- Sticky labels for edits to friendly and enemy symbols.
- Nails to secure tape and markers.
- Cardboard for symbols.
- Clear lamination paper for water proofing cardboard.
- Rubber bands for organizing materials.
- Chalk for marking hard surfaces.
- Chem-lites for illumination during limited visibility rehearsals.
- Model buildings, airplanes, helicopters.
- Pointer.

Set-up Procedures. The kit must be constructed to scale, and the graphics must be accurately transferred to the terrain model. The systematic transfer of graphics from the general to the specific can eliminate the chance of overlooking or distorting the representation. The area of operation should be depicted first, then the phase lines, unit boundaries, objectives, units' axes, friendly and enemy locations, target reference points, and key terrain. Constructing the terrain model to scale reduces graphic distortion. A terrain board that closely represents the operational graphics also increases the rehearsal's clarity and validity. There may be occasions, however, when a particular area should be enlarged for greater emphasis.

Rehearsal Methodology. A clear rehearsal methodology improves synchronization, initiative, and agility at all levels. The battalion commander's intent and mission execution determine the methodology of a rehearsal. During the rehearsal, the commander communicates his intent and shares his vision of the mission's outcome. The sand table provides the commander with a key leaders' briefback that reinforces his orders and requires the leaders to describe their actions throughout an operation. A well-executed rehearsal gives unit members a better understanding of the commander's intent and mission requirements.

A rehearsal is conducted chronologically, the same way the mission is to be executed. Each leader moves from phase to phase within the sand table's boundaries, representing his unit during the mission. Leaders also familiarize themselves with the leaders of adjacent units. This method reinforces the scheme of maneuver by providing a vivid picture of the operation in relation to the other units involved.

To prepare a good battalion rehearsal kit, junior officers must be aware of the commander's intent for rehearsals. A self-contained rehearsal kit, configured for deployment with the battalion task force, provides the materials necessary to execute walk-throughs and briefbacks. Well-resourced and executed sand-table rehearsals represent the operational graphics, convey the commander's intent, and familiarize leaders with mission requirements. Finally, a battalion is more likely to succeed if it uses sound methodology in conducting rehearsals.

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Night CAS
On the Conventional Battlefield

CAPTAIN PHILLIP P. TABER, U.S. AIR FORCE

Certainly, nighttime conditions complicate all aspects of combat operations. Before the Gulf War, night close air support (CAS) had not been actively pursued within the U.S. Air Force. Night CAS and air interdiction had been dedicated almost exclusively to contingency operations for special operations forces. During Operation DESERT SHIELD, however, the need for night CAS on the conventional battlefield became very apparent.

As a result, the U.S. Air Force implemented aggressive night CAS training programs for both pilots and tactical air control party (TACP) personnel. This training raised serious questions concerning such issues as target acquisition, identification and fire control measures for friendly positions, and terminal control by ground forward air controllers (GFACs). Myriad field expedient techniques were developed to support the night CAS mission. Unfortunately, little information on the subject has found its way into the training publications that have appeared since the Gulf war.

Night CAS is inherently more difficult for both the pilot and the GFAC, but there are some techniques that overcome these difficulties.

During night operations, fighter and attack aircraft enjoy the advantage of being less vulnerable to optically sighted surface-to-air threats. At the

same time, however, the darkness also limits the pilot's ability to visually acquire targets and friendly positions. Generally speaking, as the threat intensity decreases, target acquisition improves. Likewise, as radar-guided surface-to-air missile and antiaircraft fire intensifies, the accuracy of night CAS employment decreases.

On a fluid battlefield, the positive identification of target locations and friendly positions is not only the most important task but also the most difficult. When this task is combined with night operations, it can be virtually impossible for the pilot to tell who's who without the assistance of a GFAC. It is imperative, then, that the GFAC be able to provide target and friendly positions, using the best means available. Accurate target identification improves the probability of a successful first-pass attack by the fighters. Accurate marking of the target also reduces the risk of fratricide.

