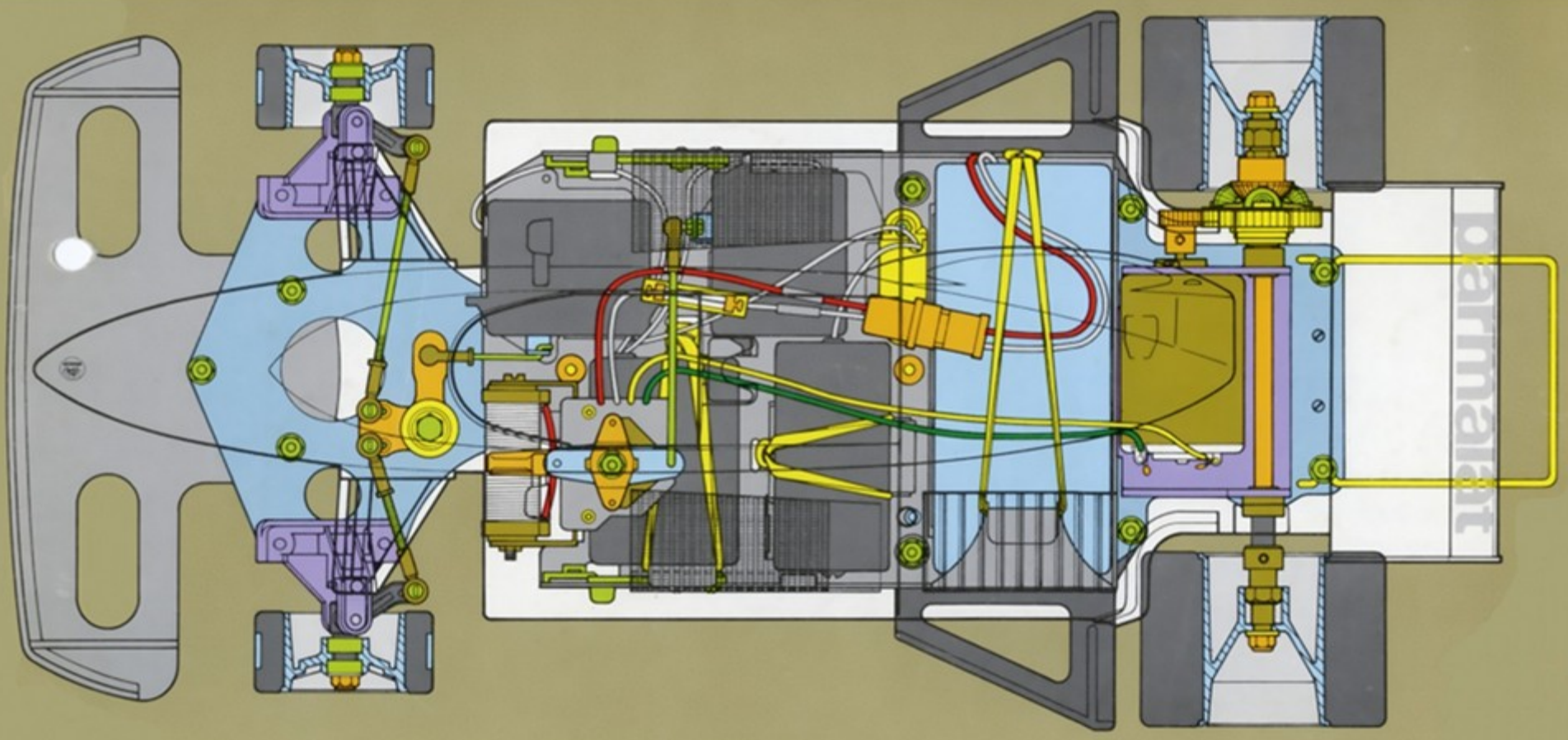
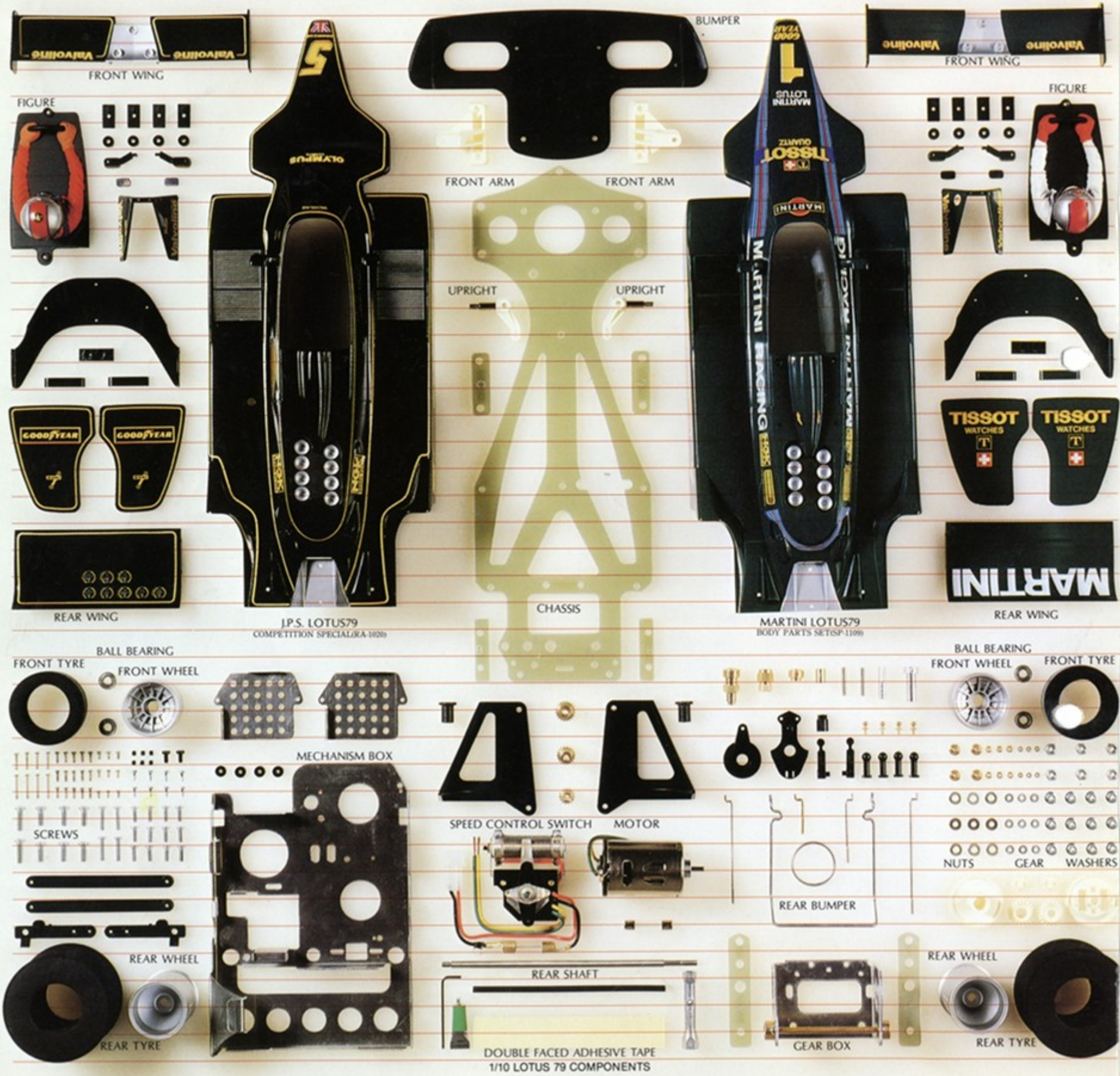
TAMIYA RADIO CONTROL GUIDE BOOK





1/10 LOTUS 79 COMPONENTS

TAMIYA RADIO CONTROL GUIDE BOOK

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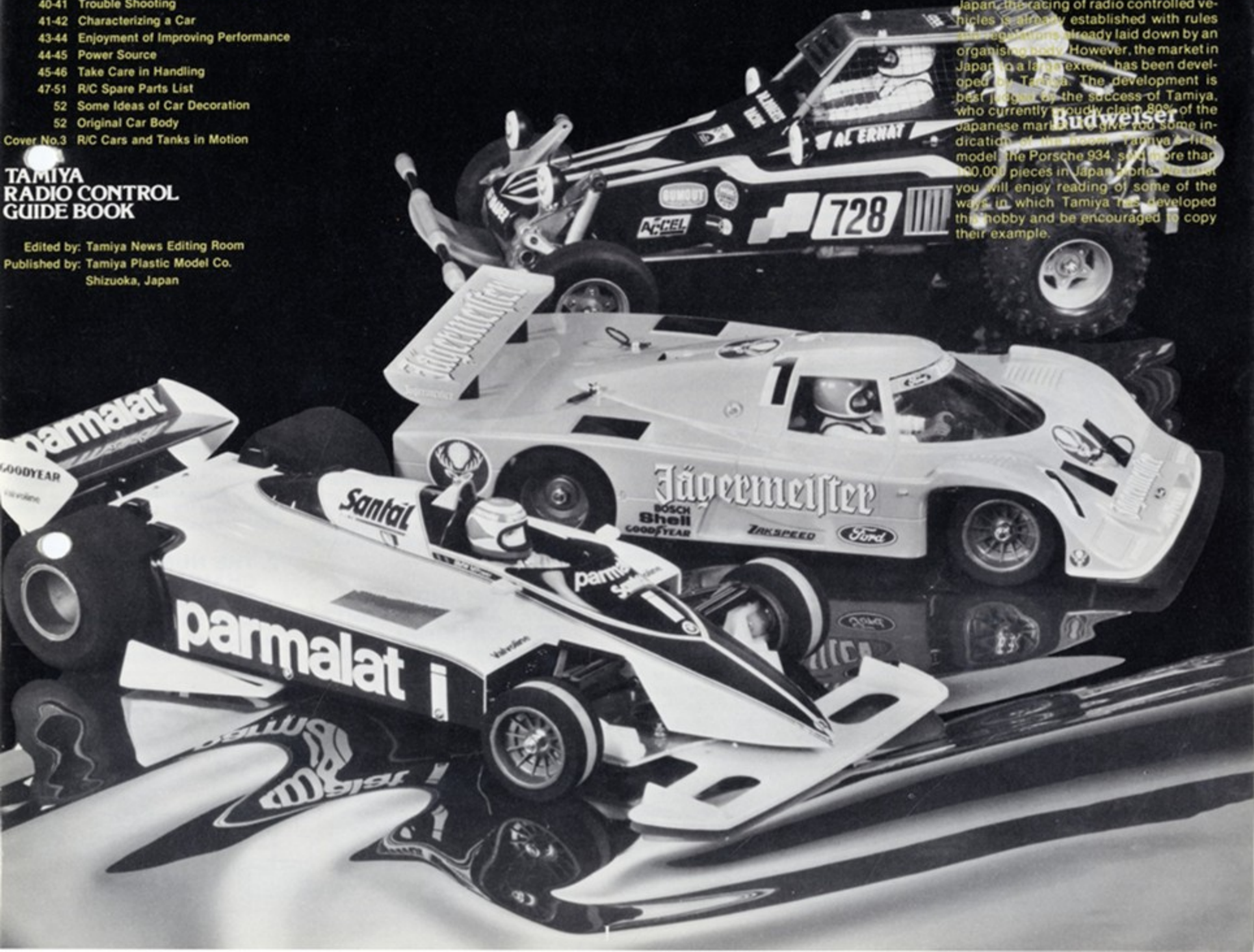
Published by: Tamiya Plastic Model Co.
Shizuoka, Japan

Toys they're not.

