

CIVIL AIR PATROL
U.S. Air Force Auxiliary

Mission Aircrew
Task Guides



SAR/DR Mission Pilot

Revision May 2013

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MP O-2001
DEMONSTRATE OPERATION OF THE AIRCRAFT AUDIO PANEL

CONDITIONS

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

OBJECTIVES

Demonstrate and discuss the use of the aircraft audio panel and FM radio.

TRAINING AND EVALUATION

Training Outline

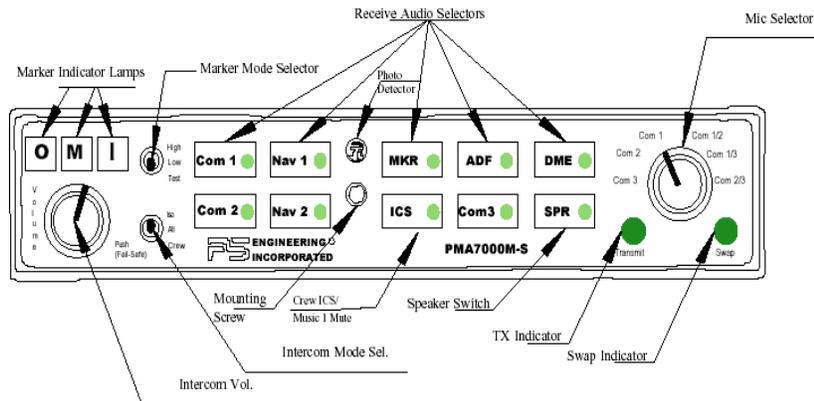
1. As a Mission Pilot trainee, knowing how to set up and use the aircraft audio panel and how to use the CAP FM radio is essential. In particular, the MP trainee needs to know how CAP-specific equipment interfaces with the audio panel, and how to set up various intercom modes.
2. The position of the 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.*
3. 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.

4. 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 1 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 1 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 is transmitting and the pilot presses her PTT, the pilot's microphone will be heard over the selected transmitter. In Com 3, both pilot and copilot are using the CAP FM radio.

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
Com 1/2	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!*

5. **CAP VHF FM radio.** CAP has authorization to use special frequencies in order to communicate with government agencies and our own ground forces. For this purpose CAP aircraft have a VHF FM radio that is separate from the aviation comm radios. This radio is primarily dedicated to air-to-ground communications and is normally operated by the observer or scanner. Several of the frequencies programmed into the radio are frequencies assigned to CAP by the U.S. Air Force, and are used to communicate with CAP bases and ground teams (do not publish or reveal frequencies to unauthorized personnel). Others are programmed at the direction of the Wing Communications Officer (e.g., mutual aid, fire, police, park service, forest service, and department of public service); these frequencies almost always require prior permission from the controlling agency before use. [CAP is replacing the older Yaesu and NAT NPX138 radios with the TDFM-136. NPX138 operation is outlined in the *Flight Guide*.]



The TDFM-136 is a P25-compliant airborne transceiver capable of operating in the 136 MHz to 174 MHz range (digital or analog) in 2.5 KHz increments. It can have up to 200 operator-accessible memory positions, each capable of storing a receive frequency, a transmit frequency, a separate tone for each receive and transmit frequency, an alphanumeric identifier for each channel, and coded squelch information for each channel. Data can be entered via the 12-button keypad but is normally downloaded from a PC. Operating frequencies, alphanumeric identifiers and other related data are presented on a 96-character, four-line LED matrix display. It is capable of feedback encryption. The FM Radio is selected using Com 3 on the Audio Panel; it is also directly accessed using the Push-to-Talk toggle switch located in an armrest by the rear seat of the aircraft.

National will enter the first four main frequencies (Primary, Secondary, Ground Tactical and Air-to-Ground) and the wing communications officers will enter the rest. Guard 1 will be preset to the Air-to-Ground and Guard 2 to the Primary frequency. Therefore, all you will just have to know is how to *use* the radio. The radio also has a scan function that can scan any or all of the main channels stored in the preset scan lists; scan lists, if enabled, are set by the wing communications officer.

As shown in the figure, the radio simultaneously displays two frequencies. The upper line is the Main (MN) frequency and the lower is the Guard (GD) frequency. Normally, you will be set up to transmit and receive on the Main and be able to receive the Guard frequency. This feature allows mission base to contact you at any time (via Guard), no matter what frequency you are using (Main).

Controls and normal settings:

- a. The knob above the MN/GD switch is the power switch and controls volume for Main. The knob above the G1/G2 switch is the volume control for Guard.
- b. The "Squelch" pushbutton is not used (automatic squelch). *Don't push it.*
- c. The MN/GD toggle switch selects the frequency on which you will transmit *and* receive. It is normally set to MN.
- d. The G1/G2 toggle switch selects the Guard frequency you are *monitoring*. It is normally set to G1.
- e. The HI/LO toggle switch selects transmitter power (10 watts or 1 watt). It is normally set to HI.

Keypad operation:

- a. Pressing and holding "4" (Scroll Memory Down) will let you scroll down through the programmed memories (it wraps around). Upon reaching the desired entry, release the button. "6" (Scroll Memory Up) lets you scroll up. [Note: scroll speed increases the longer you hold the buttons.]
- b. Pressing "5" (Scan) lets you select a scan list to scan, and to start or stop the scan. Once the scan list you want is displayed press # ENTER to start the scan or press * ESC to stop the scan. [Note: this function must be enabled by the wing communications officer for it to work.]
- c. Pressing and holding "2" (Display - Brighter) will increase display brightness; "8" (Display - Dimmer) decreases brightness.

When you get in the aircraft and power up the radio it should be set to MN, G1 and HI. Use pushbutton 4 or 6 to select the assigned Main frequency.

As another example, let's say you are working with the U.S. Forest Service and have their frequency on Main. Mission base, noting that you have not called in your "Operations Normal" report, calls you using the G1 frequency. You will hear mission base over Guard (its set to G1), regardless of what is coming over the Main frequency. You simply take the MN/GD switch to GD and answer "Ops Normal," and then return the switch to MN and carry on with the mission.

6. *Required FM radio reports.* As a minimum, the aircrew must report the following to mission base:
 - a. Radio check (initial flight of the day)
 - b. Take off time
 - c. Time entering a search area
 - d. Time exiting a search area
 - e. Landing time
 - f. Operations normal ("Ops Normal"), at intervals briefed by mission staff (usually every 30 minutes)

Additional Information

More detailed information on this topic is available in Chapter 2 and Attachment 2 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

Evaluation Preparation

Setup: Provide the student access to the aircraft audio panel and FM radio.

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

NOTE: The performance measures are designed for the PMA7000MS and TDFM-136; adjust as necessary for your aircraft.

Evaluation

<u>Performance measures</u>	<u>Results</u>
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
2. Set up and use the CAP VHF FM radio:	
a. Power, volume and squelch controls.	P F
b. Select assigned frequencies (main and guard channels).	P F
c. Keypad controls (scroll and scan).	P F
d. Give required mission FM radio reports (may be simulated).	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.

MP O-2003
GRID SECTIONAL CHARTS

CONDITIONS

You are a Mission Pilot trainee and must grid sectional charts.

OBJECTIVES

Demonstrate the ability to grid a sectional chart using the CAP and the Standardized Lat/Long Grid systems.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Pilot trainee, knowing how to grid a sectional chart and use grids is essential in planning a search, and to maintain situational awareness during a search.

2. *CAP grid 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	109-00W	103-00W	384
San Antonio	SAT	32-00N	28-00N	103-00W	97-00W	384
Houston	HOU	32-00N	28-00N	97-00W	91-00W	384
New Orleans	MSY	32-00N	28-00N	91-00W	85-00W	384
Jacksonville	JAX	32-00N	28-00N	85-00W	79-00W	384
Brownsville	BRO	28-00N	24-00N	103-00W	97-00W	384
Miami	MIA	28-00N	24-00N	83-00W	77-00W	384

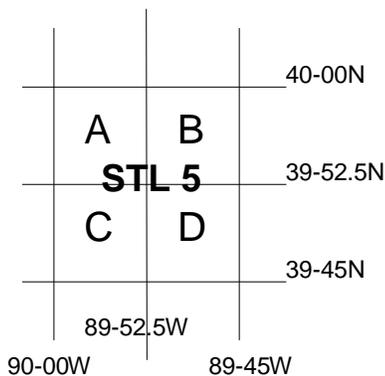
The process begins by dividing the whole area into twenty-eight *1-degree* grids, using whole degrees of latitude and longitude. Then each 1-degree grid is divided into four *30-minute* grids, using the 30-minute latitude and

longitude lines. 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.

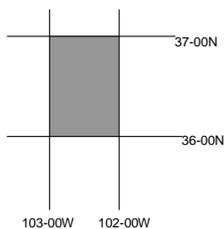
In cases where two sectionals overlap one another, the Civil Air Patrol always uses the numbering system for the western-most chart of the two in question. You can see this where the overlap area between 90° 00' and 91° 00', shown in the first 4 vertical columns, is identified with Kansas City (MKC) 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."