Mission Planning

Successful night CAS operations require extensive mission preparation by both the aircraft crews and the TACP personnel. Pilots should address the way night operations affect tactics, formations, coordination of simultaneous use of airspace, terrain, and contingency plans. TACPs require detailed integration with all available fire support element assets.

Tactical Air Command Pamphlet 50-44, *Multi-Service Night and Adverse Weather Combat Operations,* lists the following planning factors:

- Location of friendly forces.
- Method of target and aircraft identification.
- Availability of mortars or artillery for target illumination and suppression of enemy air defenses (SEAD).
- Infrared (IR) and laser capability of CAS aircraft.
- Laser designation capability of the TACP or fire support team.
- Aircraft support for illumination with aircraft flares (LUU-1 or LUU-2 from OA-10 or U.S. Marine Corps OV-10).
- Friendly and enemy air defense systems.
- Deconfliction of airspace control areas (ACAs) and other procedural control measures used to prevent fratricide for direct and indirect support.

Target Acquisition

With few exceptions, units of conventional brigade or battalion size have the organic assets necessary to mark or illuminate a target during hours of darkness. These assets include flares, artillery, and laser designators. The TACP is responsible for selecting and integrating the assets that best suit the aircraft's capabilities.

Illumination flares are now the most commonly used assets for target acquisition. Flares can be fired from artillery, mortars, or naval guns. A flare can be set either to "air-detonate," for airborne illlumination, or to "ground-detonate" and burn for 10 to 15 minutes. Air-released flares (LUU-1, LUU-2) can also be dropped by an airborne forward air controller (AFAC) fighter or flare-ship, although higher threat environments may preclude this type of flare delivery.

On a fluid battlefield, the positive identification of target locations and friendly positions is not only the most important task but also the most difficult.

Ground-detonated flares (GND flares) serve as excellent target marks and can be used as common reference points (a CAS bull's-eye) for the fighters. These flares allow additional targets to be located by referencing the target to the flare by cardinal direction and distance. GND flares do not affect night vision devices (NVDs) to the same degree as airborne flares. Additionally, GND flares do not offer the enemy an illumination source that he may be able to use to his advantage.

Artillery and mortars can also deliver white phosphorous (WP) or high explosive type rounds to impact in the target area. This type of mark also serves as SEAD for the fighters. WP is an excellent heat source, but if the fighter is using a forward-looking infrared (FLIR) system, the WP smoke can obscure the target area.

Laser designating devices are, by far, the most accurate means of marking a target or a friendly location. Laser designators allow for target acquisition without conventional illumination devices. TACPs with access to either the laser target designator or the ground/vehicle laser locater-designator (G/VLLD), equipped with NVD/thermal sights, can ensure positive target identification and marking. Aircraft equipped with the laser spot tracker (LST) or Pave Penny Pod, can acquire the laser spot and attack without the pilot's visually identifying the target. Aircraft equipped with either self-contained or pod-contained LSTs include the A-6E, AV-8B, A/OA-10, F-15E, F/A-18, F-111F, OH-58D, AH-64, and AC-130. The use of laser designators to mark targets also carries an additional advantage—a ground laser can provide terminal guidance for laser-guided munitions. This type of employment requires a very high level of proficiency and planning by both the air crew and the TACP.

Hand-held near-IR lasers can be used not only to designate targets but also to mark friendly positions. The LPL-30 and the personal illumination marker (PIM) are lightweight cigarette pack or flashlight-size laser systems used to point out targets with unpulsed laser energy. They produce a near-IR spot that is invisible to the naked eye but easy to see with NVDs. Aircraft equipped with NVDs can visually acquire the near-IR spot or mark. This type of designator requires an unobstructed line-of-sight to the area being designated. It must be noted, however, that it also allows anyone else with NVDs to see both the designated target and the designator.

