Roger Bonhomme's
RALLY NAVIGATION SCHOOL
L E C T U R E O N E

CONTENTS:

Introduction to rallying

Rallying is a form of motor sport which is nearly as old as the motor car itself. In Australia there are roughly six levels of rallying: novice, club, open, State championship, National championship and International. These in turn are divided into what are known as navigation events or drivers' events, the emphasis being either on navigational skill or driving ability respectively.

The idea of rallying is for a car containing a driver and a navigator to complete a course varying in length from 100 miles upwards, obeying as near as possible a set of instructions (called, strangely enough, Route Instructions) which are given out to each competing car by the rally director. It is the navigator's job to interpret these route instructions onto a map or maps and then direct his driver along the set course. Each crew starts a rally with no points lost. Points are then deducted from each crew for failing to obey a particular route instruction, for failing to arrive at a specified point on time and for various other "offences".

The route is usually divided into stages; most rallies have two stages with a short rest/refuel break between stages. Each stage is in turn divided into a number of parts called sections or, confusingly, controls. At the start and end of each section is a control point manned by a control official whose duty is to note the direction of entry and time of arrival of each competing vehicle. This information is recorded on a control card carried by each navigator and on the official's master card. At the end of an event the director and his scoring team use these cards to work out the various points losses of each crew and, eventually the rally winner.

Rallying is controlled in Australia by the Confederation of Australian Motor Sport. CAMS, through various sub-committees, sets down the rules and regulations of the sport so that it is conducted on a proper basis. CAMS' control in motor sport is very important. If there were no control by a responsible organisation, then the sport would suffer in the eyes of competitors, the public and officialdom generally. Car clubs affiliated with CAMS run rallies. CAMS may be contacted on 29.8862, their address is corner Burke & Toorak Roads, Camberwell.To get into rallying, you should join a car club and obtain a Victorian Road Event licence. This costs approximately $3 and must be renewed annually. The secretary of your car club must sign the licence application form.

Before you compete in your first event, it is advisable that you watch a rally as an assistant control official or similar. In this way you will get a fairly accurate idea of the sport with little expenditure. From time to time your club will either hold or be invited

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to compete in events and in many cases the rally director will be looking for control officials - do not take on the job of control official without the help of an experienced official.

After you have seen what the sport is all about as an official, you can take the next step.

Choosing a driver and car

This is a very important step and should be completed very carefully - its like choosing a wife! In your club there is bound to be someone who wants to take up rallying as a driver. By attending club meetings and speaking to fellow members you will get an idea of who's who and who is looking for a navigator. You should aim to compete with a driver who you know reasonably well, he should be a good driver, have a very even temperament (and not fly off the handle or become argumentative), he must be very patient, and he should have been in one or maybe two trials already. He must also have a strong road-worthy car and MOST IMPORTANTLY - he must be prepared to make allowances for your lack of skill. Such drivers are very few and far between - as you will find out - so obviously you must make a compromise somewhere along the line.

Car selection and preparation would fill a book, but here are a few pertinent details. Almost any car in good condition will suffice for your first novice event. It need not have a sump and/or petrol tank guard for your first event, provided the driver knows his ground clearance. In fact the lack of guards will make the driver travel slower and this will be a great advantage to you. The car MUST have seat belts, MUST be in roadworthy condition and clean. Cleanliness in the car is a good habit to get into early in your career as a navigator. Dirty, dusty cars will tire you more quickly.

Your equipment need not be very comprehensive for your first event - a map board of approximately 12-14ins. x 15-18ins. made of tough cardboard (so that it will collapse in an accident) will be a necessary item, plus several soft pencils around 2B, and a fairly accurate mileage recorder. Most cars have an odometer (mileage counter) set into the speedo which shows miles and tenths of a mile. Unfortunately, car manufacturers do not have navigators in mind when they install speedos so they mount them in front of the driver instead of the navigator. You have two courses of action here - you can either compete by looking over the driver's shoulder to get an indication of distance travelled or, better still, purchase an extra mileage counter, mount it in front of the navigator's seat (on the glovebox or under the dashboard) and connect it to a junction box behind the car's main speedo.

This latter course may become a little expensive depending on how mechanically minded you are! The cheapest method of installing an extra speedometer is to buy a VW-VDO trip-speedo or early BMC unit. Alternatively, you can go the whole hog and purchase a Halda Tripmaster or Twinmaster. Haldas are expensive but vital if you intend taking up rallying seriously.

If your first event is to be held at night, you will need a torch and a flexible map light of the Lucas or Butler type. The latter can be purchased through any Lucas electrical agency.

Overalls are always a good thing to wear because they protect your clothing should you have to get under the car in the mud, they can be washed easily and they also keep you warm. A final point would be the purchase of car sickness tablets if you are prone to queasiness

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- Kwells and Benecine are the best; buy them in any chemists.

Supplementary Regulations and Final Instructions

Your next step is to carefully choose your first event. Discuss this with your driver (after all, presumably its his car) and select a Novice Trial or one which has a novice class in it. Obtain a set of Supplementary Regulations and Entry Form through your club and read these closely. Supp. Regs. govern an event and whilst they are all basically the same, you should become very familiar with the rules for every event in which you enter.

Look for the following points: how many miles is the event, where does it start and finish, how much is the entry fee, how many stages are there, who is directing the event and which club is running it. Talk to more experienced rallyists in your club to see if you can glean any further information. Once you have settled on an event, fill in the entry form and obey any further instructions which may be listed in the Supp. Regs. and post the entry to the relevant club.

A week before the event you will receive in the mail a set of Final Instructions for the event. These will detail: your car number (1, 2, 3 and so on), your starting time, the time at which you must report to the start, the correct maps which you must have, and other details. It is a good idea to take both the Supp. Regs. and the Final Instructions with you in the event.

Pre-event and the Event

Work out how long it will take you to get to the start of the rally, arrange for your driver to pick you up, make sure you have the set map(s), take a pencil sharpener, rubber, three or four soft pencils, map board, warm clothing, an extra pair of socks, and some food. Apples are a good food choice. They tend to settle the stomach, they are easy to eat, they do not spill sticky juice everywhere and they are easy to stow away - preferably in a place where they can't get under the driver's feet.

