BRISBANE VALLEY FLYER

July 2023

Watts Bridge Memorial Airfield, Cressbrook-Caboonbah Road, Toogoolawah, Q'ld 4313.

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Victa (Airtourer) 100. Image by Phil Vabre - http://www.airliners.net/photo/Victa-Airtourer-100-A1/.

See the Victa Story, page 10.

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Greetings members,

Well, we are now heading into July, halfway through the year. It is going by fast.

Our last meeting was held at Wivenhoe Dam and was well attended. This meeting was also going to be our poker run, but with the late replies from some airfields, the committee had to make the call and cancel it for now.

Please join us for the next meeting to be held 01 July at the Clubrooms at Watts.

Best wishes

Peter Ratcliffe
President BVSAC

Thou Shalt Manage Thy Fuel ….. OR ELSE!

By Rob Knight

Statistics are well loaded with anecdotes of aircraft running out of fuel. Yes, it's always the aircraft that runs out of fuel, not the pilots. However, the pilot's absolute duty and responsibility is to ensure that there is sufficient fuel to carry out the intended flight plus any reasonable contingencies.

This is well covered in aviation law, in particular the legal requirements to carry fuel loads sufficient to reach alternate airfields etc. However, there's a lot more to secure fuel management than merely what the law infers.

A few examples of aeroplanes having very specific fuel system requirements which make their fuel management requirements specific to type would include:

- The Piper Colt in which I flew my first solo was placarded that take-offs and landings should only be made with the left fuel tank selected. Piper sold the aircraft as an economy model (read that as a cheaper purchase price) with only a fuel tank in the left wing-root. An up-grade was later available that had a second tank fitted into the right wing-root. Called an "auxiliary tank," it was plumbed into the fuel system in a manner than only ensured constant fuel supply in level flight, hence the placard. In the Colt, the fuel tanks had to be managed, as well as the quantities to ensure fuel for destination landing.
- Piper PA32 Cherokee sixes and Lances have four tanks, two main and two tip tanks. When refuelling, the tip tanks should always be filled first and, in flight, the mains should be used before the tips. The in-flight requirement to burn fuel from the main tanks first keeps the load better spread along the main spar. In this aircraft was a placard restricting take-offs and landings to the main tanks only.
- Mooney aircraft, at least up to the M20C model should have their top wing surfaces covered if parked outside and rain is possible. Water, collecting in their recessed and lockable fuel caps, trickles down through the lock mechanism and runs directly into the fuel. After one wet night at Ardmore, New Zealand, I personally collected more than a pint of water from each tank the following morning. The aircraft didn't have the ubiquitous contamination traps of other aircraft, but rather a drain to a flushing sump and a flushing system as the following excerpt from the M20C POH depicts.

  > *"The fuel tank selector valve drain control is on the cabin floor forward of the pilot's seat. To flush the fuel selector valve sump and the lines leading from the wing tanks to the selector valve, turn the selector handle to the left, and pull the fuel drain control for, about five seconds. Repeat the procedure for the right tank, being sure that the fuel drain control is returned to the closed position and that the drain valve is not leaking."*

  In my experience this was unique, and this knowledge was very much a requirement when converting pilots on to type. This example serves to illustrate how important adequate and appropriate conversion training onto a new aircraft type can be. It also notes in the Flight Manual that the total fuel capacity and the useable capacity are the same, the only flight manual in which I can recall seeing such a statement recorded.

- The Beechcraft A36 Bonanza series aircraft had a wide variety of auxiliary fuel arrangements available, and a wise pilot would ensure they knew and understood exactly what is fitted to the aircraft they're strapped to, and how it, specifically, should be operated. Such variations in their auxiliary fuel systems could include:
  - Fuselage mounted tanks in the rear baggage area,

- ❖ Wing mounted, internal auxiliary fuel tanks,
- ❖ Wingtip tanks feeding fuel directly to the engine, and,
- ❖ Wingtip tanks that transfer fuel into the main wing tanks for supply selection.

Note that this list does not include such systems that might be fitted as temporary arrangements for ferry flights over long range or even oceanic flights. Please also note that this disclaimer also fits with any/all aircraft being ferried over long distances and is not intended to reflect solely on the Beechcraft A36 aircraft. Ferry operations and trans-oceanic aircraft flight fuel system requirements fall outside of the scope of this article.

As in all cases, the pilot-in-command of any aircraft is responsible to ensure he/she is sufficiently knowledgeable to be competent in all that aircraft's systems and operations, including fuel management.

- The Victa/Airtourer series of aeroplanes has, perhaps, one of the simplest fuel supply systems around. Excluding the CT4, the 100s, 115s, 130, and 150s, all had a simple rotating tap control on the console between the seats. The fuel was either ON, or it was OFF. The selector lever was red and the pilot simply pointed the sharp end to either ON to supply fuel to the engine, or OFF to shut the supply off. However, such simplicity was not continued in the Victa's fuel dipstick design.

The Victa fuel tank was a rubberised bladder installed beneath the cockpit bench seat and the filler cap was vertical on the starboard fuselage side. This meant that the dipstick had to bend close to 90˚so the tip could touch the bottom of the tank for accurate dipping. Therefore, Victa made the stick – it had a handle with a "T" button, placed for one's thumb, attached through a spring and strong cord to the last of about 6 segments, each one reading 5 gallons (imperial). Pressing the button made the string of linked segments go limp and they could be thrust through the open cap on the aircraft's side. When the button was released, the spring shortened and "stiffened" the stick. The tip of the erect stick was then to be gently tapped on the bottom before the whole thing was pulled out so the dampness mark on the segments could be read to indicate the level of fuel present. To ensure the dips were reliable, the tank was always dipped three times and the average of the dips used as the likely quantity of fuel held. Teaching young women to fly these aircraft did result in some ribald comments and red faces at the time, where double entendre's were rife and such statements, "The Victa dipstick, the only thing that goes in soft and comes out soft", were common. Some of these young women are now senior Captains for Qantas and Air New Zealand, so I doubt the dipsticks caused any real trouble. Anyway, the flight manual gave appropriate instructions on how to use the dipstick for anyone trying to figure it out for themselves.

The Victa/Airtourer dip stick
Image courtesy of Doug Stott

Worthy of another note here is the point that dipsticks are made individually for each aircraft. No pilot should ever use the dipstick for another aircraft to check the fuel quantity in his own. For that reason, properly made dipsticks have the registration cut into/stamped onto their shaft for specific identification. Before you dip any aircraft fuel tank, check the dipstick is appropriate to that aeroplane.

Other fuel system designs and issues are widespread across all aircraft types and care must universally be taken on every individual type to ensure that the specific machine is operated correctly. Such items include fuel tank vents, their location and operation specific to the type of aircraft being operated at the time, and fuel caps, and fuel contamination drains. The pilot flying each type must be familiar with the individual aircraft systems, and be able to operate them proficiently to be competent to operate that aeroplane. Let's examine the issues with some.

Fuel Tank venting Systems.

Fuel tanks cannot operate without vents for the fuel supply system to function. If we have a tank filled with fuel (or any fluid) and slowly draw that fuel out, we must allow air into that tank to replace the volume of fuel being drawn away. Unvented, flow will begin but that quickly reduces and will eventually stop. If a pump is used, the flow will continue longer but eventually, again, with nothing to replace the volume of liquid being drawn away, the tank will crumple and collapse. Now, with a greater volume of liquid removed, the crumpling will be far worse.

