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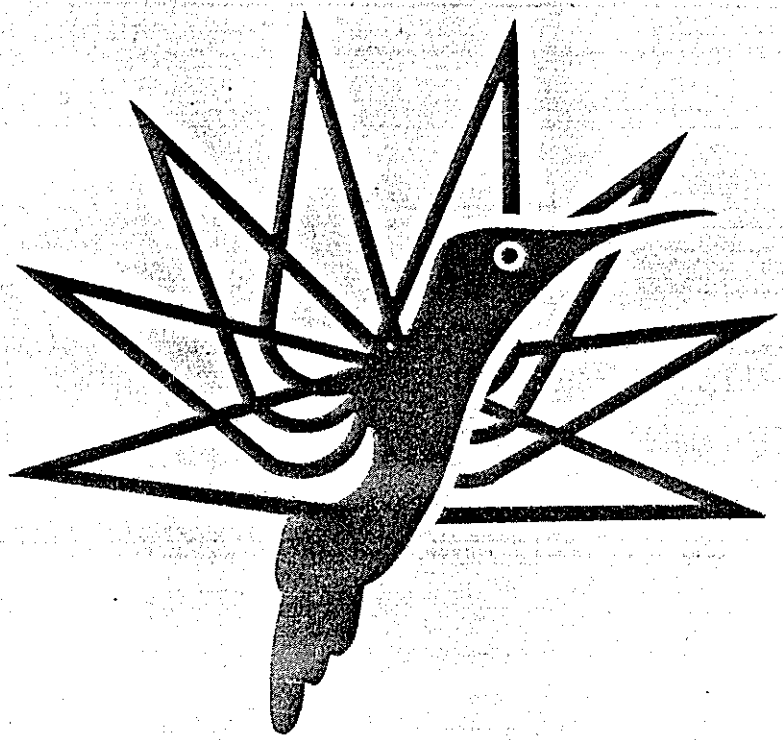

SOME ASPECTS OF HELICOPTER FLEET STANDARDIZATION IN THE ROYAL NETHERLANDS NAVY AND ITS IMPACT ON AIR-SEA RESCUE OPERATIONS IN THE NORTH SEA

by

G.G. Weenink : Major Royal Netherlands Marine Corps

K. Bakker : Lieutenant Commander
Royal Netherlands Navy

E.M. Delhaas : Surgeon Lieutenant Commander
Royal Netherlands Navy

FIFTH EUROPEAN ROTORCRAFT AND POWERED LIFT AIRCRAFT FORUM

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ABSTRACT

For several reasons the Royal Netherlands Navy has chosen for the philosophy of performing a variety of tasks by one type of helicopter, the Westland Lynx. These tasks are:

- Anti Submarine Warfare
- Surface Recognition
- Search and Rescue
- Liaison

and require each in itself a specific platform.
This lecture deals with the capabilities and limitations of the shore based Lynx in the search and rescue role.
Since its introduction in May 1977 in this role almost 100 persons were rescued from the sea.

1. INTRODUCTION

Annex 12 of "The Convention on International Civil Aviation" of 1947 gave the necessary instructions for the participating countries to establish national Search and Rescue (SAR) organisations.
The Netherlands whole-heartedly supported the above convention, and delegated their SAR task to the Royal Netherlands Navy.
Initially this task was restricted to aviation accidents, but in January 1958 the Netherlands and the Federal Republic of Germany agreed to extend the SAR task to mutual assistance in lifesaving operations in the North Sea.

2. STANDARD HELICOPTER EVALUATION

The Royal Netherlands Navy (RNLN) operates fixed wing and rotarywing aircraft in the SAR-role.
In this presentation the fixed wing element will be omitted as it is not relevant.

Until the middle of 1977 the RNLN employed the single engined Agusta Bell 204 B in the SAR-role.
In 1969 the Naval staff presented its first studies on the future helicopter to be employed in the RNLN. Until then three types of helicopters were in use: Westland WASP, the Agusta Bell 204 B and the Sikorsky S-58.
The aim of the study was to formulate the requirements for a multipurpose helicopter able to carry out the following tasks:

- Anti submarine warfare (ASW) integrated into ships weapon- and sensor-systems
- Execution of surface recognition integrated into the ships sensor-systems
- SAR
- Liaison.

The result of the study was the achievement of the aim.
One of the most important considerations in the study was "minimum payload".
The result was accepted by MODNAVY and thus the term "standard helicopter" was born and introduced in the RNLN.
Apart from the general specification of the aircraft, specific requirements were formulated for the various tasks.
This presentation will only deal with those requirements related to the SAR task.
In broad terms the SAR requirement can be stated as: "To be able to execute independent air sea rescue operations by day and by night".
In more concrete terms: "The aircraft must have a search capability, a recovery capability and a capability to communicate effectively with the various agencies during the transit, search and recovery phase".
In terms of aircraft equipment the general requirement for the RNLN SAR-helicopter was an aircraft fitted with:

- two gas turbine engines
- hoist
- radar
- communications, VHF, UHF, HF
- navigation system.

