EXPLANATION OF ABBREVIATIONS USED

AAC	Army Air Corps
CD	Combat Development
IR	Infra-red
AARV	Armoured Airborne Reconnaissance Vehicle
V/STOL	Vertical/Short Take-Off and Landing
RPVs	Remotely Piloted Vehicles
ECM	Electronic Countermeasures
ATGW	Anti-Tank Guided Weapon
FEBA	Forward Edge of the Battle Area
LLAD	Low Level Air Defence
RDMs	Remotely Delivered Munitions
II	Image Intensification
MTI	Moving Target Indication
SAMs	Surface-to-Air Missiles
FGA	Fighter Ground Attack
AD	Air Defence
ECCM	Electronic Counter-Countermeasures

FUTURE ARMY AVIATION CONCEPTS

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INTRODUCTION - CD LOOK INTO FUTURE

1. It is a difficult and dangerous task to look ahead for 20 years or so and to predict what may occur.

2. To attempt to do so is fraught with pitfalls. However one thing is certain - change there will be and in the field of defence, unless one makes some attempt to forecast those changes and the consequences of them, we might as well give up now.

3. What I propose to do in the next half hour is to touch on some of these changes, attempt to apply them to the battle that may occur in North West Europe and from that start point, see how we can prepare ourselves in AAC to meet the design of the new battle.

FORECAST OF SCIENTIFIC AND TECHNOLOGICAL ADVANCES

4. Before embarking on the AAC's future it is sensible to see what science and technology promises for the next 20 years. One caveat about the forecasts is that they should not be taken as developments which will necessarily be achieved. They represent the limits of achievement if the necessary resources are made available.

MOBILITY

GROUND VEHICLES

5. Firstly then what improvements in mobility can we expect for wheeled or tracked vehicles? Well better engines, specifically boost engines, will allow high rates of acceleration for short periods thus decreasing vulnerability. New materials giving lighter weights for the same protection will allow movement over soft ground. Basically however ground vehicles will still be relatively slow moving and immobile.

SURFACE EFFECTS MACHINES

6. Secondly, surface effect machines such as hovercraft will continue to be feasible. However, their limitations on quick manoeuvre and in particular negotiating obstacles of much more than 5 or 6 feet high are likely to remain.

7. All in all therefore, the message must be that to gain significantly in mobility you must get away from the ground and into the air. So let's look at Air Vehicles.

AIR VEHICLES

8. Helicopters. There are some specific improvements that can be foreseen. These are:

   a. Agility as a result of better design, engines, materials and controls.

   b. The ability to operate on the battlefield at night and in adverse weather by the use of night vision devices, navigation systems and target acquisition aids.

c. The ability to survive by the use of lightweight armour, duplication of vital controls, reducing their physical signature by reducing the IR output, radar reflection, noise, glint from perspex and rotor downwash. Lastly of course by improving their all round visibility by doing away with the tail rotor. Here for example is the Sikorsky AARV mockup.

All these improvements lead to an increase in maximum speeds, payload, endurance and reduction in vibration.

9. V/STOL. New V/STOL aircraft will almost certainly become available though it is difficult to see quite how best to employ them. A possibility might be in the anti-helicopter role when their excess of speed over the helicopter may give them a marked attraction. Here is an artist's impression and this shows the impression brought to life.

10. RPVs. Apart from the obvious use of Surveillance and Target Acquisition it is possible that RPVs could improve longer range engagements by the artillery if they were equipped with a target designating system. Indeed they might be used as weapon platforms themselves - though I think this is unlikely in the immediate future. They will, however, remain vulnerable to ECM.

FIREPOWER

11. So much for the vehicles. What about weapons?

12. Again improvements are likely to be evolutionary and the balance between guns and missiles is likely to be substantially as it is now, with improvements in warheads affording the most rewarding field.

13. The ATGW. Fully automatic missiles using homing systems based on infra red, optical contrast, radar or laser technology are possible and may provide significant improvements in their effectiveness. By dispensing with wire links it will make supersonic speeds possible and effective, separation between controller and launcher much easier, and providing the potential for longer ranges. One could foresee for example a missile carrying helicopter lurking well behind the FEBA firing its missile into the capture arc of a smaller designating helicopter closer to the FEBA thus exposing only the small helicopter to the enemy's LLAD system. Finally of course it is theoretically possible for a fire and forget system but it is difficult to predict whether such a weapon would be cost effective at the moment.

14. Either type of missile would increase the engagement rates and minimise exposure time thus 'at a stroke' increasing the surprise and shock effect whilst reducing vulnerability.

15. Terminal guidance of artillery shells, possibly using laser guidance is a possibility and could increase our ability at longer ranges, particularly against hard targets.

16. Laser weapons with sufficient power to blind, cause fires and damage electric or electronic equipment could be developed. But the huge power requirement, its ineffectiveness against more than light armour and its degradation by mist, rain and smoke, make it less attractive.

