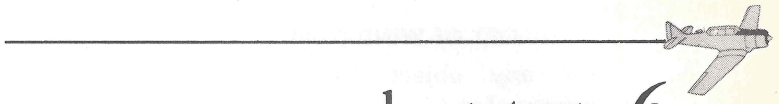
ground-track maneuvers



chapter 6

Ground-track maneuvers are maneuvers which are performed at a relatively low altitude to make good a predetermined track or path over the ground. These maneuvers are mainly designed to accomplish a dual purpose, however, they will aid your flying proficiency in many other ways. First, they will help develop your ability to fly the aircraft almost automatically, and at the same time divide your attention among other factors, such as planning ahead of the aircraft, noticing your present position in relation to the ground, and flying proper headings to make good a desired ground track. Second, they will increase your ability to recognize the effect of wind drift and how to correct for it properly.

Up until this time most of your flight training has been at higher altitudes, with not much thought given to wind drift. Your attention was, more or less, concentrated on just flying the aircraft and making it perform as you desired.

Your proficiency should have increased to such an extent by now, that you should be able to fly the aircraft, and at the same time be able to concentrate on these other related factors.

Since most of your flying has been at higher altitudes, you were not aware of the proximity of the ground. When you begin practicing ground-track maneuvers, you may encounter a slight tension, or uneasiness. Practice in these maneuvers will tend to relieve this tension and enable you to fly the aircraft with ease. They will also help you become accustomed to the apparent increase in speed near the ground, consequently helping develop your ability to think ahead of the aircraft.

The three ground-track maneuvers discussed in this manual are S-turns Across a Road, "8's" Along a Road, and Rectangular Course. They are all related to the traffic pattern and are excellent practice maneuvers to improve your traffic pattern flying technique and your ability to correct for wind drift to fly a desired ground track. Although all of these maneuvers may not be presented to you, they are, nevertheless, covered in sufficient detail to ensure a comprehensive coverage should time permit. For the sake of continuity it is mandatory that all the maneuvers be reviewed.

Be on the alert for forced-landing fields while performing ground-track maneuvers. Because of the proximity of the ground, there is not too much time available in which to look for a suitable field for a landing. You should always be prepared to cope with any emer-

gency that may develop. For this reason you may expect a simulated forced landing during any part of any ground-track maneuver. Your instructor will give you forced landings to see if you are dividing your attention properly and have a field picked out in case of an emergency.

Do not select an area to execute the ground-track maneuvers which will take you over cities or towns.

THEORY OF WIND DRIFT

Whenever any object frees itself from ground friction, that is, when it no longer has any connection with the ground, it can only be affected by the medium with which it is surrounded. This means that it is free to move, and must move, in whatever direction the medium is moving, and at the same velocity.

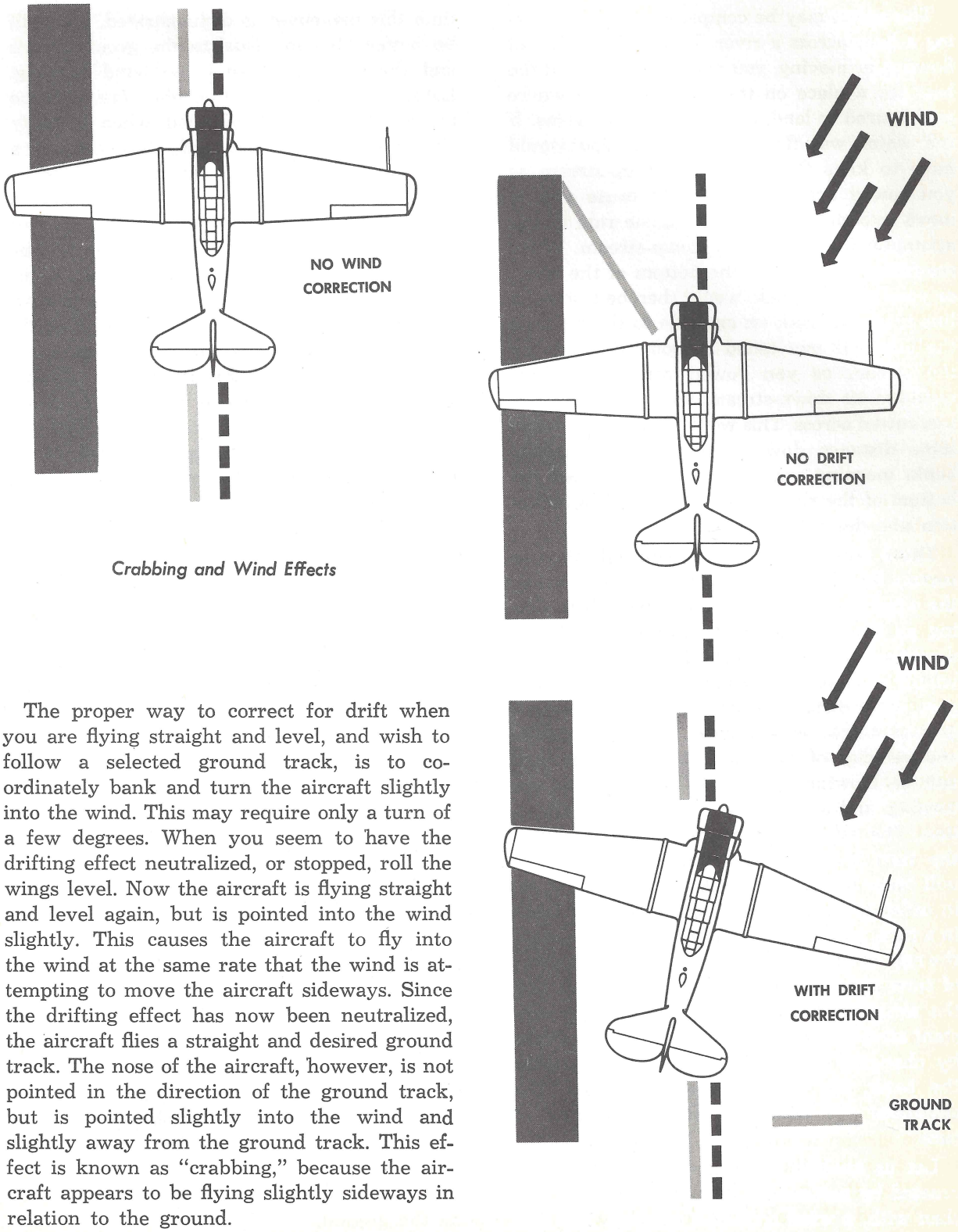
For example, when you were younger, you probably made little cork or wooden boats to float in a ditch, or a small stream. Your buddy probably made similar boats, so you decided to have a race. You placed both boats in the flowing stream of water, and released them simultaneously. The boats then began to move along in the water, in the same direction, and at the same velocity as the water. Now and then one of them would get into a certain section of the stream which was moving faster than the water where the other boat was floating. Naturally, this would result in one boat getting ahead of the other.

