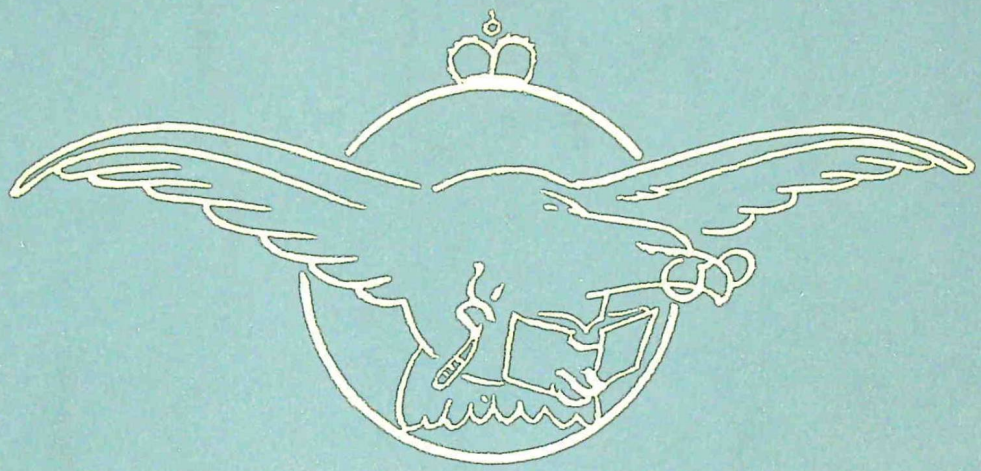
TEE EMM



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Vol. 2 No. 7

TEE EMM

October, 1942

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

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

ORGANISATION WITHOUT TEARS

I

"EVERYTHING ran perfectly. . . . I wonder why?"

Well, if you really don't know the answer to this question, it is "Organisation." For without organisation it's all Lombard Street to a Hitler promise that things *won't* run perfectly.

Now all of us have had instruction of various sorts—flying, technical and so on, even instruction in instructing instructors in how to instruct. But how many have had instruction in organisation? The answer is, mighty few.

Perhaps you think that organising is a thing any ordinary bloke can take in his stride. Well up to a point you are right. There *are* great organisers who have never given a thought to their technique—but the average man is pretty weak when it comes to arranging anything. Funnily enough, the worse he is the more he regards himself as a born organiser! (P.O. Prune, for instance, feels there's just nothing he can't organise, button up and get fully under control.)

You all remember bad muddles that have occurred in your own experience. Journeys made by parties of men to places when they weren't expected till next

day ; waiting in the rain for other people who didn't turn up, because someone hadn't warned them ; instructions given which cut across other instructions ; and so on. And you have probably summed it all up as " just another blasted muck-up."

Now anyone who allows, or causes, muck-ups is really not far off being a saboteur, no matter how brilliant his work in other directions. The errors may be of small importance, but you can never be sure that the offender won't let you sadly down when he is planning something which *is* of great importance. Loss of life may even result. And anyway, any muck-up, however small, makes for lack of confidence.

Organisation prevents all such muck-ups.

How good organisers set to work has been studied—and there is a definite technique. One might almost say there is a cockpit drill. There are certain things which must always be done. In short, one can learn. Competent organisers can be made out of practically anybody who takes the trouble to master the theory of organisation—and apply it. And good organisation is as important to the R.A.F. as good flying, or good maintenance.

With which thought we are starting here the first of a short series of articles on the fundamental principles of organisation which, if mastered, will help you to make things run perfectly. Let's go !

Lectures, talks, or even articles in TEE EMM, won't make a perfect organiser out of anybody, but they *will* help to get rid of certain common faults. Of course it's impossible in a few articles to cover everything about such a large subject, but here, in potted form, are some tips which may turn out to be of use—sometime.

First, what *is* organisation ? There are many definitions, but here is a good one : " Organisation consists of (1) Foreseeing future actions ; (2) Determining the one best way of planning them ; and (3) Carrying them out with maximum effect."

Let's look at the first point, one we so often meet. You are suddenly called upon to carry out something—it may be very complex, or quite simple. The following steps should be taken (varied in degree according to the dimensions of the task) :—

(*a*) Visualise in broad outline what has to be done, and, except in the simplest jobs, write it down.

(*b*) Break the job up into its component parts till you get down to what are called " elementary problems."

(*c*) Take each elementary problem in turn and visualise in detail what is required.

There is a good example of all this in the M.O.I. publication " Air Sea Rescue." Refer to page 5, where the problem is first stated—briefly—as a whole. Then it is resolved in these four parts :—

(1) The pilot must have means of keeping afloat,
(2) He must be kept alive,
(3) He must be found, and
(4) He must be brought safely to land.

Although the booklet does not carry the process on, each of these will in

reality have been resolved still further. For example, No. (1) presents a number of minor problems such as (*a*) the dinghy, (*b*) inflation, (*c*) storage, etc. Each of these can be resolved into further subdivisions until you are left with hundreds of problems which cannot be sub-divided, and these are the " elementary problems " which now have to be dealt with one by one. In short, THE SOLUTION TO ANY PROBLEM IS THE SUM OF THE SOLUTIONS OF ALL THE ELEMENTARY PROBLEMS INTO WHICH IT CAN BE DIVIDED.

The steps to be taken in solving a problem will be discussed at a later date. But in the meantime, may we suggest that you can practise this visualisation business and make it part of the " cockpit drill for organisation " so that it becomes second nature. As an example, you may have to move a party of men to Exville next Thursday. Start visualising ! Break the problem down into (1) New accommodation, (2) Transport, (3) Feeding.

Then break each of the above down. For example, " New accommodation " could be resolved into :—Position, floor space, beds, bedding, lighting, black-out, heating, ventilation, telephone, tables, chairs, ablutions, latrines, cooking facilities, planning of lay-out—and so on. Each elementary problem must be clearly foreseen, and none must be overlooked. And like an umbrella cover over every problem are two questions which must permeate every action. They are : " Who has to be consulted in advance ? " and " Who has to be notified of decisions ? "

Do you get the idea ? But the visualisation must not be done in a slipshod, haphazard way. *Write down* the problem and its divisions and subdivisions and rack your brain to ensure that you have missed nothing. And if you cultivate this habit you will (one day) earn the highest tribute a good organiser can be given : " He thought of everything."

Two words of warning. First : speed —especially in war—is essential ; and as practice more than anything else will improve your speed in organising, lose no opportunity to practise.

The second warning is this : We have only been discussing the mechanics of organising a plan—not the plan itself. If that is bad, the best organising brain can't make it good. Conversely, even if the plan is 100 per cent. perfect it can be ruined for all time by bad organisation. Does that make you sit up and think ? It may be the lot of any of us, any day, to help in the organisation necessary to carry out the perfect plan. Are we confident that we can do it ?

P.O. Prune doesn't know anything about organisation.

