1. Checklists, Flows, and Callouts

Before we fly, we will spend a few minutes thinking about checklists, standard operating procedures, and callouts. We need to be realistic about the way these are going to be employed in single pilot IFR operations in complex singles and twins. What checklists do we need? What should the checklist contents be? When should we perform the checklists? Should they always be written? How do checklists mix with flows?

There are all sorts of ways to make sure you don't forget any critical tasks when you fly. I've flown with Tex, who doesn't use any written checklists at all, but his habits and flows are so well thought out and ingrained that I am not tempted to try to change his behavior. And I've flown with Amyl, who is so methodical he checks his credit card expiration dates before he gets in the airplane. Amyl has a checklist for everything. "Insert key smooth side up." Somewhere in there is a happy medium, and my personal view is that the more complex the airplane, the closer we ought to be to Amyl.

What follows here are just some random thoughts and suggestions on the construction and use of checklists for single-pilot operations. This is not one of those topics where there is only one "right" way to do something. Think about my suggestions. Try them if you like. Abandon what doesn't work for you, but then try to come up with some sort of structure of your own.

Some checklists are written like recipes–you read it, do it, read it, do it. These sorts of lists are abbreviated instructions on how to accomplish some task. A lot of engine start checklists are like that: push the blue levers forward, push the red levers forward, pull the black levers all the way back, then push them forward 1/4 inch,... If you had never flown the airplane before, you could use these instructions to get the engines started. Other checklists are intended to ensure that you didn't skip some part of a task that you have already done and think is complete–you do it, do it, do it, then read it, check it, read it, check it. The idea is to verify what you have already done. After-landing checklists are often like that. You clear the runway and "run your flow," meaning you sweep across the panel in an organized, rehearsed way, shutting off landing lights, getting transponders to standby, etc. Then, if you want to grab a list and make sure you didn't forget anything, you use the do it, do it, read it, check it list. Each type of list has its place.

What I am going to do in the next few pages is walk through the checklists that I would use on flights like we envision here. I'll talk about some general principles and then go through the checklists line by line.

2. Flying by the Numbers

Before we go out and start flying approaches, we are going to do a fair-weather test flight to establish "the numbers" for the airplane we will be flying–the virtual Beech Baron on the ELITE Personal Simulator. This is an absolutely wonderful, cost-effective, teaching and currency device. I have used one for years, and I highly recommend it for instrument pilots at all experience levels. Since the performance of the ELITE Baron is so similar to the real post-1984 Baron, the numbers we determine here will be very close to what you will find in the actual airplane.

When I say we are going to establish "the numbers," what I mean is that we are going to find the power settings, pitch attitudes, and configurations (meaning gear and flap positions) that we are going to use on our instrument flights. We will refer to these settings as PAC's, for Power, Attitude, and Configuration. The idea is that we are going to be looking for the power, attitude, and configuration that work on the initial climb, cruise climb, cruise, en route descent, etc. What is the PAC for the ILS? For the missed approach? How much power do you have to add to level off at the MDA?

At the end of the test flight, we will have decided how we are going to set up the airplane for each of it's basic IFR maneuvers. Here's the key: When we are finished with this flight we will have a *preconceived idea* of how we are going to manage the power, attitude, and configuration at any point in the trip. There will be no more playing it by ear, no more making it up as we go along. We will find a PAC that works for each segment, and we will use it routinely from that point on, so the PAC's will become an integral part of our SOP's.

A "by-the-numbers" pilot does not saw back and forth with the throttle trying to find out how much power it takes to stop his or her descent at the MDA. The "numbers" pilot does an experiment one time, finds what works, and from that point on simply dials up the appropriate PAC when the need arises. The beauty of learning to use your airplane's numbers is that you can now take all the time and attention you formerly wasted jockeying with the throttle and devote it instead to steering the airplane along the charted lines.

You will be amazed at how much simpler and more accurate your flying can become. I have seen it hundreds of times. I watch a "seat of the pants" IFR pilot level at the MDA. The power comes up, but the pilot does not even look at the MP or torque or N1 gauge as he changes the power. If too much power is put in...oops, we're climbing away from the MDA. Then the power comes back...oops, that's too much. Next thing you know he's messing with the trim,

3. Clearance and Departure

The first leg of our trip is from Santa Barbara to Santa Maria. Our plan is to do the RNAV (GPS) approach to Runway 12 at Santa Maria followed by the published missed approach. We will then head up toward Oroville, a little over an hour to the north. This book is not about weather, and I would rather not derail into a protracted discussion of current conditions and forecasts. Let's just say it's a great day for instrument training. Ceilings are running anywhere from 400 to 800 feet broken with overcast layers at about 2800 feet and tops around 9000 feet. Freezing levels are at about 10,000 feet.

