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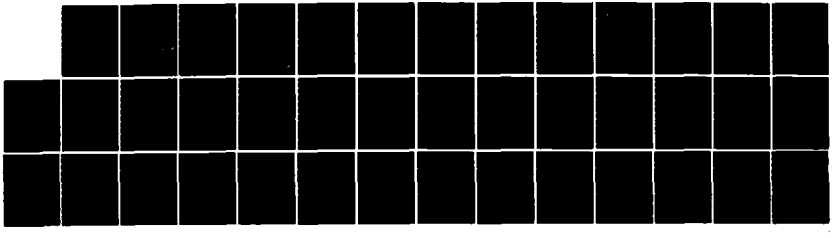

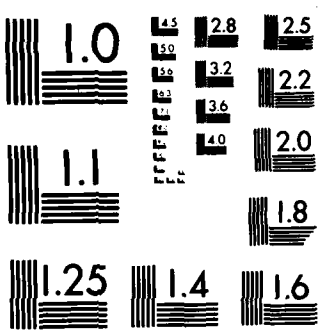

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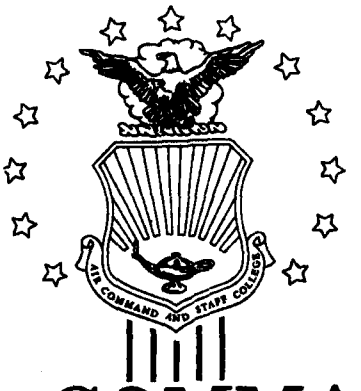

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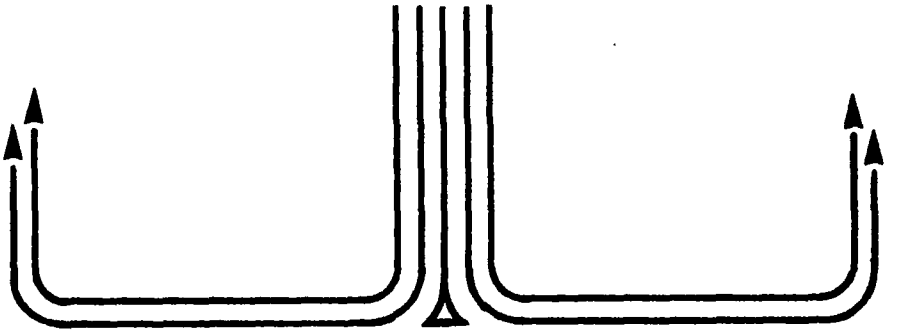
STUDENT REPORT

NEXT GENERATION GUNSHIP

MAJOR WALTER F. HOLLOWAY 85-1235

"insights into tomorrow"



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REPORT NUMBER 85-1235

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requirements for graduation.

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Special Operations Forces (SOF) possess requirements for unique air-to-ground attack and reconnaissance capabilities. Conventional air assets do not possess these capabilities. The present SOF air-to-ground attack weapon system, the AC-130 gunship, suffers from inherent tactical and system limitations. The study explores the requirements, the tactical employment concepts, and design considerations for a new gunship. The study concludes that a new gunship must not be a modified conventional airplane but a dedicated weapon system designed and built for SOF.

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PREFACE

The United States Air Force's Special Operations Forces (SOF) have always modified existing weapon systems for employment. One of the reasons the SOF has never designed and built a weapon system is because it has been so successful in remaking its own. The AC-130 gunship put together by this method has been one of the most innovative and successful weapons in the Air Force inventory. Why nothing has been accomplished to further gunship capability and what direction the gunship emphasis should take are the two issues that motivated this study.

Many of the ideas and thoughts contained in this study came through experience and association with the missions of the SOF and the gunship role. The books and sources quoted relate mostly to the Vietnam era. Chapter I is taken from the book Development and Employment of Fixed-Wing Gunships 1962-1972. There is a gap in printed material regarding the SOF and unconventional warfare (UW) during 1975 to 1982. This period would cover the ending of Vietnam to the fallout over the rescue attempt in Iran.

This study could not have been written without the advice and counsel of the AC-130 gunship operators. Many provided their time, insight, and enthusiasm toward the completion of this study. Among those who where particularly helpful were Lt. Col. Ed Gambel, Chief of Tactics, 23rd AD; CMSgt Loren Siron, advisor to the 919th SOG; Lt. Col. Martha Weitzel, Chief of Intell, 10th AF; Maj. Wesley "Peter" Gunn, Chief of Weapons and Tactics, 919th SOG; Maj. David Peel, Chief Electronics and Warfare Officer, 919th SOG; Capt. Will Elledge, UW instructor at the SOF School; Lt. Col. (Ret) David Metts a former 16th SOS Commander; and Lt. Col. W. O. "Sam" Schism.

In addition, a number of SOF ground soldiers from the Army and Marine Corps provided knowledge and assistance. Among them are Maj. William McHenry USMC, Combined Special Operations, and MSgt (Ret) John W. Jones USA.

Particular thanks goes to Capt. Alva Greenup, USAF reserve pilot with 711th SOS. A former Special Forces soldier who served in Vietnam with Project Delta, Capt. Greenups' knowledge of ground combat and his ability to place the ground war in perspective with the air was extremely valuable.

CONTINUED

A final thanks goes to my advisor Maj. J. Clem who readily provided anything I requested including the encouragement and freedom so necessary for such a study.

ABOUT THE AUTHOR

Major Walter F. Holloway was a flight commander and aircraft commander in the 16th Special Operations Squadron (SOS) in Southeast Asia. He has over 5,000 hours of flying time and has been assigned to the SOF for over eight years. He has attended the "Foreign Internal Defense," "Unconventional Warfare," and "Dynamics of International Terrorism" courses at the USAF Special Operations School at Hurlburt Field, Florida. He also attended the "Strategic Intelligence Symposium" at Bolling AFB, Washington, D.C. Major Holloway is now an Air Force Reserve officer assigned to the 711th SOS, Duke Field, Florida where he has been the unit's Weapons and Tactics officer for the last four years. He is presently a member of the class of 1985 at the Air Command and Staff College, Maxwell AFB, Alabama.

