

# TEE EMM



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*for official use only*

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*Pilot Officer Prune says—  
 "Take Tee Emm regularly!  
 Prevents that Thinkin'  
 feeling!"*

## FOR UNITS IN CANADA

**W**E occasionally receive letters from Canada saying TEE EMM can't be obtained. Well, TEE EMM is now printed in Canada—has been ever since the fourth issue, in fact—and the printing figure is designed to cover the estimated demand. The fact that you can't get copies may be your fault in not asking for them, or your unit's fault in not seeing that they get adequate supplies for their strength. Ask your Adjutant about it, and if any unit is not getting enough, he can write about it to *Air Force H.Q. (Attention D.S.D.) Ottawa*. And tell them, too, if you have any surplus; we don't want to waste copies!



*I hope that these Training Memoranda will be widely read and studied, since I am certain that they will help us all to improve our efficiency, not only in our training but also in operations against the enemy.*

*Air Chief Marshal, Chief of the Air Staff*

## THE WAR ISN'T OVER WHEN YOU'RE DOWN

**E**VERY striking Air Force has, speaking generally, two main components. Aircraft and crews to fly them. Behind the former stand the men who design, build, service, repair and generally keep aircraft in the air; behind the latter are the men who instruct, train, watch over, and also repair and generally keep the pilots and air crews fit and flying.

Theoretically these two Air Force ingredients are equally important: in practice, of course, their relative values fluctuate according to whether aircraft or crews are in greater supply at the moment. But there is this one permanent difference between them: a crashed aircraft is rarely any more use, whereas the pilot who bales out is in most cases just as valuable as before.

But—and this is important; indeed, it is what we want to write about—he may not come down on this side of the Channel where he can get that aircraft. He may come down in France, Belgium, or Holland and have to get home first to where the aircraft are waiting. And so it is your duty as pilot or member of an air crew to avoid being taken prisoner. To get back. To escape if you are a prisoner,

and to get back. In short by hook or crook, *to get back*. You are still a trained man—even though you haven't an aircraft at the moment—and you are as valuable to your country as only a trained man can be. For in so far as the waste of a trained man goes, a prisoner of war is no better than a corpse. You must help—by not becoming either. Once you are the latter, of course, you can't do much about it, but you can do something about the former. "While there's life there's hope." To get back is one way of obeying that old rule—keep flying.

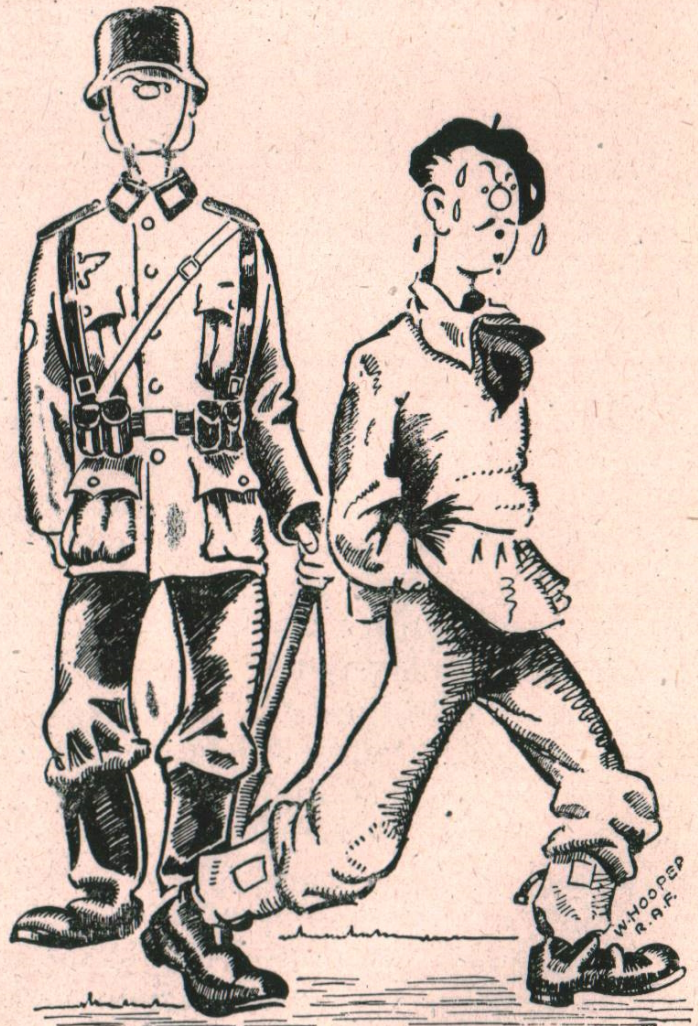
You should all have realised by now that much time and trouble have been spent in giving you all the information that a would-be escaper can want. This is a matter of vital importance, and since everything has been done to supply air crews with *What Every Good Escaper Should Know*, it is up to you to do your share.

For ultimately—make no mistake about it—it all depends on you. It is your personal responsibility. Just as training is necessary to pilot an aircraft, so is training necessary to use the various aids to escape you are given. And training yourself to be "escape-conscious" is really very simple: and it can be great fun. Nor is it adopting a pessimistic attitude. The best of pilots can be shot down; the best of engines cannot guarantee eternally perfect service.

P.O. Prune of course says that "he never likes to cross his bridges before they are hatched." If he does have to bale out over enemy occupied territory, well, he'll work it all out on his way down. Or perhaps even after he lands. But as we don't really want to lose our P.O. Prune we would advise him to study very carefully the words of a recently escaped fighter pilot. He is now back with his Squadron, back with his friends in the front line. By his very presence he is a reassurance to them that, given the will to get back, they can go hunting the Boche, confident that there is no real possibility of their seeing the inside of a Prisoners of War Camp.

For he said: "I knew before I went up exactly what I should do if I were shot down. I wouldn't mind trying it again. Given half an hour's start I could make it easily."

And if you think that he was shooting a line you're wrong. For he is one of the most unassuming chaps we have ever met.



*P.O. Prune just got away with it.*

## THE U.S. PROMOTION TREE

(Just to help you learn the ranks of the U.S. Army Air Force)

**B**UDDY, can you spare the time  
To tell me—ere my body moulders—  
What the heck those emblems mean,  
Sitting on your U.S. shoulders ?

Think of trees, son, and a ladder,  
And the fact I'm telling you  
Silver means much more than Gold does.  
Funny, sonny ? But it's true.

First rung—gold bar—when commissioned,  
Gold 'cause it's so precious, boy.  
Next stage—1st Lieutenant—silver ;  
Both feet on the ladder—JOY !

Add another silver—Captain :  
Pushing through the branches, soldier ?  
Golden oak leaf means you're Major ;  
You're off, and now yer Pop can't hold yer !

Go on pushing ever upward ;  
Silver leaf now hits the eye.  
Lieutenant-Colonel is your rank now ;  
Soldier, you're quite close the sky.

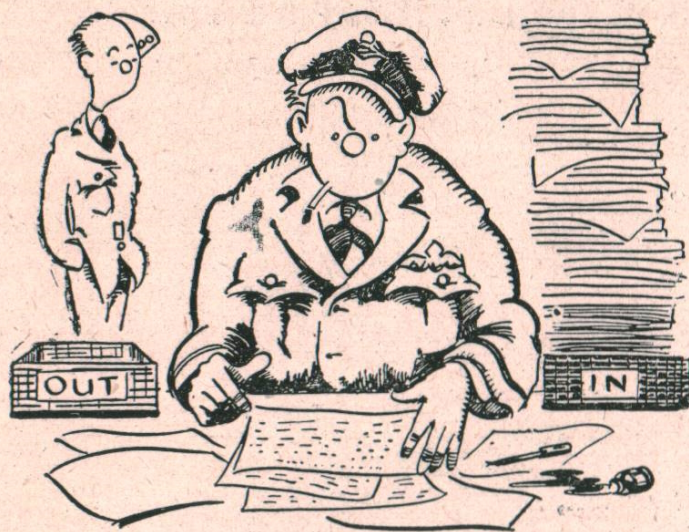
Birds : the U.S. Silver Eagles,  
Perch on shoulders bringing cheer—  
Colonel. Now replace the eagle  
With star of silver—Brigadier.

