

# Basic Orienteering Skills

Introductory course – by Nillumbik Emus Orienteering Club

## MAP TERRAIN SKILLS

Orienteering maps are large scale, very detailed topographic maps, generally having five colours. Maps are the basis of orienteering and the competitor needs to know as much as possible about the map and how it can be used. The following section will outline the parts of the map and how the information on the map can best be used in an orienteering competition.

### Parts of the Map

Important Map Components

- Title - all maps have a name.
- Magnetic North Lines - normally black or blue and separated by the equivalent of 500 metres (on 1:15,000 maps)
- Club Logos and/or purchasing information so that coaches or interested persons can purchase maps for training.
- Credits - who fieldworked, drew and printed the map.
- Border - maps must be drawn with magnetic north facing directly up the page. If a border is drawn, the side borders will normally be aligned with magnetic north.
- Lettering - all lettering should be aligned north-south, except some road names may be parallel to the road

### Map Symbols

The legend on the map describes all map symbols used. These can basically be divided into five colour categories:

**BLACK** is used for man-made features such as fences, buildings, roads, mineshafts, rock features, impassable earth cliffs;

**BLUE** is used for water features such as rivers, creeks, watercourses, dams, marshes;

**BROWN** is used for land forms - contour lines, earth features including mounds, pits and embankments;

**GREEN** is used to indicate the thickness of the bush. The darker the green the thicker the bush, and the more difficult it is for orienteers to get through it. Out of Bounds is sometimes shown with a khaki green;

**YELLOW** indicates cleared areas, i.e., there are no or few trees (semi clear);

**WHITE** areas of a map indicate treed or typical forest areas which are easy to move through.

### Scale

Orienteering maps are generally 1:15,000. However, larger scales (1:10,000 or larger) are sometimes used for detailed terrain, or for school maps, for easier reading. Knowing the scale enables the orienteer to estimate how far it is to travel from one point to another.

The scale is ALWAYS stated on the map and in most cases there is also a Scale Bar





The scale is stated as a ratio, for example, 1:15,000 means that any one unit of distance on paper is equal to 15,000 units on the ground or 1cm = 150 metres on the ground.

### **Contour Interval**

The contour interval shows the height difference vertically in metres between the contour lines. Normally on orienteering maps the contour interval is 5 metres. Occasionally, in detailed terrain, lesser intervals are used, such as 2.5 metres are used. Form lines (broken brown lines) are used to indicate contour shape/height for features under 5m or 2.5 m.

## HOW TO READ CONTOURS

The contour lines show the orienteer what land formations are present. They are the brown lines on the map. Each contour line shows the lie of the land by connecting points of equal height above sea level. They enable the three dimensional terrain to be represented on a two dimensional piece of paper.

The hardest map reading skills to learn are how to interpret the contour lines, how to recognise from the map what the land will look like on the ground, how to distinguish gullies from spurs. This is partly because the contour lines are the only "imaginary" symbols on the map - all other symbols represent identifiable feature on the ground.

### Important Land Forms

It is essential, for continued enjoyment of orienteering, to be able to quickly and accurately recognise the shape of the land from looking at the contours. This section shows the most common and most important features to recognise and navigate by.

#### Knoll

This is a hill top and is shown by a loop contour or several concentric loop contours depending on how high the hill is. Some examples are shown below.



Fig1 - Small knoll  
- roughly circular

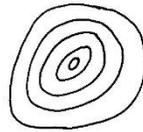


Fig2 - Steep hill, circular

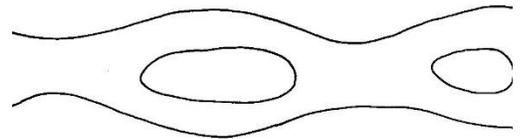
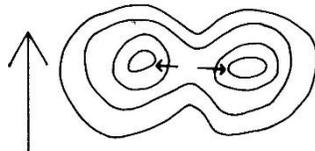


Fig 3 Two elongated, flattish knolls  
along a long, generally flat ridge

#### Saddle

Named after a rider's saddle-is a low point between two knolls. It looks up to higher ground on two sides, and looks down on to lower ground on the other two sides.



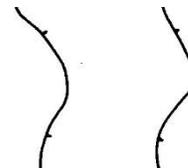
A saddle, with higher ground to the east  
and west, and lower ground to the north  
and south

#### Steep and Flat Terrain

Contour lines close together indicate steep terrain; contour lines a long way apart indicate flatter terrain.



