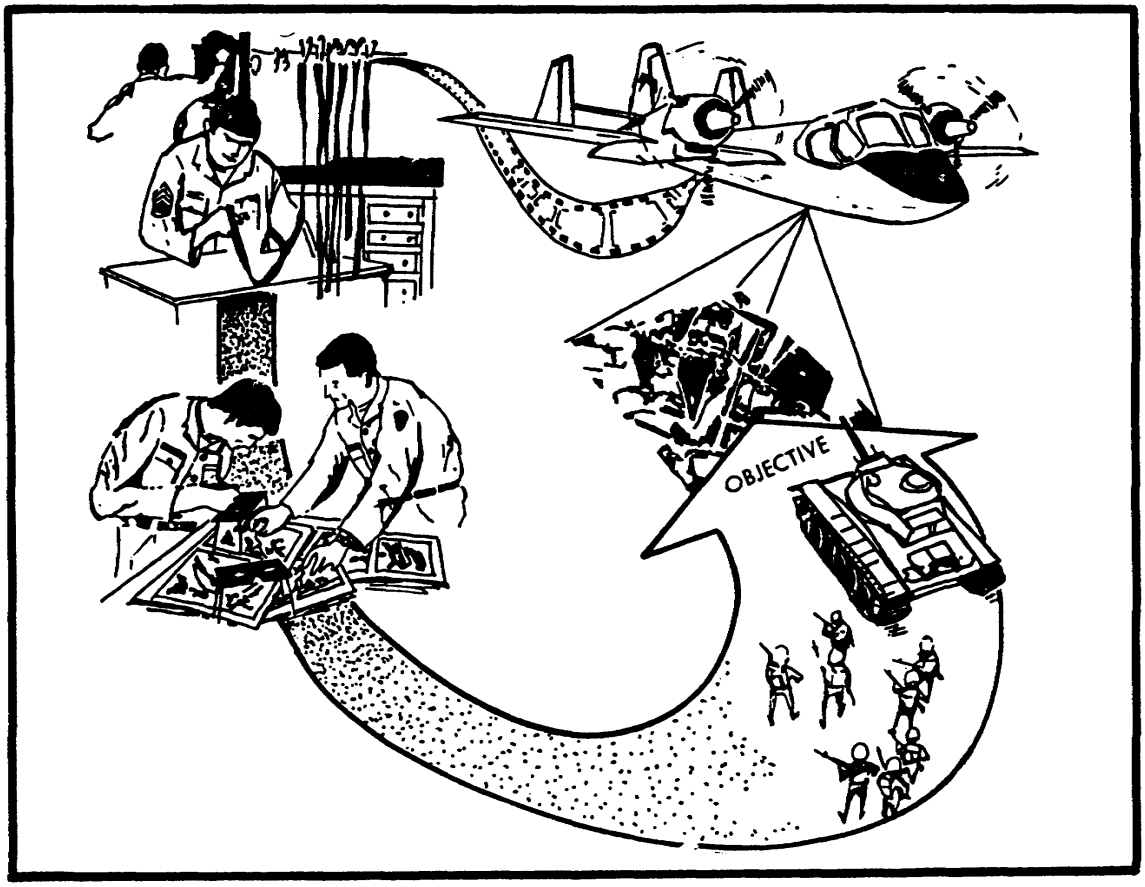
SUBCOURSE
IT 0458

EDITION
A

US ARMY INTELLIGENCE CENTER
INTRODUCTION TO IMAGERY ANALYSIS



THE ARMY INSTITUTE FOR PROFESSIONAL DEVELOPMENT
ARMY CORRESPONDENCE COURSE PROGRAM

AIPD

READINESS/
PROFESSIONALISM

THRU
GROWTH

INTRODUCTION TO IMAGERY ANALYSIS

Subcourse Number IT 0458

EDITION A

US Army Intelligence Center
Fort Huachuca, AZ 85613-6000

8 Credit Hours

Edition Date: December 1992

SUBCOURSE OVERVIEW

This subcourse is designed to teach you the composition of military intelligence (MI) organizations and their functions and basic imagery analysis procedures, techniques, and reports used by imagery analysts (IAs).

There are no prerequisites for this subcourse.

This subcourse reflects the doctrine which was current at the time the subcourse was prepared.

TERMINAL LEARNING OBJECTIVE

TASK: You will describe the composition of MI organizations and their functions, perform basic imagery analysis procedure and techniques, and prepare imagery analysis reports.

CONDITION: You will have access to extracts from DA Pam 25-7, FM 21-26, FM 34-10, FM 34-25, STP 34-96D1-SM, STANAG 3596, STANAG 3377, TC 34-55, and USAICS SupR 60059.

STANDARD: You will describe the composition of MI organizations and their functions, preform basic imagery analysis procedures and techniques, and prepare imagery analysis reports in accordance with (IAW) DA Pam 25-7, FM 21-26, FM 34-10, FM 34-25, STP 34-96D1-SM,STANAG 3596, STANAG 3377, TC 34-55, and USAICS SupR 60059.

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LESSON 1

BASIC IMAGERY ANALYSIS

Critical Tasks: 301-338-1800
301-338-2802

OVERVIEW

TASK DESCRIPTION:

In this lesson you will learn how to utilize imagery analysis principles and techniques, identify aerial reconnaissance and surveillance (R&S) capabilities and limitations, and describe the basic requirements for mission planning and requesting.

LEARNING OBJECTIVES:

ACTIONS: Describe the information and procedures required to utilize imagery analysis principles and techniques, identify aerial R&S capabilities and limitations, and describe requirements for mission planning and requesting.

CONDITIONS: You will be given extracts from FM 21-26, FM 34-10, FM 34-25, and TC 34-55.

STANDARDS: Define basic duties and techniques for basic MI organizations with IA personnel, the capabilities of U.S. Army and U.S. Air Force (USAF) reconnaissance aircraft, and the different types of imagery an IA will use: infrared (IR), side-looking airborne radar (SLAR), and conventional photography. Furthermore, you will define basic requirements for planning and requesting aerial R&S IAW FM 21-26, FM 34-10, FM 34-25, and TC 34-55.

REFERENCES: The material contained in this lesson was derived from the following publications:

FM 21-26.
FM 34-10.
FM 34-25.
TC 34-55.

NOTE: Replace the following pages with attached glossy photo pages for better viewing: 9, 13, 28, 32, 35, 38 through 41, 43, 45, 46, 94, and 108. Photo pages 458-1 through 458-13 are mentioned throughout the text. The enclosed photos are for your convenience and better understanding of material covered.

INTRODUCTION

Today, imagery intelligence (IMINT) is highly developed and an integral part of the intelligence effort. However, the early beginnings gave little or no hint of the potential of IMINT. IAs have come a long way and their duties vary with their diverse job assignments. IAs must know the strategy and equipment of the enemy, solve problems, and reach a reliable judgment by using basic imagery analysis techniques.

PART A: IMAGERY ANALYSIS BACKGROUND

1. During the early days of the Civil War several aeronauts with their gas-filled balloons were employed by the Union Army. Their mission was to hover above the Union lines and report Confederate activities. Professor Thaddeus Lowe devised a method of rigging a telegraph line to the balloon, enabling him to send a steady stream of intelligence back to earthbound associates.

2. Professor Lowe's exposed position did offer an inviting target to the sharpshooting Confederate squirrel hunters turned soldier. The minnie balls and artillery shells may have been the deciding factor that caused the professor to advance the idea of taking pictures from a balloon which could be studied in an atmosphere free of such petty annoyances. The Army experimented with the idea of aerial photography, but that idea, as well as the Balloon Corps, was "left up in the air." It was not until World War I that aerial photography was adopted for widespread military use.

3. Aircraft were first used militarily for visual reconnaissance during World War I. It was found that a pilot, much like the Civil War aeronaut, was subject to numerous distractions of which the most important was keeping the aircraft aloft. The pilot's notes, if any, were apt to be incomplete and of limited value. The obvious advantage of photographs was soon recognized, and the camera became the aviator's "eye and memory."

4. During the relatively peaceful period between 1918 and 1941, the military application of aerial photography was neglected in all operations except mapping. In the early stages of World War II, the importance of aerial photography was again realized, and vigorous efforts were launched to provide photographic equipment and develop proper interpretation techniques. As a result, IMINT was proved valuable time and time again in World War II. One corps G2 estimated that 90 percent of the intelligence on enemy defenses and at least 50 percent of our total intelligence were received from aerial photography.

5. In World War II, photo interpretation personnel were attached to all echelons, from division to theater, and were controlled by the military intelligence service headquarters of the theater army where they were employed. Photo interpretation proved so successful during World War II

that after the war photo interpretation personnel were made organic to division, corps, and field armies, known today as echelons above corps (EAC).

6. Korea represented the first combat area in which photo interpretation personnel were organic to major units, but it was discovered the "organic concept" did not work. In many cases, photo interpreters (PIs) were not utilized in the specialty for which they were trained. As a result of this lesson, image interpretation (11) personnel became organic to the MI battalion of the field army. The MI battalion provided Ml companies to corps and division. The MI company included an II platoon.

7. The post-Vietnam era brought more reorganization that affected image interpretation. The combat electronic warfare and intelligence (CEWI) concept drastically changed the location of the image interpreter (II). The field army is no longer a command echelon, unit designations have changed, strength has been restructured, and missions redesigned. The term "photo interpreter" became obsolete when the business of interpretating imagery began to involve not only built-in cameras using black and white film, but airborne radar, IR, and camouflage detection sensors as well. A more comprehensive term was needed to describe the technical expertise these devices and methods required, thus the new designation of "imagery analysis" evolved, and the II became the IA.

NOTE: Refer to Appendix B for a complete list of terms and definitions used in aerial reconnaissance.

PART B: IMAGERY ANALYSIS DUTIES AND TECHNIQUES

1. IAs are imagery analysts trained in the techniques of extracting information from imagery produced by airborne sensors. They must know the intelligence requirements of the command to quickly identify, locate, and report information obtained from the imagery. IAs are generally employed as a group. They are normally located where they can have immediate access to film processing facilities which serve the various units employing airborne sensors. This assures the availability of adequate imagery for analysis, the elimination of administrative lead time in transmitting imagery, and the economical use of processing equipment.

2. The responsibilities of IA personnel are similar at all tactical levels; however, the emphasis on certain duties will vary according to the tactical situation and the echelon to which assigned. IA personnel at division, corps, and EAC levels are responsible for:

a. Analyzing and reporting enemy offensive and defensive position. In this category are positions for artillery, mortar, and automatic weapon emplacements, minefields, barbed wire entanglements, and strongpoints. The reports should include such visual aids as overlays and overprinted maps.

b. Locating and studying enemy supply installations and lines of communication (particularly to forward areas), including front-line supply dumps, rear area supply depots, railheads, main supply routes, and civilian activity related to military operations such as population concentrations, industrial production facilities, and traffic networks.

c. Locating enemy vehicles and personnel concentrations.

d. Confirming or refuting intelligence information obtained from other sources. "Other sources" would include order of battle (OB) personnel, interrogation personnel, technical intelligence teams, and covert sources. IAs evaluate this information against their most recent coverage and confirm or deny its accuracy. It should be noted that certain types of information cannot be confirmed or denied from imagery alone. For example, an IA may be able to report a certain area contains an enemy force of regimental size, but the IA would not be able to identify it by name or number from imagery alone.

e. Evaluating selected targets for ground and air weapons as well as guided missiles and special weapons of a nuclear nature. It is here where such weapons referred to as "mass destruction" weapons are considered. It must be kept in mind that IAs do not select targets for destruction, but merely provide detailed reports upon which evaluations are made as to suitability for special weapons.

f. Preparing post strike or damage assessment reports. Reports on the extent of damage caused by friendly air or ground fire are an important part of the IA's contribution to the overall intelligence effort.

g. Constructing mosaics and panoramas. A mosaic provides an updated vertical view and a panorama provides an oblique view of an area. Mosaics and panoramas are important to commanders for briefing and planning purposes. Observers find panoramas valuable for spotting and designating targets.

h. Plotting the imagery received and maintaining a "sortie plot" and a "master cover trace." The sortie plot is used to determine the individual sortie prints needed to cover the area. The master cover trace contains the map locations of all sorties that have come to the unit. If a unit is to furnish a mosaic of a specific area, the master cover trace will be used to locate the sortie covering the area in question. The master cover trace prevents duplication of effort by illustrating areas already covered by imagery.

i. Preparing target folders.

j. Updating maps from current imagery and preparing map supplements from photography.

k. Assisting the collection management and dissemination (CM&D) mission manager in planning aerial R&S missions.

l. Providing operations security (OPSEC) support to the commander.

NOTE: Formerly, IAs were used in preparing terrain analysis studies; however, with the activation of terrain analysis detachments at division, corps, and EAC, trained terrain analysts are now performing this task.

3. Knowledge will increase the effectiveness of an IA. It is increased by the experience and the amount of background knowledge which the soldier possesses about the enemy and the area of interest. The IA's time and effort are also more effectively expended when made aware of exactly what information is requested or desired. The IA's effectiveness is enhanced when the following is available:

a. Area studies, other background material, and selected intelligence reports that deal with the enemy and the area of interest.

b. Operations orders, commander's priority intelligence requirements (PIR) and information requirements that identify intelligence needs and the area of interest.

c. Knowledge of the capabilities and limitations of the supporting aircraft and sensors, and the analysis equipment available.

d. Knowledge of current enemy tactics, equipment, and OB.

e. Prior imagery coverage of the area of interest for comparative analysis.

f. Intelligence information received from other sources that will assist in confirming or denying his evaluations.

4. Physical qualifications. An IA must possess normal or correctable vision and visual acuity or, in other words, the ability to see images clearly and to detect differences in parallax the visual displacement of objects (stereovision). Unless images are seen sharply, the IA cannot identify them correctly.

a. Observation and Analysis. The IA must have the ability to see and recognize objects which appear on imagery. For example, you see two objects on a stereopair (two overlapping photos) and, using your power of observation, recognize and identify the objects as two buildings. On closer examination of the area immediately surrounding the first building, you discover objects which you identify as slides, swings, and teeter-totters. After your analysis, you conclude the building in question is an elementary school. The second building is identified as

a church after a study of its shadow marks the fact it has a high conical tower with a cross on top. Because this building is a church, the rows of small white objects behind it may indicate a cemetery. The individual who observes without analyzing, and identifies the objects only as buildings, is a photo reader.

b. Patience is defined as having the endurance and perseverance to stay with a problem and bring it to a successful conclusion. The process of making a detailed analysis of imagery has been likened to that of working a jigsaw puzzle in that each new piece of information contributes some small bit to the overall picture. The simile can be enlarged upon by stating the IA, like the individual putting the jigsaw puzzle together, may be required to exercise great patience in the course of solving the puzzle. In some cases the IA is required to have patience to stick with the problem a little longer in the hope of discovering additional useful information. In other cases the IA must do a repetitive job which may offer little challenge. Patience required of an IA may be expressed as perseverence in correct procedures for the job even though a less efficient way might be faster.

c. Judgement. Reaching a decision by the comparison of facts and ideas and forming a logical conclusion depending upon good judgement are factors which enter into the analysis of imagery in many different ways. Judgement is required of the IA in properly weighing the reliability and significance of the various clues detected on the imagery. For example, the IA locates what appears to be an artillery position on a photograph. Is it an active or dummy position? Through analysis and computations the IA concludes it is a heavy artillery position, but knowing, from the existing tactical situation and personal knowledge of enemy tactics, that the area does not lend itself to the placement of heavy artillery. Can it be a change in the doctrine of the opposition? Can it be a new type position? These and other questions must be answered to make the analysis complete. The IA must judge how meticulous and extensive the analysis must be. Ultimately, the IA's report is dealing with people's lives. The IA cannot afford to report less significant information than what is seen, nor can any doubt be left as to the degree of certainty with which the IA is reporting.

5. The IA sees under the stereoscope a miniature three-dimensional illusion which becomes significant as the result of the training, experience, immediate environment, or perhaps some remarks heard yesterday in the CM&D section. To make sense of what the IA sees, the opposition's tactics must be studied to learn the characteristics and employment of the enemy's weapons. To do this effectively and to keep the information tactically current, the IA must receive intelligence information from other intelligence activities; otherwise, the IA can furnish only mechanical imagery reading, not imagery analysis. The IA must grasp the general intelligence picture and apply it to the soldier's particular problem.

6. Stereovision Principle. Because most identification is performed stereoscopically, stereoscopic acuity is a requirement of virtually all IAs. Stereoscopic acuity is the ability of the IA to detect differences in parallax (ability to see objects three-dimensionally) by optical means. We can detect differences in parallax or, if you prefer, see three-dimensionally, because of the distance between our eyes (interpupillary distance). When we look at an object, we are actually seeing a slightly different view with each eye. To demonstrate, look across the room or out of the window. Locate an object 10 to 25 feet away. Look at the object with your right eye closed, then look at it with the left eye closed. When you rapidly close one eye and then the other, the objects seem to move. The two different views of the object obtained by looking at it with both eyes enable you to see it in three instead of two dimensions. A person who is blind in one eye cannot identify dimension with a stereoscope. Viewing imagery in three instead of two dimensions enables the IA to recognize and determine the height of an object more readily.

7. Stereovision is the three-dimensional effect achieved by fusing into one image two slightly different views of the same object. To obtain two views of the same object, a stereopair is used. Refer to Figures 1-1 and 1-2.

8. Stereopairs are two photos made in succession at the predetermined intervals along an aircraft's flight line. The interval between exposures depends upon the type of camera used and the altitude and speed of the aircraft. The interval is controlled automatically by a timing mechanism within the camera called an intervalometer. The intervalometer is normally set so each exposure overlaps 60 percent of the preceding photo. 60 percent overlap is desirable and will ensure all portions of the ground covered by the sortie (except portions of the first and last photos) can be viewed stereoscopically.

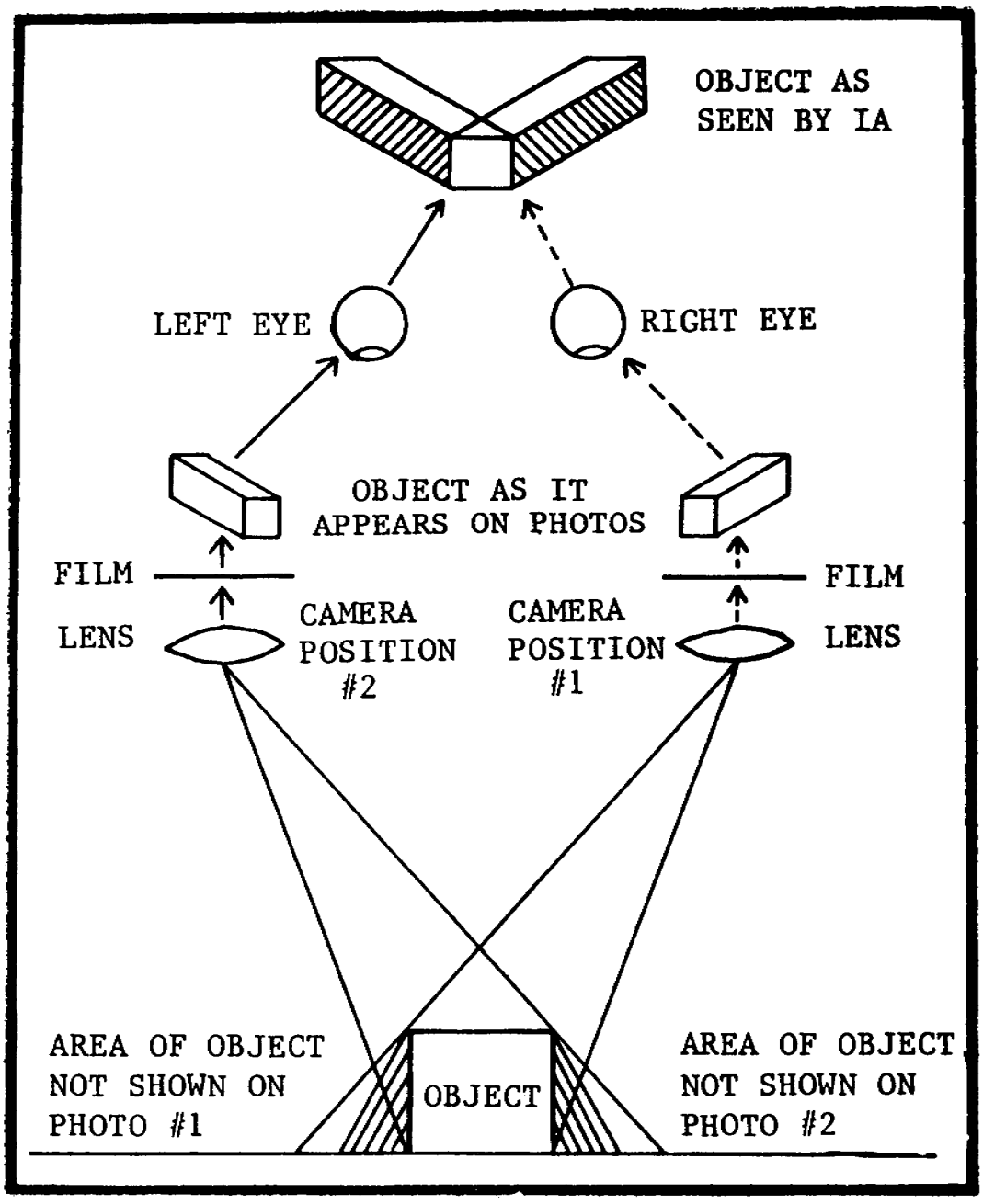


Figure 1-1. Stereovision.

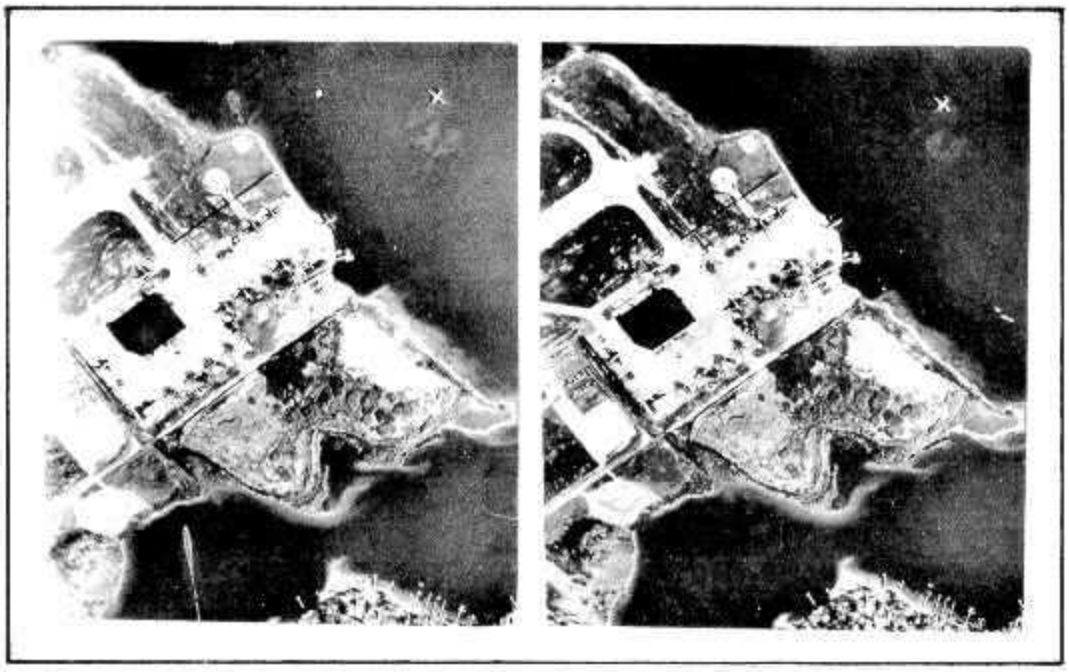


Figure 1-2. Stereo Pair.

9. Overlap and sidelap. Overlap makes stereovision possible with photos in a single flight line, which is normally flown at 60% overlap. Sidelap is used to ensure complete coverage with photos from different flight lines which overlap. To obtain sidelap stereovision the photos must be approximately the same scale; a sidelap of 30% is desirable. Figure 1-3 demonstrates sidelap and overlap photos. Photos A and B are a stereo pair from one flight line of overlapping photos; photos C and D are a stereo pair from another flight line overlaps (sidelaps) the first flight strip. All four photos overlap each other as illustrated. These photos can provide stereovision in six ways:

a. Along the flight line on Photos A and B or C and D.

b. With Photos A and C, or B and D, using sidelap between flight lines.

c. With Photos A and D, or B and C, by using the overlapping corners of these photos.

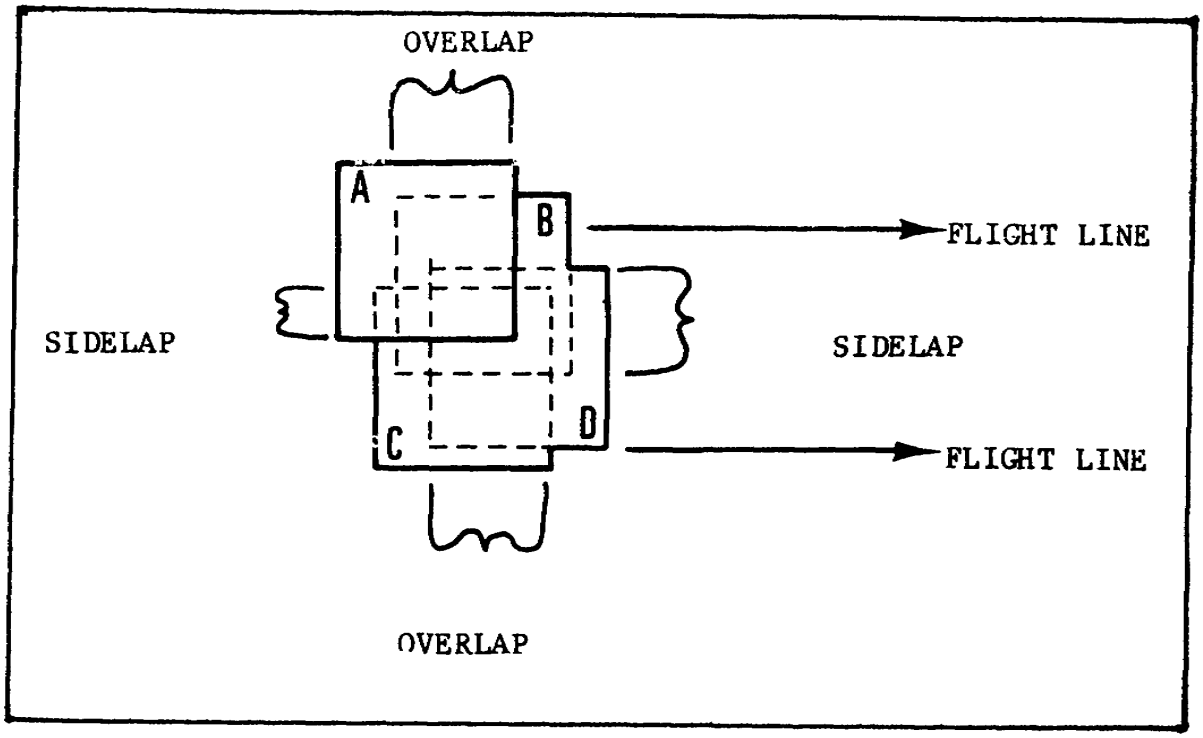


Figure 1-3. Sidelap and Overlap.

10. Accuracy and Reliability. The individual IA is the link between an important intelligence source and all intelligence consumers. IA reports must be timely, thorough, concise, and accurate. Accurate reporting means more than writing identifications and conclusions. It entails presenting the information so the reader will clearly understand it and accept it as reliable. Careful choice of language is particularly important. In some cases the IA cannot be completely certain of the accuracy of the results. This may be because of small-scale imagery (which covers a large area), a gap in knowledge and experience, or the lack of adequate information to fully support a conclusion. In these cases the IA must be sure the reports are not misleading. As a rule of thumb, a good IA--

a. Names the object on the imagery.

b. Describes the object.

c. Remembers the object's appearance for later use.

11. Under optimum conditions, imagery analysis can produce highly accurate and detailed information on almost all topics of military interest. The reliability of imagery analysis is controlled by three main factors: the quality of the imagery with which the IA works, the amount of time allowed for analysis, and the IA's ability.

12. General Knowledge. The IA must devote some time to study to maintain or improve proficiency. The study consists of two types:

a. General background information relating to the military, political, geographic, and economic situation in the area of projected military equipment.

b. Specific information on imagery analysis developments, including equipment.

13. References. To be most effective the IA should have a suitable working place, proper equipment, adequate storage space, access to intelligence information from all sources, and suitable reference material. Reference material deserves special mention; an IA cannot mentally catalog all needed information. The IA must have access to target folders, imagery interpretation keys, recognition manual, maps, city plans, industrial flow charts, and various types of intelligence reports.

14. Operating Procedures. Through teamwork of officers and enlisted personnel trained as IAs, information is produced by IA units and centers for intelligence agencies in the most rapid and reliable manner possible. Therefore, units and centers should adopt a standing operating procedure (SOP) which is fully understood by all members. Once adopted, training should increase efficiency by actually proving the procedure with practical imagery analysis exercises. If any changes must be made in the procedures, the entire unit should be informed. In actual operations, circumstances may require a different SOP.

15. History. The functions and capabilities of IAs have been studied individually and collectively. The emphasis has been to impress you with the value of the IA to a commander. Look at several historical examples of photo interpretation accomplishments.

a. In 1941 Great Britain was in danger of starving because Admiral Doenitz's U-boats were decimating Atlantic convoys at an alarming rate. U-boats operating from new bases along the French coast had a short run to the North Atlantic where they slaughtered the slow Allied convoys. St. Nazaire was one of the most important of these U-boat bases. The British planned a commando raid to destroy the port's facilities. An old admiralty chart was the only information available, and an up-to-date model of St. Nazaire was needed. The Royal Air Force flew several photo reconnaissance missions. PIs interpreted the photos and built a model showing the location of new buildings, reinforced concrete U-boat pens, and the defensive devices designed to make a British attack costly. The assault forces studied the model and familiarized themselves with the different approaches to be used for day or night attack. About six

months after the first photographic sortie was flown, the commandos launched a successful raid on St. Nazaire. The accuracy of the model constructed by PIs from aerial reconnaissance photos aided in meticulous planning and training necessary for success in this operation.

b. The first evidence the Germans were using radar came from aerial photographs of the Cap de la Hague Peninsula in France. The PIs reading photos of a sortie of enemy defenses on the Peninsula noticed an odd-shaped object. By studying the object on two overlapping photos, they noticed the shape of the object was slightly different on each photo; therefore, they concluded it must be moving. The PIs checked previous cover of the area and found no trace of the installation. At first the PIs suspected they had found a new type of antiaircraft artillery (AAA) position, but closer study of the surrounding area showed a lack of track activity which normally is found around such a site. Special low-altitude obliques of the object were requested. Six days later the PIs studying the obliques identified the object as a radar installation, giving the first positive proof of the German use of radar.

c. One of the major contributions of Allied PIs during the war in Europe was the identification of German rocket sites. The experimental V2s were first located on Peenemunde Island. Later, operational sites were located by PIs, enabling the Allied air forces to attack the sites, preventing some from ever becoming operational or crippling others, and materially reducing the effectiveness of the German rocket attacks.

d. During the course of the war, the allied PIs furnished strategic bombing intelligence and poststrike analyses. They interpreted coast and antiaircraft trafficability analysis; and performed tactical interpretations for combat units.

e. World War II ended in 1945, but five years later another conflict began in Korea. The US entered the fighting, and PIs were again called upon to provide their services. The PIs furnished a large percentage of our intelligence in Korea. A PI must be familiar with native customs of the area of concern. In the early days of the Korea conflict, some PIs were convinced every North Korean soldier carried his own portable antiaircraft gun. This belief was occasioned by a lack of knowledge of the local custom of using circular burial mounds with poles. What the PIs thought were automatic weapon positions were actually Korean graves. Figure 1-4 is an example of oriental graves (14) within a trench system.

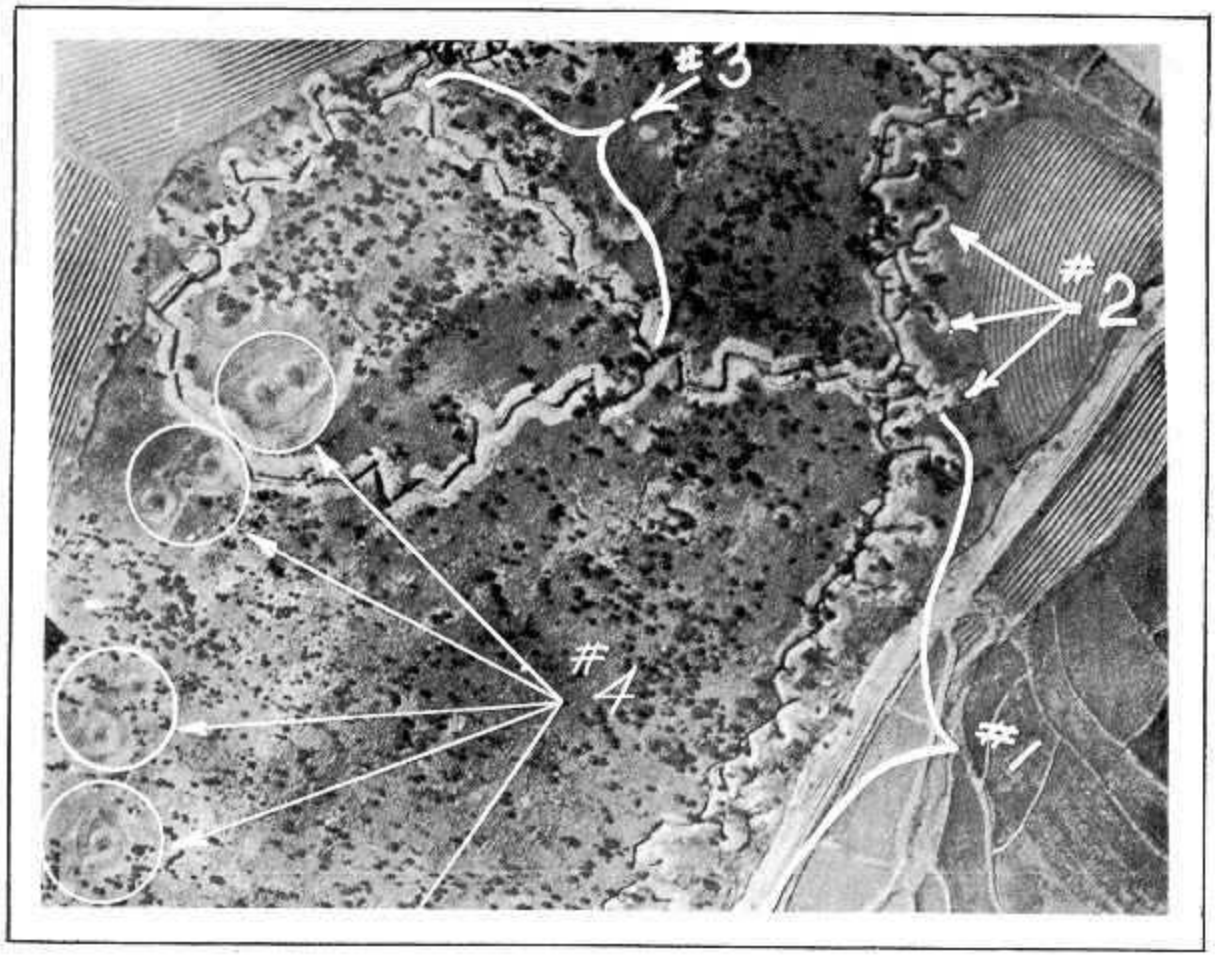


Figure 1-4. Graves Within a Trench System.

f. Since the end of the Korean conflict PIs have been exposed to more modern aerial photography and started to interpret images on IR and radar imagery in addition to the conventional aerial photography. The name "photo interpreter" was consecutively changed to "image interpreter" and recently to "imagery analyst" since the IA analyzes imagery, thus being more expedient in preparing imagery reports utilizing immediate results derived from aerial R&S missions which enables the G2 to satisfy the commander's PIR more rapidly.

PART C: MI BRIGADE (CORPS) ORGANIZATION

1. The MI brigade (Corps). Tables of organization and equipment (TOE) support a corps structured with two and two-thirds of a division. The corps G-2 exercises control of the MI brigade. Normally, MI brigade assets provide general support to the corps as a whole. When required, control is decentralized and assets provide direct support to subordinate corps units. The MI brigade consists of a headquarters and headquarters detachment (HHD) and four battalions (see Figure 1-5). As an IA you will be concerned with the MI battalion operations and the MI battalion aerial exploitation (AE).

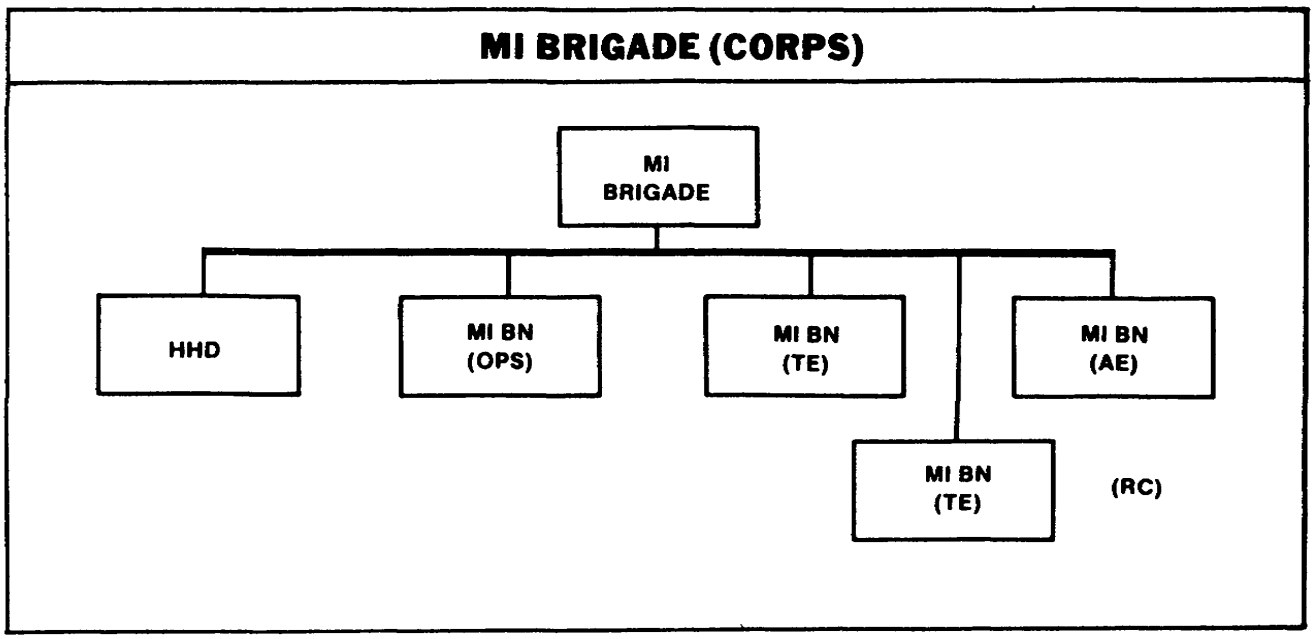


Figure 1-5. MI Brigade (Corps).