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EXECUTIVE SUMMARY

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REPORT NUMBER

AUTHOR(S)

TITLE

I. Purpose: To examine the real world requirements and tactical employment concepts of a future Special Operations Forces (SOF) air-to-ground attack weapon system. To recommend a dedicated SOF gunship, and propose design considerations based on tactical employment concepts and SOF missions. To emphasize, a new SOF gunship must be multi-role and capable of fighting throughout the low-intensity conflict spectrum.

II. Problem: The SOF operates with handed-down conventional weapon systems modified by in-house ingenuity for its attack capability. Modified conventional weapon systems employed in Special Operations missions and low-intensity conflicts limit mission planning and potential. Presently, numerous SOF designated missions cannot be carried out because of the inability and limitations of the present attack weapon system. SOF air-to-ground attack aircraft must not be created out of old or new conventional weapon systems. Institutionalized conventional weapon developers determine SOF weapon systems with little knowledge of the SOF environment.

III. Data: The Secretary of Defense's Annual Report to the Congress for fiscal year 1986 states that ". . . low-level conflict. . .poses the threat we are most likely to encounter

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through the end of this century" (14:285). The ground SOF requires dedicated air support uniquely tailored for its mission. The current SOF air-to-ground attack capability is a conventional cargo airplane converted into a night search and attack airplane. The gunship concept proved valid in almost seven years of combat in Southeast Asia. The gunship concept is tremendously effective in low-intensity conflicts and in Special Operations missions. New airframe construction technologies and design considerations based on tactical employment concepts would create a survivable gunship.

IV. Conclusions: Conventional weapon systems do not possess the unique capabilities necessary to support Special Operations missions or the ground SOF. Present SOF air-to-ground attack, target acquisition, and reconnaissance capability primarily handled by the AC-130 gunship has deteriorated significantly. The loss of gunship effectiveness is primarily due to its employment survivability. Present gunship survival is directly related to airframe size and limitations, basic attack parameters, and system capabilities. A new gunship is the ideal weapon system for the SOF because of its multi-role and unique capabilities. A new gunship must be designed and constructed with the tactical employment concepts for low intensity conflicts as determinants. A new gunship would be a significant advancement in our SOF capability.

V. Recommendations: Design a new gunship to confront threats in low-intensity conflicts. It must be designed to incorporate the unique capabilities of the AC-130 gunship with the flexible requirements of the total SOF mission. A new gunship must be developed and designed as the present one by the people who would employ the weapon system in the night sky.

Introduction

We have met the enemy and he is us.
Pogo

The purpose of this study is to analyze the requirements, the design, and the tactical employment concepts of a new gunship for tasking by Special Operations Forces (SOF) during the 1990's and beyond. War today is reactionary, intricate, and decidedly unconventional. Unconventional war demands a unique perspective. It is a method of fighting that requires innovative tactics, specially trained soldiers, and dedicated weapon systems. The United States Air Force, in slowly reacting to its Special Operations mission, has not confronted the real problems of a specialized gunship weapon system and has failed in improving fixed-wing gunship capabilities. This is a disturbing oversight, for a gunship provides those novel capabilities that are the essence of the unconventional and special operations air war.

The gunship emphasis comes only in times of immediate crisis. In these crises, it is the only weapon system we possess that perform certain specialized tasks like immediate night surveillance and surgical firepower. Yet the Air Force has neglected the concept of such a versatile and proven weapon system. Following Vietnam, our planners greatly de-emphasized our special operations and unconventional capabilities and concentrated on nuclear and conventional conflicts.

> Over and over one was told in the Pentagon that the war had become a "non-subject," and certainly the discussion of it would bring few promotions. "We have put the war behind us," was a boast that was frequently heard in the centers of national defense after the debacle of spring 1975. (9:V).

Now our planners are beginning to recognize that our armed forces must be prepared to fight and react to the unconventional aspect of war. Maj. Gen. Leroy Suddath, Commander of the Army's 1st Special Operations Command, said, "I look for a continuation of the surrogate-type war sponsored by the Soviet Union. And I think that we have to have some capability of responding to that at every echelon. And the special operations forces give us that capability" (23:5). A new gunship tailored to the missions that SOF are tasked to undertake would effectively revitalize our combat capabilities in unconventional areas. A new gunship must be visualized and presented by those who would employ the system: airmen and ground troops. They understand its capabilities and must be the ones to intuit its future.

The gunship on the flight line today is essentially the same one flown in Southeast Asia in the late sixties and Grenada in 1984. Its creators used existing weapon systems and modified them for a dedicated and specialized role. The end result was the "Pave Spectre" gunship, a deadly, self-contained, night-attack aircraft that was the ". . . preeminent truck-killer of the war. . ." (1:V). However, the weapons and tactics of unconventional war have changed, and so must the weapon system. The luxury of adapting conventional weapon systems for employment in the unconventional arena lies blowing in the dust of Iran at "Desert One."

This study is divided into three parts. Chapter I presents a concise history of the gunship as it evolved from the mid 1920s to Vietnam. The main focus highlights the interesting development of the gunship during Vietnam, a remarkable lesson in practicality and innovation, for it was a weapon system improvised by a small dedicated cadre using basic equipment found in the Air Force inventory.

Lt. Col. Ronald W. Terry, one of the officers most responsible for the development of the gunship employed in Southeast Asia, wrote a report in 1972 on the future of the gunship entitled "Capabilities of Gunships Post-Southeast Asia." This report is valid today and distressing, because it reveals degradation in gunship capabilities due to the gradual wearing of the systems and the failure to continue tactically interfacing the gunship with other weapon systems. Lt. Col. Terry's report recommends maintaining the gunship in the force structure until a more advanced weapon system with gunship capabilities is employed (28:8). Unfortunately, the present gunship remains virtually the only weapon system able to perform night, all-weather interdiction, and close air support in a troops-in-contact situation. The Marine Corps recognizes this, stating that ". . . the most significant limitation of aircraft weapons systems is the difficulty in providing support at night and in periods of limited visibility. . ." (29:40). There are no other weapon systems in the Air Force inventory that are accurate at night and possess the exceptional capability to shoot close to friendlies.