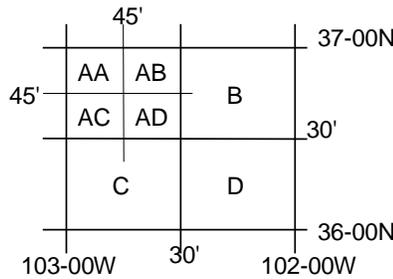
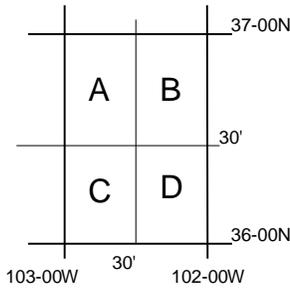
Pinpointing an area within the grid system becomes easy once you gain familiarity with the grids' many uses. You soon will be able to quickly plot any area on a map and then fly to it using the basic navigation techniques already discussed.

3. *Standardized Latitude and Longitude grid system.* Another means of designating a grid system, this 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 5 and Attachment 1 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

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), a sectional chart and a plotter. Give the student a sectional (may be out-of-date) and a gridding assignment.

Brief Student: You are a Mission Pilot 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*, 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.

MP O-2004
USE A POD TABLE

CONDITIONS

You are a Mission Pilot 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 Pilot 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					MODERATE TREE COVER AND/OR HILLY					HEAVY TREE COVER AND OR VERY HILLY				
SEARCH ALTITUDE (AGL)	SEARCH VISIBILITY				SEARCH ALTITUDE (AGL)	SEARCH VISIBILITY				SEARCH ALTITUDE (AGL)	SEARCH VISIBILITY			
Track Spacing	1 mi	2 mi	3 mi	4 mi	Track Spacing	1 mi	2 mi	3 mi	4 mi	Track Spacing	1 mi	2 mi	3 mi	4 mi
500 Ft					500 Ft					500 Ft				
.5 mi	35%	60%	75%	75%	.5 mi	20%	35%	50%	50%	.5 mi	10%	20%	30%	30%
1.0	20	35	50	50	1.0	10	20	30	30	1.0	5	10	15	15
1.5	15	25	35	40	1.5	5	15	20	20	1.5	5	5	10	15
2.0	10	20	30	30	2.0	5	10	15	15	2.0	5	5	10	10
700 Ft					700 Ft					700 Ft				
.5 mi	40%	60%	75%	80%	.5 mi	20%	35%	50%	55%	.5 mi	10%	30%	30%	35%
1.0	20	35	50	55	1.0	10	20	30	35	1.0	5	10	15	20
1.5	15	25	40	40	1.5	10	15	20	25	1.5	5	5	10	15
2.0	10	20	30	35	2.0	5	10	15	20	2.0	5	5	10	10
1000 Ft					1000 Ft					1000 Ft				
.5 mi	40%	65%	80%	85%	.5 mi	25%	40%	55%	60%	.5 mi	15%	20%	30%	35%
1.0	25	40	55	60	1.0	15	20	30	35	1.0	5	10	15	20
1.5	15	30	40	45	1.5	10	15	20	25	1.5	5	10	10	15
2.0	15	20	30	35	2.0	5	10	15	20	2.0	5	5	10	10

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 6 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

Evaluation Preparation

Setup: Provide the student with search planning figures (e.g., Chapter 6 of the MART Vol. II) and a POD table.

Brief Student: You are a Mission Pilot 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.

MP O-2005
OPERATE THE AIRCRAFT DIRECTION FINDER

CONDITIONS

You are a Mission Pilot 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.

NOTE: These methods apply to the L-Tronics DF unit; operation of the Doppler DF (Becker & RhoTheta) is covered in the “Electronic Search Patterns” section of the CAP Mission Pilot slides.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Pilot 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.

3. 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.]
4. 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).**
5. 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 (which doesn't transmit on 243 MHz) or a military beacon (which uses 243 MHz and may also transmit on 121.5 MHz), switch between 121.5 and 243 MHz at least once each minute until a signal is heard. All civil beacons except 406 MHz EPIRBs and some military beacons transmit on both frequencies. Undamaged ELTs can usually be heard further on 121.5 MHz than they can on 243 MHz; the reverse is often true for damaged ELTs.

6. 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.

Additional Information

DF is covered in MP Task O-2006 (Perform ELT Searches) and may be performed concurrently with this task. More detailed information and figures on this topic are available in Chapter 7 and Attachment 2 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

Evaluation Preparation

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

Brief Student: You are a Mission Pilot trainee asked to set up the aircraft DF unit and locate a practice beacon.

Evaluation *

Performance measures

Results

- | | | |
|--|---|---|
| 1. Describe how the aircraft DF works (Alarm and DF modes). | P | F |
| 2. Set up the DF in the Alarm and DF modes. | P | F |
| 2. Use the DF during a typical ELT search. Include how the DF should respond during the initial phase (include signal fade), when you are getting close, and when you pass over the ELT. | P | F |

* The performance measures are designed for the L-Tronics DF; change performance measures as necessary if your aircraft has the Becker or Rhotheta SAR DF.

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.

MP 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.

NOTE: These methods apply to the L-Tronics DF unit; operation of the Doppler DF (Becker & RhoTheta) is covered in the "Electronic Search Patterns" section of the CAP Mission Pilot slides.

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 by keeping the left/right needle centered. 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.

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.

3. *Wing shadow*. The wing shadow (or signal null) 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 (signal null)" section of Chapter 7 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 Chapter 7 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 Chapter 7 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 Chapter 7 for details.

7. Night ELT searches. Darkness eliminates your ability to precisely determine your position in reference to the ground, and that impacts the effectiveness of your search. Once you've successfully homed to an ELT you can usually narrow the target area down to about one square mile. Unless the ELT is located on an airfield or the occupants of the target aircraft are able to signal you, you will have to call in a ground team or land at the nearest airport, arrange for transportation, and find the ELT with hand-held equipment.

If you have a GPS that will plot your flown track, you can pinpoint the ELT position more accurately. After station passage is assured, fly another two minutes. Make a 90° turn (either way) and fly for another five minutes. From this point, DF back to the ELT and repeat the process, making turns in the same direction. When you look at the plotted track on the GPS, the lines will cross at a point over the ELT. You can then read off a lat/long position from the GPS, which is usually good to better than 1/2 mile - certainly good enough to get a ground crew headed to the right place. This technique can also be used in IMC.

8. IMC ELT searches. It is possible to DF in IMC, but this is dangerous and not to be undertaken lightly. Instrument flight imposes a higher workload on the pilot and demands a higher level of training and proficiency. As discussed earlier, the ability to fly steep-banked turns and other maneuvers without losing altitude is demanding for even the most proficient pilot. Trying to conduct these maneuvers while flying solely by referencing the flight instruments is not wise; the pilot can easily get vertigo and lose control of the aircraft. For these reasons only highly trained and proficient pilots should attempt to DF in IMC, and it is highly recommended that another equally proficient instrument-rated pilot fly in the right seat. CAPR 60-1 also imposes extra restrictions under certain conditions.

Additional Information

Using the DF is covered in MP Task O-2005 (Operate the DF), and may be performed concurrently with this task. More detailed information and figures on this topic are available in Chapter 7 and Attachment 2 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

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 shadow 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 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.

Evaluation *

<u>Performance measures</u>	<u>Results</u>
1. Locate a practice beacon using the following search methods:	
a. Homing to a non-reflected signal.	P F
b. Homing to a reflected signal.	P F
c. Wing shadow to a non-reflected signal.	P F
2. Locate a practice beacon using the following search methods (may be simulated):	
a. Aural.	P F
b. Metered.	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

* The performance measures are designed for the L-Tronics DF; change performance measures as necessary if your aircraft has the Becker or Rhotheta SAR DF.

NOTE: Although not required, it is highly recommended that MPs practice DF at night. Use all precautions as required in CAPR 60-1 for night flight, and take an experienced (preferably Instrument rated) pilot with you.

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.

MP O-2007
LOCATE AND SILENCE AN ELT ON THE GROUND

CONDITIONS

You are a Mission Pilot 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 Pilot 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 (or very near) an airfield, you will have to 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.

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

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. Don't ignore the obvious: some aircraft have remote indicating lights (usually red) that flash when the ELT has activated; also look for obvious signs of disturbance near an ELT. Most 406 MHz ELTs have an aural monitor (siren-type) that can be used to locate an ELT in a confined area such as a hanger; they also have a light above the Remote rocker switch (usually mounted on the front panel) that can be seen once you have access to the aircraft.

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. Don't ignore the obvious: some aircraft have remote indicating lights (usually red; see below) that flash when the ELT has activated; also look for obvious signs of disturbance near an ELT.