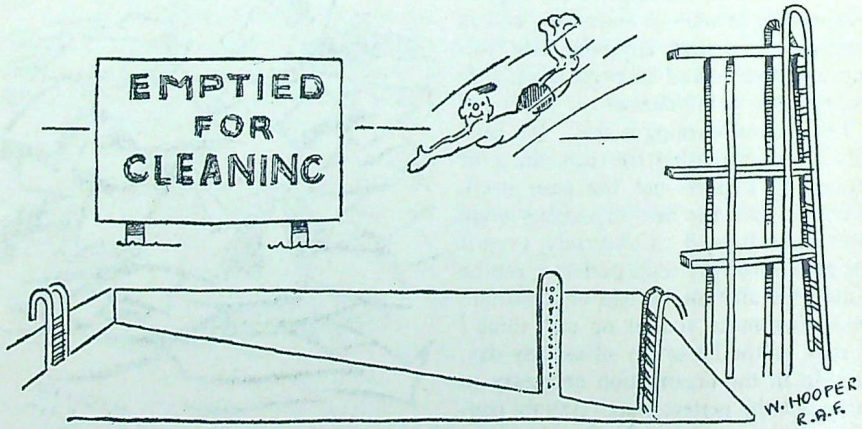
"YOU DIDN'T KNOW I COULD DRIVE, DID YOU, REGGIE?"

WAITING at the dentist the other day we were idly thumbing through the most recent periodicals—one was even a late 1935 vintage—when we came across a joke. It showed a girl at the wheel of a large car going at enormous speed. The girl is leaning out to shout proudly at a friend on foot : " You didn't know I could drive, did you, Reggie ? " The car is heading off the road straight for a large tree. . . .

We liked that joke. It reminded us of something, but at first we couldn't think what. Then we realised it was our old friend, Sergeant-Pilot " Flash Alf." He's at the moment in hospital, having had an accident. He span into the ground from fifty feet while making what should have been a wizard tight turn over his girl-friend's home at Much Burping. He had just got his wings and, of course, as soon as he found the opportunity, flew over his girl-friend's home to show her he could fly. He naturally also flew *low* over her home to show her how *well* he could fly. Women, and particularly girl-friends, are always impressed by their boy-friend's achievement—and the more sensational it is the better they think it. Girl-friends, of course, don't have copies of the Flying Regulations in their homes.

Well, Flash Alf survived, though badly knocked about. He just had time, before lapsing into unconsciousness as they lifted him into the ambulance, to murmur : " You didn't know I could fly, did you, Kitty ? "

On our way back from the dentist we found ourselves still musing about that picture. We'd loved, to have torn it out and printed it here, but what with our own troubles—a cavity in a left lower bicuspid—we forgot. So instead we made up a joke of our own. Here it is. We are sending a copy to Flash Alf.

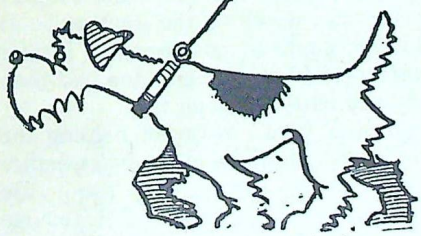


" You didn't know I could dive, did you, Reggie ? "

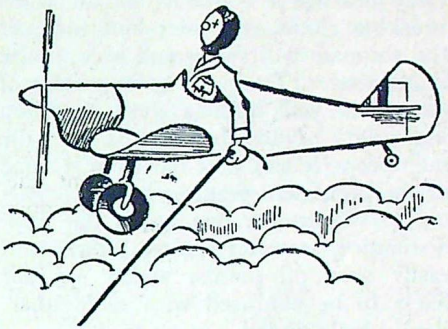
NAVIGATIONAL INSTINCT IN PILOTS

THERE'S a good deal more to pilot navigation than drawing 5° lines on the map either side of track. There's no reason why it shouldn't become second nature to any pilot, a sort of instinct. But to acquire this instinct you should catch your pilot young. This piece aims at handing out to instructors a few suggestions as to how best to cultivate the instinct in the trainee or budding pilot.

Well, to start off with, what about a simple little fine-weather exercise quite early on in the pupil's S.F.T.S. flying, which, if nothing else, will be a nice addition to the standard practices and make them much more interesting. After a few turns in the vicinity of the aerodrome tell the pupil to fly you to a spot some fifty miles away which you point out to him on a map. His reactions and method of tackling this give you a very good idea as to whether he'll become an efficient service pilot. Does he get in a dither with the map and finish by letting it blow out of the window? Or calmly trim the aircraft and then fold the map? Does he fly in circles looking for the right direction? Or keep straight and let his compass settle before turning? Does he make a reasonable estimate of the course to steer? Or is the compass rose just a mystery to him? *And*, having hit on a course, *can* he map read?



It is his dog who has the instinct.



Prune can always find his way by instinct—

Now all these points go to make up the instinct of pilot-navigation and one of the most important of them is the last—map reading. Does the pupil give enough attention to detail? Quite probably he doesn't. So you must impress him with the fact that there are very few places in a continuous trip where a reasonable scale map will not give good pin-points all along the route. A small twist in a river, a railway crossing, a distinctive shaped wood—all these will help. A pupil can nearly always get back by map reading on big features, but if the weather closes down, so does his field of view, and he has to work on the smaller features which may mean nothing to him, if he's got in the habit of ignoring them.

Continuous map reading is a good start, but a far more important thing for

him to learn is identifying positions after coming down through cloud. For this the first thing he must do is get a very clear idea where North is, and so, when breaking cloud, don't let him turn, or the compass will swing and give a false impression. (This isn't so important of course if you have a gyro direction indicator.) Next, he must orient the map properly and pick out from it some of the prominent features he can expect to see. Naturally one wants the most distinctive, so water features, towns and easily seen pin-points, which are *not* likely to be confused with each other, should be included.

Practice in this identification can be given by taking a pupil out from under the hood or coming out of cloud and letting him identify his position. In order to start properly he must have a fair idea of the approximate position and this he can do by keeping a mental air plot. So take him into cloud or above cloud, give him various courses to fly and let him time them mentally or against a watch and then estimate his position at any time, allowing for the wind. Come down and identify position at intervals. All this, too, adds a little interest to the sometimes boring job of instrument flying.

When the pupil has got to the stage of carrying out cross country exercises, his pre-flight planning should be carefully checked. Using the met. wind and the estimated true air speed, ground speeds should first be worked out and then the tracks marked in for the distances to be travelled in each five minutes. After that it is really quite an easy matter for the pupil to look at his map from time to time and pick out those landmarks which ought to be in view. Also, marking maps like this helps him to estimate E.T.A.'s fairly easily. Even when the actual ground speed doesn't agree with the estimated one it isn't difficult to allow for differences. And the time marks save the mental calculations necessary if the tracks were marked off in distance intervals only.

In bad weather, cloud bases can fall quickly and if a pilot is forced to fly low there are one or two points to remember. First, the apparently more rapid speed in relation to the ground makes a novice uneasy, especially as at 200 feet or less in bad weather the field of view may be cut to a half-mile radius. Each landmark will turn up very quickly and without its usual surroundings. Even your own aerodrome can be unrecognisable, and the pupil must try to make the mental adjustment necessary to cope with this sort of thing. Five minutes of bad weather low flying seems more like half an hour, so make him pay strict attention to his watch. Tell him not to panic if expected landmarks seem slow in turning up. He may be only half a mile from a town and not see it; but he should remember he's probably been used to seeing it ten miles away.

Another important point is to see that the pupil knows something about meteorology. This means always getting a weather forecast before a cross country trip and also watching the weather so as not to be caught by any change. It's far better to land before it gets too bad than to try and battle through it.

However, here's a way of helping the pupil if he does get caught in bad weather and pin-points along the route are likely to be obscured. Set course deliberately to one side of the objective.

