

Lesson 201

Rectangular Course

Overview

You will continue your flight training by learning how to perform a maneuver called a rectangular course (Figure 201-1).

A rectangular course is a combination of straight and level flight and level turns while tracking points over the ground. There will be markers to assist you with points to fly over and points at which to turn.

This mission uses the pointer, as well as the Point of Interest (POI) compass to guide you. These are features within Prepar3D, so verify that you have set all the correct settings, or this mission may not display correctly. The compass and pointer are designed to assist you with measuring the distance from each pylon and to help point you in the correct direction.

Briefing

This lesson is the first one in a series of ground reference maneuvers. These maneuvers require the aircraft to be flown based on a ground track, which is your position over the ground. To maintain a ground track when the wind is blowing, a wind correction is needed during straight legs and turns. For more information on flying a track, refer to the notes section at the end of this briefing.

Rectangular courses are meant to simulate flying a traffic pattern. You will practice dividing your attention between outside references and the flight instruments, as well as applying wind corrections to fly a perfect rectangle over the ground.

This lesson consists of flying a rectangle by flying parallel to roads at 1/3 to 1/2 NM distance from the roads. Each road should be approximately 1 NM long and the maneuver should be performed at 600' to 1,000' above the ground.

A large pylon will mark each road intersection. On the ground, there will be small pylons to assist you in maintaining the ground track. After each lap, a few of the small pylons will be removed, forcing you to maintain your distance from the road without their assistance. On the third lap, all the pylons will be removed.

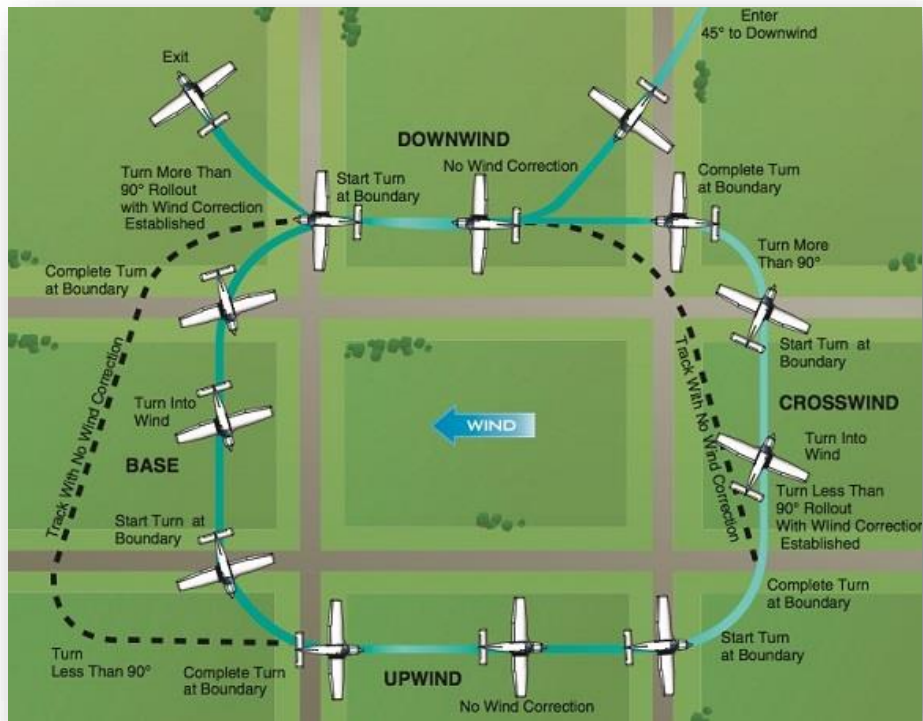


Figure 201-1: Rectangular Course Pattern

Here is an overview of the rectangular course:



Figure 201-2: Rectangular Course at Starting Position

The ground track is drawn in white and the rectangular course is outlined in red. At each corner of the red rectangle are large pylons. On the ground, next to the white track, you will see the small pylons. These small pylons will help you maintain the distance from the roads and they will disappear gradually after each lap.

Entrance

This maneuver will be initiated at 90 knots with the aircraft flying straight and level. Prior to entering the maneuver, bug the altitude at which the maneuver will be performed and verify that 2,300 RPM is set for 90 knots, straight and level flight. I will tell you the altitude to maintain during the flight.

Approach the course at a 45° angle at a point halfway through the downwind leg, as shown in Figure 201-2. This will be where the lesson begins.

Figure 201-3 depicts the entry. As you approach the first leg, intercept the downwind leg at a point approximately 1/2 NM from the road.