Discuss with your driver the knowledge you have about the event, where its going etc. Try to get into his mind that its your first event and that you want to win as much as he does but that you won't be able to do well if he drives like a madman. Use a little bit of common-sense and try and develop a close bond of teamwork with him - teamwork will win an event, without it you will just be wasting your time and his petrol.

At the start of the event, ensure everything in your car is in its place with nothing floating around to rattle and annoy you. Clean the car, top up the petrol tanks and let your driver check things such as oil level, tyre pressure and so on. Work out with him whether he or you are going to pay for the petrol. In the vicinity of the start will be the start official. It is the navigator's job to report to this official and state his car number. This number will be recorded by the official who will also note if you have arrived late; late arrival at the start will usually be rewarded with a penalty of a point per minute late.

As the cars move off from the start (usually at two minute intervals) check to see which way they are going. This may help. When it is your turn to start, the official will tell you what the "official time" is - adjust your watch or clock to this time as the event will be run by clocks all set to this official time. You will then be handed your road card and a set of route instructions and be bade farewell. It is often a good idea if you tell your driver to leave the start

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point and park about 100 yards away whilst you work out the first control point in a stationary vehicle.

The route instructions should be dissected in the following manner:

Control location: work out on your map where control one is located, place a circle around it on the map.

Entry: note the direction of entry to control one specified in the route instructions and place an arrow alongside the control one location point.

Via: There may be one or more via points specified in the instructions treat them in the same way as control points - i.e. encircle the via location and, if a direction of entry is specified, place an arrow alongside the point.

Time allowed: note the time allowed and, if it is given, the distance for the section.

NOTE: Navigators vary in the method with which they plot section routes. It is a good idea to get into the habit of plotting the via points (in order) before you plot the control point. In this way, you can quickly plot the first via point and give your driver his first directions and then, whilst you are moving off, plot the other via points (if any) and then the control point.

Mark your intended route on the map by placing arrows at the various intersections through which you will pass. Try and visualise the road ahead by looking at the map. Read into the map as much information as you can - note rivers, creeks, railways, towns, schools, post offices, road junctions etc. on the map and tick them off either in your mind or on the map as you pass each feature. In this way you will KNOW WHERE YOU ARE ON THE MAP ALL THE TIME. And this is the most important maxim in rally navigation. Don't forget it.

Give your driver simple, precise instructions. Tell him how far he must travel along this road and what his next turn will be. i.e. "Travel along here for one and a half kilometres then turn right". Don't chat about the weather or your problems with Mildred. Concentrate and allow your driver to do likewise.

When you are happy that the route you have plotted to control one is the correct one (check it once or twice but don't keep doint it), work out what time you are due to arrive at control one. If you left the start at 8.12 and the time allowed for control one is 22 minutes, then your time of arrival at control one is 8.12 plus 22 minutes which is 8.36. Isn't it? No, its 8.34. Some navigators chant out to their drivers as a double check "8.12 plus 22 is 8.34 check?" The driver then acts as a safety precaution in your calculations.

In many cases, you will arrive at control early. Depending on what the Supp. Regs. stated about early arrival at control, you will usually be allowed to enter the control area early and nominate your intended time of arrival to the control official. Make sure he writes down the time you want if you arrive early. If you arrive late, say 8.34, he will write this time down on your card. Don't argue with him - he's doing the job the best he can.

When you have plotted a control and you are on a fairly straight piece of road with no turns coming up for a mile or so, try and plot ahead - work out the next section - but don't lose your place on the map. KNOW WHERE YOU ARE ON THE MAP ALL THE TIME.

At the end of the first stage, remember that car care comes first. Refuel and check over your car carefully. Clean it if necessary. Restow your gear and get the car into the same condition it was at the start. Rub out unnecessary markings on your maps and sharpen your pencils. Then, and only then, can you go and have something to eat or

drink. A car that needs attention won't go at all, a crew that needs food will go. Most rest/refuel breaks are fairly short so fix the car first.

At the end of the event, if you have enjoyed it, make a point of thanking the director. He has put a lot of work into the rally and a word of thanks will be worth a great deal to him.

Post-Event

Discuss with the director the route he selected, why he did it, discuss your mistakes with him, don't rubbish the event if you didn't like it, and admit to any "blues" you made - don't be too proud. Find out how or why you lost points.

When the results are issued check over them carefully on your own. Check them with your driver with a view to improving teamwork. Tell him what you learned from the event and that the mistakes you made were valuable to you in that they will help you do better next time. Ask him if he enjoyed the event, does he have any suggestions to improve your navigation, the teamwork angle, or is he happy with the way you call up the intersections for him?

In your lounge room plot out the route again and try to learn by your mistakes. Talk to other competitors and work out what they did wrong and why. Talk to the winner and find out why he didn't lose as many points as you did.

Teamwork

This is a most important subject - good teamwork will be vital for any success in rallying. Don't argue with your driver. Instill in his mind that he will always be able to drive far too quickly for your navigation. Tell him that if he drives too quickly or too hard, you will get lost and fast driving will only get you more lost (if that's possible). Impress on him the importance of him obeying your instructions. If you say "We're on the wrong road, turn around" make sure he realises that this is exactly what you mean and that there is no reason for him to suggest that you travel for another mile in the hope that the right road might just turn up.

Map collecting and marking up

For your first couple of event, it is best if you use only the official map specified in the Supp. Regs. When you become a little more proficient and decide that rally navigation is good fun, you should start a map collection. Most of your early trials will be run on Hamlyn "301", 100 Miles Around Melbourne map. This is quite a good map but to do better in rallies, you will sooner or later come across more accurate maps produced by Government and semi-government organisations such as the Forests Commission, Department of National Development, Lands Department, and so on.

There are hundreds of maps available - the best are the 50,000, 100,000 and one inch to the mile maps produced by the above bodies. Do not buy them all at once; buy them as you need them. If, for example, your next rally starts in Dandenong and you know it will be going up into the Gembrook - Neerim area, then buy the Gembrook and Neerim 50,000 maps.