Now it's all just astronomic,  
Silver stars from one to four—  
Brigadier, Major- Lieutenant-  
Then Full-General ; right, top score.

Got the idea, son ? It's easy—  
U.S. stripes and stars and sky.  
Oaken leaf and national Eagle. . . .  
Say ? What's mine ? A Rye and dry.



## PRUNE INTO STAFF



*First Day.*

David Garnett once wrote a story called "Lady into Fox." It was, improbably enough, about a lady who was turned into a fox. This article, equally improbably, is about a Prune who was turned into a staff officer. *Very* improbably you say? No, it *is* being done constantly. How? Well, take the case of Flight Lieutenant Ullage.

Two years ago Ullage was a typical Prune. Six months ago he was a flight commander, with a D.F.C. and bar, in one of our best Fighter squadrons. He got a slight wound which put him off operational flying for a bit, and anyway he was due for a rest. So his A.O.C. whisked him into Group Headquarters, made him an Acting Squadron Leader, and put him in charge of TACTICS.

Now poor Ullage, although a first-class Fighter pilot, had never polished an office chair in his life. As soon as his posting came through he invoked the Almighty, had a final party at his Squadron and arrived at Headquarters

with a sore head and a sinking feeling, to deal with what he called "that something bumph."

His first effort was not crowned with conspicuous success. A long letter came in from Command dealing with a new method of fighting formations. Ullage read it through, wondered what it meant, read it again; finally seized his pen and wrote a snappy minute to the Senior Air Staff Officer, saying "Enclosure 192 passed to you for information and action." He then hurriedly climbed into a Spit and shot off to 'liaise' with his old Squadron.

On his return the S.A.S.O. sent for him and they had a heart-to-heart talk—not a very happy one—during which the S.A.S.O. with considerable restraint, explained a few simple rules. We thought you might like to know them, so here they are:—

Always assume that the A.O.C. or the officer to whom you send your file, has never flown at all. (He usually has had bags more flying experience than yourself, but that doesn't matter). Assume also that he hasn't the least idea what it is all about, and needs to have it explained simply. All this means it is up to *you* to read and understand what you are dealing with. Set about it this way. Look back in the file and see if the subject has been dealt with before. Frequently it has, and the new letter or order with which you are dealing must be considered in relation to the previous letter and orders. (Put little flags on the ones which do connect.) Having got a grip

on what it's all about, think it all over and make up your mind whether the new idea is a good one or not, or whether the new order is one which needs modification because of local conditions.

When you've decided this consider what should be done about it. If you think it calls for a new order, or letter, or instruction to the chaps, draft one out, remembering it has to be read by fellows like yourself, and so should be simple, clear, short and to the point. (Remember how often you have grumbled at the amount of bumph the Group has shot at you.)

Now write your minute to the S.A.S.O. or Group Captain, and tell him very briefly: (i) what it's all about; (ii) what other papers refer to it—these you have already flagged to save him looking through the file; (iii) what your opinion is, as a practical and experienced chap; (iv) what you think should be done about it, asking him to see the draft which you have made out.

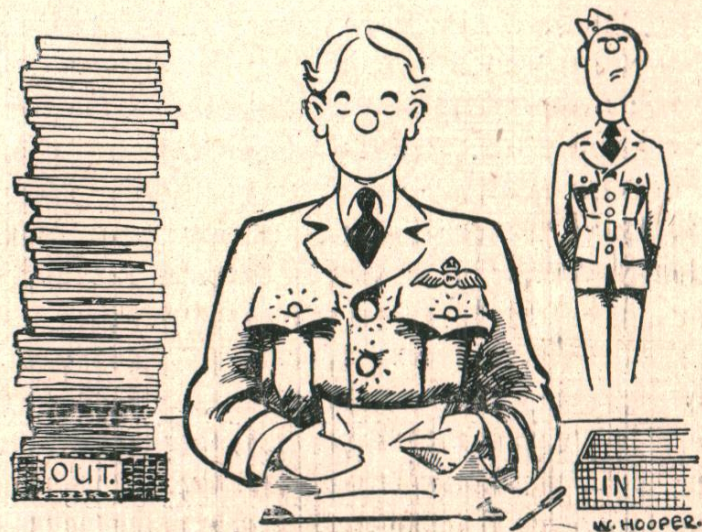
All this is merely a commonsense sequence of dealing with everyday affairs, so that the officer above you can sum up the whole story at a glance, and decide what to do about it all. After all, the S.A.S.O. or the A.O.C. are very busy chaps who have to deal with *all* problems. Your side of the show is one of many; so put things up as clearly and as simply as you can, and save their time. That's what you are being paid for—delving into detail, digging out the meat, and giving your advice.

Don't get downhearted because all your best work and brightest ideas may go off under someone else's signature.

Remember the whole show is a team working for the A.O.C. who in the end has to carry the can if you make mistakes. And finally, don't lose heart if the job seems stogy and dull. A chap may stooze for months on unimportant details, then one day he writes something, or says something, which may save hundreds of lives, or which may defeat the enemy. Wait for that chance, and be ready to take it; after all *someone's* got to do the dull jobs and you've had your share of the excitement.

Flight Lieutenant Ullage having absorbed all this good advice, soon learnt to act upon it. Funnily enough, after a short time he began to find his job quite interesting. After six months his A.O.C. sent for him, congratulated him on his good work, and gave him his heart's desire, which was the command of a Squadron.

And when he got to it he realised, rather to his surprise, that during that six months he had learnt quite a lot which was of great value to him in his new job.



*Last Day.*



## 2. CHECKING LOGS

ONE of the main troubles in seeing that practical navigation exercises have been properly carried out, is the checking of logs after the students have landed. After the first five or six logs an instructor is apt to get a slightly jaundiced view of the whole situation, and it needs a strong will not to drop into the bad habit of giving the remaining logs merely a cursory glance and a few optimistic but meaningless ticks. And that's not going to be of much use to a trainee who is probably quite keen but who doesn't know just what is needed for the complete and perfect log.

So here's an idea which should bring about an immediate improvement and should ensure that all the logs are thoroughly checked and will save an instructor a good deal of time into the bargain. As soon as possible after flying, get the entire course together and have them change over logs (but not the plotting charts!). Then, get them to plot the exercise on a fresh plotting chart, thus making them work through a completely new set of data.

Trainees will soon find out what is and what isn't necessary in a log—and will make efforts to add what is needed when they next fly, just to make the extra plotting job an easier one when they get back into the classroom.

Also, any errors can immediately be found and commented on, while the perpetrator still has the details of the exercise fresh in his memory. All the instructor has to do is to be on hand to answer queries and straighten out any problems that may come up. (Just a piece of cake for the instructor, eh? says P.O. Prune.)

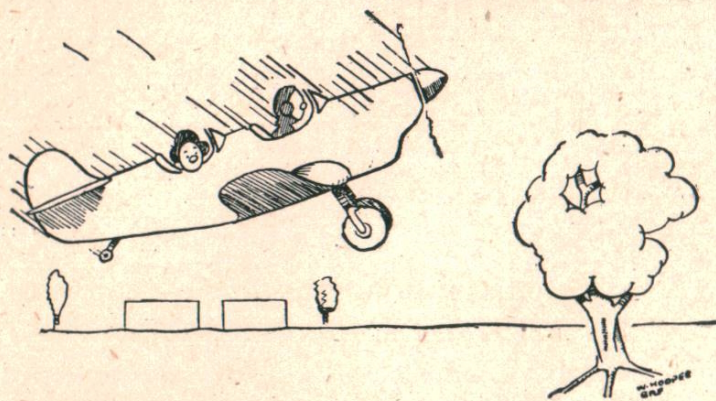
On the other hand, checking logs by this method is a great help to the Navigation Officer on operational stations where an analysis of sorties is essential to check that a successful raid has been carried out and the objective properly blitzed.

