IFR

A Structured Approach

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In certain cases, you might want to power up the avionics and get the ATIS and clearance before you start the engines. If you are about to fly an unfamiliar route, for example, you might want some time to correlate the clearance to the charts before you start the engines.

Some checklist items will call forth a separate sub-list. This is likely to be true for the autopilot preflight. We will get into that later in this book.

With all this accomplished, we get our taxi clearance and off we go. Here's the taxi list:

TAXI

brakes	checked
flight instruments	AS zero, attitude erect, field elevation on altimeter, VSI zero, heading checks with compass, turn and bank

Notice that the taxi list is very brief. In fact, we are going to do this one from memory. We add power, start the roll, and tap the breaks to make sure they are working before we build up any speed. And somewhere along the taxi route we induce a little turn and check the flight instruments with quick glances to the panel. Other than this brief flight instrument check, we have our eyes outside at all times.

Once in the runup area, we stop the airplane and go back to reading from a list:

RUNUP

engine instruments	considered
mags	checked
props	checked
alternator output	checked
trims	set for takeoff
flaps	up
controls	free and correct
fuel selectors	crossfeed
fuel selectors	on mains

doors and windows..... secure
crew briefing..... complete

Sample crew briefings are provided elsewhere in the book. This runup list assumes that the user knows how to check the mags and props, so it does not

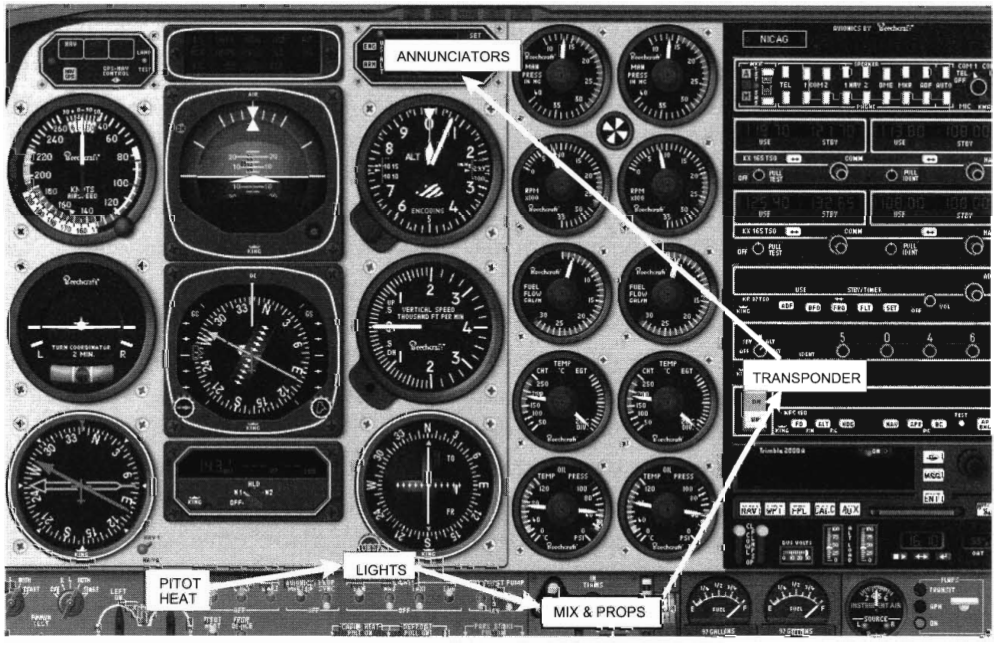

Figure 1. Before takeoff flow.

specify the RPM for this and the RPM for that. There is no need to clutter the list with obvious details. "Insert key..."

With the runup complete, we call the tower and request takeoff clearance. Once we get the clearance, we run the before takeoff list as a flow, meaning we are not reading, but sweeping across the panel in a rehearsed motion.

BEFORE TAKEOFF

pitot heat..... considered
ext lights ..... considered
mixtures and props..... considered
transponder..... ALT
annunciators..... clear

Since this is the first flow-type list we have considered, let me give a little detail. Figure 1 shows the panel of the virtual Baron that we are going to be

flying. We are in the runup area facing the threshold for Runway 25 at Santa Barbara. Once we get our takeoff clearance, the flow sweeps across the panel as indicated. "Pitot heat...considered." With visible moisture or temp below +10° C., we turn it on. "Exterior lights...considered." The landing light will be turned on unless there is an aircraft facing us on the other side of the runway at night. If so, we don't want to degrade the night vision of the other crew. In that case, we'd roll out and get pointed down the runway before turning on the landing lights. Strobes come on unless we will be in cloud shortly. Taxi lights come off, since they are on the nose gear which will soon be in the well. "Mixtures ...full rich." (I've removed the troublesome altitude compensating fuel pumps from my virtual Baron.) "Props...forward." "Transponder...alt." Finally, the annunciator panel should be clear. (You might notice in the figure that our virtual Baron has prop sync. In the interest of simplicity, I am going to leave that out of the discussion.)

