FIGHTING IN THE AIR

(Personal Recollections 3rd course document and essay No II)

By Squadron Leader (later Marshal of the Royal Air Force) William S Douglas

Marshal of the Royal Air Force Sholto Douglas, 1st Baron Douglas of Kirtleside, GCB MC DFC served as a pilot (flying the BE2c, Strutter, and SE5a), flight commander and squadron commander during the First World War. He became Assistant Chief of the Air Staff in 1938 and Deputy Chief of the Air Staff in 1940. During the Second World War he famously clashed with other RAF commanders over the strategy for the Battle of Britain, replacing Dowding as AOC-in-C Fighter Command in November 1940. Later in the War he would command both Middle East Command and Coastal Command. He was promoted to Marshal of the Royal Air Force in 1946, when he became the 2nd Commander of the British Zone of Occupation in Germany. He retired in 1947, becoming a Labour party peer in 1948.

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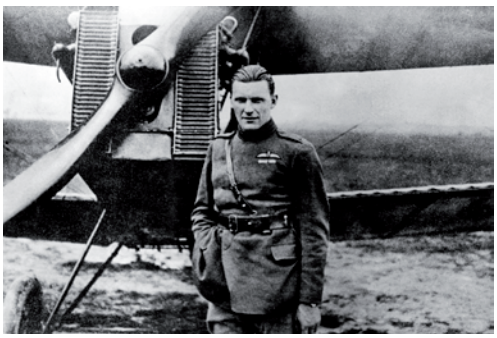

2nd Lieutenant Sholto Douglas MC beside his SE5a aircraft during World War I.
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II.

A LECTURE

ON

FIGHTING IN THE AIR

by

Squadron Leader W. S. DOUGLAS, M.C., D.F.C.

Introductory.

Fighting in the air is a pretty wide subject on which to talk. A good deal of the ground however has already been covered in various conferences. We have discussed the merits of the single-seater fighter as opposed to the two-seater; air fighting in a fleet action; and the requirements of a fighting aeroplane—all somewhat controversial aspects of air fighting. What I want to do now is to try and cover fresh ground of a less controversial nature, and to put before you some aspects of air fighting which have not so far been discussed.

We have considered air fighting during this course from a somewhat impersonal point of view. In our exercises, for instance, we have, of necessity, had to assume that such and such a combination of circumstances will produce certain results. In real life of course this is not so. You cannot always assume that, if you send out two fighting squadrons, they will necessarily defeat one of the enemy's, or *vice versâ*. You have got to take into account the personal factor. I want therefore to try and show you why one pilot is a better air fighter than another, and why one squadron is capable of defeating twice its own number.

Besides this question of the personal factor, I want to put forward some ideas on the subject of the tactics of air fighting. Actually the personal factor enters so much into tactics that it is difficult to separate the two. The tactics of a pilot depend to an extraordinary extent on his personality; the tactics of a squadron depend largely on the personality of the squadron-commander or of his flight commanders. This is not a thing to be deplored; we want all sorts of air fighters. It would be a great mistake to make air tactics stereotyped, to force them into a mould. Diversity of tactics is one method, and a very good one, of attaining surprise in the air.

Fighting between individual Machines.

The earliest form of air fighting was between individual machines. Of tactics there were practically none. If you saw an enemy machine, you flew towards it, and shot at it with whatever weapon you happened to be carrying—rifle, revolver, carbine, and, of course, as time went on, with a machine gun. Fire tactics were only evolved gradually, as knowledge increased with experience, and as the fighting aeroplane came into being.

I don't want to bother you with a lot of diagrams; but I just want you to have a look at this one, which to my mind at once simplifies the whole question of fire tactics :—

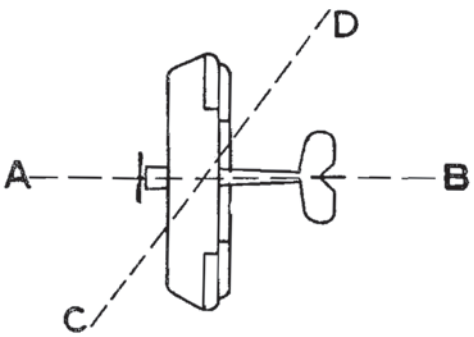

Fig. 1.

Now it is easier to hit a target with a gun firing along the line A–B, either forwards of backwards, than it is to hit a target with a gun firing along the line C–D. The reason of course is that you do not have to take into account the speed of your own machine or the direction in which it is moving with reference to the target.

The tactics of Attack.—Now it is obvious, referring to our diagram, that an S.S. fighter can only fire along the line A–B forwards, while a two-seater can fire along this line both forwards and backwards. But it must be remembered that, in the case of the two-seater, the rear gun is mainly a defensive weapon; it is the front gun which is the weapon of attack. I have heard this disputed; and I admit that in exceptional circumstances (*e.g.*, when a pilot's front guns have jambed) it may be possible by clever manœuvring to use the rear gun as an offensive weapon. But nine cases out of ten, it is the front gun which is the easiest and most effective weapon of attack. In fact, to my mind, the two-seater fighter should be fought in the same way as the single seater when attacking; the gunner behind is purely for defence.

In the present state of aerial development therefore, by far the most effective method of attack—and it is only by attack that we can hope to attain air superiority and keep it—

is to fly towards the enemy, and to shoot at him with a gun firing forwards along the line of flight. The object therefore of all fighting tactics is normally to bring the enemy under fire from the pilot's front gun, because it is the easiest shot that can be afforded you. Very often of course you are unable to attain that object; but it is the object at which you are constantly aiming.

