23RD EUROPEAN ROTORCRAFT FORUM 1997

PROCEEDINGS - VOLUME ONE

16-18 September 1997
Dresden, Germany

Published by DGLR, Godesberger Allee 70,
D-53175 Bonn, Germany

OPERATIONAL AND TECHNICAL ASPECTS OF HELICOPTERS IN FUTURE MILITARY SERVICE

Brigadegeneral Fritz Garben
General der Heeresflieger und
Kommandeur Heeresfliegerwaffenschule
31667 Bückeburg / Germany

Abstract

Political changes at the turn of this decade have produced new multinational commitments and missions for the German Army. Helicopters are becoming increasingly important. Interoperability will be required with assets of different force origin. At the decision of parliament, operational scenarios can range from „other than war" to „high intensity conflict", regional restrictions no longer exist. In multinational operations information, language, procedural and technical command and control problems must be solved. Helicopters will operate 24 hours a day at high speeds, very low altitudes and in marginal weather conditions, providing a high workload for the crew. This makes computerized mission planning and support a must. German Army is developing a concept for air mechanization and intends to have such missions performed by the combat helicopter UH TIGER and the transport helicopter NH 90/LTH Heer, to be introduced after the turn of the century. They will be organized at brigade and regimental level and capable of multirole missions in all types of combat. UH TIGER will provide the firepower, LTH Heer will provide combat support and combat service support. Simulators will be an integrated part of both systems for training and mission rehearsal. Field operations will be from mobile Army airfields with all necessary installations. Maintenace must be facilitated by a high system reliability and a health and usage monitoring system. In spite of sophistication, systems must remain affordable to give the Army the efficiency it will need in the future.

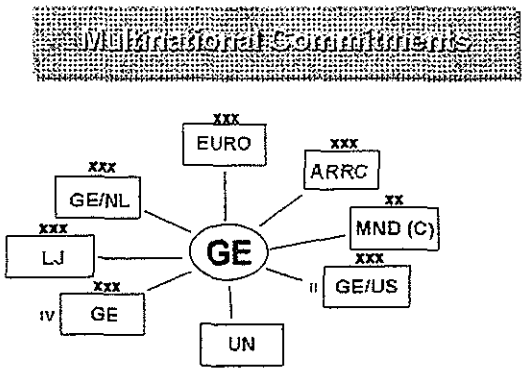
A.Introduction

To begin with, a short overview on our present German national defense situation as a result of the radical changes in Europe of the early nineties seems necessary. These have resulted in a fundamental change in the scope of future missions for army rotary wing assets, part of which we are already experiencing today. The second major change will be instrumented by the introduction of the multi role UH TIGER combat helicopter and the NH 90 transport helicopter as the mainstays of Airmechanisation. The third will be the result of the impact of electronic data processing in military command, control and information systems.

B. Political and military situation

The employment of German Armed Forces is primarily governed by constitutional requirements for the defense of German national territory and for defense operations under NATO command in the NATO area of responsibility. Force structures and procurement policy of the Army are oriented in a generally national manner which is understandable not only from a historic viewpoint based on the development of the Bundeswehr.

1.Commitments



A look at existing and probable multinational commitments, shows the Franco-German Corps, the Allied Rapid Reaction Corps, the German-Netherlands Corps, the Multi National Division (Central), the Danish-German LandJutCorps, the United States-German and second German United States Corps and the German national IV Corps. This speaks for itself and proves the economic feasability of national policy for equipment. It is also the only way to ensure training and interchangeability of German personnel.

The armed forces are however not limited to missions with the above mentioned formations. Since the supreme court ruling of 1993 on the German constitution, they can be additionally employed for other goals the German Parliament agrees to. This especially applies to the support of United Nations missions. In consequence, cooperation with non-NATO nations must also be expected.

As a result, no one can foresee the exact nature of future engagements. Considering employment in various and unspecified threat environments, the formerly justified specialisation to a few specific worst case roles for helicopters in Central Europe no longer fitted. Missions had to be adjusted to include a multirole and out of area capability.

This enlarged scope of missions will unfortunately not substantiate general requirements for additional equipment. Such missions must indeed be performed with existing equipment by task forces tailored to mission requirements. Additional equipment will, if at all necessary, be bought restrictively off the shelf in very limited quantities. There are no dedicated expeditionary forces. Due to their versatility, helicoters are becoming increasingly important in all missions.