2. The HHD is organized to provide command and control of assigned or attached units, to include specialized intelligence, electronic warfare (EW), and OPSEC support attachments. It provides the staff planning, management, and coordination necessary for the employment of MI brigade resources.

3. The MI battalion (operations) has a headquarters, headquarters and service (HH&S) company; an operations (OPS) company; and a communication (COMM) company (Figure 1-6).

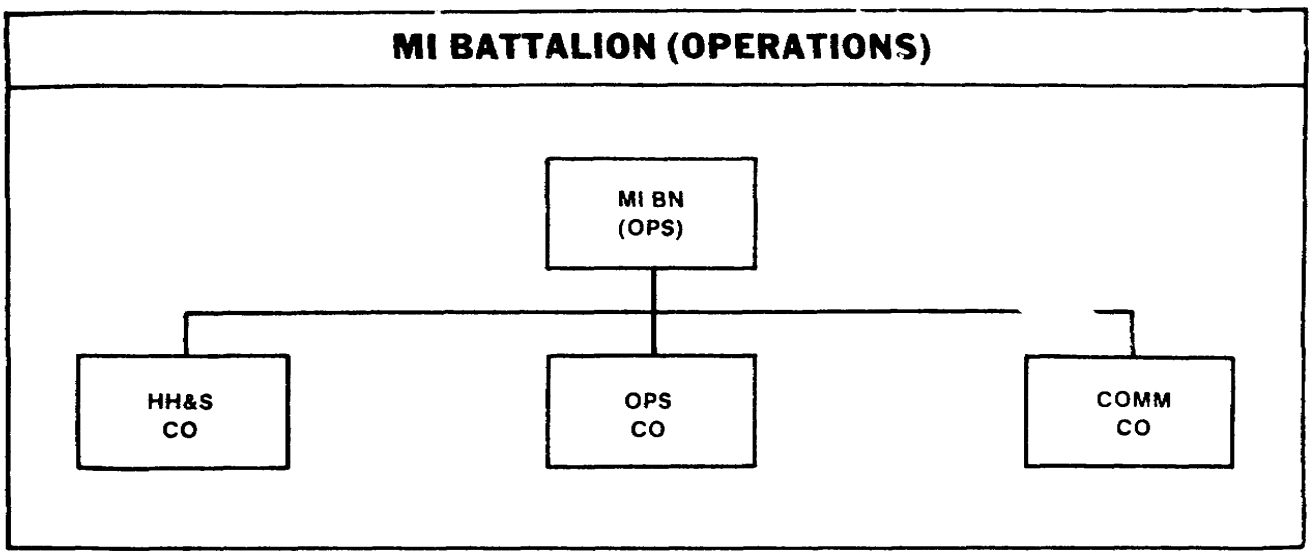


Figure 1-6. MI Battalion Operations.

a. The operations company is organized with a company headquarters and four support elements. The company headquarters includes personnel and equipment for command and control and administrative support of the company (see Figure 1-7).

b. The corps tactical operation center (CTOC) support element supports the G2 and G3. It is staffed with intelligence, EW, and OPSEC support personnel to provide the corps with intelligence and EW management and all-source production section (ASPS) and CM&D.

c. The technical control and analysis element (TCAE) merges with the Ml brigade S3 section to form the MI brigade operations center. Under the direction of the S3, the brigade operations center plans, manages, and provides technical control and tasking of brigade assets. It processes intercepted signals intelligence (SIGINT) and EW data to produce SIGINT.

d. The sensitive compartmented information facility (SCIF) security squad provides 24-hour physical security for up to three SCIF's. This squad consists of military police personnel. Each SCIF security team will provide 24-hour physical security and one entry control point for its facility. Minimum physical security requirements for field SCIF are specified in DIAM 50-7, chapter 7.

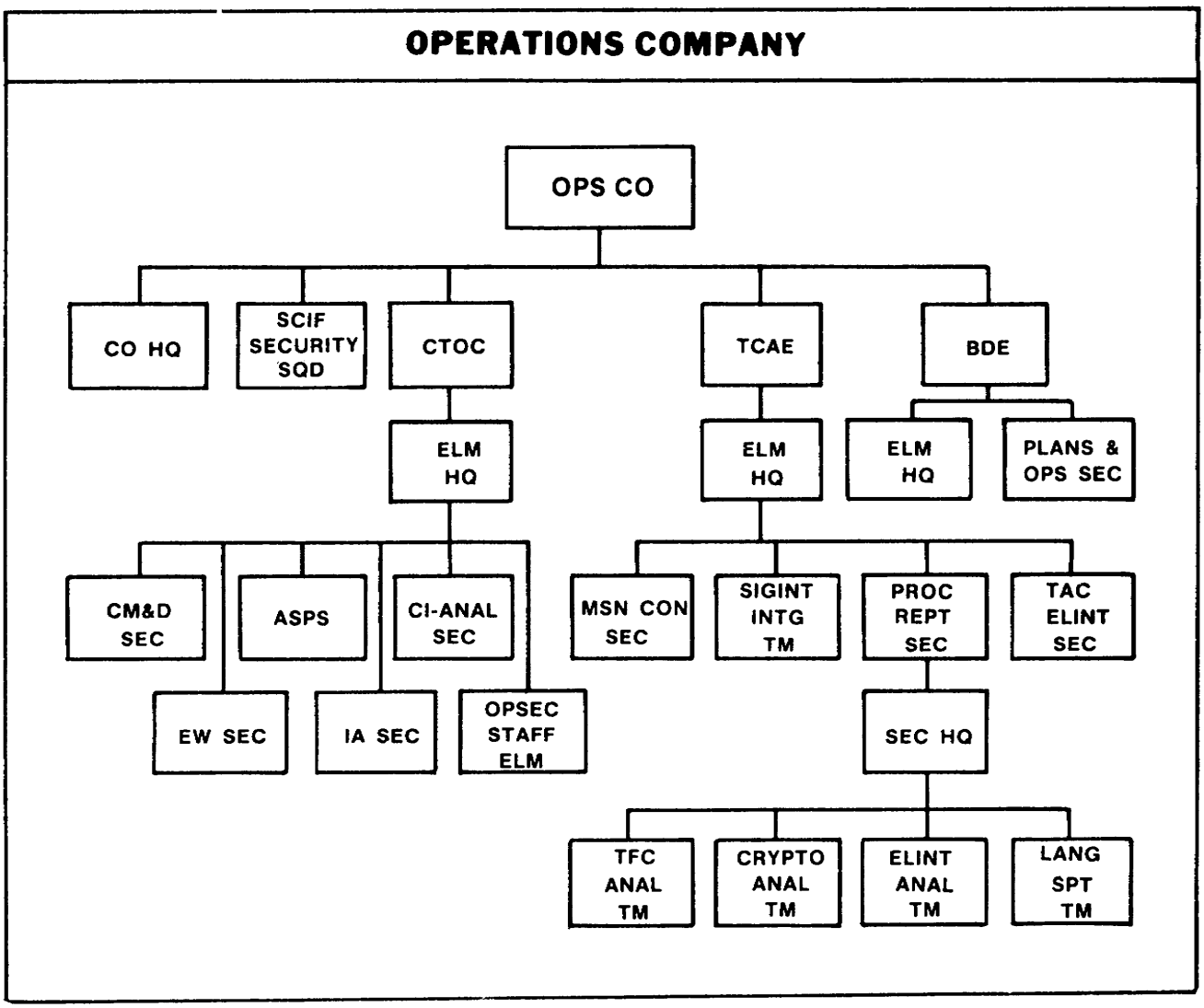


Figure 1-7. Operations Company.

e. Battlefield deception element (BDE) is responsible for augmenting the theater deception objective. It ensures that division level battlefield deception is applicable when required and provides deception planning support. The BDE supports the execution of corps deception operations. It can execute limited deception events with organic resources. The corps BDE is collocated with and operates under the staff supervision of the CTOC G3.

f. The HH&S company provides command and control for assigned and attached battalion resources. It provides logistical support for the battalion.

g. The communications (COMM) company provides consolidated communication, communications-electronics/communications security (C-E/COMSEC) organizational maintenance, and COMSEC logistical support for the MI brigade.

4. MI battalion (AE). The corps commander's mission is to fight the battle as one extended integrated operation. To do so, the commander must see the battlefield in-depth and be aware of what the enemy is doing, where they are, and what they intend to do. The MI battalion (AE) provides the corps commander with his organic "deep look" through aerial reconnaissance, surveillance, SIGINT collection, analysis, and reporting. The MI battalion (AE) is organized as shown in Figure 1-8.

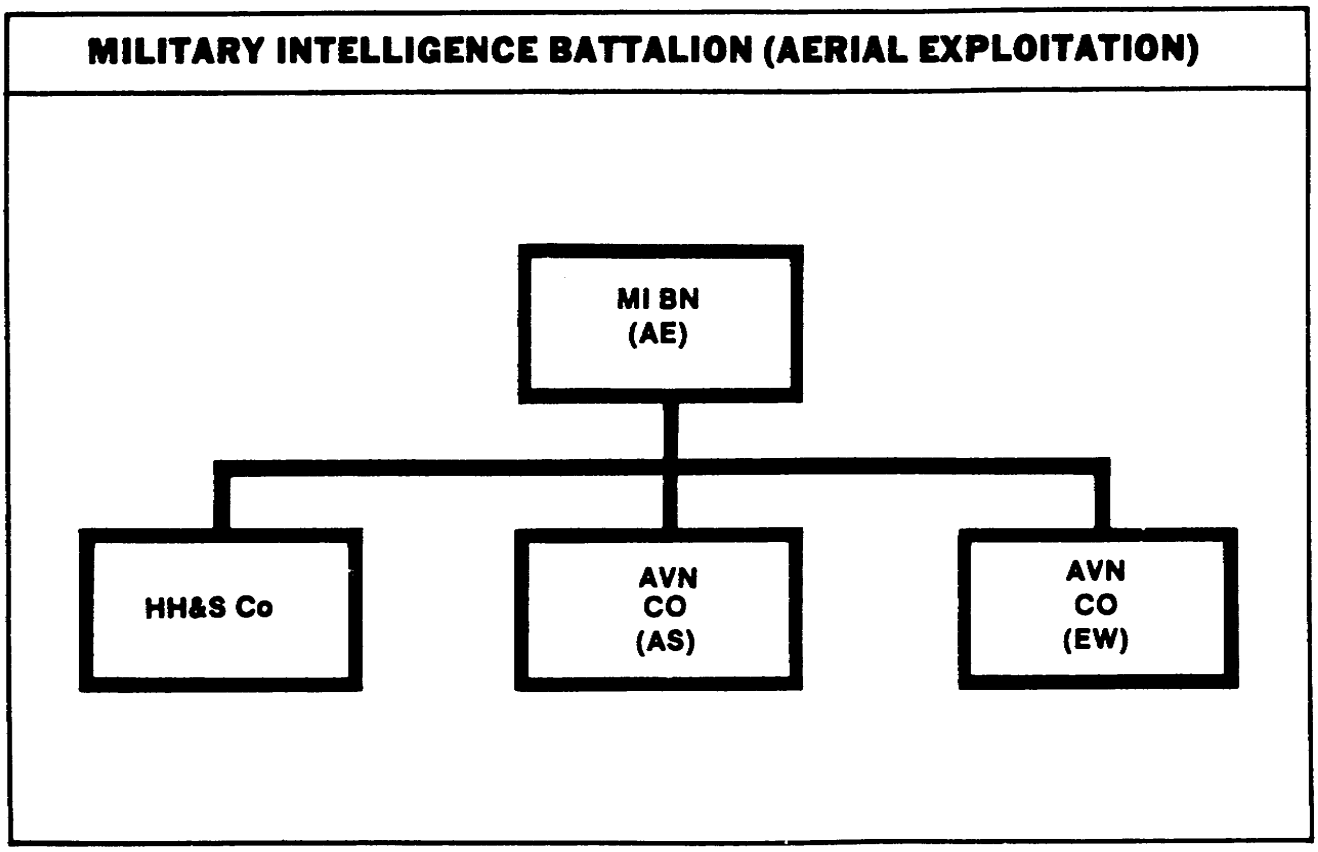


Figure 1-8. MI Battalion (AE).

a. The HH&S company provides command and control for assigned and attached battalion resources. It provides logistical support for the battalion.

b. The aviation company (electronic warfare)(EW) provides airborne SIGINT collection, analysis, processing, and reporting.

c. The aviation company (aerial surveillance)(AS) provides surveillance and reconnaissance support to the corps. The company plans and conducts aerial R&S of routes, zones, areas, coastlines, and borders using SLAR and photographic and visual means. Combat information and IMINT are reported to the supported unit and to the CTOC. All company assets, except for the data terminal section, normally operate at the corps fully instrumental airfield. The aviation company (AS) is organized as shown in Figure 1-9.

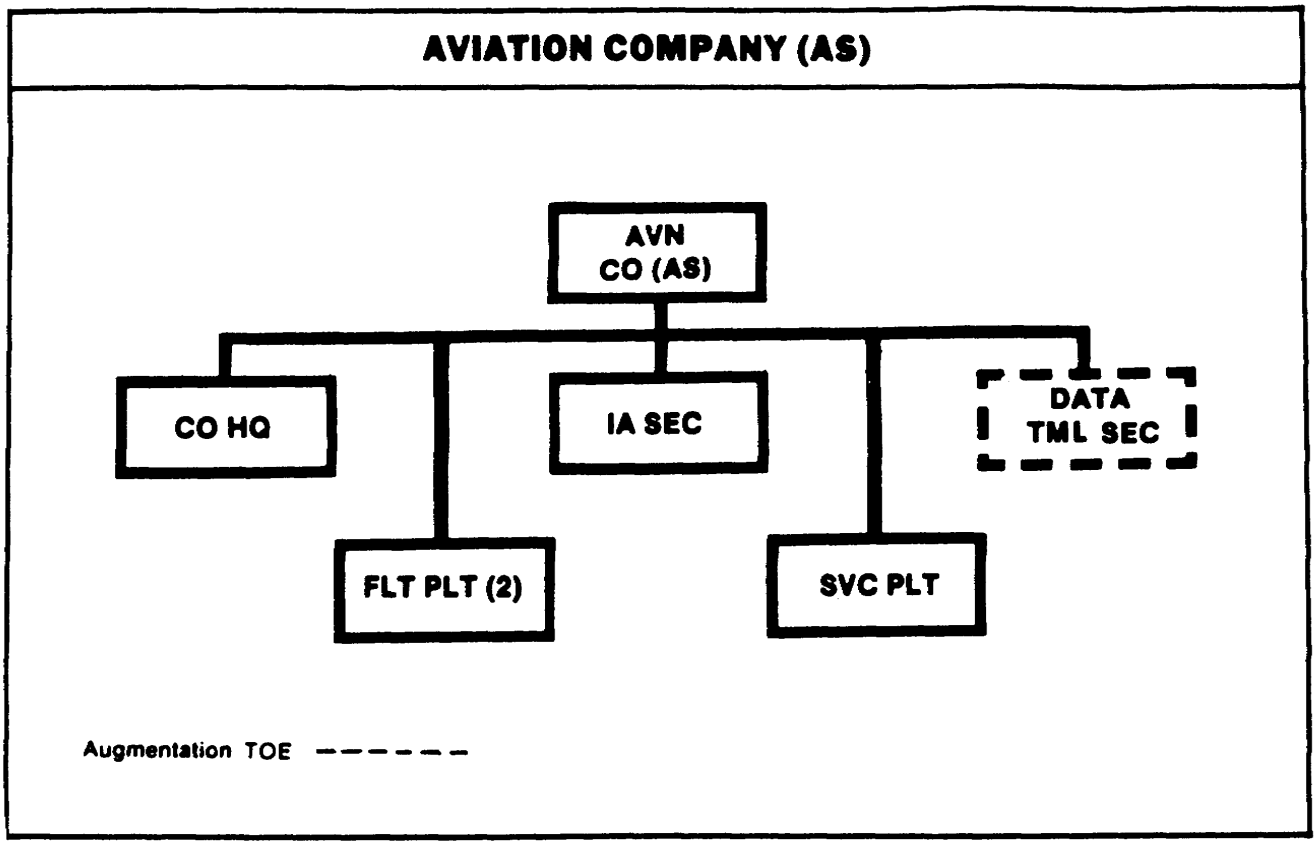


Figure 1-9. Aviation Company (AS).

5. MI battalion (tactical exploitation)(Corps). The tactical exploitation battalion is organized with four companies. It has a HH&S company, a counterintelligence (CI) interrogation company, an EW company, and the long-range surveillance company (LRSC).

6. In division size units IAs are part of the G2s CM&D section that work in the division tactical operation center support element (DTOCSE). The CM&D mission manager of the CM&D section monitors the current and planned deployment of R&S assets and maintains the current status of R&S resource available to the division. The CM&D mission manager is the interface between the plans section of the G3, the air liaison officer, division aviation and the fire support element for R&S planning, requesting, and tasking.

7. In an airborne division there is an imagery analysis section in the headquarters, headquarters and operation company of the MI battalion. This section has a two fold mission.

a. To analyze imagery to identify suitable drop/landing zones for airborne operations.

b. To provide limited imagery analysis support for contingency planning and operations.

PART D: US ARMY RECONNAISSANCE AIRCRAFT AND THEIR CAPABILITIES

1. Helicopters are used extensively for visual reconnaissance.

2. OV-1D Mohawk. The OV-1D Mohawk aircraft (Figure 1-10) is used by the Army to perform R&S missions. The Mohawk is an army surveillance aircraft capable of intelligence collection through SLAR, IR, electronic, and photographic systems, as well as visual reconnaissance.

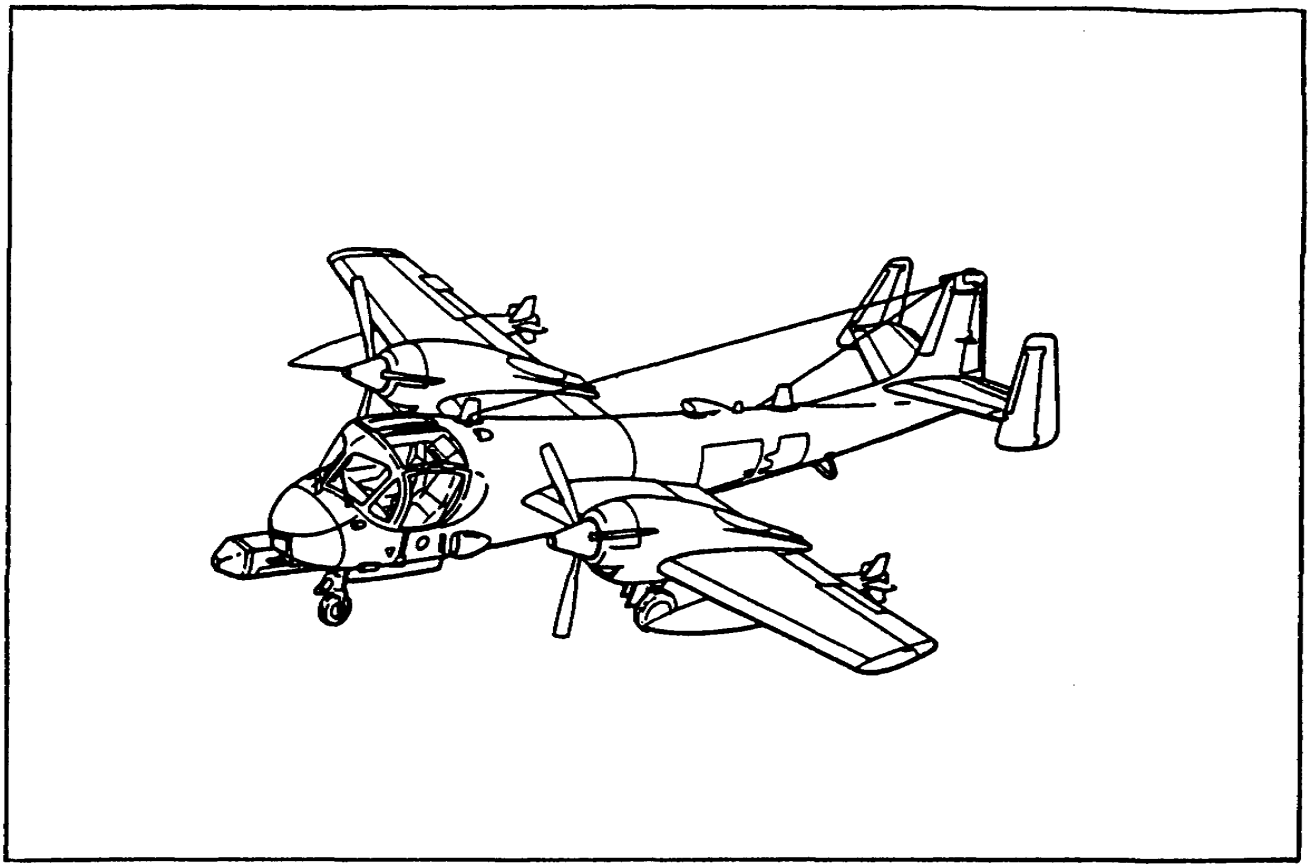


Figure 1-10. OV-1D Mohawk.

a. Characteristics.

(1) Normal cruise speed: 210 knots true air speed (TAS).

(2) Service ceiling: 25,000 feet (ft).

(3) Normal mission duration: three hours.

(4) Crew: Pilot and aerial intelligence specialist.

(5) Communication: High frequency (HF), very high frequency (VHF), ultra-high frequency (UHF), frequency modulated (FM) secure voice radio, and identification friend or foe (IFF) radar transponder.

(6) Defenses: Aircraft survivability equipment (ASE).

b. Advantages.

(1) Quicker responsiveness to the commander's needs.

(2) Slower flying speeds.

(3) The ability to operate from short, semi-improved runways.

(4) The ability to operate in proximity to the supported forces.

(5) Near all-weather capability.

c. Disadvantages.

(1) Short operational range.

(2) Vulnerability to enemy air defense.

(3) Limited variety of camera systems.

(4) Not capable of flying in severe weather.

3. Unmanned airborne vehicles (UAV) have been organized within the Army into three functional categories (Figure 1-11).

a. Target acquisition designation and aerial reconnaissance system (TADARS).

b. General purpose (intelligence and electronic warfare (IEW) UAV.

c. Expendables.

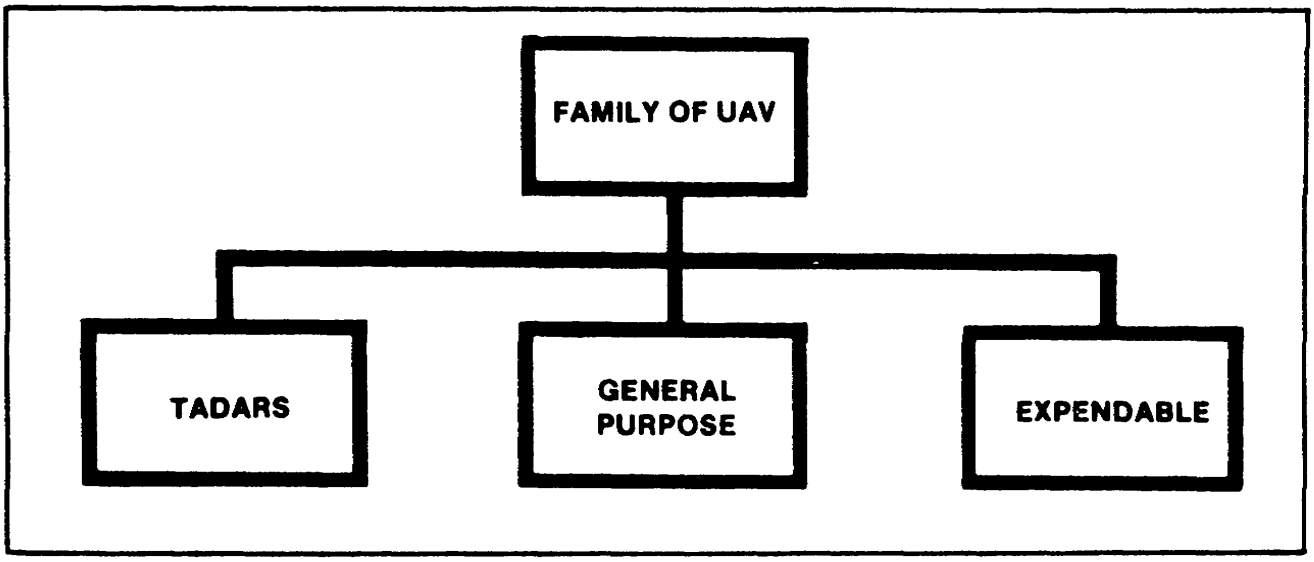


Figure 1-11. UAVs.

4. Target acquisition designation and aerial reconnaissance system (TADARS) primary function is target acquisition and attack. A secondary function is reconnaissance and surveillance, depending upon the commander's priorities. The AQUILA UAV program is in the TADARS category. The AQUILA has the capability of laser-designating critical targets, both moving and stationary, for attack by laser-guided weapons. These weapons are launched by a variety of standoff systems. Although consolidated at corps, the AQUILA normally supports a division. It contains sections which will be allocated to each brigade of a supported division. The key to a successful UAV mission lies in planning and coordination.

5. The function of the general purpose category is reconnaissance and surveillance. The Army program supporting this category is the IEW UAV. The IEW UAV is an EAC and corps-level system.

a. The IEW UAV can--

(1) See deep.

(2) Provide superior IMINT and multisensor support to EAC requirements and to the corps and its subordinate units.

(3) Provide timely interface to deep-targeting elements via the joint surveillance target attack radar system (JSTARS) ground station module (GSM).

b. All IEW UAV products are provided to the all-source analysis system (ASAS) for fusion into the commander's all-source intelligence products.

c. A typical IEW UAV mission would proceed in the following manner: After takeoff from the corps rear area, the IEW UAV would proceed forward to conduct its R&S mission. The imagery is downlinked to the JSTARS GSM and a reconnaissance exploitation report (RECCEXREP) is prepared and forwarded to corps through available communications. Upon completion of the mission, the air vehicle returns to the corps rear area for recovery. IEW UAV support is allocated to corps and division users by the G2, based on the commander's guidance and coordination with the G3. Mission planning and tasking will be accomplished by the corps CM&D section and passed to the MI battalion (AE) for flight planning and execution.

d. The last category of UAV is the expendable category. Expendable UAVs show great potential for employment on the battlefield, particularly with respect to lethal and nonlethal (primarily jamming) attack targets. Expendable UAVs may also be useful in performing special battlefield functions involving deception, resupply, and specialized reconnaissance.

PART E: USAF RECONNAISSANCE AIRCRAFT AND THEIR CAPABILITIES

1. RF-4C Phantom is the primary Air Force tactical reconnaissance aircraft. RC-4C missions are allocated to EAC and corps. It uses conventional photography (oblique, vertical, panoramic), IR, radar and visual reconnaissance (Figure 1-12).

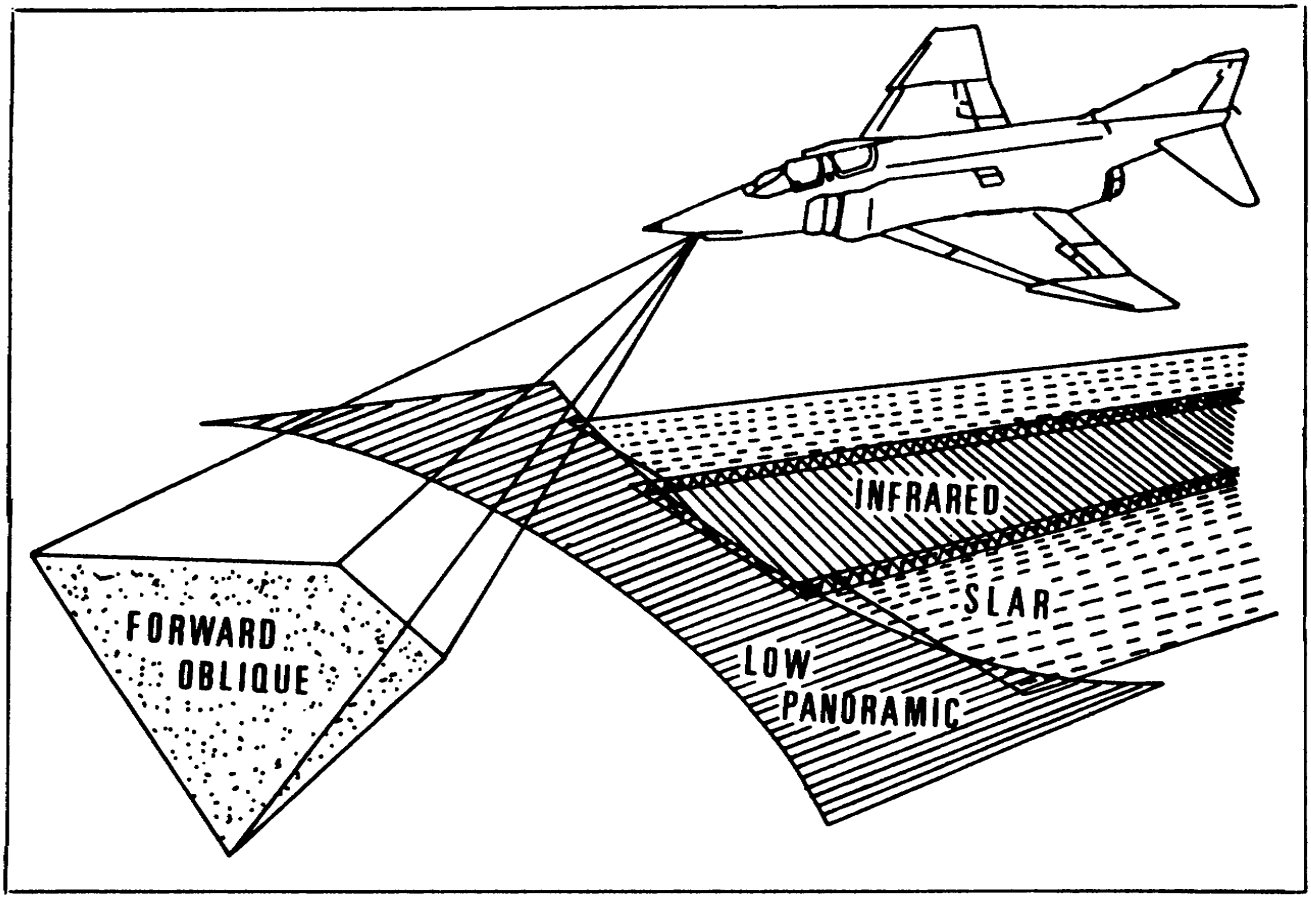


Figure 1-12. RF-4C.

a. Characteristics.

(1) Primary USAF reconnaissance aircraft.

(2) Maximum altitude: 60,000 ft plus.

(3) Supersonic (Mach 2.6 plus).

(4) Long-range (2,000 nautical miles (nm) plus).

(5) Communications: HF, UHF, and a transponder.

b. Advantages.

(1) Ability to photograph large areas.

(2) Multiple sensor capability.

(3) High altitude and low altitude reconnaissance capabilities.

(4) Deep penetration into enemy territory.

(5) Low vulnerability to ground fire.

(6) All-weather, day and night operations.

(7) Crew: pilot and navigator.

c. Disadvantages.

(1) High speeds too fast for detailed visual observation.

(2) Require improved airfields.

(3) Response time is slower than with organic aircraft.

2. PAVE TACK AN/AVG-26 is a line of sight (LOS), forward-looking infrared reconnaissance sensor. It has a laser ranger/designator and is currently used on RF-4C, F-4E, and F-111F aircraft.

a. Characteristics of the PAVE TACK are--

(1) Can be used day or night.

(2) Has limited adverse weather capabilities.

(3) Has a fuselage-mounted pod.

(4) Has cockpit controls and displays operated by the reconnaissance systems operator (RSO).

(5) Allows the crew to actually see the target at night.

(6) Provides accurate target locations and identification.

(7) Incorporates a laser ranger/designator to provide accurate system updates and to serve as a target designator for laser-guided munitions.

b. PAVE TACK has two basic operating modes: search and track. The search mode is used to locate the target. The track mode is used to accurately track targets after acquisition.

3. The U-2R is a high-altitude reconnaissance aircraft. It has both an IMINT and a SIGINT capability. Characteristics of the U-2R are--

a. Mission speed: 400 knots.

b. Range: more than 3,000 nm.

c. Operational ceiling: above 70,000 ft.

4. The TR-1 is a high-altitude tactical reconnaissance aircraft.

a. The TR-1--

(1) Is fitted with a synthetic aperture radar (SAR) to provide battlefield reconnaissance information for tactical commanders.

(2) Provides near real time (NRT) information and a date link to a ground terminal.

(3) Normally supports EAC, but the imagery may be available for exploitation at corps level.

b. Characteristics of the TR-1 are the same as for the U-2R.

c. Imagery from the TR-1 is downlinked to a TR-1 ground station. This station receives imagery in NRT and selects, formats, and transfers image high-density tape. The tape is transferred via a courier system to the imagery processing and dissemination system (IPDS) located at corps and EAC.

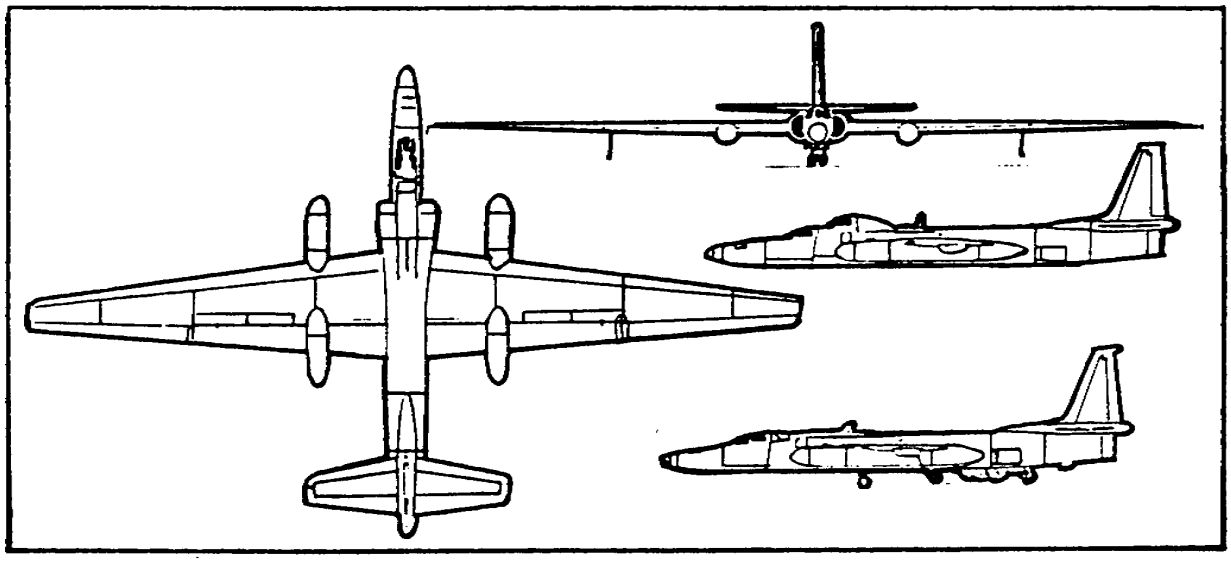


Figure 1-13. TR-1.

PART F: INFRARED IMAGERY

1. General. IR photography uses a special black and white film primarily sensitive to blue-violet and IR radiation. It is used mainly to supplement panchromatic cover. Details register in varying shades of grey, similar to panchromatic film, but results are different. The tones result from the degree of IR selectively of different materials, and not from their color.

2. The characteristics of IR photography are: vegetation appears very light, sky and water show up black, concrete and gravel roads appear very light, and asphalt appears dark.

a. Vegetation. All live vegetation except coniferous appears very light in tone because of the high IR selectivity of the chlorophyll in the leaves. Dead vegetation registers as very dark grey. This characteristic often permits the detection of camouflage when paint or cut vegetation is used. Cut vegetation gradually loses its IR reflectance until finally appears black on the image.

b. Haze penetration. The objects in the background on a high oblique photograph are obscured by haze, even on a clear day. This is caused by minute particles of dust and water vapor that scatter most wavelengths of visible light. Haze does not affect IR radiation to any extent, and by using IR film good penetration of background haze is often possible.

c. Terrain analysis. By absorbing most of the IR rays, water registers as black. This aids the IA in locating streams, shorelines, and swampy or marshy areas. During World War II, airborne troops were dropped into flooded grasslands that could have been detected beforehand if IR photography has been available.

d. Night reconnaissance. IR film is particularly useful in night reconnaissance because a large part of the light is present from the IR portion of the electromagnetic spectrum. However, the low exposure index of this film requires that night photography be flown at much lower altitudes to ensure adequate radiation. Subcourse IT 0654, Analyze Infrared Imagery, is available for additional information.

