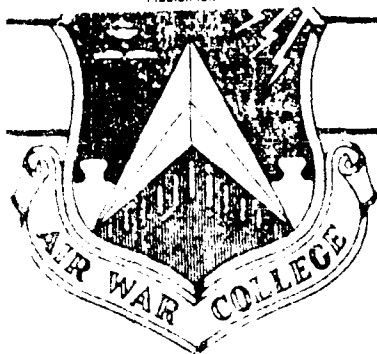
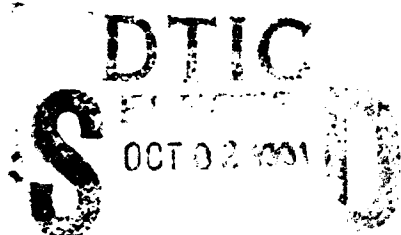




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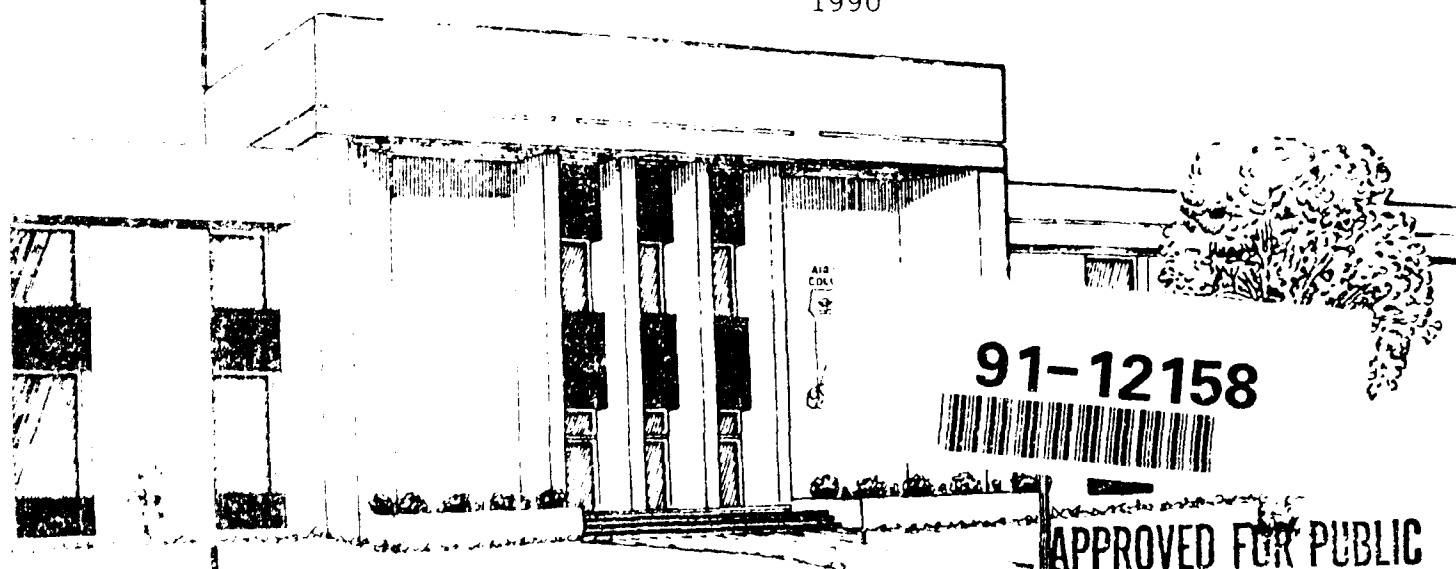
RESEARCH REPORT

A WING COMMANDER'S GUIDE TO NIGHT FLYING



LIEUTENANT COLONEL ROBERT D. WILLIAMS

1990



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AIR UNIVERSITY
UNITED STATES AIR FORCE
MAXWELL AIR FORCE BASE, ALABAMA

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A WING COMMANDER'S GUIDE TO NIGHT FLYING

BY

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A DEFENSE ANALYTICAL STUDY SUBMITTED TO THE FACULTY

IN

FULFILLMENT OF THE CURRICULUM

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EXECUTIVE SUMMARY

TITLE: A Wing Commander's Guide To Night Flying. AUTHOR:
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The increase in our night fighting capability is a recognition that the various threats to the United States will be operating at night. Fighting at night is not new, but until recently our tactical air forces were ineffective at it for many reasons. The latest innovations in technology have caused us to reevaluate the effectiveness of night operations. However, the application of technology requires more than just machines. The human element must also be integrated into the effectiveness equation. This paper examines why we need to increase our night capability, problems with operating in the night, and some ways to organize for night air operations.

