TEE EMM

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Vol. 4 No. 5

TEE EMM

August, 1944

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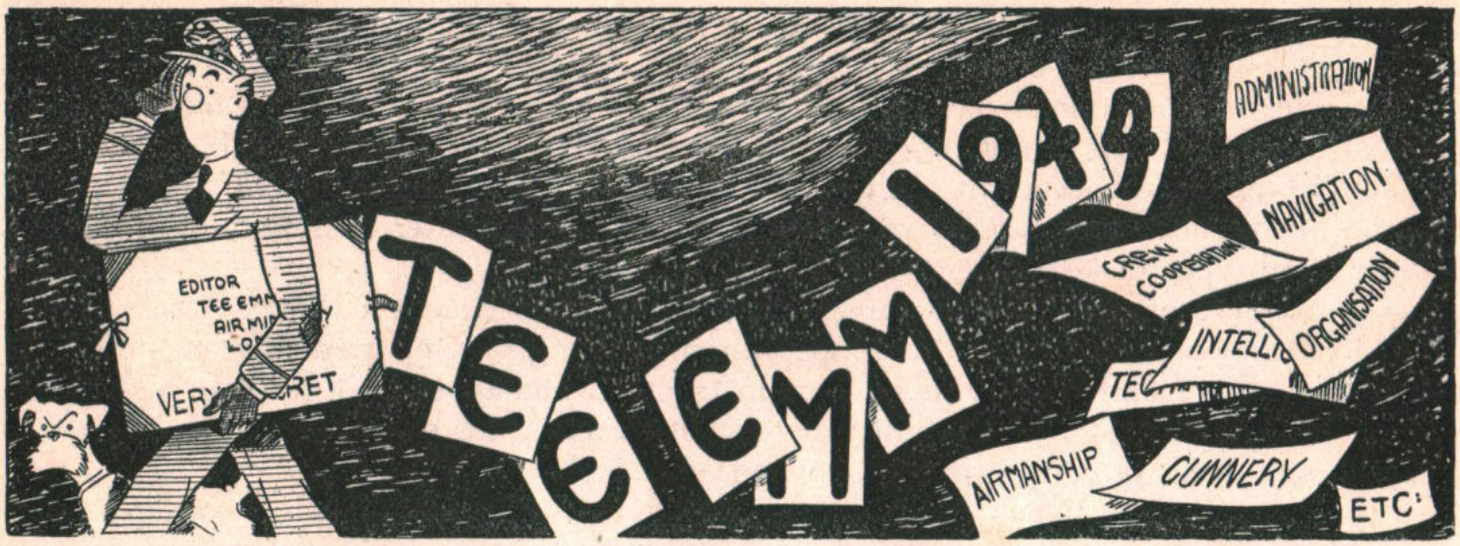
Pilot Officer Prune says—
"Take Tee Emm *regularly! Prevents that Thinking Feeling!"*



" I hope that these Training Memoranda will continue to be as widely read and studied as they have been during the past three years. It is impossible to exaggerate the importance of constant training in ensuring the highest operational efficiency.

Marshal of the Royal Air Force,
Chief of the Air Staff

HE WAS TOO CLEVER FOR THAT

YOU read our Sabotype piece last month on " Unwilling Instructor." Did you think it was exaggerated ? If so read this, and see if you still think so. For this is the story of a More-Than-Unwilling-Instructor, a Worse-Than-Sabotype—a real *Bad* Type, in fact. We'll call him Sergeant Blank.

He was twenty years old and on completing his flying training was selected for instructor duties. But this did not please this young man. Naturally he wanted to fly operationally, but then so does practically every other flying instructor. Unlike them, however, Sergeant Blank did not accept the decision, refused to realise that it's all one Air Force and that we are all there to do our best in it whatever job we are given. Nor could he comprehend—or try to—that instructing, when well done, with your heart in it, is a job of enormous value to the Service—and that instructors who realise this do have their reward.

Now Sergeant Blank was definitely a good pilot, with over 400 hours solo—and just because he was a good pilot he had been selected to train others up to be the same.

But he didn't see it that way. The important thing to him was not what the Air Force wanted, but what *he* wanted. He refused to co-operate, did all he could to get out of instructing.

He did, of course, have a grievance. For an ex-pupil to be retained as an instructor is always annoying, always unpopular, but it is often inevitable and the better type of man accepts it. The bad types don't ; but to take them off instructing and put them in more attractive occupations is only to pander to them and to make the good types dissatisfied.

So Sergeant Blank went on his truculent non-co-operative way. Assessed at " above average " he was " fed up with instructing." Reported as " capable of accurate flying and of becoming a good instructor when a feeling of pride in his work could be inculcated," he remained merely interested in his own personal ability as a pilot and in his opportunities for showing off.

Came the day when his C.O. had to interview him personally regarding his aptitude for disobeying orders and his general attitude towards his instructing job. He was told straight out that if he continued on his present course he would " either kill himself or be court-martialled and gaoled." He retorted that he was too good a pilot for the former and too clever for the latter.

Ten days later he was detailed to carry out a test flight in a Harvard. He took with him in the rear cockpit a Corporal fitter to help in the test.

Finding the aircraft fully serviceable, he decided to show the Corporal what he, Sergeant Blank, could really do. He proceeded to indulge, against all orders, in a little low flying. His passenger could say nothing about this ; for in accordance with the pilot's usual disregard of regulations, he had not been provided with a helmet and so was not in communication.

After flying for some while at only ten feet above trees, Sergeant Blank for once didn't fly quite high enough. A tree caught the starboard wing, tore it badly and broke off part of the aileron. The aircraft continued straight and level, but although it was controllable Sergeant Blank, the expert, decided to try a crash-landing.

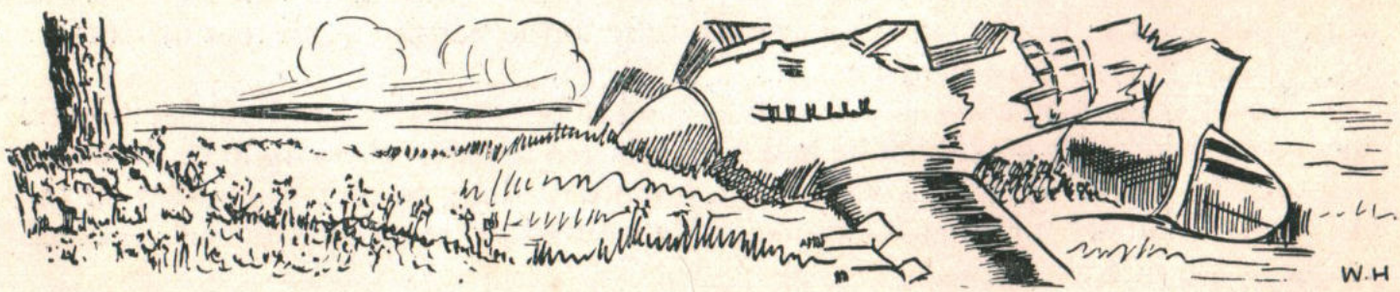
He failed . . .

Luckily his passenger escaped with minor injuries but Sergeant Blank died without recovering consciousness.

Had he lived he would undoubtedly have been court-martialled and gone to gaol, as his C.O. had warned him. But he was too *clever* for that.

And not quite good enough to avoid killing himself.

Well, there's the story of a bad type who refused to pull his weight or obey orders—just because he was not allowed to do exactly as he liked in the Air Force.



R.A.F. AIR SAVINGS GROUP

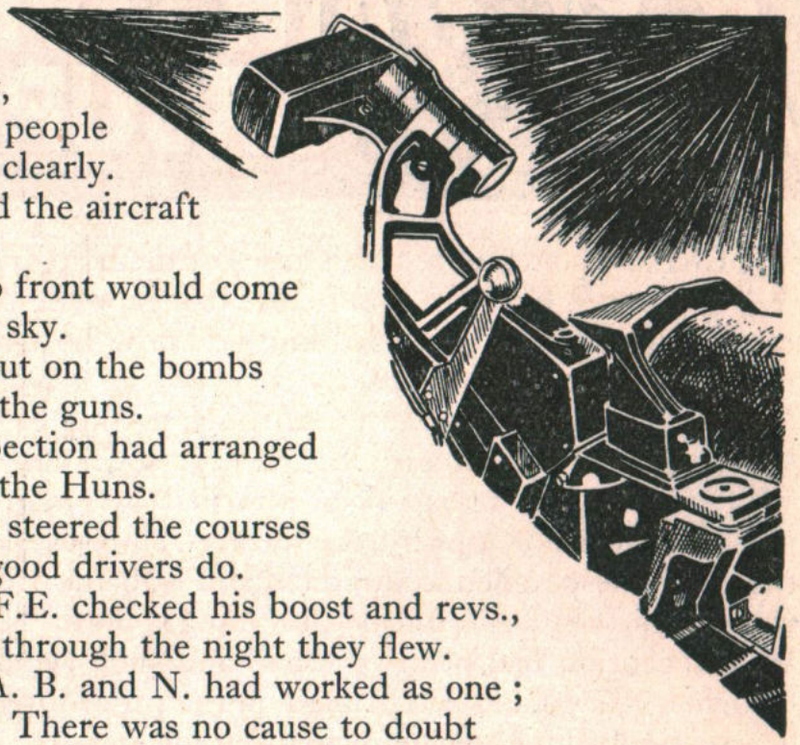
HERE are some more true stories of the help given to aircraft in distress. The idea is that not only can you realise just how the Air Safety people do help you—but can study the methods used and so know how to play your part in building up a record total of Air Savings.