3. AN/AAS-24 (Army--OV-1D IR System).

a. Advantages.

(1) The system is completely passive and cannot be jammed.

(2) May detect hot or cold targets.

(3) Can be used day or night.

(4) Requires no illumination for night operations.

NOTE: Figure 1-14 was omitted (no longer required)

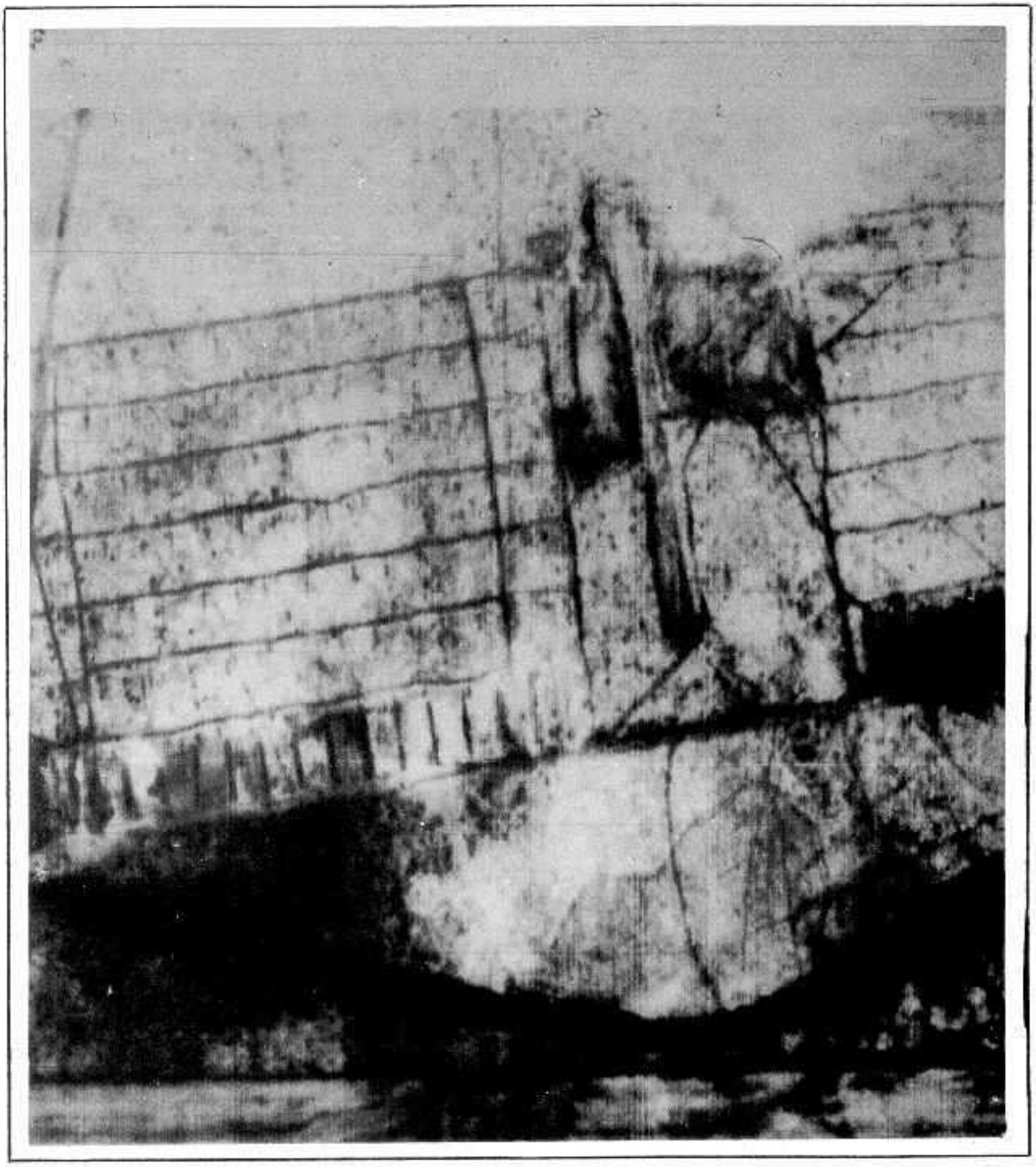


Figure 1-15. IR Imagery (OV-1D).

(5) Allows in-flight readout.

b. Disadvantages.

(1) Dense vegetation, rain, snow, hail, smoke, dust, or fog will hinder quality of the imagery (but not hinder detection).

(2) The aircraft must pass directly over the target making it more vulnerable to enemy air defense weapons.

(3) The system has no data-link capability.

(4) This system is found only in NG units.

c. Figure 1-15 is an example of IR imagery the OV-1D Mohawk produces.

4. AN/AAS-18 (USAF--RF-4C) IR system.

a. Advantages.

(1) 120-degree vertical field of view.

(2) Completely passive system.

(3) Records imaged terrain on a continuous film strip.

b. Disadvantages.

(1) Low altitude system.

(2) No cockpit display.

(3) No data transmission capability.

(4) System is used by National Guard and Reserves only.

5. AN/AAD-5 (RF-4C) is a new USAF infrared system that replaces the AN/AAS-18. Many characteristics will remain the same; however, most of the AN/AAD-5 is classified.

PART G: SIDE-LOOKING AIRBORNE RADAR

1. SLAR is an active sensor that sends out radar pulses and records the "returns." Radar waves must be taken into consideration when planning missions for SLAR. Heavy foliage and terrain features such as mountains and large hills cannot be penetrated by radar waves so blank areas called radar shadow are produced. Therefore, flight lines must be planned to provide maximum coverage. The outgoing radar waves can be detected by the opposition and electronic countermeasures (ECM) may be used to either jam the sensor or degrade the quality of the returns. The major advantage to

SLAR is its standoff capability. It does not require the aircraft to fly over the target area so enemy territory need not be entered to gather intelligence.

2. The AN/UPD-7 SLAR is a radar component system of the OV-1D Mohawk. It consists of the AN/APS-94F radar surveillance set and the digital data link. The AN/APS-94F detection set has two channels to differentiate between moving target indicators (MTIs) and fixed target indicators (FTIs). One channel shown all terrain features and the other channel shows MTIs with a slight showing of the terrain. The AN/APS-94F is used mainly with MTIs for surveillance. The FTIs are often used for terrain studies. The stand-off capability on the AN/APS-94F is adjustable. The radar has a maximum range of 100 kilometers (km) on either side of the aircraft using both antennas simultaneously. The system has range delay settings in increments of 10 km.

Furthermore, there are three range settings of 25, 50, and 100 km. The range delay settings begin at 0 and advance to 60. There is a dead zone directly beneath the aircraft corresponding to the above ground level (AGL) altitude. If the aircraft is flying at 10,000 ft AGL, the first 5,000 ft per antenna used is a dead zone. If both antennas are being used it would be 10,000 ft. The aircraft must fly at low altitude and maintain a straight and level flight path for quality imagery. Figure 1-16 shows the effect of range delay selection for the AN/APS-94F. Refer to Subcourse IT 0653, Analyze Side-Looking Airborne Radar Imagery, for additional information.

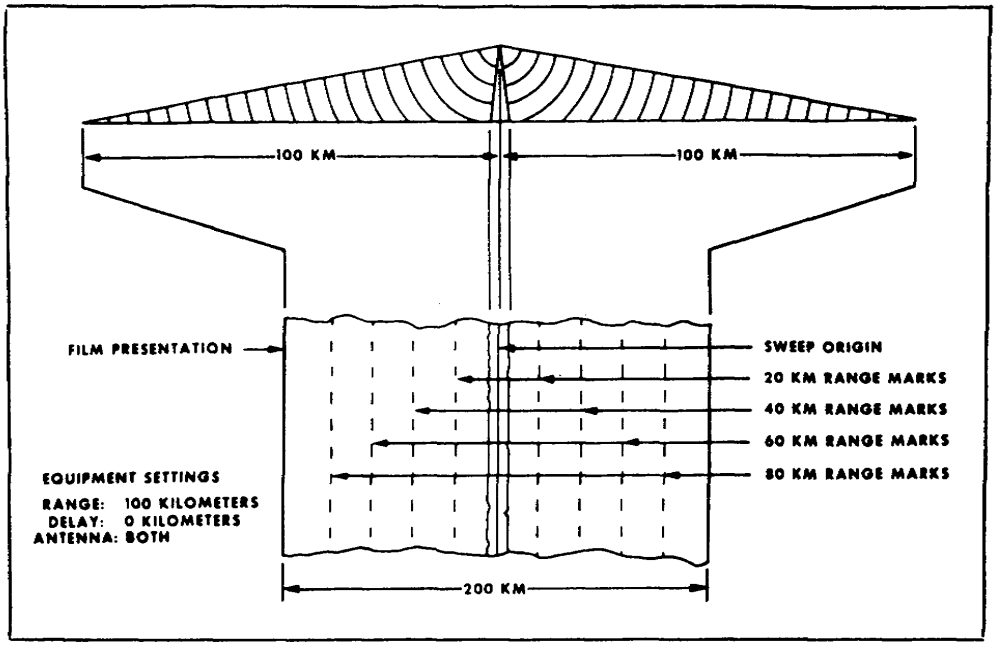


Figure 1-16. Mapping diagram -- AN/APS-94F.

NOTE: The use of the range delay setting will change the distance value of the range marks. When a range delay of zero is used, each range mark will equal a distance of 20 km. But when a range delay of 10 or more is selected, the value of the range marks will be changed by the value of the delay selected. In Figure 1-16 is a diagram mapping which shows how the range delay affects the range marks presented on the imagery.

a. Advantages.

(1) Has near all-weather capabilities.

(2) The system may be data-linked to a ground terminal.

(3) Continuous wide-area surveillance.

(4) Reduced threat from air defense artillery because of standoff capabilities.

(5) The film processed in flight and viewed by the operator. It is ready for immediate readout upon landing.

(6) Rapid dissemination of information through ground data terminals and operator in-flight reports.

b. Disadvantages.

(1) SLAR radiation is easily detected by enemy EW elements.

(2) Cannot distinguish friend or foe on the imagery.

(3) Cannot identify targets, only movement.

c. Range setting. 25, 50, or 100 km to either side or both sides. Range setting cannot exceed 100 km.

d. Range delay setting (cannot exceed 100-km range setting): 0, 10, 20, 30, 40, 50, or 60 km.

e. Figure 1-17 is a SLAR photograph taken from the OV-1D.

Figure 1-17. Side-Looking Airborne Radar Imagery (AN/APS-94F).

3. The AN/UPD-8 SAR system is a radar component system of the RF-4C using the AN/APD-10 radar surveillance set; it is a wide-area, all-weather, day and night surveillance system.

a. SLAR can be flown in two basic profiles:

(1) As a stand-off border-surveillance collector.

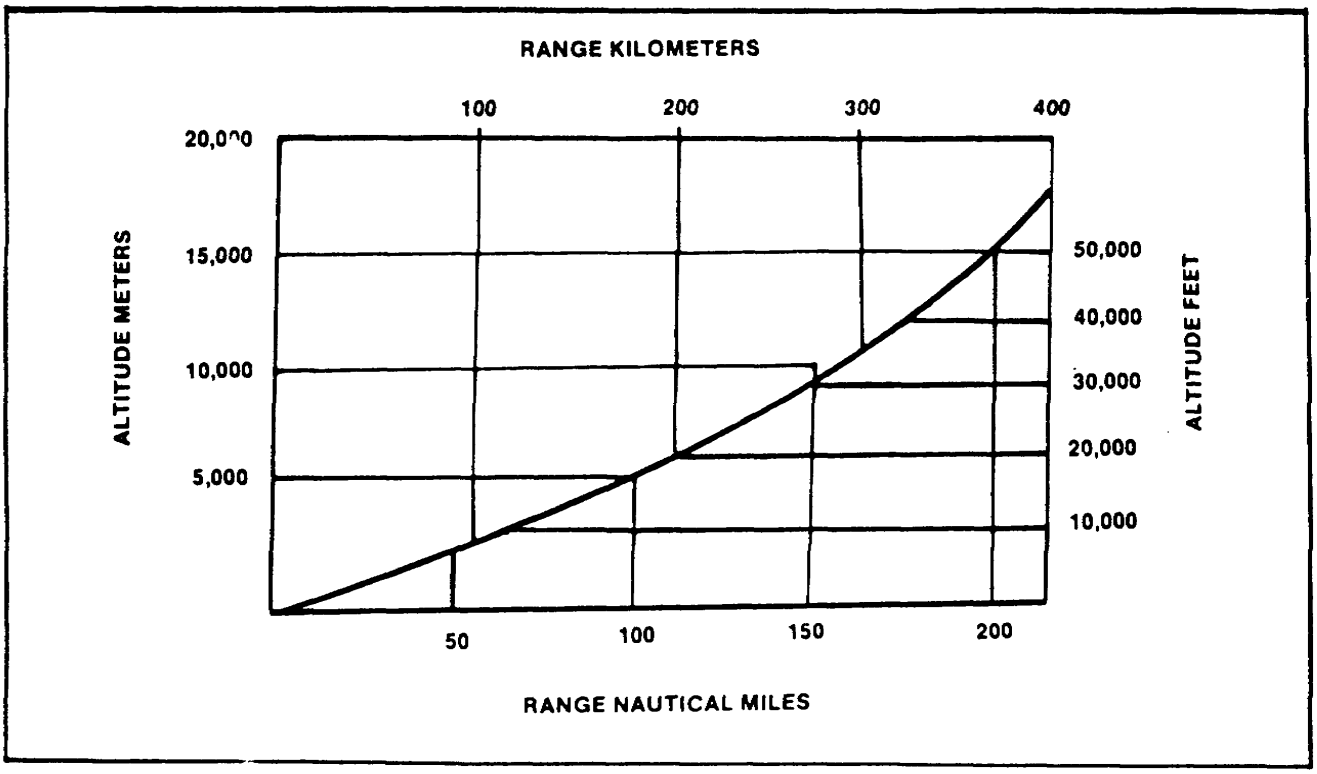
(2) As a low-altitude penetrator where information on high value targets (HVTs) cannot be collected with conventional sensors because of weather, darkness, or Threat.

b. The UPD-8 system has eight modes of operation (Figure 1-18). SLAR imagery taken from the UPD-8 system is shown in Figure 1-19.

(1) All modes operate on either side of the aircraft. Modes 2, 3, and 4 are MTI and high resolution. The remaining modes are high resolution only.

(2) The wideband SLAR data link equipment is limited to LOS from the aircraft to the ground receiving antenna. The maximum data link range possible for the RF-4 is illustrated in Table 1-1.

Table 1-1. Maximum Data-link Range.



UPD-8 USAF SLAR					
MODE	ALTITUDE (ft)	STANDOFF (nm)	SWATH WIDTH (nm)	IMAGERY RESOLUTION-FEET FTI RANGE/AZIMUTH	MTI
1	500-6,000	2.5	10	10/10	
2	500-6,000	2.5	5	10/10	30/100
3	500-6,000	6	5	10/10	30/100
4	6,000-20,000	10	5	10/10	30/100
5	20,000-50,000	10	10	10/15	
6	20,000-50,000	20	10	10/15	
7	30,000-50,000	30	10	15/20	
8	30,000-50,000	40	10	15/25	

Figure 1-18. AN/UPD-8 (AN/APD-10) SLAR Range.

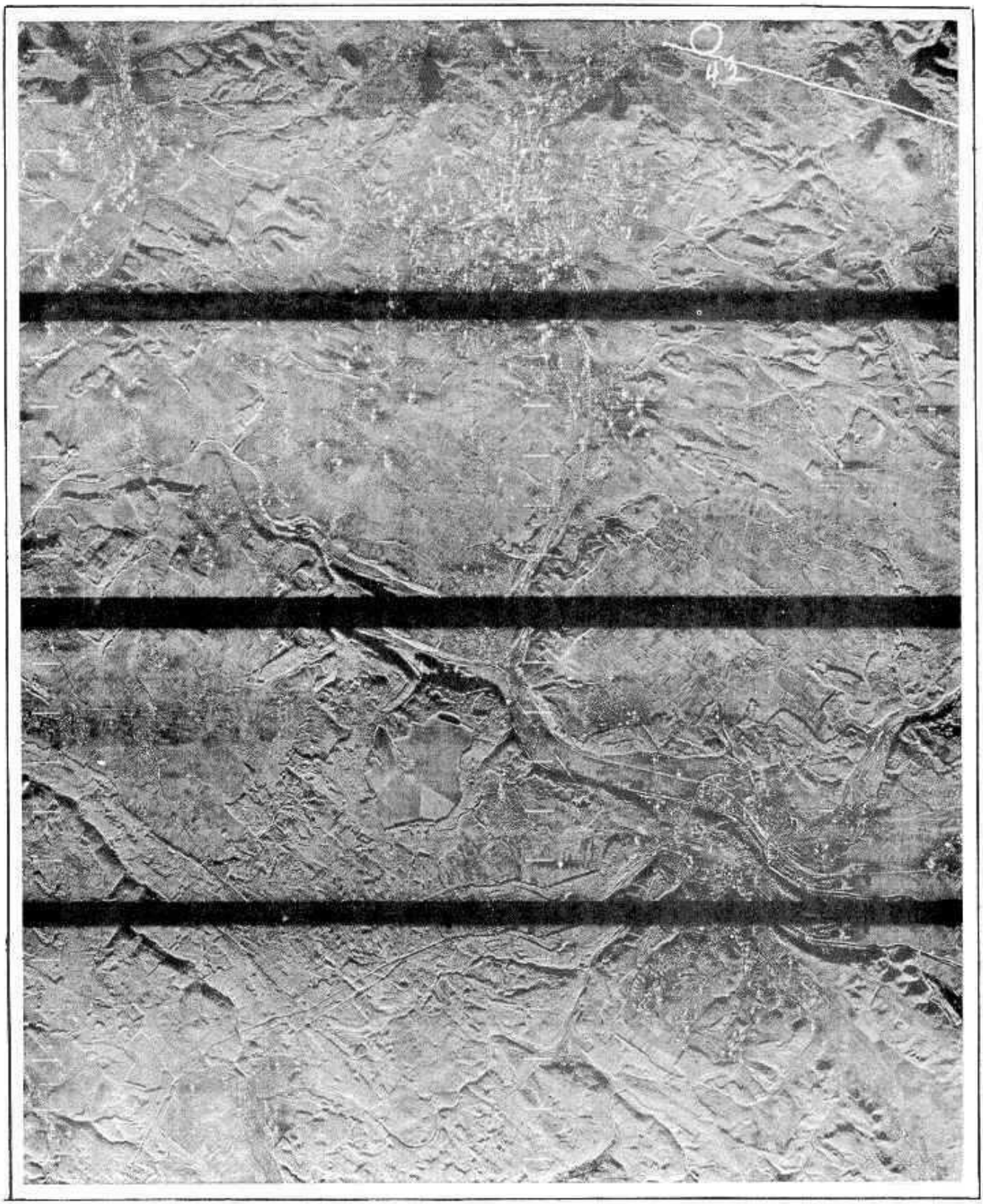


Figure 1-19. Side-Looking Airborne Radar Imagery (AN/APD-10).

4. The joint surveillance target attack radar system (JSTARS) is an airborne, wide-area surveillance, target acquisition radar system. It is designed to detect, locate, and track moving targets and to detect and locate stationary targets in support of battle management and targeting. Multimode radar data (such as MTI, FTI, and SAR) are transmitted from the sensor platform in NRT to Army ground station modules (GSMs) located at corps and division.

a. The major components of JSTARS are the airborne platform and the GSM AN/TSQ-132. The airborne platform is the Air Force E-8A (militarized Boeing 707). The system contains a radar subsystem, an operations and control subsystem, and a communications subsystem.

b. The GSM will be used by Army tactical commanders to exploit the JSTARS battle management and targeting capabilities. It is a truck-mounted system (modified S-280 shelter, mounted on a 5-ton truck) that includes real-time processing, memory, and operator stations.

c. The GSM is specifically designed to provide battlefield management and targeting data to tactical operations centers, fire support elements, and artillery commanders at both division and corps level. Future applications of the GSM will enable it to exploit other sensors in NRT.

PART H: CONVENTIONAL PHOTOGRAPHY

1. The major advantage to conventional photography is seeing the target area as it actually is. True size and shape can be seen which is valuable for identifying equipment and identifying friend or foe. The photo will show the IA any new roads or buildings, and so on, not shown on the map. Unfortunately, photography depends on good weather. Rain, snow, heavy clouds, and darkness defeat the system. The different types of conventional photography are listed below:

2. Vertical. The camera axis is perpendicular to the earth's surface giving a view directly below. To the novice IA this view seems unnatural at first. Vertical aerial photography is excellent for area and pinpoint coverage. It is the easiest photograph to obtain stereovision with and ideal for making fast, accurate measurements. The scale is nearly uniform throughout. Since the aircraft must fly directly over the target area, it has a high vulnerability to AAA fire.

a. KA-76A (Army--OV-1D). The OV-1D Mohawk has the capability of using black and white, color, IR, and camouflage detection film types in a 4.5-by 4.5-inch format (Figure 1-20). A 1 3/4-, 3-, 6-, and 12-inch focal length lens cone can be mounted (not in-flight). A flasher system can be mounted for night reconnaissance.

Figure 1-20. Vertical Imagery (OV-1D).

b. KS-72/KS-87 (USAF--RF-4C) is the USAF's vertical framing camera with high or low altitude capability. Lens cones can be either 3, 6, 12, or 18 inches. It has a photoflash capability for night photography as well. Film is in a 4.5- by 4.5-inch format (Figure 1-21).

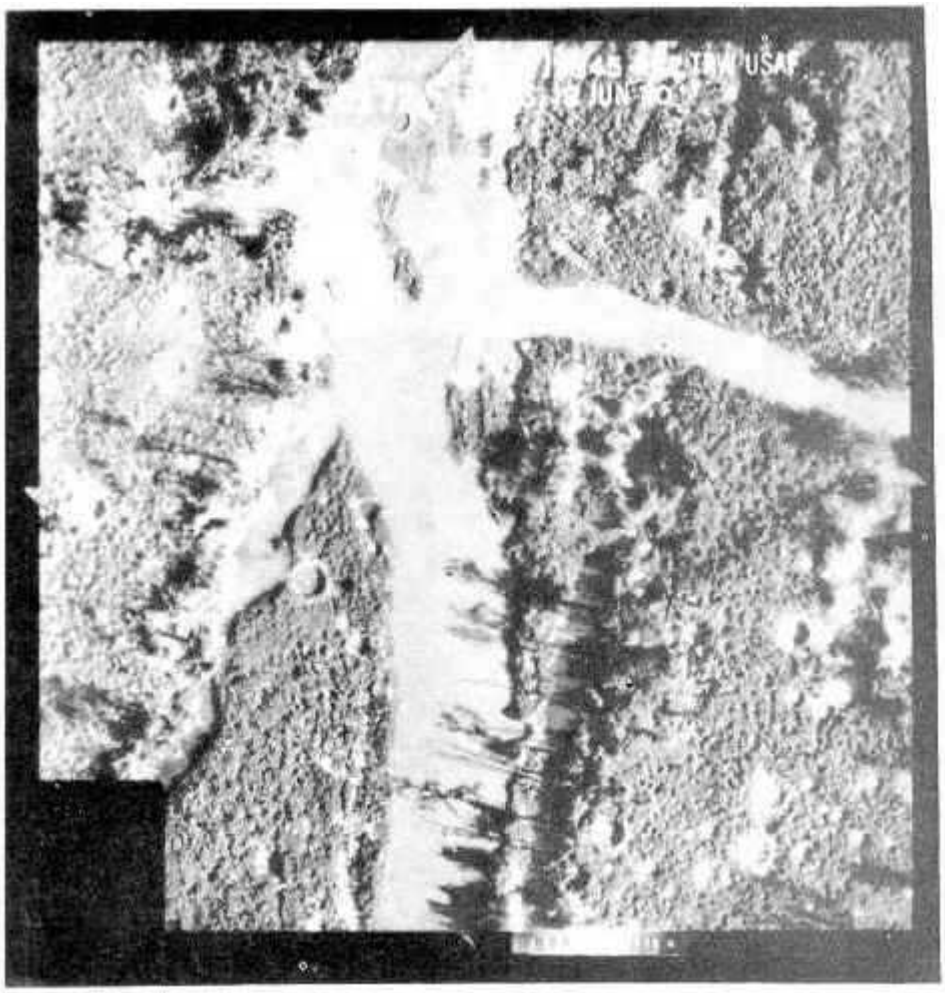


Figure 1-21. Vertical Imagery (RF-4C).

3. Oblique. The camera photographs forward of the aircraft to obtain forward oblique, to the left for left oblique, and to the right for right oblique photos. This gives the aircraft a slight advantage of standing off from the target somewhat. Because the view is angled, it presents a more natural view. Since the sensor cannot see through obstructions such as large hills or into gullies, or even into heavy stands of trees, a target may be hidden from view. It is possible to make measurements from oblique photography, but it is more difficult and time consuming than from vertical photography. Stereovision is very difficult to obtain and cannot be obtained from the entire frame.

a. KA-76A (Army--OV-1D). This is the same camera used for vertical exposure. The camera can be placed at a 15 or 30 degree oblique, left or right. This oblique position cannot be used at night (Figure 1-22).

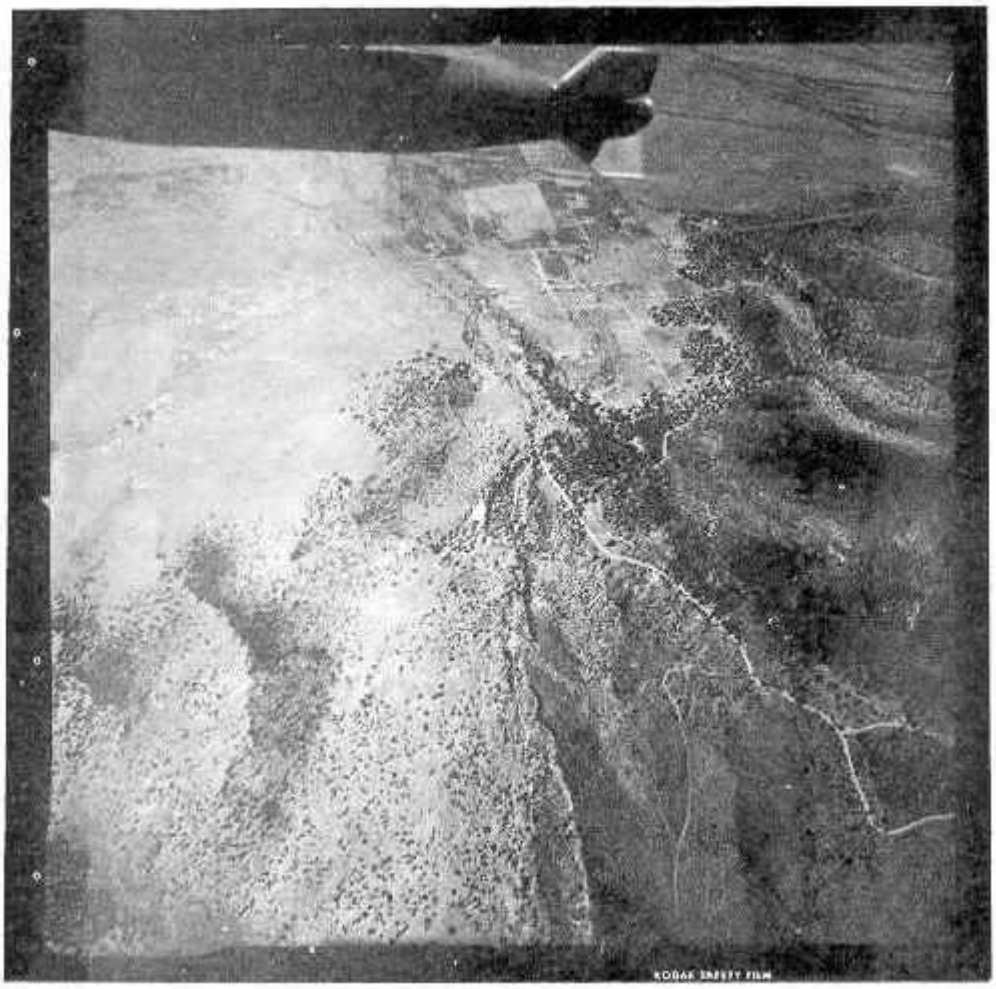


Figure 1-22. 15 Degree (Low) Oblique Imagery (OV-ID).

b. KS-72/KS-87 (USAF--RF-4C) is the same camera used for vertical exposure. However, the 3-inch lens cone is usually used when the camera is in the forward, right, or left oblique configuration. These camera positions have a 5-, 15-, or 30-degrees depression angle (Figure 1-23).

Figure 1-23. Forward Oblique Imagery (RF-4C).

4. Panoramic camera sweeps from side to side and combines vertical, left, and right oblique images into one frame. This is excellent for route reconnaissance and covering large areas of terrain. Panoramic photography has the advantage of vertical only within the center of the frame. The disadvantage of the sensor is that stereovision and measurements are difficult to obtain.

a. KA-60C (Army--OV-1D) camera provides horizon-to-horizon reconnaissance photographs and is designed specifically for high-speed, low-altitude reconnaissance. It may be mounted vertically (belly) or in the forward oblique (nose) position. It has a scan angle of 180 degrees with a frame size of 2,25 by 9.4 inches with black and white film (Figure 1-24).

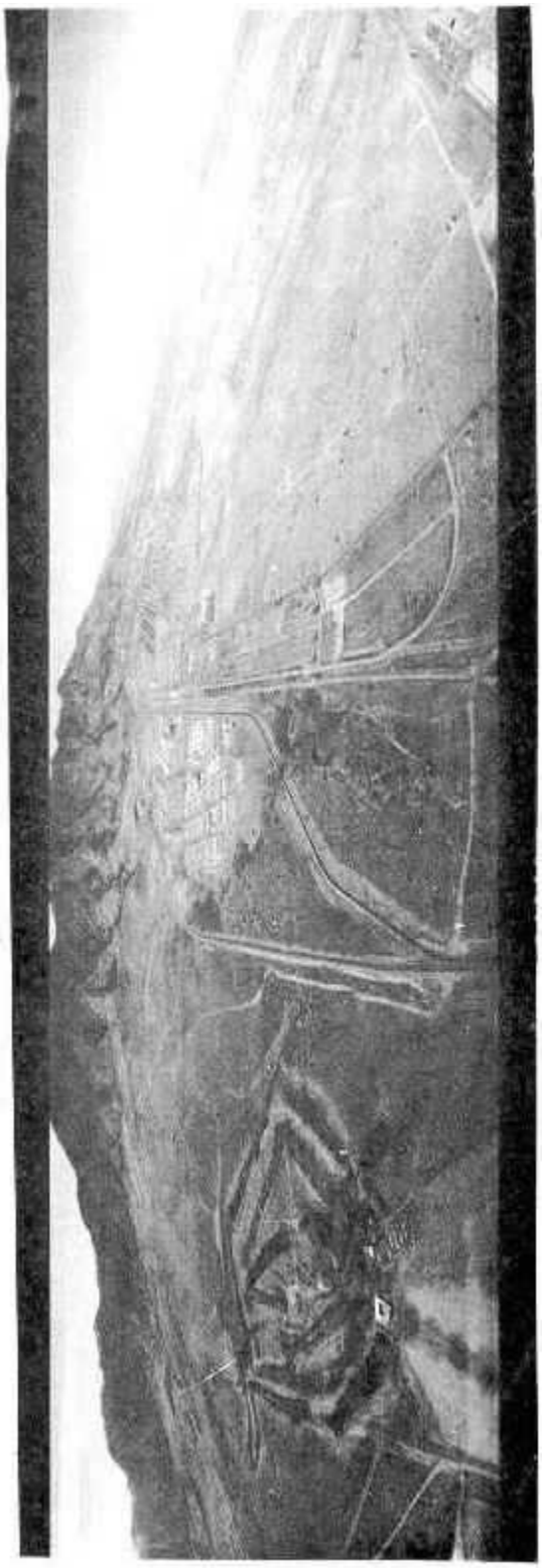


Figure 1-24. Forward Panoramic Imagery (OV-ID)(cropped-off).

b. KA-56A/91B (USAF--RC-4C) cameras are used by the USAF for their panoramic requirements. These systems must be used during daylight hours. All film is 4.5 by 10.5 inches (Figure 1-25). The KA-56A is a low-altitude panoramic camera using a 3-inch focal length. It has a 180 degree field of view. The KA-91B has a 60- or 93-degree field of view.

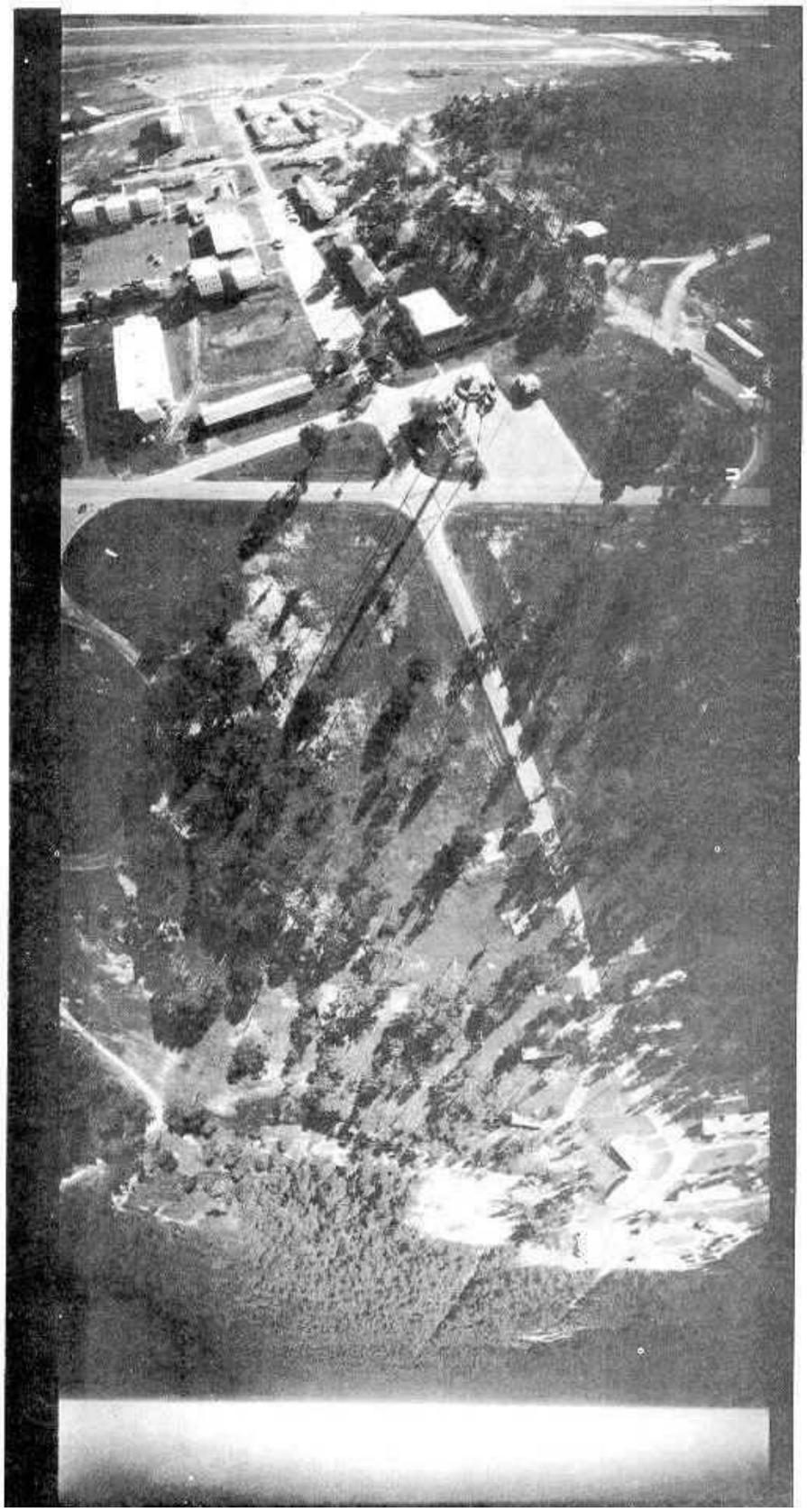


Figure 1-25 Low Panoramic Image (RF-4C).

5. Night photography (Figure 1-26) illumination, techniques, and employment requirements are described below.

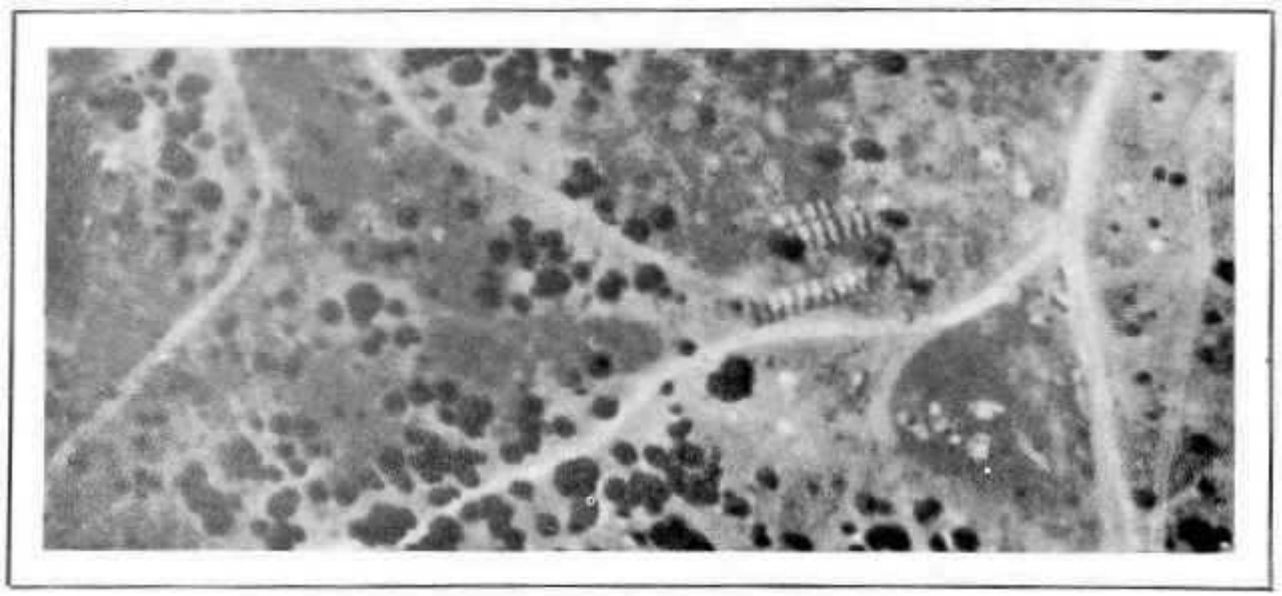


Figure 1-26. Night Photography.

a. Illumination. Although extremely high-speed panchromatic emulsions have been developed that permit photography during semidarkness, without artificial illumination none are adequate for use from an aerial platform at night. The two illuminating techniques are flash cartridges at low altitude and flash bombs at high altitudes.