Steep Hillside



Much flatter land

## Gullies and Spurs

A gully is a small valley, usually where water runs in wet weather. A spur is a sloping ridge jutting out from the side of a hill. In most Australian terrain, hillsides have been eroded to form a series of gullies separated by spurs. Some hillsides, however, remain straight and featureless without being broken into spurs and gullies. Every bend in a contour indicates either a gully or spur. It is crucial to be able to tell which of the two it is.

### How to distinguish between a gully and a spur

Find the highest point ( the knoll)

SPURS point away from the knoll and downhill

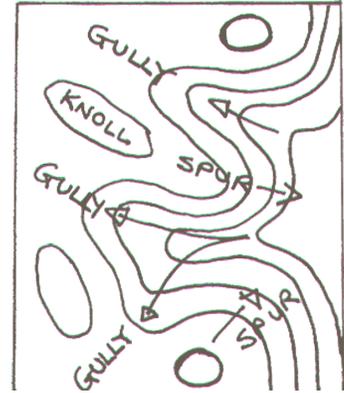
GULLIES point towards the knoll and uphill.

### How to know which way is uphill and downhill?

It is not easy to tell, because unlike normal topographic maps, oriente heights of the individual contours marked. Locate a high point or a low contours from there.

Here are some hints:

- 1) Watercourses flow in lower land than that immediately surrou
- 2) Water flows downhill. Watercourses get larger and join each other as they flow down to lower country.
- 3) Look for closed loop contours indicating hill tops. The immediately surrounding land is lower.

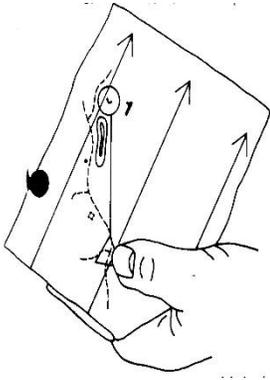


Interpreting spurs and gullies is best learned in the terrain with a map. It can also be reinforced by means of suitable theoretical exercises.

## SPECIFIC NAVIGATIONAL SKILLS

### Thumbing the Map

To help the orienteer keep in contact with where they are on the map, it is essential that they do three basic things at all times:



- 1) Fold the map to make it easier to hold and read. This may be needed to be done constantly as new sections of the map come into consideration.
- 2) Keep the map orientated at all times i.e north on the map to north in the field.
- 3) "Thumb" the map". Means that you grip the map with your thumb just below the exact spot where you are. This is a very simple but effective way of avoiding a common mistake - reading the wrong part of the map. Because you have to constantly glance up from the map to the terrain and back, and because there are many similar-looking features on the map - it is easy to mistakenly start reading the wrong part of the map, with disastrous results. This is called a parallel error.

The essence of success in orienteering is to maintain contact with the map, always knowing exactly where you are. Moving your thumb along the map as you move through the terrain helps you keep this contact. Think ahead, read both the map and the terrain, moving your thumb along the map as you pass the major features.

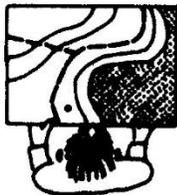
### Orientating the Map by Terrain



If the exact location on the map is known the orienteer can use the features in the terrain especially linear features to orient the map.

Turn the map so that the map matches the ground.

How often should the orienteer check that the map is oriented? Every time a change of direction is made, and every time a new linear feature (especially a track) is crossed. Check that the map is orientated.



Check that the track lies in the direction shown on the map. If not, STOP. If what is on the map does not match the terrain, something is wrong. Early recognition of an error will save a lot of time and energy.

Advanced orienteers are able to orient the map directly from the terrain, but this requires continuous and close map contact. The coach should be encouraging the orienteer to work towards this and, in training, to practice map reading without the use of the compass to force the orienteer to use map reading skills.

### Using Map Features

Use of Handrail Features.

These are features that form a continuous line and are easy to follow, e.g., roads, fences, creeks, ditches. Beginners use these features initially when learning to read the map as they can easily be followed on the ground, and reduce the possibility of "getting lost".