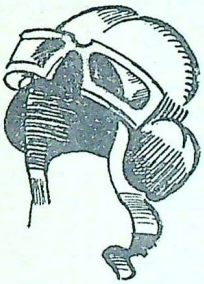
Then, short of E.T.A., come down through cloud and even if you cannot identify your surroundings at once, you have a good idea as to which way to turn to pick up the correct track. If a continuous feature such as a coast-line or river runs near the objective and you have been making good a track to the right of it, you immediately know you must turn left. Then you make your way along this position line until an identifiable landmark can be picked up.

In conclusion, instructors should constantly impress on the trainee that a knowledge of navigation is not the sole prerogative of the navigator. A pilot ultimately becomes a captain of aircraft, and to do his job properly he should be able to check his navigator's work and keep in his head a good mental plot of his aircraft's progress. This he can only do if he has been well trained in the basic principles of pilot navigation.

(Like me, says Prune, laughing heartily, as he 'phones for transport to bring him home from three aerodromes away !)




WEAR YOUR HELMET AND YOUR GOGGLES !



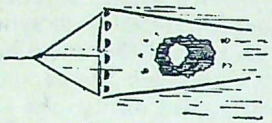
Helmets and goggles definitely help to prevent accidents or at any rate reduce their seriousness. Here are three instances to show what we mean. You probably know of others yourself.

In a recent accident an aircraft had to make a forced landing on the sea. The impact threw an air gunner violently to the floor of his turret. He was, for some reason, not wearing his helmet and as a result got a nasty wound on the base of his skull from a projecting metal fitting. Wearing his helmet would almost certainly have saved him a considerable time in hospital ; and, indeed, he was lucky not to have been so badly injured as to be incapable of getting out of the sinking aircraft in time.

Again, a fighter pilot, coming in to land, opened the top of his cockpit and pulled off his goggles while still circling the aerodrome. He was unlucky enough to get a piece of grit in one eye—with the result that he crashed and got a severe shaking. Would it have happened if he'd kept his goggles on ? No.

And finally here's a bit out of a combat report : " As I broke away a ·303 and a ·500 bullet shattered the perspex, which entered my eyes and face. I continued to dive to ground level, clearing blood out of my eyes. . . ." That pilot might have been blinded or even killed, might have been shot down while incapacitated, or might have crashed. All through not wearing goggles.

WHAT WILL THEY THINK OF NEXT ?



Then you know who hit it where.

Recipe. To one part of lithographic ink add six parts of turpentine (in very dry weather slightly more turpentine may be needed owing to more rapid evaporation). Mix thoroughly to get the ingredients evenly distributed. Take ammunition belts, coil tightly, and tie round the mid-point with tape (colour unspecified). Tap the bullet tips lightly on a flat surface and dip to ¼ of an inch. Stand coiled belts on a drain surface to allow excess solution to drain away and serve within seventy-two hours. A slightly sticky coating will remain, which " will colour the fingers when touched with moderate pressure." (Why anyone should want to colour their fingers is a different matter.) This dish looks very tasteful when the attractive blue, green, red and mauve colours have been applied to different belts.

The object of all this is to enable several gunners (our guess is four—unless we're colour-blind) to fire at the same target and be able to know who hit it where. It seems to us a pretty cracking idea, too, for it becomes impossible to bag someone else's bird, so to speak.

The use of this ink was originally restricted to certain types of schools and training units, but it has been found so helpful that it is now available for Fighter, Bomber, Coastal and Army Co-op. Squadrons who are carrying out firing practice on towed targets, as well as Air Gunner and Air Observer Schools, O.A.F.U's., Command Armament Practice Camps and Gunnery Flights. By those who have tried it the time and trouble saved have been found well worth while and a good time is had by all. One journey of the target-towing aircraft does the same amount of work, when these coloured inks are used, as four journeys when they are not ; one towing pilot takes the place of four, or puts in very much less towing time for the same results. And there is also all that petrol and oil saved—apart from wear and tear on the engine, target and target fixing. Time, trouble, material—a saving everywhere. Incidentally these coloured inks may be used in operational guns as they do not clog chutes, etc. But don't mix more of the stuff than is needed within the seventy-two hours as the turpentine evaporates and the mixture then dries up, which is (*a*) a waste of turpentine, and (*b*) a waste of time, as it will have to be mixed all over again.

By the bye, there are two A.M.O's. about this—N.346/42 and N.857/42. So if you want to go further in the matter, have a look at them : and order now to avoid disappointment.

LETTERS TO AN AIR GUNNER

Sergeant Burste regrets to say he hasn't received his fourth letter of the series this month in time for us to publish it in this issue. Something to do with the mails in war-time, we suppose. Anyway, it will be in next month.

A BOUQUET FOR INSTRUCTORS

HERE is an extract from a letter written by a pupil at an S.F.T.S. to one of the officers at his I.T.W. It should be explained that upon his first arrival at the I.T.W. this particular pupil was a bit of a tough customer. He had done some flying already and held the view that it was sheer waste of time for him to go through the I.T.W. Course ! His letter shows that his views have now been modified.

" Day before yesterday, I did my first solo in the Hurricane ; they are indeed a grand plane and it is little wonder that they have gained the name they have. Luckily for us they are not so hard to handle as the Master which may sound strange. They are harder to land though, because of the narrow wheel base.

" I got rather a big surprise when I came here, and that was the mortality rate. There are quite a few deaths here, and this fact has made me extremely careful in everything I do in the air. I **have come to the conclusion that most of the accidents are caused by two things, carelessness and disobedience, known in the R.A.F. as breach of discipline.** For some reason many of the boys simply will not obey the orders that have been given to them. I can give two good examples of this : A Dutch boy was sent up to do aerobatics and was told not to do any aerobatics under 7,000 feet, yet with that order still in his mind, he started doing rolls at 2,000 feet, got into a spin and unable to pull out, thus killing himself. Another case : a boy on the more recent course went up with only two hours solo and went 70 miles to ' shoot up ' his home. He crashed into the house, killing himself and some others. He knew the orders about low flying, yet he deliberately disobeyed them. Of carelessness one sees accidents ranging from minor to major ones nearly every day ; fortunately most of them are not very serious, and a plane is put out of use for a few days only, but some terrible accidents have happened since I've been here (all accidents due entirely to disobedience of orders).

" You may wonder why I write about all this. Well, simply to thank you for being strict when I was in the I.T.W. That strictness has probably kept me alive.

" Secondly, I know that because you know this you will be able to tell the others that they may profit by others' mistakes. I know we all used to grumble at the discipline, but I know that was for our own safety and our good."

Step forward, please, all I.T.W. instructors, and take your bow !

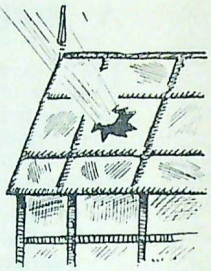
WHEN IT'S BLACK-OUT TIME FOR PILOTS

" Please, sir, it wasn't me . . .

IMAGINE a small boy playing in a garden. He has a stone tied to the end of a string which he is whirling rapidly round his head. You know what happens, if the string suddenly breaks? We don't mean what happens to the small boy, when the owner of the greenhouse next door catches him: we mean what happens to the stone. It whizzes off and away under the impulse of centrifugal force, hitherto counterbalanced by the pull of the string. In other words, there has been a centrifugal acceleration on the stone all the time it is being whirled round in a curve.