Fuel tank collapse caused by a blocked vent

It should be obvious to all, then, that a blocked vent is a dangerous situation to encounter in any aircraft. Not only will the engine stop when it cannot be supplied with fuel, but substantial damage will result in the airframe.

So how many fuel tank venting systems can possibly exist? Let's list a few. Some tanks vent through the fuel caps, either as threaded fittings that require special adjustment and checking after every refuel, or as tubes with one-way fuel valves fitted. Yet others are curved metal tubes rising up from the caps before curling forward and down 180° so the open end points down, towards the wing's upper surface.

Other designers vent tanks from a special line from the tank upper regions to the underside of the aircraft's wing tips. More yet sneak a line from the tank to the wing trailing edge, some venting at the trailing tip corner if flaps are fitted, others out from the underside of the trailing edge inboard, close to the fuselage when flaps are absent. Yet others vent through tubes extending through the wing's under-surface, inboard, close to the main wheels. Obviously, then, a pilot must be conversant with the fuel tank venting system on the aeroplane he/she is flying to ensure its not blocked and the engine fails and the tank collapses.

Fuel Caps

There are as many fuel cap designs as there are flies in the NT. Some caps screw on, using threads, others have tangs and rotate a mere 90° to lock on or unlock to remove. Some sit proud of the wing surface; other types are recessed and have levers to lock them.

The loss of a fuel cap in flight can be very expensive. Not just that the caps alone are costly, they are, but the airflow will draw fuel from the tank affected and you can run out of fuel. This will create a whole new set of issues likely to cost a hellava lot more than that fuel cap. A pilot MUST understand how the fuel caps function to ensure they remain in place for the duration of the flight and don't leak fuel, either liquid or vapour.

Fuel Gauges

Also relating to fuel is the question of fuel gauge indications, for both accuracy and in-flight reliability. Generally, gauges are so notoriously unreliable that pilots are taught to consider most readings advisory at best, and to use dipsticks for accuracy of reading fuel levels on the ground. As illustrated in the Victa Airtourer series mentioned earlier, even dipstick readings require caution they are not always as precise as we pilots would expect. Common issues with their accuracy stem from even slight rocking of the aeroplane whilst dipping, the movement caused either by the pilot climbing up to dip, or wind effects rocking the aeroplane, or passengers loading items. In many aircraft types, even a slight and gentle movement can result in an indicated fuel level that is 5 litres or more than what's in that tank, which is 10 litres or more for two tanks. A 10-litre quantity represents close to half an hour's flight time in many 100hp aircraft and, in bad weather, that 30 minutes could be a life-saver. If you can't be accurate, find something else to do.

The early model Fletchers I used to fly when crop dusting had fuel gauges built into the top surface of the wing and slanted in a manner that allowed the pilot to see and read them from the cockpit. It was a pity that they were too unreliable to bother with – we only ever used dip readings and an hourly burn-off rate to assess quantities remaining. The process worked extremely well. In fact, it's the initial method of basic fuel assessment that was taught to me in 1961 when I started training in a Piper Cub. Dip the tanks carefully and find a total fuel on board value, and divide that by the aircraft's burn rate appropriate to the flight. Apply that to the estimated take-off time and you have the estimated time your engine will stop. Note that you MUST be on the ground, out of the air, before that time. What else do you need to know for a basic fuel-out time on most light aircraft operations? That method has served me now for sixty-two years, I reckon it's proved its reliability as I am still here. Be a wise pilot and re-calculate that time when doing the pre-take-off checks for a final and more accurate maximum endurance time assessment. That's what the, "Fuel sufficient for Flight", bit really means.

Another fuel gauge issue that besets pilots is mentally registering the actual values indicated in the gauge readings. Gauge indications can be in fractions, Imperial gallons, US gallons, pounds and/or kilograms. Also, as some scales do not read proportionally, if the gauge reads in proportions and the needle indicates half way between the full and the empty marks, don't assume that the tank is half full. Assumptions crash aeroplanes with monotonous regularity. It's amusing to note here that a Piper Chieftain imported in New Zealand in the late 1970s had fuel gauges installed by Piper that the NZCAA refused to accept: the gauges indicated in fractions – Full, ¾, ½, ¼, and Empty. It was refused a Certificate of Airworthiness until the gauge indications were annotated to indicate that these proportions represented US gallons. Think about it….. Sometimes the authorities are of little help!

A two-tank fuel gauge. It states that it reads in gallons, but are they US or Imperial. The difference could be a matter of more than a little consequence to those on board.

Note:

10 x US Gallons = 27.2kg

10 x Imp Gallons = 32.7kg

So far, we've touched on a few of the mechanical issues. How about the cockpit management side of things? How about issues that occur in the actual understanding of fuel management needs.

Let's start with an example. A Victa 115 left Christchurch, New Zealand, for a time-building flight by a PPL collecting hours for his CPL. His tank was full – 29 Imperial gals of fuel and, using a cruise burn rate of 5.5 Imperial gallons per hour, he anticipated a total endurance without reserves of 5 hours and 15 minutes as he set heading for Greymouth on the West Coast. His plan was to cross the Alps to Greymouth and return to Rangiora, across the Alps for the second time. After a touch and go at Rangiora, he intended to cross the Alps yet again, enroute to Hokitika where he planned to refuel. The total planned time came to 2 hours and 52 minutes, leaving a reserve of 2 hours 23 minutes. His third attempt to ascend the Southern Alps was uneventful until his engine stopped and he was, fortunately, able to forced land on a sheep station with only unusable fuel remaining. Where had all his fuel gone as his total flight time had only reached 2 hours and 17 minutes according to his flight log and hour meter? He lost it in his poor fuel management due to a lack of knowledge. Had he already done his CPL training, he would have known that, for any sustained climb (generally considered to be any climb to a height in excess of 5000 feet above the departure airfield) consideration of the extra fuel burned at the climb power setting should be applied instead of the cruise rate. It is wise to consider, unless more specific data is available pertaining to the aircraft being flown, that a sustained climb at full throttle might consume three times the fuel burn at the cruise rate. He had climbed the Victa through 17,000 feet, at full throttle and should have allowed for a burn rate for his climb time of 18 imperial gallons per hour. That's just poor fuel management through a lack of knowledge. Alas, that lack of knowledge did not release him from his embarrassment and it was only good luck his engine did not fail in the less hospitable terrain crossing the Alps themselves. I did his CPL training sometime after this event and his lesson had been well learned. By spreading the word, I hope his lesson gives others food for thought.

Another issue regarding fuel management is relevant to aeroplanes fitted with a manual mixture control. And herein lies another message relating to specific knowledge about the specifics of the aeroplane being flown. Most light GA aeroplanes are fitted with either a Continental or a Lycoming engine. To the uninitiated, they look the same, sound pretty much the same, and have the same set of cockpit controls to operate them. However, using the wrong method for cruise mixture leaning on the wrong engine can quickly cause the engine to fail, and subsequently require deep pockets to repair the damage.

