

urgent calls for the helicopter. We read almost daily of dramatic rescues in the search and rescue role. I hope I have demonstrated how helicopters have proved their worth in the type of operation we have witnessed in Malaya over the past 7 years.

Discussion

The **Chairman**, opening the discussion, said that they had listened to an intensely interesting lecture, which had raised a large number of points in his mind. He asked whether the Author could give any idea of the utilisation rate of these aircraft in the course of a year.

Wing Cmdr Williams, in reply, said that basically they worked on getting something like forty hours a month out of each helicopter. When the aircraft were first established it was a difficult target to achieve, since there had been the first large concentration of helicopters in the Forces and, although they had many skilled technicians, squadron commanders had to ensure that the aircraft were kept in a fully serviceable condition and they had to analyse all the snags. For instance, the Dragonfly had a number of vibration troubles and although these did not render the aircraft unserviceable, it was not advisable to send it away from base on operations.

A point to be borne in mind is that, when operating in the conditions encountered in Malaya, a helicopter cannot be sent away from its base unless one is 100% sure of its serviceability. If there is any likelihood of some minor fault developing, the aircraft could not be used on operations because a helicopter stuck out in a clearing in Malaya is a very expensive matter. A technician has to go out to examine it, and then a working party has to be lifted into the clearing to make the aircraft serviceable, usually working under very primitive conditions.

He paid credit to the ground crews who entered into the spirit of operations frequently working all night to keep their machines serviceable and who occasionally were called to service aircraft in the wilds of Malaya.

Mr L S Wigdor (*Rotorwings Ltd*) (*Founder Member*), said that the Author had stated that a Communist Terrorist had avoided capture, having got wind of the operation, presumably due to the fact that helicopters had first to get to an emplaning point. If it was necessary for these machines to get within a striking distance before the forces could be mustered, a certain amount of the surprise value of the operation was lost. Would it not, therefore, be better to employ helicopters with a longer range?

The **Author**, in reply, said that for the type of operations in which they were engaged, the range limitation of present-day helicopters was no handicap. Increasing the distance over which troops were lifted might have resulted in some advantage from the security angle, but to achieve the requisite build-up of troops more helicopters would be needed. They were all conscious of the cost of operating helicopters and the greatest economy was needed.

Referring to the incident in which a C T had avoided capture, he said that the security screen was a difficult matter. It was difficult to move troops around Malaya without word travelling around by some incredible means. That fact had to be taken into account when operations were planned. When troops had to be lifted to a particular area there was hardly any warning of the movement. They moved to their emplaning point in the early morning, the helicopters positioned, and the lift started with little delay and was invariably completed before mid-day.

There were various types of troop-lift. There was the long-term operation in which troops went into the jungle on patrol. They established a jungle base from which they operated. There was the quick follow-up type of operation (like the one the author had illustrated with a short film) "laid on" at short notice. In the case illustrated, the troops mustered along a road and were picked up by helicopter. To have carried them by helicopter from the main operating base into the jungle would have added to the complications of the operation and would have involved a very long

flight In the particular operation to which the questioner had referred, helicopters had surrounded the house which was right out on a peninsula The attack was made at first light (in fact, all the helicopters took off in the dark) so that the operation could not have been kept more quiet On their arrival the terrorists whom they hoped to capture had gone, except the gardener

Mr E L Bird (*Bristol Aircraft Ltd*) (*Member*), said that he was interested in knowing whether the Author thought that the equipment of the machines was satisfactory He referred in particular to stretcher equipment and winches, and to vision when making steep approaches into the jungle

The **Author** said that the Dragonfly arrangement had been redesigned and the original basket-type panniers on the side of the aircraft were removed, as they were more awkward to use than a stretcher The Sycamore carried its own type of stretcher which was much more convenient and offered a great advantage in that the aircraft could be converted from the passenger to the ambulance on the spot and with no trouble

With regard to vision, on the Whirlwind configuration there was no complaint at all about forward vision The configuration was ideal for the type of work involved When the Sycamore was first delivered to the theatre of operations there were some complaints about visibility, but after a few months of operation the pilots became accustomed to it, and he thought that applied to any aircraft

He stressed that the views that he was expressing, throughout the lecture, were purely his own, but he knew that those responsible for these matters at Air Ministry were doing all they could to provide better visibility, and this applied also to the manufacturers

In answer to the Chairman, the Author said that tactically backward vision was important When going into the type of jungle clearing that he had described in the lecture, a helicopter would turn on the spot and in those circumstances the pilot required to see what was happening at the rear, especially if he had no other crew member to assist him