Use of Point Features

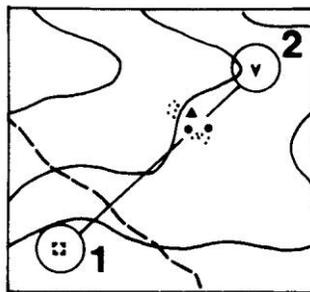
These are small features that exist in the terrain and occupy a single point on the map, such as boulders, pits, and mounds. If they are a long way away from linear features they are harder to find and therefore are not normally used for beginners. For harder courses, if controls are placed on point features, the course setter must make clear in the course description where the control marker

is placed in relation to the feature. This may help the competitor to decide from which side to approach the control or where to find the flag once the feature has been found.

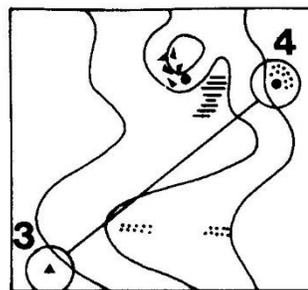
### Use of Attack Point

Moderate or hard navigational courses rarely have controls on or near linear features. Course setters will try to make the orienteer cross the linear features instead of following them. In this case the orienteer can use major features near the control to simplify the navigation.

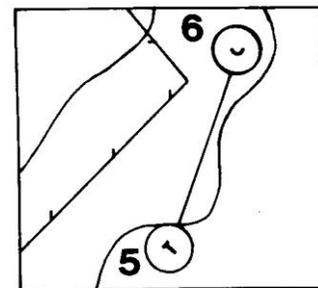
In the examples that follow, the orienteer aims at locating a large, obvious feature near the control site, from which an accurate bearing and pace count can be taken (See 1.2 for training exercises). For each of these examples the ATTACKPOINTS are:



*Rocks*



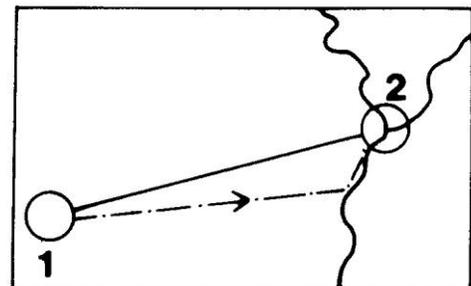
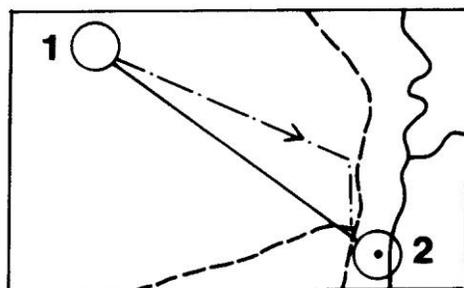
*Edge of Marsh*



*Fence Corner*

### Aiming Off

Aiming off is a navigational technique used when navigating towards a linear feature at right angles to the direction of travel. If there is a control point or attack point on the feature, the orienteer can take a bearing to either the right or left of the control so that when the linear feature is reached the orienteer knows which way to turn. The following are examples:



Aiming off to the left of the track junction (attack point) so the orienteer knows to turn right after hitting the track

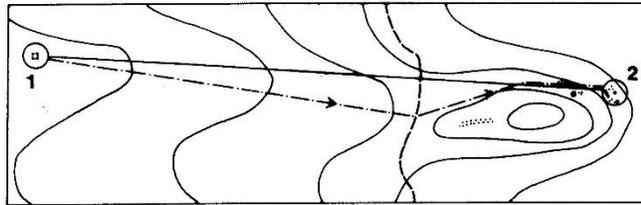
Aiming off to the right of the control to enable fast running to the linear feature, with the knowledge that the orienteer will turn left and follow the water course up to the junction

## Traffic Light Orienteering

RED ,YELLOW, GREEN

*Slow until you know*

Traffic light orienteering is a method that orienteers can use to break down a leg into three sections, and to try to match speed with the navigational difficulty, whilst still keeping in contact with the map.



- GREEN** indicates rough orienteering normally early in the leg, to a large collecting feature
- YELLOW** indicates slowing down - taking more care, moving from collecting feature to attack point.
- RED** indicates very careful fine navigation into the control, often including stopping and walking.

