of traffic and obstacles and keep the crew appraised of conflicting traffic and obstacles. When above 1000' AGL the crewmembers can remove shoulder harnesses but it is best to leave them fastened unless it interferes with a task (e.g., video sortie).
b. Lean the engine (burn gas, not valves). For a typical C172 with an EGT: For economy setting, lean to peak EGT then richen 50 degrees rich-of-peak; for max continuous power, lean to peak EGT then richen 100 degrees rich-of-peak.
c. Update fuel assumptions and set the altimeter to the closest source at least hourly.
d. Maintain situational awareness.

5. ***Approach, descent and landing***

Approach

a. Obtain ATIS/AWOS and contact approach control. Review the taxi plan/diagram and make crew assignments for approach, landing and taxi. *Sterile cockpit rules are now in effect*.
b. Collision avoidance! Lights on within 10 miles of the airport. Read back all landing and hold-short instructions.
c. *Remind the crew that midair collisions are most likely to occur in daylight VFR conditions within five miles of an airport* (especially non-towered airports) *at or below 3,000' AGL*! This means that most midair collisions occur in the traffic pattern, particularly on final approach.

Descent

a. Richen the fuel mixture during descents and don't shock-cool the engine. A well planned, partial power, mixture rich, cowl flaps closed descent is best.
b. Enhance collision avoidance by making shallow S-turns and lifting your wing before turns during descent to check for traffic.

Landing, shutdown and post-flight

a. It is recommended practice not to use the brakes during normal landings; a well-executed approach and landing allows you to roll out and taxi off the runway without the need for braking. Save the brakes for short-field landings and emergencies.
b. Defer the after-landing check until the airplane is brought to a complete stop clear of the active runway (minimizes distractions).
c. Fill in all remaining information on the aircraft flight log. Double-check entries for mission symbol, mission number, crew names, and FRO name. Enter any new problems into the Discrepancy log.
c. If this was the last flight of the day install chocks, tie-downs, Avionics/control lock, and Pitot tube covers/engine plugs.
d. Check that the Master Switch and Parking Brake is OFF and that the Fuel Selector Switch is in the 'Right' or 'Left' position for refueling. Remove any trash and personal equipment from the aircraft. Lock the aircraft windows, doors and baggage compartment.
e. Check the general condition of the aircraft, check the oil, and refuel. Clean the leading edges and the windshield and windows and replenish cleaning supplies, if necessary.

Additional Information

More detailed information on this topic is available in FAR 91 Subpart C, CAPRs 60-1 and 66-1, and Chapter 12 of the MART. A "Mission Checklist" in Attachment 2 of the MART summarizes the steps in this task guide.

Practice

Setup: Give the student a flight to plan and fly. The flight should include planning to land at an unfamiliar airport in controlled airspace -- Class B, if practical and be of sufficient length to force the student to plan a refueling stop. The student should have access to CAP regulations and forms and aircraft logs.

The student will fly long enough to demonstrate proficiency in all aspects of the flight. Flight altitude and airspeed should be selected to match the local practice area.

The trainer should play the role of an aircrew member, particularly for receiving briefings and instructions from the mission pilot trainee.

Depending on the level of proficiency of the pilot, one or more of these tasks may be practiced simultaneously:

Planning. All CAP flights must be thoroughly planned: this ensures the pilot and crew can accomplish the flight safely. Each time the student practices a flight all required paperwork should be completed as part of the drill. Review the weight and balance and fuel assumptions thoroughly.

Preflight and crew briefings. Ensure the student performs a thorough preflight of the aircraft. Acting as a crewmember, receive pilot safety and crew briefings from the student. Perform safety assignments as directed by the student (e.g., collision avoidance during taxi and in flight).

Equipment. To the extent possible, the student should operate the communications and navigation equipment. The student should set up and enter information into the equipment (especially the GPS) prior to taxi. [Where necessary for safety or training, the training pilot should take over the aircraft controls while the student sets up navigation equipment (particularly the GPS) in flight.]

For this flight, watch for:

1) Thorough knowledge of aircraft and CAP regulations, logs and paperwork.

2) Proper use of checklists during all phases of flight.

3) Accurate and thorough planning for all phases of flight (e.g., taxiways and airspace restrictions).

4) Thorough briefings to the crew during all phases of flight.

5) Proper use of sterile cockpit rules and collision avoidance techniques (e.g., safe taxiing, observing airport signs, reading back ATC instructions, and S-turns to look for traffic during climb and descent).

6) Situational awareness and proper attention to fuel status and altimeter settings.

7) Proper shutdown, inspection, securing and cleaning of the aircraft after flight.

Evaluation Preparation

Setup: Give the student a flight to plan and fly. The flight should include planning to land at an unfamiliar airport in controlled airspace -- Class B, if practical, and should be of sufficient length to force the student to plan a refueling stop (this won't be performed). The student should have access to CAP regulations and forms and aircraft logs.

The student will fly long enough to demonstrate proficiency in all aspects of the flight. Flight altitude and airspeed should be selected to match the local practice area.

The trainer should play the role of an aircrew member, particularly for receiving briefings and instructions from the trainee. Whenever flight safety allows, act as an inexperienced observer to force the pilot to do most of the work (e.g., setting up radios and navaids and talking on the aircraft radio).

Brief Student: You are a Mission Pilot trainee asked to plan and fly a CAP flight.

Evaluation

Performance measures	Results	
1. Compute Weight & Balance, list fuel requirements and state fuel reserve.	P	F
2. Receive a briefing and obtain a flight release.	P	F
3. Prior to the flight:		
a. Referring to the aircraft log books, identify last mid-cycle oil change, last 100-hour inspection and annual, instrument requirements (i.e., ELT battery, pitot-static system, transponder and altimeter current), expiration dates on the CO detector and fire extinguisher, and the date of the last VOR check.	P	F
b. Identify outstanding squawks in the Discrepancy Log.	P	F
c. Identify minimum equipment for VFR (day & night) and IFR.	P	F
4. During aircraft preflight:		
a. Verify outstanding squawks.	P	F
b. Dispose of sumped fuel properly.	P	F
c. Clean windows, as necessary.	P	F
5. Prior to startup:		
a. Fill in Aircraft Log, and state time left to oil change and annual.	P	F
b. Perform passenger and crew briefings, and assign responsibilities.	P	F
c. Determine crosswind and state crosswind limit.	P	F
6. During startup:		
a. Turn rotating beacon ON before starting engine.	P	F
b. Setup the DF, Audio Panel and FM radio.	P	F
7. During taxi, takeoff, departure, approach, decent and landing:		
a. Demonstrate challenge-response method for checklists.	P	F
b. Demonstrate proper collision avoidance and taxi procedures.	P	F
c. Read back all ATC clearances (including hold-short directions).	P	F

d. State and enforce sterile cockpit rules.	P	F
e. Maintains situational awareness at all times.	P	F
f. Demonstrate proper attention to fuel status and altimeter setting.	P	F

8. After landing:

a. Fill out the Aircraft Log and enter discrepancies (if necessary).	P	F
b. Properly shutdown, inspect, secure and clean the aircraft (as if last flight of the day).	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-2107

PREPARE FOR A TRIP TO A REMOTE MISSION BASE

CONDITIONS

You are a Mission Observer trainee and must prepare for a trip to a remote mission base.