For training purposes, we would like to do the approach to Santa Maria via the OVMAF initial approach fix (IAF). Other things being equal, we would file GPS direct from Santa Barbara to OVMAF, but there is a possible complication. What complicates matters is R-2516. Figure 1 shows a stylized chart that depicts salient features from the Santa Barbara departure procedures, the low altitude en route chart, and Santa Maria approach plate. R-2516 overlies Vandenberg Air Force Base. The restricted area begins at the surface and is

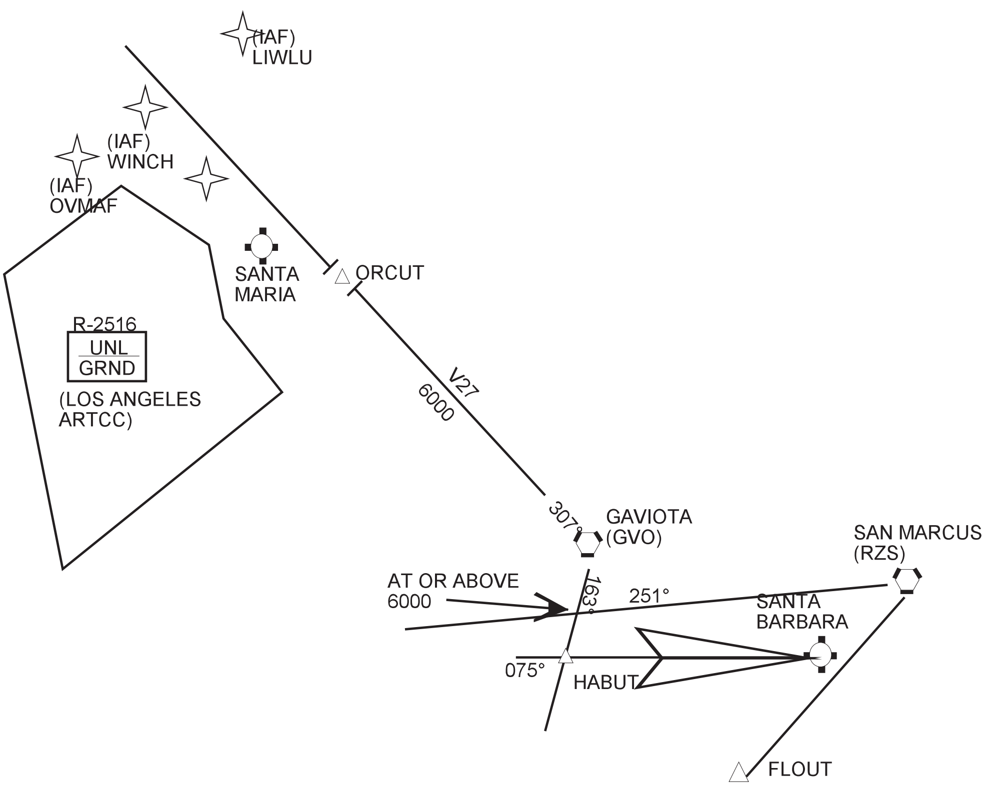

Figure 1

4. GPS

Flip through your Jepp book or NACO U.S. Terminal Procedures volume looking for GPS approaches. You will see titles like “GPS Rwy 33,” “VOR or GPS-A,” “VOR/DME or GPS-A,” “VOR/DME RNAV or GPS Rwy 16,” “NDB or GPS-A,” “RNAV (GPS) Y Rwy 11,” “RNAV (GPS) Z Rwy 11,” or “RNAV Rwy 36.” Why so many different titles? And what do they all signify? Now look at some of the charts themselves and you see all sorts of acronyms and notations that you never saw in instrument groundschool. There is a note about “DME/DME RNP-0.3 NA.” What is that all about? Or in the minimums section, you read, “GLS PA DA.” Any ideas?

