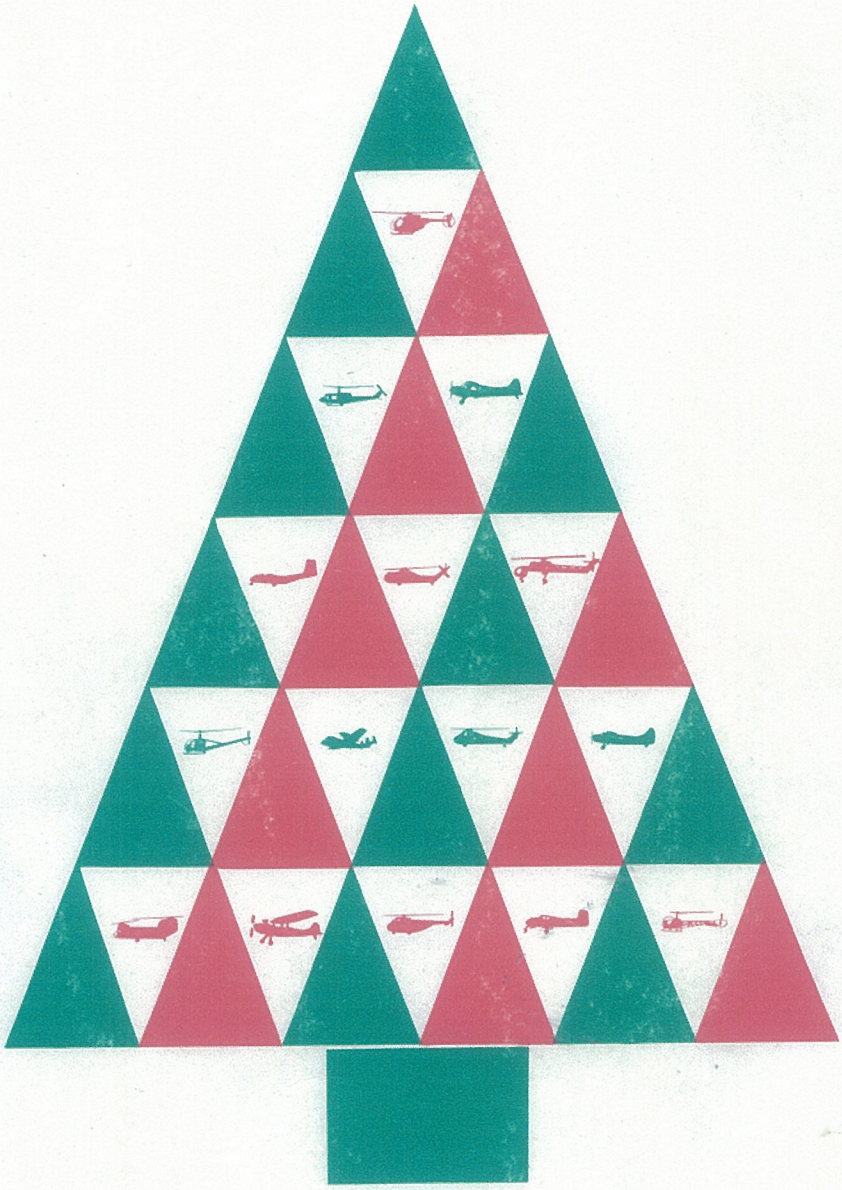
