

CIVIL AIR PATROL
U.S. Air Force Auxiliary

Mission Aircrew
Task Guides



Airborne Photographer

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Airborne Photographer O-2204
COMPOSE AN IMAGE

CONDITIONS

You are an Airborne Photographer trainee and must demonstrate how to compose an image.

OBJECTIVES

Demonstrate image composition, particularly proper framing.

TRAINING AND EVALUATION

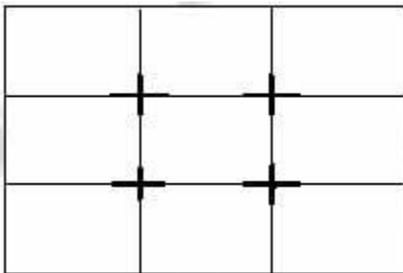
Training Outline

As an Airborne Photographer trainee, knowledge of how to compose an image is essential.

1. Composition concerns how you arrange a subject in a picture and how you translate what your eyes see into a digital image. The key to composition is remembering that a digital camera doesn't "see" the same way that you do. How often have you taken a photo from an airplane, only to discover later that the image doesn't look anything like what you remember seeing? This is the first rule of photography – reality, as seen by your camera, is different from what you see with your eyes. If you frame all your photos without taking this into account, you will always get disappointing results.
 - a. The *focal point* is the main subject of an image, such as a downed aircraft in a field or a breach in a levy. It is the main point that the viewer's eye will be drawn to when looking at the picture. This is why it is so important to know exactly what the customer wants to see in the images you will be taking on a particular sortie. If you don't know what you are supposed to be taking a picture of, it will be difficult or impossible to emphasize the right element in your images. This can lead to a disappointed customer, and that customer may decide CAP doesn't know what they're doing.

As a general rule you only want a single focal point in an image. But sometimes the image will be required to show multiple focus points. For example, the customer may want to know the condition of two roads leading into a damaged power plant. In this case, you must compose the picture so that each road can be clearly seen.

- b. A useful rule to use in this case is the "Rule of Thirds," where you mentally draw two horizontal and two vertical lines through your viewfinder so that you have divided the scene into thirds. This breaks up your image into nine zones, with four interior corners where the lines intersect:



These four corners constitute the "sweet spots" in your picture. If you place a subject in any of these intersections, you'll usually end up with a satisfactory image. This holds true for a single focal point or with multiple focal points, as in our example above. In the case of a single focal point, such as the

downed aircraft, placing the aircraft at any of these spots (or dead center) will result in a satisfactorily composed image.

2. *Filling the frame* is very important when taking a digital image. If the target is too small in the frame you lose important detail because you wasted a lot of pixels on extraneous details.

You should always minimize the amount of dead (non-mission related) space in an image. Once you have decided on the focal point, don't relegate it to a small portion of the picture. In aerial photography, this is most easily accomplished with a combination of proper aircraft positioning, framing and use of the zoom lens. If you need to place the horizon in the image to establish perspective, never let the sky take up more than the top one-third of the image (note that this also satisfies the rule of thirds). And try to keep the horizon straight in the image.

In CAP aerial photography, we try to follow three rules for framing:

- Frame the image so the target fills most of the frame, but never < 75% of the image
- Frame the image so no aircraft parts (i.e., wingtip, strut, window sill or wheel) show; don't rely on imaging software to crop your image
- Frame the target without using the zoom feature; only use the zoom to improve the framing or to concentrate on a specific portion of the target (e.g., damage to one section of a power plant or a crack in a bridge support)

As you can see from this discussion, composition is basically all about deciding what to leave in the photo and what to leave out.

Practice

An inexpensive way to practice framing is to take photos of objects from a vehicle. Preferably, have a friend drive along a freeway where you can safely drive ~ 55 mph; this most closely simulates the speed effect you'll experience during flight. Pick out "targets" of varying sizes along the roadway and photograph them, practicing the three rules for framing. After you get proficient at proper framing, take 2-3 photos of the same object as you pass; this also simulates what you'll be trying to accomplish while on imaging sorties.

Additional Information

More detailed information on this topic is available in Chapter 3 of the *Airborne Photographer Reference Text*.

Evaluation Preparation

Setup: The evaluation should be conducted with a digital camera and its user manual.

Brief Student: You are an Airborne Photographer trainee asked how to compose an image.

Evaluation

Performance measures

1. Demonstrate image composition, particularly proper framing.

Results

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.

Airborne Photographer O-2205
TRANSFER IMAGES TO AND VIEW IMAGES ON A COMPUTER

CONDITIONS

You are an Airborne Photographer trainee and must demonstrate how to transfer images to a computer and view images on a computer.

OBJECTIVES

Transfer several images to a computer. Select and view several images on a computer.

TRAINING AND EVALUATION

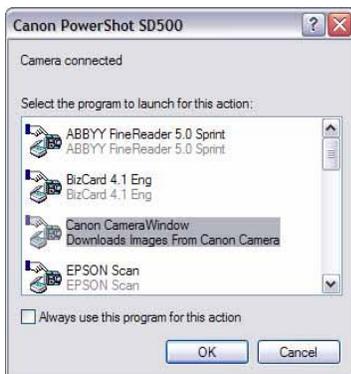
Training Outline

As an Airborne Photographer trainee, knowledge of how to transfer your images to a computer for review and future use is essential.

NOTE: Best practice is to set up a mission folder (mission number and date) before downloading the photos. In the newly-created mission folder, create two sub-folders: one for the original, untouched photos (e.g., RAW) and the other for photos (e.g., Sortie xxx Photos) you may manipulate (e.g., re-name or crop). Download your photos into the RAW folder, then copy them and paste them into the other folder. Having the untouched photos in the RAW folder will allow you to recover any photo that is accidentally damaged or lost.

1. There are two ways to transfer images from most digital cameras onto a computer: attaching the camera directly to the computer (also known as tethering) or using a memory card reader.
 - a. Most digital cameras provide a USB cable connection that offers a fast way to transfer your images (e.g., the D200 USB 2.0 cable can transfer images at about 5.3 MB/sec.). However, tethering ties up the camera and can deplete the camera's batteries. Some cameras include an AC adapter that can provide power to the camera; if you choose to tether, use the AC adapter during image transfer sessions.

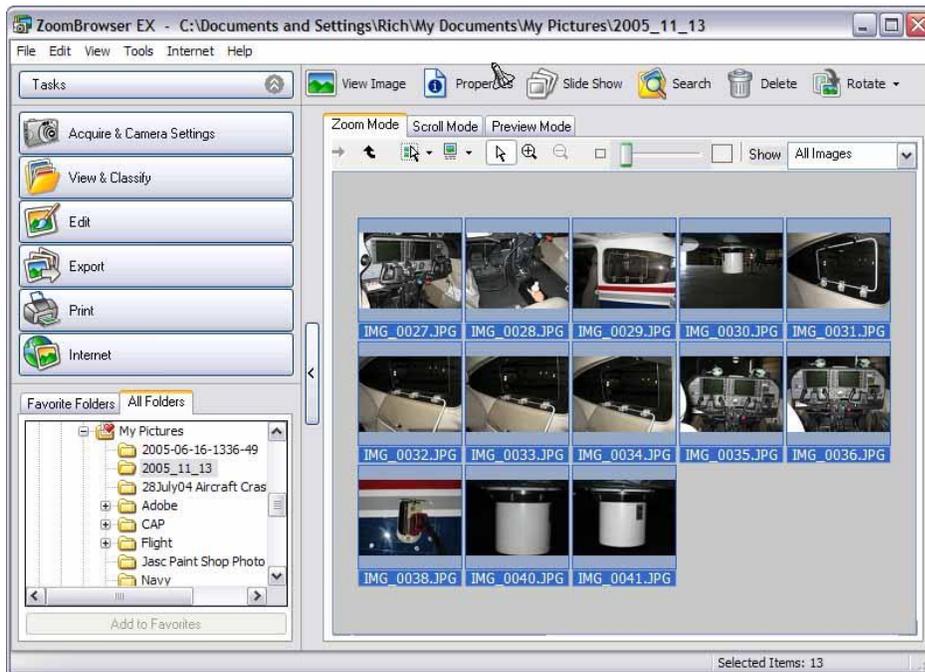
Most camera manufacturers provide software that helps transfer photos from a tethered camera to the computer. If your camera comes with such software, you should install it before you attempt your first transfer (read the manual). If your camera does not include image transfer software, or you simply prefer not to install it, you should still be able to transfer images. Windows includes built-in tethering support to many popular digital camera models, typically via the computer's USB port, and most of the image editing programs (e.g., *Elements* or *PhotoStudio*, discussed in the chapter on "Viewing and Editing Images") will recognize and accept the pictures directly from your camera. This example uses Canon's transfer software:



This window appears the first time you connect your camera (after you have installed Canon's camera software).



You can begin the transfer from the camera or computer.



- b. The easiest and most versatile way to import pictures into your computer is through a USB memory card reader that plugs into your computer; this allows fast and easy downloads from a camera's memory card. The best choice is a USB 2.0 card reader that accepts multiple types of cards.

Some computers (laptops, in particular) come with slots that accept cards directly into the computer or via a PC card adapter. These features essentially function in the same way a card reader does, although much faster. Additionally, some printers also come with built-in card readers that allow you to print photos without using a computer.

Another advantage to a card reader is that it enables a crew to drop off their memory card and take the camera back out for another sortie, while the staff processes the images.

2. If you're using a USB cable and your camera is Plug-and-Play, the Scanner and Camera Wizard starts once you connect your camera to one of the computer's USB ports. Click "Next" and follow the instructions in the wizard. If you do not see the wizard you may have an older camera that is not Plug-and-Play and should follow the instructions to install your camera manually. [Note: If the wizard doesn't appear as soon as you connect your camera, you can open it by selecting Start \ Control Panel \ Scanners and Cameras and then selecting your camera.]

If you're using a memory card reader, simply insert your card into the proper slot and the wizard will start.

- a. If the wizard asks which action you would like to perform, select "Always do the selected action."
- b. Click "Copy pictures to a folder" and then click OK.



- c. If you want to transfer all the photos in your camera (or on your memory card), click "Next." If you want to choose which pictures to transfer, click "Clear All" and check the images you want to transfer (or just un-check the check boxes next to the photos you do not want to transfer), and then click "Next."
 - d. The wizard puts your photos in the 'My Pictures' folder on your computer unless you choose another location, which you should (see "Organizing Mission Images on a Computer" below). Choose the 'Unedited Photos' sub-folder in the particular mission's folder and click "Next."
 - e. When the transfer is complete, select what you want to do next and click "Next." If you chose nothing in the previous step, click "Finish." The folder that contains your newly transferred photos opens.
3. If you have an image editing program installed on your computer it will step you through the process of transferring images from your camera or the camera's media card (using a media card reader).
 4. Most digital cameras show up as a removable drive in Explorer, so you can just click the drive letter to open the drive. Your pictures will probably be in a sub-folder rather than in the root of the drive. Drag the images onto the applicable 'Unedited Photos' sub-folder on your hard drive to copy them.
 5. Once transferred to your computer, your digital images become computer files. Review them to ensure they transferred successfully before you erase the images from your media card.

6. Image browsers are programs that help you view digital images in a number of different ways.
 - a. Remember that image browsers are designed to support only the photo formats they understand. In other words, they contain the necessary code to decompress a JPG photo, plus show a thumbnail and large preview, since they support the JPG format. When an all-purpose image browser comes up against a RAW file, chances are it won't be able to display it (see "Editing RAW Images" in Chapter 7 for programs that will display RAW images).
 - b. Windows contains a basic image viewer (XP: Picture and Fax Viewer; 7: Photo Viewer) and a simple editing program (Paint).
 - c. Most cameras, camcorders, printers and scanners include basic browser and/or editing programs. Most are easy to use and allow you to quickly review images on your hard drive (as well as download them directly from a digital camera) as moderate-sized thumbnails. They will normally enable you to rename photos, set up new folders, group photos into categories and do some simple processing.
 - d. Some basic browsers and/or editing programs can be downloaded from the Web. These programs support most file formats, have a thumbnail/preview function, allow batch renaming, and have basic editing features (e.g., cut or crop).
7. Image browsers allow you to quickly review the images from your sortie and determine if you captured all the images necessary to meet the mission's requirements. You can see if you captured images of the target from all required angles, that you properly framed and focused each image, and whether questionable conditions such as shadows, overcast or turbulence will necessitate another sortie.

Discuss the "bad" examples found in the "Conducting an Imaging Sortie" section of the Airborne Photographer slides.

Additional Information

More detailed information on this topic is available in Chapters 6 & 7 of the *Airborne Photographer Reference Text*.

Evaluation Preparation

Setup: The evaluation should be conducted with a digital camera and its user manual, a computer and a media card reader. The evaluator should set up a folder on the computer to which the student will transfer photos.

Brief Student: You are an Airborne Photographer trainee asked to transfer images to and view images on a computer.

Evaluation

Performance measures

	<u>Results</u>	
1. Set up a mission folder with two sub-folders (RAW and another).	P	F
2. Transfer several images (into the RAW sub-folder) from a camera to a computer using the camera's cable and via a media card reader.	P	F
3. Copy the images into the other sub-folder. Demonstrate browsing images using a browser and/or editing program.	P	F
4. Describe what data must be recorded to complete the image processor datasheet.	P	F
5. Demonstrate how to view images on a computer.	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.

Airborne Photographer O-2206

DISCUSS CAP IMAGE/GRAPHICS REQUIREMENTS AND IMAGE PROCESSING SOFTWARE

CONDITIONS

You are an Airborne Photographer trainee and must discuss the typical graphics requirements for photos.

OBJECTIVES

Discuss image graphics requirements and the information needed to use the CAP Image Processing software.

TRAINING AND EVALUATION

Training Outline

As an Airborne Photographer trainee, knowledge of the graphics requirements needed for image upload is essential.

A. Typical Graphics Requirements.

The *CAP Image Processing Program* is simple application which automatically watermarks digital imagery with geographically identifying details (e.g., target name, latitude/longitude, time on target, and picture direction). If required by the customer, the aircrew needs to record the following information in order to complete the image processor picture datasheet (Excel spreadsheet):



Use of a Photography Log that lists all required information is essential. An example is the CAP Photo/Recon Log found in the CAP Flight Guide.

An alternative is using a stand-alone GPS in tracking mode (track log) to record the required information, which is then downloaded to a computer and matched with the photos taken on the sortie. This is discussed in AP O-2218.

B. CAP Image Processing Software template

The following lists the information required by the CAP Image Processing template picture spreadsheet. Once completed, the spreadsheet is utilized by the Image Processing software to watermark the photo.

Filename	Target ID	Target Name	City	State	Lat	Long	Zulu Date	Zulu Time Over Target	Picture Heading (True)
123.jpg	1	Signal Peak	Irvine	CA	34 15.5	117 30.4	30-Oct-09	2100	230

1. **Filename:** Must match the filename of the image exactly; don't forget the file extension (usually ".jpg")
2. **Target ID:** Can be any value; used to match the image back to the target deck / customer request
3. **Target Name:** A descriptive name for the target
4. **City:** The city/town where the target is located
5. **State:** The state where the target is located
6. **Lat:** The latitude of the target (valid formats are "DD MM SS", "DD MM.MM", or "DD.DDDD"). North America is assumed, so do not enter N/S. Latitude will be converted to the AFNORTH standard format (DDD, MM.M) on the output image.
7. **Lon:** The longitude of the target (valid formats are "DDD MM SS", "DDD MM.MM", or "DDD.DDDD"). North America is assumed; do not enter E/W or +/- . Longitude will be converted to the AFNORTH standard format (DDD, MM.M) on the output image.
8. **Zulu Date:** The Zulu date of the photo (valid format: "DD-MMM-YY")
9. **Zulu Time:** The Zulu time of the photo (valid format: "HH:MM")
10. **Picture Heading:** The heading the camera was facing when the image was captured (in TRUE degrees, not magnetic)

C. Web Mission Information Reporting System (WMIRS)

The following lists the information required by the WMIRS image management feature. [Note: when you enter the image date, use the calendar feature to ensure you enter the date in the proper format (MM/DD/YYYY)] The program watermarks the photo using this information during upload.