In Japan to-day radio control models are enjoying a tremendous boom. This boom has been brought about largely by the lead given by the Tamiya Plastic Model Company. Tamiya has, through its advanced thinking, revolutionized the whole Japanese radio control market. For some time now, Tamiya in its efforts to promote its own items suitable for radio control, has produced a manual to guide the beginner and expert alike. This manual has previously only been available in Japanese language. The English version which we hope you will enjoy, is a literal translation from the Japanese. In some countries outside of Japan, the racing of radio controlled vehicles is already established with rules and regulations already laid down by an organising body. However, the market in Japan to a large extent, has been developed by Tamiya. The development is best judged by the success of Tamiya, who currently proudly claim 80% of the Japanese market. To give you some indication of this boom, Tamiya's first model, the Porsche 934, sold more than 100,000 pieces in Japan alone. We trust you will enjoy reading of some of the ways in which Tamiya has developed this hobby and be encouraged to copy their example.



ENJOY RADIO CONTROL

ENJOY RADIO CONTROL

A great number of people today are enjoying radio controlled models. They find excitement in the precise mechanism and excellent maneuverability of these models. Some people enjoy customizing to increase their performance and, furthermore, organize races and competition. All of these categories offer limitless enjoyment to the fans. The reliable radio control unit, which was once a very expensive gadget, has come to be within a reasonable price range as the science of electronics has advanced. Also new car and airplane kits are coming on the market one after another in increasingly refined form. The radio controlled electric car models are becoming more popular among not only novices but also skilled modelers because of high performance in spite of their easy handling. Many enthusiasts are attracted by the exciting operation and realistic make up of radio controlled electric tanks, too.

This guide book is compiled to focus on the fundamental knowledge of the radio controlled electric model cars, on hints of assembly and adjustment, on operating techniques, and on racing, with our hope that the book can be instructional and help you enjoy the sport as well.

1. RADIO CONTROLLED MODELS

Radio controlled models are nothing but models remotely controlled by radio signals. So most operating models, if they are big enough to mount radio control units, can be converted for radio control. Radio controlled models are classified under kinds of power units; there are ones with gas powered engines, with electric motors, with steam engines, and ones with no power units like sailboats and gliders. There are airplanes, helicopters, gliders, racing cars, buggies, tanks, boats and some others, each of which has many fans.

However, as for the radio control units, most of them in use today are fundamentally the same; they are the digital proportional type, although their capability varies from unit to unit.

2. RADIO CONTROLLED ELECTRIC CAR

The ideal radio control vehicle for a novice modeler to start with is the electric car. And yet, because of their high performance, a number of adept modellers organize races of the electric car in many places. In fact, throughout the world the radio control electric car has the largest number of enthusiasts. As a result, there are many kinds of these models on the market, from large ones of 1/8 in scale to the smaller 1/24. The one most abundant car type and most intensively manufactured by makers is 1/12 scaled products.

In the case of 1/8 scale, there are less variety of car styles and races are less frequently held. As for 1/20 and 1/24 scale, many kinds are seen on the market and spare plastic bodies of the sizes are also available at the market for variety's sake. However, most of them are of toy quality. It is not easy to assemble and adjust full-fledged models of the small size, which are difficult to work on. 1/12 scale cars are most suitable for a modeler whose intention is to enjoy full fledged radio controlled cars and from time to time to participate in official competition. For the present, most radio controlled electric cars are scaled after real racing cars. Some off-the-road buggies in 1/12 scale have been put on the market, and the variety of electric cars seems to be widening all the time.

DIFFERENCE BETWEEN RADIO CONTROLLED MODELS AND TOYS

There are many radio controlled toys sold on the market these days. The characteristic of toy products is inferior in capability to models; for instance, they can turn only in one direction or run very slowly. Of course, some of them are close to the border line between models and toys. A conclusive factor is that the toy is always sold in the completed form, while the model is presented in a kit form with components unassembled which are left to you to finish, no matter how little the assembly may be. So the model may be finished in varying levels of performance ability according to the skill of the assembler. Also, they are able to be improved and customized with accessories available on the market. This is another phase of attraction of the model-level products.

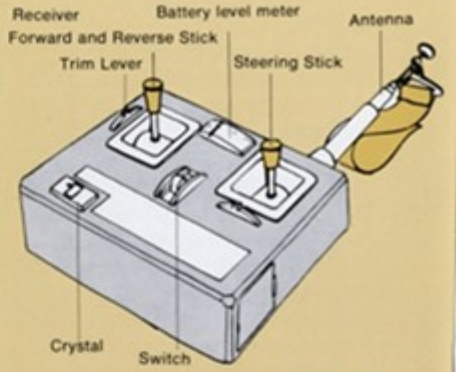
RADIO CONTROL SYSTEM

When you have bought a model, a radio control system designated for the model should be purchased separately which then is to be installed into the model, such as an airplane or car.

Most predominant radio control systems on the market today are the digital proportional type. In short, they are called a radio. For radio controlled electric cars and tanks, a two channel digital proportional system is used.

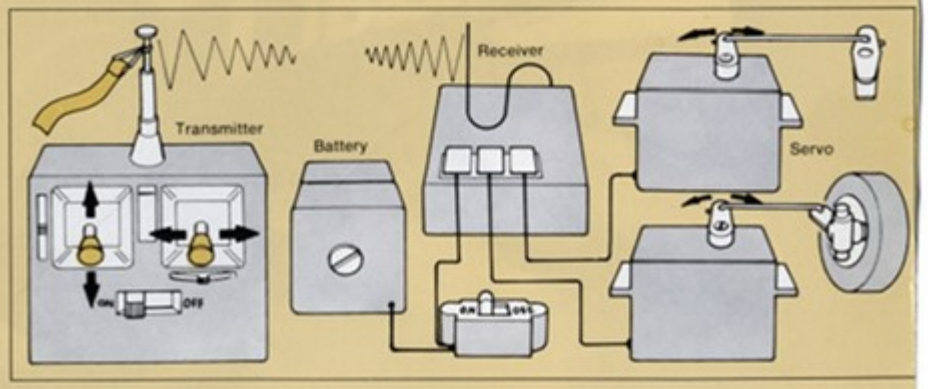
1. MAKEUP AND OPERATION OF DIGITAL PROPORTIONAL

The digital proportional radio control system consists of a transmitter which is to be operated by a modeler, and a receiver and servos which are mounted into the model, and power supplies for the units. A transmitter functions as control box, fitted with operating sticks and trim levers for fine adjustment. When the transmitter is in operation, it emits signals by means of radio waves. The signals are accepted by a receiver and sent to servos, which translate the signals into mechanical movements. A servo motor in the servo rotates in either direction at some velocity for some duration of period according to the signals given. The mechanical movements are put out from a servo horn to a model unit to be controlled. Thus, the whole model can be manipulated. The word "proportional" of "digital proportional" indicates that a model is controlled in proportion to the degree that sticks of the transmitter are moved. When you move a stick quickly, the servo motor rotates quickly and the servo horn moves quickly. When the movement of the stick is stopped halfway, the movement of the servo horn will also stop halfway. In other words, you can control a model car at will by manipulating a stick of the transmitter quickly or slowly, to full range of throw or halfway; the movement of the servo horn is hooked up to be transmitted to, for instance, front wheel of the car. This characteristic of movement has made the digital proportional radio control system the principal type in use today.



2. THE NUMBER OF CHANNELS —THE NUMBER OF CONTROL OPERATIONS

The number of channels of the radio control system indicates the number of

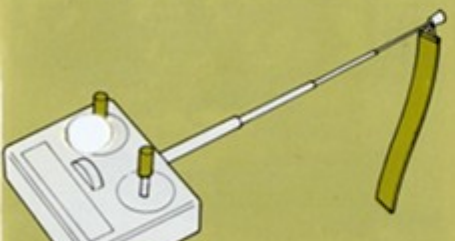


operations to be controlled at a time. A four channel digital proportional system will employ four servos to control four different types of action. The radio controlled electric car is basically designed to be controlled in two ways, speed control and steering control; therefore, a two channel radio control system is to be employed. In the present market, radio control sytems are available with up to eight channels. The two channel type, though the most fundamental, is enough to control cars, tanks, boats, and gliders, except gas powered model airplane (which usually require over three channels).

Gas powered airplane requires 3 or more channel Radio Control system.

3. ABOUT RADIO FREQUENCIES-STATUTORY BANDS FOR RADIO CONTROL

Radio waves are used very widely in the society and are very important for medical emergency, police and military, let alone radio and TV broadcastings. If these radio waves should be interfered with, obvious problems could develop. Therefore, specific frequency radio waves for different purposes are regulated to be handled by qualified personnel for the purpose of avoiding disorder. Thus a number of frequency ranges are designated for model radio control, and any other frequency ranges than the allocated ones should not be used under any circumstances.



4. FREQUENCY BANDS

This phrase "frequency band" is used to denote the frequencies of radio waves. A receiver of the radio control system will accept signals emitted even from another transmitter, if the frequency used happens to be the same the servos will also be put in motion. In other words, radio control systems on the same frequency will respond to each other, thus causing them to go out of control. However, a number of radio control systems all using different frequency bands can control many models. Hence, it is recommended to employ radio control systems with dispersed frequencies to avoid interfering with each other when organizing a new racing event.

5. SAFETY, REGULATIONS AND OPERATIONAL BEHAVIOUR

Some radio controlled models of airplanes, racing cars and boats powered by gas engines can achieve speeds of over 100 km/h. It can cause serious trouble if they should lose control in the midst of operation; it might involve personal injury. Even electric radio controlled cars can attain speeds of 30 km/h. Be sure to abide by the rules stated below and be careful not to endanger or annoy others:

- Do not use the streets for running model cars.
- Do not operate near children or in crowds.
- Avoid radio interference.
- Inspect your transmitter, receiver and models prior to operation.

RADIO INTERFERENCE IS DANGEROUS

Signal waves of radio control systems sometimes reach about 2 kilometers in the air and over 300 to 500 meters on the ground. When there is another person operating a radio control unit, compare the frequency of your radio control unit with his. Avoid the possibility of interference; operating radio control units of the same frequency will inevitably result in interference and get your model out of control. In such a case use an alternate frequency if possible.

All models will be interfered with so long as frequency bands are the same.

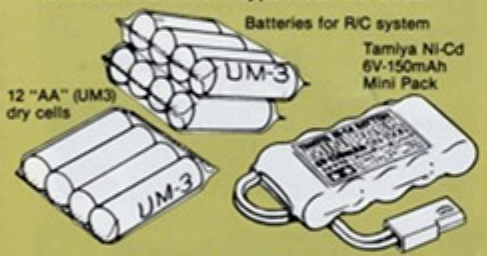
- In radio controlled models, the fixed frequencies are used commonly among cars, airplanes, boats, and any other kind of model. So radio interference will occur so long as the same frequency is used regardless of the difference of types of models. Radio signals from other types of radio control units will interfere with your radio control model.

CHECK UP ON INTERFERENCE

A device called a "monitor" can be used for detecting radio interference. There is another simple way: get your transmitter away from the model at some distance, and watch response of your servos. If the servos move strangely, interference can possibly be recognized. While operating your models, if you recognize any sign of interference, stop running and check the cause.

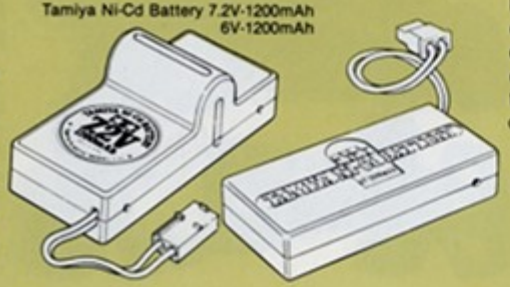
6. POWER SOURCE

Two different batteries are necessary for the radio controlled electric car: one is for operating the radio control system and the other is for driving the car motor. For the radio control unit, about 12 "AA" (UM3) size dry batteries are used in most cases and for powering the motor generally batteries of 3 different types can be used.



