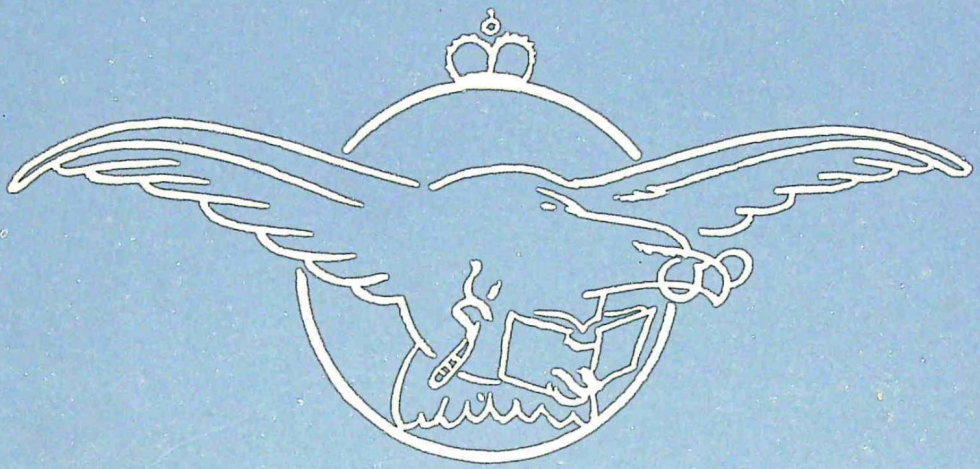
TEE EMM



Vol. 2 No. 3 3,000-5 42 2502A June 1942

for official use only

Vol. 2 No. 3

TEE EMM

June, 1942

CONTENTS

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

AIR CREW INSTRUCTOR COURSES

We have been asked to tell you something about the excellent courses for instructors now being held at the Air Armament School at Manby. These came into being as a method of training future armament instructors from among those available for the job, *i.e.*, air crew members released either temporarily or permanently from operational flying.

The aim is to improve the standard of training by having the best instructors. At the same time, since it is realised aircrews do not know much about this instructing business, all would-be instructors are first attached to one of the Observer or Air gunner schools for two weeks, where they are given a chance to see what it is all about. The suitable ones are then posted to No. 1 Air Armament School to take one or other of the Instructors' Courses held there—Observers' or Gunners'.

Now here are some notes about these courses, because it has been found that pupils often arrive not knowing in the least what it all means, with the result that in various ways much valuable time and energy is wasted.

The courses begin on a Sunday, go on for six weeks, and end on Friday. As the pupils should definitely all be there by 9 a.m. on that first Sunday, a full working day, this means coming on Saturday evening. If they turn up a day or so late, or,

most important, come without full kit, respirator, gas helmet, anti-gas cape, and so on, as well as physical training clothes and rubber shoes, and flying kit, they will lose valuable instructional time in going back to fetch them. The full kit is necessary because on leaving No. 1 A.A.S. men are quite likely to be posted direct to wherever they're going without returning to their previous unit. In addition, there is no leave during the course, so pupils should be given it before joining.

Though the courses are primarily armament courses, plenty of training in instructional methods is given, such as preparing lectures, handling of classes, and the use of all aids, from blackboards and diagrams to synthetic training devices. And since instructors should know their powers and duties as N.C.O's, there are also lectures in R.A.F. Administration.

On the technical side, the Observers' course deals naturally with " bombery," mathematics of armament and bombing (only one bomb-sight—either the C.S.B.S. or the A.B.S.—is taught), training equipment, the standard bombing exercises and pyrotechnics. The Gunners' Course is on much the same lines, but deals naturally with specific gunnery subjects—turrets and their handling, the Browning, V.G.O. and 20 mm. guns, the theory of sighting and gunsights, spotlight trainers and so on.

At the end of each course there is a written examination and a lecture test, and the pass mark is 60 per cent. of the total, which must not include a marking of less than 50 per cent. in any one subject.

When units are selecting candidates it should be remembered that a desire to become an instructor, a capacity for hard work, and potential ability to control a class are the important things : all the rest can be taught at the school.

The next Air Observer Course (one has only just started) begins on July 12th, and thereafter at intervals of six weeks. The next available Air Gunners' Course begins on June 28th, and thereafter a new course starts every three weeks.

Sad End of an Astro-Navigator

Poor Prune, mistaking Sirius for Mars,
Lost himself,—and nearly died.
" The fault, dear Brutus, lies not in our stars,
But in ourselves," he sighed.

ARE YOU A FLAT-TURNER?

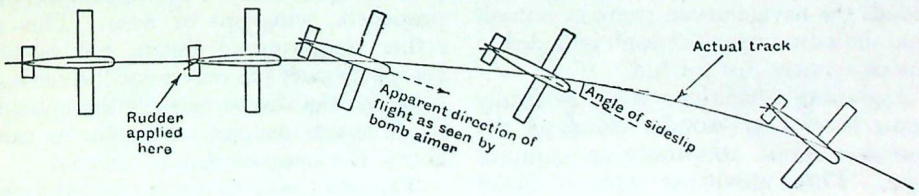
WE hear that large numbers of bombing pilots still try and do flat turns when running up to bomb. Modern aircraft will not flat turn. If you attempt a flat turn by applying rudder and holding off bank the aircraft swings its nose in the direction of the intended turn and then flies crabwise with its track in much the same direction as before (see figure below).

The actual rate of turn—that is the change in direction of flight—is very slow, and does not exceed about 41° per minute with full rudder in a representative aircraft (Whitley). During the initial swing you have the *illusion* of turning because the nose of the aeroplane moves round the horizon, the direction gyro dial revolves and the rate of turn indicator indicates a turn. The upper pointer of the latter indicates *sideslip*. When you take off rudder, there is an apparent reversed turn as the nose of the aircraft swings back. As a result of applying rudder for a considerable time you will find that you have changed course only by a few degrees.