My point is that there is a lot that is new and different with GPS compared with VOR, ILS, or NDB. The GPS system came to us offering unbelievable accuracy, direct IFR routing, enhanced situational awareness, and much more, but at the same time we slipped into a very new world of procedures, issues, and regulations, and I am not so sure the average pilot’s training has kept pace. I am hoping the next two chapters will help bring you up to speed. In the present chapter we look at some generic issues: How does GPS work? What problems does it have? What are the regs that relate especially to GPS operations? What is new and unique about the GPS approach plates?

In the following chapter we will put all this to use as we fly the first approach of our trip–the RNAV (GPS) Rwy 12 to Santa Maria, California.

How does GPS work?

By way of introduction, let me say that we are not going to get out our soldering guns and build a GPS receiver. What I am interested in is just the basics of the system, just the key facts that will help you use and interpret your unit, especially issues that relate to accuracy. What exactly does it mean, for example, when you read a warning saying “RAIM unavailable”? Or “EPE 20 ft”? We’ll start, as we must, with some solid geometry.

Suppose you don’t know exactly where you are in some 3-dimensional space, but you do know that you are, say, 14,000 nm from point A, which is at a fixed and known location in space. That information would locate you anywhere on the surface of an imaginary *sphere* with a 14,000 nm radius and center at point A.

If you also knew that you were 13,000 nm from a different known point, call it point B, then what would you know about your position? You can now deduce that you are somewhere on the circumference of a *circle* which has the line from A to B passing perpendicularly through its center. This is marked the “circle of position” in Figure 1. Every point on this circle is 14,000 nm from A

5. Flying The GPS Approach

Shortly after we pass Gaviota northwest bound on V27 at 6000 feet, we call Los Angeles Center and request the RNAV Runway 12 approach to Santa Maria via the OVMAF initial approach fix (IAF). We also give them a heads-up that we are a training flight and that we would like the published missed followed by a second flight plan to Oroville. See the excerpt of the Jeppesen low altitude en route chart in Figure 1 and the Jeppesen approach plate in Figure 2. L.A. Center is receptive, and we are told to expect clearance to the Santa Maria Airport via OVMAF, though we are to remain on our present route up V27 for now.

It's only about thirty miles to the airport at this point, and things are going to start happening fast. It is a good thing that we spent some time on the ground studying the charts. Now is the time to get through the approach checklist:

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

Landing lights come on. Seats and belts are secured. Fuel selectors stay on the mains. We tune the ATIS on 121.15 and hear that the weather is 600 broken, 1200 overcast and two miles in light rain. Wind 140 at eight. Landing and departing Runway 12. Altimeter is 29.92, and that is set. We will set up the GPS in a moment, but for backup we will now bring the Guadalupe VOR (GLJ) into Nav2. GLJ sits about 5 miles out on the final approach course to Runway 12 at Santa Maria. (See the low altitude chart in Figure 1.) There is also an ILS to Runway 12, but this is a training flight, and our intent is to do a GPS approach. We are presently using the Gaviota VOR on Nav1 to proceed up V27, but we've had the GPS map page in view to enhance our situational awareness.

We continue the approach checklist at avionics. Back in Santa Barbara we created a flight plan in the GPS from Santa Barbara (KSBA) to Gaviota (GVO) to ORCUTT to Santa Maria (KSMX). Right after takeoff we were flying vectors which ultimately led to GVO. We had GVO VOR in Nav1, and we had Nav1 selected on the RMI. As soon as we got the clearance to proceed direct to Gaviota, we turned toward GVO with the help of the RMI, and we selected direct

6. The Trip to Oroville: On Top, Holds, and NDB's

After the approach at Santa Maria, we followed the missed approach procedure toward WINCH until we climbed through 4000 feet, and we then turned toward Morro Bay as we continued the climb to 8000 feet. Passing Morro Bay, we are GPS direct to GRIDD intersection.

When we set up our flightplan for the second leg of the trip from Santa Maria to GRIDD to Oroville, we consulted the charts and picked an altitude 2000 feet above the highest obstacle within four nautical miles of our proposed track. But we were assuming then that we would proceed more or less direct from Santa Maria to GRIDD. Our new clearance shifts us to the north, so we better double check the altitude. We can't assume that Center has checked this for us.