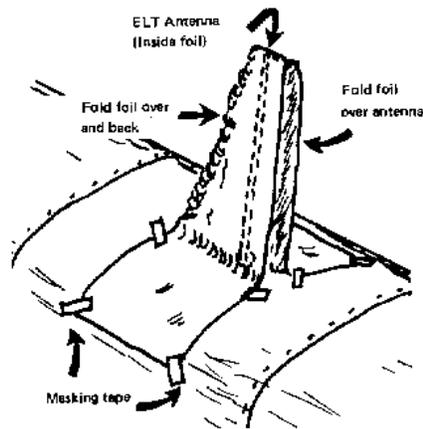


Most 406 MHz ELTs have an aural monitor (siren-type) that can be used to locate an ELT in a confined area such as a hanger. They also have a light above the Remote rocker switch (usually mounted on the front panel) that can be seen once you have access to the aircraft.



5. 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; if you can't talk them out of this, 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).

6. 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.

7. 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.

8. *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 (don't forget Game Wardens) 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 7 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

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 Pilot 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 to 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.

MP O-2008
COMPLETE A MISSION SORTIE

CONDITIONS

You are a Mission Pilot trainee and must demonstrate how to complete a mission sortie.

OBJECTIVES

Complete a mission sortie, acting as both aircraft and mission commander. 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. As a Mission Pilot trainee, the ability to complete all phases of a mission sortie is essential. 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) Stabilize at search heading, altitude and airspeed at least two miles out
- 6) Evaluate the scene (situational awareness) for conflicting traffic

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) Limit time spent below 1000' AGL (no lower than 500' AGL) during daylight
- 6) Maintain 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) Double-check heading and altitude assigned for transit to next search area or return to base

2. *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.

A. Take a short break then assemble the crew to complete the CAPF 104 (WMIRS)

- 1) Fill in or verify 'ATD' and 'Actual Landing Time'
- 2) The Summary section describes what you accomplished on the sortie
- 3) The Results/Deliverables section can be as simple as "no sightings" or "no damage noted." However, you must list results such as sightings (including negative sightings), the number of photos you took, etc.
- 4) The Weather Conditions section can be as simple as entering "as forecast." However, if the weather was unexpected it is important to explain how the weather conditions affected sortie effectiveness.
- 5) The Remarks section is for entering any information you think is pertinent or helpful that was not entered elsewhere on the CAPF 104. It also gives the crew a chance to comment on the effectiveness of the sortie in detail.
- 6) The Sortie Effectiveness section involves a quantitative assessment of how well you accomplished your mission.
- 7) The Attachments & Documentation section is self-explanatory. Be sure to label any attachments (e.g., mission and sortie number) so they can be related to the mission/sortie if it accidentally becomes separated.
- 6) Ensure the 'Hobbs To/From' and 'Hobbs in Area' entries equal the 'Hobbs Total' hours entry
- 7) Ensure all entries and sketches/drawings are clear and legible
- 8) Upload fuel receipt (WMIRS)

B. Check in with Debriefing Officer

- 1) Tell how you did your job and what you saw
- 2) Usually starts with a review of the information you entered on the CAPF 104
- 3) Answer all questions as best you can, and be very honest about conditions and your actions
- 4) If you are scheduled for another sortie, find someplace to rest. Close your eyes; you may even want to take a nap if there is time and a place to do so. Also, take in some refreshment to give you sufficient energy for the next sortie.

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 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 sortie 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.

What types of clues did you investigate? Perhaps a clue seemed to be insignificant and you decided not to pursue it. Describe any clues that were investigated and found to be false. This information becomes part of the briefing for other aircrews because it can keep them from pursuing the same false clues.

Debriefing results are provided to the operations staff and incident commander, periodically or whenever significant items are evident. At the end of each operational period, the incident commander and staff will review the debriefing forms to develop the complete search picture, compute probabilities of detection and cumulative POD, and then determine priorities and make plans for the next operational period.

When the debriefer is satisfied that pertinent information has been discussed and explained, you will be dismissed. Now what should you do? Obviously, you will need rest. If you are scheduled for another sortie, find someplace to rest. Close your eyes; you may even want to take a nap if there is time and a place to do so. Also, take in some refreshment to give you sufficient energy for the next sortie.

Additional Information

More detailed information and figures on this topic are available in Chapter 10 and Attachment 2 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

This task should be performed in conjunction with MP Task O-2106, *Plan and Command a CAP Flight*.

Practice

Setup: The student will complete the sortie assignment given in MP Task O-2106. The student should have access to typical mission base materials and an aircraft.

The student will perform or simulate completion of the sortie. The student will discuss (or perform) required actions during the sortie, secure the aircraft upon return, perform an aircrew debriefing, and fill out the remainder of the CAPF 104 (from MP O-2106). All tasks that can be performed will not be simulated.

The trainer should play the role of crewmembers during the sortie, receiving instructions from the student.

During post-flight and pilot debriefing, ensure that the student completes aircraft and mission paperwork. Play the role of Debriefing Officer and debrief the student, checking the CAPF 104 for accuracy and completeness.

For this simulated sortie, watch for:

- 1) Knowledge of mission sortie requirements.
- 2) Proper and complete aircrew briefings.
- 3) Actions upon return to base.
- 4) Thorough knowledge of the information required on the CAPF 104.
- 5) Accurate completion of the CAPF 104.
- 6) Knowledge of debriefing procedures.

Evaluation Preparation

Setup: The student will complete the sortie assignment given in MP Task O-2106. The student should have access to typical mission base materials and an aircraft.

The student will perform or simulate completion of the sortie. The student will discuss (or perform) required actions during the sortie, secure the aircraft upon return, perform an aircrew debriefing, and fill out the remainder of the CAPF 104 (from MP O-2106). All tasks that can be performed will not be simulated.

The trainer should play the role of crewmembers during the sortie, receiving instructions from the student.

During sortie debriefing, ensure that the student completes all mission paperwork. Play the role of Debriefing Officer and debrief the student, checking the CAPF 104 for accuracy and completeness.

Brief Student: You are a Mission Pilot trainee asked to complete a sortie.

Evaluation

<u>Performance measures</u>	<u>Results</u>
1. Describe or perform required actions during a sortie:	
a. Actions to be taken if the search objective is found.	P F
b. Actions to be taken if you deviate from assigned search parameters.	P F
2. Complete the remainder of the CAPF 104.	P F
3. Perform an aircrew debriefing with a Debriefing Officer.	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.

MP O-2009
DEMONSTRATE AIR/GROUND TEAM COORDINATION

CONDITIONS

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

OBJECTIVES

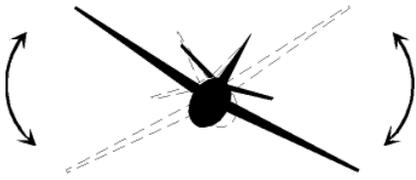
Demonstrate and discuss air and ground team coordination plans and techniques.

TRAINING AND EVALUATION

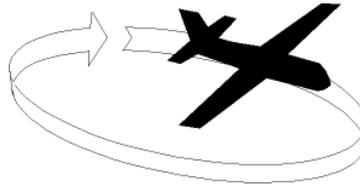
Training Outline

1. As a Mission Pilot 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 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-com 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 com; 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.



a. Message received and understood



b. Message received but NOT understood



c. Yes or affirmative

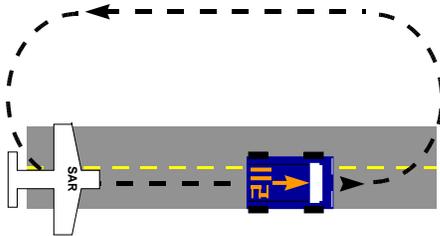


d. No or negative

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.

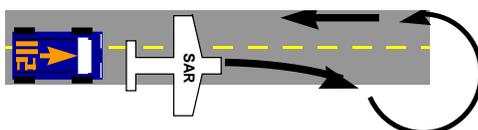
Second, you may pinpoint an area for investigation by circling above the area, continuing to do so until the ground team reaches the area and begins the search. The better the communication from ground-to-air and air-to-ground, the more coordinated the search will be and the greater the chances for success.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

Keeping contact with the ground team.



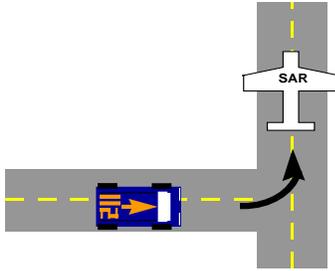
- Aircraft action: Aircraft approaches the vehicle from the rear and turns in a normal manner right (or left) to re-approach the vehicle from the rear. Circle back as necessary using oval patterns and flying over the team from behind, indicating that they should continue. This process may be referred to as a "Daisy Chain." Daisy Chain over the ground team as long as necessary.
- Desired team action: Continue driving in indicated direction along this road.

Turning the ground team around.