Up to this time we have been discussing the movement of the boats with respect to the water. We saw that the boats were motionless in respect to the water in which they were floating, because they drifted along only as fast as the water would allow. Now let us take into consideration the movement of these boats in relation to the ground, or the bottom of the stream or ditch. Obviously, they were moving at a certain rate in relation to the ground, because you had to walk along the side of the stream to keep up with them. You noticed also that they were moving only at the rate that the stream dictated, which was its own speed. You also noticed that when one boat floated into the section of the stream that was moving faster, you had to walk or run faster to keep even with it, proving that the speed the boat was making, in relation to the ground, changed as the speed of the water around it changed.

Now then, as soon as an aircraft becomes airborne, it is free from ground friction. It, therefore, can only be affected by the wind, i. e., move with the air mass in which it is flying. By this time in your flying training, you have noticed that the aircraft does not always follow the ground in the same direction the nose is pointed. You have probably at one time or another been flying parallel with a road. The longitudinal axis of the aircraft was lined up perfectly with the road and you were flying a straight and level course. Suddenly you realized that the aircraft was getting closer to the road or had actually crossed it, without any turn having been made.

This would indicate to you that the air in which you were flying was moving in a direction that caused it to cross the road at some angle. Of course, whenever air moves we feel the pressure of its movement when we are standing on the ground, and we call this movement of air the wind. Since the aircraft is flying in this certain body of air, it tends to move along with the air in the same direction and at the same velocity just as the boats moved with the stream.

Suppose you were flying along straight and level and the wind was blowing 30 MPH from your left and precisely 90° to the direction the aircraft was pointed. At the end of one hour the body of air in which you are flying would have moved 30 miles to your right. Since the aircraft is in this body of air, and moving right along with it, you and the aircraft would also have drifted 30 miles to your right in one hour. Of course, in relation to the air you only moved forward; but, in relation to the ground you have moved forward and 30 miles sideways. This effect is known as drift, and must be compensated for, in order to cause the aircraft to pass over a desired track, or course on the ground.



Crabbing and Wind Effects

The proper way to correct for drift when you are flying straight and level, and wish to follow a selected ground track, is to coordinately bank and turn the aircraft slightly into the wind. This may require only a turn of a few degrees. When you seem to have the drifting effect neutralized, or stopped, roll the wings level. Now the aircraft is flying straight and level again, but is pointed into the wind slightly. This causes the aircraft to fly into the wind at the same rate that the wind is attempting to move the aircraft sideways. Since the drifting effect has now been neutralized, the aircraft flies a straight and desired ground track. The nose of the aircraft, however, is not pointed in the direction of the ground track, but is pointed slightly into the wind and slightly away from the ground track. This effect is known as "crabbing," because the aircraft appears to be flying slightly sideways in relation to the ground.

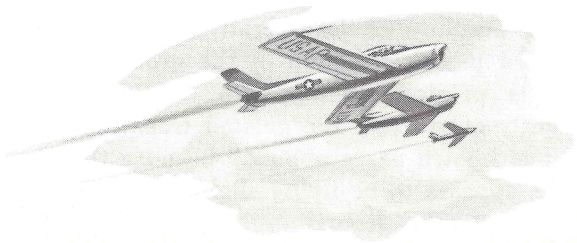
This effect may be compared to that of rowing a boat across a river. If the river was not flowing, or moving, you would merely head the boat for a place on the opposite shore where you desired to land, and row straight across. If the water was flowing, however, you would have to keep the boat pointed up-stream as you rowed across. This would cause you to move into the stream at the same rate it was attempting to move you down-stream. Your resulting track across the bottom of the river, or your ground track, would then be a straight line from the bank on one side to the bank on the other. If you failed to point the boat up the stream as you rowed across, the boat would drift down-stream with the water as you rowed across. This would cause you to land some distance down-stream on the opposite bank, meaning your ground track across the bottom of the river was diagonal to the direction you desired to take.