Now if your target was a stationary one that could'nt shoot back at you, the problem of attack would be a simple one. You would merely fly straight at it, shooting as hard as you could. But the target is not only moving in three dimensions at a great speed, but can also shoot back at you. You have, therefore, two objects: first, to attack the enemy in such a way that he presents a reasonably easy target, and, secondly, to attack him if possible from a direction in which he cannot shoot back at you. Now obviously the easiest target is one whose line of flight is identical with your own; *i.e.*, when you are flying straight towards the enemy, or directly behind him. So :—

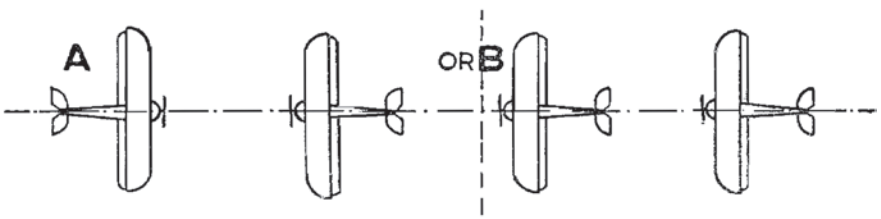

FIG. 2.

But if you are flying straight towards him and he straight towards you, he can shoot back at you just as easily as you can shoot at him. Moreover his speed of approach is very great; you are therefore only within range of him for a brief space of time. Consequently you will normally try to attack him from directly behind. If the enemy is a single-seater, he cannot shoot back at you. If on the other hand he is a two-seater he can shoot back at you. In attacking an enemy two-seater therefore you can do one of two things :—(*a*) you can either trust to your superior powers of shooting, and on the moral effect of your swift approach, and possibly to surprise, if you have been able to effect it, and dive straight on to the tail of your two-seater enemy; or (*b*) you can try to put the empennage of his machine between you and the gunner, so that he cannot see your machine, while you can see and shoot at his; *i.e.*, you can dive to a point slightly below the enemy machine, and some 300–400 yards behind, and then "zoom" up under his tail with all the added velocity that you have gained in your dive. There you have quite shortly the ideal at which you normally aim

when you yourself alone are attacking a single enemy machine —you try to "get on his tail," as it is called; because by doing so you not only have the easiest possible shot at him, but, if you take ordinary precautions, he cannot shoot back at you.

The tactics of Defence.—Now, if the enemy is a novice or stupid, you should be able to shoot him down without difficulty. You have him at a disadvantage. But naturally the enemy, if he is any good, is not going to sit there tamely while you shoot him down. He is going to try to do something. What will he do? Well, let us now reverse the situation. Let us imagine that you yourself are attacked in the manner that I have tried to describe. What would you do yourself?

You would have two objects in life at that moment:—First, to get out of the enemy's line of fire as quickly as possible. Second, to try to turn the tables on your attacker, so that you yourself became the attacker and he the attacked. Now you have a large choice of manœuvres open to you; and while I can tell you some of the things that it would be foolish to do, I wouldn't like to dogmatise on what you ought to do. Every pilot has his own theories to suit his own temperament. However, I will try to give some idea of what would be a suitable course of action.

First and foremost you must try to maintain your height, and if possible gain some height on your opponent. For height in aerial fighting means the initiative—the power of attack. It would be foolish therefore for you to try to escape by diving. Not only would you be losing height, but it would be the simplest thing in the world for your opponent to dive directly behind you, and to continue to shoot at you from an ideal position. This is fairly obvious, and yet the first impulse of nine new and inexperienced pilots out of ten is to dive for safety. It is fatal.

It would be almost as fatal for you to try to escape by spinning. A spinning machine is easy enough to follow and is not a difficult target to hit if you aim at the axis of the spin. As soon as you stop spinning, the enemy is there, ready to "get on your tail" again. Besides, you are losing height fast all the time that you are spinning, and are not giving yourself a ghost of a chance of turning the tables on the enemy, and of yourself becoming the attacker.

Therefore, don't try to spin or dive away.

Now for some of the things that you might do.

(1) You might try to loop over the enemy machine, Obviously, if you can make a nice tight loop, and the enemy goes straight on, you will be on the enemy's tail. I have once or twice seen this manœuvre done with good effect; but not often. For it has certain very definite drawbacks. First,

if you are fighting at a height, as you probably are, it is very hard to loop without losing height. As I have already said, this is just the contingency you wish to avoid, if possible; you want to gain height, not to lose it. Secondly, once you have started your loop you have got to go on with it. If, when you are half way over, you see the other fellow turn and make off, you can't all in a moment go off after him yourself. You have either got to finish out your loop, which will take several valuable seconds; or else you have to roll yourself right way up off the top of the loop—a difficult manœuvre if you are at all high. Any way, whichever you do, you are giving your opponent a valuable two or three seconds, in which he can do what he likes; for during a good proportion of the loop you are, practically speaking, out of control; and you never want to be out of control during a fight, if you can possibly help it. On the whole therefore a loop is not a good piece of tactics under such circumstances.

(2) You can suddenly decrease your forward momentum, so that the enemy, who, you will remember, is directly behind you, being taken unawares, will overshoot you. You can check your forward momentum either by doing a roll, or by a sudden stall. Apart, however, from the danger of collision, this manœuvre is open to the objection that it gains you no height. A roll, however, is better than a stall, since you are less liable to lose height; moreover, in the case of a stall you are very much out of control for several seconds—a contingency to be avoided, as I have already pointed out.

(3) Personally I have always found the simplest and most effective way, not only of taking yourself out of the enemy's line of fire, but of putting yourself into a good position for attacking, is to do an ordinary steep climbing turn. By doing this, you compel the enemy to turn also; as soon as he starts to turn his sights are deflected from you As you can see, it is impossible for two machines that are following each other round in a circle to keep the sights of their front guns, which are fixed, on each other. By climbing on the turn, you gain that all-important factor—height; and with the help of this height that you have gained, you can often by a quick " Immelman " turn get yourself on the enemy's tail.