1. Mission number (e.g., 09-T-5421)
2. Description
3. Location (state two-letter abbreviation)
4. Mission type
5. Latitude (degrees and minutes)
6. Longitude (degrees and minutes)
7. Image date (e.g., 03/24/2011)
8. Direction picture taken (can be degrees or N, NW, E, SSE, etc.)
9. Time over target (Zulu)
10. Location (city and state)
11. Objective (name of object imaged, such as "Chalmette Refinery" or "Coal-fired power plant")

[WMIRS Main Menu](#)

Image Management (Upload an Image)

Mission No:	09-T-5421
Description:	
Location:	TX
Mission Type:	
Image File:	C:\Documents and Settings\Richard Simerson\My Doc <input type="button" value="Browse.."/>
Coordinates (Center of Image)	
Latitude:	Deg:N <input type="text" value="35"/> Min: <input type="text" value="18"/>
Longitude:	Deg:W <input type="text" value="101"/> Min: <input type="text" value="44.5"/>
Image Date:	<input type="button" value="14"/> <input type="text" value="05/24/2009"/>
Direction picture taken:	<input type="text" value="E"/> Can be degrees or N, NW, NNW, etc.
Time Over Target (Zulu): Example: 1030Z	<input type="text" value="2045"/>
Location: City and State Example: Biloxi, MS	<input type="text" value="Amarillo, TX"/>
Objective: Name of object imaged (from collection deck when available) Example: Chalmette Refinery	<input type="text" value="Coal Fired Power Plant"/>
Is this image already captioned?:	<input type="radio"/> Yes <input checked="" type="radio"/> No
<input type="button" value="UPLOAD IMAGE"/> <input type="button" value="Reset"/>	

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Additional Information

More detailed information on this topic is available in Chapters 6 & 8 of the *Airborne Photographer Reference Text*. This task may be combined with AP O-2207, *Prepare an Image with CAP Graphics utilizing Imaging Processing Software*.

Evaluation Preparation

Setup: The evaluation should be conducted using a digital camera and a computer with the CAP Image Processing software installed. Access to WMIRS is also required.

Brief Student: You are an Airborne Photographer trainee asked what information (graphics requirements) are required by the CAP Image Processing software and for photo uploads in WMIRS.

Evaluation

Performance measures

1. Discuss the information required by the CAP Image Processing software and WMIRS.

Results

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.

Airborne Photographer O-2207

PREPARE AN IMAGE WITH CAP GRAPHICS UTILIZING IMAGING PROCESSING SOFTWARE

CONDITIONS

You are an Airborne Photographer trainee and must prepare an image using the CAP Image Processing software.

OBJECTIVES

Use the CAP Image Processing software and template photo spreadsheet.

TRAINING AND EVALUATION

Training Outline

As an Airborne Photographer trainee, knowledge of the graphics requirements needed for image upload is essential.

A. Typical Graphics Requirements.

The *CAP Image Processing Program* is a simple application that automatically watermarks digital imagery with geographically identifying details (e.g., target name, latitude/longitude, time on target, and picture direction).



If the customer wants the photos watermarked, the aircrew is responsible for collecting all of the required information during flight, and should know how to enter the information into the image processor spreadsheet once back on the ground.

Refer to <http://cap.ttar.org/imageprocessor/> to download the image processor and Excel template picture spreadsheet, and for instructions on how to use the program.

B. CAP Image Processing Software

To use the CAP Image Processor:

1. Place all of the source images into a folder on your computer.
2. Open the template photo spreadsheet and modify it:
 - a. Replace the sample record with your own data
 - b. Add additional records for each image which will be processed
 - c. Save the worksheet in "Comma-delimited values (CSV)" format using "Save As" (note: in Office 2008 you must go to "Save As" -> "Other Formats" and then select "CSV")
 - d. If prompted about "incompatible features", say Yes
3. Create a new folder to store the output of the program; this folder can be anywhere on your computer and can have any name.
4. Run the CAP Image Processor by double-clicking on CAPImageProcessor.exe (the file you downloaded above).
5. In the "Spreadsheet" selection box, select the worksheet you created/saved above in step 2.
6. In the "Picture Directory" selection box, select the folder containing all of the source images
7. In the "Output Directory" selection box, select the new (empty) folder you created above in step 3.
8. Click the "Process Images" button and wait a few minutes.
9. You will be notified when the process is complete, and your "Output Directory" will contain the processed images.

Notes on the fields in the picture worksheet:

- * Filename: Must match the filename of the image exactly; don't forget the file extension (usually ".jpg")
- * Target ID: Can be any value; used to match the image back to the target deck / customer request
- * Target Name: A descriptive name for the target
- * City: The city/town where the target is located
- * State: The state where the target is located
- * Lat: The latitude of the target (valid formats are "DD MM SS", "DD MM.MM", or "DD.DDDD"). North America is assumed, so do not enter N/S. Latitude will be converted to the AFNORTH standard format on the output image.
- * Lon: The longitude of the target (valid formats are "DDD MM SS", "DDD MM.MM", or "DDD.DDDD"). North America is assumed; do not enter E/W or +/- . Longitude will be converted to the AFNORTH standard format on the output image.
- * Zulu Date: The Zulu date of the photo (valid format: "DD-MMM-YY")
- * Zulu Time: The Zulu time of the photo (valid format: "HH:MM")
- * Picture Heading: The heading the camera was facing when the image was captured (in TRUE degrees, not magnetic)

Additional Information

More detailed information on this topic is available in Chapters 6 & 8 of the *Airborne Photographer Reference Text*. This task may be combined with O-2206, *Discuss CAP Image/Graphic Requirements and Image Processing Software*.

Evaluation Preparation

Setup: The evaluation should be conducted using a digital camera and a computer with the CAP Image Processing software installed. Access to WMIRS is also required. [NOTE: You do not need to take photos from the aircraft for this task; have the student take a few photos around your headquarters to use with this task.]

Brief Student: You are an Airborne Photographer trainee asked to prepare an image using the CAP Image Processing software.

Evaluation

Performance measures

1. Prepare an image using the CAP Image Processing software

Results

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.

Airborne Photographer O-2210
PREPARE FOR AN IMAGING SORTIE

CONDITIONS

You are an Airborne Photographer trainee and must demonstrate how to prepare for an imaging sortie.

OBJECTIVES

Demonstrate how to prepare for an imaging sortie.

TRAINING AND EVALUATION

Training Outline

As an Airborne Photographer (AP) trainee, knowledge of how to prepare for an imaging sortie is essential.

*The key to a successful imaging mission is **preparation, planning, patience, and practice!***

NOTE: This task and AP O-2211 should be performed in succession. This task has you prepare for a sortie to take pictures of a target using the “4-Square” and the “Bird’s Eye (Overview) imaging patterns. The sortie is then flown in AP O-2211, *Conduct an Imaging Sortie*. Imaging patterns are shown in Chapter 11 and in Attachments 3 – 7 of the *Airborne Photographer Reference Text*.

The great majority of our imaging missions are “fly back” missions, where we take photos, return to base, and then transmit the images to our customer. Missions where we take photos and transmit them from the aircraft (the older Slow Scan and the new Satellite Digital Imaging systems) require specialized equipment and training. However, the way we plan and take the photos is the same whether it is a fly back or SDIS mission.

1. Normally the mission staff will have obtained all the information the aircrew needs and has prepared a thorough briefing. However, an imaging aircrew needs to know all the information that is needed for a successful mission (and a satisfied customer) so they can ask for any information that is missing from the prepared briefing. To do this, you need some or all of the following details.
 - a. What and where is the target? Get the exact location of the target(s). Even though the customer just gives you a name or location (e.g., the “Lake Meredith” dam or the “southwest part of Pampa”), try to define the target location by at least two forms of navigational information such as Lat/Long and VOR radial/DME. Also ensure that you get a good verbal description of the target.
 - b. How the target and surrounding features should be imaged. Some questions to ask are:
 - 1) Is the target a single feature or facility, such as a building? If so, do they want as close a picture as possible (e.g., completely filling the frame)?
 - 2) Does the customer want to see the target and its environs to allow a larger perspective?
 - 3) Does the customer want to see roads and/or power lines leading to or from the target? If so, how far out from the target? You need this information to determine if you can get the desired results in one photo without losing the desired level of detail. You make have to take several photos to get the desired results.
 - 4) Does the customer want to see the extent of flooding below a dam or levee, or the entire trail of debris from a tornado?
 - 5) Does the customer want wide shots followed by close-ups?

- 6) Does the customer want the shots taken from a certain altitude (AGL) or from a specific angle to the target? Or is it OK to change altitudes and/or zoom as necessary to get the best shot? This will affect how you plan and fly the imaging pattern.
- c. Does the customer care about lighting conditions over the target area? The customer may not want photos taken under a heavy overcast, or in early morning or late afternoon light.
 - d. What information do they want to accompany the images (or be included in a video's audio commentary)? Accompanying information may include:
 - 1) Altitude (MSL or AGL, or both)
 - 2) Latitude and Longitude (GPS format OK?)
 - 3) Time (local or Zulu)
 - 4) Distance from target (nautical or statute miles?)
 - 5) Direction to target (e.g., looking South)
 - 6) Angle to target (e.g., 45°)
 - e. What image format do they want? Do they want JPG or an uncompressed image (e.g., TIF or RAW) or both? This also helps you determine how large (or how many) media cards you will need for the sortie.
 - f. What quality do they want (e.g., highest, medium or low)? This also helps you determine how large (or how many) media cards you will need for the sortie.
 - g. Do they mind if you crop images, if needed? This will help you determine if a particular image you took is acceptable. If your image contains part of the wheel, wing tip or strut but is otherwise OK, and the customer doesn't mind you cropping the image, then you won't have to re-shoot the picture; just crop the image once you're back at mission base.
 - h. Do they mind if you edit images, if needed? This will also help you determine if a particular image or set of images you took is acceptable. If your image was taken under cloud cover or some other condition that affects lighting but is otherwise OK, and the customer doesn't mind you adjusting image brightness or contrast, then you won't have to re-shoot the picture; just edit the image once you're back at mission base.
 - i. Do they want you to add text or symbols to the images? This may include some of the information listed above, along with arrows or circles.
 - j. How do they want you to name the image files? Be specific, especially as to the sequence of information contained in the file name. For example: Date (mm/yy) / mission number / sortie number / photo (sequential) number.
 - k. How do they want you to send the images? If the customer wants you to e-mail the images this may affect file format and quality (file size) settings. If you do e-mail the images, ask what information the customer wants in the "Subject" and "Remarks" areas of the e-mail.
 - l. What is the e-mail address of the customer or customers? Do they want you to cc: or bc: (blind copy) anyone? Do they need to enter your e-mail address in their "anti-spam" software so it isn't blocked? Do they want you to call before sending the images, and if so, what is the phone number (plus a backup)?

2. Once the mission staff is satisfied they have determined the mission objectives, they will put together the briefing package for the aircrew(s). In addition to the briefing items specific to the imaging mission (see above), information should include:
 - a. Terrain, obstacles and ground cover around the target(s)
 - b. Weather (local and target area)
 - c. Hazards to flight and military routes (local and search area)
 - d. Aircraft separation (will others be in the area?)
 - e. Communications call signs, frequencies and procedures
 - f. Time format (local or Zulu)

NOTE: If the customer really doesn't know exactly what they want (e.g., they just want you to perform damage assessment and take video or photos of the damage), the staff should include time for a recon survey of the damage. The crew will then decide what pictures are needed and how to get them. Also, a refueling stop may be necessary to safely complete the sortie.

3. The AP and the Mission Pilot must work closely to ensure a successful imaging mission. Planning the type of pattern(s) to be flown (see below for examples) and reviewing the communications between the pilot and AP go a long way in assuring a successful outcome. Preferably, a third crewmember should be included to keep a photo log and assist the crew by monitoring the scene during shooting and/or communicating with ground assets.
 - a. The Mission Pilot and AP should also be aware of the information necessary to complete a successful mission, just as mission staff (see above). This allows the aircrew to know whether or not they got a complete briefing, and acts as a backup to mission staff. This information also is a factor in deciding how the AP will set up the camera or camcorder.
 - b. Make certain that each member of the crew knows their responsibilities during each phase of the flight. The AP is normally the Mission Commander when the aircraft is in the vicinity of the target, while the Mission Pilot retains responsibility for the safety of the flight as Aircraft Commander.
 - c. When planning, remember that the more pictures you take the better chance you have of getting the required shots; therefore, allow for plenty of time over the target. Also, plan extra time to reposition the aircraft and re-shoot some images.
 - d. If the customer really doesn't know exactly what they want (e.g., they just want you to perform damage assessment and take video or pictures), plan extra time after the ID Pass for a recon survey of the damage; the crew will then decide what pictures are needed and how to get them. Determine if a refueling stop will be necessary to safely complete the sortie.
 - e. Weather can be more of a factor in video imaging than in other missions (e.g., overcast or high clouds can affect the quality of your shots). Get as much information as you can, especially in the target area. If a front is passing through, it may be best to delay launch in order to improve your chances for a successful imaging mission.

- f. Determine Photography Log requirements and brief the Scanner on data needed and how the Mission Pilot and AP will communicate this information. If you will be taking multiple photos, you may use 3x5 target cards instead of the photo log.
 - g. If shooting video, determine what needs to be included in the commentary and discuss how to set up the Audio Panel and Intercom during the run in order to minimize extraneous conversation (including ATC communications).
 - h. As with all CAP mission planning, ensure you get enough information to fill out the CAPF 104 in WMIRS.
4. Both the Mission Pilot and the AP must be familiar with how any particular imaging pattern will be approached and flown; that's why planning is so essential to a successful mission. Once you decide on which type of pattern to use (covered in a separate task), fill in all the data you need (e.g., lat/long of all entry and turning points) to fly the pattern using the GPS and/or VOR.

Don't plan for less than 15 minutes per pattern, and add some additional time (e.g., 10 minutes) to review the images and re-shooting at least one image. Don't set an artificially short time to obtain the images.

- a. How the Mission Pilot maneuvers the aircraft into the proper position for each shot is very important. The approach to the imaging pattern should be stable, and the AP must be given enough time to analyze current conditions and set up for the photo or video imaging run.
- b. Aerial Imaging flight patterns are always flown at 1000' AGL or higher.
- c. Every imaging pattern starts with an "ID Pass" that allows you to verify the target and note its coordinates. Examine the target, its surroundings, and lighting conditions. *Verify that what you see is what you planned for and that you can properly frame the target*; if not, have the Mission Pilot pick a safe location to loiter and re-plan how to perform the imaging run (e.g., determine the altitude, angle and directions you need to get the best photos) and how you wish to frame your photos.
- d. If you are performing damage assessment and didn't know the extent or type of damage to expect when you left on the sortie, the ID Pass will be followed by a recon survey. The circling flight pattern is a good pattern to use to survey of damage. Also, you may want to sketch the damage to help you decide what images you need and what imaging flight patterns to use.

Note: You may need a combination of flight patterns and/or need to make several runs to capture all the damage. Be sure to check your fuel status as you may need to refuel and return to complete your sortie, and update Mission Base on your new sortie time assumptions.

- e. After the ID Pass (and damage survey, if needed), fly the pattern. Remember to fly slowly enough so the AP can get several photos from each angle or side.
5. Perform an inventory to make sure you have everything you need to accomplish the mission. At a minimum check for:
- a. Camera/GPS batteries charged (including spares). Note: If batteries get too cold they will weaken and even stop working. If it's cold keep the camera and batteries with you; don't leave them in the airplane overnight. If it's really cold, carry the spare batteries in your pocket where your body will keep them warm.

- b. Memory cards with sufficient capacity (including spares).
 - c. Filters (as needed). A UV filter should normally be installed to protect the lens.
 - d. Working condition of the camera and lens cap straps.
 - e. Photo Log or 3x5 target cards, Recon Sketch Sheet and Image Pattern Planning sheets, along with a good clipboard.
 - f. Cleaning supplies.
 - g. If you're using a camcorder, ensure you have the microphone adapter.
 - h. If you intend to stop away from mission base between sorties, take the battery charger along.
 - i. A light jacket or XXL black T-shirt or equivalent to use as a "portable darkroom" for reviewing images on the LCD screen.
6. Adjust Camera Settings.
- a. Turn on the camera and check status. Look for a full battery charge, sufficient space on the media card, and other settings as listed below.
 - b. Set the exposure mode, usually Auto or Program. Also, determine whether you will be shooting normally (single frame) or if you need to set the burst (continuous) shooting mode.
 - 1) You should use the fastest shutter speed you can (no less than 1/250s and at least 1/1000s when using telephoto) because short shutter speeds mean less jitter. Normally, the Auto (Program) mode will select a fast-enough shutter speed
 - 2) In the Auto mode, make sure the focal point is set to 'Infinite' if necessary
 - c. You may turn off the color LCD to save batteries. However, you will need the LCD to review your images before leaving the target area.
 - d. Disable (turn off) the digital zoom.
 - e. Disable (turn off) the flash.
 - f. Disable (turn off) the AF-Assist Lamp. Usually located near the lens barrel, an Autofocus Assist Lamp assists focusing when taking photos in low-light conditions. When the shutter-release button is depressed half-way, a light beams from the camera to illuminate the area where the camera is focusing. However, the lamp's short range is useless for taking photos from an aircraft. If you are shooting through a closed aircraft window (you shouldn't), the lamp may confuse the camera's focus.
 - g. Disable (turn off) Image Stabilization, if necessary. This feature, not found in most cameras, is designed for stabilizing hand tremor while hand-holding; it may not correct for large amounts of wobble resulting from a moving airplane. More importantly, most of today's image stabilization technology doesn't prevent blur if the subject itself is moving (which is the case when you are shooting from a moving

aircraft). Some systems are better than others: some help, but others may actually make things worse. Try taking images with the stabilization both ON and OFF to see which works better. If in doubt, turn it off.