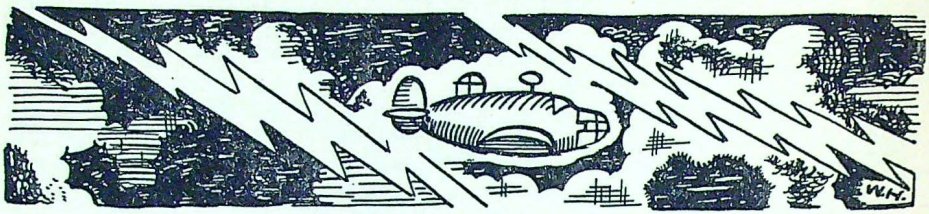
The flat-turning technique is a survival from the days of relatively slow aeroplanes with light loadings and ample keel surface. These aircraft could be turned flat at reasonable rates (up to, say, 270° per minute), and in bombing approaches, flat turns were used so that the plane of sight indicated by the bombsight would remain vertical and would indicate to the bomb-aimer when to stop the turn. The bombsight, however, indicates the point of impact of the bomb only if the airspeed bar lies along the direction of flight, so that the sight is seriously inaccurate when sideslip is occurring. With the old aircraft this did not matter, as sideslip was not large and died away rapidly when the turn ceased. With modern types, as we have seen, an attempted flat turn results in a small turn and *large* sideslip, which furthermore dies away slowly. The bombsight is therefore useless in a flat turn and it would be better for the bomb-aimer to accept the fact that his sight will " go off " in a turn owing to bank and for the pilot to do normal banked turns in a bombing approach. The " azimuth bracket " was devised to allow the bomb-aimer to estimate the turn required under these conditions.

In some sights the line of sight is *stabilised* in *roll* by a gyroscope so that the sighting plane always remains vertical and gives the bomb-aimer an indication of the point of impact of the bomb, even in a banked turn. With these sights there is no excuse whatever for flat turns; the use of flat turns leads only to large bombing errors due to sideslip.

FLAT TURNS
(Illustrated effect of Flat Turn)



LIGHTNING IS FRIGHTENING



BEING in an aircraft when it is struck by lightning is not at all a pleasant experience. Lightning, however, is not half as dangerous as it looks or sounds, and in most cases it only causes minor damage. Trailing aerials have been burnt off, radio sets damaged, small holes made in the wing surfaces and fuselage, and the pilot perhaps scared out of his pants by the blinding flash and deafening noise of the discharge, but the aircraft has continued to fly more or less unaffected. For, provided there is efficient electrical bonding between the metallic parts of the frame the chances of lightning seriously affecting either the aircraft or its crew are remote. Its most common trick is to make the compass unexpectedly unreliable by magnetisation of metal near by, but once suspected this should not worry a pilot unduly, since he has a directional gyro—and should have some idea as to its rate of precession. And, in any case, when the aircraft is above the clouds the navigator can prove to himself that the astro-compass wasn't included in the equipment just for fun.

Lightning conditions most generally occur in or near thunder clouds of the cumulo-nimbus and towering cumulus type. These particular types of cloud carry a concentration of positive electricity in the upper parts, while the lower parts are negatively charged. The difference in potential between the lower part and the upper, or between the lower part and an induced opposite change on the earth's surface, may reach a stage when a breakdown occurs, and you get a sudden discharge, or lightning flash.

Now the aircraft that flies into the middle of this little set-up is obviously asking for excitement. And it can get it in two different ways, for cumulus cloud offers two different types of electrical discharge. The first is known as St. Elmo's Fire and is caused by the aircraft passing through a charged area of cloud and thus charging up itself. When it then flies into an area of oppositely charged electricity and the difference in potential is great enough, a discharge occurs from the sharper points of the aircraft. A glow, and in more extreme cases long streaks of fire appear at the propellers, wing-tips or nose. This is rather shattering to watch, but as the aeroplane itself has only a small electrical capacity, the discharge isn't big enough to do much damage, although, as said above, the compass may be affected.

The other type of discharge, lightning

proper, only affects the aircraft when it, so to speak, gets in the way of it, by being between two oppositely charged cloud areas just as a flash passes across. The electricity then enters some sharp point of the aircraft, say a wing-tip, and leaves by another, such as the nose. If St. Elmo's Fire has been previously noticed, a lightning discharge may be reasonably expected ; for the aircraft moving through the air creates a channel for the flash. The aircraft itself, in short, may start the discharge. Naturally more damage results than from St. Elmo's Fire, since the discharge is between two large cloud areas and not between a mere aeroplane and a cloud.

Now the obvious way of avoiding lightning is to avoid thunderclouds and the electrical field near them, by keeping at least half a mile away, or by flying well beneath them, more than 2,000 feet from their base if possible. If, however, the cumulus clouds are part of a front and you have to go through, the chances of being struck are lessened by the following :

Don't fly at levels where the temperature is between —7 to 4 C. or between —9 to —23 C.: the largest amounts of electricity and the greatest differences of potential are found in these areas. When there is a likelihood of lightning, or you get St. Elmo's Fire, reduce speed. This prevents the aircraft picking up electricity so quickly and reduces also the chance of lightning taking a path through the aeroplane. Always wind in the trailing aerial when lightning conditions are expected. Put George in (if you are fitted with him) before, or immediately after, a discharge, so as to keep on a level keel while the pilot recovers. And you should remember that fire may break out if you have oil drippings anywhere near where the electricity strikes into the aircraft, such as the point where the trailing aerial enters the fuselage.