Such then, very sketchily outlined, I am afraid, are the close or minor tactics of two single aeroplanes in an aerial combat. There are of course infinite variation of the main principle that I have attempted to outline. But you will find that the basic idea underlying all these variations is that of getting an easy shot with the front gun at the enemy machine in such a way that the enemy is unable to shoot back at you.

The Tactical Manœuvres preliminary to a Fight.—I have very briefly outlined the normal tactics of two single pilots

after they have come to grips. There is no question that this is tactics. Now I want to talk about the phase of an aerial combat that immediately precedes the actual combat. You may critically ask why I am dealing with what goes before a fight after I have dealt with the tactics of the fight itself. The reason is that the manœuvres preliminary to a fight are largely dependent on the actual tactics that you intend to employ during the fight. Preliminary manœuvres in fact are meaningless, until you are quite clear on the ultimate object at which you are aiming. I have first therefore tried to explain what that ultimate object normally is, *i.e.*, to get the easiest and safest possible shot at the enemy aeroplane with your front gun. Now I want to talk about the manœuvres by which that object is obtained.

Now here you are—you are flying along, and in the distance you see an enemy aeroplane. You want to shoot it down. How are you going to set about it?

Well, the first thing that you have to consider is the question of height. You can only attack him if he is on the same level as you, or if he is below you. If he is above you, you must get height. Otherwise the initiative rests with the enemy; he can either attack you, or fly off home. We will assume then that you have climbed up so that you are above him. Now you have the initiative. What are you going to do? Now here we come to the question of the personal factor. What you will do will depend to a large extent on your personality. First class fighting pilots fall very roughly into two classes. The dividing line is very vague. But at one end of the scale there is the dashing class of fighting pilot; by that I mean the type of pilot who relies chiefly on dash, energy, élan, to bring him success. The second class of fighting pilots is the cautious, cunning type. I would take Ball and Guynemer as typical of the first class, McCudden, and perhaps Fonck, as typical of the second.

Now your dashing pilot, your Ball, on sighting an enemy machine in the distance wouldn't worry much about the direction of the sun, or any possible cover afforded by clouds. If he could do so easily and quickly, he would perhaps try to obtain surprise by these means. But normally he would go straight as a die for the enemy aeroplane—or aeroplanes for that matter. Ball himself quite often dashed into the middle of, say, half a dozen German aeroplanes; threw them into confusion; in the confusion shot down one or two of the enemy; and, before they had had time to recover their presence of mind, was away and half way home again. He was the personification of the offensive spirit. You see what I mean—this type of pilot relies on his superior dash and energy. He doesn't manœuvre much at all. And there is

a good deal to be said for this method of attack. It would be alarming, to say the least of it, if every enemy machine you met came " bald-headed " at you, and seemed to be trying to ram you. The moral effect of such a procedure would be immense. And if every one was an Albert Ball, it would undoubtedly be the correct policy. Unfortunately every one isn't. The average pilot, if he made a practice of dashing on sight into the middle of every enemy formation that he came across, wouldn't live very long.

For the average pilot is first, not a good enough shot to get his man quickly—in a flash—with one burst of fire; and, secondly, the average pilot doesn't think quickly enough to be able to rely on forestalling every countermove on the part of the enemy. In short, to be a successful fighting pilot of the dashing variety you must be an exceptionally fine shot and an uncannily quick thinker.

Now we will turn to the other extreme—the cautious and cunning—the McCudden. What will he do on sighting the enemy? Well, there's not much dash about him, at any rate just at first. He will take a look round, and see exactly what he is taking on. If the odds are too much against him, he will go off and look for less difficult game. If on the other hand he considers that he has a good chance of shooting the enemy down without too much risk to himself, he will proceed to stalk him. He will probably climb high up above his adversary, and, still keeping as far from him as possible, will work round so as to put himself between the sun and the enemy; or he will look for a friendly cloud from which to pounce; or he will try and attack from an unexpected direction—*e.g.*, from the direction in which the enemy expects only friends to come. When our cautious pilot has got into a favourable position, from which he can take the enemy at a disadvantage, then, and not till then, will he attack. Normally, of course, he will try to attack from the blind side. If it is a single-seater that he is attacking, he will adopt the " dive and zoom " method, *i.e.*, he will dive down on the enemy at a terrific speed; open fire; keep on firing to close quarters; and then " zoom " hard. If the first attack is unsuccessful, he will dive and " zoom " again—*ad infinitum*. If on the other hand he is attacking a two-seater machine, he will dive to a point just below the enemy machine that he is attacking and then " zoom " up under the enemy's tail. All the time he will be watching for the approach of other enemy aeroplanes. If he sees that he is going to be attacked by greatly superior numbers before he has shot down his opponent, he will very likely sheer off and try to climb up above the enemy reinforcements, thus putting himself in a favourable position for attacking them—in preference to

continuing his first attack at the risk of being overwhelmed by superior numbers.

Your cautious type of fighting pilot possesses infinite patience. McCudden would spend hour after hour sitting high up over the lines watching for his opportunity. Perhaps he would return without having had a fight at all. You would ask him if he had seen any enemy machines. Oh, yes, he had seen plenty of enemy machines, but none that he could attack without exposing himself to what he considered to be disproportionate risks. He would wait and wait patiently until he saw his chance of taking the enemy at a disadvantage. Then and not till then would he attack. It may be objected that is an unenterprising policy, lacking in the proper offensive spirit. But if every pilot in France had, like McCudden, succeeded in shooting down some 60 odd German machines—well, the German Air Force would have ceased to exist !