Now whenever an aircraft is whirling round in a curve—a diving spiral, a tight turn, pulling out of a dive and so on—the same centrifugal acceleration is acting on the pilot. This wouldn't matter so much if he didn't weigh anything. But his weight is a *force*, mathematically expressed as his mass multiplied by the acceleration due to gravity, or " g " as Isaac Newton has so happily nicknamed it. This means that if the centrifugal acceleration is more than the gravity acceleration his weight at the moment is proportionately greater. For instance, a 160-lb. pilot, at a centrifugal acceleration of seven times " g " weighs 1,120 lbs. or 10 cwt. A half-ton pilot is a solemn thought.

An even more solemn thought is that at this 7g acceleration the pilot's blood is a trifle heavier than molten iron — if he were to cut himself, he'd probably bleed iron filings!—and this means that, in brief, the vein mechanism has considerable difficulty in returning this heavy blood to the heart from below. It hangs about below the heart in the big veins of the legs, stomach and so on, and as a result there is a fall in the blood pressure in the large arteries above the heart which lead to the brain and eyes. When the fall reaches a certain point, varying for each individual pilot, his sight fails. That is the " black-out."



. . . it was centrifugal force!"

All clear so far? Good. Now here are some points about blacking-out.

First, it doesn't come instantly; the acceleration must be applied for some time. For most pilots, sitting upright, an acceleration of about 5·5g has to go on for four seconds at least. And when the black-out does come, it generally only lasts for about two to four seconds, during which the vision is the only sense that is " markedly impaired," as the medical experts say. Recovery, too, is immediate, and even if a pilot blacks-out very often, it doesn't affect his sight.

Next, the black-out occurs before any loss of consciousness. If the high " g " is prolonged, unconsciousness *can and*

does occur. But the eyes always get the trouble first. So in a way this is an advantage: the black-out is itself a warning of impending unconsciousness, a more serious thing altogether.

Consciousness again may only be lost for a few seconds, but does not return until shortly after the centrifugal force is removed, which is one of the reasons why you should not indulge in aerobatics at low altitudes. In combat, however, loss of consciousness is rare, indeed it need never occur, as the "greying" of vision and the black-out itself are pretty efficient warnings. You'd better here note that unconsciousness is more likely to come on from wearing too tight binders round the body or by pressure on the veins of the neck (the mistaken idea being to prevent the blood draining away from the head) or by the after-effects of drinking or smoking too much.

Above oxygen height, if you are fool enough not to use oxygen—and to make a thorough job of it, indulge in aerobatics as well—the unconsciousness comes on readily and is always particularly unpleasant, besides lasting a relatively long time. And remember that severe dazzle, such as the light from the upper side of clouds or from searching into sun, also causes the pilot to black-out earlier, if he has to take evasive action; but it doesn't make him lose unconsciousness any more easily.

Now of course the obvious way to avoid black-out is to avoid high "g," but modern fighting tactics don't allow of this. Values of 7g and 7·5g have been met with operationally, and these are liable to black you out, and if maintained for about three to four seconds, to knock you out.

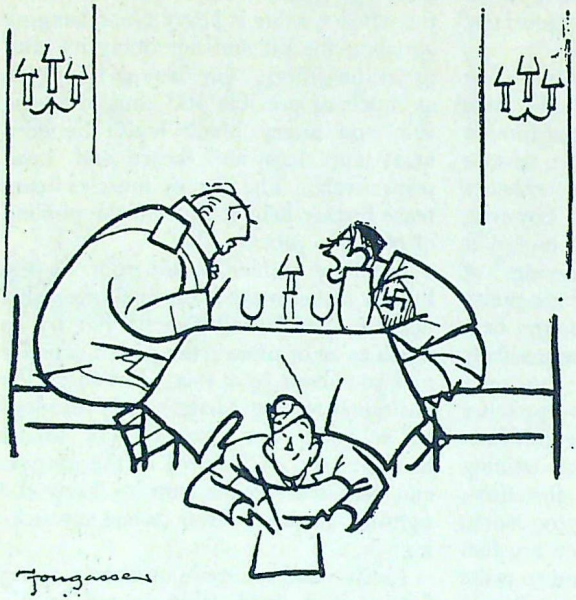
You can, however, do a certain amount to lower the effects on yourself of these high "g" values; for, as you remember, the whole trouble is heavy blood hanging about in the pit and not doing its stuff up in the gallery. One way is to crouch as much as possible and thus alter the vein and artery blood levels between heart and legs and heart and head respectively. The tummy muscles being tense further help to prevent the pooling of blood in your middle.

Auxiliary rudder pedals to raise the feet six inches make it easier to keep this position, which will benefit you by as much as 2g or more; the pedals actually give you about ¾g of this. But adopt the position before "g" starts; at 5g your legs are so heavy you won't be able to lift them at all. Adjustment of the harness and seat will enable you to keep the sighting position even when crouching.

Lastly—and we are honestly not being funny—it is good value to yell loudly during any manœuvre likely to cause blacking-out, as this raises the diaphragm and increases the internal stomach and chest pressures. (Pilot Officer Prune doesn't do this, because he says he can never think of anything to yell—except a few bad words he picked up at his mother's knee, and she never liked him to repeat them!) But remember yelling is only an additional help.

Summing up, therefore, all the aids to reducing liability to black-out at high "g," we have the crouching position, feet up, yelling (anything you like!), not too much drink or tobacco, and keeping generally fit, particularly the tummy muscles. More or less back again, you see, to the old rule: Keep fit and keep flying!

WHAT THE HUN IS DOING



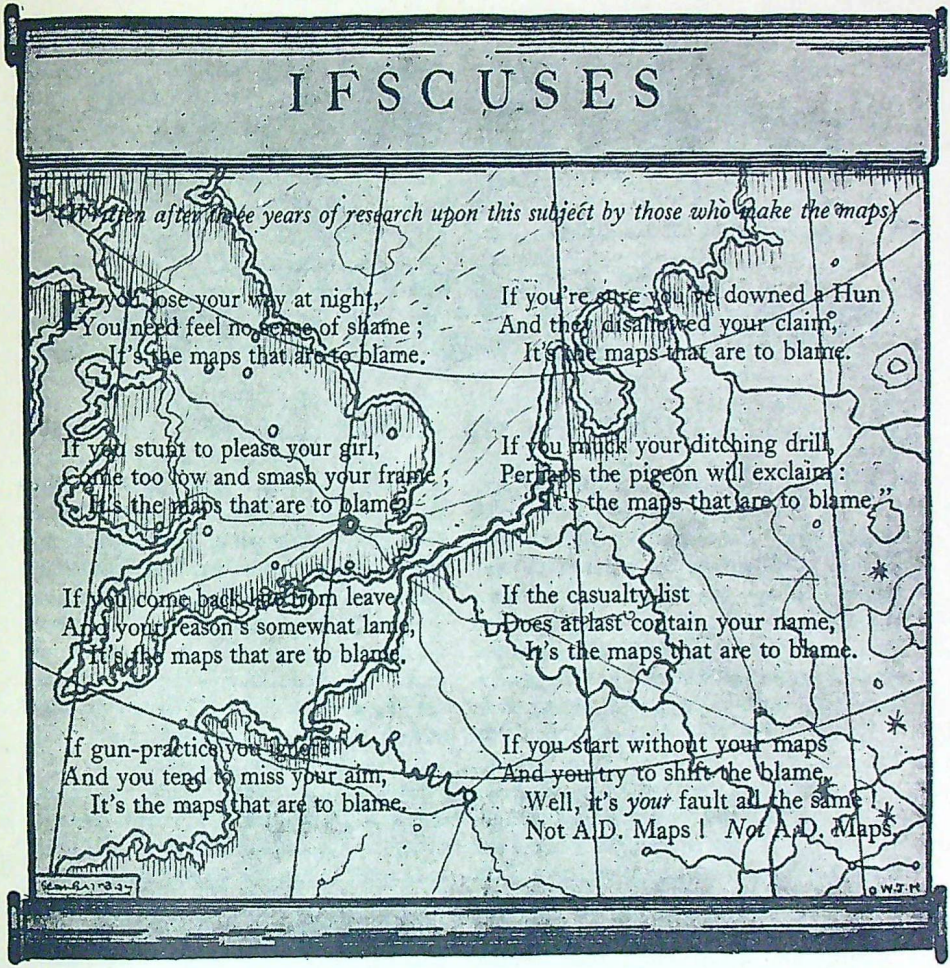
There are strong indications that Hun night fighters are working in pairs, one as a decoy to attract the attention of the mid-upper and rear gunners, while the other attacks from the quarter or the beam.