Mr F L Swain (*Westland Aircraft Ltd*) (*Member*), enquired whether the Author thought that in the type of terrain which he had described, the single rotor helicopters used were ideal, or whether he would prefer the larger type of twin rotor helicopter Secondly, the Author had stated that the period of serviceability of the helicopters used was 40 hrs per month He knew that the Author's figure was correct for the period to which he was referring, but wished to point out since that time this serviceability figure had considerably improved Current operations in Malaya and Algiers having a serviceability rate well in excess of the figure quoted

The **Author**, in reply, said that the Whirlwind configuration had proved ideal under the conditions he had described in his lecture As stated the main weakness lay in the limited lifting capacity of the present day helicopter, especially under Malayan conditions During the time he was in Malaya the introduction of a twin rotor aircraft would have been advantageous provided it gave greater lift capacity than a single rotor aircraft On the other hand the introduction of a twin rotor aircraft might have produced problems over the size of clearing required but the answer to the problem could only be given in the light of actual performance of the twin rotor in practice

The **Chairman**, said he thought there was some confusion between the single and twin rotor helicopter for a specific job He invited the Author to give his idea of an ideal specification

The **Author**, in reply, said that for troop-lifting the first requirement was the ability to lift a reasonable load and thereby reduce the number of aircraft needed for a specific lift There was a great variety of troop lifts in Malaya Sometimes 300 or 400 troops had to be lifted, at other times there were large-scale troop operations involving thousands of men and lasting several days The first troops to go in would secure a clearing and make it suitable for helicopter landings The number of troops required on the ground would depend on the degree of opposition

likely He thought that 10 troops could ideally meet that requirement under most circumstances encountered in Malaya Unfortunately, on the first lift it was necessary to reduce the load to enable the pilot to manoeuvre into a clearing with a margin of safety Therefore, the first requirement was a helicopter powerful enough to lift sufficient troops into a clearing to overcome any opposition

He drew a distinction between casualty evacuation and emergency operations For the former type of operation the medium or light helicopter was preferable

Lt -Col J W Richardson (*Westland Aircraft Ltd*) (*Founder Member*), asked the Author if what he wanted was a small but more powerful helicopter rather than a larger helicopter in Malaya ?

The **Author** said that as long as the emergency continued in Malaya they would require the type of helicopter which was being used now, but that the advantages from using a larger type were numerous, particularly if further and more widespread trouble should develop But for the type of operation that was carried out today in Malaya there was no requirement for a great weight lifter If the present-day helicopter could lift as much in that climate as it is able to lift in a temperate climate, it would be doing the job extremely well

The **Chairman** pointed out that the Author had drawn attention to the fact that present-day helicopters were not matched for the climate They had the volume to accommodate the troops but they had not the performance to carry them

The **Author** agreed that helicopters had been lost in such conditions through lack of power They could not operate all the time up to the limit The pilot had to have some margin in hand, and this could only be achieved by reducing the load All unnecessary equipment had been removed from the aircraft He had explained how the question of refuelling was dealt with, and the rest was up to the designers From what he had heard, progress was being made

It was not easy to answer the question relating to Service requirements, but he thought it could be summed up by saying that three types were needed—light, medium and weight-lifting machines There would be tasks for those types when available He stressed that the helicopter was called upon during times of emergency When there was no emergency, people were apt to sit back and complain of the expense of running helicopters There would come a time when those three types were needed, and unless enthusiasts kept pushing and showing what helicopters could do, they would not have the helicopter that they really wanted in an emergency

The **Author**, having been asked whether conditions in Malaya presented a special type of requirement for helicopters, said this was not so Helicopters had certainly been adapted for the type of operation that they had to do, but he thought that trouble would arise if they, as enthusiasts, tried to insist on a definite type of helicopter for a certain sort of terrain They needed a vehicle which would earn its keep, and if it were adaptable for several tasks so much the better

It was asking a lot to expect the British aircraft industry to provide different types of helicopter for such tasks as flying over the North Sea to rescue pilots and take them to hospital, for training purposes, for operating in conditions obtaining in Malaya, and for the type of operation at Suez There was a very wide field to cover, and they must keep the number of types of aircraft needed down to the minimum

Lt -Colonel Richardson referred to a film which had shown helicopters operating from built-up platforms He enquired whether that form of landing ground had been used in Malaya

