

TEE EMM



Number 2

May 1941

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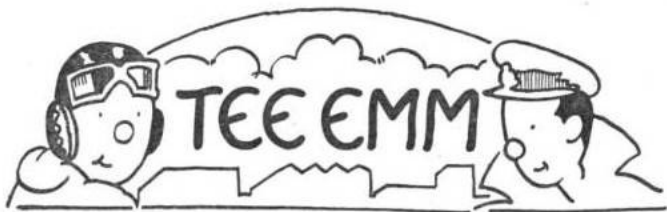
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*Pilot-Officer Prune says—
"Take Tee Emm regularly!
Prevents that Thinking
feeling!"*

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This means it must only be read by those for whom it is intended. No part of it must be published and nothing it contains must be told or written to any one who might publish it. And, of course, it must not be taken into the air.



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

TEE EMM FOR MAY

WE remember reading some years ago a book by, we think, Mark Twain, or maybe O. Henry, in which the author at one point was describing his early life as a "cub" reporter on the local paper in a small but tough "Wild-West" town. He recalled how in those carefree times scarcely a week went by without a couple of revolver shots crashing through the window past the Editor's head, "testifying to the success of yesterday's Personal Column."

Well, we've had no bullets here yet (P.O. Prune, looking over our shoulder, murmurs "Famous Last Words") and we hope we don't get any—except of the right sort. By right sort we mean helpful suggestions as to what you'd like to read about—or even stuff written up by you if you've got some pukka gen of value to others. See, for instance, "The Ancient Mariner" in this issue.

Talking of this issue, too, we particularly want to draw your attention to "War Over France" on page 22. We think this straightforward account of the war in the air during those hectic summer months of 1940 is invaluable both as a stirring record and as a straight-from-the-horse's-mouth exposition of fighter tactics. You have read "The Battle of Britain," written by an experienced author; well, "War Over France," by an experienced pilot, should, in our opinion, be to the R.A.F. what "The Battle of Britain" was to the wider civilian public. . . .

We must break off. A brick has just come through the window. We rather *thought* those remarks about the Navigators' Union in the last issue would be appreciated in certain quarters.

INSTRUCTORS CAN ALSO LEARN



"P.O. PRUNE
says they can't
teach him anything."

A good instructor is born not made. Our first comment upon this statement is that, like so many other similar snappy aphorisms floating mistily about the world to-day, it is a half-lie. Worse still, it is a dangerous half-lie, in that, repeated often enough and believed often enough, it leads to self-deception. The instructor who despises instructing and wishes he were on a more exciting job, the instructor who is perhaps depressed at getting poor results, the instructor who is inclined to be lazy, soon starts repeating the phrase to himself by way of comfort and justification. He says, "I was never born a teacher. So I just haven't got this quality, this innate faculty for imparting information." He thus comes gradually to believe that he's unlucky, that the art of teaching really *is* a mysterious gift which he unfortunately missed when the Almighty was handing out good and bad qualities. And since no one can help bad luck, he's next telling himself that because the art of teaching has been left out of his make-up he needn't do any more about it, except tackle his uncongenial job in a pedestrian manner and hope soon to be posted elsewhere.

Well he might as well be posted to the Sahara for all the good he's doing in his present position. He's not pulling his weight. With that attitude of mind if he tried to teach a hen to lay an egg he'd only end by getting the bird itself all confused.

For while we must admit that an ability to teach *is* very definitely inborn in a man, it is quite false to assume from this that it cannot also be acquired. It is being acquired every day. Instructors are being made everywhere at this minute. Why? Because they are *making themselves*. It is only a very, very few who, in spite of every endeavour, still find that somehow or other they remain indifferent instructors.

Remember this one simple point. The gift of teaching is acquired by the *wish* to teach. If you feel you really want to get the stuff over to your pupils the job will be infinitely easier. And the acquiring of this wish to teach is in your own hands naturally; anyone can acquire a taste for anything if he perseveres—even if it is only beer. Indeed, if you are an instructor—and by instructor we mean any officer or N.C.O. who, even if only for a brief half-hour, finds himself in the position of having to impart some knowledge to someone—you must all the time keep in the forefront of your mind a determination to get the stuff over. You must all the time cultivate a real urge to explain what you know to those in front of you in such a manner that they understand it. It should not be very difficult. Their minds are—as far as your subject goes—blank pages, white walls; and who doesn't love writing on a clean, blank page or drawing on a lovely white wall? It gives a sense of power, and there is no power so delightful and so permanent as that inherent in teaching, in passing on what you know to people who don't know it. (We recall here the story of the old man of 73 who still

called another old man of 89 "Sir"; for the elder of the two old dears had been the other's headmaster at school!)

We used just now the phrase "A real urge to explain what you know to those in front of you in such a way that they understand it." Those last words are most important; because if their real meaning is ignored you will never learn the real art of teaching. You will only be a half-instructor. You will be like a man on the rifle range who sets his sights correctly, aims carefully, and squeezes the trigger in the proper manner—and then doesn't give a darn where the bullets strike on the target. The sights may need adjusting, he may be pulling off too jerkily, taking too much foresight; or there may be corrections necessary for wind or for idiosyncrasies of the rifle. Any of these may result in his so carefully despatched bullets failing to connect with the bull; yet none of these seem to worry him as long as he's gone through the correct motions at his end.

You would call him a fool. He is. But you in your own line can be equally foolish. It is of little use to concentrate on getting your charts filled up with

exercises completed or of indulging in the ephemeral satisfaction of so many pupils passed, on paper. You must, as far as lies in your power, see that the pupils *really* understand what you're driving at, are *really* aware of the pitfalls that you yourself have discovered and avoided, are *really* following you step by step. You must not confuse false results with real results. You must earnestly desire that they *shall* learn. You must see that they *are* really learning, not being towed along like a broken-down car, unable to run under its own power when the tow is cast off. You must, in short, etch lines and patterns which will endure on the minds of those you are instructing, not scribble superficial markings which will soon be washed away.

Your reward will be their gratitude and the realisation that you have added to the sum total of the world's knowledge by distributing your own stock of it permanently over a wider area.

And then you will be a good instructor, not by the easy method of being born one, but because you have *made yourself* into one through your own desire to teach.



EVEN YOUR BEST FRIEND WON'T TELL YOU WHY

ARE you a sufferer from *Halifaxosis*, or the inability to distinguish a Halifax I from a Ju. 90. Don't be caught by this one. They may *look* alike, but they *are* different. Make certain you *know* the difference by looking up your A.P. 1480A and B. Remember the tough Lady President at the "Equality Between Sexes" Meeting who said "After all there's very little difference between men and women," and the meek little man at the back who called out "But thank God for that little difference." So should you be thankful for that little difference between the Halifax and the Ju. 90.

Make sure you know it.

WHAT THE HUN IS DOING

II

CO-OPERATION between Hun night-fighters and ground defences is frequently very good. A short while ago one of our bombers flying over Holland at 10,000 feet was suddenly ringed round by red flares shot up from the ground. Wisely the pilot changed course abruptly—just in time to avoid by 150 yards a German night-fighter which was swooping down on this red target circle to see what he could find in the bull's-eye.

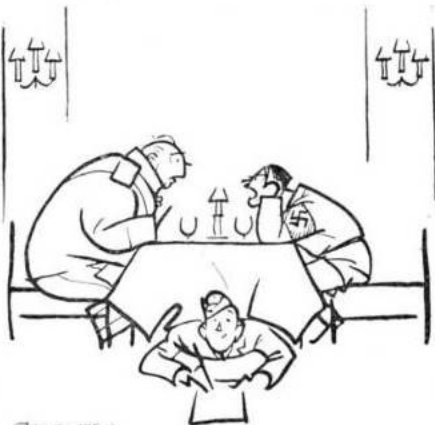
White and yellow circles round fuselage markings have recently resulted in Hun planes being mistaken for friendly aircraft.

The Hun is still playing games with his navigation lights in night operations. Recently an E/A, picked up by searchlights, retired hastily in one direction—and promptly reappeared from another, burning navigation lights and trying to look like the other fellows.

It is sometimes inadvisable to assume that an E/A diving to the sea after a crew of three have baled out has not still got a sting in its tail. A Hurricane approached one such to about thirty yards, in order to watch it pancake. Instead, he got a short sharp burst from the German pilot—luckily with not much damage.

More German searchlight tricks. Searchlights along both sides of a bomber's route raise their beams to 45° to show the track. And searchlights are laid along the ground in the direction the bomber is heading, being raised to the vertical as it passes overhead.