---

“SPECIALISTS N.” have always been the angels of the navigational heaven. In future they are going to be upgraded to archangels. If you're a man of imagination you'll naturally want to be one: even if you're just a chap who's frightfully keen on Nav., you may want to be one too.

So take a look at A.M.O. A.817/42 and learn how, why, when and what to do.

## WHY COME IN WITH YOUR NOSE IN THE AIR ?



crate, but lousy on the approach with that sanguinary great nose sticking up in front of you ! ”

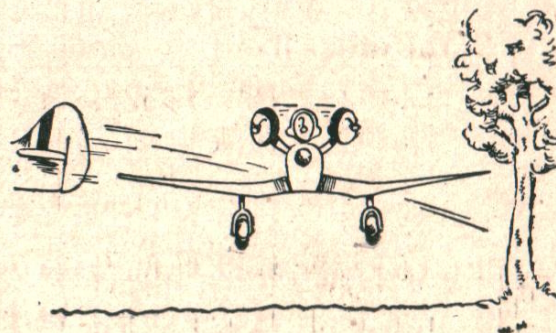
Well, *must* you have the nose sticking up ? We've seen lots of instructors' heads popping out from side to side of the “back seat” as though trying to escape from something—maybe their nerves ? Why don't you as an instructor *insist* on your pupils doing reasonably steep approaches ?

To get to the point, we think we are right in saying that the average pilot uses much too much engine to get him into the aerodrome. (S/Ldr. Biplane-ffixpitch says : “ I remember the days when you simply weren't allowed to use the bally thing.”) The engine should be used as an aid to judgment, *not* as a substitute. If you go on motoring in, you'll get an awful surprise when you have to force land some day. So just try a few gliding approaches on to the aerodrome : it will probably show how ropy your judgment is on modern types. If you are taken aback by the ground rushing at you in the later stages, ease it out with a little engine until you get used to it. When you do, don't forget that little extra speed to make an allowance for the check.

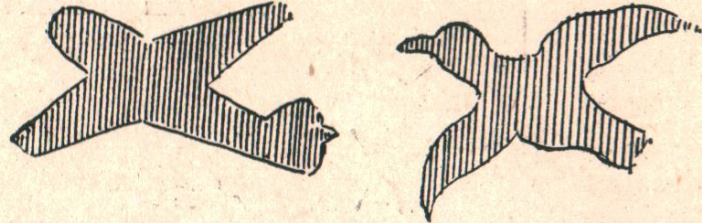
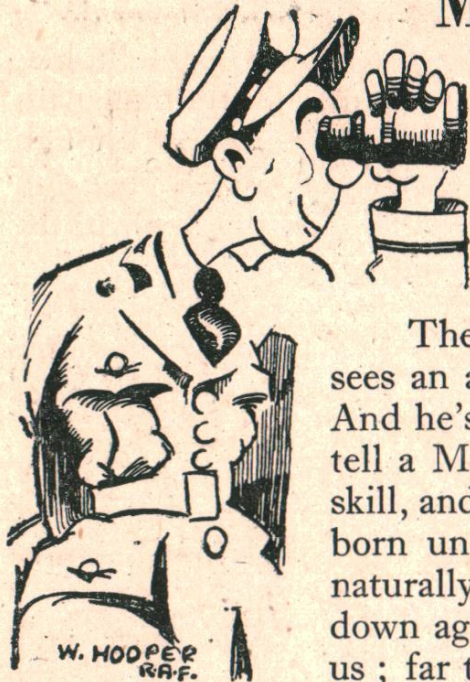
Anyway, practise until you can come in with a “trickle” of engine and see how much you like it with the nose stuffed well down. Another satisfaction you should get from a well-judged steep approach is the tiny and gentle throttle movements necessary to take the aeroplane just where you want it.

Try it !

This is written for the single-engine boiler whose engine interferes so much with the view. With him we have every sympathy when taking off. Poor devil, he is tied down and the only remedy is : for taxiing, to swing the nose ; for taking off, to make *sure* before opening the throttle. And as for coming in, well we've heard lots of pilots say—“ Lovely



## THE LESSER YELLOW-BELLIED MESSERSCHMITT



The Perfect Air Gunner looks up in the sky. Far away he sees an aircraft. Confidently he says, "That's a 'So and so.' " And he's right. The assembled multitude, those who can hardly tell a Mustang from a Manchester, are duly impressed with his skill, and probably feel at the back of their minds that he has been born under fortunate stars and has taken to this sort of thing naturally, instinctively and without effort. Then they all settle down again as before, saying, "Well, well, it's all rather beyond us ; far too difficult ! "

But they forget that they have not been looking at a gifted amateur but at the finished article, the Perfect Air Gunner, a professional using his skill. And that skill is really 90 per cent. hard work.

Perhaps when he was younger our Gunner was a bit of a naturalist. Let us suppose he was ; but all the same we can be quite certain that he didn't always know instinctively every bird he used to see. There must have been a time when eyeing a dark bird sitting on a bough he pondered, " Is it a blackbird or is it a crow ? It is singing ; and crows cannot sing ; it has got a long tail ; and crows have short tails ; it is not very large ; and crows are large. Therefore it is certainly not a crow, and is probably a blackbird." In time, as he saw both crows and blackbirds more often, he was gradually able to name them more quickly and with less effort, until finally his answers became almost instinctive. And then, as now, the assembled multitude who could hardly tell a hawk from a wren, were duly impressed with the easy way in which he did it.

When the naturalist became an Air Gunner—long before he was Perfect—he found he had a long and weary road to travel called " Aircraft Recognition." The types he had to know were numerous and hopeful guessing only produced broad smiles from the Instructors, definitely not smiles of approbation either. Once again, casting his mind back to his days of Bird Recognition, he began to ponder, " Is it a Greater Black-backed Gull or is it a Puffin V ; is it a Focke Wulfe 190, or is it a Lesser Yellow-bellied Messerschmitt ? " And his reasoning was always the same as for the blackbird and the crow. He tried to see as many as he could of all types of aircraft, and the more he saw them the quicker and more easily could he

distinguish them, until one day his Instructor said "That chap's a trier" and sent him to a Squadron. Here he found much knowledge and some slackness, and all this influenced his actions and outlook. He found, for instance, gunners who said: "No you are operational you don't need to bother about those things; I never do"; but he also found, in time, that these gunners had a habit of failing to come home. He didn't ponder this fact for long before he decided to resume his training with redoubled enthusiasm. He had a combat, unsuccessful; and found it is not enough to recognise an aircraft unless you can also recognise its range so accurately that you can put your bullets where they hurt most. He hadn't had to do this with birds, but he realised it was just as well to do it with hostile aircraft.

He soon began to turn into a very good gunner. He learnt to give fighting control, and found that whereas before he had judged range through his ring sight, now he had to estimate without it; so he practised this hard and long until once more people wondered at his "instinct." Had they not had nearly half an hour's laborious practice one afternoon and failed to produce any startling results? They felt he must have been born clever—and left it at that. And so, while he put in just ten minutes more practice, they all went and had one, and discussed the phenomenon over it: "Well, it's a rum world—have another, it's my shout this time!"

But slowly and for a long time afterwards our Gunner went on learning—till at last he turned into the Perfect Air Gunner.