Multinational alliances must be expected to increase in numbers and composition, so quite some issues seem to arise:

- The force commander must know what to expect from the helicopters supporting him.
- He must know how to task them for maximum benefit,
- Operations of helicopters of different force origin must be possible without mutual interference.
- Command, control, information exchange must be maximized
- The extent of interoperability possible between helicopters of different services must be explored
- Helicopter formation commanders and aircrews must be even more highly trained.
- They must be prepared to cope with a multitude of vastly different situations.
- Missions may be subject to change without notice.
- Logistic constraints must be minimized.

2. Scenarios

Operations are no longer restricted to Central Europe as they basically were in the cold war era. Future missions can be performed in hot

or cold areas and in areas of higher elevation. Aircraft performance will impose the only limitations.

Army helicopters may be used in Operations Other Than War. This can include disaster relief, peace supporting, evacuation operations or compatible scenarios. Examples for this are firefighting forest fires in Greece, the support of UN mission BAGHDAD or the IFOR/SFOR missions in former Yugoslavia and the TIRANA evacuation.
Scenarios can also range from low intensity to high intensity warfare. Examples for low or medium intensity warfare might be peace enforcing missions under UN authority. They could range from a civil war scenario to a limited battlefield scenario with a wide range of threats. A high intensity scenario might be expected in areas with troop concentrations such as were the case in Central Europe and which still exist in a number of countries.

In the cold war scenario there was one primary user - NATO Central Army Group (CENTAG) with one set of rules. Future Army Aviation missions must also be seen in cooperation with many users having many sets of rules. Not all of these will be identical with or even similar to national German or NATO regulations. This can complicate mission allocations, flight planning and command and control. Above all, different to a full scale war scenario, cooperation with civilian airspace authorities parallel to military airspace control centers must be expected. A mix of civilian and military air traffic must be dealt with.

The tactical environment can vary from a no - threat to a threat scenario, sometimes without warning and will often make precautionary measures necessary. These will require aircrews to wear additional ballistic or other protection gear, increasing personal risk and crew fatigue.

Multinational operations will require intensive and close coordination for planning and command and control. Adjustments to operational procedures may become necessary. Language problems may reduce efficiency and require double checking to minimize mistakes. This not only applies to planning but also especially to in - flight coordination.

The employment of helicopters is nearly always time critical. On the other hand mission planning requires intelligence in high detail. This can only be achieved by a constant flow of information being continuously digitized, processed and evaluated. It must be accessible to any and every friendly user requiring it. Information management will become one of the keys to successful missions. Nevertheless, situations may arise where digitized information is not available, because a key operator does not have the necessary facilities, or his facilities do not match ours, or vice versa. Manual processing must then still be possible, but time penalties will have to be accounted for.

Fast moving missions using heliborne combined arms combat power will not be possible in future complex environments without an intensive use of digitization. As end users, the helicopter crews must have a sophisticated on board data processing capability to deal with incoming information, and to display the near real time tactical scenario. They must rapidly and faultlessly be able to evaluate the situation and to react accordingly to threats or changes in the

mission. On the other hand, the crew must be able to enter data gathered in flight for processing and transmission to ground stations to update the situation.

The majority of missions will be at lower altitudes, often at night to reduce threat risk and make use of the element of surprise. Helicopters will have to perform missions at Nap Of The Earth heights. They will fly in between obstacles at light levels down to 0.5 millilux at speeds up to 250 Km/h and more in sensor flight. Obstacle warning and avoidance measures will be necessary.

Work load on the crews will be high, so many functions will have to be automated. A standard PC workstation is no use on board the helicopter. Man-Machine-interface optimized, Menu controlled line key, touch screen or voice activated functions must allow almost constant hands on controls operations. On-board emergency displays must override tactical displays, suggesting and allowing appropriate action.

