Flag Signals Used

	Class Flag not less than 300mm by 200mm flown below club burgee during competition. Raised during starting sequence at the start.
	Line In Use - Raised on the start line to indicate line in use. Lowered after last boat starts.
	"P" - Preparatory signal—"The class designated by the warning signal will start in 5 minutes"
	"B" - Protest signal when flown means "I intend to lodge a protest"
	"L" Flown ashore means "A notice to competitors has been posted" When flown afloat means "come within hail" or "Follow me"
	Answering Pendant—Postponement signal • Alone means all events not started are postponed. • Over 1 ball or shape means postponed for 15 minutes • Over numeral pennant means postponed that number of hours • Over class flag means postponed till a later date
	"N" Abandonment signal "The event is abandoned." Over the first substitute means "The event is cancelled"
	First Substitute—When flown under "N" means "The event is cancelled"
	"Y" Life Jackets. Means "Life jackets should be worn by all competitors"
	"M" Mark Signal means "Round or pass the object displaying this signal instead of the mark it replaces.

Acknowledgements:
The following material has been modified or rewritten for this publication.
Enjoy Predicted Log / Cruiser Navigation By Tom Collins, Staff Commodore SCCA
Time Trialling Training Notes for Skippers by Garry Woods
Time Trialling Training Notes for Navigators by Peter Farrell
Skippers Presentations by Bryan Carter .
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How To Time Trial

Compiled by
Peter Farrell

WHAT EXACTLY IS TIME TRIALLING?

Time trialling is a boating activity run by yacht clubs on the Swan River and available to any members with a craft capable of navigating at a speed between 5 and 15 knots under engine power. Family participation is possible, there are a lot of husband and wife teams, and it provides an excellent opportunity to:

- Use your boat during the winter season.
- Learn the local waters.
- Learn the navigational marks and hazards.
- Learn the capabilities of your boat.
- Familiarise yourself with the local waters.

A time trial event involves sailing and accurately maintaining a predetermined course between fixed marks on the river at a nominated speed.

Sailing instructions are available prior to the event and courses must be followed at the speed nominated by the competitor.

After starting at a given time, time checks are taken on each competitor at the start, finish and at a number of undisclosed check points around the course. One point is lost for each second a competitor is early or late at these check points, and penalties can be applied for obvious changes in nominated speed or diversions off course. Time errors are cumulative, being early at one check is not cancelled by being late at another. The winner is the competitor with the least points lost, according to the rules.

Equipment required for the event is a timing device (clock) and sailing instructions that include a course sheet and possibly a chart if you don't know the course.

Preparation involves calculating your ETA at all the marks of the course from your respective start time. Most events last between thirty minutes and two hours, depending on your nominated speed and the length of the course.

The variation in weather, wind, tide and the wash from other boats cause a never ending change to conditions under which events are conducted. To those participating regularly, a challenge is provided to master these variations, and in doing so, improve their boat handling and navigation skill.

The fellowship of other competitors, particularly in interclub events, adds considerably to this further enjoyment of power yachting.

Sailing instructions are available prior to the event and courses must be followed at the speed nominated by the competitor.

Passing a Mark to the Wrong Side

If a mark is passed on the wrong side you will be asked to retire unless you rectify the error. If you realise that you have passed a mark on the wrong side you must unwind it to be able to continue. To unwind return on the same side as you initially passed it and then pass it on the correct side.

True Course

Finally remember steer a true course, the shortest distance between any two marks is a straight line. Failure to steer a true course may result in a penalty.

Retirement

If you are unable to finish or retire inform the starter personally or on Channel 94 but not when another vessel is approaching the finish line.

Interference

If you have to slow down to give another vessel right of away near a mark and are subsequently late fly your red protest flag as soon as possible. When you finish report this fact to the starter as soon as possible giving the mark at which it occurred and any other information such as the boat name or competition number. You may have to accept having an average given for that mark.

Post Event

Raft Up

Joint the raft up. Take care to approach other vessels at slow speed and have buffers and lines ready. Join others for drinks and visit other boats.

Check Results

After the results are posted check your times for each mark and compare them with those the navigator has noted on the running sheet. If there are major discrepancies which you can't explain you may request the Starter check the tapes. In any case you should be able to learn something from your results for example if you are consistently early or late it could be that your clock was incorrectly set.

Enjoy your time trialling.

Counting down.