(1) Low Altitude. When the desired scale and camera equipment available require photography from an altitude of 8,500 feet or less, a low-altitude illuminating system is used consisting of flash cartridges, an ejector mechanism, and a suitable control element. The standard night aerial reconnaissance camera is the K37/CA-17, which has a 12-inch lens and an image motion compensating magazine. Upon firing a round, the ejector automatically places another cartridge into position. The flashing component of the ejector round ignites after a predetermined delay.

(2) High Altitude. There are physical limitations as to maximum cartridge size that is practical and the maximum altitude at which satisfactory ground illumination can be produced. Illumination above 8,500 feet must be furnished by flash bombs that are released from the bomb bay during the photo run. The standard flash bombs can illuminate an area 60 times greater than an illuminating cartridge. The fuze is set to explode the flash bomb at about three-tenths of the altitude of the aircraft, up to 5,000 feet. In both systems a photoelectric cell is activated by the flash of light to affect shutter action.

b. Techniques. The choice between high-altitude or low-altitude night photography depends on the type, size, and location of the target. Typical low-altitude targets are pinpoint targets such as bridges, dams, supply dumps, and factories. The size of the target is an important consideration. Large areas such as marshaling yards, harbors, and airfields often cannot be covered by a single photostrip or stereopair and will call for high-altitude coverage.

(1) Low-Altitude Coverage. The most important considerations in flying a low-altitude mission are navigation and target identification. A preinitial point is selected as a reference point to begin the let down from altitude. This point must be at the appropriate distance from the initial point to enable stabilization of the aircraft at target altitude and airspeed. Cartridge ejection must begin at a point that will ensure complete photographic coverage of the target.

(2) High-Altitude Coverage. Standard bombing procedures are with modifications. The aircraft must be over the target when illumination reaches a peak. The flash bomb must be just outside the field of vision of the camera and at the correct height for proper illumination.

c. Employment. The need for night photography is governed by several factors. The enemy without air superiority will make maximum use of darkness to move troops and supplies and repair damaged roads, bridges, and installations. Night photo reconnaissance provides a measure of

safety and surprise. A single airplane may evade the radar defense net and obtain coverage on the first pass over the target. If the opposition has air superiority, photo missions will stand a better chance of success if flown at night, rather than during daylight hours.

d. Advantages. Night photography provides information on the movement of shipping, troops, supply trains, and convoys. Guns and installations camouflaged in the daytime are frequently uncovered at night. Rapid strike assessment of night bombing missions is possible through night photography.

e. Disadvantages. Because only one photo can be taken by the light of each cartridge or bomb, coverage is limited by the number of illuminants that can be carried, rather than by the number of exposures per roll of film. Improper ejection of the illuminant will impair photographic quality. A bomb exploded too close to the edge of the picture may cause reflections within the lens system. When the burst is too low, the film is overexposed. Poor resolution and differences in shadow length and direction often make it difficult to plot and analyze night photos. Since the flash gives the location of the aircraft, it becomes very vulnerable to AAA fire.

6. Color Photography. There are two types of color film: standard color and camouflage detection. Although panchromatic film allows a wider latitude of exposure error than other films, its inability to present colors as other than various shades of grey limits the IA in his study of industrial facilities. When correctly exposed and processed, color film is an aid to the IA.

a. Advantages of color film.

(1) The colors of industrial smoke and dust are good indicators of their chemical content. Examples of this are the light yellow sulphur stain on the roofs of some chemical plants, and the red ferrous oxide smoke that steel mill smokestacks emit.

(2) Color film has good water-penetrative ability and is very useful in the recognition of underwater objects and in determination of water depths.

b. Disadvantages of color film. Color film has a low exposure index that limits its use to optimum light conditions and accurate filter corrections. The 14 steps in color processing and the critical time factors involved greatly increase the chances of getting poor colors or prints that are either too dark or too light to be usable. Another disadvantage is that overall processing time for color film is many times greater than for panchromatic. Finally, color film costs much more than black and white film.

c. Camouflage detection film resembles normal color film in that it has three emulsions. However, one emulsified layer is particularly sensitive to the IR wavelength reflected by chlorophyll. Objects containing chlorophyll will register as red and reddish-brown on camouflage detection film, but other objects appear as blue, yellow, black, or green. Objects camouflaged with garnish nets and other types of artificial materials will show up in bright colors, as compared with live vegetation that shows up as red or reddish-brown. During the late fall and winter months dead vegetation appears yellow-green on camouflage film, similar to the colors of camouflage material. Therefore, normal color photography is more effective during this time of year.

PART I: PLANNING AND REQUESTING AERIAL RECONNAISSANCE AND SURVEILLANCE

1. The planning of aerial R&S is performed by the G2/S2. However, a knowledge of the procedures and factors involved will help you if it should ever become necessary for you to request reconnaissance.

2. Responsibility. At division and above, the G2 has staff responsibility for planning and coordinating aerial reconnaissance and surveillance (R&S) missions. At battalion and brigade, the S2 has this responsibility. At corps and division, routine staff supervision of the aerial R&S effort is delegated to the CM&D collection manager. At battalion and brigade, the S2 is the R&S manager. Exceptions to this are separate armored, infantry, and mechanized brigades which have S2 air personnel assigned. The CM&D mission manager at division and corps keeps the G2 advised of the availability, status, capabilities, and limitations of aerial surveillance assets. This requires a thorough knowledge of the variable effects of weather, light, visibility, precipitation, haze, and other natural phenomena that influence sensor selection and aircraft operations. The mission manager attempts to eliminate or reduce duplication of effort by ascertaining whether available photography fulfills the requirements, and by combining two or more requests into one mission when possible. The CM&D collection manager is responsible for planning and integration of aerial R&S into the collection effort.

3. The corps G2 air determines what organic assets are available to support a preplanned R&S request and assigns it to the aerial exploitation battalion or forwards it to EAC for incorporation into the Army component commander's reconnaissance requirements. Immediate R&S requests are submitted through the Air Force request net and are approved/disapproved by corps G2 air/CM&D mission manager, who are collocated with the air support operations center of the Air Force. See ACCP subcourse IT 0661 for more detailed information.

4. Selection. There are four factors the G2 Air/CM&D mission manager considers in selecting areas for photographic reconnaissance:

a. Current and planned operations of the unit.

b. Previously and presently active areas.

c. Areas rendered suspect through information obtained from other intelligence sources.

d. Requests from subordinate and other units.

5. Besides these general factors, the CM&D mission manager must consider factors of a more specific and technical nature in planning reconnaissance.

a. Photo scale. To obtain various types of information from aerial reconnaissance, different scales of imagery are required. For example, to locate fire control radar, a scale of approximately 1:27,000 is required, but to make a technical analysis of it, a scale of approximately 1:400 is needed. Tactical analysis of a headquarters requires photography with a scale of 1:2,000 to 1:3,000.

b. Production Capabilities. The capabilities of processing, reproducing, analyzing, and distributing must also be considered. These capabilities will vary from time to time, depending upon the equipment and personnel available. The overloading of any of these will reduce the effectiveness of the overall effort.

c. Location. Areas deep in enemy territory will probably require nonorganic aircraft. Hillside installations and other unique installations will probably require oblique photography for detailed analysis.

d. Capabilities of Aircraft and Equipment. The capabilities of the aircraft flying the mission must be considered when determining the scale of the photography to be obtained or the ground to be covered. At the present time, the capabilities of organic aircraft and cameras do not permit flying at high altitudes. Organic Army aviation does not presently include high-performance aircraft. The number of exposures needed to cover a given area at a given scale might also be prohibitive.

6. Once you have planned your aerial R&S mission you need to submit the request. There are several different R&S request forms used by U.S. forces; some of those are: The air reconnaissance request/task message, the joint tactical surveillance request (JTACSURVREQ) in U.S. message text format (USMTF), the USMTF air request reconnaissance voice template (AIRREQRECON), and the North Atlantic Treaty Organization (NATO) imagery request.

a. The air reconnaissance request/task message (Figure 1-27) is completed as required to include lines "L" to "U". The following instructions are to guide you through completion of such a form. Normally, you circle, fill in, check, underline, or "X" pertinent columns on the form.

NOTE: The letters A through K have a special significance for certain organizations only; they are used for tactical air support requests and are purposely omitted from the form.

(1) The heading is the first element of the message text and is complete as directed by SOP.

(2) Line L. ORIGINATOR SERIAL NUMBER is the originator's request serial number. Each originator is given a letter prefix to identify the requesting headquarters followed by the request number in the sequence, commencing with the number for each month of the year. Requests will be filed in numerical sequence by month and may also be numerically sequenced by calendar year.

(3) Line M. Type of sensor and technique requested.

(a) --TYPE OF MISSION. Photo, Electronic, SLAR, IR, BEST SUITABLE.

(b) --TECHNIQUE. Vertical, Oblique, Panoramic, BEST POSSIBLE.

NOTE: In case you have problems in deciding which of the above items to select, indicate an "X" behind or encircle "BEST SUITABLE." or "BEST POSSIBLE."

(4) Line N. MAP REFERENCES. Be specific and complete required data.

(5) Line O. TARGET LOCATION AND DESCRIPTION. To leave the recipient of the request in no doubt as to the requirements, it is necessary to provide a brief description of the target, its name, and basic encyclopedia (BE) number, and the exact location of the target area. Indicate the type coordinates used (UTM or GEO) and state the actual coordinates, for example, 16XNB123456, for a pinpoint; for area cover, use the top most/top left coordinate first and describe the remaining coordinates clockwise; for oblique photos, state the near

boundary of the area to be photographed and the direction from which the photos should be taken. For the target description, give its name, and basic encyclopedia number if known.

(6) Line P. OBJECT AND RESULTS DESIRED (TARGET CATEGORY). It is important that tasking agencies and reconnaissance units understand the exact purpose of the request. The target categories list the different types of target category (TGT CAT) that be can used (Table 1-2). If the target for a reconnaissance mission is a bridge you would enter TGT CAT 12. on line P. otherwise, a plain language statement of purpose should be provided.

Table 1-2. Target Categories.

01. Airfield.	10. Terrain Reconnaissance.
02. Missile Systems	11. Coastal Strip.
03. Electronic Installations.	12. Bridges.
04. Barracks/Camps/Headquarters.	13. Water Control Facilities.
05. Storage and Repair Facilities	14. Ports/Harbors.
	15. Rail Facilities.
06. Military Activity.	16. Industrial Installations.
07. River Crossings/Ferries.	17. Electric Power Installations.
08. Shipping.	
09. Route Reconnaissance.	

(7) Line Q. PHOTO SCALE/OR ACCEPTABLE LIMITS. Self-explanatory.

(8) Line R. NUMBER OF PRINTS OR PLOTS REQUIRED AND REPORTS.

(9) Line S. DELIVERY ADDRESS. Self-explanatory.

(10) Line T. LAST ACCEPTABLE DATE/TIME FOR DELIVERY. Self-explanatory, NLT stands for no later than.

(11) Line U. SPECIAL INSTRUCTIONS. Give instructions or information not provided elsewhere in the request that will aid in the planning and accomplishment of the mission. This includes control arrangements, communications, security instructions, details of own forces, or other pertinent entries. This line can be used to indicate if an INFLIGHTREP is required.

(12) Line V. TASKING AND MISSION DATA. This line is completed by the tasking agency. It includes details regarding the unit, number of aircraft, and mission parameters. The mission number for the task is the requestor's request number, abbreviated if necessary.

AIR RECONNAISSANCE REQUEST/TASK MESSAGE

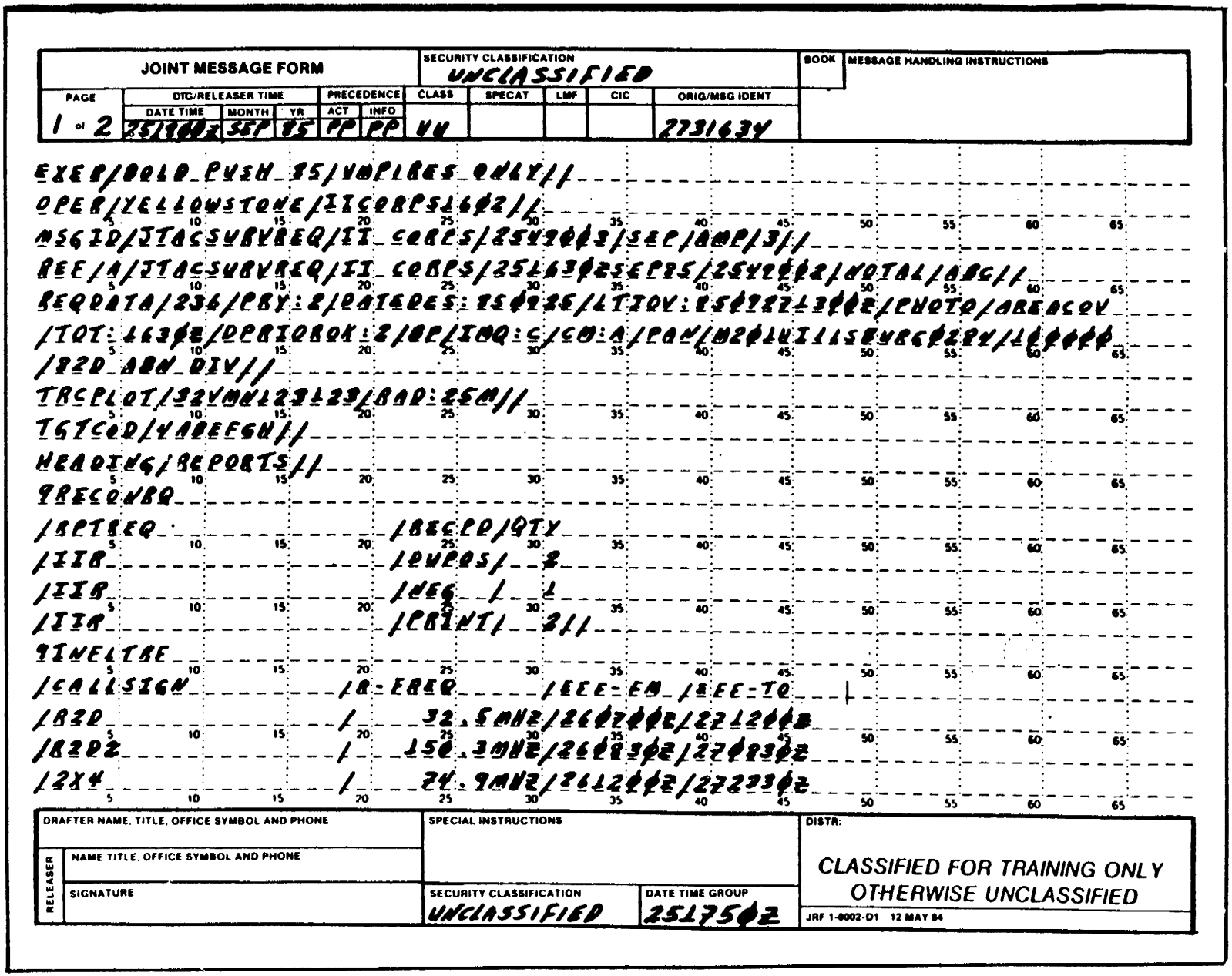
CLASSIFICATION NATO: UNCLASSIFIED	REQUESTOR: CDR V CORPS	DTG: 081000Z JUN 85	
PRECEDENCE		INTERNAL COORDINATION	
ACTION: OO INFO: PP		G2 / G3	
FROM: V CORPS COMM		INFO: CENTAG	
TO: SEMBACH COMM		NORTHAG	
		SIC	

NOT FOR TRANSMISSION L. ORIGINATOR SERIAL NO.	L. AIR RECCE REQUEST/AIR RECCE TASK NO. 2V3Ø1
M.1 TYPE OF SENSOR	M-1 ■ PHOTO ☐ ELECTRONIC ☐ SLAR ■ IR ☐ BEST SUITABLE
M.2 TECHNIQUE	M-2 ■ VERTICAL ☐ OBLIQUE ☐ PANORAMIC ☐ BEST POSSIBLE
N. MAP SERIES, SHEET NO. AND EDITION NO.	N- M745, L-6126 ED.2
O. 1 TARGET LOCATION	O.1- TGT 1: 32UNB123123, TGT 2: 32UNB456456
O. 2 TARGET DESCRIPTION	O.2- TGT 1: CP, TGT 2: PINPOINT
P. OBJECT AND RESULTS DESIRED (TARGET CATEGORY)	P. TGT 1: CAT Ø4B, TGT 2: CAT Ø6B
Q. PHOTO SCALE	Q. 1:5,ØØØ OR ☒ BEST POSSIBLE
R. NO. PRINTS PLOTS RPTS	R. 1X IPIR 1X PRINT EA SIGNIFICANT SIGHTING
S. DELIVERY ADDRESS. DATE TIME REQ	S. CDR, V CORPS G2 AIR ATTN: MAJ SMITH PRINTS REQ'D AT END EX.
T. LATEST ACCEPTABLE DATE TIME FOR DELIVERY	T- NLT 251630Z JUN 85
U. SPECIAL INSTRUCTIONS U. 1 TOT	U. 1- 1Ø11ØØZ-13ØØZ JUN 85
U. 2 PRIORITY	U.2- ☐ PRI-1 ☒ PRI-2 ☐ PRI-3
U. 3 TARGET SECURITY CLASS	U. 3- UNCLASSIFIED
U. 4 REMARKS	U. 4- CONTACT FAC CALL SIGN: HONEY BEE ON TAD 682/BACK-UP 683 PRIOR TO ENTRY INTO TGT AREA FOR ADDITIONAL TGT INFO. INFLIGHT REPORT REQUESTED.
V. TASKING INSTRUCTIONS	V-

COPIES TO: COMM CTR ☐ CURRENT OPS ☐ INT ☐ OTHER ☐ ARMY ☐ ATTACK ☐ RECCE ☐ EW ☐	RCVD DTG Z	INITIALS	DRAFTER	TEL NO.
	TRANS DTG	INITIALS	RELEASER	TEL NO.

Figure 1-27. Air Reconnaissance Request/Task Message.

b. JTACSURVREQs must include the report requirements the requester wants back, including the time-sensitive and summary information. For example, explanation (EX) 23 tells you to list type reports desired on the form; in this case, an IIR is required, which is the equivalent of an IPIR/SUPIR. Detailed instructions for using this form are in DA Pam 25-7.



JOINT MESSAGE FORM

SECURITY CLASSIFICATION: UNCLASSIFIED

BOOK

MESSAGE HANDLING INSTRUCTIONS

PAGE	DTG/RELEASER TIME			PRECEDENCE		CLASS	SPECAT	LMF	CIC	ORIG/MSG IDENT
	DATE TIME	MONTH	YR	ACT	INFO					
1 of 2	251800Z	SEP	85	PP	PP	YY				2731634

EXER/DOLD PUSH 85/NOFIRES ONLY//

OPER/YELLOWSTONE/IICORPS16Ø2//

MSGID/JTACSURVREQ/II CORPS/25Ø8Ø3/SEC/AMP/3//

REF/A/JTACSURVREQ/II CORPS/251639Z SEP85/25Ø8Ø2/NOTAL/ABC//

REQDATA/236/CBY:2/DATADES:85Ø825/LTIOV:85Ø827-1300Z/PHOTO/ARECOV

/TOT:1639Z/DPRIORITY:2/OPI/INQ:C/CM:A/PAN/M2Ø1UIILSEURCØ2RW/1ØØØØ

/82D ARM DIV//

TRCPLOT/32VMK123123/RAD:25M//

TGTCOD/YABEFGH//

HEADING/REPORTS//

PRECONREQ

/RPTREQ /RECCD/QTY

/IIR /DUPOS/ 2

/IIR /NEG / 1

/IIR /PRINT/ 2//

PINELINE

/CALLSIGN /R-FREQ /EEE-FM /EEE-TO

/82D / 32.5MHZ/261ØØZ/271200Z

/82D2 / 150.3MHZ/261Ø3ØZ/271Ø3ØZ

/2X4 / 24.9MHZ/261200Z/272230Z

DRAFTER NAME, TITLE, OFFICE SYMBOL AND PHONE

SPECIAL INSTRUCTIONS

DISTR:

RELEASER

NAME TITLE, OFFICE SYMBOL AND PHONE

SIGNATURE

SECURITY CLASSIFICATION: UNCLASSIFIED

DATE TIME GROUP: 251750Z

CLASSIFIED FOR TRAINING ONLY
OTHERWISE UNCLASSIFIED

JRF 1-0002-D1 12 MAY 84

Figure 1-28. JTACSURVREQ.

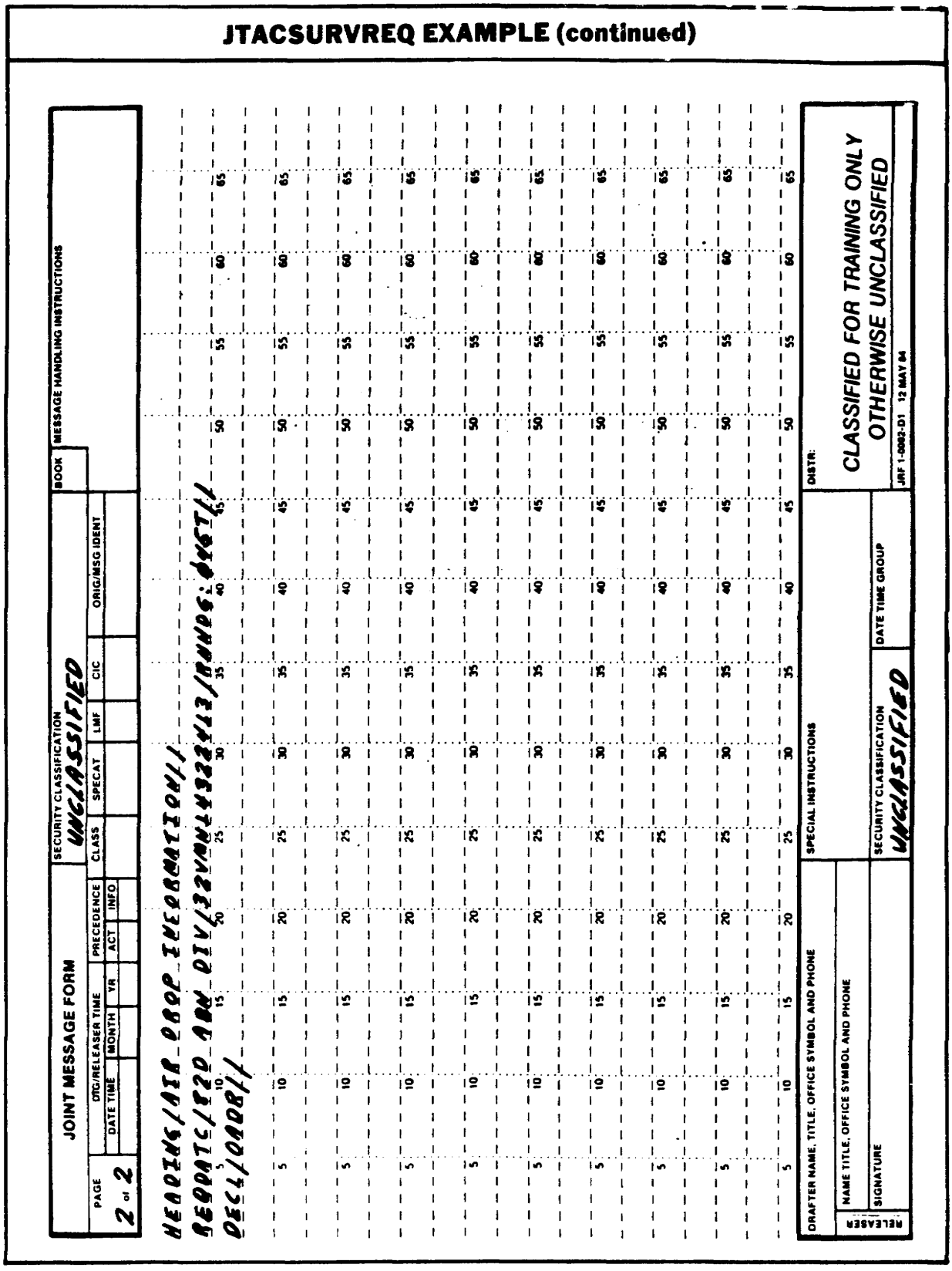
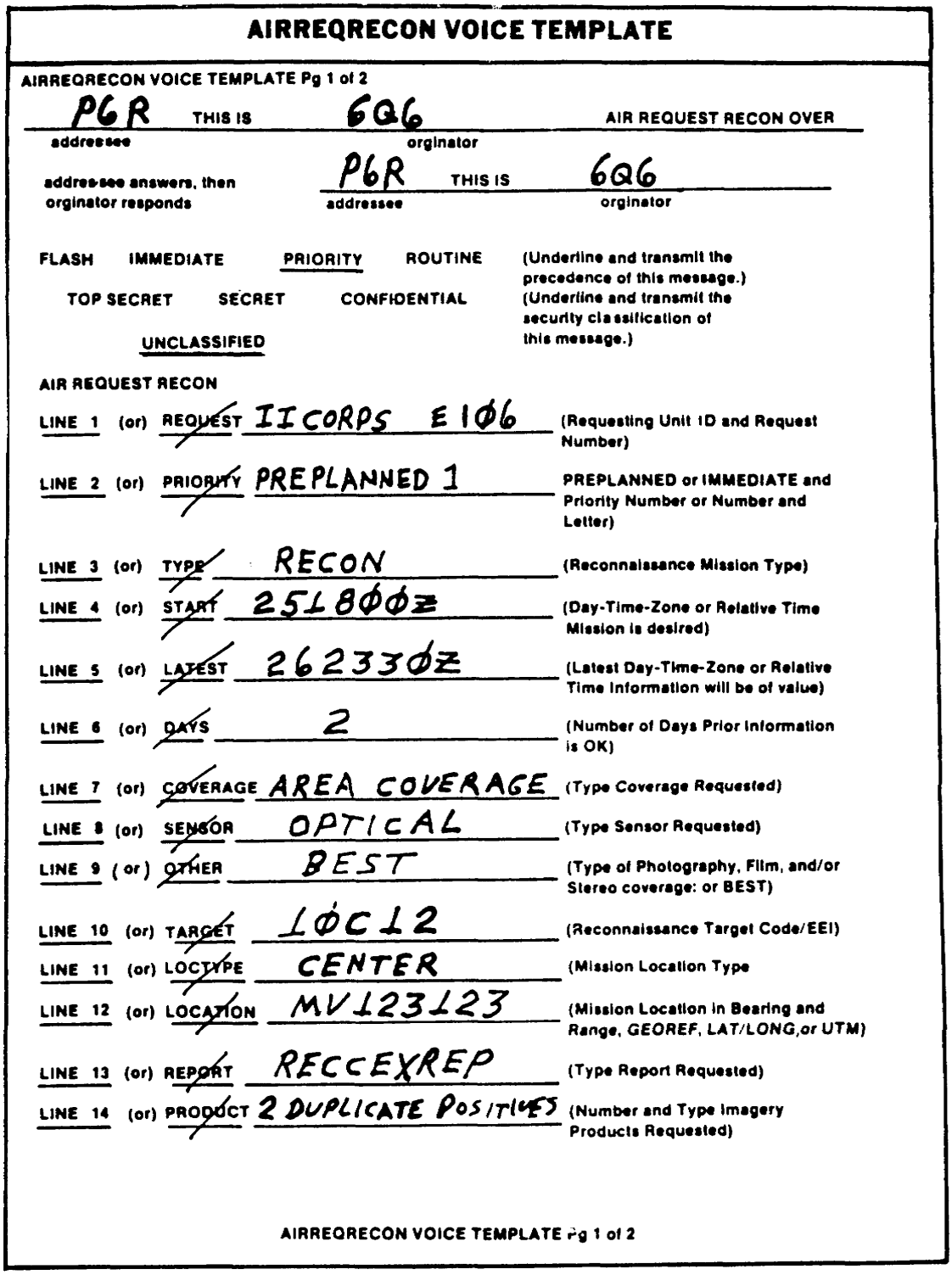


Figure 1-28. JTACSURVREQ (Concluded).

c. The AIRREQRECON voice template is used to request preplanned and immediate aerial reconnaissance support missions. This message is transmitted by voice only, using standard radio procedures. Figure 1-29 depicts a sample AIRREQRECON voice template. Detailed instruction for using this form are in DA Pam 25-7.



AIRREQRECON VOICE TEMPLATE

AIRREQRECON VOICE TEMPLATE Pg 1 of 2

P6R THIS IS 6Q6 AIR REQUEST RECON OVER

addressee orginator

addressee answers, then orginator responds: P6R THIS IS 6Q6

addressee orginator

FLASH IMMEDIATE PRIORITY ROUTINE (Underline and transmit the precedence of this message.)

TOP SECRET SECRET CONFIDENTIAL (Underline and transmit the security classification of this message.)

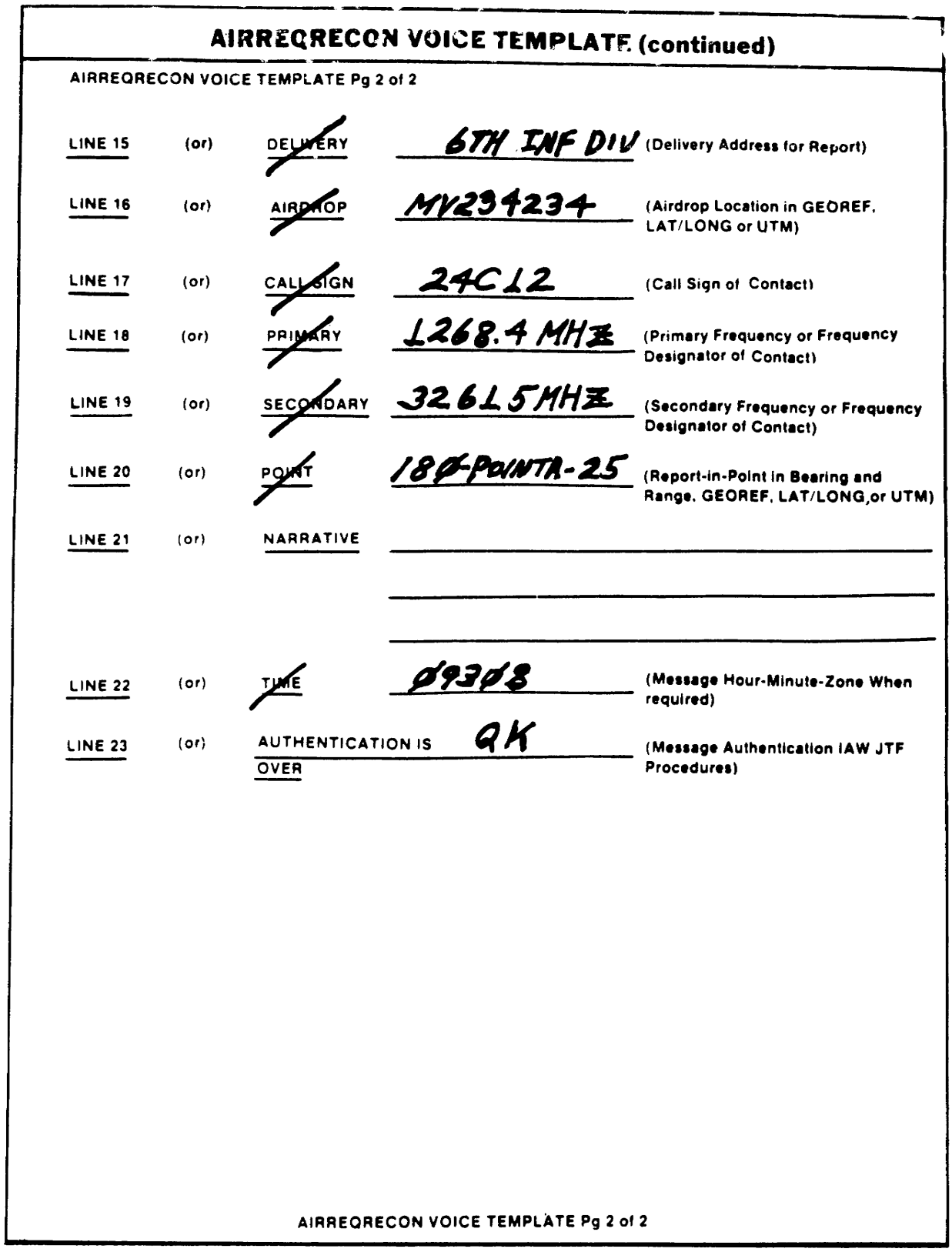
UNCLASSIFIED

AIR REQUEST RECON

LINE 1 (or) REQUEST	IICORPS E1Ø6	(Requesting Unit ID and Request Number)
LINE 2 (or) PRIORITY	PREPLANNED 1	PREPLANNED or IMMEDIATE and Priority Number or Number and Letter)
LINE 3 (or) TYPE	RECON	(Reconnaissance Mission Type)
LINE 4 (or) START	2518ØØZ	(Day-Time-Zone or Relative Time Mission is desired)
LINE 5 (or) LATEST	262330Z	(Latest Day-Time-Zone or Relative Time Information will be of value)
LINE 6 (or) DAYS	2	(Number of Days Prior Information is OK)
LINE 7 (or) COVERAGE	AREA COVERAGE	(Type Coverage Requested)
LINE 8 (or) SENSOR	OPTICAL	(Type Sensor Requested)
LINE 9 (or) OTHER	BEST	(Type of Photography, Film, and/or Stereo coverage: or BEST)
LINE 10 (or) TARGET	LØC12	(Reconnaissance Target Code/EEI)
LINE 11 (or) LOCTYPE	CENTER	(Mission Location Type
LINE 12 (or) LOCATION	MV123123	(Mission Location in Bearing and Range, GEOREF, LAT/LONG,or UTM)
LINE 13 (or) REPORT	RECCEXREP	(Type Report Requested)
LINE 14 (or) PRODUCT	2 DUPLICATE POSITIVES	(Number and Type Imagery Products Requested)

AIRREQRECON VOICE TEMPLATE Pg 1 of 2

Figure 1-29. AIRREQRECON.



AIRREQRECON VOICE TEMPLATE (continued)

AIRREQRECON VOICE TEMPLATE Pg 2 of 2

LINE 15	(or)	DELIVERY	6TH INF DIV	(Delivery Address for Report)
LINE 16	(or)	AIRDROP	MV234234	(Airdrop Location in GEOREF, LAT/LONG or UTM)
LINE 17	(or)	CALL SIGN	24C12	(Call Sign of Contact)
LINE 18	(or)	PRIMARY	1268.4 MHZ	(Primary Frequency or Frequency Designator of Contact)
LINE 19	(or)	SECONDARY	3261.5MHZ	(Secondary Frequency or Frequency Designator of Contact)
LINE 20	(or)	POINT	180-POINTA-25	(Report-in-Point in Bearing and Range, GEOREF, LAT/LONG,or UTM)
LINE 21	(or)	NARRATIVE		
LINE 22	(or)	TIME	09308	(Message Hour-Minute-Zone When required)
LINE 23	(or)	AUTHENTICATION IS OVER	QK	(Message Authentication IAW JTF Procedures)

AIRREQRECON VOICE TEMPLATE Pg 2 of 2

Figure 1-29. AIRREQRECON (Concluded).

d. The NATO imagery request should be used when imagery of NATO equipment is required. An example of the NATO imagery request form is shown in Figure 1-30. The request should be sent to the member nation addressee listed in STANAG 3764 or air standardization agreement 101/9.

NATO IMAGERY REQUEST FORM

REQUEST FOR IMAGERY OF NATO EQUIPMENT	1. CLASSIFICATION	2. CONTROL NUMBER: 3. DATE PREPARED
4. TO:	5. FROM	
6. DATE REQUIRED:	7. LATEST DATE REQUIRED:	

8. SUBJECT SPECIFICATIONS:

A: NOMENCLATURE: (Subject, Description)

B: COUNTRY OF ORIGIN:

9. IMAGERY SPECIFICATIONS:

A. CLASSIFICATION:

B. DATE RANGE: FROM TO
( ) LATEST ( ) ANY ( ) ALL

C. TYPE: ( ) VERTICAL ( ) OBLIQUE ( ) GROUND ( ) ANY
( ) BLACK & WHITE ( ) COLOR ( ) RADAR ( ) IR
( ) STEREO ( ) OTHER (Specify)

D. SCALE:

E. MINIMUM QUALITY ACCEPTABLE: ( ) ANY

10. PRODUCT SPECIFICATIONS:

A. ( ) DIAPOSITIVE ( ) NEGATIVE ( ) PAPER PRINT
B. ( ) CONTACT ( ) ENLARGEMENT (Specify format, enlargement factor)

11. ADDITIONAL INFORMATION (PURPOSE OF REQUEST, ETC.)

12. CERTIFICATION: I certify that this imagery is required for valid intelligence production purposes and that compatible imagery is not available within our own national resources. (Signature)
(Title)
(Agency)

	1. CLASSIFICATION	

Figure 1-30. NATO Imagery Request.