An overseas Liberator returning to this country was plotted showing distress signals in the entrance of St. George's Channel. A message was picked up on W/T stating that it had been attacked by enemy aircraft. Courses to steer were passed but did not appear to be received since they were ignored. A Beaufighter was, therefore, despatched to intercept and lead the Liberator to a nearby airfield. This was successfully accomplished and the Liberator landed safely. The pilot stated that W/T reception had been very bad and such vectors as he had received seemed to be incorrect. He had been briefed on the procedure for fighter guidance and as soon as he saw the Beaufighter he recognised the signals and followed it to a safe landing.

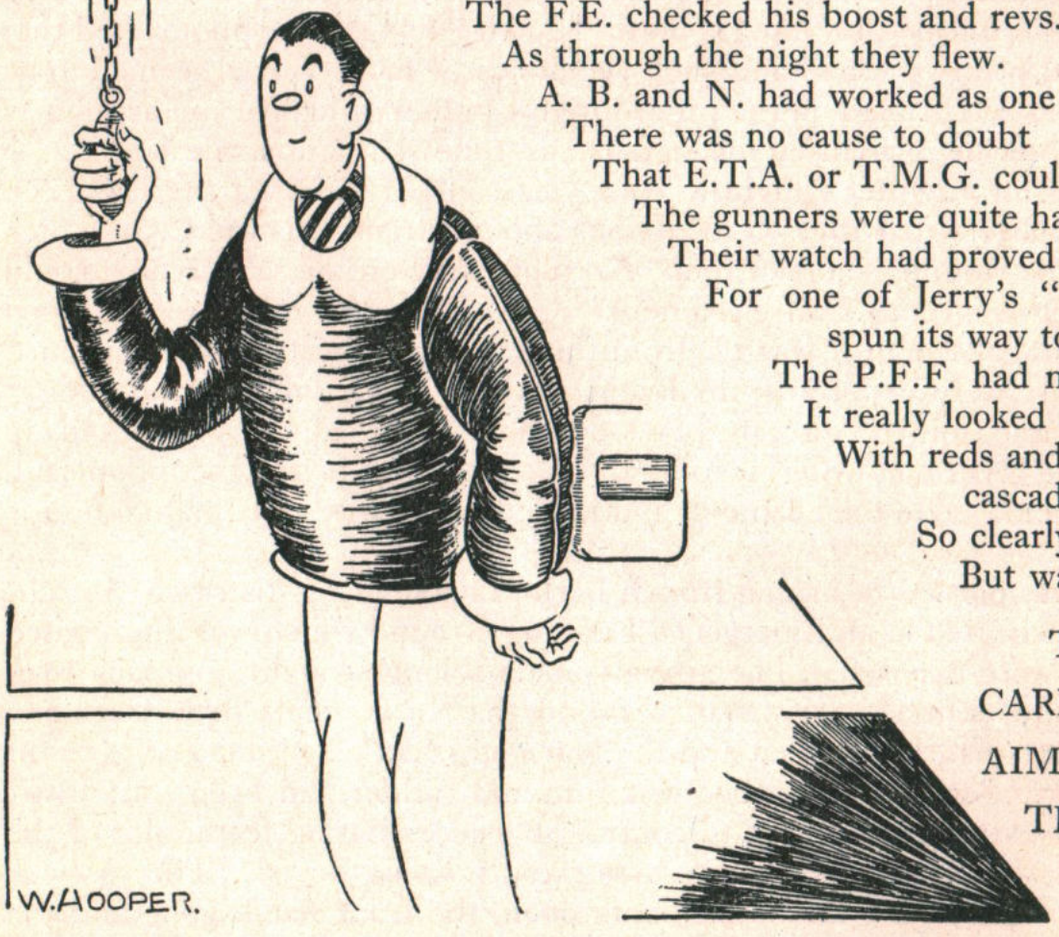
At 2149 hours on a winter's night a West Coast airport advised the F.C.L.O. at a Group Headquarters that they were anxious about a trans-Atlantic C.54, which was late and must be running short of fuel. No plots were on the table which could be linked up with this aircraft. At 2310 hours a plot came up which was assumed must be this aircraft, although it was far from the position indicated by the airport. Homing searchlights were exposed from Radar stations in the vicinity and shortly after a fix was obtained on the aircraft. At 0035 hours a broadcast was picked up from the aircraft—" Am following searchlights." At 0037 hours the pilot said, " Can now see airfield." He then came in and landed safely with only half an hour's petrol left.

A Lancaster was plotted returning from a Berlin raid showing distress. Searchlight homing was instituted to an Emergency Landing Ground which was illuminated and Sandra lights were exposed. The aircraft made a long straight approach over the occult and landed safely. It was then found that in combats over Germany both the Air Gunners had been killed and the Navigator had baled out as the result of a mistaken order. Part of the starboard tail fin and rudder had been shot away, making the aircraft extremely difficult to control and necessitating feathering of the port outer engine. The port inner engine was rapidly losing power. The fuselage was full of cannon shell holes, the bomb doors open, the front hatch gone and the W/T out of order. One tyre and the tail wheel were punctured, but the pilot carried out the correct procedure throughout, and as a result the landing which might otherwise been extremely hazardous was completed without a hitch.

CAN YOU AIM BOMBS—



Command arranged the target,
The one the Huns prized dearly,
And Station, Grp. and Sqdn. people
Gave out the " gen " quite clearly.
The ground crew checked the aircraft
And did a good D.I.
The Met man said no front would come
To mar the perfect sky.
The Armourers put on the bombs
And loaded all the guns.
The Signals Section had arranged
To mystify the Huns.
The pilot steered the courses
As all good drivers do.
The F.E. checked his boost and revs.,
As through the night they flew.
A. B. and N. had worked as one ;
There was no cause to doubt
That E.T.A. or T.M.G. could possibly be out.
The gunners were quite happy ;
Their watch had proved its worth ;
For one of Jerry's " 88s " had
spun its way to earth.
The P.F.F. had marked the spot ;
It really looked a show
With reds and greens
cascading
So clearly there below. . .
But wasn't it a *pity*—



THROUGH
CARELESSNESS IN
AIMING BOMBS,—
THEY DIDN'T
HIT THE
CITY ?

—OR DO YOU JUST PULL A PLUG ?

SABOTYPES

ARE you one of those types who, quite unconsciously and probably with the best motives in the world, yet manage to put in plenty of "sabotage hours" ? Sabotypes definitely impede the war effort ; their activities slow it down. While not deliberately throwing spanners in the works they are increasingly putting grit in parts that should run smoothly.

Examine your conscience, and then ask yourself if you are one of them.

No. 3. Squirrel-Man

The Squirrel-Man may be a fitter or armourer or a member of an aircrew, or even one of the higher grades of squirrelarchy, such as an Equipment Officer or Flight Commander. But, whichever he is, he can be distinguished at once by his vicious habit of hoarding.

What he hoards has first invariably been either "won" or "scrounged" ; for this is all part of his system. The two terms differ only in method. "Scrounging" is definitely acquisition by theft, while "winning" is rather acquisition by cheating. The Squirrel-Man uses both methods. He sees some other unit's unwatched tender and promptly "scrounges" a spare wheel or a kit of tools. He has a starboard-aileron hidden in his Flight Lock-up, but sees a chance, owing to a recent accident, to "win" another by indenting officially for it, and so keeping his own as a spare. In either case he has acquired something *bukshee*, in case it's needed later.