Noise and other signature reductions must reduce detectability. Ballistic damage resistance by armour or damage tolerant structures must improve survivability. High mean-time-between-failure rates are necessary for all helicopter components. Easy maintainability resulting in low manpower required in the field must ensure a high mission availability. **All systems must however remain affordable.**

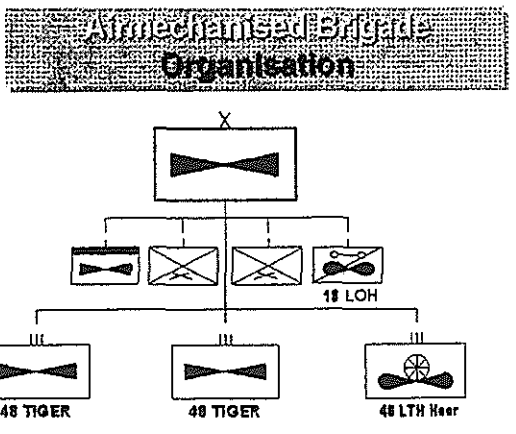
3. The Future

We are preparing ourselves for this future.
In developing the helicopter as a sophisticated weapons platform we are in the middle of a giant technological leap. This is partly the result of increased flight performance, but mainly due to the great advances in the equipment we will be installing. Vastly improved technology in the fields of mobility, firepower and self-protection will allow the helicopter to fulfill an operative role on its own. In the all arms combat it will perform in the same manner as the main battle tank has been employed. The really new quality in operating helicopters will be given to the German Army with the introduction of two completely new helicopter systems.
The corresponding concept is called Army Airmechanization. It will be centered on the UH TIGER combat helicopters and the NH 90/LTH Heer light transport helicopters to be operated by German Army Aviation. These will become the backbone of German Army Airmobility after the turn of the century.

C.The Concept

The German Army concept on Air Mechanization has not been finalized yet, so I will only touch on the present state of discussion on the German Army Aviation Concept on Air Mechanization.

1. General



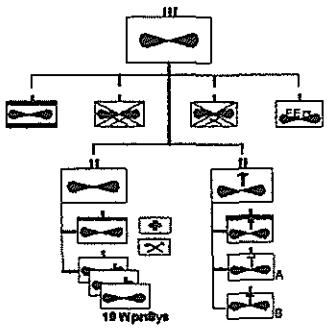
Airmechanised forces are to fight under almost all weather conditions by day and night. They will be organized in brigades with a headquarters company and an Light

Observation Helicopter squadron with Bo 105, two regiments equipped with UH TIGER and one regiment with NH 90 LTH Heer

The UH TIGER Regiments provide the firepower in the combined arms battle.

The transport regiment provides air transport capacity and combat support facilities. The Light Observation Helicopter squadron is for reconnaissance and liaison.

Army Aviation Regiment Organisation



Army Aviation regiments have a headquarters and logistics squadron, an aviation battalion with 3 flying squadrons and 4 flights per squadron and a flight services squadron, a maintenance battalion with a unit level and an intermediate level maintenance squadron each and two security squadrons.

Airmechanised forces are especially suited to win in the battle for time. This makes them capable of dealing with all operational challenges starting with :

+ crises management and leading to
+ initial operations and finally to
+ follow - on operations

in NATO and national defense.

An Airmechanized Brigade's extremely high degree of mobility makes it unwise to harness it to ground forces. Foot-pace or cross country vehicular formation speeds would greatly hamper it and unduly expose it to enemy threat and attrition.

2. Missions

An Air Mechanized Brigade can perform the following missions

a. Containing a breakthrough in depth
b. Countering air assault landings
c. Surgical strikes in depth
d. Assault of enemy follow on forces
e. Flank protection
f. Advance assault operations
g. Defense against enemy amphibious landings
h. Support of friendly amphibious operations
j. Support of ground forces

The Airmechanized Brigade (AirmechBrig) will be the major formation with the highest degree of mobility and the shortest reaction time in the army. As a rule the AirmechBrig can either be committed as an autonomous formation on its own or reinforce or support other major formations with dedicated elements. Alternatively it can be committed in part to an autonomous mission, at the same time supporting or reinforcing other major formations.

Airmechanised forces are not constrained to the boundaries of ground forces. They will often have to cross boundaries for best mission accomplishment. This must be considered when coordinating missions in support of ground forces and also when addressing communications.

D. Helicopters

1. UH TIGER

As a multi role helicopter, it can quickly be adapted to different missions. Its supreme agility, optimized weapons symbology

combined with the mast mounted sight permit long target standoff distances with its different weapons configurations. This enhances mission performance. Good survivability against threats gives a penetrating capability into operational depths.

