FLIGHT STATISTICS

Another Way To Do It

An R4D–3 was parked on the warm-up apron with the engine idling while a change of instructors and students was taking place. As one of the students vacated the left-hand pilot's seat, he inadvertently disengaged the landing gear retaining lever, thereby causing the warning horn to sound. Another student, in trying to stop the warning signal by shaking the landing gear valve handle, pulled the handle into the "up" position causing the gear to retract.

Progressive Stalls and Spins

Case 1. While executing an acrobatic maneuver the pilot of an F4F–4 allowed his airplane to stall and enter a normal spin. Rotation was stopped by the proper technique, but the pilot evidently tried to pull out too rapidly and the airplane immediately stalled and whipped into a violent spin in the opposite direction. The pilot became confused and bailed out; he later stated that the second spin was abnormal in that it was so much faster than the first spin.

Case 2. Another F4F–4 was observed to stall while in a steep, climbing turn and then fall into a spin. The nose was immediately dropped as if the pilot were applying normal recovery technique, but then the nose of the aircraft was pulled up sharply and the airplane again stalled and whipped into another spin from which there was insufficient altitude to recover.

Case 3. An SNJ–3 was observed stunting at an altitude of approximately 2,000 feet. During one of the maneuvers the airplane fell into a spin from which the pilot apparently attempted an abrupt recovery. The aircraft stalled during the pull-out and fell into a much faster spin from which the pilot failed to complete recovery.

Case 4. While on his first familiarization flight in an SBD, a pilot stalled his airplane in a steep turn at an altitude of 1,400 feet. He recovered from the subsequent spin but attempted to pull out too quickly, thus causing his aircraft to enter a progressive spin from which it crashed.

BUREAU COMMENT **These examples, taken from recent trouble reports, indicate a lack of familiarity with the progressive stall characteristic possessed by all aircraft, which is the tendency of an airplane to stall at increasingly higher airspeeds as higher acceleration ("g") is attained.**

All aircraft are designed to stall at a certain airspeed for certain flight conditions; namely, for a specified gross weight, at sea level, and at temperature of 15° C. The stalling speed of an airplane, as listed in the performance chart, is figured on this basis; the airplane will have different stalling speeds for other conditions. Naturally, if you carry less weight, you can fly at a slower speed without stalling; and don't forget, if you overload an airplane, it will stall at a higher speed.

The stalling speed of an airplane is mainly dependent on wing loading. The higher the wing loading, the higher the stalling speed; the formula being that the stalling speed of any particular airplane varies as the square root of the wing loading. Also, the wing loading of any airplane increases in direct proportion to any increase in acceleration ("g"); therefore, giving us the simple formula that stalling speed increases as the square root of "g." Thus we find that if, during recovery from a dive or spin, we use a 4 "g" pullout, our stalling speed will go up during this period as the square root of 4, or twice the normal stalling speed, while a 9 "g" pullout will give us three times normal stalling speed. In other words, an airplane with a 70-knot normal stalling speed will stall at 140 knots during a 4 "g" pullout and at 210 knots if 9 "g" is reached. Do you begin to see why it is so easy to go from one spin into another, at progressively higher stalling speeds?

There is another important factor which affects stalling speed and that is the angle of bank. Stalling speeds are figured for level flight. Everyone knows that an airplane will stall and spin at a higher speed when banked than when in level flight. This is equally true when recovering from a spin or a dive and it is for this reason that it is important that wings be absolutely level in such recoveries.

An understanding of the following physiological reactions during a spin and subsequent recovery is also important, in that these reactions may have a tendency to influence the pilot to employ wrong recovery technique and thus prolong the spin:

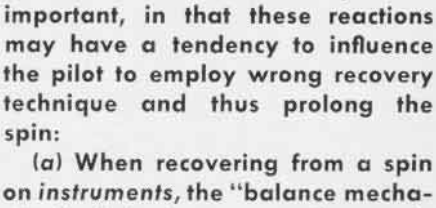
(*a*) When recovering from a spin on *instruments*, the "balance mechanism" of the inner ear will react in such a manner as to cause a tend-

With Comments by GRAMPAW PETTIBONE

All-Time Record

NATC, CORPUS CHRISTI.—The number of students graduated and the total hours flown at the Naval Air Training Center, Corpus Christi, for the month of March 1943 is an all-time record for that Center, and for all aviation training establishments in the world, in so far as is known.

HOW'S YOUR NAVIGATION TODAY?



ency to reenter the spin in the *same* direction to that of the original spin.

(*b*) When recovering from a spin by *visual contact,* the physical stimulus is such as to cause a tendency to reenter a spin in the *opposite* direction to that of the original spin.

(*c*) Upon removing the stress of centrifugal force, such as is obtained in a tight spin, there may be a disagreeable feeling of falling, even when flying contact. This may cause a tendency to pull back on the stick, even in level flight. A pilot must overcome this reaction by will power and a visual check of the instruments.