OBJECTIVES

Prepare for a trip to a remote mission base, acting as mission commander. Assist in performing pre-trip planning and inspections, preflight tasks and briefings, filling out a CAP flight plan, and after-landing tasks.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Observer trainee, the ability to prepare for a trip to a remote mission base is essential.

2. *Before you leave*. The urgency of events, coupled with a hasty call-out, may leave you and other crewmembers feeling rushed as you prepare to leave for a mission. This is where a good pre-mission checklist comes in handy. As a minimum, check the crew (and yourself) for the following:

A. Proper uniforms (CAPM 39-1) and credentials
   1) CAP Membership
   2) CAP Motor Vehicle Operator
   3) ROA
   4) 101/101T (note experience and tasks to be accomplished)
   5) Ensure the pilot has necessary credentials (e.g., license, medical, and photo ID)

B. Check personal equipment
   1) Clothing sufficient and suitable for the entire trip
   2) Personal supplies (civilian clothing, headset, charts, maps, plotter, log, checklists, fluids and snacks)
   3) Personal survival equipment (in addition to the aircraft kit) suitable for the entire trip
   4) Sufficient money for the trip (credit cards, some cash or traveler's checks, and coin)
   5) Cell phone (including spare battery and charger)

C. Check aircraft equipment
   1) Current aeronautical charts for the entire trip, and gridded charts for the mission area
   2) Maps for the mission area (e.g., road atlas, county maps, topo maps), plus clipboard and markers
   3) Tie-downs, chocks, Pitot tube cover and engine plugs, fuel tester, sick sacks, and cleaning gear
   4) Survival kit (fits trip and mission area terrain), headsets, flashlight, binoculars and multitool

D. Ensure the pilot reviews the Aircraft Logs
   1) Note the date and the starting Tach and Hobbs times to ensure you won't exceed:
      a) Mid-cycle oil change (40-60 hours, not to exceed four months)
      b) 100-hour/Annual
      c) 24-month checks (Transponder, Pitot-Static system, Altimeter and ELT/battery replacement date
      d) 30-day VOR check for IFR flight and AD compliance list.
   2) Check the status of the Carbon Monoxide Detector and Fire Extinguisher
   3) Pilot reviews the Discrepancy Log and makes sure the aircraft is airworthy and mission ready

E. Pilot obtains FAA Weather Briefing and CAP Flight Release
   1) Perform Weight & Balance (reflecting weights for the crew, special equipment and baggage)
      a) Include fuel assumptions (fuel burn, winds, power setting, distance, and fuel stop)
      b) Ensure fuel reserve (land with one hour's fuel, computed at normal cruise)
   2) Verify within flight time and duty limitations (CAPR 60-1, Chapter 2)
   3) Obtain FAA briefing (ask for FDC and Local NOTAMs and SUA status) and file FAA Flight Plan

    a) Enter 'CPF XXXX' in the Aircraft Identification section
    b) Put the 'N' and 'Cap Flight' numbers in the Remarks section
  4) Assist in filling out an "Inbound" CAPF 104 or 84 (leave copy for FRO)
  5) Pilot briefs the crew on the fuel management plan (assumptions, refueling stops, and reserve), Local and FDC NOTAMs, and SUA status
  6) Review "IMSAFE" and pilot obtains a CAP Flight Release
  7) Pilot requests Flight Following

F. Pilot preflight
  1) Ensure proper entries in the Flight Log (e.g., mission number & symbol, crew & FRO names)
  2) Check starting Tach and Hobbs times to ensure you won't exceed limits (e.g., oil change)
  3) Review the Discrepancy Log and make sure the aircraft is airworthy and mission ready
  4) While preflighting, verify any outstanding discrepancies. If new discrepancies discovered, log them and ensure the aircraft is still airworthy and mission ready. [Be extra thorough on unfamiliar aircraft.]
  5) Verify load is per your Weight & Balance (baggage, survival kit, extra equipment and luggage)
  6) Double-check aeronautical charts, maps and gridded charts (also clipboard and markers)
  7) Ensure required aids onboard (Flight Guide, distress and air-to-ground signals, fuel tester, tools)
  8) Windshield and windows clean, and chocks, tie-downs, Pitot tube covers and engine plugs stowed
  9) Right Window holding screw removed (video imaging mission) and stored
  10) Check and test special equipment (cameras, camcorder, slow-scan, repeater), including spare batteries
  11) Parking area clear of obstacles (arrange for a wing-walker if one will be needed to clear obstacles)
  12) Perform passenger briefing and review emergency egress procedure
  13) Review taxi plan/diagram and brief crew assignments for taxi, takeoff and departure
  14) Remind crew that most midair collisions occur in or near the traffic pattern
  15) Enter settings into GPS (e.g., destination or flight plan)
  16) Organize the cockpit

G. Startup and Taxi
  1) Pilot briefs checklist method to be used (e.g., challenge-response)
  2) Seat belts at all times; shoulder harness at or below 1000' AGL
  3) Double-check Intercom, Audio Panel and Comm Radio settings
  4) Rotating Beacon Switch ON and pilot signals marshaller before starting engine; lean for taxi
  5) Ensure DF and FM Radio are operable and set properly (FM radio check if first flight)
  6) Select initial VOR radial(s) and GPS setting
  7) Obtain ATIS and Clearance (read back all clearances and hold-short instructions)
  8) Pilot computes crosswind and verify within Crosswind Limitation
  9) Verify 3 statute miles visibility (VFR in Class G - unless PIC is current IFR)
  10) If IFR, verify weather at or above landing minimums and date of last VOR check
  11) Begin sterile cockpit
  12) Pilot signals marshaller before taxiing; checks brakes at beginning of roll
  13) Pilot taxis no faster than a slow walk when within 10 feet of obstacles
    a) Maintains at least 50' behind light single-engine aircraft
    b) Maintains at least 100' behind small multi-engine and jet aircraft
    c) Maintains at least 500' behind heavies and taxiing helicopters

H. Takeoff, Climb and Departure
  1) Pilot double-checks assigned departure heading and altitude
  2) Pilot leans engine for full power (> 3000' DA)
  3) Look for landing traffic before taking the active runway
  4) Keep lights on within 10 miles of the airport and when birds reported nearby
  5) Begin Observer Log with takeoff (time and Hobbs) and report "Wheels Up"
  6) Pilot uses shallow S-turns and lifts wing before turns during climbing to check for traffic
  7) Keep shoulder harnesses buckled (never remove at or below 1000' AGL)
  8) Keep crew apprised of conflicting aircraft and obstacle positions

9) Keep checklists close at hand and open to Emergency Procedures

I Enroute

1) Maintain situational awareness
2) Pilot leans engine for economy cruise
3) Ensure pilot updates fuel assumptions and sets altimeter to closest source at least hourly