The Hun has been adding to his collection of "decoy ducks" in Germany and occupied countries. Besides the usual dummy aerodromes, flare paths and fires, he is also using lines of flickering lights to look like a stick of incendiaries, often with a grand decoy blaze in the middle of them, and even fake explosions to give "verisimilitude to an otherwise bald and unconvincing" imitation fire.



The "Itey" troops have recently adopted this dodge. When being attacked from the air they lie absolutely "doggo"—they are naturally good at this, of course—even though the likely-looking hiding places are heavily machine-gunned. The idea is to induce the attacking pilot to come back low over his target in order to see what damage he has done, or even if there is anything there at all. This is the signal for heavy and frequently well co-ordinated anti-aircraft fire, largely pom-pom, which quite probably the pilot wasn't expecting.



“YELLOW DOUGHNUTS”

(1) *THE ANCIENT MARINER AND . . .*

THE various crew drills tell an air crew just how to go about things, should they suddenly have to leave their aircraft in the sea and take to their dinghy. All those, therefore, who are at any time likely to have to use a "yellow doughnut" are advised to study the drills carefully and to find out everything about the dinghy and its equipment. "Taking to the boats" is one of those things you may never have to do—but if you do have to do it, you want to do it pretty quick. Many crews have lost their lives, many others have suffered greater discomfort and hardships than necessary, simply because they did not seriously consider the possibility of landing in the drink till it had become a matter of the immediate rather than the remote future.

The following tips are general ones—for different aircraft have different dinghy habits and the main routine of dinghyship is all given in the various crew drills—but they come from a real Ancient Mariner, one who has unavoidably gone boating on two separate occasions and now has a total of over thirty dinghy-hours to his credit. As that is twice as many times, and some thirty hours more than most people achieve, you would do well to listen to the Voice of Experience.

"The first thing," says the Ancient Mariner, giving a hitch to his slacks and spitting over the side of our desk, "is to see that your skull-caps are on. You may forget about them later; besides the only ship that's ever going to pass you may be passing in the first ten minutes. I may say," he adds with a rough oarsman's oath, "that the skull-caps made all the difference to our being seen in a very rough sea, when last I rounded the Needles, and beat up Channel.

"And talking of rough seas, the best way to prevent them breaking over you is to watch the waves carefully, lean away as they come up, and then lean forward as you pass over the crest—rather like being on a swing. It eases the boat over the waves and it makes an astonishing amount of difference to the amount of water you ship. If you do start shipping water, bail out as best you can. The Captain should be sure

to give the order 'Bail out!', not 'Bale out!'—or some well-disciplined member of his crew may suddenly jump over the side, fumbling for his ripcord handle!

"And Keep Awake!" suddenly barked the Ancient Mariner, sitting on the desk and spitting on the deck—or *vice versa*. "Especially at night. If you drop off, you may easily drop out, when a sudden swell catches the boat. Every man of the crew—and particularly the Captain—must keep an eye on the rest and give a shout if anyone seems to be dozing. Besides, if you go to sleep you'll get cold and it's important to keep warm. Captains must do their best to make their crews take exercise at least every quarter of an hour during the night.

"The exercises we used to do in my boating days were these: Patting thighs briskly with hands, thus warming both; doing



"Doing the Gabby Swing."

the 'cabby swing,' arms across chest, thirty or forty times—that's grand for getting up a glow, but mind you don't knock the man next to you overboard; and smacking one another's backs to warm up the kidneys—the cold wind gives you a nasty backache. When you can't think of anything else to do with your hands, sit on 'em, holding the perimeter rope. An old oarsman's trick," added the Ancient Mariner reminiscently, shifting his quid to the other cheek.

"The Captain must also think out what the crew's probable endurance will be and decide on a food and water ration-issue accordingly. Three days, I considered reasonable on my last cross-Channel trip in a yellow doughnut—and issued out on that basis. But it's the Captain's responsibility to decide.

"Save your rum as long as you can," the Ancient Mariner added, with a trace of regret; "the second day is worse than the first. You can always finish it off," he went on, brightening, "just as you're about to be picked up.

"And be prepared! Before anything happens, or is likely to happen, know your boat and its equipment. Know where the rations are and the cigarettes and rum. Know where the fluorescent bags are and how to use them. Don't forget the Verey pistol; and all of you take as many cartridges as you can in your pockets. Above all, don't forget to see that you have your water—wherever you carry it in different aircraft. Put on your old 'Mae West,' by the way; it's more buoyant and weighs less.

"Once again, learn all you can about your boat beforehand. Don't think you'll be able to pick it all up when you start 'getting some in.'"

The Ancient Mariner here got up off our desk—or deck—shifted his quid to the other cheek, shifted it back, and finally swallowed it. "Don't go boating, unless

you have to," he said. "I'm telling you . . . And now"—he looked at his watch—"I think They must be open . . ."

Together we rolled across the road with true nautical gait, setting a course for The Nearest . . .

. . . AND THE MODERN MARINER

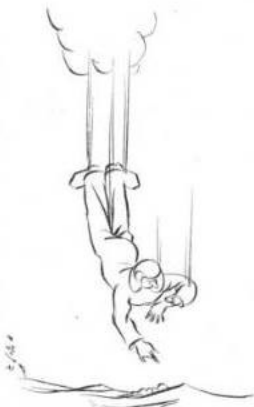
AFTER a while we left the Ancient Mariner in The Nearest. We said that duty called us back—actually it was our turn to pay for a round—but barely had we returned when we had another visitor. This, it seemed, was a Modern Mariner. He was straight from the Air Sea Rescue Service, and ought to have met his Ancient brother. Maybe he will some day!

The job of the A.S.R.S., he told us, is to turn on the heat whenever it hears that you have gone bathing, by sending out surface craft, or aircraft constantly held in readiness, or even by diverting ships.

A single-seater aeroplane, of course, is not a good thing to go bathing with—it has a nasty habit of disappearing as soon as it hits the waves; so bale out long before it does this. With bombers it is usually possible to report on what may be going to happen well in advance, which is a great help to A.S.R.S. and enables them to push out the boat at once. In either case (the Modern Mariner said) do let us know two things if you possibly can: Your position; and the time you went in.

Even if you don't know your position accurately we can try and get a fix on you by D.F. But don't forget to do this while you are at a good height, as wireless waves low down get mixed up with sea waves and fade out. And if you are a fighter pilot and see another go down to the sea, stick around and contact A.S.R.S. They will do the rest—and their best—by plotting his position and in turn contacting the Navy. But do be as accurate as you can; the sea is big, and once you are in it you are a tiny speck on a mighty ocean. The Navy, by the way, are particularly interested in rate and direction of drift and whether the victim is in a dinghy or not; it helps a lot in chasing him up.

Before all this takes place, however, one important question arises: to bale or not to bale? This is largely a matter of taste. As long as your aircraft is under control it is generally better to stay put and tell A.S.R.S. all about it while gliding down, aiming, if possible, for a buoy or a ship or the nearest coast line. Of course, in a fighter things happen so fast that there isn't much time for serious reflection;



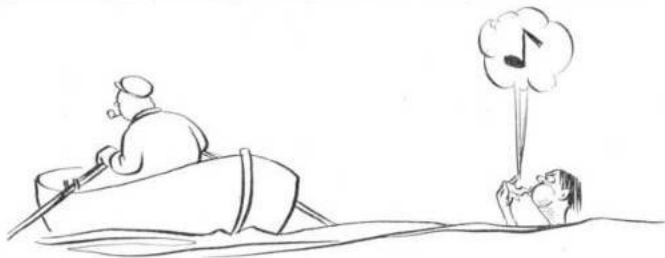
Note the time you go in!

but in a bomber you will probably have several precious minutes in which to let us know all about yourself.

Once you have decided to land on the sea, do it as slowly as you can with your undercarriage and flaps up. And see that you and your crew are well anchored. Deceleration is so rapid that you are otherwise liable to be thrown forward and hurt yourself. Once you are down get your dinghy out quickly. You never can tell how long your kite will float. If you have a "K" type dinghy on your pack, spread it out in front of you as soon as you have hit the water, inflate it and crawl in. You can see by now that your dinghy is pretty important; therefore inspect it regularly, so that you don't find, when you want to use it in a hurry, that the mice have been at it. See, too, that it is secured by a painter to the aircraft and that the knife is there.