HOW TO SELECT AN ELECTRIC SOURCE FOR POWERING CARS

Either dry batteries or nickel-cadmium batteries can be used for the power source of radio controlled electric cars. There are two types of nickel-cadmium batteries: one is a package type and the other is an individual type which has the same shape as dry batteries. Dry batteries are cheaper in cost, but not economical since they are thrown away after complete discharge. Also in performance, dry batteries cannot power the car as fast as nickel cadmium batteries do. It is recommended to use nickel cadmium batteries for operating a full fledged radio control model for greater running time.



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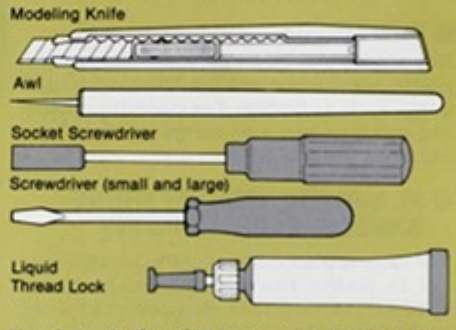
THE BEST POWER SOURCE IS A NICKEL CADMIUM BATTERY PACK

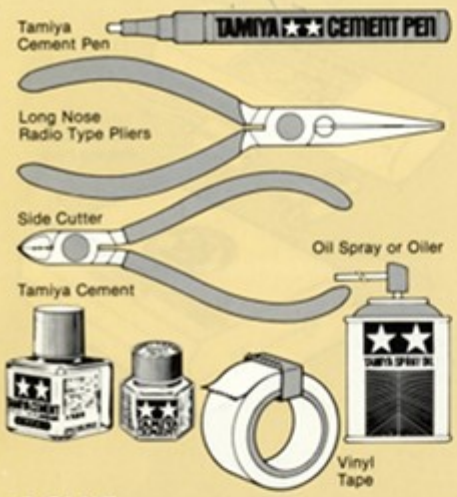
Nickel cadmium batteries have excellent discharge characteristics. They can discharge a great flow of electricity at a time. This is the reason why nickel cadmium batteries can drive a model car several times faster than dry batteries can. They call for a lot of money when you purchase it at the beginning. They will come to be economical in the long run, since they can be recharged about 300 times. Because 1/12 radio controlled electric cars are designed to be able to reduce the speed by changing the gear ratio, nickel cadmium batteries can be used for both races with high speed gear combination and for practice running with the low speed gear combination. They are not only economical, but also handy batteries.

NECESSARY TOOLS AND GLUE

Not many tools are required so long as you assemble a kit as is. The necessary tools are illustrated below. Tools especially in need are included in the kit, or at least an explanation about tools is given.



Handy tools if available are side cutting pliers (radio type and ordinary types), screwdrivers (big and small), diagonal cutting pliers, files, vinyl tape, awls, oiler, glues, cutter, liquid threadlock, box drivers for 3 mm or 4 mm nuts.



● GLUE

As for glues, the following three kinds are adequate for assembly: plastic glue, instant glue, and synthetic rubber cement. Some model kits include a tube of glue; on top of that liquid plastic cement at hand is quite useful. Instant glue is used, for example, to fix a semi-pneumatic tire on the wheels, and synthetic rubber cement for a sponge tire to the wheel.

* Be careful when using instant glue, since it has strong adhesion, requiring only a moment to dry. So it is dangerous to have it in the eye or on the skin.

● LIQUID THREADLOCK

Synthetic rubber cement can be used for locking bolts and nuts but "liquid threadlock" works well for keeping bolts and nuts from getting loose.

● OILER

It is a must to oil the gearbox, shaft, and bearing. When oil is insufficient, it causes lowering of performance, and more serious trouble such as seizure of shafts. Spray type oilers are also available on the market today which are very handy for upkeep of radio controlled model cars.

● FINISHING

Any plastic paint can be used. Spray type paints are convenient for finishing larger areas such as bodies. For painting details like doll face features, paints for brush application are available.

● PLA-PLATE, POLYSTYRENE SHEETS, PLASTIC PUTTY

Pla-plate is plastic sheet of the same material as plastic kits. It can be expediently used for creating your own designed wing to the car and for reinforcing bodies and so forth. Putty is handy for mending scratches and small cracks which are often found after remodelling kits. Several kinds of plastic putty are sold at the market.

ADVICE ON SELECTING KITS

The production of plastic model kits is concentrated on the 1/12 scale line by the manufacturers, consequently the products of this size are most abundant in variety. When you buy kits, not only kits of 1/12 but also any size, it is recommended to choose a good store. A good store is one which gives you kind servicing, one which carries an ample stock of parts, one which can be a good advisor in building and radio controlling techniques, one which may organize racing and practice gatherings. Generally speaking, a good store means a very reliable retail store which helps you enjoy radio control. Advice from experienced modelers is very helpful, too. It is a sound way of purchasing kits after asking anything you like to know, and studying contents and performance of the kits by yourself until you can be convinced of a sound purchase.

ASSEMBLY KITS AND COMPLETED MODELS

There are assembly kits on the market which you build up parts into a model by yourself and you buy a radio control unit separately and install it into the model, while completed or semi-completed models are available on the market, too. These

completed or semi-completed models may be more economical, since in most cases they are equipped with a radio control unit from the beginning. At the same time they have such limitations as difficulty of disassembling, repairing, or transferring the

radio control units into another model. So assembly kits can be recommended for enjoying radio controlling in a real sense. It is not a hard task to assemble kits, either.

READINESS OF PARTS AND COMPONENTS

Select model, the parts of which are easy to obtain. Tires and gears can wear out; even a speed control switch is an expendable component in a sense. Bodies and chassis may have to be replaced after some collisions. In such a case, your models can be mended easily and economically if the repair and replacing parts are available. For the Tamiya models, such components as a ball bearing gearbox and a more powerful motor are available for improving model performance according to a modeler's controlling skill. Spare parts and components for tuning up are essential to make fun out of radio control to a further extent, so choose a model whose parts and accessories are easy to buy at model stores.

HOW TO SELECT A RADIO CONTROL SYSTEM

The price range of radio control systems on the market is very wide. Any two or more channel proportional type can be used. However, radio control systems sold with small servos may be of low performance for gas powered models. It is recommended to get a radio control system with surplus capability for a modeler who has an intention of handling gas engine models. In any event a thorough checkup and consultation with hobby shops are strongly recommended when you choose one. A two channel proportional unit can control most kinds of models like gas powered cars and boats, sailboats and gliders, except most gas engine powered model airplanes.

HOW TO CHOOSE BODIES

There are two kinds of model car bodies: clear bodies and hard bodies. The clear bodies are made of polyvinyl chloride or polycarbonate, featuring lightness. However, being vacuum-formed from rather simple molds, they are inferior to hard bodies in finish of lifelikeness and detailings, while hard bodies (plastic bodies) offer much more precision scale as they are manufactured by means of injection forming from exquisitely made molds.

POINTS IN PURCHASING

The assembly kit consists of numerous parts and accessories. So it is recommended to check up on the contents of a kit with a store attendant at the purchasing point. Also read through the assembly pamphlet to see how difficult or easy it is and ask questions, if any. Also you might as well inquire about the technical guidance and servicing by the store.


FORD C100 & CELICA LB TURBO

WILLIAMS FW-07 & J.P.S. LOTUS 79


WEST GERMAN LEOPARD A4

TOYOTA 4x4 PICKUP

VERSATILITY OF TAMIYA PRODUCTS

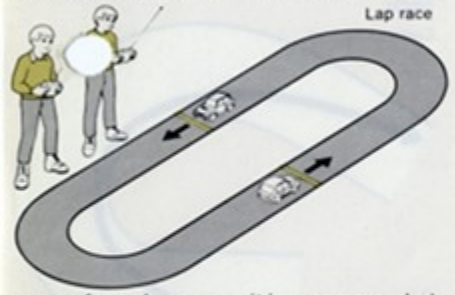
HOW BEST TO ENJOY RADIO CONTROLLED CARS

Speed race, gymkhana, drag race, and rally are the ways you can enjoy radio controlled cars. They are roughly classified into two groups by nature of races. In speed races and drag races, a number of cars start at a time to beat each other in time elapsed; and in gymkhana and rally, cars start one by one to compete against time. The Tamiya radio controlled electric cars will produce various speeds according to the kind of batteries employed. With that feature you can

do a number of different racing events, depending upon the size of area, large or small.

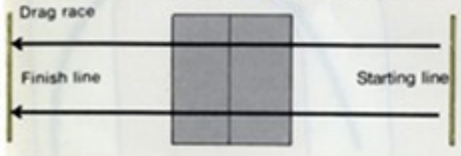
IN LARGE SPACES

If a large open space is available, enjoy speed racing (heat racing). The road course (winding course like a circuit) and simple oval course are typical for use. In this kind of competition, the first to complete a certain number of laps is the winner. On the oval course, the lap race is also run, in which two cars start at the same time from opposite positions on the course, the one which catches up with the other being the winner. If it is difficult to make a road



course for only one car, it is recommended to enjoy high-speed gymkhana. Set a course with obstacles of empty bottles or anything like that. The winner is determined by the time required to complete the course.

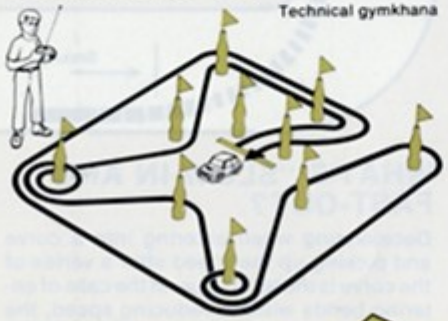
IN LONG NARROW SPACES



If the space is long but narrow, you can enjoy drag racing or slalom racing. In the drag race, the object is to cover a long straight way distance as quickly as possible. Since this is a simple race, maintenance of your car to attain high performance is of great importance. It may be fun to make a slope on the course which requires proper choice of gear ratio. The slalom race is an interesting variation of the drag race. Here cars start one by one and race against time through a number of pairs of empty bottles placed in various positions on the course so that they must take a serpentine zigzag path. Tamiya's radio controlled car will need a course only about one meter wide.

IN SMALL SPACES

You can enjoy Tamiya's radio controlled car even in a space only about 2 meters



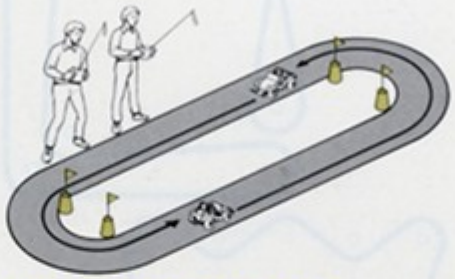
square. If the space is limited, it is recommended to race technical gymkhana. Make a course with many curves which need good control technique. The winner is determined by the lowest time required to run the course. Garaging gymkhana, backing gymkhana, etc., may be a lot of fun, too.

RALLYING

In rally, the car which runs the course in the closest time to a certain fixed time is the winner. The same timing method as the rally can be employed to determine winners of other games. It is recommended to fix a target time after a few timings of trial runs along the course. Various rules can be established; for example, the penalty system is adopted for a time required over the target time, or in both cases of over or short of the target time. By changing a duration of a target time or conditions of a course, the game may be made more enjoyable.

HOW TO USE RADIO CONTROLLED BUGGIES

An off-the-road buggy race has a quite exciting fascination, a different pleasure than racing cars. Compete over a dirt course and cross country race to enjoy exciting driving.