LESSON 1

PRACTICE EXERCISE

The following items will test your grasp of the material covered in this lesson. There is only one correct answer to each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, study again that part of the lesson which contains the portion involved.

1. Which of the basic types of photos has a scale nearly uniform throughout?

   A. Panoramic.

   B. Infrared.

   C. Vertical.

   D. Oblique.

2. Which imaging system has eight modes of operation?

   A. KA-56A.

   B. KA-60C.

   C. AN/UPD-7.

   D. AN/UPD-8.

3. Which MI units have an organic IA section?

   A. Operations company and aviation company (AS).

   B. HH&S company and aviation company (EW).

   C. TCAE and TACP.

   D. DTOC and CTOC.

4. An IA must have common sense, powers of observation and analysis, reasoning ability, and good judgment to arrive at the proper analysis. The most essential requirement for an IA is the ability to achieve stereovision, or viewing in:

   A. Two dimensions.

   B. Three dimensions.

   C. Four dimensions.

   D. One dimensions.

5. What type of photo coverage will be of aid to commanders for briefing and planning purposes?

   A. Portraits.

   B. Target folders.

   C. Map extracts.

   D. Mosaics.

6. What must be described on line M of an air reconnaissance request/task message?

   A. Delivery Address.

   B. Request number.

   C. Map references.

   D. Type of sensor and technique requested.

LESSON 1

PRACTICE EXERCISE

ANSWER KEY AND FEEDBACK

Item	Correct Answer and Feedback
1.	C. Vertical photos are taken perpendicular to the ground so the scale is nearly uniform throughout (page 37, para 2).
2.	D. The AN/UPD-8 SAR system has eight operating modes (page 33, para 3b).
3.	A. The operations company of the MI battalion (OPS) and the aviation company (AS) have an organic IA section (pages 16/18, figs 1-7/1-9).
4.	B. Stereovision or the ability to see objects three dimensionally on film is a requirement for all IAs (page 7, paras 5/6).
5.	D. Mosaic gives the commander an updated vertical view of an area (page 4, para 2g).
6.	D. You must describe type of sensor and technique in line M [page 51, para 6a(3)].

LESSON 2

IMAGERY ANALYSIS PROCEDURES

Critical Tasks: 301-338-1304
301-338-1609
301-338-1800
301-338-3701

OVERVIEW

TASK DESCRIPTION:

In this lesson you will learn to determine linear/vertical distances on vertical aerial imagery, prepare a plot of aerial imagery, utilize imagery analysis principles and techniques and perform quality control on aerial imagery analysis products.

LEARNING OBJECTIVES:

ACTIONS: Describe the information and procedures required to determine linear/vertical distances on vertical aerial imagery, prepare a plot of aerial imagery, utilize imagery analysis principles and techniques, and perform quality control on aerial imagery analysis products IAW FM 21-26, and USAICS SupR 60059.

CONDITIONS: You will be given extracts from the FM 21-26, and USAICS SupR 60059.

STANDARDS: Determine linear/vertical distances on vertical aerial imagery, prepare a plot of aerial imagery, utilize imagery analysis principles and techniques, and perform quality control on aerial imagery analysis products IAW FM 21-26, and USAICS SupR 60059.

REFERENCE: The material contained in this lesson was derived from the following publications:

FM 21-26.
USAICS SupR 60059.

INTRODUCTION

Various procedures are used by the IA in interpreting and analyzing aerial imagery missions. These procedures include but are not limited to orientation and plotting, military identification, photogrammetry, mosaics, photomaps, and panoramics.

PART A: ORIENTATION AND PLOTTING

1. To obtain maximum use from information gathered from aerial photos, you must be able to locate on a map the area covered by the photos. A perfectly analyzed photograph is of little value unless the area covered can be located with respect to known terrain features. For example, you have a photo showing a large concentration of the enemy's armored vehicles along a road. The significance of this concentration would be readily apparent to you, but without knowing the exact ground location of the vehicles the information would be of doubtful value. You must be able to orient and plot vertical, oblique, and panoramic aerial photography.

2. Vertical Photography. The following guidance will show you how to orient a vertical air photo with a map.

a. First determine north on the photograph by one of the following methods:

(1) Method 1: Occasionally there will be a north arrow in either the margin or in the titling data on the photo; this arrow will point to magnetic north.

(2) Method 2: If a north arrow is not present on the photo, north can be determined by using the 'shadow technique." On photos taken in the northern hemisphere shadows will point generally north.

b. As soon as you have determined north on the photo, orient the photo so north on the photo coincides with north on the map.

(1) Select prominent natural or manmade features on the photo which appear on the map. Prominent hills, streams, railroads, or road networks will usually fulfill this requirement. Locate these same features on the map.

(2) Determine the area the photo covers on the map by comparing details along the edges of the photo with the same details on the map.

c. Locate objects/areas of interest on the map by using the map of Fort Huachuca and Photo 458-3 (in back of your subcourse booklet). Using a piece of overlay paper, follow the steps outlined below and locate the points on the map. Disregard annotations on the photo.

NOTE: When plotting photography, whether a sortie plot, a master cover trace, or individual photos, you should always plot on overlay paper and NOT on the map.

(1) Step 1: Locate the area of the map covered on photo 458-3. If you place the titling data of Photo 458-3 to your upper right, you will see the shadows point generally north; therefore, you have the photo oriented north.

(2) Step 2: Examine the photo. By examining photo 458-3 you can see it covers a part of Fort Huachuca. Keep the titling data in the upper right corner and observe the I-shaped building in the left center of the photo (annotation A). In the upper center of the photo is an odd U-shaped building (annotation B). There are three major roads in the photo, a curved road on the left side, a straight road along the bottom of the photo, and a S-curved road on the right side of the photo.

(3) Step 3: Examine the map. As you examine the map, look for an area with large buildings and open space around them. After you have found the buildings described in step 2 use your overlay paper and prepare your plot, as follows:

Place a piece of overlay paper over the area of interest on your map and tape it down. Look for the L-shaped building (annotation 5) at the right top of your photo and on the map and place a tick mark on your overlay paper to coincide with the boot of the L. Locate the rectangular building (annotation C) on the right side of the photo and the map; again, place a tick mark on the overlay paper to coincide with a point slightly further than the right side of the building. Next, locate the set of duplex buildings/quarters (annotation D) on the right bottom of the photo and the map; place a tick mark on the overlay paper to coincide with the outer duplex building on the photo and the map. The road intersection at the left of the map is now a traffic circle on the photo (annotation 8); again, place a tick mark on your overlay paper to coincide with the left of the traffic circle of the photo and the road intersection of the map. At the top center of the photo is a road junction (annotation E) which is also on your map; place a tick mark on your overlay paper to coincide with a point slightly further than the road junction. Finally, connect the tick marks by drawing a line through them, so the overall plot looks like an awkward square (Figure 2-1).

NOTE: After examining both the map and photo 458-3 you will see that there are differences between them. The information on the map is dated 1970 for roads and 1973 for other information. Photo 458-3 was taken in 1989 and you will see that some buildings have disappeared and new ones have been built in places; furthermore some roads have been changed or disappeared.

Figure 2-1. Plot of Photo 458-3.

d. Keep your plot, as you will use it in practice exercises. For additional practice, use Subcourse IT 0646, Plotting Vertical Aerial Photos and Master Cover Trace.

3. Oblique Photography. To plot an oblique photograph on a map, the following steps are performed:

a. Step 1: Orient the photo to the map.

b. Step 2: Select two objects or points on each margin of the photo which also appear on the map. The points you select may not necessary be exactly on the margin of the photo. In this case, it will be necessary to interpolate visually from those points to plot the edge of the photo.

c. Step 3: Identify these objects or points on the map and mark their locations on an overlay.

d. Step 4: Draw a straight line through the lefthand pair of points. This line represents the left edge of the area covered by the photo.

e. Step 5: Draw the line representing the bottom edge of the photo. Draw the top line representing the top edge of the photo. No line is drawn across the top of a high oblique.

f. Step 6: Take out the Fort Huachuca Map and Photo 458-7. Again, using another sheet of overlay paper, try to plot the photo.

4. Keep your plot, as you will use it in the practice exercises. Again, ignore the annotations on the photo. For additional practice, use TEC Lesson 242-301-6702-A, Prepare a Plot of an Oblique Photo Mission.

5. Panoramic Photography. Plotting panoramic photography is a combination of vertical and oblique methods. The center portion of a panoramic photo is vertical and toward the sides the imagery fans out as in an oblique. For more specific panoramic plotting, see TEC Lesson 242-301-6703-A, Prepare a Plot of a Panoramic Aerial Photo Mission.

PART B: MILITARY IDENTIFICATION FACTORS

1. There are five basic factors, the five Ss, which aid in identification of objects on aerial photos. Refer to the appropriate factor in Figure 2-2 as they are being discussed. Furthermore, general characteristics should assist you in determining military objects.

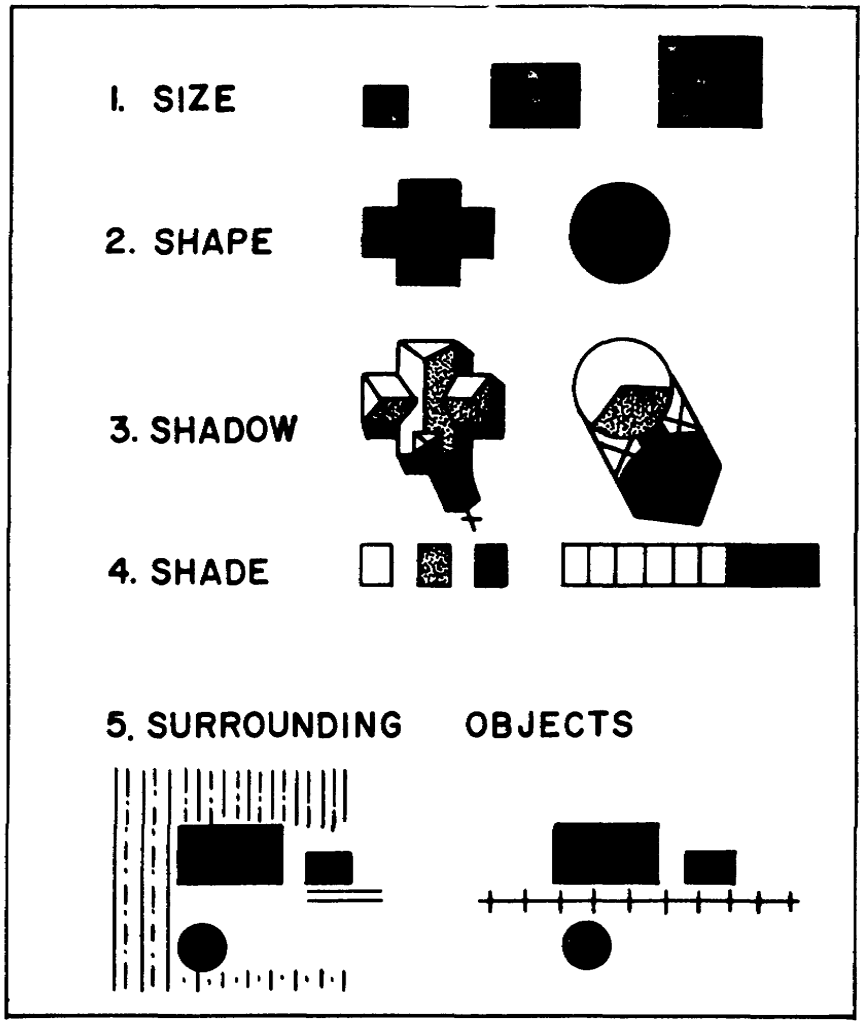


Figure 2-2. Military Identification Factors.

2. The Five "Ss"

a. Size. The three black squares at the top of Figure 2-2 represent buildings. If the two large buildings are homes, it should be obvious from the size of the other square that it represents some other type of building, probably a garage.

b. Shape. The figure on the left, because of its crosslike shape, could be a building with four wings, or possibly a church. The circular-shaped item on the right could be water tank or a silo.

c. Shadow. The object on the left is a church, and the object on the right is a water tank.

d. Shade. The term "shade" as applied to grey or tone is caused by the amount of light reflected from an object. Look at the separated squares opposite "shade" in Figure 2-2. The center object

reflects only part of the light shining on it; therefore, it is a medium shade. The rectangle on the right absorbs almost all light shining on it; therefore, it is a dark grey or black. The rectangle on the left reflects all the light; consequently, it is a light shade. The long object on the right could be a greenhouse. The glass roof reflects the light shining on it. The dark roof of the office absorbs the light.

e. Surroundings. Of the five factors of identification, surroundings are probably the most important to military identification. To make use of surroundings fully, you must be familiar with the enemy's weapons and equipment, his organization and tactics, and the topographic and geographic aspects of the area of interest. The last items in Figure 2-2 are groups of buildings. These building groups are similar, but in different surroundings they are identified differently. Surrounded by cultivated fields, the group on the left becomes a farm group with a house, barn, and silo. A railroad track added to the group of building on the right changes the analysis to a railroad station with a storage buildings and a water tank.

NOTE: Another factor of a more abstract nature is your own personal experience. You know what a school looks like because you are familiar with its structure, features, and surroundings. The same applies to the recognition of churches, parking lots, and industrial buildings. The soldiers who have been in combat areas can readily recognize defensive works such as trenches, bunkers, and machine gun positions because of their makeup, concentration, and tactical layout on the ground. This knowledge aids you materially in developing the skill necessary to recognize and identify familiar objects on aerial photography.

3. Application. To apply the factors of military identification, use Photos 458-3 and 458-7 which are photos of portions of Fort Huachuca, and the Fort Huachuca Map. The two photos are a vertical and oblique view of the same area of Fort Huachuca. Orient the photographs to the map.

4. Observe that the photographs are annotated, so when the numbers are in a readable position the shadows fall away from you on photo 458-3 and toward you on photo 458-7. This was done for easier orientation and reference with the map. If you have difficulty in analyzing the photos after orienting them to the map, invert the photos so the shadows fall toward you or so that you are looking into any obliquity. By applying the factors mentioned above you will understand how the following items have been identified.

NOTE: Use photo 458-3 for the following examples.

a. Area annotated 1 is an automobile parking lot. The surfaced roads leading to it, the proximity of the large buildings, and the many automobiles angle-parked in the area make this identification obvious.

b. The surface material of the road indicated by annotation 2 is blacktop or asphalt macadam. The dark tone of the road is a typical color representation of this type of road on aerial photography. As blacktop gets older it turns gray in tone. If the blacktop is dark in tone it is an indication of either a new surface or one that has been resurfaced. Roads that are used a lot will have dark stripes in the traffic lanes.

c. The area annotated 3 is a motor pool with a new maintenance building. The factors that identify it as a motor pool are the fence around it, the vehicles and the way they are parked. The new maintenance building is identified because it is not on the map and the blacktop around it is darker than the rest of the blacktop. These are indications of new construction work.

d. The surface material of the sidewalks indicated by annotation 4 is concrete. Concrete appears as a light gray tone on aerial photography. Gravel roads will also appear as a light gray tone but the edges of the road cannot be defined and are irregular.

e. The L-shaped building in annotation 5 is a church. It is not marked on the map as one but if you look closely you can see the steeple on top of the building.

f. The building in the area annotated 6 is a fast food restaurant. It has a large parking lot for a small building and a drive up window on the left side of the building.

g. In the area annotated 7 the houses are getting new roofs. The new roofs are lighter in color and the two houses in the lower left corner already have their new roofs. The third house in that row is just getting its new roof. You can see the trucks in the backyards of the homes and the tracks they made on the lawns.

h. The area annotated 8 on the photo is shown as just as a road intersection on the map. Since the date of the information on the map the road intersection has been changed to a traffic circle.

NOTE: Use Photo 458-7 for the following examples:

i. The area annotated 9 is a parade field. These are usually large grassy areas located near headquarters or troop barracks. The trees at the top center of the parade field are near the location for the flagpole and reviewing stand.

j. The circle annotated 10 is a service/gas station. Most gas stations are located at corners of roads for easy in and out traffic flow. The structure on the left side are the gas pumps. The building on the right are the auto parts store and auto service section.

k. In the area annotated 11 you have two obstacle courses. They are both laid out in a four-leaf-clover configuration. If you look closely you can see the obstacles.

l. The area annotated 12 is the garrison location of a military unit. There are four single story administrative buildings on the south end of the area two multistory barracks, one dining facility, and next to it is another multistory barracks. There is one more multistory barracks in the lower left corner of the photo.

5. General Characteristics. The following general characteristics of military activity should assist you in distinguishing between military and civilian objects or installations.

a. Spoil does not conform to the pattern of civilian construction or activity.

b. There is a disregard for economic use of land.

c. There is a regularity, with no relation to the economy of a region.

d. There is nonconformity with the overall regional activity.

6. Application. Refer to Photo 458-5 during this discussion of the methods of distinguishing between military and civilian objects or installations in the following areas:

a. In area A observe the civilian dwellings bordering on streets and having many gardens. In the open areas between the groups of buildings are cultivated fields, which have a close and continuous relationship to each other. There are sharp lines separating one farmer's field from another's, or one type or crops from another, and there is an absence of unused land.

b. There is an industry in the center background in area B which, judging by its size, would require a large number of workers. Beyond it, in area C, you can observe numerous buildings where workers probably live. From this you can see the various parts of the civilian economy have a relationship to each other.

c. There is also a similar relationship between the various aspects of military activity, but fortunately for the IA military patterns of activity do not lend themselves readily to the requirements of civilian activity. So in a combat or possible combat area, wherever a discrepancy appears in the expected civilian pattern, military activity should be suspected.

d. In the lower left corner of the photo in area D, the field pattern has been disrupted. Examination will show a trench system that has been dug in the area.

e. In the fields alongside the roads in Area E you can see wheel or track marks left by vehicles crossing or turning in the fields. This practice would destroy crops and land, and it is doubtful this would be done by the farmers.

PART C: PHOTOGRAMMETRY

1. There are three instruments which IAs generally use to make measurements on aerial photos and maps. First, there is the tube magnifier, a plastic tube with a lens at both ends. One end has an eyepiece, and the other end includes a scale graduated in thousandths of a foot and one-half millimeters (mm). The second device is the boxwood scale, one side of which is graduated into tenths (marked 100, 200, 300, 400, 500), hundredths (marked 1 through 9) and increments of thousandths (.001) of a ft. Some boxwood scales are also graduated into one-half mm. The boxwood scale has been designed in ft as the basic unit and with decimal fractions thereof. This simplifies measurements and mathematics involved in determining actual sizes of objects or areas on the ground (Figure 2-3).

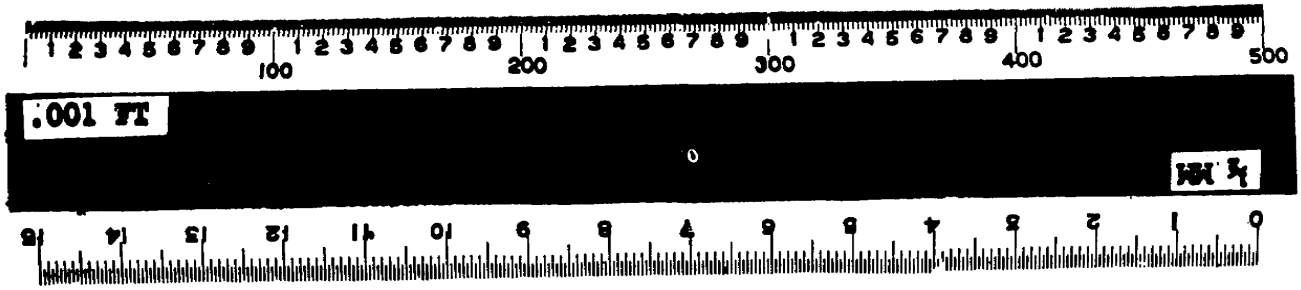


Figure 2-3. Boxwood Scale.

2. The third device, the PI scale (in back of your subcourse booklet) is made out of hard plastic. Similar to the boxwood scale, the PI scale has been designed in decimals and decimal fractions thereof. The PI scale is in tenths (.1, .2, etc.), hundredth (.01, .02, etc.), thousandths and .0005 ft increments; additionally it has centimeters (cm), mm, and .01mm.

3. Computing ground distance. Using the Fort Huachuca Map locate the landing strip in the city of Sierra Vista at UTM coordinate WK6892.

a. Place the PI scale along the bottom edge of the landing strip so the .1 on the scale is at the right edge of the area with scale graduations along the bottom edge. Measure to the left the length of the landing strip using the thousandths of a foot graduation on your PI

scale. You should obtain a measurement of approximately 0.187 ft (allow for expansion of the scale occurred in the reproduction process). Now measure the width of the landing strip along the right edge. You should get a reading of approximately 0.004 ft.

NOTE: You may find a slight discrepancy in your measurements. This may be caused by the expansion or contraction of the material on your PI scale, the map, or the photo. Weather conditions such as dampness or dryness may cause a discrepancy of one to two thousandths of a foot. Discrepancies of more than three thousandths of a foot should be rechecked.

b. Once you have measured an object appearing on a map you can determine the actual ground distance (GD) by using the following formula:

GD = map distance (MD) x denominator of the map representative fraction (DMRF) or GD = MD x DMRF.

c. The formula is applied in the following manner: You have already measured the MD length and width of the landing strip. The map's RF is (1:25,000). Now you can find GD of the landing strip by substituting your measurements for MD and 25,000 for DMRF as follows.

GD = MD x DMRF = 0.187 ft x 25,000 = 4,675 ft landing strip length.

GD = MD x DMRF = 0.004 ft x 25,000 = 100 ft landing strip width.

NOTE: The procedures for computing GD from a map using the PI scale are equally applicable for determining GD from an aerial photo. The denominator of the photo representation fraction (DPRF) is used instead of the DMRF. The formula should be: GD = PD x DPRF.

4. Determining the scale of vertical imagery. There are three formulas used in determining the scale of vertical imagery:

$$RF = \frac{f}{(H-h)} \qquad RF = \frac{PD}{MD} \qquad RF = \frac{PD}{MD \times DMRF}$$

a. The following definitions are used and should be remembered.

RF = Representative fraction or the scale of the imagery.
f = Focal length of the camera (the optical distance between the film and lens of the camera).
H = Height of aircraft above mean sea level [also expressed as ASL (altitude above sea level)].
h = The elevation of terrain above mean sea level (MSL).
PD = Photo distance.
GD = Ground distance.

MD = Map distance.
DMRF = Denominator of the map representative fraction.
DPRF = Denominator of the photo representative fraction.
H-h = Altitude of aircraft above ground level (AGL).
AGL = Above ground level (radar altitude).
ASL = Above sea level (barometric altitude).

Remember: All measurements or values used in the formulas to include the numerator and denominator must be in the same unit.

b. The first commonly used formula is $RF = \frac{f}{(H-h)}$. You must consult the titling data first to obtain the values for f and H, which are shown as items 8 and 9 in Figure 2-4. f = 36 inches (in) or 3 ft and H = 12,000 ft. The elevation of the terrain (ASL) is given as h = 2,000 ft. By placing these values into the formula, you should arrive at the following result:

$$RF = \frac{36 \text{ in}}{(12{,}000 \text{ ft} - 2{,}000 \text{ ft})} = RF\ \frac{3 \text{ ft}}{10{,}000 \text{ ft}}$$

$$RF = \frac{1 \text{ ft}}{3{,}333 \text{ ft}}$$

RF = 1:3,333.

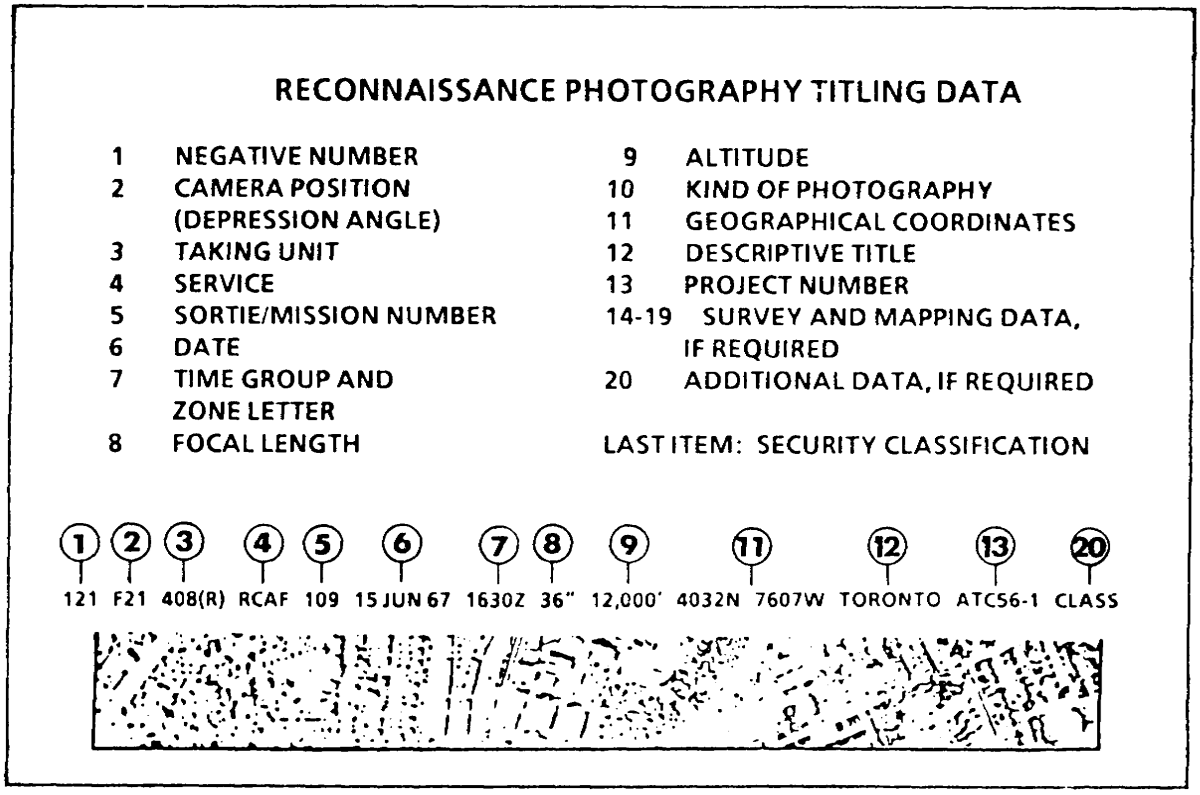


Figure 2-4

NOTE: A quick way to obtain the RF (1:) is to invert the fraction and divide the denominator by the numerator, for example:

$$\frac{15{,}600 \text{ ft}}{3 \text{ ft.}} = 1{:}5{,}200$$

c. Determining scale using the known distance method. If you wish to make a more accurate measurement on a photo than the focal length/altitude method permits, and you cannot use the scale line method because you do not have a map, you can determine the scale of a photo by the "known distance" method. If you can find an object of known size on the photo (for example, a football field) you can determine the scale by measuring the PD of the object and using the formula:

$$RF = \frac{PD}{GD}$$

For example, the GD of a football field is 300 ft. Suppose the PD of the football field is 0.1 ft. By substituting these values in the formula show the following result:

$$RF = \frac{0.1 \text{ ft}}{300 \text{ ft}} = \frac{1}{3{,}000}$$ Therefore, the scale or RF of the photo is 1:3,000.

d. In determining scale using PD and MD use the following formula:

$$RF = \frac{PD}{MD \times DMRF}$$

For example, if PD = .432 ft; MD = .108 ft; and the DMRF = 50,000;

$$RF = \frac{.432 \text{ ft}}{.108 \text{ ft} \times 50{,}000} = \frac{.432 \text{ ft}}{5{,}400 \text{ ft}} = 1{:}12{,}500$$

e. One calculation will not provide you with an accurate RF; instead, several measurements and calculations must be accomplished. Therefore, the scale lining method is applied. In this method the lines are constructed on the photo. Then the map and photo are compared to determine the scale of the photo. This can be accomplished through the following steps:

(1) Step 1: Find north on the photo by means of the shadow method.

(2) Step 2: Locate the photo coverage accurately on the map.

(3) Step 3: Select several pairs of points on the photo which also appear on the map and which must be accurately located on both the photo and the map and have approximately the same ground elevation for the points in any pair. This can be determined from the map contours or by stereovision; they have points approximately equidistant from the center of the photo and lines (called scale lines) connecting pairs of points and passing through the center of the photograph.

(4) Step 4: Measure the distance between one pair of points and between the same points on the map, using the PI scale.

(5) Step 5: Substitute the measurements thus obtained in the formula

$$RF = \frac{PD}{MD \times DMRF}$$

(6) Step 6: Reduce the entire fraction so it has a numerator of one. The new denominator in the reduced fraction results from dividing the denominator by the numerator.

(7) Step 7: Repeat the foregoing steps for all pairs of points. It is suggested at least three sets of points be used.

(8) Step 8: Total the RF for the three sets of points and divide them by three to get the average RF. This will give you a more accurate scale of the photo than the focal length/altitude methods.

f. The following steps will give you a better understanding of the procedure involved in scale lining an aerial photograph:

(1) Step 1: Take out Photo 458-6 and the Fort Huachuca map. Map scale is 1:25,000.

(2) Step 2: Orient the photo to the map. The area covered by the photo is illustrated in Figure 2-5.

(3) Step 3: Next, select the points between which the scale lines will be constructed. To help you understand the procedure, the points have already been designated and the scale lines drawn on the photo. Observe the points annotated on the photo fulfill the requirements previously stated for scale lines. The points are approximately equidistant from the center of the photo, and the points are approximately the same elevation. If you have difficulty locating the same points on the map as were selected on the photo, look at Figure 2-5 which is a reduced map extract.

(4) Step 4: Now, draw the scale lines between the points on the map. To avoid confusion, first annotate the points on the map the same as they are lettered on the photo.

(5) Step 5: Measure the distance between the points at each end of the scale lines on both the photo and the map.

Use formula RF = $\frac{PD}{MD \times DMRF}$ to determine the scale of each scale line.

You should get approximately the following measurements and calculations.

(6) Step 6: Reduce the entire fraction so it has a numerator of one. The new denominator in the reduced fraction results from dividing the denominator by the numerator.

(7) Step 7: Repeat the foregoing steps for all pairs of points.

(8) Step 8: Total the RF for the three sets of points and divide them by three to obtain the average RF.

NOTE: Measurements can be reported in feet or meters, depending on unit SOP. When converting meters to feet multiply meters by 3.281; when converting feet to meters multiply feet by .3048. For example:

5 m x 3.281 = 16.405 ft.
5 ft x .3048 = 1.524 m

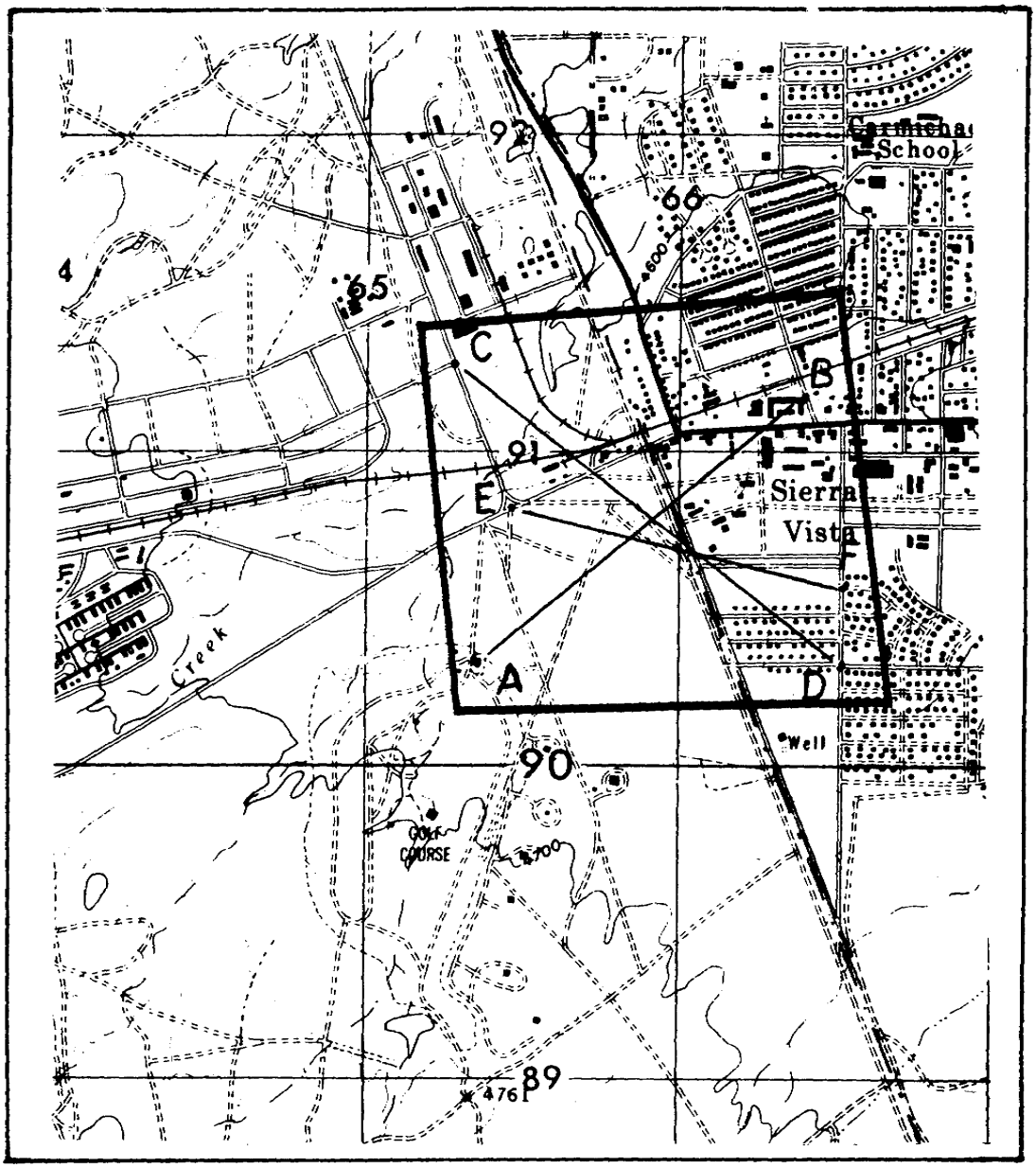


Figure 2-5. Scale Line Method.

Points	MD	PD	Scale
A-B	0.174 ft	0.6310 ft	1:6,894
C-D	0.205 ft	0.7510 ft	1:6,824
E-F	0.143 ft	0.5175 ft	1:6,908
			3) 3:20,626
			= 1:6,875

The average scale of the photo is 1:6,875.

5. In determining mph of a moving object on land, you need two consecutive photos that show the shift of the object (Figure 2-6). The following formula is used to arrive at the mph:

$$R = \frac{D}{T} \times \text{ft per seconds} \times \frac{\text{seconds in one hour}}{\text{ft in one mile}}$$

R = Rate or speed the object is moving in mph.

D = PD (photo distance or image shift) x DPRF in ft.

T = Intervalometer setting (time elapsed between exposure of two consecutive photos) in seconds.

$\frac{D}{T}$ = feet per second

a. First you must determine D; for example, if the image shift is 0.015 ft and the DPRF is 4,000, multiply 0.015 ft x 4,000 = 60 ft, thus D = 60 ft.

b. Next, you divide the intervalometer setting (T) into D; for example, if D = 60 ft and T = 8 seconds, 60 ft: 8 = 7.5 ft per second, or $\frac{D}{T}$ = 7.5 ft per seconds.

c. Finally, you must calculate the mph by using the following formula:

$$R = \frac{\text{(ft per second) x (seconds in one hour)}}{\text{ft in one mile}}$$

$$R = \frac{\text{(7.5 ft per second) x (60 seconds x 60 minutes)}}{\text{5,280 ft}} = 5.1 \text{ mph}$$

R = 5.1 mph

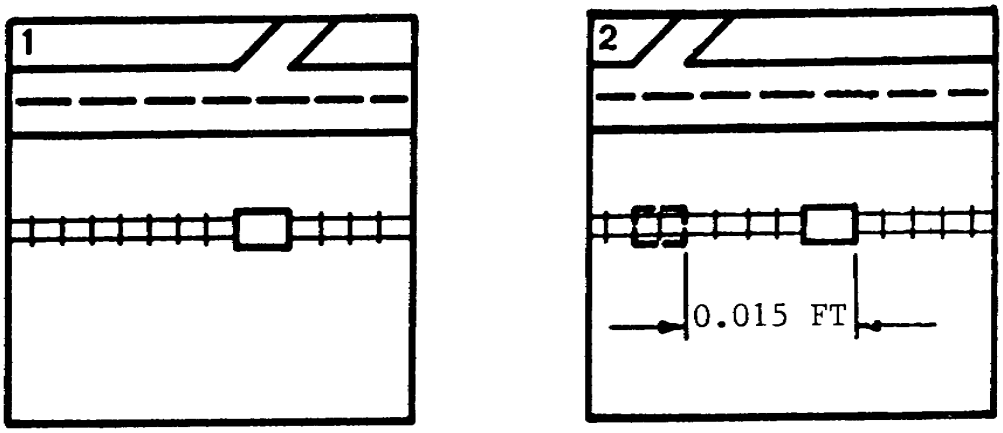


Figure 2-6. Moving Object.

6. For additional practice, study TEC Lessons 242-301-6717-A through -6731-A on Oblique and Panoramic Photogrammetry; -6754-A, -6756-A, and 6757-A and Subcourse IT 0644 on Vertical Photogrammetry.

PART D: MOSAICS, PHOTOMAPS, AND PANORAMICS

1. Mosaics. There will be times when you desire a complete view of your area of responsibility beyond that which can be shown by maps. Mosaics fulfill this need and are used for planning operations, briefings, orientations, terrain evaluations, and determining the enemy's disposition and installations. Normally, the IA section will produce these mosaics for its own use and the use of other sections within the headquarters, as well as for other units.

2. A controlled mosaic is an arrangement of two or more vertical aerial photos methodically joined together to form a composite view of the area over which they were taken. It shows terrain detail pictorially in true characteristics and relationship. Photos are aligned in projection printing to plotted control points and mounted on a stable base. These mosaics are prepared by topographic draftsmen.