2.Roles

As a combat support helicopter, UH TIGER is to perform in the following primary roles:

+ support of light airmobile infantry
+ escort transport helicopters
+ armed tactical reconnaissance
+ anti-armour operations

3. Visionics

Both crew members will be fully qualified pilots. Flight vision is enhanced by using night vision goggle tubes in the helmets, and a forward looking infrared sensor installed in the aircraft nose. The images are projected alternatively at the pilots' discretion into the combiner lenses of the integrated helmet. These can be overlaid with flight information and weapons engagement data. Decluttering is possible.

4. Armament/firepower

Reconnaissance, target acquisition, identification and selection are performed in masked positions using the mast mounted sight. The sight is gyro stabilized and contains a high-resolution daylight TV camera, a high-resolution infrared camera (IRCCD) and a laser rangefinder.

TIGER armament is being concieved as quick-change armament modules.

TRIGAT LR is a fire and forget missile for use against sophisticated armour targets. **HOT** is a wire guided missile against armour.

Rockets will be used against soft and semi-hardened targets.

Air-to-air fighting will be done by primarily using **STINGER** autonomous missiles

A **.50 cal machinegun** will be used against soft targets at close ranges.

UH TIGER missions will always be directly supported by LTH Heer carrying mission equipment packages as needed.. This will enable instant reaction to changes in the situation.

5. The NH 90/LTH Heer

Officially called LTH Heer for the German Army transport helicopter version, it will fully match the UH TIGER flight envelope and be able to operate under the same tactical and environmental conditions.

In addition to troop transport, the helicopter will be used for heliborne replenishment and casualty evacuation in Airmechanized operations.

6. Mission Equipment Packages

In support of UH TIGER operations LTH Heer will be equipped with specialized mission equipment packages (MEP) covering the following functions:

MEP **Command and Control** is an airborne command post

MEP **Standoff Reconnaissance** is primarily for non- penetrating radar target and target group aquisition

MEP **Electronic Warfare** is for jamming and deception of various emitters.

MEP **Minelaying** is for airborne anti vehicle minelaying.

7. Operational principles

The most valuable assets of UH TIGER formations are their speed, long ranges and high fire power. They provide an extraordinary potential for rapid reaction.

Lacking armour, UH TIGER formations are little suited to a static role or for holding, restricted by close boundaries in defensive or delaying actions.

Best suited for dynamic fighting, they will always be used in an offensive role in all types of combat, swiftly dealing out lethal blows to the enemy. Continuously attacking in a flexible manner from quickly changing directions and firing positions, they rapidly draw back again, shifting the point of main effort before enemy counteractions become really effective.

They can command terrain by fire for a limited time but they cannot take it or hold for an indefinite period. Weapons engagement must always be attempted at maximum range.

The UH TIGER is an individual firing platform. The smallest tactical element is the flight. A flight consists of 4 helicopters. Flights can operate simultaneously or in echelons. This applies to all types of missions.

8. Command and control

Combat efficiency greatly depends on the intelligence available for the mission. Mission planning, briefing, debriefing and logistic support are accomplished using a computerized ground based Automatic Mission Planning Station (AMPS). The data generated there is loaded onto a mission data transfer device and then physically loaded into the UH TIGER on board data system. The crew is then ready to go on mission. If reasons dictate, the complete mission data can also be transmitted via secure radio. Long range secure communications and on-board data processing capabilities allow an extremely high degree of situational awareness and instant reaction to changes in the situation where necessary. Tactical control is executed by the aircraft commander from the rear station. Navigation and situational awareness is centered on the on board digital map system using digitized map data bases in different scales to which a number of tactical overlays can be added. Information can be displayed individually or in any combination of layers on the multifunctional displays in the cockpits.

9.Coordination

Airmechanized operations must be coordinated with the airspace management plan to maximize flexibility.They must be closely coordinated with Air Defense assets and the Artillery fire support plan.

For penetrating missions coordination with the Air Force operations for battlefield air interdiction is imperative.

Airmechanised forces **fight** the combined arms **ground war** battle using a three dimensional battlespace and are **not** part of the **air war.**

10. Training

UH TIGER is a high performance weapons system. As such, it will need complex training assets integrated as part of the whole system. Basic helicopter flight training will be completely restructured to achieve an extremely high training level. It will also allow the selection of individuals best suited for the different types of helicopters at the end of basic training.