Although lightning is frightening, we repeat that the damage is slight. Of forty odd cases the very worst damage was only that detailed below where a large passenger aircraft was struck while its trailing aerial was still reeled out. A deafening explosion occurred in the radio set behind the pilot and his seat was forced to the left of the compartment, jumping its catch. The engines did not stop, he regained control and throttled back. He found that the cockpit was very draughty, not unnaturally since four of the eight panes of glass had disappeared. The aerial was burnt off, the aerial winch shattered, a fire extinguisher was in two pieces, and there was minor damage in the wireless compartment. Apart from all this the aircraft was unaffected.

Finally, don't forget that if you have your sextant and your astro-compass with you they'll always get you home. They won't be damaged even if the aircraft is struck and the pilot's compass and the radio are put out of commission.




FULL MARKS

FULL marks for resourcefulness are awarded to Pilot Officer B——, a pupil pilot at a Coastal Command O.T.U.

This officer took off from base and made for his coastal departure point for the start of a D.R. sea navigation exercise. As he left the coast he noticed that his undercarriage indicator lamps showing red seemed less bright than usual. From his position in the cockpit he could see no wheels showing and assumed them to be up, until another aircraft told him by R/T that his wheels were partly down. This fact was verified by his observer from the rear of the aircraft.

His maximum airspeed at this point was 120 knots, and he decided to climb to 2,000 feet and try the functioning of the emergency hydraulic pump. The pump failed to function, and he assumed a leak to be present in the system. He was not sure if any fluid were escaping because some fluid had been spilled on the floor prior to take off when the hydraulic tank had been filled. He then tried diving and pulling out sharply several times to bring the wheels down to the locked position, but to no purpose.

As a last resource he remembered the two pints of coffee carried in the aircraft, and told his W.Op. to pour them into the emergency tank beside the radio table. This was done, and after one and a half minutes' pumping on the emergency pump, pressure began to build up sufficiently to bring the wheels down. The pilot was not sure that there would be sufficient pressure to operate the flaps and decided to make for an aerodrome further than his base, where he could make full use of the longer runways. Fortunately, he was able to pump 30 degrees of flap and landed successfully.

The hydraulic system was cleaned and refilled ; and he asked for the flasks to be refilled with coffee, because he had unfortunately not had it. Shortly he left for base, about ten minutes' flying time away, leaving his wheels down. On the circuit over base he again found that no hydraulic pressure was available for flaps, and the fresh flasks of coffee had to be used in the emergency hydraulic tank. A successful landing was made.

The pilot subsequently stated that everything went all right, but that he would like to suggest that aircrews should be provided always with treble rations of coffee—both to ensure their getting some of it to drink and also to obviate any other type of emergency measures.

POST ARDUA AD ASTRA

The pilot of a Spitfire recently attacked and shot down an Me. 109. On returning to his aerodrome he began a victory roll, got into a spin and failed to recover. Net result : all square—instead of one Jerry down. A perfect example of what Major " Mick " Mannock, V.C., called " bad arithmetic."

before taking off, should again be checked before ditching, if there is time, as it is possible for them to be in a closed position but not latched. They will then burst open and allow a great inrush of water and thus accelerate the sinking and decrease the chances of escape. The pilot's escape hatch and the astro hatch should be jettisoned before ditching, but bear in mind that open hatches cause drag, so if the pilot is struggling along on one engine, don't open the upper hatches till at least 1,000 feet. In one case where this was not done four lives were lost.

Since land planes are not designed for alighting on the sea, it is important to approach as near to horizontal as you can and at the lowest possible safe speed. The average approach speed estimated from 16 ditchings was 74 m.p.h. I.A.S. At night try to see the sea with the landing lamp, while coming down slowly and at a shallow angle if you can. Then, when you do ultimately come down, remember your dinghy drill. In every case under investigation the dinghy inflated, but there were four cases where it was inverted and one in which inflation was impeded by entangled cordage, though it was subsequently released. Inverted inflation should not occur in the Wellington owing to the way in which the dinghy is stowed.

Repeated warnings have been issued with regard to entanglement of cordage on the dinghy during inflation, and cordage should therefore be kept to the minimum. The addition of unofficial loose equipment tied to the life-line is likely to lead to entanglement with possible bursting of the dinghy. It *must* be avoided. Emergency packs for all such equipment are now available.

On the whole casualties are surprisingly low, but there is no doubt that they might be very much lower if crews *really did know* their stuff. You are reminded, of course, that much of the above applies specifically to Wellingtons and not necessarily to other types.

THE MONTH'S PRUNERY

THE MOST HIGHLY DEROGATORY ORDER OF THE IRREMOVABLE FINGER (Patron, Pilot Officer Prune) has this month been awarded to Pupil Pilot —— of —— O.T.U. for Marked Devotion to Asininity.

Sent off to do air firing in a single-seater fighter he reported on his return that the practice had not been carried out. Asked why he couldn't manage it, he said: "Well, sir, there was a little tin plate clipped over the firing button . . . "

LEARNING TO NIGHT FIGHT

BEFORE flying your operational aircraft at night you will, of course, have flown it many hours by day and so will be able to handle it instinctively, not only on external indications and instruments, but by being dead certain of putting your hand on any of the controls in the cockpit without looking down.

The tactical applications of night flying are few and simple. First, you must learn to fly accurately on the instructions of your observer, and by " accurately " we mean within two to three miles an hour and 20 feet altitude. Think of instruments rather as a means of flying accurately than of maintaining equilibrium. Casual reference only is needed to maintain your " balance," but definite concentration on your instruments is necessary if you are to fly within such narrow limits of accuracy. CONFIDENCE, therefore, is essential for such instrument flying, and it can only come from natural aptitude as developed by hard and regular PRACTICE.