## THIS MONTH'S PRUNERY



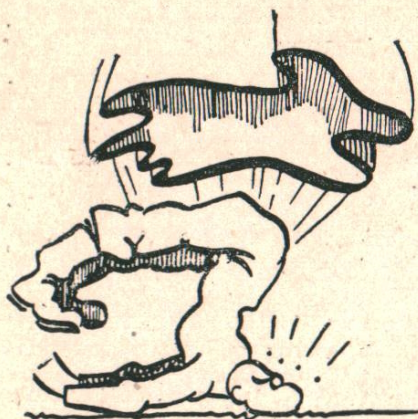
**T**HE MOST HIGHLY DEROGATORY ORDER OF THE IRREMOVABLE FINGER (Patron: Pilot Officer Prune) is this month awarded to Pilot Officer — for Stupendous Blind Faith in his Instruments.

In the course of carrying out certain flying duties this fully operational pilot took his Mustang through some high tension cables with a 120,000 volt load. After removing three insulators, 200 yards of 1-inch cable and 120 yards of telephone wire complete with pole, he flew back and landed the remains of his aircraft (Cat. C) at base, where he was told he must have been flying at less than 50 feet height. To which he replied: "Oh but, sir, that is not true; my altimeter showed 500 feet, so I must have been 500 feet up."

The same Order has also been awarded to Pupil Observer — for Abnormal Ability to Detect Wind.

When engaged in a bombing exercise, he busied himself for half an hour with getting a three-course wind on the Course Setting Bomb-Sight and at the end of his calculations announced that he had just got the wind and it was "no miles an hour from 352 degrees."

## COMING DOWN TO EARTH

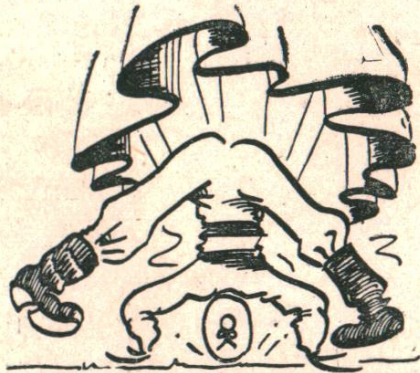


Don't land like this—

It is just eighteen months since we had an article on baling out—in our first issue to be precise—and so we feel it's about time we had another, and since we recently met a pilot, a thrice-baled-out chap, who said, "Leaving the aircraft is easy: it's the landing that I don't like," we thought we'd hunt up the latest griff on happy landings. We've got it from the boys that know, the Parachute Training School. The average pilot or air crew may never have to bale out at all, or at most very few times, but these chaps are doing it all day long, so what they've got to say is probably worth listening to, and worth remembering in case one day you have to jump for it.

Here it comes:

To make a safe parachute landing the first thing is to face into drift, *i.e.*, the way you're going. You can see the direction by watching the ground; obviously if the objects on it are coming towards you, you are going forward. If you aren't right you

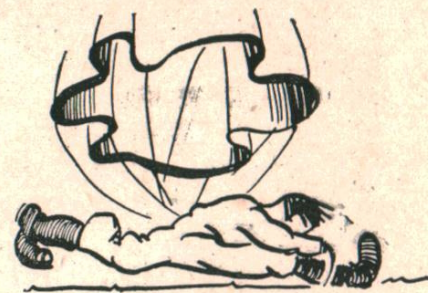


—or this.

must turn about, and the actual method of turning yourself is as follows: Whether left or right about doesn't matter, but to turn to the left, pass the left hand *in between* the left harness lift web and the body and grasp the right harness lift web; simultaneously pass the right hand *outside* the right harness lift web to grasp the left harness lift web. Then turn as required by pulling sideways and downwards. You can make up to a complete about turn, but you must hold it or you'll swing back. This turning into drift is really most important and you should get it quite clear in your mind. (Borrow a bit of rope and a pair of Grannie's stays and practise from the chandelier!)

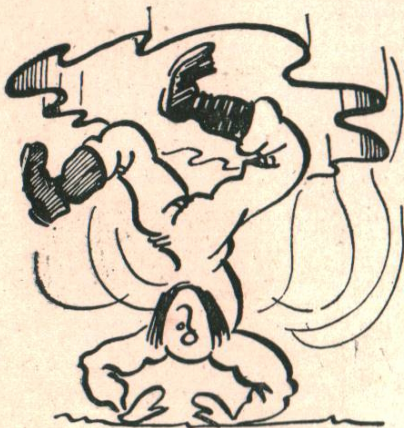
Two small points about the above are: (i) if the wind by any chance twists you round again, releasing the lift webs will turn you back; and (ii) if you have difficulty, as well you may, in reaching the opposite lift web, you can do it more easily by "leaping up" the webs, or, as it were, jumping for them.

Now for the actual landing. Remember that you're coming down at 20 feet per second and probably going forward with the wind as well at anything up to 20 m.p.h., so you've got to take things seriously. The feet should touch the ground facing forward in the line of the drift, or slightly across it, with feet



—or this.

and knees together and the centre of gravity of the body slightly forward. The reason for keeping the legs together is to provide a single strong column, for if the legs are apart, any side shock, from not facing quite properly or being swung by the parachute, will come heavily on one leg and may damage it. The knees should be half-flexed, half-tensed, ready for action, something like, say, a tennis player waiting to take a service. Try to take the initial shock on flattish feet, weight forward, and immediately after touching the ground relax in the line of least resistance. If you think this means you'll fall, you're right, it does. That's the safest way to land.



—or this.

A natural fall is a collapse diagonally to the right like this: crumple down to the side of the knee, to thigh, to hip; then swing the near shoulder round with head and elbows tucked in; and end the fall on the rounded back of your shoulders. If you don't believe us, jump off a chair, weight forward, feet together, elbows and head in, and see how natural it is. (P.O. Prune hastily says *he* believes us all right, never doubted for a moment.)

Now, though falling diagonally to the right is the easiest fall, you may not be able to make it always. The parachute or wind may take a hand at the last moment, or maybe you can't get your turn quite right. In this case, if you're land-

ing forward or sideways, just keep the main rules: feet together, relax in the line of least resistance, and tuck in all the knobby parts, particularly your head.



—or even this.

If, in spite of all your endeavours, you are somehow landing backwards, try first to make a last minute turn and fall sideways: if not, reach back with your *feet* and roll sideways, backwards, rounding your back and tucking in your head. Whatever you do, try to avoid landing flat on your back: it may hurt your spine, and as you can't control your head so well, you may get concussion as well. Immediately you are grounded, turn on your back and unlock the quick release mechanism. Let's just briefly sum up:

1. Face into drift.
2. To turn (to left): Left hand across inside the near strap, right hand across outside both straps. Grasp opposites and pull. Keep pulling.
3. Feet and knees together, muscles semi-tense and ready for relaxing after touchdown.
4. Collapse forward diagonally, side of knees, thigh, hips; then twist round to end on hunched shoulders, head and elbows tucked in.
5. For landing in any other position than the correct, fall in the line of least resistance, tucking in everything and, if necessary, roll.

There you are. As P.O. Prune says, why, it's as safe as falling off a house.

# LATEST AMENDMENTS TO PILOT'S NOTES

ARE your copies amended up to date? A.M.O.'s N Series show each month the complete list of amendments to Pilot's Notes, but the following are some of the more important amendments issued recently :—

Baltimore I, II & III.	A.L.2/B	Engine limitations, economical cruising and fuel consumption.
Catalina I & II.	4/D	Revised Section 2—instructions on starting and feathering, etc.
Chesapeake I .	2	Revised Section 2—text rearranged.
Halifax I .	22/G	Maximum speeds and weights, starting and testing.
Halifax II .	8/A	Revised Section 2—engine and speed limitations and more details generally.
Hurricane II .	24/J	Detailed instructions on method of changing to main tanks after emptying reserve.
Kittyhawk I .	2	Position error correction and economical cruising.
Lysander II .	13	Notes on target towing.
Manchester I .	24/K	Revised Section 2—more details throughout.
Martlet I .	4/B 3/C	Revised Section 2—text rearranged and expanded.
Martlet II & III	2nd Ed.	New Section 2—fuel consumptions, etc.
Spitfire V .	16/F	Operating instructions for overload tanks.
Wellington I .	14	Fuel system instruction including operation of overload tanks.
Wellington II .	10/D	New simplified fuel system diagrams.
Wellington III .	6/C	
Wellington IV .	8/B	



*Prune didn't know there were any amendments.*

*Note.* In the August TEE EMM the Wellington VI should have read Wellington IV.