Service stores and equipment are always the object of the exercise, but it must be pointed out that this Sabotype does not scrounge or win for *himself*. He is, of course, too honest for that. It is always for his unit, or flight, or for the work he is doing in hangar or on airfield. For he says to himself : "This article is in short supply ; so I'd better have a spare one by me and then my work runs no risk of being held up." Or he says to himself : "It's all very well having an authorised scale, but it's much too small for the work our push is doing." Or he just says : "I'll swipe this ; it'll come in useful in the flight some day."

His attitude of mind, of course, stems from that of the old-time Quartermaster-Sergeant. If this worthy's unit did not hold more equipment than it was entitled to as a result of his winning and hoarding instincts, then quite simply he was not a good Q.M.S.

But in spite of his supposedly good intentions the Squirrel-Man is a menace. To wangle odd bits and pieces of equipment and put them aside for a rainy day "just to be on the safe side" is *not* clever or efficient. It simply means that that much equipment is out of use, that its equivalent has to be additionally provided,

and that all those concerned with its production, transport and distribution, from merchant seaman and factory hand to lorry driver and storekeeper, have to work that much harder.

And if the particular article " won " is in short supply—which so often is just why he has won it—then the Squirrel-Man's hoarding instinct becomes even more dangerous and pernicious. For it means that he is now actually doing someone else down—someone in the same Air Force as himself. The store or piece of equipment concerned is not now just lying idle, merely making extra work for its replacement. It is definitely *needed* by someone else, who because it is in short supply *can't have it.*

But the Squirrel-Man doesn't care ; he is busy providing for his rainy day. He is ensuring that he has stores and tools, which he doesn't want at the moment, though others do. He is ensuring that he has equipment, which his aircraft and vehicle don't want at the moment, though other aircraft and vehicles may be temporarily unserviceable for lack of it. He is hindering the war effort.

He is a Sabotype.



TAKE IT OFF BEFORE TAKE-OFF

THERE is a list lying on our desk as we write. There are twenty-five items on it. It is a list of accidents to aircraft over a period of about eighteen months.

These accidents vary in every possible manner. The aircraft are of every type from Liberators to Spitfires, from Wellingtons to Beaufighters, from Albemarles to Ansons. The scenes of the accidents are as far apart as from India to West Africa, from Malta to Great Britain. The results vary between slight damage only to the aircraft, repairable on the site, up to total destruction with the loss of a full crew of seven.

Yet there is one thing they have in common : they were all caused in the same way. And that cause is nothing more nor less than one tiny lapse of memory, before even the aircraft took off, on the part of either the pilot or the senior member of the ground crew.

What lapse is this ? The answer is : merely forgetting to remove the pitot-head cover before starting the flight.

Failure to do this results, as you all know, in the A.S.I. going on strike, and while an experienced and cool-headed pilot *can* take off with his A.S.I. out of action, the risks are very great. (The list on our desk proves it.) For the sudden realisation in the middle of your take-off run that your A.S.I. is not co-operating confronts a pilot with the necessity for

making an immediate decision : shall he try and stop the run, or shall he go on and chance being able to get airborne at the proper speed ? Nearly always this results in a slight hesitation and may easily mean the wrong decision. Even so neither of the decisions may be feasible, for the speed may be too great to allow of stopping before the end of the runway, while the hesitation may have slowed it down so that the aircraft can't get clear after all.

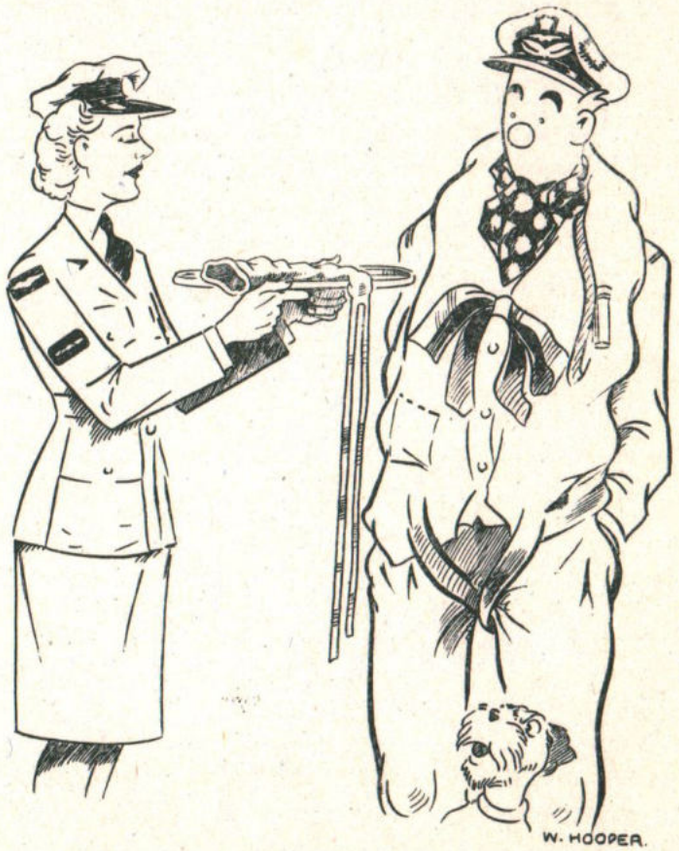
Now the responsibility for taking the pitot-head cover off rests in the first place upon the senior airman of the ground party. He has to take it off and hand it to the pilot immediately before the start of the flight. But it is also the *pilot's* responsibility to see that he does so. The orders on the subject in all Commands are quite clear. And they should be adequate, for even if one man forgets, the other will remind him—*if* both carry out the orders.

On the other hand *both* are human and so *both* are quite liable to forget this small item of drill and that is really where the trouble lies. Many dodges have been used to try to rule out the risk of human error. Bright streamers have been attached to the cover ; or a streamer is tied from the cover to the controls ; or a cord is fastened between the cover and the chocks, so that when the latter are pulled away the former, if forgotten, comes too. But still the lapses occur.

The point of this article, therefore, is, first, to impress on Squadron Commanders the liability of their pilots and ground crew to overlook this small point and to urge the advisability of establishing, even of originating, all precautionary measures possible. (If you are actually employing any successful dodges in your squadron, by the way, let us know and we'll pass them on to the proper quarters.)

Secondly, we want to impress on pilots that it is no good relying implicitly on the ground crew never forgetting their part in the business—or if they do, trying to pass the buck afterwards. The pilot is equally, and ultimately, responsible for seeing that it's done—and as he's the chap who's going to fly the aircraft, it's just as well for his own sake that he should see that it *is* done.

And thirdly we want to impress on everyone that though removal of the pitot-head cover seems only a small point, it is a very important one. The list that lies on our desk tells you that. The accidents therein are all *avoidable*.



" Your pitot-head cover, sir."

FISH OUT OF WATER

THE most important thing to consider in designing a torpedo is obviously good performance under water where it is no longer under the control of the pilot. Satisfactory behaviour during its " Flight in Air " is, of course, almost important, but during this, however, the pilot *can* definitely exercise a good or bad influence.

He may carry out hundreds of A.L.T.'s and drop dozens of dummies, but, until he has shown that he can drop practice torpedoes which run at the correct depth along the straight and narrow and finally return home unscathed, he has no business to call himself a torpedo pilot.

Since, unlike a bomb, a torpedo is necessarily unstable in air, what are the requirements for ensuring a good flight in air followed by a good entry ?

Well, first, the torpedo must enter very nearly tangential to its line of flight. If it enters too steeply it will make a deep dive, when, even if it doesn't hit the bottom, it will certainly take a long time to recover and settle down to run at its correct depth. On the other hand, if it enters too flat it is liable to damage, a fact which can be readily appreciated by all who remember learning to swim—particularly S/Lt Swingit, who's never really learned. But as long as it is reasonably well dropped, these little troubles are taken care of by the drum control gear and the air tail, which operates in much the same way as the tail feathers on the common dart.

Secondly, the torpedo must be given as little excuse as possible to roll. A roll in air produces two evil effects. The air tail instead of acting wholly as a horizontal rudder operates partially as a vertical one. Consequently it fails to control the torpedo in a fore and aft direction and so lets it strike the water at a poor angle. But provided always that the aircraft is kept steady, the drum control gear will ensure that the fish is not rolled about by the slip stream acting on the air tail.

The other evil effect of a roll in air is to accentuate the roll in water. Unlike an aircraft in a roll, in which the pilot partially exchanges the duties of the stick and rudder bar, the horizontal and vertical rudders of a torpedo, now being

under human control, continue to be operated in the normal manner. The worst result is that the torpedo plunges headlong to the bottom and stays there. Even if this does not occur, a heavy roll will probably cause a swerve when the torpedo may thus start on its straight run so many yards to one side of its correct track that a miss is scored solely on this account.