Friendly Location

During night operations, the risk of fratricide increases dramatically. Normal ground references used during

daytime operations are not available to the pilot, or the GFAC. It is imperative that the GFAC be able to provide the fighters with a mark for the relative position of friendly units. This mark greatly reduces the probability of fratricide, but it must be used in a way that does not compromise friendly forces.

Visual marking devices must be shielded from direct enemy observation. The marking devices can be "hidden" by direct terrain masking (operating them from behind a hill or other land mass), or by using vehicles parked in either a V or a U pattern. Directional near-IR lasers and blue lighting are the preferred devices for covert marking of friendly positions. A position marked with white lights can easily be seen with the naked eye and will undoubtedly be compromised, while IR marking devices are invisible to the naked eye and require the enemy to use NVDs to acquire the marks.

A narrow-beam, or focused, light similar to the MAG-LITE, equipped with either IR or blue light filters, can be used along with NVDs to mark positions. The light can be made directional by fitting a tube or sleeve over the end of the light. The sleeve overcomes the "halo" effect that most flashlights produce and makes the filtered light difficult to observe by anyone except the aircraft at which the light is being aimed. The light can be "aimed" at the aircraft with NVDs. This type of mark is easily seen by fighters in a low-threat wheel type formation. The LPL-30 and PIM can be used in a similar manner.

Laser designating devices are, by far, the most accurate means of marking a target or a friendly location.

IR strobe lights can also be an effective mark, but when used as the only mark they are difficult for the fighter to detect. Placing a strobe beneath a piece of thin white fabric enhances the flash. The fabric should be suspended from the side of a vehicle or vegetation and must be shielded from direct enemy observation.

Friendly locations can also be identified to the fighters with an accurate grid, or latitude-longitude, position. Currently, all TACPs are equipped with the global positioning systems (GPSs), which allow them to fix their positions accurately. This information can be passed to the fighters by secure voice or UHF radio. This will enable the pilots to build a picture of the battlefield and to increase their situational awareness. The pilots must understand which grid is the target area and which grid is the friendly position. Grid information is meant to increase situational awareness; it should not normally be used as the only means of showing the location of friendly positions.

Terminal Control

One of the most difficult tasks for the GFAC is ensuring the safety of the friendly units. Night operations present the GFAC with many of the same challenges the pilots face. Those challenges include visual acquisition and depth perception, both of which directly affect when the fighters are given clearance to employ ordnance. Additionally, the aircraft's capabilities (LST, NVD, or laser fire interface) affect the way the GFAC will employ the fighters in the target area.

It is imperative that the GFAC establish positive control of night CAS operations. Thorough mission preparation is vital if the GFAC expects to maintain situational awareness during the operation. If the situation permits, the GFAC should conduct a reconnaissance of the observation position and the general area of operations. The selection of initial points will dictate attack geometry. This will give the GFAC some idea of where he can expect to visually acquire the fighters before ordnance is employed. A thorough reconnaissance will help in the visual acquisition of the fighters. Mandatory radio calls from the fighters will help build the GFAC's situational awareness—"Departing IP, one minute out, five miles out, JLASER calls," etc. The fighters can expect to receive an earlier clearance to drop, if the GFAC knows where they are during an attack. These control measures enable the GFAC to ensure the safety of friendly units and increase the opportunity for target destruction on the first pass.

Visual acquisition can also be assisted if the fighters are equipped with either external IR position lights, or formation tape lights. The GFAC should also know the fighters' run-in altitude during the attack; this gives him an area of sky to search instead of an entire horizon or a tree line to scan.

Currently, all TACPs are equipped with the global positioning systems, which allow them to fix their positions accurately.

Due to the inherent risks involved with night CAS operations, minimum safe distances should be based on aircraft capabilities, type of target mark, attack geometry, and ordnance fragmentation patterns. Aircraft are equipped with operational LSTs, NVDs, or FLIR, and a compatible target mark, can be brought in as close as one kilometer to friendly positions. Aircraft attacking "grid only" should be brought in no closer than two kilometers to those positions.