Marking up your maps is very important. The idea here is for you to put onto your survey map the roads shown by '301'. In the area covered by the Hamlyn map, there are approximately 45 large scale survey maps which, when put together, cover '301'. Thus one survey map is a fairly accurate enlargement of a small portion of '301'.

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As survey maps are based on aerial photographs, they show roads, rivers, hills and other features much more accurately than '301'. So you now have the situation where the Route Instructions of a rally refer to '301' whilst you have more accurate maps with '301' roads marked on them - your navigation should become more precise and better.

Most navigators use a simple colour code for marking Hamlyn roads onto their survey maps. Hamlyn roads are either black (highways), red (secondary roads), white (minor roads) or dotted white (tracks). Firstly select your colour coding - purple for highways, red for red roads, yellow for white roads is a popular choice. Then draw the '301' black highways in purple on your survey map. '301' red roads in red, the white roads in yellow and white dotted in yellow dotted. Use Coloriter or Texta Nylorite pens for this work; they can be purchased either singly or in colour sets from most stationery stores. This job should be done very carefully and slowly. Rushing this often difficult job will cause you to misplot route instructions whilst competing in a rally. Careful preparation will pay dividends in improved map reading. Later on you can do similar marking up exercises correlating small scale maps (such as Melbourne 1:250,000) with large scale maps which cover it in greater detail.

When you use these survey maps, correct them as you go along. They will often show roads which no longer exist or are gated off, write in distances between intersections, start your own shorthand system of 'G' for gate, 'Ruf' for rough track, '?' for possible map error, 'BWW' for boggy when wet, 'X' across roads which are marked on the survey map but do not in fact exist any more, 'HTS' for hard to see road junctions, 'Tr' for track, write 'CAUTION' on the map at the points where necessary such as bad creeks, difficult bends, rough bridges, etc.

SUMMARY

1. Know where you are on the map all the time.
2. Read your instructions slowly and carefully, plot your way through the rally slowly and carefully, don't rush.
3. If your driver travels too fast, just look out of the window and stop navigating until he slows to the required speed.
4. Talk to fellow competitors and directors, check your mistakes both at home in peace and with other more experienced navigators.
5. Never be afraid to admit you made a mistake....you only learn by experience and by making mistakes.
6. Read the Victorian Trial and Rally Code available from CAMS.
7. Read magazines such as Australian Auto Action, Motoring News International and Racing Car News to find out who's who in the sport, what the major events are etc.
8. Navigating is like reading a book - learn the symbols and the new language then learn to walk before trying to run. Start off in small events.
9. Build up teamwork within the car - practice changing tyres etc.
10. Know where you are on the map all the time.

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ROGER BONHOMME'S
RALLY NAVIGATION SCHOOL
L E C T U R E T W O

CONTENTS:

* Route charts, director's and map mileages,
* Compasses, setting up and reading,
* Mapping, choosing an area and working it
* Personal preparation, mental and physical approach to rallies,
* Advanced car preparation.

Route Charts

A route chart is a series of highly abbreviated instructions arranged to take a car from point A to point B, generally with a minimum amount of navigational skill. By far the most popular type of route chart is one based on mileages with instructions given alongside progressive mileage readings.

The first thing to do with regard to mileage route charts is to learn the abbreviations used; there is a common set of abbreviations which are straightforward.

T.R. = Turn Right; T.L. = Turn Left; S.O. = Straight On; T.H.L. = Turn Hard Left; T.H.R. = Turn Hard Right; B.R. (also V.R.) = Bear Right (Veer Right); B.L. (also V.L.) = Bear Left (Veer Left); P.W.C. = Proceed with Caution; R.X. = Railway Crossing; E.O.S. = End of Section.

These instructions are written alongside cumulative mileage readings and must be obeyed as your car's mileage recorder reaches the respective reading - e.g.

Route	Instruction	Interpretation
0.00	S.O.	At the Start, proceed Straight On
0.50	T.R.	After .5 mile from the start, turn right
1.30	T.L.	After 1.3 miles from the start, turn left
1.85	P.W.C.	After 1.85 miles (halfway between 1.8 and 1.9) from the start, proceed with Caution
2.05	T.H.L. at R.X.	After 2.05 miles from the start, Turn Hard Left at railway crossing
3.25	Proceed to Control	After 3.25 miles from the start, the route chart ends and you must proceed on a route of your own choice to control.

Directors use route charts basically for one of the three reasons:

* to take competitors through a tricky area so that they don't get lost (through a town for example),
* to make a section a drivers' section where driving skill and not navigational ability will be the criterion of success.
* to take cars into a tricky area and finish the route chart usually at a confusing fiveway intersection, leaving navigators to work out the best way from there to control.

If a director intends to use a route chart in his rally, he must specify an "odometer check" or "mileage check" in his Supp. Regs. or Final Instructions. This will read something like: "From the 24 mile

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peg on the Princes Highway Hallam, to the 34 mile peg, the director's odometer showed 10.05 miles".

This means that over this 10 mile distance, the director's odometer was 0.05 (five hundredths of a mile or 88 yards) in excess of being perfectly accurate. Thus when the director sets a route chart his readings will be generally half a percent in excess of what they would be with a spot-on mileage recorder. You should check your own speedo over the set mileage check and keep in mind the subsequent difference between your mileage recorder and the director's.

When you are faced with a route chart of this type in your route instructions, the first thing to do is to look at the end of it to see:

(a) if the route chart takes you all the way to the next control point,
(b) if the next control is actually specified in the normal way,
(c) if the location of the next control point is only specified as being at the end of the route chart (in this case, you will have to follow the route chart on a map to determine where you are at the end of it),
(d) if the route chart drops you off half-way along the route, between two controls forcing you to find your way from there,
(e) if the route chart is just to take you through a tricky part of the section, leaving you with an easy run to the next control.

If the route chart comes under the category of points a. and b. together or e., then you should concentrate mainly on reading out the route chart to your driver and not really worry about where you are going on the map. In all other cases you must try and follow fairly closely where the route chart is taking you on your map.