Cessna 150s, 170s, early 172s, Victa 100s, and Morane-Saulnier MS880B Ralleys were all fitted at manufacture with Continental engines. A simple and reliable powerplant, and very economical in training aeroplanes, they stated in their relevant flight manuals that the process to lean the engine without access to an EGT gauge when cruising at altitude was to first set up the cruise at the desired RPM. Then the mixture control should be drawn backwards until rough running was discernible in the engine. Immediately, on feeling and hearing the start of the rough running, the mixture control should be pushed forward by half the distance it had been drawn back, and then left alone until a change in altitude or power setting was required. At those times a full rich mixture should be re-selected.

Cessna 152s, later 172s and 182s, Victa 115s Piper Colts, Tomahawks, and Cherokees, and Grumman aircraft, were fitted with Lycoming engines. They required a specifically different process to correctly lean the mixture for cruise when an EGT was not fitted, which was most common in the two seaters. For these engines, cruise was to be set up at the desired RPM, and then the mixture control again drawn back until rough running was experienced. At that specific point the process underwent an important change. Now the mixture control was to be pressed back only a tiny amount – just enough to remove the roughness and restore smooth running, not back to the half-way mark as required by the Continental engines.

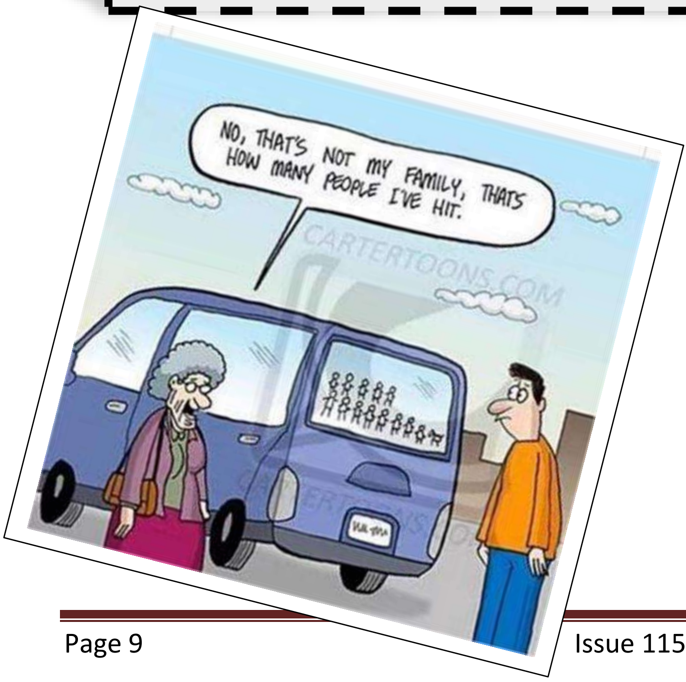
Whilst using the Continental method on the Lycomings never causes an issue because they run just a little richer than they could be, if the Lycoming method is used on Continentals, woe betide the hapless pilot. The mixture remains too lean and the engine is likely to detonate, the explosive detonations punching neat round holes (like bullet holes) through the piston crowns. Naturally this reduces power output somewhat, and forced landings become a probable outcome depending on the number of pistons damaged. An extensive engine overhaul will also be needed after the flight.

I recall one instance of this occurring to a pilot trained on a Victa 115 fitted with a Lycoming 0235 engine. Several years later that aircraft was out for maintenance so he booked the club's newly acquired Victa 100 with a Continental 0200 instead. He planned to fly from Whangarei to Hamilton in New Zealand and bring his fiancé back to visit his farm. But south of Auckland on his return flight, his engine briefly rattled, lost power and the prop stopped resulting in his putting the aircraft, him and GF ignominiously into a farmer's paddock. He had applied the inappropriate Lycoming leaning process to the Continental engine in that he failed to press the mixture control about an inch further in, towards the instrument panel when he leaned for cruise. That was all it took! The damaged pistons were displayed in the Club bar as a warning to all about flying the aeroplane that's strapped to you bum, and not something else.

Pilots owning their own aircraft may consider these writings not particularly relevant as they only need to be familiar and competent with that single type they operate. In that, they do have a point but, one day, they just might trade that aeroplane up to a bigger, faster, more sophisticated one. Then they will need to have considered the points made in here. Also, it might just serve to remind readers of the professionalism of their instructors. While students commonly learn on just a single type, their instructor will need to keep up with the play on every aircraft that he or she instructs in. Whatever is on the flight line, they must be able to adjust to immediately, and cover every aircraft's quirks every time they are strapped into it. At Waitemata Aero Club, where I was deputy CFI, the club flight line included a Piper Cub, Victa 100s, Piper Tomahawks and Cherokees 140, 151, 180 (and intermittently a 235), Cherokee Arrow, and Cherokee sixes, Cessna 152 (Texas Taildragger version), Cessna 177 Cardinal, Maule Rocket, Mooney M20c, Beechcraft A36 Bonanza, and CT4. Each with its own set of special needs. If you find a good instructor – treasure him or her.

My advice – always ensure that you are knowledgeable on the aircraft that you fly: your life might just depend on it. It matters not what you know about other aeroplanes, it only matters what you know about the one that you are flying.

Happy Flying



The Victa Story

By Rob Knight MA23-118

The prototype Air Tourer VH-FMM about to be test-flown in 1959

The AESL Airtourer is a light, all-metal , low-wing monoplane touring aircraft developed in Australia and manufactured in New Zealand. It was the winning design in a competition organised by Australia's Royal Aero Club in 1952. A wooden prototype, the Henry Millicer designed Airtourer was constructed by a small group of enthusiasts in the Melbourne suburb of Williamstown and was test flown in March 1959 by RAAF pilot Flight Lieutenant Randall Green.

The prototype was demonstrated to aero clubs and flying schools where significant interest was shown as a Tiger Moth or Chipmunk replacement. After trial flights were completed, sufficient general interest had been aroused for the design to progress to an all-metal version where it caught the interest of Mervyn Richardson, the Chairman of Victa Ltd who was best known for making lawn mowers and who, at the time, had some aviation manufacturing interests.

During the period 1961 to 1966, Victa Ltd. undertook production of the all-metal Airtourer, building both 100 hp and 115 hp models. Production by Victa took place until 1966 when the line closed down.

As the Australian Government had rejected Victa's appeals for tariff protection assistance, and for funding assistance to keep the production lines open, the company had no choice other than to close down its Aviation Division in February 1966, by which time it had built 168 aircraft.

The manufacturing rights to the Airtourer were purchased the following year by the New Zealand aircraft maintenance company A.E.S.L. Ltd (Aero Engine Services Ltd) who produced further 115 hp and 150 hp models in the period to 1971. Ironically, one of its largest offshore orders came from the Royal Australian Air Force which purchased fifty-one uprated Airtourers (designated as CT4 Airtrainers) between 1975 and 1982. These remained in service as the RAAF's ab initio trainer until 1993 and indeed, the CT4 is still being used (in Tamworth) as the basic trainer for all Australian military pilot training.

Victa 100 ZK-CGM S/N 55, Built in Australia, flown in New Zealand

A total of 168 were completed or significantly completed by Victa in Sydney and a further 80 built by AESL in Hamilton NZ. However, it would be correct to say that 170 serial numbers were issued by Victa and 80 by AESL.