- h. Check or set image type, resolution and quality depending on how the images will be used. The best choice for the majority of CAP imaging missions is JPEG with the highest resolution with the best quality. This results in high-quality, low-compression files of manageable size.
 - 1) If you know that the customer won't want to print the photo or examine the target in great detail, you may choose lower settings. If you only intend to e-mail the pictures (or the images are only going to be viewed on a monitor or posted to a Web page), you can use lesser quality settings if you don't want to bother to resize or compress the images before they are sent to the customer.
- i. If having the shortest time possible between pictures is important, you can shorten (e.g., by about 0.5 seconds) or deactivate the instant image review function that automatically displays the image on the LCD immediately after it's taken. This saves time between photos and also saves your batteries. This can be used in addition to selecting the camera's burst (continuous shooting) mode.
- j. Set the Diopter Correction. Look at something within shooting range, raise the camera's viewfinder to your eye, and adjust the diopter until the scene or the focus brackets are sharp.
- k. If you are using a GPS that doesn't connect to your camera, synchronize your camera's time to that of the GPS. Ensure the GPS is in the "tracking" mode (this is usually the default mode on a GPS).

7. Prepare the aircraft for the sortie.

- a. Clean the aircraft windows before you leave, and make sure you have cleaning supplies on board. This is for safety reasons, not photography purposes, as you should avoid shooting through windows. Windows are made of Plexiglas and are not flat. With telephoto lenses they often will cause distortion that makes the images wavy.
- b. If you will be shooting out the right front window of the aircraft, remove the window holding screw. Be careful to retain the screw's bushing or washer as you remove the screw; place the screw in a secure container (e.g., a 35mm camera plastic film case works great, or use a small zip-lock bag) and put it where you can find it later (e.g., the aircraft glove compartment or in the camera bag).
- c. Enter waypoints into the GPS before startup.
- d. Set up the Audio Panel and Intercom. Check the operation of the intercom (all positions) and perform a communications check of the CAP FM radio from all positions.
- e. If applicable, turn on the laptop and check for full battery charge and proper settings.
- f. If applicable, connect the portable GPS to the camera and check for proper operation.
- g. Check the imaging equipment. If you will be shooting video, test the camcorder and audio connection for proper operation.

Note: A shot of the aircraft 'N' number with the camera or camcorder provides a good "starting image" for the sortie, particularly if there are images on your media card or tape from a previous sortie.

- h. Arrange your equipment for easy access, but ensure lightweight objects such as charts and logs are not lying loose where they can be blown about the cabin when you open a window to take pictures.

Additional Information

More detailed information on this topic is available in Chapters 10 & 11 of the *Airborne Photographer Reference Text*.

Evaluation Preparation

Setup: The evaluation should be conducted with a digital camera and accessories, a local aeronautical sectional, a *Customer Imaging Request Checklist*, an *Imaging Sortie Checklist*, a Photo Log (or target cards), 4-Square & Bird’s Eye imaging pattern planning sheets, a CAPF 104 (WMIRS), and an aircraft. The evaluator should play the part of Mission Pilot and/or Mission Briefer.

Pick a target that is suitable for both the “4-Square” and “Bird’s Eye (Overview)” imaging patterns. The planning for this sortie will be used in AP O-2211, *Conduct an Imaging Sortie*.

Brief Student: You are an Airborne Photographer trainee asked to prepare for and help plan a video imaging sortie.

Evaluation

<u>Performance measures</u>	<u>Results</u>	
1. Using the <i>Customer Imaging Request Information Checklist</i> , discuss the importance of determining exactly what a customer expects and needs from a particular imaging mission	P	F
2. Concerning an aircrew briefing for an imaging mission, discuss:	P	F
a. Why it is important to be aware of the information necessary to complete a successful mission, just as mission staff		
b. Crewmember responsibilities during each phase of the flight		
c. Factors to consider when determining sortie duration		
d. Effects of weather on an imaging sortie		
e. The importance of the Photography Log (or 3x5 target cards)		
f. Special requirements for video sorties		
3. Obtain a briefing for an imaging sortie that includes both the “Four Square” and “Bird’s Eye (Overview)” imaging patterns.	P	F
4. Demonstrate equipment inventory and camera set up and aircraft preparation using the <i>Imaging Sortie Checklist</i> .	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.

Airborne Photographer O-2211
CONDUCT AN IMAGING SORTIE

CONDITIONS

You are an Airborne Photographer trainee and must demonstrate how to successfully conduct an imaging sortie.

OBJECTIVES

Conduct an imaging sortie using “4-Square” and “Bird’s Eye” imaging patterns.

TRAINING AND EVALUATION

Training Outline

As an Airborne Photographer trainee, knowledge of how to conduct an imaging sortie is essential.

Preparation for this sortie was completed in Task AP O-2210, *Prepare for an Imaging Sortie*. This exercise requires an aircraft, a Mission Pilot proficient in flying imaging sorties, and a Photo Log keeper (the Evaluator). Use the applicable “4-Square” and “Bird’s Eye (Overview or Look Down)” imaging patterns for this exercise.

The student should have a copy of the *Imaging Sortie Checklist* (see Attachment 2 of the *Airborne Photographer Reference Text*) for the following.

1. Transit to the Target Area:
 - a. Once you’re out of busy airspace, relax the sterile cockpit rules but maintain situational awareness.
 - b. Double-check navigational settings to be used in the search area.
 - c. Review search area terrain and obstacles.
 - d. Update in-flight weather and file a PIREP.
 - e. Review methods to reduce fatigue or combat high altitude effects during the sortie.
2. Approaching the Target Area:
 - a. Turn on exterior lights to maximize your visibility so others can "see and avoid." NOTE: You may need to turn off the strobe lights so they will not affect the photos, particularly in low-overcast conditions.
 - b. Review sortie objectives and crew communications, and set the audio panel and intercom for imaging pattern communications.
 - c. Double-check radio and navigational settings and check navigational equipment against each other (detect abnormalities or failures).
 - d. Remember hourly updates - Altimeter setting (closest source) and fuel assumptions, and times to report “Operations Normal.”
 - e. If applicable, connect the portable GPS unit to the camera and ensure it locks onto the satellites (usually denoted by solid “GPS” symbol or letters on the camera display).

If you're using a GPS that doesn't connect to your camera, turn on the GPS (tracking mode) and ensure it locks onto a sufficient number of satellites.

- f. Stabilize at 'Target ID Pass' heading, altitude and airspeed (not $< V_x$) at least two miles out. This allows time for everyone to get set for the photo or video run, and gives everyone the opportunity to see what visibility and turbulence conditions will be encountered over the target area. Implement sterile cockpit rules.
- g. Log the time (and Hobbs) and report "In the Search Area."

3. The ID Pass:

- a. When you pass over the target, log the latitude and longitude and verify you have the right target. If you have DME, log the radial and distance.
- b. The Mission Pilot may enter the coordinates into the GPS as a 'User Waypoint', and display this waypoint in the navigation mode. This will give the Mission Pilot an additional means to ensure accurate distance from the target during passes.
- c. Determine if lighting conditions are acceptable; if not, determine whether or not to proceed with the sortie. *Verify that what you see is what you planned for and that you can properly frame the target; if not*, have the Mission Pilot pick a safe location to loiter and re-plan how to perform the imaging run (e.g., determine the altitude, angle and directions you need to get the best photos) and how you wish to frame your photos.
- d. If needed, perform a damage survey and plan the imaging pattern(s) necessary to fully document the damage. Reassess your fuel status and plan a refueling stop if needed. Update Mission Base on your new sortie time assumptions.

4. Preparing to Enter the Imaging Pattern:

- a. Fly at least 1000' AGL during daylight.
- b. Ensure you're flying slowly enough to allow the AP to get several photos from each angle or side of the imaging pattern.
- c. If applicable, turn on the separate (stand-alone) GPS camera and ensure it locks onto the satellites
- d. While the Mission Pilot sets up for the first run, the AP should ensure the camera's neck or wrist strap is secured and the lens cap is removed. If the lens cap has a strap attaching it to the camera, hold it in your hand so that it will not be blown in front of the lens while shooting; if it has no strap, store the lens cap in the camera bag.
- e. Check that the camera is on; it may have automatically turned itself off. [Don't confuse this with the 'sleep' mode where the camera turns off the LCD to conserve power; a quick touch of the zoom switch will wake the camera.] Verify portable GPS signal is stable, if applicable.
- f. The third crewmember readies the Photo Log. It is important to keep a log of the photos you take, as it is not always obvious what and how you were looking at a target after the fact. Which way was North? Was that access road oriented E-W or ENE-WSW? Good communications between the AP and the Photo Log keeper will ensure you have all the information you need to explain your photos.

If you are using 3x5 target cards instead of a Photo Log, get them handy. Take a photo of the sortie card (mission number, N number and sortie number).

g. Secure loose items (e.g., charts) in the cabin and then open the window.

5. Taking the Images:

a. Steady the camera:

- 1) Choose a comfortable, sustainable posture. If you're sitting in the front right seat, slide the seat back so that you are centered in relation to the window (let your pilot know before you slide your seat backwards or forward).
- 2) Avoid contact with the aircraft (i.e., don't rest your forearm or elbow against the window frame)
- 3) Use both hands. Put one hand through the grip (especially true for camcorders) and use your free hand to help support the camera
- 4) Use the optical viewfinder, pressing the camera to your head and holding it against your nose or cheek with both hands (but make sure your fingers don't cover the camera's light sensor or brush against the camcorder audio plug)
- 5) If you have tested it and know it helps, use the camera image stabilization feature. Otherwise, leave this feature turned off

b. Taking photos:

- 1) A typical imaging pattern begins with a "panoramic view" of the target. The aircraft will be at least 1000' AGL and one nm south of the target, with the pilot flying so that the AP is looking to the North. Once this is completed, you move in for close-up shots (not <1000' AGL) of the target from each of the four cardinal points (North, South, East and West). Note: the approach is different when taking Bird's Eye (Overview or Look Down) photos.
- 2) As the aircraft closely approaches the point where you intend to shoot, begin framing the shot. Normally, this means centering the target in the viewfinder. Some missions require different framing, as dictated by the circumstances or by the customer.
- 3) When you near the shot point, take a photo of the 3x5 target card (if applicable). You should then pre-focus on the target for faster camera response; focus on an object that is currently the same distance away as the target will be once you are lined up (i.e., in the same plane as the target). Once the target moves into frame, press the shutter button the rest of the way down to take the picture.
- 4) Keep the Photo Log keeper aware of what you are shooting, as you planned before the sortie. It is easier on the log keeper if you tell them when you will be taking several photos per leg. On each leg, tell the log keeper the following photos will be taken "looking east" or "looking northeast" or "looking between the northern-most buildings," then call out "shot 1, shot 2," This allows the log keeper to quickly and accurately log the photos.
- 5) If you are going to take photos of different targets on the same sortie, take a picture of the aircraft wing, wheel, or interior between targets to act as a "target separator."

c. Using the zoom:

- 1) Optical zoom should be used sparingly, but it can be a tremendous help in composing a shot because you'll rarely be in exactly the best location to take a photograph. *Let the zoom improve your position*, either by bringing the target a little closer (optically) or backing off a bit. [Getting closer is the obvious attraction of any zoom, but zooming out can be very helpful by, for example, revealing a road that may be used by emergency vehicles to get to the scene].
- 2) Zoom in until you get the frame you want or until the image begins to shake; if the image starts shaking, zoom out until the image becomes steady.
- 3) Note: If you do use the telephoto lens to zoom in on a target, we recommend you take several images to increase the chance that you will get a properly focused photo. Also, you should carefully review the photo(s) before moving on to ensure the image is sharply focused. If available, use the camera's magnifier function when reviewing the images.
- 4) Minimize zooming during low light conditions.

6. Determine Success or Failure. The AP usually knows whether she got all the required shots, and the third crewmember can back her up by checking the Photo Log. However, you must check and make sure because you don't want to fly all the way back to mission base and then discover that you missed a shot, or that your shots weren't framed properly.

- a. If time allows, you may check each shot as it appears on the camera's LCD screen after each shot. However, since the display is usually set to come on for only a few seconds this may not be practical. Additionally, it may be so bright in the cabin that you can't see the image on the LCD.

In situations like disaster reconnaissance, the time you spend reviewing each photo on the LCD screen can make you miss the next one. Large memory cards let you shoot scores of photos and review them when there is a break in the action, keeping only the best and deleting the obvious duds.

- b. After you have flown the pattern, have the Mission Pilot pick a safe spot nearby and circle while you check the photos or video. If you have difficulty seeing the images on the LCD screen, look at it under a large dark T-shirt, jacket or blanket (i.e., a portable dark room). [Note: A LCD hood helps minimize the glare on a digital camera LCD monitor because it shields the monitor from bright overhead light and from light coming from the side. Unless you buy a LCD hood made for a specific model, universal LCD hoods attach to digital cameras by Velcro, an elastic strap or by attaching it to the tripod thread.]

Most cameras offer a LCD magnification feature in the review mode that allows you to zoom in on the image (usually 2x and 4x) and scroll to look at different parts of the image. This allows you to check finer details such as focus.

If using the portable GPS, ensure the coordinates were recorded with the images.

- c. Log time (and Hobbs) and report "Out of the Search Area."
- d. Double-check heading and altitude assigned for transit to next target or return to base. Relax sterile cockpit rules.

7. After the Sortie:

- a. Make sure you have all your equipment before you leave the aircraft.
- b. Clean the windows for the next sortie.
- c. If no more imaging sorties will be flown in the aircraft, replace the aircraft window screw (and bushing or washer) if it was removed for your flight.

8. Debrief:

- a. Transfer your photos to a computer as soon as possible. Verify that the pictures were successfully and completely transferred by looking at each image on a monitor before you erase the images on the media card. Then determine if the photos meet all the mission objectives and requirements.

Some mission bases will just have you give them the media card and Photo Log (or target cards). In this case, be sure to put one of your spare cards back in the camera, check that it is empty, and put the camera back in its bag.

- b. Take a short break and then meet to complete the CAPF 104 (WMIRS):

- 1) Fill in 'ATD' and 'Actual Landing Time' on the front of the form
- 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. This should include lighting conditions and other factors that affected your imaging.
- 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. . . If you can't upload all the files, 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. Enter a description of what photos or video was taken, and to whom and how they were sent. Also write "Photo Logs attached" if mission base wants copies attached to the 104 instead of filling in the CAPF 104b.
- 8) Ensure the 'Hobbs To/From' and 'Hobbs in Area' entries equal the 'Hobbs Total' hours entry
- 9) Ensure all entries and sketches/drawings are clear and legible

c. 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 in the Debriefing section of the CAPF 104, and may involve filling in all or part of the CAPF 104a
- 3) Review the photos (and Photo Logs) or video, comparing them against mission objectives and requirements (this may involve filling out the CAPF 104b)
- 4) Answer all questions as best you can, and be very honest about conditions and your actions
- 5) 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 on this topic is available in Chapter 12 of the *Airborne Photographer Reference Text*.

Evaluation Preparation

Setup: The evaluation should be conducted with a digital camera and accessories, an *Imaging Sortie Checklist*, a Mission Pilot proficient in flying imaging sorties and an aircraft. The Evaluator will act as the Photo Log keeper. Fly the sortie planned in AP O-2210 (suitable training target flying both the “4-Square” and “Bird’s Eye” imaging patterns).

Brief Student: You are an Airborne Photographer trainee asked to conduct the imaging sortie that was prepared for in AP O-2210, *Prepare for an Imaging Sortie*.

Evaluation

Performance measures

Results

- | | | |
|---|---|---|
| 1. Using the <i>Imaging Sortie Checklist</i> , discuss: | P | F |
| a. Transit to the target area | | |
| b. Approaching the target | | |
| c. ID Pass | | |
| d. Damage assessment survey | | |
| e. Preparing to enter the pattern | | |
| f. Taking the photos | | |
| g. Determining success or failure | | |
| h. After-sortie actions | | |
| i. Debrief, including the Debriefing section of the CAPF 104 (WMIRS) | | |
| 2. Demonstrate actions during transit, target approach, the ID Pass, the survey, preparations to enter the imaging pattern, taking photos, determining success or failure, after-sortie actions, completing the CAPF 104, and receiving a debrief using the <i>Imaging Sortie Checklist</i> . | P | F |
| 3. Use an image browser to review the images and determine whether or not they meet mission objectives and requirements. | 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.

Airborne Photographer O-2212

PREPARE AN IMAGE WITH CAP GRAPHICS UTILIZING IMAGING PROCESSING SOFTWARE

CONDITIONS

You are an Airborne Photographer trainee and must process an image taken from an aircraft using the CAP Image Processing software.

OBJECTIVES

Using images you take from an aircraft, process the images using the CAP Image Processing software and template photo spreadsheet.

TRAINING AND EVALUATION

Training Outline

As an Airborne Photographer trainee, knowledge of how to process airborne images for upload is essential.