Many mentally agile navigators use a system called differential mileages to help them read route charts. This means that they subtract the first mileage from the second, the second from the third and so on which gives them the distance between each instruction as well as the total mileage from the start for each instruction. The advantages here are twofold:

* if your odometer is slightly different to the director's then the "gap" between your readings and his will get progressively worse during the route chart, and it will become harder to follow,
* by having the distance between consecutive instructions, you will be able to "count down" the distance to the next instruction more accurately for your driver; this means he will overshoot fewer corners.

Another type of mileage route chart refers to the mileages shown on a map. This is a fairly simple method of route charting, usually written as 1, 2½, ½, ¾, 1½, and so on. You then have to find a course from your starting point where the map mileage to the first intersection is shown as 1 mile, the distance to the second intersection is 2½ miles, to the third intersection ¼ mile and so on. Remember that unlike the first type of route chart, map mileage route charts shown non-cumulative mileages - they are a type of differential mileage route chart. Don't forget too that just because the map shows 1 mile between intersection, this could be anything from 0.8 mile to 1.2 mile because of basic map inaccuracies.

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Compasses

There are two golden rules to remember with compasses:

* if you want to install one in your car, buy a good one and set it up properly,
* read it correctly and believe in it - its an inanimate object which has no mind or will of its own; if it has been installed correctly and is showing south-east then that is the direction in which you are heading, despite the fact that you may feel strongly that you are heading north-west.

A compass is a necessary item of equipment once you pass the novice stage. Unfortunately there are few hard and fast rules which can be applied to compass selection. I have heard experienced navigators swear by small cheap compasses little better than those that stick on windscreens whilst other top navigators will only use radio-type compasses built for aircraft. A lot will depend on your car's metallic construction and the placement of its wiring.

I have found that a relatively inexpensive Sylva hiking compass (Robertson & Mullens, $3 approx.) is quite good in Monaros, Minis, Anglias, Cortinas, and only reasonable in a VW and not too good in a Renault Gordini. This type of compass should be attached to a loop of string around your neck so that it lies flat on your map board. Walthams Trading (Elizabeth Street) have a range of compasses that is worth inspecting. H. Firth Motors, Auburn, sells one popular brand which is reliable in the Holden Dealer Team Toranas. A more complex unit, the magnysen radio compass, is now being installed in many cars because of its accuracy, ease of reading and relative stability. However this ex-aircraft compass requires specialised knowledge in electronics as most of them need a transistorised power supply to convert the car's 12 volts into 400 cycle AC.

The majority of compasses have fitting instructions supplied with them. Don't forget when installing the compass to check it with the car engine running, the lights on then off, the wipers on then off, so that you can find a mounting position where there is minimal interference from the car's body and wiring.

Once the compass has been installed and accurately adjusted there is only one final step - don't argue with it.

Many compasses spin a great deal because of the car's vibrations. A pad of foam rubber can be used as an effective shock absorber to reduce this spinning.

With hand held compasses you must find the position in which it is most accurate. Hand compasses are usually very finicky, e.g. you may find the compass most accurate when you hold it three inches above the right hand side of your map board, but very inaccurate when the compass is held six inches above the board. Experimentation and patience - that's the answer.

Using the compass in the car is largely a matter of common sense. Get into the habit of reading the compass every time you pass through an intersection or turn at a cross roads. This will ensure you are turning onto the right road. Regular checks of the compass should be made to ensure you're on track, but the number of checks will naturally vary according to the terrain through which you are passing.

But don't forget - accurate compasses, like cameras, never lie.

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Mapping

All maps, like jet aircraft, are virtually obsolete by the time they go on sale. This is because of the time taken by aerial photography plus extensive photogrammetrical work, printing and distributing. This period is usually two or three years and so new roads are built which are unmapped. Also many minor tracks, although they may be quite trafficable (in the director's view), are left off survey maps. For these two reasons, the astute navigator will go mapping - he will bring up to date his survey maps or, in densely roaded forestry areas, he will make his own large scale maps.

Choosing an area to map is quite easy - you may know that part of one of your survey maps has too little detail and needs bringing up to date, or, you may have come across a tricky area during a rally. But whichever method you use to select your area you must be firm in your own mind that you are going to check a lot of other less important areas and find you have run out of daylight by the time you arrive at your target area.

Okay, so you've selected your area - preferably no more than 10 x 10 miles to begin with - the next step is to find an accurately mapped starting or datum point. This may be an intersection or a town. From here on there are a number of ways of carrying out mapping. My own method is to slowly travel through the target area using only those roads which are mapped. I write down on a foolscap notepad a complete route chart of what I am doing, noting those unmapped roads or tracks leading off from the mapped road and the mileages at which they occur. Once I am happy about the positionsof all the mapped roads - which are often difficult to follow - phase two starts.

I then tackle the best of the unmapped roads, moving slowly along them, continuing the route chart, checking my compass and lightly drawing in their approximate positions on my survey map. Unless it is absolutely necessary, I ignore those tracks on which the maximum safe speed is less than 15mph - too much time can be lost checking this type of track when there are better roads in the vicinity to explore.

The worst driver to take with you on a mapping expedition is usually your rally driver. He will invariably want to "have a good thrash", he is likely to become impatient and generally rally drivers make unsatisfactory mapping drivers. I prefer my wife because she drives slowly and carefully and has a great deal of patience. You should choose carefully the person with whom you go mapping. There is no point in rushing a mapping trip as you will make mistakes which will undoubtedly cost you dearly in future events.

After a mapping trip, I check over the route chart and my map markings and ink in the mileages, unmapped roads and map errors I have collected. If I am still not sure of a road or a mileage I put it on the map in pencil so that it can easily be corrected at a later date. Information put onto a map should be printed in fairly large letters andnot written; this will make it easier to read in a moving car.