BIOGRAPHICAL SKETCH

Lieutenant Colonel Robert D. Williams, (MSM, Troy State University) has been involved with tactical flying in night combat operations and night fighter training since pilot training. LtCol Williams has flown night combat missions in the F-111A in Vietnam, Laos, and Cambodia and has instructed night flying in the F-111D, A-7D, and the F-117. He was an operations officer and squadron commander in the F-117 unit at Tonopah, Nevada. LtCol Williams has accumulated over 2800 hours of flying time as a flight lead, instructor pilot, and flight examiner. Additionally, he flew over 1500 hours of that time at night during combat, normal continuation training, and numerous night tactical exercises. LtCol Williams completed Air Command and Staff College in 1981. He holds the Distinguished Flying Cross and seven Air Medals. He is a graduate of the Air War College class of 1990.

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CHAPTER I

INTRODUCTION

Man has been fighting at night since the dawn of recorded history. The primary reasons for fighting at night have been to surprise the enemy, conceal movements from the enemy, and ultimately destroy the enemy. The attacker, with conceivably a smaller force, would surprise the defender in the darkness. This surprise would create confusion among the defenders and the attacker would proceed to win the battle with fewer losses than if he had attacked during daylight. The great military theorist, Carl Von Clausewitz, was very skeptical of night warfare. He stated in his book On War:

Basically, a night attack is only an intensified raid. At first glance it looks highly effective: supposedly the defender is taken unawares, while the attacker, of course, is well prepared for what is about to happen. What an uneven contest! One imagines complete confusion on one side, and on the other an attacker concerned merely to profit by it. This image explains the many schemes for night attacks put forward by those who have neither to lead them nor accept responsibility for them. In practice they are very rare. (1:273)

His skepticism has not prevented military men from attempting night attacks. A foremost proponent of night warfare has been the Soviet Union. They have used the darkness with varying degrees of success since before their wars with the Ottoman Turks. In World War II they were very successful using it

against the Germans and later the Japanese. (2:ix)

For the United States, technology has been the answer to Clausewitz' skepticism. Night Vision Goggles, Low-Light Level Television, Infrared systems, and Laser systems can almost turn night into day for our forces. The American lead in technology over the Soviets has become a shibboleth in our defense planning. This technology lead is how we expect to counter the sheer mass of the Soviet military. (3:105)

Practically since its inception the US Air Force was interested in night warfare. A founding father of the USAF, General Muir S. Fairchild, believed in 1922 that airpower used at night could add a new dimension to combat. (4) Yet, in World War II the Air Force was primarily a day force. This was due fundamentally to the importance the Air Force placed on the writings of the Italian airpower advocate Giulio Douhet. After the war there was a renewed realization that night combat aircraft could be a significant factor in the employment of airpower. Unfortunately, we entered the Korean War with little in the way of equipment for night warfare. At the beginning of the Vietnam War, we still had little in the way of reliable night capability. There were some specialized night units created and thousands of night sorties flown to stop the North Vietnamese from moving their supplies and equipment at night. The effectiveness of these sorties was questionable at best. These night missions, with aircraft

ill-equipped for night warfare, had more than one pilot wondering what he had achieved when ordered to drop bombs at night from high altitude using a radar system that could hardly be called accurate. (5:10)

However, later in this war there were some successful night tactical missions flown. This was due to the introduction of aircraft equipped for night warfare, such as the F-111. When the war was over our night tactical fighter capability rested primarily with the F-111s but was largely forgotten about by the rest of the Tactical Air Forces (TAF). Even as late as 1984 General Wilber Creech, then Commander of Tactical Air Command (TAC), declared that tactical air force night capability had not progressed significantly since World War II. (6:55)

The situation for night tactical air warfare is changing. Now through the 1990s the TAF is scheduled to receive approximately 200 F-15Es and the Low Altitude Navigation and Targeting Infrared for Night (LANTIRN) pods. (7:60) The F-15E and F-16 with LANTIRN will add tremendous night capability to the current force of F-111s in the TAF.

What will the TAF do with these added forces? This paper will address the need for the increased night tactical capability, some problems developing this capability, and considerations for commanders when incorporating this equipment capable of night employment into their wings. This

analysis will be accomplished under the assumption that there will be significant budget reductions for the military in the 1990s. The reduced expenditures for operations and maintenance could erode our general combat capability. To help prevent this erosion, this new equipment needs to be effectively employed. For effective employment, commanders need to adequately man their organizations and provide the proper training environment. The tools will be there--the TAF needs to understand how best to use them.

CHAPTER II

WHY INCREASE OUR NIGHT CAPABILITY?