We open the low altitude en route chart and take a quick look at the grid MORA (Minimum Off-Route Altitude) figures. Recall from Chapter 3 that these are the bold-type figures (e.g., **7⁵**) in each lat/long grid which give 1000 feet (or 2000 feet in mountains) of obstacle clearance. Progressing up the route, the MORA's run 7500, 7600, 8200, 6600, 4900, and 9500 feet. The 9500 foot value is due to the Sierra foothills to the east of Oroville, and they won't be a factor as we fly in from the south. And the 8200 foot value is for the grid surrounding Big Sur/Monterey/Salinas. Consulting the sectional chart, we see that the 8200 foot MORA is due to Junipero Sierra Peak, at 5862 feet, which is well to our west. So 8000 feet looks good. Moral: When you are flying off the airways, be sure to have a sectional or WAC handy.

We are mostly in cloud, but every once in a while it gets very bright and we then pop out into the clear for a while. The tops look to be about a thousand feet above us, and it is sparkling blue above the clouds. It is +5° C at 8000 feet.

Shortly after we are handed off from L.A. to Oakland Center, we get a call: "Baron 78PS, Oakland Center, we've got an amendment to your route. Advise ready to copy."

We grab our pencils, and this is what we get: "...direct Priest (VOR), victor 113 Manteca, victor 585 Sacramento, victor 23 GRIDD, direct Oroville. Climb and maintain one-zero thousand."

I knew this fairly long direct leg was too good to last, but I've got a plan. I read back the clearance, set Priest into Nav1, switch the HSI to VLOC mode, and turn toward Priest as I start a climb. "78PS is out of eight for ten with a request."

Here's what I'm thinking. We are probably being taken off the direct route because of a traffic conflict. If we were VFR-on-top, we could assume responsibility for traffic avoidance, and center might approve direct once again.

"78PS, say your request."

7. Holding

The first thing we need to do is visualize the hold. There are numerous ways you might do this. You might draw the hold on your approach plate or on a blank page on your kneeboard as we show in Figure 1. Of course there are a couple of things you need to remember in order to draw the hold properly. Our clearance was to “hold west,” and you might be confused about whether that means to hold so as to be flying west when you are inbound or to hold on the west side of the fix. You might want to review section 5-3-7 in the AIM, where you will be reminded that “hold west” means that your holding pattern should be on the west side of the fix, so you will be flying east when you are on the inbound leg. The next thing you need to remember is whether the turns should be to the

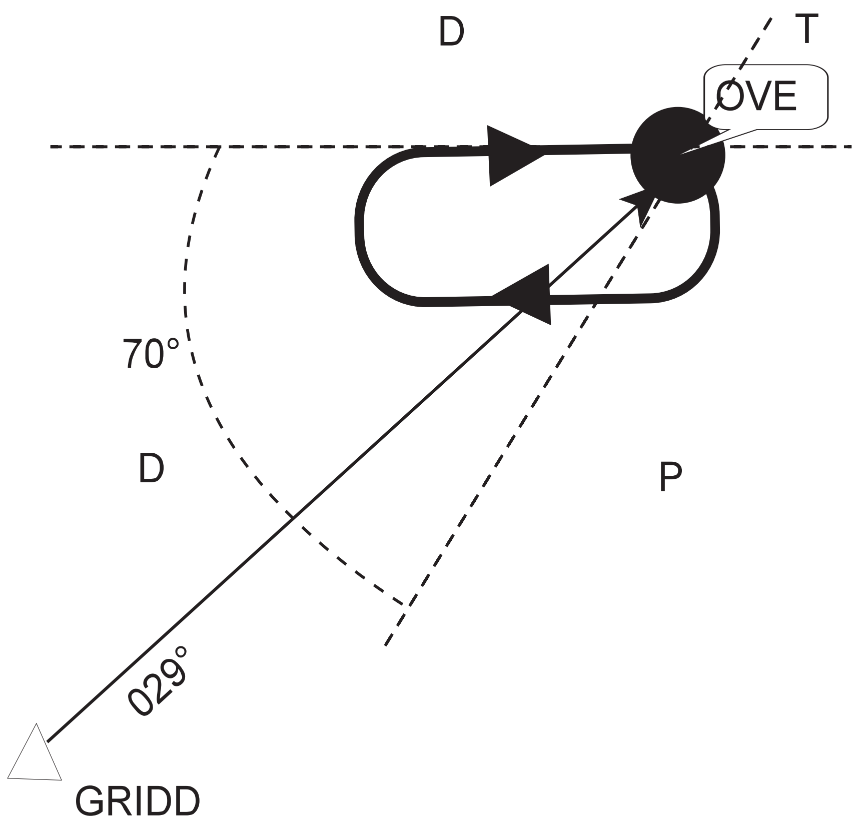

Figure 2. Drawing in the hold.