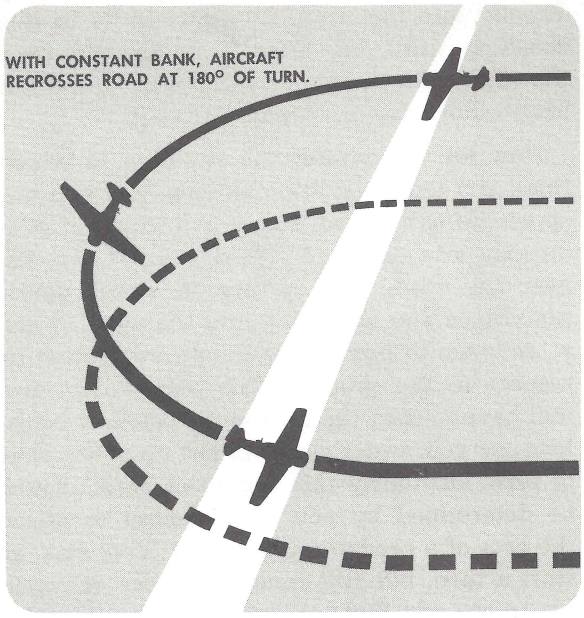
There will be times when you will want to correct for drift while in a turn. As you know, the wind in relation to the ground will be acting on the aircraft from constantly changing directions when the aircraft is turning. The length of time you remain in any particular part of a turn, in order to make a certain ground track, is governed by the direction and velocity of the wind. At times the wind will be blowing opposite to the way you are turning, and at other times in the same direction. The effect of wind drift, plus or minus the turn and the movement of the aircraft, will cause the ground track to vary. Therefore, in order to make good a desired ground track in a turn, you may have to increase or decrease the rate of turn. As you already know, the rate of turn is governed by the angle of bank and the airspeed of the aircraft. Assuming a constant airspeed, you can change the rate of turn by changing the angle of bank. The greater the bank, the faster the rate of turn. The shallower the bank, the slower the rate of turn.

Let us analyze the ground tracks that are created by performing turns first without, and then with, a wind condition existing. The first time this maneuver is demonstrated, you will be better able to visualize the ground track and the turns if there is no wind blowing. Later, however, you will benefit more from the maneuver if it is performed when a fairly strong wind is blowing and, thus, causing a more noticeable drifting effect.

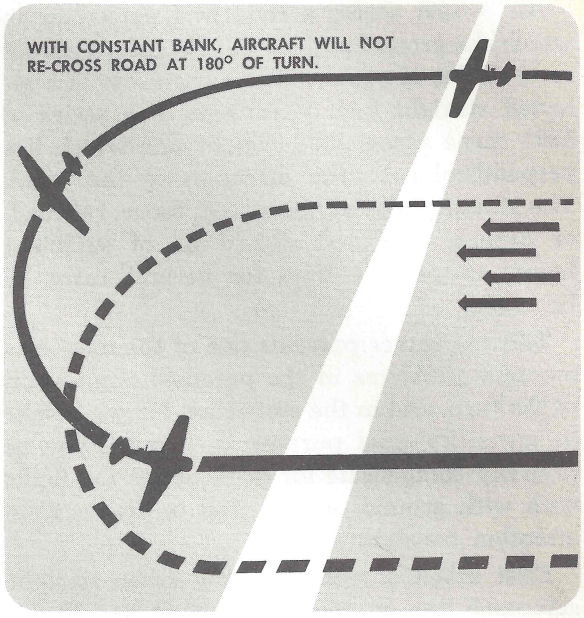
Let us assume there is a no-wind condition existing. It would be simple in this case to make arcs of 180 degrees over the ground, because the air track and ground track are identical. All you have to do is approach a road from a 90° angle, and when you are directly over the road, roll into a turn with any angle of bank and maintain this same angle of bank for 180 degrees of turn. If the bank is steep, the turn will be fast. If the bank is shallow, the turn will be slow. In any case, if you cause the aircraft to turn 180 degrees in the air, the aircraft will follow the same path over the ground. This means that if you were to start your turn directly over the road, and turned 180 degrees while maintaining the same angle of bank, you should be back over the road just as you complete the turn. Remember, a constant angle of bank at a constant airspeed, means a constant rate of turn.

You could then lead the roll-out so the wings become level just as the aircraft reaches the road and roll immediately into a turn in the opposite direction, with the identical amount of bank. This would cause the aircraft to turn 180 degrees in the opposite direction, make exactly the same size semi-circle, and be back to the road just as the turn is completed. This would be an ideal situation and would only be possible if there was no wind blowing, and if the angle of bank and the rate of turn remain constant throughout the entire maneuver.