J Approach, Descent and Landing

1) Pilot plans approach and descent (remembers fuel mixture and cooling)
2) Double-checks radio and navigational settings
3) Obtain ATIS/AWOS and contact approach control
4) Review taxi plan/diagram and brief crew assignments for approach, landing and taxi
5) Remind crew that most midair collisions occur in or near the traffic pattern, especially on final
6) Begin sterile cockpit
7) Turn lights on within 10 miles of the airport
8) Pilot double-checks assigned approach heading and altitude
9) Pilot uses shallow S-turns and lifts wing before turns during descent to check for traffic
10) Read back all clearances and hold-short instructions
11) Log (time and Hobbs) and report "Wheels Down"

3. *Arrival at mission base*

A. Park and Secure Aircraft

1) Look for marshallers, follow taxi plan, pilot signals marshaller that ignition is OFF
2) Double-check Master Switch OFF
3) Fuel Selector Switch to Right or Left (refueling)
4) Avionics/control Lock and Pitot tube covers/engine plugs installed
5) Pilot completes the Flight Log and enters squawks in Discrepancy Log
6) Chocks and Tie-downs installed and Parking Brake OFF
7) Remove trash and personal supplies/equipment
8) Lock the windows, doors and baggage compartment
9) Check oil and arrange for refueling
10) Clean leading edges, windshield, and windows
11) Replenish cleaning kit

B. Check in with Flight Line Supervisor and Safety Officer
C. Close FAA Flight Plan, call FRO
D. Sign personnel and aircraft into the mission (Administration)
E. Assist in completing and submitting 'Inbound 104' (keep a copy)
F. Report any special equipment to Logistics (cameras, camcorder, slow-scan, repeater)
G. Inquire about fuel billing, lodging, transportation and meals
H. Note time to report for duty and ask for sortie assignment (get briefing packet)

The mission staff will probably show you around mission base and inform you of transportation, lodging and meal arrangements. They will also tell you when to report for duty, normally by telling you when the general briefing will be held.

Additional Information

More detailed information and figures on this topic are available in Chapter 13 and Attachment 2 of the MART.

Practice

Setup: Give the student an assignment to go to a remote mission base. The base should be located on a large (unfamiliar) airport in controlled airspace -- Class B, if practical. The student should have access to mission materials and a CAPF 104.

The student will assist in planning a simulated a trip to a remote mission base. All tasks that can be performed will not be simulated.

The trainer should play the role of the mission pilot, particularly for performing inspections and giving briefings and instructions to the observer trainee. The observer will be given preflight and pilot briefings.

For this simulated sortie, watch for:

1) Thorough knowledge of documents and equipment required for an extended stay at a remote base.

2) Assists pilot in completion of the CAP flight plan.

3) Assists pilot with accurate and thorough planning for the trip.

4) Proper actions upon arrival at mission base.

Evaluation Preparation

Setup: Give the student an assignment to go to a remote mission base. The base should be located on a large (unfamiliar) airport in controlled airspace -- Class B, if practical. The student should have access to mission materials and a CAPF 104.

The student will assist in planning a simulated a trip to a remote mission base. All tasks that can be performed will not be simulated.

The trainer should play the role of the mission pilot, particularly for performing inspections and giving briefings and instructions to the observer trainee. The observer will be given preflight and pilot briefings.

Brief Student: You are a Mission Observer trainee asked to prepare for a trip to a remote mission base.

Evaluation

Performance measures	Results	
1. Check for proper uniform, credentials and equipment.	P	F
2. State the flight time and duty limitations per CAPR 60-1.	P	F
3. Assist in checking the aircraft:		
a. Check for required equipment on board (e.g., tie downs, survival kit, cleaning gear).	P	F
b. Clean windows, as necessary.	P	F
4. Assist in filling out a CAP flight plan.	P	F
5. Receive a briefing from the mission pilot:		
a. Fuel assumptions and fuel stop.	P	F
b. Airspace restrictions, NOTAMS, and destination airport diagrams.	P	F
6. Upon (simulated) arrival at mission base:		

a. Secure the aircraft and arrange for refueling.	P	F
b. Sign yourself and the aircraft into the mission.	P	F
c. Assist in completing your "Inbound" CAPF 104.	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-2001

DISCUSS MISSION PILOT DUTIES AND RESPONSIBILITIES

CONDITIONS

You are a Mission Pilot trainee and must discuss MP duties and responsibilities.

OBJECTIVES

Discuss Mission Pilot duties and responsibilities.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Pilot trainee, knowing your duties and responsibilities is essential.

2. The first and foremost duty of a mission pilot is to fly the aircraft in a safe and proficient manner, following all applicable FAA and CAP rules and regulations. All other duties are secondary to those of the aircraft commander.

3. The second most important duty of a mission pilot is to remember that he or she is the *pilot* -- *not* a scanner. You are the Pilot-in-Command (PIC) and you must never forget that.

4. In addition to the normal duties of a PIC, CAP mission pilots must also perform all the non-scanner duties of the Observer if no qualified observer is on board.

5. In addition to PIC duties, your general duties and responsibilities include:

   a. Obtain complete briefings and plan the sortie. A good mission pilot always includes the observer during these activities. [Remember, you may be the aircraft commander but you are not always the mission commander; an experienced observer should serve as mission commander whenever possible.]
   b. Thoroughly brief the crew before the flight (include fuel management).
   c. Thoroughly brief the crew on their responsibilities during all phases of the flight.
   d. Obtain a flight release.
   e. Enforce sterile cockpit rules.
   f. Fly search patterns as completely and precisely as possible. Report any deviations from the prescribed patterns during debriefing.
   g. Monitor the observer and ensure all events, sightings and reports are recorded and reported.
   h. Fill out all forms accurately, completely and legibly.

6. The Mission Pilot needs to know what goes into the observer's log, in order to help inexperienced observers and to be able to keep the log when riding in the right seat. The log is a maintained from take-off until landing, and should include all events and sightings. It is important to log the geographical location of the search aircraft at the time of all events and sightings (as a habit, always log the Hobbs time each time you make a report or record an event or sighting). This information is the basis of CAP Form 104, which is passed back to the incident commander and general staff after the debriefing and becomes a part of the total information that is the basis for his subsequent actions and reports. Good logs give the staff a better picture of how the mission is progressing. If sketches or maps are made to compliment a sighting, note this and attach them to the log. The log and all maps and sketches will be attached to the CAPF 104.

Additional Information

More detailed information on this topic is available in CAPR 60-1 and in Chapter 12 and Attachment 2 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 Mission Pilot trainee asked about your duties and responsibilities, and to discuss the Observer Log.

Evaluation

Performance measures	Results	
1. State the first and foremost duty of the mission pilot.	P	F
2. State the second-most important duty of the mission pilot.	P	F
3. Discuss general duties and responsibilities.	P	F
4. Discuss the information recorded in the Observer Log.	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-2002

DISCUSS GENERAL CAP-RELATED SAFETY REQUIREMENTS AND ISSUES

CONDITIONS

You are a Mission Pilot trainee and must discuss general CAP-related safety requirements and issues.

OBJECTIVES

Discuss general CAP-related safety requirements and issues.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Pilot trainee, knowing general CAP-related safety requirements and issues is essential.