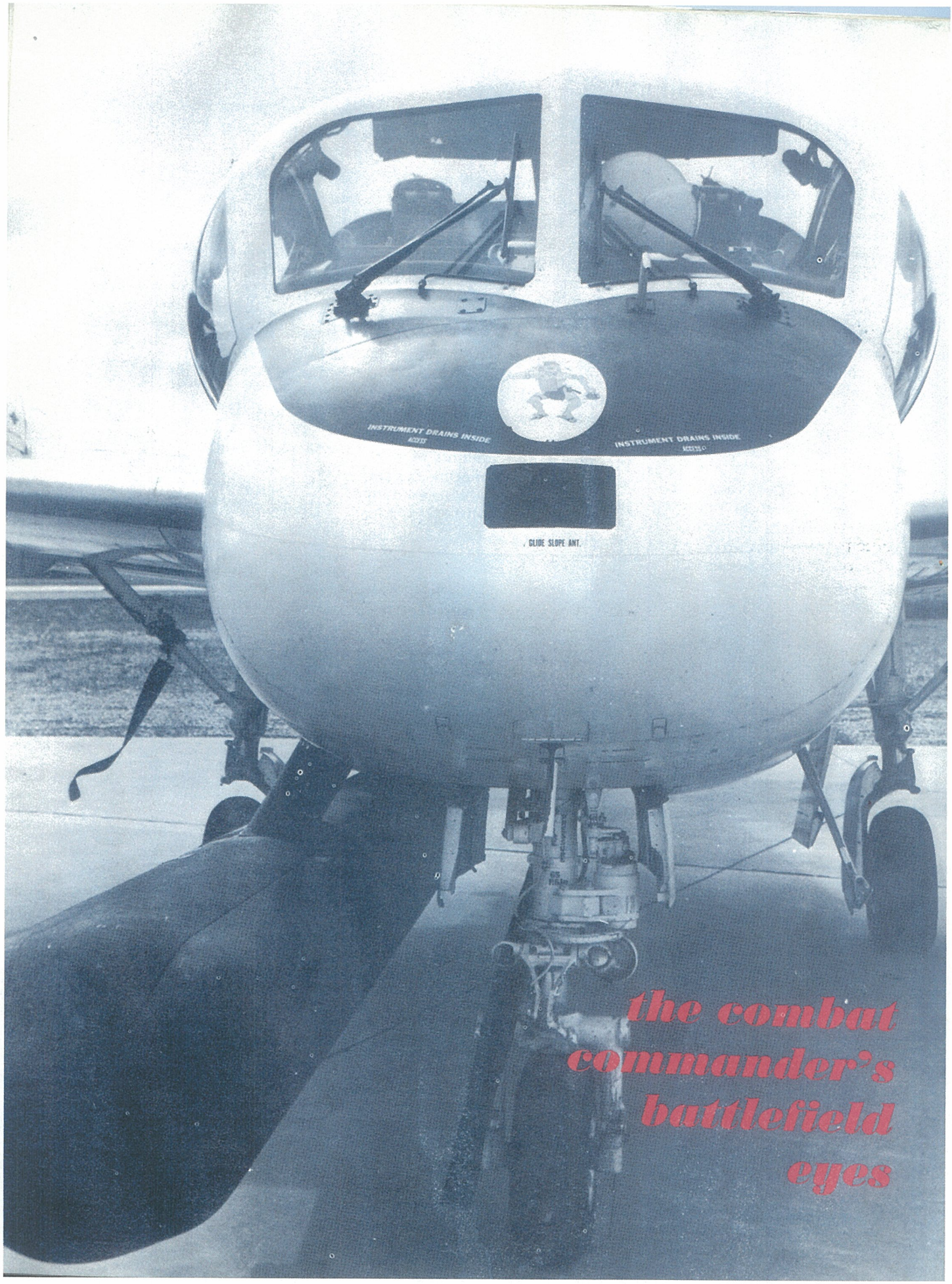
UNITED STATES ARMY DECEMBER 1965