Chapter II explores the requirements for a new gunship by reviewing Army and Marine Special Forces mission concepts and operational air demands. The conventional weapon planners of today seldom interface other services' total fighting concepts or small unit problems when considering weapon designs. The SOF side usually interfaces easily because of the requisite experience level, small force size, and realistic necessity for abilities in all facets of combat. It is imperative then for this study to consider the problems of the ground SOF to effectively address the requirements and design of a new gunship.

Chapter III discusses the tactical employment concepts and design considerations for a new gunship within the framework of special operations and unconventional warfare. How unconventional warfare is understood is infinitely important when deciding what tactical concepts and design considerations should be planned for a new gunship. The present gunship suffers from antiquated technology and design limitations. There are new technologies that can make a gunship more effective, survivable, and cost effective. The technology considered is reviewed in light of SOF requirements and its application in present and future conflicts.

In analyzing the requirements for and the fighting concepts of a new gunship, the Air Force will be able to address the issues concerning this weapon system. The Air Force would make a great mistake if it plunged into a large-scale gunship design program. In considering a gunship's potential, one must realize its limitations and consider what an operator has to say about his weapon system. There are no star plans here; unconventional war is a dirty, deceptive business where only professionals survive. The hope is that the pressing need for a gunship designed specifically for SOF will be recognized.

Chapter I

HOW WE GOT HERE

> The Air Commando Wings will provide combat ready SAW [Special Air Warfare] Forces. (16:1). AFM 2-5

The evolution of the fixed-wing, side-firing gunship was a process of combining proven aerial technique with available technology. The idea was first considered and demonstrated in 1926 by 1st. Lt. Fred Nelson, an instructor pilot stationed at Brooks Field, San Antonio, Texas (1:1). The concept combined a long-known aerial maneuver, a pylon turn, with previously employed automatic weapons. In World War I, swivel mounted machine guns had been installed on aircraft and fired laterally at air and ground targets by gunners. Lt. Nelson equipped a DH-4 aircraft with a fixed-mounted, side-firing .30 caliber machine gun (1:1). He flew the aircraft in a pylon turn sighted through an aiming device installed on a wing strut and struck lime-marked targets on the ground with surprising accuracy. A later success in using the pylon turn for accuracy was a technique developed by Nate Saint, a South American missionary. He ". . .executed the maneuver with a long rope extending from the aircraft to the ground. This permitted amazingly accurate delivery of mail and other objects to remote villages" (1:2).

In 1942 the German U-boat posed a threat along the eastern and Gulf coasts of the United States. 1st. Lt. Gilmore MacDonald of the 95th Coast Artillery (CA) suggested a method to increase the effectiveness of civilian aircraft on submarine patrol:

> . . .with a view of providing means for continuous fire upon submarines forced to the surface, it is proposed that a fixed machine gun be mounted transversely in the aircraft so that by flying a continually banked circle the pilot may keep the underseacraft under continuous fire if necessary (1:2).

Lt. MacDonald pointed out that the real advantage of the side-firing pylon-turn maneuver was in preventing the submarine crew from manning its own anti-aircraft defenses. No action was taken on his suggestion, which was actually the first formulation of the gunship concept (1:2).

In the summer of 1943, the Luftwaffe employed two airlpanes on the Russian front in an anti-tank role. The JU 87G, commonly known as the "Stuka," carried two 37-mm cannons. The twin-engine Henschel 129B carried four 30-mm cannon aligned with the fuselage (2:298). An anti-tank shell with a projectile core of tungsten was developed. These airplanes were extremely effective in a direct air-to-ground role (2:298). They proved that large caliber weapons mounted on airplanes for specific tasks worked and solved problems that bombs could not.

In 1945 Lt. Macdonald again addressed the concept of side-firing weapons from aircraft. This time he suggested installing a transverse-firing T-59 superbazooka in a liaison-type aircraft. An aircraft so armed could fly pylon turns, pin down enemy troops in their trenches, and effectively strike larger targets such as tanks (1:2). The end of the war terminated this proposal.

With the increased emphasis being placed on counterinsurgency operations in 1961, Lt.Col. MacDonald reintroduced his ideas. He felt that spotter and liaison aircraft could enjoy some definite tactical advantages with the installation of lateral firing weapons. He offered to undertake a test program to validate his ideas and declared:

> By flying a banked circle, the airplane can keep the gun pointed continuously at a target, and by flying along with one wing low, limited longitudinal strafing can be done without worrying about pullout (1:2).

Still there was no response to MacDonald's idea.

Later in the same year, MacDonald met Ralph Flexman, an assistant chief engineer with Bell Aerosystems Company. Flexman introduced MacDonald's concepts to a Bell Aerosystems brain-storming group which concluded that lateral firing from a pylon turn was feasible (1:3). The Bell group also foresaw that lateral firing from a low-flying, slow speed aircraft could provide wider coverage, higher angle of fire, and capability for pinning down enemy troops.

Air Force Capt. John C. Simons, a friend of Flexman's, became an advocate of the concept and began a search for supporters. He eventually arranged a test program. The basic flight tests were flown in a C-131 and the test results were so impressive that after the first live fire test during the summer of 1964, the Aeronautical Systems Division (ASD) assumed management of the program (1:9).

The C-131 test results aroused the interest of the 1st Combat Application Group at Eglin AFB, Florida. They asked the designated project test pilot at ASD, Capt. Ronald W. Terry, if a gun kit could be constructed for installation on other aircraft,

specifically the C-47 or C-123, since these aircraft were presently employed in Southeast Asia (1:9). A kit was built for the C-47 consisting of three 7.62-mm Gatlin guns, and test results were as impressive as in the C-131. A test team commanded by Capt. Terry was sent to Vietnam in late 1964 to test a C-47 gunship in actual combat (1:15). Designated as an FC-47, each aircraft carried a crew of seven Air Force personnel and one Vietnamese observer.