(*d*) During a spin, a slight movement of the head to read a low-placed instrument may produce the sensation of going past the vertical, thus influencing the pilot to pull back on the stick, resulting in a dangerous prolongation of the spin. Consequently, it is advisable to hold the head very still during a fast spin.

It will be noted that in Case 1 the pilot became confused and stated he bailed out because his second spin was abnormal, in that it was so much faster than the first spin. The second spin was not abnormal; it was merely faster than the first spin because it was entered at a much higher speed.

Recovery technique for a spin entered from a progressive stall is the same as for a normal spin, except that, due to the faster spin, it will usually be necessary to apply corrective controls *for a longer time* to get the desired results. Also, because of the higher speed, the pull-out must be less abrupt; sharp pull-outs increase the "g's" and, therefore, the stalling speed. Failure to allow for this is considered the major cause of progressive stalls and spins.

See T. O. #3–42 on this subject.

Pilot-Caused Engine Failures

Case 1. After warming up the engine, an SBD–3 pilot taxied for approximately 6,000 feet to the take-off position, using about 750 r. p. m. He then tested the "mags" and began his take-off. Just after the plane was airborne, the engine began to lose power, necessitating a forced landing in very rough terrain beyond the end of the field.

The Trouble Board said: These engines will foul up if the r. p. m. is allowed to drop below 1,000 for any length of time. As a rule, testing mag-

netos at 1,750 r. p. m. will not reveal this condition. Usually the drop in power will not occur until approximately 35″ H. G. is reached on the take-off run, and in most cases the pilot can notice it soon enough to stop his run and clear the engine for a second take-off attempt. All pilots on this station have been instructed as to the danger of fouling spark plugs and have been ordered to keep r. p. m. above 1,000 when idling. After taxiing long distances they have been told to run the engine up to 1,800 r. p. m. for a short period, then turn up to full power as a final check. On the take-off run they have been instructed to be particularly alert for drop in power.

Case 2. An F4F–4 pilot practiced a few stalls at 6,000 feet altitude and then executed several slow rolls, the last one of which was prolonged. A few minutes later, when taking off after a practice landing, the engine failed completely. During the subsequent forced landing the aircraft received major damage.

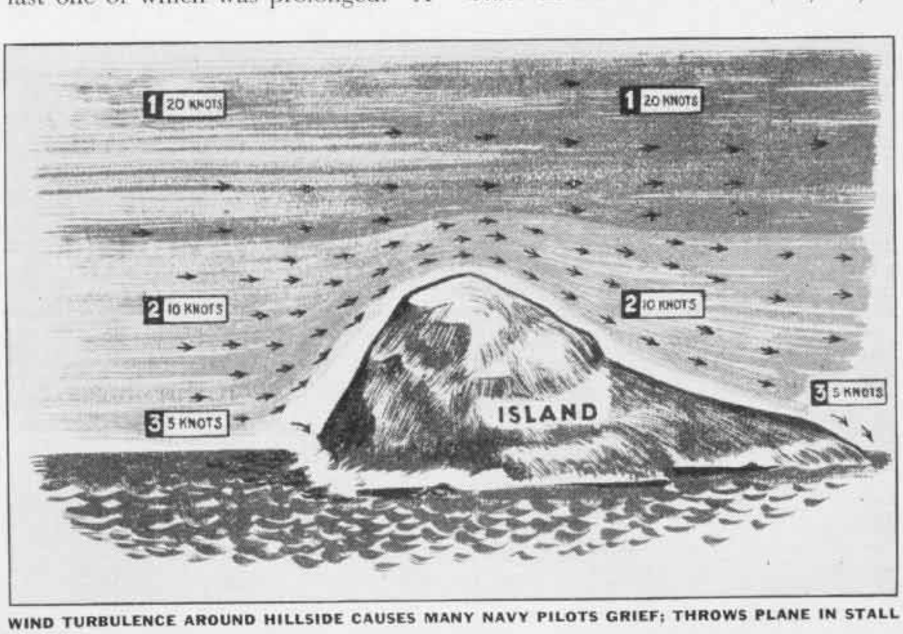
In the opinion of the reviewing authority, the cause of this engine failure was error of judgment and poor technique on the part of the pilot in prolonging a slow roll to such an extent that oil pressure dropped excessively, thus allowing the engine bearing to be wiped clean, which resulted in ultimate failure of the engine.

BUREAU COMMENT **In connection with the above cases pilots should review articles 14–203, 14–217, and 13–124 in the Bureau of Aeronautics Manual.**

Turbulence Near Hillsides

NATTC, Corpus Christi.—A recent item in News Letter on turbulence in the vicinity of hillsides has brought to light a similar experience with this natural phenomenon. A pilot of this command reports having had a loss of flying speed and subsequent stall while making a landing on the windward side of the island.

The plane, an OS2U–2, dropped in on an even keel from a height between ten and twenty feet. The principle illustrated is that as the plane passes into a level at which the wind velocity is reduced, if there is no acceleration of the plane, air speed is correspondingly reduced. The result is a definite scare when the plane stalls unexpectedly. (See *Beware of the Leeward Side!* in News Letter 4/15/43.)