3. A semi-controlled mosaic is constructed of unaltered contact prints aligned to plotted control points and mounted to a stable base. Again, these mosaics are prepared by topographic draftsmen.

4. An uncontrolled mosaic is an assembly of two or more overlapping photos without rectification. The photos are arranged by matching image detail on adjacent photos. Relative rather than absolute position of terrain will result. True distance and direction cannot be computed accurately; however, for purposes requiring no precise measurements, uncontrolled mosaics are satisfactory. Furthermore, a North arrow and bar scale must be placed on the uncontrolled mosaic. Uncontrolled mosaics are particularly useful for illustrating reports or briefings.

5. A strip mosaic consists of a mosaic strip of vertical photos spread on a flat surface in such a way as to give an idea of distances and direction along the area covered. Each photo is laid over the preceding one in "shingle" fashion so image detail of overlapping portions coincide. A strip mosaic is uncontrolled.

6. Additional uncontrolled mosaic preparation requirements. Depending on the particular requirement of the mosaic, the following items are shown in most mosaic title blocks:

a. Identification of the report which the mosaic accompanies.

b. Photography title information, to include date, mission number, print numbers, altitude, focal length, and security classification.

c. Map reference.

d. Identification of the producing unit.

e. Date mosaic was completed.

f. Preparer's rank and name.

g. Security classification at the bottom of the title block and top and bottom of the mosaic in larger than normal lettering.

7. You should be aware of mosaic limitations. On uncontrolled mosaics, distance, and directions are approximate. Uncontrolled mosaics also contain errors in scale and azimuth. Mosaics will lack graphic detail such as contours and elevations, and some detail may be obscured by foliage and shadow. The construction of mosaics requires a considerable amount of time, a degree of training, and much patience, all of which are beyond the scope of this subcourse; therefore, you will not be required to make a mosaic. You can obtain an idea of how to construct an uncontrolled mosaic by looking at Photos 458-1,-2, -3, and -4, and attempting to lay them out so details overlap. You would then cut away the overlapping photo to the extent you could fit the photos together to achieve a continuous picture of the area covered. For further information, consult subcourse IT 0639, Construct Uncontrolled Mosaics.

8. Photomaps are a reproduction of an aerial photograph or mosaic upon which north, approximate graphic scale, grid system, and place names have been added. The usefulness and accuracy of photomaps are governed by methods used in compilation and construction. Even though special measures are taken, the photomap is always less accurate than a line map.

9. Panoramas are an arrangement of two or more overlapping oblique photos fitted together to give an oblique panoramic view of an area.

LESSON 2

PRACTICE EXERCISE

The following items will test your grasp of the material covered in this lesson. There is only one correct answer to each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, study again that part of the lesson which contains the portion involved.

1. What does (H-h) in relation to aerial photos stand for?

   A. Altitude of the aircraft measured in feet or meters.

   B. Optical distance between the film and the lens.

   C. Vertical distance from MSL.

   D. Altitude of the aircraft AGL.

2. While performing a photogrammetric calculation, one point to remember is both the numerator and denominator must be:

   A. Changed so the numerator is in feet and the denominator in inches.

   B. Changed so the numerator is in meters and the denominator in feet.

   C. In the same unit of measure.

   D. In different units of measure.

3. Of the five factors of identification, which is the most important to military identification?

   A. Size and shape.

   B. Size.

   C. Shade.

   D. Surroundings.

   E. Shape and shadow.

Each of the statements in column I may be matched with an item in column II. Make the proper match and put the letter of the item you have chosen in the blank space in Column I.

	COLUMN I	COLUMN II
4. _____	An arrangement of two or more overlapping oblique photos fitted together to give an oblique view of an area.	A. Controlled Mosaic
5. _____	An arrangement of two or more vertical aerial photos methodically joined together to form a composite view of an area over which they were taken.	B. Photomap C. Uncontrolled mosaic D. Panorama
6. _____	A reproduction of an aerial photograph or mosaic upon which north, approximate graphic scale, grid system, and place names have been added.	E. Strip mosaic
7. _____	An assembly of two or more overlapping photos without rectification.	
8. _____	A mosaic strip of vertical photos spread on a flat surface to give an idea of direction and distances along the area covered.	

9. What is the rate of speed in mph for a moving tank using the following data: image shift = .1 ft; DPRF = 5,000; intervolameter setting = 10 seconds?

   A. 3.6

   B. 5.

   C. 34.

   D. 50.

10. Given are the following data: PD = .074 feet; MD = .009 feet; DMRF = 100,000. What is the RF of the photo?

    A. 1:1,216.

    B. 1:12,162.

    C. 1:121,620.

    D. 1:122,222.

11. You measure a park on a map with your PI scale. The length of the park measures 0.150 ft on your PI scale. The scale of the map is 1:50,000. What is the ground distance?

    A. 5,850 ft.

    B. 6,250 ft.

    C. 7,500 ft.

    D. 8,900 ft.

12. The known distance between soccer goal posts is 24 feet and the photo distance is .0165 feet. What is the RF of the photo?

    A. 1:396.

    B. 1:1,454.

    C. 1:6,875.

    D. 1:14,454.

13. You measure a railroad yard on a map with your PI scale. The length of the railroad yard measures 0.175 feet. The map scale is 1:25,000. What is the ground distance?

    A. 3,250 ft.

    B. 4,375 ft.

    C. 5,250 ft.

    D. 6,795 ft.

14. Take out Photos 458-1, -2, -3, and -4. Plot these vertical photos by using your overlay paper and the Fort Huachuca map extract.

15. Take out Photos 458-7 and -8. Plot these oblique photos by using your overlay paper and the Fort Huachuca map extract.

LESSON 2

PRACTICE EXERCISE

ANSWER KEY AND FEEDBACK

Item	Correct Answer and Feedback
1.	D. H-h is the altitude of the aircraft above ground level (page 74, para 4a).
2.	C. For photogrammetric calculations all measurements or values must be in the same unit of measure (page 74, Remember).
3.	D. Probably the most important factor for military identification are surroundings (page 69, para 2e).
4.	D. Definition of a panoramic (page 81, para 9).
5.	A. Definition of a controlled mosaic (page 80, para 2).
6.	B. Definition of a photomap (page 81, para 8).
7.	C. Definition of an uncontrolled mosaic (page 80, para 4).
8.	E. Definition of a strip mosaic (page 80, para 5).
9.	C. The rate of speed for the moving tank with given data is 5.1 mph (page 79, para 5c).
10.	B. The RF of the photo with given data is 1:12,162 using RF = PD / MD x DMRF (page 75, para d).
11.	C. GD of the park length is 7,500 ft, using GD = MD x DMRF (page 73, para b).
12.	B. RF is 1:1,454, using RF = PD / GD (page 75, para c).
13.	B. GD = 4,375 ft, using GD = MD x DMRF (page 73, para b).
14.	Compare your plot to the one on page 87, fig 2-7.
15.	Compare your plot to the one on page 88, fig 2-8.

Figure 2-7. Plot of Photos 458-1, -2, -3, and -4 (Enlarged).

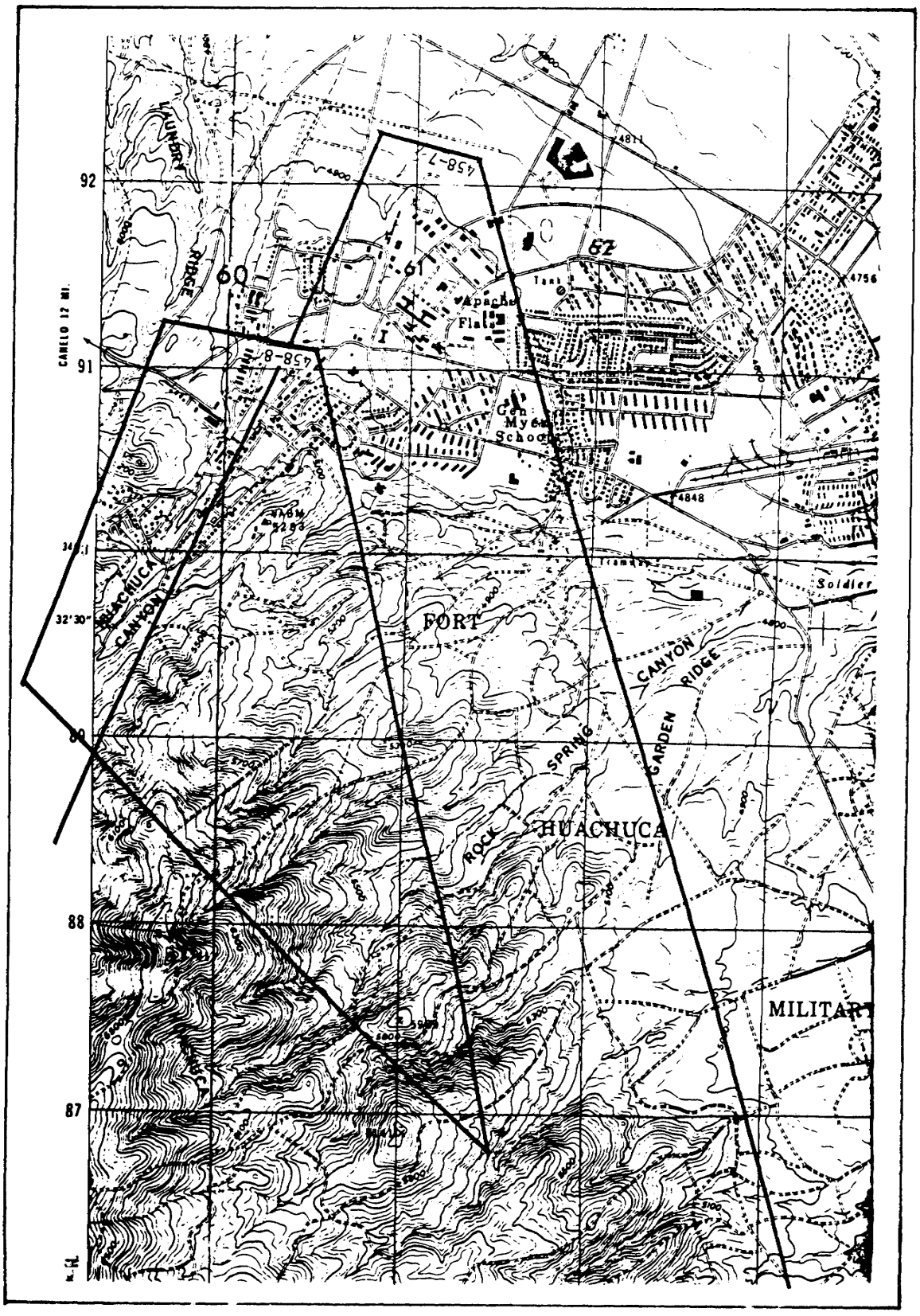


Figure 2-8. Plot of Photos 458-7 and -8 (Reduced).

LESSON 3

MILITARY IDENTIFICATION

Critical Tasks: 301-338-1606, 301-338-1607,
301-338-1608, 301-338-1801,
301-338-1802, 301-338-1805,
301-338-1809, 301-338-1811,
301-338-1838, 301-338-3701

OVERVIEW

TASK DESCRIPTION:

In this lesson you will learn to prepare a RECCEXREP, initial/supplemental programed interpretation report (IPIR/SUPIR), and a radar exploitation report (RADAREXREP); furthermore, you will identify military equipment, types of defensive measures, and military installations on aerial imagery and perform quality control check on aerial imagery analysis and reports.

LEARNING OBJECTIVES:

ACTIONS: Describe the information and procedures required to prepare a RECCEXREP, IPIR, SUPIR, and RADAREXREP; identify military equipment, types of defensive measures, and military installations; and perform quality control check on aerial imagery analysis and reports.

CONDITIONS: You will be given access to extracts from ACCP IT 0667, ACCP IT 0687, DA PAM 25-7, FM 21-26, STANAG 3596, STANAG 3377, and USAICS SupR 60059.

STANDARDS: Preparation of a RECCEXREP, IPIR/SUPIR, and RADAREXREP; identification of military equipment, types of defensive measures, and military installations on aerial imagery; and performing quality control check on aerial imagery analysis and reports will be IAW ACCP IT 0667, ACCP IT 0687, DA PAM 25-7, FM 21-26, STANAG 3596, STANAG 3377, and USAICS SupR 60059.

REFERENCES: The material contained in this lesson was derived from the following publications:

ACCP IT 0667.
ACCP IT 0687.
DA PAM 25-7.
FM 21-26.
STANAG 3596.
STANAG 3377.
USAICS SupR 60059.

NOTE: Replace the following pages with attached glossy photo pages for better viewing, 92, 96, 98, 104, and 109.

INTRODUCTION

Upon receipt of aerial imagery the IA must immediately screen it, identify and analyze any military activity to include personnel, field fortifications, tanks, vehicles, field artillery, etc.. In conjunction with this action the IA must prepare a pertinent report and have it transmitted to the requester.

PART A: MILITARY ACTIVITY

1. Personnel on foot are probably the most difficult objects to distinguish on aerial photography. This is particularly true where troops are dispersed throughout an area which is covered by heavy vegetation. Seldom will large bodies of troops moving on roads or in the open be seen on daylight photography.

2. Look at Photo 458-3. On the roofs of the building at the left in area 7 there are several persons; observe how difficult it is to distinguish them clearly. Now look at Photo 458-6. This photo is of a scale approximately 1:6,875. It is doubtful if you could locate personnel on photography of this scale, particularly in these surroundings. However, personnel can be seen if:

a. Large-scale photography is used.

b. Good quality photography is available.

c. Photography is taken during the time of day which produces long shadows.

d. There are large numbers of personnel on a road, in an open field, or in some other easily defined area.

3. Be on the lookout for personnel in the succeeding photos to this lesson. This will give you an indication of the type of photography you should request if you are interested in distinguishing persons from objects.

4. Field fortifications are perhaps the most readily identifiable military activity. Completed uncamouflaged fortifications are particularly evident.

a. Trenches. Look back to Figure 1-4 on page 13; it shows the different types of trench systems. Annotation 1 points to defensive trenches which can be identified by the small finger-like bays extending out from the main trench (annotation 2). These firing bays are usually occupied by riflemen or small automatic weapons. On the same figure, the area enclosed by annotation 3 is a communication trench. These trenches provide a protected means of communicating with defensive trenches and can be identified by the absence of firing bays. The major characteristics

in identifying trenches are the dark shadow cast into the trench and the contrasting light tone of the spoil on all sides. Trenches usually--

(1) Are constructed on high ground.

(2) Are in a zigzag pattern.

(3) Have no relationship to the surrounding cultivated fields or area.

b. Bunkers are typical installations in any defense system and may be found in the vicinity of civilian installations, but they do not lend themselves to their surroundings. In a static situation, the ground forces have ample opportunity to dig into the ridges and slopes of the mountains which constitute the front lines. Very often bunkers are elaborate positions constructed of rocks, logs, or other field expedients and usually appear in conjunction with the trench systems. Bunkers may house antitank (AT) guns, artillery, machine guns, and other infantry weapons; however, when seen on the rear slopes of mountains, they are usually personnel, supply, or ammunition shelters.

c. Tank ditches must be wide enough and deep enough to stop the enemy's largest tank. On Photo 458-9 you will see a tank ditch in the area annotated A. Tank ditches are wider than personnel trenches and appear on aerial photos as dark strips in the terrain with light-toned spoil on the sides. They are found in terrain which is suitable for armor, and their chief function is to delay armor or channel them into routes which are well-organized with AT weapons. When an AT ditch is located, look for AT guns nearby. Observe how a ditch is being constructed to form a barrier for the protection of the heavy coast-defense battery.

5. Vehicles of today's armies are highly mechanized, and the identification of military vehicles is an important phase of imagery analysis. Supplies and personnel are transported in the rear area as well as in the combat zone. The location and analysis of opposing force's supply and troop vehicles can result in successful aerial or ground interdiction and the disruption of enemy's operations. Track or wheel marks which do not conform to economical civilian use of the land indicate military activity. Nonmilitary vehicles will travel on the existing roads and avoid crossing fields. Frequently, important information on photos would be overlooked if it were not for the presence of track or wheel marks. Tracked vehicles leave tracks which are wide, heavy, deep, and leave wide scars on sharp turns. Wheeled vehicles leave tracks which are narrow, smooth, even, and form a gentle arc for each set of wheels on sharp turns.

a. Look at the track activity on Photo 458-10. In the lower right corner of the photo there are track marks in the garden. The tracks

in the center of the photo have been made with disregard for the economical use of the field. This immediately suggests military activities in the area; namely, the presence of tents, trailers, and ambulances. Based on this information, you can conclude this is or was a military command post. An aid to the identification of tracked and wheeled vehicles is the tracks on a turn. A wheeled vehicle makes four tracks, whereas a tracked vehicle makes two tracks, usually with dirt thrown up along the side forming a scar effect. Figure 3-1 is a "negative" print. Observe the spurs off-road. These are typical North Vietnamese "truckstops," called truck parks.

Figure 3-1. Truck Parks.

b. The usual length/width ratio of a tank (and most tracked vehicles) is 2 to 1. On vertical aerial photos the length and width of a tank can be measured, the shape of the turret can be seen, and sometimes the gun tube and muzzle brake can be detected. Once the enemy's vehicles and tanks are located, additional information in 11 keys, and the dimensional information in technical intelligence reports will assist in identifying them by type.

c. The usual length/width ration of wheeled vehicles is 3 to 1. One of the exceptions to this rule is the truck, 1/4 ton, 4 by 4, which has a length to width ratio of 2 to 1. IAs should attempt to identify vehicles by name. For example, an IA report would identify five KrAZ-255B trucks, not just five trucks.

6. Field Artillery. Locating artillery on aerial photographs is important though sometimes difficult. It requires a full exploitation of the five basic factors of identification and the use of information from other sources such as technical intelligence, OB, and interrogation reports. The term "artillery" includes the weapon, weapon site, ammunition storage, command post, and fire direction or control center.

a. Field artillery location and identification are the most important functions of the IA. Artillery positions may be located in woods, dug into hills, and sometimes even positioned inside houses or other structures. Once artillery is located, an attempt is made to classify it by examining the weapon site and associated installations, and by determining the ground dimensions of the emplacements.

b. The position of field artillery in relation to the front line is a definite indication of the enemy's capability to pursue a particular course of action. Artillery placed well forward is an indication of the enemy's capability to attack. Artillery placed well to the rear is an indication of a defense or withdrawal.

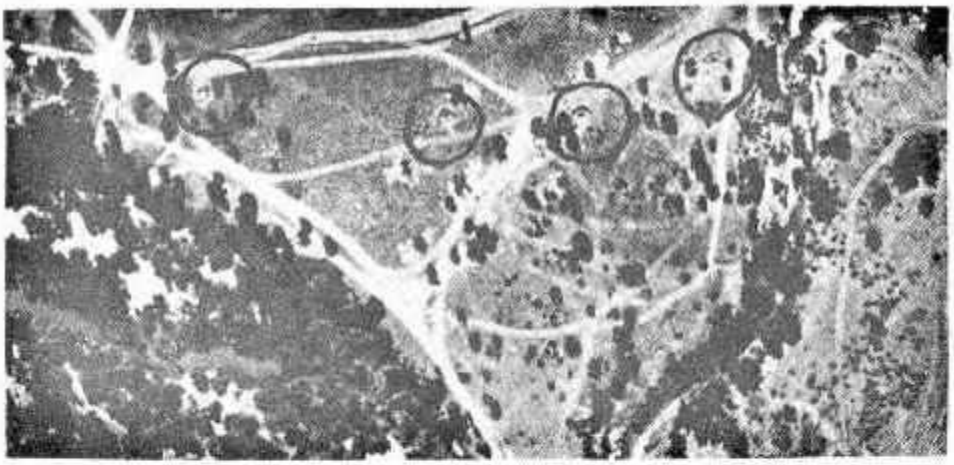
c. Identification Aids. The following features aid in the identification of field artillery:

(1) Blast marks which are dark, fan-shaped patches on the ground with the apex of the fan directly below the gun muzzle.

(2) Tracks made by the prime movers when they drop the artillery pieces into place.

(3) Cleared fields of fire in wooded areas.

(4) Characteristics size, shape, and shadow of the piece and/or the prime mover.



AIR PHOTO OF FOUR ARTILLERY POSITIONS TAKEN 6 JUNE.

AIR PHOTO OF SAME FOUR ARTILLERY POSITIONS (CAMOUFLAGED) TAKEN 10 JUNE (FOUR DAYS LATER).

Figure 3-2. Field Artillery Positions.

d. Figure 3-2 is an excellent example of comparative cover of an area identifying artillery. Observe the looping pattern near the positions made by the prime movers.

7. Antiaircraft Artillery (AAA) is easier to locate than field artillery because it is usually found in the open. It is difficult to camouflage and bears little or no resemblance to natural or civilian surroundings. Because of added emphasis on surface-to-air missiles (SAM) and rockets, it is expected that fewer antiaircraft (AA) gun installations will be seen on the modern battlefield.

a. AA weapons are normally placed in circular or square-shaped emplacements in areas which contain strategic installations such as airfields, factories, railroad yards, shipyards, or bridges. When the position is occupied, a black blob or dot is seen in the center of the emplacement.

b. The electrically controlled AAA position has a fire direction center (FDC) in the center or near vicinity, and buried cables from each gun may appear as white lines from the gun to the FDC. Radar units may appear in close proximity to the gun positions. These are usually smaller in size than AAA revetment and may be on high ground to facilitate an effective 360 degrees operation.

c. Light AAA and AA guns are more difficult to identify because of the lack of any standard pattern, their similarity to other types of emplacements, and they are somewhat easier to camouflage than heavy AAA. Camouflaging AAA is sometimes attempted but is usually ineffective because the guns must be able to fire in any direction and the gun crew must be able to locate the target. Heavy concealment makes this almost impossible.

d. Photo 458-11 covers a portion of an AAA site. You will find a large AA installation located in circle A. If you look closely you can find the following positions in this installations:

(1) Arrow B points to four large occupied emplacements for heavy AAA guns.

(2) Arrow C points to the FDC.

(3) Arrow D points to a searchlight on top of a bunker.

(4) Arrow E points to a battery of three light AAA guns.

(5) Arrow F points to another battery of three light AAA guns.

(6) Arrow G points to another battery of two light AAA guns.

e. On the small photo area H you will see 12 x AA emplacements organized into two 6-gun batteries. Although the emplacements are smaller than the heavy battery on the high ground, the presence of a fire control center for each battery would indicate there are medium guns in the emplacements.

f. The North Vietnamese AAA positions (annotations 1, 2, and 3 of Figure 3-3) are an excellent example of quick off-road employment. Do NOT confuse these positions with nearby bomb craters.

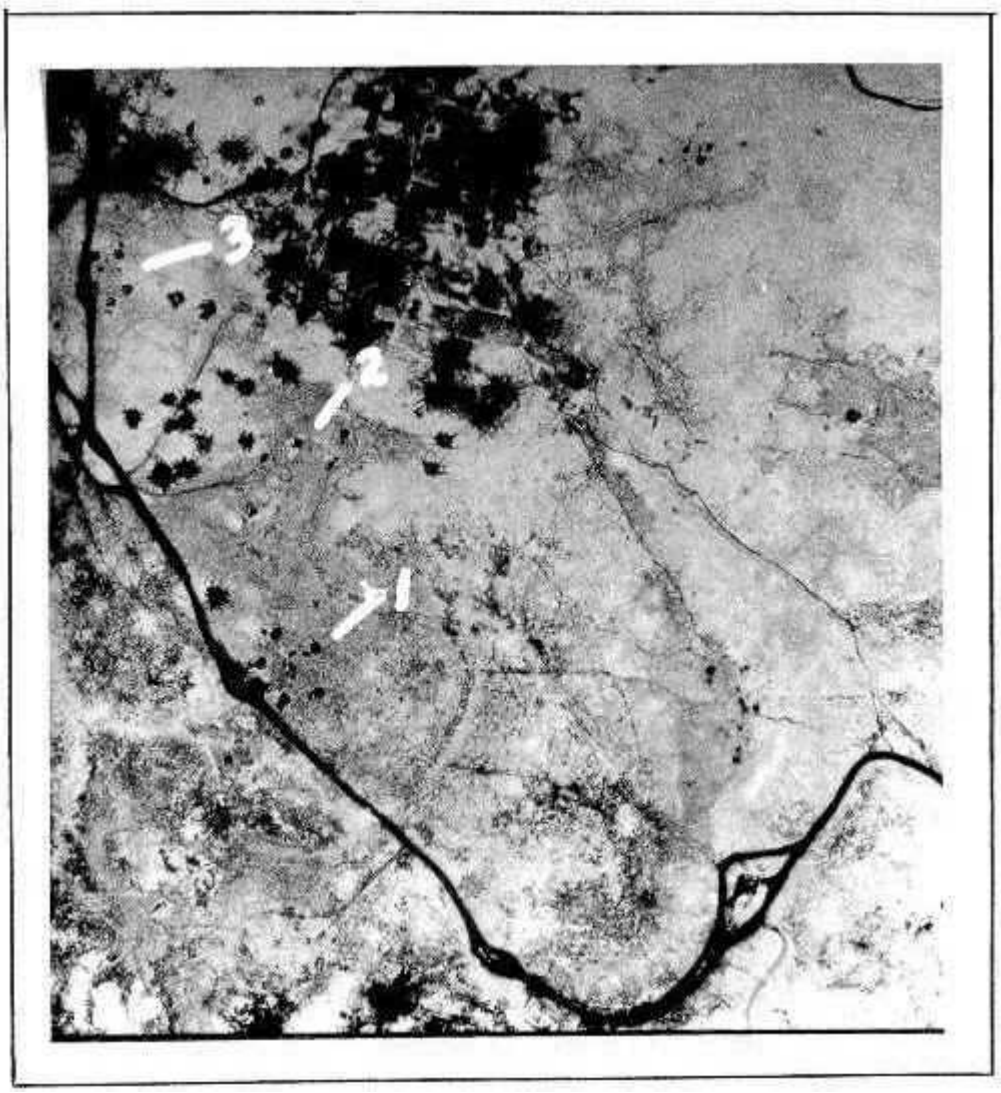


Figure 3-3. AAA Positions.

8. Supply Areas. An indication of the enemy's capability to attack, defend, or withdraw is the movement, location, and/or accumulation of supplies. Supply depots and storage areas are usually located in rear areas and close to good transportation facilities. Supply dumps are mostly temporary and are more often farther forward along good road nets. Look at Photo 458-12. The circle contains a supply dump located in an orchard. Observe the revetted stacks of supplies and the easy access to a main road. The abnormal road net in this area should arouse suspicion.

9. Bivouacs and Barracks Areas. The successful discovery of bivouac areas is also a factor in the determination of enemy capabilities and intentions. Bivouacs are usually located in wooded areas which provide good cover and concealment. In a tactical situation, bivouac areas are somewhat difficult to identify on aerial photos. Bivouacs are usually occupied only at night or during adverse weather conditions when aerial observation of the area is impractical. There are several factors to be considered when searching for bivouac areas on aerial photos. First, study the likely areas such as wooded terrain with fairly accessible roads and good vehicle and equipment dispersal areas. Second, look for tracks which lead into the wooded areas and observe any changes in shade of vegetation in these areas. Poor camouflage discipline is the principal reason for bivouac detection.

a. Use Photo 458-13 in searching for bivouacs and barracks areas. You can see a bivouac area in the wooded areas. Vehicles and tents are visible, but the main violation of camouflage discipline is the excessive track marks in the area. Very little effort has been made to camouflage the tracks of the vehicles or the vehicles themselves. On Photo 458-1 the characteristic regular pattern of the buildings and drill ground of a military post should be readily apparent. Even when barracks are located in the center of a civilian area they can be picked out by the obvious difference to the surrounding buildings.

b. Figure 3-4 shows an off-road truck park/bivouac area in North Vietnam. These were common all along the Ho Chi Minh Trail.

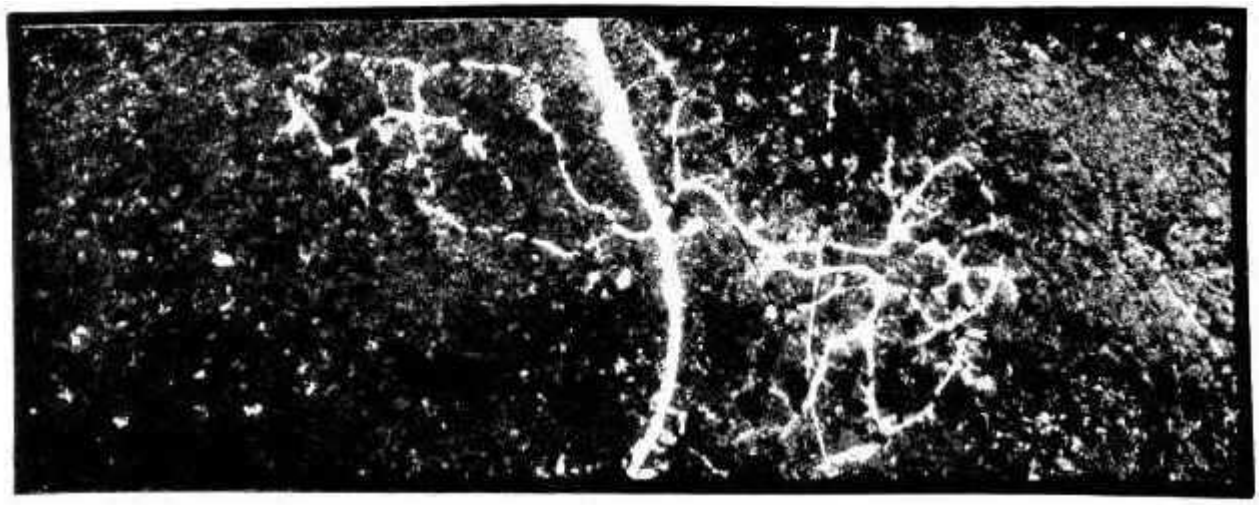


Figure 3-4. Bivouac Area.

10. Communication. As dealt within this lesson, radio means stations capable of transmitting and receiving spoken words or code. Antenna masts are of primary importance in analyzing radio communication installations. On some vertical photographs, mast location, type, and height often can be determined by the shadows they cast on the ground, if the ground is flat or nearly so. Masts can be divided into three types:

a. Whip masts are used on short-range portable sets.

b. Stick masts seldom reach a height in excess of 75 ft. With good photography it is possible to determine the design even with a fairly small scale.

c. Lattice masts include a great variety of designs. They are usually of steel construction with prefabricated members. These masts range in height from 75 to 600 ft, with the majority being between 75 and 300 ft.

d. The transmitter is the most vital unit in the communication installation and usually found within 300 ft of the masts. Quite often a communication office is found close by the transmitting building.

11. Electronic/Weather Installations. The field of weather intelligence involves the transfer of weather forecasts from remote to central points so accurate weather forecasts can be made. A weather installation consists of a shelter for personnel, a weather tower, radio station, and pibal shelter. The pibal shelter is roofless and used for release and observation of weather balloons. Following is a list of the points you should keep in mind when looking for electronics or weather installations:

a. DO NOT look for wires.

b. Study the shapes or shadows.

c. Look for concrete building or installation foundation.

d. Look for this type of setup in the vicinity of military installations.

e. Look for transmitters in open areas or on high ground.

f. Look for paths to towers, transmitters, and transformers.

g. Study earth scars.

h. Look for barracks and common post buildings in the vicinity.

i. Look for rectangular or odd-sized round revetments near heavy AAA.

12. Engineer equipment or activity can provide you with an indication of the enemy's intentions. Engineers use many types of equipment which are often large and difficult to conceal. The engineer equipment of all armies is similar. Most armies use standard construction equipment while USSR/Warsaw Pact armies use specialized equipment. By identifying equipment on aerial photographs and analyzing the significance of its location and disposition, you can determine the indications of offense, defense, withdrawal, or reinforcement.

a. Offensive Indications.

(1) Moving heavy engineer equipment (road maintenance equipment and river-crossing equipment) forward.

(2) Preparing breaches through its own defensive works, such as wire, obstacles, and minefields.

(3) Building forward airfields for high-performance aircraft.

(4) Concentrating road maintenance along main supply routes.

b. Defensive Indications.

(1) Moving heavy engineer equipment to rear areas.

(2) Constructing entrenchments, wire obstacles, minefields, and other barriers.

(3) Maintaining landing strips for light aircraft.

(4) Actively maintaining lateral and rear roads.

(5) Increasing camouflage activity.

c. Withdrawal Indications.

(1) Preparing obstacles and demolition activities behind its own front lines.

(2) Neglecting road maintenance.

(3) Preparing defensive positions in the rear areas.

d. Military engineer equipment and supplies in many cases are identical to those used by civilian engineers. In this category are bulldozers, tractors, cement mixers, road scrapers, power shovels, cranes, pile drivers, road rollers, and variety of earthmoving equipment. Shape and shadow are the two factors most helpful in identifying this type of equipment. Spoil, which is always present around a construction project, should prompt you to search for engineer construction equipment. To identify such equipment, photos with a scale of 1:8,000 or larger are needed.

e. Engineer supply dumps can generally be identified by the types of supplies in the dump, for example, barbed wire, demolition materials, mines, boats, pontoons, and flooring for bridges. To identify dumps containing the smaller engineering supplies, photos with a scale of 1:2,000 or larger are required for proper identification, while the larger supplies can be identified on photographs with scales as small as 1:8,000.

f. River-crossing equipment is unique to military engineers. This equipment is divided into three major categories: boats, bridges (both floating and fixed), and rafts and ferries. Photographs with a scale of 1:10,000 or larger are needed for satisfactory identification of river-crossing equipment.

g. In reporting river-crossing equipment, especially of foreign armies, it is difficult to identify by specific model number what is seen. The best way to report is to describe the equipment in detail.

Figure 3-5 shows standard Army bridges which you should compare against civilian bridges in Figure 3-6, both of which can be used for military activity.