Remember there are now lots of buoys round the coast. The Thames and East Coast are stiff with them. Soon all of them will be equipped with ladders to climb into the housing, where the bell or light is kept, and where you will find a box containing iron rations, first aid kit, fresh water (if you use the stuff), a yellow flag and enough fireworks for a grand Fifth of November all on your own. What with this and the gear in the dinghy, paddles, leak-stoppers, floating torches, flame floats, and other gadgets to attract attention, and so on, you will have plenty to play with; and always take your whistle with you. But do make sure you know *how* to use your toys before you *have* to. It'll save you a lot of trouble in the end—as well as possibly your life.

With which the Modern Mariner steamed out of our room. We'd told him where the Ancient Mariner was—and he'd decided he ought to effect a rescue.



"Always take your whistle with you!"

Are you Blind? Then read A.P. 1751! Do you know what A.P. 1751 is about? Read it, and find out!

HOW MUCH DO YOU KNOW?

COCKPIT DRILL TESTS.



"P.O. Prune says What has he done wrong?"

Our Pilot Officer Prune carries out the drills and makes the assertions given below. What has he done wrong, or forgotten? There are definite mistakes in each paragraph, as stated in brackets at the end. Take a bit of paper and write down what you think he's done wrong. Then turn to page 21 and check your answers, marking yourself on the scale laid down. Marks are awarded according to the gravity of the error. You can then see what sort of a pilot you are—or if you would be better employed in a Demolition Squad!

1. Preparing to Fly

Collects maps, weather information, flying kit and parachute. Signs Authorisation book and Form 700. Carries out external reconnaissance of aircraft, goes up wing and enters cockpit. Plugs in intercommunication, fixes harness, and begins preliminary check before starting up. (1 error.)

2. Cockpit Check before Starting-up

Working from left to right, checks the following:—

Seat security, rudder bias neutral, gills 1/3 open, air intake lever in "warm air," elevator tab control at zero, petrol levers locked on, 2-speed blower and mixture levers down, airscrew controls at 8 approx., throttles at beginning of cruising range, main and hand starter magneto switches off, green lights on, flap needles at zero, altimeter at zero, fuel tanks full,

No. 2. THE HAMPDEN I.

brake pressure 120 lbs. sq. in., power bolt off, bomb door rotary valve shut. (4 errors.)

3. Starting up with Accumulator Trolley

Sees that trolley and chocks are properly placed, that airscrew area is clear, and that fitter has removed his cap and fitted starting handle. Shouts "switches off, petrol on, suck in port" and receives repeat from fitter. On message "All clear, contact port" from fitter, repeats, places hand starter magneto switch on, and presses button. Engine does not start after 30 seconds' pressure, so rests battery for 10 seconds and then tries again. (2 errors.)

4. Testing after Warming Up

Tests switches when idling. Opens up to O boost, sets airscrew controls to give 2,000 r.p.m., tests switches again. Opens up to +3 boost, sets airscrew controls to "fully fine," looks for 2,600 r.p.m. max., tests switches again. Is satisfied that magneto drop of 200 r.p.m. is within permissible limits, and that oil pressure of 100 lbs. sq. in. is correct. Throttles back to O boost, reduces pitch to "fully coarse" and gets appreciable r.p.m. drop. Resets pitch to "fully fine," and eases back throttle to slow running. Repeats for other engine. (3 errors.)

5. Take Off, Climb and Cruise

With sliding roof open, power bolt on, and 15° flap applied, takes off in normal manner. Passes over aerodrome boundary at a good speed and selects "wheels

up." Waits for red light to come on whilst gaining speed and height; reduces boost to $+2\frac{1}{2}$. Checks pressures and temperatures and opens gills slightly. At 500 feet red light comes on. Reduces r.p.m. to 2,250. Raises flaps and restores selector level to neutral. Closes sliding roof, climbs further, reduces boost to -3 , levels out at 2,000 feet, sets air intake lever to "warm air," and settles down to cruising. (2 errors.)

6. One Engine Flying Practice when Cruising

Closes port throttle. Keeps aircraft flying straight and level by firm use of controls. Fully opens starboard throttle. Rotates rudder bias control wheel anticlockwise as seen from above. Places starboard airscrew control fully forward. Closes gills. When aircraft is under smooth control with new settings, finds he can reduce pitch and boost and open gills slightly and still gain height. (2 errors.)

7. Use of Hydraulic Emergency Devices

Puts on power bolt and tries to lower flaps and then wheels. Nothing happens. Repeats whole procedure several times, but without luck. Decides to try hand-pumping. Puts on power bolt again, selects "flaps down," and pumps on 20" flap. Then selects "wheels down" and pumps for 25 minutes. Wheels protrude only about 2 feet, so decides to pull red handle. Places selector lever in neutral and power bolt off. Pulls handle vigorously. (3 errors.)

8. Cruising

He believes that the following are the settings for the most economical cruising:—

- (i) two-speed blower up in "S,"
- (ii) mixture control in "weak,"
- (iii) airscrew control levers at about 6,
- (iv) I.A.S. 140-160 m.p.h.

(3 errors.)

9. Preparing to Land and Landing

Cages gyro and checks brake pressure. Reduces speed to 140 I.A.S. and places power bolt on. Applies 15" flap. Reduces speed to 120 I.A.S. by throttling back to about $\frac{1}{3}$ open, and lowers wheels. Whilst waiting for green lights, closes gills and checks air intake lever is in "warm air." Trims aircraft to glide; green lights come on. At 250 feet puts selector lever in "flaps down" with power bolt still on. Levels out, throttles back and lands. (3 errors.)

10. Going Round Again

Has approached with all settings correct and overshoot. Opens up smoothly to full throttle. Keeps aircraft straight and level until speed is adequate and height is 50 feet. Leaves power bolt on and selects "flaps up." Next selects "wheels up." Whilst climbing and waiting for red light, reduces r.p.m. and boost and opens gills about $\frac{1}{3}$. When wheels are up, places power bolt off and selector lever in neutral. Levels out and makes settings for the next circuit. (1 error.)

(For answers see page 21)



NEVER TOO OLD TO LEARN

THERE is a story told of a very famous painter who, shortly before he died at an advanced age, said to a friend that he had only just realised how little he knew about his art and that if he could but live another seventy years he might by then have really learned to paint. This attitude is admirable. Where should we be now if our ancestors had generation by generation blindly gone on the principle of "What was good enough for my father is good enough for me"? Probably living in caves, hunting the Sunday joint with a stone axe. Where would the Air Force be to-day if once designers had achieved a machine that would fly in the air, they had said, "Well, that's that," and sat back satisfied? Still in the "stick and string" days. What, to come down to brass tacks, ought we to think of a Navigator who persists in using out-of-date instruments or old maps because he has no use for new-fangled ideas? Frankly, darn little.

Yet, strangely enough, old ideas and old methods die very hard, even in the Royal Air Force, whose youthful members might have been expected to grasp eagerly at anything that even looked like being an improvement. Sometimes a young Pilot Officer can be as conservative as any elderly Victorian in resisting the introduction of a new invention—unless, of course, he is convinced of its efficacy. But sometimes again he unfortunately does not seem to want to be convinced. Sometimes he'd rather take a chance on the new device being probably not nearly so helpful as it's cracked up to be.

This may sound a little unfair on a Service which is notorious for its insati-

able appetite for new aeroplane types with greater speed, better armament, increased flexibility. Yet breathe the word "Astrograph" and your dyed-in-the-wool Navigator will snort that he always got on quite well without one, thank you. Moreover, a corroborative snort may come from a dyed-in-the-wool pilot who prefers to risk getting lost rather than take a few pains checking his progress methodically over the ground. As a result of this inherent conservatism you will sometimes find equipment, which many people may have sweated blood to produce, lying unknown and unheeded in some obscure cupboard. In one case such a piece of equipment has even been found under the Mess Secretary's table! One can think of few places where it could do less good.

Now recent investigation into flying habits and navigational failures confirms a belief that a new method of recording deviation may be a good thing to develop, it may, in short, save both aircraft and time. At present the Pilot is given a magnetic course of, say, 076° to steer, and he then has to refer to Form 316, which will say, for example:—

"For Magnetic Course 045° , steer by compass 048° ,"
and

"For Magnetic Course 090° , steer by compass 089° ."

What does the Pilot do? He is certainly faced with a teaser that might defeat a Mathematical Don in his own warm study, let alone a young man 20,000 feet up in a temperature of -30° F. So he almost certainly guesses, probably

reflecting to himself as he sets 076° in desperation on the compass: "I remember what a job I had last week trying to decide what figures to put on the Deviation Card anyway."