WIND TURBULENCE AROUND HILLSIDE CAUSES MANY NAVY PILOTS GRIEF; THROWS PLANE IN STALL

Metamorphosis of a Navigator

Some pilots learn by study, others by observation, but some learn only the hard way.

A review of the circumstances under which the pilot of an OS2U–3 got himself completely lost on an anti-submarine patrol, may prevent other and less lucky pilots from getting lost the same way.

This pilot knew his surface wind, at the time of departure, was 15 knots from 045 degrees. He had the radioman take a drift sight at 2,000 feet. The radioman reported this wind to be 35 knots from 127 degrees.

Using this wind, the unsuspecting pilot went blithely on his way.

This was the basic error.

For the radioman didn't know how to use the drift sight. And the pilot should have known this. Anyway, knowing the surface wind, he should have been suspicious of the wind as reported at 2,000 feet.

We pick up our unsuspicious pilot again 4 hours later, when his flight should have been completed. But there was no land in sight. As one wag put it, he was completely "at sea."

Finally suspecting the drift sight, the pilot reworked his navigation, using the surface wind. This put him approximately 50 miles south of his base.

He then requested his radioman to take a direction finder bearing of the base. This was reported as 214 degrees.

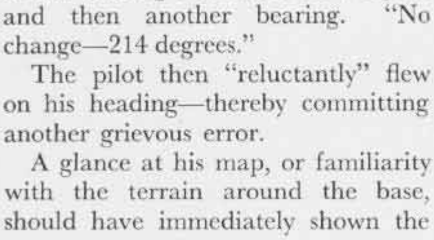
But the radioman, apparently, wasn't any handier with the direction finder than with the drift sight.

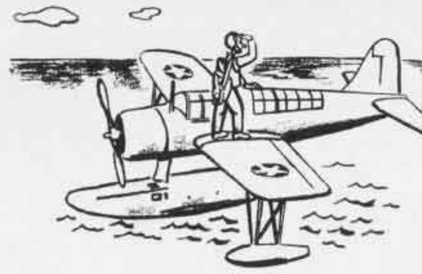
The pilot did suspect the accuracy of this bearing and asked for a repeat and then another bearing. "No change—214 degrees."

The pilot then "reluctantly" flew on his heading—thereby committing another grievous error.

A glance at his map, or familiarity with the terrain around the base, should have immediately shown the pilot that the bearing could not be correct, or they would then be over land.

HOW'S YOUR NAVIGATION TODAY?





Whether this bearing was entirely erroneous, or possibly a reciprocal bearing, was never cleared up.

What finally happened? Oh, about the time the gasoline supply was exhausted, a tramp steamer came along and the pilot landed alongside and got a tow.

Grampaw Pettibone says

There being more airplanes than ships, don't depend on a tramp steamer to cover up your faulty navigation. Also, there is no good substitute for common horse sense.

Collision During Night Take Off

Two SNJ–4 student pilots were parked on the end of the runway waiting for the take-off signal. One plane was about 100 feet to the rear of the other and apparently in line with the tower. When the green light was given the first plane, each student thought it was meant for him, and both began simultaneous take-offs. The first plane was overtaken before it left the ground and was completely demolished. In the opinion of the Trouble Board, this collision was due entirely to carelessness on the part of the student piloting the overtaking aircraft because he failed to determine that the runway was clear before commencing his take-off.

PV-1 Take-Off Crash

After gaining approximately fifteen feet altitude on take-off, the starboard engine failed. An immediate forced landing resulted in extensive damage to the aircraft. Upon investigation, it was determined that the pilot had attempted take-off while using fuel from the wing auxiliary tanks. The capacity of these tanks is 162 gallons and at the time of the crash, they contained only about 25 gallons. It is believed that the small amount of gasoline in the wing auxiliary tanks was insufficient to cover the standpipe, thus allowing air to be sucked into the carburetor, causing engine failure.

The Trouble Board recommended that no take-offs or landings be made on the wing auxiliary gas tanks.

BUREAU COMMENT **Pilot's Handbook states that take-offs shall be made on REAR MAIN.**

* * *

For Sheep Who Fly

This paean of praise and trust was discovered hiding under a bushel in Pre-Operational Training at Miami by a traveling bureaucrat of the Gunnery Training Section looking for some flight time and a sun tan. It was thought it might be appreciated by operating pilots to whom the signal officer means home, supper, a bunk, and some rest.

A PILOT'S VERSION

The landing signal officer is my shepherd;
I shall not crash!
He maketh me to land on green runways.
He waveth me off the rough waters.
He restoreth my confidence.

Yea, though I come stalling into the groove
At sixty knots,
I shall fear no evil
For thou art with me.
Thy hands and thy flags they comfort me in the
Presence of mine enemies.

He attacheth my hook into a wire;
My deck space runneth over.
Surely safety and caution shall follow me
All my days in the fleet,
And I shall dwell in a fool's paradise forever.

—C. M. R.