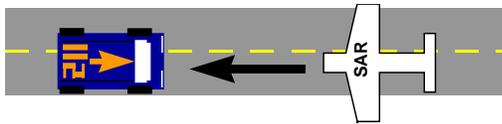
- Aircraft action: Aircraft approaches the vehicle from the rear and then turns sharply right (or left) in front of the vehicle while in motion. Circle back as necessary, flying against the team's direction of travel, and then take up the 'keeping up' procedure outlined above.
- Desired team action: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

Turn.



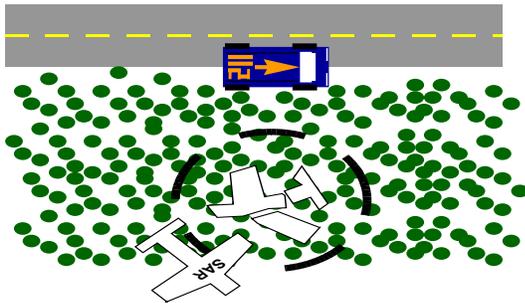
- Aircraft action: Aircraft approaches the vehicle from the rear and then turns sharply right (or left) in front of the vehicle while in motion. Circle back as necessary using oval patterns and flying over the team from behind, indicating that they should continue.
- Desired team action: Turn vehicle 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 2 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

Evaluation Preparation

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

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

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 com. | 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.

MP O-2101
DESCRIBE HOW ELTs ARE DETECTED

CONDITIONS

You are a Mission Pilot 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 Pilot 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. 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). **Space-based monitoring of 121.5 MHz ELTs ceased on 1Feb09.**

Advanced ELTs that transmit on 406.025 MHz at 5 watts are specifically designed to operate with the SARSAT/COSPAS satellite system. They also produce standard sweep tones on 121.5, 243.0 and 406 MHz, and may transmit GPS coordinates. The registered transmitter sends a coded signal that can be used to obtain the owner's name, address and type of aircraft, so AFRCC can call the number to see if the aircraft is really missing (~ 70% of the false alerts will be resolved by this call). Since geostationary satellites process the signal it will be heard more quickly and allow a much faster response (~ 6 hours saved). If the unit has a GPS receiver, it can transmit lat/long coordinates to further speed the search. The signal can also penetrate dense cover (e.g., trees). [Adoption of the these ELTs will be slow by general aviation as they presently cost about three times as much as a 121.5 MHz ELT.]

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 406 or 121.5 MHz ELTs, some are automatically activated while others can only be activated manually.

Personal Locator Beacons (PLBs) and Personal Emergency Transmitters (PETs) use a 406 MHz transmitter and a 121.5 MHz homing signal (at only 25 mW). Many are also equipped with a built-in GPS receiver that provides lat/long coordinates (typically to within 98 feet). Each PLB must be registered.

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 406 MHz ELT transmissions. In the event the ELT is activated (such as during a crash) it transmits the standard swept tone on 121.5 and 243.0 MHz at 100 milli-watts. Additionally, every 50 seconds for 520 milliseconds the 406.025 MHz 5-watt transmitter turns on; during that time an encoded digital message is sent to the NOAA-SARSAT satellite (part of the COSPAS-SARSAT satellite system). After activation the 406.025 MHz transmitter will operate for 24 hours and then shuts down automatically; the 121.5/243.0 MHz transmitter will continue to operate until the unit has exhausted the battery power (at least 72 hours).

The information contained in the ELT message is:

- Serial Number of the Transmitter or Aircraft ID
- Country Code
- I.D. Code
- Position Coordinates (Lat/Long), if coupled to the aircraft's GPS unit

5. 406 MHz ELTs must be registered with the United States the National Oceanic and Atmospheric Administration (NOAA). This identification code helps the Air Force Rescue Coordination Center (AFRCC) determine whether an emergency actually has occurred. The code permits accessing a registration database that contains the:

- Owner's Name
- Owner's Address
- Owner's Telephone Number
- Aircraft Type
- Aircraft Registration Number
- Alternate Contact

6. For 406 MHz ELTs without GPS position data it is necessary for the polar orbiting satellites to pass overhead, using Doppler Shift technology to determine approximate position; this results in position accuracy of 1-3 nm. If the ELT is coupled to the aircraft's GPS unit, the position data is also transmitted and position accuracy improves to within 100 yards. [Note: in a worst-case scenario, there could be a 3-4 hour wait for a polar orbiting satellite to pass overhead.]

7. AFRCC uses the registration data to inquire about the whereabouts of the aircraft (e.g., contacts know the owner if flying or the FAA has a Flight Plan on file). If AFRCC determines the aircraft is really missing, they will immediately launch a search.

8. Upon receiving SARSAT coordinates and registration details, the CAP Alert Officer will notify an Incident Commander to launch a search. The success of the search may depend upon several factors. The simple 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 become inoperative or the batteries totally discharged. 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.

NOTE: Since SARSAT/COSPAS satellites no longer monitor 121.5 MHz, we must rely on air- and ground-based monitoring (e.g., aircraft and FAA radios). CAP is still developing procedures on how it will respond to

these reports, but we can expect these searches to take longer and be more manpower-intensive for both air and ground teams.

Additional Information

More detailed information and figures on this topic are available in Chapter 7 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

Evaluation Preparation

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

Brief Student: You are a Mission Pilot 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.

MP 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.

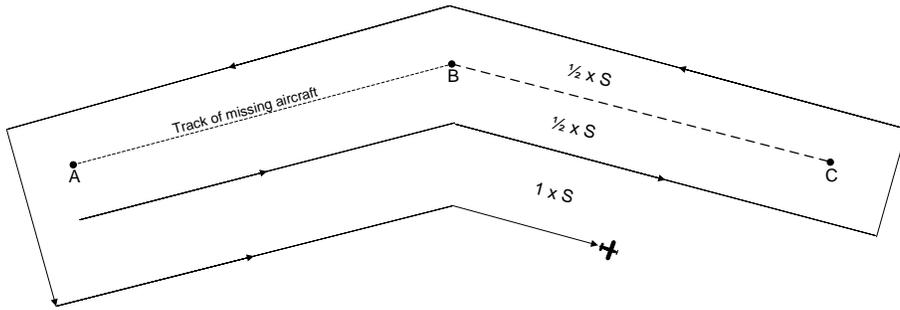
The pilot (or the observer acting as mission commander) must be aware of how many scanners will be on board in order to assign which side of the aircraft they should scan. *Planning and executing a search pattern with only one scanner on board is quite different from one where you have two scanners.* 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*, 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 route search 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 GX-50/55 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 MP 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 8 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

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 nautical 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 briefing information 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 30° 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 nautical 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

<u>Performance measures</u>	<u>Results</u>	
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:	P	F
a. Estimated time enroute and fuel requirements.		
b. Position coordinates for the route (lat/long and VOR radials/cross-radials).		
c. Altitude restrictions, obstacles and other hazards (e.g., MTRs and SUAs).		
d. Discuss observer/scanner assignments for all possible combinations.		
4. Fill out the flight plan and briefing information 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 nav aids (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 30° 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.

MP 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.

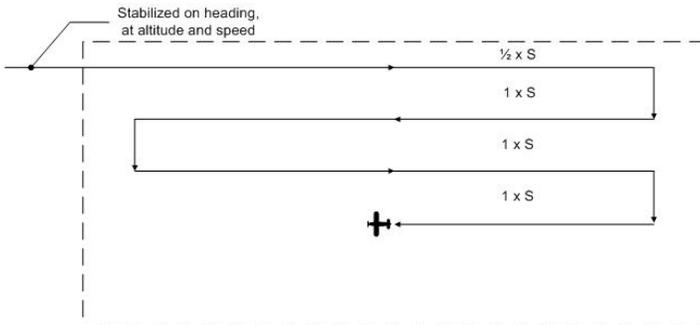
OBJECTIVES

Demonstrate how to plan and fly a parallel track search.

TRAINING AND EVALUATION

Training Outline

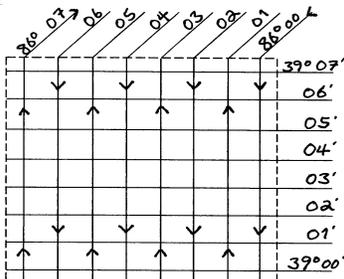
1. As a Mission Pilot trainee, the ability to plan and fly a parallel track search pattern is essential.
2. Parallel Track search pattern. The parallel track (sweep) search pattern is normally used when one or more of the following conditions exist: a) the search area is large and fairly level, b) only 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.

Grid Coordinates

SECTIONAL: STL ^(N) GRID # 104 A B C ^(D)
 ENTRY POINT: N 39°07.5' W 86°00'
 EXIT POINT: N 39°07.5' W 86°07'



	IDENTIFIER	NAVIGATIONAL AIDS FREQUENCY	RADIAL
1.	<u>OOM</u>	<u>110.2</u>	<u>090°</u>
2.	<u>ABB</u>	<u>112.4</u>	<u>330°</u>

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 39° 07' W 86° 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 GX-50/55 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-50/55 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-50/55. The example, above, has the data listed in the sequence that you enter into the GX-50/55.

