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AVIATION EXPERIENCE IN HELICOPTER NIGHT FLYING PRACTICE

by

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ALAT FRENCH ARMY'S

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An Army aviator who cannot fly at night, cannot see at night, cannot fire at night is really disabled. Night vision is an imperative if air mobility is required. ALAT (Aviation Légère de l'Armée de Terre/French Army Aviation) is fully aware of this imperative and has already undertaken studies necessary to develop a night flying envelope thus acquiring some experience in this field.

Such experience was acquired through practical exercises 25 years ago when ALAT units received their first helicopters, decisive studies were undertaken in the 1970s when ALAT Command decided to increase Army's air mobility.

This decision was followed by provision of PUMA medium transport, light observation and anti tank helicopters with increased performance and better equipment to Army divisions and lead to research in the development of helicopter operation at night.

Since you were kind enough to invite me to this Forum to talk about ALAT's experience, I suggest that, after a brief historical reminder and following analysis of data obtained so far, we examine methods ALAT use to familiarize their crews with specific features of night operation; I shall afterwards describe techniques and procedures applied and briefly mention some future perspectives.

I. NIGHT FLYING CHARACTERISTICS

Twenty years ago, night flying training was limited to a short basic course considered sufficient to carry out exceptional medevac missions. The risks incurred, considering airborne and ground equipment available at that time, were quite important.

As an example, the number of night hours flown by ALAT from 1965 to 1970 did not exceed 1%.

The first night transport flown by US Forces in artificially illuminated battlefield in Viet Nam in 1966 is still quoted as an exceptional event.

In those years, ALAT had to meet air mobility requirements and to reduce operational discontinuity imposed by night.

In short, ALAT was trying to carry out, at night, all or part of their daily missions such as command, intelligence, fire support and transport.

To analyse the problems raised by the development of such night flying capability (figure 1) , the MOVEMENT function had to be studied separately from the firing function; crew qualification and anti tank missile firing technology existing at the time were also accounted for in these studies.

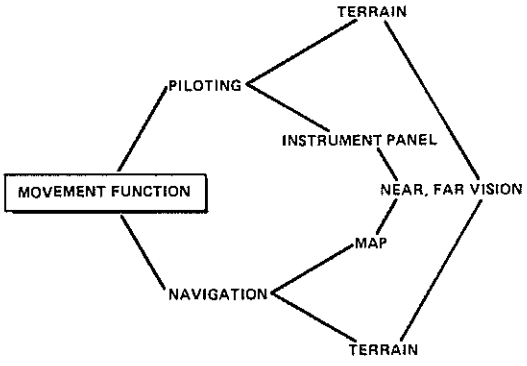

Figure 1

A number of technical requirements had to be satisfied after assessment of particular needs (figure 2 and 3)

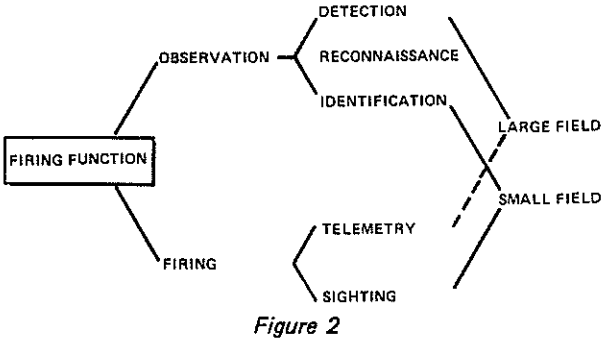

Figure 2

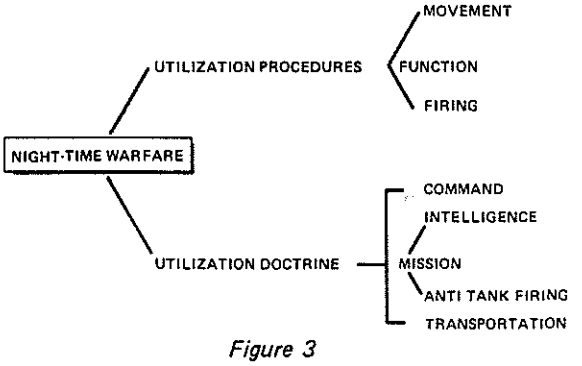

Figure 3

To save time while dealing with this new concept, two simultaneous actions were undertaken :

- The first action, developed without help of night vision equipment, required that we move from individual missions carried out by well trained crews on to regimental tactical manoeuvers or deployment of large air mobile detachments in order to prepare or continue combat missions initiated in day light conditions

- The second action was to find out night vision requirements as soon as possible so that crews already familiar with night environment could quickly be provided with combat equipment.

II. PROGRESSIVE CREW FAMILIARIZATION

ALAT crews' training update is summarized in the statistical analysis of night missions flown without night vision equipment (figure 4). ALAT presently flies more than 12000 night hours a year i.e. approximately 8% of their total number of flying hours.