There are many reasons to increase our night capability. First, our primary enemy, the Soviet Union, will fight at night. In a global war scenario we need to be ready to meet this threat. In low-intensity conflicts and regional wars, where we have air superiority practically by definition, the hours of darkness will be used extensively by our adversaries. Increased night capability would help remove this sanctuary from the enemy. With the economics of lower defense budgets, our tactical aircraft have to be used both day and night. A night capable aircraft can also conduct many day missions effectively. Finally, we can use the hours of darkness to our own advantage with improved night technology.

Global Warfare

In spite of the political changes occurring today in the Soviet Union, they are still the only power capable of threatening the U.S. militarily, and will remain our primary adversary in the future. History shows that the Soviets have fought at night in the past and have been very effective at it. Also, the writings of Soviet military authors disclose

that they will be prepared to fight at night in the future.

One reason for their willingness to fight at night results from the lessons they learned in World War II. Initially they used night operations because they were being soundly beaten by the Germans. The Germans had control of the air and superior firepower. The Soviets operated at night to help reduce their casualties. They used night resupply and reinforcement while on the defensive at Stalingrad between July 1942 and February 1943. After the war turned in their favor they continued to use night operations very effectively. Fully 40 per cent of all Soviet attacks in 1944-45, including tank assaults, were launched in the night. (8:51)

Soviet writings and doctrine also discuss the use of night operations for achieving surprise and gaining the initiative in battle. A.A. Sidorenko, a Soviet Doctor of Military Science and a faculty member of the Frunze Military Academy, discusses night ground operations in his book The Offensive:

Surprise is a basic characteristic of night operations. In any situation it is necessary to attempt to take advantage of this factor to the maximum. The experience of the past war (WW II) shows that at night even relatively small podrazdeleniya (Russian term for subdivision or units) can use sudden and decisive offensive actions to achieve a level of success which in the daytime would require considerably more forces and weapons. (9:200)

They, like the U.S., plan to rely on new technology to give them improved night capability. Sidorenko goes on to state:

Outfitting troops with night vision instruments and using various means of illumination permit a reduction in the unfavorable influence of night conditions on offensive troop operations. Existing instruments for driving various vehicles (tanks, APCs, automobiles) make it possible to move at night with a speed close to the speed of movement under daytime conditions. (9:202)

As final documentation of the Soviet Union's commitment to night warfare, William E. Odom, Director of National Security Studies at the Hudson Institute, stated recently in an article in Foreign Affairs concerning Soviet doctrine:

The new goal for the high command is to be able to conduct a multifront operation on a frontage of about 700 kilometers, driving about 1200 kilometers deep in three or four weeks. . . . For the Central Front in Europe, it means reaching the English Channel and Pyrenees in less than a month on a front from the Alps to Denmark. (10:129)

The only way they could meet such an ambitious schedule is by operating day and night.

Despite the dramatic changes occurring in the Soviet Union every day, they will remain our most dangerous adversary in the foreseeable future. They will continue to have a very capable military that will be prepared to fight under any conditions, day or night. We have to meet this challenge.

Low-Intensity Warfare

A more likely scenario for the employment of U.S. military forces in the future will be in low to mid-intensity/Third World conflicts. These conflicts could range in size from single-mission type raids in Libya, to short

interventions in Grenada or Panama, to Korea and Vietnam type wars. We must be able to conduct effective tactical operations at night in these scenarios for both our own safety and because the enemy will be operating at night.

Night tactical air operations in these lower-intensity conflicts can be safer than daylight operations. In these scenarios we will have air superiority almost by definition. The Third World class of countries do not have strong air forces in comparison to ours, and they definitely do not have a strong night fighting air force. Against these weaker air forces we can concentrate our combat support aircraft to assist the attacking forces. Such support could come in the form of EF-111s or EC-130s providing ECM jamming. These aircraft could operate almost unimpeded in these environments. With this support and the cover of darkness, the attackers have an excellent chance of performing their missions safely and effectively.

Unfortunately, technology is not just the domain of the highly industrialized societies either. As the Secretary of State, James A. Baker, III, stated:

In light of the growing threat to our global interests and power projection forces posed by the proliferation of new technologies, we also need to reconsider our strategy for Third World conflicts. (11:12)

A result of this dispersal of technology is that our forces need to be able to counter this threat. Therefore, to help

insure the safety of our aircrews in Third World conflicts, we need to further develop our technology and capabilities.