The pilot fired the guns while flying the aircraft in a left pylon turn. The copilot monitored instruments, advised the pilot if he deviated from firing parameters of bank, airspeed and altitude, and coordinated crew activities (1:17). A flight mechanic watched the various aircraft systems. The navigator checked the aircraft's position and worked with the Vietnamese observer to verify target information. Two gunners were assigned to load and maintain the miniguns, and a loadmaster dropped flares from the rear cargo doors.

The first actual FC-47 sortie was flown on December 15, 1964, and the first night sortie on December 23rd and 24th of the same year (1:20). Both sorties were dramatically successful against Viet Cong infiltrators. By December 26th, the FC-47 gunship had flown seven training and sixteen combat sorties and expended almost 180,000 rounds.

An impressive demonstration of gunship power unfolded on February 8, 1965. The aircraft was sent to the Bong Son area to assist in blunting a Viet Cong offensive in the Vietnamese highlands (1:21). From 1850 to 2310 hours, the miniguns expended 20,500 rounds on enemy positions accounting for almost 300 enemy KIAS (1:21).

The night air war in South Vietnam would never be the same. The FC-47 gunship was created by dedicated innovators who believed in the worth of experimentation and improvisation, often against official opposition. Its success set the stage for the future development of the weapon system. Its ability to lay down a concentrated barrage in support of surrounded bases became an immediate advantage, one that filled a void in our tactical attack capability.

After combat testing the FC-47, numerous areas were identified for improvement and operational tactics were defined. With the requirement for the gunship established, the first gunship squadron was ordered into service on July 13, 1965 (1:26).

The first major increase in the size of the gunship force began in 1967. The FC-47 gunship had been redesignated the AC-47 for attack cargo and had already earned a nickname, "Puff the Magic Dragon" (1:22). During the year ten more AC-47s were authorized and several South Vietnamese C-47s were converted into

AC-47s in order to quickly increase the fleet.

The dramatic success of the AC-47 in its attack role provided impetus to work on a follow-on aircraft that could carry more armament and be more survivable (1:54). Debate in Washington had seemingly settled on the C-119 as the best available replacement. An armament effectiveness study on the use of high-caliber weapons had begun in early 1966. This study, and an Air Force headquarters analysis of the gunship's mission requirements, pointed to a larger gunship potential. In January 1967 the Air Staff directed Air Force Systems Command to configure a C-130 gunship (1:82).

The selection of the C-130 as a gunship was an almost immediate success (1:84). The size, load capacity, space, and engines gave the C-130 a distinct advantage over the AC-47. Four 7.62-mm miniguns and four 20-mm M-61 Vulcan cannons were installed. Sensor equipment included a night observation device and side and forward-looking radars. A computerized fire control system married guns and sensors. The capability to acquire a target at night with a visual sensor and destroy that target from a stable gun platform added a new dimension to gunship effectiveness.

Despite the success of the prototype AC-130 gunship in combat, Air Force Secretary Dr. George Brown decided on a mixed gunship force of AC-119s and AC-130s. The old "Flying Boxcar" transports (AC-119s) became known as "Shadow" and were the most numerous of Air Force gunship assets.

The different roles the AC-119 and AC-130 gunships were to assume were evident from inception. Secretary Brown said, "I see a clear distinction between the more localized support and protective role of the AC-119 aircraft and the predominatly search-and-destroy concept envisioned for the AC-130" (1:179).

By late 1971, the AC-130 gunship had developed into a formidable weapon system far removed from the original FC-47. Called "Spectre," one model carried twin 40-mm guns and another carried a 105-mm Howitzer. New sensor equipment including a low light level TV and an infra-red (IR) had been placed aboard. The crews had developed imaginative and innovative tactics which kept pace with the tempo of the night air war. Spectre became the lone, self-contained, night attack aircraft which its dedicated creators envisioned.

Chapter II

THE FORCE BELOW

THE GROUND

> In the long run it is control of the ground that wins or loses wars. (3:79).
> A U.S. Army Infantry advisor, South Vietnam

This chapter establishes the requirement for a future gunship as a dedicated weapon system. To accomplish this, ground special operation combat missions, and employment concepts will be reviewed. "The interrelated fields of unconventional warfare are rarely a unilateral service function; they are almost always conducted with our sister services. . ." (11:61). The operational demands of the ground commander must be understood to address the problems from the air. This study dedicates airpower in a direct support role, where it can be most effectively employed and shares a common objective with the ground SOF forces.

"The most basic principle for success in any military operation is a clear and concise statement of a realistic objective" (16:2-5). The missions and objectives of the air and ground forces tasked for special operations and unconventional warfare are the same. However, directing the entire capabilities of both air and land special operation forces toward clearly defined and coordinated tactical objectives is difficult. This is because the perspective from the air is very different, and there is a lack of aircrew knowledge of what the soldier on the ground is doing. Total coordination and absolute understanding of objectives is imperative for success in a special operations mission.

MISSIONS AND PLANNING

> A good plan violently executed now is better than a perfect plan next week. (7:263). General George Patton

The mission of the Army Special Forces is to conduct ". . . Unconventional Warfare, Special Operations and Foreign Internal

Defense" (26:20). U. S. Army Special Forces are the repository of expertise within the active army force structure for unconventional warfare. "A Special Forces group can undertake a variety of tasks and missions: in many modes and configurations, under circumstances and in environments not customarily envisioned for conventional forces and, most importantly, in all levels of conflict" (12:62). The tactical operations undertaken by Special Forces units where gunship support appears to be most valuable fall into three general areas. These are any special operations missions requiring fire power or night reconnaissance support, during interdiction operations, and where Special Forces forward operating bases (FOBs) are established.

Special Forces could be tasked for innumerable special operations missions. This study addresses several common planning considerations Special Forces units would analyze, and the most likely tactical combat situations they would encounter based on recent missions.

The following planning considerations are taken into account when developing a Special Forces mission. It is essential to realize that ". . . planning is both an art and a science" (8:205). Planning special operations missions is possibly more of an art as many more factors are unknown. These considerations do not represent all those which would be required for any particular mission. However, they are characteristic of what the planners, as the executors in Special Forces, use to develop a special operations mission.