Here again the average pilot has not the patience, the self-control, or the skill to take every advantage of every existing factor that conduces to surprise, to follow this policy of caution to its logical conclusion. As with the dashing method of air fighting, so with the cautious—it is only the exceptional man that can thoroughly exploit the method to the fullest advantage. The average pilot will come somewhere between these extremes. He will cut his coat according to his cloth. He will know his own limitations. He will have to weigh up the particular circumstances, and will then decide whether he can afford to be dashing, or whether the circumstances impose caution. As a general rule, the new and inexperienced pilot must be cautious, while the old hand, with plenty of experience behind him, can afford to take risks, because, if he gets himself into a fix, he knows the best means of extricating himself; which is just what the novice does not know.

I have taken Ball and McCudden as two typical instances of the individualist in air fighting. But I think that the day of the individualist is on the wane. In future wars the sky will be so thick with large formations that the " lone-hand " man will always be in grave danger of being overwhelmed by superior numbers. A Ball can fight six enemy machines; but even he could not hope to take on sixty with much hope of success. While, therefore, any fighting pilot may find himself by circumstances of war isolated from a friendly formation, and compelled to fight on his own and unsupported, the type of pilot who used to make a practice of fighting alone and unsupported will normally stand but a poor chance of success—except, perhaps, in night fighting. In the next big war your Ball or your McCudden will probably be best employed as a night-fighting pilot.

Even during the last year of the late war, the individualist among fighting pilots tended to disappear. In 1918 the two most successful fighting pilots were Mannock and Beauchamp-Proctor. They were both exponents of the more recent form of air fighting—*i.e.*, fighting by formations, rather than as individuals. While both of them were undoubtedly brilliant as individuals, they achieved their success rather as leaders of large fighting formations. The fighting squadron as a whole was the weapon which they used—they themselves were, as it were, the head of the spear.

FIGHTING IN FORMATION.

Before dealing with the tactics of a formation of fighting machines, it is first necessary to consider (1) the size of the fighting formation, and (2) the disposition of the machines in the formation.

Size.—It is obvious that you can easily make your formation so large as to be unwieldy and unmanœuvrable. Assume, for instance, that you took the squadron of 18 machines as your fighting unit, and made it fly in one large mass, arranged something like this :—

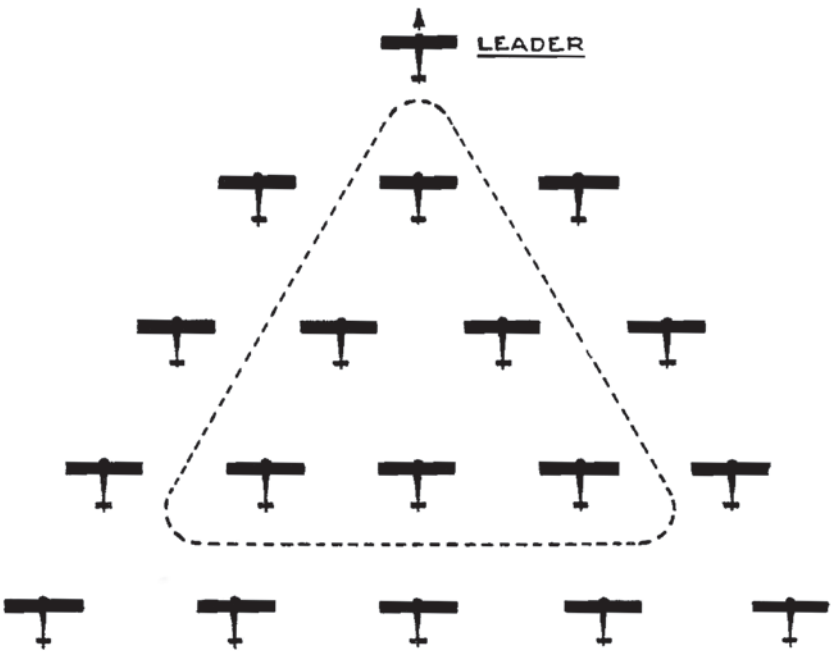

FIG. 3.

The machines enclosed in the triangle would be a useless encumbrance either in attack or defence. They couldn't fire either forwards or backwards for fear of hitting one of their own friends. And then think what a business it would be to do even an ordinary right-angled turn in formation! Not to speak of the dangers of collision! No—you must make your formation small enough to manœuvre easily. I should say that a formation of nine machines is the absolute maximum which can be handled as one fighting unit. You would arrange it something like this :—

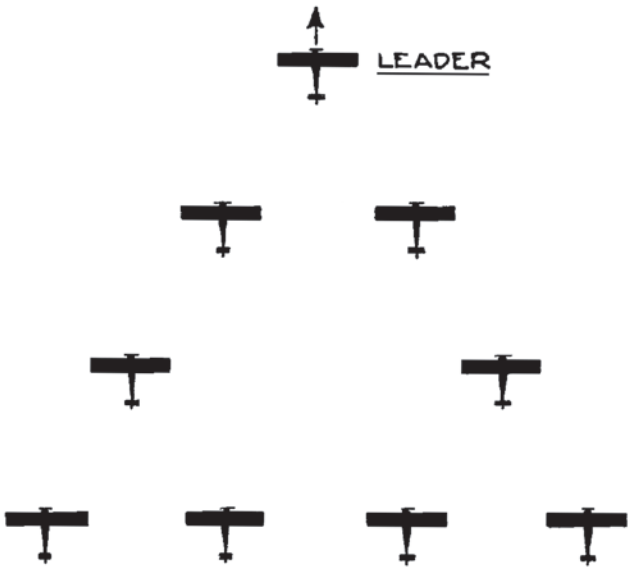

FIG. 4.

But even this formation is, I think, too large for a fighting formation. It might be all right for a bombing formation, where defence is the primary motive. But for attack you must be able to manœuvre easily and quickly. In fact, now that the day of the individualist is passing, it is far more important that your formation should be highly manœuvrable than your individual fighting machine.