Form 316a with its graph is a great improvement, but still leaves scope for handsome mistakes in extracting and applying deviation. It does, however, show the shape of the deviation curve, which Form 316 fails to do. With the latter the assumption is made that the peaks of the curve coincide with the eight tabulated points of the compass. Using the preceding example, the Pilot is left to conclude that the deviation varies smoothly from -3° W on 045° (M) to $+1^\circ$ E on 090° (M); when, in actual fact, the deviation may be -4° on 055° (M), or some equally concealed value.

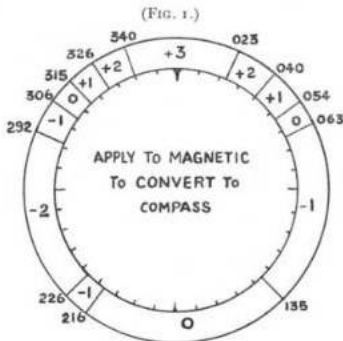
A suggestion is being put forward that what the Pilot really wants is a kind of "critical" table of deviations,

no more interpolating required. The sort of table you might produce would be as above (Fig. 1). (The deviation coefficients left uncorrected are $+0.5^\circ$ B, $+1.5^\circ$ C, $+2^\circ$ E.)

The above table would be compiled most easily from a graph of the deviation, and the number of entries in the table would naturally depend on the shape of the curve. Thus, a smooth curve would have, as a general rule, fewer entries than an irregular curve. This is certainly a disadvantage as regards the design of a critical table applicable to all aircraft. A compromise might be effected by making out a Form 316a in a "critical" way. Thus, instead of recording deviation for a Pilot's compass on Form 316, the existing Form 316a could be given him made out like the right-hand graph in the following illustration. The left-hand graph is, of course, necessary for drawing the final "critical" graph, each "step" of which covers that part of the curve half-way between successive *whole* degrees of deviation. The same deviation is taken as for the preceding table; that is, the residual deviation is made up of $+0.5^\circ$ B, $+1.5^\circ$ C, $+2^\circ$ E, which may be taken as representative of the state of affairs after a good "swing" (see Fig. 2).

Have you ever tried finding wind velocity without knowing your true airspeed? Well, it *can* be done by observing if "small trees in leaf are beginning to sway" (Beaufort Scale No. 5) or whether "smacks are carrying all canvas with a good list" (Beaufort Scale No. 4). But suppose it is winter and not a leaf or smack in sight? What we are driving at is whether or not you ever trouble about your Airspeed Indicator.

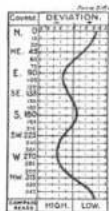
It is amazing how much people will



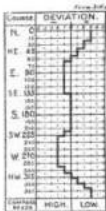
This will take a little more effort to produce at first, but once done there is

take for granted. Stick an instrument into the cockpit and if its dial reads "Thousands of Feet" you will find people willing to believe that it not only cannot lie, but will also record their actual height above the ground. What is more often not fully appreciated is that the Airspeed Indicators at present fitted to aircraft are far from giving readings of true airspeed.

(FIG. 2.)



"That's deviation, that was!"



knots is neither uncommon nor accurate enough to avoid serious navigational errors.

Unfortunately, Position Error depends upon the angle of incidence of the pitot head, which, being rigidly fixed to the aircraft, causes the error to vary in amount with the indicated airspeed. Experiments are being made in an attempt to reduce Position Error to negligible proportions. At present, however, it is far from insignificant, particularly on certain types of aircraft.

Calibration of Airspeed Indicators is a most important practical requirement for two reasons. Firstly, it is the only way to check the instrument and its installation for wear and tear and individual idiosyncracies. Secondly, it has been found

by experience that an airspeed indicator that behaves in a markedly different way from a standard instrument (*i.e.*, speeds differ by as much as 10 knots, or m.p.h.) will almost certainly be erratic in action. Calibration not only checks the accuracy of an instrument but also its serviceability, and should therefore be carried out as frequently as, say, compass swinging.

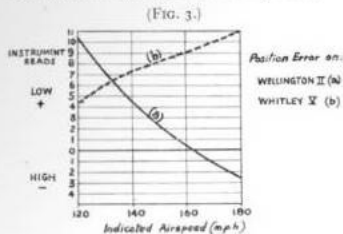
The Pilot is naturally intimately concerned with the accuracy of his Airspeed Indicator, since he judges the performance of his aircraft directly from Indicator readings. Our remarks, therefore, might well be taken to heart by Pilots, although they are primarily addressed to Navigators.

Below, in graph form, are given the

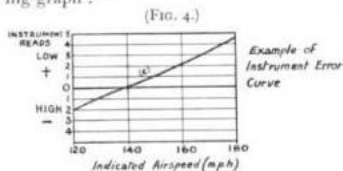
The instrument itself is mass-produced and, considering its fairly delicate mechanism, it works surprisingly well, suffering, as it does, from no end of wear and tear both in the air and on the ground where it is always exposed to the atmosphere. Added to all this, the conditions under which it is expected to function vary tremendously. At low speeds all kinds of air eddies set up around the Pitot head; while at high speeds the compressibility of air becomes a factor that should not be altogether overlooked. Yet time and again you will find such "niceties" as Calibration, and Position Errors, quite ignored by the Navigator. Nor is it always a case where ignorance is bliss, since an assumed airspeed that differs from the truth by as much as 25

Below, in graph form, are given the

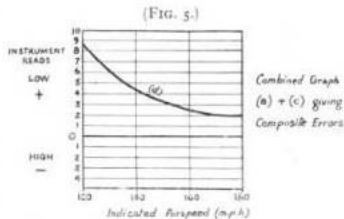
Position Errors for Whitley V and Wellington II aircraft. It will be agreed that the quantities involved must be taken into account for accurate navigation.



At the same time, the Airspeed Indicator may be reading abnormally owing to defective mechanism or erroneous Calibration of its dial. Suppose that the Calibration Errors of an Airspeed Indicator in a Wellington II give the following graph:—



In what way can the Navigator cope with these errors? At present he may make out a separate correction card for Position Error and another for Calibration Errors; in which case he has two separate operations to make before finally computing true airspeed. Why not go further and combine the two errors (or graphs) as is shown in the following graph, which is a composite error graph of (a) and (c) above.



Better still, why not stick a narrow disc over the dial of the Navigator's Airspeed Indicator, and recalibrate the instrument, allowing for Position Error at the same time. For example, connect up the Calibrator to the pitot head and pump up to a speed of, say, 120 knots. Perhaps the Navigator's instrument, like that shown in Graph (c), indicates 122 m.p.h. *Ignore this altogether.* See what the Position Error is for the type of aircraft at an Indicated Airspeed of 120 m.p.h. Suppose this is + 10.5 m.p.h., as in the case of Wellington II aircraft. Thus, when the needle of the Navigator's Airspeed Indicator is in its present position, the aircraft will have an airspeed of 120 + 10.5 m.p.h. = 130.5 m.p.h., corrected for Instrument and Position Errors. Drop the Calibrator down by 0.5 m.p.h. and check that Position Error at 119.5 m.p.h. is still + 10.5, or near enough for practical purposes. Then mark "130" on the disc which we suggest you paste on the instrument dial. You continue this process up and down the scale.

If you object to sticking labels and figures on your instrument dials you can, as a Navigator, make out a critical table or critical graph from the composite error graph (d) to show corrections for various Airspeed Indicator readings. The

principles of "critical-ising" have been described above in dealing with Deviation.

Anyhow, it would be interesting to know how many of you Navigators

realise how alarmingly Position Errors may vary on each aircraft. It is snags like these that lie in the way of inventors of True Reading Airspeed Indicators.



SYNTHETIC SIGS.

IT may seem a far cry from a German *Ersatz* sausage to signals training, but it is a cry that "T. Sigs" at the Air Ministry has heard with ecstasy and responded to with alacrity.

The artificial Teutonic sausage, with its 90-per-cent, pure Aryan sawdust, is the noble embodiment, the very incarnation, of the principles of doing without and of "making do." We on our side, by employing artificial or "synthetic" signals training methods, are also "doing without," but with less wear-and-tear and more satisfactory results to our training programmes than the *ersatz* sausage has on the Hun stomach.

Here are some of the items synthetic signals training has been able to eliminate: flying aircraft, or any sort of aircraft for that matter; daylight; fine weather; pilots; petrol; possible crashes; flights over enemy territory and the inconveniences thereof; expert instructors; time; innumerable kilowatt-hours of electric juice; costly wireless instruments; cluttering up of the ether wave bands; interference by enemy aircraft wanting to join in the fun of our training flights.