1. Construct a model of the target, if possible.
2. Be imaginative, yet realistic.
3. Use surprise.
4. Use deception, possibly tactical deception.
5. Use diversion.
6. Build a plan with common sense.
7. Function in darkness.
8. Prepare a psychological operation package.
9. Keep fit.
10. Consider weather.
11. Use every available intelligence resource.

Several Special Forces planning considerations prohibit the successful employment of conventional Air Force weapon systems. The first is the extremely effective use of surprise. "Surprise is important in the tactical dimension for it can decisively affect the outcome of battle" (8:203). Surprise is a force multiplier. Clausewitz states that ". . . basically surprise is a tactical device. . ." (8:152). In designing a force package for a special operations mission, the size must be tailored to a sufficient minimum. Special Forces cannot sacrifice the tactical element of surprise because they will not possess supremacy of force or firepower. A mistake we consistently repeated in

Vietnam was the inability to achieve surprise. "The more elaborate an American operation the greater, obviously, was the chance of its being compromised" (5:61). Secrecy is more easily achieved with a smaller force. The airpackage planned for special operations missions must be made up of self-contained, multi-role special operations aircraft.

The second planning consideration which conventional weapon systems have great difficulty in achieving is deception. The employment of deception on the battlefield is as old as war itself. Machiavelli stated that ". . . fraud . . . in the management of war is laudable and glorious. He who overcomes an enemy by fraud is as much to be praised as he who does so by force" (12:62). Special Forces applies tactical deception to mask the real objective by using diversionary or screening attacks or forces. There is no realistic way to be deceptive when the sky is filled with airplanes. Conventional assets can become detrimental, especially if the enemy is highly elusive and shadows himself in the civilian population. Deception or disguise of intention is one element that facilitates the gaining of surprise.

The third planning factor which conventional Air Force assets have difficulty in performing is functioning in darkness. There are no substitutes for SOF night flying aircrews. The Son Tay rescue mission in North Vietnam and the Iranian "Desert One" ending graphically illustrate the high degree of night proficiency required to operate on special operations missions (7:106;18:35). Special Forces must use the cover and psychological edge that darkness provides. Darkness plays a considerable part in special missions, and must be used as an asset not an adversary.

Intelligence is the key to success in any SOF ground mission. The capability to provide immediate reconnaissance or surveillance and record or relay real time information is invaluable. The intelligence collected during a night reconnaissance mission with a visual sensor prior to mission execution could be decisive. During the recent American experience in Lebanon one of the difficulties encountered was the inability to quickly locate night mortar firing positions. Presently, no conventional aircraft possess night video recording capabilities except the AC-130 gunship.

DIRECT COMBAT SUPPORT

> The Infantry does most of the dying and almost none of the killing anymore (9:174). Col. Ray Franklin

The actual combat engagements ground SOF forces encounter

present the greatest dangers. The unexpected or unforeseen attacks are those which stand the greatest chance of defeating a ground SOF. It is here where things might go the enemys' way, where tailored air assets would play the possible winning role.

The first U.S. soldier killed in Vietnam, Sp4 James T. Davis of Livingston, Tennessee, died a few days before Christmas 1961 in an ambush (3:180). Today in El Salvador the ambush is still the technique employed by both sides to gain large results with minimum effort. An ambush can be accomplished with an inferior force. The results of well-executed and timely ambushes, especially against large conventional forces, can alter the character of an entire conflict. An ambush against a ground SOF unit could totally defeat the mission.

The early years in Vietnam witnessed our inability to react and adapt quickly to the ambush war waged by the Viet Cong. A frustrated American army general said:

> The VC are excellent at ambushes but that's kind of a cowards way of fighting the war, and almost anybody, if you can open fire with an overwhelming volume of fire at the beginning and get the psychological advantage, anybody's army would have a hard time withstanding it and anybody else's army would have a good chance of success (3:138).

The capability to immediately react and deliver accurate fire support to a ground SOF caught in an ambush is mandatory for the SOF air arm. In the high-intensity unconventional war, contact with the enemy is very close, rarely exceeding more than 50 meters (31). The Marines on the beach at Koh Tang island during the Mayaguez incident found out what real tactical air support was when an AC-130 gunship began firing on enemy positions between two marine units striking ". . . well within 50 meters of enemy forces" (6:321).

One aspect of conventional air support that can directly affect long range objectives in a low intensity conflict is the devastation caused by indiscriminate application of conventional airpower. Air strikes can often have adverse political effects. The American use of firepower in Vietnam, especially some bombing carried out in South Vietnam was ". . . counterproductive in terms of winning hearts and minds" (5:96). Killing a few of the enemy while killing many noncombatants or neutrals can drive some into insurgency through resentment. "A VC propaganda cadre who defected in February 1969 told interrogators that the effect of air strikes in Vinh Binh province (IVCTZ) had been to drive many villagers to join the VC" (5:103).

The application of firepower in all unconventional and low-intensity conflicts should never be in excess. There is a

sufficiency of firepower in these conflicts, and the accuracy and precision of the weapons determine its success.

It is necessary for the aircrews to fully understand what the soldier does and for the soldier to have some appreciation of the problems the aircrews encounter because, ". . . it is almost an absolute requirement to use the essential skills and capabilities of two or more services for any unconventional warfare mission" (12:62). In understanding the problems of the ground soldier, a new gunship can be designed that satisfies the total SOF mission requirement.

Chapter III

DEMANDS OF THE FUTURE

THE CONTINUING REQUIREMENT

> We can expect conflict and terrorist activities to occur and to some extent grow...we anticipate increased violence...the possibility of a peaceful global environment in the future seems remote. (15:2-9). Air Force 2000

A new gunship would be tasked to perform in a wide variety of special roles. The majority of these roles can be visualized against the scenario of unconventional war, while others must be projected in light of future conditions. In the following pages, the tactical employment concepts demanded in these roles are considered using existing and perceived future requirements. It is important in reviewing the tactics and design requirements for a new gunship to realistically define its desired capabilities. In all cases these capabilities must satisfy the requirements of the Special Operations Force.

There are advocates of other weapon systems for the ground attack role in the USAF SOF. The A-10, A-37, and F-20 have been proposed as attack aircraft that would provide survivable weapon systems with the capability of carrying wider variations of ordinance (21:39). These proposals are inadequate. These aircraft do not possess the night target acquisition or the multi-role capabilities required for the SOF. To be effective, an attack aircraft for SOF must be designed for all facets of employment in the SOF spectrum.