Next, by means of daylight practices, you must learn to come up behind a target aircraft without making violent changes in overtaking speed. This is necessary because not only is your visibility so reduced on a dark night that there is invariably a tendency to " overshoot," but pulling back your throttle violently to correct the fault belches flame from the exhaust, and this gives your position away.

After this you must learn to apply the simple principles of search by night. Search by night means looking for an opaque object which you must be able to recognise instantly in silhouette from as long a range as your eyesight permits. Always, therefore, aim at placing your quarry against the lightest background and yourself against the darkest. This involves factors like state of cloud, moon and sky, which vary from one night to another. The principles of search, however, remain the same. You must learn by experience to apply them to changing conditions.

The problem of shooting is a simple one. You manœuvre your aircraft to within 150 yards of your quarry and take a non-deflection shot through a simple reflector sight. Most night fighters carry four cannon and six machine guns—which at anything under 150 yards *should* be good enough even for the poorest shot. Unfortunately this is not always so : remedy—more practice. Training for night shooting is best done at first in daylight, by flying behind the target aircraft, judging its range and holding it in your sights. Remember, however, that ranges look greater at night, so learn the different types of hostile aircraft through your sights at ranges of 150 yards, 200 yards and 250 yards by practising on the ground with the range estimator.

" That's a Ju. 88," says P.O. Prune, "I can tell it blindfold."

That, in sum, is the gist, or guts, of the night-fighter pilot's training. It takes longer than that of the daylight-fighter pilot, and it needs great concentration. Find out your problems—and then *concentrate* on them.

IT MIGHT HAVE BEEN YOU

WE have received the following from a Pilot Officer. It is perfectly genuine and quite unsolicited. We publish it with the writer's permission, in the hope that his sincere and straightforward statement may help to prevent other accidents due to similar disregard of the regulations.

" About the middle of last December I was lying in Hospital dictating a statement for the Court of Inquiry. My eyes were bandaged and I could not remember the crash, only what came before it. The Squadron Leader sitting at the bedside had just told me my Radio-Observer had been killed.

" But the crash was not in a ' Beau,' not on operations, not at night. We had taken a ' Maggie ' up for a pleasure flip one afternoon ; he sat in front because I was going to let him take the controls. I can remember doing some pretty ropey manœuvres chasing a flight of plover, and I can remember handing over to him, but that is all. Witnesses say that we were flying low, and that while in a turn the lower wing hit some telephone wires. Whatever happened, he was, as the M.O. put it, partially decapitated, while I had a fractured skull, broken nose and something funny in my eyes. When the bandages came off I used to see double.

" It was stupid of me to disregard the regulations, and let my Radio-Observer take over ; it was still more stupid to do as I must have done, and let him fly low ; but what is important, and what I'd like other pilots to know, is that I regarded myself as a good pilot, careful, steady, and ready for emergencies. For what it is worth, I came top in the flying ability marking at my S.F.T.S., and have always been rated ' above average ' ; and yet I did this thing. I am amazed at my own criminal idiocy.

" Now, after three months in Hospital, and two months hanging about on the ground, the C.M.E. has passed me ' fit for non-operational flying at home.' And the Blitz has started! The squadron has, after those months of inaction, started to bag Huns. Non-operational flying at home!

" But, of course, I may never fly again. They have arranged the Court Martial for next week."

THE HUN IS NOT DEAF.

IF your C.O. tears you off a strip for nattering too much over the R/T, don't bother to have a grievance about it. Cutting down R/T conversation is for your good; it isn't just done to make flying more boring.

That long procedure which was drilled into you at your O.T.U. was simply to teach you the system, to accustom you to hearing words and phrases which will stand you in good stead when you join your Squadron. If you constantly use the same set sentences and phrases when you talk in the air, you'll soon know the sound of them so well that you won't have to listen to each individual word, probably getting completely foxed if you miss one in the middle. For instance, if the R/T transmission is a bit distorted, "Say again" is a set expression which you should be able to catch even if the speaker said it with his mouth full of marrons glacés, or, seeing this is war time, wheatmeal bread. If, however, the other chap says, "D'you mind repeating that last bit again," you're very unlikely to guess what he's driving at first time off and you'll probably reply "I'm afraid I didn't quite catch what you said," and he'll say, "I'm having great difficulty in hearing you," and so it'll go on and on. Meanwhile the Hun, who is no fool where radio is concerned, can take a D/F fix on your transmission, and the more you tattle the more accurate that fix will be. So, in your own interest, use the set phrases and *cut out the R/T chatter*.

There was a time when you had to repeat each message and the other fellow had to say it back to make sure that he had got it. It was necessary to speak slowly and to roll the R's. (Prune says that he rolls his whenever he wears a parachute.) To-day with V.H.F. you should never have to say anything twice, and when the set is working properly (which you must admit it usually is), the sound is more like an ordinary telephone. So long as your helmet fits snugly and you haven't been sitting on it too much you ought to be able to hear anything anybody says.

A lot of chaps still believe that it is necessary to shout into a microphone. Well, remember how frequently people shout at foreigners who don't speak English well, thinking that they will be better understood. Does it get them

anywhere really? No. Nor will it you on the microphone, which, as a matter of fact, distorts much more if you shout than if you speak in your usual voice.

Don't start to transmit before thinking out what you want to say. Not only are "hms" and "er's" annoying to listen to, but they make the transmission longer. Moreover, if you stop to reflect for one moment you'll probably find that a lot of the things you were going to say are unnecessary. So before speaking, ask yourself: "Can I cut it down?" Don't, however, extend your verbal economies to a constant leaving out of your call-sign: it usually merely confuses everybody It's impossible to lay down hard-and-fast rules about when to use or not to use the call-sign; like everything else in this flying racket it's more common sense. For example, just suppose that you want to test your set and establish contact with your Leader it is only necessary to say: "Hello, Blue Leader, Blue 2 calling. Are you receiving?" Blue Leader should then answer: "Yes, Blue 2, loud and clear. Over." You finish by saying: "O.K. Blue Leader. Listening out." Blue Leader by then would know your voice and as nobody else is calling up, he is sure that Blue 2 is answering, while your last message simply tells him that you are satisfied with the transmission and that you have no more to say. Aim at the least chatter combined with the greatest understanding.