Other causes of roll in water which are partially under the pilot's control are yaw, and sideways motion of the torpedo during its flight in air. The former is largely produced by the air tail when it starts to act partly as a vertical rudder due to the torpedo roll, while the latter may be the result of either turning, banking, slipping or skidding at the moment of release, or else of high cross wind. Regarding the latter it is unfortunately not possible to restrict dropping to balmy windless days, but it *is* practicable to reduce the evil effects of a high wind blowing from any direction by dropping slightly lower and faster than normal.

Skidding is the cause of much tribulation and frequently results from a flat turn made at the last minute in an effort to correct the point of aim. It is futile waste of effort to drop with the sights not correctly on ; so, if you must make a last-minute sighting correction, be certain to do a banked turn and ensure against skidding. Some pilots fail to appreciate that it is quite wrong to put their sights on the target before closing to the dropping range. To keep them there means flying in a curve, which is against all the rules for achieving a successful drop.

While on the subject of steady flight at the moment of release a warning on drum control gear may not come amiss. The torpedo remains attached to the aircraft for over a second after the button has been pressed and a pull on its tail during this period is asking for trouble.

To sum up, the rules for putting the fish into its natural element can be given in three sentences which are worth memorising :—

DO drop at approximately the best height and speed and in high winds fly slightly lower and faster.

DO be in steady flight, and particularly beware of skidding when you let go.

DON'T, when using drum control gear, turn away before the wire has unwound.

Entering too flat is liable to cause damage : any swimmer (or S/Lt Swingit) will tell you this

TASMAN FLIGHT

HERE is the story of what might be called an epic of navigation. It occurred over thirteen years ago. We publish it because we feel it will be of considerable interest to navigators to-day. It also provides what is quite probably the first air-plot ever made, which incidentally we reproduce. (Not too well, we are afraid, but then the air-plot was made in the air and for practical reasons, not with the idea of ultimately being reproduced in TEE EMM.)

The flight (by a pilot known to many in the Air Force) was quite definitely an achievement. It was made in a wooden Moth, fitted with floats and possessing a Gipsy I engine. It started from Norfolk Island, N.W. of New Zealand, whence the pilot had previously flown. It covered five hundred and seventy-five miles of lonely Tasman Sea, which was not such a trivial distance then as nowadays, and on this particular occasion an unbalanced propeller, damaged by choppy waves while taking off in the open Pacific, had reduced the aircraft's speed. The journey thus took seven hours, forty minutes, yet only nine and a half hours' petrol could be carried, while the objective was another island, Lord Howe Island, of barely five square miles, with the nearest land more than four hundred miles further on. Moreover, the navigation had to be done by the pilot in an open cockpit, and, owing to vibration from the damaged propeller, he found it impossible to write while touching any part of the aircraft.

Yet it was successful. Certainly an epic of navigation. Here are the navigational details.

The navigation comprised an air-plot started afresh from the D.R. position at the end of each hour. The D.R. position was amended when possible by sun position-lines, of which five were obtained using a marine-type box-sextant and the sea horizon. The sun observations were relied on completely, and post-flight checking showed this was justified in that none could have been more than $3\frac{1}{2}$ miles in error.

The method of making a sun observation was to pre-compute the sun's altitude and azimuth—in one case, six hours in advance—and plot a datum position-line through the assumed position. Of course the altitude could not be observed at the exact instant of the pre-computation but allowance for this was made according to the known rate of change of altitude of the sun at the time and in the area. The difference between the altitude observed and the pre-computed altitude gave

an actual position-line a corresponding distance away from the datum one and parallel with it. The pre-computing was done by means of the cylindrical Bygrave position-line slide-rule of which one cylinder has a scale 36 feet long.

One to three sun-shots were taken at each observation. Judging the drift by eye, treble drift observations were made every half-hour and the mean of the two W/V's found was used to decide the hourly D.R. position. The drifts were plotted on the chart itself and this is almost the only respect in which the navigation differed from to-day's Coastal Command navigation drill. As a result of this method a succession of hourly W/V vectors were shown on the chart which enabled the pilot to forecast the next hour's W/V by eye. Marking the W/V vectors with 3-stroke arrows shows an interesting conformance with the latest R.A.F. practice.

The method of plotting the wind was as under; the reference letters are marked on the chart which is on the next page :—

Plot the course-line YX from the last D.R. position Y and mark off the next hour's air distance = YX along it. From the air position X at the end of this course-line draw an arc UY of an air-speed-circle of radius equal to the hour's air distance. Plot course-lines UX, etc., from the circumference of the airspeed circle to its centre, X; these lines represent the courses on which the drift was measured, namely, 30° to port, and 30° to starboard. Plot drift-lines (YZ, UZ, etc.) one side or other of each course-line according to the drift observed; the drift-lines meet in a point, or form a cocked hat.

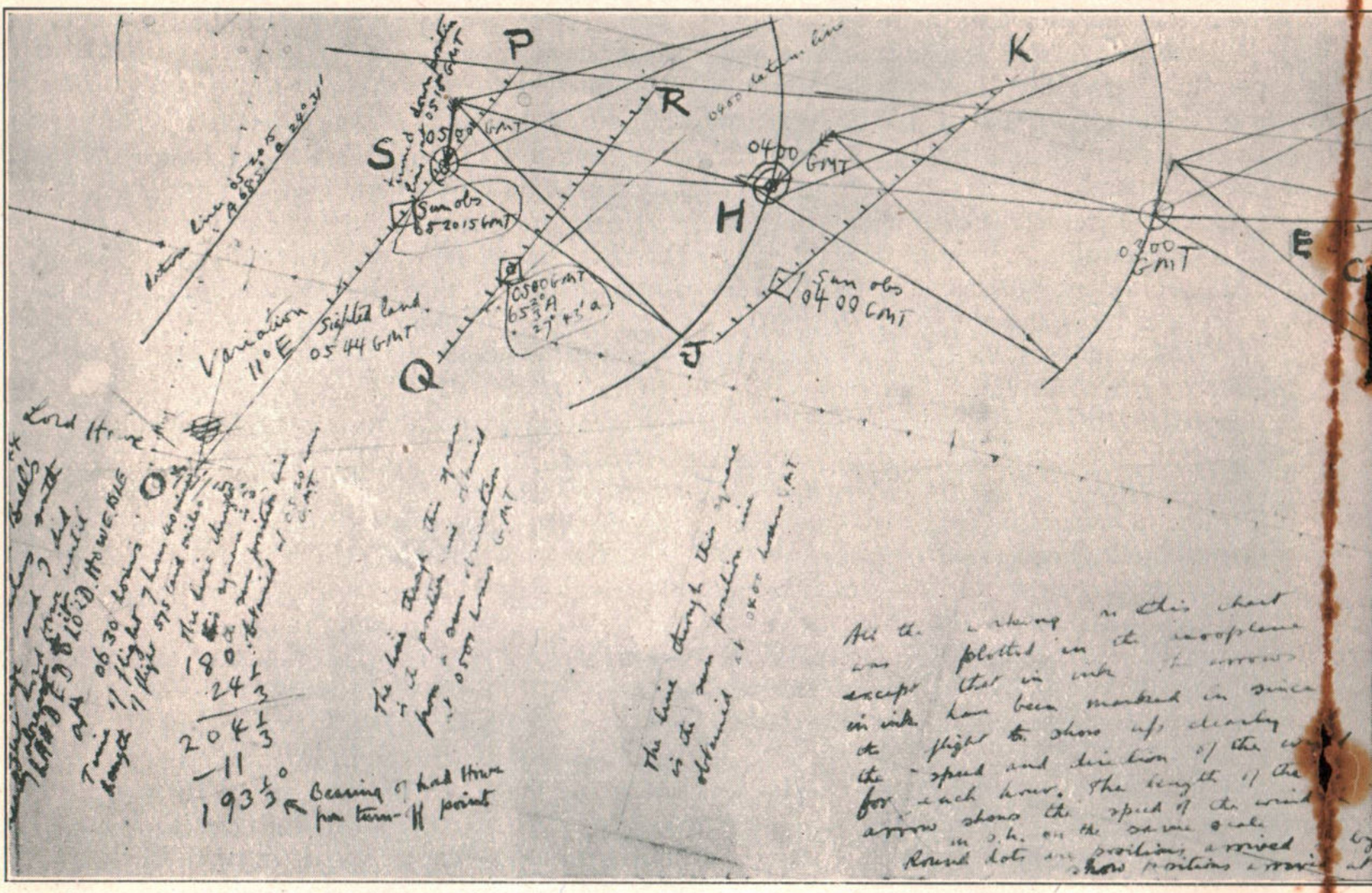
Now here are some points about the actual navigation.