Dedicated training assets are being developed for UH TIGER to meet the requirements of different levels. Lower level assets are

computerized training workstations. The next level is comprised of equipment and subsystem trainers in duplicated cockpits. The highest level contains full mission simulators, allowing all types of missions to be flown in any terrain including weapon employment. Full capabilities for mission rehearsal will be included.

UH TIGER regiments will have simulators for proficiency training. Training hours will have to be increased greatly as compared with today. The majority of flight hours will however be produced in simulators. This is the big difference to the civilian world, where helicopters have to fly as much as possible to earn money, providing the crews with flight experience. Military helicopters have to be preserved as much as possible, on call for their military missions. At the same time a very high level of proficiency and readiness is required from the aircrews. The simulators can be interlinked and operated in a network, allowing individual, formation and leader training under all conceivable environmental and tactical situations.

The LTH Heer will require similar efforts in training facilities.

E. Technical and logistical requirements

1. Health and Usage Monitoring

A new approach was also made for the technical and logistical effort needed to keep UH TIGER operative. There are very high requirements for MBTF with all components. An integrated health, monitoring and usage system will be integrated into the helicopter. This system records and controls all relevant performance data, allowing a constant real time technical assessment. This will make it possible to timely initiate necessary on-condition repairs. It will reduce the number and depth of calendar timed inspections and Time Change Interval (TCI) parts drastically and also the amount of stockpiling necessary. Other efforts will have to be made to reduce the number of logistic personnel needed to sustain operations.

2. Field Operations

Army Aviation begins and ends all missions in assembly areas. These are mobile Army airfields of substantial size and contain more than 40 different continuously operated field site facilities for command and control and logistics. A regiment is fully mobile on vehicles to install, maintain and relocate its assembly areas.

In the regimental assembly areas, helicopters are maintained and prepared for missions in flight dispersal areas. In an ongoing mission, replenishment is performed at rearming and refuelling points in the assembly area. If the mission is to be continued against an unchanged target constellation, replenishment will take a maximum of 15 minutes. If the target constellation changes, replenishment may take up to one hour. Due to the extreme reactiveness of Airmechanised forces, fixed forward arming and refuelling points will only be established and operated under exceptional circumstances. The regiments can install and operate them using ground vehicles. The installations will be used solely for logistics. A sufficient time lead must be considered.

Heliborne replenishment using NH 90 or CH 53 G will be possible in quickly established temporary forward field sites. These will only be operated for the actual duration of replenishment. This will reduce enemy threat and the lead time required to an absolute minimum.

Facilities for unit level and intermediate level maintenance must be included in the assembly areas. Requirements for infrastructure should be met to the highest possible degree.

Airmobile aircraft battlefield damage repair teams will aid in the recovery of downed helicopters.

F. Summary

The scope for helicopter military missions has been greatly enlarged and may be expected to grow even more. Forces and machines must adjust and at the same time remain affordable. Airmechanized forces will give the Army capabilities it has not possessed and which no other means, e.g. Airforce, have been able to present. Airmechanized forces are no substitute for mechanized ground forces, they will on the contrary supplement existing capabilities to increase the army's efficiency.

The future will no doubt be very demanding for Army Aviation personnel and material, the acceleration of actions being the driving force. We feel capable of meeting the challenges lying ahead.

List of abbreviations:

AMPS: Automatic Mission Planning System
ARRC: Allied Rapid Reaction Corps
cal: caliber
CENTAG: Central Army Group
CH 53: Cargo Helicopter 53
EURO: Franco-German EuroKorps
GE: German
HOT: High speed Optically tracked Tube launched missile
IRCCD: Infra Red Charge Coupled Device
LJ: Danish-German LandJut Corps
LOH: Light Observation Helicopter
LTH: Light Transport Helicopter
MEP Mission Equipment Package
MND(C): Multinational Division Central Europe
NATO: North Atlantic Treaty Organisation
NH 90: NATO Helicopter 90
NL: Netherlands
PC: Personal Computer
TRIGAT LR:Three Nation Guided Anti Tank Long Range missile
TV: Television
UH TIGER: Unterstützungshubschrauber TIGER
UN: United Nations
US: United States of America
WpnSys: Weapon Systems