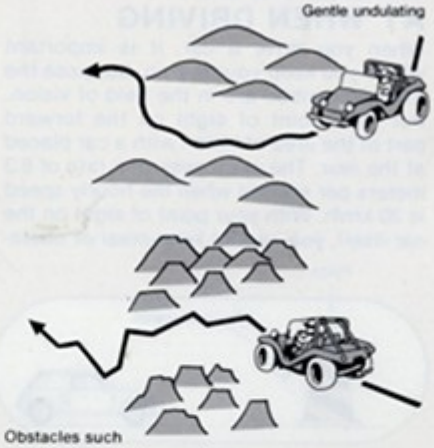


DIRT SPEED RACES

Dirt speed races can be done in flat and vast areas such as a playground or a park. The course can be made in a simple oval course or a more complicated track with hairpin curves and figure "S" curves. You have to be careful since the surface of a dirt course is slippery. Advanced techniques of control are called for, but it is fun.

OBSTACLE RACES

In a place which does not have a very large open space, make an obstacle course. Utilize dents and humps on the ground. Along a curving course with ups and downs, a car will run in an unexpected direction and it is fun to drive cars on it. You can make it more interesting by spreading sand and pebbles.



DIRT GYMKHANA

In a small place or when there is only one car, make a gymkhana course with empty bottles and drive a car through the pylons. By changing the arrangement of the bottles, a backward course may be made. Compete for time one-on-one.

HILL CLIMB

It is a slope ascending race. Any one which arrives at the top of a mound or a slope is the winner. Or you can contend for ranking by how far you can reach on the up-slope in a fixed time. A decisive factor can be the selection of a high gear or low gear combination, and to take a straight way or a zigzag path.

SPECTACULAR JUMPS

Thrilling jumps are another way of putting on a show with a buggy. Have take-off planks in your course. However, do not make it too high. Build a fairly long straight way before the plank to provide an approach run.

Do not run the model car in the following places:

In a pebby area or with a very bumpy surface, since the suspension system of the car may be damaged; or in a grass covered field, because grass blades may be caught in the car; also, not in a crowd of people or nearby children.

HOW TO ENJOY R/C TANKS

Tamiya model tanks are powerful enough to force their way over rough terrain and to climb obstacles. They will offer you the widest diversity of enjoyment. You are challenged to create various ways of racing with the Tamiya radio controlled tanks which can be made to move right and left, do gradual and pivot turns and, of course, go forwards and backwards.

ON LEVEL PLACES

The simplest slalom games can be enjoyed. Use empty bottles for pylons and run your tanks in the same way as your radio controlled cars. The first to complete the course is the winner. If a bottle is knocked down, one point is deducted from your marks. You can make the racing more interesting by adding slopes to the course.

IN ROUGH PLACES

It will be more fun for you to race powerful tanks on a rugged surface. Obstacles, such as boulders, steep slopes and trenches, can be made a part of the course. A rule could be made to lose marks when a vehicle goes off course or runs backwards. When a tank stalls on the course during a race, the driver is disqualified. The winner is determined by measuring the time taken to complete the course.

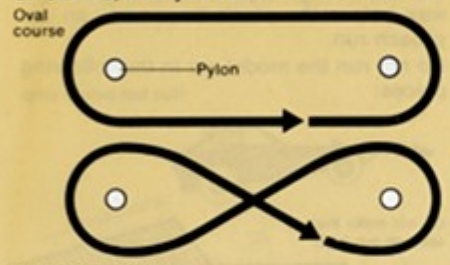
DRIVING TECHNIQUE

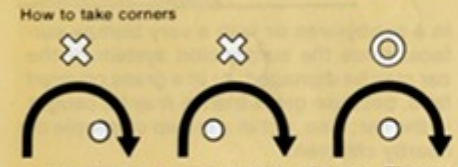
HOW TO IMPROVE DRIVING TECHNIQUES

You cannot make yourself a skilled driver just by running a car at will. Make a course using things like empty cans as pylons.

BASIC TRAINING OVAL COURSE 1

This is the simplest course using two cars. It looks simple at first sight to drive a car along, but it will require some practice to achieve sharp and rigid turns made with the pylons as vertexes of the curves. Practice both ways, clockwise and counterclockwise, until you can make both rounds

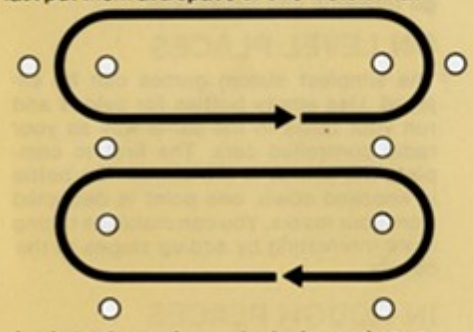




in about the same period of time. Figure "8" drill can also be done in the same track.

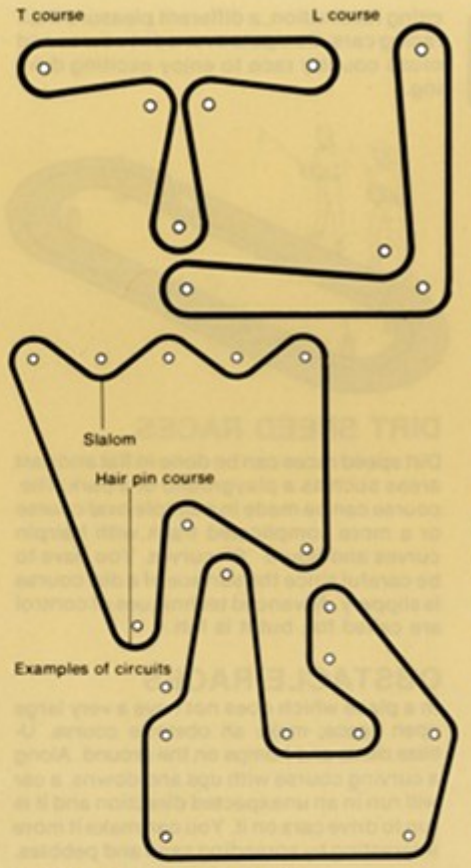
OVAL COURSE 2

Have two or three pairs of pylons forming gates and run your car through them as accurately as possible. You will find it much harder than the oval course No. 1. For the first period of time, arrange the pylons at a wide space, narrow them gradually, then at last put them at a space of one meter. Practice in both rotations, clockwise and counterclockwise.



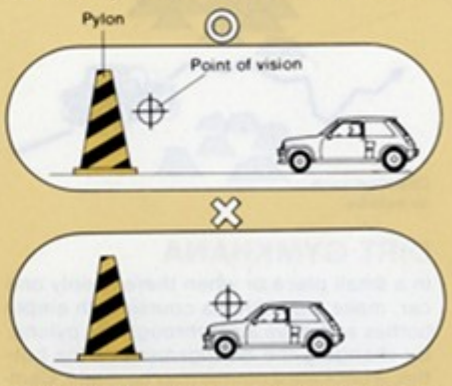
ROAD COURSE

When finishing course No. 1 and No. 2 you have mastered the basic driving techniques. Now you should proceed to complex courses. Build a road course with the pylons, from basic figure "T" and "L" courses to more complicated circuits, assortment of figure "L" and hairpin curves, high speed course and slaloms.



WHERE TO LOOK AT WHEN DRIVING

When you drive a car, it is important where you keep your eye on. Suppose the ovals described are in the field of vision. Put your point of sight on the forward part of the area of vision with a car placed at the rear. The car moves at a rate of 8.3 meters per second when the hourly speed is 30 km/h. With your point of sight on the car itself, you cannot keep clear of obstacles ahead, because it is too late to notice them; nor can you take corners easily.

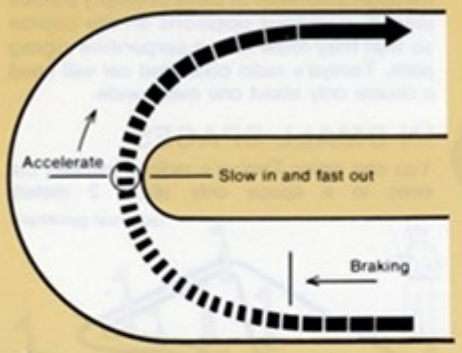


CORNERING TECHNIQUES

No particular skill is required for driving a car just straight, and the drag speed is limited by the car's own inherent performance capability. However, at curves, your finesse of taking corners affects the result even among cars of the same performance. Especially in speed races, the cornering technique is one of the decisive factors. After becoming accustomed to the car, try to practice smooth, speedy and stable cornerings.

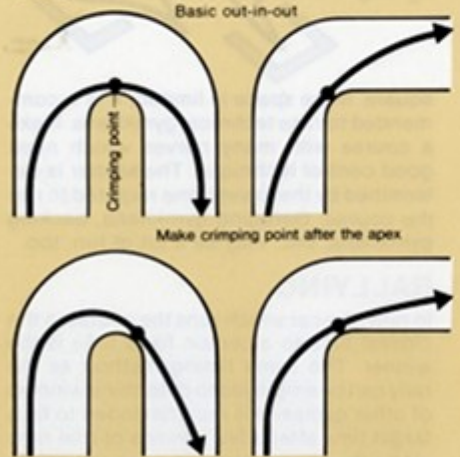
THE BASIC PRINCIPLES OF SLOW-IN AND FAST-OUT

"Slow-In and Fast-Out" is a golden rule in speed controlling at curves. And "Out-In-Out" instructs how to steer a car. Briefly, you should control speed in "Slow-In and Fast-Out" manner and steer a car in "Out-In-Out" way.



WHAT'S "SLOW-IN AND FAST-OUT?

Decelerating when entering into a curve and picking up the speed after a vertex of the curve is the technique. In the case of entering bends without reducing speed, the car is forced to slow down before finishing corners to lose speed and stability. In the worst cases, the car might spin or run off the course. It also gets the car moving too late to pick up speed. As a result "Slow-In and Fast-Out" is the fastest way to take corners.



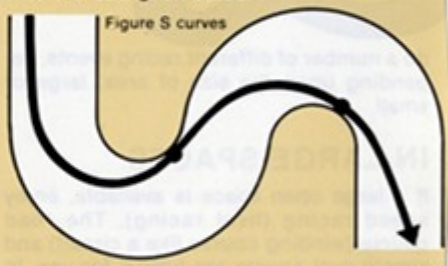
WHAT'S "OUT-IN-OUT"

It is, as illustrated above, a way of turning curves from the outside line of a course into the inside line to which the car will come closest at the vertexes (crimping points) and finishing the cornering approaching back to the outside line, thus making the longest possible turning radius. By utilizing the full width of the course, the car will make an easier turn than the actual curve. So the car may be allowed to run through it faster. As a matter of fact, however, it seems more advantageous to set the crimping point a little after the vertex, because it allows easier latter half cornering and enables the car more powerful acceleration into the straight course, in spite of sharper first half cornering.

Both "Slow-In and Fast-Out" and "Out-In-Out" techniques are established from attaching more importance to velocity in the latter half of cornering than the first half. This has something to do with the acceleration of a car; that is, a car increasing speed faster than other cars at the latter half can take the lead in the successive straight track, provided the cars should have the same pickup and maximum speed capability. This principle is true anywhere except in a very wide road where you are not required to reduce the speed at all.

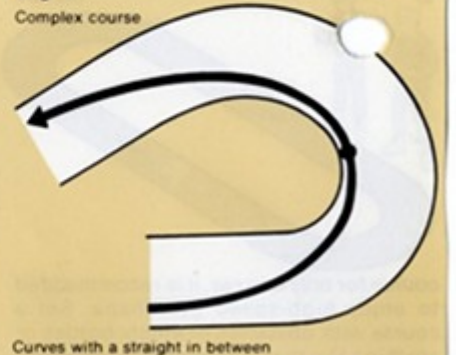
THE LAST CURVE IS THE MOST IMPORTANT IN A CHICANE

The last curve is the most important in continuous curves. In successive be[illegible]f a road, steer your car so that it will m[illegible]e the easiest turn at the last curve. Then you will be able to speed it up as soon as getting into the straight course.