AVIATION DIGEST





the combat commander's battlefield eyes

Airborne Surveillance

Major James R. Barkley

IT WAS 0200. Steady rain drummed on the tent as the division G-2 and his G-2 Air studied the situation map. The opposing enemy armored division was deployed at the outskirts of a small town several miles to the north. The front had been quiet for three days except for considerable patrol activity. An attack by the enemy division had been expected for the past two days. The G-2 was certain that the attack would come before dawn.

Anticipating that the division would begin movement within the next three hours, the G-2 had directed that a continuous radar surveillance of the enemy division be conducted, using the OV-1B aircraft of the Airborne Surveillance and Target Acquisition (ASTA) Platoon. Employing the radar inflight processor, the sensor operator was able to continuously monitor the activities of the division while operating several kilometers behind his own "lines."

0200—Mohawk sensor operator had reported to the G-2 Air that the enemy division had not yet made any large scale move. Usual small random traffic was noted and reported.

0225—The Mohawk sensor operator reported a sudden increase in moving targets.

0230—G-2 Air had requested the immediate takeoff of an OV-1C infrared (ir) equipped aircraft. The pilot was ordered to proceed to a point just behind the forward edge of the battle area (FEBA) and hold pending further instructions.

0245—OV-1B sensor operator reported a considerable increase in traffic converging on two main arteries heading westward.

0246—The circling OV-1C was given a heading which would take the aircraft to a small town on the southern artery being used by the attacking force and several kilometers west of the lead column.

0253—OV-1C sensor operator reported that he had passed over the town at low altitude and was turning eastward to follow the highway.

0257—Now at slightly higher altitude, the OV-1C passed over a column of enemy tanks. The sensor operator reported the contact to the G-2 Air. A ground sensor operator at the ASTA Platoon airstrip also noted the contact; his data transfer system was simultaneously receiving the infrared information from the OV-1C. Four minutes later the OV-1C pilot broke off his ir surveillance run, banked to the left and headed north to pick up the second main highway.

The OV-1B, side looking airborne radar (SLAR) aircraft, meanwhile maintained a long range watch over the progress of the two columns from its standoff position behind the FEBA.

By 0310, less than 45 minutes from initial detection, the G-2 had established that the enemy had launched a major attack led by at least 50 tanks. Detection had been accomplished at night under extremely poor weather conditions. It was the result of carefully planned employment of a system organic to all divisions in the field.

A field commander's requirement for timely, accurate information regarding the strength, disposition, and activity of enemy forces is indisputable. Without it he is unable to use his own forces effectively. This requirement exists through the entire spectrum of war, from armed insurrection to all-out nuclear conflict.

TACTICAL SURVEILLANCE REQUIREMENTS

An ideal battle area surveillance system would keep the field commander informed of all enemy activity—everywhere, at all times, and in detail. In practice, surveillance is performed by sampling enemy activity—in selected areas, at intervals, in varying detail. In this manner, an adequate amount of information may be pieced together to deduce the enemy's capabilities and probable intentions. Requirements imposed on a tactical surveillance system, then, are to obtain these essential elements of information (EEI) in an orderly manner, in usable form, at minimum risk, and in time for proper action to be taken.

Ultimately the purpose of the EEI is to answer this primary question: What probable plans will the enemy use in attempting to gain the advantage in a particular area of conflict? To answer this question, full or partial answers to the following secondary questions are required.

Is the enemy making an effort to alter the status quo?

If so, what? (Detection)

Where and when? (Location)

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SURVEILLANCE

By whom and with what forces? (Identification)

Does commander have time to react? (Timeliness)

Answers to these questions result in the intelligence required by the field commander to make sound decisions. However, complete, continuous, detailed information may not be required to make a decision. A selective combination of observations will give the desired effectiveness.

The field commander, now aware of the information he needs to determine the enemy's plans, must select techniques for obtaining the information. However, all combinations of coverage and tactics do not yield the same effectiveness. The chart (fig. 1) illustrates the several paths available, the effectiveness of each, and the risk involved in each approach.

Maximum effectiveness can be obtained at very high risk. This is because the tactic employed makes the aircraft highly vulnerable to enemy defenses; however, the same effectiveness, at only moderate risk, can be obtained by using a combination of two tactics. The first tactic involves frequent scanning with SLAR, from behind friendly lines, to detect activity. This is followed by a low-level penetration and popup maneuver, using ir and photographic coverage, to locate and identify the activity. This mode of operation, in addition to reducing the risk involved, provides necessary information in time for evaluation and suitable decisions.