Some folks like doing a modified GUMP check as they taxi into position. They do GUMPFST: Gas–good tanks; Undercarriage–down; Mixture–rich; Props–up; Flaps–set for takeoff; Seats and belts–secure; Trims–set. The idea is to go one last time through some "killer items."

We do a full-power climb to at least 400 feet AGL, then lower the nose and reset the power for a cruise climb. When everything settles down in the cruise climb, we run an after takeoff flow: power, exterior lights, gear, flaps. If we had yaw damp, we would get that on too. Several, perhaps all, of the items on the list have already been accomplished by the time we run the flow check. The gear, for example, was brought up when the airspeed got to blueline. That is an example of an SOP, standard operating practice, for me in this particular airplane. (More on this point shortly.) Later in the climb, perhaps with the autopilot on, we can reach for the printed after takeoff list and make sure we didn't forget something:

AFTER TAKEOFF/CLIMB

power..... climb power
ext lights..... considered
gear..... up
flaps..... up

Shortly after we level off, we complete the short cruise list:

CRUISE

cowl flaps..... closed
power & mixture..... set
exterior lights..... considered

When you are droning along in cruise with nothing better to do, you might think about reviewing the approach plates for your destination. Hopefully you have studied these prior to departure. After all, FAR 91.103 says you must familiarize yourself with "all available information" prior to your flight. Now it's time to get serious. If you are within range, listen to the destination ATIS. If you can't pick up the ATIS, ask the Center controller if he/she knows what approach you ought to expect. If Center is too busy, tune the approach frequency in use at the destination and see if you can pick up on which runway is in use. Now look at the approach plate and run through your likely arrival. "Fly" your finger over the chart. Note the altitudes, the fixes, the runway characteristics, the missed approach procedure. Set up some radios in advance if you can. If there is a pilot sitting there with you, give him/her a briefing on what is likely to take place during the approach: "Sounds like we'll come in over AVA, then it's the 313° radial to TUFFY at 4000..." If there is no one else there, then say all this to yourself. It's called the "approach brief," and I will give plenty of examples later in the text.

When you feel you are getting close to your descent, you can run through the approach checklist. This one breaks the reverie of the en route phase and brings us back to business.

APPROACH

exterior lights ..... considered
seats and belts..... secure
fuel selectors..... mains
ATIS..... copied
altimeter..... set
avionics..... set
approach briefing..... complete

The time at which the before landing checklist gets completed is going to depend upon the weather, the airplane, and whether or not the autopilot is used. You can run the before landing checklist when the gear goes out or just after the final flap extension. If you are flying a coupled approach, you might get almost to the end of the list and hold up with "A/P and yaw to go." Then on short final, the autopilot and yaw damper come off. "Before landing checklist complete."

In a plane like a Baron, there are more variables. For instance, I prefer to leave the prop controls back so as not to buzz down final with 2700 RPM. For that reason I don't bring the props forward until a missed approach is imminent or the runway is in sight and my airspeed is low enough that pushing the prop controls forward won't rev the engines up. Full flap extension follows the same

pattern: Flaps are at approach as we go down the ILS, and they go to full only when the runway is in sight and the plane is being slowed to its target threshold speed. Some engines, Continental IO-470's come to mind, often don't run well at low power with full rich mixtures, so mixture may not be fully advanced until late in the approach. In light of all these variables, if we want to establish some useful habits, what might we do?

In these airplanes, it seems to come down to this: The flaps are set full down if and only if we have every intention of landing. If that is the case, then *complete* the before landing checklist *by memory* when you extend full flaps, but keep the list in mind the whole way down final. When you extend full flaps you might try saying something like, "Before landing check. Flaps–full. Gear–three green/no red. Mixtures–rich. Props–forward. Autopilot–off."