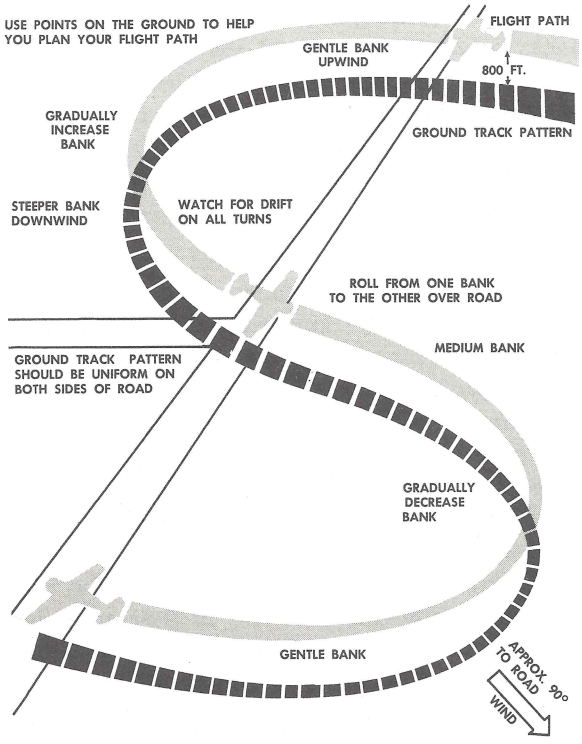




No Wind: Desired Track Identical with Flight Path.



With Wind: Desired Ground Track Not Identical With Flight Path



S-Turns Across A Road

Very rarely, however, does a no-wind condition exist. If you attempt to maintain a constant degree of bank, with the wind blowing perpendicular to the road, you would make a true semi-circle track through the air; but, with the air mass moving constantly, this would cause your ground track to differ from a true circle. Of course, the greater the wind velocity, the greater would be this difference.

To counteract for this wind drift effect, you can vary your air track in such a manner as to neutralize the drift effect of the wind, and cause the projected ground track to be a true semi-circle. This is accomplished by varying the angle of bank, consequently varying the rate of turn, to compensate for the drift effects caused by the various wind angles encountered in a turn.

These wind-drift effects, and the proper techniques just discussed, will apply in principle to all ground-track maneuvers. These maneuvers will then help develop your ability to correct for wind drift in straight and level flight, and also in turns.

S-TURNS ACROSS A ROAD

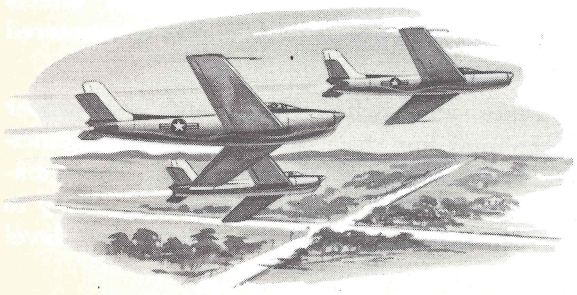
An S-turn across a road is a maneuver in which the ground path of the aircraft describes semi-circles of equal radii on each side of a selected straight line. It consists of a series of 180° turns across this straight line which lies perpendicular to the direction of the wind. The straight line may be a road, fence, railroad, or section line, and should be of sufficient length to provide time for several turns to be made.

This maneuver presents one of the most elementary problems in the practical application of the turn, and in the correction for wind drift in turns. Its chief purpose is to teach you to properly compensate for drift, orient the flight path with ground objects, and to divide your attention constantly.

First select a road, or some other straight reference line on the ground that lies 90 degrees to the direction of the wind. Check the area to insure that no other aircraft is using the road as a reference line, then enter a power let-down to traffic altitude on the down-wind side of the road. The aircraft should now be set up with the following conditions of flight:

Throttle at 25″ Hg
Propeller at 1850 RPM
Mixture set at full rich
Gas on fullest tank
Gear and flaps up
Canopy open
Altitude 800 feet above terrain (traffic altitude)
Normal cruising airspeed

Maneuver the aircraft directly toward the road. You are now approaching the road from the down-wind side, which means you are flying directly into the wind. Continue to fly in this direction until the aircraft is directly over the road, with the wings parallel to it, and the longitudinal axis perpendicular to it.



Now let us consider the situation in which there is a wind condition existing and you are approaching the road from the down-wind side, directly into the wind. When you are directly over the road, start a turn in either direction. Since you are flying into the wind, it has a tendency to impede your forward motion in respect to the ground. This means that you will have to start the turn with a shallow bank, because you aren't ready to set up a fast rate of turn. Obviously this degree of bank should be determined by you as necessary to effect the arcs of a predetermined radii. You want to start a turn, but still remain as close as possible to straight flight in order to allow the aircraft to fly away from the road at a certain rate of departure.

Look back at the road to see how the turn and distance of departure are progressing. Now look forward and around the proposed semi-circle ground track you intend to make good. Visualize the track for symmetry and the approximate place on the road where the 180° turn should be completed. Continue to fly the aircraft to follow this visualized ground track.

To accomplish this, you will find it necessary to keep the bank fairly shallow until the aircraft has turned approximately 90 degrees. It is now flying parallel to the road and perpendicular to the wind. The wind is now affecting the aircraft directly from the side and attempting to push it back toward the road. Since the turn is still being continued, the rate of closure with the road will be more rapid than was the rate of departure. Consequently the turn must be accelerated so that the aircraft turns 180 degrees and is perpendicular to the road at the approximate time it reaches it. This is accomplished by increasing the angle of bank, in the second 90 degrees of turn, in order to coordinate the rate of turn with the rate of closure to the road. Lead the roll-out

sufficiently so the aircraft is in straight and level flight precisely when it is over the road, with the wings parallel and the longitudinal axis perpendicular to the road.