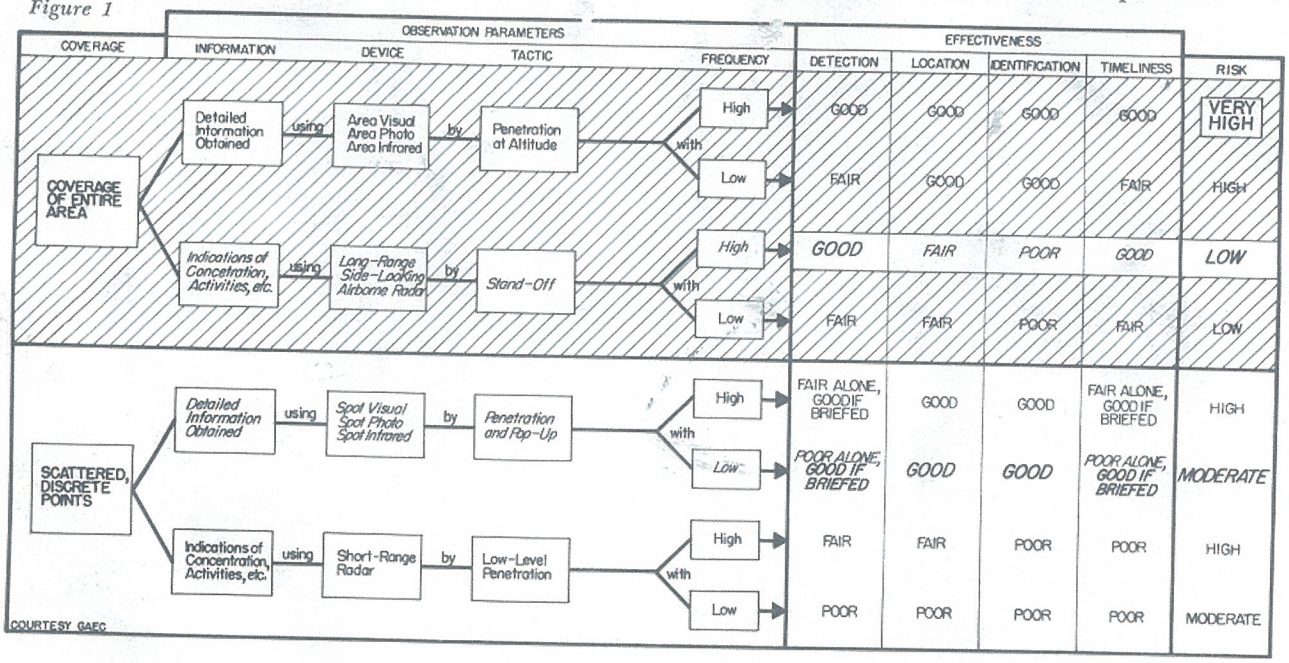
Only airborne intelligence gathering systems can maintain surveillance of a large area around-the-clock in most weather conditions. Though other intelligence gathering media will continue to be used and are necessary to the total effort, the airborne system must provide the bulk of the tactical intelligence.

Modern sensory devices have contributed to the efficiency of the airborne surveillance system. One with a most profound implication is the long range radar with moving target indication (MTI). On a single run across a division front, for example, it is possible to determine in a matter of minutes the activity throughout the entire division area of influence without penetrating the FEBA.

In fair weather, a camera equipped aircraft would be required to take a considerable number of pictures, thereby exposing the aircraft to the enemy's ground defense for a prolonged period. It would also be necessary to return to base, unload the camera, process the film, and perform a considerable amount of photo interpretation and correlation of data to obtain the overall situation that the SLAR equipped aircraft obtained in minutes. In foul weather, the information could not have been obtained within any reasonable time frame by any other method.

Infrared detection equipment in the OV-1C aircraft has the capability of passively producing imagery of excellent resolution either day or night and in some forms of precipitation. It is particularly useful in penetrating haze or smoke and in detecting camouflaged objects. The data transfer system incorporated in the

Figure 1



The objective of surveillance is to maintain continuous knowledge of the enemy in a given area of interest.

ir installation permits the infrared imagery to be observed and recorded in a ground station many miles away, limited by radio line of sight, simultaneously with that in the aircraft.

