

Version
2.5

FLIGHT STANDARDS and TRAINING (VHQTD)

Flight
Planning &
Dispatch Tool

 **UNITED VIRTUAL**

United Virtual Airlines

Flight Planning & Dispatch Tool (FPD)

Version 2.5

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From: Chief Pilot
To: All United Virtual Airlines Pilots

Subj: Flight Planning & Dispatch Tool (FPD) v2.5

1. Use of this planning tool is restricted to UVA Operations. FPD v2.5 is the new name for the updated FVP v2.0 tool.
2. Fuel planning, Weight and VSpeed calculation and use is critical to the safe operation of an aircraft. We have repeatedly observed pilots who lacked this data, and ended up struggling unsuccessfully to fly their checkrides.
3. This tool is not only a practical fuel and weight planner, it also gives you weight corrected takeoff/landing VSPEEDS (V1, Vr, V2, Vref) for the entire UVA Fleet! Not only a joy when planning for a checkride, but a tool you should be using for every flight.
4. Once all entries are complete, a Dispatch Release sheet is created for your flight, neatly summarizing the data. A functionally identical Dispatch Release sheet can be generated from within the online Pilot Center reservations area, in similar fashion.
5. Pilots flying freeware panels, and who often have to struggle to get a handle on accurate information, will find this tool indispensable. Even those that have access to advanced panels, which often include their own similar tools, may find this fast and accurate utility still quite useful.
6. This documentation also includes an explanation of exactly what the VSPEEDS mean and how to use them. This really includes a basic "how to fly" section for takeoffs and landings. Best to have this information before you fly your checkride!
7. My hearty thanks go out to all those that helped put this utility together, who contributed with their ideas, collected all the data, and suggested improvements, without which this would never have happened. I would also like to thank all the BETA testers that helped ensure that nothing was left askew.
8. Anyone with recommended changes to this publication should contact the [Chief Pilot](#).



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Introduction

Fuel & Weight

Unlike taking out your personal Cessna 172 for a one hour joyride and that \$100 hamburger, fuel planning for the big birds is pretty complex.

With some exceptions, in a small aircraft you generally fill up the tanks to full any chance you get. You do not do that with large commercial aircraft.

There are a number of common errors that we are seeing in the checkrides as regards fuel and weight planning. A number are critical and are holding folks back. This utility should really help folks out.

The considerations are many, but the major items are covered with this tool, and attention to these should keep you on the straight and narrow, and flying safely.

There is a balance to strike between safety and cost. If you load too much fuel, you are lifting and flying more weight than you need to, and you may actually exceed the maximum *takeoff* or *landing* weight for the aircraft. Of course if you don't load enough fuel -- well nothing good happens then.

Take off & Landing Speeds – VSpeeds

The speeds used for the critical Takeoff and Landing segments are carefully calculated for efficiency and safety. It is absolutely imperative to not approach stall speed in a swept wing jet, especially during these critical times – so you must carefully respect these speeds. Stall speed may be only 25% below the speeds you will be flying in these segments!

“VSpeeds” will vary depending on the aircraft weight, configuration and weather & conditions. This planner will calculate reasonable values for you to use, as long as your aircraft simulation has reasonable accuracy.

The planner will also indicate the UVA SOP (Standard Operating Procedure) flap positions for takeoff and landing in all fleet aircraft.

Calculation and proper application of these VSpeeds is very important, and is a critical issue on checkrides.

Fuel & Weight

Maximum Gross Takeoff Weight (MTOW)

There is a maximum weight for takeoff, in any plane. The fuel on board and the payload is the extra weight that is added to the Empty Weight of the plane. This total weight must be less than the maximum to safely takeoff. Note that sometimes you will need to trade payload for fuel, in order to make a trip. You will be warned by this planner, if you are too heavy.

Maximum Gross Landing Weight (MGLW)

If you try to land your plane at a weight exceeding this, you will damage the plane, or at a minimum put it into an extensive maintenance review. It should not be done except under emergency considerations. This is a critical issue.

Most larger planes will be able to take off with more fuel than they can safely land with. The values vary tremendously for different planes, but if you have more than 3 to 4 hours of cruise fuel still on board when you land, you may be over the limit. Beware. This Planner will tell you for sure.

Far Reserve Fuel

For dispatch planning, this is the absolute minimum legal amount of fuel that must be on the aircraft when you land. This amount of fuel cannot be used for the flight, during planning. Once planning is done and you are in the air, all fuel on board is in play. But, unless you have a good reason like an unanticipated emergency, we expect you to have at the very least this minimum amount of fuel when you land,. With proper planning and no unanticipated events, you will have *much more* than the FAR Reserve when you land. This is a critical issue.