2. *Flying into and taxiing on unfamiliar airports*. CAP missions often require flying into small, non-towered and unlighted airports. The mission pilot needs to quickly obtain information about these airfields. Of particular importance:

a. Runways. Determine length, width, markings and lighting. Is runway alignment compatible with predicted wind direction and strength? If not, what is your alternative?
b. Taxiways. Are there any, or will you have to back taxi? Are the taxiways marked and/or lighted?
c. If you will be arriving in low visibility conditions or at night, taxi SLOWLY and use a wing walker if necessary. If you can't see the turnoff to the taxiway or the taxiway itself -- STOP.
d. Obstacles. Note all near the airport and its approaches.
e. Services. Fuel and oil, phone, tie downs, and maintenance. Will they be open when you arrive? Is there a phone number to call after normal hours? If in doubt, call ahead -- most FBOs are glad to assist CAP.
f. Local NOTAMS.

3. *Flying into large, busy airports*. Of particular importance:

a. Airspace and obstacles. Review airspace layout and restrictions, and note all relevant frequencies (including ATIS, AWOS or ASOS).
b. Taxiways. Make sure you have a taxiway diagram, and review it before you land. Brief the crew so they can assist you.
c. Local NOTAMS.

4. *Taxiing around and near a large number of aircraft*:

a. Follow the taxi plan that is in the Operations Plan, if applicable.
b. Taxi no faster than a slow walk when around obstacles.
c. When there are no flight line personnel or marshallers available, do not taxi within ten feet of any obstacle; stop, and then proceed at no faster than a slow walk.
d. Follow all signals given by flight line personnel. However, use common sense as some of the flight line marshals may have little or no experience. If it looks too close -- STOP.
e. Pilot aids such as the *Airport/Facility Directory* or commercial products such as the *Flight Guide* (Airguide Publications, Inc.) are invaluable tools for the CAP mission pilot. One should be carried in the aircraft at all times, and kept *current*. Also, several web sites (e.g., *AOPA*) have very detailed airport layouts available for downloading.
f. Another often-overlooked safety measure is reconnoitering the terrain around unfamiliar airports to determine your actions in the event the engine quits on takeoff. Get in the habit of flying a circuit around the airport upon arrival to look for emergency landing areas off the ends of each runway. Ask local pilots

for the best actions to take if you lose an engine on takeoff (from each runway). Also, suggest that mission staff include this information in the general briefing, if necessary.

5. *Squawks*. CAP aircraft have Discrepancy Logs - use them! While private pilots may delay 'minor' repairs, mission pilots should not. Just as ELT missions always seem to occur between midnight and 0dark30, you can bet that a nighttime mission will come up if a landing, taxi, strobe or navigation light is out. Been having troubles with your comm radios? Get ready for an ELT search in Class B airspace.

CAP pilots often fly unfamiliar aircraft during missions. Pay particular attention to each aircraft's squawk sheet, and don't fly unless you are satisfied with the aircraft's condition: question the aircraft's regular crew about the particulars of their aircraft -- probe for "unwritten" squawks.

In a related matter, keeping the aircraft windows clean and having a well-stocked cleaning kit in the aircraft is vital. How many of you have arrived at the airport for a night flight and found that the last pilot had flown through a bug convention and neglected to clean the windscreen? And, as if this isn't enough of a delay in launching the mission, you can't find anything to clean the windscreen!

6. *Fuel management*. CAP missions often require flying long distances to mission bases, and the missions themselves involve flying several sorties a day. Mission aircrews often carry a lot of luggage and equipment. Missions are flown in widely varying weather conditions. Therefore mission pilots must carefully plan, check and manage their fuel.

a. Per CAPR 60-1, the PIC is responsible for maintaining a sufficient fuel supply to ensure landing with one hour of fuel remaining (computed at normal POH/AFM cruise fuel consumption). If it becomes evident the aircraft will not have that amount of fuel at its intended destination, the PIC will divert the aircraft to an airport that will ensure the requirement is met.
b. Weight & Balance computations *must* be accurate. Do you include the weight of the permanent equipment stowed in the aircraft? Do you change your W&B from the standard FAA 170 pounds when a crewmember that doesn't meet the Air Force weight standards shows up? Do you have a scale available at your headquarters to weigh luggage and equipment?
c. If you do not fill the aircraft fuel tanks to the top or a tab, do you have a means to accurately determine fuel on board? Each aircraft that is routinely filled to a level less than full should have a calibrated fuel-measuring device on board. Remember that these devices are specific to the particular aircraft!
d. *Each CAP aircraft should have information concerning the aircraft's fuel consumption rate for various power settings, taken from actual flight conditions*. If the information is not in the aircraft, ask the aircraft's regular pilot for fuel burn rates. If neither of these options is available, be very conservative in your planning. Long cross-country flights, or a series of legs in a flight, or a series of mission sorties require careful planning. Make sure you note your assumptions (e.g., distance, power setting, and predicted wind direction and speed) so that you can compare them against actual conditions in flight.
e. *Brief your crew, especially the observer, on these assumptions so they can assist you in managing the fuel*. The pilot or observer should ask about fuel status at least once an hour, or before departing on each leg or sortie. Are the winds as predicted, or are you facing a stronger-than-expected headwind? Is your power set at economy cruise, as you planned, or have you gone to full power because you're running late? Did the last leg take as long as you had planned, or did ATC put you in the north forty for 30 minutes for "traffic separation"?

If in doubt, *land and refuel!* Just in case, *land and refuel!*

7. *Unfamiliar aircraft equipment*. CAP aircraft are not equipped uniformly. If you are assigned to another aircraft than the one you usually fly, check the equipment. If you don't know how to use its GPS, tell air operations. If you can't set up and operate the GPS, you won't be able to use it correctly. If you try to learn "on the fly," you will spend too much time with your head inside the aircraft instead of looking outside. The same

reasoning applies to the Audio Panel, FM radio, and DF unit. In these cases, someone will probably be available to show you how to set up and operate the equipment.

Even something as simple as an unfamiliar navaid can affect safety. In most cases, just spending some time sitting in the aircraft and going over an unfamiliar comm radio or transponder will suffice. But if you've never used an HSI before, this isn't the time to learn.

Whatever you do, don't try to bluff your way through. Tell someone and ask for assistance. Another pilot can help you, or mission staff may assign another pilot or experienced observer to your crew who knows how to operate the equipment.

8. *Trainees and inexperienced crewmembers*. CAP aircrew members may be trainees, or simply inexperienced. You must take the time to ascertain the qualifications and experience level of any crewmember assigned to you.

If a crewmember is a trainee, spend extra time on briefings and be very specific as to duties and responsibilities. If the trainee is a scanner, listen in on the observer's briefing to make sure he does the same. Make sure trainees understand that, while you will teach them as much and as often as possible, you (and the observer) have duties that must not be interfered with.

If a crewmember is newly qualified or has not flown in some time, make allowances. You may have to assume some of their normal duties (e.g., setting up and operating navaids or radios) in certain situations, so be sure to brief them so there is no confusion. For example, you may brief that you will handle all ATC communications while in Class C airspace while the inexperienced observer will handle all other communications.
Cadets and some seniors often qualify as flight line marshallers as their first mission specialty, and there is no practical way to determine their experience level. On some missions the flight line is handled by whoever is available, regardless of qualifications. Be alert and brief your aircrew to be alert. Don't hesitate to stop the aircraft if a marshaller's signals don't make sense or seem to be leading you into an unsafe situation.