right or left. The clearance didn’t specify, so you need to remember whether the standard hold has left turns or right turns. The scene in the cockpit generally goes

8. The Circling Approach

Still out in the hold, we listen to the ASOS one more time. The weather is now 800 overcast with 2 miles visibility in haze. Do we have minimums for the approach? Take a look at the approach plate on page 125. This Baron is an approach category B airplane, which means that its max gross weight stall speed times 1.3 is between 91 and 120 KIAS. Note that the approach category depends upon *max gross* weight. If we were light, 1.3 times stall would actually be less than 91 knots, but the reg says that we would still need to observe the approach category B minimums. The only exception is that our category could *increase* if we elected to fly the approach faster than 120 KIAS. The reason the visibility minimums often creep up with the higher categories is that faster airplanes have higher turning radii, so they need more visibility to keep the airport in sight as they maneuver.

The high speed also affects the MDA in a circling approach. This is because the TERPS guaranteed 300 feet obstacle clearance during the circle, and if our speed is high and our turn radius is large we may encroach on a distant obstacle and need to be higher to have adequate clearance. More on this point shortly.

Based on the ASOS, we have minimums for the approach. The two mile visibility is greater than the Category B required 1 mile, and the 800 foot AGL ceiling translates to just under 1000 feet MSL, which is well above the required 840 MDA.

As a Part 91 flight, we would be legal shooting the approach even if the ASOS said the weather was below minimums. We could "have a look," as the saying goes. The wisdom of doing so is highly suspect. We would be like a recovering alcoholic meeting friends in a bar–we'd be presenting ourselves with a temptation that could lead to disaster. Regardless of the legality of taking a look, the regs are clear on this point: we can not descend below the MDA unless the flight visibility is at or above the visibility listed for the approach we are flying. (91.175(c)(2)) This is an especially important consideration for circling approaches.

Characteristics of Circling Approaches

We would do well to pause here and ponder the finer points of circling approaches. Suppose for a moment that we are cleared for the VOR Alpha approach to the XYZ airport shown in Figure 1. It is a calm-wind, standard day with the ceiling just above circling minimums. The airport sits at sea level. We cross over the XYZ VOR at 120 KIAS, drop the gear, descend to the circling MDA, and then maintain the MDA as we maneuver toward the airport at 120

9. Departing Oroville

We relax in Oroville for a few minutes and then call the Rancho Murieta Flight Service Station and check the weather to the north at Chico, Red Bluff, and Redding. It is plus or minus 500 overcast and 2 miles in light rain and mist in the general area. The freezing level is at about 9000 feet, as are the tops, which we saw for ourselves thirty minutes ago. There is no convective activity. We want to head north for some more approaches, but since the weather is below 2000 and 3, we need an alternate. FSS offers Sacramento International, 70 nm south, which is 2500 broken, 5000 overcast and 8 miles, more than good enough to be an alternate. (Our alternate, which has multiple ILS approaches, needs to be forecast to be 600 and 2 at our ETA. If Sacramento International only had a non-precision approach, we would need 800 and 2. See FAR 91.169.)

We file IFR, GPS direct from Oroville to the Red Bluff VOR (RBL) to the Red Bluff airport at 4000 feet. (See the low altitude chart in Figure 1.) We'll do a full stop there and then file the next leg. There is no radio communication with ATC on the ground in Oroville, so we will have to call FSS again in a few minutes to pick up our clearance. We go out to the plane to check the fueling and do a pre-flight.

When we call FSS a few minutes later, this is what we get: "ATC clears November 78 Papa Sierra to the Red Bluff airport as filed. Climb and maintain 4000. Squawk 4240. Departure frequency 125.4. Clearance void if not off by 1600Z. Time now 1550Z."

As far as the routing is concerned, we are cleared to take off and turn toward Red Bluff VOR, climbing to 4000 feet. But there are hills around here. How do we stand in terms of terrain separation?