For UVA SOP the absolute minimum is 45 min of cruise fuel, or 10% of the flight fuel on overseas flights. The Planner will calculate this value for you.

How much fuel to board?

These are the items that the planner will add up for you, once you fill in the particulars of the trip.

- Flight Plan Fuel (the fuel required to fly from the origin to the destination)
- Wind Correction (headwinds and tailwinds will affect the amount of fuel required)
- Alternate Fuel (cruise fuel required to fly to your alternate)
- Contingency Fuel (cruise fuel for holds, 2 missed approaches, off optimum flight/route, long taxi)
- Captain's/Tanker Fuel

- Taxi Fuel
- [Absolute] Minimum Landing Fuel (45 min cruise or 10% trip)

As a general rule of thumb, landing at your primary airport without exercising any of the contingencies will typically result in having at least 1.5 hours of cruise fuel remaining on board.

What is an hour's worth of cruise fuel?

The UVA planner will assume that you are flying a plane/panel that is reasonably close to real world values. If this is a valid assumption, then fuel and weight planning will be accurate. If not, then errors will occur - but you can easily check for and correct for these errors with a little bit of testing.

If you have a fancy payware plane, pretty likely it will be quite close. In fact you may even have some sort of utility available to do much of your fuel planning for you.

In order to correct for an inaccurate panel (or just check it), you will have to collect some simple data yourself to make a first approximation, here is what to do. Load up your plane with about 50% of its fuel capacity, take off and level out at a typical cruise level for the plane. (FL300's for jets, FL200's for turboprops). Now set a timer and see how much fuel you burn in an hour while in stable cruise. Now you have a measured base amount fuel burn to work with. Check that against the fuel burn figure used by the Planner, if it is different, you will need to apply a correction, or even better fix up or get a more accurate panel!

VSpeeds

Now, what are all these mysterious VSpeeds? We will only discuss a few of the very many different speeds that are critical for aircraft operation. This planner will make it very easy for you to calculate the critical speeds you need to make a safe takeoff and landing.

V1

The *Go – No-go* or *Decision speed*. For takeoff you proceed in the following manner. This is UVA SOP.

Centered in position on the takeoff runway, with the brakes applied, runup the engines to 70% N1, check for stabilization, then smooth advancement of throttles to takeoff thrust, engage TO/GA mode. Keep your right hand on the thrust lever until V1 (decision speed), if you reach that you are committed to T/O, both hands on yoke then.

For the takeoff roll, this speed is calculated as the maximum that will allow you to abort the takeoff, and come to a safe and complete stop on the available runway you have. This is done in conjunction with setting the autobrakes to RTO (rejected T/O)

The correct sequence for an abort at >80 knots (and less than V1) is:

1. Close the thrust levers quickly and firmly
2. Confirm/hit the A/T disconnect, not necessary if THR HLD is indicated, but good habit
3. Confirm/manually deploy the spoilers to be sure.
4. Full reversers down to 80 knots.
5. If above 85 knots on rejection, confirm RTO autobrakes are active.
6. Bring the aircraft to a full stop and engage parking brakes. Announce to the cabin crew if passengers should sit tight or evacuate.
7. Look outside and see lots of smoke coming from the gear, and a bunch of fire trucks all around real soon with hoses ready. RTO application of brakes will give it every possible ounce of braking it can muster, all in an instant. Aircraft will be out of action for the day.

Vr & V2

The Rotation Speed (Vr) and Safety Speed (V2). When rolling down the runway, Vr is the speed at which you will begin to apply smooth, steady, and positive back pressure on the yoke to lift

the nose off the ground and start the aircraft rotation and takeoff from the ground. V2 is called the safety speed, as it will allow you to climb at the best rate with one engine out.

At Vr you should smoothly rotate the aircraft to about 8° of pitch over 3 seconds, confirm that you have lifted off, and then continue in a smooth movement to about 15° pitch. You should control the pitch to maintain V2+10 speed up to Acceleration Height (1000ft AFE). AFE is *above field elevation*, AGL is *above ground level*, they will coincide only if the ground is perfectly flat around the airfield. This V2+10 speed is sometimes called V3. You should have V2 in the speed window for this portion of the flight. If the aircraft is light (especially if you didn't derate the takeoff power) and you miss V3, don't worry, just hold the speed you are at. Even up to V2+25, the climb profile will be very similar. Never decelerate to try to catch it. Once you have 1000fpm positive rate of climb (just seconds), gear up.

And remember, set and fix your TO thrust on takeoff, and then control your speed with pitch, take whatever VS you get. As a reference and to guide the FD, V2 should be set in the speed window, don't you dare touch the SPD button.

From 35ft AFE to acceleration height (1000ft AFE) is the second segment climb. This segment is designed to get you away from the ground as quickly as possible, while still allowing for recovery in the event of an engine loss.