This pattern is also included in the G1000® SAR package.

Additional Information

Search patterns are covered in MP 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 8 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

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 briefing information 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 30° 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 nautical 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

<u>Performance measures</u>	<u>Results</u>	
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:	P	F
a. Estimated time enroute, time in the grid, and fuel requirements.		
b. Position coordinates for the entry and exit points (lat/long and VOR radials/cross-radials).		
c. Position coordinates for the grid legs (lat/long and VOR radials/cross-radials).		
d. Altitude restrictions, obstacles and other hazards (e.g., MTRs and SUAs).		
e. Discuss observer/scanner assignments for all possible combinations.		
4. Fill out the flight plan and briefing information 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 nav aids (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 30° bank, and stays inside the grid.	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.

MP 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.

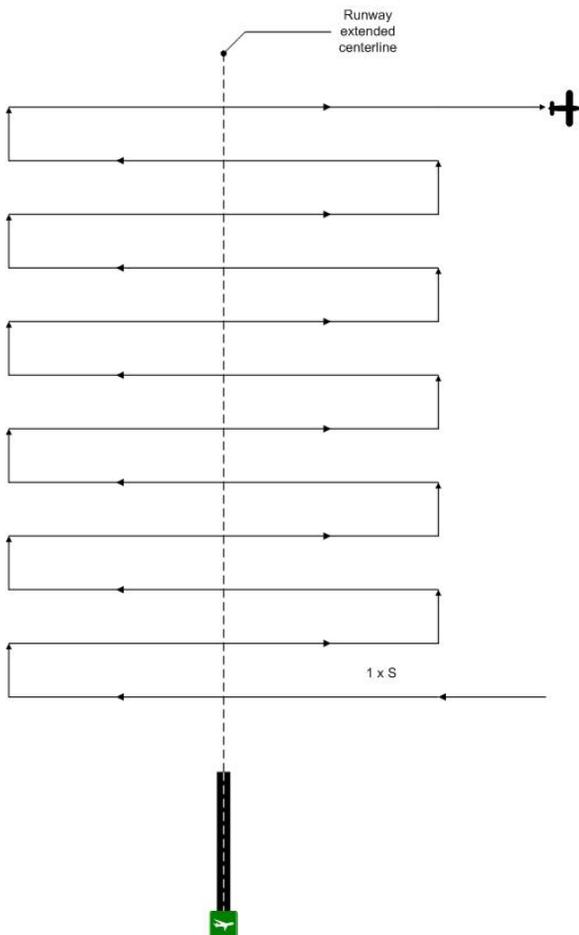
OBJECTIVES

Demonstrate how to plan and fly a creeping line search.

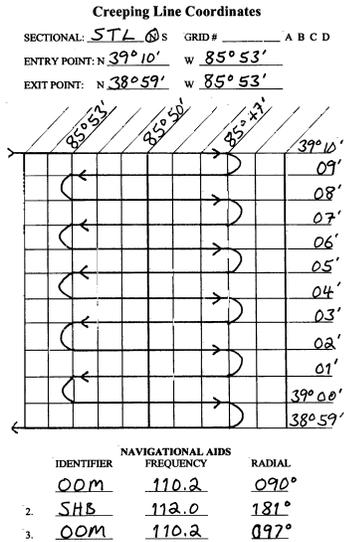
TRAINING AND EVALUATION

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.

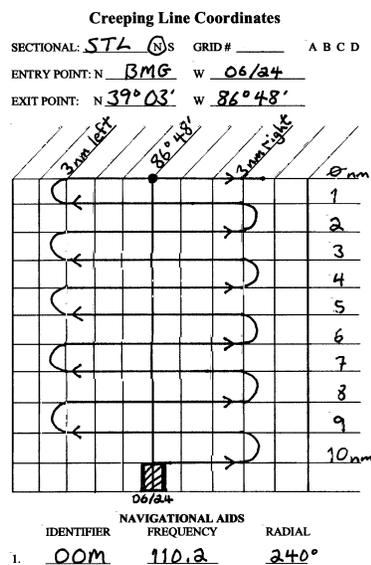


4. You may use a worksheet to draw the pattern and to log coordinates and distinctive features. As a backup, note applicable VOR radials and cross-radials. [Note: You may also create a flight plan for the pattern.]



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 39° 10' W 85° 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 39° 10' until you reach W 85° 47' where you will turn right 180° and stabilize on a constant latitude line of N 39° 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 39° 03' W 86° 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 as the CDI begins 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 GX-50/55, 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 GX-50/55 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, 060°).
- Leg Length (3 nm *).
- Start Side (Right).

* 9.9 nm is the longest leg length you can select on the GX-50/55.

Additional Information

Search patterns are covered in MP 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 8 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

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 briefing information 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 30° 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 nautical 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

<u>Performance measures</u>	<u>Results</u>	
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:	P	F
a. Estimated time enroute, time in the search area, and fuel requirements.		
b. Position coordinates for the entry and exit points (lat/long and VOR radials/cross-radials).		
c. Position coordinates for the legs (lat/long and VOR radials/cross-radials).		
d. Altitude restrictions, obstacles and other hazards (e.g., MTRs and SUAs).		
e. Discuss observer/scanner assignments for all possible combinations.		
4. Fill out the flight plan and briefing information 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 nav aids (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 30° 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.

MP O-2105
DEMONSTRATE PLANNING AND FLYING POINT BASED SEARCHES

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 a point-based search (expanding square or sector).

TRAINING AND EVALUATION

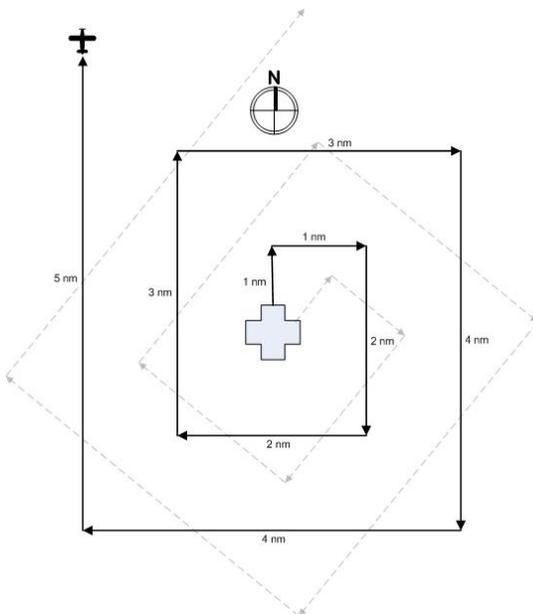
Training Outline

1. As a Mission Pilot trainee, the ability to plan and fly a point-based search pattern is essential.

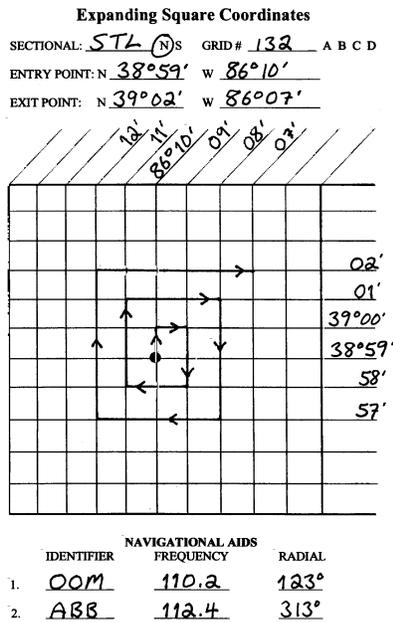
Point-based searches are organized around a point on the ground. These patterns are used when the approximate location of the target is known and are not intended to cover large areas. Examples are the expanding square, sector and circle search patterns.

2. Expanding Square search pattern. The expanding square search pattern is normally 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 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.



- The GPS is used because this pattern requires precise navigation and is affected by wind drift. Even using the GPS, it is helpful 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.]
- 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.



5. 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 38° 59' W 86° 10') into the GPS and save it as a waypoint. Select the waypoint and fly to it, maneuvering to approach from the south at about three to five miles out. Set altitude and airspeed so the aircraft is stable and the pilot will be ready to concentrate on flying the pattern precisely. Fly the pattern using the heading indicator and continuously displayed latitude and longitude on the GPS.