Do not remain in the level flight attitude, but immediately roll into a turn in the opposite direction. Remember, now the wind is behind you. With the aircraft flying down-wind, the rate of departure from the road tends to be rapid. In this case you must roll into a fairly steep bank, or at least as steep as the bank used in the second 90 degrees of turn of the first semi-circle. This steep bank, by causing the aircraft to turn more rapidly, enables it to turn sufficiently to prevent the wind from drifting it too far from the road. This would cause the ground track semi-circle to be larger on the down-wind side. Continue to hold a fairly steep bank until the aircraft has again turned approximately 90 degrees. All this time you should also be visualizing the proposed ground track, the same as you did in the up-wind semi-circle.

When the aircraft has turned 90 degrees, the wind will be affecting it directly from the side. This time, however, the wind is blowing away from the road and is tending to hold the aircraft away. This means that the rate of closure to the road will be slower than was the rate of departure. If the steep bank were now maintained, the aircraft would turn too fast for the rate of closure, and the aircraft would be turned perpendicular to the road too soon. Because of the slower rate of closure, it will be necessary to use a more shallow bank during the second 90 degrees of the down-wind semi-circle, in order to slow the rate of turn and make it proper for the rate of closure to the road.

Lead the roll-out sufficiently so the aircraft is back in straight and level flight precisely as it reaches the road. The wings should be parallel to the road, and the longitudinal axis perpendicular to it. Continue making these alternating 180° turns until you have reached the end of the road. At this point you may work back up the road in the opposite direction. Remember to maintain a constant altitude and airspeed throughout the entire maneuver. Theoretically, the bank will be changing constantly to effect a true semi-circle ground track. Divide your attention constantly.

"8's" ALONG A ROAD

An "8" along a road is a maneuver in which the ground track of the aircraft describes circles of equal radii on each side of a straight line on the ground. This projected ground track resembles a figure "8."

The "8" along a road has a special function in that it teaches you to solve other problems of turning with relation to the ground. It is slightly more advanced than the S-turn and, hence, requires a high degree of orientation and division of attention, together with a more or less instinctive ability to fly the aircraft. In this maneuver you will be required to cope with the problems of wind drift through 360 degrees of turn, in which the wind, in relation to the ground, acts on the aircraft from all directions.

There are various types of "8's" performed with the wind blowing from various angles. The "8" along the road discussed here will be practiced along a road that is perpendicular to the wind. Since we have already discussed in detail the effects of wind in a turn in the S-turn maneuver, references will be made to this maneuver without such a detailed discussion.

First select a straight road, section line, or other straight ground reference, that lies perpendicular to the wind. Enter a power let-down to traffic altitude and set up the aircraft for the following conditions of flight:

Throttle at 25″ Hg
Propeller at 1850 RPM
Mixture full rich
Gas on fullest tank
Gear and flaps up
Canopy open
Altitude 800 feet above terrain (traffic altitude)
Normal cruising airspeed

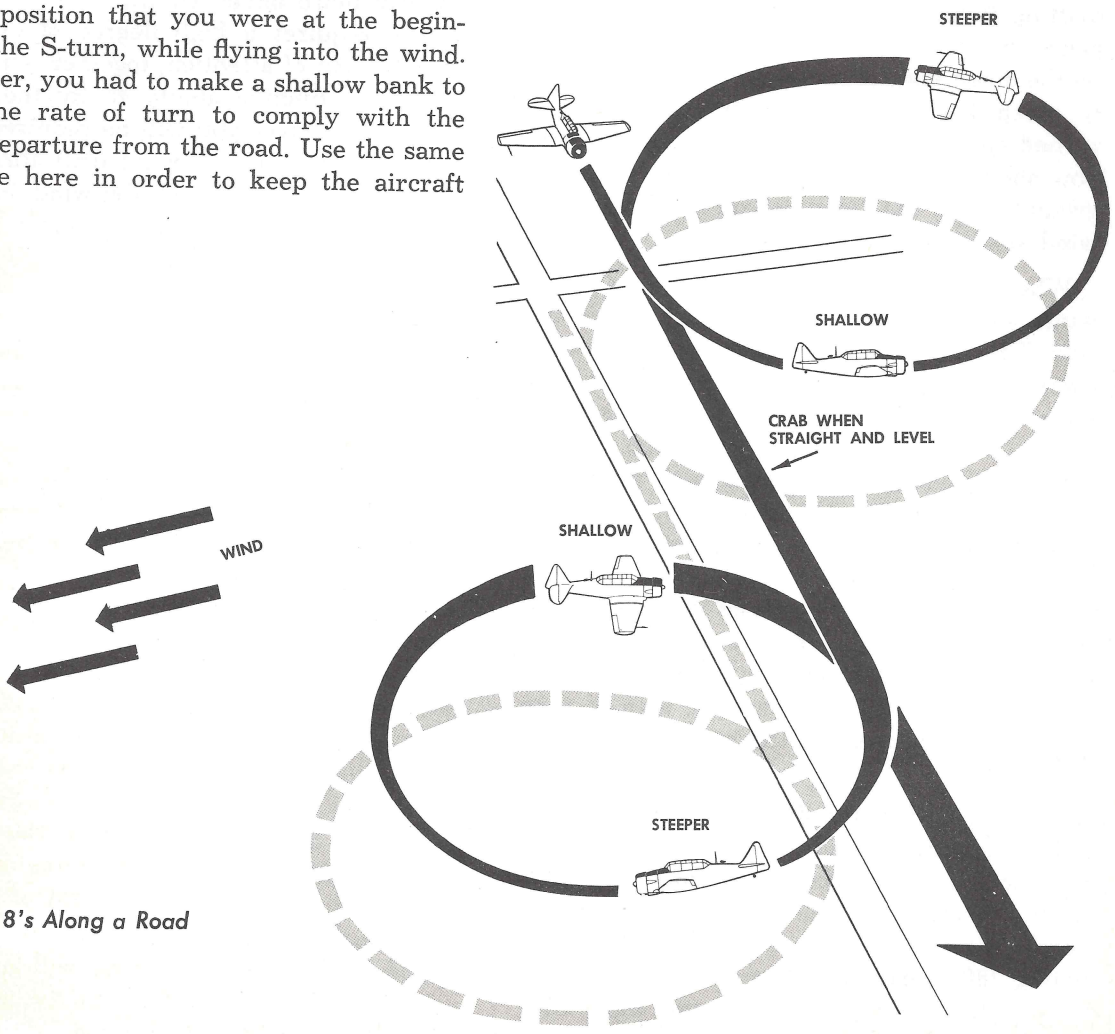
Now maneuver the aircraft parallel to the