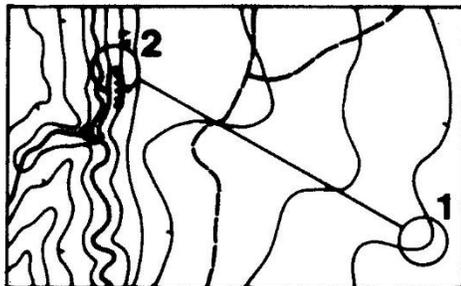
Orienteers often move at the wrong speed - either taking their time when they could be running faster, or running too fast when they are close to the control or in an area which requires more careful navigation. Many legs may require only one or two different speeds.

Some errors occur when an orienteer emerges from a complex area to an easier part of the course, relaxes mentally, loses concentration and promptly makes an error.

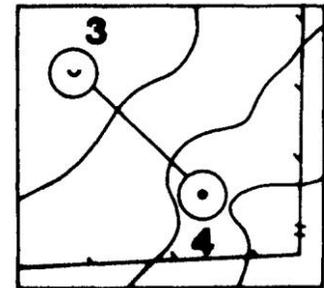
## Use of Collecting Features

Moderate navigational courses will have collecting features after the control to "collect" the orienteer if the control is not found.

Collecting feature, is the fence. Relocate using the fence corner and carefully navigate back to the control.



Collecting features can also be used during the course, rough navigating quickly to a large linear feature that will be passed on the way to the control. These features enable the competitor to run fast through the terrain with little risk of error as the collecting feature will slow them just before the control, when fine navigation will take over.



## Distance Estimation

Estimating distance can be done by:

- using the eye to estimate how far it is from one feature to the next. This is a rough calculation and must be matched to identified map features on the ground.
- using a pacing system: counting paces travelled through the terrain. This is a more exact method of calculation and once acquired can be used to minimize guess work.

## Relocation

At some point during an event, orienteers may lose contact with their position on the map. How big an error this becomes will depend upon the ability to relocate. The more experienced and familiar the orienteer becomes with maps, the easier this skill becomes. The type of terrain also affects the ability to relocate. In some terrains, the orienteer can afford to take risks. It is essential that the orienteer knows when to take risks, and when to be cautious.

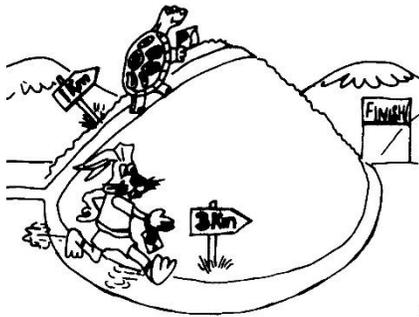
How to relocate

- 1) Stop immediately, as soon as the problem is recognised.
- 2) Orient the map, using the compass.
- 3) Try to recall the route taken and features passed on the map. Where was the last point that you knew definitely where you were?
- 4) Try to fit the terrain with the map - direction of slope, major features matching up. Ensure that the map is correctly oriented.
- 5) If unsuccessful, select and move to a major collecting feature – relocate from this using smaller features near it. This may require moving, typically, 250metres (each way), but may be a lot quicker than searching aimlessly for a recognisable landmark. To relocate quickly is the hallmark of a competent orienteer. Have a good general idea of position, be decisive and resolute in making a choice of relocation method. Move positively to prevent further loss of time.

## Route Choice

Courses are set as problems that the orienteer needs to solve, "How can I get around the course as quickly as possible without making mistakes?". The orienteer's ability to select the best route for their self will affect their competitive success. The chosen route will differ for different competitors, depending on experience, skills, fitness and speed through various terrains.

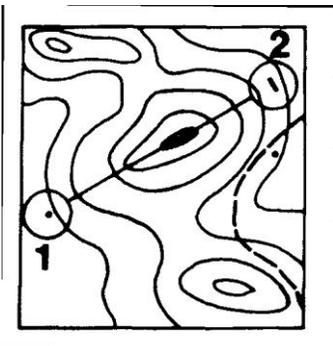
There are several features on the map that should be avoided as they obviously slow down any orienteer. These are:



- **GREEN** (solid) - Thick bush/fight
- **BLACK** – dangerous areas, mainly mine shafts, should be avoided at all costs.
- **BROWN** dots indicating broken ground, normally pitted areas, that is hard to run through.