9. *Low and slow*. CAP mission search patterns often require you to fly below 1000 AGL and at speeds at or below 90 knots (but never below Vx). Proficiency and planning are critical.

a. Ensure that "low and slow" is an integral part of your proficiency program.
b. Strictly enforce sterile cockpit rules under these conditions, and make sure your crew is briefed on all obstacles in the search area.
c. Flying at low altitude often means losing radar and communications with ATC and mission base. Don't hesitate to climb back up to an altitude where you can make your "ops normal" reports.
d. Maintain situational awareness and continually ask yourself, "If the engine quits now, where will I land?"
e. CAPR 60-1 requires pilots to maintain a minimum of 500 feet above the ground, water, or any obstruction and a minimum of 2000' AGL at night (except for takeoff/landing or when under ATC control). For SAR/DR/CD/HLS reconnaissance, the pilot will maintain at least 800 AGL. Pilots may descend below the designated search altitude to attempt to positively identify the target (but never below 500 AGL); once the target has been identified the pilot will return to 800' AGL or higher. [Refer to CAPR 60-1 for special restrictions for over-water missions.]
f. Per CAPR 60-1, minimum airspeed will be no lower than the aircraft's published best rate of climb speed (except for takeoff, landing, go-arounds, practice stalls, slow flight training and evaluation, and glider towing).
g. Per CAPR 60-1, practice of in-flight emergency procedures and maneuvers will be conducted during daylight VMC at an altitude high enough to allow recovery from an inadvertent stall/spin entry and complete a recovery at no lower than 2000' AGL or the aircraft manufacturer, FAA, or CAP approved training syllabi recommended altitude, whichever is higher. Simulated forced landings will be discontinued prior to descending below 500' AGL, unless you intend to land.

Additional Information

More detailed information on this topic is available in CAPR 60-1 and in Chapter 12 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 Mission Pilot trainee asked about general CAP-related safety requirements and issues.

Evaluation

Performance measures	Results	
1. Concerning general CAP-related safety requirements and issues, discuss:		
a. Flying into and taxiing on unfamiliar airports.	P	F
b. Flying into large, busy airports.	P	F
c. Flying into large, busy airports.	P	F
d. Taxiing around and near a large number of aircraft.	P	F
e. Taxiing around and near a large number of aircraft.	P	F
f. Squawks.	P	F
g. Fuel management.	P	F
h. Unfamiliar aircraft equipment.	P	F
i. Trainees and inexperienced crewmembers.	P	F
j. Low and slow.	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-2003

DISCUSS TYPES OF FLIGHTS PERFORMED BY CAP AIRCREWS

CONDITIONS

You are a Mission Pilot trainee and must discuss the types of flights performed by CAP aircrews.

OBJECTIVES

Discuss the types of flights performed by CAP aircrews.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Pilot trainee, knowing the types of flights that CAP aircrews perform is essential. CAPR 60-1 covers the types of flights for CAP aircraft, but we want to look at a few of these in a little more detail.

Note that per CAPR 60-1, the minimum flight visibility for VFR flight in Class G airspace is three statute miles (unless the PIC is instrument current), and you must update altimeter settings hourly from the closest source.

2. *Transportation flights*. Always consult CAPR 60-1, Chapter 2 (Authorized Passengers) when you need to know who is authorized to fly as passengers in CAP aircraft and the conditions under which they are authorized to fly.

As a general rule, anyone other than CAP or US government employees need special permission to fly in CAP aircraft. All non-CAP members eligible to fly aboard CAP aircraft must execute a CAPF 9, *Release (for non-CAP Members)*, prior to the flight.

3. *Night flights*. Typical sorties flown at night are transport sorties, route searches, and DF searches (it seems these are always flown at late at night). CAPR 60-1 requires pilots to maintain a minimum of 2000' AGL at night (except for takeoff/landing or when under ATC control). During night over-water missions, both front-seat crewmembers must be CAP qualified mission pilots and both will be instrument qualified and current (the right-seat pilot need not be qualified in the specific aircraft).

As a minimum, the PIC should be night-current in the aircraft (category, class and type) you're going to fly and assure the required one-hour fuel reserve required by CAPR 60-1. When performing night searches it is preferable to have an experienced crew accompanying the pilot to assist in situational awareness and search procedures.

Night time route searches will only be successful if the downed aircraft or missing person has the capability to signal the aircraft or if an ELT has been activated. Usually, ground team searches near the LKP or intended airport stand a better chance of success. No CAP crewmember may use night vision devices during any flight operations.

The most important item when planning night sorties is the PIC. Flying at night requires more attention to preflight planning and preparation. In particular, a careful check of the weather is essential; probably the most significant problem that can occur at night is flying into weather you cannot see. Also, pay attention to the dew point spread as a predictor of fog. During the flight, maintain situational awareness and always know where you can land in an emergency.

Before you accept the mission, ask yourself a few questions:

a. If all the night flying you have had in the last 90 days are your three takeoffs and landings, are you really proficient?
b. How long has it been since you've done a night cross-country?
c. How long has it been since you've done a night ELT search?
d. If you are Instrument rated, how many approaches have you done at night lately?
e. How familiar are you with the terrain and obstacles along the route?
f. Since landing lights only fail at night, when was the last time you practiced landing without the landing light?
g. Have you included all your flashlights in the weight-and-balance?

Remember that confidence is gained by experience, so you should include night flying in your proficiency regimen. You should also include periodic DF training at night.

4. *IMC flights*. CAP sorties are very seldom flown in IMC. The most common reason for an IFR flight is to transport personnel to a search area or mission base. However, it is possible to conduct a route search in IMC. If an aircraft was lost while on an IFR flight plan, a sortie may be launched along the same route with the hope of picking up an ELT signal. This approach may also be taken, with careful planning and close coordination with ATC, for aircraft lost outside prescribed IFR routes.

It is also possible to DF in IMC, but this can be dangerous and is not to be undertaken lightly. Per CAPR 60-1, IFR flights will not depart unless the weather is at or above landing minimums at the departure airport.

In any case, a few extra precautions are in order:
a. The pilot must have completed section XIV, "Instrument Proficiency" on her Form 5.
b. The PIC must meet FAA instrument flight proficiency requirements.
c. The PIC should be proficient in instrument flight in the CAP aircraft to be used.
d. For any flight other than a simple IFR transportation flight, it is highly recommended that another current and proficient Instrument-rated pilot be in the right seat. *Never* fly a search alone in IMC.
e. Never fly an instrument search when ground teams are appropriate and available for the search.