17. RDMs. Anti-personnel and anti-tank mines designed for remote emplacement from surface vehicles, aircraft, helicopters and artillery are possible. Here is an American helicopter dropping some. They will, however, need to be laid more thickly than conventional mines with the obvious logistic burden that that implies.

SURVEILLANCE, TARGET ACQUISITION, RECONNAISSANCE

18. Well, so much for vehicles and firepower. What about being able to find targets to use them against?

19. Radar is the only method of monitoring enemy activities in all conditions of weather and visibility but it will still be subject to ECM. However one could expect it to give improved detection ranges including reliable detection of slow moving targets in clutter with a general slimming down in size and weight.

20. Surveillance by satellites will be improved, particularly in sensor resolution. This, with real time imagery, will offer higher commanders in the field the promise of tactical information being available. However I believe this would not affect division or battle group commanders because of their need for immediate information.

21. Improvements in integrated systems for detection perhaps combining optical and II devices, MTI radar, thermal imaging and laser illuminators may be possible but extremely expensive. The problem of recognising what these systems are showing you should not be underestimated. This slide from an MTI radar in a US Army MOHAWK illustrates the problem. On the left a convoy of vehicles and on the right a column of marching men and a vehicle.

22. Finally, and I believe most important, the means of producing white light will continue to improve. For a relatively poor nation this is an attractive route to follow and one which I do not believe we have given sufficient serious thought to. I sometimes think that the obvious tactical disadvantages have been overstressed.

HUMAN FACTORS

23. I think that that is enough to be going on with. It is rather like an Aladdin's cave but the most significant limiting factor in continuous combat of the future will be the endurance of the individual soldier. Drugs could be used but this is fraught with difficulties about their reactions, but what is certain much more emphasis must be paid to human engineering of all our equipment to make the work less tiring and to make it possible for the man to be more efficient in its use.

THE THREAT

24. I have sketched an outline of some of the changes that may occur. I want now to examine these self same changes and see how they may affect Soviet tactical thinking and thus the threat.

25. It seems that the Soviet High Command continues to be convinced of the importance of mobility and the maximum use of armoured forces, supported by tactical air forces in order to make the vital break-throughs before the NATO forces are fully effective. So our own armoured forces equipped with long range tank guns and supported by ATGW, both ground and helicopter launched, assisted by longer range artillery, will remain as firm a requirement in the future as it is now.

26. Enemy LLAD is likely to improve in quantity and quality and remain a mixture of gun/radar combinations complemented by SAMs. More effective low level mobile SAMs are sure to be introduced in the future.

27. This increased threat calls into question the employment of our own close support aircraft in the 0-5 km area from the FEBA. I'll talk on this later on in more detail.

28. The increasing deployment of Soviet armed helicopters must make the chance encounter by our own helicopters more likely and this is an aspect we have to take very seriously indeed. Here is the Soviet HIND A fitted to carry SWATTER ATGW.

29. A new generation of Soviet offensive aircraft will have entered service by the 1980s and on the Central Front in Europe a total of some 2000 aircraft is likely to be available, of which nearly half will have a primary offensive role. This calls for a much more positive approach to the threat by AAC than possibly we have pursued in the past. Despite some who may feel that it is a blinding glimpse of the obvious I want to emphasize that the helicopter's chance of survival is significantly better if the crew see the attacking aircraft first so this calls for a high premium on all round, unobstructed vision and possibly the inclusion of extra crew as rear observers. Given a short warning the helicopter's agility stands it in good stead for evasion. Clearly also an improved bad weather and night capability will be particularly important in minimising the threat.

CONCEPT OF OPERATIONS

30. Nothing I have said so far invalidates our present concept of operations namely to detect the enemy early, hit him as far out as possible. wear him down in a vigorous mobile defensive battle and that successfully achieved, move over on to the counter move. The three most important features seem to be:

a. Early information.

b. Concentration of force and fire at the critical points which calls for high mobility.

c. Maintenance of a reserve to take care of the surprise threat which once more calls for speed of reaction, achievable only by excellent mobility.

FUTURE REQUIREMENTS FOR HELICOPTERS

31. What does this mean in terms of AAC's roles in the future? I shall look at the effect on our present roles and see if any additional roles are necessary.

OBSERVATION AND RECONNAISSANCE

32. The need to locate enemy forces will remain as a priority task.

33. Although satellites and unmanned aerial vehicles may to some degree replace the need for manned flight, such systems suffer from the severe limitations of ECM, meteorological conditions and response times. The need for manned visual airborne observation and reconnaissance will continue and possible force reductions, with consequent increased frontages, could increase this demand.

Armed Action

34. The army's requirement for armed action is likely to increase in importance and extend in scope. The destruction of enemy armour will remain a high priority.

35. In addition the following tasks may need to be undertaken by Army Air Corps helicopters:

a. Replacing close support aircraft in the 0-5 km zone.

b. Countering the new threat from enemy armed helicopters.

c. Provision of fire support for airmobile operations.