VARIANTS

AESL purchase of the type from Victa included parts from which 7 Airtourers were assembled before AESL launched production of its own, Hamilton- built aircraft. Ultimately, the type extended to seven variants as follows.

T1 – powered by a 100 hp Continental O-200.
T2 - powered by a 115 hp Lycoming O-235 engine.
T3 - powered by a 130 hp Rolls-Royce/Continental O-240 cu engine.
T4 - powered by a 150 hp Lycoming O-320-E1A (with a fixed pitch propellor).
T5 - 150 hp Lycoming O-320-E1A (fitted with a CSU).
T6 - initially a small run of 4 aircraft for the RNZAF with a 150 hp Lycoming O-320-E1A driving a CSU.
T8 - 160 hp Lycoming AEIO-320 with fuel injection.

A higher powered 4 seat variant named the Aircruiser, had been built by Victa in 1966. With the sale to New Zealand ownership of this aircraft passed to AESL who remanufactured it in a configuration which became the prototype of the successful CT/4 Airtrainer, production of which was continued by AESL which, by then, had morphed into Pacific Aerospace.

Victa Aircruiser

AESL's production of the Airtourer began in July 1967 and terminated after the delivery of 87 aircraft, in July 1973. Rights to produce the Airtourer were then on -sold to Edge Aviation back in Australia. Edge rebuilt a single AESL aircraft but to date there has been no further production of the type.

ZK-CXU. MOTAT. Auckland New Zealand

A large number of Airtourers continue to fly, particularly in Australasia, and a sizeable contingent continue to operate in the UK.

A T2 was sent to the USA but the FAA were displeased with the extensive use of pop rivets in the type's production and issues developed that would have restricted sales in the US. No further exports from New Zealand to the USA are known.

As depicted in his book, “The Flight of the Kiwi”, AESL delivery pilot Cliff Tait flew Airtourer T2 ZK-CXU on his record-breaking flight around the world in 1969. During the flight he covered 29,000 nm 288 hours .

The author instructing in T3 ZK-DLU in 1978

CT4B. ZK-DGY, a great aerobatic trainer

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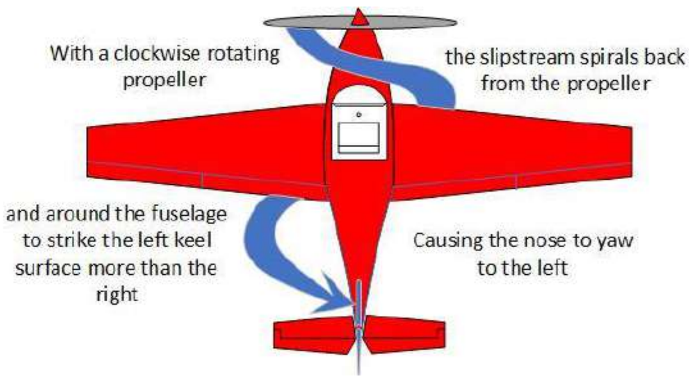
When the Slipstream Pulls You Sideways - WTF

By Rob Knight

When an aeroplane throttle is advanced at the beginning of a take-off roll, the RPM increases and the aeroplane accelerates as the propeller pulls it forward. But this is not all it does – the propeller also tries to pull the aircraft's nose sideways. Well, almost! The slipstream generated by the propeller actually provides an uncommanded sideways force quite sufficient to, if left uncorrected, see the aeroplane leave the runway. It's totally up to the pilot to maintain directional control and counter this yaw with appropriate rudder application. This uncommanded yaw will be apparent at any time the aeroplane is flown at a speed lower than its design cruise speed with a higher power application than its design cruise power, so it is most apparent at low speeds and high-power settings – exactly the conditions when beginning the take-off roll. This issue, known as *slipstream effect*, is recognised as being one of the five factors causing nose swing on take-off in single-engined aeroplanes.

It's easy to imagine that the propeller blows air directly backwards but, by the propeller's rotary motion, it also imparts a "swirl" to the rearwards-moving airflow. As this swirl passes along the fuselage, it imparts a greater force on one side of the aft fuselage/keel surface than the other, the side with the greater force being determined by the direction of propeller rotation.

Most aeroplane propellers rotate clockwise when viewed from the cockpit causing the down-going blade to be on the left side of the engine (for tractor aircraft[1]). The airflow spiral, or swirl, will therefore exert a greater force on the left side of the keel surface aft of the centre of gravity and including the tail fin, pushing the tail to the right. As the aeroplane yaws about its CofG, a left-acting force on the aft keel will yaw the nose left. Aeroplanes with anticlockwise rotating propellers will experience the same force, but on the other side keel surface, and yaw right.



Slipstream effect from a clockwise rotating propeller.

As mentioned, the intensity of the slipstream effect is a function of low airspeed and a high-power setting. At these times, as are typical of the take-off and climb, the effect is strongest because the magnitude of the swirl in the slipstream is greater relative to the airspeed of the aeroplane. If it is fitted with a rudder trim, this can be adjusted to counter the slipstream effects whilst climbing, however, aeroplanes not so fitted will be set up for zero rudder pressure coordinated cruise flight, which means that pilot intervention will be necessary to keep straight on take-off and the ball centred in the climb.

At lower power settings such as when on approach, even though there is a lower airspeed than cruise, the force is negligible because there's very little slipstream and no corrective rudder control is required.

But wait – there's more….

[1] Tractor aircraft – aeroplanes with the engine in front, pulling forwards.

In regard to the aeroplane's wings, the spiralling slipstream behind a propeller produces an upwash behind the up-going blade and a downwash behind the descending blade. If there is a wing surface close enough behind the propeller, this effect will increase the local angle of attack on the wing root on one wing and the reverse on the other because of the different relative airflows. At sub-stall angles of attack, this increases localised lift on one wing and decreases it on the other. The lift differential generated is not great, and really only serves to cause a small rolling moment that can help counteract engine torque.

BUT, at higher angles of attack, the asymmetry in local angle of attack caused by the slipstream swirl can result in an asymmetric stall where the wing downstream of the upgoing blade reaches the stalling angle before the wing downstream of the descending blade. On a single-engine aeroplane the stall will occur inboard, close to the wing root, and will likely be so benign most pilots won't recognise it. However, should the aircraft have a lateral weight distribution problem, such as wing tanks on the side of the down-going blade being full and the other side empty, a sudden and uncharacteristic wing drop can result.

This last characteristic of the slipstream effect can have the greatest effect when a pilot elects to go around, when already low and slow on final approach, especially in higher powered light aircraft. When doing type conversions onto PA32 Cherokee six aircraft, Cessna 206 and 207s, and Beechcraft A36 Bonanzas, I demonstrated this (at altitude) by getting the candidate to set up a simulated approach with full flap, the propeller set to full fine pitch with a low power setting applied. When established, I'd ask to slow the aircraft to 5 knots below its normal approach speed. Then I'd suddenly ask him/her to begin an emergency go around. All the afore-mentioned aircraft, with the sudden power application and changing flight path, would suffer a stall induced inboard on the left wing. It was caused by the relative airflow exceeding the critical angle on that part of the wing by the slipstream spiral rising towards the leading edge; a brief buffet would begin at the break of the stall and the developing drag would yaw the nose to the left, and, if the angle of attack wasn't immediately reduced to an appropriate angle, result in an uncommanded roll in the same direction. It wasn't possible to save the situation without sacrificing altitude. This served as a warning to the candidates to never get slow on approach in these aeroplanes, to make decisions to go around early, and to use caution in full power applications.