A. CAP Imaging Processing program.

The *CAP Image Processing* program is a simple application that automatically watermarks digital imagery with geographically identifying details (e.g., target name, latitude/longitude, time on target, and picture direction).



The aircrew is responsible for collecting all of the information that will be needed to watermark (mission and positional information) an image during flight. This information will be entered into the image processor spreadsheet once back on the ground.

To use the CAP Image Processor:

1. Place all of the source images into a folder on your computer.
2. Open the template photo spreadsheet and modify it:
 - a. Replace the sample record with your own data
 - b. Add additional records for each image which will be processed
 - c. Save the worksheet in "Comma-delimited values (CSV)" format using "Save As" (note: in Office 2008 you must go to "Save As" -> "Other Formats" and then select "CSV")
 - d. If prompted about "incompatible features", say Yes
3. Create a new folder to store the output of the program; this folder can be anywhere on your computer and can have any name.
4. Run the CAP Image Processor by double-clicking on CAPImageProcessor.exe (the file you downloaded above).
5. In the "Spreadsheet" selection box, select the worksheet you created/saved above in step 2.
6. In the "Picture Directory" selection box, select the folder containing all of the source images
7. In the "Output Directory" selection box, select the new (empty) folder you created above in step 3.
8. Click the "Process Images" button and wait a few minutes.
9. You will be notified when the process is complete, and your "Output Directory" will contain the processed images.

Notes on the fields in the picture worksheet:

- * Filename: Must match the filename of the image exactly; don't forget the file extension (usually ".jpg")
- * Target ID: Can be any value; used to match the image back to the target deck / customer request
- * Target Name: A descriptive name for the target
- * City: The city/town where the target is located
- * State: The state where the target is located
- * Lat: The latitude of the target (valid formats are "DD MM SS", "DD MM.MM", or "DD.DDDD"). North America is assumed, so do not enter N/S. Latitude will be converted to the AFNORTH standard format on the output image.
- * Lon: The longitude of the target (valid formats are "DDD MM SS", "DDD MM.MM", or "DDD.DDDD"). North America is assumed; do not enter E/W or +/- . Longitude will be converted to the AFNORTH standard format on the output image.
- * Zulu Date: The Zulu date of the photo (valid format: "DD-MMM-YY")
- * Zulu Time: The Zulu time of the photo (valid format: "HH:MM")
- * Picture Heading: The heading the camera was facing when the image was captured (in TRUE degrees, not magnetic)

Additional Information

More detailed information on this topic is available in Chapters 6 & 8 of the *Airborne Photographer Reference Text*. This task was also discussed in AP O-2206, *Discuss CAP Image Graphic Requirements and Image Processing Software*.

Evaluation Preparation

Setup: The evaluation should be conducted using an aircraft with Mission Pilot, a digital camera, and a computer with the CAP Image Processing software installed.

Brief Student: You are an Airborne Photographer trainee asked to take photos from an aircraft. Once you have returned to base, you must process an image using the CAP Image Processing software.

Evaluation

Performance measures

1. Process an airborne image using the CAP Image Processing software

Results

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.

Airborne Photographer O-2213
SEND IMAGES TO THE CUSTOMER

CONDITIONS

You are an Airborne Photographer trainee and must send images to the customer.

OBJECTIVES

Demonstrate how to e-mail images, upload an image into WMIRS, and transfer images to a USB thumb drive.

TRAINING AND EVALUATION

Training Outline

As an Airborne Photographer trainee, knowledge of how to deliver your images to the customer by e-mail or other internet-related methods is essential. You must also know how to upload an image into WMIRS.

A. Deliver your images via e-mail.

Before you send pictures across the internet, get them into a form guaranteed to be readable on the other end and that doesn't take up too much space. The common JPG format should be considered mandatory for e-mail; avoid BMP, TIF, or RAW unless your customer has special requirements. If you have picture in something other than JPG, use your imaging or e-mail software to convert it to JPG before you send it.

1. Sending and receiving images by e-mail can be challenging. Internet Service Providers (ISPs) limit the size of individual files and attachments to 1 or 2 GB (you can usually assume the limit is 1 GB) or if they do make it through the recipient may have problems viewing them, especially if they are using an older computer. Another problem with larger image files is that the process of conversion and encoding the file as an attachment can add increase the file's size by 10 – 35%.

NOTE: If both your and the customer's ISP allows large file transfers, just ensure the number of images you're sending in each e-mail adds up to a number lower than the limit.

NOTE: Many ISPs and/or users have anti-spam software installed. If the recipient tells you they haven't received your e-mail, ask them to ensure their ISP and/or personal anti-spam program is set to receive files sent using your e-mail address.

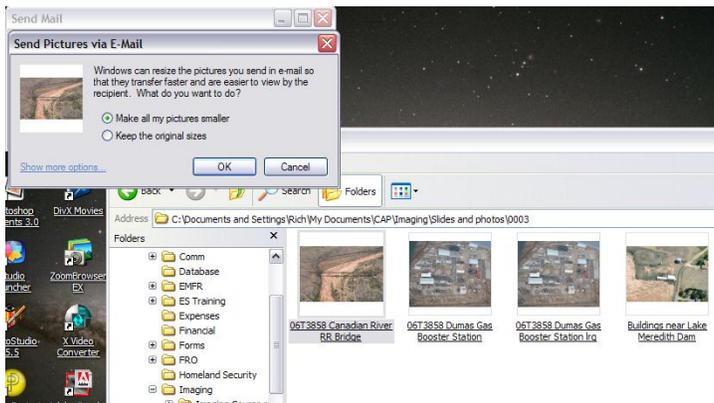
Most photo-related e-mail problems are eliminated by resizing a copy of your photo to a lower resolution. How low you go depends on what will be done with the photo. Here are some guidelines for resizing:

Intended use by customer	Size to send
Photo viewed on computer only	640 pixels x 480 pixels
Photo printed at 4" x 6"	800 pixels x 600 pixels
Photo printed at 5" x 7"	1024 pixels x 768 pixels

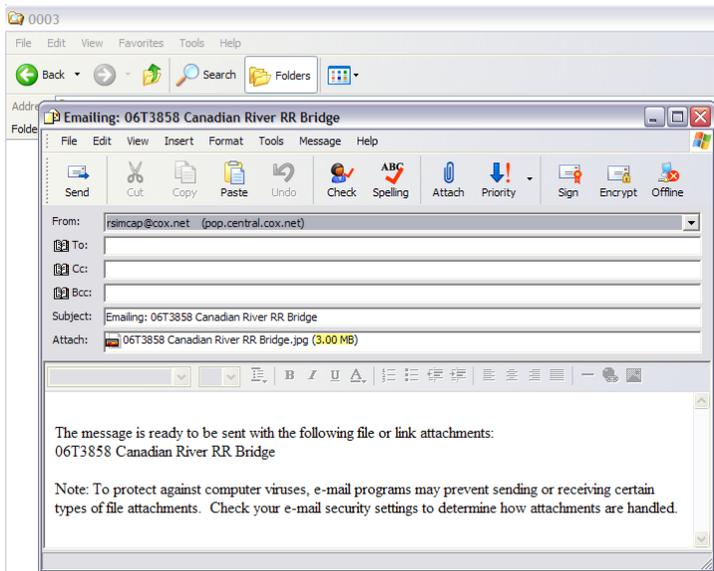
It's best to limit image size to no more than 800 x 600 when sending them as e-mail attachments. Windows can automatically resize images using the "Send Pictures via E-Mail Wizard" (covered below). If you have trouble sending or receiving a group of digital photos over the Internet, try sending each image in a separate e-mail.

2. If you are sending uncompressed files (e.g., RAW or TIF) you can reduce the image file by “zipping” it using Windows or a compression program such as *PKZip* or *WinZip*. However, image files that are already compressed (e.g., JPG) won’t benefit, and *WinZip* can even increase the file size. Compressing large files is easy to do in Windows: simply right-click a file or group of files, select Send To \ Compressed (zipped) Folder and then attach this folder to an e-mail. When sending a bunch of pictures, it’s much easier to send a compressed folder than to e-mail the images individually.
3. The simplest way to attach an image file to an e-mail is to open your e-mail program and attach the image file. However Windows gives you an easy way to resize (or not) your images, attach them to your e-mail and send them.

Navigate to the folder containing your images in Windows Explorer. You then select the image(s) you want to send, right-click on the image(s), scroll down to “Send To” and then select “Mail Recipient” from the list. When you release the mouse key Windows will open a message box giving you two options:

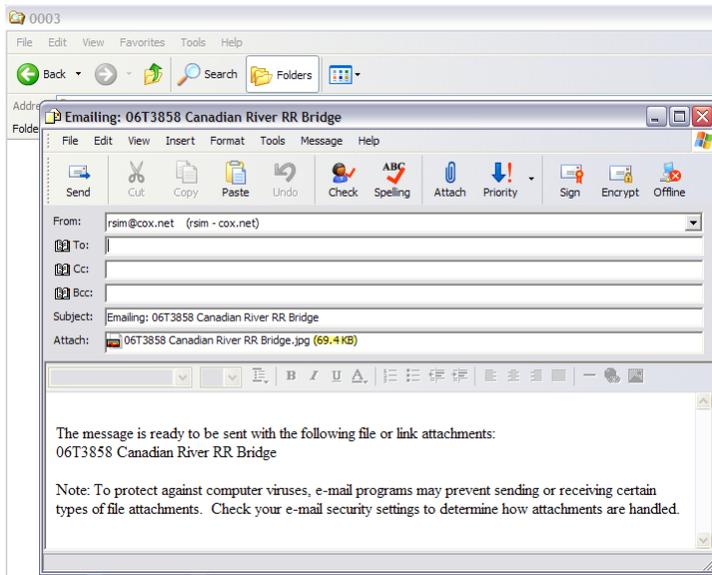


If you want to sent the images as is, select “Keep the original sizes” and click “OK.”



All that’s left to do is enter your customer’s e-mail address and hit Send.

If the customer just wants to view the images on a computer screen or monitor, leave the default “Make all my pictures smaller” selected and click “OK.” Note the Attach: section of the e-mail: the image was reduced from its original 3 MB (above) to 69.4 KB (below).



Sending the reduced-size images is a good way to send many large-size images to the customer for a quick assessment. You can then follow up by sending the images in their original size for a detailed assessment.

B. Images may be uploaded and shared with the customer using File Transfer Protocol (FTP).

File Transfer Protocol (FTP) is a standard way of sending and receiving files between your computer and any other computer on the Internet that supports FTP. There are many FTP applications out there that are simple and user friendly such as CuteFTP Lite; this application allows you to connect to a defined site and send and receive files by simply dragging and dropping.

C. Images may be uploaded and shared using Google Docs[®].

If you have a Gmail[®] account you can upload photos and share them via an e-mail invitation.

- a. Select "Documents" from the Gmail tool bar
- b. Select the "Upload" button
- c. Select and upload your photos
- d. Select "Back to Google Docs"
- e. Check the items you wish to share and select "Invite People" from the "Share" drop-down menu
- f. Enter the e-mail address and write your message, then select "Send"

If the e-mail was sent to another Gmail account they will be delivered into the account. If the e-mail goes to another account, they will receive a link to the uploaded photos.

D. Images may be uploaded and shared using Google Docs[®].

If you have a Gmail[®] account you can upload photos and share them via an e-mail invitation.

- Select "Documents" from the Gmail tool bar
- Select the "Upload" button
- Select and upload your photos
- Select "Back to Google Docs"
- Check the items you wish to share and select "Invite People" from the "Share" drop-down menu
- Enter the e-mail address and write your message, then select "Send"

If the e-mail was sent to another Gmail account they will be delivered into the account. If the e-mail goes to another account, they will receive a link to the uploaded photos.

E. The *Web Mission Information Reporting System (WMIRS)* provides a means to organize, display and watermark mission images. When enabled by mission command, crew or staff may view mission images and/or upload images into WMIRS. The program automatically watermarks images with the information entered during the upload process.

- Log into WMIRS, select "Current Missions/Sorties," and select the camera icon for the associated mission

Civil Air Patrol
Web Mission Information Reporting System (WMIRS)

[WMIRS Main Menu](#)

Current Mission List - 22 Active Mission(s)

[Refresh](#)
[List](#)

Line No	Agency Number/Comments	REQ Number	Mission Number	Mission Date	Wing	Mission Type	Air	Gnd	Approval Status
1	/ C8,C9,C16,C17,C20	REQ-SWR-MISC	SWR_MISC	10/01/08	SWR	CORP MISC	8	0	
2	/ C8,C9,C16,C17,C20	REQ-TX-MISC	TX_MISC	10/01/08	TX	CORP MISC	548	0	
3	/ A6, A8, A9, A15, A20	REQ-09-4313	09-A-5488 TRAINING	05/01/09	TX	Monthly A Mission	95	0	
4	/ B9, B12, B17, B15, B20	REQ-09-4314	09-B-5489 TRAINING	05/01/09	TX	Monthly B Mission	20	0	
5	/ UNFUNDED Aeros and Autos marshaling and GT training	REQ-09-4397	09-T-5626 TRAINING	05/08/09	TX	SAR TRNG	0	0	
6	/ Prof Flying	REQ-09-4449	REQ-09-4449	05/09/09	TX	OTH	0	0	
7	/ Prof Flying	REQ-09-4450	REQ-09-4450	05/09/09	TX	OTH	0	0	
8		REQ-09-4536	09-T-5743 TRAINING	05/13/09	TX	Proficiency	0	0	
9	/ Capt Don Anderson	REQ-09-4548	REQ-09-4548 TRAINING	05/18/09	TX	Proficiency	0	0	Wing/C Penden
10	/ Texas Wing SAREVAL	REQ-09-3811	09-T-5421 TRAINING	05/20/09	TX	SAR EVAL	67	47	
11	09M0467 / 406 EPIRB, LAUGHLIN, TX, SSGT BENNETT	REQ-09-4665	09-M-0467	05/20/09	TX	ELT	0	0	

WMIRS Data Current as of 05/26/2009 - 21:13:57 Eastern Time

- Images already uploaded can be viewed by location on a map or by scrolling down and selecting the date the images were uploaded. In both cases you can enlarge the image by clicking on it; the images are automatically watermarked with the information you entered prior to adding the image

Civil Air Patrol
Web Mission Information Reporting System (WMIRS)

[WMIRS Main Menu](#)

Type:

Comments:

Texas Wing SAREVAL

Click on camera to see image.



153 Total Images for Mission

1 Images from 25May2009 Shown

Click on Dates Below for other Images

Civil Air Patrol
Web Mission Information Reporting System (WMIRS)

[WMIRS Main Menu](#)

10 Images from 24May2009 Shown

Click on Dates Below for other Images

[25May2009](#) [24May2009](#) [23May2009](#) [21May2009](#) [20May2009](#) [17Jan2009](#)

Click on Image for full size image.



Coal Fired Power Plant
Lat: 35 18.000000 N
Lon: 101 44.500000 W
24May2009
615.7KB



Coal Fired Power Plant
Lat: 35 18.000000 N
Lon: 101 44.500000 W
24May2009
815.5KB

- To upload a new image, select “Add Image”

Civil Air Patrol
Web Mission Information Reporting System (WMIRS)

[WMIRS Main Menu](#)

Mission Number: 09-T-5421
Status: OPEN

[Images from Mission](#) [Add Image](#) [Manage Im](#)

Units Involved: TX
Date Opened: 20 May 2009
Description:
Location: TX
Mission Type:
Comments: Texas Wing SAREVAL



- Enter the required information for each image (example) and select “UPLOAD IMAGE”

Civil Air Patrol
Web Mission Information Reporting System (WMIRS)

[WMIRS Main Menu](#)

Image Management (Upload an Image)

Mission No: 09-T-5421
Description:
Location: TX
Mission Type:

Image File: [Browse...](#)

Coordinates (Center of Image)
Latitude: Deg:N Min:
Longitude: Deg:W Min:

Image Date:

Direction picture taken: Can be degrees or N, NW, NNW, etc.

Time Over Target (Zulu):
Example: 1030Z

Location:
City and State
Example: Biloxi, MS

Objective:
Name of object imaged (from collection deck when available)
Example: Chalmette Refinery

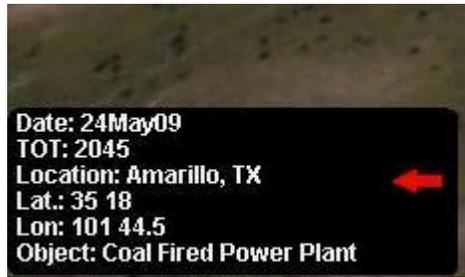
Is this image already captioned?: Yes No

[UPLOAD IMAGE](#) [Reset](#)

Copyright©, 2009 Civil Air Patrol, National Technology Center. All rights reserved. Page Generated: 26-May-2009 21:21:38.
Direct comments or problems to the [National Operations Center](#).
This application uses the [ColdFusion](#) middleware product from Macromedia, Inc. to integrate data with the web.