We haven't said anything about leaving your set switched on to "Transmit" after you've finished. That sort of thing is unforgivable, elementary, and is so easy to prevent. Right from the first time you use an R/T set, get into the habit of keeping your hand on the switch whilst you transmit. You'll find that this helps to make your messages shorter. In any case they should never be more than five seconds; you can always spare your left hand for that time.

One more thing—which applies particularly to Section Leaders. If things go wrong, don't get rattled; or if you can't help getting hot under the collar, never let it show in your voice. Nothing is so disturbing as a frantic shout of "Look out, 109's behind—do something." Take a lesson from the Bomber pilot who, when he was told in a frenzied yell by his rear gunner that a couple of 109's were coming up from behind, replied, "O.K. Let me know when you've shot 'em both down."

EVASIVE TACTICS

When out of ammunition DON'T hang about, but dive steeply with rocking turns to right and left. If you put your stick forward quickly the engine will cut out for a few seconds. This is not recommended.

If you have been really surprised by an enemy fighter on your tail, and if his bullets are getting uncomfortably close, do a quick barrel half roll with plenty of skid, pulling the stick back firmly when you are on your side, and then rudder into a steep dive with aileron turns.

OTORHINOLARYNGOLOGY

STAND back there! Keep clear of the title, or you'll get trampled underfoot!

No, *we* don't know what it means either, but it occurred in a file on the subject we've been told to write about, and looked so impressive that we thought we'd use it. We *like* taming wild, unbroken titles! Ride him, cowboy!

Well, the subject we're going to write about—if we survive—is deafness due to aeroplane noise. You may often have wondered whether the continual noise of aircraft engines had any adverse effect on your hearing. After all, the human ear is not designed to listen to several thousand H.P. doing its stuff at close range. The answer, in brief, is that it does have a certain effect—*unless* you take precautions. Here are the results of a recent investigation into the effect of noise upon pilots while undergoing training. It (the investigation, not the noise) was made by a skilled consultant in Otorhino-what-we-said-before.

One hundred and thirty-four pupils—two courses—were chosen, and were followed right through their training, from first going to an E.F.T.S. to passing out from the O.T.U. Hearing tests were carried out at the start of the E.F.T.S. course (on Tiger Moths); at the start of the S.F.T.S. course (Masters and Oxfords); at the start of the O.T.U. course (Blenheims, Wellingtons, Whitleys, Ansons, Spitfires and Hurricanes); and at its completion. For various reasons only sixty-five of these pupils could be completely tested right through.

We won't bother you with the details,

When it's the right question . . .

which make considerable use of that lovely word "Decibel." (P.O. Prune, by the way, thinks Decibel was the wife of Ahab, and didn't she end up as a dog's dinner?) The conclusions reached, however, were that by the end of the O.T.U. course there is an appreciable loss of hearing, particularly at the higher frequencies. Once having properly proved this in black or white, or rather in decibels, the next thing is how to combat this tendency.

Apart from those steps which are being taken to reduce mechanical vibration, which also may affect the ear, the main thing is to realise the protection your helmet affords. For one of the results of the investigation proved that the strongest tendency to deafness was caused either by not wearing the helmet continuously and properly strapped, or else by discarding it altogether. It is

admitted that the old Type B helmet is uncomfortable and fatiguing, but by now all those flying, either operationally or on training, should have been issued with the newer Type C. And if you study your A.M.O.'s, as we hope you do, you will see that A.M.O. A.220/42 lays down definitely that you must wear a properly fitted and properly strapped flying helmet at all times, and not just when you want to use W/T or R/T. If you are not using these, and it is very hot, and the helmet tires you, and you feel it essential to get a little relief, you may remove it, but you *must* plug your ears with plasticine wrapped round with cotton wool. These are available at *all* stations. . . .

Prune's hearing is never at fault!

This is not really all nonsense. It is honestly directed towards saving you from any loss of hearing which may become permanent and progressively worse. So bear the A.M.O. in mind; and, incidentally, obey it. . . .

Now stand by while we dismount from that bucking bronco of a title and go on to a simpler one!

BLAST THAT BIRDMAN!!

PICTURE an A.A. Practice Camp somewhere on the Welsh Coast. A line of guns and all their appendages sit along the cliff edge. All last week it poured with rain, but at the moment it's fine. Although it doesn't look as though it'll last long, there'll be time for a nice bit of practice. . . .

There's the old Henley and there's the sleeve coming up. . . . They're off! . . . Bang, bang-bang, bang! A grand salvo after a week's weary waiting! Bang, bang, double-bang—and another! Lovely. The first bursts appear in the sky. Then—Hell! STOP EVERYTHING! What's this in aid of? Screams of whistles, red flags, shouts, and, saddest thing of all, British gunners angrily cursing a British aircraft. For a socking great Wellington has just gate-crashed the range. (P.O. Prune, for a dead cert!)

Now luckily this doesn't happen often, but happen it does. Almost every week precious hours of good weather are wasted and gunners have to hold everything—all because the Prunes of the Air Force *will* ignore the existence of the A.A. Danger Areas. Yet the regulations are there, clear and plain to read, instructing all Pilots to avoid the A.A. Ranges; and all the ranges are marked on the proper maps, equally clearly and plainly.

"DON'T FORGET THE D.R., SIR!"

Sgt. Straddle gives it a thought.