Personal preparation

This is largely a matter of personal choice and common sense. However, a few pointers will be worth considering:-

* Get plenty of rest before an event, the longer the event the more rest you will require,
* You will soon discover if you are prone to car sickness (and most people are) so find out what foods you can stomach before a trial, if any, and only eat those foods before an event,

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* Complete your preparation for an event in the week prior; don't rush around on the Saturday morning checking your compass, installing a Halda or trying to buy maps which were specified for the event a week earlier; last minute panics lead to hasty, inaccurate navigating.
* In your first few events, don't try to win. This may sound a little odd but if you concentrate on doing well and learning about navigation, then you will make fewer mistakes and do better in the long run. By worrying yourself about how well everyone else is doing, you will concentrate less and your navigation will suffer.
* Cleanliness is next to Godliness - dust and mud are very fatiguing so keep as clean as possible even to the extent of taking extra clothes. If you are a heavy smoker, it may be best to brush your teeth during a stage break as this can freshen you up quite a deal (your driver may be happier too).
* Quite often you will find that you will want to go to the toilet during a long control or stage. It is often best to stop and disappear behind a tree rather than cross your legs and hope. Your concentration will suffer greatly and, in extreme cases, you may do some damage to your internals on a rough road with a full bladder. If you leap out of the car at a control point looking for a tree, please don't embarrass female control officials - most of them won't know of your agonies.

Advanced Car Preparation

Experience is the best guide here. Inspect whenever you can the interior layout of the "works" and leading Classified Class cars. Don't worry yourself too much about tyres, suspension settings and tuning - let the driver deal with that.

You should make your own little world on the left hand side of the car as comfortable and convenient as possible. If the driver is installing a Halda, compass and navigation light for you, make sure you have some say on where this equipment is to be placed.

The best idea is to sit in your navigation seat with your seat belt on and the seat adjusted to a comfortable fore and aft position. Then make sure that your equipment - mileage recorder, compass, map box in the rear, navigation light and any miscellaneous switches - are all within easy reach. Don't mount anything so that you would hit it in the event of an accident. Make up a small box for odds and ends and mount it on the transmission tunnel. A flat plastic wallet is a useful pencil carrier when taped to the car door.

Make sure you know where all the extra equipment is in the car - spade, axe, first aid kit, warning triangles, jack, wheel brace, spare wheel, spare fan belt and other bits and pieces. You can waste much valuable time searching for say, the jack handle and a 5 minute tyre change mid-section could easily stretch into a 10 minute frantic comedy scene with the crew members blaming each other for the missing piece of equipment. Remember teamwork.

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Roger Bonhomme's
RALLY NAVIGATION SCHOOL
L E C T U R E T H R E E

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Advanced Navigation

This is a fairly difficult topic to discuss as undoubtedly experience is the greatest teacher. Navigation is a subject which you can study a great deal but only through competing in rallies will you get into the top class. However, listed below are a number of points which you should try and remember whilst navigating.

1. Know where you are on the map all the time. It's too easy to work ahead and lose your place on the right map. When travelling through blank areas of the map, keep an eye on your compass and draw on your map roughly where you are using your Halda and compass to guide you. Treat all maps very suspiciously - if a road is mapped as running straight, keep checking that the road you are on is straight. Remember that all maps are obsolete by the time you get them - even if they are so new that the ink is still wet.

2. Keep your head. Getting flustered means getting lost. Navigating can be very frustrating with problems like unmapped roads, inaccurate maps, rough roads, noise and an inconsiderate driver all making things difficult. If you are losing control of the situation, the ONLY thing to do is to tell the driver to stop until you discover the right course of action to continue your way to the next control.

3. Use all the facts before you. If the route instructions say the next control is only 10 minutes long and you can find only a route which is 10 miles long, then obviously you must use an unmapped road. If the director specifies the distance of a control as 15 miles, don't use a shorter route because the 15 mile route will be the correct one. Any shorter route is likely to be impassable - it's not worth running the risk. Get as much information from the map as possible - use landmarks such as creeks, rivers, churches, schools, railway lines etc. to guide you. Two landmarks to be wary of - roads, and signposts. Roads move (or rather, are moved) with regular monotony. Sign posts can often be misleading. Certainly, you should check signposts whenever possible,but don't regard them as infallible.

4. Be flexible in your thinking. If you suddenly arrive at an unmapped T-junction don't exclaim to your driver, "But that's impossible" - he will be rather unsympathetic and he will demand to know what to do next. Naturally with map inaccuracies and the fact that not all information can be placed on a map, you should realise that what is mapped as a crossroads may, in fact, be an offset crossroads; you may have to turn right at a T-junction then left immediately after to negotiate a mapped crossroad.

5. Learn teamwork with your driver. It is difficult for a learner navigator to develop properly if he changes his driver all the time. Even top navigators spend a couple of sections getting used to a new driver. So find a suitable driver, settle in with him and, if possible stay together. Teamwork means lots of things - practising tyre changes can save valuable minutes in the middle of the night; when opening and closing gates, work out whether he will hold your map board whilst driving through, a good driver will hold the map board, tell the navigator which way the gate opens, on what side the lock is, and switch on the reversing light (to help the navigator see when he is closing the gate); break the communication barrier with your driver AT THE RIGHT TIME and discuss your work together; find out what he wants to know in the way of information; don't chat about nothing on difficult sections; if you start going in long distance events, you may have to drive his car for a while so have a practice with him before a long event so he knows your style of driving.

6. All rally crew members are created equal - but navigators are more equal than drivers. Don't be overbearing, but be firm. If you say "Turn right", make sure your driver isn't going to argue that the previous car turned left.

7. Keep all your Supp. Regs., route instructions and results and study them from time to time. Practice makes perfect.

8. Maps are your investment in your future ability. The top navigators work hard on their maps. Don't treat them just as bits of paper. Store them carefully, mark them up as neatly and accurately as possible. Learn all the symbols in the legend area at the bottom of the map. Learn to read contour lines - which are self-explanatory but take a little bit of study and getting used to. A good navigator will use contour lines to check his position, to ensure he is on the right road, to tell him what sort of country lies ahead and to work his way through a maze of unmapped roads. Remember that whilst roads are moved by man, very rarely indeed are contour lines and rivers/streams moved.

9. Get into the habit of working as far ahead as possible. But at no time should you run the risk of losing your place. When working ahead you may be using a number of maps which should be stacked and folded in the correct chronological sequence. If you find the navigation is too difficult to work ahead, then don't worry. Remember that if you are finding things tough, then chances are the other navigators in the field are having the same trouble. Also, if the navigation is tough on the section you are doing, then the chances of getting lost by working ahead are so much greater. Remember point 4 - be flexible.