As a guide:

1. count down each minute and
2. then count the last minute,
   - every 10 seconds down to 30 seconds and
   - each 5 seconds down to 15 seconds and
   - each second until you pass the mark..

When you reach the mark and the skipper calls “NOW” enter the time on your running sheet as seconds early or late or zero. You can then add the total points at the end of the event. This enables you to check with the actual result given on the official score sheet which is displayed after the Results are announced.

Short Legs.

Some times you get some short legs where it is difficult to count down so you may decide to count up. For instance you call Bricklanding counting up to 10 - 5 6 7 8 9 10

Aids to judging time

Sometimes you might have intermediate navigational points around the course which can assist in gauging time to a mark. How to obtain and use these should be left till you are more experienced.

Rules of the Road.

Time trialling and the yellow competition flag do not give you any extra rights on the river. Remember you must still obey the rules of the road. You must pass vessels on the correct side and you must give way as required by the rules of the road.

Penalties -

First read and become familiar with your rule book and your club red book and any sailing instructions.

Change of Speed

The most common penalty applied is for changes of speed and add 10 points to your score. Remember the call is tape recorded at the marks and the check point crews watch for changes of speed.

TIME TRIALLING IS FUN

There is really no secret to it. You don't have to be a mathematical wizard or a genius. You don't need 100,000 miles of experience in your boat and reams of figures. All you really need is some simple speed data you can easily obtain in a morning and a basic understanding of the procedure for calculating your course and times. One more thing you'll need is the desire to join in with a fine group of yachtsmen like yourself as you enjoy using your boat during the contest and sharing in good fellowship afterwards at the trophy presentation.

SO LET'S GET STARTED

Remember, the idea is to keep it simple and to have fun ! As you become more involved, you'll hear stories of compensating for winds, currents, weight, etc. The important thing to remember is that you really don't need to be concerned with these complexities. Each year many of the contests are won by novices just like you, while some of the "scientists" outsmart themselves as they watch their theories on wind and waves disintegrate before their eyes.

CHOOSING A SPEED

The first thing you'll need to do is to determine the speed of your boat. It's nice to have a complete RPM speed curve, although for most contests all you really need to know is your boat's RPM for the speeds which you intend to use for the contest (limited to 5 to 15 knots). Choose a comfortable speed, probably below the speed you normally use for cruising. Keep in mind that during the contest you will need to increase or decrease that speed to compensate for turns, tide or wind, so choose a speed where you and your boat won't be knocked about if the water is a bit lumpy. One other consideration, choose a speed which allows you room to increase or decrease your speed a little without significantly affecting the attitude of your boat. If you have a planing hull you need to select a speed which is a couple of knots above the speed at which the boat planes.

RUNNING THE MILE

Your local chart will show the measured nautical mile course in your vicinity. The course end points will usually be identified by a set of markers or some other fixed object, such as a breakwater or pier. The best time to run the mile is in the morning before the course becomes congested with other boats and the winds kick up a chop. Set your throttle(s) carefully and run the course noted on the chart in both directions, without stopping or changing your RPM. Use a stopwatch to measure the exact time it takes you to travel the mile in each direction. The times you record for each direction will probably be different due to wind and current that might be present. Times for multiple runs in the same direction should be nearly the same.

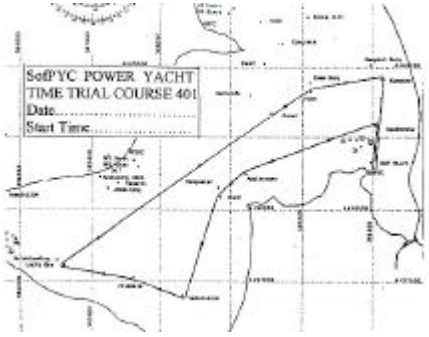
CALCULATING AVERAGE SPEED

You will now want to determine the average speed of your boat in seconds per nautical mile (sec./nm). To do this, first convert the times you recorded for each direction into seconds (example: 4 minutes and 25 seconds = 265 seconds). Now, add the times from each direction and divide by two to determine the average speed in seconds per nautical mile (example: 265 + 281 divided by 2 = 273 sec./nm). Divide the number of seconds into 1 nautical mile (6075 ft) in this case 6075/273 = 22.25 ft per second. Look up the chart Appendix 5 of the Time Trialling Rules and the closest are 21.96 = 13 knots and 22.8 = 13.5 knots.