At first sight this looks like a policy of despair, as if what the Germans humorously call their blockade has prevented us from using any of the necessities of signals training, forcing us to accept and

use the shadow for the substance. This is not so. Synthetic Training is not just a despairing approach to reality, but, if desired, an advance beyond it. Just as the servant girl preferred tinned salmon "because it tasted more like salmon," so are tinned synthetic methods sometimes preferable to the real thing.

One of the chief merits of synthetic training is that you can go on all day and all night reproducing artificially a given set of working conditions which a pupil might in actual operations only meet with very occasionally, or which would be very difficult or expensive or dangerous to reproduce in real life.

Take the simple case of training a wireless operator to receive messages in morse. In practice he may have to be able to read a message through certain kinds of "jamming." In the Signal Training schools we can, if necessary, give him minutes, hours or days of practice in this by "injecting" suitable interference into morse buzzer instruction; but if we tethered him by his phone leads to a real wireless receiver he might go days without getting the sort of real interference he'll have to meet.

Here is another advantage: when working the real thing you may have to operate a whole variety of gadgets but, in synthetic training, the pupil can be taught in easy stages. A pilot of a

single-seated fighter has to fly his aircraft while using his R/T. It would be difficult to teach him R/T procedure anyway while he is in the air as, like Garbo, "he wants to be alone," but it is made more difficult by his having to do several things at the same time. But we can train him "synthetically" on the ground—an excellent preparation for future work in the air. We can, further, train a large class simultaneously by synthetic means whereas "real" practice might involve dozens of aircraft being in the air, with the instructor quite unable to walk round and check each pupil as he can when synthetic methods are adopted.

Synthetic training must *not* be regarded as a poor substitute for the real thing. You can do some training synthetically which is almost impossible otherwise. Take a direction-finding case. A bomber wireless operator might on his way home send out a signal asking for his position. This signal might be picked up by three ground wireless direction-finding stations 150 miles apart. Each station takes a bearing on the aircraft and these bearings are collected at a centre and plotted on a map; the aircraft's position may thus be determined.

Well, this is now actually being done synthetically. Once again, training dozens of airmen "in the field" in this procedure presents great difficulties, but by synthetic means we can simulate the conditions exactly while having all the pupils—and the synthetic "aircraft"—in a large room. The instructor can stroll round and supervise each pupil's work, checking each operator's bearings.

If you have never seen synthetic methods you must have read of them. The safety exit system in submarines

is practised synthetically in a tank at submarine schools. If pilots' oxygen apparatus is to be tested or a pilot's reactions at different heights is to be ascertained you do not, for most purposes, need to send him up with a doctor or scientist to 15,000, 20,000, 30,000, 40,000 or 50,000 ft. Just put the human guinea-pig in a glass cubicle and pump the air out, taking care to leave the "pilot" behind. As the air pressure is reduced, so does it reproduce conditions at greater heights. And simultaneously the temperature can be altered in the cubicle. An advantage is that if the guinea-pig starts to squeak or collapse, air can be let in immediately to revive him.

Details of synthetic signals training devices will be given on another occasion. All we want to impress now is that at comparatively negligible cost in money and no cost in lives, classes can be trained for twenty-four hours a day, if need be, in perfect safety and in vastly greater numbers and also these periods of training can be drastically pruned.

Enough has been said to show the value of synthetic training. Now for the point. Synthesis is no emergency war measure. Ideas are welcome from all. It has come to stay. While the Hun smacks his lips reminiscently when he thinks of his genuine pre-war *wurst* with its minced filling of little-known portions of the porcine anatomy (or *indelicatessen*), we shall stick to our *ersatz* training methods. And T. Sigs, Air Ministry, wants comments, suggestions, ideas for new devices or improvements to existing ones, anything, in fact, that will help us in developing this vital time-money-men-material-labour-saving branch of R.A.F. training.

THE MONTH'S BAD ARITHMETIC



"P.O. PRUNE *scornus arithmetic.*" would crash his own by careless landing or "stunting" to celebrate his victory. This turned his bag of One into One-Minus-One, or Nought, which, Mannock said, was "not good arithmetic." How much worse arithmetic is it to mark up a "minus-one" through carelessness when under training—without even having had your "plus-one" first?

Here are some recent accidents, all unfortunately due to human not mechanical failure. Read, mark, learn and rigidly avoid! Keep out of these "accident headlines."

Petrol Cap Costs Six Lives

After a large four-engine aircraft had been refuelled, someone forgot to replace the cap of one of the petrol tanks, someone else forgot to check up and see that they were all on. This valuable aircraft, as a result, was completely destroyed; worse still, an experienced crew of six were killed.

Mother Indirect Cause of Son's Death

A mother was very proud of her son in the Air Force, too proud unfortunately; for she asked him to fly over the house so that she could see him and point him out to her friends. The pilot did so, in flat disobedience of the orders about low flying; moreover, to impress his mother still further he indulged in a

little stunting to show how much at home he was in the air. He crashed straight into the ground at high speed and killed himself.

Took Chance Which Didn't Come Off.

A pilot was taxiing his aircraft across the aerodrome when he saw an obviously suspicious bit of ground ahead. He was too slack to get out and inspect it. He said to himself, "Oh, I expect it'll be all right," and went ahead. It wasn't. He bogged and damaged a valuable plane.

Lost Head: Lost Aircraft

Owing to a jammed lever a Spitfire pilot, about to land, found himself unable to select the undercarriage down. He made three circuits and then landed with his wheels up. This pilot damaged his plane as a result of losing his head. He did not report his trouble on R/T, nor was there any real reason after a mere three circuits to assume that the lever was so immovably jammed that he could never get it to work and must, therefore, crash his aircraft. He should have kept his head and persevered.

What Could be Worse Than This?

Coming down to land, a pilot (a) came in at right angles to the "T"; (b) failed to put his flaps down; (c) overshot badly, but failed to go round again; (d) touched down where the aircraft should have finished the landing run; (e) landed with his brakes fully on; (f) had not made his passenger wear a safety belt, and so flung him out and killed him. There was, in short, little else wrong that he could have done. It was called sheer carelessness; it might almost have been called sheer inefficiency.

THIS MONTH'S ANNIVERSARY

MAY

ON May 1st, just twenty-three years ago, the name of 2nd Lieutenant A. A. McLeod of the Royal Air Force appeared in the *London Gazette* as having been awarded the Victoria Cross. Only three Canadian aviators received this decoration during the last Great War, and he was the youngest, being not then nineteen. As a matter of further interest he was not a fighter pilot, to whom, as a rule, fate sent more opportunities for V.C. winning; he was one of the very few airman to win it in a heavy bomber. As a record of successful achievement, dogged endurance and high courage, the story of the fight that gave McLeod his decoration is worth re-telling.

With Lieutenant A. W. Hammond as observer, he was one morning flying an Armstrong-Whitworth on a bombing raid against German troop concentrations near Bray. They were flying in company with six other planes, but soon lost them in fog and had to come down at another squadron's aerodrome. Owing to slight damage on landing they did not take off again till afternoon, but in spite of the weather and disregarding the fact that Richthofen's famous circus was known to have been operating in the neighbourhood, they determined to finish the job they had started out to do.

Reaching the Bray area, with clouds now at about 3,000 ft., they started to look for a target. Soon they spotted a German battery in action and were just getting into position to bomb when suddenly a German triplane appeared only 200 yards away.

The enemy was one of the fast new Fokkers for which the heavily-loaded Armstrong-Whitworth was hardly a match, but without hesitation they attacked. By skilful manœuvring McLeod put Hammond in position, and after three short bursts of fire the German machine went over on its back, then into a spin, and crashed to the ground immediately below.

McLeod and Hammond were waving congratulations to each other over their unexpected success, when all at once the clouds broke and they saw blue sky. At the same moment another Fokker triplane dived at them, followed by six others. (It is quite clear from Richthofen's reports for the day that these machines were his and were therefore flown by some of the finest German pilots.) The German aircraft swarmed around them, firing from all directions, but Hammond and McLeod made good use of their guns, firing just enough to keep the enemy at bay and at the same time conserving their ammunition. Presently, by very skilful handling of the Armstrong-Whitworth, McLeod again gave Hammond the chance for a good burst, this time at a plane which had dived so close that he was only a few feet away when Hammond opened fire. The force of the bullets hitting the German aircraft was so great that the body of the triplane broke off at the pilot's seat and the wreckage immediately burst into flames.