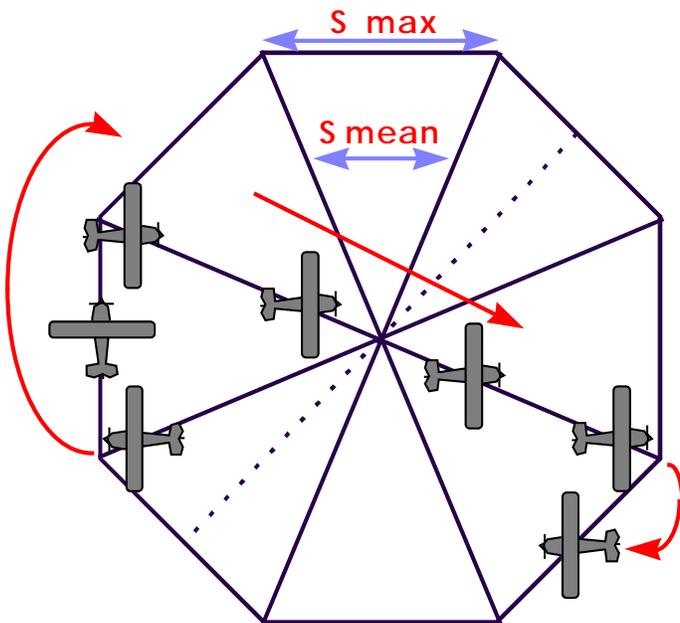
Note: If the aircraft doesn't have an operable GPS the first leg should be flown directly into or directly with the wind. Every other leg will thus be affected by the wind in a relatively consistent manner.

6. In the GX-50/55, 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 GX-50/55 is on the worksheet:

- Type of Grid and Sectional (US grid, STL).
 - Type of pattern (Expanding Square).
 - Starting Waypoint (483' AGL tower, N 38° 59' W 86° 10').
 - Spacing (1 nm).
 - Direction of Travel (due north, 000°).
- * 9.9 nm is the longest leg length you can select on the GX-50/55.

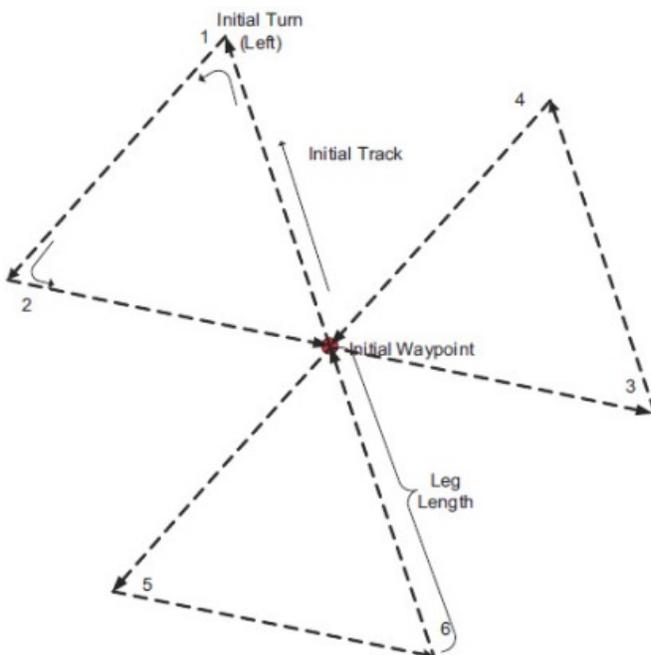
This pattern is also included in the G1000® SAR package.

7. Sector search pattern. A sector search pattern is also best planned on the ground, as it involves multiple headings and precise leg lengths. 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).

For aircraft equipped with the G1000[®], the pattern consists of three equilateral triangles (i.e., all leg lengths are equal). The default initial track is 360°, initial turn is to the left, and leg length is five nm.



8. 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 move 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 (you 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, you must constantly correct for the wind.

Additional Information

Search patterns are covered in MP 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 8 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

Practice

Setup: Give the student an expanding square or sector search to plan and fly. The student should have a sectional chart, plotter, and worksheets as needed.

Two kinds of expanding square searches should be practiced: one aligned with the cardinal points, and the other aligned 45° from the cardinal points.

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, 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 briefing information 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 an expanding square 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 reaching the starting point. Turns should be planned and flown so the observer/scanners are always looking in the search area (i.e., normally right turns).
- 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 on track without requiring steeply banked turns (no more than 45° 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 an expanding square or sector 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, and one nautical 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 point-based search.

Evaluation

<u>Performance measures</u>	<u>Results</u>	
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 point-based search (expanding square or sector). Include:	P	F
a. Estimated time enroute, time in the search area, and fuel requirements.		
b. Position coordinates for the entry and exit points (lat/long and VOR radials/cross-radials).		
c. Position coordinates for the legs (lat/long and VOR radials/cross-radials).		
d. Altitude restrictions, obstacles and other hazards (e.g., MTRs and SUAs).		
e. Discuss observer/scanner assignments for all possible combinations.		
4. Fill out the flight plan and briefing information 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 point-based (expanding square or sector) search. Demonstrate:		
a. Proper use of nav aids (GPS and HI 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 45° 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.

MP 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 either perform or repeat back performance of the item.

The Mission Pilot must be thoroughly familiar with the FAR exemptions referred to in CAPR 60-1. When using the chart, note that "aerial work operations" refers to a *flight that originates and terminates at the same point* and where the purpose of the flight is to perform some mission in the air during the course of the flight, and "transportation" refers to a flight that *originates and terminates at different points*, where the purpose of the flight is to go from the point of origin to the point of destination. Where 'Note 1' applies regarding reimbursement, it states that a pilot must either pay a pro rata share of the operating expenses (provided the expenses involve only fuel, oil, airport expenditures, or rental fees) *OR* the pilot may not log flight time.

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:

- Hangar 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.
- Pay particular attention during preflight inspections. Look for signs of tampering and carefully inspect the fuel for contamination.
- Be as "low key" as possible, and be discrete. Don't discuss CAP business in public places.
- 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.

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.

- a. After you have obtained a flight release (including from mission base if AFAF), fill in all required information on the aircraft Flight Log. Ensure proper entries for mission symbol, mission number, crew

names, and FRO name. Note that for AFAMs you must also get a flight release from mission base before leaving.

- 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 planning to have a minimum of one hour of fuel remaining upon landing, computed at normal POH/AFM cruise fuel consumption). Complete your ORM.
- 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 either perform or 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, brief crewmembers on taxi, takeoff and departure assignments, and enter navaid settings (e.g., destination or flight plan in the GPS).
- d. All crewmembers must wear their seat belts and shoulder harnesses at all times, unless such wear interferes with pilot or crew member duties (e.g., 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; or POH), 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, and turn on exterior lights for safety.

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.
- d. Follow the marshaller's directions, but remember they may be trainees (make sure their directions make sense and conform to the taxi plan).
- e. 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! Turn on your Landing light when you start your takeoff.
- 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 apprised 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: Lean to peak EGT then richen 100 degrees rich-of-peak (see your engine operating manual).
- 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! Turn lights on when 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. Read back all clearances and hold-short instructions.
- c. Defer the after-landing check until the airplane is brought to a complete stop clear of the active runway (minimizes distractions).
- d. Taxi back per the taxi plan and look for marshallers (remember they may be trainees, so make sure their directions make sense and conform to the taxi plan). Upon engine shutdown you may have to show the marshaller the aircraft keys to let them know it's safe to approach the aircraft and install chocks. Once the chocks are installed, release the Parking Brake.
- e. 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.
- f. If this was the last flight of the day, install all chocks, tie-downs, Avionics/control lock, and Pitot tube covers/engine plugs. [Note: Tie-down chains shall not be used directly from aircraft mooring points to an anchor point because of excessive impact loads on wing spars. If chains are used they shall be attached to wire rope anchors -- refer to Attachment 3 of CAPR 66-1.]
- g. 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.
- h. 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.
- i. Sign off any tasks that were completed on the crew's SQTRs.

Additional Information

More detailed information on this topic is available in FAR 91 Subpart C, CAPRs 60-1 and 66-1, and Chapter 9 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot* Reference Text; a "Mission Checklist" in Attachment 2 summarizes the steps in this task guide.

This task should be performed in conjunction with MP Task O-2008, *Complete a Mission Sortie*.

Practice

Setup: Give the student a flight to plan and fly (see O-2008). 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. Discuss various scenarios to test the trainee on FAR exemptions, especially the definitions of “aerial work operations” and “transportation,” use of the chart, and Note 1.

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 or C, 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. Also give the student several scenarios to test his/her knowledge of the FAR exemptions.

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 nav aids and talking on the aircraft radio).

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

Evaluation

<u>Performance measures</u>	<u>Results</u>	
1. Discuss FAR exemptions referred to in CAPR 60-1.	P	F
2. Compute Weight & Balance, list fuel requirements and state fuel reserve.	P	F
3. Complete an Operational Risk Management assessment for the sortie.	P	F
4. Discuss basic airport security precautions.	P	F
5. Receive a briefing and obtain a flight release.	P	F
6. 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
7. During aircraft preflight:		
a. Verify outstanding squawks.	P	F
b. Dispose of sumped fuel properly.	P	F
c. Clean windows, as necessary.	P	F
8. 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
9. During startup:		
a. Turn rotating beacon ON before starting engine.	P	F
b. Setup the DF, Audio Panel and FM radio.	P	F

10. 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 |

11. 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.