The **Author**, in reply, said that a lot of the clearings were in areas where the ground was very soft These platforms had been constructed in many such areas, especially near jungle forts on sloping, slippery ground Bamboo was usually used

Mr D Blaise (*Lloyd's*) (*Companion Member*), said it was evident from what the Author had told them that helicopters had been a great threat to the terrorists so that presumably they had devised ways of destroying helicopters either on the ground or in the air He enquired what methods had been employed by the terrorists

The **Author**, in reply, said that no such attempts had been made and there had been no opposition in that respect. Of course, when engaged on crop-spraying, helicopters were very vulnerable as they flew at a very low speed and were sitting ducks. But a feature of the C T was that he did not want to get into contact with his enemy. If he could preserve himself and his arms he was of far more value to the organisation than by fighting it out. However, when helicopters went into such areas, certain precautions were taken to protect them.

Mr C Faulkner (*Saunders-Roe Ltd*) said that his Company had recently done a considerable amount of work (in collaboration with D Napier and Son, Ltd) on the development of a Rocket Booster system for helicopters.

This device gives a helicopter greatly enhanced short-period vertical flight and climb performances. In countries such as Malaya, where high temperature/humidity conditions prevail, and where operation at relatively high altitudes is required, the outputs of normal power plants drop sufficiently to severely penalise work in these regions. The auxiliary power booster would seem to be particularly attractive in these circumstances.

The system naturally had its limitations. Its maximum duration (between refuellings) was of the order of five or six minutes, and there were the logistic problems involved in storing and supplying the hydrogen peroxide fuel employed.

They had met with many conflicting views on the value of this system, and he wondered whether the Author would have chosen to use this equipment on his machine had it been available at that time.

The **Author** said that obviously anything that would assist take-off would have been a great boon, but he pointed out that during a day's work the helicopters were doing something like five landings an hour on troop lifts and they maintained this performance all day. With an average of 25 take-offs a day, he thought that considerable problems would have arisen with such a system, and he thought that it was perhaps wiser to make a small load sacrifice.

Lt-Col C D S Kennedy (*Light Aircraft School, Middle Wallop*) (*Companion Member*) said that he understood that in the type of operation described by the Author almost every casualty occurred singly. He invited the Author to speculate on the use of a two-seater helicopter with as good a vertical performance as existed in larger aircraft, carrying one stretcher externally as had been done by the French and Americans. He wondered whether that would have been an advantage in requiring smaller clearings with resultant speedier evacuation of casualties and more economical aircraft—at present a large helicopter plus an Auster may be committed for one casualty.

The **Author** said he agreed that it would have been a great advantage to have had such a helicopter, but again it would have been an additional type for one particular sort of operation. They could not replace what they had with that type of aircraft. It might be possible to produce a wonderful aircraft which was very good for, say, winching but little else. That would have been ideal, since winching had always been a problem in view of the great height of the trees, but it would have added to the number of types.

With thousands of troops spread out over a large area there were bound to be casualties, such as cut limbs, and they had to be moved. That sort of thing would happen all over the place, and a light helicopter met the case. Wherever possible, a light helicopter was positioned at the emplaning point during troop lifting operations.

The **Author**, replying to a further question from Mr Faulkner, said that it was necessary to keep the types of aircraft down to a minimum. They could not call for a helicopter for one particular purpose. The helicopter had to earn its keep all the time. It might be that someone would produce a helicopter that would meet all requirements, that was so economical that it could be used for light jobs, was small enough to go into the smallest clearings, and yet was capable of lifting a number of people.

Mr Faulkner said that it would be most helpful if the Author could put forward some criticisms of the machines which he had operated in Malaya, and also give some idea of the "optimum" type of helicopter which he would consider most suited to

these particular conditions. It was most difficult for a manufacturer to produce a satisfactory machine, as operating experience was still limited, and there did seem to be some reluctance on the operating sides (in this case the Services) to commit themselves to definite requirements.

The **Author** replied that the necessary organisation existed. Technical staffs consulted together frequently.

The **Chairman** expressed the view that what was required was a critical appraisal of categories. Whether three types—small, medium and large—were a desirable number he did not know, but so much money had to be invested in the design, development and production of these aircraft that a critical appraisal was certainly called for now.

Such a study could be made from the amount of work which was done on certain operations and the flying hours involved. The operations side of the Navy, Army and Air Ministry should be able to produce this data.

Replying, the **Author** said he believed that the Service Departments were producing this information as best they could.