Replacing Close Support Aircraft

36. There is doubt amongst some that in the NW Europe defence concept, it is sensible to use expensive close air support aircraft in the 0-5 km band from the FEBA on the grounds that:

a. The main targets will be deployed armour, on the move. FGA aircraft, particularly with the emphasis on one low level pass, are not well suited to deal with such targets.

b. The problems of identifying moving targets, in a confused situation, are considerable.

c. Response times are unlikely to match the enemy speed of movement. By the time aircraft arrive the enemy target may have become involved in close quarter combat and be an unsuitable target.

d. To use highly expensive aircraft against relatively cheap targets, so deployed that the prospects of securing a kill are greatly reduced, and with weapons of doubtful kill value, would not seem to be cost effective.

37. Increasing speeds of future FGA aircraft will aggravate the problems of target acquisition and decrease the possibility of securing a hit on hard point deployed targets and improved enemy mobile LLAD deployed well forward will exacerbate the problem. This could mean the need for an attack helicopter.

Countering the Threat from Armed Helicopters

38. As I have already mentioned there is an increased likelihood of helicopter versus helicopter battles. It would seem that there is a possibility that a special attack helicopter, equipped with a cannon or missile, could be the answer for close protection of our anti-tank helicopters.

Fire Support for Airmobile Operations

39. The concept of operations for airmobile forces by definition will often be out of reach of conventional support and I believe that armed helicopters will be needed as both anti-tank and suppressive fire platforms. Again this points towards the possible need for an attack helicopter.

Movement of Men and Materiel

40. The possibility of increased frontages, the high demand for casevac, the growing importance of CRO and the possible introduction of airmobility all points to the continuing importance of this role.

Additional Roles

41. We see also that there may be a need for additional tasks.

42. ECM. In view of the increasing threat from radar controlled low level AD there may well be a requirement for heliborne ECM and ECCM.

43. Remotely Delivered Mines (RDM). Helicopters are likely to be required to deliver such mines, aerially, either in support of the Royal Engineers mine laying plan or as part of an anti-tank helicopter operation.

44. Laser Weaponry. If the full range of the laser weapon is to be exploited and the adverse effects of mist and smoke are to be minimised the helicopter could well provide a suitable platform for this weapon, particularly since it can use mobility to overcome temporary battlefield obscuration.

45. The laser, possibly mounted in helicopters, might provide a partial counter to the enemy armed helicopter threat.

THE FUTURE HELICOPTER

46. What sort of helicopter do we need for the future?

47. The increasing AD, air and ground threats will:

a. Emphasize the need for protection.

b. Increase the importance of concealment and the ability to crawl under cover.

c. Make field of view of great importance. Improved vision to the rear is required to counter the air threat.

d. Increase the desirability of arming helicopters for self protection. The disappearance of the tail rotor might enable a rear gun turret to become a characteristic of helicopters.

e. Increase the need to be able to operate in adverse weather and darkness.

48. The increasing work load likely to result from the increased threat, the need for self protection, operating at night and in adverse weather, operating as a complex anti-tank fire team with its own ECM aircraft, and the increased use of avionics and visionics would indicate the need, on occasions, for a third crew member. The characteristics must take this into account.

THE HELICOPTER FAMILY

49. General. Bearing in mind the relatively small numbers of helicopters likely to be provided to meet the army's requirements it is particularly important that the number of different types is kept to the minimum.

50. Light Helicopter. There is a continuing need for a light helicopter to operate well forward in the battlefield.

51. Utility/Type B Helicopter. There are a number of roles and tasks which will require a larger helicopter than the light one. There is therefore a need for what is now called a Type B helicopter (capable of carrying 10 fully armed men or alternatively possibly lifting 2700 kg), primarily as a RAF support helicopter for troop lift. In the interests of reducing the number of helicopter types it would be logical to make the Army utility and Type B one and the same aircraft.

52. Medium Lift/Type A Helicopter. A decision has already been made that there is also a need for this type of helicopter (lifting 9000 kg or carrying 38 fully armed men for the RAF). It is generally a machine for transporting

the heavy and awkward load, such as bridging, or indeed as a recovery machine for downed helicopters.

53. Armed Helicopter. The armed helicopter is necessary in the anti-tank role. It is not possible to decide whether or not a light or utility helicopter could be adapted for other roles, or whether a specially designed attack helicopter is required, until further studies are undertaken.

54. Here are some silhouettes of the possible future family.

CONCLUSION

55. Scientific and technological forecasts are such that ground mobility will not be improved to the extent that air vehicles will become redundant. The helicopter will still be needed but it will have to change its shape and improve its protection to face the changing threat. The roles of AAC will remain essentially as they are today but the balance between them may alter whilst some additional roles may become necessary. The requirement for a 3 man crew may become more pressing, principally because of the better 24 hour capability and growing air threat. The family of helicopters that seem to be called for are a Light, Utility/Type B and MLH/Type A with a question mark over the Attack helicopter.