Immediately after taking off from A, the sun's bearing at the objective O at a time five hours later, *i.e.*, 1¼ hours before the E.T.A. at O, was computed and a datum position-line OP plotted on the chart. P was now an earlier objective and selected so that the required track to it was 10° to one side of the direct track to the island.

The 0000 G.M.T. air-position, X, was plotted (note that it was labelled 1200 G.M.T. by mistake). Course-lines 30° to starboard (UX) and the other 30° to port were plotted and the drift lines on each course (UT, etc.) were plotted. These gave a D.R. position at 0000 G.M.T. at Z, using the first half-hour's W/V found; or at T, using the second half-hour's W/V found. W was accepted as the mean D.R. position and a fresh air-plot started from it.

During the second hour a mistake was made of plotting the drift-lines for the centre course to starboard instead of port. It looks as if the pilot, though he did not rub out the wrong lines, realised the mistake at the time, because the D.R. position he chose is at the intersection of two accurate drift-lines; and the numbering of the various drift-lines suggests he smelt a rat. From then on he gave up plotting six drift-lines per hour and only plotted the mean of each pair; though, in fact, next hour he did not plot any drift lines, but estimated the D.R. position at B; easy enough in this case, with the drift nil on the flight course and only 3° on the courses to port and starboard.

The sun was now nearly on the beam and two observations gave position-lines

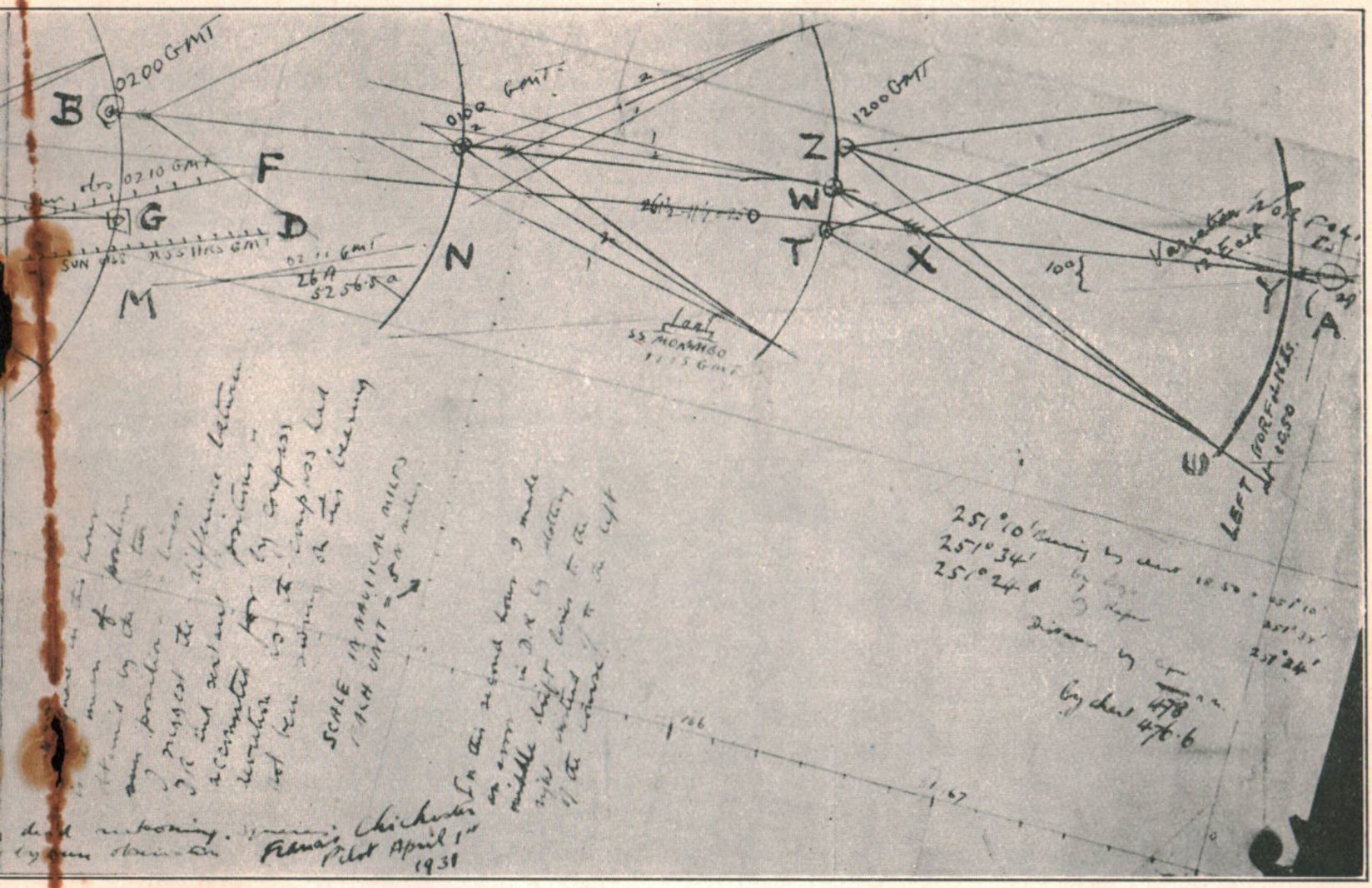


Reproduction of original Flight Plan, exactly as made during the flight, except that reference letters are, we are afraid, rather illegible, but ar

EF and CD. These were important because the pilot relied on them for checking deviation, there having been no opportunity to swing the aircraft on this heading. The pilot accepted G as the 0200 D.R. position instead of B, 21 miles to the north, and assumed this was due to a 5° compass deviation. From then on he subtracted 5° from each magnetic course to obtain the correct compass course.

MN was the pre-computed datum position-line for the 0210 G.M.T. sun observation. Five hours after the start, sun observations were again made, the first of these, JK, at 0400 G.M.T. showing that the corresponding D.R. position at H, was 22½ miles in error.

An 0500 sun observation put the aircraft on QR, 26 miles short of the line OP through the island. This was accepted as correct, disregarding the D.R. position, S, of the same time and the pilot continued the same course as before until he reckoned to have reached OP, when he altered course 55° to port to fly along OP.



have been added, and the navigational comments were written on completion of the flight. These re all covered in the accompanying article.

At 052015 G.M.T. another sun observation confirmed that the aircraft was on OP all right.

The weather was now getting bad, the last two sun observations being taken through lucky gaps, one actually while turning to keep the sun in view.

A large rock 12 miles south of the objective island was sighted ahead at 0544 and mistaken for the island itself, which was not seen till abeam, 5 miles to starboard, at 0625 G.M.T.; it had been completely hidden in a heavy squall.

The aircraft was on the island lagoon at 0630 after a flight, as stated, of 7 hours, 40 minutes.

All this occurred on April 1st, 1933, and, as Prune says, it only goes to show what an interesting day April 1st can be. Why, look what happens on it—the formation of the Royal Air Force, the first issue of TEE EMM, and of course the birthday of P.O. Prune himself!

THIS MONTH'S PRUNERY

THE MOST HIGHLY DEROGATORY ORDER OF THE IRREMOVABLE FINGER (Patron: Pilot Officer Prune) has this month been awarded to the ground staff at —— Airfield, overseas.

An aircraft had landed at —— for refuelling, and while this was going on one of the crew started to remove some grease from his hands by holding them under the drips from the nozzle of the bowser pipe-line. Not having much success with this he looked more closely and found the drips were water, not petrol.

Apparently the water bowser at —— had been in frequent use just beforehand and the ground crew had got accustomed to using it. The net result was that some sixty or so gallons of water were being pumped into the fuel tanks. The subsequent remarks of the crew, however, were of such an inflammatory nature that the mistake in this case turned out to be a fortunate one.

The M.H.D.O.I.F. is also awarded to Warrant Officer —— and Flight-Sergeant —— for Blissful Ignorance of the Magnetic Properties of Metal Objects.

These two men reported that the S.O.2 compass in their aircraft was unserviceable because it differed from the P.4 compass by nearly 20°. A Compass Adjuster carried out a check and found that the difference was after all no more than ½° after he had removed from the proximity of the S.O.2 compass two tin boxes and an Aldis lamp.

The M.H.D.O.I.F. is also awarded to Flight-Sergeant —— for Apparently Taking a Drift While Sober.

This Flight-Sergeant reported that his drift recorder was unserviceable because objects appeared to travel, in the line of vision, in the *same* direction as the aircraft. In point of fact they actually do.

The M.H.D.O.I.F. is also awarded to Sub. Lt. (A.)—— of the Fleet Air Arm for an Excuse That Wouldn't Hold Sea Water.