10. Get into the habit of jotting down as many mileages and map corrections as possible. With practice, you should be able to follow the route of a trial after completing it by following the corrections and mileages you have made across your maps. These annotations will prove valuable in future events.

11. Know where you are on the map all the time.

Championship Rallies

There are basically three series of championship rallies in Australia in which you can compete. At the lowest level is Victoria's Clubman series. Comprising seven events, the series is open to all navigators (and drivers) who are not on the State's Grade one or two list of competitors. Points are earned on the basis of 9 points for a first place in each event, six points for a second, four for a third, three points for a fourth, two points for a fifth and one point for sixth. At the end of the season, the points are totted up and the navigator with the most points is declared Victorian Clubman Champion Navigator for the year.

Clubman series rallies are relatively straightforward and are aimed at improving the standard of rallying in the State. They also make the jump from normal club events to full State championship events a little easier.

If you are keen on navigating, I suggest you attempt two or three novice rallies, then half a dozen club events before tackling your first Clubman series rally.

The second level of championship rallies is the Victorian Rally Championship series which also comprises seven events. These rallies are a bit more difficult than the Clubman series, naturally, and should not be tackled unless you have at least a season's experience behind you.

At the top of the tree is the Australian Rally Championship which is made up of two rallies in Victoria, two in N.S.W. and one each in Queensland, South Australia and Western Australia. Each competitor's best five results over the series is counted. Championship points scoring for State and National titles is the same as the Clubman series 9-6-4-3-2-1 for first to sixth place.

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The secret of success in Championship rallies is stamina - not only the stamina required to see you through a hard night of rallying, but also the stamina to get you through a season of seven tough events. If you would like to tackle a Championship series, then you should plan right from the start of the season with your driver. Unless you are rich or sponsored, it is best that you enter only championship events in your bid for the title. You will find that by competing in championship events AND other open or club trials, your budget will be sorely strained.

Most senior Championship events are in the order of 250-400 miles long and can be very tiring. Thus your personal preparation, especially with regard to early nights before the event, must be a bit more meticulous than for average club events.

Long distance and interstate events

These are in a field all of their own and require special attention. I believe that long events, such as the Alpine and interstate rallies, such as the Southern Cross Rally or heats of the A.R.C. held in N.S.W., Queensland and South Australia, should NOT be attempted under any circumstances by a crew which has not done at least half a dozen Victorian senior championship events.

This may seem a little harsh, but there are good reasons why inexperienced crews should not contest long or interstate rallies. The competition in these events is extremely tough and usually of a high standard. The events are fast moving, not only in the speeds required from A to B, but they also have shorter rest breaks and controls seem to close a little earlier than one would expect. Thus the novice crew at the tail of the field can find himself traversing strange country at, to him, ridiculously high speeds or with incredible navigational hazards to be surmounted. Its all a little unfair, the novice may feel. The end result is that the navigator unready for such difficult challenges may well throw the whole sport away, whereas, if he had taken his development over a better range of rallies, then he may well have become a really good navigator a season later.

The point here is that the development of a navigator must be taken fairly slowly if he is to be successful. Don't rush into tough events in a foolhardy attempt to prove to your driver that you are better than he thinks you are.

When you are ready for long or interstate events, the first point to remember is that you are just going into the event for experience. It will be fairly expensive experience, but undoubtedly it will be valuable toyou.

Car preparation will obviously have to be of a higher standard than normal and you could do well to invest in a layback seat. Make sure that the little annoying things you have to put up with during overnight events are fixed - things like rattly glove boxes, loose compass mounting, strange noises in the boot, difficult to operate window winder. All these things, no matter how small they seem on a short 200 mile event, will tend to become much worse on a long event. Annoying rattles or draughts will cause greater fatigue, and fatigue is your biggest enemy on long distance events. Second biggest problem is the strange territory you will be covering.

After a dozen or so rallies on 301 you will become very accustomed to using it and the geography it covers. But names like Bemboka, Tantawangelo, Bibbenluke, Mullumbimby and Goonoo Goonoo can have strange effects on navigators used to town names like Warragul, Daylesford, Lorne or Mirboo North. But this is where a navigator with a flexible mind will come to the front. He will quickly get used to his strange environment and he will get used to using a State map

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where the blue is on the right hand side instead of along the bottom. For the driver, of course, things don't change quite so dramatically. Even near Cooktown in the far north of Queensland there are roads that look like the Grand Ridge Road. The road signs and sign posts may look strange to a driver but drivers have notoriously poor memories for roads anyway. The point here is that the strange territory will only trouble the navigator - but you can overcome the eerie feelings of being in an alien country (and that's no exaggeration for many navs. on their first interstate event) if you concentrate on your job.

Cleanliness of person and car also plays an important part in reducing fatigue and increasing concentration in long distance events. Long distance rallies, like big race meetings or even cross country running, need to be "paced" - that is, you must realise the length of the event and don't push yourself too hard in the early stages. These events have a high failure rate because car and crew are often pushed too hard early on. Take it easy and work your way slowly to the leading positions. You will only tire yourself if you try to maintain your lead right from the word go.

Interstate rallies are run on much the same lines as Victorian events. In N.S.W. the major difference is that in large events, you haveto sign the control official's card as proof that he has written in the correct time. Also in most cases, the navigator has to get out of the car and go to the control table rather than the official coming to the car. There is usually an enforced two minute stop at each control point instead of arriving and leaving often on the same minute as in Victoria. Big N.S.W. rallies usually have a timing disc some yards down the road from the control point at which the car's arrival time is taken. Also N.S.W. controls are usually marked with green or blue lights instead of just a board.

In South Australia the major difference is that route charts are called itineraries. In Queensland and N.S.W. navigators are required automatically to travel the shortest mapped route, although when Australian Rally Championship events are held in those States, the point about shortest mapped route must be mentioned in the Supp.Regs. N.S.W. has some very good maps available from the N.S.W. Forests Commission. Most of these in the south-eastern part of the State are of the 50,000 scale whilst those of the central coast and inland are of a variety of scales. In South Australia where there are relatively few forests or mountain ranges as we know them, the maps used (apart from the few 50,000, 100,000 and inch maps) are a type of county plan. Queensland has a variety of fairly old one inch maps, a few forestry charts plus a handful of new 50,000 maps.