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(Advt.)\*

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## FROM TEE EMM'S FILM CORRESPONDENT

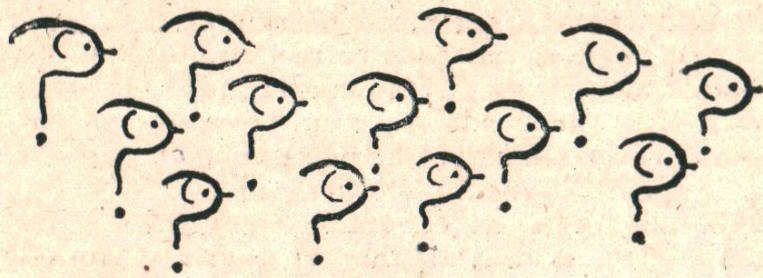
**R** for Robert, a great big tough Halifax, takes the lead in the latest offering from the Air Ministry Instructional Film stables, charmingly partnered by that glamorous blonde, Miss Rubba Dinghy. Robert ditches himself in the North Sea, but thanks to the skipper's earlier insistence on the importance of dinghy-drill training the crew escape, ably supported by the heroine who carries one of the most efficient compacts we have ever seen. It's got everything, from food to floating knives, from paddles and plugs to portable wireless.

The skipper's peculiar ideas about actually making his crew learn their dinghy drill beforehand, instead of wishing they had when it was too late, was due to a narrow escape on a previous trip, when he had been second pilot to a skipper who didn't care much about anything and so wrote off nearly all his crew, including himself. The second pilot realises from the subsequent interview with an Air Sea Rescue Officer that careless confidence, over-optimism and an "it'll-be-all-right" attitude with regard to possible ditching amount almost to criminal misbehaviour, and at once makes up his mind that if he ever gets a "kite of his own" he'll see that *his* boys know it all backwards.

And they do. We see the whole crash, from the first realisation that they may not make it and the immediate S.O.S. down to the A.S.R.S. launch pulling the crew out of the drink after a bare five hours afloat, thanks to their discipline, common sense, and knowledge of their particular duties. It's all most dramatic and most instructional. Robert ditches excitingly to back-ground music and the self-inflated heroine bears up nobly.

We liked the thoroughly bored air of complete efficiency displayed by the Navigator. We liked also the bit where the front gunner pigeonholed the message.

\* As yet unpaid for.—Ed.



# TEE EMM'S Brains Trust

*Tee Emm, as you know, is an official Air Ministry Publication. Everything in it appears with the approval of the Air Member for Training, representing official views or policy. We get, however, a certain amount of correspondence—criticisms or comments on articles, queries, suggestions and so on—which cannot be published as official, and though we always dig out the answer, when we can, it only affects the writer, when others, who haven't written us, might also like to know the answer.*

*Under the above title we propose to print some (but by no means all!) of this correspondence, and in our turn will try to produce (from the experts here), and publish, any answer that may be needed. In accordance with Tee Emm's policy, we won't print names (and in accordance with the Editor's own policy, no payment will be made!).*

LETTER. "May I use your columns to bring to light what I consider to be a possible fallacy in obtaining fixes. The conventional method of ascertaining from an aircraft the position of that aircraft by obtaining bearings (either visual or wireless) on two or more objects may give a substantially incorrect position. The plotting of such a FIX is based upon an assumption; it then proceeds to disprove that assumption. This assertion can best be explained by taking an example (see Fig. 1). The navigator desires to make good a track

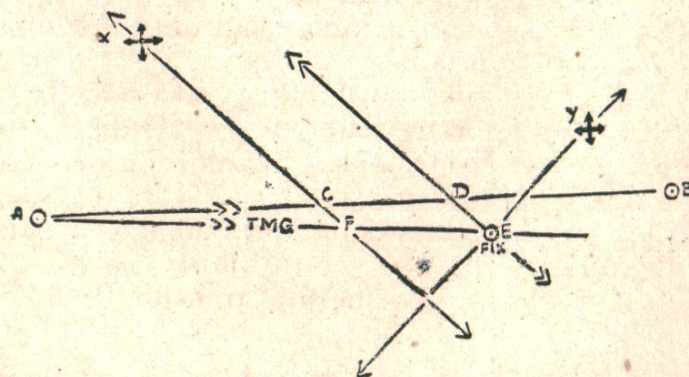


Fig. 1.

of  $090^\circ$  (T) from A to B. He calculates his course and ground speed upon the basis of a wind velocity which may or may not be correct. His ground speed so calculated is, say, 120 m.p.h. After twenty minutes' flying he obtained a W/T bearing; e.g., "X" W/T station gives him a bearing of  $135^\circ$ . He plots this on his chart. After a further ten minutes' flying

he obtains another W/T bearing; e.g., "Y" W/T station gives him a bearing of  $225^\circ$ . He plots this on his chart. He then assumes (a) that his track has been correct and (b) that his ground speed has been correct—two assumptions which, if true, would make it quite unnecessary to obtain a FIX. Nevertheless, the assumptions are made and from C he sets off ten minutes of ground speed at 120 m.p.h. along the  $090^\circ$  track fixing the point D. Through D he draws the "transferred" position line, i.e., a parallel to the first position line. Where the transferred position line cuts the second position line, there, so convention has it, is the FIX.

"But that position was discovered by means of the assumption that the track and ground speed originally calculated were correct—an assumption which the very position itself has proved to be untrue. If the assumption had been true the aircraft would have been at D. If, on the other hand, the FIX obtained (viz. E) is correct then the track made good has been AE and the ground speed has been that which will allow ten minutes for the distance FE.

"The position E as a FIX cannot, therefore, be accurate. It can, however, be made more accurate by continuing to make false assumptions. Assume, for the purpose of further calculations and plotting, that the position E is more accurate than the position D and calculate the ground speed which will allow thirty minutes for the distance A to E. In the example drawn this would give a ground speed of 128 m.p.h. With that ground speed, calculate the distance run in ten minutes, i.e.,  $21\frac{1}{4}$  miles. Mark this distance off from F, fixing the point G

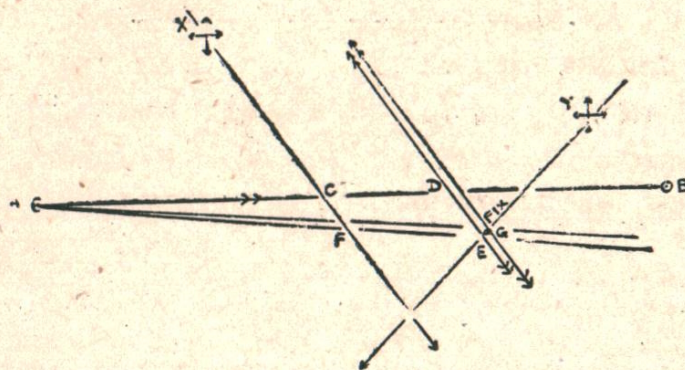


Fig. 2.

(see Fig. 2). Through G, transfer the first position line again. Where it cuts, the second position line will be a more accurate FIX than the one previously obtained at E.

"This process might be repeated again and again until the difference between successive positions thus obtained is indistinguishable.

"The moral to be drawn from this is twofold, viz. : (i) that the navigator should ascertain his track by means of a drift reading immediately before or after obtaining a position line, and (ii) that even if he has his track correctly noted his plotting of a FIX may be inaccurate by reason of the assumption of a wrong ground speed unless he re-transfers his first position line once or more times. If, however, he knows his track angle from drift readings and has been able to ascertain the wind velocity (e.g., by recent multiple drift) and thus knows his ground speed, he can rely upon the FIX given by the first transfer of the first position line as being accurate."