On the other hand, if you make your fighting unit very small, *e.g.*, three aeroplanes, while it is highly manœuvrable, it is not strong enough for self-protection; it is always liable to be overwhelmed by superior numbers before it can be reinforced.

For attack, then, the most suitable fighting unit is one of five or six aeroplanes, *i.e.*, a flight.

Shape.—Your formation of five or six would be arranged *en echelon* in a wedge-shaped formation. So :—

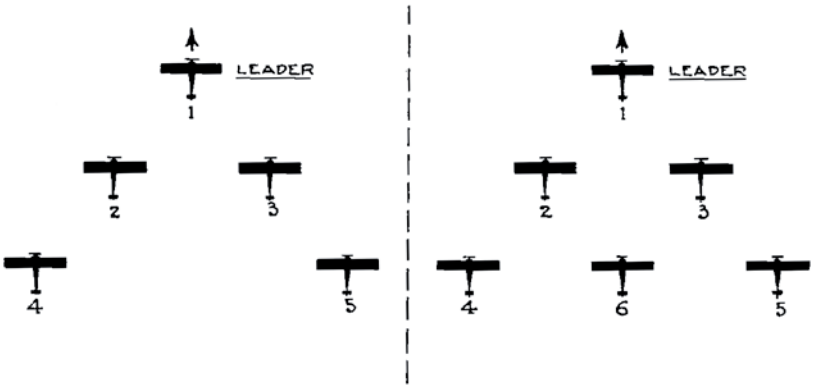

FIG. 5.

The reason the wedge is the most suitable shape for a formation of aeroplanes is, of course, so that the fire of one machine is not masked by another; also you must have your leader in front so that everyone can see him, and—which is almost as important—so that he can see everyone.

For single-seaters a formation of five is preferable, rather than one of six. The reason is that number six in the preceding diagram is more or less useless, if he is a single-seater. He can of course only fire forwards at any time, and in this case he can't even do this, because if he did so, he would probably shoot down his own leader.

On the other hand, with a formation of two-seaters, the objections to No. 6 do not apply with nearly the same force. There is, in fact, a *raison d'etre* for his being there. For although he cannot fire forwards for fear of hitting his leader, he *can* fire backwards, and so help to protect the formation from attack from the rear.

Whether you made your formation of two-seaters five machines or six might depend on such a factor as the performance of your aeroplanes. If your aeroplanes were of such surpassing performance that you could reasonably expect to be doing all the attacking and never be yourself attacked, then No. 6 would be rather a " dead-head." If on the other hand your machines were inferior in performance to the enemy's, so that you were liable to be the attacked rather than the attacker, then No. 6 would be a very useful asset.

What we arrive at then is that the flight is the most suitable fighting unit; that for single-seaters five aeroplanes is the most useful and economical formation; while for two seaters either five or six aeroplanes may be used according to circumstances.

There is just one thing more about the flight formation—it is echeloned in height as well as in depth, *i.e.*, No. 2 and 3 are some 10 feet above the leader (No. 1); and Nos. 4 and 5 are some 10 feet above Nos. 2 and 3. The reason of course is that it is easier to keep station if you are slightly above the man in front of you. If the leader suddenly opens his throttle, perhaps in pursuit of something, and forges ahead, the pilots behind him can quickly catch up by opening their throttles and putting their noses down slightly. It is, as I suppose you all know, the most important thing in formation flying to keep closed right up, especially for single-seaters, who have no rear defence. Once the formation spreads out, and the rear men begin to lag, the latter are always liable to be attacked and shot down before the men in front can get back to help them. A good S.S.-fighter flight in France in 1918 could fly the whole of a two hours' patrol, and perhaps have several fights, and never be more than a couple of machines' lengths from one another the whole time.

The Tactics of a Flight Formation.

If you remember, just now I compared the leader of the flight to the point of the spear. I want to enlarge on that a bit. What we found to be the greatest danger and the chief source of casualties in aerial fighting, was, as you might expect, for the formation to be split up. As long as it hung together, and fought as one man, casualties were few, and successes many. But once the formation broke up, single pilots would be set upon by half a dozen enemy fighters, and downed by superior numbers. This is fairly obvious—we all tumbled to it quite early on. But what was not quite so obvious was the fact that it was not, as you might have expected, when the formation was attacked that it became split up, but when it was itself the attacker. We found that when attacked, pilots seem to hang together naturally for safety—I suppose a psychologist would say that it was the primitive instinct of the herd in operation. But when a flight attacked—that was the time when formations were apt to disintegrate. Every pilot worth his salt was keen to shoot down his "Hun" so, having marked down his own particular victim, he would proceed to chase him round the sky, regardless of the rest of the formation. Within the space of a few seconds, the formation as such would cease to exist, and would become merely a number of individuals madly careering about the sky.

Sometimes it worked out all right. The Flight Commander would succeed after a few minutes in rallying his flight, and would carry on with the patrol. But on a distressingly large number of occasions, especially in 1918, when the sky grew pretty thick with fighting patrols, the flight would be caught

napping, when the pilots were so isolated, and shot down in detail. So much so that we sought round for a solution of our troubles. After much debate, and not without opposition from the individualists of the squadron, we finally made a strict order that no pilot was on any account to leave the formation, even to take an apparently easy opportunity of shooting down an enemy aeroplane. The initiative in any attack lay wholly with the flight leader; if he dived to the attack, the whole flight dived with him; what is more, when he "zoomed" away after the attack, even if he failed to shoot down the enemy attacked, the whole flight "zoomed" away with him, still keeping formation. Pilots were not allowed to stay behind, and carry on with the attack. The results were unexpectedly gratifying, and the casualty rate dropped considerably, without any diminution in the number of enemy machines shot down.