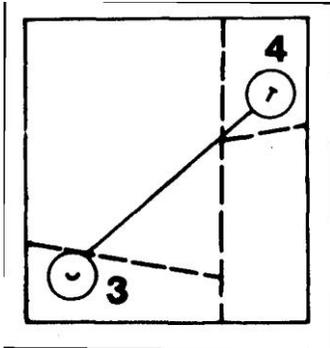
Route choice basically means asking yourself "Which way will I go?" A coach can help the new orienteer in this respect through postmortems or theoretical courses, discussing possible routes available and their advantages.

Some route choices are discussed below:



### Up and Over, or Around?

The orienteer can go over the hill, increasing the amount of climb and fatigue, or contour around the left or right of the hill; left or right will depend on the comparative runnability and the presence of good attack points near the control.

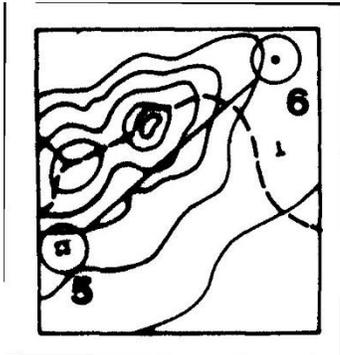


### Straight Ahead versus Track Route Choice?

Many legs on a course give the orienteer the opportunity to use linear features for at least part of the leg. This example of a leg shows a track route choice versus "straight ahead".

The orienteer's decision will depend upon:

- **Fitness** - The track increases the distance to be travelled, and also the climb. It must be remembered that an orienteer can run much faster on a track than through the bush.
- **Navigational Skills** - The less experienced orienteer, by going across country, increases the chance of error. An experienced orienteer would have less problem with this route choice.



The inexperienced orienteer will use safer route choices, with more handrail features between control sites. The experienced orienteer has the choice to use the handrail features for part of the way or to cut corners and therefore reduce the distance traveled.

## COMPASS SKILLS

The compass is an essential part of an orienteer's equipment, but the coach must remember that it is only a secondary aid to assist in the solving of navigational problems. Without the ability to read and understand the map, the compass has little value. The compass only gives a set direction; it cannot help the orienteer decide which route to take.

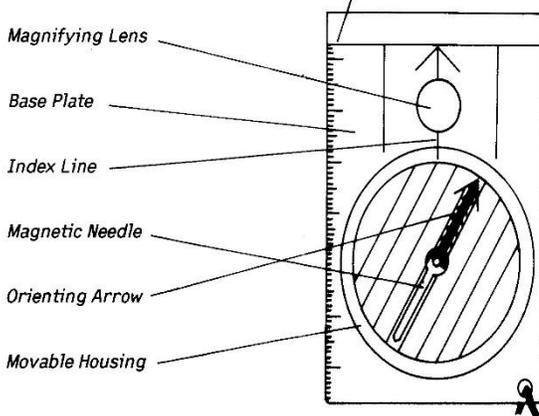
The compass can be used to:

- orient the map;
- set a bearing, which enables the orienteer to run in any set direction where there are no "handrail" features for guidance.
- measure the distance between points on the map.

Two types of compasses are commonly used in orienteering; the conventional protractor compass with a base plate and a movable compass housing, and the thumb compass.

### The parts of the Compass

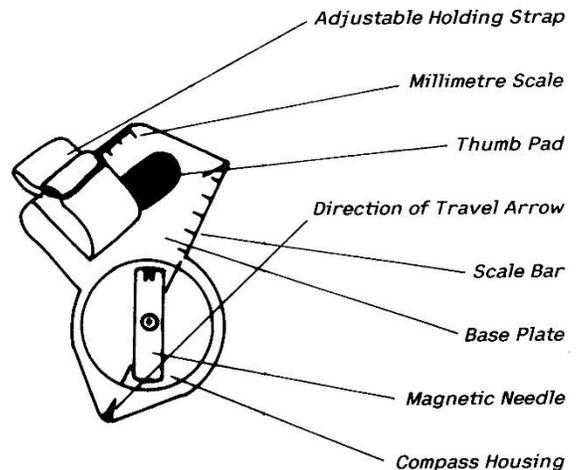
*Measuring Scale in millimetres and inches.*



To get the best possible assistance from a compass the coach must ensure that the orienteer knows the parts of the compass and their function. The following diagram (see next page) is an example of a conventional protractor compass and a thumb compass. Ensure that you are conversant with the parts of both styles of compass so that you do not seem to favour one style over the other and that you are able to succinctly impart the use of the compass to your students