AIRFRAME SIZE AND CAPABILITIES

The flexible and responsive actions demanded in the Special Operations environment dictate lean, compact, and quiet weapon systems. A new gunship must be able to operate through a wide range of speeds and maneuvers. Its design and construction must utilize the latest technologies. The majority of its basic systems and components already exist and have been proven successful. Serious consideration should be given to constructing the airframe out of composite materials. These

materials are ideal for a maneuverable subsonic aircraft as they are light, high strength, and lessen the radar and infrared (IF) return.

The AC-130 gunship is too large and suffers from wasted space and cargo features which perform nothing for its role. An aircraft designed to be a gunship should be reduced in size from the AC-130 to enhance its survivability.

This study does not address the aeronautical engineering problems associated with airframe design. However, in presenting the gunship case, it is necessary to suggest an airframe for consideration. It is recommended that a rear winged airframe with push turbo props and canard wings be studied. This configuration allows for protective engine mounting and unobstructive weapon placement.

Seven crew members are suggested for a new gunship. They would be designated as follows: (The dual jobs assigned some crew members easily integrate with each other.)

1. Pilot
2. Copilot
3. Fire control officer/Sensor
4. Electronic warfare officer/Sensor
5. Engineer/Weapons mechanic
6. Illuminator/Scanner
7. Lead weapons mechanic

The following capabilities are necessary to provide for tactical advantages and operational roles required by the SOF:

1. Deployment: The airframe must be constructed to provide a pressurized area for expediting deployment.
2. Flare Capability: The aircraft must possess the ability to provide flare support in search and rescue (SAR) operations and forward operating base (FOB) cover.
3. Range/Loiter Time: The aircraft must be capable of air refueling, and flying a minimum of 2,000 N.M. and operating for a minimum of 5 hours in combat without refueling.
4. Secure Voice: The crew members must be able to transmit and receive on secure voice.
5. Weapons: The aircraft must have three trainable weapons of mixed capabilities.
6. Sensors: There must be a minimum of two night visual sensors.
7. Pod Mountings: There must be pod mounting points on the airframe.

The tactical employment concepts presented in Chapter III are based on a gunship designed and constructed with these capabilities.

NIGHT OPERATIONS

> They (the Soviets) know the United States will not fight at night. (9:203). Maj. Gen. George Keegan

> In between gunships, three to four minutes, the enemy would be up and into the wire. The gunship would then shoot them back from the wire and do this until the next gunship came up. It continued all night (1:171). An American observer; objective 31; Cambodia

Darkness is an asset in unconventional war, especially during clandestine or low visibility operations. A new gunship must be designed to operate in all flying conditions, with emphasis toward performance in marginal weather and total darkness. JCS Publication 20, Volume II outlines this specific requirement. "In an unconventional warfare (UW) environment, most air operations will be conducted during the hours of darkness and, for some missions, in adverse weather conditions" (13:5-23). The capability to function in darkness provides the gunship with numerous unique advantages. The psychological impact of denying your adversary the safety of darkness and using darkness to heighten fears of the unknown is extremely advantageous.

The nightfighting capabilities of the new gunship must be self-reliant, independent of other flying assets, and directed toward target search, acquisition, and destruction. The recent real-world employment of the AC-130 gunship in daytime conventional operations as in Grenada has shadowed the original design intent of a ". . . night and all-weather very close support. . ." (28-3) weapon system.

WEAPONS

> This is a political war and it calls for discrimination in killing. The best weapon of killing would be a knife. (1:258). John Paul Vann

No part of a gunship design provides more controversy than its armament compliment. The remarkable advances in fast-firing guns and the recent innovations in rocket propulsion and guidance present new choices for gunship application. If mixed properly, these weapons add tremendously to the destructiveness and survivability of the gunship. The targets encountered in the

unconventional arena fall into two categories: personnel and resupply elements encountered on lines of communications (LOCs) (33). These targets are the same the gunship was designed to destroy in Southeast Asia where there was ". . . a need for a system that could saturate the ground with fire for interdicting enemy reinforcements, for supporting ground troops in contact with the enemy, and for defending isolated hamlets and outposts under attack...(and) hit small, often fleeting targets. . ." (1:iii). The weapons this study reviews are superior in the destruction of the targets considered most likely to be encountered in the UW arena.

The guns must be trainable and sensor sighted. General Electric is currently developing an airborne universal turret system capable of firing through plus 90 degrees forward azimuth and a maximum depression of plus or minus 50 degrees (20:1). If required, the ability to fire and hold on one particular target could be accomplished in a maneuvering, either-direction orbit.

The advantages in tracking a target and firing from numerous flying attitudes, variable altitudes, and air speed ranges provides several exceptional dimensions to gunship employment. Foremost, the gunship is no longer placed in a forced firing orbit and can operate with much greater freedom. The pilot may now select the best possible attack position and continue the attack free from a predetermined orbit, air speed, and altitude, yet provide constant target coverage. The pilot is essentially removed from the firing procedure, allowing him the freedom to concentrate on aircraft maneuvering and defense. Secondly, the altitude variation allows weapons enhancement and stronger target signatures due to decreased range and greater options in countering threats. The final dimension is the increased element of surprise. The ability to fly in, acquire, and shoot quickly limits exposure time and denies the enemy the run to cover.

Targets encountered on LOCs during armed night reconnaissance missions are usually composed of transportation, resupply, and personnel elements. These targets are easily destroyed when caught in the open with weapons and munitions designed for these particular targets. The guns selected for a new gunship must be fast-firing, quickly armed and aimed, with one gun capable of an effective slant range of 12,000 feet. The munitions must possess flechette anti-tank and incendiary rounds with excellent ballistics. The bomb damage assessment (BDA) issue that arose in Southeast Asia when the Air Staff relayed the doubts about the credibility of gunship truck-kills must not be repeated (1:169). A superior fire-starting round would solve any BDA validity problem. The effectiveness of a gunship is determined by its munitions and their destructive capability which depends on the availability of rounds designed for specific targets. "The AC-119KS truck-killing record rested in part on a mix of 20-mm rounds - armor piercing incendiary (API) and high-

explosive incendiary (HEI). . . the mixed rounds fully demonstrated their worth against tanks. . ." (1:218). The ability to mix rounds is extremely important in all unconventional shooting situations.