"The basis of all navigation is Dead Reckoning: everything else is only an *aid*." This sounds rather a sweeping statement, but it is overwhelmingly true. Though it sounds rather like one of those things you tediously memorise during training and easily forget as soon as your training is finished, it is not a bad idea to ponder over its inner meaning for a while. For it may help to clear up a certain amount of loose thinking that is going on to-day about navigation in general.

Dead Reckoning is defined as "Working from a known position by means of data known at the time of being in that position." That is a fundamental, and you can't get away from it. Yet you'll find that you *are* getting very far away if you look upon Astronomical, Radio and Visual aids as separate means of navigation to themselves. It is like looking on C.S. propellers, flaps, retracting undercarts and so on as means of flying. They are only *aids* to flying better and faster.

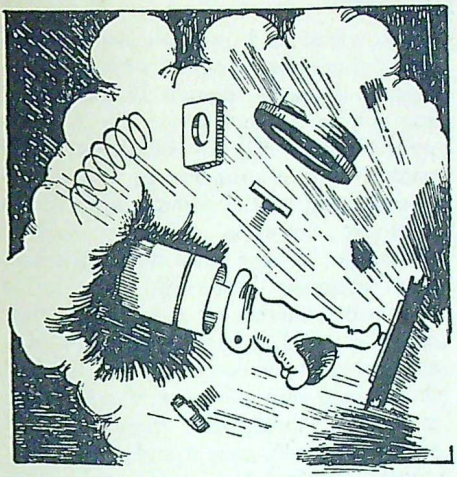
After all, before the war not one navigator in ten used astro position lines. Before the war the enormous present advances in navigating by the help of radio had not been made. To-day, however, you can't be called a fully qualified member of the Navigators' Union unless you can make the most of the stars, of Q.D.M's, of loop-bearings, and such like more or less fancy stuff.

Yet these are only there to *help* the navigator check up on the accuracy of his Dead Reckoning. There is no doubt, of course, of their value. It is definitely a help to making good a track along a parallel of latitude by taking sights on Polaris from time to time to ensure that it *is* being made good, but this does not give the complete answer, and it is to your D.R. that you refer to answer questions about ground speed and E.T.A. It is definitely a help to pick up a strong beacon signal with your loop and to home on it; but without D.R. the exact time of arrival still remains an unsolved problem.

Moreover, astro or radio position lines are liable to error, and even if they are accurate, the wind, the track to make good and the course to steer all have to be calculated. You can't call yourself a navigator if you carry out a flight by first getting fixes and then applying the Met. wind, when a few moments' work with an air plot will give you a wind to use as a check against the one actually being used.

Well, we think we've talked enough about it to impress on you that even though astro and radio aids are daily becoming more accurate, these aids only serve as checks on your original D.R. (or Flight Plan) or to provide factors for further calculation. Dead Reckoning is the fundamental method which links up all the information obtained. So use aids as much as possible to *check* your working—but for the complete picture, *keep that D.R. going!*

DON'T BE AFRAID TO PRESS THE BUTTON!



There are some pilots, so TEE EMM is informed by the authorities, who view the act of pressing the feathering button of a hydromatic propeller with grave suspicion, not to say horror. Indeed, one pilot at B——, when asked how he would feather a propeller, said, " I'd press the button and hope for the best " —in the same frame of mind in which a man sitting on a barrel of gunpowder might bring out his cigarette-lighter. (P.O. Prune says he'd be *quite* safe, the ruddy things never *do* work.)

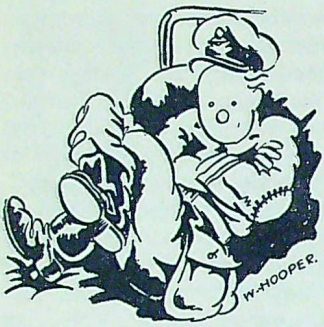
Now this idea that the feathering button is in the nature of a dirty practical joke—put there by the makers in the hope that some unsuspecting person may be induced to press it, when at once the whole aircraft blows up—is due to two things. (Three, if you count that rather terrifying word " hydromatic.") The first is that at one time there was a tendency in certain aircraft for failures to occur in the feathering booster pump's oil pipe to the C.S. unit and so spray oil on to the exhaust manifold, with great risk of fire. A modification to prevent this possibility was instantly adopted, but an accident did occur to an Albemarle before the modification had been fitted to it. Reports of this accident, therefore, may have made some pilots think that the whole business of feathering was fraught with grave danger.

The second thing influencing many pilots' attitude to their hydromatic propeller was that, for the very reason above mentioned, *i.e.*, possibility of oilpipe failure, practice feathering was at first definitely prohibited on Albemarles. This again gave pilots the impression that it was a dangerous undertaking and only for emergencies.

The answer to these two points is that, first, according to the Bristol Aeroplane Company, there is now no hydromatic airscrew in the Service, or at the contractors, with an unmodified pipe ; and, second, that the restriction on practice feathering has since April 22nd been officially removed. In other words, there is, after all, no possibility of your aircraft exploding if you press the button.

So every pilot who had qualms about it need have them no longer. They can go ahead and practise feathering as much as they like without disintegrating in mid-air. But you must remember that the feathering oil is supplied by a battery-driven electric pump, so that not more than three practices should be attempted in any one flight, and you must make certain that your batteries are invariably kept well up.

INSTRUCTIONAL FUSELAGE DRILLS



P.O. Prune enjoys a quiet half-hour in the cockpit.

In the good old days before the war aircraft were comparatively simple affairs, and flying training could be carried on in leisurely fashion. The instructor would sit his pupil in the cock-pit for a quiet half-hour's lesson on the instruments and controls; then, when they began to feel more or less happy about these, they would go into the air together to carry on with dual training. The results would turn out quite satisfactory; and an enjoyable time would be had by all. Accidents were few and far between, for much time and attention could be given to each pupil individually.