BEFORE LANDING

flaps..... considered
landing gear..... three green/no red
mixtures..... considered
props..... forward
A/P & yaw damp..... off

If you find yourself doing a missed approach while flying single pilot IFR, the last thing you want to do is reach for a checklist at the missed approach point. It's far better to have a quick litany of critical items. Try: Power-up, pitch-up, positive rate-clean up, cowl flaps-open. Be sure the mixtures and props are part of your "power up." Pitch up to some pre-determined target attitude. Follow the V-bars to the go-around pitch attitude, if you have that equipment, or find some other handy pitch target, like 10° up. With a positive rate of climb, you can bring the gear and flaps up, then get the cowl flaps open. When you reduce to cruise climb power and get everything settled down, run your after takeoff/climb checklist.

After landing, we taxi clear of the runway, cross the hold line, stop, and run the after landing flow as seen in Figure 2. There is no harm in pulling out a checklist when you finish the flow, but don't start taxiing until you can devote all your attention outside the cockpit.

AFTER LANDING

pitot heat..... off
exterior lights..... considered
trim..... set for takeoff
cowl flaps..... open
flaps..... up

transponder..... standby
mixtures..... considered

Finally

Figure 2. After landing flow.

As I've suggested, what you might do is go out to your airplane with a blank tablet and your manufacturer's checklist. Sit in the plane and take note of equipment that is not accounted for in your original checklists. Work the new equipment into the old lists. If you see a good reason for it, move an item from one spot to another on the checklists. Think about the natural flows that exist on your panel–left/right, up/down. Think about what should trigger a checklist, i.e., when you want to run it. Again, notice that the right time for many of the lists is either right before or right after a power or configuration change. That might be a good cue that you need to run a list. Finally, discipline yourself to form the habit of using your lists. Part of the payoff is that you will be less likely to screw up, but part of it also is that you will feel like a more competent aviator.

Callouts

If you flew as part of a well-trained crew, you and the other crew members would be constantly exchanging standardized callouts. For example, if you are flying as we climb through eight thousand feet with a clearance for nine thousand feet, I might say something like, "Eight thousand for nine

thousand" or simply "eight for nine." There would be a company procedure that specified exactly what gets said, when, and by whom. There are a lot of obvious advantages to this process. We can divide our attention, with you focused on this aspect of the big picture, and me focused on that aspect. Then one quick, unambiguous phrase transfers a whole lot of information from one crew member to another. As we near minimums, you can be focused on the flight instruments, while I am looking for the airport. Then when I say, "Airport in sight, one o'clock," you know I'm not trying to tell you what time it is.

Another benefit of these callouts is that they constantly bring us back to the current situation and break up whatever daydreaming or tunnel vision has crept over us. If you are thinking about what you are going to tell the plumber when you get home, a phrase like "five hundred above minimums, ref and five, sink six" is likely to bring you back into the moment.

The advantages mentioned above are not available to us when we fly by ourselves, but there is another benefit from these callouts. When we are busy flying on instruments, we are trying to keep track of and remember many bits of information. There is a lot of data that we have *seen*, like radials on the charts or localizer deviations on the HSI. And there is data that we have *heard*, like altitudes in a clearance. As we maneuver the airplane, we are constantly trying to keep these bits of information fresh in our memories. I am no expert on how the human mind works, but experience convinces me that you remember something better when you have seen it *and* heard it. Better yet, you might see it, hear it, touch it, taste it, and smell it. Ever notice how a certain smell can bring back a flood of vivid memories. Some day your radar altimeter might emit a foul odor when you are 100 feet above minimums. In any event, even if you are by yourself, you might benefit from saying, not just thinking, "100 above minimums." It seems to me that saying and hearing something like that puts an extra Postit© on the brain somewhere, and that can be very useful.

There is actually some indirect scientific support for the idea that callouts can improve recall. Mrim Boutla of the University of Rochester found that deaf subjects cannot recall strings of letters in American Sign Language as well as hearing subjects can recall spoken numbers. "Spoken digits are taped on the brain's short recording loop," explained Boutla. (Quoted in *Nature News Service*, November 6, 2002.) And isn't that exactly the idea? We want our "recording loop" to be constantly reminding us of upcoming minima, fixes, missed approach procedures, etc.

I strongly advocate keeping a constant chatter going as you maneuver through critical phases of the flight. If you were sitting next to me during an ILS, you would get an ear full: "1700 for 440. On the slope. Groundspeed 110, sinking 700. Nose up just a little. 1500 for 440. Sinking 5. Miss is straight out to..." This may not work for you, but it definitely helps keep me on task. As we

get into doing specific approaches later in the book, I will discuss how these callouts might get implemented.

Now let's head out to the airplane.