The **Chairman** said that operational requirements were prepared, but these days the Treasury seemed to be all-powerful and the operational requirements were ignored.

The **Author** said that the Helicopter Association came into its own in that sphere. He was sure that many lectures, talks and discussions could be arranged. Helicopter enthusiasts had to emphasize the helicopter's potentialities to those who had no experience of it. Those with experience of helicopters were enthusiasts and they had to persuade the non-enthusiasts and get them to think on the right lines.

Flt-Lt J L Price (A & AEE) (Member) asked whether there was any opinion among pilots that some accidents could have been avoided if they had had complete control of the boost available. On the Sycamore for instance, should one be able to get 52" of manifold pressure in emergency by twisting the handle more, instead of the artificial limit of 46". He also wanted to know to what extent helicopters had suffered from "jungle sickness" by hitting trees, and how much damage they could sustain without untoward effects.

The **Author**, in reply, said the pilot would like to have the extra boost available to him, but the training organisation had to impress on him the consequences of misusing it. There was no doubt that pilots could not concentrate on the boost gauge when they were emerging from a clearing. If the trees were getting closer and the machine was not rising as quickly as the pilot required, he "wound on" a bit more power.

Asked whether more aircraft had been lost through lack of power—in the case of the Sycamore, for instance, which had limited boost—than from engine failures due to bad handling, the **Author** said he did not think so, though he had no statistics.

The **Chairman** interposed that it would be interesting to know what would be the incidence of premature engine failures if unlimited boost were available.

The **Author** said that it would be necessary for the pilot to have some audible reminder that he was over-boosting his engine. It would also be advisable to have some mechanical and automatic means of recording that the boost had been exceeded.

On the question of accidents, if a helicopter touched or hit a tree there was little hope of getting it out of a clearing again, especially if the tail rotor was involved. On the other hand, aircraft had hit outer branches of trees with their main rotors, when going into a clearing, and had still continued to fly. It was difficult to assess the amount of damage which a helicopter could get away with. If, as had happened, a person were to walk into the tail rotor of a Sycamore, the rotor was scattered for yards around, and could cause quite nasty injuries to those standing close by.

S/Ldr G R G Henderson (Air Ministry) (Founder Member) said he did not agree with the suggestion that manufacturers did not know what the R A F wanted.

In the first place, manufacturers must know the requirement in broad outline—an aircraft with maximum performance, of medium size, with maximum part of the overall size as useful cargo-carrying space, and with the minimum of maintenance requirement. Those were the broad overall requirements, and manufacturers had various ways of meeting them, albeit no easy task.

The Royal Air Force was tending to retrench towards two types of helicopter, an all-purpose medium and a medium heavy lift. It was apparent that in America also they were revising their ideas of the very heavy lift helicopter.

Mention had been made of the advantages and disadvantages of the single rotor versus the twin rotor helicopter, but one should not forget that whether it was a twin or single rotor, unless tip-driven, it still had a tail rotor which stuck out and was liable to get in the way and cause damage. There was little to choose between either type, on balance in the general purpose R A F roles.

Some of the problems considered in helicopter operations in Malaya were peculiar to Malaya, and the R A F could not tie itself down to a particular theatre's requirements but had to assess the overall future requirements. If manufacturers had any misgivings about the R A F's future requirements, the point should be raised, despite the lateness of the hour.

Wing Commander Williams, in reply to the suggestion that manufacturers were not acquainted with Service requirements, said that manufacturers could only form individual points of view from lectures of this sort, but there were official sources from which he hoped it was possible to get guidance on what was required in the future. If such guidance was not forthcoming, the enthusiasts had to place their experience at the disposal of those people who had to make the decisions.

In the case of the Sycamore in Malaya, they had tailored it to suit local conditions after carrying out trials in that country. But it so happened that much of that tailoring suited the helicopter all round, and many of the modifications that were asked for were now included among the sales points.

The **Chairman** thanked the Author for an excellent lecture which had provoked an interesting discussion. He was a great believer in these lectures which brought to the programme first-hand knowledge and experience of current operations, whether military or civil. It was by having these forums that lecturers and people who took part in the discussions could present their own viewpoints on the difficult problem of preparing suitable aircraft for future operations.

They were indebted to Wing Commander Williams for putting the problems of the specialised situation in Malaya so clearly. A great deal of ground had been covered, and if there were any further questions he would be pleased to have them in writing, when he was sure that Wing Commander Williams would answer them.

The vote of thanks to the Author was carried by acclamation.