Grid References

A grid reference is a simple mathematically based formula referring to a point on a map. Normal grid references in rallies are known as six or eight figure references (because each reference contains six or eight numbers) but basically they are the same as the reference system used in street directories.

Let us take a typical street directory reference as an example. If you are looking for Wellington Road, Clayton, the index in Melway's street directory shows that it is on map 70, reference G12. We then turn to page 70 and find the relevant map reference. As you know, this is done by dividing the G12 reference into two halves - a G and a 12. We look across the top of the map until we find the G line, then follow it down the page until we are level with 12 written on the side of the map. Where the line drawn down the page from G intersects with a line drawn across the page from 12 we should find Wellington Road.

This, as mentioned before is the simpliest form of grid reference or map reference. References used in rallies on survey maps are done exactly the same way. Lets have a look at typical grid references on one inch to the mile maps (1:63,360) and 50,000 scale maps (1:50,000).

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The 1:63,360 means that one inch represents 63,360 inches (one mile) on the map. Similarly, on the 50,000 scale maps, one inch represents 50,000 inches. Taking the inch to the mile maps first, note that across the top of the map there are progressive numbers atop vertical grid lines. Down each side of the map are other series of progressive numbers attached to horizontal lines. The normal grid reference used on a map such as this is a six figure reference such as 131 995. To find grid reference 131 995, we take each half - 131 and 995 - separately. The 131 is broken into parts - 13, which refers to vertical grid line 13, and 1, which represents 1 tenth of the distance between grid lines 13 and 14.

The second half of the reference - 995 - is also broken into two parts. 99 represents grid line 99 whilst the 5 represents 5 tenths of the distance between grid lines 99 and 00. We now have two reference points. 1. Grid line 13 plus 1 tenth, along the top; 2. Grid line 99 plus 5 tenths up the side. If you draw a vertical line down from 131 and a horizontal line across from 995, they will intersect on the map at point E. Thus the grid reference for point E is 131 995.

Grid references on the 50,000 scale maps are done in a similar fashion. Note that the grid line numbers around the map comprise three digits - a small one and two large ones. The numbers printed in smaller type is usually ignored when working out grid references. Thus grid reference 066 024 refers to point B on the 50,000 scale map.

To help you plot grid references (or find them) more accurately, a simple piece of printed metal (or plastic) has been designed called a Rally Romer. This has a number of different map scales printed on it. To find a reference on a one inch to the mile map, you use the scale in the corner marked 1:63,360. Note that the square marked in the corner of the romer is the same size as a grid square on the map. The romer's square has been divided into tenths to allow you to see more easily and accurately the third and sixth figures in a grid reference (i.e. those figures which refer to the distance in tenths between adjacent grid lines).

When using a romer on 50,000 scale maps, note carefully that the part of the romer marked 1:50,000 shows numbers running up to five. Thus these numbers should be doubled when read in regard to references. To explain this further, place the tip of the corner of the rally romer to point B. You will see that grid line 06 lines up with the 3 on the romer and that the grid line 02 (along the side) lines up with the 2 on the romer's edge. Thus grid reference for point B is 066 024.

Try these grid references for yourself:

1: 63,360		1:50,000	
116 972	150 003	103 043	066 976
134 963	117 000	054 005	051 975

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APPENDICES

1. Car clubs. This is not a full list of car clubs, just those which regularly run rallies.

Car Club of Royal Melbourne Institute of Technology, 33 Myrniong Grove, East Hawthorn.
General Motors-Holden's Motoring Club, GPO Box 1714, Melbourne.
Gippsland Car Club, P.O. Box 493, Morwell.
Light Car Club of Australia (and Junior LCCA), 34 Queens Road, Melbourne. (LCCA branches at P.O. Box 400, Ballarat, and P.O. Box 361, Bendigo).
Melbourne University Car Club, P.O. Box 37, Parkville.
Monash Sporting Car Club, Monash University, Wellington Rd. Clayton.
North Eastern Car Club, P.O. Box 138, Wangaratta.
Morris 850 Club, P.O. Box 59, Toorak.
Peugeot Car Club, 3 Ashby Court, Bayswater.
Renault Car Club of Victoria, P.O. Box 317, Richmond.
Victorian Amateur Drivers' Club, P.O. Box 106, South Melbourne.
Victorian Sporting Car Club, P.O. Box 61, Heidelberg.
Western District Car Club, P.O. Box 399, Geelong.
Central Victorian Car Club, Box 123, Maryborough.
Datsun Car Club of Australia, P.O. Box 278, Box Hill
Ford Four Car Club, P.O. Box 11, Canterbury.
Mazda Car Club of Australia, P.O. Box 39, Blackburn.
Renault Car Club of Dandenong, P.O. Box 68, Noble Park.

2. Navigational equipment. Haldas, Halda gears, compasses, rally romers; car preparation from H. & N. Firth, Queens Avenue, Auburn; Racegear (Ken Nancarrow), 41 Ralston Street, South Yarra, 3141; Ken Harper, 32 Ellis Road, Glen Iris; John Armitage, Autosport, Box Hill, 1199 Whitehorse Road, Box Hill; RND Services, 78 Whitehorse Road, Deepdene; Tony Roberts Automotive Centre, Bay Road, Cheltenham.

3. Maps.
Robertson & Mullens Pty. Ltd., 107 Elizabeth St. Melbourne, 3000.
John Donne & Son (Chart House), 372 Little Bourke St.,Melb. 3000.
Dept. of National Development, 460 Bourke Street, Melbourne, 3000.
Forests Commission, Treasury Place, Melbourne, 3000.
Crown Lands and Survey Dept., Treasury Place, Melbourne, 3000.
RND Services, 78 Whitehorse Road, Deepdene.

4. Licences, club addresses etc. The State Secretary, Confederation of Australian Motor Sport, Cnr. Toorak/Burke Rds., Camberwell.