Once you reach Acceleration Height (1000 ft AFE), you pitch down, generally to around 8°, and accelerate to 250 knots still maintaining a bare 500 to 1000 fpm climb. As you speed up, retract the flaps gradually as you increase past the minimum flap speed for each setting. Note that 250 knots to 10,000 ft AGL is a target not a limit. Once you approach 250 knots, pull the nose up a bit again, and hold 250 knots with your pitch.

Vref

This is your reference speed for landing. The planner will calculate the raw Vref, as well the Vref corrected for the landing winds, for the UVA SOP flap position.

Your landing approach speed is calculated as $V_{ref} + 5 + \text{wind correction}$. The wind correction is half the steady wind plus the full excess gust. If winds are 10, G15 on the nose; $\text{speed} = v_{ref} + 5 + (10/2) + (15-10) = v_{ref} + 15$. Never more than $V_{ref} + 20$. But, don't worry, the planner will do all the work for you! The wind corrected Vref is sometimes called Vtgt, for V(target).

If you are autoland in weather (can't on a checkride), then your landing approach speed is just $V_{ref} + 5$, as autoland has gust protection. Note that autoland is not just flying the glideslope with the A/P. Only more advanced panels have a full autoland, this will do an approach, full landing, flare and even rollout in the larger Boeings.

The FAF (final approach fix) will be marked on runway plates with an "X" or Maltese Cross. It will usually be located 5nm to 7nm from the threshold, and will be denoted by a co-location of an OM (outer marker), NDB (non-directional beacon, use your ADF to sense this), or perhaps just an intersection. It is critical that you use every navigational instrument you have to backup and crosscheck your course. Regardless of the type of approach, always tune in the NAV radios

to nearby VORs or the ILS, and the ADF as applicable. This goes not only for landing, but for all segments of the flight.

Do not get into the bad habit of just following the magenta line, it may lead you into trouble.

You must fly a stabilized approach from the FAF, flaps in landing configuration, gear down, and at the wind corrected V_{ref} . Your VS will be -750 fpm or so, and should never be more than -1000 fpm, and not less than -300 fpm, and you must be within one tick of glideslope and localizer centers. If you fail to meet these conditions, or get even one aural warning (such as PULL UP) you must go-around. Bad landings follow from a Bad approach, conversely Good landings follow from Good approaches.

If you need to go-around, you engage TO/GA mode, as soon as your engines spool up, retract flaps to 15° (20° in the 747), nose up and set the command speed for the set flaps minimum speed + 10. On positive rate up, retract gear and then retract flaps as per the usual schedule as you speed up.

Assuming you have a good approach, and do not go-around, you continue to approach the runway. Once over the threshold you should be at 50ft AGL, and still flying at the wind corrected V_{ref} (V_{tgt}). This puts you in perfect position to touchdown on the two big white rectangles, which is your aiming point on a precision runway. If set up correctly, you are like an arrow headed straight for the bull's eye! That landing aim point is 1000ft downrange from the usable runway threshold. You may land on the runway even 2000ft further (3000ft downrange from the threshold) and still be UVA SOP. The smaller markings on the runway mark off 500ft intervals, and are for orientation.

So, when you reach 50 ft AGL (hopefully at the threshold), slowly retard the throttle to flight idle. While doing so, at the right point (40ft to 10ft AGL, depending on the plane) you give a gentle tug for the flare to reduce your descent slope by 2° or so, you will then be descending on a 0.5° to 1° slope in the flare and at 150 fpm or less. You literally fly the plane (gently) into the runway.

Ideally during the flare and up to touchdown you should not go below $V_{ref}+5$ + the gust excess, that is you bleed off the steady wind component only, but in any case you must never go below $V_{ref}-10$. If you flare at the right time this will not be a concern as you won't bleed enough speed for it to be a factor. The important thing to remember is that base V_{ref} is only 30% above your stall speed and nothing good happens when the stick starts shaking!

Using the Spreadsheet Planner

All entries that you make to the spreadsheet are on a gray background, and are further denoted with thin-lined colored boxes. Do not change anything else.

You will first fill in the Flight Information in the blue box. This is optional, but if filled out will give you a complete dispatch release sheet.

Then in the red Fuel Information area, you select the aircraft type by using the list box on the left. Once selected, all the pertinent aircraft weight and fuel burn data will be shown in the yellow boxes. These are rounded for you, for easy memory work, but the precise figures will be used in all the calculations.

Next, enter the Trip Length in fractional hours.

If you know what the average winds aloft will be for the trip, then enter that value in the next box down. Negative values are headwinds. If you don't know what the winds aloft will be, then assume a 40 knot headwind average for the trip and leave the default (-40).

If an alternate is required, enter the time to reach the alternate from the destination airport in fractional hours.