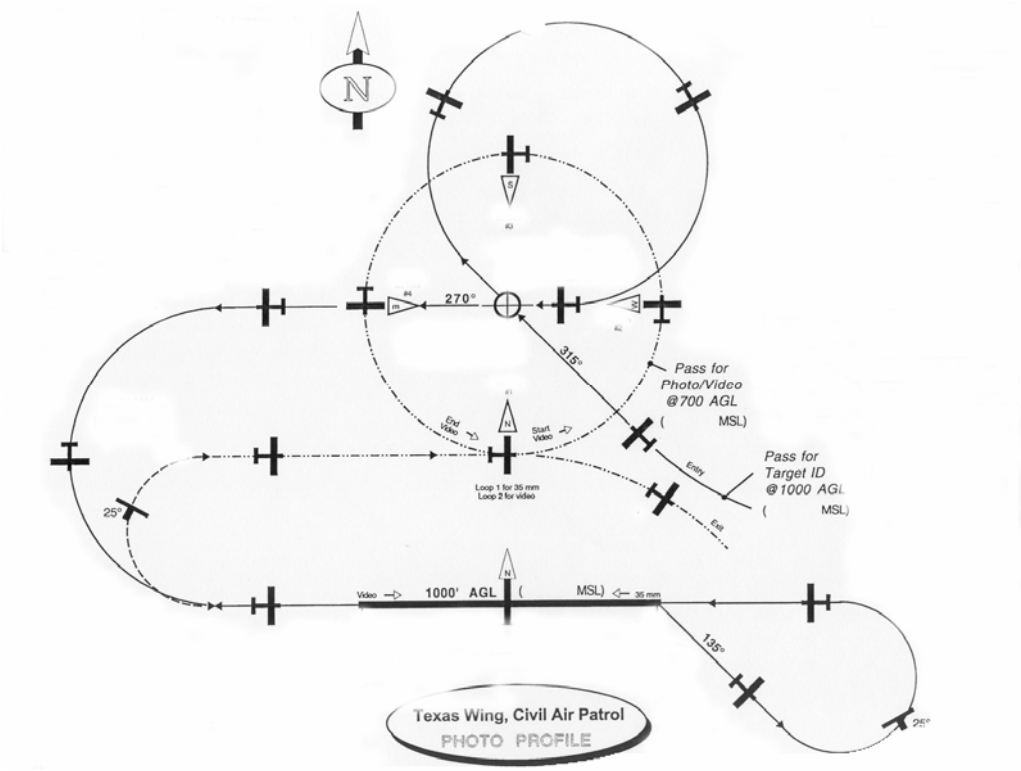
5. *Video Imaging*. More and more, we are performing aerial reconnaissance for our partner agencies. We primarily take still photos (digital and 35mm) and video (analog and digital), and may use Slow Scan video. The mission pilot must know how to fly these missions. As SAR missions decline and the phase-out of 121.5 MHz ELTs begins, video imaging will become one of CAP's most valuable assets.

Emergency response planners expect more timely information about developing situations. These planners recognize real-time and near real-time images as an invaluable tool.

Regardless of the type of video imaging mission, there are some basics that everyone involved in the mission need to know to ensure success. The following presents the extra essentials needed for a video mission briefing:
a. Make sure each crewmember knows what the target is and what types of images are needed. For example, a sortie may require a digital still shot of the target area for orientation, followed by a recorded video to detail egress points.
b. Ensure the target location is identified so that you can find it.
c. Thoroughly brief the route to and from the target, and the flight patterns within the target area. Mark them on the appropriate sectional chart and maps (e.g., road or topographical).
d. Ensure minimum altitudes are established, both for the routes to and from the target and in the target area.
e. Ensure all communications frequencies are well understood. This is particularly important for Slow Scan sorties.

f. Define the duties of the PIC and the photographer when in the target area. The photographer will actually be in command of the mission and will give directions to the pilot, but the PIC retains responsibility for the safe operation of the aircraft.
g. Ensure video equipment batteries are fully charged and that extra batteries are available.
h. Clean the aircraft windows. If the video will be shot from the front right seat (normal), remove the window latch screw and put it in a safe place.
i. For Slow Scan sorties, make sure the equipment is secured and properly connected. Make a test transmission before you leave the ramp.

The customer sometimes defines *video imaging flight profiles*, but a typical profile is shown and discussed below:



As the aircraft approaches the target the photographer should alert the pilot and prepare to begin photographing the target. You may need to over-fly the target first for positive identification. Assume the photographer is in the right front seat.

The first step is to take an identification photo, usually one mile south of the target from an altitude of 1000' AGL. The photographer will begin shooting as soon as the aircraft is established on this easterly route. If another pass is needed, the pilot will circle around to repeat the route.

Next the pilot will turn toward the target, descend to 500' AGL and establish a 1/2 nm circuit around the target. The photographer will be taking shots at the cardinal points of the circle, or continuously if using video. This circuit may be enlarged to fit the target area or if it is important to identify entrance and egress routes near the disaster area.

During slow-scan sorties it may be necessary to climb to a higher altitude to transmit each image.

NOTE: Never hesitate to make another pass or move to a better position if necessary to ensure the success of the sortie. Film (especially digital) is cheap and flight time is expensive; it is better to make another pass or reposition the aircraft at the scene than it is to send another aircraft back to repeat the mission.

6. *Proficiency*. CAPR 60-1 encourages pilots to maintain currency and proficiency by accomplishing a self-conducted proficiency flight at least once every 90 days (described in an Attachment, and using mission symbol C1). More specifically, mission pilots are authorized four hours of proficiency flight training per calendar month under Air Force-assigned non-reimbursed mission status (described in an Attachment, and using mission symbol B12).

When practicing in-flight emergencies, adhere to the restrictions in CAPR 60-1.

As the demands on the CAP mission pilot increase, the need to maintain and improve your mission skills becomes more important. Besides the guidance given in the CAPR 60-1 Attachments, you should also practice:

a. Search patterns. Use the GPS as your primary tool but also practice planning and flying the different patterns using VORs and pilotage.
b. Night proficiency. Practice search patterns at night (particularly the ELT search).

As part of your cross-country proficiency, practice with the GPS:

a. Maintain a constant track over ground.
b. Select/display a destination: Airport, VOR and User Waypoint.
c. Determine heading, time and distance to a waypoint.
d. Save lat/long coordinates as a User Waypoint.
e. Save your present position as a User Waypoint.
f. Enter and use flight plans.
g. Exercise the nearest airport and nearest VOR features.
h. Practice navigating with present position displayed (constant lat/long display).
i. Always try to take someone along with you on your proficiency flights. This will provide excellent practice for scanners and observers, helps improve CRM and teamwork, and makes the flights more enjoyable. [Remember, if you are going to be practicing instrument approaches you must use a safety pilot. It is also preferred to have one during your night practice, although a qualified non-pilot observer will serve just as well.]

Additional Information

More detailed information on this topic is available in CAPR 60-1 and in Chapter 12 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 Mission Pilot trainee asked about the types of CAP flights.

Evaluation

Performance measures	Results	
1. Concerning types of CAP flights, discuss:		
a. Transportation.	P	F
b. Night.	P	F
c. IMC.	P	F
d. Video imaging, including the typical flight profile.	P	F
e. Proficiency.	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-2004

DISCUSS SECURITY CONCERNS AND PROCEDURES

CONDITIONS

You are a Mission Pilot trainee and must discuss security concerns and restrictions, and describe your actions in case of an airborne interception.

OBJECTIVES

Discuss security concerns and restrictions, and describe your actions in case of an airborne interception.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Pilot trainee, knowing security concerns and restrictions is essential. Additionally, you must know how to respond to an airborne interception.