road and directly above it. Since the wind is directly from the side, it will necessitate a "crabbing" attitude in order to stay directly above the road.

The first turn should be started into the wind. A fairly steep bank should be used initially to cause the aircraft to leave the road with a certain rate of departure. Remember, you are turning into the wind and it is attempting to hold the aircraft back in relation to the ground. Continue this turn for approximately 90 degrees, visualizing at all times the proposed 360° circle you intend to make good over the ground. When you have turned 90 degrees, you should shallow the bank to slow the rate of turn. At this point you are in the same relative position that you were at the beginning of the S-turn, while flying into the wind. Remember, you had to make a shallow bank to adjust the rate of turn to comply with the rate of departure from the road. Use the same technique here in order to keep the aircraft flying away from the road at a certain departure rate.

Continue to hold the fairly shallow bank until the aircraft has turned another 90 degrees, or 180 degrees altogether. You should now be flying parallel to the road and approximately a wing-tip distance from it, with the wind acting directly on the opposite side of the aircraft. At this point visualize the remaining 180 degrees of turn and try to judge the ground path that will return the aircraft to the same place over the road from which it started.

Since the turn is being continued, the wind will now be attempting to push the aircraft



8's Along a Road

back toward the road, causing the rate of closure to increase. Remember, you must get the aircraft turned 180 degrees more before it reaches the road. In this case you must increase the rate of turn since the rate of closure is increasing. To accomplish this you must increase the bank in this third 90 degrees of turn. When this has been completed, you have 90 degrees more to turn to complete the circle. You will find you have to shallow the bank slightly in this last 90 degrees of turn in order to fly the aircraft back to the correct starting point.

In any event, use this last 90 degrees of turn to vary the bank sufficiently to make up for any errors in turning rates that were committed in the earlier part of the maneuver. Remember your errors and correct for them so that you do not have to do this again.

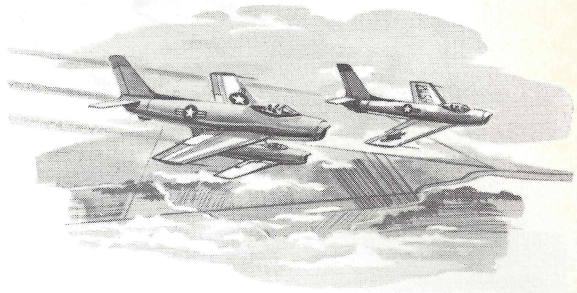
Lead the roll-out sufficiently to cause the aircraft to be straight and level precisely over the starting point, with the same amount of "crab," or drift correction, to hold the aircraft over the road. You should now be flying parallel to the road once again.

Do not hesitate at this point, but roll immediately into a down-wind turn. You are now beginning the down-wind 360° circle. In this case, the wind is helping to push the aircraft away from the road. Thus a shallow bank will suffice to turn the aircraft and cause it to leave the road with a definite rate of departure. Maintain a fairly shallow bank for the first 90 degrees of turn, and then increase it to speed up the rate of turn. This is done to prevent the aircraft from drifting too far from the road before it has turned 180 degrees. Remember, both the up-wind and down-wind 360° circles should be symmetrical and of the same size.

After you have turned 180 degrees and are entering the third 90 degrees of turn, the wind attempts to hold the aircraft away from the road. This causes the rate of closure to be slow; consequently, the rate of turn should be slower. Thus, shallow the bank somewhat to cause the aircraft to follow the proposed ground track.

Use the last 90 degrees to adjust the rate of turn in order to bring the aircraft precisely over the starting point in the road, and maintain this position by applying the same amount of drift correction as previously used. Lead the roll-out sufficiently so the aircraft is straight and level, and following a ground track parallel to and directly over the road.