For those pilots flying aircraft with a propeller in front of the cockpit rotating anticlockwise, expect the right wing to stall as it will have the disadvantage of the relative airflow rising ahead of its leading edge.

Note that P-factor (or asymmetric blade effect) will create and/or aggravate this same situation. P-Factor will be dealt with at a later time at which time its results will be seen to be even more dramatic.

Happy Flying

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When External Pressure Leads to Poor Decisions

By Meg Godlewski. Published in FLYING, April 11, 2023

Nearly three decades later, an accident report from a Cessna 177B crash in Wyoming still provides a valuable teaching tool.

Don't let someone pressure you into doing something foolish. You probably heard this sentiment (or some form of it) as a child—as a pilot, foolish mistakes can be deadly, and sometimes very public. You may know someone who did something foolish with an airplane and ended up on the local or national news.

Nearly three decades later, an accident report from a Cessna 177B crash in Wyoming still provides a valuable teaching tool. [Credit: Shutterstock]

This isn't just stunt flying gone bad—it can be a pilot who bows to external pressures such as get-there-itis or makes decisions when compromised by fatigue. Saying no to a flight, especially when you have passengers on board, can be very difficult—but sometimes it is necessary. When you read accident reports, you see the red flags—the mistakes or questionable decisions made by the pilots. This makes accident reports a valuable teaching tool.

April 11 is the anniversary of a Cessna 177B crash in Cheyenne, Wyoming, in 1996. The flight had captured national attention as its purpose was for 7-year-old Jessica Dubroff to set a record as the youngest pilot (I'm compelled to use finger quotes here) to fly across the United States. She was accompanied by 52-year-old Joe Reid, a full-time stock broker and part-time flight instructor, and her father, 57-year-old Lloyd Dubroff.

The flight, which began on the west coast and was supposed to terminate on the east coast was billed as the "Sea to Shining Sea" flight. Lloyd Dubroff was acting as the publicist, and created an ambitious itinerary for the 6,900-mile trip, which was supposed to take eight days.

I remember this story vividly. I was both a pilot and a television news producer at the time, and the whole concept of a 7-year-old pilot smacked of a publicity stunt. I was then and still am doubtful that most 7-year-olds have the strength, size, focus, and maturity to take flying lessons; however, the media accounts of her skills in the cockpit indicate that the little girl, who learned by doing, could fly the airplane. The videos of her flight lessons—a few were shown on television—show a little girl on a booster seat using rudder extensions. She has both hands on the yoke as Reid cautions her to use more right rudder.

I was still years away from being an instructor, but it didn't look like she was really doing the flying. From the angle you couldn't see the rudder pedals, so I couldn't be sure. When I became an instructor I sometimes flew with children and gave them instruction with their parent's permission. As long as they listened and followed directions they could fly, but I found that many of the younger ones were more interested in looking out the side window than flying the airplane.

The Dubroffs told media outlets that it was their daughter's idea to try to set a new record for the youngest pilot to fly across the U.S., although at the time of the crash, the Guinness Book of Records had already eliminated its "youngest pilot" category, citing concerns it might encourage unsafe flying in the pursuit of record setting. The FAA also takes a dim view of this. Even before the Dubroff crash, the FAA stressed that the youngest age a person can pilot a powered aircraft is 16. In the accident report, both Dubroffs are listed as passengers.

You may notice that when television cameras appear, people get silly. They interrupt live interviews or run in front of the camera and wave. It's all about getting attention. Lloyd Dubroff knew this, and was working with media, both national and local, to promote the flight.

ABC News supplied Dubroff with a video camera and blank cassette tapes to record the flight. At various stops, Dubroff was to exchange the used video tapes for fresh ones. There was ostensibly no financial compensation for the videos, but they would be used in a story in the future. The aircraft also carried boxes of baseball caps with the slogan "Sea to Shining Sea " that were supposed to be handed out along the way. To pilots who saw the video of the packed aircraft, it looked overloaded —and it was.

The gross weight of the C177B is listed as 2,500 pounds (1134 kg) The National Transportation Safety Board (NTSB) estimated the actual weight of the aircraft at the time of the accident to be 2,596 pounds (1177.5 kg).

Reid was somewhat sceptical at first about the idea of teaching a 7-year-old to fly, and viewed the Sea to Shining Sea event as getting paid to fly across the country with a little girl and her father on board, his wife told NTSB investigators. To his wife, he described the flight as a "non-event for aviation."

At the time of the accident, he had logged 1,484 hours. It was noted that most of his experience was along the California coast, although his logbook reflected he had conducted eight flights out of airports that had field elevations of roughly 4,500 feet msl prior to the accident flight. Reid had several students in addition to Dubroff, who had logged approximately 33 hours with Reid.

The route was planned in effect by Lloyd Dubroff, who did not have a pilot certificate. According to a hand-written itinerary found on the body of Lloyd Dubroff, each day consisted of several hours of flight and several media stops. It was not determined if he understood how flight time desired and actual flight time acquired are often different things. One wonders if he had ever heard the phrase 'time to spare, go by air'.

The days preceding the launch of the transcontinental flight included multiple media interviews, some of them before 7 a.m. to accommodate east coast live television morning news shows. On April 10 there was an early morning live television interview at the airport, and at 0700 the aircraft took off from Half Moon Bay, California (KHAF), and headed east to Elko, Nevada (KEKO). The aircraft refuelled then headed to Rock Springs, Wyoming (KRKS), for a brief stop. The airport manager noted how worn out the pilot looked. The flight made it to Cheyenne at 1756. Reid called his wife that evening, saying he was elated by the reception they had been getting along the way, but added he was very tired.

From a TV producer standpoint, I found it hard to get behind the story, which was the same every place they stopped, be it on television, newspaper, or radio. People were always excited to meet the little girl. She was asked if she wanted to be a pilot when she grew up. She was asked if she liked to fly. I maintain that if they had delayed a departure to get more rest or to wait out the weather it would have made for a much better story—at least it would be different than the previous ones—what does a 7-year-old pilot do when she is waiting for the weather to clear? Does she play with the airport dog? Does she read magazines in the FBO? Drink the FBO coffee and raid the popcorn and candy machines? She certainly wasn't doing the flight planning.

Per the witness statements in the NTSB report, Reid obtained a weather briefing on the morning of April 11 and performed the pre-flight inspection. The weather was deteriorating as a thunderstorm approached the airport, and they were in a hurry to leave because they had media interviews with the local television stations to get to.

Think about that for a moment: taking off and trying to outrun a thunderstorm in a Cessna 177B to get three minutes of facetime on a small-market television station.

When you are in a hurry, you make mistakes. The NTSB report depicts several slips, including forgetting to pull the wheel chocks prior to engine start and stumbling on a few radio transmissions, including asking for “special IFR” rather than “special VFR.” The aircraft took off in strong, gusting winds and heavy rain. There was hail, reduced visibility, and lightning in the vicinity. At the time of the accident, the Cheyenne Regional Airport (KCYS) density altitude determined from the ASOS was approximately 6,670 feet.

