Pre-flight checks – Part 2

Taking your time

It's been a while since I've delved into the "There I was" archive to start an article. There I was, at Pearce in 1986, doing instrument flying in the RAAF's advanced trainer of the day, the Macchi. For instrument flying the student sat in the back cockpit, with a cover over the inside of the canopy. It meant you didn't need to wear a hood, and it was commonly known as flying "in the bag." But because you could only start the aircraft from the front cockpit, it also meant you had very few pre-flight checks to do; the instructor had to start the aeroplane, including most of the pre-start and after-start checks. I had an instructor who was a Mirage pilot. Now that was an aeroplane that burnt hideous amounts of fuel on the ground (converting most of it to noise), so its pilots learnt to do their checks and get airborne as quickly as they could. On the day in question, I timed D-Mac, as he was known, as he exited the flight line hut at least 100 metres away. He walked out, climbed in, strapped in, got the groundie to tighten his parachute straps and take his face blind ejection seat pin out, shut the canopy, ran through (or skipped most of) the 60-odd pre-start checks, started up, and commenced taxi. Four minutes. He was an impatient old coot, but even for a knucklehead (fighter pilot), I thought that was a ludicrously short time.

For what it's worth, my personal recommendation is that you spend a bit more time than that before you taxi. It's become standard practice to use written checklists, so the first step is to make sure you have a good checklist appropriate to your aeroplane. And that can be quite specific. For instance, PGL's checklist is not suitable for the R and S model 172's at RACWA because their engines are fuel-injected and their starting procedures are different from a carburetted aircraft, and they vary depending on whether the engine is hot or cold.

What the rules say

Chapter 10 of the CASR Part 91 MOS lists items to be checked before take-off. It includes checking NOTAMs and making sure you're fit to fly, and external items such as fuel caps and chocks. This chapter doesn't actually tell you a lot. The only internal checks most of us do that are included in this chapter are:

- Hatches secure;
- Flight controls working correctly;
- Altimeter check.

The last of these only applies if you have an accurate QNH available, which you don't have unless you have an ATIS, AWIS or similar. So at Jandakot, with the QNH off the ATIS set, your altimeter must read within 100 ft of aerodrome elevation, which is 99 ft. So anything between 0 and 199 ft and you're good to go.

Some tips

Other than the rules, and an exhortation to take longer than four minutes, here are some tips relating to some of the pre-flight cockpit checks. As with the last article, these tips may not all apply to every aeroplane, and it's not an exhaustive list, but let me know if you learn anything from them.

- Controls
    - Once upon a time there was a regulation that said you had to check the controls immediately before take-off, which is why it's in a pre-takeoff checklist. But it's also

in most pre-start checklists. Why do it twice? If you do a control check before start, and there are any creaks and groans that may give you pause for thought, you're more likely to hear them without engine noise in the way.

- Avionics
    - Make sure they're off before start. With the high current required for start, that's the best time for a power spike that could damage the radios.
- Throttle
    - If you set it as per a typical checklist, such as ¼ inch for a 172, the RPM on start will be about 1000 RPM. If you put your finger about 5mm from the friction nut, then push the throttle in till your finger touches the nut, you should get about 1000 RPM on start.
- Master
    - Checklists say to turn it on so your oil temperature gauge will tell you if you need to prime or not. If it's the first flight of the day you know you'll need to prime, so you don't need to check the temperature. Turn the Master on anyway, or chances are you'll forget, you'll prime, then you'll wonder why it won't start.
- Mixture
    - It's easy to flood a fuel-injected engine, which is why you don't prime it if it's hot, but it also means you start one of those with the mixture lean, and push it to rich as the engine starts.
- Oil pressure
    - It needs to be up within 30 seconds. If it's not, shut down before you cook the engine. Check it as soon as you start the engine, before you even look at the after-start checklist. Don't fiddle around with seat belts and headsets and kneeboards and radios straight after start if you haven't checked the oil pressure first.
- Amps
    - If the Amps light stays on, your alternator hasn't come on line, and you only have the battery for electrical power. If recycling the alternator doesn't work, you're not going flying.
    - As well as the Amps light going out, if you have a voltmeter you can also use that to check the alternator is on line. In PGL, if the voltmeter says 24V or thereabouts, it's the battery that's doing the electrical work. It's a 28V alternator, so the voltmeter should read 28 or so after start.
- DG
    - Align it with the compass.
    - But that's only useful if the compass is right. The ideal place to check that is when you line up straight on a runway whose exact magnetic heading you know. Otherwise you may just look at and say, "We're sitting in front of the hangar, pointing more a bit to the left of Runway 32, and the compass is reading 310. Looks OK."
- Taxi checks
    - Apart from checking the brakes as soon as you start moving, taxi checks are typically instrument checks, particularly important if you're flying at night or IFR.
    - For a left turn:
        - "Turning left, skidding right": if you turn left, the turn coordinator will show it, but if you turn too gently the skidball won't really show it.
        - "AH erect, wings level".
        - "Compass and DG reducing."