Continue along the road with following "8's." Visualize the intended ground track, and then vary the bank and rate of turn to cause the aircraft to follow this path. Again, in order to insure a true semi-circular ground track, theoretically, the bank should never be constant. Fly the aircraft instinctively and divide your attention constantly. A constant altitude and airspeed should be maintained throughout the entire maneuver.

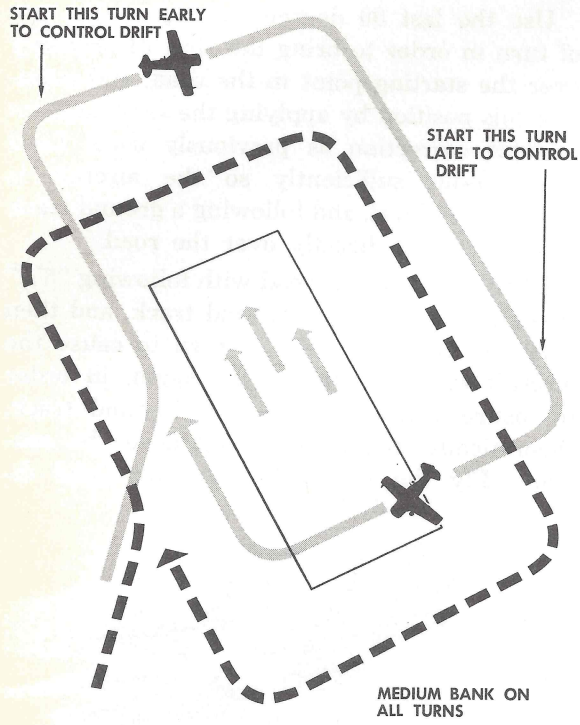


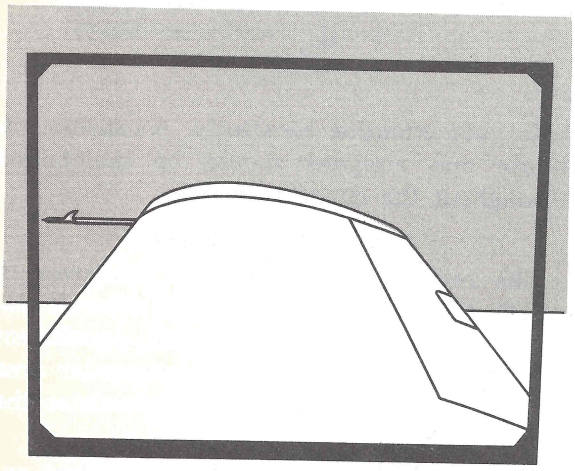
RECTANGULAR COURSE

The rectangular course is a maneuver in which the ground track of the aircraft describes a rectangle on the ground, equidistant on all sides from a selected rectangular area on the ground. This maneuver simulates the actual traffic pattern.

You should by this time have sufficient experience to be at ease at low altitudes and should be able to learn easily the minor problems of ground-track maneuvers. You should be able to grasp the details of the problems peculiar to the rectangular course and should be able to display a fair amount of technique while flying it.

Flying a rectangular course will give you an opportunity to learn how to fly a practical ground track. It will also help give you the





Rectangular Course

ease and confidence necessary to permit you to fly properly in traffic. This maneuver not only simulates an actual traffic pattern but also teaches the establishment of "crabbing" angles and ground tracks necessary on all legs of the pattern. It also provides experience in the practical application of turns.

Like all other ground-track maneuvers, however, its most important objective is to teach you the division of attention between flight path, ground objects, and the subconscious handling of the aircraft.

The best way to begin the entry to a rectangular course is to fly at sufficient altitude to enable you to see large portions of the terrain. Approximately 2000 feet above the terrain is sufficient. Select a field, or a group of fields, having a rectangular or square border outline. This field should be well away from any traffic at the home field, or the auxiliary fields, and should be of sufficient size to simulate one of these. When you have selected the rectangle, check the wind direction from smoke movement or other signs. Now visualize a traffic pattern set up around the rectangle with the landings into the wind. Turn your aircraft to a heading that is opposite the simulated 45° entry leg. Continue out on this heading and look back frequently, so as not to lose sight of the rectangle. When you have reached a point that will allow you to make a 45° entry leg of normal length, enter a power let-down to traffic altitude. Keep close watch on the rectangle, since it may be difficult to see as the altitude decreases. Remain oriented, and when you have reached traffic altitude, you should be heading toward the rectangle, on a simulated 45° entry leg.

At this point on the entry leg, perform the pre-landing check and set up the aircraft for the following conditions of flight:

Throttle sufficient to maintain altitude and airspeed (approximately 22″ Hg)
Propeller at 2000 RPM
Mixture full rich
Gas on fullest tank
Gear down
Flaps up
Canopy open
Altitude 800 feet above terrain (traffic altitude)
Airspeed 120 MPH

The aircraft is now in the same flight condition as it would be in the traffic pattern. The landing gear should have been lowered with a

normal gear check while in straight and level flight. Continue on a straight course until you see the rectangle ahead.

Turn onto the down-wind leg at what you consider the proper place. After you have rolled out of the turn and are on the down-wind leg, check your distance from the rectangle. The aileron trim tab on the inside wing should appear to be just on the edge of the rectangle. This turn should be a medium-banked turn. If you are out too far, the boundary will appear farther out on the aileron, or possibly out past the wing tip. If you are too close to the rectangle, the boundary will appear inboard of the trim tab. If your distance is not correct you will know that you turned onto the downwind leg either too soon or too late. Practice will give you the judgment to make this turn at the proper time. After you have rolled out and checked your distance, make any correction necessary to place your aircraft at the correct distance from the rectangle.