After damaging himself and seaplane by landing 20 feet too high he airily explained it away by saying he'd been flying for five hours by which time the tide had gone out.

THE M.H.D.O.I.F. is also awarded to Pilot Officer —— for Conspicuous Attention to Minute Details.

This pilot was collecting recognition cartridges prior to a training flight, when he suddenly raised a hue and cry for Red-Greens. Search by a W.A.A.F. officer at once revealed several of them on a shelf. "No," said Pilot Officer ——, "not those. Those are Green-Reds, in which the green comes out first: I want the ones in which the red comes out first."

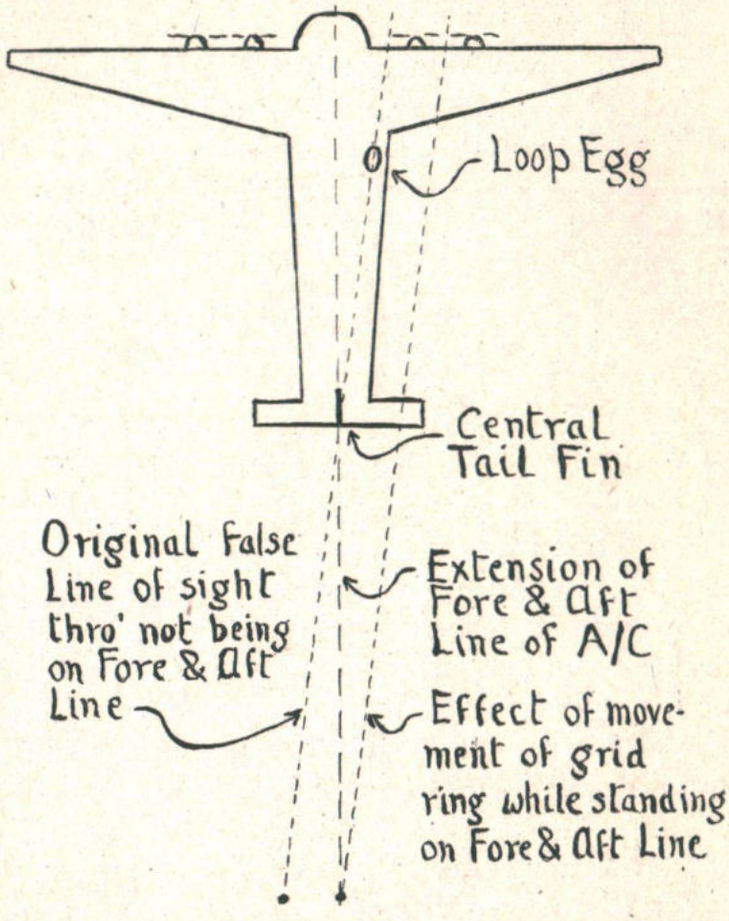
TEE EMM'S Brains Trust

LETTER. " Far be it from me to question the traditional wisdom of TEE EMM, but there does seem something wrong with your Nav. Pointer (May) ' A Compass Swinging Catch.'

" To substantiate it or otherwise I tried it out myself. I lined up the landing compass with an aircraft and found its magnetic heading. I then simulated the case in question and moved the grid ring 2 degrees to starboard. I found that the sights left the fuselage altogether, crossed the wing and stopped slap bang in the middle of the starboard engine ! Now your compass adjuster ' assumed that the tail fin, the loop aerial egg and wireless mast were in the same straight line lying along the centre line of the aircraft ; ' therefore, unless something was very wrong with his peepers they must almost have appeared that way. Since we learn they were not in the same straight line the error must only have been a few inches, and an infinitesmal fraction of a degree.

" It is of course highly desirable to align the landing compass properly, and if any difficulty is experienced, I suggest moving round to a position in the athwartships line of the aircraft and aligning the landing compass with the landing wheels ; adding or subtracting 90 degrees to the reading obtained.

" The discovery of a coefficient ' A ' of two degrees where there has been no ' A ' before, you say ' seemed queer ' and prompted an investigation. Pray why ? There is nothing extraordinary about an ' A ' error and there has to be a first time. The compass may have vibrated round 2 degrees since it was last swung, or if it was a D.R. compass other factors may have been the cause.



REPLY. The answer is, it all depends upon the position of the man taking the landing compass readings, and this can best be explained by the diagram herewith.

The point that our very keen Compass Adjuster correspondent has missed, is that moving the grid ring 2° whilst standing in the same place (i.e. on the extended fore and aft line of the aircraft), does not have the same effect as will be obtained from a mal-alignment of sights on the structure of the fuselage. As may be seen from the sketch, the 2° movement of the grid ring results in an absurd line of sight which is completely clear of the aircraft fuselage. We agree that the appearance of a co-efficient " A " is not so queer, but for it to appear so soon after the normal acceptance swing (carried out by a more seasoned adjuster than on the day in question) caused suspicions to be aroused.

GO EASY ON THOSE MAPS, CHUM!

YOU read our little piece last month—at least we hope you did !—on the importance of not being wasteful with maps. We published it at the request of the Map People and since then we've been in further touch with them.

They now tell us that the situation is really serious—or rather that it *will* be serious, unless everyone concerned co-operates. In other words, unless everyone who has anything to do with maps makes a very definite effort to economise in them, there may soon be an acute shortage of maps and charts for both Army and R.A.F.

After all, it's not to be wondered at. The presses are now running night and day and the demands are enormous. Before D Day, simply for the invasion of Europe alone, 120 million of maps had to be got ready. Can you visualise 120 million maps ? Why, if laid end to end they'd reach from—but you know the sort of thing. And the war is by no means over ; nor do maps last for ever.

Let's consider the question in a little more detail. Most maps are multi-coloured and are printed by a process known as photo-lithography. In this each different colour on a map has to be applied separately, and each colour, therefore, means a separate drawing, negative, printing plate, and, of course, a separate operation in the press. You can see, therefore, that while a one-colour job, such as a plotting chart, needs only one impression, a nine-colour topographical map needs nine carefully adjusted impressions. Obviously the most worth-while economies are in the use of multi-coloured maps, so they should be your primary objective. On the other hand, in the R.A.F. the actual number of plotting charts used is naturally far greater than any other series. If any means can be found to use plotting charts over again, the resultant saving will be considerable. (Any ideas on this, by the way ?)

There are many ways in which you can prolong the life of a sheet. For instance, get into the habit of stowing your maps in a large envelope or wallet made out of cardboard and brown paper. This protects them from dirt and from getting torn, and they will be also less easily lost. The worst place to carry maps is in your pocket or in your flying-boot (however smart this latter looks) as rubbing and chafing soon wears paper out. Whenever possible, avoid getting your maps damp ; and if you must draw lines on them use a soft blacklead pencil which will rub out easily, *not* coloured wax crayons which mostly stay on for ever.

Another cause of wastage is HOARDING. If every Navigator has two copies of a sheet when he only needs one, then thousands of maps are out of circulation—*and* out of the war—and, by being thus locked up, are hastening the day when a reprint has to be made. Make it your duty to turn out any accumulation you may have, and hand surplus sheets in to your local map office.

Individuals, we regret to say, are not the only hoarders. Squadrons and other units have a deplorably acquisitive, even miserly, tendency to hold stocks of maps, which are quite unnecessary where there is a centralised Station map store. It's up

to Station Map Officers to see that these hoards are raided without delay and put back into circulation.

Another way to help is to " make do " as long as you can, which even involves " mending." Do not ask your Station Map Officer or Map Clerk to exchange an old sheet unless you are quite certain that you would be taking a risk in continuing to use it any longer. Don't expect always to get a brand-new sheet either. Second-hand copies are legal tender in map circles.

Again, Map Officers should continually be on the look-out for extravagant or careless map-users, while much can be done locally by Map Clerks in the way of map-mending. Some Stations who are salvage-conscious have even been known to produce new maps from old by joining together the clearer portions of otherwise unserviceable copies. Good show !

There is an old saying from north of the Border—if you'll pardon us going all Scots for the moment—" To hain is to hae," which, being interpreted for Sassenachs, means " To save is to have." So treat your maps with all the reverence you would accord to other works of art, and thus save and *have* them. For by going easy on the maps *now*, you will for the future—

(i) Save scarce materials, labour, transport, storage space and public money—which ultimately is your, and even our, income tax.

(ii) Release valuable labour and printing presses for the production of urgent new maps and charts for use in new theatres of war, or with new navigational aids.

(iii) Help in ensuring that the Forces always get the *right maps* in the *right quantities* in the *right place* at the *right time*.

And much of the responsibility for all this is in your hands. So

GO EASY ON THE MAPS

Treat maps with the reverence you would accord to other works of art.