Figure 201-3: Turning Downwind

Crosscheck your distance from the road by looking outside the window. Once you turned, the road should appear halfway up the strut of the aircraft as in Figure 201-4 and Figure 201-5.



Figure 201-4: On Downwind Approaching First Turn

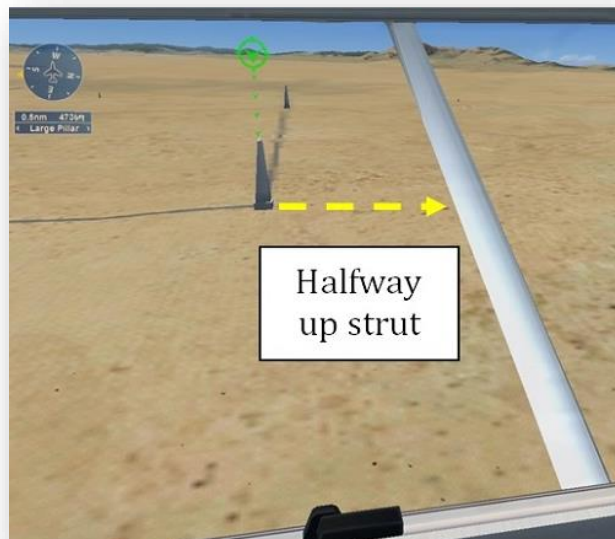


Figure 201-5: Abeam First Pylon

If not, correct as appropriate.

Maneuver

All of the turns in this lesson are level turns. For more information on level turns, refer to lesson 104.

As you approach the first turn from the downwind (first leg), remember that because the groundspeed is faster, you will need to bank steeper in order to increase the rate of turn. This will compensate for the increased ground speed and keep the aircraft on the desired track over the ground.

Prior to entering the turn, look for the next large pylon to help you determine when to roll out on the next heading. It will be about 90° to the left of the course where you entered the turn.

To complete the turn, wait until the middle of the wing is directly over the first corner (large pylon) and begin the turn. During the turn, pivot around the large pylon while adjusting the bank angle as necessary to keep the aircraft at a constant distance from the pylon as shown in Figure 201-6.



Figure 201-6: Side View of a Turn

Roll out of the turn when you are parallel to the new road. Once turned, ensure that you are 1/2 NM from the road by checking to see if the road is half-way up the strut as in Figure 201-5. Make appropriate adjustments based on what you see.

Figure 201-7 depicts what you should see once you completed the first turn and are approaching the next large pylon.



Figure 201-7: Approaching Upwind Turn

Continue using this technique for each turn and you will be back at the start of the course.

You will complete three laps. Remember that some small markers will disappear on the second lap and all of them will be hidden completely on the last lap. As you go around the first lap, use the small markers to help guide you around, but do not rely on them.

Common Errors

Not maintaining altitude throughout the maneuver: Remember that this maneuver is a combination of flying straight and level and level turns. The same concepts must be applied to maintain altitude in each of these situations.

Failing to adequately divide attention: You must be able to multitask between looking outside at the course and inside at the flight instruments. Fixating outside commonly results in airspeed and altitude deviations, while fixating inside commonly results in ground track deviations.

Improperly timing the turns: Can lead to overshooting or undershooting the desired distances from each road. Remember to wait until the intersection of the roads is directly under the wing before commencing each turn as shown in Figure 201-8. Adjust the bank angle to keep the tip of the wing on the large pillars throughout the turn, and roll out parallel with the next road.