CONSIDER COMPLEX CURVES AS ONE

Consider complex curves as one integrated compound. In the case of complex curves with different radii, you can manage to get through by considering them as one complex curve and making a cornering passage.



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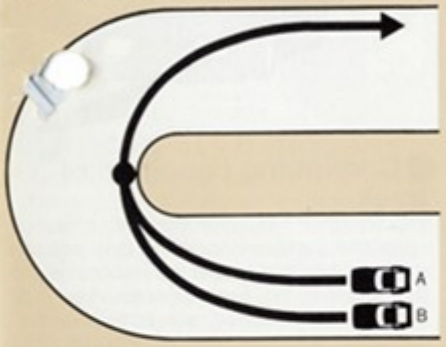
CURVES WITH A STRAIGHT COURSE IN BETWEEN

Even in the case of recurrent curves with straight tracks intervening, you could achieve a smooth cornering by counting them as one integrated curve.

DURING A PRACTICAL RACE, TAKE THE CLOSEST POSITION TO THE INSIDE LINE

Get to the inside lane while still on the straightway prior to the curve. The cornering technique explained is the ideal way when a car is running alone. In actual races, however, when several cars of almost the same capability are competing, naturally other racing techniques have



been developed and are used. The most important point is to get the closest position to the inside line of the course ahead of the other competing cars. Here, as illustrated, the passage of car B is sharper than A's and car B will be forced to slow down, but with the advantage of a smaller radius, may be able to get ahead of car A by risking a spinout or being hit from behind by car A. It may block the other oncoming cars. Slower cars should yield the right of way to the faster cars.

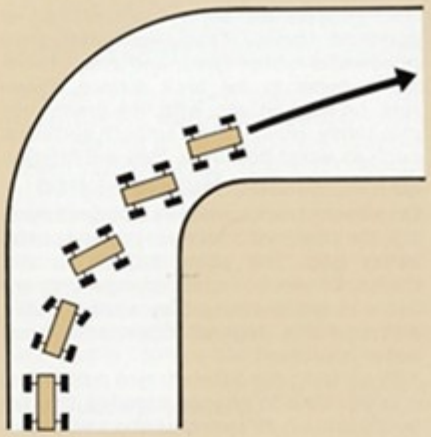
OTHER CORNERING TECHNIQUES

As for other cornering techniques, there exists four wheel drifting and tail sliding like real racing cars do. Four wheel drifting is a technique steering a little excessively at the early stage of a curve and letting all the wheels slide outside with the nose heading for the inside line of the course. In this way the car can get through the curve most quickly; however, it is difficult to practice. The tail sliding technique is to make the rear wheels skid while countersteering. This technique is not as stable as compared with the four wheel drifting, and it may not be fast enough to get through the curve, although it looks spectacular.

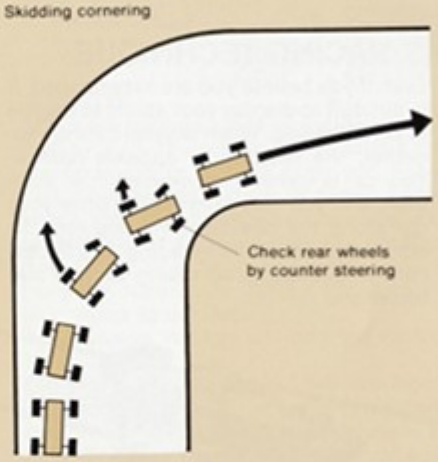
OPPOSITE LOCK STEERING

The word indicates to steer the wheel against the curve of the turn. If a car should go too fast on a curve, the rear wheels might start to skid, to counter the spin steer into the direction of the skid.

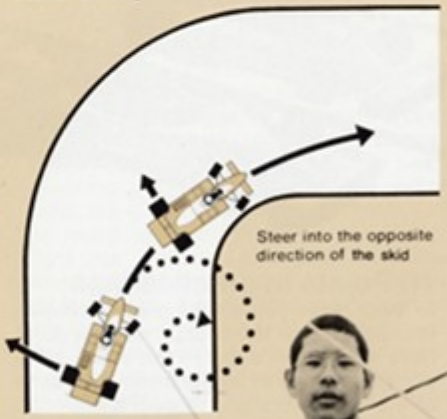
Four wheels drift cornering

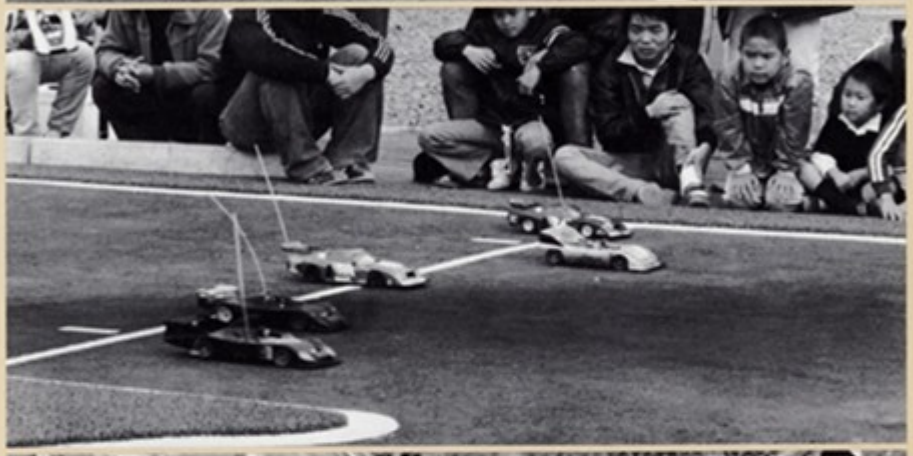


Skidding cornering



Counter Steering





WINNING RACES

After mastering the basic driving technique, apply it to practice. If you have been practising in the same place, it is recommended that you change the location from time to time. Also, on certain types of surface you will find it very difficult to control the car because it is liable to spin or run off the course. It is also advisable to run your car with others. Then, the track will appear narrower than usual and you no longer have such freedom of movement. Don't hesitate to take part in racing. Accumulated racing experience is very helpful in racing.

1. DRIVING ACCORDING TO RACE TRACK CONDITIONS

There are various track surfaces; asphalt, concrete, wooden boarding, vinyl tiling, etc., and they all have different characteristics. Practice repeatedly so that you can control the car on any kind of surface. Generally speaking, asphalt or concrete tracks are not slippery because they are rough and have a high coefficient of friction. Wood, vinyl-tiled or cement surfaces are smooth and slippery. Note that even asphalt race tracks are slippery when they are wet or covered with fine sand or dust. It is possible to gauge the track condition by eye, but it is very important to confirm the difference of the surface from your usual practice ground by making a trial run.

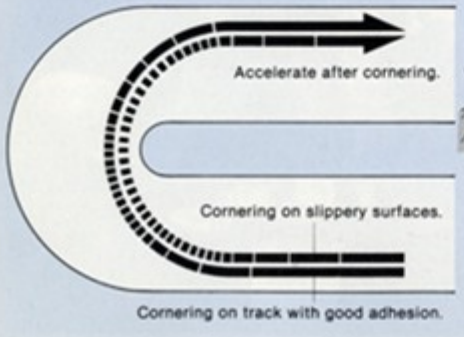
● Quick acceleration, quick braking and quick steering are taboo on slippery surfaces.

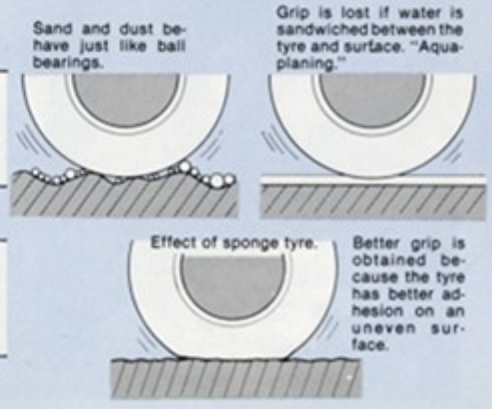
On slippery race tracks, the grip of tyres is very small and the stability of the car is disturbed very easily. Quick acceleration is taboo even at the start, because the rear wheels (driving wheels), whose tyres have little grip, are liable to spin and the car may slide even when it is turned only slightly. Be even more careful in deceleration. If the car is quickly decelerated, the load of the car will move forward by inertia, (in other words, the centre of gravity will move forward), and the load on the front wheels will increase while that on the rear wheels will decrease. Therefore, the grip of the rear wheels will become much less and they will skid very easily. Deceleration must be made as slowly as possible. Never brake the car quickly when it is running at top speed.

Reduce speed sufficiently before cornering. In cornering, the car is subjected to centrifugal force which pulls it outwards. It is because the centrifugal force is greater than the grip of the tyres that the car is liable to spin or run out of road on slippery surfaces. The centrifugal force increases in proportion to the speed. Therefore, it is necessary to decrease the centrifugal force by reducing the speed and making the turning radius as large as possible. Needless to say, quick acceleration and quick braking are taboo in cornering. Reduce the speed sufficiently before entering the corner, and increase the speed after completing the turn. It is a cardinal rule that the cornering line should be "out-in-out" so as to make the turning radius as large as possible.

2. CHOOSING TYRES ACCORDING TO TRACK CONDITIONS

The tyres have a great influence on the performance of the car. Even when the surface is slippery, it is possible to reduce the chance of skidding by using suitable tyres. Many people use sponge or pneumatic rubber tyres. Use either of them according to the surface.





● Sponge Tyres

Sponge tyres are suitable for asphalt or concrete tracks. They are softer than pneumatic rubber tyres, and adapt themselves better to the track surface. Therefore, on asphalt, etc, with fine grain, they grip firmly. However, on smooth surfaces, such as wood boarding, they are inferior.

● Pneumatic Rubber Tyres

On smooth tracks, such as wooden boarding, the pneumatic rubber tyres may offer better grip. The same applies to wet tracks. On wet surfaces, sponge tyres are liable to slip because they absorb water, although this depends upon how much water is present.

• By utilizing the different tyre properties, it is possible to change steering characteristics such as over-steering and understeering.

3. RACING TECHNIQUE

Even if you believe you are experienced, it is difficult to display your ability to the full in actual racing. When several cars are together, the racecourse appears narrow. Your car is sometimes involved in an accident, and you may often fail to drive your car along the desired cornering line. To achieve good results in racing, it is necessary to acquire good racing tactics and technique.

(1) Points in practice laps

In most races you will be given a chance to practice over the course, but you don't have to run the car very fast. What is important is to make adjustments by means of the trim levers and to gain knowledge of the track.

● Adjustment with trim levers

Practice is the last chance to make any necessary adjustment by running the car. Make sure the car runs straight and the speed control switch can be turned to maximum speed. If necessary, make fine adjustment by means of trim levers. If the switch contains a brake circuit, make sure that the brake works well. In adjusting the straight running of the car, it is recommended to run it directly away from you.

● Knowledge of the race track

Course errors in racing must be avoided. It is important to do practice running along the course at least once. Particularly if you are on this track for the first time, it is necessary to run the car positively along the course in advance without hindering the progress of races, as well as to attend the drivers' meeting. It is advisable, if possible, to walk along the course in order to remember its intricacies and to note its condition.

● Confirming condition of track

The weather has an important influence upon the surface condition. It is not too much to say that tracks vary according to the weather on the previous day. You should confirm the track condition and decide in advance how to negotiate the main corners. Consider changing the tyres, if you have time, according to the track conditions.