RANGE AND FREE FLIGHT

OR

HOW TO GO SO FAR AND NO FARTHER—OR NOT SO FAR!

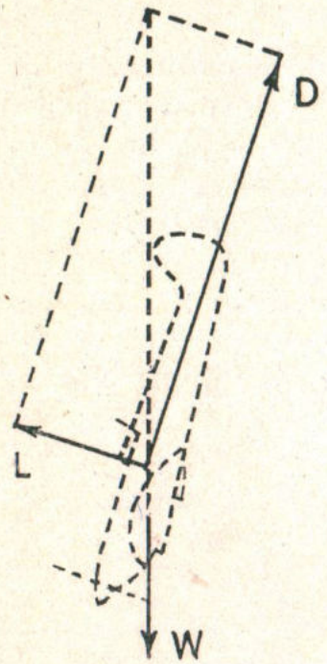


Diagram 1.

Nearly everybody knows that during free flight, that is for gliders not on tow, and for powered aircraft without the power, the forces which act on the glider or aircraft are (i) weight, (ii) lift, and (iii) drag. Everyone also knows, or should know, that for straight constant-speed flying these forces are in equilibrium. Lest there should be any doubt, the drag is always opposed to the line of flight, while the lift is at right angles to it.

For a *steep* flight path, the forces should be as in Diagram 1 herewith, from which we see that the weight is balanced by a small lift and a large drag.

In contrast, for a *shallow* flight path, the forces would be as in Diagram 2, when the weight is now balanced by a large lift and a small drag.

From all that, we are able to deduce that the *most* shallow path—and therefore the best range—is when we can get as much lift as possible for as little associated drag—which the backroom boys call the best lift/drag ratio.

Now the best lift/drag ratio occurs at *one* angle of attack which the experts know, and that angle of attack is only utilised at *one* speed which the experts also know—and so should you! That speed is the speed for the best range, and is therefore the best gliding speed. Faster than that shortens the range: and so does slower than that.

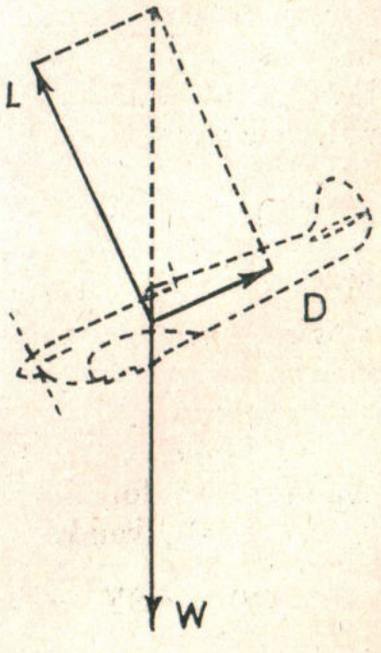


Diagram 2.

All the above is subject to no-wind conditions. Only in the event of high winds or an unusually large wind gradient would the problem be materially changed.

Having got all that off our chest we now come to the hub, as it were, of our article; that is, the examination and shooting down in flames of some *alleged* means of improving range. Frankly, it may be a little difficult, as we are discussing one of those problems for which it may be easier to prove the right than to disprove the wrong. But since people *will* do this sort of thing, in spite of our having already stated the case correctly, we'll have to tackle it.

Well, we'll take the first fallacy, in which the air-

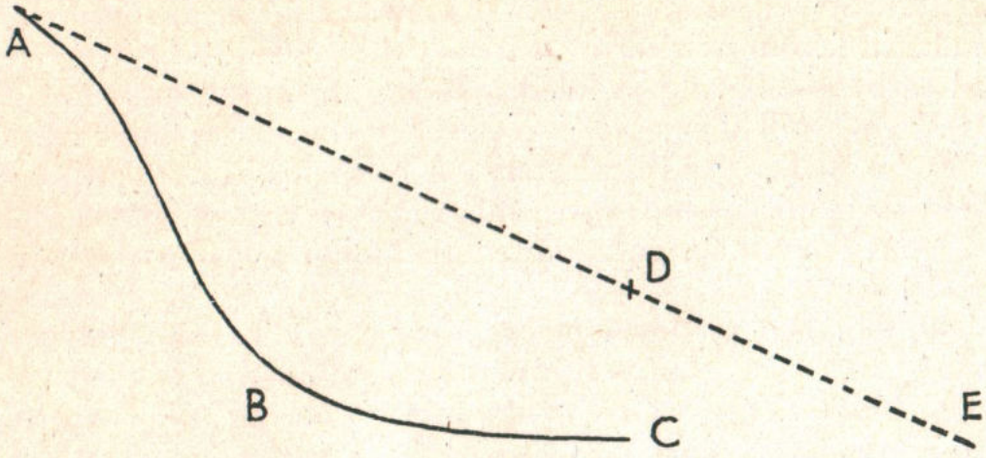


Diagram 3.

craft is "dived" to increase the speed above that of the best gliding speed, and then flattened out. This results in a path A B C, see Diagram 3.

Now if the aircraft arrives at C at the best gliding speed, then it would have arrived at D along the path A D E if that best gliding speed had been maintained throughout. It is not nature's way to give something for nothing—which means one never gets back in distance what one gains in speed by losing height. Faster than the best gliding speed, you see, shortens the range by E to C. All clear ?

Again, an alternative *alleged* method of increasing range is first to reduce speed below the best gliding speed, and then to recover that speed—having avoided reducing the speed to so low a value as to stall (we hope !) The resulting path is then A B C, as in Diagram 4. It is true that between A and B height has even been gained—at the expense of speed. But, as before, it is not nature's way to give something for nothing. One never gets back in distance what one gains in height by losing speed. If the aircraft arrives at C at the best gliding speed, then it would have arrived at D along the path A D E if that best gliding speed had been maintained throughout.

In discussing this latter method it is interesting to note that B is higher than the corresponding point on the direct route and that, therefore, whereas the path A D E may well hit an obstacle X Y, the path A B C does not. Quite! The obstacle *may* be so cleared — at the expense of shortening the range from E to

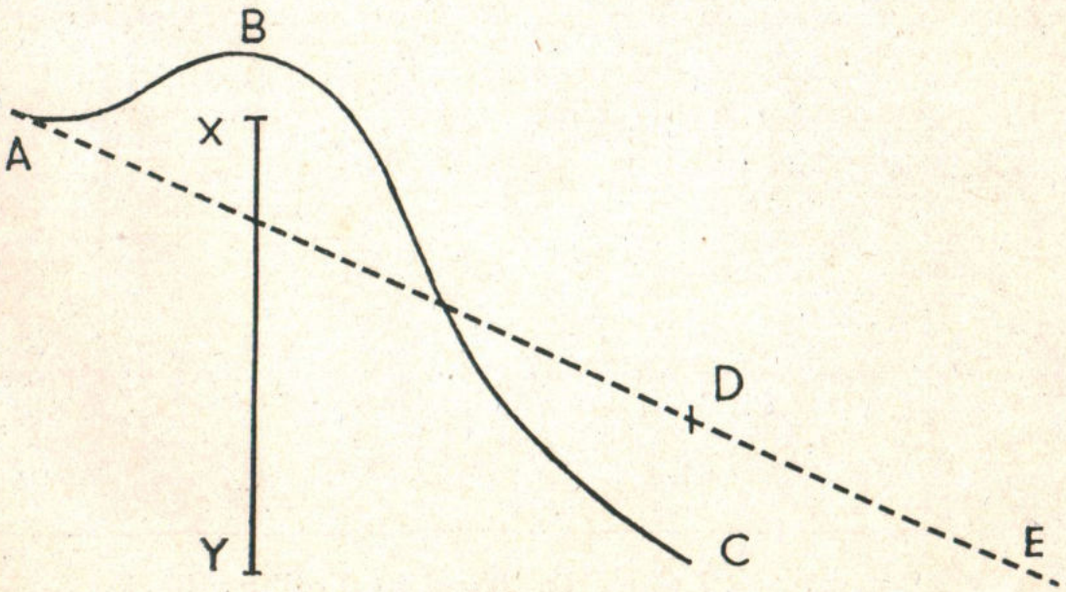


Diagram 4.

C—which is, of course, well worth while from the point of view of clearing the obstacle. All this may well be argued in favour of clearing a tree at the edge of a field. But remember what was said earlier—" having avoided reducing the speed to so low a value as to stall (we hope !)." We still hope. He is a clever man who can judge what obstacle he can clear before he stalls. And if he stalls, he earns his just reward.

But we are not supposed to be discussing ways and means of clearing obstacles. If we were, we would say put down flap, and shorten the range so as to land in the field in front of the tree !