Security and Privacy Notice

- Each image is automatically watermarked with the CAP trefoil (upper left corner of the image) and the information entered prior to upload (lower left corner of the image)



F. If the internet isn't available but you still have a working computer, you will have to send the images by messenger.

The simplest way is to transfer the images to a USB thumb drive (also called flash or pen drives) and send the drive to the customer.

Since the price of these devices is so low, you should consider keeping a couple 1 or 2GB thumb drives for this purpose. If the customer doesn't return them, you can claim them as an expense under "Comm/Other Cost Claimed" on the CAPF 108.

Additional Information

More detailed information on this topic is available in Chapter 8 of the *Airborne Photographer Reference Text*.

Evaluation Preparation

Setup: The evaluation should be conducted using a computer with an e-mail account and access to a WMIRS sortie (any sort) that will allow the trainee to upload a photo. If available, a Gmail[®] account may be used. Additionally, a USB thumb drive should be available.

Brief Student: You are an Airborne Photographer trainee asked about how to send your images to a customer. As a minimum you will demonstrate how to transfer images from the computer via e-mail, WMIRS, and to a USB thumb drive. If you have a Gmail[®] account, you may also demonstrate how to transfer images via Google Docs[®].

Evaluation

<u>Performance measures</u>	<u>Results</u>
1. Discuss how to send images by e-mail, including potential problems with large files and anti-spam software, and then send an image via e-mail.	P F
2. Demonstrate how to upload an image in WMIRS.	P F
3. OPTIONAL: If you have a Gmail [®] account, you may also demonstrate how to transfer images via Google Docs [®] .	
4. Demonstrate how to transfer images to a USB thumb drive.	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.

Airborne Photographer O-2214
CAP and AFNORTH Guidelines for Photos

CONDITIONS

You are an Airborne Photographer trainee and must be familiar with photo guidelines.

OBJECTIVES

Discuss CAP and AFNORTH guidelines on photos.

TRAINING AND EVALUATION

Training Outline

As an Airborne Photographer trainee, knowledge of guidelines and restrictions for photos you upload is required. Remember, all mission photos are the property of CAP (and/or the customer).

A. CAP.

Before you send pictures across the internet, CAP may require you to superimpose the CAP logo on the photos. Both the CAP Image Processing software and WMIRS uploads will automatically do this for you.

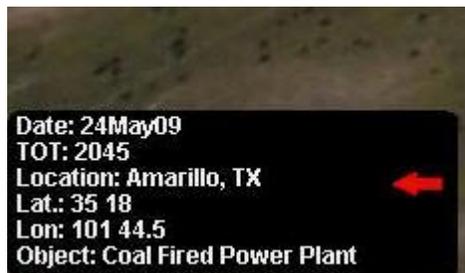
If you are not using these programs, check the software you are using to see if it will allow you to insert the CAP logo onto the photos; for example, *RoboGEO* allows you to do this.

B. AFNORTH.

AFNORTH currently requires the following data (unless the customer asks otherwise).

1. Date in Military format; for example, 03MAY11
2. Time Over Target (TOT) in Zulu time; for example, 1030Z
3. Location of the photo including:
 - City and State
 - GPS Coordinates in the format of N000 00.0 W000 00.0 (DDD, MM.M), and
 - A North-pointing arrow annotated
4. Name of the object imaged; for example, “Chalmette Refinery”

NOTE: The above information, including the North arrow annotation, is added to photos automatically when photos are loaded properly into WMIRS. Also, the CAP Image Processing software follows these requirements.



Additional Information

More detailed information on this topic is available in Chapter 8 of the *Airborne Photographer Reference Text*.

Evaluation Preparation

Setup: The evaluation should be conducted as a discussion. Actual performance of these tasks occur in AP O-2212 & -2213.

Brief Student: You are an Airborne Photographer trainee asked about CAP and AFNORTH photo requirements.

Evaluation

Performance measures

1. Discuss CAP requirements for photos sent to the customer.
2. Discuss AFNORTH image requirements.

Results

P F

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.

Airborne Photographer O-2215
DISCUSS IMAGING SORTIE PLANNING AND SAFETY

CONDITIONS

You are an Airborne Photographer trainee and must discuss the importance of planning for an imaging sortie, and safety concerns that are unique to imaging sorties.

OBJECTIVES

Discuss the importance of planning for an imaging sortie, and unique safety concerns.

TRAINING AND EVALUATION

Training Outline

As an Airborne Photographer (AP) trainee, knowledge of the importance of planning for an imaging sortie and the unique safety concerns involved is essential.

A. Planning

The details of actually planning for an imaging sortie is covered in AP O-2210. However, the AP needs to recognize early on the particular importance that planning plays in imaging sorties.

1. Normally the mission staff will have obtained all the information the aircrew needs and has prepared a thorough briefing. However, an AP needs to know all the information that is needed for a successful mission (and a satisfied customer) so they can ask for any information that is missing from the prepared briefing. This information is covered in detail in AP O-2210.
2. The AP and the Mission Pilot must work closely to ensure a successful imaging mission. Planning the type of pattern(s) to be flown and reviewing the communications between the pilot and AP go a long way in assuring a successful outcome. Preferably, a third crewmember should be included to keep a photo log and assist the crew by monitoring the scene during shooting and/or communicating with ground assets.
 - a. Make certain that each member of the crew knows their responsibilities during each phase of the flight. The AP is normally the Mission Commander when the aircraft is in the vicinity of the target, while the Mission Pilot retains responsibility for the safety of the flight as Aircraft Commander.
 - b. Both the Mission Pilot and the AP must be familiar with how any particular imaging pattern will be approached and flown; that's why planning is so essential to a successful mission. Once you decide on which type of pattern to use (covered in a separate task), fill in all the data you need (e.g., lat/long of all entry and turning points) to fly the pattern using the GPS and/or VOR.

Don't assume that your Mission Pilot is familiar with the particular requirements of flying imaging sorties; if the pilot isn't very familiar with the mechanics of flying imaging patterns and/or communications required between the pilot and the AP, take the time to go over these items before actually planning the sortie.

- c. Don't plan for less than 15 minutes per pattern, and add some additional time (e.g., 10 minutes) to review the images and re-shooting at least one image. Don't set an artificially short time to obtain the images.

B. Safety

The great majority of the safety precautions for an imaging mission were learned during Mission Scanner qualification. Some safety concerns that are unique to imaging sorties are:

1. Fatigue from using the camera or camcorder. Looking through a viewfinder for extended lengths of time can quickly lead to fatigue, air sickness or vertigo. Take frequent breaks and look out the window toward distant objects to relax and refresh your vision (and yourself).
2. Don't startle the pilot by abruptly moving your seat back. If you are taking photos from the right front seat, you will need to move your seat back to get into position to take photos. Be sure and warn the pilot before you do this, and be aware that it can affect the aircraft center of gravity.
3. Taking photos during significant turbulence or taking "look down" photos that require the pilot to fly the aircraft with a large bank angle can cause fatigue, air sickness or vertigo. Take frequent breaks under these conditions.
4. Taking photos out of the open right-side window can cause loose items to fly about the cabin. Having an open aeronautical sectional fly in front of the pilot's face isn't a good idea. Secure all loose items before opening the window.

Additional Information

More detailed information on this topic is available in Chapters 10 & 11 of the *Airborne Photographer Reference Text*. Actual planning for a sortie is evaluated in AP O-2210.

Evaluation Preparation

Setup: The discussion should be conducted with the evaluator playing the part of Mission Pilot and/or Mission Briefer.

Brief Student: You are an Airborne Photographer trainee asked to discuss the importance of planning for an imaging sortie and the unique safety concerns involved.

Evaluation

<u>Performance measures</u>	<u>Results</u>
1. Discuss the importance of planning for an imaging mission	P F
2. Discuss several safety concerns unique to imaging sorties.	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.

Airborne Photographer O-2216
Describe Target Control List

CONDITIONS

You are an Airborne Photographer trainee and describe a target control list.

OBJECTIVES

Describe a target control list.

TRAINING AND EVALUATION

Training Outline

As an Airborne Photographer trainee, you need to understand the purpose and use of a target control list.

Mission staff either develops or obtains a target control list and uses this to assign airborne photography sorties. The imaging sortie aircrew will use their assigned targets as a base for planning their sortie. This information is entered on the Photo Log or used to fill out the 3x5 Target Cards. The targets' latitude and longitude may also be programmed into the aircraft GPS as waypoints.

If you take photos of targets that were not assigned (i.e., targets of opportunity), then you must be sure to let mission staff know when you return from your sortie.

Additional Information

More detailed information on this topic is available in Chapters 10 & 11 of the *Airborne Photographer Reference Text*. Actual planning for a sortie is evaluated in AP O-2210.

Evaluation Preparation

Setup: The evaluation should be conducted as a discussion.

Brief Student: You are an Airborne Photographer trainee asked about target control lists.

Evaluation

Performance measures

1. Discuss the purpose and use of a target control list.

Results

P F

2. Discuss your actions if you take photos of targets not on the control list.

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.

Airborne Photographer O-2217
CONDUCT IMAGING SORTIE REHEARSAL AND AIRCREW BRIEFING

CONDITIONS

You are an Airborne Photographer trainee and must discuss the importance of thorough planning for an imaging sortie.

OBJECTIVES

Discuss how to preview (rehearse) an up-coming imaging sortie.

TRAINING AND EVALUATION

Training Outline

As an Airborne Photographer (AP) trainee, knowledge of how to preview an imaging sortie during planning is important.

A. Rehearsal

Sometimes it is possible to preview (rehearse) a sortie using various information and/or tools. Once you have identified how you will fly the sortie (usually using aeronautical sectionals and maps), you can research the sortie flight path using Google earth or other flight planning tools. If you have been given photos of the targets during your briefing, use these to supplement planning.

B. Aircrew Briefing

The mission staff briefer will give you all available intelligence for your sortie, and should brief you on any tools available to preview (rehearse) your sortie.

Details of an aircrew briefing, including questions you should ask to be sure the briefing is thorough, is found in AP O-2210, *Prepare for an Imaging Sortie*.

Additional Information

More detailed information on this topic is available in Chapters 10 & 11 of the *Airborne Photographer Reference Text*.

Evaluation Preparation

Setup: The evaluation should be conducted as a discussion, with the evaluator playing the part of the Mission Briefer.

Brief Student: You are an Airborne Photographer trainee asked about sortie preparation.

Evaluation

Performance measures

1. Discuss ways to “rehearse” your imaging sortie.

Results

P F

Airborne Photographer O-2218
SYNCHRONIZE CAMERA CLOCK and GPS – VERIFY TRACKING

CONDITIONS

You are an Airborne Photographer trainee and must demonstrate how to synchronize the camera clock to the GPS, and verify GPS tracking.

This task is only performed when you are using a separate (stand-alone) GPS to track your imaging sortie in order to provide critical information used by mission staff to label your photos. It is not necessary to do this when you are connecting a GPS device directly to your digital camera (e.g., Nikon D-200).

OBJECTIVES

Demonstrate how to synchronize the camera clock to the GPS, and verify or set the GPS to the Tracking mode (track log).

TRAINING AND EVALUATION

Training Outline

As an Airborne Photographer (AP) trainee, knowledge of how to synchronize the camera clock to the GPS and verify/set the GPS to the Tracking mode is essential.

NOTE: This task and AP O-2210 may be performed together. This task has you synchronize the camera clock to the GPS and verify/set the GPS to tracking mode (track log). The sortie is then flown in AP O-2211, *Conduct an Imaging Sortie.*

If you are using a GPS that doesn't connect to your camera, you must synchronize your camera's time to that of the GPS, and ensure the GPS is in the "tracking" mode (this is usually the default mode on a GPS). This allows the mission staff to correlate the photos with the track as shown on the GPS. This ability is especially important if the staff needs to geocode the photos you took.

NOTE: The Camera clock is adjusted to match the GPS clock, not vice versa. Most GPS devices will automatically reset their internal clocks to match that of the satellites. When this happens, it would undo any changes you previously made to the GPS time.

1. As part of the briefing, mission staff will provide the required time and time zone information for the aircrew to use when synchronizing the clocks of the Camera and GPS (the staff will also tell you whether to use local time or UTC/Zulu time).
2. Turn on the GPS, place it in clear view of the sky, and let it acquire satellites. Turn on the camera.
 - a. First, be sure that both devices are set to the time zone briefed by mission staff.
 - b. You may encounter cameras that can only be set to the top of the minute (not to the second). In this case, you must set the camera one minute ahead of the GPS device and then watch the seconds count up on the GPS. When it reaches 59 seconds, hit OK on the camera; this will start the camera's 'minute' at the approximate start of the GPS device's minute. [It is important that the camera and GPS be synchronized to within 5 seconds of each other (preferably within 2 seconds)]. NOTE: If the camera does not capture seconds at all it will not be useable for geocoding images.

3. Set the GPS to record a Track Log. Most do this automatically (default); if it isn't in the Tracking mode then select this mode from the menu.
 - a. If the GPS device offers the option, set the Track Log to record at 2-second intervals. It is permissible to select any interval setting between 1 - 4 seconds, but never more than 5 seconds.
 - b. Delete all previous Track Logs from the GPS. This function will be different on each GPS device, but be sure to either erase the current track log or start a new track log. This ensures that the track log in the GPS contains only the data from your upcoming sortie.

Additional Information

More detailed information on this topic is available in Chapters 10 & 11 of the *Airborne Photographer Reference Text*. These tasks are also listed in AP O-2210, *Prepare for an Imaging Sortie*.

Evaluation Preparation

Setup: The evaluation should be conducted with a digital camera and a portable GPS.

Brief Student: You are an Airborne Photographer trainee asked to synchronize a digital camera's clock to the GPS device's time, and verify or set the GPS to the tracking mode (track log).

Evaluation

<u>Performance measures</u>	<u>Results</u>
1. Synchronize the camera's clock to the GPS, to within 5 seconds of the GPS time.	P F
2. Set the GPS to the track mode (track log).	P F
3. If possible, set the GPS track log to record at an interval between 1 – 4 seconds.	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.

Airborne Photographer O-2219
CONDUCT AN IMAGING SORTIE DEBRIEF

CONDITIONS

You are an Airborne Photographer trainee and must discuss the importance of an imaging sortie debriefing.

OBJECTIVES

Discuss the importance of an imaging sortie debriefing.

TRAINING AND EVALUATION

Training Outline

As an Airborne Photographer trainee, knowledge of an imaging sortie debriefing is important.

Detailed information for sortie debriefing is demonstrated in AP O-2211, *Conduct an Imaging Sortie*. This task gives a brief overview of the process.

Preparing for the debriefing that follows the sortie includes looking over the photos you took and determining success or failure. If any of your assigned targets was missed, or the photos aren't satisfactory, it is incumbent upon the aircrew to tell the mission debriefer as soon as possible.

Once you have determined success or failure, the aircrew will complete the applicable debriefing portions of the CAPF 104 in WMIRS. The mission debriefer will use the CAPF 104 information as a starting point for the sortie debriefing.

It is very important that you answer all questions as best you can, and be very honest about conditions and your actions.

Additional Information

More detailed information on this topic is available in Chapter 12 of the *Airborne Photographer Reference Text*.

Evaluation Preparation

Setup: The evaluation should be conducted as a discussion.

Brief Student: You are an Airborne Photographer trainee asked to discuss the importance of sortie debriefing.

Evaluation

Performance measures

1. Discuss the importance of a complete imaging sortie debriefing.

Results

P F

Airborne Photographer P-2201
DISCUSS DIGITAL CAMERA FEATURES

CONDITIONS

You are an Airborne Photographer trainee and must discuss basic knowledge of digital camera features.

OBJECTIVES

Demonstrate basic knowledge of digital camera features.

TRAINING AND EVALUATION

Training Outline

As a Airborne Photographer trainee, having a basic knowledge of the digital camera features is essential.

1. Digital cameras offer two types of zoom - optical and digital.
 - a. *Optical* zoom means that the actual glass lens of the camera zooms through a range that goes from a wide angle view of the scene in front of the camera to a narrower (telephoto) view that makes a distant target look bigger. Optical zoom is a handy feature. Although some cameras offer more than the typical 3x zoom, they are more expensive; *3x optical zoom is sufficient for most CAP imaging missions.*
 - b. *Digital* zoom means that the camera's electronics provide an even larger image that can be captured optically; this is done by interpolating the image captured by the optical lens. Digital zoom simply crops a center part of the captured image; other slightly more sophisticated digital zoom implementations take this same center crop and then interpolate it back up to the cameras full (native) resolution. Because of this function, the camera's viewfinder cannot accurately depict a subject that is digitally zoomed; you must use the LCD to preview the target.

On most cameras, digital zoom is activated when you hold the zoom switch all the way to the maximum zoom, release the switch, and then move it in the zoom direction again and hold it. While there may be times when digital zoom is necessary to get an image of a distant object, the truth is that it does not create as good an image as can be recorded optically. ***Don't use digital zoom!*** Either turn it off (if your camera has a setting for this), or be careful not to activate it when you zoom.