2. *Security*. CAP resources should be considered National Security assets. In times of emergency you should take special security precautions to protect the aircraft and crew. Some examples are:

a. Hanger the aircraft whenever possible. You may place small pieces of clear tape on fuel caps, the cowling and/or doors that will break if someone tampers with vital areas.
b. Pay particular attention during pre-flight inspections. Look for signs of tampering and carefully inspect the fuel for contamination.
c. Be as "low key" as possible, and be discrete. Don't discuss CAP business in public places.
d. Be aware of your surroundings at all times. If you see something or someone that is suspicious, don't ignore it. Report your suspicions to your supervisor and/or law enforcement.

3. *Airspace restrictions*. The FAA may issue Temporary Flight Restrictions at any time, so it is vitally important to ask for FDC NOTAMs before each flight and to monitor ATC for changes while in flight. TFRs were issued to establish enhanced Class B airspace, protect airspace around nuclear facilities, and protect airspace around large gatherings of people.

Even with most TSRs lifted, you should not loiter around or circle critical facilities (e.g., nuclear power plants, large stadiums or gatherings, air shows, and dams or reservoirs). If you have to circle critical facilities (e.g., for planning or actual mission purposes) make sure you coordinate with the facility's manager and ATC.

4. *In-flight Intercept*. If your aircraft accidentally approaches or encroaches restricted airspace military aircraft may intercept you; it is important to know how to respond. The following covers the important points; details can be found in AIM 5-6-2.

<u>An intercept to identify your aircraft has three phases</u>:

a. Approach phase. A flight leader and wingman will coordinate their individual positions in conjunction with the ground-controlling agency.
b. Identification phase. The intercepted aircraft should expect to visually acquire the lead interceptor and possibly the wingman during this phase. The wingman will assume a surveillance position while the flight leader approaches your aircraft. The flight leader will then initiate a gentle closure toward the your aircraft, stopping at a distance no closer than absolutely necessary to obtain the information needed. The interceptor aircraft will use every possible precaution to avoid startling you.
c. Post-intercept phase. After you have been identified, the flight leader will turn away. The wingman will remain well clear and rejoin the leader.

If you are intercepted you should immediately:

a. Follow the instructions given by the intercepting aircraft, interpreting and responding to the visual signals (see the Table below).
b. Notify ATC if possible.
c. Attempt to communicate with the intercepting aircraft and/or ATC on the emergency frequency 121.5 MHz, giving the identity and position of your aircraft and the nature of the flight.
d. If equipped with a transponder, squawk 7700 unless otherwise instructed by ATC. If any instructions received by radio from any sources conflict with those given by the intercepting aircraft by visual or radio signals, request clarification while continuing to comply with the instructions given by the intercepting aircraft.

Intercepting aircraft signal	Meaning	Intercepted aircraft response	Meaning
Rocks wings. After acknowledgement initiates a slow level turn, normally to the left, onto desired heading.	You have been intercepted. Follow me.	Rocks wings and follows.	I understand and will comply.
(At night, the pilot will also flash the navigational lights at irregular intervals.)		*(At night, the pilot will also flash the navigational lights at irregular intervals.)*	
Performs an abrupt breakaway maneuver consisting of a climbing 90º turn without crossing the intercepted aircraft's flight path.	You may proceed.	Rocks wings.	I understand and will comply.
Circles airport, lowers landing gear, and over-flies runway in the direction of landing.	Land at this airport.	Lowers landing gear, follows the intercepting aircraft and lands if the runway is considered safe.	I understand and will comply.
(At night, the pilot will also put the landing lights on.)		*(At night, the pilot will also put the landing lights on.)*	
Raises landing gear while flying over runway between 1,000' and 2,000', and continues to circle the airport.	This airport is inadequate.	If the intercepted aircraft is requested to go to an alternate airport, the intercepting aircraft raises its landing gear and uses the intercept procedures (listed above).	Understood, follow me.
(At night, the pilot of the intercepted aircraft will also flash landing lights while passing over the runway.)		To release the intercepted aircraft, the intercepting aircraft will perform the breakaway maneuver listed above.	Understood, you may proceed.

The pilot switches on and off all available lights at regular intervals.	Cannot comply.	Performs the breakaway maneuver listed above.	Understood.
The pilot switches on and off all available lights at irregular intervals.	In distress.	Performs the breakaway maneuver listed above.	Understood.

Additional Information

More detailed information on this topic is available in CAPR 60-1 and in Chapter 12 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 Mission Pilot trainee asked security concerns and restrictions, and your actions if intercepted.

Evaluation

Performance measures	Results	
1. Discuss security concerns.	P	F
2. Discuss airspace restrictions.	P	F
3. Describe the phases of an in-flight intercept, and your actions.	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-2005

DISCUSS MISSION PILOT RESPONSIBILITIES DURING A MISSION

CONDITIONS

You are a Mission Pilot trainee and must discuss the mission pilot's responsibilities during a mission.

OBJECTIVES

Discuss the mission pilot's responsibilities during a mission.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Pilot trainee, knowing the mission pilot's responsibilities during the mission is essential.

2. *Mission Pilot and POD.* There are some factors affecting Probability of Detection (POD) that you can control:

a. Ask questions during briefings to ensure you *really* understand your assignment.
b. Take the time to plan the flight thoroughly and make sure you are prepared to fly it before leaving mission base. This knowledge enables you to concentrate on the mission and "stay ahead of the aircraft," thus increasing search effectiveness.
c. Maintain optimum altitude and airspeed. If you have to decrease power on a southbound leg and increase power when you turn northbound in order to maintain a constant 90 knots, then do it.
d. Accuracy of navigation: Use the GPS! However, you should be ready to complete the search using other navigational methods should the GPS fail.
e. Avoid turbulence whenever possible, avoid steep or abrupt turns, and ensure the mission commander is scheduling breaks and monitoring the scanners (and yourself) for fatigue or dehydration.
f. Give a thorough debriefing and be brutally honest about your effectiveness.
g. Stay proficient in your flying skills. Flying the aircraft and operating its equipment should be second nature, leaving you free to concentrate on accomplishing mission objectives safely.

3. *Flying the Mission.* Before missions are launched, the briefing officer provides you with information designating the routes to and from the search area, and the types of search patterns to be used upon entering the search area. Your planning should involve the observer, as they are familiar with each type of search pattern and can assist you in planning and navigation. While the observer should be scanning while you fly the pattern, they can assist you if things become confused (hey, it can happen).

4. *Number of Scanners*. Search planning, probability of detection, and search pattern effectiveness depends upon some underlying assumptions; the most important as far as the aircrew is concerned is the *assumption that there is one crewmember dedicated to scanning out the right side of the aircraft and another on the left side*.

Since the majority of CAP aircraft are Cessna 172s that only carry three crewmembers, we will assume that the crew consists of a pilot, an observer in the right front seat, and a single scanner in the rear seat. We assume that the observer will be scanning out the right side of the aircraft while the scanner covers the left side. If a larger aircraft is used there may be two scanners in the rear seat; this will allow the observer to spend more time assisting you without seriously decreasing search effectiveness.