At the same time another triplane dived from behind and zoomed up underneath the British machine, raking it with fire, hitting both McLeod and Hammond

and igniting the tank. At last the fight had come to its almost inevitable end. They were still about 2,000 ft. up, and McLeod put the machine into an easy dive in an effort to reach the ground. Before long, the floor of the machine fell away, carrying with it the revolving stool on which the observer sat. Hammond, in spite of his wounds, managed to climb up and sit on the ledge surrounding the top of the observer's cockpit. It now looked as though death was certain, but McLeod climbed out on the left lower wing and controlled the plane from there, putting it into a steep sideslip so that the flames blew clear of himself and his observer. One of the Germans, evidently thinking that the British aircraft was hopelessly out of action, dived so close that Hammond could see the features of the pilot. In spite of the fact that one of his arms was completely useless and that he had been hit in several places, Hammond once more manned his gun and shot the German machine down in flames. The remaining Fokker again opened fire, and finally jammed Hammond's gun. He was then able to follow them safely almost to the ground, hitting them time and time again. McLeod still kept the Armstrong-Whitworth in a steep sideslip and finally succeeded in flattening it out just before it hit the ground, where it crashed into a shell hole. Before it did so, Hammond had climbed on to the upper wing and both were thrown clear of the wreckage.

As it crashed the plane began to blaze fiercely, and as there were eight heavy bombs and more than 1,000 rounds of ammunition still in it, the two airmen, who had already escaped death most miraculously, were once more threatened,

Hammond, who had been wounded six times, was now quite helpless, and McLeod, although he had himself received five wounds, began to drag him to safety. The machine gun bullets from the plane were going off all around, and very soon the bombs also exploded and blew parts of the aircraft about the pair, but without further injuring either of them. When they landed, neither had known where they were, until heavy machine-gun fire told them that they were between the two front lines. McLeod dragged Hammond toward the British trenches and was again wounded; but before collapsing from loss of blood had, by sheer dogged courage, dragged his companion to within a few yards of the trenches, where some men from the South African Scottish rushed out and carried them into the trench.

Then came perhaps the worst experience of all. They were in the very midst of the battle area, and at this particular point there were no communication trenches through which they could be carried back to safety. Their rescuers could only wait for darkness, and all afternoon they lay in terrible pain, expecting at any time to be attacked.

About eight o'clock that night they reached the reserve trenches where their wounds were dressed and the pain relieved by morphine. Then they were taken by stretcher bearers to a dressing station, on by ambulance to the Casualty Clearing Station and thence to hospital at Etaples. Two nights later both were safe back in England.

For this epic fight Hammond received a bar to his Military Cross, while McLeod was awarded a well-earned Victoria Cross.

STANDARD BLIND APPROACH

IS yours one of the aerodromes fitted with Standard Blind Approach? Is your Aircraft fitted with Standard Blind Approach equipment?

If so, do you use the darn thing; or do you dodge the issue by bleating, "I've never had a course?"

If you haven't had a course, don't you think it's about time you had? Apply to your local Link Trainer Instructor—then be a bit enterprising and try it in the air. You don't want to have to leave your aircraft behind one dark night, do you?

Do you know how many Blind Approach Training Flights are in action, giving instruction in Whitleys, Wellingtons, Blenheims and Ansons? They are there to help you. Ask your Flight Commander about it all?

Don't add "I wish I'd learnt Blind Approach" to the list of Famous Last Words!



SALUTING

SALUTING is one of those Service obligations with which people are sometimes inclined to get bored. One feels there is such a lot of it. Both the saluting and the acknowledging of salutes can be inconvenient and wearisome; frequently it is difficult to see the necessity for it. Frequently, too, its implications are misunderstood. One man thinks it is an admission of personal inferiority to salute a fellow-being; another comes to believe he is something rather superior because someone salutes *him*.

In point of fact, the custom comes down to us from the Stone Age, and though its meaning has altered as time has marched on, its purpose has remained the same. This purpose was a serious one. The Stone Age man merely wanted to show that he was unarmed. So he raised and opened his right hand to let the other fellow see he hadn't got a half-brick in it. It's possible, of course, he was left-handed and had his operational hand loaded and hidden behind his back ready to do an Ehud on the unsuspecting stranger, but that doesn't alter the main fact: the raised empty hand indicated friendly intentions.

The Roman greeting was also a raised hand and this has been revived to-day in the Fascist and Nazi salutes—though naturally one distrusts its intention from such a source. In fact, it's almost as bad as the offer of a pact of non-aggression.

Later on in the Middle Ages, when two knights in armour happened to meet—two friendly knights of course, not two highly hostile knights—they also made a gesture of peaceable intentions by raising the visor of their helmets. This action not only showed that the raised hand was empty of a weapon; it went further and uncovered a most vulnerable spot. Furthermore, it enabled one man to look the other in the eyes. And this gesture was the real origin of the two forms of Service

salute as we know them to-day, the "eyes right" and the open hand to the cap. For, from being a simple gesture it soon became a privilege. The man-at-arms was *privileged* to look his leader in the face, while lesser folk had to keep their eyes on the ground.

There have, however, always been misunderstandings about the meaning of the salute. A Flight Sergeant has been known to tell a squad of recruits, "It's the *uniform* you salute; not what's *in* it"—peculiar point being lent to this announcement by the passage at that moment of a couple of good-looking W.A.A.F. Section-Officers. The Flight Sergeant, of course, was quite wrong; for if that was the idea, one should logically salute uniforms in a tailor's shop window. Equally, it is not the man wearing the uniform whom you salute; purely as a man he may be no better nor worse at his job or anything else than you are. No, what you *do* salute is the virtue invested in him by reason of his holding the King's Commission.

It is this authority, in its varying degrees according to rank, that is acknowledged by subordinates when they meet their superior officers. There is nothing servile or obsequious in the action. Saluting—and, equally important, acknowledging salutes—is an old Service tradition maintained by regulations, a sign and countersign, as it were, between all those who together serve the King, a mark of respect paid to his authority and acknowledged on his behalf. And as such it should invariably be performed smartly and acknowledged smartly. The officer and airman who does not do so is guilty of lack of respect to his Sovereign, and, almost as bad, is revealing that the Squadron to which he belongs is one that does not seem to care whether he shows this lack of respect or not.

ANSWERS TO "COCKPIT DRILL" (see page 9)

1. Did not check setting of main petrol cocks in rear of fuselage (3 marks). 2. Air intake lever should be in "cold air" (1 mark); Did not check rudder and control column for freedom and correctness of movement (2 marks); Did not check that selector was in neutral position (2 marks); Did not see that cock for gyro instruments was positively set at "pump" (2 marks). 3. Main switches should be put on with hand-starter magnet switch (1 mark); Button should be pressed for 10 and rested for 30 seconds (1 mark). 4. Max. permissible r.p.m. drop is 100 r.p.m. (1 mark); Oil pressure should be 85 lbs. sq. in. approx. (1 mark); Forgot to exercise 2-speed blower (1 mark). 5. Did not place power bolt off (2 marks); Did not put mixture control to "weak" (3 marks). 6. Turned rudder bias the wrong way. Wheel should be turned in direction towards which it is desired to "pull" aircraft nose (2 marks); Forgot to put port airscrew control to "fully coarse" to reduce windmilling effect (1 mark). 7. Failed to apply test for stretching of power bolt cable (2 marks); Power

bolt should be off before using hand pump, or oil becomes emulsified (1 mark); Selector lever must be in "wheels down" before pulling the red handle (2 marks). 8. Two-speed blower should be down in "M" (1 mark); Airscrew control levers at "fully coarse" (1 mark); Air-speed 120 I.A.S. at height in calm air, 140 I.A.S. lower down in bumps (1 mark). 9. Forgot to open sliding roof (1 mark); Did not set airscrew control levers to fully fine (1 mark); Did not shut throttles to test hooter (2 marks). 10. When definitely clear of the ground and speed is adequate, drill should be: (i) Power bolt off; (ii) Selector lever from "flaps down" through neutral to "wheels up"; Power bolt on; (iii) Raise flaps only when height is really safe, say, 500 feet (5 marks).

100%-90% = 40-36 marks . Exceptional.
 89%-80% = 35-32 marks . Above the average.
 79%-60% = 31-24 marks . Average.
 59%-50% = 23-20 marks . Below the average.
 Under 50% = under 20 marks . Fail.

WAR OVER FRANCE

OUR tactics since air warfare started on the grand scale have been a series of adaptations to meet the rapidly changing tactics of the enemy. We can count this to our favour. The tactics which enabled the *Luftwaffe* to blast aside the defences of Poland, Czechoslovakia, Holland, Belgium and France failed against Britain.