The finest gun combinations defeat a wide variety of targets and provide variations in stand-off ranges. In reviewing possible gun choices that have met the preceding criteria, there are three which are compatible for gunship configuration. These guns solve the problem of arming a gunship for engagement and defeat most targets encountered in the SOF environment. They are the General Electric .50 caliber Gatling gun, the General Electric 25-mm GAU-12/4 gun that is built into the airborne turret previously discussed, and the Bofors 40-mm L/70 automatic AA gun. These guns provide coverage of the most likely encountered unconventional targets by possessing the best total characteristics in ballistics, probable kill ratio (PK), and round mixes.

The .50 caliber gun is one of the most versatile weapons ever used in combat. It possesses devastating destructive capabilities, and the added dimension of a fast-firing Gatling system increases its effectiveness. General Electric has tested a prototype of a .50 caliber Gatling gun which is suitable for mounting in their AH-1T turret system. "The gun is currently designed to fire at rates of up to 8,000 shots-per-minute with linkless feed" (24:2). The proposed ammunition is an improved high velocity round with muzzle velocities between 2,800 to 3,450 feet-per-second, depending on round mix (24:2). The loading system can be designed to facilitate easy reloading in the air by using module systems. The .50 caliber Gatling gun would be a superior anti-personnel and light-target destructive weapon for a new gunship.

The General Electric 25-mm GAU-12/4 gun and AH-1T turret system is ideal for gunship installation. The gun is a newly developed five-barrel Gatling gun built with existing technology. "The turret is designed to handle recoil loads for firing rates up to 1,500 shots-per-minute" (20:1). The turret system is electrically driven by two servo-motors and can be easily adapted to sensors for trainable shooting. "The ammunition possesses better stand-off range and lethality than the current 20-mm or 30-mm ADEN/DEFA guns" (20-1). The projectile weight of the 25-mm HEI is 181 grams with a muzzle velocity of 1,085 meters-per-second versus the present AC-130 20-mm HEI projectile weight of 100 grams with a muzzle velocity of 1,030 meters-per-second. This weapon could destroy most vehicles and targets encountered on LOCs. Its proven technology, firing rate, reliability, ease of loading, and ammunition mix make it an excellent weapon for a new gunship.

The Bofors 40-mm L/70 automatic AA gun is a proven weapon

for gunship application. The L/70 ballistics are substantially improved over the Bofors L/60 which is currently in the A/C-130 gunships. The L/70 HE projectile weighs .88kg with a muzzle velocity of 1,025 meters-per-second (4:478). The firing rate is 300 rounds-per-minute which, if slowed, would provide an excellent two second burst pattern of approximately six rounds. For ease of mounting, the weapon could be hard-mounted with trainable positioning of only plus or minus ten degrees vertical and plus or minus 15 degrees azimuth. This would provide excellent shooting results in a modifiable shooting orbit. The round mix could include an adaptable flechette anti-armour round that would defeat 4 inches of armour at 2,000 meters.

The rocket is the one other weapon that should be considered for application as it is capable of greatly extending the destructive magnitude of a gunship. The ability to guide a rocket could be easily designed into the sensor system. The new turbine rockets are fast and allow enough warhead size and weight to destroy large and difficult targets with increased stand-off range. The "Hell-fire," "Laser Maverick," and "Harpoon" are proven rockets that should be considered for gunship armament (32). They are capable of carrying various warheads which would solve tactical problems not presently handled by the AC-130. These problems are chemical dispersion, large bunker destruction, small vessel engagement, and the ability to cleanly knock a large hole in a wall or building. The capability to have a loading station inside the aircraft to change warheads should be considered. Rockets would provide a gunship with the discriminatory killing capabilities of the knife; surgical firepower in a one-time, one-shot situation.

THREAT SURVIVABILITY

The range of sophisticated light and highly mobile anti-aircraft weapons available to our enemies creates an ever increasing threat environment. In low intensity conflicts, the efficient deployment of anti-aircraft weaponry, some which is of our own manufacture, can significantly upgrade threats. Several inherent features of a new gunship would provide added survivability, even in medium threat environments. Aircraft survivability depends on numerous factors and constantly evolving combat tactics that are difficult to categorize and prioritize.

AC-130 gunship survivability was a direct result of the development of fighter-escort tactics (1:118). These tactics evolved as methods to strike extremely tempting targets that were well defended. The fighters were employed in a flak suppression role, which they successfully accomplished. Maj. Gen. Robert L. Petit, Seventh/Thirteenth Air Force Deputy Commander, thought it evident: "The enemy pays a hell of a price to go after 'Spectre'" (1:120). In any future gunship role fighter escort

tactics must be created and employed, something which is not being accomplished in the gunship units now (30). A new gunship must allow for the easy integration of other tactical air assets.

The very low attrition rate of the AC-130s in Southeast Asia can be traced to two factors which must be incorporated in any future gunship. The first is the ability of the crew members to visually observe threats. In the AC-130s the illuminator operators (IOs) and gunners hung over the ramp to call evasive maneuvers after seeing threats. The ability to actually see threats behind and under a gunship is one asset that should never be retired. Secondly is the ability to quickly modify the gunship to counter improved enemy tactics. This enabled the gunship to keep pace with the dynamics of the night air war. What consideration one could allow in the design of a gunship for future modification would be difficult to know, yet the nature of unconventional war demands flexible and modifiable weapon systems.

The most important maneuver in a hostile sky is the ability to place the airplane in another part of that sky in a non-predictable and un-predetermined maneuver. This ability will be enhanced by a new smaller-sized gunship with higher speed and greater maneuverability. The pilot is removed from the firing loop, so his concentration can be focused on aircraft maneuvering and defense. This should greatly enhance his threat awareness and reaction time.