There were other pilots at the airport as the storm approached. A few were interviewed by the NTSB after the accident and described the heavy rain and strong and gusting winds that created issues even while taxiing.

It began to rain before the Cardinal departed. In her last telephone call with her mother, just moments before take-off, Jessica Dubroff commented on the weather, asking her mother if she could hear how loud the rain was.

Witnesses say the aircraft took off from Runway 30 and appeared to struggle to gain altitude as it never got higher than 400 feet. The aircraft appeared to be turning to the right when it plunged nose down, coming down on a street and the end of a driveway some 9,600 feet off the end of the runway. The aircraft had 10 degrees of flaps in at the time of impact. There were no injuries other than to the persons on board, and only the aircraft was damaged. The NTSB noted the nose section and forward cabin area were crushed and displaced rearward along the airplane’s longitudinal axis. Fuel poured out of the wings, but there was no fire.

The photographs of the wreckage are jarring. What is left of the cockpit is a mess of fragmented instruments and the ear cup from a David Clark headset. There are photos of the front seats. They are bent, misshapen, and bloodstained.

Witnesses told investigators that the aircraft hit so hard they knew no one could have survived. The cause of death for all three was listed as traumatic injury. Lloyd Dubroff, who was sitting in the rear left seat, had his arms wrapped around his daughter at the time of impact. Jessica had a fractured right foot. Based on the multiple fractures in Reid’s arms and legs it was determined that he had been on the controls at the time of impact.

Any time there is a high-profile accident, there will be blowback in the form of people trying to legislate ways to prevent poor decision-making. This was no exception. Almost immediately, there were cries to pass laws to prohibit children from taking flying lessons. Thankfully, the furor died down after people realized this horrible accident wasn’t so much caused by a child flying but rather the choices the adults made for the child.

However, as part of the Federal Aviation Reauthorization Act of 1996, President Clinton approved the Child Pilot Safety Act, amending Federal aviation law to prohibit a pilot in command of an aircraft from allowing an individual who does not hold a valid private pilot’s certificate, and an appropriate medical certificate, to manipulate the controls of an aircraft if the pilot knows or should have known that the individual is attempting to set a record or engage in an aeronautical competition or aeronautical feat.

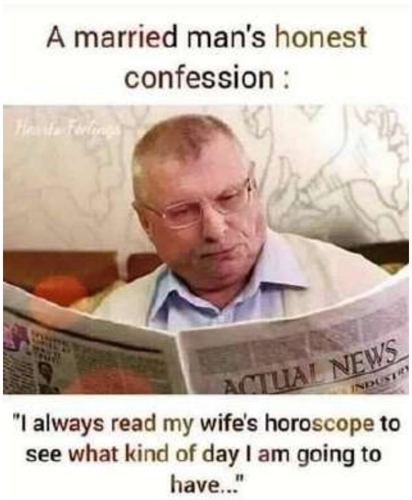
A pilot who allowed this to happen could face revocation of their airman certificate.

Fortunately, most pilots who fly with children—either their own, friends of the family, or as EAA Young Eagles ambassadors, are more careful about the choices they make. For children under 16, the purpose of the flight is, more often than not, to generate interest or as a reward. I have flown with these children at the request of their parents, with the understanding that when they were old enough, if they wanted them, flight lessons would become much more serious business. But only if the child wanted it.

Parents are supposed to protect their children. My instructor at the time of the Dubroff crash had a little girl of his own, and he was dismayed by the behaviour of both the CFI and the father. He remarked we will never be able to remove all the poor decisions from aviation—I believe the technical term is 'you can't fix stupid', but you need to learn to recognize when you're heading down that path—and know when to divert.

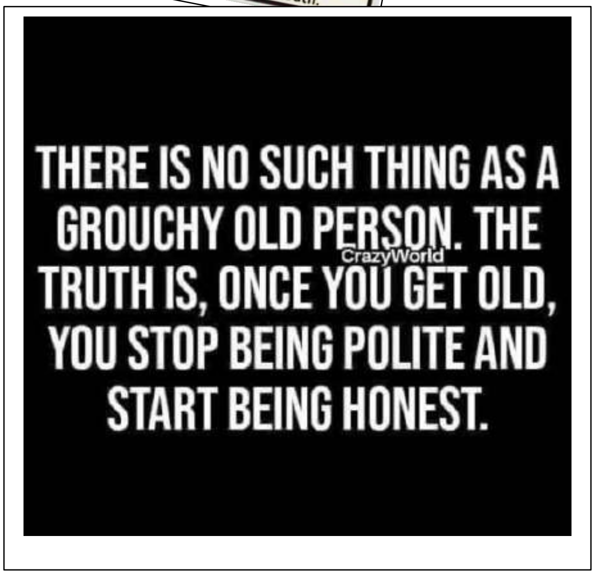
Meg Godlewski

Meg Godlewski has been an aviation journalist for more than 20 years and a CFI for more than 18 years. If she is not flying or teaching aviation, she is writing about it. Meg is a founding member of the Pilot Proficiency Center at EAA AirVenture and excels at the application of simulation technology to flatten the learning curve. Follow Meg on Twitter @2Lewski.



FLY-IN Invites Looming

WHERE	EVENT	WHEN
Murgon (Angelfield) (YMRG)	Burnett Flyers Breakfast Fly-in	**Find Next Planned EVENT Sunday 13 August.** **Confirm details at:** http://www.burnettflyers.org/?p=508



The Grumman's Avenger: The Most Effective Torpedo Bomber of WWII

By Scott Mall - September 16, 2022

Pilots adapted the aircraft to meet the challenges of the war in the Pacific theatre.

Five U.S. Navy Grumman TBF-1 Avengers from Escort Scouting Squadron 29 flying in formation over Norfolk, Virginia, on September 1, 1942. [Photo: Lt. Comdr. Horace Bristol/U.S. Navy]

The Douglas TBD Devastator torpedo bomber was the U.S. Navy's first all-metal monoplane carrier aircraft, joining the fleet in 1937. However, by 1939, the Devastator was already obsolete. War had raged in China for years as Japan sought to conquer its Asian neighbor. War was looming in Europe as well; Nazi Germany continued to gobble parts of other nations. By most accounts, World War II officially began on September 1, 1939, when Germany invaded Poland. As war began, German and Japanese aircraft were generally more advanced than those of the Allies.

Knowing they were behind, the U.S. armed forces were working desperately to improve their armaments. Several companies bid on building a new torpedo bomber; Grumman Aircraft's design was chosen by the Navy. In April 1940 two prototypes were ordered. The Navy then ordered 286 torpedo bombers in December 1940. Designed by Leroy Grumman—founder of the company and an aerospace engineer—the prototype was the XTBF-1, first flown in August 1941.

On the afternoon of December 7, 1941, Grumman held a ceremony to open a new manufacturing plant and display its new Avenger torpedo bomber to the public. When Grumman officials learned of the attack on Pearl Harbor, the facility was quickly sealed off against possible sabotage.

In January 1942 the first production TBF-1 joined the fleet and the Avenger quickly went into mass production. During the first half of 1942, 145 TBFs were delivered.