Things, however, are very different now. New factors have come into the picture. As the output of planes increased, the demand for pilots grew; thus training has had to be speeded up. Less time can now be devoted to each pupil and the instructor is, therefore, less able to study personal idiosyncrasies and nurse each individual into efficiency. Moreover, flying has sometimes to be carried out in weather that, in more peaceful days, would have kept every aircraft on the ground; while night flying comes much earlier into the pupil's career. Nor is it possible to "hand-pick" the prospective pilot with the same care as formerly, though the standard has still to be kept up to the highest possible level. On top of all this, the controls and instruments of aircraft in general, and of operational aircraft in particular, have, as a result of war experience, become more numerous and more complex. The first sight of a Hurricane's instrument panel is enough to make a civilian faint at the very idea that any one man can get to understand their varied uses this side of the bath-chair. Yet speeds have increased and have made swift, correct and instinctive control manipulation more necessary than ever, especially when night flying under black-out conditions.

From all this it will be obvious that if old instructional methods were continued, there would be a grave risk of increasing the number of accidents among pilots doing their first flying on the type, as a result of their not being sufficiently familiar with the controls.

As a result, a system of Fuselage Drills has been devised. For every flight phase —taking off, climbing, and so on—full notes are typed giving the correct way in which controls should be handled. These notes are stuck on millboards, and each forms a fuselage drill. Now comes the instruction, designed to make the pupil thoroughly at home in the cockpit before he goes up in the air.

Armed with the proper millboard the instructor puts the pupil in the pilot's seat of an instructional fuselage in the

hangar. He then, according to the type of aircraft being used, takes the dual control seat, or stands on the wing root; or, better still, sits in a chair mounted on a platform beside the pilot's cockpit. Then, from the millboard he first explains the controls and their manipulation. He next asks the pupil to point out and handle the controls he's talking about and explain just what they do. By repetition and correction the pupil will soon reach a stage when he can be said to know the drill, and meanwhile his actions and his reasons for them can be checked against the millboard.

The advantages of all this are obvious. Flying instruction can be carried out by the newest instructor without fear of his missing important points either in his lessons or demonstrations; a logical habit of thought can quickly be formed in the mind of the pilot who in a few weeks may be called upon to fly in fast and complex aircraft under all conditions; and his ability to do so can easily be seen in advance.

After the novelty has worn off, of course, fuselage drills can easily become dull and tedious. Don't let them become so! Remember that they were not invented for amusement. Remember, too, that instead of going over drills for perhaps the two-hundredth time with his fiftieth pupil, your instructor would far rather be sitting in his Flight Office smoking a cigarette. The whole idea of the drills is to bring order out of what could easily become chaos, to reduce complexity to a simple system, to cut down aircraft accidents which nobody wants—not even the manufacturers—and to make your flying as safe, accurate and confident as is humanly possible. In short, *to help you*.

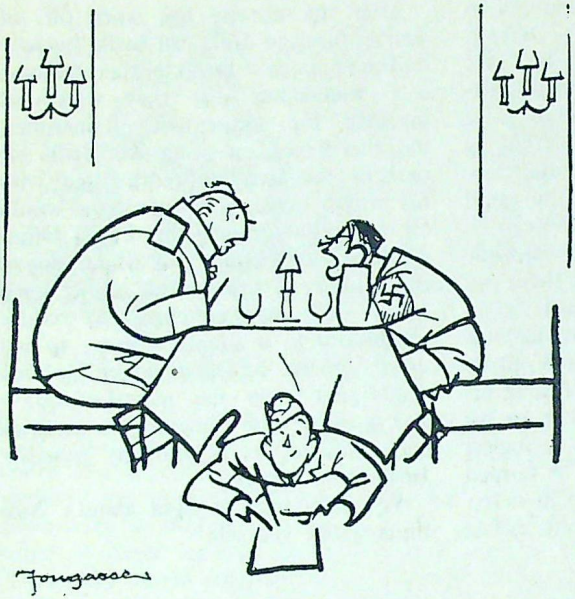
You have been thought about: Now think about yourself!



APOLOGY

ON behalf of Pilot Officer Prune we apologise to the junior Naval Officer who called at a R.A.F. Station in S. England the other day, explaining that he had been told by a friend in the Fleet Air Arm that Prune would be delighted to fly him to Edinburgh on his forty-eight hours' leave. Prune, his friend had stated, enjoyed doing long trips like that to improve his navigation. We would like to record formally that Prune's navigation cannot be improved; and if he was here he would be the first to agree. Unfortunately he is still overdue on a flight from Croydon to Heston.

WHAT THE HUN IS DOING



The following notes about German flak may be of interest :—

The attack on Cologne made a short while ago provided an example of ground defences not opening up, under poor weather conditions, until it became clear that the target had been located — tactics which have been observed from time to time in attacks on other objectives. Further information which has since been received about a night attack on another German town leads to the belief that similar tactics were employed there, but with additional refinements. It seems that during the first phase of the attack the defences of the city lay low, even though bombing took place, but there was violent firing at the outskirts. This procedure was presumably intended to give the impression that the city centre was actually some distance from its real position. During the second phase of the attack flak fire was thought to have come from positions running through the city as well as the outskirts ; thus again tending to deceive attacking aircraft as to the real location of the target area.

German railway trains carrying troops or M.T. have their A.A. defences with them and the following information on their extent and position may be of help to pilots when attacking these trains : (i) Three trucks mounted with machine guns are usually situated $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ of the way along the train. (ii) In addition three trucks with 20 mm. light flak are carried, one immediately behind the locomotive (this does not open fire unless the train is stationary), one in the middle of the train and one at the extreme end. (iii) Some trains may carry an additional 20 mm. armed truck in the front of the engine. During lengthy halts where the gun crew's view is obstructed, these A.A. defences are dismounted and set up in suitable positions off the train. Gun crews are forbidden to open fire when on tracks with electric overhead cables. This last may be worth remembering !