There was one consequence of this order that we did not foresee at first, but which soon became apparent; *i.e.* that it was the flight commander who four times out of five shot down the enemy aeroplane. If there was more than one enemy aeroplane, then the rest of the flight certainly got a chance. But rarely such a good one as the leader. Still, being the most experienced pilot, he was the most capable of getting his man with certainty and expedition. Besides, with his flight behind him to act as a buffer against any attack from behind, he could afford to concentrate all his attention on the destruction of the enemy aeroplane; there was no need for him to be peering over his shoulder all the time, anxious lest he himself be attacked. His aiming and shooting were therefore all the more careful and deliberate.

It may be objected that this method is more designed to avoid casualties than to achieve results. But, as I said before, we found that we shot down just as many enemy aeroplanes, using this method, with very much fewer casualties. After all the best squadron is not necessarily the squadron that suffers the heaviest casualties; the latter may be the bravest squadron, but it is not usually the most efficient.

There are people who incline to the theory that the goal of all fighting tactics is the melée, the "dog-fight." In my experience, although one often became involved in a melée, in which one almost inevitably lost formation, such a situation was one to be avoided whenever possible. Fighting, as we usually were, in the region of the enemy aerodromes, casualties nearly always followed loss of formation; nor was there any compensation in that a correspondingly large number of enemy aeroplanes were shot down; in fact the reverse was usually the case. The enemy on the other hand, being in the vicinity of its own aerodromes, did not suffer to nearly the same

extent, if his formation was broken up. His stragglers always had a refuge handy, if hard-pressed. It was therefore rather like playing into the enemy's hands to court a "dog-fight." Still, sometimes it is necessary to do so. It is therefore of supreme importance to train your pilots to rendezvous quickly on a signal from the leader.

The Fighting Squadron in Formation.

Of course we found after a time that the flight formation was too small for the work. There was a natural tendency for each side, both ourselves and the Germans, to try to outnumber each other at the decisive point. They would send out a formation of, say, nine machines to defeat our flight formation of five or six machines. We would reply with one of, say, twelve machines, so as to outnumber them. Hence they grew up the practice of sending out a whole squadron in formation to fight as one unit, and later on two or more squadrons, working in close co-operation.

Now as I have already pointed out, it is impossible for a fighting squadron to work altogether in one big mass. It is too unwieldy. Therefore in a squadron formation the flight is still the fighting unit, only we have three fighting units, *i.e.* three flights, working together in close co-operation.

The normal system of co-operation was something as follows:—The leader of the whole formation is the leader of the lowest flight—call it A flight. About 500 feet above A flight and about half a mile away, behind and to a flank, is the second flight—call it B flight. The duty of B flight is to follow closely, and conform to the movements of A flight. It does not attack on its own initiative—the initiative lies absolutely in the hands of the leader of the squadron, *i.e.*, the leader of A flight. This somewhat rigid formalism was found to be necessary owing to the tendency of the following flights to be drawn away into subsidiary combats, leaving the squadron patrol leader entirely unsupported, perhaps just at a time when he required support very urgently; just as, you will remember, it was found necessary to make a strict order that no one was to leave the flight formation, because of the tendency of individual pilots to go off in pursuit of the enemy that they had marked down as their own victim, regardless of the rest of the formation.

When the leader of A flight attacks, B flight does one or two things; it either reinforces A flight, if the enemy is sufficiently numerous to make this worth while; or else it flies directly over the top of A flight, and affords protection to A flight against enemy aeroplanes attacking from above.

A and B flights, which, you will observe, remain fairly close together, form the striking force; the third flight, C flight, is the covering force. It flies as high as possible, and some two or three miles behind and to the flank of A flight. The leader follows A flight at a distance, and has orders never to come to the assistance of A or B flights except in great emergency. The mere fact that C flight is circling high up over the combat is usually sufficient to prevent any but the strongest of enemy formations from attacking the two lower flights, until they have dealt with the top flight or covering force. Meanwhile the two lower flights have been carrying out their attack, which they should have completed before the enemy have climbed up and dealt with the top flight.

I have drawn out a diagram in order to make the disposition of the three flights clear :—

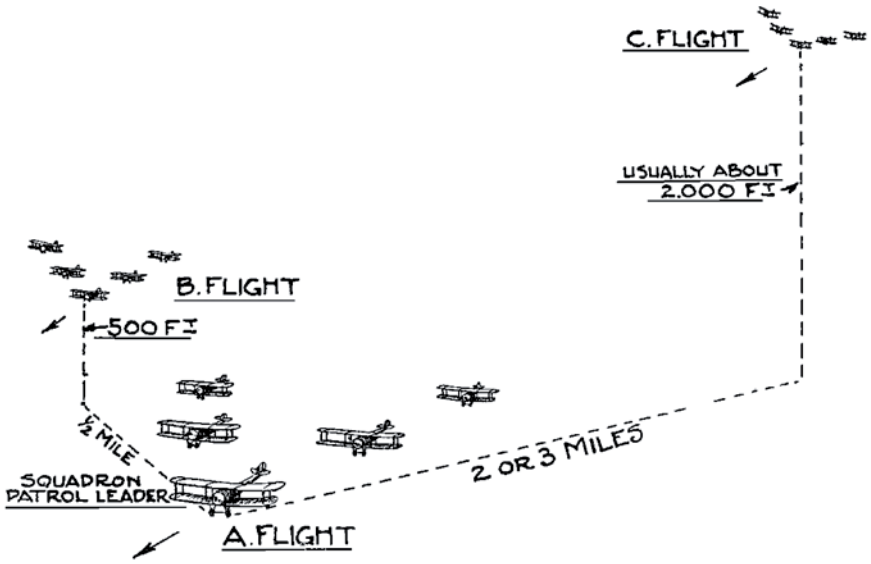

FIG. 6.