A U.S. Navy Grumman TBM-3W Avenger on the ground at Naval Air Training Centre, Naval Air Station Patuxent River. [Photo: U.S. Navy/National Museum of Naval Aviation]

The Avenger was powered by a Wright R-2600-20 Twin Cyclone 14-cylinder radial engine that generated 1,900 horsepower. Each Avenger held three crew members – pilot, turret gunner, and radioman/bombardier/ventral gunner. The airplanes only had one set of controls, and there was no direct access to the pilot's position from the aircraft's interior. Radio equipment was large and cumbersome, and filled the length of the "greenhouse" canopy to the pilot's rear.

A synchronized .30-caliber machine gun was mounted in the nose, a .50-caliber gun was mounted next to the turret gunner's head in a rear-facing electrically powered turret, and a .30-caliber hand-fired machine gun mounted under the tail was used to defend against enemy fighters attacking from below or the rear. Later models of the TBF/TBM replaced the cowl-mount .30-caliber gun with twin Browning AN/M2 .50- calibre guns, one in each wing outboard of the propeller arc. These guns gave pilots better forward firepower and increased the airplane's strafing capabilities.

A TBF Avenger ready for catapult launch. [Photo: U.S. Navy]

The Avenger was built with a large bomb bay that held either one Mark 13 torpedo, a 2,000-pound bomb, or up to four 500-pound bombs. It was a rugged but stable airplane said to fly like a truck. With a 30,000-foot ceiling and a fully loaded range of 1,000 miles, the Avenger was superior to any previous American torpedo bomber, and far better than its Japanese counterpart, the obsolete Nakajima B5N "Kate."

To ease aircraft carrier storage concerns, Grumman designed the Avenger (as well as the F4F-4 Wildcat carrier fighter and the later F6F Hellcat) to use the new Sto-Wing patented "compound angle" wing-folding mechanism.

After hundreds of TBF-1 models were delivered, the TBF-1C began production. Space for specialized internal and wing-mounted fuel tanks doubled the Avenger's range. With capable radios, fairly easy handling, and long range, the Avenger was also a good command aircraft.

In 1943, Grumman began to phase out its production of Avengers to manufacture Hellcat fighters. The Eastern Aircraft Division of General Motors, with manufacturing facilities in Maryland, New Jersey, and New York, began to produce Avengers under license (designated TBMs). In mid-1944, production of the TBM-3 began. It was equipped with a more powerful engine and wing hardpoints for drop tanks and rockets.

U.S. Navy Grumman TBM-3 Avengers and Curtiss SB2C Helldivers assigned to Carrier Air Group 83 aboard the aircraft carrier USS Essex dropping bombs on Hakodate, Japan, in July 1945. [Photo: U.S. Navy]

Seven Grumman TBM-3D Avenger bombers of night torpedo squadron VT(N)-90 flying in formation in January 1945. The squadron was part of Night Air Group 90 on the carrier USS Enterprise. Note the radar pods in right-side wings, and the distinctive tail insignia. [Photo: William T. Barr/U.S. Navy]

In total, 9,836 Avengers were built. Grumman manufactured 2,290 TBFs before production ended, while General Motors produced 7,546 (2,882 TBM-1s and 4,664 TBM-3s).

By early June 1942, more than 100 Avengers had been delivered to the Navy, but they were too late for the pivotal Battle of Midway on June 4, 1942. However, six Avengers had been assigned to Torpedo Squadron 8 on Midway Island for evaluation. The aircraft and their crews arrived on Midway three days before the battle. None of the pilots had ever been in combat, and few had ever flown out of sight of land. Operating from the island's airstrip, the Avengers and other aircraft attacked the Japanese fleet. Five Avengers were shot down, and the last was badly damaged.

Author Gordon Prange wrote in Miracle at Midway that dive bombers were responsible for sinking four Japanese fleet carriers. He noted that the obsolete Devastators—and having too few Avengers on hand—contributed to the lack of a complete victory at Midway.

Later, with increased American air superiority, more effective attack coordination and more veteran pilots, Avengers played a more dynamic role in subsequent battles with Japanese forces.

After the Americans captured Guadalcanal, Japanese Marshal Admiral Isoroku Yamamoto organized a large naval counter-strike in the Eastern Solomons. On August 24, 1942, Japanese and American carrier forces met. According to the Naval Air Station Fort Lauderdale Museum, the Saratoga and Enterprise had a total of 24 TBFs. During the afternoon and evening, Avengers were launched in four different strikes. In the second strike, torpedoes struck the light carrier Ryūjō and helped to sink her at the cost of seven aircraft.

In the war's fourth big carrier engagement (the Battle of Santa Cruz, on October 26, 1942), Avengers did not play a major role. The two surviving U.S. carriers in the Pacific, USS Enterprise and USS Hornet, each carried 14 Avengers. Although the carriers helped stop the Japanese effort to retake Guadalcanal, most of the Avengers were shot down by Japanese combat air patrol and anti-aircraft guns.

These early battles showcased the strengths and weaknesses of the Avenger, but also exposed the deficiencies of the Mark 13 torpedoes used by the U.S. Navy during the first two years of the war. Because of the torpedoes' poor performance, torpedo bombers flew many missions carrying 500-pound bombs instead.

The Japanese continued to attack Guadalcanal. From November 12 to 14, 1942, the naval Battle of Guadalcanal took place. Leading the powerful Japanese naval forces was the *Hiei,* a 37,000-ton battleship. Marine Corps and Navy Avengers torpedoed and helped sink the *Hiei.*

A TBF-1 Avenger early in 1942. Note the red spot centered in the U.S. roundel and flag-inspired fin flash on the rudder, both of which were removed prior to the Battle of Midway to avoid confusion with Japanese insignia. [Photo: U.S. Government]

Although the Avenger was a sound aircraft, the National Naval Aviation Museum notes that increasingly effective Japanese anti-aircraft capabilities, combined with vulnerability during torpedo runs rendered traditional massed torpedo bomber attacks less likely after Midway. "The Torpedo Bombers," an article in the October 1944 issue of *FLYING,* stated, "torpedo attacks must be delivered at a comparatively short range and amid heavy enemy AA fire. Torpedo bombers no longer creep in low over the water. They move in with the dive bombers and at high altitudes under the same fighter coverage."

Avengers also were used in different roles, including reconnaissance, anti-submarine warfare, mine-laying, airborne early warning and control, glide bombing in close air support, light transport or cargo work, and medical evacuation.

"The Torpedo Bombers," also stated, "…Grumman Avengers had sown mines in the harbor at Palau. This job was so well done that no ship in the harbor at the time of the mine planting ever got out. Thousands of mines had been laid by aircraft, but this was the first time carrier-based planes had, with fighter protection, gone right into the enemy's front yard and done the job."

In November 1943, the U.S. Navy began systematic night-fighting teams. From the Enterprise, Avengers and Hellcats were directed toward incoming Japanese bombers. Radar-equipped Avengers would lead the Hellcats behind the bombers, close enough for the Hellcat pilots to see their exhaust flames so that they could be shot down.

During the "Marianas Turkey Shoot" (June 19 and 20, 1944), more than 350 Japanese aircraft were downed (primarily by Hellcats). A 220-aircraft mission followed, seeking the Japanese task force. Fighting 300 nm from the fleet, Hellcats, TBFs/TBMs, and dive bombers suffered many casualties. However, Avengers from the aircraft carrier USS Belleau Wood sank the light carrier *Hiyō.*

On October 24, 1944, Avengers were instrumental in sinking the Japanese super-battleship *Musashi* in the Battle of the Sibuyan Sea. In the next day's Battle of Leyte Gulf, Avengers helped keep Japanese surface ships from exposed U.S. troop transports. On the 26th, TBFs also helped sink *Zuikaku* and three light carriers.