The Hun has adopted a new method of defence against night intruders at some aerodromes. A number of light flak guns and searchlights are concentrated close to the start of the runway and on the line of approach. As soon as a homing aircraft has reached the runway light guns and searchlights engage at a high angle, putting up a barrage on the line of approach likely to be employed by intruder aircraft attempting to attack the aerodrome.

From the following extract, it will be noted that the enemy is again using fake R/T orders directing our aircraft to "Pancake":—"I broke off the attack and climbed up sun to the east of Sidi Barrani East. I circled there for some minutes when I received by R/T a message to 'Pancake' with a jumbled preamble as though the transmitting microphone was practically unserviceable. This message was repeated three times in exactly the same manner. The 'Pancake' came through clearly each time. The frequency of my R/T was 4690 k/cs. On landing, I checked this message with the Area Controller and he had *not* sent this order."

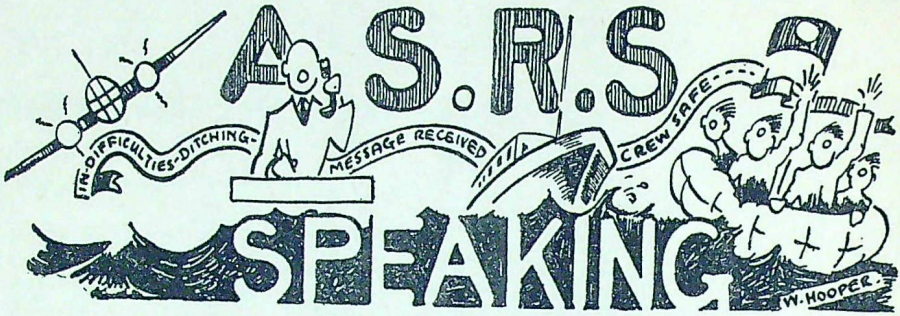
A report from Port Moresby states that approximately 90 seconds before the arrival of enemy bombers five enemy fighters made a white smoke cross. Subsequently enemy bombers flew through the centre of the pattern and bombs were heard to drop about twelve seconds later.

Japanese fighters are reported to have staged sham dogfights amongst themselves with the object of enticing our aircraft to go down and join them. ("Is this a private fight or can anyone join in?") So if you *do* go down, make sure there are no enemy aircraft above you.



STOP PRESS

As we go to press we hear that it has been decided that in future the Air Crew Refresher School at Brighton is henceforth to be known by the name of " Prune's Purgatory." When we say " decided " we don't mean " decided by the authorities." We mean decided by those attending the Aircrew Refresher School at Brighton !



IT WON'T BE ALL RIGHT UNLESS—

"IT'll be all right on the night" is an old theatrical saying now heard mainly in connection with amateur shows. Modern professional producers leave nothing to chance. Everything must be all right at the final rehearsal (which often takes place before a crowded house) so that it all goes like clockwork when the curtain rises and the show is really on. And that does not mean that the actors merely know their words; they must know their positions, where to sit, where to stand, and when and where to move. That's why they have producers and stage managers and why each piece of furniture is placed in position to an inch.

Now the Royal Air Force is not theatrical, but it does have shows. Unfortunately a part of some of these shows is ditching at sea. For this, if everything is to be "all right on the night," every man's station or position must be so well planned, rehearsed and really known that he can take it up quickly and instinctively.

Two things in particular are essential to safe ditching. The first is the taking up of proper ditching stations; the second is bracing. In both cases special instructions have been got out for each type of aircraft. And, believe it or not, these instructions have been very carefully devised as a result of experiment, trial and error, experience and so forth. So don't listen to the advice of Bruce Bairnsfather's "Old Bill" of the last war; don't think you "know a better 'ole" and go to it. There *is* no "better 'ole" than the one officially chosen for you—the ditching station set out in the special instructions for your own aircraft.

Once you have taken up your correct ditching station, stay there and be ready to brace yourself against the shock of the sudden stoppage when your aircraft meets the sea—and again this must be done in the way laid down in the individual instructions for each type of aircraft.

The value of bracing in saving you from injury and so enabling you to get clear afterwards has been proved again and again in a number of ways. For the

most part the methods are simple, such as clasping your head in your hands and holding it firmly forward away from the direction in which you are travelling, so that the sudden stoppage will not jerk it violently against some hard object, of which aircraft are uncomfortably full.

To give an example of what bracing can do, we need only refer you to those stunt crash-motorists you sometimes see on the films ? They drive full tilt against a brick wall, but however much they damage the car or the wall they seldom hurt themselves. Why ? Because at the last moment they dive from the driver's seat and press their heads against the back cushion of the back seat. Another instance is that provided by the crash of a civil aircraft some years ago. It went out of control at 3,000 feet, and one passenger, who was an experienced flier, realised what was coming. He retired to the toilet, sat down and braced his body and head against the front wall so that when the crash came his body and head were not thrown forward but took the cushioned deceleration of the aircraft itself as it piled up. All the other passengers and the crew were killed, but he himself was uninjured.

The value of " cushioning " has also been proved by experiments carried out some while ago in America by means of a pendulum being swung against a shaven head. (Not the sort of experiment we'd volunteer for ourselves ; more in P.O. Prune's line ; his skull is thick enough !) The pendulum, falling against the head at 25 feet a second, produced considerable concussion, but with only an *eighth of an inch* of felt covering it, the force of the blow had to be increased by 20 to 30 per cent. to produce the same result. (Who *did* take that job on, we wonder ? Even with the covering of felt, it's still not our piece of cake.)

Again, there is actually on record the amazing case of a young woman of twenty-one who decided to commit suicide by jumping from an eleventh-storey window of an hotel. She had a clear fall of 92 feet and fell flat on her back—but landed on soft turf. Her head sank 6 inches into the turf but the girl succeeded only in spraining her wrist—she didn't even get concussion. Now maybe that was luck—but it shows what you *can* survive by absorption of shock and how little a thing like mere soft turf after a 90 foot fall—can yet absorb it.

