

Soaring Australian Thermals

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Cheaper Cross Countries

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There are three new shapes of cross-country tasks that can make cross-country flying very much cheaper. I call them the Arrow, the Fox, and the Star.

Retrieve Costs

Cross-country gliding is not cheap. However, in one respect it is a great deal more expensive than it could be and that is in the matter of retrieves from outlandings.

On any cross-country flight the pilot lays himself open to the risk of an outlanding, with consequent costs in money, in time, and in forbearance on the part of his family or friends.

One cannot insure against this kind of risk, except by trying to build up whatever kind of credit is appropriate. Every year, there are probably several retrieves that are costly enough, in cash or in domestic harmony, to be called disasters!

As a pilot's skill improves, he will aim for cross-country achievements that are near the limit of his abilities. He will try for Silver Distance, Gold Distance, Diamond Goal and Diamond Distance, then try to break State speed and distance records, enter for the Decentralised Competitions, and regional and State competitions. All these activities carry the risk of crippling retrieve costs, especially those for the FAI badges.

It takes practice to acquire cross-country skills, but in the tasks that a pilot sets for himself he can reduce the risks of high retrieve costs to a very low value by sensible task setting. If enough people recognise the benefits of tasks that are planned to economise on retrieves, perhaps competition organisers and even the FAI can be persuaded to adopt the same idea.

The essence of the tasks that I propose is to minimise the average distance from the home airfield. Since I don't think anyone likes going over and over the same short course, this means

setting a number of turning points, and wrapping the task around the airfield.

In this way the average distance to possible outlanding points can be drastically reduced without reducing the length of the course which should, as usual, be set to make maximum use of the daylight and the weather.

I have experimented with setting up various kinds of closed-course tasks. Three that are very practical I call the Arrow, the Fox and the Star (Fig. 1).

Outlanding distance

Table 1 compares 300 km tasks of various kinds that can be flown from the Greenethorpe Gliding Club's field. I measured the mean distance of the turning points from the home field for each task as a rough indication of the maximum distance for retrieving in the event of an outlanding.

To make the comparison valid in spite of different task distances, I divided the mean distance to turning points by the task distance to give a percentage ratio. This was then divided by the ratio for the FAI triangle to show how each kind of task compares with an FAI triangle.

The table shows that an Arrow task has only 60% of the retrieve distance that an FAI triangle does, while the Fox task has 45% and the Star task 36%.

The average distance for possible outlandings will be somewhat less than the maximum. It is more difficult to calculate but, for these tasks, is in roughly the same proportions as the maximum distance.

Fig. 2 shows maps of some of the tasks of Table 1, drawn to scale. One can clearly see that the average distance from the home field of all the points on the FAI triangle is more than 50 km, whereas those on the Arrow task average about 30 km.

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If we estimate that the costs of retrieving are proportional to the distance, we can say that, if a pilot paid \$200 for retrieves in a competition using FAI triangles, he would have been saved from \$80 to \$130 by the setting of Arrow, Fox or Star Tasks of the same length.

Factors to consider

The factors to consider in planning a cross-country task of a certain total distance can be grouped under the headings of expense, challenge, and danger.

Expense

i. The ratio of average outlanding retrieve distance to total distance should be as small as possible.

ii. All turning points should be rounded in the same direction, to make use of a camera mounted on only one side of the sailplane.

Challenge

i. No leg of the task should have to be flown twice.

ii. Each leg should be long enough to test the pilot's skill in navigation, and the intermediate legs should not pass so close to the home field that they are just like outbound or inbound legs.

Danger

i. Tracks to and from a turning point should not be in the same line, or at such an acute angle that there is danger of head-on collisions.

ii. Turning points, where aircraft congregate and the pilots are very busy, should not be too numerous.

iii. Intersecting tracks should be avoided.

Features of various tasks

No turning points

Straight distance flights or goal flights are preposterously expensive for retrieves. They are practical only for soaring safaris.

One turning point

Dog-leg tasks are only slightly less expensive than straight distance tasks. Out-and-return tasks are still extremely expensive, and are very dangerous for head-on collisions, as well as being boring.

Two turning points

All triangle tasks are expensive, but long triangles are more expensive than FAI triangles, whereas flat triangles are cheaper. Hazards arise if any of the angles become too acute. An extremely flat triangle is like two consecutive out-and-return tasks: cheaper, but just as dull and dangerous.

Three turning points

Various task shapes can be made using three turning points, but the cheapest and most useful is the arrow task, with the turning points roughly equally spaced on a circle around the home field. This arrangement wraps the task around the field and ensures that, none of the angles is too acute for safety.