2. Optical viewfinders only allow you to see a percentage (80 to 95%) of what the sensor will capture. Additionally, the viewfinder normally shows a lower percentage (e.g., 85%) of the final image area at telephoto range (this percentage increases to 89 - 95% at wide angle settings). So don't be surprised if an aircraft's wheel, strut or wingtip shows up in your picture, even when you didn't see it in the viewfinder while you were framing the shot. With practice you can anticipate this effect when framing your shot.

Diopter correction is a feature found on more expensive cameras that allows you to focus the image in the optical viewfinder, usually by means of a knob, slider, or dial located next to the viewfinder.

3. Most LCD screens are small and hard to view in bright sunlight, so it is preferable to use the viewfinder during CAP missions. Additionally, using the LCD screen on all the time can quickly deplete your batteries.

4. Digital cameras provide two ways of deleting images from a memory card: erasing and formatting. Erasing deletes image and video files, but not other data on the card. It does not remove images that have been protected.

Formatting (also known as initializing) overwrites everything on the card, including protected images, directories and camera data. Formatting also sets up new folders and data on the card. To help ensure the integrity of the folders and data, *it's important to format the card using your camera, not a computer.*

A corrupted media card has damaged data that prevents it from performing properly, and may even become unreadable. Since media card corruption often results from human error, understanding the main causes can help prevent it from occurring.

- Turning off a camera before an image is completely written to the memory card. Wait a few seconds to let the camera finish writing the information from the buffer to the card; if your camera has a blinking activity light, make sure it has stopped blinking. Only then should you shut off the camera and remove the card.
 - Removing the memory card from a camera while an image is being written to the card
 - Removing the card from a memory card reader while files are still being transferred to a computer
 - Removing the card from a card reader while folders and files from the card are open on a computer
 - Opening, deleting, renaming or moving files on the card while its contents are open on a computer
 - Using a memory card which has not been formatted in the camera, or using a memory card from one camera in a different camera without first formatting it in the new camera
 - Formatting a card in a computer instead of the camera
 - Inserting a second memory card into a card reader before closing and removing the first, when viewing images on the card from a computer
 - Taking photos when camera batteries are nearly empty
 - Taking photos so rapidly that the camera can not complete writing one image to the card before starting the next
 - Continually shooting and deleting images when the card is full
 - Letting a media card get too full before downloading the images to a computer or storage device. Cards that are too full may overwrite the card headers
 - Exposing media cards to powerful electrical sources (remember that static electricity from walking on a carpet in winter can produce a very high voltage charge that can damage a card) and strong magnetic fields (walk-through x-ray machines and scanners at airports are safe, but some of the new more powerful x-ray machines that they use on checked luggage may damage your cards). If you have any doubt or concerns, carry your media cards on the plane.
5. *Lossless* compression is similar to what *WinZip* or *PKZip* does. For instance, if you compress a document into a ZIP file and later extract and open the document, the content will be identical to the original. No

information is lost in the process. TIF and RAW are image formats that can be compressed in a lossless way.

Lossy compression reduces the image size by discarding information and is similar to summarizing a document. For example, you can summarize a large document into two-page document that represents the original, but you cannot re-create the original out of the summary because information was discarded during summarization. JPEG (also JPG) is an image format that is based on lossy compression, and is the preferred format for CAP photography missions.

Note: It's important to minimize the number of times you perform JPG compressions because loss accumulates with repeated compressions/decompressions. Once you compress an image with JPG you cannot decompress it, manipulate it (e.g., crop a border) and then recompress it without further image degradation.

Additional Information

More detailed information on these topics is available in Chapter 1 of the *Airborne Photographer Reference Text*.

Evaluation Preparation

Setup: The evaluation should be conducted with a digital camera and its user manual.

Brief Student: You are an AP trainee asked about camera features.

Evaluation

<u>Performance measures</u>	<u>Results</u>	
1. Discuss the difference between optical and digital zoom, and which to use on CAP imaging missions. Demonstrate operation of the optical zoom.	P	F
2. Discuss the limitations of optical viewfinders, and describe the purpose of the diopter correction. Demonstrate use of the viewfinder and diopter (if available).	P	F
3. Discuss the limitations of using the LCD screen during aerial imaging. Demonstrate how to turn the screen on and off, take a picture and display it on the camera's LCD screen, then view the image in varying degrees of brightness (shadow to full sunlight).	P	F
4. Discuss the purpose of formatting a media card and when you should format a card. Format a media card in the camera.	P	F
5. Describe actions to avoid so that you won't accidentally corrupt a memory card. Demonstrate the proper way to remove and insert a media card into a camera and a media card reader.	P	F
6. Briefly describe the difference between lossless and lossy compression.	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.

Airborne Photographer P-2202
SELECT CAMERA SETTINGS

CONDITIONS

You are an Airborne Photographer trainee and must select various digital camera settings that may be used during a CAP imaging sortie.

OBJECTIVES

Demonstrate how to verify/select the camera settings that may be used during an imaging sortie.

TRAINING AND EVALUATION

Training Outline

As a Airborne Photographer trainee, knowledge of digital camera settings is essential.

1. Digital cameras work by opening their shutter for a brief time to allow light to enter and interact with a light-sensitive photo-receptor; usually either a Charge Coupled Device (CCD) or Complementary Metal Oxide Semiconductor (CMOS) sensor. Each pixel notes the variation in light rays that travel through the lens and passes this information on to the camera's microprocessor in the form of varying electrical charges. The electrical charges are converted into digital bits and stored on the memory card.

In addition to the camera shutter a camera lens can change the diameter of its aperture, thus letting in more or less light. Thus sensor sensitivity setting (ISO), the camera's shutter speed and the size of the lens aperture all affect light sensitivity and thus image exposure.

- a. *ISO* defines how sensitive a camera's sensor is to light. In digital cameras, instead of changing film you can simply adjust the camera's light sensitivity (ISO rating). The higher the sensitivity, the less light is needed to make an exposure. Remember that changing the ISO setting affects aperture and shutter speed. AUTO is the usual setting for most CAP photography.
- b. *Shutter speed* determines how long the camera's sensor is exposed to light. The dimmer the light, the longer the camera needs to collect enough light to make a good image. Outdoors at night, without a flash, this can stretch into seconds or minutes. In aerial photography you should use the fastest shutter speed you can (no less than 1/250s) because short shutter speeds mean less jitter. Normally, we let the camera set the shutter speed automatically.
- c. *Aperture* refers to the size of the opening in the lens (iris) and thus affects the amount of light falling onto the camera's sensor. Aperture affects exposure and depth of field. An aperture acts much like the pupil of an eye: Your pupil opens wider as light decreases, letting in more of the available light; conversely, your pupil gets smaller when the amount of light increases to reduce the amount of light entering your eye.

The size (diameter) of a lens's aperture at any given moment is called the f-stop (also f/stop or f/number), which is expressed in three different ways: f/8, f-8, and 1:8. A lower f-stop number (f/2.8) opens the aperture and admits more light onto the camera sensor, while higher f-stop numbers (f/11) make the camera's aperture smaller so less light hits the sensor.



2. The exposure lock feature is one of the handiest features you can use in a digital camera. It is usually activated by applying slight pressure to the shutter release button – not enough to activate the shutter and take a picture, but enough that you feel the button move and the camera respond. This is also referred to pre-focusing.

Once you activate exposure lock, the camera's autofocus lens locks the subject into sharp focus and the exposure meter measures light and locks in the exposure. As long as you hold the shutter button in this position the exposure is locked, even if you move the camera. Pressing the shutter release the rest of the way causes the camera to take the picture.

On most cameras, when you hold the shutter button halfway a steady 'Ready' or 'In-Focus' light or symbol next to the viewfinder illuminates. If you get a blinking (or different colored) 'Warning' light rather than a steady 'Ready' light it can indicate one of two things: 1) there is insufficient light (e.g., from cloud cover) for the picture, or 2) the camera thinks it's too close to the target because of a reflection from the window (this is why we shoot images through an open window).

This feature is handy when shooting from an airplane, as it allows you to focus and lock onto your target at the earliest possible moment; you can then concentrate on framing the target to best advantage before you press the shutter release the rest of the way to capture the image. Another advantage to using exposure lock is that it reduces the time between pushing the shutter release and the camera actually capturing the image, which is a nice feature when you are taking a picture from a moving airplane. This time lag (called shutter lag) can be significant with low- to medium-priced digital cameras; during this wait, the camera is subject to turbulence and the chance of a blurred shot increases.

3. Examples of selectable exposure modes are:
 - a. The *Automatic* (A) mode determines the optimal combination of aperture, shutter speed, and sensitivity based on the exposure value determined by the camera's light metering system (discussed below). The camera's microcomputer usually assumes that you want to take a picture using the fastest available shutter speed because this minimizes camera shake and the blur that can result from a moving object. As it chooses the shortest possible shutter speed, it is only limited by how small the aperture can go given the current lighting conditions and ISO setting. The only adjustment you can make is the exposure compensation (see below) to over- or under-expose the image.
 - b. The *Program* (P) mode is similar to the automatic mode. Although the camera selects aperture and shutter speed you can modify the camera's selection by turning a dial or pressing a button. You can thus increase or decrease shutter speed, and the camera will adjust the aperture to match. On many cameras this the best all-around setting to use.

- c. Most digital cameras feature a *Full Manual* (M) mode, allowing you to set both the aperture and the shutter speed. This can be useful to ensure that the same exposure is used for a sequence of shots or when shooting in special circumstances such as direct sunlight. When in full manual exposure mode, the camera will often display a simulated exposure meter which will indicate how far over- or underexposed the image is compared to the exposure value calculated by the camera's metering system. If the camera has a “live” LCD preview it will often simulate the effects of the exposure on the LCD.
 - d. Two other modes that act between the auto and manual modes are the shutter or aperture priority modes. In *Shutter Priority* (S) mode, the camera will adjust the aperture to keep the exposure value (discussed below) constant; this can be used to lock in a speed fast enough to freeze action scenes. In the *Aperture Priority* (A) mode you can select the aperture over the available range and have the camera calculate the best shutter speed for correct exposure; this is important if you want to control depth of field.
 - e. Many digital cameras come with a variety of “scene” modes such as landscape, night, portrait, sports, sand or snow. The sports mode will set a fast shutter speed while sand or snow modes compensate for very bright backgrounds which would otherwise underexpose your image. When used appropriately, these scene modes work well for what they are designed to do, but aren't very useful for CAP missions.
4. You will notice that, after pressing the shutter release, there is a delay before you can take another picture (usually denoted by a flashing light next to the viewfinder). The reason for this delay is that, after each shot, the camera must:
- Set the focus, exposure time and white balance
 - Charge the sensor
 - Copy the image out of the microprocessor into RAM
 - Compress the image after it's been taken
 - Write the image to the flash memory

The better (i.e., more expensive) the camera, the shorter is the delay between pictures. So you must know your camera's delay and make allowances for it, particularly since you are shooting from an airplane that travels over the scene at 75 - 80 kts.

Normally, a camera is set for single frame mode, where the camera takes one picture each time you press the shutter release button.

Most digital cameras have another shooting mode for capturing pictures called the “continuous” or “burst” mode. If you set the camera for this type of shooting mode and hold down the shutter button and don't release it, the camera will take pictures until you release the shutter or you fill the camera's memory buffer. The time between pictures varies with the camera; the more expensive the camera the shorter the time between pictures.

5. Resolution and quality are two different things: resolution is the number of pixels in the picture, and quality is how much you compress them. Based on these two factors, some pictures will be of a higher quality than others. Also, the resolution and quality settings you choose dictate how many pictures you can fit on your memory card.
- a. The sensors in a digital camera are made up of millions of pixels (megapixels), each one registering the brightness of the light striking it as the photo is taken. The number of pixels in the image is about equal to the number of pixels on the sensor; this number is referred to as the image's *resolution*. The easiest way to visualize pixels is to compare them to a puzzle; pixels make up a digital image much like the pieces of a puzzle are assembled to create the puzzle image.

A digital camera records digital pixels onto a removable media card. The greater the number of pixels in an image, the higher the resolution; the higher the resolution, the more detail you can see and the better and larger the print you can make.

Most digital cameras allow you to change the resolution setting, so you can fit more or fewer images on your memory card.

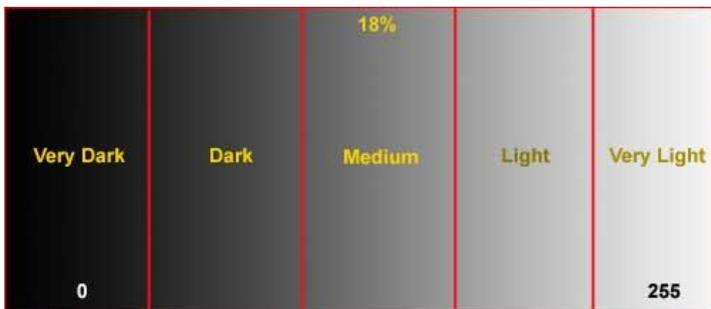
- b. The *quality* setting indicates how much the picture is compressed to save space on the memory card. The pictures are normally captured in a JPG file format, except for the “Uncompressed” quality setting which captures the picture in an uncompressed TIF file format. With the uncompressed TIF file format, the file size is very large and takes up a large amount of space on the memory card. [Note: Newer cameras allow you to save images in the RAW format, but this is not normally recommended for CAP missions because the formats are often proprietary and cannot be read or edited without the manufacturer’s special software.]

In other words, quality is inversely proportional to the amount of JPG compression the camera uses. Thus, a higher quality image will have less compression, and vice versa. As you lower the quality and increase the compression, there will be more "artifacts" in your image that are a result of the higher JPG compression. You will notice that edges will seem blurry or that little squares (“jaggies”) will appear.

The best choice for the majority of CAP imaging missions is the highest resolution with highest or next-to-highest quality (JPEG). This results in high-quality, low-compression JPGs of manageable file size while still allowing you sufficient memory card space for most sorties. If the customer desires maximum detail and you have a large media card, you may chose RAW + JPEG.

- 6. Possibly the most useful tool available in digital photography is the *histogram*. Virtually every digital camera, from the simplest point-and-shoot to the most sophisticated digital SLR has the ability to display a histogram directly or superimposed upon the image just taken. On most cameras the histogram displays on the rear LCD screen, and most cameras can be programmed to do this both on the image that is displayed immediately after a shot is taken, or later when frames are being reviewed.

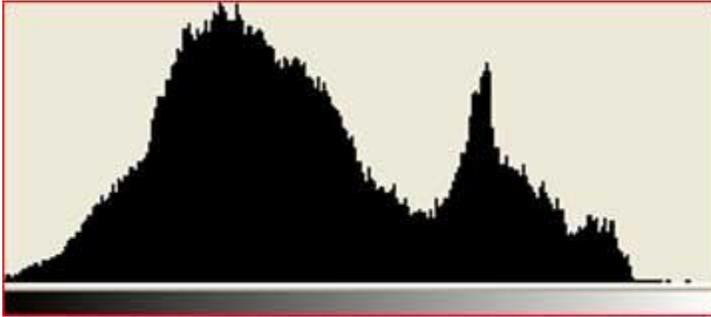
The histogram is a simple graph that displays where all of the brightness levels contained in the scene are found, from the darkest to the brightest. These values are arrayed across the bottom of the graph from left (darkest) to right (brightest). The vertical axis (the height of points on the graph) shows how much of the image is found at any particular brightness level.



The names of the five zones (or F-stops) containing the dynamic range recordable by a camera is arbitrary.

A histogram that shows more weight at the left of the graph represents a dark image (also called a low-key image); a histogram with more weight to the right of the graph represents a bright (or high-key) image. An

image with a low-key histogram may be overexposed, and an image with a high-key histogram may be underexposed, though this is not necessarily always the case. Your eye - not a histogram - should always be your final judge.

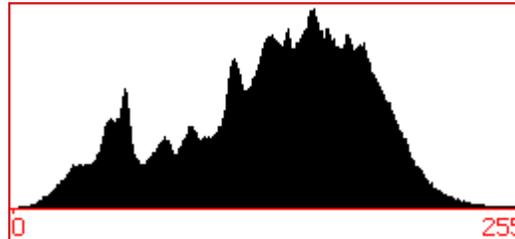


This histogram shows an almost perfect distribution of tones, from deep shadows on the left to bright highlights on the right.

Typical histogram examples:



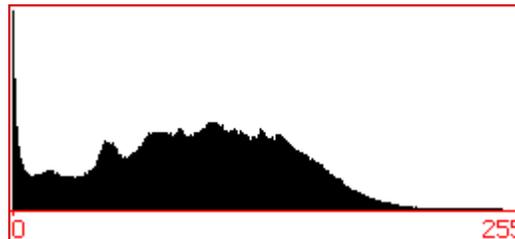
Correctly exposed image



This is an example of a correctly exposed image with a "good" histogram. The smooth curve downwards ending in 255 shows that the subtle highlight detail in the clouds and waves is preserved. Likewise, the shadow area starts at 0 and builds up gradually.