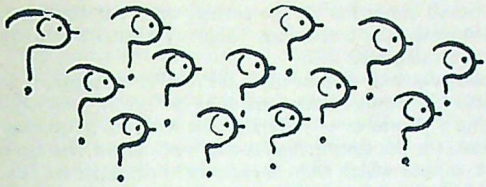
While bracing, therefore, is obviously essential, it is not reasonable to expect people to be braced for too long. The natural tendency is to want to see what's happening or why it doesn't, and thus to relax and look around just at the wrong moment. The Captain must therefore maintain communication with his crew, if he can, up till the last moment, so as to warn them of the final moment for bracing. But in no case should the crew relax or release themselves in their ditching stations until the aircraft has really come to rest ; not only for their own personal benefit, but also because a casualty is a very serious handicap to a ditched crew. And finally remember that the first impact of the tail can easily be mistaken for the final shock. It will, however, be followed by a greater shock when the nose strikes the water after a correct three-pointer, tail-down ditching. So do go to your right places and brace yourselves for what's coming. It will be best for you and best for your friends.

SHAKESPEARE ON SECURITY

OR SHOULD A HUSBAND TELL ?

" . . . But hark you, Kate ;
I must not have you henceforth question me
Whither I go, nor reason whereabout :
Whither I must, I must :
I know you wise . . . constant you are,
But yet a woman : and for secrecy
No lady closer ; for I well believe
Thou wilt not utter what thou dost not know !
And so far will I trust thee, gentle Kate ! "

Henry IV, Pt. 1, Act II.



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 are now printing some (but by no means all!) of this correspondence, and in our turn have tried to produce an answer, or answers, from the experts here. 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. "DEAR SIR:—THE article on Flat Turns for Bombing in the June issue of TEE EMM has once more raised a controversial issue. The statement that 'modern aircraft will not flat turn' is simply not true, as is admitted by the later statement that the rate of turn does not exceed 41° per minute.

"1. In fact, modern aircraft *will* flat turn, and will *not* swing back to the original heading provided pressure is maintained on the rudder until the sideslip has damped out.

"2. Whilst it is true to say that flat turns are not as easily executed on modern aircraft, the comparison seems to be over-stressed. A rate of turn of 270° per minute is very rapid, corresponding to a rate of 1½ turn.

"3. Anyone who has flown a Hart or Gordon (representative of the old types) will no doubt agree that it would be very difficult to achieve such a rate of flat turn for anything more than a fraction of a second.

"4. In any event, the requirements on a bombing run remain the same—*i.e.*, the straightest possible run, the fewest and smallest corrections as quickly as possible and the sight to be disturbed as little as possible.

"5. We may leave out of account automatic and gyroscopic sights, since bombing is still done mainly with the C.S.B.S.

"6. Taking these points in order: First and second go together, since few and small corrections will give the straightest possible run, in fact, in a blinding glimpse of the obvious, it might be pointed out that no corrections at all will give a perfectly straight run, provided the pilot can fly a straight course, which most observers will hotly dispute. This, of course, means that the pilot must in the first place be able to turn his aeroplane on to a point, within a few degrees, when that point is obscured by the nose of the aircraft.

"7. Another factor to be considered in this connection is the wind, for the pilot must also be able to make the appropriate allowance for drift when turning on to the target. Pro-

vided the pilot can achieve this, and the bomb aimer has set the correct wind on the bomb sight (about which the pilot has grave suspicions) the corrections either way on the run up to the target should not exceed more than a few degrees.

"8. Now for the third point, corrections as quickly as possible. If P/O. Prune happens to be flying the bomber, he will probably have come out of his turn quite 30° away from the required heading. Now, whether he is flying a Wapiti or a Wellington, he will find it quicker to do a banked turn for such a large amount, for the simple reason that a sustained flat turn becomes increasingly difficult to hold, up to a limit which from experience appears to be just over 20° with the older types and about 10° with the more modern. In other words, the rate of flat turn is high initially, but slows up fairly rapidly with increasing amount of turn. This is because the sideslip increases with the turn. The amount of turn which can be achieved by the pilot before it becomes too great for his strength depends on the speed, the rudder power available and the moment of inertia of the aircraft, which is governed by its size and weight. In a banked turn, the rate of turn must build up slowly as bank is applied—not many pilots can turn quickly *and* correctly and if they try to do so will probably achieve either a slipping or skidding turn. The banked turn, therefore, is initially slower than the flat turn. Add to this that more time is occupied in coming out of the turn and we see that for small amounts of turn the quickest result will be achieved by doing a flat turn. In addition it is much easier to do an accurate amount of turn flat than banked, since the control movements are coarser and therefore more easily adjusted.

"9. It is true that sideslip will persist for a little time after the turn has been stopped, but this will damp out, provided the aeroplane is held on its course by the rudder and laterally level by ailerons.

"10. On balance we may say that in modern aircraft, for turns up to 10° the flat turn is quicker than the banked turn and for older aircraft up to about 20 degrees.

"11. Regarding the fourth point—disturbances of the bomb sight. The most serious disadvantages from which a bomb sight suffers are compass errors, especially Northerly turning error. No one will dispute that compass errors are greater in banked than in flat turns and that the compass will therefore take longer to settle down on completion of the turn. This is a great joy for the bomb aimer, who is strenuously trying to keep RED on RED and chasing the compass needle round the bowl. In addition, as your previous contribution says, in a banked turn the sight will 'go off' and the bomb aimer must rely on the pilot doing exactly the right amount of turn, whereas with a flat turn he does at least have a sight the whole time, can give the pilot 'Steady' to stop the turn and can keep RED on RED even while the resultant sideslip is damping out.

"12. Your article finally says, 'the use of flat turns leads only to large bombing errors due to sideslip.' If a bomb aimer is bad enough to leave his corrections so late that he must release his bombs while still turning or sideslipping, then he would be equally capable of bombing with the aircraft in a banked turn or with a sight not quite accurate. Protagonists of the other school might then say that the use of banked turns leads to large bombing errors due to bank and bad sighting.

"13. In conclusion, the truth probably lies somewhere between the two. Just as a pilot setting course on a cross country flight will turn approximately on to his course with an accurate banked turn and then make the last few degrees after he has settled down by using his rudder only, so on a bombing run the same technique can be followed, *i.e.*, a banked turn as near as possible on to the desired heading, large corrections, if any, by banked turns and small corrections by flat turns, all to be completed before the sight is on the target."

REPLY. We can only reiterate what we have already said in the article. Application of rudder alone in a modern aeroplane produces all the symptoms of turning, but the rate of *turn* is not high initially *or at any other time*. The initial rate of *yaw* is high, and apparently deceives not only the bomb aimer, but also the pilot!

Even when the rudder pressure is removed the nose will always swing back a certain

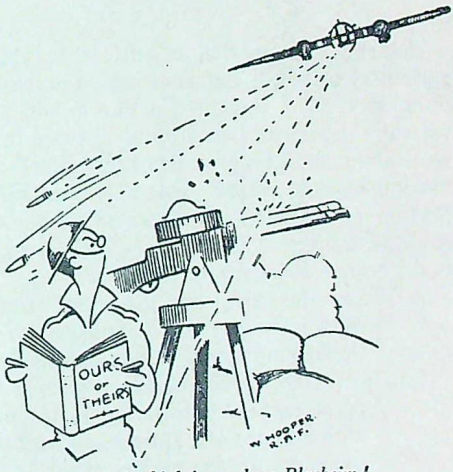
amount, proving that the aircraft was not flying in the direction in which it was heading while the rudder was on. As the bombsight assumes the opposite, errors must result. This point has been proved during extensive bombing trials with the Mk. XIV Bombsight.