MP O-2107
PREPARE FOR A TRIP TO A REMOTE MISSION BASE

CONDITIONS

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

OBJECTIVES

Prepare for a trip to a remote mission base, acting as both aircraft and mission commander. Perform pre-trip planning and inspections, perform preflight tasks and briefings, fill out FAA and CAP flight plans, and perform after-landing tasks.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Pilot 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 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/SQTR (note experience and tasks to be accomplished)
 - 5) Pilot currency (including a Photo ID)
 - 6) For passengers, PIC review CAPR 60-1 Attachment 2 (CAP Missions & Pilot Limitations)
 - 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) Check special equipment (e.g., computer, camera, portable GPS)
 - 5) Survival kit (fits trip and mission area terrain), headsets, flashlight, binoculars and multi-tool
 - D. Review 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 six 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) Review the Discrepancy Log (WMIRS) and make sure the aircraft is airworthy and mission ready

E. 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 1-hour reserve)
 - b) Ensure fuel reserve (plan to land with one hour's fuel, computed at normal cruise)
- 2) Verify within flight time and duty limitations (CAPR 60-1)
- 3) Obtain FAA briefing (ask for FDC and Local NOTAMs and SUA status) and file FAA Flight Plan
 - a) Enter 'CAP XXXX' in the Aircraft Identification section
 - b) Put the 'CAP' and 'N' numbers in the Remarks section (e.g., CAP4239 is N239TX)
- 4) Perform ORM and fill out Inbound CAPF 104 (WMIRS)
- 5) Brief the crew on your fuel management plan (assumptions, refueling stops and reserve), FDC and Local NOTAMs, and Special Use Airspaces
- 6) Review "IMSAFE" or equivalent and obtain CAP Flight Release (WMIRS)

F. 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, entry points and waypoints)
- 16) Organize the cockpit

G. Startup and Taxi

- 1) Brief checklist method to be used (e.g., challenge-response)
- 2) Seat belts and shoulder harnesses
- 3) Double-check Intercom, Audio Panel and Comm Radio settings
- 4) Rotating Beacon Switch ON and signal 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 settings
- 7) Obtain ATIS and Clearance (read back all clearances and hold-short instructions)
- 8) If flying VFR, request Flight Following
- 9) Compute crosswind and verify within Crosswind Limitation
- 10) Verify 3 statute miles visibility (VFR in Class G - unless PIC is current IFR)
- 11) If IFR, verify weather at or above landing minimums and date of last VOR check
- 12) Begin sterile cockpit and assign crew duties for critical phases of flight
- 13) Signal marshaller before taxiing; check brakes at beginning of roll
- 14) Turn on the navigation, position, Pulselite, and anti-collision lights (be considerate of others at night)
- 15) Taxi no faster than a slow walk when within 10 feet of obstacles
 - a) Maintain at least 50' behind light single-engine aircraft; 100' behind light multi-engine or jet aircraft, and 500' behind helicopters and heavies

H. Takeoff, Climb and Departure

- 1) Double-check assigned departure heading and altitude
- 2) Lean engine for full power (> 3000' DA or POH)
- 3) Look for landing traffic before taking the active runway; landing light ON when rolling
- 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 "Takeoff"
- 6) Use shallow S-turns and lift your wing before turns during climbing to check for traffic
- 7) Keep shoulder harnesses fastened (unless interferes with duties)
- 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) Lean engine for economy cruise
- 3) Update fuel assumptions and set altimeter to closest source at least hourly

J Approach, Descent and Landing

- 1) Plan approach and descent (remember fuel mixture and cooling)
- 2) Double-check 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 and assign crew duties for critical phases of flight
- 7) Turn lights on within 10 miles of the airport
- 8) Double-check assigned approach heading and altitude
- 9) Use shallow S-turns and lift your 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 "Landing"

3. *Arrival at mission base*

A. Park and Secure Aircraft

- 1) Look for marshalls, follow taxi plan, signal 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) Complete the Flight Log and enter squawks in Discrepancy Log
- 6) Chocks and Tie-downs installed and Parking Brake OFF
- 7) Remove trash, special equipment, 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 and replenish the cleaning kit

B. Check in with Flight Line Supervisor and Safety Officer

C. Close FAA Flight Plan and call FRO

D. Sign personnel and aircraft into the mission (Administration)

E. Complete and submit Inbound CAPF 104 and upload fuel receipt (WMIRS)

F. Report any special equipment to Logistics (e.g., cameras, camcorder, slow-scan, or 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

NOTE: MP O-2106 (Plan and Command a CAP Flight) and O-2008 (Complete a Mission Sortie) should be performed prior to this task. Although many of the steps in this task guide repeat those of O-2106 & O-2008, they are repeated because of their importance.

More detailed information and figures on this topic are available in Chapter 10 and Attachment 2 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

Practice

Setup: Give the student an assignment to take a crew to a remote mission base. The base should be located on a large (unfamiliar) airport in controlled airspace -- Class B, if practical. The base should be sufficiently far away to force the student to plan a refueling stop. The student should have access to mission materials and aircraft logs, a CAPF 104, and a CAPF 71.

The student will plan, brief and simulate a trip to a remote mission base. All tasks that can be performed will not be simulated (the student may simulate filing an FAA flight plan).

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

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.

For this simulated sortie, watch for:

- 1) Thorough knowledge of documents and equipment required for an extended stay at a remote base.
- 2) Thorough knowledge of aircraft and CAP logs and paperwork.
- 3) Accurate completion of the FAA Flight Plan and CAPF 104.
- 4) Accurate and thorough planning for the trip (e.g., airspace restrictions, airport diagrams, fuel requirements and refueling stop).
- 5) Proper actions upon arrival at mission base.

Evaluation Preparation

Setup: Give the student an assignment to take a crew to a remote mission base. The base should be located on a large (unfamiliar) airport in controlled airspace -- Class B, if practical. The base should be sufficiently far away to force the student to plan a refueling stop. The student should have access to mission materials and aircraft logs, a CAPF 104, and a CAPF 71.

The student will plan, brief and simulate 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 aircrew members, particularly for receiving inspections, briefings and instructions from the mission pilot trainee. Brief the sortie as if you were the Briefing Officer during a mission.

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

Evaluation

<u>Performance measures</u>	<u>Results</u>	
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. Check the aircraft:		
a. Fill out a CAPF 71.	P	F
b. After doing a weight & balance, state fuel requirements, assumptions and reserve.	P	F
c. Check for required equipment on board (e.g., tie downs, survival kit, cleaning gear).	P	F
4. Fill out FAA flight plan and CAPF 104, obtain a CAP flight release.	P	F
5. Brief the crew:		
a. Fuel assumptions and reserve.	P	F
b. NOTAMS, SUA status and destination airport/taxi diagrams.	P	F
c. ORM	P	F
6. Upon (simulated) arrival at mission base:		
a. Secure the aircraft and arrange for refueling.	P	F
b. Close FAA and CAP flight plans (call FRO).	P	F
c. Sign yourself and the aircraft into the mission.	P	F
d. Complete 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.

MP 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 (including one from mission base if AFAM).
 - 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. Sterile Cockpit Rules
 - a. The "Sterile Cockpit" concept recognizes that flight operations other than routine cruise flight are intrinsically more hazardous and require the undivided and vigilant attention of all crewmembers. Non-essential conversations and activities not directly related to the operation of the aircraft and its mission are inappropriate.
 - b. The Pilot in Command (PIC) is responsible to ensure that these non-essential conversations, activities, and otherwise distracting actions do not occur during those portions of the flight that are considered critical. Examples of critical portions of flight would be taxi, takeoff, climb and departure, operating in the search area, and arrival, descent and landing. Operations in high-density traffic areas or heavy ATC periods would also be considered critical.
 - c. The simplest way to ensure that all crewmembers and passengers are aware of this requirement is to conduct a crew and passenger briefing prior to boarding the aircraft or prior to engine start. The Sterile

Cockpit brief can be as simple as a general statement by the PIC indicating that an announcement will be made when the flight is in a critical phase of flight, or possibly, a detailed briefing of the various phases of flight that are considered busiest and critical for the crewmembers to avoid distractions.

- d. It is essential that the PIC include in the Sterile Cockpit brief a statement that safety of flight items are always appropriate to be brought to the immediate attention of the PIC. Safety concerns would be such items as potentially conflicting traffic, or potential mechanical problems with the aircraft (i.e., electrical smoke or smoke of an unknown origin, and leaking fuel).

7. The Mission Pilot needs to know what goes into the observer's log (MART Vol. II, 1.2), in order to help inexperienced observers and to be able to keep the log when riding in the right seat. The log is 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 entered into the CAP Form 104 (WMIRS), which is reviewed by the incident commander and general staff after the debriefing and becomes a part of the total information that is the basis for 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. Maps and sketches should be uploaded into the CAPF 104 (WMIRS).

Additional Information

More detailed information on this topic is available in CAPR 60-1 and in Chapter 9 and Attachment 2 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

Evaluation Preparation

Setup: Provide the student with a current copy of CAPR 60-1 and the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

Brief Student: You are a Mission Pilot trainee asked about your duties and responsibilities, and to discuss the Observer Log.