Composite construction materials will provide a smaller image return negating the effectiveness of radar controlled anti-aircraft guns, aircraft acquisition radar, and IR tracking systems. Quieter engines and the installation of IR shielding around the engines would reduce the success of IR SAMS.

The concept of defense for a new gunship should be based on countering the threats found in a low-threat environment. These would include weapons used for short-range defenses, such as small arms, high-rate AAA, all types of man-portable IR SAMS, and large caliber transportable AAA systems (27:1). The older Soviet AAA weapons are now ending up in the arsenals of third world countries instead of being retired from service. This threat is increasing as these countries acquire large amounts of these weapons.

Electronic Countermeasuring Equipment (ECM) should be pod-mounted for threat interchangeability. The ECM controls should be split and mounted at both the copilot and Fire Control Officer's (FCO) panels. The ECM equipment selected should compliment visual threat acquisition.

The best systems are those which, once turned on, are automatically capable of countering the threat. Two systems of equal capability are recommended: the AN/ALQ-171(V)ECM pod or the

AN/ALQ-131 pod (27:1). Both provide countermeasures against a wide variety of enemy-threat radars and have growth and flexibility features which would allow them to increase their capability as enemy radar equipment improves.

Infrared countermeasures should be mounted in the form of an IRCM pod. The Modularized Infrared Transmitting Set (MIRTS) is recommended to counter the IR-guided surface-to-air missiles (27:1).

The effectiveness of any weapon system results from the confidence of the crew and their belief in the machine and in their own survivability. The present gunship is difficult to bail out of in an emergency, especially for the people up front. A new gunship should have bail-out exits that are accessible to every crew member.

SENSORS

> With its multiple sensors, I think [the gunship] is the best weapon for either air or ground support of a night engagement. (1:258).
> General Momyer, 7th AF Commander

Sensors provide a gunship a primary advantage in unconventional warfare. The gunship has no competition in the mission of searching out the enemy in the night and targeting his position. To be effective, the sensors must be able to perform large area surveillance at a distance of at least 20 kilometers unencumbered by moderate meterological conditions from 5,000 to 15,000 feet. They must possess resolution capable of distinguishing people at 2,500 meters. It is possible that the ground commander could have a data link with the gunship providing him with a high resolution display of the target from the air. The gunship could then engage targets selected by the ground commander (31).

The sensors must be trainable to all weapons, possess slave features, INS interface, and video recording capability. They must have automatic tracking features which allow hands-off tracking of certain large targets. The ability to engage multi-targets, with one sensor and gun working one target simultaneously with a second sensor and gun working another would be a significant increase in fire power. The potential of attacking several targets in one pass while maneuvering and engaging targets while exiting would be a formidable capability.

A high-resolution radar sensor would provide all-weather accuracy and target detection. The technological decision concerning the application of high-resolution radar for

use as a gunship sensor must take into account two factors: the reliability problem and the future advances in radar acquisition and homing weaponry (30).

Two sensors which provide excellent target acquisition and are complimentary in capabilities are the television (TV) and infra red (IR). Since the last production of both for gunship installation, several technological advancements have been made which offer improved target recognition and identification ranges (19:3). Both can be mounted in stabilized platforms which provide adequate sweeping capabilities for trainable gun shooting.

OTHER CONSIDERATIONS

The tactical concepts and design considerations covered in this study are essential in developing a future gunship because they represent the basic SOF mission. There remain tactical employment concepts and design considerations which were not addressed. Those which are classified were not included. In addition, the dynamics of the weapons acquisition system itself exerts its own influence beyond the immediate realm of the SOF. Any decisions concerning the design and construction of a new gunship will unfortunately reflect this complex environment.

Conclusion

> What are we going to do? What are we going to do? (10:231). Capt. Sven Ryberg, CIA command ship at the Bay of Pigs

A recent Air Force study of future conflicts, Air Force 2000, found that ". . . the risk of U.S. involvement in such low intensity conflicts can be high, but in the decades ahead the hazards of standing aside may be higher. . ." (15:86). Our ability to adapt sufficiently to the dynamics of unconventional conflicts cannot be handled in a business-as-usual approach. These are not typical situations. The weapon systems and the soldiers sent to fight in them must be as unique as the situation.

Dr. Thomas A. Faybranic, a historian specializing in U.S. airpower, recently said, "We have failed to build an adequate force structure for the real world" (25). Unfortunately, this is true. The weapon system and the soldier are not tailored to the situation, especially in the SOF. We have institutionalized our weapon systems to fight the Soviets and we would probably send these very weapons to fight the Romans. Somehow we must clear our heads, and move aggressively toward improving our capabilities in these low-intensity conflicts.

To accomplish this the Air Force must evaluate its real SOF capabilities and not refer the findings. There is not a night, all-weather attack aircraft that approaches the capabilities a new gunship would possess. The SOF should no longer operate with weapon systems intended for employment in conventional arenas. The unique capabilities of a gunship dedicated for the SOF will create conventional employment possibilities. However, the threat is in the unconventional night war. A gunship must be dedicated to fight that war with the SOF.

There are no realistic alternatives. The Air Force gunship capability must be changed or we will gradually lose a deadly, effective weapon system that is essentially the entire night air attack capability of the SOF. A new gunship designed and constructed for the SOF mission would provide the Air Force with the powerful ability to project a surgical, covert weapon system worldwide. It would be a quantitative and qualitative leap toward confronting the dynamics of low-intensity conflicts.

Recommendations

"Revitalizing our Special Operations Forces (SOF) remains a high priority of this Administration. . ." wrote Caspar Weinberger in his annual report to Congress (14:285). If this is to be successfully accomplished, a new gunship is a necessity. It would provide us flexibility in our reaction to the unknowns and intangibles that low-intensity conflict imposes. It is a tailored weapon system that would fill the growing void in the low intensity conflict air attack capability.

The Air force must move toward directing its own role in the SOF. General McConnell's remark on gunship development in 1964 is worth remembering: ". . .it certainly is in the Air Force interest to run the program rather than to sit on the sideline commenting" (1-257). The Air Force must focus on the SOF gunship weapon system. A project group composed of experienced SOF operators and planners should be tasked to explore a new gunship.

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