(2) Start

The result of a race sometimes depends upon the start. However, a quick start is not always advantageous. Accidents are most liable to occur between the start and the first corner because participating cars are running close to one another. Decide how you should start according to the characteristics or your car, course layout, etc.

● When a quick start is advantageous

If you have confidence in the starting ac-

celeration of your car and you believe it is able to out-distance others before the first corner, then you should choose a quick start. Also, if the distance between the start and the first corner is long, a quick start is advantageous. In this case, even if several cars have made a quick start, the distances amongst them gradually increase and, therefore, there is little possibility of collision on the first corner. A quick start is advantageous also when the distance of the race is short or when the course layout is intended mainly for speed competition.

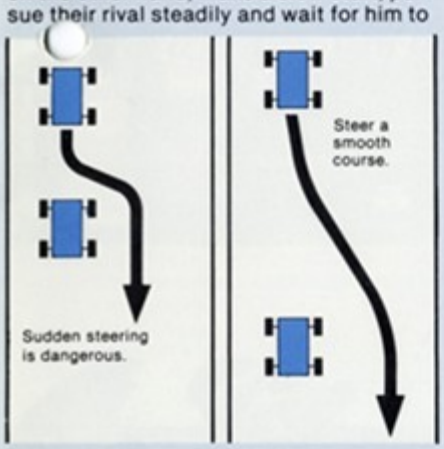
●When a slow start is not disadvantageous:

When you have tuned your car with a greater emphasis attached to its maximum speed rather than on its acceleration, it should be easy to make up for leeway on a straight even if you have made a slow start. In a long-distance race, you don't have to be very nervous about the start. Also, if the distance between the start and the first corner is short, it is advisable to make a slow start to avoid collision on the first corner.

(3) Pace Setting

●Whether to run ahead or behind a rival

Some drivers prefer to run ahead of their rival rather than behind him, whilst others prefer to be in pursuit. They have their own pace setting in races. The former drivers direct their energies particularly to the first half in order to take the lead from the beginning. Drivers of this type need to employ tactics so as not to be passed by their rival. They should avoid leaving a gap on the inside of a curve where they could be passed. Note that if a driver brings his car into contact with any other car on purpose, he may be disqualified from the race. The latter drivers, on the other hand, make a slow start, pursue their rival steadily and wait for him to



drop out of the race or try to pass him later. Drivers of this type aim at constant performance. They must be able to pass their rival whenever they get a chance. It is good advice to follow close behind your rival's car hoping to cause him to commit an error and thereby getting a chance to overtake him. Decide whether to be ahead or behind your rival, and employ suitable tactics.

●How to pass others

• Passing on the straight

There are various places in which you can try to pass another car. A straight is the safest place to do so. It is dangerous to start passing a car when you are following close behind it. When you judge it is possible to pass, steer your car a little as soon as possible and attempt to pass. You may pass on either side, wherever there is more room. If the space on each side is about the same, it is advisable to go inside the make the next corner easier to negotiate.

• Passing on a corner

Passing on a corner is dangerous as compared with passing on a straight. If the driver of the car you are going to pass is not skillful in control, your car is liable to be involved in its spinning. To make passing easier, it is advisable to go inside the rival's car and pass it after turning the corner. It is very difficult to pass it on the outside of the corner even if your car is much faster.

If your car has hit another car and lost its stability, then reduce the speed by turning off the speed control switch. If you try to restore stability by steering, the car must be further disturbed. Start acceleration again only after the car has slowed down and is stable.

(4) Pace setting for each heat

●First heat

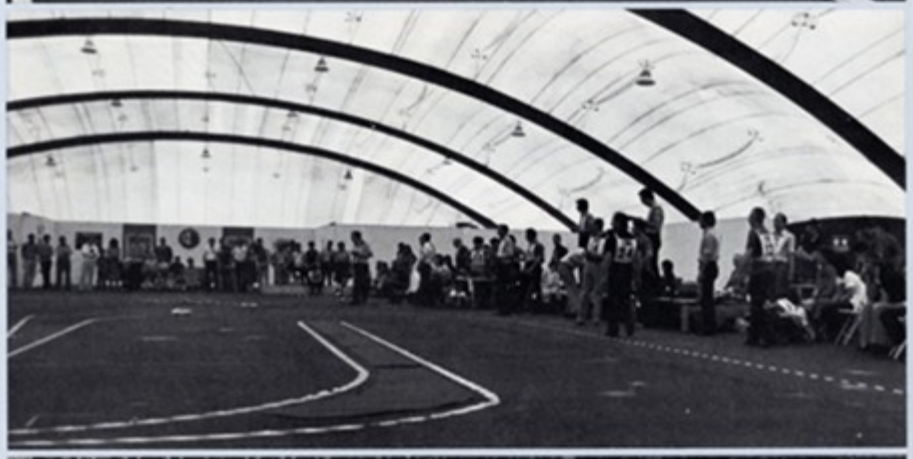
It is impossible to foresee what accidents or trouble will occur in your race. If you damage your car in the first heat by overtaxing it, perhaps you may not be able to achieve a good result in the end. Steady running is the key to success. Use the first heat to verify that your car is handling correctly and running smoothly, and just endeavour to complete the race. Never overtax the car. If it fails to finish, there is little possibility of being allowed to run in the final.

●Second heat

If you run the first heat steadily, you can try your best in the second heat. To obtain a better result than in the first heat, use all your skill and employ more aggressive cornering techniques. If you did not obtain a satisfactory result in the first heat, you may stake your all on the second heat, but you must not drive recklessly. You should refrain, as far as possible, from using tactics that might cause an accident.

●Final race

Being able to take part in the final race already means that you are a qualified driver. Show ability to the full in the final race. From the results in the first and second heats, you can guess your ranking among the finalists. If your ranking seems low, endeavour to raise it, even a little, without aiming at victory. If you seem to rank high among the finalists, you should try to win. As you are capable of winning, or at least a good place, be careful not to be involved in a stupid accident. Always do your best.



DRIVING IN RAIN

It is recommended to refrain from running your car in rain because the radio control mechanism is liable to be affected by water. However, races may be held in drizzle. It is necessary to have some basic knowledge of driving in the rain.

1. DRIVING TECHNIQUE IN RAIN

Any wet race track is very slippery, so cars may spin even when they accelerate at the start. Read the description of driving on slippery surfaces on page 8 and drive your car accordingly. Quick acceleration, quick deceleration and sudden steering are taboo. In cornering, keep the steering angle of the front wheels as little as possible so that the turning radius is large. When there are puddles on the racecourse, avoid them even if your car has to make a detour. If you attempt to drive through deep water, the radio control gear may get wet and your car will be slowed by the resistance of water. Furthermore, your car may skid out of control.

2. WATERPROOFING

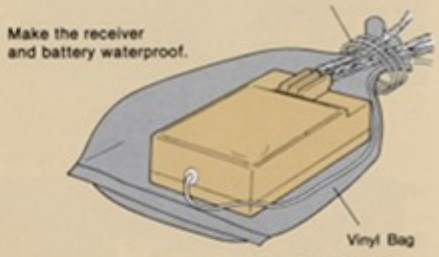
The radio control mechanism, particularly the receiver and servos, contains precision electric circuits carrying weak electric currents for control. If water enters the mechanism, it may cause a short circuit which often causes damage to an electric circuit and makes it impossible to control the car. If a wet electric circuit is kept electrified, its fine wiring begins to corrode gradually by chemical reaction and may be broken even by a slight shock some time later. Such a circuit may become unrepairable. Therefore, the radio control mechanism must be made waterproof. If the weather forecast says it will rain on the day of racing, it is necessary to make the radio control mechanism waterproof in advance.

● Waterproofing of car body

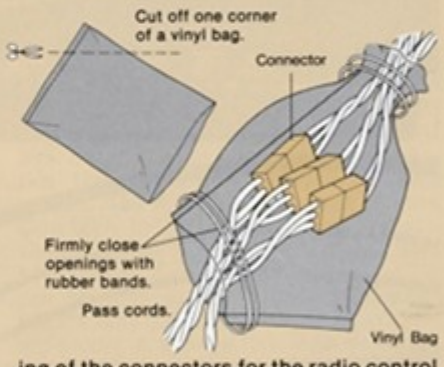
It is rare for the radio control mechanism to get wet directly by raindrops because it is contained in the car body. Pay attention to water splashed by the front and rear wheels and water entering the car body through the chassis. Openings in the chassis, such as holes bored to reduce weight, should be stopped up with vinyl tape or similar. Another means for preventing spray from entering the car body is to fix screens of toughened polystyrene sheet or aluminium plate to the chassis parts just in front of, behind, and inside each wheel to deflect the spray.

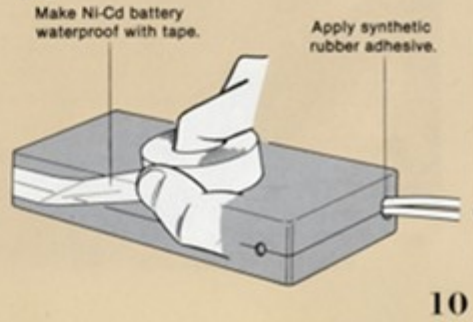
● Waterproofing of radio control mechanism, etc.

The receiver in the radio control mechanism is most likely to be affected by water. To make it waterproof, wrap it in a



vinyl bag, the mouth of which is firmly closed by means of a rubber band, as shown in the illustration. It is advisable to apply vinyl tape or similar to the joints of connectors and casing. It is difficult to put servos into vinyl bags because they have moving parts. However, at least their lead wire holes should be filled with synthetic rubber adhesive. The waterproofing of the connectors for the radio control mechanism and traction motor is also important. Put the connectors into a vinyl bag and close it by means of rubber bands. Previously, the switch for the receiver/servos often became faulty because of short circuits, etc., caused by water. Nowadays, it is almost free of such troubles. But, it is advisable to move it to a position which is less liable to become wet, and to apply synthetic rubber adhesive to its lead wire holes. Tamiya Oil Spray will help to waterproof the speed control switch, electric motor, etc. Also, the battery is liable to be affected by water and should also be put into a vinyl bag.





3. MAINTENANCE AFTER RUNNING

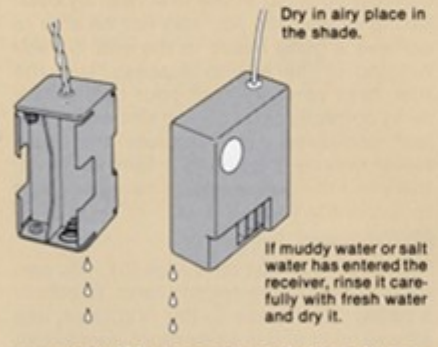
On a rainy day, the car gets very wet and dirty, and it is almost impossible to prevent water from entering the car. If it is left as it is, the chassis, etc., may rust and the radio control mechanism may develop unexpected trouble. After using the car in rain, be sure to carry out maintenance as soon as possible.

● Maintenance of car body and chassis

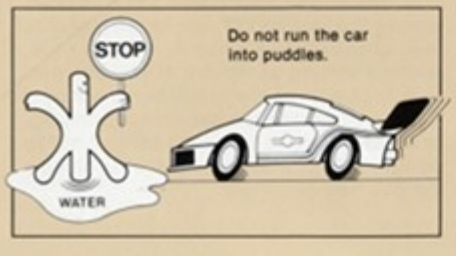
Wipe water off carefully with a soft cloth. The chassis, in particular, should be taken apart, the axles should be removed and thoroughly dried. Oil anew all moving parts because their oil has probably been washed away by water. Adhesive fixing of the servos, etc., may have been weakened by water. It is recommended to refix them with new adhesive. Tamiya Oil Spray gets under water and protects metal surfaces. Use it freely on moving parts.