FURTHER NOTE ON CLAY PIGEON TRAINING

WE had an article on Training with Clay Targets and the Skeet Range in our April, 1942, issue (Vol. II, No. 1). Since then we have received some further notes on the subject.

As regards the layout of the range we hear that 50 yards is not the best distance between the two traphouses, if the " Plus " trap is being used ; because this trap is too powerful for that distance. The distance should be at least 65 yards. We have not space here to reproduce another plan of the ideal layout for a " Plus " trap, but in brief it shows the distance between traphouses to be 65 to 70 yards, and the half circumference round which the firing positions are arranged is flattened out to an ellipse, the mid-point (No. 4 position) being only 20 yards from the line joining traps. If, by any chance, the " Minor " trap has to be used, the distance between traphouses is reduced to 40 yards ; the 20 yards stays the same.

We also mentioned in the article that shooting should be supervised by a qualified Instructor ; and we now hear that there is a good Shooting School already working, with an ideal layout where prospective Instructors could take a short course. This school is under the supervision of the best clay target shot that this country has produced ; he has won the Skeet Championship several times, the Open Championship five times and every other important competition. He also has the help of three other international shots and we will willingly put any of our readers in touch upon hearing from them.

So go to it—fix up your " Skeet " outfit and shoot clays at every available opportunity. Remember Ball, Bishop, McCudden and the other Big Boys in the last War spent *all* their spare time with a shot-gun.

They knew that " good flying " is hopeless without "good shooting."

HOW TO WASTE AMMUNITION REALLY WELL ?

The following is an extract from a cine-film assessment :—

" The target is at about 1,000 yards range and is, therefore, indistinct—it is presumed to be a Me. 109. Two bursts of $1\frac{1}{2}$ and $1\frac{3}{4}$ seconds are fired. The first opens from the starboard beam and closes to about 60°. Aim is low and insufficient deflection allowance is made. A second burst is fired in a beam attack from about 750 yards' range with wander of aim. . . ." Whose Prune was this ?

FOOLING THE HUN . . .

". . . Red 2 saw bombs dropped by a Dornier 217 on a convoy to the west. He drove this E/A off by mock attacks, having exhausted his ammunition. The E/A returned and was about to attack convoy again so Red 1, who was also without ammunition, made a port quarter ' dummy ' attack and E/A pulled up and disappeared into cloud. Red 1 again turned to convoy and immediately observed another Dornier about 5 miles east of the convoy and diving at it from cloud base. Red 1 turned towards it as if to attack, and E/A pulled up and disappeared in cloud. Red 1 continued to patrol convoy until relieved. . . ."

. . . AND FOOLING YOURSELF

A pilot's combat report claims a 109 in flames after the first attack. Here is the cine film assessment of the combat :—

". . . The first two bursts of ¼ second and 1 second are fired on a Spitfire. The first from 200 yards and the second 150 yards. . . ."

TO ADJUTANTS

AND OTHERS CONCERNED

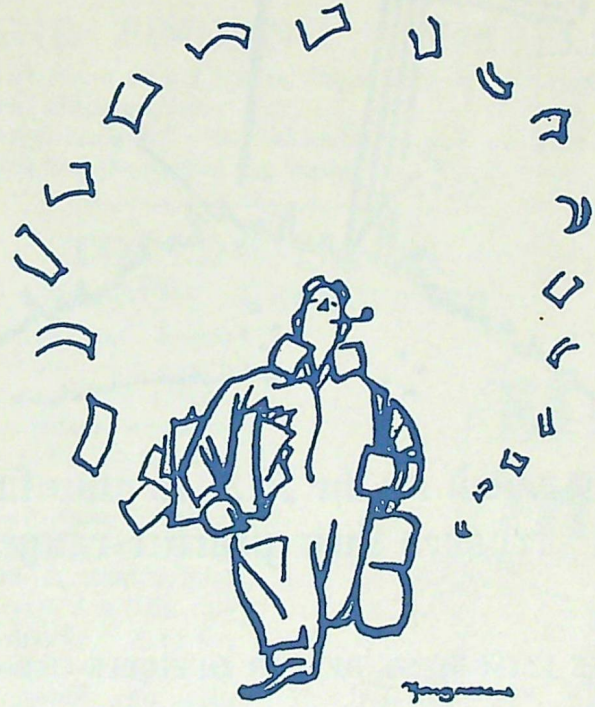
THE Air Publications and Forms Stores report to us that each month copies of TEE EMM are sent back to them, presumably as surplus, *without any indication of where they come from.* You have been often asked in these pages—and even in A.M.Os.—to state the *origin* of returned copies, if they are being returned as surplus and you want to have fewer next time. If you don't do this we can't adjust your distribution to the required figure, we send out the same number to you next month, you again send them back, and we all look damn fools shoving badly needed paper back and forth at each other in badly needed transport.

Our sole object is to supply you with the number you require ; but we're not thought-readers. Unless you *tell* us that you want more or fewer copies we can't comply with your wishes.

He always relied on the A.A. to stop firing when he crossed their practice range.

TEE EMM MUST BE FOR OFFICIAL USE ONLY

Nothing in TEE EMM may be published in the Press—either with or without "the usual acknowledgments," or in any way communicated to the public. It is your further duty to *ensure* that this cannot happen, by safeguarding your copies, not lending them to anyone outside the Service, and not leaving them lying about where an unauthorised person can get at them, pass them on to other unauthorised persons, and so on and so forth, till they may even end up on a second-hand bookstall. And *you'll* be to blame. TEE EMM 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