When we have air superiority we have learned that the enemy moves at night. (12:1) To counter this nocturnal movement, we need to be able to interdict their operations at night. We have not been very effective at this in the past. This was primarily because we did not have the equipment capable of effective night interdiction. To become more effective we must rely on our night technology in these scenarios. Night vision goggles, low-light level television, infrared systems, and lasers have been used with various degrees of success in the past and continue to be improved. These technological instruments will help decide the effectiveness of our forces in the future.

Economics

In this era of reduced defense spending we need to make sure that we are operating as efficiently as we possibly can. Clausewitz once said, "Only the man who can achieve great results with limited means has really hit the mark." (1:573) This could apply to the future of the U.S. military. For the TAF this means that our aircraft and aircrews must be capable of multiple missions.

Night missions normally require more operable avionics than day missions. This is because the pilot relies more on

his instruments and computers for navigation and weapons delivery at night than in the day. An example is the Terrain Following Radar on the F-111. It has to function correctly at night to accomplish the night low-level mission, but it does not have to function at all for an effective day mission. If an aircraft is designed with the equipment to accomplish the night mission, the same equipment can be used on a day mission. This multiple mission capability has been designed into the F-15E and needs to be designed into our future fighters in the interest of economy.

Our aircrews also must be able to accomplish multiple missions due to the budget reductions. The night missions are normally more difficult to execute due to human limitations. With reduced vision at night, thorough mission planning is required because every maneuver has to be anticipated in advance to operate safely and effectively. Procedures have to be known and understood completely because it is more difficult to read checklists at night. The same planning and procedures knowledge needed to execute a night mission easily applies to day missions. Therefore, if one trains for the more difficult night mission it will be relatively easy to transition to the day mission. Night training could consequently save money by reducing the need for some day training missions.

In summary, we need night capability for several

reasons. The various threats we will face will operate at night. It can also be safer and more effective to operate at night in the various threat scenarios. It can be more economical to design our aircraft for night missions than for strictly day missions. It can also be more economical to train for night missions knowing that aircrews can transfer much of that training to day missions. The Air Force is building the equipment to move into the night environment now, but there will be problems implementing this new capability.

CHAPTER III

PROBLEMS IMPLEMENTING NIGHT CAPABILITY

There are many problems when implementing a night tactical capability. Some of the problems to be considered are that most people do not like to work at night and the human body was not designed for efficient night work. Also the equipment used at night has limitations and the associated risks of night missions need to be judged. Problems with night training and tactics also need to be deliberated. Finally, the support required of night operations will cause many changes in wing organizations. These problems need to be carefully thought out in peacetime if we are to have an effective night capability in combat. Yet, the commander will have the most difficulty preparing for combat in this peacetime environment. This is partially due to the domestic concerns of the aircrews, such as family life and other activities. As Lieutenant General Jack N. Merritt, former Commander of the Army Command and General Staff College, said concerning night operations:

An impulsive soldier might embrace new technology and consider the problems associated with operating at night overcome. A more thoughtful soldier will find that new tools and advanced technology provide only partial solutions and that experience, study, and practice cannot be ignored if one is to understand the essence of night combat. (2:Forward)

Peacetime allows us the freedom to study and practice night warfare to gain the experience needed to have an effective night fighting force.

Night Work

One of the first things to consider about night flying is the fact that most pilots do not like to fly at night. They would much rather fly day missions than night missions. When the author was an operations officer and squadron commander it was easy to schedule day training sorties. Even wing staff pilots that were attached to the squadron for flying would readily fly more than their required day missions. However, the night training sorties were always more difficult to schedule. The attached pilots were reluctant to fly more than their required night missions. Even the experienced pilots within the squadron were difficult to schedule at night. This was normally because they were training the inexperienced aircrews during the day. Yet, when presented with the opportunity to fly at night they were hesitant, because they did not like night flying.

In another example, the Officer-in-Charge (OIC) of the Aircraft Maintenance Unit (AMU) that worked with the author's squadron decided that he needed more senior supervisors on his midnight to eight shift. He moved several highly qualified master sergeants to that shift to provide the needed

supervision. Within two weeks every one of them, through various excuses, had moved back to the day shift. The OIC felt the real reason they moved was that they did not like working the night shift. This problem continued to plague him throughout his tenure as OIC. Generally, most people do not like night work as much as day work and the commander will have problems implementing night flying because of it.

Physiology and Psychology

Some of the problems with night flying stem from the fact that the human body is not designed for night work. It is a well known fact that man cannot survive long without food or water. However, he must have sleep even more frequently and cannot disrupt the cycle for long.