It is possible to do the same by running between any two marks on the course where the distance is known. For examp le Applecross Spit and Deepwater spit are 449 metres apart and at 15 knots it takes 59 seconds = 7.62 m/sec.

PLOTTING THE COURSE

The next step is to plot the contest course. The contest instructions will list the start, intermediate marks, and finish points as well as the side to which they are to be left. Once you have identified these points on your chart, draw the course lines interconnecting them. Now note the heading for each leg.



LEG TIMES

The issued course sheets show the cumulative times for each mark The leg time can be calculated by subtracting these times. Remember that each leg is from mark to mark and does not include the time taken to turn after reaching the mark therefore compensation must be made by increasing the speed for the next leg. Below is an example of turn times at a constant speed. You should of course calculate your own.

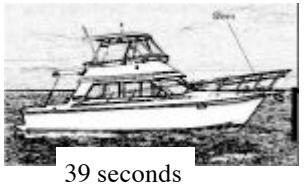
TURN ANGLE	TIME TAKEN
0 to 60 degrees	0 seconds
60 to 90 degrees	5 seconds
90 to 110 degrees	10 seconds
110 to 125 degrees	15 seconds
125 to 140 degrees	20 seconds
140 to 150 degrees	25 seconds
150 to 165 degrees	30 seconds

Speed Restrictions

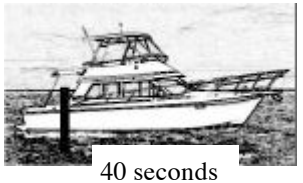
There are some speed restrictions on the river and therefore in our courses. These are generally 8 knot areas and they are marked on the course instructions at the mark at which the speed restriction finishes. Heathcote 8KT means there is an 8 knot limit from SoPYC Start Line, the mark prior to Heathcote, to Heathcote.

The Marking System

Around the course there are check point teams (normally 3 people) who mark the time you pass the mark. They are equipped with a clock, which has been set against the master clock, and a tape recorder. One of the team counts the time from the clock as you approach the mark, one calls when you pass the mark and the other records the time on a sheet. Your time is recorded when the stem of the boat reaches the mark. Technically it is the last second called before the stem reaches the mark (see illustration below where the time would be 39 seconds not 40). Competitors gain a point for each second early or late at the mark. These points are cumulative and do not cancel each other out. The object is to score as few points as possible. There have been a few zero points lost. Tapes are replayed when the starting team notice any large discrepancy.


39 seconds


Mark


40 seconds

During the event.

For the navigator.

The method of counting down is a team effort and the skipper and navigator will determine the best method for them.

Calling the next mark

As a guide:

1. call the name of the next mark,
2. the side to pass and the bearing
3. time to the mark

   for instance from SoPYC Start to Heathcote may be called as " Heathcote Port 2 degrees 1 min 47".

Time To Next Mark

To calculate this we simply subtract the ETA at the previous mark from the ETA at the current mark so using the example above the time from Applecross to Deepwater is 10:38:16 — 10:37:07 = 1:13. This can also be done by using the running time in the same manner.

Hints for chart marking.

If you draw your course to leave the marks on the actual side they are to be left you can then colour them in red and green to make it easier to see at a glance whether they are to be left to port or starboard. You can then calculate the bearings to each check point and enter the bearings on the running sheet. Having a bearing to the check point makes it less likely to head for the wrong mark.

Setting the clock

Before you leave home you can set the clock by telecom time (phone 1194), however when you arrive at the club you should check with the official clock and reset if necessary. While you are there check for any notices for the day, you start time and the course number. Even champions have been known to start at the incorrect time or use the wrong course. Don't rely on information provided by phone or the internet.

Checking the call

Just prior to the event the skipper and the navigator should get together and the navigator should call a practise time with the skipper looking over the shoulder so that the skipper is aware of exactly how the navigator is calling their time. Skippers watch to see if the call is before, on or after the second.

Course and Marks

- PT - Port means that you leave the mark to the port side of your vessel.
- STB - Starboard means leave the mark to the starboard side of your vessel.
- CA-PT = close abeam port means that you must be close the mark leaving it to your port
- CAS-TB = close abeam starboard means you must be close to the mark leaving it to starboard.
- ST(20m) means that you must leave the mark to your starboard and be no closer to the mark than 20 metres.
- TRNSIT = transit . This is an imaginary line joining two fixed marks and extending through them. Examples are Foam - Concrete or Inner - Outer. Not all clubs mark transits using them only to give intermediate times on some long legs.