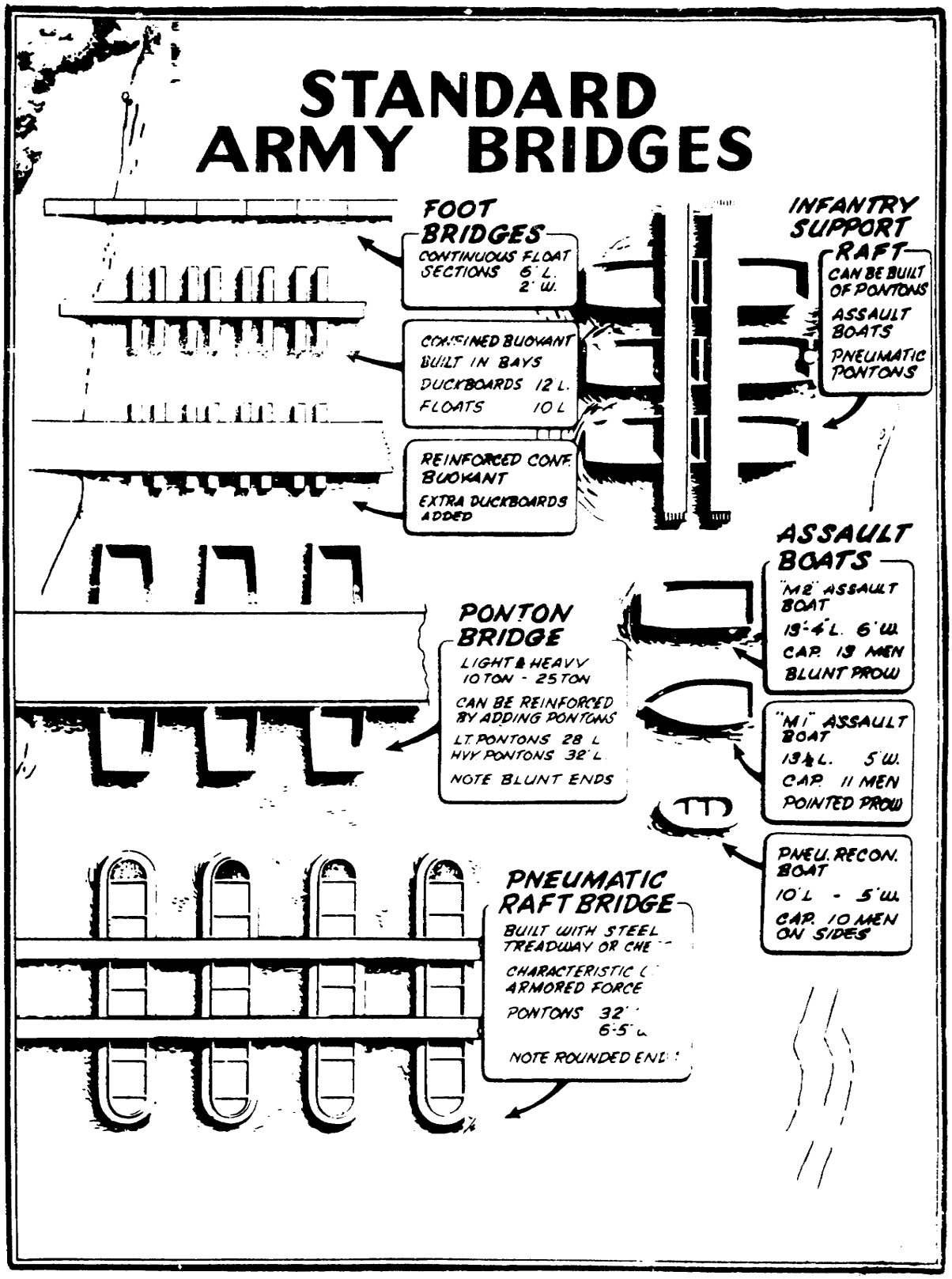

STANDARD ARMY BRIDGES
FOOT BRIDGES
CONTINUOUS FLOAT SECTIONS 6' L. 2' W.
COMBINED BUOYANT
BUILT IN BAYS
DUCKBOARDS 12' L.
FLOATS 10' L
REINFORCED CONF. BUOYANT
EXTRA DUCKBOARDS ADDED
INFANTRY SUPPORT RAFT
CAN BE BUILT OF PONTONS
ASSAULT BOATS
PNEUMATIC PONTONS
ASSAULT BOATS
"M2" ASSAULT BOAT
19'-4" L. 6' W.
CAP. 13 MEN
BLUNT PROW
"M1" ASSAULT BOAT
13½ L. 5' W.
CAP. 11 MEN
POINTED PROW
PNEU. RECON. BOAT
10' L - 5' W.
CAP. 10 MEN ON SIDES
PONTON BRIDGE
LIGHT & HEAVY
10 TON - 25 TON
CAN BE REINFORCED BY ADDING PONTONS
LT PONTONS 28' L
HVY PONTONS 32' L
NOTE BLUNT ENDS
PNEUMATIC RAFT BRIDGE
BUILT WITH STEEL TREADWAY OR CHE
CHARACTERISTIC
ARMORED FORCE
PONTONS 32'
6-5'
NOTE ROUNDED END

Figure 3-5

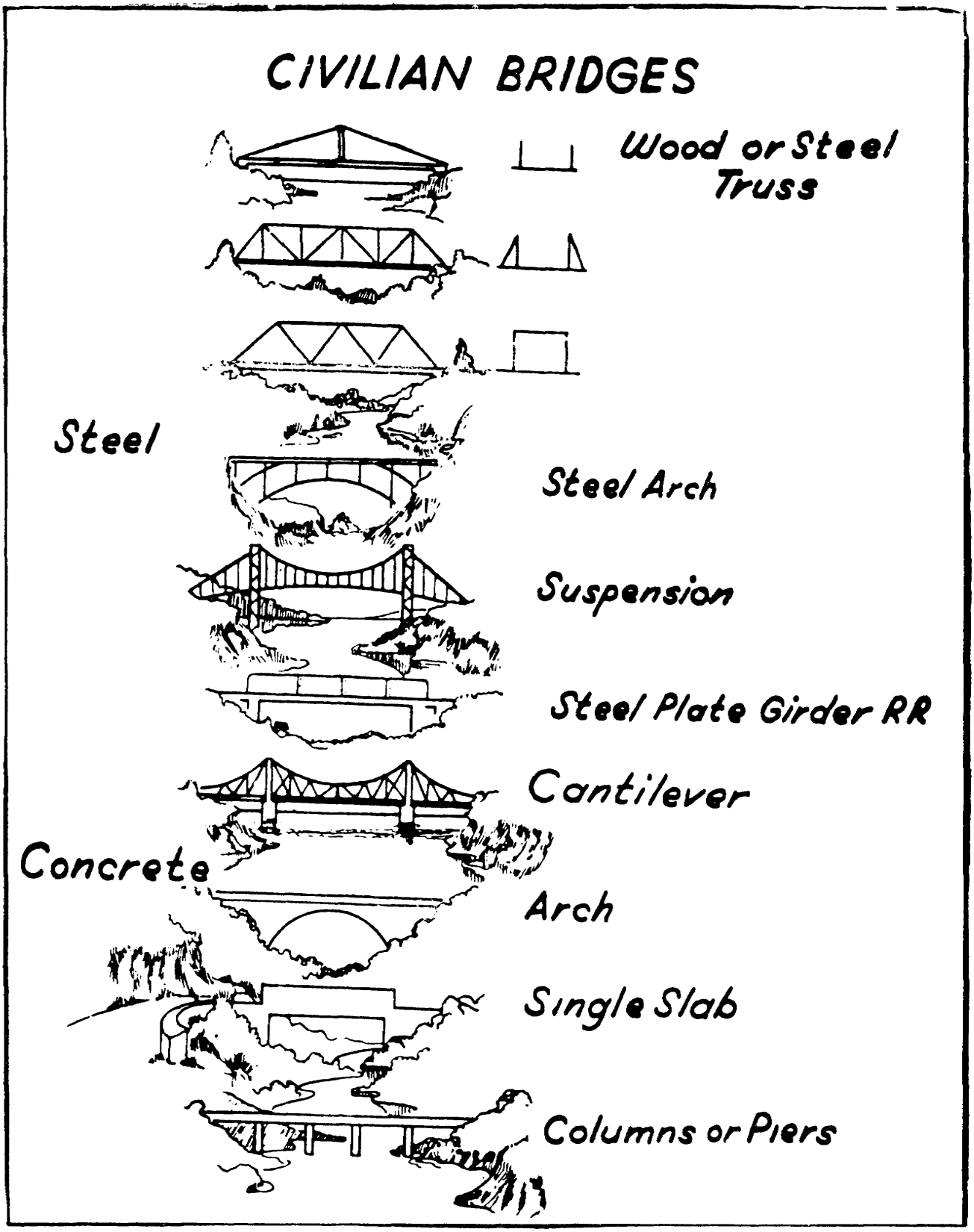

CIVILIAN BRIDGES
Wood or Steel Truss
Steel
Steel Arch
Suspension
Steel Plate Girder RR
Cantilever
Concrete
Arch
Single Slab
Columns or Piers

Figure 3-6

h. A close study of Figure 3-7, Photo B, reveals no signs of activity except tracks in the fields adjoining woods. Concealment has been affected entirely by use of natural cover. Sketch A shows the amount and approximate location of vehicles and equipment. If the enemy knew this was a pontoon company, a river-crossing would be suspected at once because the river is less than a half mile away.

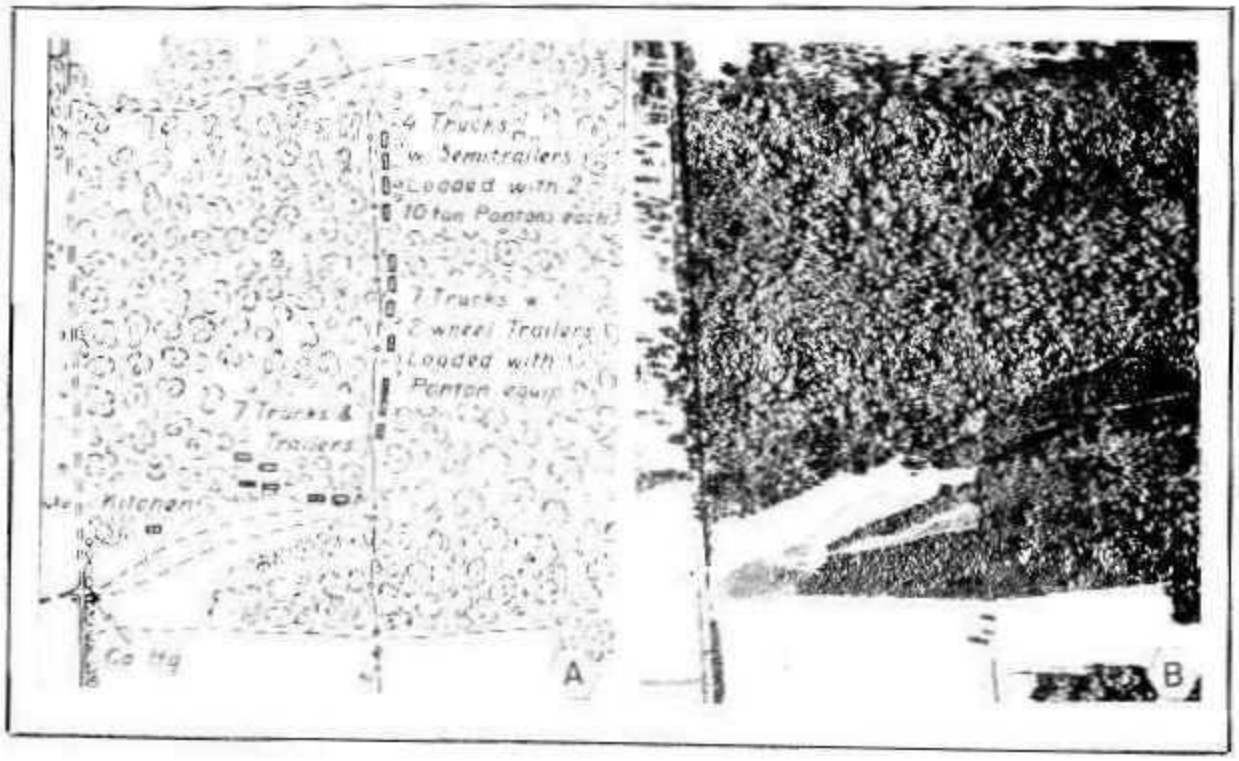


Figure 3-7. An Engineer Light Pontoon Company in Bivouac.

13. Other Studies. IAs are called upon to make detailed studies of just about anything, such as:

a. Drop zones and helicopter landing zones.

b. Airfields and railways.

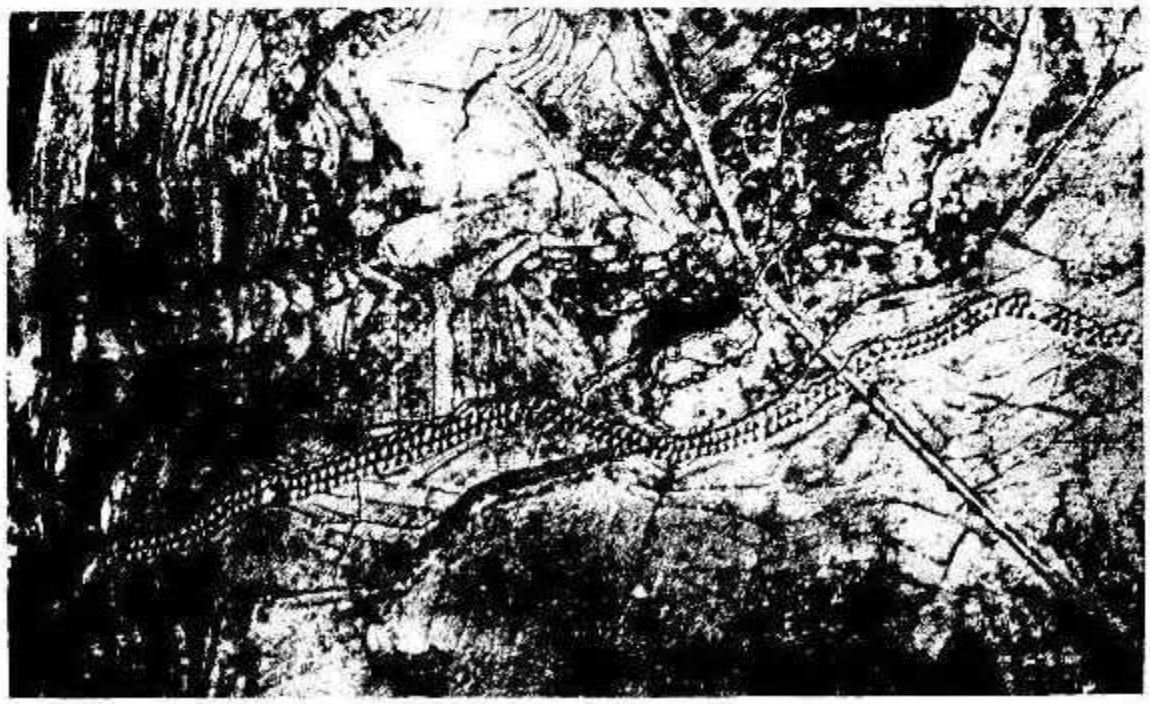
c. Bomb damage assessments.

d. Targeting.

14. These types of studies are usually accomplished at a strategic-level unit where time is not so critical. Figure 3-8 through 3-13 are examples of jobs performed by IAs.

a. Figure 3-8 is an example of a comparative study, showing an area in which an antitank ditch and other enemy fortification have been constructed, thus indicating an increased capability to defend the area.

5 OCTOBER 1951



22 JUNE 1952

Figure 3-8. Comparative Study.

b. Figure 3-9 is an annotated photo which illustrates how aerial photographs might be used to select and designate daylight patrol routes.

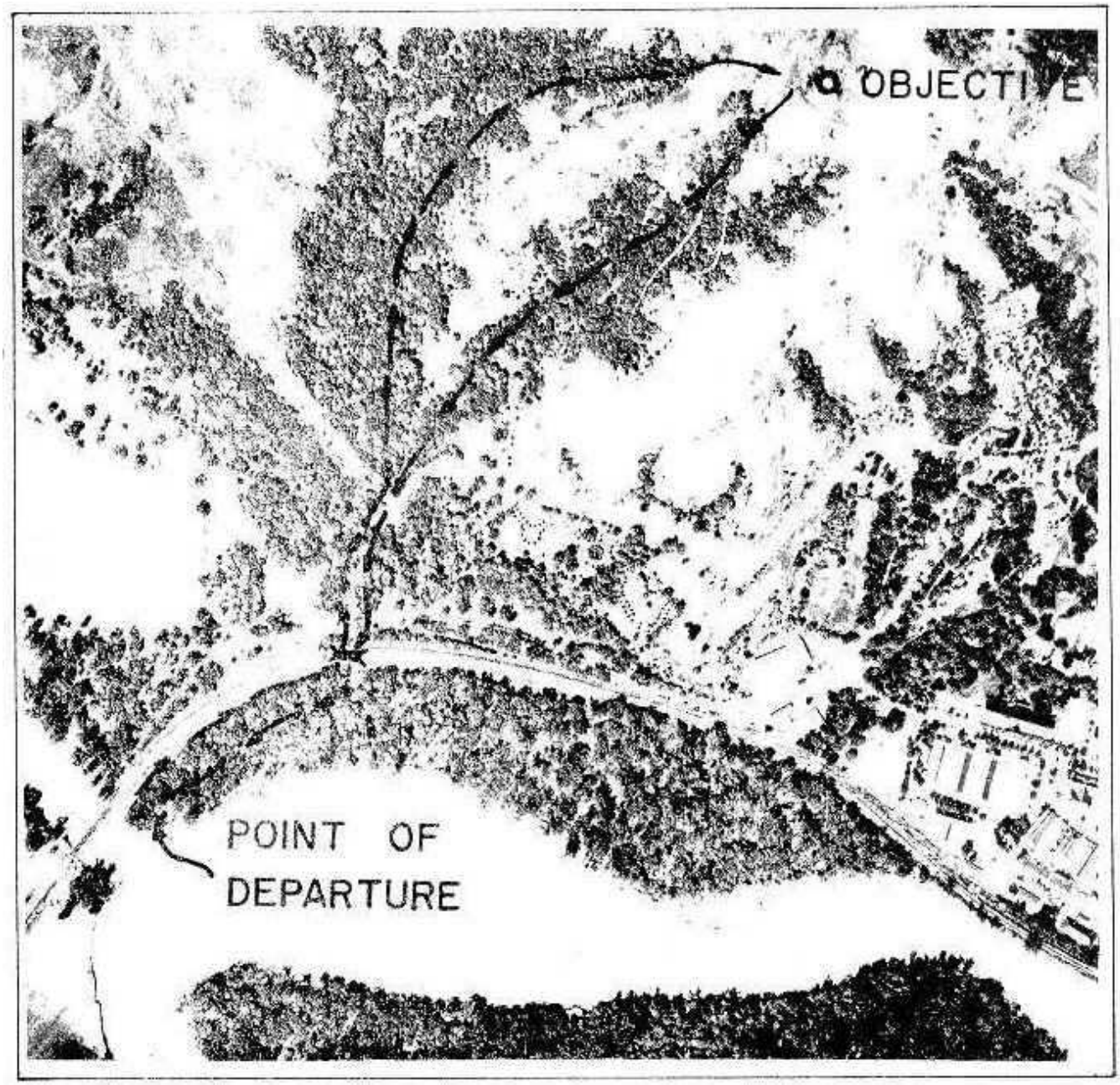


Figure 3-9. Daylight Patrol Route Study.

c. Figure 3-10 contains a drop zone study.

Figure 3-10. Drop Zone Study.

d. Figure 3-11 depicts pre strike and post-strike photography which illustrates the use of aerial photographs in the assessment of damage by friendly air, artillery, or ground weapons.

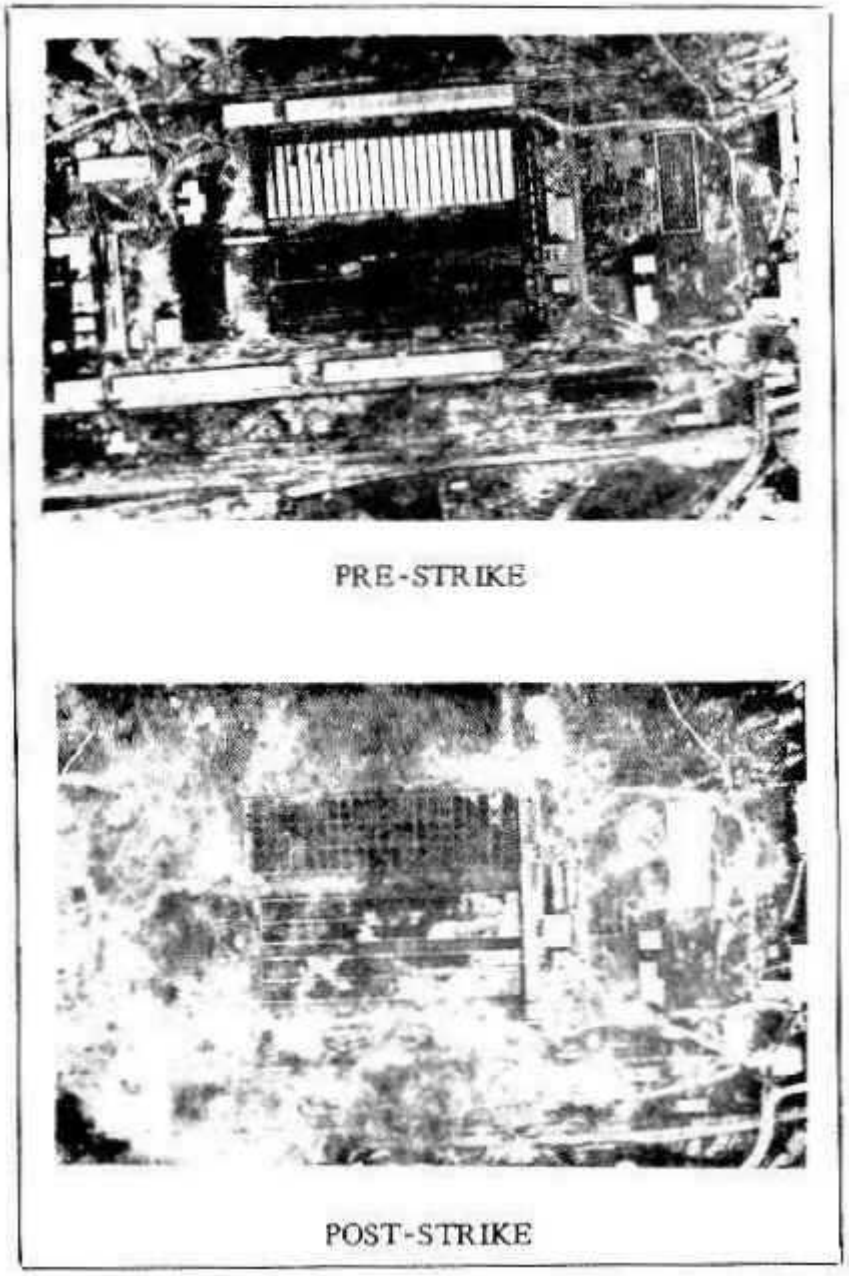


Figure 3-11. Damage Assessment.

e. Static defense studies are performed to analyze continuous fieldworks which are protected by barbed wire. Figure 3-12 shows a stereogram with fieldworks constructed in conjunction with caves and trenches. Annotation A shows a trench system, B depicts cave openings, and C shows cave openings for weapons. Collateral intelligence reports will aid the IA in analyzing the fortifications.

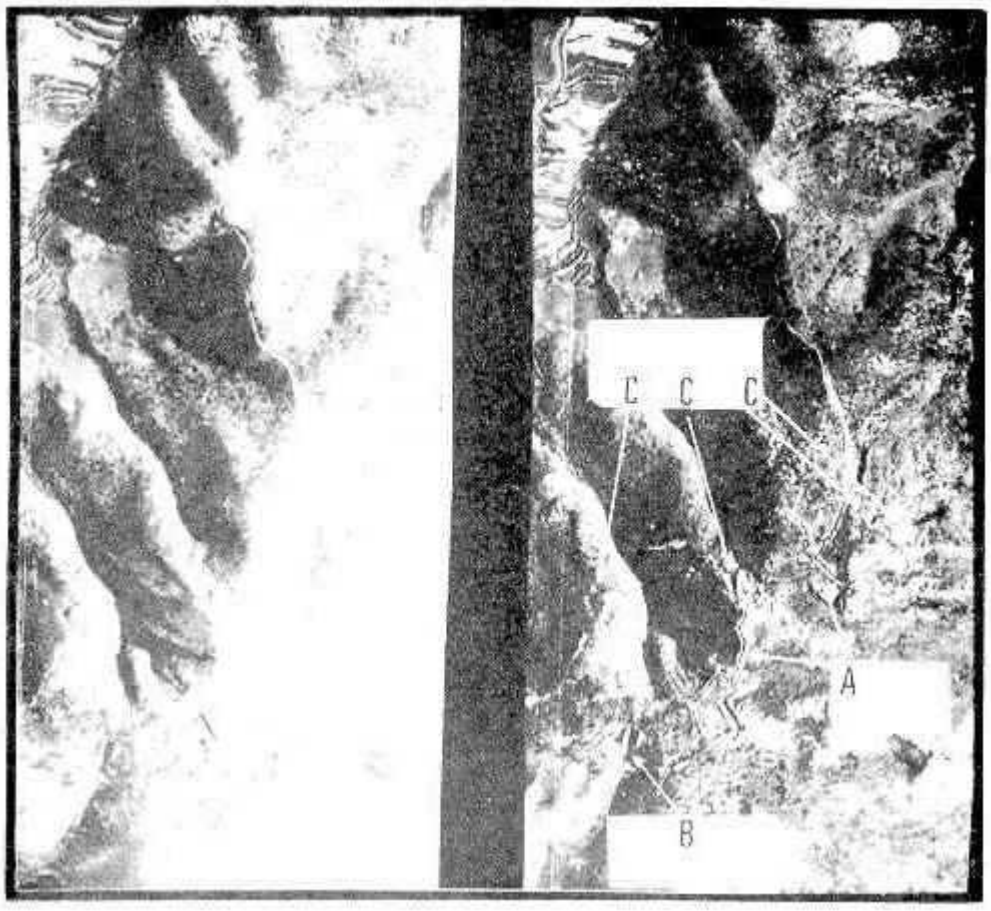


Figure 3-12. Caves and Trench System.

f. Figure 3-13 illustrates the use of photography in designating assembly areas, assault positions, departure lines, and objective.

Figure 3-13. Study for Assembly Areas.

PART B; IMAGERY ANALYSIS REPORTS

1. This part of the lesson will introduce you to imagery analysis reports. Regardless of how effective or sophisticated our surveillance systems and organizations become, or how expert the IA may be, all are wasted if the IA cannot disseminate the collected information in a usable form to the requester and to other interested agencies.

2. Imagery analysis reports provide the IA with a simple, uniform means of relaying intelligence to an action agency. Wherever the IA is used, he will be required to prepare these reports and disseminate them.

3. Imagery analysis results must be transmitted to the requester in a timely manner to be of intelligence value. Reporting times are based on priorities assigned to the R&S missions, the commander's PIR, and the urgency for follow-up air and artillery strikes. The following reports and reporting times (Table 3-1) are used. The reports are compatible with the reporting requirements established in STANAG 3377, and US Message Text Format (USMTF). Your unit's SOP will establish which format you will use for reporting. An example of each format will be shown. For a more detailed explanation of USMTF refer to ACCP IT 0667, and for STANAG 3377 format see IT 0687.

Table 3-1. Reports and Reporting Times.

Reports	Reporting times
In-Flight Report (INFLIGHTREP) (Figure 3-14)	During the mission.
Reconnaissance Exploitation Report (RECCEXREP) (Figure 3-15)	To the external transmission point within 45 minutes after engine shutdown (ESD).
Initial Programed Interpretation Report (IPIR) (Figure 3-16)	As soon as possible (ASAP) but no later than (NLT) four hours after ESD to the external transmission point.
Supplemental Programed Interpretation Report (SUPIR) Figure-16)	ASAP after the IPIR.
Radar Exploitation Report (RADAREDREP) (Figure 3-17)	To the serving message center or dedicated net within 45 minutes after ESD.

4. The purpose of the INFLIGHTREP is to provide the ground commander with tactical information sighted by the pilot or air crew while in flight. This information is of such an importance and urgency that if delayed by normal debriefing and other imagery analysis reporting requirements it would negate the usefulness of the information and possibly hamper his unit's combat effectiveness or survivability. The INFLIGHTREP is transmitted by secure voice broadcast. The IA is not normally responsible for this report unless assigned as aerial observer. However, the INFLIGHTREP must be integrated into other imagery analysis reports when analyzing imagery.

a. The following STANAG 3377 message format is used for the INFLIGHTREP (Figure 3-14):

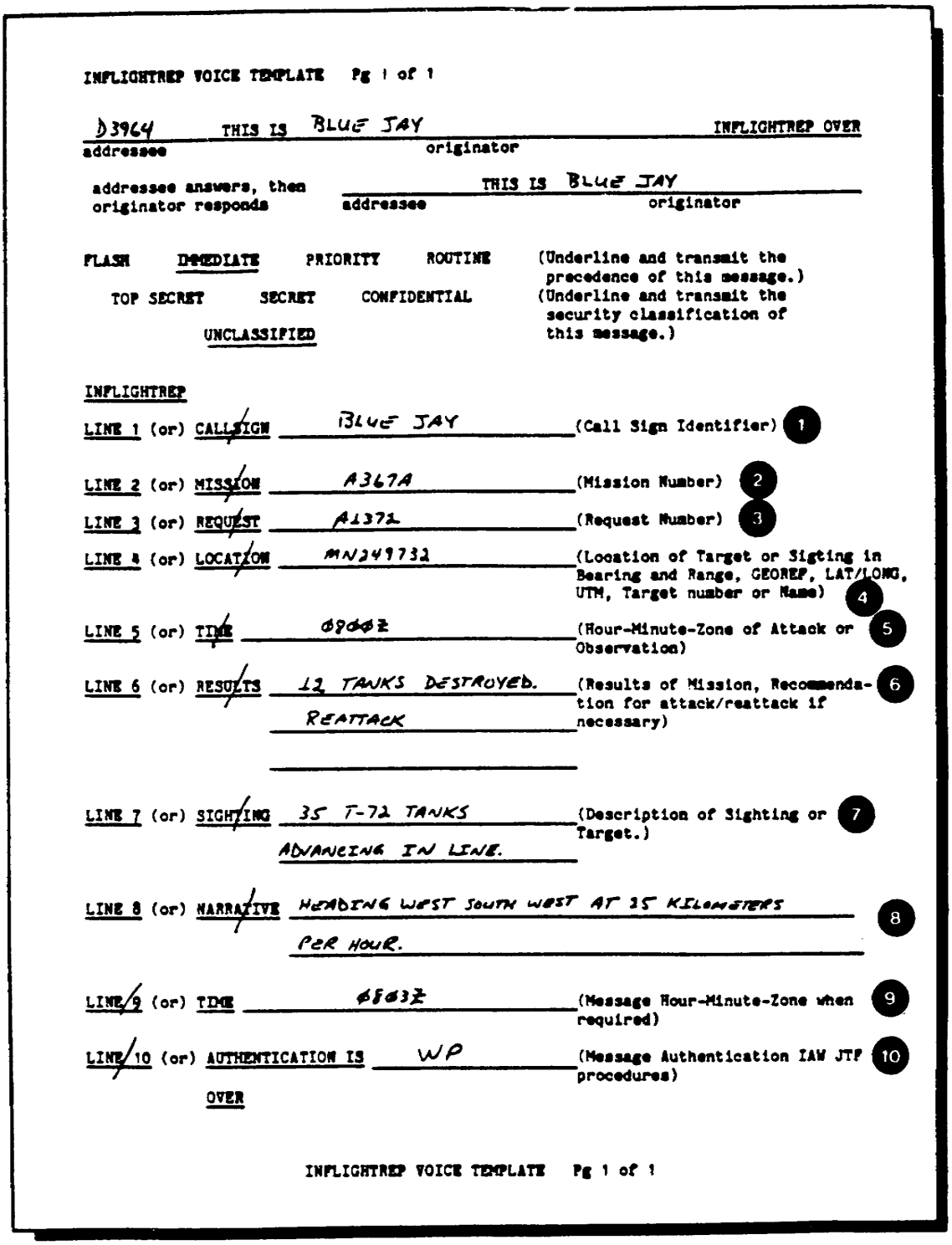
FORMAT	EXAMPLE MESSAGE
INFLIGHTREP	
AIR TASK/MISSION NUMBER	INFLIGHTREP
A. LOCATION IDENTIFIER	2/G/321
B. TIME ON TARGET/TIME	ALPHA: KZ 1234
OF SIGHTING	BRAVO: 1500Z
C. RESULTS	CHARLIE: 15 X TANKS MOVING NORTH
	ON ROAD

Figure 3-14. STANAG 3377 Format.

b. Message preparation and interpretation of the INFLIGHTREP in USMTF format is a fairly simple process as outlined in Figure 3-15. Unless otherwise specified or directed, the INFLIGHTREP will contain only 10 items of concern. Only one of the first three items is required (call sign, mission, request); however, any combination is authorized. Additionally, the security classification and the precedence should be underlined. A completed INFLIGHTREP is shown in Figure 3-16.

EX	ITEM	EXPLANATION
		NOTE: Underline the message security classification and precedence. Use standard radio-telephone procedure (ACP125) to transmit the message.
		NOTE: You only need to use one of the first 3 lines (CALLSIGN, MISSION, or REQUEST).
1	LINE 1 CALLSIGN	Enter the call sign of the aircraft
2	LINE 2 MISSION	Enter the mission number of the mission being flown.
3	LINE 3 REQUEST	Enter the request number that is being supported.
4	LINE 4 LOCATION	Enter the location of the sighting or target in Bearing and Range, GEOREF, LAT/LONG, UTM, Target Number, or Name.
5	LINE 5 TIME	Enter the hour, minute and time zone of the attack or sighting.
6	LINE 6 RESULTS	Enter the results of the mission and/or any recommendation for attack or reattack.
7	LINE 7 SIGHTING	Enter a brief description of the sighting or target activity.
8	LINE 8 NARRATIVE	Enter any additional information about the sighting or target.
9	LINE 9 TIME	Enter the hour, minute and time zone designator for the message time or origin.
10	LINE 10 AUTHENTICATION IS	Enter the appropriate authentication code(s) for this message if authentication is required. Authentication will be in accordance with joint task force procedures.

Figure 3-15. INFLIGHTREP Preparation Instructions.



INFLIGHTREP VOICE TEMPLATE Pg 1 of 1

D3964 THIS IS BLUE JAY INFLIGHTREP OVER
addressee originator

addressee answers, then originator responds: addressee THIS IS BLUE JAY originator

FLASH IMMEDIATE PRIORITY ROUTINE (Underline and transmit the precedence of this message.)

TOP SECRET SECRET CONFIDENTIAL UNCLASSIFIED (Underline and transmit the security classification of this message.)

INFLIGHTREP

LINE 1 (or) CALLSIGN BLUE JAY (Call Sign Identifier) 1

LINE 2 (or) MISSION A367A (Mission Number) 2

LINE 3 (or) REQUEST A1372 (Request Number) 3

LINE 4 (or) LOCATION MN249732 (Location of Target or Sigting in Bearing and Range, GEOREF, LAT/LONG, UTM, Target number or Name) 4

LINE 5 (or) TIME 090Z (Hour-Minute-Zone of Attack or Observation) 5

LINE 6 (or) RESULTS 12 TANKS DESTROYED. REATTACK (Results of Mission, Recommendation for attack/reattack if necessary) 6

LINE 7 (or) SIGHTING 35 T-72 TANKS ADVANCING IN LINE. (Description of Sighting or Target.) 7

LINE 8 (or) NARRATIVE HEADING WEST SOUTH WEST AT 25 KILOMETERS PER HOUR. 8

LINE 9 (or) TIME 0803Z (Message Hour-Minute-Zone when required) 9

LINE 10 (or) AUTHENTICATION IS WP (Message Authentication IAW JTF procedures) 10

OVER

INFLIGHTREP VOICE TEMPLATE Pg 1 of 1

Figure 3-16. Completed INFLIGHTREP.

5. The RECCEXREP informs the requester of the results obtained from a aerial R&S mission. If further analysis of the imagery reveals additional significant items, another RECCEXREP must be immediately transmitted. Sightings from the pilot and air crew previously reported in the INFLIGHTREP and or derived from the debriefing must be included; these sightings should be confirmed on the imagery whenever possible (Figure 3-17).

a. The RECCEXREP in STANAG format is preceded by a message heading, for example:

FROM: CDR, 588TH MI DET (IA) KILROY AFB/
TO : CDR, XXTH CORPS/FIELD LOCATION/G2 AIR/
INFO: CDR, 22ND INF DIV/FIELD LOCATION/CM&D/

FORMAT	EXAMPLE MESSAGE
CLASSIFICATION	UNCLASSIFIED
RECCEXREP (always start of message)	RECCEXREP
AIR TASK/MISSION NUMBER/ ORIGINATOR'S REQUEST SERIAL NUMBER	2/T/123/
A. LOCATION IDENTIFIER (target number/designator/or coordinates)	A. 155 LC 751342/
B. TIME ON TARGET/TIME OF SIGHTING	B. 231600Z/
C1. RESULTS (enter target category) (See table 1-2 on page 52.)	C1. CAT 06/
	1. ARMOR/
	2. BEING POSITIONED TO FIR WEST/
	3. 4X M60 TANKS/
	4. NIL/
C2. FURTHER REPORT MAY FOLLOW YES/NO	C2. YES/
D1. OTHER INFORMATION	D1. CONCENTRATED LAA FROM ARE 2 KM SOUTH OF TARGET/
D2. WEATHER	D2. 0081X/
D3. IMAGERY CONFIRMED YES/NO	D3. YES/
E. SENSOR TYPE AND EXPOSURE NUMBERS	E. L0001-0030/
F. QUALITY AND SCALE OF IMAGERY (Use National Imagery Interpretation Rating Scale (NIIRS).)	F. 4/VARIES/
G. PERCENT OF COVER	G. 100/
END OF MESSAGE	EOM

Figure 3-17. RECCEXREP.

b. Preparation of a RECCEXREP in USMTF is a detailed process involving numerous options of message content. DA Pam 25-7 authorizes tailoring of message content to best suit your unit's needs or missions. This report is used to provide an abbreviated imagery intelligence report to the requester. Figure 3-18 is extracted from DA PAM 25-7 and explains the procedure for a RECCEXREP in USMTF. Figures 3-19 and 3-20 are examples of a RECCEXREP in USMTF Joint Message Form and Voice Template.

ANNEX 118 TO CHAPTER 3
RECONNAISSANCE EXPLOITATION REPORT (RECCEXREP)

1. GENERAL

The RECCEXREP is used to provide an abbreviated imagery interpretation report format for tactical reporting.

Use the IIR to make routine reports to major command levels.

2. MESSAGE MAP

EXER/exercise name/additional identifier//
OPER/operation name/plan originator & number/option name/2d option name//
MSGID/RECCEXREP/originator/message serial number/month/qualifier
/qualifier serial number//
REF/serial letter/(jintaccs message short title) or (type of reference)/originator
/date-time group/message serial number/special notation/nasis code//
AMPN/free text to explain preceding reference set//
NARR/free text to explain preceding reference sets//
MISSNID/mission type/unit name/unit serial number/project identifier code
/imagery mission number/mission date//
ITEM/item number/target name/be number/CAT: target category
/CTY: country of sighting/national tasking indicator//
LOC/GEO: location in geographic coord/UTM: location in utm coord//
TOT/day-time on target/time camera on/time camera off//
NARR/free text//
TARWI/low cloud cover/low cloud base height/surface visibility/weather conditions
/weather remarks//
IMDAT/image type/sensor position/image number/scale/scale size
/percent of coverage/major weather/other weather//
DECL/downgrading instructions//
NOTE: MISSNID, MITEM, LOC, TOT, and NARR are Mandatory.

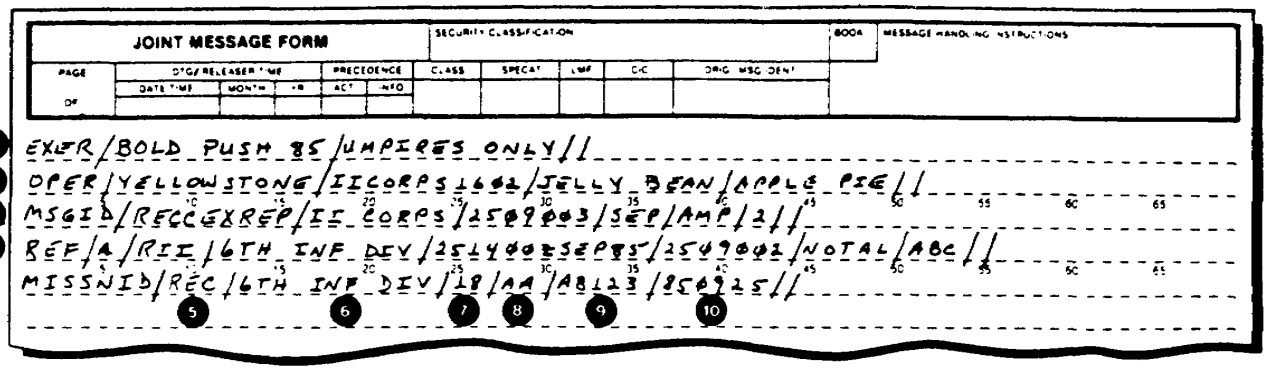
3. ENTRY LISTS

The RECCEXREP uses the following Entry Lists:

LIST NR	TITLE
11	Location
59	Country Code
107A	Mission Type
564	Sensor Position

Figure 3-18. RECCEXREP USMTF Explanation.