Many studies have been conducted on the effects of loss of sleep and the resultant fatigue. One author determined that fully one-fourth of all night accidents list aircrew fatigue as a contributing factor. (13:4) Research at NASA shows that sleep loss and fatigue lead to predictable performance degradations in pilots in the following order: complacency, computational and navigational errors, and communications errors. (14:22)

Physiologically the body has built-in time clocks that regulate many body functions. This is the famous biological or circadian rhythm. Studies have shown that the body is

constructed to operate on a day awake and night sleep cycle. When this normal schedule is reversed the biological rhythm does not change. (15:17) The rhythm will change over a period of time when changing geographical locations, such as flying east or west. Research on people making long distance flights indicated:

If the difference in clock time does not exceed five hours the biological rhythms are not altered. If it does exceed five hours, it will take about a week for the biological rhythms to become adjusted to the place of arrival.
(15:16)

However, the human body still does not adjust to a reversed work schedule. A schedule that routinely conflicts with the body's normal sleep cycle will lead a person to experience difficulties in obtaining adequate sleep and lead to fatigue. Research has also shown that between approximately 0200 and 0600 every day a person can be expected to have lower performance. (14:23) For these reasons commanders should avoid scheduling flights between these times, if at all possible.

The fatigue of night work does not affect everyone equally. Diet, family life, and the social environment, are also major factors. Individual intelligence and maturity also play a large role. (13:6) While there is probably not much that can be done in changing people's bodies to adapt to night work, there needs to be more research on the psychological effects of night work. This research should include studying the effects of night work on the worker's families.

It is a fact that day sleep is less restful than night sleep. (15:23) Unfortunately, for the night worker most families operate on a day cycle. With constant family movement and noise, the night worker's sleep becomes even less restful and fatigue will eventually set in. For the family, there are other problems to be considered. They have to be quiet during periods of normal activity. They will not be able to interact together for much time during each 24 hour period. Finally, the night worker will have trouble adjusting to the family's day schedule when they have the opportunity, such as on weekends.

These factors can lead to fatigue and commanders need to be aware of these potential problems in night flying. The best flight surgeon that the author ever worked with spent innumerable nighttime hours in the squadron talking to everybody. His real purpose was to study the pilots to see when they were tired. He would then make suggestions to the author and the operations officer concerning those pilots he felt were fatigued. At his recommendation, we would put those pilots on earlier and easier missions or take them entirely off the flying schedule.

As aircraft become more capable in night operations with new technology like LANTIRN; pilots, commanders, and flight surgeons need to become more aware of the inherent problems with night work and night flying. For a safe and

effective night force we need to use this knowledge in designing routine training activities.

Equipment Limitations

A major hazard of night flying is spatial disorientation. A survey of Air Force pilots showed 85 per cent have had vertigo or spatial disorientation. (5:21) Part of the reason for this has been that aircraft cockpits have not been well engineered for night operations. One culprit has been the location of some controls. In the A-7 for instance, to change a radio frequency, the pilot's head had to move down and left. Such movements are vertigo inducing at night or in the weather. Another problem has been cockpit lighting. The A-7 had many reflections on the canopy from the lights on the instrument panels. These reflections resulted in pilot disorientation more than once. Even the F-111, an aircraft designed for night missions, had many cockpit lighting problems. In Southeast Asia, most F-111 aircrews used masking tape to reduce the glare on the canopy from some of their instrument lights. With the adoption of day fighters like the F-15 and F-16 to night roles, commanders can expect continued incidents of vertigo and spatial disorientation. While there seems to be no medical cure for these incidents, emphasis on using proper instrument procedures during spatial disorientation incidents can help prevent accidents.

Night Training

The success of Soviet night operations in World War II was in large part due to intensive training and the ability to profit from mistakes and failures. (2:36) The TAF must have the versatility, adaptability, and capability for night employment. A major problem with implementing our night capability in the past has been a lack of headquarters guidance. For the TAF, TACM 2-1, Tactical Air Operations, outlines the flying training philosophy,

The pace of modern high intensity war will not allow time to polish skills, develop new procedures, new techniques . . . as the crisis develops or after hostilities begin. Hence, training for aircrews . . . must be as realistic as possible Our peacetime training goal for aircrews must be to provide the equivalent of combat experience in the maximum quantity and quality that our resources can produce. (16:10-2)

Night aircrews need this quantity and quality training also since our potential enemies will be equipped and prepared to fight at night. TACM 2-1 was written to ensure the aircrews complete their training safely and effectively. However, it was written for a TAF that primarily trains during the day. This can cause problems in effective night training.