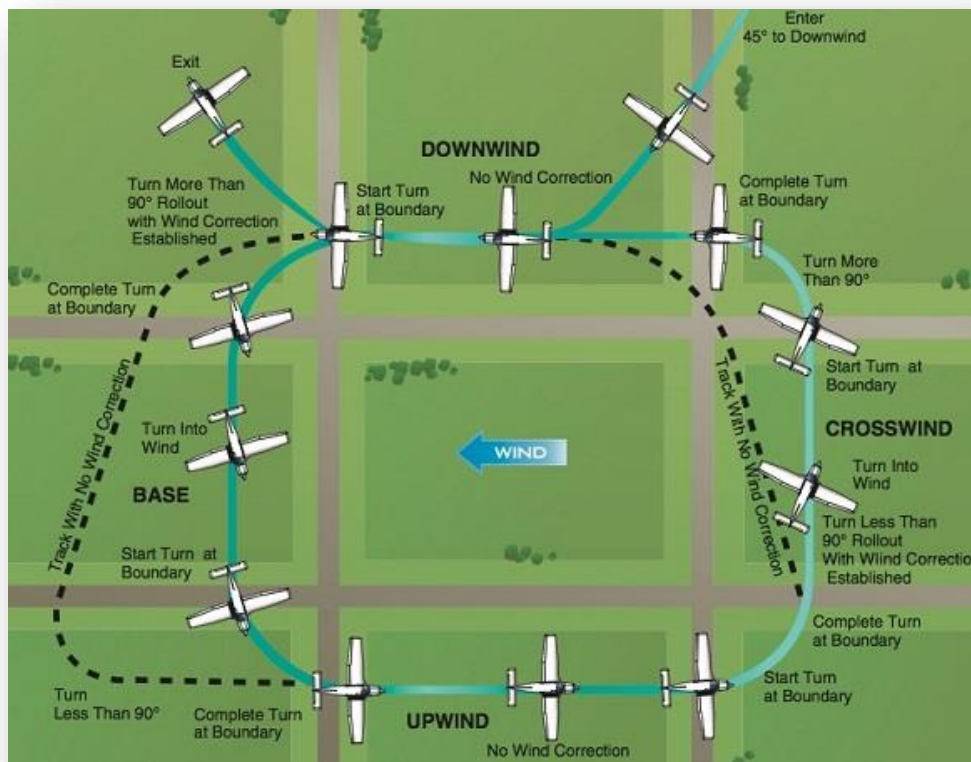


Figure 201-8: Rectangular Course Pattern

Notes

Downwind: Leg parallel to the road in which the aircraft flies with the wind. You will have the fastest ground speed on this leg since you will be flying with a tailwind.

Base: Leg perpendicular to the roads on the downwind side. Crab left into the wind.

Upwind: Leg parallel to the roads that go against the winds. You will have the slowest ground speed on this leg caused by the headwind.

Crosswind: Leg perpendicular to the wind on the upwind side. Crab right into the wind.

Tracking and Wind Drift

An aircraft's track is its flight path over the ground. Just as water currents affect a boat's direction of movement, an airplane's movement over the ground is affected by the wind direction and speed. This means that if the current or wind is going one way, the boat or airplane will be moved in that direction with it.

To counteract this, a correction angle into the wind (also known as crab angle) must be used. The angle will depend on how strong the wind is and at what angle it is hitting the aircraft. The wind correction angle must create a force strong enough to balance out the wind force and maintain the same ground path as shown in the figure 201-9.

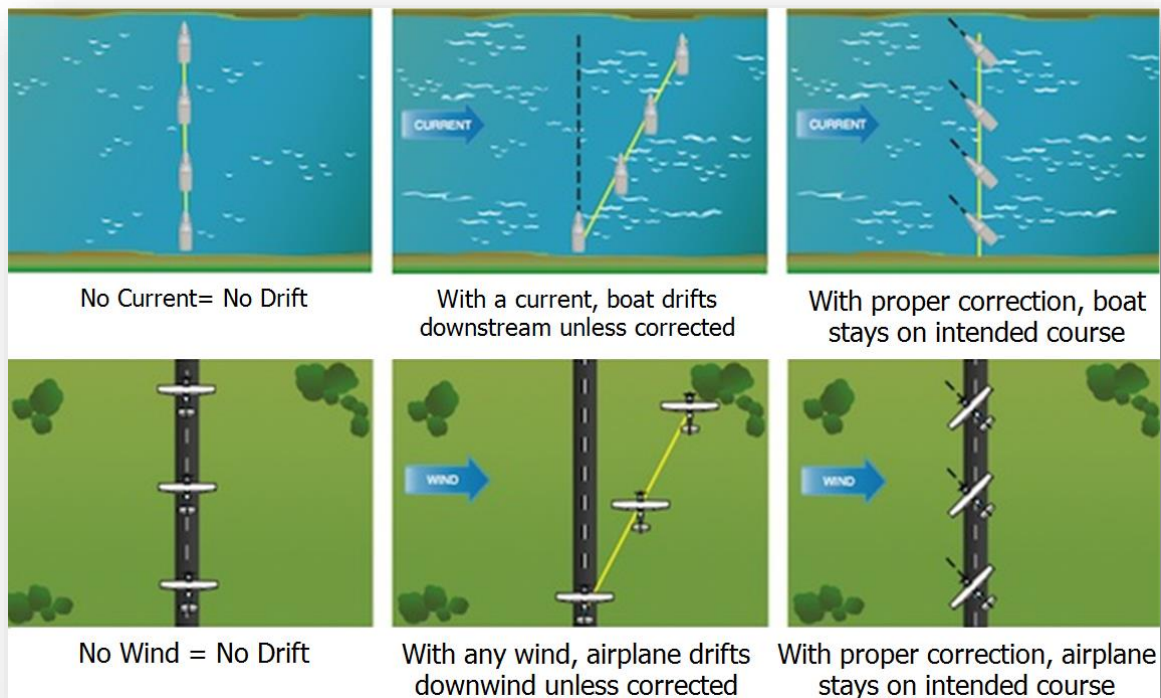


Figure 201-9: Drift

A wind correction will be necessary during a turn when there is a wind that will change its path over the ground as shown in Figure 201-10. To counteract the wind effect, the aircraft will need to be banked steeper (to increase the rate of turn) while flying downwind (with the wind). Likewise, the bank will need to be shallower if making a turn while flying upwind (against the wind).