This is an area that is not well understood, and we would do well to stop and ponder the subject of instrument departures. There are many possible scenarios.

Departing When There Is No Instrument Approach at the Departure Airport

Sometimes we depart from an airport that does not have a published instrument approach procedure (IAP). Perhaps there is a nearby VOR, and we filed direct to the VOR and then along airways toward our destination. We may have picked up a clearance on the phone through Flight Services with an instruction to proceed to the VOR and to climb and maintain some altitude at or above the MEA for the airway we are heading toward. It is vital to recognize that terrain/obstacle clearance is left entirely to the pilot in this case. In spite of the clearance, there is no guarantee that you can depart and climb toward the VOR

10. DME Arcs: Transition to the VOR Approach

As you recall, we got our clearance for the flight from Oroville to Red Bluff on the phone from Flight Services. FSS gave us a ten minute void time, which is typical when you depart from an uncontrolled field. Be sure you are ready to go when you make the call.

Our departure is routine. We takeoff on Runway 12 and turn right toward TALUM, climbing to 4000 feet. Cloud bases are now down to about 600 feet AGL.

As soon as things settle down after departing Oroville, we bring up the Red Bluff ASOS on Com2. The weather up there isn't wonderful, but certainly not dangerous. It's 400 overcast and 1 mile with light rain and mist. The wind is pretty light out of the southwest. Definitely worth a shot.

Nearing TALUM intersection, we call Oakland Center and ask for the VOR Runway 33 to Red Bluff via the initial approach fix (IAF) at the RBL 122° radial and 10 DME. See the Jepp chart in Figure 1 together with the excerpt from the en route chart in Figure 2. Since Center might think this request is odd, given that we are presently in better position for a straight shot at RBL, I tell them we are a training flight and want to do the DME arc. We are given a heading of 360° to intercept the RBL 122° radial and track inbound toward the arc at 4000 feet.

It is time for the approach checklist:

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

Exterior lights–landing lights on. Seats and belts–secure. Fuel selector–on the mains, adequate and balanced. ATIS–we copied the ASOS. Altimeter-set. Avionics–RBL is tuned and identified on Nav1 with the DME selected to Nav1. We also put the inbound course for the VOR approach, 328°, on the OBS for Nav2 and tuned Nav2 to RBL. We will leave the moving map up on the GPS, but fly this as a VOR procedure. Note that there is no GPS overlay for the VOR 33 at Red Bluff. We *must* use the VOR for the approach. Later in the book, we will discuss the use of GPS in these cases. Avionics are now set.

11. The VOR Approach

We turn left onto the 10 nm arc transition to the VOR Runway 33 approach at Red Bluff. See the approach plate in Figure 1. We stay oriented on the arc with the RMI and DME, and we have the course select pointer on the HSI set to the 328° inbound course. If we were doing this solely with a DG and single VOR, we would pick off an initial arc heading from the “9 o’clock” position on the OBS as described in the last chapter and then set the OBS to 328° to watch for the inbound turn.

Once on the inbound course and within 10 nm of RBL, we can descend to 1400 feet. We will have a little less than 10 miles to descend from 4000 to 1400 feet. At 500 feet per minute, we’ll need five-plus minutes to descend. There is no way to make that work at high airspeed. Even at 120 knots indicated, we’ll be doing close to 140 knots over the ground, so five minutes will put us past the VOR by the time we get to 1400 feet. That says we had better use more than 500 feet per minute and consider doing the approach a little slower than 120 KIAS. Non-precision approaches can be like that, and you need to look for descent problems before you are half-way down the approach, otherwise you will be tempted to make it up at the end with a big descent rate, and that is not wise.

We slow to about 110 KIAS with approach flaps out and drop the wheels as soon as we are established inbound. Gear down calls for the before landing checklist. We run the checklist from memory, holding up with mixtures, props, AP/yaw and full flaps to go. Oakland Center releases us to the CTAF frequency, and we switch over.

If we use a couple inches less than our customary 17" MP, we should pick up an extra few hundred feet per minute of descent. We can check our progress along the descent as we proceed inbound by comparing time to go with altitude yet to lose. Figure 2 shows us with 3.6 nm left to go to the VOR. We are out of 2200 feet for 1400 descending at 800 feet per minute. That leaves a minute more to descend. At 124 knots groundspeed on the DME, we have well over a minute to the RBL VOR, so the descent is working well.