To illustrate a potential problem consider the following example. TACM 51-50, Tactical Aircrew Training, governs night training. According to this manual a night sortie is "one on which either takeoff or landing and at least 60% of flight duration or one hour of flight time, whichever

is less, occur during hours of official darkness." (17:3-2)
AFR 60-1, Flight Management, defines night time as occurring between official sunset and official sunrise. (18:27)
Following these rules, an aircrew could takeoff 20 minutes before sunset, accomplish an air refueling event, land one hour after takeoff, and log a night sortie with night refueling. While this is strictly legal, it is not realistic and certainly would not enhance their night proficiency nor capability. It is possible to accomplish all the night training events required by TACM 51-50 after the sun goes down but never in actual darkness. This manual should be revised to incorporate the philosophical intent of realistic combat training stated in TACM 2.1.

Another issue that needs emphasis is the lack of night tactics using this new night technology. Since the night mission is more difficult to execute than the day mission, it is not just a matter of telling a pilot to do it like he did it in the daytime. Frank C. Mahncke stated in the Naval War College Review concerning new naval technology and tactics:

. . . first, the best combination of technologies and tactics is not always obvious. Second, the best solution requires a good grasp of both the technologies and the operational needs. (3:103)

The tactics must be developed for the mission to be accomplished. With the development of tactics, the needs of a training program become obvious and the goals become focused. As we obtain the equipment to enhance our night capability, we

need to develop the ability to use that equipment. This has to start at the headquarters with the development of better tactics to cover potential threat scenarios. Only by developing sound tactics can training programs be designed to implement them. The tactics manuals and regulations need to be updated to reflect the new emphasis on night employment. They need to become more realistic to night combat requirements and capabilities. With budget constraints, night training missions need to become more than "square fillers". Individual training events have to be performed in the dark and not just after official sunset. Air refueling just after the sun goes down is not the same as night air refueling. The tactics and training programs for night operations need to be studied now while there is time to develop them fully.

A better solution to the training problem would be to have the wing commander develop his own program. The headquarters should dictate the mission and the wing decide how best to train for it. Since each wing is different, even when they have the same aircraft, it is logical for the commander to tailor the training the wing needs. He should be the one deciding how ready the wing is for each mission task and then make the adjustments. For instance, if he determines that the wing is deficient in night weapons deliveries then he can change the training schedule to correct the deficiency. The responsibility for mission execution lies with the wing

commander and there is nobody better qualified to train the wing for that mission.

Another problem is that military training generally, and aircrew low-level training in particular, has come under attack in recent years. The public has complained that the maneuvers and training were too destructive and too noisy. This has been particularly true in Europe, especially in West Germany. This problem will become more acute as we obtain more night capable aircraft and we conduct more night training. This will bring more protests from the public. Without a perceived national threat, they will see no need to put up with this unwanted noise. The Air Force is even considering cancelling the deployment of LANTIRN pods to the F-16 wings in Europe because there is no place for the units to train. (19:26)

Consequently, we need to constantly work on convincing the public of our need for training. They have to be told how our training considers the potential threats to them. From analyzing these threats, the techniques are developed to defeat the threats. These techniques need to be practiced in the same environment where they will be used and they cannot be simulated effectively. Aircrews cannot be safe and effective if their training does not take place in the type of environment in which they will be called upon to fight. (20:13) The public also needs to be told that restrictions

are constantly being imposed on the military and this is greatly hampering our ability to train.

The military will, unfortunately, have to spend much time and money convincing the public of the need for training. One solution has been to move the training to other countries. The German Air Force flies 46 per cent of its low-level flying in foreign countries. (21:33) This is very expensive and not very realistic. As Air Vice Marshall Walker, Deputy Chief of Staff Operations and Intelligence, Hq Allied Air Forces Central Europe said:

The remaining ace is NATO-man, he must be trained superbly. That training costs far more than money and resources; it involves the complete understanding of the need for training by the free people. It is a message which collectively, is not getting across to the NATO electorates anywhere near enough and that comment is framed in political terms because it is, essentially, a matter for political masters to espouse. (22:33)

The problem then for military leaders is to be articulate enough and persuasive enough to convince the politicians and the public of the need for training. This will become even more difficult as the requirement for night training increases.

Night Support

The last problem to be discussed is in the support area. Most Air Force bases routinely operate from approximately 0730 until 1700. While there are always some support functions operating after these hours, they are small

in number. Most base facilities do not operate after normal duty hours to work with these few potential customers. However, with an increase in night operations, commanders must take a critical look at their support organizations to see how they can help with the night mission. As Flying Safety magazine said in an article on night missions:

During night operations, environmental and social issues take on added importance. As much as possible, base facilities such as CBPO, BX, commissary, eating facilities, and the hospital will need to accommodate the increased night operations. Education of family members will be especially critical in recruiting their understanding and support. (14:23)

The increase in night activity will place an added burden on the functioning of the base. Still, commanders must minimize the burden on their people as much as possible to improve the effectiveness of the night fighter force.

