

OFFSET GPS APPROACHES CAN CREATE A MORE EFFICIENT TRAINING ENVIRONMENT

Ever fly 30 miles to practice a complex GPS approach only to be vectored onto final due to traffic. Or, given the instruction “no procedure turn authorized fly heading 120 for vectors...” While this is the real world there are times when flying the full published procedure is a real benefit to IFR training. Wouldn't it be nice to have a variety of approaches within a few miles of your airport? Well you can just by offsetting any approach you like to a convenient location near you.

In this example we will take the Phoenix Gateway GPS C 30C and offset out of the busy Class B airspace to a point just north of Scottsdale where we are located. We can take off and fly the offset approach and published missed with about 45 minutes of aircraft time, where flying the actual approach, if we are lucky enough to get it, will take at least 1.5 hrs.

STEP 1 Find the co-ordinates of each waypoint for the approach you are offsetting. This is easily done by going to AIRNAV.COM. I've created an Excel spread sheet for many of the waypoints in our area. Figure 1 is an excerpt from this spreadsheet showing some of the waypoints needed for this approach. Notice that the fix co-ordinates in AirNav are given in degrees minutes and decimal seconds. For calculating the offset it will be convenient to convert this to decimal degrees. And for programming the GPS you need degrees and decimal minutes so set up cell formulas for the conversions after you do that it's only a matter of copy and paste for new co-ordinates as you enter them.

GICGE	32 57.686	111 42.884	32.961433	111.714733
COMGU	33 03.790	111 35.510	33.063167	111.591833
BOBRE	33 09.398	111 28.707	33.156633	111.478450
ORIYE	33 16.496	111 36.967	33.274933	111.616117
IBIXE	33 22.416	111 43.882	33.373600	111.731367
SACAT	33 15.379	111 52.446	33.256317	111.874100

Figure 1 Tabulated fixes in both degree decimal minutes and decimal degrees.

Your spread sheet may grow large as you add fixes, airports, and VOR's so no particular order is needed. In fact I usually sort this input data alphabetically.

STEP 2 Go to Google Earth and pick the geographic point you want as your offset missed approach point. In this example I picked Horseshoe Dam Spillway. Note the co-ordinates at the bottom of the frame (33 58.979N 111 42.526W). Figure 2 shows a screen shot of Google Earth with Horseshoe dam place marked.



STEP 3 Create another page in your spreadsheet for the new approach and list the approach waypoints in the order that you fly time from the first all the way to the last missed approach way point. Change the names a bit so as to not conflict with the database in your GPS. For example I start all my names with Z so BOBRE becomes ZBOB the name should remind you of the real name and starting with a Z and only 4 characters long it should not conflict with existing database names.

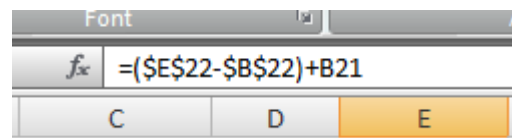
Enter the offset *missed approach waypoint* co-ordinates next to the new offset name. **Figure 2** shows the spread sheet for the offset approach. The original missed approach point, IWA is offset to horseshoe Dam and renamed ZIWA. This row is highlighted in yellow in **Figure 2**.

IWA GPS-30C			ZGPS30C-IWA (offset to Horeshoe Dam)		
ID	Latitude (N)	Longitude (W)	New ID	Latitude (N)	Longitude (W)
GICGE	32.961433	111.714733	ZGIC	33.64125	111.77207
COMGU	33.063167	111.591833	ZCOM	33.74298	111.64917
BOBRE	33.156633	111.478450	ZBOB	33.83645	111.53578
SNOWL	33.227833	111.561817	ZSNO	33.90765	111.61915
ORIYE	33.274933	111.616117	ZORI	33.95475	111.67345
IWA	33.303167	111.651433	ZIWA	33.98298	111.70877
IBIXE	33.373600	111.731367	ZIBI	34.05342	111.78870
SACAT	33.256317	111.874100	ZSAC	33.93613	111.93143