By late 1944 the U.S. Navy had almost complete air superiority. On April 7, 1945, the remaining Japanese super-battleship—*Yamato*—made a desperate run for Okinawa.

In 1997, Charles G. Fries, Jr. a TBM tail gunner, described the attack to the Naval Air Station Fort Lauderdale. "…we went after the last remnants of the Japanese Fleet, which comprised the battleship *Yamato*, the cruiser *Yahagi* and two screen destroyers. When we came into range, the squadrons split into two sections. The first TBMs got the wagon [*Yamato*], and she was severely damaged, ready to sink. So we went after the cruiser… Both big ships and the destroyers put up a lot of flak. After firing our torpedo, we were pleased to see the cruiser go down. Later another destroyer went down too. …we sank three of the four Japanese ships. As far as we were concerned, the Japanese fleet was no more."

Future U.S. President George H. W. Bush in a TBM Avenger on the light aircraft carrier USS San Jacinto in 1944. [Photo: U.S. Navy]

As noted by the National WWII Museum, Avengers "effectively interdicted enemy shipping and delivered ordinance on enemy positions throughout the Pacific war."

In the North Atlantic, Avengers destroyed 30 submarines, including the unique sinking of the Japanese cargo submarine I-52. Flying from escort carriers, the Avengers became the key strike aircraft in the Allied hunter-killer groups.

After the war Avengers continued flying in the U.S. Navy, primarily as missile platforms, in anti-submarine, electronic countermeasures, and for training. The last Avengers were retired from the U.S. Navy in 1954.

Specifications

Type:	Torpedo bomber	Wing span:	54 ft., 2 in.
Crew:	Pilot, gunner, and radio operator/bombardier	Wing area:	490 sq. ft.
Powerplant:	Wright R-2600-20, 1,900 hp	Basic empty weight:	10,545 lbs.
Length:	40 ft., 11 in.	Maximum take-off weight:	17,895 lbs.
Height:	16 ft., 5 in.	Maximum speed:	276 mph (240 knots) at 16,500 ft.

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Keeping up with the Play (Test yourself – how good are you, really?)

1. What will ten litres of fuel weigh if its RD[2] is 0.72?
   A. 6kg.
   B. 7.2kg.
   C. 8kg.
   D. 10kg.
2. Holding, ready to take-off, a pilot notices the windsock indicates a headwind aligned 30˚ off the runway heading. If the estimated wind speed is 20 knots, what effective crosswind should be anticipated?
   A. 5 knots crosswind.
   B. 15 knots crosswind.
   C. 7 knots crosswind.
   D. 10 knots crosswind.
3. The further effect of roll is?
   A. More roll.
   B. Pitch.
   C. Yaw.
   D. Bank.
4. The W/V on a GPW&T is presented in which of the following?
   A. Degrees True.
   B. Degrees Magnetic.
   C. Degrees Compass.
5. If an aeroplane is rolled gently to one side and then the controls are released, most aircraft will then yaw towards the down wing. Why?
   A. The aeroplane will no longer be in balance.
   B. Because of longitudinal dihedral
   C. Because of the gyroscopic forces generated by the propeller.
   D. The aircraft will slip and the weathercocking action by the keep surface during the slip will yaw the nose towards the lower wing.

See answers and explanations overleaf

[2] Relative density.

If you have any problems with these questions, See Notes below or call me (in the evening) and let's discuss them. Rob Knight: 0400 89 3632 (International +64 400 89 3632), or email me at kni.rob@bigpond.com.

1. B is correct.
   10litres X 0.72 = 7.2 kilograms.

2. D is correct.
   A wind 30 degrees off the nose of an aeroplane will have half its value as crosswind.

3. C is correct.
   When an aeroplane is rolled and left to its own devices, because the lift is now inclined (because the aeroplane is banked), it will slip towards the lower wing. The slip action will cause weathercocking towards that same lower wing. Because the weathercocking action yaws the nose, the further effect of roll is yaw.

4. A is correct.
   By convention, all winds presented in aviation forecasts are in degrees true. You will never see a written magnetic wind direction unless you write it yourself!
   See: http://www.bom.gov.au/aviation/data/education/GAF-user-guide.pdf

5. D is correct.
   An aeroplane, banked, has its lift inclined towards the lower wing. The inclined lift pulls the machine sideways which results in the tail and aft keel surface weather cocking the aeroplane. Roll promotes yaw – the further effect of roll is yaw.

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Aircraft Books, Parts, and Tools etc.

Contact Rob-on mobile – 0400 89 3632

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Item	Condition	Price
Tailwheel tow bar.	Good condition	**$50.00**

Aircraft Magnetic Compass (Selling on behalf)

Item		Price
Wired for lighting • Top of panel mount, • Needs fluid replenished.		**Open to Offers**

Propeller Parts

Item	Condition	Price
Propeller spacers, Assorted depths, all to fit Rotax 912 UL/ULS propeller flanges	Excellent	**$100.00 each**
Spinner and propeller backing plate to suit a Kiev, 3 blade propeller, on a Rotax 912 engine flange.	Excellent	**100.00**

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Or email me at:

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$9,750.00 NEG

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The aircraft at Kentville

New Engine Rotax 503 Dual Ignition has only 10

Fuel tank

Instrument panel

Details

Built - 1991	Serial Number - 312
Model - Thruster 85 SG	Rego Number – 10-1312
TTIS Airframe - 638	Original logbooks - YES
Engine - *NEW* Rotax 503 DIUL	Next Annuals due – 05/11/2023
TTIS Engine – 10 hours	Propeller – Sweetapple, Wood, 2 Blades (as new)

Instruments - RPM, IAS, VSI, ALT, Hobbs meter, New Compass, CHTs, EGTs, Voltmeter & furl pressure gauge

Avionics - Dittel Radio 720C and new David Clark H10-30

Aircraft is fitted with Hydraulic Brakes. Elevator Trim. Landing Light. Strobe Beacon. Auxiliary Electric Fuel Pump.is in excellent mechanical condition and the skins are “as new”.

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<u>Work performed at Lightwing Ballina:</u>

* Wings recovered, tanks resealed, new brakes, wheel bearings and hubs, new wing tips.

<u>Other work carried out:</u>

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<u>Rotax:</u>

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Contact Kevin McDonald on 0419 607 637

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The landed Sky Dart III rolling through at YFRH Forest Hill

TTIS airframe is 311 hours, and the engine, TTIS 312 – is just 1 hour more. Up-to-date logbooks available. 2 X 20 litres tank capacity. To be sold with new annuals completed.

It is easy to fly (for a taildragger), and a great way to accumulate cheap flying hours.

Call me to view, Bob Hyam, Telephone mobile 0418 786 496 or Landline – 07 5426 8983, or Email: bobhyam@gmail.com

Landed at McMaster Field after my flight back from Cooma just West of Canberra. In the cockpit with me is GeeBee, my dog

Single Seat T84 Thruster, disassembled and ready for rebuild.

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ROTAX 582 motor.

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