In spite of these problems, commanders must convince their people that the problems conducting night operations are outweighed by their potential benefits. These benefits above all include the potential effective execution of night combat missions to carry out the national will. With good planning, training, and equipment, the objectives of a night mission may be accomplished safely. We must be able to exploit our capabilities in every area and not be afraid of innovations. Since we are acquiring the capability, let's make sure we can use it.

CHAPTER IV

ORGANIZING FOR NIGHT OPERATIONS

Clausewitz stated that, "night operations are not merely risky; they are also difficult to execute." (1:275) Night operations are difficult to execute but they are not impossible. This chapter will discuss some of the ways a wing could be organized to have a more effective night capability. One way of organizing is to have an exclusive night unit within the wing. A more practical solution might be to have a unit fly a mixture of day and night sorties. The advantages and disadvantages of both of these organizations will be discussed.

Night Unit

The first change to be considered is the creation of a unit exclusively trained for night operations. Units dedicated to night operations are not unique. Military organizations have had them since they first started fighting at night. In World War II practically the entire British bombing effort was accomplished at night. The Germans countered with a night interceptor force. After the Korean War, General Mark W. Clark, Commander of the United Nations

Forces the last 15 months of that war, mentioned his concern about night air warfare when he stated, "night aviation required specially trained units dedicated to the night mission to do the job properly." (23:91-92) In the modern Air Force, the F-111 units have almost an exclusive night role. There are also other smaller, specialized units whose domain is the night. For those units receiving the equipment for night fighting, the commanders need to consider the advantages and disadvantages of designating a portion of their forces exclusively for night employment. These forces can become the night experts for the commander.

There can be many advantages to a wing in making one squadron the night unit. First, the pilots in that unit would become very proficient in night operations. Obviously the more you practice in the environment where you will be employed the better you should be. Second, the morale of that squadron will normally be very high. There will be a spirit of "eliteness" within the squadron. This special feeling stems from being asked to do a difficult task and knowing that in a conflict this squadron could be the first in the wing to be employed. Also, in making an entire squadron the exclusive night unit, the commander could be more assured that the people are doing the night training instead of drifting back to the day shift as the AMU OIC discovered. There would not be another shift to move to. The pilots would be more likely

to follow the intent of the regulations when accomplishing their training requirements because there would not be another environment to turn to. Finally, a wing commander can be more assured that when tasked to do a difficult night mission he will have a unit ready and will not have to spend time preparing for that mission.

There are also many disadvantages to having a dedicated night unit within a wing. For one, it will take more people to manage all of the activities of the wing. This will be true in the operations, maintenance, and support areas. Exclusive night units will also take people away from other wing functions. Finally, there could also be morale problems from other units within the wing.

One large disadvantage is that it will take more people to manage a wing with an exclusive night unit. Within operations, ancillary duties such as Supervisor-of-Flying and Range Officer, will have to be performed over extended hours. People performing these duties will not be available for work until later the next day. This analogy is true in the maintenance and support areas also and thereby increases the number of people required in a wing. The supporting functions of the base will also have to extend their operating hours to accommodate the night unit. In wings without night units, the night workers go to CBPO, the hospital, finance, etc., during normal working hours. This has the tendency to make the night

workers come in earlier and extend their work day. With a dedicated night squadron, extending the work day becomes unacceptable due to the build-up of fatigue. Support organizations, therefore, must also have more people to extend their duty hours.

Dedicating people to an exclusive night squadron also takes them away from other activities within the wing. This disadvantage was pointed out by the British experience during the Dams Raid in the Battle of the Ruhr:

An elite squadron had spent eight weeks out of the front line undergoing special training and had suffered a 42% loss-rate which kept it off operations for a further long period. (24:20)

The people in the night squadron would not be able to interact with the rest of the wing. This could preclude the use of night squadron personnel in wing projects. They could also be precluded from participating in other activities such as intramural sports.

There could also be problems of morale within the wing because of the elite night squadron. If the night squadron is perceived as being treated better than the other units, the rest of the wing could become jealous. A more probable morale problem would be with the people in the night unit wanting to transfer to day work. As pointed out before, their bodies just are not built for continuous night work and most do not want to work at night for very long.

Exclusive night units will not be a panacea for commanders. Their effectiveness versus their cost in numbers of people has to be carefully weighed within the context of a given situation. In the final analysis, the disadvantages of an exclusive night unit outweigh the advantages in a peacetime environment. Budget reductions and a subsequent loss of manpower will preclude hiring the additional people required to operate such a unit.