The plea that with the C.S.B.S. compass errors justify flat turning is inadmissible. Compass errors are *not* the biggest errors in bombsighting. Quite a large error in keeping " red on red " can only result in a *small* error in the direction of the drift bar. For example, if the airspeed is 200 m.p.h. and the wind strength 20 m.p.h. *in the worst case* an error of 20° in keeping " red on red " will only result in an error of about 2° in the direction of the drift bar. If an aircraft is sideslipping by say 6°, however, the whole of this amount will be present as an error in the direction of the drift bar.

Finally, roll stabilised sights are now coming in to the service. These will allow much greater freedom, and will permit turning without losing the line of sight. *Flat turns*, however, will result in errors using these sights, where *banked turns* will not, so surely there is every case for doing banked turns *now* so as to avoid forming a habit which will completely outweigh the advantages to be obtained from the new sights.

DON'T FORGET THE GUNNER, SIR!

HE'S there on the aerodrome, waiting to deal with enemy aircraft. Do you ever forget this and shoot up the aerodrome for a spot of unauthorised fun ? If you do, then quite apart from the little matter of its being bad discipline, it's very unfair on the Gunner. For diving on an aerodrome is an unfriendly action and it's his job to discourage unfriendly visitors. Furthermore, it's difficult to distinguish one fighter from another in a head-on position and he may open fire on spec. If he shoots *you down*—well, *your* troubles are probably over, but his are just beginning. And as he gets equally into trouble if he *doesn't* open fire upon an enemy aircraft, because he thinks it may be some damfool just shooting up the aerodrome, he carries the can both ways. Which, as we said, is unfair. So *don't do it!* Help the Gunners to get clear in their minds that any aircraft behaving in an unfriendly manner cannot *possibly* be a friend. Then they can act accordingly. Safer for you, too—if that matters.



I don't think it can *be a Blenheim!*

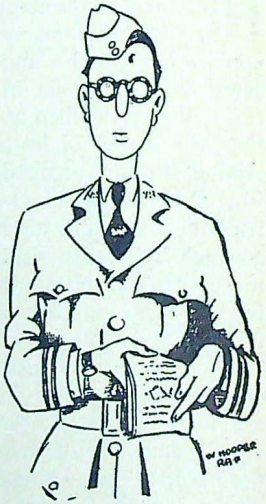
THIS MONTH'S PRUNERY

THE MOST HIGHLY DEROGATORY ORDER OF THE IRREMOVABLE FINGER (Patron: Pilot Officer Prune) has this month been awarded to WOP/AG —— for Unnecessary Loss of Fingers.

He prepared for a flight of 2½ hours duration at 20,000 feet altitude and — 30° temperature by wearing no underclothing, one pair of socks and gauntlets with a hole in them. He used his oxygen at 15,000 feet reading though flying at 20,000. He then removed his gloves to adjust his helmet. It cost him seven months in hospital and nearly that number of fingers.

(*The Editor is always open to receive recommendations for the award of this Order.*)

FROM FLIGHT LIEUTENANT HYEBROW



SIR,

Far be it from me to butt in to your inimitable periodical unasked, but knowing so much about everything as I do, I thought I'd like to add a bit more to what my pal Bertie Barrell-ffoulynge said in your August issue about breeching up Browning guns. It'll save you looking up A.P. 1641C, Vol. 2, Second Edition, Part 3, Section 1, Chapter I, paras. 69–78. *I* don't have to look it up, of course; I always carry it all in my head. Here is the correct sequence of events :—

(1) Screw the barrel into the barrel extension but not right home; you will find you will have to lift the locking spring as you do this.

(2) Then take the breech block without the following parts, namely transporter, switch plate complete with plunger and spring and cocking lever; and place it into the guides in the barrel extension and push it right home.

(3) Raise the locking piece and hold it as far up as you can.

(4) Screw up the barrel until it comes into contact with the face of the breech block. You will probably find you can't engage the locking spring as it is not opposite a recess; if so, *unscrew* the barrel so that you can engage the first possible notch.

(5) Place the whole assembly into the gun and see that they are as far forward as possible.
(6) Steady the barrel extension and see if you can move the breech block in a fore and aft direction. If you can move the breech block take the assembly out and try screwing up one more notch.
(7) Go on doing this until all end play has been eliminated.
(8) If you find you can't get the barrel assembly properly into the gun, it means you have screwed the barrel in too far ; this is called over-breeching. Therefore slack it back one notch and try again.

To anybody except a really clever fellow it may all look a little complicated. I should add that *I* don't think so. Still when you've done it once or twice, I expect even you will find it fairly simple. Moreover, you won't get gun stoppages, and you won't be able to blame the ammunition any more (bad luck, clots !) because there'll be no more separated cases, since these are caused by excessive head space due to under-breeching.

That's all to-day. If I think of anything else you ought to know at any time I don't mind passing it on. After all, not everyone's born with a brain like mine !

So long

V. HYEBROW, F/Lt.

BOMBING SENSE

IT'S no use taking huge and expensive Bombers on bombing raids and risking valuable lives unless you can hit your targets. As the experts say in the introduction to an excellent new pamphlet Bombing Sense, (which will become available by the time these words are in print)—" It is more like a game than anything else. Your one aim is to score goals by delivering the bombs in the right place. All the enemy opposition is there to prevent you doing that. In a game you do not barge through to score a goal, you play for an opening and then go in all out. Operational bombing is like that."

But, of course, unlike footballs bombs are of vastly different sizes and weights. They vary largely in kick and in other ways and have many more idiosyncrasies than have footballs. Bombing Sense (Air Ministry Pamphlet 139) tells you all about it, admirably assisted by the cartoons of David Langdon, one of whose illustrations we reproduce here. Get it and see. It will interest, amuse and instruct.

ALL ABOUT THE HANDLING SQUADRON

ONCE modern types of aircraft started replacing biplanes in the Service, accidents due to mishandling gradually increased. As a result aircraft of perfectly sound design began—quite undeservedly—to get a bad name. It was obvious, therefore, that the technique which had proved to be the best for the older aircraft ought to be adapted to fit the characteristics of the new types. So early in 1939, a Handling Flight was formed, as part of the Central Flying School, to study the handling qualities of these new aircraft; and at the same time Pilots Notes came into being to spread the resulting gen throughout the Service. Later the Flight was detached, sent to another station and upgraded to a Squadron, though remaining under the direction of the C.F.S. It is now back again with the Empire Central Flying School but has a detached Flight at the Aeroplane and Armament Experimental Establishment.

When first formed, the Flight was made up of highly qualified instructors, but since the outbreak of war it has aimed at including experienced operational pilots from all Commands. These not only go thoroughly into the handling qualities of all new types, but are available to advise on any subsequent prolems that crop up about the aircraft they originally operated. There are also experienced air crews to help in the intensive flying trials carried out at the A. & A.E.E.

Now since it is the Handling Squadron's job to find out, and to pass on, all the inside dope, it has to have close liaison, via Groups and Commands, with all units, particularly O.T.U.'s and Conversion Units, so that ideas can be swapped and differences of opinion discussed and generally ironed out. But although the Squadron sometimes visits a Station to talk over some special problem, it cannot, of course, pay routine visits to all of them; so any criticisms, queries, special information, or visitors are always welcome, *so long as* they have the approval of Groups and Commands.