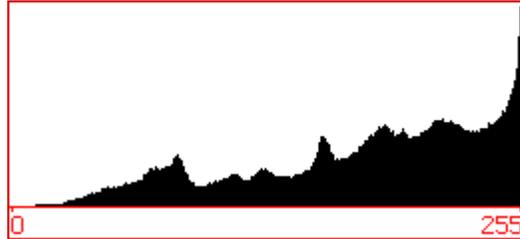
Underexposed image



The histogram indicates there are a lot of pixels with value 0 or close to 0, which is an indication of "clipped shadows". Some shadow detail is lost. Unless there is a lot of pure black in the image, there should not be that many pure black pixels. There are also very few pixels in the highlight area.



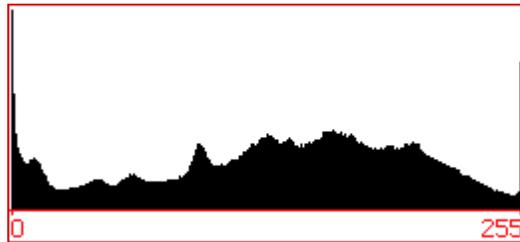
Overexposed image



The histogram indicates there are a lot of pixels with value 255 or close to 255, which is an indication of "clipped highlights". Subtle highlight detail in the clouds and waves is lost. There are also very few pixels in the shadow area.



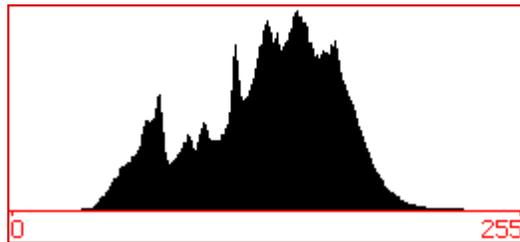
Image with too much contrast



This image has both clipped shadows and highlights. The dynamic range of the scene is larger than the dynamic range of the camera.



Image with too little contrast



This image only contains midtones and lacks contrast, resulting in a hazy image.

Additional Information

More detailed information on this topic is available in Chapter 2 of the *Airborne Photographer Reference Text*.

Evaluation Preparation

Setup: The evaluation should be conducted with a digital camera and its user manual.

Brief Student: You are an AP trainee asked about configuring a digital camera for a mission.

Evaluation

<u>Performance measures</u>	<u>Results</u>	
1. Discuss the relationship between ISO, shutter speed and aperture, and demonstrate how to set ISO, shutter speed and aperture on a camera.	P	F
2. Discuss the purpose and use of exposure lock (pre-focus), and demonstrate how to use the exposure lock on a camera.	P	F
3. Discuss the exposure modes of a camera, and demonstrate how to select each mode.	P	F
4. Discuss the effects of shutter delay (lag) and the use of continuous (burst) shooting modes, and demonstrate how to set and use single-frame and continuous shooting modes.	P	F
5. Discuss image resolution and quality and which settings are best for most CAP imaging missions, and demonstrate how to set resolution and quality on a camera.	P	F
6. Discuss the information contained in an image's histogram, and demonstrate how to display and interpret an image's histogram on a camera.	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.

Airborne Photographer P-2203
KEEPING THE CAMERA & ACCESSORIES MISSION READY

CONDITIONS

You are an Airborne Photographer trainee and must demonstrate how to keep the camera and accessories mission ready.

OBJECTIVES

Demonstrate the actions taken to ensure the camera and all accessories will be ready to use if a mission arises.

TRAINING AND EVALUATION

Training Outline

As an Airborne Photographer trainee, knowledge of how to maintain the camera and its accessories mission ready is essential. Each camera and camcorder should be kept in a camera bag, along with its accessories. As a minimum, your camera bag should contain spare batteries, a battery charger, lens cleaners, and spare media cards or tapes. Additionally, your camera/camcorder should have a sturdy wrist strap attached (try and explain how you dropped an expensive digicam out the aircraft's window!).

Don't store your camera where it will be exposed to extreme heat or cold, or near a strong magnetic field (e.g., TV set or radio). Don't put moth balls in your camera bag; take the camera out of storage every 4-6 weeks to help prevent mold and mildew.

It is a good idea to create a one-page "camera set-up" card to put in your camera bag. This quick-check item should list normal camera settings (e.g., exposure mode, resolution and quality), checking the batteries, checking the media card, checking cleanliness, checking the filter installed, etc. If you wish, you could also list the camera bag inventory on the reverse. Once completed, trim and laminate the card and keep it in the camera bag.

1. Most manufacturers suggest removing the camera (and portable GPS) batteries if the camera is not used for two weeks or longer. Don't mix fresh and used batteries in the camera, and don't mix different kinds of batteries (e.g., two regular alkaline and two rechargeable batteries, or two NiMH and two lithium ion rechargeable batteries).

Don't leave batteries plugged into a battery charger; once the batteries have been fully charged, remove them from the charger and store them at room temperature. Use a charger that is designed for your camera's battery.

Once charged, Lithium Ion batteries don't lose very much of their power while being stored; single-use lithium ion batteries are essentially unaffected by sitting unused for several years. However, NiMH batteries don't maintain their charge as well as lithium ion batteries; their charge gradually dissipates while sitting on the shelf. Get in the habit of recharging batteries when you're done shooting, and always have at least two fully-charged sets of batteries: one in the camera and one in the camera bag so you're always ready for a mission. Also, it is best to charge batteries as a set so that they grow old together.

Assign someone to check the batteries and charge them as needed (maybe in conjunction with one of your periodic meetings).

2. The lens, LCD, and viewfinder must be kept clean and protected from scratches. Ensure lens caps are kept in place anytime the camera isn't being used, and that the cap is secured to the camera with a strap. Cleaning supplies (as recommended by the manufacturer) should be kept in the camera bag.

Each time the lens is cleaned there is the risk of tiny abrasive particles present in the tissue, creating microscopic scratches in the coating. For this reason a lens should not be routinely cleaned (the way you regularly wash your hands, for example); a lens should only be cleaned when you see dirt or dust on the lens surface.

Condensation or raindrops on the lens can distort or even totally obscure an image. When a camera is taken from a cool area into warm air, the lens frequently fogs up; this can be a real problem in cool climates when camera equipment is brought inside after being outside in the cold for some time. To control the effects of condensation, you should allow 30 minutes or so warm-up time whenever you bring a camera or camcorder from a cold to a warm environment. Also, putting the camera in a plastic bag will help prevent the lens from becoming foggy; if condensation does form, it will do so on the bag instead of the camera. [Note: Do not store your camera in a plastic bag; the case can deteriorate.]

3. As a rule, filters are of little use with a digital camera except as a means to physically protect your lens. A damaged filter is much cheaper to replace than a lens. Protection of this type is particularly important when the camera is used in high winds where dirt or sleet can be blown into the lens.

A simple Ultraviolet (UV) filter is preferred for CAP purposes, and mainly serves to protect the camera lens without degrading quality or interfering with the camera's automatic functions.

4. Keep your media cards (the one in the camera and the spares) empty whenever possible. You don't want to grab the camera for a mission, fly to the target, and then discover that the card is full of images from a previous mission.

Keep in the habit of transferring images to a PC promptly, and then format or erase the card before putting it back into the camera or into the camera bag as a spare. Regularly formatting your memory cards will help prevent them from becoming corrupted.

Additional Information

More detailed information on this topic is available in Chapter 10 of the *Airborne Photographer Reference Text*.

Evaluation Preparation

Setup: The evaluation should be conducted with a digital camera and accessories.

Brief Student: You are an AP trainee asked about how to protect your video equipment and keep the equipment mission ready.

Evaluation

Performance measures

Results

1. Describe the contents of a typical mission camera/camcorder bag.	P	F
2. Describe the storage requirements of a camera/camcorder and its batteries, and discuss how to properly charge a battery.	P	F
3. Discuss how to clean a camera lens, LCD, and viewfinder.		
Clean a camera LCD screen and viewfinder.	P	F
4. Discuss the purpose and use of UV and polarizing filters.		
Fit, clean and remove a filter on a camera lens.	P	F
5. Discuss the storage and use of media cards.	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.

Airborne Photographer P-2208
DESCRIBE IMAGING PATTERNS AND COMMUNICATIONS

CONDITIONS

You are an Airborne Photographer trainee and must describe the basic imaging patterns.

OBJECTIVES

Demonstrate knowledge of the basic imaging patterns and communications between the Mission Pilot, Airborne Photographer (AP) and photo log keeper when flying imaging patterns.

TRAINING AND EVALUATION

Training Outline

As an Airborne Photographer trainee, knowledge of imaging patterns and communications is essential.

The 4-Square imaging pattern is the standard imaging pattern for most missions, as it is the simplest and most stable pattern that results in very good images.

The Bird's Eye (Overview or Look Down) pattern is used to show an overview of a target or when images need to show detail between structures (e.g., between buildings or between trees). This pattern is also used when the customer wants to use georeferencing.

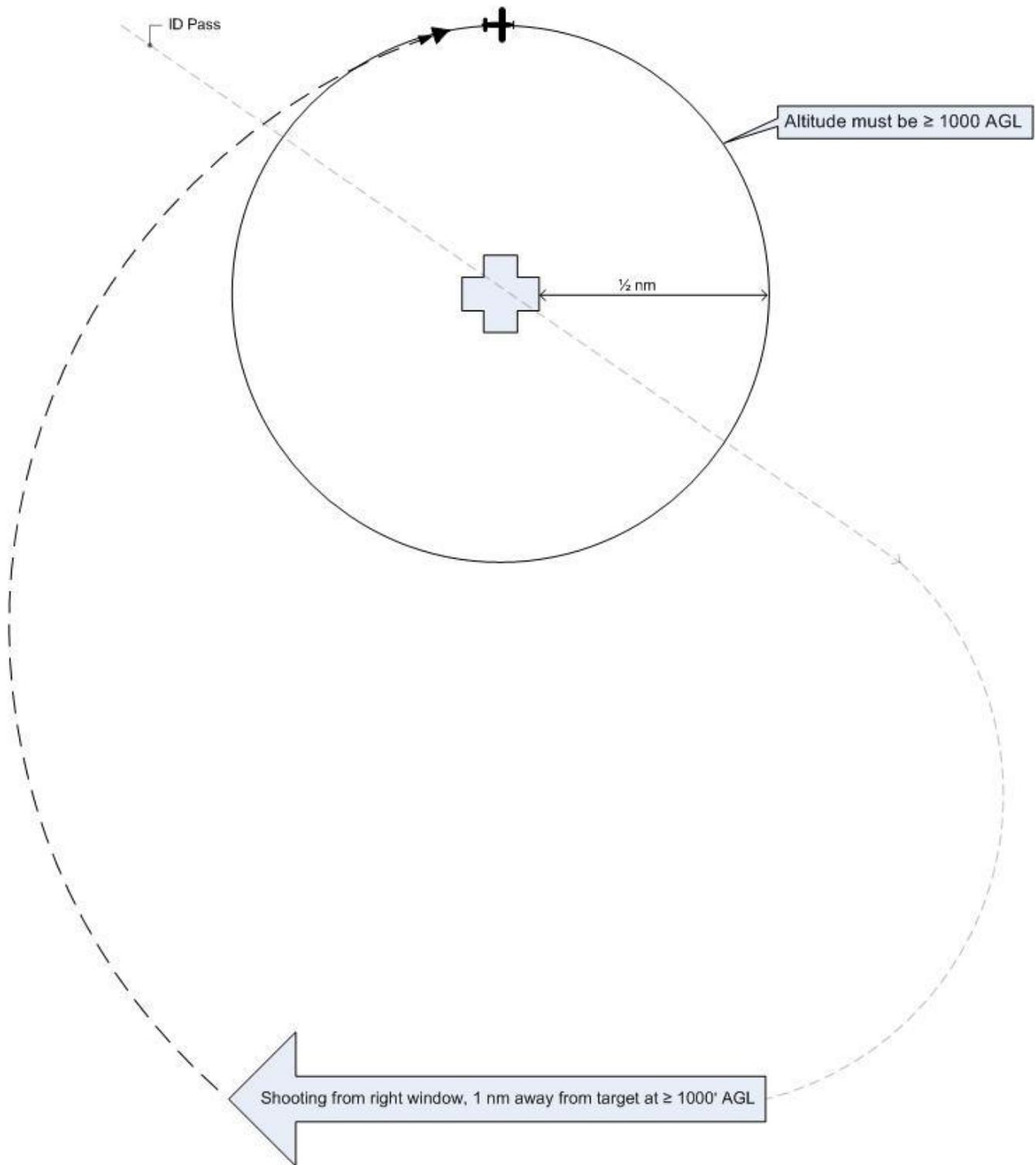
The Circling pattern is more difficult to master, particularly if the photographer is shooting out the right-side window. This pattern is also good for taking quick shots of multiple targets, and can be used if a quick survey of wide-spread damage is needed by staff to determine resource needs and plan more detailed sorties. It is also useful for flying an 'ID Pass'.

The 45° Angle pattern is used when the customer specifically asks for these types of images. Note that a 25-45° angle is a good angle to use for most shots, regardless.

NOTE: A combination of the techniques used in the Bird's Eye and the 45° Angle patterns is useful for taking repetitive shots, such as when taking multiple, sequential photos along a river levee.

NOTE: Proper coordination with the third crewmember is also important, especially the communications or actions needed to keep a proper record of the photos. This is usually accomplished using a Photo Log or 3x5 target cards. A portable GPS in the tracking mode may also be used.

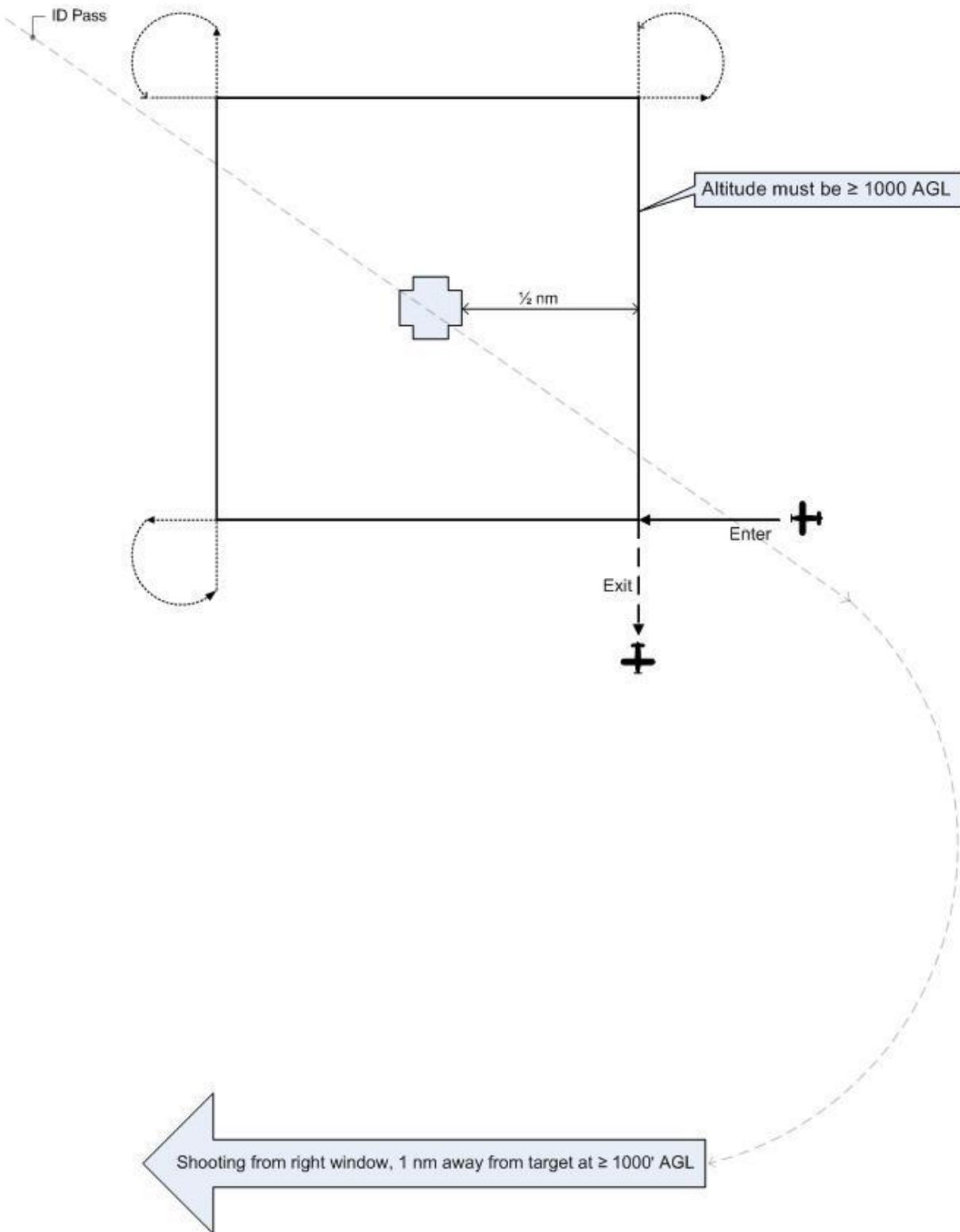
1. Circling Imaging Flight Pattern:



Note: The AP should be looking north. The pattern shows an entry for aircraft shooting from the right side of the aircraft; for aircraft shooting from the left side, simply reverse the entries.