As always, there is a lot of mental chatter at this point. Looking at Figure 2, I’d be saying: “2200 for 1400 to the VOR, then 740 to 2.7 DME. Speed 110, sinking 800. Stabilized. On course. If we see the airport, have the required 1 mile visibility, and an acceptable descent profile to the threshold, I’ll go to full flaps for the landing. If not, the miss is climb to 1500, then climbing right turn to 2000 back to VOR.”

We reach 1400 feet with a little less than a mile to the VOR. Add 5" MP to hold altitude and speed. Still in cloud. Cross the VOR, pull the throttles back to 15" MP for the final descent to the 740' MDA.

12. Preparing for the ILS to Chico

Up to this point we have extracted a lot of information from approach plates, but we have yet to take a long, careful, top to bottom look at a plate. It would be a good idea to do that at some point, and now is as good a time as any. This will give us a chance to consider some issues that might not otherwise come up.

Take a look at the Jeppesen plate for the ILS Rwy 13L to Chico shown on the next page. Starting at the top right we identify the geographic location (Chico), the airport name (Chico Municipal), the type procedure (ILS), and the runway (13L). We also see the primary approach frequency (111.3 for the localizer). We'll tune that in Nav1 now. The airport elevation is 238 feet MSL. The airport elevation is the highest point on any runway–not to be confused with the touchdown zone elevation (TDZE) for the intended runway, though in this case the numbers are the same. At top center we read the chart date (January 15, 1999) and the chart index number (11-1).

Notice that this plate was drawn up prior to Jeppesen's use of the Briefing Strip™ concept, though the chart is recent enough (post March 10, 1995) that key information is shown in bold type. Unfortunately, as the charting methodology evolves we find that not all the charts present the information in the same way. This is the inevitable price of progress, but it does change the flow of the approach briefing.

Just to the right of top center is the MSA (Minimum Safe Altitude) ring. This will give us 1000 feet of obstacle clearance (even in mountainous areas) when we are within a (normally) 25 nm radius of the defined center-point, in this case the CIC VOR, which is on the field. If there were a locator outer marker, the MSA ring would probably be defined around the NDB at the marker site even though you may not be required to have an NDB to shoot the approach. On a GPS approach, the center-point of the MSA ring might be the end of the runway or some other GPS waypoint. (We have already discussed how the new RNAV (GPS) approaches incorporating the TAA do not publish an MSA.)

On a VOR or NDB approach the center-point is usually the VOR or NDB. In some cases the missed approach point can be located near the edge of the MSA ring. The VOR DME Runway 5 approach into Coolidge, AZ, for instance, has its missed approach point at 24 DME–which is 1 mile from the edge of the MSA ring. In rare cases, the MAP will be beyond 25 nm from the VOR. In these cases the radius of the MSA ring is extended to as much as 30 nm so as to reach the runway threshold. This is the case at Grass Valley, CA, where the MAP is 27.3 nm from the Marysville VOR, and the MSA ring has a radius of 28 nm from the VOR. Fortunately, MSA is an emergency reference

13. Flying the ILS to Chico

As we complete our preparations for the ILS to Chico, we run down through the avionics stack to double check that everything is set properly. Figure 1 shows the avionics configuration when we are just past RBL on the leg from RBL to GERBE. Working from the top down, we see that the marker beacons are selected to low sensitivity and the audio will be coming through the cabin speaker. If I had nervous passengers, I would probably route the marker audio through the headphones only. We have Com1 tuned with center frequency active, and on Com2 we are ready with tower and ground frequencies for Chico. You generally get the com frequency change when you are at the outer marker–a busy time, when you are stabilizing the aircraft on the final descent and running the before landing checklist. Presetting the com frequencies will save you from one more task at this critical time. Navs1 and 2 are both tuned to RBL VOR as we leave the hold toward GERBE, and both the HSI and OBS have the 099° radial selected. The HSI is displaying Nav1 VOR information. Nav1 has the Chico ILS 111.3 in standby, and Nav2 has CIC VOR in standby. DME is selected to Nav2, since the Chico ILS does not have a DME. Altitude alert/preselect is at 3000 feet.