● Maintenance of radio control mechanism, etc.

Remove all the connectors and wipe off water from the whole mechanism. Then, remove it from the car and dry it in an airy place in the shade. If the receiver is wet inside, remove the casing, wipe off water, and dry in the shade. (The receiver must be handled with care.) If the receiver is wet inside with muddy water or salt water, carefully rinse it with clean water. After it has dried completely carry out a performance test. If it does not work, have it serviced by the manufacturer or his agent. As for the electric motor and speed control switch, it is recommended to apply Oil Spray or similar after carefully wiping off all water. Also dry the battery thoroughly.



• The RC mechanism contains precision electric circuits. Do not attempt to take it apart.

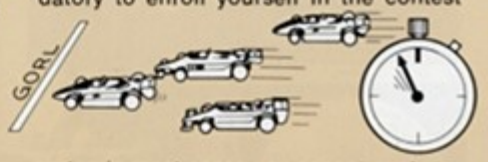


GUIDANCE TO PARTICIPATING IN RACE

Today the radio controlled electric car races are often held in many places promoted by manufacturers and hobby stores. Participate in the official competition when you get used to operating model cars to some extent. If you attain a good score, you will gain confidence. Even with poor grades, you will see better modelers operating a car which is most likely of better performance and helps you to improve your own control technique and your model. You will also find a different kind of delight other than playing with models among just your friends.

1. APPLICATION FOR PARTICIPATION

Schedule of races may be announced at the hobby stores or in the magazines. It is mandatory to enroll yourself in the contest



roster; in most cases you cannot apply to an event on the very day. You are required to give the class and kind of your car and frequency you will use, besides your name and age.

2. CONFIRMATION OF RULES AND REGULATIONS

TAMIYA GRAND PRIX

X th TAMIYA GRAND PRIX

Site : Tamiya Circuit
Officials : Steering Committee of Tamiya

X month XX day

Tamiya has adopted a system of classifying drivers who participated in the 1979 Tamiya Grand Prix. Drivers who have once participated in a R/C race promoted by Tamiya are recognized as the Senior Class except those who were nominated to the Expert Class. Certificates will be given if the application form is completed and sent to the Steering Committee of Tamiya. Please note, you will be automatically recognized as Freshman Class for the next race if we do not receive your application before the Xth X month 19XX.

When rain put it off to April 29.
Registration: AM 9:00 – 9:30

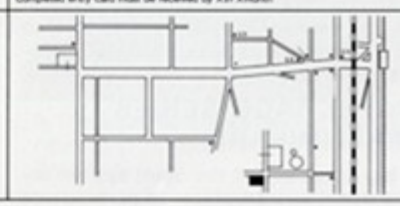
Promoted by Tamiya Plastic Model Co.

Car Type	1/12, 1/10 radio controlled electric car
Item	Speed race time system

CLASS	CAR & MOUNTED MOTOR	NO. of PEOPLE PARTICIPATING	
FRESHMAN 1	GROUP 1 : RS380 or RS380SS motor (modification is prohibited)	The first 30 applicants	Preliminary 3 circuits of the long course 2 heats
FRESHMAN 2	GROUP 2 : RS540 motor (modification is prohibited)	The first 30 applicants	Final (X) fastest from heats competed 10 circuits of the long course 1 final
SENIOR 1	GROUP 1 : RS380 or RS380SS motor (modification is prohibited)	The first 50 applicants	Preliminary 3 circuits of the long course 2 heats
SENIOR 2	GROUP 2 : RS540/3S Motor (modification is prohibited)	The first 70 applicants	Final (X) fastest from heats competed 10 circuits of the long course 1 final
EXPERT	GROUP 1 & GROUP 2	Preliminary : 3 circuits of the long course 2 heats Final (X) fastest from heats competed 10 circuits of the long course 1 final	
MASTERS CHAMPIONSHIP	GROUP 1 & GROUP 2	Preliminary : 3 circuits of the long course 2 heats Final : 10 circuits of the long course 1 final	

Battery to be used	6V 1,200mA Rechargeable Nickel Cadmium Battery only
Prizes	All classes 1st – 6th place: Prize of Concours de Elegance Team Prize : 1st – 3rd place Junior Prize (6th grade or under only): Prizes for all entrants
Entry Fee	Free – Open to all

- Entry : 1 car/1 class/1 driver
- The participants for the Expert class should be limited to the persons nominated.
- The participants for the Masters Championship should be limited to shop keepers.
- The participants for Freshman class should be limited to people who have failed to pass the preliminary heat of a Freshman Meeting Race or who have never participated in a race promoted by Tamiya before.
- The participants for Senior class should be limited to people who have participated in a race promoted by Tamiya (except Freshman Meeting) but who have not been nominated to Expert or who have passed the preliminary heat of Freshman meeting race
- Minimum weight :
  GROUP 1 : 950g (Freshman Class – 1100 g)
  GROUP 2 : 1200g

Dead Line	Completed entry card must be received by Xth X month
Guidemap	

TAMIYA GRAND PRIX

TAMIYA GRAND PRIX ENTRY CARD

Name			Age		Occupation School Grade			Team's name					
One's dwelling								Mail No.					
								Phone					
Participating race name	Freshman 1	Senior 1	Expert	Used band	1	2	3	4	5	6	A	B	
	Freshman 2	Senior 2	Masters										
Maker's name					Retail Store								

TAMIYA GRAND PRIX

REGISTRATION CARD

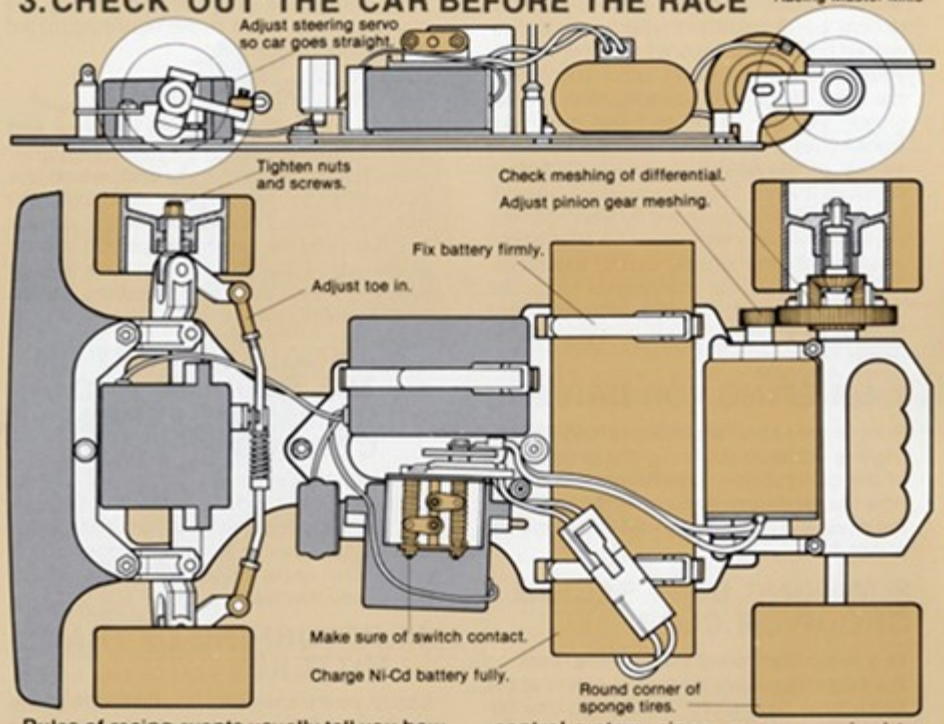
Registration Card

☎ 0542(86)5105

TAMIYA

3. CHECK OUT THE CAR BEFORE THE RACE

Drawing of Tornado Racing Master Mk.3



Rules of racing events usually tell you how the race proceeds, how to determine the winners, how to group the models, kinds of motors and batteries to use. Sometimes detailed regulations are provided to regulate the standard equipment of racing cars. Confirm these rules and regulations beforehand with your car, and remodel or modify if necessary for compliance. In official competition, car inspection will be done at the registration area on the day to see whether or not your car is qualified. Of course, a disqualified model is rejected for competition. Therefore, if there is any point you don't understand in the rules and regulations, you should check it with the host organization.

4. PREPARATION BEFORE THE RACE

Get your car ready for the race by the previous day. The most important is the radio control system, since you are required to place the transmitter in custody of the host organization. Namely, you cannot tune it up on the competition site after registration. On top of that, gear meshing, screws or bolts and nuts, shaft and tires should be carefully looked after; repair or replace with new parts, if necessary. Of course, oil all the rotating parts. If you find batteries are low on power, replace them or charge them fully if rechargeable.

5. THINGS YOU MAY NEED AT THE RACE TRACK

It is needless to say to take a registration card or membership card with you, if anything like that is required. Be sure to bring tools, glue and oil which you use every day. Sometimes you have to mend your car even in the midst of competition. Do not forget to bring fragile parts and accessories which are easy to lose such as screws and bolts. It is advisable, in regards to the length of time of the event, that spare batteries may be recommended to have for caution's sake.

6. REGISTRATION AND CAR CHECK

Leave your home for the race site with ample time for arriving early for registration. Your delay for the registration may upset the whole schedule and annoy others. Very often registration and car check are conducted at the same spot. Undergo the registration desk, you may be given a contest number, perhaps marked on a pennant. During the whole event, you may be referred to with that number when being called or receiving your transmitter; so remember this number. Car check may be done after the registration. Your car will be examined

with batteries on board. Even if your car should be disqualified, you might be admitted provided you could repair or modify your car on the spot in accordance with the rules of the organization. After the car check, you are called to hand over your transmitter to the officials. Be sure the switch of the power source is off before handing it over. The reason why transmitters should be impounded by the organization is to avoid interference by intentional or unintentional signals during the races. If a receipt for your transmitter is issued out, do not lose it; sometimes the pennant is used as a receipt to retrieve your transmitter.

7. BRIEFING FOR DRIVERS

Prior to the races, a briefing is held for letting the contestants know the procedures of the competition. Listen carefully, since how the races proceed, penalties for violating rules and other important affairs are explained.

8. MAKING UP A RACING GROUP OR CLUB

In a radio controlled model race, cars on the same frequency cannot compete at the same time. Therefore, those who use different frequencies will make up a competing group. Before the races the combinations of the groups are announced. You should confirm which race you will be in. When time is getting close to your turn, prepare yourself for the race.

9. JUST PRIOR TO YOUR RACE

Your name or number is called to inform you of your turn. Receive your transmitter according to the official's direction; switch on both your transmitter and receiver in the car. Move the sticks of the transmitter and see if the speed control switch operates properly and the front wheels turn firmly right and left.

10. PRACTICE LAP

If you have time to make a round before the race, run your car along the course. There is no need to rush it, but drive leisurely and become familiar with the course. The most important matter is to confirm that the car goes straight on the straight course. If not, adjust it with the trim lever of your transmitter.

11. RACE

Now is the time to start; countdown has begun; try not to be hasty. Be particularly careful not to make a premature start. The first curve right after the starting section is the place where collisions occur most frequently. So drive your car prudently. The point is to keep your coolness during the race. Vying with other cars and taking corners at great speed will most likely result in spinning or sliding off the course. A rule you should keep in mind is to drive your car at your own speed calmly. When you pass another car, try not to hit it from behind. Also, it is etiquette not to hinder a faster car when being passed. During the race, priority should be given to completing the course. Try to finish all the laps designated without any accident.

12. AFTER THE RACE

You have run the complete distance and the race is over. Switch off your transmitter and receiver immediately and return the transmitter to the officials. Although you may be anxious about the result, do not stand around the finish line, as you may be in the way of the officials. Get back to your seat and check your car, preparing for the next competition.