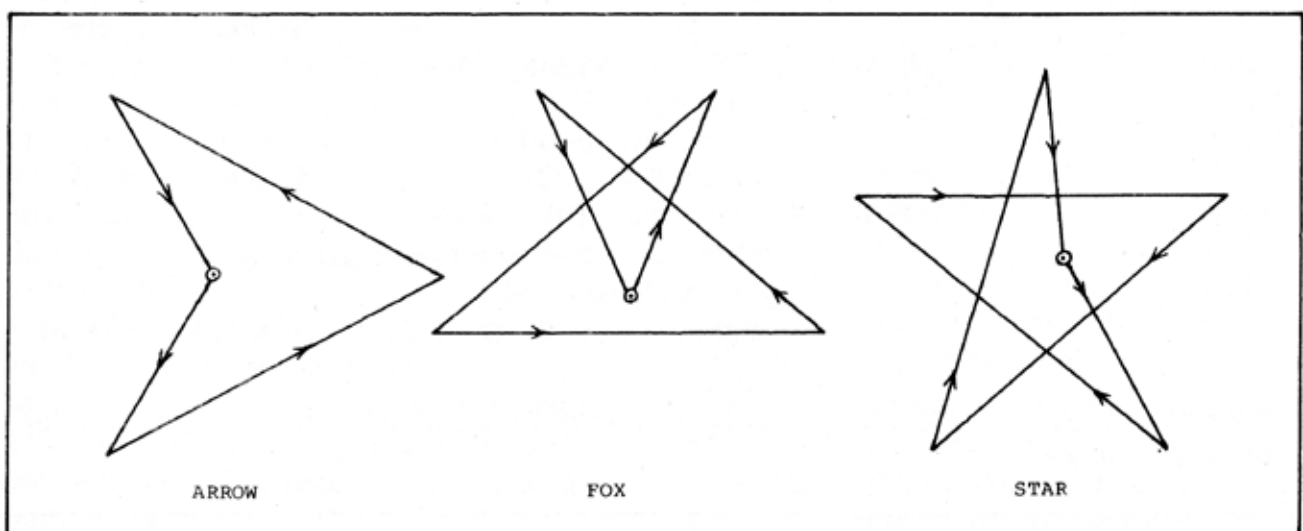


Fig 1. Arrow, Fox and Star tasks.

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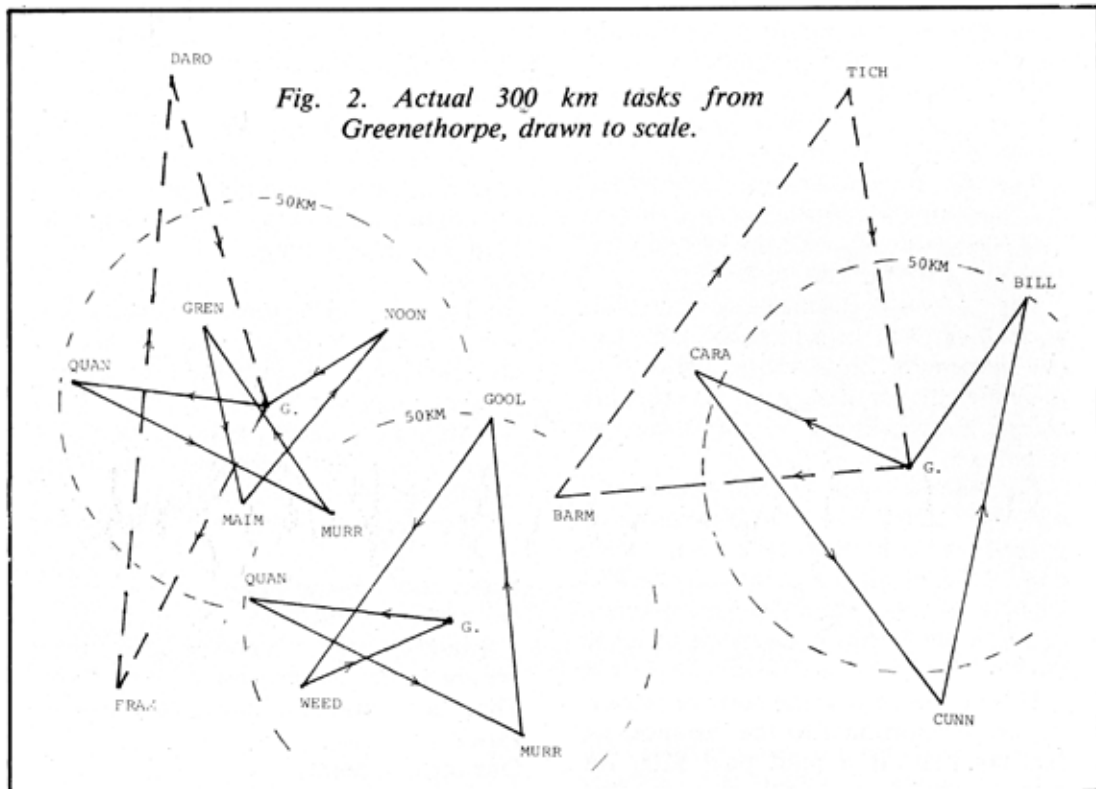