Now we have argued stuffing the nose down, and holding it up. The only deduction is that nothing is gained by either—nor will it be by a combination of the two. *The best gliding speed gives maximum range.* Don't kid yourself you can cheat nature. If your objective is farther than the maximum range, that's just too bad. You will have to land short—or perhaps shorter. And it is better to land intentionally shorter at landing speed than unintentionally shorter at stalling speed.

THE SEVEN DEADLY SINS OF W/OPS. No. 5.

Failure to Wind In Trailing Aerial.

WHAT THE JAP IS DOING

BASIC Tactics of Jap Dive Bombing. The accuracy of Jap dive bombing is not exceptional ; it seems to be considerably affected by A.A. fire and fighter interception.

Since the start of the war, Jap dive bombers have been driven to approach our ships at increasingly high altitudes because of our fighter patrols. Lately, they have been coming in as high as 18,000 feet, then gliding down to the push-over point. Formerly the approach was at about 10,000 to 12,000 feet. The approach altitude is gained well clear of the target, a fast run-in being made upon contacting the target. Approaches will naturally be made, whenever possible, from up sun or from the direction of least visibility and of minimum exposure to A.A. fire. Sometimes Japanese dive bombers will come in at several different levels.

Japanese dive bombing formations usually run to multiples of three, as in the following : (*a*) in line, in three plane sections ; (*b*) in six or nine plane Vees ; (*c*) in Vees of Vees.

Although dive bombers approach in Vee formation, they will change into a special dive formation before reaching the push-over point. This formation will generally consist of a loose echelon or string which enables the planes to come down singly, in rapid succession, along the same line of dive.

While the normal push-over point of Japanese dive bombers is around 6,000 feet, observers have, on occasion, seen these planes diving from their approach altitude of about 17,000 feet, while at other times they have spiralled down to 12,000 feet for the pushover. Presumably the state of our defences and of the weather are of prime importance in deciding the push-over height. The glide before push-over is held at well-spaced intervals. The planes dive on a signal from the sub-flight leader ; they indicate about 240 knots in their dives. An enemy source states that the maximum speed for enemy dives is 285–300 knots.

On occasion Japanese dive bombers have failed to follow each other closely in their dives, thus leaving our A.A. gunners time to follow each plane in, and then to shift before its successor came into sight.

A CLOSE SEASON FOR M.O.'S?

And still they come . . .

CAUTIOUSLY breaking from cover (his Sick Quarters) the M.O. set course for the Mess, tired and hungry after a hectic morning's work. All the way up he kept a wary look-out, but as he was hanging his hat up in the lavatory, came the first attack, an unsuspected one from the port quarter.

" Hello, Doc., I was coming up to see you to-day. The fact is I've got a couple of spots on my chest and I was wondering if I've got anything. Just have a look, will you."

In spite of corkscrewing, a partial F.F.I. has to take place before the attacker is driven off.

While occupied in washing his hands, another E/Q (Enemy Questioner) nails the poor M.O. down. " Well, Doc., how's it going ? By the way, old Fixe said he was coming up to see you to-day. What's he got ? He always thinks he's so fit, so we'd like to rag him if he's really got something. . . . Oh, all *right !* I was only asking in a friendly way."

At the bar, while the M.O.'s vision is rather obscured by a raised can of beer, a third attacker sneaks up : " Doc., I've got a bad swelling on my wrist. I'd have been along probably this afternoon, but since you're here . . ."

Putting down his beer the M.O. investigates and prescribes. The sufferer drifts off with a final " Thanks, Doc. ! Saved me coming this afternoon."

Before he has had time to pick his beer up again F.O. Fixe has swept in from the beam.

" I did mean to go up to sick quarters this morning, Doc., but a lot of things cropped up. Anyway it's like this . . ." Yet a further consultation takes place.

A fourth takes up nearly the whole of lunch, after which the harassed M.O. escapes into cloud-cover—a pretence of sleep in an armchair—till he can escape to the peace of his Sick Quarters once more, where he has plenty of work, including consultations in their proper setting.

And this is not so exaggerated as it might seem !

Moral : It's bad form to tackle the M.O. about his job, *i.e.*, your health—unless it's absolutely urgent—when he is temporarily off duty in the Mess. (It's even worse form by the way to tackle him about the complaints of your friends however curious you are.) The M.O.'s Sick Quarters and he himself are always available during working hours.

Let there be a close season—however short—for M.O.'s. We speak, of course, only to the offenders, but are you one ?

Is Your Accident Really Necessary ?

Spit for Spat

WE APOLOGISE

WE apologise to all our readers for the fact that both last month's TEE EMM and this month's were so late in being despatched, and also that there has been delay in replying to letters and making required changes in distribution.

To tell the truth, we've been once more left for a considerable period without any staff whatsoever—and, we've only got one pair of hands, as the saying goes. What with being our own clerk and/or office-boy, as well as keeping an ear stretched for Prune-less planes overhead, things have unfortunately got a little behindhand.

PRUNERIES NOTE

CHATTING to an Air Commodore, as we were the other day—we're pretty snobbish, of course, and go miles to say " Good morning " even to Group Captains and then tell everybody about it afterwards—we were surprised to learn that he took a poor view of our integrity as an Editor—not to mention as a writer.

For he remarked that one of our awards of the M.H.D.O.I.F. in the " Month's Prunery " was " a bit far-fetched."

" How come ? " said we, politely.

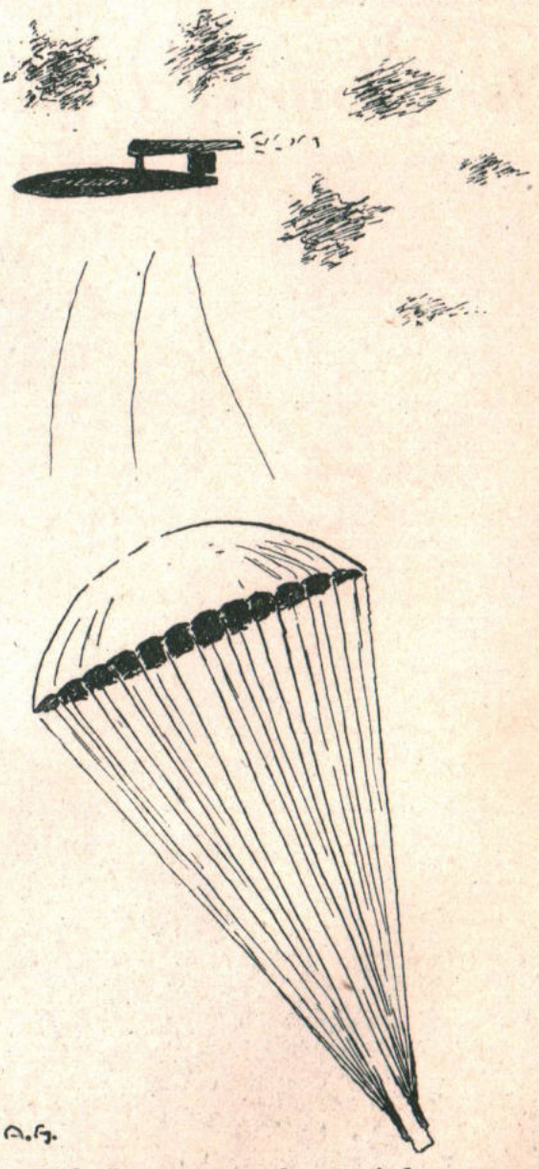
" Oh well, you know," he said, " nobody really would have done that."

We were amazed. We shook with anger. Our eyeballs suffused with blood. There was a throbbing drone in our ears. It stopped abruptly, we instinctively took cover under the desk, and came up a moment later looking sheepish. . . .

" Sir," we thundered indignantly, " do you realise that each and every one of our Month's Pruneries is *true ?* "

He looked unbelievingly at us. Then he slank away. Or maybe *we* slank away —you know how Air Commodores *can* look.

But it *is* true. All Pruneries are, to the best of our knowledge, genuine. In nearly every case we know the hero's Station ; and in most cases we know names.



P.O. Prune swears he saw it happen.

He said a Verey pistol wasn't really dangerous.

TEE EMM, the Royal Air Force's Training Memorandum, is a "Restricted" publication. This means that those not entitled to see it are *not* to see it. It is primarily a Training Memorandum for air-crews, instructors and all those in the Air Force connected with these jobs. It is, in short, a Service Training Memorandum written *for* the Service, issued *by* the Service, and restricted *to* the Service.

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KEEP SMILING

PILOT'S NOTES

ARE GOOD FOR YOU