Evaluation

<u>Performance measures</u>	<u>Results</u>
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 sterile cockpit rules.	P F
5. 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.

MP 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

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 marshallsers 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 marshallsers 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 planning for 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 revise your W&B if you change crewmembers at the last minute? 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 nav aids 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 at (and sometimes below) 1000 AGL and at speeds at or below 90 knots (but never below V_x). 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. Per CAPR 60-1, pilots shall maintain a minimum altitude and lateral distance of 1000 feet (in congested areas the lateral distance increases to 2000') from the ground, water or any obstruction during daylight VFR operations; for night VFR operations the minimum increases to 2000' (unless under ATC control). For search grids and DR/CD/HLS reconnaissance, the pilot should fly at an altitude or flight path not closer than 1000' to any terrain or obstruction. Pilots may descend below the designated search altitude to attempt to positively identify the target, but never below 500' AGL (see CAPR 60-1 for specifics); once the target has been identified the pilot will return to 1000' AGL or higher. [Refer to CAPR 60-1 for special restrictions for over-water missions.]
- f. 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 9 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

Evaluation Preparation

Setup: Provide the student with a current copy of CAPR 60-1 and the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

Brief Student: You are a Mission Pilot trainee asked about general CAP-related safety requirements and issues.

Evaluation

<u>Performance measures</u>	<u>Results</u>	
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.

MP 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 when you need to know who is authorized to fly as passengers in CAP aircraft, and the conditions under which they (and you) 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.

Additionally, flying a standard approach to landing will prevent or mitigate many of these illusions.

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 be a current CAP Instrument Pilot.
- 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. *Aerial Photography.* More and more, we are performing aerial reconnaissance and photography for national agencies. Emergency response planners expect more timely information about developing situations, and they recognize that aerial photos or video are an invaluable tool. We primarily take still photos (primarily digital) and video (analog and digital), and 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.

The key to a successful imaging mission is preparation, planning, patience and practice! Mission Pilots need to practice flying imaging patterns with an airborne photographer in order to master the patterns and the communications necessary to get the best images.

Complete details of Aerial Photography missions are covered in the MART Volume III, *Airborne Photographer*. As a minimum, study and practice MP-related knowledge and skills covered in Chapters 10 & 11.

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 (Self Conducted Pilot Proficiency Flight Guidelines on the Stan/Eval/Flight Ops webpage). More specifically, mission pilots are authorized four hours of proficiency flight training per calendar month under Air Force Assigned Mission, Non-Reimbursed mission status (see the CAPR 60-1 Pilot Proficiency Profiles on the Stan/Eval/Flight Ops webpage, using mission symbol B12).

Adhere to the restrictions in CAPR 60-1 when practicing in-flight emergencies.

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 MP Proficiency Profiles, 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 9 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

Evaluation Preparation

Setup: Provide the student with a current copy of CAPR 60-1 and the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

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, including FAR exemptions/rules. | P | F |
| b. Night. | P | F |
| c. IMC. | P | F |
| d. Aerial photography, 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.

MP 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

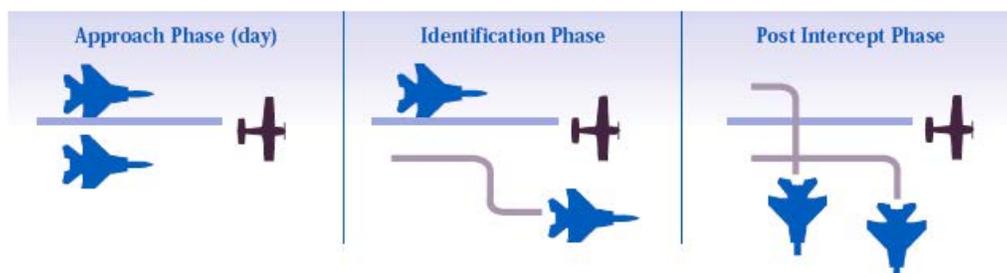
Training Outline

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.

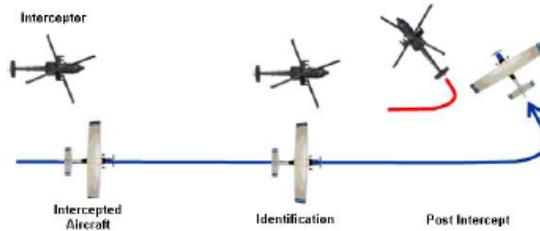
Even with most TSRs lifted, you should not loiter around or circle critical facilities (e.g., nuclear power plants, large stadiums or gatherings, air shows, and dams or reservoirs). If you have to circle critical facilities (e.g., for planning or actual mission purposes) make sure you coordinate with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

An intercept to identify your aircraft has three phases:



The interceptor may fly in front of you and disperse flares if you don't respond.
During night/IMC the intercept will be from below the flight path.



Intercepted aircraft must not follow directly behind the helicopter, thereby allowing the helicopter pilot to maintain visual contact with the intercepted aircraft and thus ensuring safe separation is maintained.

- Approach phase. A flight leader and wingman will coordinate their individual positions in conjunction with the ground-controlling agency.
- 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.
- 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:

- Follow the instructions given by the intercepting aircraft, interpreting and responding to the visual signals (see the Table below).
- Notify ATC if possible.
- 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.
- 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.

Law Enforcement Aircraft	Meaning	Intercepted Aircraft	Meaning
Rocks wings. After acknowledgement initiates a slow level turn, normally to the left, onto the desired heading.	You have been intercepted. Follow me.	Rocks wings and follows. [Also, at night flash navigational lights.]	I understand and will comply.
Performs an abrupt breakaway maneuver consisting of a climbing 90° turn, or more, without crossing the intercepted aircraft's flight path.	You may proceed.	Rocks wings.	I understand and will comply.
Circles airport, lowers landing gear, and overflies runway in the direction of landing.	Land at this airport.	Lowers landing gear, follows the LE aircraft and lands if the runway is considered safe. [Also, at night turn the landing lights on.]	I understand and will comply.

Intercepted Aircraft	Meaning	LE Aircraft	Meaning
Raises landing gear while flying over runway between 1000' and 2000', and continues to circle the airport.	This airport is inadequate.	If the intercepted aircraft is requested to go to an alternate airport, the LE aircraft raises its landing gear and uses the intercept procedures.	Understood. Follow me.
The pilot switches on and off all available lights at <i>regular</i> intervals.	Cannot comply.	Performs the breakaway maneuver.	Understood.
The pilot switches on and off all available lights at <i>irregular</i> intervals.	In distress.	Performs the breakaway maneuver.	Understood.

Additional Information

More detailed information on this topic is available in CAPR 60-1 and in Chapter 9 of the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot* Reference Text.

Evaluation Preparation

Setup: Provide the student with a current copy of CAPR 60-1 and the MART Vol. II, *Mission Observer/SAR-DR Mission Pilot* Reference Text.

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.

MP 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 grid (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 a current CAP Instrument Pilot, 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 9 of the Mart Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

Evaluation Preparation

Setup: Provide the student with a current copy of CAPR 60-1 and the Mart Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

Brief Student: You are a Mission Pilot trainee asked your responsibilities during a mission.

Evaluation

<u>Performance measures</u>	<u>Results</u>	
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.

MP P-2028
DISCUSS CREW RESOURCE MANAGEMENT

CONDITIONS

You are a Mission Pilot 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 Pilot 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 11 of the Mart Vol. II, *Mission Observer/SAR-DR Mission Pilot Reference Text*.

Evaluation Preparation

Setup: None.

Brief Student: You are a Mission Pilot 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.

MP P-2119
DEMONSTRATE HOW TO COMPLETE AN AIRCRAFT INSPECTION

CONDITIONS

You are a Mission Pilot trainee about to leave on a mission and must perform a safety inspection on your aircraft.

OBJECTIVES

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

TRAINING AND EVALUATION

Training Outline

1. As a Mission Pilot trainee, knowing how to perform a CAP aircraft inspection is essential.
2. *CAPF 71*. The CAP Aircraft Inspection Checklist is designed to help determine the overall condition of an aircraft, as well as enduring compliance with FAA and CAP regulations and directives. Many missions require you to upload (WMIRS) a CAPF 71 for the aircraft you are bringing.
3. The major sections are:
 - 1) Top portion: Wing and Aircraft data, the Date/Tach time of the last mid-cycle oil change and the 100 hour/Annual inspection, and the current Tach time.
 - 2) Aircraft Log Books and Records
 - 3) Aircraft Interior
 - 4) Aircraft Exterior
 - 5) Exterior and Interior Lighting for Proper Operation.
3. The last page of the form gives detailed instructions on completing the CAPF 71.

Additional Information

The CAPF 71 is available on the CAP NHQ website, under *Forms, Publications & Regulations*.

Evaluation Preparation

Setup: Provide the student with a current CAPF 71 and an aircraft (with logs).

Brief Student: You are a Mission Pilot trainee asked to complete a CAPF 71.

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.