    - Check the instruments both ways; obviously in a right turn your TC and skidball will go the opposite ways, and your compass and DG numbers will increase.
- Runup
    - The checklist will specify the power setting to use, typically 1700-1800 RPM. But make sure your engine has warmed up a bit before you do these. If you start up, taxi out and do runups three minutes after start, Roger and Trevor at NAS will be torn between berating you for poor engine management and thanking you for potentially giving them repair work.
    - If you have a CSU, with the pitch full fine, the RPM needs to get above 2500 (typically about 2700) before the CSU governor will say, "Oops, RPM's getting a bit high, coarsen the pitch". So when you increase power for your runups, the CSU won't react, and the tacho will indicate power changes just like in a fixed-pitch prop aeroplane. So the mag checks are basically the same. You don't need to take any notice of the MAP gauge.
    - When you turn one magneto off the mixture will burn a bit more slowly, so you'll get an RPM drop. The checklist or POH will specify the maximum allowable drop – typically 100-150 RPM.
    - If you spend too much time taxiing or idling you may get too big a drop. Lean the mixture and set a bit more than 1000 RPM for a few minutes, and see if that burns a bit of the fouling that you may have got on the plugs, then do the mag check again.
    - Note that these mag checks are not the same as the ones you do before shutdown. The shutdown one is not to see if they're working; it's to check they're earthing. A live ignition system, fuel in the cylinders, and some muppet playing with the prop, could be a very disarming experience. The "fuel in the cylinders" bit is of course why you shut down by leaning the mixture and not just turning the ignition off like you do in your car.
    - Carby heat hot. Hot air in means richer mixture, and with mixture full rich you're on the right-hand side of the mixture-power curve, which means lower RPM.
    - And especially on a cold or humid day, leave the carby heat on for a short while to see if it rises after dropping. If it does, it's probably melting ice, so leave it alone until it stops rising. When you put it cold again, your RPM should be a bit higher than what you initially set for your runups.
    - While the RPM is up, check all the other engine instruments – Ts & Ps, amps, suction gauge. That's the closest thing you can do to an instrument check at take-off power.
- Flaps
    - PGL has an error in its checklist for this one, which says "Flaps up." It should say, "Flaps as required", which may mean Up or it may mean 10 or 15 (depending on your aeroplane's settings) for a performance take-off.
- Autopilot
    - If you have one, make sure it's off for take-off, otherwise it will chase the heading bug. Not a real drama if you set the heading bug for your take-off heading, but turn the AP off for take-off anyway.
- Strobes
    - In many aircraft these are in a "line-up" checklist. Especially at night, I believe it's a good idea to put your strobes on before you enter the runway. That way, anyone in the air who sees strobes knows that aeroplane is on the runway or about to enter it.

- Safety brief
    - This not your passenger brief about seat belts, exits, sickbags and leaving the controls alone. This is your “If it goes wrong on take-off” brief. Don’t be in the habit of parroting “Nose down, 65 knots, full flap, don’t turn more than 30 degrees” or similar. Think about where you are and where you’d go if it went wrong. For instance, of Runway 14 at Northam you have the racecourse, some powerlines and a solar farm to avoid. Off 27 at Wylie you have plenty of flat ground and probably more options.
    - And as my students know, if they forget to say that brief out loud, they are guaranteed a practice engine failure after take-off. For those who choose to do their flight reviews with me: you have been warned!

Kevin