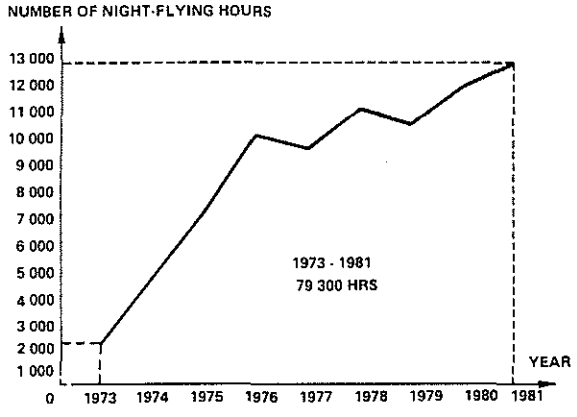

Figure 4

Another significant figure is the cumulated number of night hours flown by the present ALAT's 1100 pilots i.e. 126000 night hours corresponding to a mean experience of approximately 120 hours per pilot.

The result is an indication of our will to develop night combat methods; it naturally leads to a complete reform of the instruction programmes in training schools and regimental units.

Pilots are now familiar with night flight (6% of total flying hours) as from basic training and instructed in OPERATIONAL INSTRUMENT FLYING for 31 hours. Such instruction proves necessary when, for example, flying unvoluntarily into cloud situations at night.

Regimental units are now flying a large number of hours at night :

- 6% of the total number of hours on light observation helicopters and anti-tank helicopters

- 10% of the total number of hours on medium, utility and transport helicopters

Concern for flight and tactical safety has lead :

- On the one hand, to distinguish between training of crews for whom night flying practice is one aspect of preparation to combat and risks incurred by airlifted personnel for whom flight is not the essential part of tactical training.

- On the other hand, depending on the level of experience reached, to decrease obstacle clearance margins progressively thus reducing flying height and increasing tactical safety of helicopters.

These safety measures were progressively developed as follows :

- Adaptation of operational instrument flight rules to night flight i.e. 150 m safety height above the highest obstacle in the corridor when flying with outside reference points.

- Night flying practice for separate aircraft at very low altitude by very clear (level 1) night, 50 to 150 m safety height from ground, maximum speed 120 km/h,

Every pilot performs this type of flight in regimental units thus acquiring effective experience applicable to combat conditions and preparing for later use of night vision goggles.

Thanks to previously acquired experience, difficulties particular to this type of flight have now been solved provided helicopter equipment, crew qualification and operational limit requirements are achieved (figure 5)

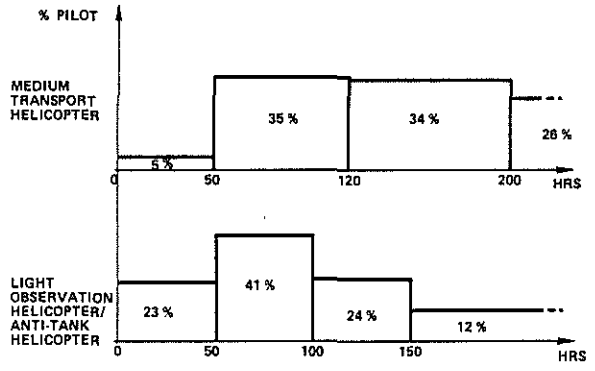

Figure 5

III. DEVELOPMENT OF TECHNIQUES AND PROCEDURES PARTICULAR TO NIGHT FLYING

A specialized, temporary unit had to be appointed to select night vision equipment, to develop the military characteristics of this equipment and to draft ALAT's operational rules for such equipment.

A Night Training Center was opened within ALAT's Advanced Instruction School in May 1975.

This training Center has been provided with its own equipment in order to perform its own missions separate from the school's.

The Center's main mission is to list and analyze problems related to acquisition of night flying capability; to do this, equipment likely to be used for visual flying, observation and firing at night is experimented.

To this day, amongst other experimental flights, thermal imaging cameras were tested for 450 hours and night vision goggles for 2400 hours.

Since the thermal imaging system is obviously irreplaceable in the FIRING function, the alternative selection between night vision goggles and thermal imaging camera applies to the MOVEMENT function only.

Both systems are assessed with a number of parameters : (figure 6)

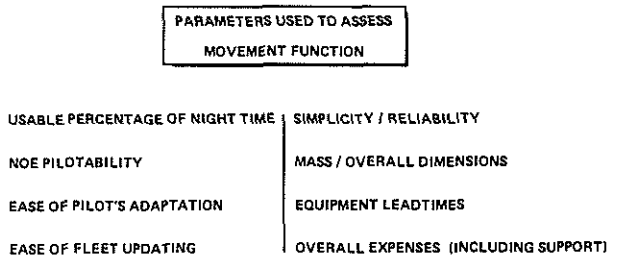

Figure 6

- Usable percentage of nighttime
- Pilotability in NOE conditions
- Ease of helicopter fleet updating
- Simplicity/reliability
- Mass, overall dimensions
- Equipment lead times
- Expenses, including support

Experiment results have already lead Center to make a proposal for regular use of night vision goggles in the near future.