165 to 175 degrees 35 seconds

Always subtract the turn-time allowance from the travel time for the leg following the turn. The distance of the leg divided by new leg time will give the velocity. Example time for leg = 2 min 11 secs less turn of 15 seconds 1 min 56 secs or 116 secs (NT). If the leg distance is 743.2 metres (D) the new speed is 743.2/116 = 6.4 m/s which from the Yacht speed table given in Appendix 5 converts to 12.5 knots for the leg instead of 12 knots.

Equipment

Timing device

The major piece of equipment needed for this sport is a reliable clock since you are competing to see how close to the exact time for the course you can complete it in. You therefore require an accurate timing device. Currently competitors use a main clock and some sort of backup clock as well as stop watches. These can be divided into three categories;

- analogue clocks
- digital clocks
- computers

Analogue clocks

Analogue clocks should be selected for their accuracy, they should be accurate to within about 1 second in 24 hours and must have a second hand. The second hand should accurately stop on each second mark. Clocks where the second hand speeds up on the descent and slow down on the ascent should be discarded.
Some sort of marker needs to be superimposed over the face to enable the seconds to be counted backwards. In the picture you will note that the face from a kitchen timer has been used. A pointer is set over the actual second that the mark is to be reached.

Digital Clocks

Digital clocks need also to be very accurate. Normally 2 are used one as the main clock and the other to count down time. The most commonly used are pictured. Some competitors set a clock to count down to the finish time of their run. Others set the count down clock at a predetermined time from each mark in turn.

Computer

Computers are used now by many competitors as they are able to enter the whole course. One of the most commonly used (Sharp 1500A Pocket Computer) and for which a program has been written which is easily available is pictured. Many computers do not keep very accurate time unfortunately. *Note: the Sharp 1500A is very old so you may have to search pawn shops or advertise to obtain one.*

Stop Watch

A stop watch is very handy for timing practice runs between marks and also for the measured mile.

Back Up Clock

Anything can go wrong with a clock during an event and stories abound of them being dropped, the batteries falling out and clocks stopping, however if you have some sort of back up clock or watch ***set to the correct time*** all is not lost.

Pencils

Have spares sharpened as there isn't any time to sharpen them during the event.

Personal Attributes

A Loud Voice

The navigator has to call and count down the time over engine noises. Navigators frequently say they "count their life away".

A Thick Skin

To take no notice of the skipper's tirade when things go wrong *and to keep* counting.

A sense humour

Needed to counteract the skipper's usual lack of a sense of humour particularly when things go wrong.

Preparation

Before you can do any calculations you need to have obtained:

- the course details and
- your start time

There are a variety of means whereby these may be obtained, however ***it is vitally important*** that they be checked against the official course and the officially published starting times. Should you use the wrong course for the day or the incorrect time you have no redress. Even *Champions* have been known to use the wrong course or the wrong start time.

Calculate ETA

The Estimated Time of Arrival or ETA is calculated for each mark. For the Start it is of course the start time that you are given. For each mark the ETA is the Start time plus the running time given in course details. Look at the example below:

You can see that the Start Time is 10:30:00 so if we add the Run time to Applecross of 7:03 the ETA for Applecross is 10:37:03.

SoP COURSE Practice (12 Knot)

Start Time	10:30:00						
Run Time	**Check Point**	**Pass,Brg**	**Time Next**	**ETA**	**E**	**L**	**A**
0:00:00	Start		0:01:47	10:30:00			
0:01:47	Heathcote	P	0:01:31	10:31:47			
0:03:18	Foam-Concrete	TRAN	0:01:06	10:33:18			
0:04:24	Nedlands-Outer	TRAN	0:01:21	10:34:24			
0:05:45	Inner-Outer	TRAN	0:01:18	10:35:45			
0:07:03	Applecross	P	0:01:13	10:37:03			
0:08:16	Deepwater	S	0:05:04	10:38:16			
0:13:20	Foam	S	0:02:46	10:43:20			
0:16:06	Sampson	S	0:01:50	10:46:06			
0:17:56	Heathcote (st 30m)	S	0:01:47	10:47:56			
0:19:43	FINISH	S		10:49:43			
	Amended 16 April 1999						