Contingency Fuel is most everything else that might occur, potential holds if traffic is busy, long taxis, or inability to get to higher altitude quickly, potential rerouting, and go-arounds. Leave this to at least 0.5 hr, increase it if required.

Captain's Fuel is “just because”. It is at your discretion, something up to 0.5 hr is not unreasonable, you can just leave it at nil. If you enter a planned tailwind, the fuel saved will not be removed, but just “set aside” in the Captain's Fuel allotment.

Also included in this figure is Tanker Fuel. Tanker fuel is ferried fuel, used when fuel pricing or other issues dictate. Not normally used for UVA ops.

The planner will then go to work, and calculate:

Taxi Fuel – estimated at 20min total

Far Reserve – this is a legal planning minimum dictated by FAR

Plan Fuel Required – a grand tally of fuel required

The next thing to sort out is the payload.

Also, look for warnings in the advice column. If there are any, you may have to trade off payload for fuel to make the trip, or eliminate some of the contingencies, if safe to do so, to stay within operational maximums and minimums and to safely make the trip.

To adjust the payload look to the Plan Payload line, and either adjust the Percent of Max Payload value from the default 80%, or input a numeric Lbs payload in the square beside. If the Lbs Payload square is left as zero, the planner will use the % entry to determine payload weight.

If you have warnings in the last column, keep adjusting the payload down until the warnings disappear. Once you know the correct value for the weight, be sure to adjust that in Flight Simulator, in your aircraft. (Alt|Aircraft|Fuel).

If you have to adjust down too much, you may not have enough payload to make this a practical flight. It may be that the aircraft you are trying to fly it with, is just not meant for this trip.

You will now have accurate data for:

Plan Takeoff Weight & ZFW

Expected Landing Fuel and Weight – if you have not exercised any contingencies this is what you will land with

Now turn your attention to Speed Information, the green section. Having set the payload, you now have the final fuel, weights, and VSPEEDS calculated for takeoff. You will recognize V1, Vr & V2 from the discussion above. For the Boeings the planner will also calculate the Vref30+80 speed. Note that these values are only valid for the flap setting specified. The flap settings advised are UVA SOP.

Vref30 at takeoff, is the Vref for flaps 30 for your takeoff weight, that is the technical explanation. But here is the important thing, for Boeings, adding 80 knots to this figure will give you your minimum safe speed for flying with no flaps extended, or your “Minimum Clean Speed”, sound familiar? With flaps retracted, you should fly at least 10 to 20 knts over this speed, for safety.

Now you have one last thing to do, you need to enter the landing winds, when you have them. Enter the steady wind and full gusts, and then the planner will give you your last number, the Wind Corrected Vref (Vtgt) for landing. Note that this value is only valid for the flap setting specified. As an example, if the METAR for the winds is 03010G15 and you are landing on runway 03 (pretty much into the wind), then enter 10 for the steady wind, and 15 for the Full gusts.

For a Gold Star, also remember that wind direction is always specified as True direction, and runways and your usual navigation in lower latitudes is specified as Magnetic direction. That said, this makes a big difference only in a handful of airports.

You do need to use the headwind component of the wind. If the wind is not directly on the nose, you can easily adjust it as an approximation. If it is 30° off, then reduce it by 15%, if it is 60° off then adjust it down by 50%.

Now, with all the information entered, the FPD will generate a complete and ready to use Dispatch Release sheet. See the included UVA Flight Planner & Dispatch Decoder PDF file to explain all the entries on the dispatch page.

Online Pilot Center Dispatch Tool

For a full discussion and more detailed information on all the entries required, see the above “Using the Spreadsheet Planner” section.

Within the Pilot Center of the UVA website, where you reserve flights you may also generate a Dispatch Release. Select that option once your flight reservation is complete.

You will see a web-form appear that will have some of the flight information already filled in for you from your reservation.

The form requires an Aircraft type, and the alternate airport if one is necessary.

You then need to fill in the flight route that you have planned.

Then, just as in the spreadsheet tool you need to fill in the information for the Fuel Planning, the actual flight time planned (takeoff to landing only), the average windspeed aloft, the fuel time to the alternate airport, the fuel time for contingencies and the Captain's/Tanker fuel.

Then you can adjust the payload, enter either a percentage of maximum payload (eg. 80%) or fill in the lbs weight of the payload. (eg. 23886).

Finally you may enter any dispatch remarks. If available, the passenger load will be noted in the remarks.

Once this is complete, then press “Check/Process”. You will see a Dispatch Release below the web-form. Any errors will be flagged and shown in red. If there are any errors, you need to go back and edit the items in the web-form to correct these, and then press “Check/Process” once again.

Once you are satisfied with the entry and data, then press the “Print” button.