Mission pilots must remember that they are *not* scanners. A mission pilot who tries to fly the aircraft and scan the search area at the same time is doing neither job effectively or safely. The mission pilot is responsible

for placing the scanners' eyes over the search area so they can do their job; your job is to fly the pattern precisely and effectively and for ensuring the safety of the aircraft.

Single scanner

a. Planning and executing a search pattern with only one scanner on board is different from one where you have two scanners. You will only be able to search out one side (usually the right side) of the aircraft; this means that you must keep the right side of the aircraft towards the search area at all times. This can have a significant effect on search time and aircraft hours. For example, this would require careful planning and flying on a grid search since you will have to modify your leg entries/tracks to ensure the scanner scans the entire gird (no inverted flight, please).
b. Additionally, this cannot help but decrease search effectiveness due to fact that you lose the "double coverage" or overlap you get with two scanners looking out opposite sides of the aircraft. Scanner fatigue also becomes more of a factor, and search times need to be reduced to account for this.
c. For these reasons, performing parallel track or creeping line searches with a single scanner is not recommended. Likewise, searching any but open/flat terrain with a single scanner significantly reduces your chances of success.

5. *Flying a search pattern*. The mission pilot's contribution to a successful search is his ability to fly the search pattern precisely while maintaining altitude and airspeed. This must be done while performing the duties of a Pilot-in-Command; in the search area the most important of these duties is to "see and avoid" obstacles and other aircraft.

Another special consideration in flying search patterns is the possibility of engine trouble or failure at low altitude. The mission pilot must always be aware of where she is, the wind direction, the nature of the terrain, and where she will land if the engine fails *now*. This also underscores the importance of a thorough pre-flight inspection.

Like the rest of the aircrew, the mission pilot must continuously and honestly critique her performance during the sortie. If you're not set up properly when you enter the search area, exit and start again. If you are off by half a mile on a leg, fly the leg again. If winds and/or turbulence caused you to fly the legs erratically, emphasize this during the debriefing.

6. *Go or No-Go*. The Incident Commander has authorized your flight, you have obtained a proper briefing and flight release, you have filed your flight plan, you have completed a thorough pre-flight of the aircraft, and your crew is briefed and ready to go. *A Mission Pilot may accomplish all of this and still not be safe to fly the mission*.

How can this be? All of the regulations and safety precautions have been followed to the letter. You have been extensively trained and have demonstrated proficiency by successfully completing a Form 91 checkride. Your wing commander has appointed you as a CAP Mission Pilot!

It all comes down to the individual pilot and the circumstances. How long has it been since you've taken off in a 14-knot crosswind? Have you ever taken off or landed on an icy runway? When is the last time you've flown cross-country at night? You're signed off for instrument privileges on your Form 5, but how long has it been since you've flown in actual IMC?

Pilots, by their nature, are confident in their abilities. Sometimes over-confident. Mix in overconfidence, unusual circumstances, and the need to put all those hours of training to the test. Now add the desire to help others who are in immediate danger and you have all the ingredients for a dangerous situation.

The most effective way to break this potential accident chain is for Mission Pilots to be brutally honest about their abilities under the present conditions. Mission Pilots (as Pilot-in-Command) must have enough courage and integrity to decline a mission that they don't feel *comfortable* doing.

Additional Information

More detailed information on this topic is available in CAPR 60-1 and in Chapter 12 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 Mission Pilot trainee asked your responsibilities during a mission.

Evaluation

Performance measures	Results	
1. Discuss your responsibilities during a mission:		
a. How you can improve POD.	P	F
b. Flying the mission.	P	F
c. Number of scanners onboard.	P	F
d. Flying a search pattern.	P	F
e. Go or No-Go decisions.	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.

P-2119

DEMONSTRATE HOW TO COMPLETE A CAP AIRCRAFT INSPECTION

CONDITIONS

You are a mission pilot about to leave for a mission, and you must perform a safety inspection on your aircraft.

OBJECTIVES

Demonstrate proper performance of a CAP Aircraft Inspection (CAP Aircraft Inspection Checklist, CAPF 71).

TRAINING AND EVALUATION

Training Outline

1. Top of CAPF 71:
    a. Date/Tach time of last 50-hour oil change, last 100-hour inspection, last Annual inspection
    b. Wing, 'N' number, make/model/year, and current Tach time
2. Aircraft Records
3. Aircraft Interior
4. Aircraft Exterior
5. Exterior and Interior Lighting for proper operation

Additional Information

More detailed information on this topic is available in the "Instructions for use of the CAP Aircraft Inspection Checklist" (last page of the CAPF 71).

Evaluation Preparation

Setup: Ensure that an aircraft is available for the student to inspect. Copy of a current CAPF 71.

Brief Student: Demonstrate a proper CAP aircraft safety inspection.

Evaluation

Performance measures	Results	
1. Demonstrate a proper aircraft safety inspection using the CAPF 71.	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.

SPECIALTY QUALIFICATION TRAINING RECORD (SQTR)
Mission Pilot

NAME (Last, First, MI)	CAPID	DATE ISSUED

Prerequisites

Item	Date Completed
Qualified Mission Scanner	
Current and qualified CAP pilot in accordance with CAPR 60-1, with at least 175 hours pilot in command time including 50 hours of cross-country flying	
At least 18 years of age	

The above listed member has completed the required prerequisite training for the mission pilot 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-2003 Grid Sectional Charts	
Complete Task O-2004 Use a POD Table	
Complete Task O-2009 Demonstrate Air/Ground Team Coordination Techniques	
Complete Task O-2101 Describe how ELTs are Detected	
Complete Task P-2001 Discuss Mission Pilot Duties and Responsibilities	
Complete Task P-2002 Discuss General CAP-Related Safety Requirements and Issues	
Complete Task P-2003 Discuss Types of Flights Performed by CAP Aircrews	
Complete Task P-2004 Discuss Security Concerns and Procedures	
Complete Task P-2005 Discuss Mission Pilot Responsibilities During a Mission	
Complete Task P-2028 Discuss Crew Resource Management	

The above listed member has completed the required familiarization and preparatory training requirements for the mission pilot 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-2001 Operate the Aircraft Audio Panel	
Complete Task O-2005 Operate the Aircraft DF	
Complete Task O-2006 Perform ELT Searches	
Complete Task O-2007 Locate and Silence an ELT on the Ground	
Complete Task O-2008 Complete a Mission Sortie	
Complete Task O-2102 Demonstrate Planning and Flying a Route Search	
Complete Task O-2103 Demonstrate Planning and Flying a Parallel Track Search	
Complete Task O-2104 Demonstrate Planning and Flying a Creeping Line Search	
Complete Task O-2105 Demonstrate Planning and Flying a Point Based Search	
Complete Task O-2106 Plan and Command a CAP Flight	
Complete Task O-2107 Prepare for a Trip to a Remote Mission Base	
Complete Task P-2119 Demonstrate how to complete a CAP aircraft inspection	
Complete CAPF 91 Check Ride	
Complete Basic Communications User Training	
Complete the appropriate portion of CAPT 117, *Emergency Services Continuing Education examinations*	

Exercise Participation

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

_____ _____

QUALIFIED SUPERVISOR'S SIGNATURE DATE

The above listed member satisfactorily participated as a mission pilot 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 pilot 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