Note: The circling portion of the pattern is shown at the CAP lowest allowable altitude (1000' AGL). Actual (higher) altitude depends upon customer needs and the photographer's discretion.

2. 4-Square Imaging Flight Pattern:

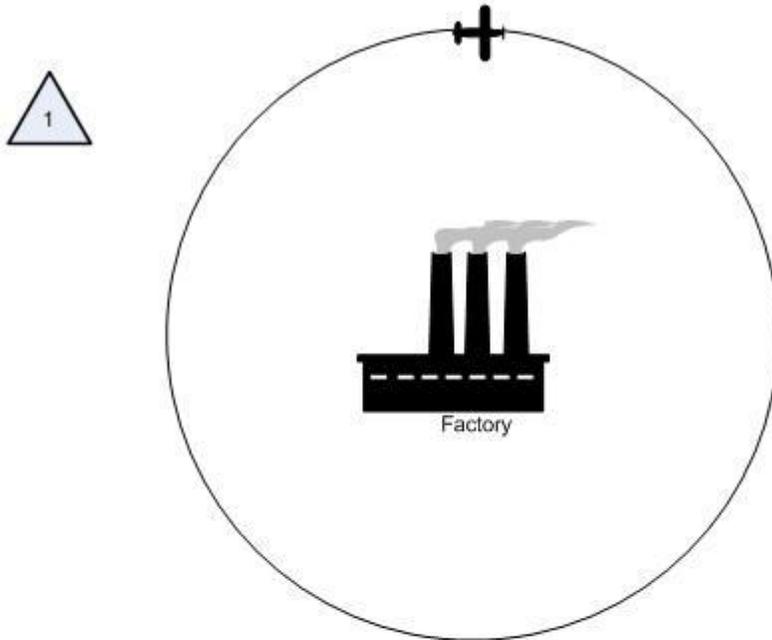


Note: The pattern shows an entry for aircraft shooting from the right side of the aircraft. For aircraft shooting from the left side, enter at the lower left and exit at the lower left.

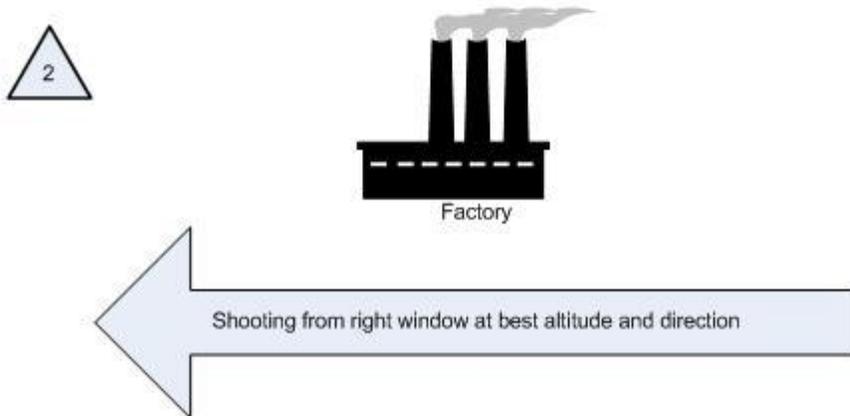
Note: This portion of the pattern is shown at the CAP lowest allowable altitude (1000' AGL). Actual altitude depends upon customer needs and the Airborne Photographer's discretion.

3. Bird's Eye (Overhead or Look Down) Imaging Flight Pattern:

Bird's Eye (Overview) Imaging Pattern



Circle target to find the altitude that will permit horizontal framing and determine the best direction from which to take the imaging photo



Approximately 75 knots (not $\leq V_x$), 10° flaps, 10° bank and full opposite rudder

The basic steps are:

- a. Fly the “ID Pass” to verify the target and note its coordinates. Examine the target and its surroundings, and decide how to frame your photos.

Use this opportunity to determine if your altitude will allow you to frame the entire target area in one shot. Climb or descend as necessary to determine the correct altitude.

Note: You may be tempted to turn the camera vertically in order to get the target area in one photo – don’t. This type of shot often truncates the ‘far’ side of the image (i.e., it looks as if it’s thinning or “falling away” in the finished image). Instead, climb higher so you can take the photo while holding the camera normally (horizontally).

- b. Note the direction that will result in the best shot. In this type of imaging sortie you may only need a good shot from one direction (as opposed to taking photos from at least four cardinal points in the circling or 4-Square pattern).
- c. Once you’ve established the correct altitude and direction of flight, the pilot will maneuver onto the desired heading at least one mile away and stabilize the aircraft at approximately 75 knots with 10° flaps.

Note: Slowing down and putting in 10° of flaps allows for better control of the aircraft when the pilot begins banking for the photo run. This minimizes the amount of bank necessary to give the AP an overhead view of the target, and makes it easier to put in up to full opposite rudder in order to maintain heading while banking. [If you are shooting from the open right-side window, 10° flaps may cause the window to partially close. Have the back-seat crewmember hold the window open in this situation.]

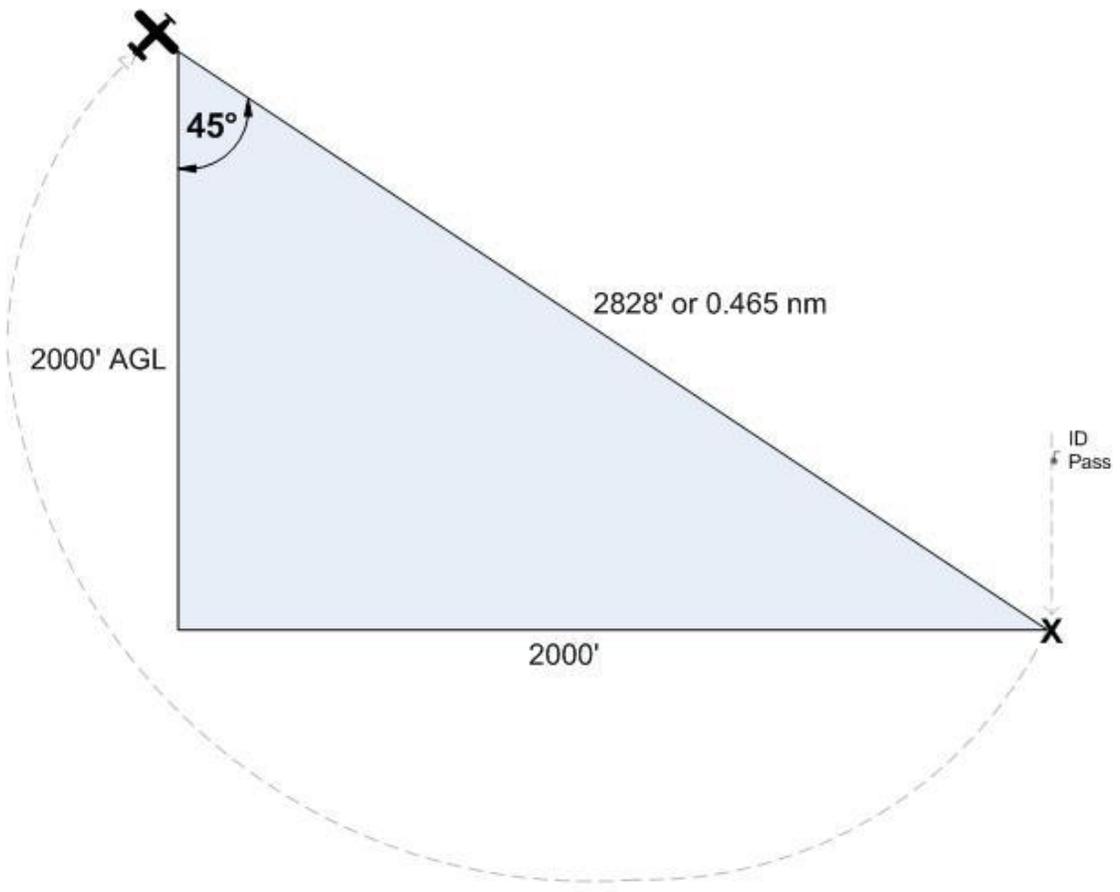
- d. As you approach the target, the AP will inform the pilot to get into position. The pilot will then put in approximately 10° bank and hold opposite rudder to maintain the heading. The AP will continuously communicate with the pilot to ensure the desired heading and angle to the target.

Note: The pilot may notice that she is losing some altitude while banking for the photo run. The altitude loss should be minimal for the time it takes to get the shot, so no effort need be made to maintain altitude during this time.

- e. Once the AP takes the shot, inform the pilot so that she can return to normal flight attitude. The AP will then review the results to see if another run is required.

4. 45° Angle to Target Imaging Flight Pattern. An imaging mission may require shots of a target from a specific angle, most often 45 degrees. The diagram and table below shows how to obtain the proper angle. The customer may specify the altitude, and all the crew needs to do is consult the table to see how far from the target they need to be in order to establish a 45° angle. If the customer doesn't specify the altitude, then the crew will have to determine what altitude/distance relationship is required to frame the target properly.

45° Angle to Target Imaging Pattern 2000' AGL Example



Height (AGL)	NM for 45° Angle
1000	0.233
1500	0.349
2000	0.465
2500	0.582
3000	0.698
3500	0.815
4000	0.931
4500	1.047

The basic steps are:

- a. Fly the “ID Pass” to verify the target and note its coordinates. Note the direction that will result in the best shot. In this type of imaging sortie you may only need a good shot from one direction.
- b. Enter the target’s coordinates into the GPS as a waypoint and select it. This will allow you to determine the correct distance to the target per the table. [Note: Even though the table gives distances to the 1/1000th of a nautical mile, for practical purposes getting the distance to the nearest 1/100th nm will suffice.]

Determine if the altitude you planned for (e.g., 2000 AGL) will allow you to frame the entire target when shot from the required distance (as determined from the table). If not, you will have to select another altitude/distance relationship to frame the shot.

- c. Once you’ve established the correct altitude, the pilot will maneuver onto the desired heading and stabilize the aircraft at approximately 75 knots.
 - d. As you approach the target, the pilot will give a countdown so the AP will be prepared to take the shot(s) when the aircraft is at the proper distance from the target.
 - e. Once the AP takes the shot, inform the pilot so that he can return to normal flight attitude. The AP will then review the results to see if another run is required.
5. The first pass by the target is very important. This is the time to determine if you are at the correct altitude for best results; that you are at the correct distance from the target; if you are flying at the correct speed; and whether or not you need to (and can) use the zoom to properly frame the photo. If any of these conditions aren’t met, have the pilot turn around, correct the problem, and redo the first pass.
6. The Mission Pilot must put the AP in the proper position for a shot. Small adjustments, not obvious to the pilot, must often be made to get the right angle or position. Lifting the wing and moving the strut out of the frame are the two most common adjustments. The pilot must be aware these maneuvers may be necessary, and the AP must know how to direct the pilot. Keep the directions clear and simple: “Lift your wing” or “Move the strut forward” or “Left 10°” tells the pilot all she needs to know. The pilot also needs *positive* feedback, especially if you are shooting out of the right-side window; use simple words such as “Good, good” to let the pilot know they’re on the right track and speed. Finally, tell the pilot when the adjustments are no longer required by saying something like “OK, I have the photos”.

NOTE: Sometimes wind direction/speed forces the pilot to tilt the wings or crab so much (in order to maintain the planned flight path) that the photographer can’t properly frame all of the photos as planned. In this case, try taking the photos from another direction (e.g., from the northwest rather from the north) or note the difficulty and discuss it during debriefing.

The AP must decide whether the pictures satisfy all mission requirements. Don’t be afraid to admit that you didn’t get a particular shot, and ask the Mission Pilot to reposition for another try. Never hesitate to make another pass or to reposition the aircraft to ensure a good photo, and don’t let any other crewmember rush you. Remember, you should take as many photos as you think you need to fulfill mission requirements – there’s plenty of room on your storage media, and the extra time you spend doing this on-scene is much less expensive and time-consuming than having another sortie go back to the target because you didn’t get the right images.

Effective crew communications also depends on a thorough understanding of the operation of the aircraft Audio Panel and Intercom, especially when there is a third crewmember on board to keep the photo log. Plan how you will set up these instruments during all phases of flight, particularly when you are in the target area.

Additional Information

More detailed information on this topic is available in Chapter 11 and Attachments 3-7 of the *Airborne Photographer Reference Text*.

Evaluation Preparation

Setup: The evaluation should be conducted with diagrams of the basic types of imaging flight patterns.

Brief Student: You are an AP trainee asked about the basic types of imaging flight patterns and communications with the Mission Pilot when flying these patterns.

Evaluation

Performance measures

Results

- | | | |
|--|---|---|
| 1. Using diagrams, describe the basic types of imaging flight patterns and when they are used. | P | F |
| 2. Discuss the importance of communications between the pilot and AP and between the photo log keeper and AP, when proper communication is of the greatest importance, and the types of adjustments you may have to tell the pilot to make to properly frame a target. | 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.

Airborne Photographer P-2209
DISCUSS FACTORS AFFECTING THE SUCCESS OF IMAGING SORTIES

CONDITIONS

You are an Airborne Photographer trainee and must demonstrate knowledge of the factors affecting the success of a mission.

OBJECTIVES

Demonstrate knowledge of the factors affecting the success of a video imaging sortie.

TRAINING AND EVALUATION

Training Outline

As an Airborne Photographer trainee, knowledge of the factors affecting the success of a video imaging sortie is essential.

1. Vibration comes from the airplane, its engine and air turbulence. To reduce the effects of vibration, hold your camera properly and don't rest any part of the camera or your body against the airframe. In particular, keep your arms and elbows from coming in contact with the window sill or armrest. Ideally, the only part of the airframe that will be in contact with your body is the seat cushion.
 - a. Normally the camera is set for the Automatic (or Program) mode, letting the camera set the shutter speed and aperture. However, if you need to use the Manual mode, keep these facts in mind.
 - b. Presuming you have good lenses the shutter speed is the biggest contributor to sharpness. Since CAP imaging sorties are conducted at 80 - 90 knots from 1000 feet AGL, the minimum shutter speed should be 1/250 second (if you're setting the shutter speed manually).
 - c. You can use very large apertures since there is no need for depth of field (discussed below). You should experiment to learn the largest aperture at which your lens is sharp and the highest ISO at which your digital camera makes clean images. Once you've set ISO and f/stop, use whatever fast shutter speed you get (the faster the better). Finally, compare these results against those using the AUTO settings, and use this if possible.
2. It's best to wait for the best visibility instead of shooting through haze or other obscuring conditions. Even on clear days visibility is rarely unlimited, so you always have to adjust to actual conditions over the target. Haze and fog are the most likely limits to visibility you have to deal with. Ways to deal with these are:
 - a. When you fly over the target during the ID pass (discussed below), see if there is a difference between looking straight down at the target and looking at a slant angle. With haze, lower angles to the target are often better. With fog, the reverse may be true.

- b. Set your digital camera to its highest contrast. Look at your histogram, if available; you'll be surprised at how it tends to bunch up in the middle (implying low contrast) even if things look normal to you while flying.

If allowed by the customer you can use an image editing program to increase contrast and cut through haze. The easy way is to use “Auto Levels” which will take the dull grays and expand them to blacks and whites; you can also use the “Levels” command and manually move the blacks and whites.

- c. UV and haze filters don't work very well in aerial photography so don't rely on them.

3. Depth of Field (aperture setting)

For aerial photography purposes, the Earth is flat so you don't have to worry about depth of field. Even at 1000' AGL you are so far away from your target that any aperture is sufficient to get everything in focus. This helps because you'll want to shoot at the largest aperture possible in order to get short shutter speeds.

4. Focus

Even though you're flying at 90 knots your distance from the ground (altitude) stays roughly the same. When using Autofocus (AF), try using the "S" AF position; this focuses each shot perfectly, even if you change the zoom setting.

If you're using Manual focus, set the lens at the “Infinity” stop unless you're using a lens longer than 200 mm or are at less than 1,000' AGL. [Note: Most AF lenses can focus past infinity and have to be focused with the AF system.]

5. Wind

The wind will knock your camera around if you let a telephoto lens extend out the window. You have to make a conscious effort to lean back away from the window to keep your lens inside. This isn't a problem with shorter lenses.

Additional Information

More detailed information on this topic is available in Chapter 11 of the *Airborne Photographer Reference Text*.

Evaluation Preparation

Setup: The evaluation should be conducted as a discussion. Use example photos from the AP course slides to supplement the discussion.

Brief Student: You are an Airborne Photographer trainee asked about factors that can affect the success or failure of a mission.

Evaluation

Performance measures

1. Discuss factors that can affect the success of an imaging sortie, including:
 - a. Vibration
 - b. Visibility
 - c. Focus
 - d. Wind

Results

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.