Regardless of aircraft capability, attack geometry will affect minimum safe distances. If the attack heading is parallel to friendly units (plus or minus 30 degrees), the minimum safe distance should not be affected. But if the attack heading is perpendicular to friendly units, the minimum safe distance moves out to at least two kilometers. In a troops-in-contact situation, the decision to employ ordnance inside the minimum safe distances for night operations would still fall to the Army ground commander.

The Gulf War has shown the importance of the Air Force's ability to provide night CAS for Army operations. In most situations, Army units will conduct offensive operations during periods of darkness to exploit their

technological advantage. If aircraft are equipped with LSTs and NVDs, this greatly improves the fighters' ability to pin-point target locations and accurately identify friendly positions.

The Navy and Marine Corps currently have a night CAS capability with the F/A-18, A-6E, and AV-8B. The Air Force is now developing this capability with the acquisition of NVDs for both the A/OA-10 and the F-16 communities. This acquisition will require both CAS pilots and TACPs to establish building-block training programs for night operations. As Air Force operational fighter squadrons receive this capability, TACPs will increasingly be able to train at night with Navy, Marine Corps, and Air Force assets.

Night CAS requires equipment that is not currently authorized for most conventional TACPs, and the cost of this equipment may be prohibitive, given smaller budgets. The tables of allowances are being adjusted, however, to reflect night CAS requirements. TACPs will be equipped with IR position markers and IR target designating devices as funding allows. With this type of equipment and training, the Air Force will consistently be able to provide ground forces with the accurate close air support they need at night.

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Air Assault Decision Matrix

CAPTAIN S.F. KUNI

No formal criteria exist for selection or rejection of an air assault course of action employed by the opposing force (OPFOR) regiment. I have made, used, and refined an air assault decision matrix at the National Training Center (NTC). Although this matrix is fairly objective, it can be tailored to fit the needs of U. S. Army units in different situations and locations.

Some of the factors shown on the matrix are defined as follows:

Enemy locations and reaction times. Enemy elements are not in a position to bring effective direct fire (mounted or dismounted) on the air assault forces for 20 minutes after landing.

Landing under friendly observation. Reconnaissance has eyes on proposed LZ and has reconned the mounted routes to the LZ and found no enemy there.

Landing zone (LZ) secure. No enemy is currently in a position to bring effective direct fire on the LZ without moving.

LZ inaccessible to tracks. Terrain between the LZ and the actual or templated position of tracked vehicles is so broken that traversing or bypassing it would take longer than 20 minutes.

Hides at or near LZ. Ground within 200 meters of the LZ gives infantry 360-degree protection from mounted weapons.

Good alternate LZs. Alternate LZs at least 1,500 meters from primary LZ with terrain that blocks direct fire between them.

Distance from LZ to objective. Ten kilometers or less for last-light insertions, 500 meters or less for first-light insertions.

Covered and concealed routes to objective. Adequate 360-degree cover from direct-fire weapons is within 25 meters of the planned route.

Objective hot or cold. No enemy can bring direct fire on the objective without moving.

Doctrinal application. Air assault goes to the objective or lands unopposed in support of higher operations, and link-up with mechanized forces is planned and accomplished.

Length of time until link-up with mechanized forces. A realistic link-up is planned within six hours.

Some of these criteria may change, and some factors may have to be added or deleted on the basis of different unit needs. Some other factors I am considering for inclusion later are listed below. They all relate to one another.

Did the air mission commander (AMC) attend the order briefing? Did the plan change after the aviators left the briefing?

Complexity of air mission and unit cohesiveness. Does the mission involve splitting lifts into serials or multiple LZs or is it "same way, same day"? Is one unit flying the mission or two (such as allied aviation attached for training)? Is the AMC familiar with the area and unit procedures?

How much time does the commander get between final plan and execution time? Is he or his unit flexible enough to react to a late change or a fragmentary order (FRAGO) and still accomplish the mission?

What is the overall proficiency of the unit involved? Some units can ac-