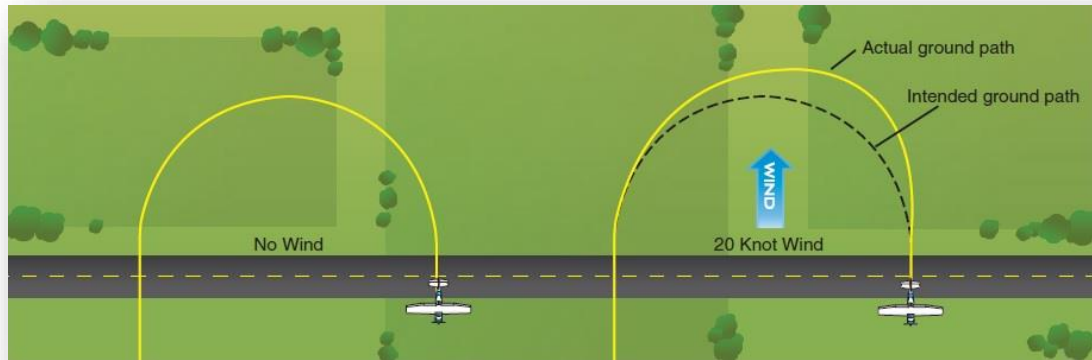


Figure 201-10: Wind Effect During a Turn

These principles for wind correction bank angle are shown in Figure 201-11.

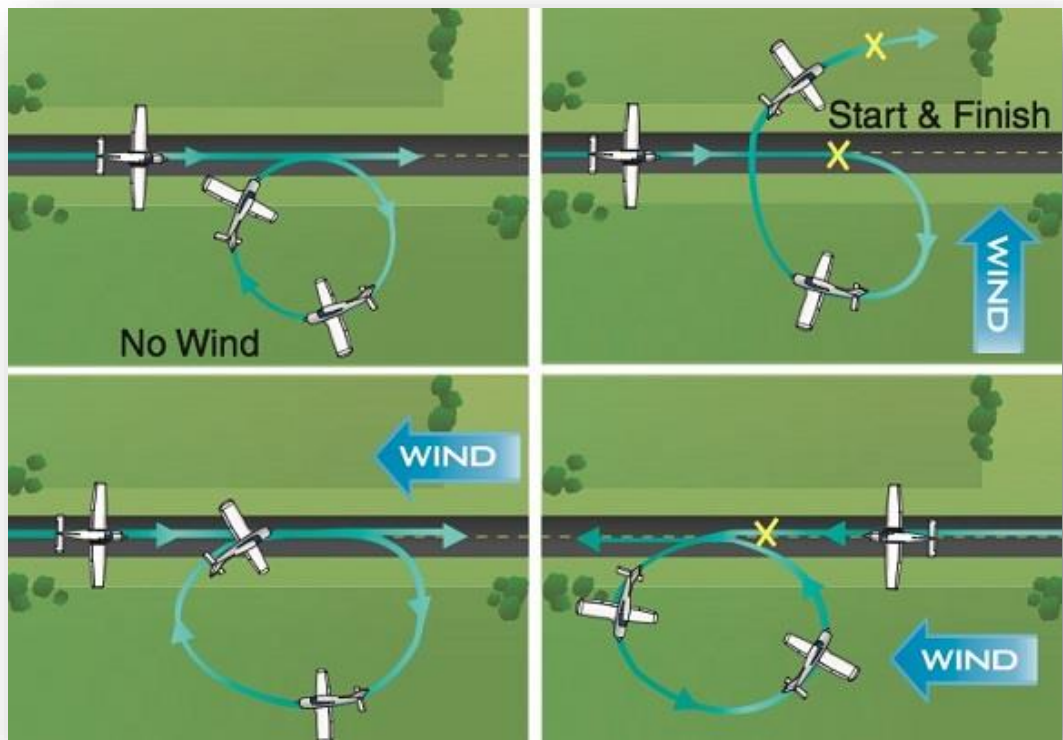


Figure 201-11: Correcting for Wind

End of Briefing
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