It is important that proper tactics be used to achieve desired effectiveness. It is also important that the system used be capable of performing the maneuvers required. The OV-1 Mohawk system is used in two basic mission profiles—the stand-off mission and the penetration mission.

The stand-off mission (fig. 2) is performed from behind friendly lines. Employment of an OV-1B Mohawk (equipped with SLAR) permits "seeing" into enemy territory. Air survivability is attained because the aircraft is out of range of most enemy air defense weapons.

As it patrols along the FEBA, the aircraft probes deep into enemy territory. The more often a surveillance aircraft passes a given point, the shorter the time between enemy movement and detection. This time is dependent upon the number of aircraft, speed and turning performance of the aircraft, and length of the front being patrolled. For a hypothetical front of 50 kilometers, a Mohawk could make one complete circuit in approximately 15 minutes. Slower speeds require more aircraft to maintain the same frequency of patrol, while faster aircraft tend to overshoot into adjacent division areas and spend more time in the turning maneuver.

The inflight processor-viewer provided with the SLAR permits the radar-observer to see the imagery almost immediately. If indicated he can alert the monitoring intelligence unit to the need for a closer look with a penetration aircraft or for immediate destruction by suitable weapons.

Nap-of-the-earth penetration of the FEBA, usually by an OV-1A or OV-1C aircraft characterizes the penetration mission (fig. 3). Activity reported from the stand-off mission, or other means of intelligence, can be identified or observed with the aircraft. Terrain features are used to minimize exposure and mask the progress of the aircraft to the objective area.

The Mohawk's excellent low-speed, low-altitude maneuverability allows treetop operations. This reduces its vulnerability to ground fire, usually antiaircraft guns rather than missiles.

The objective of surveillance is to maintain continuous knowledge of the enemy in a given area of interest. The greater the amount of information required or desired, the greater the risk

Figure 2. SLAR stand-off mission

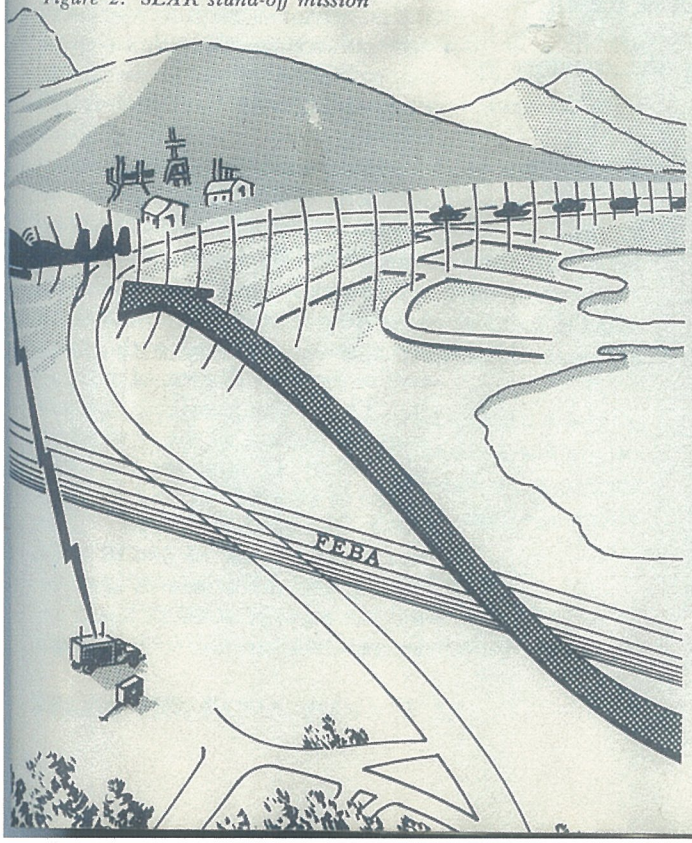
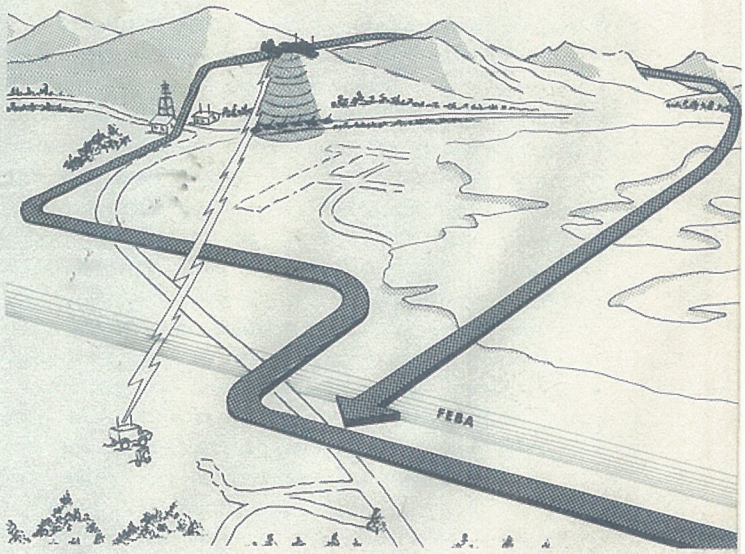