After the missed approach at RBL, we did the holding pattern with 17" MP, flaps up, and about 130 KIAS. It is 26.7 nm from RBL to GERBE to CIC. As we leave the hold toward GERBE, there would be nothing wrong with speeding up a little, but in the interest of keeping things simple, we are going to

Figure 3. Leaving RBL toward GERBE. Gear and flaps up.

14. Autopilots and Departure Procedures

Our graduation exercise is going to be the localizer/DME backcourse to runway 16 at Redding, California. We are going to try to pull it all together–the "numbers," SOP's, checklists, callouts, and briefings. We haven't yet put the autopilot/flight director (AP/FD) to much use, and it is also important that we spend some time brushing up on some of its lesser used features.

I've filed the GONGS One departure, Red Bluff, GARSA, direct Redding at six thousand. The clearance came back like this: "ATC clears Baron 78 Papa Sierra to the Redding Airport via the Gongs One Departure, Red Bluff transition, GARSA, as filed. Climb and maintain four thousand, expect six thousand five minutes after departure. Oakland center 132.2. Squawk 4535." After scribbling in my clearance template, it looks like so:

CLEARED TO *RDD✓*	
VIA	*GONGS 1✓*
	FLT PLAN ROUTE: *(GONGS → RBL → GARSA*
CLIMB & MAINTAIN *4*	EXPECT *6* IN *5*
DEPT *132.2*	SQ *4535*

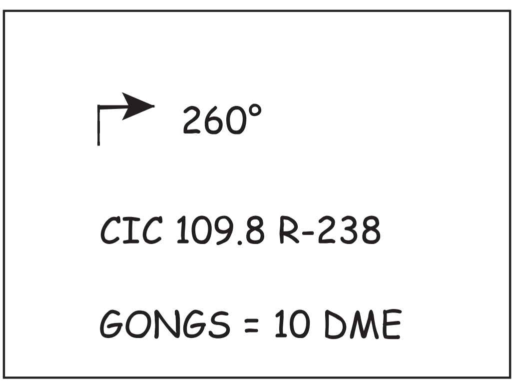

Figure 4. Sticky note with DP.

The next three pages show the low altitude en route chart and the relevant Jeppesen charts. The GONGS One Departure from Runway 13L at Chico calls for a right turn to a heading of 260° to intercept the 238° radial from the CIC VOR. According to the text of the DP, we are to "turn right ... within 1 NM of

15. LOC/DME Backcourse

Midway to Red Bluff, we call Oakland Center and ask for the localizer back course to Redding via GARSA and the RDD 17 DME arc. Just before we reach the Red Bluff VOR, Oakland center calls with the following: "Baron 78 Papa Sierra after Red Bluff, proceed direct GARSA, expect the localizer/DME back course Runway 16 to the Redding Airport via the 17 DME arc, maintain six thousand."

It's time for the approach checklist:

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

Exterior lights–landing lights on. Seats and belts–secure left and right. Fuel selectors–on the mains, adequate and balanced. ATIS–that's 124.1. We will listen now. (Wind is 150 at 10. It's 600 broken, 1500 overcast and 4 miles in mist. Altimeter 29.92". Landing and departing Runway 16.) Altimeter–set. Avionics–we'll get those as we do the brief.

Though we have studied the approach prior to departure, it is now time to review the plate and refresh our plan. Have a look at the approach plate in Figure 1and follow along with an extended briefing.

"This will be the localizer/DME back course to Runway 16 at Redding Municipal. We're on plate 11-2 dated 10 September of '99. (If there are two pilots up front, each with his/her own plate, we want to be real sure that we are literally on the same page.) We've got the ATIS. Center is 132.2, and we are talking to them. Tower is 119.8, we'll dial that into Com2 and put ground 121.7 into standby on Com2. The localizer frequency is 108.7, and we can dial that up into the standby position for Nav1. Final approach course is 162°, which we will set later. We will maintain 6000 to GARSA and (assuming we get an approach clearance) then 5500 on the arc, then once on the localizer it is 4200 to MILAR at 12.4 DME from RDD, then 2000 to ENTAR at 4.9 DME, then straight in minimums of 920 feet to the MAP at 1.0 DME, which is .1 nm from the runway threshold and 418 feet above touchdown at 502 feet. We need one mile visibility.

There is no charted VDP (visual descent point), but since there is a 3° VASI (this information is on the airport diagram, which is not shown) we know