It is on the leader of the lowest flight upon most of the responsibility devolves; and it is he moreover who will have the best opportunity of shooting down enemy aeroplanes.

Large Formations.

The principles outlined above work equally well in the case of large formations of two or more squadrons; only in this case A, B, and C flights are complete squadrons instead of flights. The flight however still remains the tactical fighting

unit; the squadron does not fly in one large mass, but in a compact formation of three flights. So :—

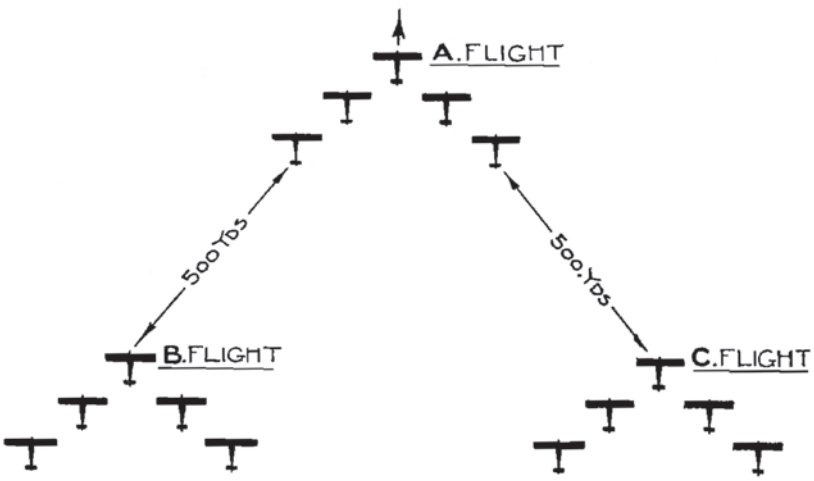

FIG. 7.

The top squadron or covering force can with advantage be two-seater fighters; in this way the rear of the whole formation is adequately protected.

Later on I shall have something further to say about the problem of the very big formation, whether it is of advantage or not, and what is the alternative.

Leadership.

This brings me to the question of leadership—an all important factor in modern air fighting. I have already pointed out the responsibility that rests on the shoulders of the leader of a big fighting formation. On him really depends the success of a fighting patrol; he may very easily bring it to disaster. A bad leader will lead his formation into trouble; will fall readily into traps set for him by a cunning enemy. He will allow his formation to be attacked under conditions disadvantageous to himself. His attacks will fail, perhaps because he himself fails to obtain surprise, perhaps because he fails to get his man when he dives to the attack—a heinous offence. The moral effect of a bad leader is very great. Whereas pilots will follow a good leader with the utmost confidence, because they know that he knows exactly what he wants to do, and how he is going to do it.

I don't think that I can do better than to take Beauchamp-Proctor as my example of the good patrol leader. There may have been better leaders; but as he was in my squadron for

over a year, I know more about his methods than those of other successful fighting-patrol leaders. The fact that he shot down 54 enemy machines in just over six months at any rate goes to show that his methods are worthy of study.

The first thing that you noticed about him was his extraordinary long eyesight. He could see and recognise an enemy aeroplane at a greater distance than anyone I have ever known. This is an important quality in a leader. For it is obviously of great advantage if you can see the enemy before he can see you. It means that you can make your dispositions for the attack before he knows that you are there at all.

Then, when he had seen the enemy, Proctor took the greatest pains in order to effect surprise, or if that was impossible to take the enemy at a disadvantage. I have known him spend an hour and a half out of a two hours' patrol stalking a formation of enemy aeroplanes. He would perhaps show himself rather obviously for five minutes or so, and then pretend to go off home. When he was out of sight of the enemy, he would perhaps fly south for a bit, and cross the lines some 20 miles further south. He would then fly out east into German territory, make a wide circuit, and come at the enemy from the direction of their own aerodromes, pretending to be a friendly formation. He always made full use of any cover afforded by clouds or the sun.

When he did attack, he rarely failed to get his man—he was a dead shot.

Finally I never once knew him to be surprised. The boot was always on the other leg. In consequence other pilots had absolute confidence in him. Very often one didn't know from Adam what he was about. His manœuvrings seemed to be absolutely pointless. But everyone was quite convinced that he at any rate knew precisely what he was about. And sure enough after an hour or so of what was apparently pointless wandering about the sky, one would find oneself diving after him straight on to the tail of some unsuspecting enemy formation. Mannock was, I believe, just such another.

In future wars, it will be of the utmost importance to see that the right men are chosen to lead fighting formations.

The System of Offensive Patrols.

An offensive patrol is, as its name implies, a patrol of fighting machines whose object in life is to be offensive—*i.e.*, to seek out and destroy the enemy. The purpose of offensive patrols is twofold—(1) to interfere as much as possible with the work of enemy aircraft, and (2) to afford protection to other types of friendly aircraft. But the protection so afforded is normally indirect; *i.e.*, the fighting patrol must not, except in very exceptional circumstances, be

ordered to keep in sight and closely guard certain of our aeroplanes, or to escort a formation of bombers. Such a policy merely ties the hands of the fighting patrol and in the long run is bound to have an adverse effect, not only on the number of enemy aeroplanes shot down, but on the morale of our fighting squadrons. For it leaves the initiative entirely in the hands of the enemy, who can attack or not as and when he thinks fit.

You must in fact go rather to the other extreme, and give your fighting patrols plenty of latitude. You shouldn't even tie them down to a definite patrol line; you have practically got to entrust them with a roving commission to seek out and attack the enemy, wherever he may be. You must leave a good deal to the patrol leader; you must judge him and his squadron, not by the regularity with which he patrols a certain line, but by results—by the number of enemy aeroplanes that he shoots down.