How was this victory won? Of one thing we can be certain: it was not won through the superior skill and bravery of our pilots, nor by the superiority of our aircraft. These factors were contributory, but not decisive. However pleasant it might be to sit smugly back and congratulate ourselves along these lines, the fact remains that for the real reason we must look further.

We must look to France, to the bloody fight that started with the odds so heavily against us and which ended in a defeat for us no less than for the French. It was there that we learnt our lessons. It was there that our theorising stopped and our experience began. It was from there that the tattered remnants of the A.A.S.F. and the few units sent out to help them came back to tell us of the real thing. Each word of their tale was worth more than a sack of gold.

They told us of the huge steam-roller formations, the menace of decoys, and the meaning of a hostile sky, when a pilot's very life depended upon the flexibility of his neck.

It was knowledge of all these priceless things that gave us victory when our turn came. We had time in which to think about them and to plan. We had Dun-

kirk as a testing ground—and it was a good one. It showed us that even the small fighter forces at our disposal, if properly disposed and properly led, were sufficient to check the *Luftwaffe* and defeat its ends.

Here, perhaps, it would be as well to say one thing. The German Air Force, over Dunkirk, was in a hurry. It had no time to plan. To achieve its object it had to hit and keep on hitting. It is doubtful whether the units taking part had any really close liaison. In the attack on Britain it was different. The raids were preceded by several weeks of intensive preparation. They were bound by the nature of things to be more formidable.

But—they were shattered.

They were shattered because the money spent on the pre-War Air Force had not been spent in vain. The tiny band of regulars and auxiliaries that met and "traded lead" with Goering's hosts in the first clash of the war proved their worth—for their years of training enabled them to discriminate between the relevant and the irrelevant and pass on the information we so urgently required.

A study of the moves and counter-moves in these great battles is well worth while.

* * * *

At the start of the May offensive against the Low Countries and France the Germans had an enormous advantage over us. Their airmen were seasoned campaigners; ours were comparatively raw. Add to this the enormous disparity in numbers, and it made David's

encounter with Goliath seem almost a fair fight in comparison.

But "out of evil cometh good." The very nature of the odds against them made our pilots adopt the habits of chameleons. They became acutely conscious of the vulnerability of their own skins, and had they been able to change the colour of themselves and their aeroplanes into an aery invisible blue they would have done so. As it was they did the next best thing: they developed rubber necks; they threw away their cramping collars and loosened their mufflers; the primitive law of the jungle began to mean something to them—they learnt to stick with their own kind. Only the king of beasts or the best of pilots can hunt alone—with impunity. It is a lesson that all too often has been learnt too late.

Before the Blitz began in earnest there had been isolated clashes between the German fighters and our own. These were not without profit to us, for they showed us that man for man and aeroplane for aeroplane we could more than hold our own. It was a fact from which our pilots derived no small comfort.

From the start of the operations the Germans used the same tactics that had proved so successful before.

The bombers, in bunches of 60 to 100, sometimes more, were invariably escorted by fighters. They flew in sections of three or five stepped-up in line astern. The fighters, normally about 30 in number, positioned themselves about 2,000-3,000 feet above and behind. Some of these circuses used to go for set objectives, others used to drone around in a sort of conducted tour, a percentage of them dropping their loads on one place, a percentage on another,

and so on. But always the formation as a whole provided mutual support for itself by keeping intact.

Sometimes, too, these raids would be preceded by an advance patrol of fighters. Their job would be either to clear the route of our patrols or to catch them as they took off.

It is easy to imagine that the set-up was no picnic. Towns, aerodromes, troops and refugees were all bombed with the same ruthless intensity, and perhaps the most common target of the lot were the aerodromes. On numerous occasions our fighters were blitzed as they were taking off or landing. The pilots had no rest and precious little food; they fought continuously during the day and at night they were kept awake by the incessant roar of heavy A.A. and the crumps of exploding bombs.

In the turmoil it was difficult to keep check on everything that went on. Combat succeeded combat with such rapidity that often the reports were dispensed with, and the true picture of many actions was lost in a hastily scribbled, colourless statement, providing little or no future value.

Certain facts, gathered mainly from the pilot's own lips, did, however, emerge.

The German fighters operated in no set formation. Their basic unit was the section of two, called a *Rotte*. (The names given to each member of the pair are strikingly apt—the leader being the *Rottenfuhrer* and the follower the *Rottenhund*!) The *Rottes* often jointed up in pairs to form a section of four, called a *Schwarme*.

It was at once apparent that the fighters were adept in the use of decoys,

It was very seldom that they were encountered in small numbers; when they were there was nearly always a catch in it. No sooner were such inoffensive little "gaggles" attacked than swarms of them would come down out of the sun and blitz the attackers.

Lone bombers, also, and Henschel "Recco" machines often held a surprise packet in store for the unwary. When attacked they would sometimes fire a coloured light to bring down the fighters; at other times it would appear that they were in R/T touch with their escort, for with uncanny timing the latter would come down through 10/10ths cloud to their rescue.

For such conditions it was, literally, every man for himself. With the small numbers at our disposal it was normally impossible to organise wing formations, and each Squadron had to guard itself. Further, with the potentially large numbers against them, it behoved each individual in the Squadron to look after himself and not place too much reliance on the "weavers" of the last section. It was a common sight to see Squadrons flying erratically out to patrol with each aircraft apparently trying to outdo the others in an exhibition of crazy flying. Even when more than one Squadron was available for any given mission the speed with which it had to be organised was so great and the time in which to do it so small, that it was nearly always impossible to arrange any effective co-operation.

The writer himself can recall just such an attempt. He was detailed to lead two detached flights from Lille Marq aerodrome to rendezvous with 24 other Hurricanes over Douai. The mission was to escort a bombing raid against a

key objective somewhere within five miles of Valenciennes. As far as the writer was concerned his job was simple. He had only to contact the leader of the escort and follow. Unfortunately things did not turn out quite so simply. Arriving over Douai he spotted 12 other Hurricanes and, determined to lose no time, he turned in sharply to take up position behind them. But as he did so the others also turned to get behind him, with the result that a large disorderly circle formed which showed no signs of breaking. When the humour of the situation had worn a trifle thin, and a sharp note of reality had been introduced by the unexpected presence of a Me.109 in the middle of the circle, the rout managed to sort itself out and go in search of the bombers. It failed. It subsequently transpired that the real leader had been shot down while taking off, and that the bombers, as a result, had had an extremely unpleasant time.

This story is not meant to be a piece of moralisation, but the moral is obviously there. Fighters should at all times retain their flexibility; at no time should they be entirely dependent upon one man. In each sub-unit of any formation, no matter what the size, there should be a deputy leader ready and capable of taking the lead should the occasion arise.

It has already been said that each pilot was forced to rely mainly upon himself for the preservation of his own skin, and this fact had the natural result of turning each one into a shrewd tactician. Service jargon expanded to embrace, in its typically cryptic fashion, the new tactical necessities. New words and new expressions were coined, such as "weavers" and "rubber-necks" to name the two

better known. And with the new slang a crude, unwritten pilot's Bible came into being, which comprised six main Commandments. These Commandments were :—

- (1) When you see a bomber or bombers *don't* ever fool yourself that there are no fighters around.
- (2) *Never* fly straight and level.
- (3) *Don't* be a sucker and squat like a limpet at the tail end of a bomber formation firing a long steady burst—make it snappy or someone will be doing the same to you.
- (4) *Don't* ever bum around on your own.
- (5) *Don't* ever follow your victim down.
- (6) *Always* turn towards an attacker—never turn away.

The most striking thing at about this time was the unconquerable spirit of the A.A.S.F. as a whole. It was common knowledge that the fight was a losing one, yet the morale of the pilots could not have been higher. It was an extraordinary state of affairs—directly contrary to all the known rules of human reactions—and it cannot be explained away by simply saying that our machines were the better.

The factors governing good morale are laid down as physical fitness, pride in oneself, faith in one's aeroplane and armament. But in this case there was another factor: a sense of carefree humour; humour which could look at death and crack a dirty joke—humour so infectious that it was impossible to resist. It was this that bound the weaker members and kept them going. It was this that made one doubt even the evidence of one's own

eyes and made it virtually impossible to believe that things were really as bad as they seemed.

With the evacuation of Dunkirk the fight in the air entered its second phase. For the first time the two rival Air Forces met on almost equal terms. The difference in numbers was still enormous, but both sides had the same length of time in which to visualise the situation and prepare for it—which was none. Neither side held the initiative, for the issue was clear-cut and inescapable. The front, also, was small. As much as we were determined to keep the sky over Dunkirk clear so were the Germans determined to bomb its beaches.