Despite their limitations when compared with thermal imagery as to the percentage usable at night, these goggles offer the following advantages:

- Ease of image comprehension
- Possibility of binocular vision
- Absence of fixed, penalizing equipment
- Ease of personnel training
- Relatively low purchasing and maintenance costs

The above advantages will permit, without further delay, ALAT crews' flying missions in forward combat areas. They will also make it possible to fly from 0 to 50 m above ground in more than 75% of nights.

Compatibility of internal (instrument panel, self-contained navigation) and external (formation lights, landing light) lighting was developed in the Night Training Center with the help of technical services and cooperation from the manufacturers, it is now being applied to the entire fleet of ALAT helicopters.

The Night Training Center also implemented a number of specific devices including adaptation of night vision goggles to ALAT helmet and map reading device.

Drafting a list of needs and solutions will save precious time upon design of future antitank helicopter.

Following definition of the above trends, the Army's General Headquarters decided to emphasize development of tactical procedures permitting operation from 0 to 50 m altitude in the MOVEMENT function which is the basic element of any mission.

Two experimental SA 341/SA 330 squadrons were selected from tactical forces in 1979 to apply the technical operational rules and principles set up by the Night Training Center.

Their first goals, tactical liaison flight and transport through forward area, were divided into three phases :

- Crews' training under Center's responsibility
- Definition of tactical procedures with active cooperation of Officers and NCOs from units to be transported.
- Application of these procedures during exercises with troops

These phases implemented, amongst other exercises, during a night air transport between Corsica and the mainland are now over; they required 610 flying hours with night vision goggles

A number of tactical lessons were drawn from these exercises, the most important are :

- Confirmation that night vision goggles allow crews to follow the terrain in conditions similar to tactical day flying thus favouring surprise effect while decreasing helicopter's vulnerability.

- Possibility to proceed with sudden raids, attack key points on weakly held objectives or land assault forces discreetly some distance away from the objective when the latter is strongly held.

- Possibility to despatch large intelligence or tank combat forces to meet an unexpected tank threat

IV. FUTURE PERSPECTIVES

Near future perspectives have already been partly studied. Tactical observation and transport missions are possible with night vision goggles and ALAT is already familiar with the appropriate know-how.

Regimental units will soon receive a first batch of three hundred 3rd generation goggles.

As indicated before, crews have already been trained for night flying with outside reference points at very low altitude, goggles could therefore be used very rapidly in combat if necessary.

Our main concern is now technical problems particular to antitank firing at night.

The efficiency of SS11 missiles firing with artificial battlefield illumination has been rapidly examined. This firing mode is delicate to implement but could be used as an alternate

solution before an imaging firing mode is available. A study is presently in process to test the possibility to fire HOT missiles in the same conditions.

To prepare the future and within the antitank helicopter development framework, ALAT has joined AEROSPATIALE's VENUS qualification programme, the first results have shown that the missile could be fired at maximum range although night detection remains the most difficult point.

The VENUS system will soon be tactically assessed to validate the concept associating a thermal imaging camera used when firing and microchannel goggles used when piloting. This assessment will require testing an anti-tank helicopter in a complete combat phase.

V. CONCLUSIONS

To be quite exhaustive, I should point out that a new problem will be raised out of the predictable proliferation of thermal imaging firing control systems applicable to all weapons. The resulting modification of the tank/helicopter detection range ratio will jeopardize the present supremacy of the helicopter, even by day.

The difficulties that remain to be solved for night combat capabilities to approach day capabilities as concerns mobility, observation, and firing, keeping the present state of technology in mind, are now beginning to be well understood thanks to previous cumulated experience (figure 7)

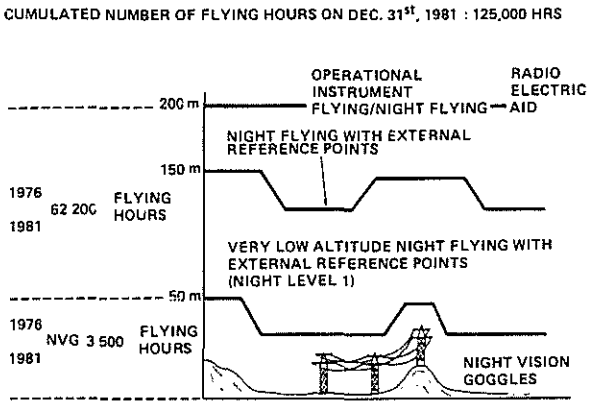

Figure 7

Although a perfect, final solution has not yet been found for each problem particularly as concerns navigation, avoidance of high voltage lines, permanent presence on terrain, it can be said, without being unduly optimistic that quantitative as well as qualitative progresses have been remarkable.

The ARMY and ALAT are determined to continue their task in order to fly and fight in a dark environment which is better known and mastered every day.