TABLE 1. COMPARISON OF ACTUAL 300 KM TASKS FROM GREENETHORPE

Task Type	Total Distance	Task Legs and Turning Points	Mean T.P. Distance Kilometres	Ratio*
Goal	315 km	G-315-Tocumwal	315 km	336%
Out and Return	308 km	G-154-Moombooldool-154-G	154 km	168%
Long Triangle	303 km	G-145-Kamarah-83-Combaning-75-G	110 km	122%
FAI Triangle	304 km	G-87-Barmedman-123-Tichborne-94-G	90.5 km	100%
Flat Triangle	319 km	G-81-Frampton-153-Daroobalgie-85-G	83.0 km	87%
Double O & R	306 km	G-90-Bethungra-153-Canowindra-63-G	76.5 km	84%
Arrow	309 km	G-59-Caragabal-101-Cunningar-99-Billimari-50-G	55.0 km	60%
Fox	318 km	G-49-Quandialla-74-Murringo-77-Gooloogong-79-Weedallion-39-G	42.8 km	45%
Star	309 km	G-49-Quandialla-74-Murringo-56-Grenfell-42-Maimuru-54-Noonbinna-34-G	32.6 km	36%

* Ratio of mean turning point distance to total distance, divided by the same ratio for the FAI triangle.

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For the best angles the second turning point should actually be somewhat further out than the other two. This task can provide a way of using a turning point that lies in good country beyond a patch of tiger country.

Four turning points

Since there are dangers in having too many turning points, it is worthwhile to consider only those four-point tasks that are cheap and have advantages in most other ways.

The fox task seems to be the best, its only disadvantage being that the fourth leg intersects the first and second legs, and the fifth leg intersects the second. This is not a great hazard because, even in a big field of gliders, very few aircraft will be two or three legs behind the leaders, and the areas of possible conflict will in any case be clearly shown on each pilot's map.

Five turning points

A satisfactory and very cheap task results from selecting five turning points roughly equally spaced on a circle about the home field and joining every second point to form a star. A leg passing close to the home field is then broken to form the first and last legs.

This task, by its extreme cheapness, is especially useful for a single glider, but may be somewhat hazardous for large fields of gliders at competitions. The boring five-point alternative is to fly twice around the one triangle.

The use of cheaper tasks

The use of the arrow, fox and star tasks in cross country practice flying allows a pilot to cover many kilometres without facing crippling retrieve costs or problems in finding the necessary crew.

It is not simply that the retrieves, when required, are quick and easy but also that one can make a habit of setting ambitious tasks, and simply cutting them short at any time when the weather turns bad or time runs out, by a small diversion back to the field.

In competitions and regattas there would not only be a substantial saving in cash for those pilots

who don't manage to get around the course, but the chaos that one sees when the task is over-set would seldom occur.

With shorter retrieve distances many more out-landed gliders could be retrieved safely before dark. A significant number of contestants would also choose to land back on the field, knowing that the points penalty would be quite small.

The status of the arrow, fox, and star tasks relative to FAI requirements for badges and records is not clear. The rules in the Sporting Code seem to have deficiencies.

The badge requirements in Chapter 5 specify distance flights for all badges: 50 km, 300 km, 500 km, and 1000 km for Silver, Gold, Diamond and 1000 km badges respectively. A distance flight is defined in section 1.3.2 as "a flight measured for the distance between either the take-off place or a departure point and a finish point".

This definition does not appear to permit the use of any turning points at all on badge qualifying flights. However, the use of some unspecified number of turning points is acknowledged by Section 1.7.7: "The Distance Flown : The length of the arc of the great circle at sea level joining the departure point and the finish point or, if there are turn points, the sum of the great circle arcs at sea level for each leg of the course".

Assuming that Section 1.7.7 does modify the meaning of "distance flight" defined in Section 1.3.2, the fox, arrow, and star tasks (including stars with more than 5 points) should qualify as distance flights for the badges.

Total confusion is then introduced by Section 5.25 which presents "Badge Flight Requirements" in diagrammatic form, arbitrarily restricting the distance flight options to straight, zig-zag, triangle and out-and-return (with straight distance the only option for the Silver badge).

I cannot see that there is any logic in these restrictions. A thousand kilometres is a thousand kilometres, whether by way of two turning points or seven.

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If it seems that the day might die when only 600 km has been covered, only the foolhardy would set out on a thousand kilometre triangle, whereas on the star task one could probably land back, if necessary, to try again next day.

The rules for the Australian decentralised competitions specify only tasks that have high risks of expensive retrieves. I, for one, cannot afford to compete.



Garry in a glider lent to him by Justin Wills and Brad Edwards. In 1998, he flew it to 23,000 feet at Omarama, NZ, to complete the FAI Diamond C badge, No. 6287.