The specific demands can be summarized as follows:

a. Transport capability:
   1) a maximum of 9 persons including the three men crew
      or
   2) two fixed stretchers plus 4 persons including the crew.

b. Fitting up:
   1) the possibility of installation of medical appliances such as oxygen and infusion apparatus
   2) capability of carrying internally a one person decompression-tank.

c. Platform capability:
   The capability of carrying out hoist-operations by night.

3. THE LYNX, SHOREBASED AND SHIPBORNE

After due consideration of the general and specific demands the WG-13 (Westland Lynx) was chosen. Six shore based helicopters of this type have been operating since may 1977. Eventually 36 helicopters will be operational of which 30 will be shipborne. The relevant features of the Lynx helicopter as operated by the RNLN are:

maximum all up weight		- 4425 kg
engines		- 2 x GEM 2 gas turbines 671 kw each
endurance (fuel jettison possible)		- 2.8 hours
cabin dimensions	length	- 2.06 m
	width	- 1.72 m
	height	- 1.42 m
max. slung load		- 680 kg
max. hoist load		- 272 kg.

Note the dimensions of the cabin which do not leave much room for the crew.
The helicopter is able to carry out missions by day and by night and has proved to be operable in adverse weather conditions. Until now it is impossible to fly IFR in civil environment because of the absence of a VOR. Steps have been taken to obtain such a device. The aircraft is equipped with a hovermeter to enable it to hover in IMC and by night. To facilitate operations in the SAR-role a TANS and RADAR are installed. This navigational equipment

has already proved its value many times. The shipborne variants of the RNLN Lynx are similarly equipped but also have autotransition to hover and autohover (cable mode). It is certainly advisable to install these facilities in the SAR Lynx as it will considerably enhance the operational capabilities in the SAR-role.
Because of the targets laid down in the requirements for standardization it is emphasized that the SAR helicopter is able to operate from small ships. One of the SAR Lynx helicopters has just completed a trip around the world on board of one of the new standard fregates, HMS "Kortenaer".

4. OPTIMIZATION OF HELICOPTERPLATFORM AND EQUIPMENT FOR SAR OPERATION

A general outline of the capabilities of the basic platform has already been given. The RNLN has specially equipped its helicopter to carry out SAR missions. The cabindimensions has made it essential to find adequate special equipment to use in the SAR-role.
SAR duties for a helicopter requires rescue, transport and treatment which starts on the spot and continues during the transit (1). Many authors emphasize that treatment on the spot and during transit is essential (2), (3), (4), (5).
One of them states:"Experience in this area has shown that there has been no special difficulty in the performance of this medical work within the helicopter if the cabin of the vehicle is big enough and equipped to act as a mobile intensive care unit, if the crew is educated as advanced first aid, and if the rescue - physician besides his education in all kinds of acute medical work is also trained as a crewmember in helicopter flying under all conditions" (6).
The considerations already mentioned have resulted in the installation of specially designed equipment on board the Lynx helicopter. Because the Dutch are the first in the world to use this helicopter in the SAR-role and no precedent is available the problems were solved in close cooperation with our technical and aero-medical department.
The equipment is divided in two parts:

a. Rescue equipment
b. Medical equipment.

Rescue equipment consists of:

1) hoist
2) sling for double and single lift
3) rescue net
4) helicopter stretcher.

The hoist is hydraulically operated and stowed inboard aft of the cabin. To increase endurance because of reduced drag. In the near future the hoist will be reinstalled in the forward side of the cabin. This will ease the handling of the helicopter stretcher and at the same time create room at the back of the cabin.

The sling for double lift is used to recover unconscious and or injured people from the sea. The single lift method is used for conscious, unharmed people able to help themselves into the sling.

The rescue net is used to recover unconscious people or dead bodies.

The helicopter stretcher is a modified "stokes litter", and is a floating lightweight rigid stretcher which can be lifted by and transported in a helicopter.

The patient is held securely in position by the envelope which is laced to the stretcher frame.

The parachute style safety harness with a kneeband enables the stretcher to be moved vertically through a narrow hatch, common in small ships.

The flotation system consists of a horse shoe shaped collar, a cushion and two pads.

Besides its floatation capability this system will also give the stretcher a positive selfrighting capability.

Medical equipment

The treatment of the patient is aimed initially at life preservation on board the ship and afterwards consolidation during the transit.

To achieve this goal the following equipment has been developed by the aero-medical department of the RNLN:

1) first aid belt
2) disaster unit
3) medical panel
4) defibrillator.