NOTE: ZIWA given co-ordinates for Horseshoe Damn

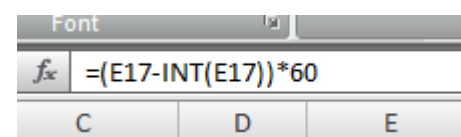
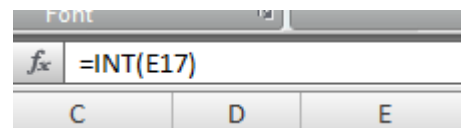
Figure 2 Co-ordinates for IWA GPS-30C offset to Horseshoe Dam

In the lat/long cells for the offset approach find the difference in decimal degrees between the real missed approach co-ordinates and the offset missed approach co-ordinates. Then algebraically add these to all the other real approach waypoints to fine the offset waypoint co-ordinates. For example the latitude co-ordinate for ZORI are created by the cell formula shown here to the right.



Copy and paste this formula to all the offset co-ordinate. This will create the co-ordinates for all the fixes in your offset approach.

Next, create a set of cells that contain the offset waypoint in the format that you GPS uses. This is usually degree and decimal minutes. This can be accomplished with two cell formulas shown here. This first creates the integer part of the number and the second creates the degree minutes value for the co-ordinate.

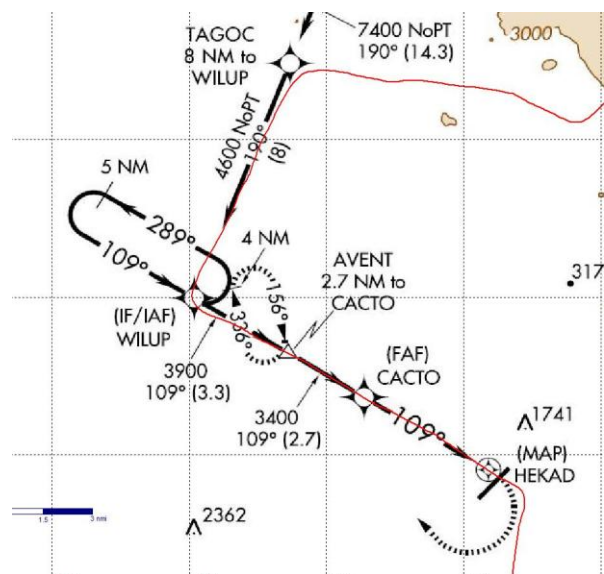


Finally, name you approach on the spreadsheet and add comments for you future use. The following picture shows three offset approaches **KIWA GPS C RWY 30C** (blue), **KSDL GPS C** (yellow), and **KPRC GPS RWY 21C** (red) all closely grouped within 10 minutes flying time from KSDL overlaying Google Earth.



STEP 4 Print the spreadsheet page showing the offset approach and take it to the airplane. Enter the offset waypoints into the User Waypoint menu. Then create a flight plan for each offset approach. Manually set the CDI sensitivity manually to 1 nm before you arrive at the IAF and then to .3 nm just before that FAF. Otherwise it will fly the same as the actual approach. The picture to the right is the GPS track of a student flying the KSDL GPS D offset approach.

This picture was obtained by taking a screen shot of the approach as downloaded from AirNav.com, saving as a JPG and calibrating it using software



from GPS Track Maker. Then the GPS track is imported into Track Maker and there you have the track overlaid onto the approach chart.

SUMMARY Eventually you will have to fly real approaches and handle ATC communications. But offsetting approaches can save a bundle of money and time while enabling you to gain the basic skills required to be able to fly a variety of approach configurations.

You can take this a step further by creating arcs about user waypoints to intercept your offset approaches creating more training scenarios than available using only the published data. You may think that entering all the data and creating flight plans is an onerous task, but you should let your students to it as this in itself is a great training exercise.