Figure 3. IR penetration mission



involved in its collection. Because all information concerning enemy activity and resources is not of equal importance, detailed information gathered in scattered, discrete areas will yield the desired level of intelligence with only moderate risk.

SURVIVABILITY

During surveillance missions, the act of "seeing" implies "being seen" in return; therefore vulnerability deserves more than passing consideration. The OV-1 gains its survivability during the standoff mission by flying over friendly territory (fig. 2). In addition, the Mohawk's low-altitude maneuverability allows it to perform at minimum altitude and safely negotiate the popup maneuver, thereby retaining a low level of vulnerability even when penetration of enemy territory is necessary (fig. 3). Although an Army surveillance aircraft does not perform the assigned mission at as high an altitude or airspeed as a high performance system, it is no more vulnerable (fig. 4).

EVALUATIONS

Because of the unique capabilities of the OV-1 system, several foreign countries have expressed an interest in procuring the system for their army forces. The first of these was West Germany. Their interest was expressed in a joint West German-U.S. Army evaluation of the entire Mohawk system. The West German evaluation indicated the true capability of the system. During an exercise involving two armored brigades, an OV-1B and an OV-1C maintained a continuous (electronic) watch over the activities of one of the brigades for approximately 24 hours without the brigade being aware that the aircraft was in the area.

The following are official conclusions extracted from the unclassified portion of the joint West German-U.S. Army OV-1 surveillance systems evaluation report.

While remaining undetected, the systems provided, within 1 hour of acquisition, the following information about a free-play maneuver:

The approach of three convoys to a staging area, exact geographical location of the convoys, approximate number of vehicles in the convoys, approximate spacing between vehicles, and their speed and direction of movement.

Deployment and identification of the vehicles in the staging area.

Tactical deployment pattern and location of the vehicles during the attack phase.

Regroupment and withdrawal of the vehicles from the area.

While remaining undetected, to ground radar defenses, the system penetrated behind antiaircraft defenses, acquired intelligence information, withdrew from simulated enemy area and returned to base.

In marine operations, the system:

Detected, located and monitored coastal shipping, including a partially submerged submarine.

Indicated speed and direction of movement of coastal shipping.

Monitored harbor, bay and canal traffic as well as dockside shipping.

Detected open-sea shipping with a very high degree of accuracy.

Attempts to frustrate the system sensory capabilities proved futile. Deliberate jamming of the radar sensor was not successful and camouflage, though an obstacle to visual/photo sensing, was easily pentrated by the infrared sensor.

Artillery target location, fire adjustment and positive damage assessment were very successfully accomplished by the systems.

Although only two Mohawks were employed in the evaluations, the systems operated with an exceedingly high degree of reliability. They were available for missions 95 percent of the time scheduled. Only 12 missions were cancelled or aborted because of equipment discrepancies. The system was flown a total of 386.10 hours during the three month test period, an average of 64.22 hours per aircraft, per month.

Figure 4