*REPLY.* It is true that the accuracy of a running fix depends on the accuracy of the "Run" (i.e., on the ground speed used and track used). Neither of these is known for certain, otherwise a fix would not be required: In A.P. 1234 (1941 Edn.) this is made clear.

But, provided the interval between obtaining the first and second position lines is short, and provided the bearings cut each other at a good angle, inaccuracies of ground speed and track used for the run can be very large without appreciably affecting the position of the resulting running fix. For example, suppose the ground speed were thought to be 200 m.p.h., whereas it was really 220

*m.p.h., and suppose the track was  $5^\circ$  in error (will our correspondent agree these errors are reasonably large?), then if the interval between obtaining the two position lines was three minutes, the error in the run would be 1.35 miles, and, provided the position lines cut at the worst acceptable angle ( $45^\circ$ ) in the worst conditions of relative directions of track and position lines, the final error from these causes in the position of the running fix would be 1.9 miles—not too bad for worst conditions. (Try working on these figures for yourselves).*

*A most important aspect of a running fix has been overlooked, namely, that the position lines are themselves subject to considerable errors, and should more properly be regarded as representing the centre of sectors of position, or of bands of position (depending on what method is used to obtain them). Thus the accuracy of the fix is being considered with undue regard to its real nature.*

*It is more correct to regard a running fix as a means of approximating the position "in vacuo" so to speak, when more precise methods are unobtainable. Hence the important conclusions are not as stated, but are :—*

(i) *To ensure that the position lines are as accurate as possible.*

(ii) *To reduce the time elapsing between the position lines to an absolute minimum.*

*In conclusion may we point out that there's quite a lot about all this in A.P. 1234, Manual of Navigation, Vol. I, at Chapter VI. And there's even more, with magnificent pictures, in A.P. 1456, Manual of Navigation, Vol. II, at Chapter XXVIII.*

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## LETTERS TO AN AIR GUNNER

### FROM ONE WHO HAS BEEN THERE

#### III

DEAR SERGEANT BURSTE,

By now you'll have got your aircraft and all its equipment right on the top line and are probably impatient to get cracking on your first op. So this month I want to tell you how to take care of yourself as regards your personal comfort and the possibilities of any discomfort due to an enemy fighter.

But first of all I want to impress on you that, now that you've arrived at a squadron, you must keep yourself absolutely up to scratch in all the branches of your work. Don't make the fatal mistake of thinking that once you're operational your training is over. Spend all the time you can in practising your range judging and aircraft identification (probably one

of the most important things you should know) and give yourself a few minutes each day in the training turrets so that your turret manipulation is absolutely one hundred per cent.; for if this isn't smooth and accurate, good shooting is impossible. And bang away, too, at the clay pigeons whenever you get the chance.

Well, now for that first op. No man can work efficiently unless he is comfortable and feeling fit. It's up to your C.O. to take care that you are kept physically fit, but it is up to you to see that you go into the air properly equipped for your job. Your greatest enemy is cold, but although no doubt you've heard stories of air gunners suffering from frost-bite there's really absolutely no excuse whatever for you to get frost-bitten, if you use your loaf.

Don't imagine, for instance, that because it is warm summer weather that you'll find the same thing a few thousand feet up or a hundred miles away from your base. On really sweltering days I've met a temperature of  $-15^{\circ}$  C. at 10,000 feet. Unless you are well wrapped up this can be very uncomfortable indeed and spoil your efficiency. Of course you will almost certainly be issued with electrically heated clothing, and, bulky and uncomfortable though it may seem, I advise you to wear it whenever you have a long trip. You need not use electrical heating, but it is a very comforting thought to know it's there.

The way to use the suit will have been explained to you, but it is up to you to keep it in good order and always test it before going on any op. Points to remember are these.

(a) See that the plugs joining the coat to the trousers, gloves to sleeves, etc., are a good tight fit, and at all times avoid treading on, or knocking, these plugs as they easily become unserviceable. If any of your plugs are "sloppy" get them attended to. Nothing is more annoying than to find, say, one glove unplugging itself every time you move your arm.

(b) See that your boots and gloves are plenty large enough; particularly gloves. Remember when fitting them that for most of the trip your hands will be on the turret controls and the back of the gloves stretched across your hand. The elements get very hot and you can get badly burnt if they are pressed hard across your knuckles owing to too tight

a fit. I personally always wear a pair of silks underneath as well, as an additional precaution.

(c) Don't wait until you feel cold before plugging in your suit. It is much easier to keep warm than to get warm once cold.

Now if you haven't been issued with electrically heated clothing, or if the Met. man has assured you that you won't meet too low temperatures, it's possible to keep quite warm with the ordinary flying clothing. Here again always assume that you are going to meet colder conditions than anticipated. Wear loosely fitting woollen underclothing. Always wear your flying boots, and see they too are an easy fit. A loose sweater is good, and many people, including myself, think it more comfortable to fly with a scarf instead of a collar, particularly if your collars are at all on the tight side. Your hands will keep reasonably warm with silks and a fairly loosely fitting lined leather glove.

Next, whenever cold conditions are expected on an op. for which you are not wearing the electrically heated clothing, avoid violent exercise on the ground after you have dressed; for if the ground temperature is warm you'll start sweating freely and the sweat will freeze later. This is most unpleasant and uncomfortable.

Now about oxygen. (There was an article about this in the June, 1941 TEE EMM, which is worth re-reading). Oxygen is there for you to use and it certainly helps to keep you warm. Even at moderate heights like 12,000 feet, although you feel O.K., your body does need additional oxygen. So always use it. By the way, if you are wounded and feel like passing out it helps greatly to

turn your oxygen full on and take good deep breaths of it. Oxygen is also most helpful to the eyes when flying at night. Always remember to check the oxygen system before flight and see that you have got your mask fitting closely and comfortably and wear it the whole time. It is no good thinking that an occasional sniff at the mask, which is probably dangling in your lap will have the same effect; it won't.

Get out to your aircraft in plenty of time before take off. See that your parachute is properly stowed, and if you are going on a long trip, take your rations with you in the turret. With little practice you will find places where your odds and ends can be stored without interfering with your job. I am uncertain whether the newest aircraft have an emergency axe stowed in the rear end of the fuselage (I'm assuming for the moment you're a rear gunner), but if there is one there take my advice and have that also with you in the turret. There have been many cases when, after force-landing or crashing, the rear gunner has been the only fellow who has been able to get out of the aircraft unaided. Remember too, that if a crash seems unavoidable, swing your turret round on to the beam. Not only is it easier for you to get out, and—if you are unhurt and have the axe—perhaps to help others elsewhere, but it's easier for rescuers to get *you* out, if you're knocked out.

Well, I could go on indefinitely telling you all the little things to be seen to before flight, but most of these you learn

for yourself; and in any case you've already been told most of them. But there is one point before I close which I should like to stress. This is, before any operation have a full discussion of your route and tactics with your captain and the rest of the crew. Go over the route with the navigator; you may be able to help him by pinpointing some feature; and think what you can expect to see in the way of coastlines, lakes, rivers, etc. Make a thorough study of the target map. You needn't take a target map with you; you won't have time to use it as you will be searching the sky, and in any case you probably won't be able to see it without putting a light on, which of course you must never do. But study it beforehand and memorise its features; not only will you perhaps be able to help find the target, but you may be able to tell just where the bombs drop and so point it out later to the Intelligence Officer. But never give up sky-searching in any district where night fighters are likely in order to watch for bomb-bursts on the ground. It's just that it *may* happen that, apart from your job, you may see some of them and then it *may* happen to be a great help to the I.O.