5. Glossary of Rallying terms.

Ace	Top, best winner (as in ace-driver).
ARC	Australian Rally Championship, decided over 7 events or heats held in N.S.W. (2), Victoria (2), Queensland (1), South Australia (1), W.A. (1).
Average Speed (sections)	Sometimes part of the route instructions, where cars are required to travel between A and B at a pre-determined average speed. Points are lost for arriving early or late at B.
Banned Areas	Closely settled areas (especially in Vic.) in which competitive parts of a rally cannot be held.
Black Spots	Another term for banned area.
Blackwell Calculator	An English calculating device comprising two circular tables which can be used to work out average speeds, distances or times providing two of the three factors (time, distance, speed) are known.
Bundle	A lot of, usually points. "I dropped a bundle on that control".

Butler	Popular type of flexible lead-light used for navigating. Often fitted with a rheostat to din the glare for drivers.
CAMS	Confederation of Australian Motor Sport and the governing body of motor sport in this country (linked with the world organisation FIA - Federation International le Automobile).
Checkpoint	An area along a rally route at which an official ensures competing cars pass through correctly. Points are lost by competitors for failing to pass through checkpoints.
Clean Sheet	To travel from one point to another within a rally without loss of points.
Co-driver	European term meaning assistant driver.
Control	A rally is broken into a number of sections (also confusingly called controls) at the start and finish of which are major controls. Times of departure from and arrival at these controls are recorded on a competitor's road card. The time taken between any two control points determines point losses if any. If a competitor takes 14 minutes between control One and Two when the route instructions allows only 12 minutes, then that competitor has lost two points.
Director	The person in charge of the event. He may have assistant directors to help with the organisation.
Division	A number of consecutive sections in an event, usually between rest or refuel breaks.
Elimination Section	Term commonly used in European events meaning a very difficult section in which no competitors are expected to clean sheet.
Flexi-light	Another term for a Butler or navigator's light.
Fogs	Fog lights. Additional lights which have a low, wide spread of illumination and useful for driving in foggy or dusty conditions.
Full (Double) Harness	Seat belt design. Two straps (usually anchored at the back of a car) come over occupant's shoulders and lock into a conventional lap-type belt. Full harnesses are preferred by most motor sport competitors because they offer greater restraint than the more common three point (lap sash) seat belts.
Halda	Swedish made mileage recording instrument popular throughout the world. Three types available, the most popular Halda (Twinmaster model) has twin mileage counters measuring up to 1/100 of a mile. Each counter can be instantly zeroed, run forwards or backwards.
Impound (Parc Ferme)	An area during a long distance rally where cars are parked when no maintenance work can be carried out on them.
Licences	Competitors must have a CAMS Road Event Licence or General Competition Licence before competing in rallies (further details from CAMS office in each State).
Low Flying	Slang term meaning to drive extremely quickly.
MPMAS	Maximum Permitted Maintained Average Speed. An MPMAS of, say 50 mph, means that competitors may not average more than 50 mph between any two time controls along that part of the route relevant to the MPMAS instruction.
Navigator	Person who travels with a driver in a rally car to read the route instructions and instruct the driver where to travel. (Sometimes an overworked, overlooked member of the sport).
NSWRC	N.S.W. Rally Code - a booklet put out by a committee of experienced rallyists under CAMS authority to set the rules and recommendations of the sport in N.S.W. (same as VTRC -Victorian Trial and Rally Code).

Odometer	Mileage counter in a car. The most useful type of a rally car - apart from a Halda-is one which can be easily zeroed.
Off The Air	See "Low Flying" (only more so).
Oscars	Popular type of driving light. Also available are Super Oscars (both made by Cibie).
Points	A competitor's performance throughout a rally is determined on a negative scale of point losses. Each car starts an event with no points lost. During the event, points are deducted for arriving early or late at time control points or for failing to follow the route. instructions (entering a control from the wrong direction missing a check point). At the end of an event, points are totalled and the winner is the crew with the least loss of points. Where time is concerned, points are usually deducted on the basis of one point per minute late/early.
Romer	Flat rectangular piece of material (3 x 5 ins. approx.) with various map scales and map grid reference plotters around the four sides. Also called Rally Romer.
Route Chart	Series of mileages, usually starting from 0.0 miles, against which are written abbreviated instructions to be followed by competing cars, i.e. 0.00 S.O. (straight on), 0.5 T.R. (turn right after half a mile) and so on.
Scrutineers (ing)	Before each major rally, cars undergo a thorough check by competent officials to ensure their roadworthiness. Special equipment (axe, first aid kit, warning reflective triangles etc.) must also be carried on some events.
Section	The rally route between two time controls.
Service Points	Specified locations along a rally route at which prenominated service crews can administer mechanical assistance to competing vehicles. Each major team running in rallies today has at least one competent service crew which drives a car laden with necessary tools and spare parts to ensure the competing car(s) of its team are kept as competitive as possible.
SP44	The more popular tyre used in rallying and made by Dunlop. SP44 is a radial ply wintertread.
Special Section.	See elimination section.
Speed Pilot	Type of Halda. Not commonly used these days. Measures average speeds.
Spots	Driving lights which show a pencil type beam. Useful for high speed driving on relatively straight roads.
Stage	See Division.
Sumpguard	Strong sheet of metal mounted under a car's engine for protection. (Also gearbox, suspension, exhaust, silencer, differential etc. - guards).
Tirfor/ Crocodile	Types of winches carried by most top rally cars. Useful for extracting cars from bogs etc.
Transport Section	Section which is easily completed usually through a town. Non-competitive section.
Tripmaster	Type of Halda. Tripmaster has single mileage recorder.
Twinmaster	The Twinmaster has two mileage recorders.
VRC	Victorian Rally Championship - comprises seven events held throughout the State between February and November each year. Points earned on the basis of 9 for a first, 6 for a second 4-3-2-1-for sixth over competitor's best five of the seven events determines the State Champion. Same system used in National and other State rally championships. (National is best five events of a competitor out of the seven held).
Yumps	Crests, sudden jump-ups in the road. From the Anglo-Scandinavian "jump".