Theoretically, there should be no wind drift on this leg, because the wind should be directly behind you. Continue to divide your attention in order to hold the aircraft the same distance from the boundary, and at a constant altitude and airspeed. Of course, if you begin flying too close or too far from the boundary, make a coordinated, slight turn to regain the desired distance.

Continue the down-wind leg, watching the base-leg boundary of the field as you approach it. This is located at the down-wind end of the field. Remember, the wind is behind you, so wait until you fly slightly past this down-wind boundary, anticipating your turn to a simulated base leg. Now turn to the base leg by performing a medium-banked turn. The wind, being behind you, will attempt to move the aircraft away from the field during the turn. For this reason you must start the turn soon enough to neutralize this effect. Continue the turn until you are paralleling the down-wind border of the field.

Remember, however, the wind will now be affecting the aircraft from the side, trying to force it away from the field. A "crab," or drift correction, must then be established to counteract this drift effect. The proper thing to do is to continue the turn so as to turn slightly more than 90 degrees. Then, when you roll the wings level, the drift correction is automatically established. If you turned at the proper time to correct for drift and radius of turn, the aircraft should be the same distance from the base-leg boundary as it was from the down-wind-leg boundary. That is, the aileron trim tab will appear to be riding on the field boundary.

Continue the base leg, constantly dividing your attention, and correcting for wind drift. The next boundary of the field will be the up-wind-leg boundary, because you will be flying up-wind when following this boundary. When you have passed this boundary slightly, make a medium-banked turn toward the up-wind leg. You were holding a slight drift correction on the base leg, so this turn will be slightly less than 90 degrees. It should be anticipated sufficiently, however, to compensate for turning radius and any drift that may be apparent.

Continue the turn until you are paralleling this new boundary. Lead the roll-out so that the wings become level as the longitudinal axis of the aircraft becomes parallel to the boundary. Once again you should be at the same distance from the field boundary as on the two preceding legs, if the turn was anticipated and executed correctly. Continue to fly along the up-wind leg, keeping your attention constantly divided. Maintain the aircraft at a constant distance from the field and at a constant altitude and airspeed. The next boundary you will approach is the cross-wind-leg boundary. This is located at the up-wind end of the field.

When you make the medium-banked turn, the wind, which now meets you head-on, will attempt to force the aircraft toward the field boundary. It is necessary, therefore, in order to properly compensate for wind drift and turning radius, to continue farther past this boundary than you did on the boundary of the base leg.

You must also remember, that if the aircraft is turned until it is parallel to the boundary, the wind will begin forcing it toward the field, even as you are rolling out of the bank. You should, therefore, lead the roll-out sufficiently, so there will be slight drift correction automatically applied when the wings become level. This turn will then be less than 90 degrees, with the aircraft pointed slightly away from the field and into the wind. The aircraft, with drift correction applied, should now be the same distance from the field as the other legs were. Continue the cross-wind leg, until you once again approach the down-wind leg boundary. Fly slightly past the boundary, anticipating the turn to correct for wind drift and turning radius. Roll into a medium-banked turn in the direction of the down-wind leg. Remember, the drift correction you were holding on the cross-wind leg entailed flying with the aircraft pointed away from the field. In order to turn the aircraft to parallel the down-wind-leg boundary, you must turn it slightly more than 90 degrees. Lead the roll-out sufficiently to insure paralleling the boundary of the field just as the wings become level.

Once again, you should not encounter any drift on this leg, nor should you encounter any on the up-wind leg. It is sometimes difficult, however, to find a situation where the wind is blowing exactly parallel to the field, making it necessary to "crab" slightly on all the legs. Remember to anticipate the turns to correct for drift and turning radius. When the wind is behind you, turn sooner; when it is ahead of you, turn later. These same techniques apply in the traffic pattern. You might ask, "Couldn't I merely use a steeper or shallower turn to correct for errors and drift?" You could, but the main purpose of this maneuver in regard to turns in traffic is to teach you to properly anticipate the turn. You will notice all the turns used in this maneuver are medium-banked turns, the same as those used in traffic. Airspeed and angle of bank are constant, making the rate of turn uniform; this requires constant anticipation and thinking ahead of the aircraft.

When you have completed a rectangular course in one direction, break traffic and re-enter to practice in the other direction. This will give you practice in making both left- and right-hand traffic patterns.

Remember, the leading gear is down in this maneuver. Keep this in mind, so if you are given a simulated forced landing, or actually have an emergency, you will not forget to raise the gear. This may determine whether or not you can safely reach a field. It may also mean the difference between a nose-over or a smooth landing, in the event of an actual emergency.

Things To Remember

Divide your attention. If you become too engrossed in watching the road, you may meet someone who is using the road in the opposite direction.

Know the direction from which the wind is blowing. Check smoke or wind trails over water. Remember your wind direction when you take off.

Think about a forced landing during these maneuvers. You are at a lower altitude than usual and will have less time to pick a good field and make a forced landing. Keep looking around.

Relax, and make all of your turns smooth, coordinated turns.