Next time I write I'm planning to go through an imaginary operational flight step by step and discuss what should and should not be done under the varying conditions.

Yours sincerely,

A. G. BARRELL-FFOULYNGE, F/LT.



# PRUNE'S PLUG

NOW all you airmen, young or old,  
Have heard of P.O. Prune, the bold  
But brainless pilot, who, in fact,  
Is minus intellect or tact.  
He noticed, just beside his seat,  
Type 6 control box, very neat,  
Designed for use, by night or day,  
With Beam Approach, the S.B.A.

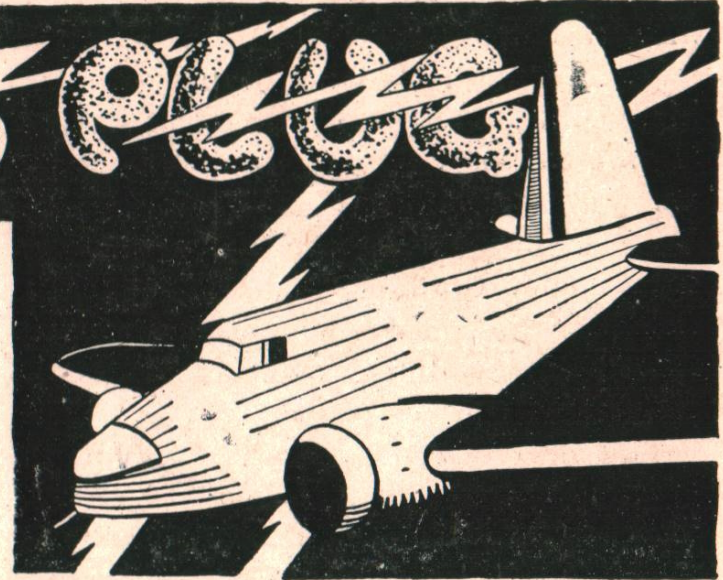
Now Prune imagined, so we think  
Because he'd done it on the Link,  
He knew it all. He classed instructors  
With office boys and 'bus conductors.  
He waited for some Q.B.I.  
And rushed aloft, the beam to try.  
But Prune, who really is a mug,  
Forgot about that wretched plug.

\* \* \* \*

Prune might have been for all he knew  
At Paddington or Timbuctoo.

\* \* \* \*

What goeth up, must yet descend,  
And flights come always to an end.  
So down he came to look about  
For something that would help him out,  
A signpost to the aerodrome,  
Or anything to guide him home.  
The altimeter fast unwound ;  
Then all at once—he *saw the ground.*



Collecting in his steep incline  
The weekly washing from a line,  
He climbed again with frantic lurch  
And just avoided Bumpstead Church,  
Scraped under some electric cable,  
And headed for a barn and stable. . . .  
By now he didn't give a darn—  
He pranged her down beside the barn.

Your turn will come, ere very long,  
To join the fast increasing throng  
Who understand the dits and dahs  
Of Q.D.M.'s and Q.D.R.'s.  
You'll use the trackless paths on high  
That chart for you the Q.B.I.  
This song must end. Your obligation  
Is Interest and Concentration.

### Moral :

Eyes open wide, ears fully cocked,  
Make sure YOUR plug is home and  
locked.



## USING YOUR EYES AT NIGHT



*Some guys get like this!*

This article is to be about the best way to use your eyes. . . .“No need to teach me to do that!” says P.O. Prune, standing politely back in order to allow his young lady to precede him to the top of the 'bus. . . . Prune hasn't let us finish our sentence. The best way—we were going on to say—to use your eyes *at night*. “Oh, *that!*” says Prune, losing interest.

Now everyone knows how important it is in these days of night bombing, night fighting—and even of going about during the black-out—to be able to see as well as possible in the dark, but there may be some who do not perhaps know the best ways of ensuring this.

First and foremost, of course, there is the question of adaptation. The human eye can actually make itself ten thousand times more sensitive in darkness than in bright sunlight, but a job like this

naturally takes time, and the maximum possible is not reached for about an hour. This time, however, is for adaptation to darkness from daylight or, say, a brightly lit mess. It would naturally be much shorter if the adaptation to darkness were only from a place like a candle-lit dispersal hut; you are, so to speak, starting further down the course. So, in order to ensure your being able to see in darkness as well and as soon as possible, you should start preparing your eyes about an hour before. This means getting out of any fully lit place into a dimly lit one, and particularly avoiding even temporary bright lights such as torches, or striking matches near your eyes. For it only takes a minute or so for your eyes to go into reverse, *i.e.*, become adapted from dark to light, and then you have to start all over again. The ideal way of doing all this, of course, is to wear the special pre-adaptation goggles which will provide you with your hour's synthetic night before you tackle the real one.

So much for adaptation or sensitising of the eye to the dark: now come three things which affect the actual degree of this sensitivity from the point of view of an aircrew flying at night. They are: Vitamins, Oxygen, and Other Lights.

If you are short of vitamins A and C (fresh vegetables, cheese, fruit, etc.) your dark vision may be seriously reduced. As a matter of fact, on the Service diet this point doesn't arise: you are, or should be, just crawling with vitamins. In any case, flying crews have vitamin capsules as an extra insurance, but remember these won't make your vision

any better than it can normally be. It's no good tanking up on them and hoping you'll be able to detect a black cat at midnight in a Bremen cellar from 10,000 feet.

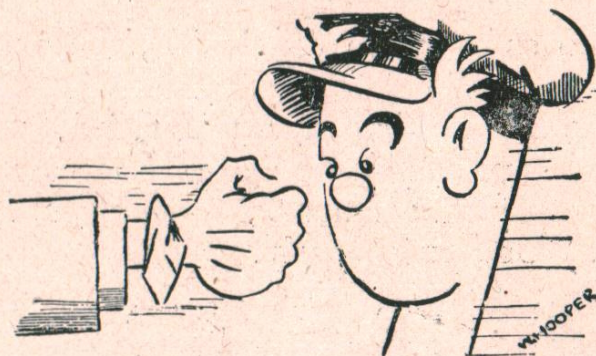
Taking oxygen at, say, 16,000 feet may make your vision ten times more sensitive than if you are not using it. Even at 9,000 there's a marked improvement; so if you're climbing quickly, use it all the way up. Moreover, if you wait too long to turn it on, say 15,000 or more, it means that, when you do, there is—such being the nature of oxygen—a short period during which your vision is obscured by a rosy glow. While this is all very nice if you're reading certain war communiques, it doesn't help you to see hostile fighters.

The presence of other lights also hamper sensitivity. These may be anything from gun flashes and moonlight reflected on the Perspex, down to the adjustable lighting in the aircraft and luminous instruments. You can't do anything much about the former, but you can do something about the latter. For instance, don't use a torch unnecessarily, keep your interior lighting as low as possible and don't yield to the temptation of turning it up in order to see better. You may see better inside—but not outside, which is more important. And only glance, don't stare, at your luminous instruments.

The next thing to remember about seeing at night is that contrast is a great help. If an object is lighted to the same degree as its background, it's invisible. Aim for as big a contrast as you can by getting it silhouetted against a light background, or lighted up against a dark one; and use the contrast to its fullest extent

by preventing the "light scatter" which comes from scratched Perspex or slightly dirty windscreens. Even though this may be so slight as not to matter in daylight, you'll find it makes a great difference at night.

Your ability to see your best in the dark may also be affected by disturbing



influences, and they should be guarded against. These may vary from things which hover on the edge of your vision, such as the framing of the windscreen or the reflection of a dashboard light—so get your face as close to the windscreen as possible—down to bodily discomfort, such as not enough clothing or an uncomfortable seat—so keep yourself as warm and comfortable as you can. In other words, you must be in a position to *concentrate fully* on using your eyes.