FX	SET NAME FIELD NAME	CAT s f	NR OF CHAR	EXPLANATION
				NOTE: The initial sets (EXER, OPER, MSGID, REF) are described briefly below. See Annex 1 for complete details.
				NOTE: Do not use both EXER and OPER in the same message. If there is no exercise or operation do not use either
1	EXER	c		
	exer name	m	1-56ANBS	Enter the exercise name.
	add id	o	1-16AB	Enter the additional exercise identifier.
2	OPER	c		
	oper name	m	1-32ANBS	Enter the operation name.
	plan orig & number	o	3-23ANS	Enter the headquarters originating the plan and the plan number.
	option name	o	1-23ANBS	Use these two fields to enter code names
	2d option	o	1-23ANBS	for options within the operations plan.
3	MSGID	m		
	title	m	9A	Enter RECCEXREP
	originator	m	1-20ANBS	Enter unit name of message originator.
	serial nr	o	1-7ANBS	Enter message serial number.
	month	o	3A	Enter first 3 letters of the month.
	qualifier	o	3A	Enter qualifier code.
	qlf serial	o	1-3N	Enter qualifier serial number.
4	REF	o r		Use this set to reference other messages.
	serial letter	m	1A	Enter letter A for the first message you reference, B for the second etc.
	msg title or ref type	m	1-20ANBS	Enter the JINTACCS message short title OR one of the following codes for other types of references: CON DOC LTR RMG TEL VMG. (Add a free text set to explain.)
	originator	m	1-20ANBS	Enter unit name of reference originator.
	dtg	m	6-12AN	Enter date-time group of reference.
	serial nr	o	1-7ANBS	Enter serial number of the reference.
	special not	o	5A	Enter PASEP or NOTAL.
	nasis code	o r	3A	FOR NATO USE ONLY. Enter the NASIS code for message subject matter.

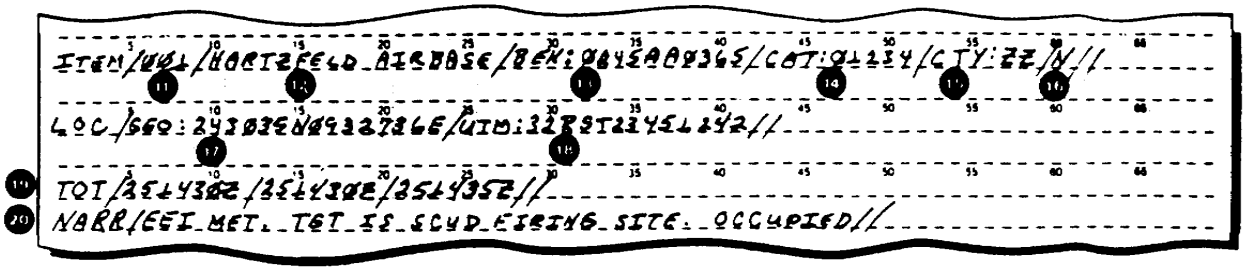


EX	SET NAME FIELD NAME	CAT s f	NR OF CHAR	EXPLANATION
	AMPN NARR	c c		You must use a free text set to explain the reference if it is not a JINTACCS message.
				NOTE: Remember you can add free text sets throughout the message. See chapter 2, section. VI for free text instructions
	MISSNID	m		Use this set to name the mission that got the information for this report.
5	type	m	2-5AN	Enter the code for mission type. **ENTRY LIST 107A**
6	agency	m	1-20ANBS	Enter the name of the unit or agency that requested the mission.
7	serial number	o	1-3N	Enter the serial number that the unit assigned to the request.
8	project code	m	2A	Enter the 2-letter project identifier code IAW DIAM 57-5-1 and DIAM 58-2. If more than one mission is used, enter "MI" (mission independent).
9	mission nr	m	1-7ANBS	Enter the number assigned to the mission.
10	mission date	o	6N	Enter 2 digits each for the year, month, day of the imagery mission.

Figure 3-18. (continued).

EX	SET NAME FIELD NAME	CAT s f	NR OF CHAR	EXPLANATION
				NOTE: Sets ITEM through IMDATA are a repeated segment. Repeat them as a group to report more than one target. You must repeat the sets in their original order. You must include the mandatory sets in each repetition.
	ITEM	m		Use this set to report item information.
11	item nr	m	3N	Enter the item number.
12	target name	m	1-38ANBS	Enter the BE installation name. If the name includes a slash mark (/), enter a hyphen (-) instead. If the BE installation is not listed in available documents, make up a name. The name you make up should include the place name and a special feature or function of the installation (IAW DDM-2600-312-80 (Target Intelligence Handbook)).
13	be number	o		Enter the BE number in one of the following ways:
	BEN:		10AN	For suspect installations enter the field name followed by the BE number. **ENTRY LIST 11** TABLE 1 COL B
	or			OR
	BEN:		10ANS	Enter the field name followed by the BE number. **ENTRY LIST 11** TABLE 1 COL A
	or			OR
	TBE:		10AN	Enter the field name followed by the transitory BE number. **ENTRY LIST 11** TABLE 1 COL E
	or			OR
	IBE:		10AN	Enter the field name followed by the field initiated BE number. **ENTRY LIST 11** TABLE 1 COL C
	or			OR
	ABE:		10ANS	Enter the field name followed by the area BE number. **ENTRY LIST 11** TABLE 1 COL D
14	CAT:	o	5N	Enter the field name and then the 5-digit code for target category IAW DIAM 65-3-1.
15	CTY:	o	2A	Enter the field name and then the 2-letter code for country of sighting or event. **ENTRY LIST 59**
16	national tasking	o	1A	Enter Y (yes) or N (no) to show if the target is tasked by national authorities.

Figure 3-18. (continued).



EX	SET NAME FIELD NAME	CAT s f	NR OF CHAR	EXPLANATION
	LOC	m		Use this set to report target location. You must use one of the fields in this set.
17	GEO:	c	15AN	Enter the field name, then Lat/Long (sec). **ENTRY LIST 11**
18	UTM:	c	11-13AN	Enter the field name, then UTM (10m or 100m) **ENTRY LIST 11**
				NOTE: For side-looking radar (SLR) missions, make entries in the narr set to report the start and end of a target or area of activities and on off times.
19	TOT	m		Use this set to report the time over target and camera on and off times.
	time on target	m	7AN	Enter 2 digits each for the day, hour, and minute followed by "Z" for Zulu time.
	camera on	o	7AN	Enter the time as for time on target.
	camera off	o	7AN	Enter the time as for time on target.
20	NARR	m		Use this set to report theater unique category codes, target status, mission results, target description or remarks, and OB information. Also, use this set to tell if the EEIs are satisfied and if a follow-on report is required.

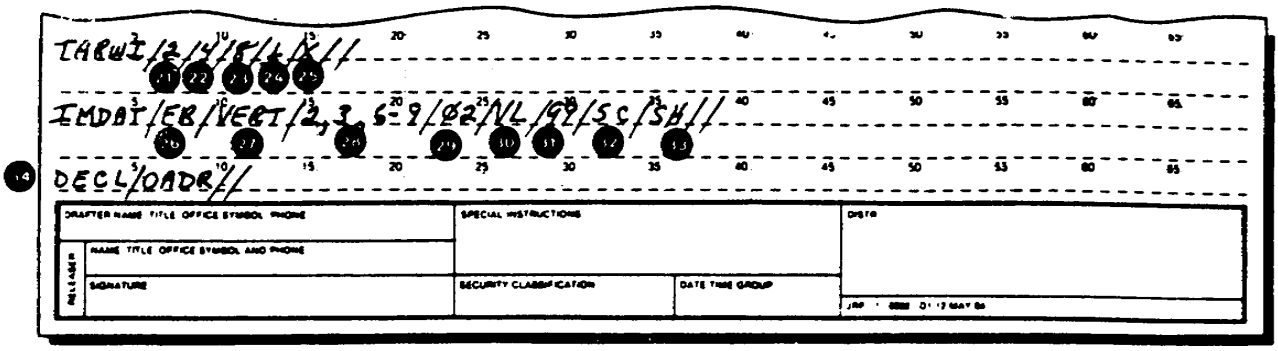
3-118-5

Figure 3-18. (continued).

EX	SET NAME FIELD NAME	CAT s f	NR OF CHAR	EXPLANATION
	TARWI	o		Use this set to report the general weather conditions in the area of the imagery mission. Use the RMKS set to report weather conditions for targets whose weather is different from the general report.
21	low cloud cover	m	1N	Enter the amount of cloud cover of the lower layer of clouds, in eighths (0-7), overcast low clouds (8) or not observed (9).
22	low cloud base hgt	m	1N	Enter the code to show the cloud base height of the lower cloud level. HEIGHT / CODE / HEIGHT / CODE No low clouds Ø — 2500 ft. 5 500 ft. or less 1 — 3000 ft. 6 1000 ft. 2 — 3500 ft. 7 1500 ft. 3 — 4000 ft. 8 2000 ft. 4 — Not observed 9
23	surface visibility	m	1N	Enter the code to show surface visibility. DISTANCE / CODE / DISTANCE / CODE under 1km Ø — 5 - under 6km 5 1 - under 2km 1 — 6 - under 7km 6 2 - under 3km 2 — 7 - under 8km 7 3 - under 4km 3 — 8km or more 8 4 - under 5km 4 — Not reported 9
24	weather conditions	m	1N	Enter the code for the major weather conditions at the target. WEATHER / CODE / WEATHER / CODE Not observed Ø — Drizzle 5 No significant weather 1 — Rain 6 Sleet/hail 2 — Snow 7 Dust/smoke/sand 3 — Showers 8 Fog/haze 4 — Thunderstorms 9
25	weather remarks	m	1A	Enter remarks code for weather. ENTRY LIST 45

3-118-6

Figure 3-18. (continued).



EX	SET NAME FIELD NAME	CAT s f	NR OF CHAR	EXPLANATION
	IMDAT	o		Use this set to report imagery data.
26	image type	o	2A	Enter the code to report image type. IMAGE TYPE — CODE: Frame Photography FR; Side-Looking Radar SL; Thermal Infrared TI; Forward-Looking Radar FL; Radar RD; Infrared IR; Electro-Optical EO; Optical OP; High Resolution Radar HR
27	sensor position	o	1-4AN	Enter the code for sensor position. ENTRY LIST 564
28	image nr	o	1-14ANS	Enter the image number(s). If you have more than one image, enter the number of the best image first. Use a comma to separate image numbers. Use a hyphen to separate the first and last numbers of a group of images. Example: 500, 490-510. No one image number may have more than 5 digits.
29	inter	o		Enter one of the following:
			2N	Enter the National Imagery Interpretation Rating Scale (NIIRS) or National Radar Interpretation Scale (NRIS) number.
				OR
			1A	Enter one of the following codes: INTERPRETABILITY — CODE: Excellent E; Good G; Fair F; Poor P

Figure 3-18. (continued).

EX	SET NAME FIELD NAME	CAT s f	NR OF CHAR	EXPLANATION
30	scale size	o	1-2A	Enter the code for the imagery scale size. SIZE — CODE — SCALE Very large — VL — 1:4999 and larger Large — L — 1:5000 to 1:9999 Medium — M — 1:10000 to 1:24999 Small — S — 1:25000 to 1:49999 Very small — VS — 1:50000 and smaller
31	part cover	o	1-3N	Enter the percent of coverage of the target.
32	weather	c	2A	You must use this field if you did not use set TARWI (for US only). Enter the code to report the major weather condition at the target location. WEATHER — CODE — WEATHER — CODE Clear — CL — Heavy clouds — HC Scattered clouds — SC — Haze — HA Noise — NS
33	other weather	o	2A	Enter the code for other weather conditions that had an effect on the imagery over the target. WEATHER — CODE — WEATHER — CODE Snow — SN — Blurred Image — BL Shadow — SH — Terrain Masking — TR Degrading Obliquity — OL — Heavy Smoke/Dust — HD Semidarkness — SD — Rain — RN
34	DECL	c		If the message is classified, use this set to enter declassification or downgrading instructions.
	inst	m	1-25ANBS	Enter the instructions in one of the following ways: INSTRUCTIONS — ENTER Declassify — date or event Downgrade to CONFIDENTIAL — DG(C), then date or event Downgrade to SECRET — DG(S), then date or event Originating Agency's Determination Required — OADR

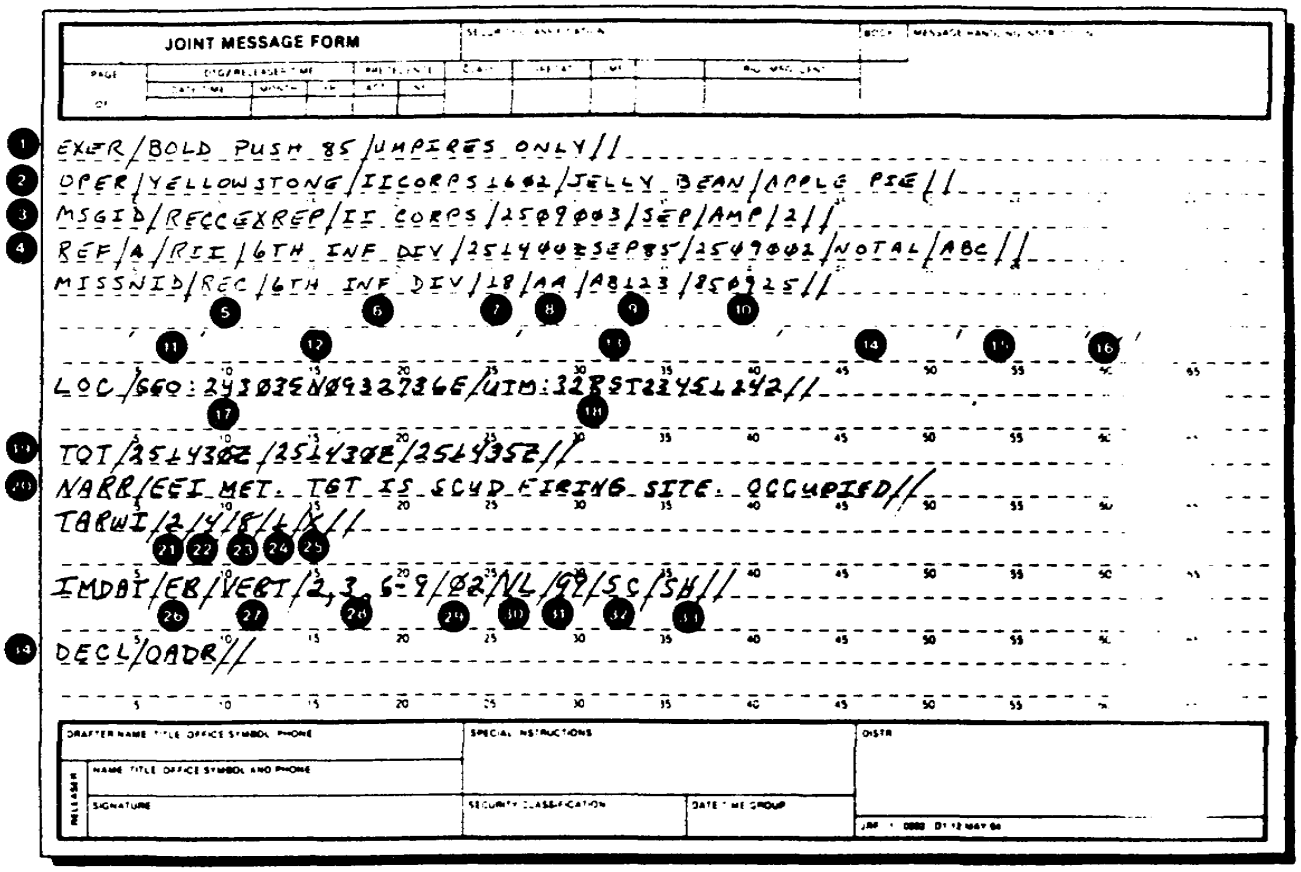


Figure 3-19. Joint Message Form RECCEXREP.

RECCEXREP VOICE TEMPLATE Pg 1 of 2

F6 THIS IS F6Z RECCEXREP OVER
addressee originator

addressee answers, then originator responds THIS IS F6Z
addressee originator

FLASH IMMEDIATE PRIORITY ROUTINE (Underline and transmit the procedure of this message.)

TOP SECRET SECRET CONFIDENTIAL (Underline and transmit the security classification of this message.)

CLEAR UNCLASSIFIED

RECCEXREP

LINE 1 (or) SERIAL	2509003	(Report Serial Number)
LINE 2 (or) REQUEST	18	(Requestor Identification and Serial Number)
LINE 3 (or) PROJECT	AA	(Project Identifier Code)
LINE 4 (or) MISSION	2509046	(Mission Number)
LINE 5 (or) DATE	890925	(Mission Date, Year, Month, Day)
LINE 6 (or) ITEM	1	(Item Number)*
LINE 7 (or) NAME	HARZFELD AIRBASE	(Target Name or Description)
LINE 8 (or) Number	ABCD X ABC	(BE Number, IBE Number, ABE Number, or TBE Number)
LINE 9 (or) LOCATION	32UMV123456	(Location of Sighting in LAT/LONG or UTM)
LINE 10 (or) TIME	1430Z	(Time of Sighting, Day-Hour-Minute-Zone)
LINE 11 (or) STATUS	OCCUPIED	(Status of Activity/Target)
LINE 12 (or) COUNT	1	(Count of OB Items)
LINE 13 (or) TYPE	SSM	(Type of OB Items)

RECCEXREP VOICE TEMPLATE Pg 1 of 2.

Figure 3-20. RECCEXREP Voice Template.

RECCEXREP VOICE TEMPLATE Pg 2 of 2

LINE 14 (or) NARRATIVE OCCUPIED SCUD FIRING SITE

LINE 15 (or) TIME 1445Z (Message Hour-Minute-Zone when required)

LINE 16 (or) AUTHENTICATION IS CF (Message Authentication IAW JTF procedures)

OVER

RECCEXREP VOICE TEMPLATE Pg 2 of 2

Figure 3-20 (concluded).

6. IPIR is a detailed analysis of the imagery mission designed to answer specific PIR or other information requirements as indicated by the requester. The IPIR is prepared only when specifically requested by the requester or when further analysis of the mission reveals additional information not previously reported in the RECCEXREP or second RECCEXREP (Figure 3-22).

7. SUPIR is a detailed report providing information not previously included in the IPIR. A SUPIR is prepared on targets such as industries, rail yards, airfields, and so on, when specifically requested or when supplemental information is required (Figure 3-21). IPIR and SUPIR have the same STANAG format.

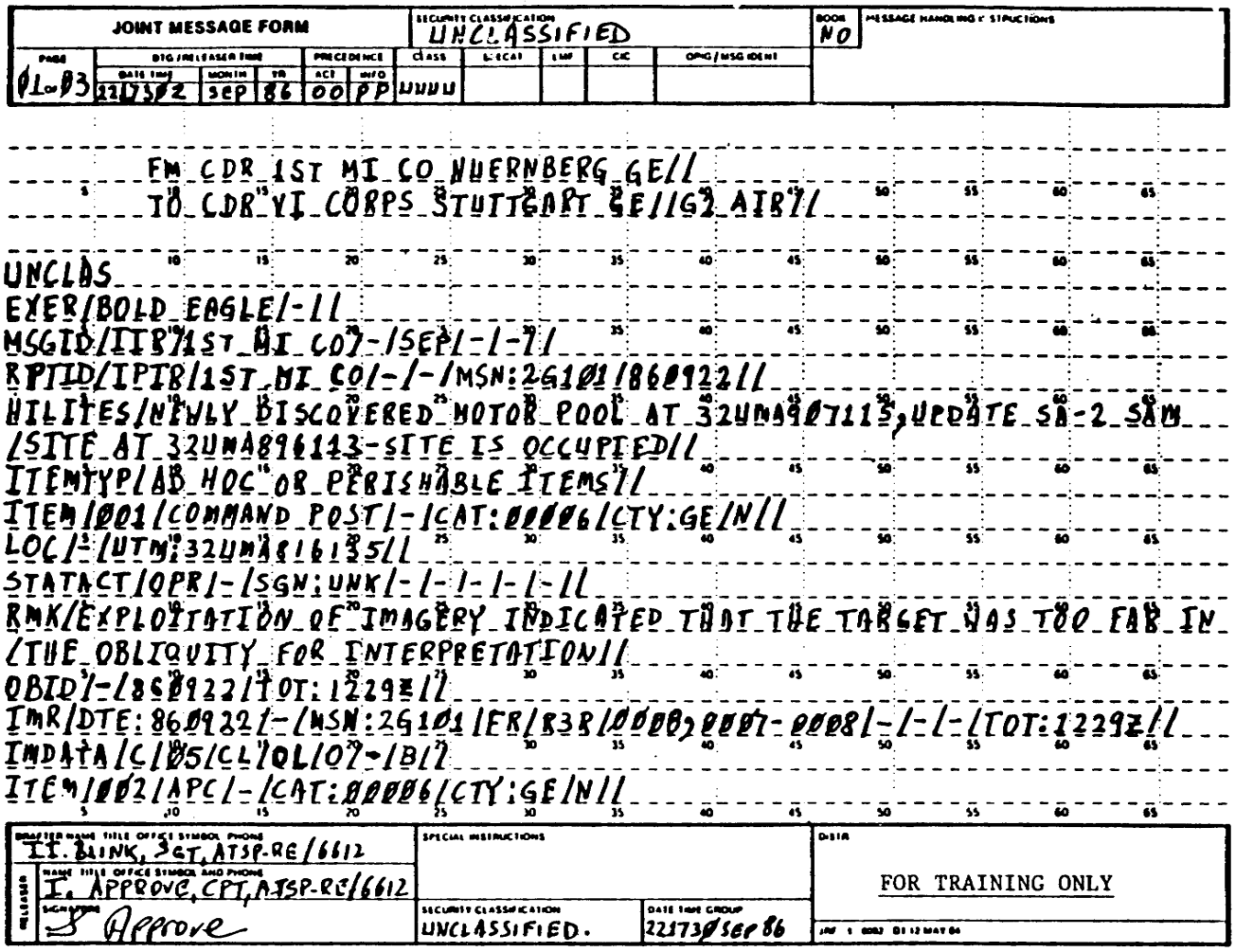
FORMAT	EXAMPLE MESSAGE
CLASSIFICATION	UNCLAS
IPIR/SUPIR (always start of the) message)	IPIR
A. AIR TASK/MISSION NUMBER/ORIGI-NATOR'S REQUEST SERIAL NUMBER	2/A/456/
RESULTS (use only applicable sections)	
PART I. MISSION HIGHLIGHTS	PART I/ ONE NEW SA-2 SITE OBSERVED/
PART II. SIGNIFICANT RESULTS	PART II/
A. PERISHABLE ITEMS	A. NTR/
B. NEW ITEMS	B. TARGET 1: CAT 02/18YLC127345/ 161230Z/L0016-0023/ 1. 5A - MISSILE SITE/PERM/ 2. OCCUPIED/ SERVICEABLE 3. 4 X MOBILE LAUNCHERS/ 4. 2 X ZU-23 AA WEAPONS WITHIN SITE/ 5. 1 X STRAIGHT FLUSH RADAR/ 6. 6 X PERM LAUNCH AREAS/ REVETED/CIRCULAR/ TARGET 2: CAT 01/LD4056/ 161250Z/L0027/

Figure 3-21. IPIR/SUPIR.

C. CHANGE AND ORDER OF BATTLE	C. UPDATE/AOB TO 6 X FORMAT X FISHBED/
D. BONUS ITEMS	D. NTR/
E. DAMAGE ASSESSMENT	E. TARGET 4: CAT 12/LD5075/ 161300Z/L0040/TWO CENTER SPANS DESTROYED/
PART III. OTHER RESULTS	PART III/
A. ADDITIONAL ITEMS	A. NTR/
B. IDENTIFICATION ONLY ITEMS	B. NTR/
PART IV. MISSION COLLECTION RESULTS	PART IV/
A. COLLECTOR'S OBJECTIVES	A. NTR/
B. COLLECTOR'S OBJECTIVES NOT	B. CAT 06/LD1437/161330Z/ CAMERA MALFUNCTION/
END OF MESSAGE	EOM

Figure 3-21. IPIR/SUPIR (concluded).

8. The imagery interpretation report (IIR) is a single message format which is used to report an IPIR, or SUPIR in USMTF. The IIR/IPIR is designed to provide results of first phase exploitation of imagery. It is formatted to allow direct data base entry and human readability. The IIR/IPIR can report single or multi-mission data. The IIR/SUPIR is designed to provide results of second phase exploitation of imagery. It is formatted to allow direct data base entry and human readability. The IIR/SUPIR can report single or multi-mission data. See Figure 3-22 for an example of IIR in USMTF.



JOINT MESSAGE FORM

SECURITY CLASSIFICATION: UNCLASSIFIED

BOOK: NO

MESSAGE HANDLING INSTRUCTIONS

PAGE	DTG/RELEASER TIME			PRECEDENCE		CLASS	LOCAT	LMF	CIC	OPNL/MSG IDENT
	DATE TIME	MONTH	YR	ACT	INFO					
01 of 03	221752Z	SEP	86	OO	PP	UUUU				

FM CDR 1ST MI CO NUERNBERG GE//
TO CDR VI CORPS STUTTGART GE//G2 AIR//

UNCLAS
EXER/BOLD EAGLE/-//
MSGID/IIR/1ST MI CO/-/SEP/-/-//
RPTID/IPIR/1ST MI CO/-/-/MSN:2G101/860922//
HILITES/NEWLY DISCOVERED MOTOR POOL AT 32UNA907115, UPDATE SA-2 SAM
/SITE AT 32UNA896113-SITE IS OCCUPIED//
ITEMTYP/AD HOC OR PERISHABLE ITEMS//
ITEM/001/COMMAND POST/-/CAT:00006/CTY:GE/N//
LOC/-/UTM:32UNA816135//
STATACT/OPR/-/SGN:UNK/-/-/-/-/-//
RMK/EXPLOITATION OF IMAGERY INDICATED THAT THE TARGET WAS TOO FAR IN
/THE OBLIQUITY FOR INTERPRETATION//
OBID/-/860922/TOT:1229Z//
IMR/DTE:860922/-/MSN:2G101/FR/R3R/00008,0001-0008/-/-/-/TOT:1229Z//
IMDATA/C/05/CL/QL/07-/B//
ITEM/002/APC/-/CAT:00006/CTY:GE/N//

DRAFTER NAME TITLE OFFICE SYMBOL PHONE: LT. BLINK, SGT, ATSP-RE/6612

RELEASER

NAME TITLE OFFICE SYMBOL AND PHONE: I. APPROVE, CPT, ATSP-RE/6612

SIGNATURE: I Approve

SPECIAL INSTRUCTIONS

SECURITY CLASSIFICATION: UNCLASSIFIED.

DATE TIME GROUP: 221730Z Sep 86

DTIR

FOR TRAINING ONLY

Figure 3-22. IIR in USMTF.

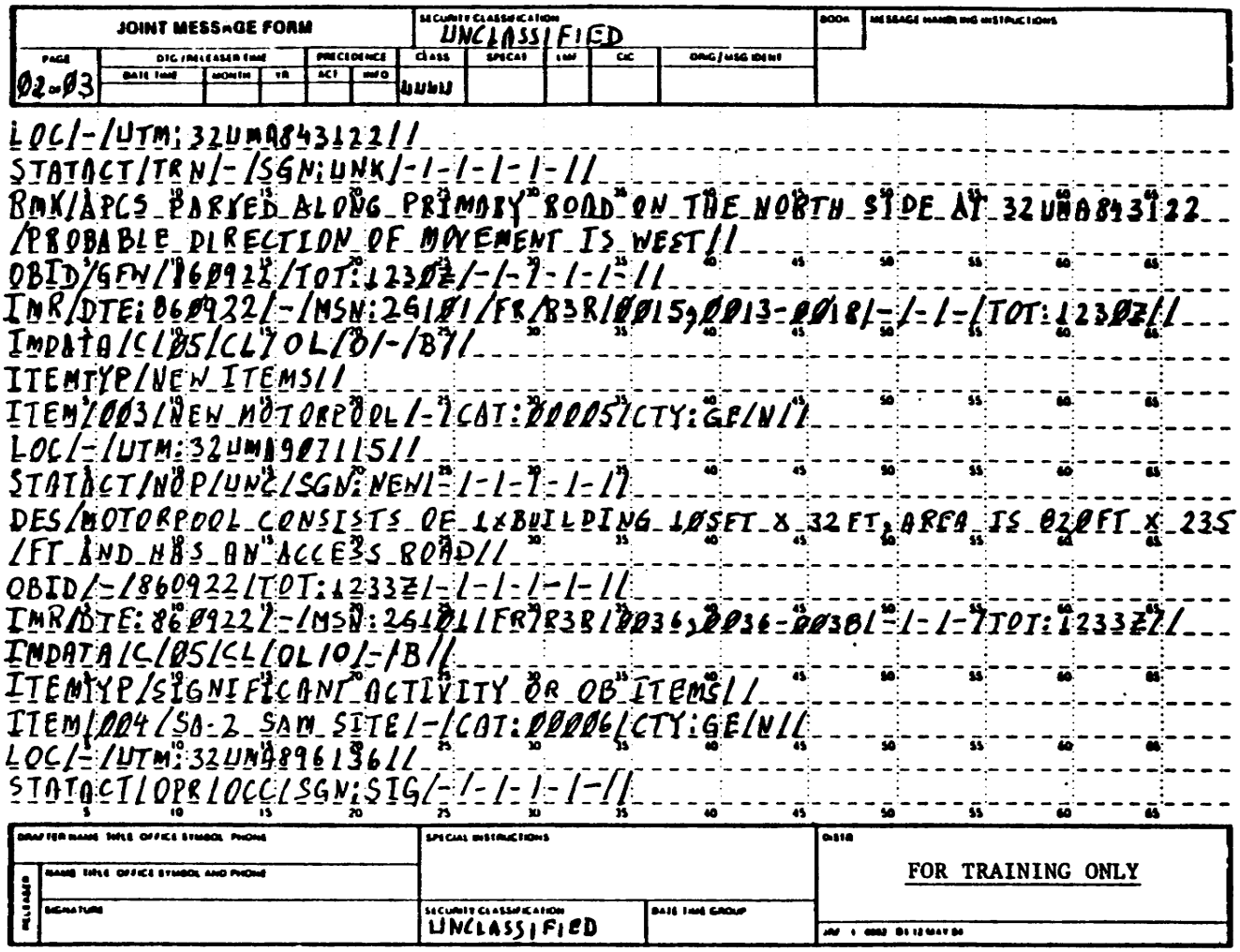


Figure 3-22. (Continued).

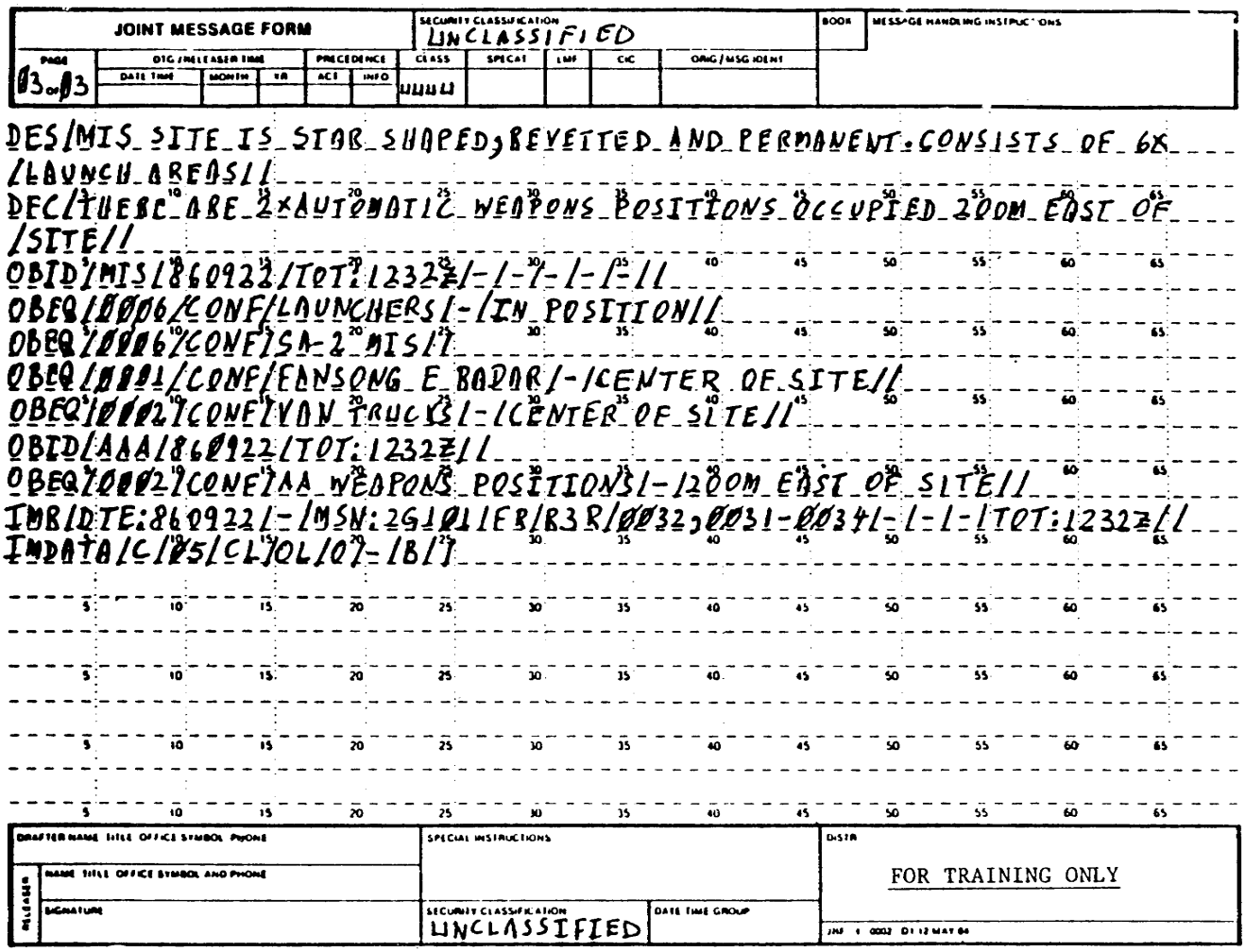


Figure 3-22. (Concluded)

9. The RADAREXREP informs the requester of the results obtained from a radar reconnaissance mission. The imagery is analyzed and reported by the IA. If further analysis of the imagery reveals additional significant items, a supplemental RADAREXREP should be transmitted as soon as possible o correct or amplify the original report. The following standard message RADAREXREP is used (Figure 3-23):

FORMAT	EXAMPLE MESSAGE
CLASSIFICATION	UNCLAS
RADAREXREP	RADAREXREP
AIR TASK/MISSION NUMBER/ORIGI-NATOR'S REQUEST SERIAL NUMBER	2/G/510/
A. LOCATION IDENTIFIER	A. 12UKC754321/
B. TIME ON TARGET/TIME OF SIGHTING	B. 231800Z MAY 83/
C. RESULTS	C. CAT 06/12 X POSS M-60 TANKS IN LINEAR PATTERN/ 50 M SPACING/
FURTHER REPORT MAY FOLLOW YES/NO	NO
D1. OTHER INFORMATION	D1. CREW ERROR/
D2. WEATHER	D2. 8118Z/
E. SENSOR TYPE AND EXPOSURE NUMBERS	E. SLAR R 0001/0002/
F. QUALITY AND SCALE OF IMAGERY	F. 4/1:250,000/
G. PERCENTAGE OF COVER	G. 60/
EOM	EOM

FIGURE 3-23. RADAREXREP Format.

NOTE: In USMTF the RADAREXREP is just part of the RECCEXREP.

LESSON 3

PRACTICE EXERCISE

The following items will test your grasp of the material covered in this lesson. There is only one correct answer to each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, study again that part of the lesson which contains the portion involved.

1. If the enemy is moving heavy engineer equipment forward (road maintenance and river-crossing equipment) it is an indication of what type of operations?

   A. Withdrawal.

   B. Reinforcement.

   C. Offensive.

   D. Defensive.

2. Where is AAA usually found?

   A. In the open.

   B. In wooded areas.

   C. Dug into hills.

   D. Inside houses.

3. Where are bivouac areas usually located?

   A. In valleys.

   B. In wooded areas.

   C. In open areas.

   D. On hilltops.

4. What feature is of primary importance when identifying a radio transmitting station?

   A. Location.

   B. Surroundings.

   C. Antenna masts.

   D. Buildings.

5. What is the usual length-width ratio of a wheeled vehicle?

   A. 1 to 1.

   B. 1 to 2.

   C. 1 to 3.

   D. 3 to 1.

6. Where are trenches usually constructed?

   A. Along a stream.

   B. High ground.

   C. Low ground.

   D. In a valley.

7. What scale of photography is necessary to identify personnel on aerial photography?

   A. Small-scale.

   B. Medium-scale.

   C. Large-scale.

   D. Any scale.

8. Which report is used to inform the requester on industries?

   A. RADAREXREP.

   B. USMTF.

   C. INFLIGHTREP.

   D. SUPIR.

9. Which report is used to inform the requester of radar results using USMTF?

   A. SUPIR.

   B. RADAREXREP.

   C. RECCEXREP.

   D. IPIR.

LESSON 3

PRACTICE EXERCISE

ANSWER KEY AND FEEDBACK

Item	Correct Answer and Feedback
1.	C. Moving of engineer equipment forward is an offensive indication (page 99, para 12a).
2.	A. AAA is usually found in the open (page 95, para 7).
3.	B. Bivouac areas are usually found in wooded areas which provide good cover and concealment (page 97, para 9).
4.	C. Antenna masts are of primary importance in analyzing radio communication installations (page 98, para 10).
5.	D. The usual length to width ratio of wheeled vehicles is 3 to 1 (page 93, para 5c).
6.	B. One of the major characteristics of trenches is that they are constructed on high ground [page 91, para 4a(1)].
7.	C. Personnel can be identified on large scale aerial photos (page 90, para 2a).
8.	D. A SUPIR is prepared on targets such as industries (page 129, para 7).
9.	C. In USMTF radar results are part of the RECCEXREP (page 134, note).