You should therefore, in my opinion, merely give your offensive patrol a certain area to patrol, and leave the rest to the patrol leader. There might even be occasions when your O.P. was justified in leaving its allotted area, *e.g.*, if it saw a friendly formation in another adjoining area being worsted in a fight with a superior number of enemy aircraft. Usually, however, the patrol leader will remain in the allotted area. But you must make that area big enough for him to manœuvre in. I should say that it must be at the very least 20 miles by 20 and can easily be more. It's a bad mistake to tie down your fighting patrol too rigidly.

An offensive patrol should of course always try to be where enemy aircraft are. But if it cannot find any enemy aircraft the best place for it is over the enemy's aerodromes. It can often watch enemy machines take off and attack them as they climb up. The enemy aerodrome is after all the focal point par excellence for enemy aircraft. The same, I should say, would apply in the case of a fleet action to the enemy's aircraft carriers.

If, in land warfare, you have sufficient aeroplanes it is often advisable to have a second line of patrols between the enemy aerodrome and the place where the majority of your army co-operation machines are working, so that enemy aircraft which have slipped through the outer network of patrols will probably be caught by the inner. This is what is meant by an outer O.P., and an inner or close O.P.

Your outer O.P. will normally fly very high, so as to have the height of as many enemy aeroplanes as possible, and consequently the initiative in attacking them. Your inner O.P. on the other hand will normally fly a good deal lower so as to catch the enemy aeroplanes that come sneaking in under

the high-flying outer patrol to attack the low-flying army co-operation aeroplanes. I should imagine this system could also be applied to a fleet action. You could have a high-flying outer patrol out over the enemy carriers, and an inner patrol at a somewhat lower altitude halfway between the enemy carriers and your own fleet.

The only thing that you must look out for in having these two patrol lines is that you do not by dividing your forces weaken your patrols overmuch. One strong patrol is better than two weak ones. But if you have enough aeroplanes to do it, the double cordon of O.P's. seems to work very well. After all, the outer patrol, if hard pressed, can always fall back on the inner—something like the army system of outposts.

In actual practice we sometimes found that a very large, strong patrol defeated its own object. You would send out two or three squadrons flying in one large formation. Every enemy fighter in the sky promptly retired eastwards, and went on retiring ad infinitum. Then, when you turned round to come home, the enemy would turn round too, and hang about at the back of your now retreating formation, taking long-range pot-shots at the rear aeroplanes, and picking off stragglers or unfortunates with "dud" engines, who fell behind. We therefore tried another system. We sent out two or three squadrons to fly to a point well behind the German lines—usually the largest of the local enemy aerodromes—by widely different routes. They would rendezvous over this German aerodrome at a specified time, and then make a big drive back towards our lines, catching in a sort of net numbers of odd German aeroplanes and small enemy formations.

There is also the theory that it is better to concentrate the majority of your fighting squadron on a big offensive patrol for a few hours during the day, than to keep up in continuous system of moderately strong patrols. It is obvious that you cannot keep up very strong patrols, in open warfare over the battle, or in static warfare over the trench line, all the day. It may therefore be better to make one of these big sweeps, such as I have described, with two, three or more squadrons, say, twice a day at irregular intervals, and that for the rest of the day you should remain on the defensive with a few weak fighting patrols doing a sort of police work round the Corps machines. It is taking a biggish risk, of course,—I don't think the idea was very popular with the Corps squadrons; they didn't like being left practically unprotected for a good part of the day. But there is a good deal to be said for the idea; it at any rate seems to fulfil one of the principles of war, that of concentration of force. Probably circumstances of war would decide which was the best policy; it would obviously

depend to a certain extent on what was happening on the ground.

Orders for Offensive Patrols.

If therefore you have one day to sit down and write out orders for offensive patrols, I think I should go about it something like this :—

(1) First, of course, consider carefully the number of fighting squadrons at your disposal.

(2) Then decide whether the situation demands that you should be reasonably strong all day, or whether you should concentrate your strength of fighting squadrons over the battle only during certain hours of the day.

(3) Then decide whether you can afford to have a double cordon of patrols, both outer and inner, or whether your fighting squadrons are too few to do this without making your patrols dangerously weak.

(4) Then decide what areas you want patrolled. The areas for your outer patrol will normally include the enemy aerodromes. Don't divide up the map into a lot of small squares like a chessboard, and put one squadron in each small square. Make the patrol areas plenty big enough for your fighting squadrons to manœuvre in, and allot two or three squadrons to each area.

(5) Finally, see that squadrons working in the same area work in co-operation, and not as separate units. They need not necessarily fly in one big formation—in fact I am inclined to think that it is better that they should not do so. But they should have some common plan; if posible they should keep in sight of one another and should always be on the lookout to render assistance to one another when required. Interchange of operation orders between two higher formations is often necessary in order to effect the necessary co-operation between squadrons working in adjacent patrol areas. During the late war the Germans had a "travelling circus" of fighting machines; we had a Headquarters Brigade which contained some fighting squadrons. While there are undoubtedly advantages in this arrangement, it does not always make for that co-operation which, as I have said, is so important between fighting squadrons. I think that it is of supreme importance that a fighting squadron before setting out on patrol, should know exactly what other friendly squadrons it is likely to encounter; and if two or more fighting squadrons are patrolling an area they should at least definitely realise that they are meant to work together in co-operation.

Training.

The last point that I would like to touch upon is the importance of training to the fighting pilot. I feel that it would be impossible to round off any lecture on fighting in the air without passing a reference to the necessity not only of a thorough preliminary training to the fighting pilot, but also of constant practice in his trade. It is extraordinary how quickly one's hand and eye become sluggish from disuse; and not only one's hand and eye, but also one's brain. No one can become a successful fighting pilot who cannot shoot straight and think quickly. These qualities are the outcome, not, as some would have us believe, of some divine dispensation, but of a sound training and constant practice.