A word now about Pilots Notes. These deal with the general qualities of aircraft and not with details of operational flying, although the Handling Squadron Pilots naturally study all new types from the operational angle. The Notes are based on data supplied by the Handling Squadron, the Aeroplane and Armament Experimental Establishment (or the Marine Aircraft Establishment), the Royal Aircraft Establishment, the Aircraft Firms' Test Pilots, and the Ministry of Aircraft Production—practically everyone, that is, except Uncle Tom Cobley! They are actually written by a branch of the Ministry of Aircraft Production which liaises with the various technical branches, to keep itself straight on technical points. And the whole object of Pilots Notes is simply to give pilots the latest gen, as compactly as possible, about handling of their aircraft.

When new aircraft are brought into the Service Provisional Notes are issued by T.F.2. Branch, Air Ministry, *before* the new aircraft are delivered, so that

the units actually using the aircraft have time to check over what is in fact a draft of the official notes before final publication. Constructive criticism at this stage is invaluable. The first distribution of Pilots Notes for each type and the subsequent amendments is then announced in A.M.O.'s. Any unit not receiving them, wanting more copies, or subsequently re-equipping with a different type, should ask for copies direct from A.P.F.S. Amendments are sent to all addresses to which Pilots Notes have previously been sent. (The above may sound a bit involved but all it amounts to is—get yourself on A.P.F.S. mailing list if you aren't on it already.)

To cut out repetition, Pilots Notes do not normally include anything which is already in Flying Training Manual, Chapter III ; and for the same reason, general information about handling modern aircraft is published in Pilots Notes General (A.P. 2095). Therefore, Pilots Notes for individual aircraft assume that you have read Pilots Notes General, which you get from A.P.F.S. in the same way.

A new edition of Pilots Notes has now been authorised which will be printed and bound, instead of reproduced in typewritten form. It will be pocket-size, with numbered pages and a proper index ; and, for easy reference, it will be in 4 parts : (1) Description ; (2) Handling Instructions ; (3) Operating Data ; and (4) Emergency Operations. Amendments will be on a sheet which can be stuck inside the cover, and any new sheet will have all the previous amendments ; so there'll only be one current amendment list ! On the whole, we think, a decided improvement.

" You want the best Notes : We have them." But they can't be kept really up-to-date without your help, because to do so the Handling Squadron would have to be established with every type of aircraft that has passed through its hands—to date, more than seventy. So if you think that Pilots Notes are wrong, or have left out something important, don't chuck them down the whatzit in disgust ; write and tell T.F.2. Branch, Air Ministry, and they'll try and put it right.

PILOT'S NOTES

HAVE you copies of Pilot's Notes for the aircraft you are flying ? They may have been amended recently. A.M.O.'s N series show monthly the complete list of amendments, but below are some of the more important recent ones.

Pilot's Notes General.		The first three notes have been completely recast. (A.P. 2095/18 and 19 on " The effects of low and negative ' G ' " and " Flying Limitations " have now been issued.)
Beaufighter I and VI	AL 21/K	Hercules VI range-flying and fuel consumption data added. Parachute drill now included and other revisions.
Beaufort I	36/J	Dive brake speed limitations.
Beaufort II	3/C	As Beaufort I and revised engine limitations.
Blenheim V	10/A	Economical cruising data and more detailed fuel consumption.
Typhoon I	15/F	Revised height for gear-change on climb and advice for jettisoning doors.

NAVIGATION POINTERS

3. MAP READING

The following may not have occurred to navigators who have had to put up with conditions of less than normal visibility over a long period.

The basic method of map reading in the Royal Air Force for all conditions of flying consists essentially of picking out pin-points along a track as shown on the topographical map and with the use of time intervals marked on the track estimating when these pin-points will come into view. Thus, on many occasions, a navigator will choose as a pin-point a feature which may not be visible for some time to come.

Now, in conditions of good visibility, it is not necessary to limit oneself to such landmarks because from any reasonable altitude one gets a panoramic view of the country round about. It is therefore possible to use features with a much wider scope—rising ground, a mountain peak, a break in a chain of hills, a prominent cape or foreland—all features which can be recognised from a great way off.

This is a lazy man's way of navigating, since these landmarks can be seen well before they are flown over. However, don't just look idly at these distant landmarks. Estimate how far off they are and work out E.T.A.'s in the usual manner. And just in case the weather closes in don't dispense with the smaller and more detailed pin-points which come into view from time to time.

So give thanks for good flying conditions, and don't be afraid to look well ahead —but keep up the detailed work just the same.

NEW ARRIVALS

THE following correspondence which has come into TEE EMM'S hands speaks for itself. (It also explains the illustration on page 153).

" I, No. 89008, PRUNE, P/O, Pilot G. D., have the honour to request that I may be granted permission to keep a dog on the Station. Details as under :—

Breed : Presumptive wire-haired fox terrier.

Description : White, black, white, repeat white, and bearded like a pard (Shakespeare).

Name : ' Binder.'

Pedigree : By Intruder out of Bandit.

I certify that the dog is well-behaved, house-trained and thoroughly mess-broken.

I have the honour to be, Sir,
Your obedient Servant,

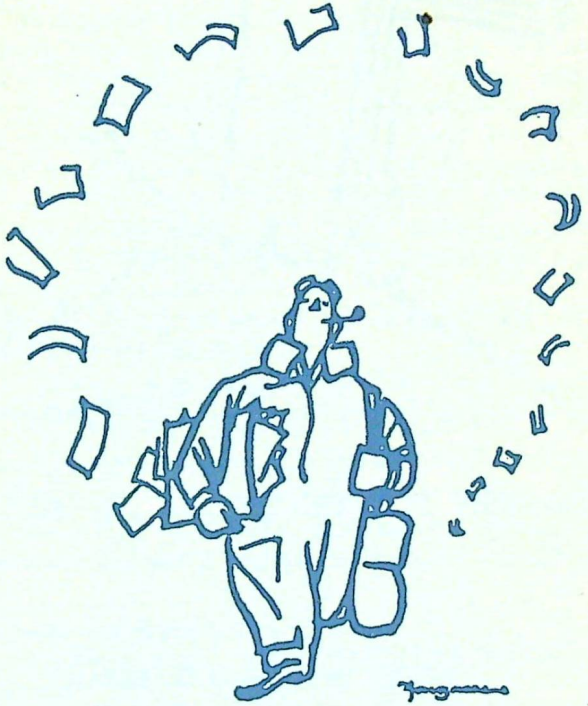
Approved. Permission granted. (Sgd.) P. PRUNE, P/O."

MAX BOOST, Group Captain.
Station Commander.

He thought it was pansy to take oxygen

WHAT DOES O.U.O. MEAN?

It means for "Official Use Only." TEE EMM is an O.U.O. publication. This—if you follow our reasoning—means TEE EMM is for Official Use Only. And this means that those not entitled to see it are not to see it. It is primarily a Training Memorandum for air-crews, instructors and all those in the Air Force connected with these jobs. It is *not* for civilians, or people who feel they'd like to see it because they've heard it's interesting, or because they have a boy who's thinking of going into the Air Force but isn't in it yet, or whose friend is in the writing business and would love to have a look at a copy, or, etc., etc. It is a Service Training Memorandum written *for* the Service and issued *by* the Service in the person of the Air Member for Training.



NOT to be taken into the air