Our patrols normally consisted of four Squadrons, two of which were detailed to attack the bombers, the other two forming the upper guard. The German dispositions which we had to meet were usually as follows: Bombers at about 10,000 feet, medium fighters at 15,000–20,000 feet, and high fighters at 25,000–30,000 feet. As a rule the medium fighters were 110's and the high fighters 109's.

To combat this we tried to place our fighters just above these heights, that is to say the two lower Squadrons at 12,000 feet, the near guard at 17,000–22,000 feet, and the upper guard at 27,000–32,000 feet.

Needless to say it did not always fall out this way. The higher we got the higher they got, and so it went on.

There was, however, a limiting factor for both sides; both we and they had to keep our lower forces in sight if we were to afford them the protection they required. For them, therefore, the maximum height of their patrols depended

upon the height of their bombers, while our limit was governed by the height of the two lower Squadrons.

It is, of course, common knowledge that height is half the battle, and as a result of this an unfortunate tendency began to make itself apparent. In their keenness to get the "drop" on the Huns the upper guards sometimes got so high that they lost sight of the Squadrons they were meant to be guarding. The result was often disastrous.

If there is any likelihood of this happening, then the advantage in height must be discarded. This was stressed over and over again, and rightly so. At all times, and no matter what happens, each Squadron in a wing must remember its rôle. The temptation to forget this is often very great, but it should never be so great that it is irresistible.

It is a fact that some of the best jobs of work done over Dunkirk were done by Squadrons which stuck to their rôle and, in so doing, never even fired a shot.

The defensive circle was widely used by the Germans over Dunkirk, mainly by 110's. The average Hun tends to have a one-track mind, and this trait was never more obvious than in their use of this circle. One of their soi-disant "aces" had evidently cracked up its virtues to such an extent that they could think of little else, for they often formed it long before it was necessary. Also, once having formed it, they seemed loth to break it up. From this point of view this was very thoughtful of them, for while they were busy defending themselves they gave us ample opportunity of dealing effectively with the bombers they were supposed to protect.

To attack these circles required a cer-

tain amount of care. If they were formed correctly every aircraft was covered by the one behind. Generally, however, there were stragglers which could be attacked with impunity. Failing this the normal method was to get plenty of height and obtain a quick snapshot in the dive. Another method was invented by a pilot who must have possessed a sense of humour. It was both easy and direct. He got inside the circle and went round in the opposite direction. In so doing all the Huns trooped through his sights one after the other and he had a shot at each.

At times it almost seemed that the Germans had the foresight of the devil, for with unflinching regularity they arrived on the scene when our patrols were almost finished and short of petrol. It was not coincidence because, significantly enough, the vanguard on such occasions consisted of fighters only. The bombers appeared afterwards.

It was not long before we discovered the reason. It was too much chatter on the R/T. The Germans evidently listened in. Hearing us coming they passed the word along and things were arranged accordingly. From then on the use of R/T was strictly limited to giving a "tally-ho" and was not even used over our own coast. Giving a "tally-ho," of course, did not matter for it meant that the fun had started.

The bulk of the fighting took place over the sea and, as was only to be expected, many of our damaged aircraft landed in it. It was soon discovered that neither Spitfires nor Hurricanes float; in fact, they showed every inclination to get to the bottom as soon as they could. To "ditch" them successfully required

fast moving on the part of the pilot as soon as they touched the water. Parachutes were generally left on as they provided a certain amount of buoyancy, but it was essential to have the cockpit hood locked back and the R/T lead and oxygen tube disconnected. It was also found inadvisable to have too much air in one's Mae West. At any reasonable depth it exerted so much force upwards that the pilot tended to get jammed in and unable to move. It is generally accepted nowadays that, rather than risk a sea landing, it is better to bale out.

There was plenty of "meat" around in these shows and ammunition was like

a Pilot Officer's pay—it required careful spending. Many pilots met up with the "golden opportunity" after they had fired their last shot. Naturally on many of these occasions it could not have been helped, but it could certainly have been avoided on some. Squirting in the vague direction of a Hun is a waste of ammunition. So is shooting out of range, and particularly against a 109. If you are behind him he cannot see you. He won't know you are there until you open fire. Therefore why open fire until you are sure of hitting him?

[The concluding half of this account will be contained in the June issue of TEE EMM.]

HOW TO USE INSTRUCTIONAL FILMS

EVERY instructor who makes use of films must keep firmly in mind that, whether sound or silent, the film is his servant and not his master. It's there to help him in his teaching, not to do the teaching for him.

It can't be denied that instructional films do help. They give a more vivid and lasting impression than still pictures and certainly than any mere word pictures; they can magnify objects and movements on the screen, so that the instructor has, as it were, his whole class gathered close round some small detail; and they are able, by means of moving diagrams, to show simultaneous processes, such as those involved by the pressure of a trigger or the starting up of a petrol engine. Further, they can compress into a few seconds events covering many days, or explain in slow motion movements too rapid for the eye to follow normally.

As all R.A.F. instructional films are sound films, the instructor can and should—unless he thinks any particular point needs emphasising—leave the talking to the film. After all, the film is there to do it—and probably does it far better. The important thing for the instructor is to get quite clear in his mind exactly *how* the film deals with the subject, and exactly *when* to show it to best advantage. To ensure this means what the army calls a preliminary reconnaissance. The instructor must first of all study any notes that go with the film; he must follow the commentary carefully and be ready with explanations for any bits that aren't quite clear; and he must decide on the exact point in the lesson where he's going to use it.

Now to cram any lecture with too much material, however interesting, is like loading six tons on a three-ton lorry; you merely bust the axle and don't get

anywhere. All that results from such a lecture is confusion and boredom. No period should consist in a continual watching of the screen: a series of half a dozen films, say on the mechanism, working and inspection of a piece of machinery should never be run off one after the other. Each reel has its part to play in illustrating its particular lesson, and should be fitted into the scheme of instruction at the proper stage, not earlier—nor, except for revision, later.

Taking an hour as a suitable instructional period, a good allocation of the time has been found to be as under. This must, of course, be taken only as a general suggestion.

- (i) An introductory talk by the instructor discussing the topic, but not the actual contents, of the film
—5 to 10 minutes
- (ii) Showing the film —12 minutes
- (iii) Questions intended to find out whether the main points have been noted and which are still not clear
—10 to 15 minutes
- (iv) Showing the film a second time
—10 to 15 minutes
- (v) Correction of previous answers, followed by a summary of main points of the lesson and questions from the class —15 to 20 minutes

It is a saving of time not to discuss answers to questions after the *first* showing of the film. These can more quickly and easily be explained at the second showing, when the instructor

will be able to interpolate by remarks such as "here is the answer to one of the questions," just as the answer is coming up. Similarly, at the end of the whole course, a run through of all the films used will prove a most useful method of rapid revision of the whole subject.

With all R.A.F. sound projectors it is possible to stop the film at any point, but since the instructional films have been made for a specific lesson it is not wise to interrupt too much with explanations. To stop a film for such reasons may easily result in disconnecting the pupils' attention from earlier sequences and killing the interest. Stopping for "stills" should really be used to show details *after* the showing, the film being re-wound for the purpose; it will not then interfere with continuity.

Instructors should note also that total darkness isn't necessary: films can be perfectly well shown in controlled daylight. The happy medium between good projection and good teaching lies in just preventing daylight from actually falling on the screen and in using a smaller but more brightly lit picture. This means having the projector fairly near the screen, perhaps about the middle of the class.

If instructors therefore follow this general outline when using instructional films and, above all, take pains to remember that films are only complementary to other forms of instruction, they should not fail to get the best out of themselves, the films and their class.



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This copy belongs to :—



Sergeant Straddle says—
“Who’s been at my Tee Emm?”

HELP WANTED

TEE EMM DISTRIBUTION

ACCORDING to A.M.O. “N” 288/41 of 20/3/41 TEE EMM is distributed on the basis of one personal copy to each G.D. Officer and each instructor at schools concerned with the training of air-crews; six copies to each officers’ mess for other officers; and six to sergeants’ mess for other members of air-crews. Well, we can’t always hit the nail on the head the first time, and it may be considered a good thing to alter or modify the above list of recipients. (Anomalies, in particular, exist in O.T.U.’s who have been already written to.) Our basic idea is that (a) everyone interested should see a copy; and (b) if interested enough, should have a copy to keep for future reference.

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NOT to be taken into the air