Finally, the actual mechanical business of looking. The most sensitive part of the eye at night is not, as in day-time, at the centre, but a little to one side. This means that you'll see better if you don't look at what you're looking at, as the Irishman might have said. If you see something out of the corner of your eye, don't look straight at it, or it'll go. The best way to look at it is about 10 degrees off. And don't stare too long in any direction: this tires the eyes and they lose a little sensitivity. Let your gaze

rove systematically round, covering the whole area slowly but effectively, and you'll get better results. Lastly, quick-moving objects are more difficult to pick up than slow ones: so don't add to the difficulties by rapid changes in angle of bank and so on—or you may miss something to one side of your line of flight.

To sum up, in conclusion, the main points:

- (1) Allow time for adaptation, use pre-adaptation goggles and avoid bright lights before going up.
- (2) Use oxygen early.

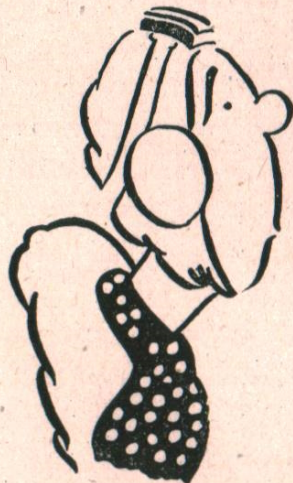
- (3) Avoid unnecessary light inside the aircraft and don't stare at lighted instruments.
- (4) Keep windscreens absolutely clean.
- (5) Keep warm and comfortable.
- (6) Don't stare directly at an object, don't stare too long in any direction, and don't move too rapidly about the sky.

If you stick to these rules you'll be getting the best out of your eyesight at night-time—and, while not up to, say, a bat's or cat's standard, it should be pretty good. And who really wants to be a bat or a cat anyway?



## A UNIQUE FIGHTER UNIT

### FROM A CORRESPONDENT



*P.O. Prune is not very intelligent himself.*

Early last year the Merchant Ship Fighter Unit was born and nurtured on an aerodrome in the Northwest country. Here met, for the first time, pilots from every type of job in Fighter Command, with one or two who had been instructors on Fighter Training Stations.

Upon first arrival we wandered about the Mess for an hour or two, trying to decide which chap appeared to be so intelligent that he would know something about this job for which we had volunteered. (P.O. Prune would have said we all looked intelligent, but as he's not

very intelligent himself, you can't go by what *he* thinks.) The Mess Bar finally proved the common meeting ground, and we found that not one of us knew anything at all—except that we were to go to sea with the Merchant Service. Having got that much satisfaction, we all settled down for the evening and finally decided that M.S.F.U. was quite a jolly proposition. The next morning was spent in making the acquaintance of the Admin. blokes in our new H.Q., and we were agreeably surprised to find them good types who, although they knew nothing either, would obviously have helped us if they had known anything. It was tough on them that first day because they couldn't even find their own offices, whereas we could at least see a few Hurricanes standing

around, and we did know where the Mess was.

In the afternoon we were called in by our C.O., at that time S./Ldr. Louis Strange, D.S.O., M.C., D.F.C. and Bar, who explained to us that we would be attached to certain specially prepared Merchant Ships which, although doing normal cargo-carrying duties, would also be equipped with a fighter aircraft as protection against Hun bombers. Apart from being at readiness during daylight, we would have no other set duties since an aircraft crew of four were coming along and catapult maintenance would be done by naval ratings provided for that purpose. By this time we all had visions of palm trees, golden beaches and innumerable Dorothy Lamours, but were hauled back to reality by some unimaginative bloke asking the C.O. whether the many Naval Lieutenants in the Mess had anything to do with our job. The C.O. said that they had a whole lot to do with it, and explained that a naval chappie would go along with each pilot and, in the event of action, would guide the Hurricane by R/T, and would home it back to the ship should the pilot drive out of sight of the convoy. The Fighter Directing Officer, or F.D.O., as he is called, would also be administration officer for all the service men on board, and would thus have quite a lot of work to do.

Having received all the gen, we started our catapult practice before actually going to a ship. The catapult consists briefly of a steel runway 85 feet long, along which the trolley, carrying the aircraft, is forced by a bank of cordite rockets over a distance of 60 feet. Using 30-degree flaps and  $6\frac{1}{4}$  lbs. boost,

a perfect take-off can be made without any loss of height at all, while in many cases the aircraft climbs directly off the trolley since the air speed is often well over 80 m.p.h.

When the catapult training is finished, the pilot, F.D.O. and aircraft crew are sent to the port of embarkation, where they organise the loading of the aircraft. This operation is usually accompanied by much amusing, though well-meaning, advice from the merchant seamen who, while possibly competent to load a normal cargo, would soon bend a Hurricane if their methods were followed. I actually saw two foreigners, transporting a Hurricane on a lighter, use the overlapping port wing to prevent their barge from hitting the wharf wall. Naturally the aircraft suffered.

Apart from incidents such as this, which luckily are very infrequent, a voyage on a C.A.M. ship can be very pleasant indeed, since on certain trips the ship soon passes out of the aircraft danger area and the pilot can sit back and anticipate the pleasures awaiting him at the port of arrival. The Captain, the Officers and even the crew are delighted to have us on board and do everything to help us, sometimes more than "everything," since the Captain, if the pilot and F.D.O. can cope, usually tries to spend about 24 hours out of every day in port entertaining us, ostensibly to celebrate a good trip out and a quiet one home, but really, I think, to make us feel happy on his ship.

When the ship arrives at its destination the pilot "shoots off" and lands at a local aerodrome where the aircraft is serviced while the ship is loading, so that it can be placed back on the ship

when the return convoy is ready to leave.

It all seems so simple, doesn't it? A pleasant sea voyage, lots of fun with the good types in the Merchant Service, and last, but by no means least, grand relations with the officers of the Naval Escort ships with whom we always work in close co-operation. In actual fact, however, M.S.F.U. has not such an easy job as all that. Several of our ships have been lost by enemy submarine action, leaving a bewildered M.S.F.U. section sitting in a lifeboat while their Hurricane dropped down to Davy Jones. Many of our chaps have watched other ships in their convoy burning and exploding, and have waited helplessly until the blitz has ended, or until their own ship rends and shudders, and they have to lower and man their own ship's boats. For a long time both pilots and F.D.O.'s had to take everything while having no chance to attack. We were merely an insurance, an effective insurance, too, since the air attacks on our convoys stopped as soon as C.A.M. ships began to operate. Yet, being an insurance, however good, is no consolation when no score is being marked up on the credit side, so it was with great delight that we learned in May of this year that F./O. Alistair Hay had catapulted from his ship while travelling in convoy to Russia and had destroyed at least one He.111 and damaged other enemy planes.

In this encounter F./O. Hay was wounded in the thigh, and his Hurricane

was badly damaged, but he baled out and was picked up by an escort vessel within five minutes. He earned and received the D.F.C. for such a good show, and is now quite fit again except perhaps for a slight taste of fluorescence which he said tasted horrible, and of which he scoffed quite a fair amount while he was waiting to be lifted out of the water.

The baling out after an action is quite a normal procedure, and for that reason we have a very careful parachute maintenance department and always carry a spare one while on a ship, so that damage to one as a result of salt water or carelessness will not affect the effectiveness of the job.

From the foregoing it will be seen that, while all on board the C.A.M. ship have lots of fun, they still have a very real job of work to do as soon as any aerial attack develops on the convoy. All the pilots of M.S.F.U., therefore, are only too glad to return to their ships in the hope that their next voyage may be a lucky one for themselves and their convoy, especially since we have now scored other successes against the "malignant" Hun.

Meanwhile we can still do with a few more chaps to help us take this job in hand, so if any of you reading this feel that you wouldn't be sick and would like to draw plenty of ozone into your system, then come along; we'll be glad to see you. But be fit, because this ain't no kindergarten.





He knew he had plenty of room to  
take off.

#### WHAT DOES O.U.O. MEAN?

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Fairbanks

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