The first aid belt is worn by the doctor when he is lowered on the ship. The construction of the belt gives the physician complete

freedom of movement during difficult hoist operations. The belt can be quick disconnected from the lifejacket.
The disasterunit contains more complex medical equipment contained in 4 suitcases and 2 boxes.
The medical panel consists of 8 individual parts and is connected to a rail attached to the aft bulkhead.
The cardiac defibrillator for treatment of ventricular fibrillation completes the medical equipment.
The defibrillator doesn't interfere with the flight instruments when used in the helicopter.

5. PERFORMANCE IN THE SAR-ROLE

The performance in the SAR-role is effected by the weight of the equipment, which is as follows (kg):

BASIC WEIGHT		3080
hoist	55	
stretcher	25	
rescue net	9	
medical belt	6	
disaster unit	39	
oxygen	14	
medical panel	9	
defibrillator	10	
	167	167
crew (5 persons)		475
OPERATING WEIGHT		3722
MAX. TAKE-OFF WEIGHT		4425
Usable fuel (100 kg reserve)		603
Endurance for 100 kts		2.4 hrs.

6. MISSIONS EXECUTED

The Lynx has performed in the SAR-role from the time of introduction in May 1977 until now:

Total missions flown	: 45
Total flying hours	:101.5
of which by night	: 21.6
Total number of recovered personnel	: 97

It can be seen that SAR-operations by the RNLN have been succesful over the past two years. The average is about one soul recovered per flying hour.
The average includes the recovery of 53 people by two helicopters in May 1978. They were crossing the Dutch Wadden shallows and were caught by the high tide.

7. ASPECTS OF STANDARDIZATION AND IMPACT ON SAR-CAPABILITY

By operating one type of helicopter in a variety of roles the non-availability of air and maintenance crews due to training will be minimized. For aircrew it also means that conversion from one to another type will be kept to a minimum. For instance young pilots after their basic helicopter training join the SAR-squadron. Once they have converted to the shore based Lynx and have accumulated enough flying hours on this variant they change to the ship-borne variant to complete their training.
They then become a deck-qualified pilot and serve with a shipsflight. Logistics are also eased, especially in a small country like the Netherlands. Apart from the items which just have been mentioned the fact that the Lynx amongst others has been bought by United Kingdom, France, Germany, Danmark and Norway offers the opportunity to cooperate on a large scale. The RNLN is cooperating already with a number of those countries.
It is now necessary to look into the consequences of this standardization on SAR-capability. The main limiting factors are cabin-space and endurance.

a. Cabin space

The cabin dimensions already have been shown.
Length 2.06 m, width 1.72 m and height 1.42 m.
Unfortunately SAR-crewmembers can not all be strapped in during flight. This is because a sea water tray in the cabin floor prevents straps being rigged. The tray is essential to prevent corrosion. To gain as much floor space as possible the 3 and 4

men seats have been removed.
But during hoist-operations the cabin crew-members are secured to the aircraft with safety harnesses.
The helicopter-stretcher cannot be secured to the helicopter structure for similar reasons. There is also no means of strapping in persons picked-up.
You can imagine the situation on board one of our helicopters the other day when 6 German sailors were rescued from a ship off the British coast. Fortunately they could be disembarked in England.
In such cases it is normal practice to send a second helicopter, although the rescue organization has only one helicopter and crew available at a time. After normal working hours at Naval Air Station de Kooy it takes some time to alert a second crew.
In case of the German ship the second helicopter was on its way but the urgency of the situation required the ships crew to be picked up as quickly as possible by the first helo.
Referring to the statement, quoted before, the medical equipment in the Lynx is adequate for reanimation, though the cabin space possible poses some limitations on its application.
Until now no such cases have occurred.

b. Endurance

The endurance of the aircraft the SAR configuration is about 2.4 hrs. This limits the rescue mission.
Generally the search phase is limited as the helicopter will not be scrambled before the scene has been defined by a Long Range Maritime Patrol Aircraft (LRMPA).
It is very important that the initial position of the object of the SAR-mission is established as accurately as possible. Several times on the helo's arrival at the scene the ship could not be found due to an incorrect initial position from the ship itself. Therefore a lot of time was lost in the search phase which had reduced the time left for the actual rescue operation. In one case the result was that the helicopter had to return to base for refuelling, whereas if the initial position had been correct all the injured people could have been lifted in one sortie

8. SUMMARY

The deliberate choice of one type of helicopter for a variety of tasks gives the RNLN considerable advanges in the field of training and logistic support. Furthermore spares on board ships have been standardized which improves cross operating.
A contribution has been made to NATO standardization.
The Lynx helicopter has been very succesful in the SAR-role.
It's radius of action covers the whole area of the Netherlands responsibility.
Provisions made have proved to be effective. The aircraft is limited by its cabinspace and endurance, but this can be partly solved by launching two or more helicopters.
The Lynx in the SAR-role is unable to execute a prolonged search followed by a time consuming recovery phase but rationally this problem is solved by using an LRMPA for the search phase.
To extend the capability a VOR will be built in and steps will be taken to fit autohover and autotransition.

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