Orienteers do need to be aware of how compasses differ so as to be able to select suggest the best one for their individual needs:

- Size of the base plate - should feel comfortable.
- Size of the magnifying lens - a competitor with poor eyesight should use a large lens to aid in the reading of small, complex features, especially near the control site.
- Removable scale along top edge - ideal for orienteering as it enables easy reading of distances with varying map scales. Many orienteers make their own scale, suited to their stride length and the map scale and attach it along the top edge.
- Luminous markings - to assist with night orienteering



## Using the Compass

### Orientating the Map by Compass

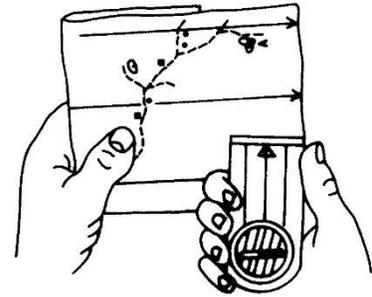
When reading a map it must be turned around so that it always faces the same way as the ground it represents, and not like a book - always read upright. Therefore, when moving northwards, hold the map right way up, when moving southwards, read the map upside down. It is important that the coach makes the orienteer understand this basic skill and ensures that the map is oriented at all times during competition.

Emphasize to the orienteer that changes in direction occur many times whilst competing, but the map should always face towards north. Beginning orienteers often tend to think that they are turning the map, but it is actually them doing the turning; the map remains oriented to north all the time.

The map can be orientated either by terrain or compass.

Place the compass on the map.

Turn the map until the magnetic north needle in the compass lines up with the magnetic north lines on the map; it is now facing the same way as the ground.

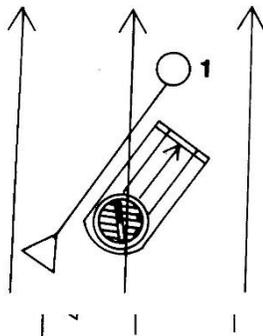


### Taking a Bearing

A bearing is used to navigate across terrain where there are no features for the orienteer to follow, especially flat terrain. Bearings are also very useful when rough orienteering. The compass keeps the orienteer generally on direction over long fast running sections of a leg.

The use of bearings in orienteering can be overused especially by intermediate orienteers, and when introduced, the coach should monitor how their charges use it. A common trap is to blindly follow a bearing hoping to find the control, without reading the map or estimating distances.

### How to take a bearing



1. Place the side of the compass from where you are to where you want to go, as if you were ruling a line from one to the next. The direction of travel arrow indicates your forward direction.
1. Move your feet (only) to turn your whole body around, until the orienting arrow and the red end of the magnetic needle line up parallel with each other
2. Turn the compass housing around so that the orienting arrow and orienting lines lie parallel with the magnetic north arrow on the map. Ensure that the orienting arrow faces north on the map, not south
3. Take the compass off the map, and hold it flat in your hand in front of your body, with the direction of travel arrow pointing straight ahead of you.
2. The direction of travel arrow is now pointing in the direction you wish to go.

## Rough Bearing



This is when a compass bearing is taken but the orienteer is running fast, checking for major collecting features from the map. With the thumb compass, the needle and map North should be kept together – again more attention is given to picking up major map features

## CONTROL PROCEDURES

It is important in the early stages of learning that the coach encourages and educates the orienteer in the correct control procedure. There are basic training exercises (see Section 8) that can be set up in a park or large backyard for practice.

The following procedure should be followed by an orienteer approaching a control:

1. Approach the control with map oriented.
2. When at the control, check the code on the control card.
3. Place the card in the punch and mark the control card.
4. Check that the punch has worked by looking and by feeling with the fingers.
5. Record time (if using a watch with split time). Press split time button on watch to record time for each 'leg'.
6. Drink (if available).
7. Move off in the direction of the next route choice.

To summarise: entry (know exit angle) - code - punch - time - move to next leg. Seconds spent at control sites accumulate to minutes by the time, say ten, sites have been visited. Coaches must teach orienteers how to save time by using a little forward planning and practice.

Competitors who stand at the control, working out where to go next tend to give the control away to other competitors, thus making it easier for those other competitors.