A Mixed Day and Night Unit

As with most things in a complicated world, a mixture of night and day flying is probably the best way to manage the entire flying training program. The proficiency of the average pilot will not be at a peak in either day or night flying, but with a minimum of additional training sorties in either environment the average pilot should be more than ready for actual combat.

The question for the wing commander now becomes what is the right mix of sorties? F-111 units are encouraged to get 50 per cent of their training requirements at night. (17:A1-1) In some units a more appropriate mix might be to accomplish 60 per cent of their requirements at night. In another unit, maybe 40 per cent night sorties would be adequate. The night flying activity of the wing could also change with the season of the year. The longer days of summer

would suggest more daylight flights. The longer nights of winter would suggest more night flights. The night training schedule could also change as the wing matured in its ability to accomplish assigned missions. These adjustments are another reason why the wing commander needs flexibility in developing his training program.

When designing the schedule for the proper training mix some suggestions from noted neuroscientist Charles Czeisler, of the Harvard Medical School, could ease the transition to night work. He found in the Philadelphia police force that changing their schedule every 18 days allowed more time for adjusting to the change. The change should also occur forward in the shift rotation, i.e. moving from days to nights not the other way. Finally, he reduced the consecutive days worked to avoid cumulative sleep deprivation. (25:14) These suggestions can reduce potential fatigue and increase alertness. This would enhance the safety aspects of any night flying program.

The advantages of this mix of day and night flying are many. The wing can be ready for both day and night missions. With the future budget reductions this will be a better utilization of precious flying time. With minor changes in scheduling the wing could increase its night preparations without raising much suspicion. There would not be an "elite" unit which could cause morale problems within the wing. The

wing member's family lives would also remain more normal. Finally, with the future reductions in people, this type of organization will be better able to absorb these reductions and still maintain the pace of training required for effectiveness.

There are many things a commander can do to implement his new night capability. Commanders can create exclusive night units to have a fully prepared night capability. This will not be without potentially high costs, however. A better solution will be to mix the day and night flying and adjust it to the needs of the wing. With this compromise the wing will not be quite as ready for day or night combat missions as it could have been if it specialized, but it will be more flexible in any tasking that could be presented to it.

CHAPTER V

CONCLUSION

In the first part of the 1800s Carl Von Clausewitz wrote his famous book about the art of war. He wrote a chapter on night warfare, but did not think very highly of it. Since then many countries have gone to war and most of them have fought night battles with varying degrees of success. The U.S. has also attempted night warfare in the past and has had some successes, but probably more failures. We are currently buying F-15Es and LANTIRN pods to increase our night tactical capability. We think these systems can be used to our advantage because of our lead in technology.

One of the reasons for moving into night warfare is because our primary threat has a history of fighting there. The Soviet Union has fought well at night in the past and shows a willingness to fight at night in the future. Their writings and doctrine show they must fight at night to meet their wartime objectives. When this determination to fight at night is coupled with recent technological advances, there is a high probability that combat with them will be nonstop.

Another reason for increased night operations is that it also offers a degree of safety in smaller conflicts for us.

The night gives our forces a medium in which to maneuver unseen. It gives them a chance for mass, deception, surprise and seizing the initiative, basic ideas to win wars. We also know that the enemy in these conflicts will be moving at night.

With the decrease in defense budgets, night capable tactical aircraft offer a method of economy in defense spending. Night capable aircraft can be employed on night or day missions effectively. Training for the demanding night mission can also be cost effective, but is not without difficulties.

There are many physiological and psychological problems that need to be overcome and studied for an effective night fighting force. Night training has to be improved. This can be accomplished through guidance from headquarters, or better yet, by having the wing commander determine the training that is needed. He can be helped in this area by the headquarters if viable tactics are developed. Also, the public needs to be educated on the need for night training. This will be a time consuming process, but if it is not accomplished the alternatives could be even worse.

Night tactical air combat is still somewhat new but is growing rapidly with advances in technology. This paper examined the threat, problems implementing night capability, and considerations for commanders to take advantage of this

new capability. We need to fully incorporate our night fighting capability to keep from being outthought and outfought by an enemy who has already considered the future of night warfare.

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GLOSSARY

AFR	Air Force Regulation
AMU	Aircraft Maintenance Unit
BX	Base Exchange
CBPO	Consolidated Base Personnel Office
LANTIRN	Low Altitude Navigation and Targeting Infrared for Night
OIC	Officer-in-Charge
TAC	Tactical Air Command
TACM	Tactical Air Command Manual
TAF	Tactical Air Forces