13. ANNOUNCEMENT OF THE RESULTS AND COMMENDATION CEREMONY

After all the races are complete, the results are posted and the winners are honored. The winners should be praised by applause. Whether or not the competition is successful depends upon the attitude of everybody involved.

14. RETURNING OF TRANSMITTERS

Lastly, your transmitter is returned to you in exchange for a receipt. It is a serious breach of rules to pick up your transmitter from custody during the contest without permission. If you have to leave the site before the races are over, you must explain it to the official and get your transmitter returned by him. In such a case, you must keep the transmitter switched off until you are sufficiently away from the race site.

TYPES OF RACES

- TIME RACE
- POINT SYSTEM RACE
- LAP RACE

These three are typical types of races. In the time race, the winners are determined by the time required. In the point system race, points are given according to the ranking of each heat, and the total points make the final record. In the lap race, the number laps a car can make in a certain time decides the winners. Of these, the time race is most common. Sometimes a preliminary game is done by a time race, and the outcome is determined by the order of arrival to the finish line.

MANNERS IN RACE

Spirit of fair play is essential in any game. It is desirable to make a pleasant race event through the fair play spirit of all the participants.

- Transmitters are kept by the host organization without exception.
- Transmitters in custody will not be taken out unless passed by the officials.
- Yield the way when you are about to be a faster car.
- When you hit another car, you should apologize. But do not ask for one after being hit. Responsibility should not be claimed by anyone for any collisions during a race.
- After all the races are over, clean the site. No rubbish should be left behind.

GUIDANCE FOR ORGANIZING A COMPETITION

LET'S ORGANIZE A RACING EVENT

It is a thrill to participate in a race; however, it is a more significant experience to organize a contest. A competition requires many people: timekeepers, course committee members, etc. In small races, such as those organized by hobby stores, players, often serve concurrently as officials. It will be appreciated if you can offer a hand as an official. It is not only welcomed by an organization, but it is also rewarding to yourself. The experience of taking part in a race meet as an official will surely help you with organizing another event. Moreover, it will be of much benefit to you when you participate in a contest as racer.

1. TYPES OF RACES

There are many types of races: series, single ones, and others. It is a common purpose to compete with fellow racers and to develop skills. The more races you participate in, the better results you can expect. Many races are organized in a series to compete throughout the year in order to single out a champion.

● POINT SYSTEM SERIES

Points are given to contestants in porportion to records achieved at each individual race. The winner, 2nd, 3rd places and so forth are determined respectively by the total points accumulated in the series.

● REPECHAGE SERIES (PRELIMINARY)

The big drawback of the point system series is that it is unfavorable to participants who join late. The repechage series has been organized for eliminating this drawback. For example, minor races are held every month to choose a champion of the month. The annual event is conducted to determine a champion of the year. Anyone who has become a champion of the month is eliminated from the following monthly events. In this way, a new champion (competent person to the annual final race) is chosen every month, and contestants from the middle will not be put at a disadvantage. At the same time, this system will give an opportunity to low scores to win a monthly race. Of course, the minor races can be held every week instead of every month and the grand championship can be held semi-annually. Though two types of series have just been introduced, the vital point of making a race successful lies in a consideration to disperse the chance of winning as widely as possible among all contestants.

2. QUALIFICATION FOR PARTICIPATION

- OPEN TO ANYBODY.
- SOME LIMITATION BY AGE

These are two typical systems. It is usually common that employees or members of the host organization are not eligible, but they may be admitted under the condition that they are eliminated from obtaining awards and ranking.

3. ANNOUNCEMENT OF A RACE

It can be announced through posters. Handouts are also good media to publicize the competition. Essential factors should be when, where, qualification, way of grouping, kinds of cars, type of race and method of determining ranking should be described. If the race is the series system, announcement of dates of the following events is desirable.

4. ENTRY

Entry forms should be ready at the registration desk. Columns for name, address, age, occupation, entry class, frequency of radio control system, and contest number should be provided along with entrance requirements. It is recommended for a host organization to make an entry register book, as it will be useful for reference. With a series race, it is important to keep records of contestants. Entry forms are made in duplicate; one for participant, the other for the organization to make a ledger.

STORE GRAND PRIX ENTRY CARD

Name Address	
Age (Grade)	Occupation
Class	
Car Number (check one)	
Frequency Band	1 2 3 4 5 6 A B

Store Grand Prix Entry Card

1st		2nd		3rd		4th	
5th		6th		7th		8th	

5. GROUPING OF CONTESTANTS

- GROUP BY AGE.
- GROUP BY SKILL AND EXPERIENCE.

The above two methods are good ways to form groups. There can be a beginner and an advanced class, if sorting is carefully done. Top ranking contestants in the beginner's class can be placed in the advanced class in the next race.

6. GROUPING OF MODELS

- **By batteries**
- **By motors**

Basically there are these two classes. You could classify by types of cars or vehicles or by scale, but grouping by battery type or motor type is probably more satisfactory because the demands of different types of track will alter the battery or motor requirement. On a straight course where cars can race at their maximum speed, there can be a wide difference in result between cars with dry cells and those with nickel cadmium batteries, or amongst cars with nickel cadmium batteries of different voltage. On a track where a lot of corners call for deceleration, it is imperative to have separate classes for cars with RS-380 motors, small but fast running, and those mounted with the big and powerful RS-540 motors.

- **Modified car class**

As a modeller enriches his experience through numerous races and grows familiar with radio control, he is urged to modify and increase the performance of his car. Increasing performance may be endlessly sought after. However, considering the cost of modifications and the finesse required, only a few people may be able to achieve this. It is practical to organise a class of modified cars with some limits set to the amount of remodelling allowed, so that those who do not have the technical knowledge or the necessary finances to carry out major modifications, may participate in the race.

7. CONSTRUCTION OF COURSES

- **SPEED COURSE**
- **TECHNICAL COURSE**

A speed course has a rather long straightaway where it is easy to pick up speed. Performance of a car is a key factor to win or lose a race. So with a speed course, a distinction of cars driven by dry battery from nickel cadmium ones and remodelled car classes are necessary. A technical course consists of a lot of curves, and the driving techniques are more important than capability of a car. With the course, therefore, sorting of classes by car types is not necessarily required. Since the Tamiya cars can go backward, it might be interesting to adopt parking and reverse going courses.

8. REGISTRATION ON THE DAY

- **CAR CHECK**
- **IMPOUNDMENT OF TRANSMITTERS**

Ascertain who the participants are with the entry form. Check if the car is qualified under the requirements of the particular racing class. At the registration desk, impound the transmitters of all the contestants. Of course, return them to assigned racers just before the races begin. As soon as the race is over, the transmitters should be impounded again. In other words, all the transmitters of the contestant are to be under custody of the host organization all the time during the event, except for those which are being used for a race. This is done at any radio control racing gathering for the purpose of preventing interference.

- The transmitters in custody had better have attached a contest number and be kept in a grouping of frequencies.

9. RACE

- **RADIO FREQUENCY CONTROL**
- **RACE ADMINISTRATION**

In a radio controlled car race, cars using the same frequency cannot compete at a time. Reversely speaking, only as many cars as there are different frequencies can race simultaneously. However, to avoid interference, cars with every other frequency should be arranged to compete.

Group / Band			
1	Mr. A	Mr. B	Mr. C
2	Mr. D	Mr. E	Mr. F
3	Mr. G	Mr. H	Mr. I
4	Mr. J	Mr. K	Mr. L
5	Mr. M	Mr. N	Mr. O
6	Mr. P	Mr. Q	Mr. R
A	Mr. S	Mr. T	Mr. U
B	Mr. V	Mr. W	Mr. X

★ Contestants will be grouped under the same frequency bands.

★ Reshuffle the contestants after each heat so they have a chance to compete in many heats.

1st heat (6 races)

Race / Band	1	2		3	4		5	6
1	Mr. A			Mr. B			Mr. C	
2		Mr. D			Mr. E			Mr. F
3	Mr. G			Mr. H			Mr. I	
4		Mr. J			Mr. K			Mr. L
5	Mr. M			Mr. N			Mr. O	
6		Mr. P			Mr. Q			Mr. R
A	Mr. S			Mr. T			Mr. U	
B		Mr. V			Mr. W			Mr. X

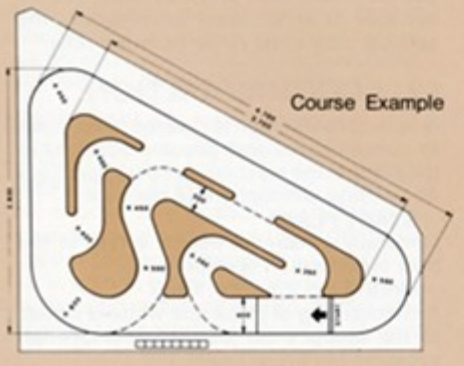
2nd heat (6 races)

Race / Band	7	8		9	10		11	12
1	Mr. A			Mr. B			Mr. C	
2		Mr. D			Mr. E			Mr. F
3	Mr. H			Mr. I			Mr. G	
4		Mr. K			Mr. L			Mr. J
5	Mr. O			Mr. M			Mr. N	
6		Mr. R			Mr. P			Mr. Q
A	Mr. S			Mr. T			Mr. U	
B		Mr. V			Mr. W			Mr. X

When there are eight contestants, a race is formed with four people to participate, making two races. Races are done repeatedly for each combination (each race called "heat" or "round"). Points of each heat are to be summed up to determine the final ranking.

TAMIYA CIRCUIT

This is a full-scale track for motorized RC model cars only. The surface is asphalt paved. The outside course is approximately 100 meters long, and combines with inner tracks to provide more than ten different types of course with a maximum length of 140 meters. The outer track is 4 meters wide, and the inside tracks are 3 meters wide with a variety of hazards including a 180° hairpin bend and "S" shaped turns. Also the entire circuit has a height differential of about 25 cms. So this circuit requires precise control and much skill. It is indeed worthy of challenge!

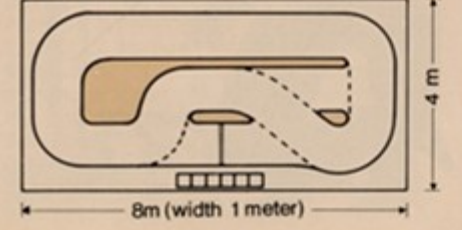


Course Example

The Tamiya Circuit is available for use, completely free of charge, for racing events sponsored by Hobby Shops etc., and it is open to the public without payment, on Saturday and Sunday of each month.
For further particulars, please write to the "Circuit Section" Trade Department, at Tamiya.

Tamiya Plastic Model Co.,
628 Oshika, Shizuoka City Japan, 422,

Course Example



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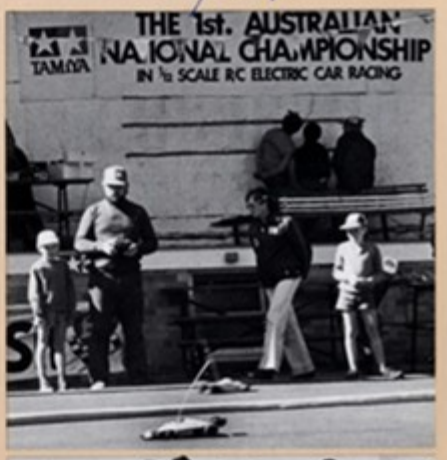

● KINDS OF RACES

- **POINT SYSTEM RACE**
- **TIME RACE**
- **ROUND RACE**

These three are typical kinds of races. And it is common through these three that the combination of the members should be changed so that any participant has an opportunity to compete with as many other contestants as possible.

● POINT SYSTEM RACE

Points are given to each heat. The points are totaled to decide the ranking.

Depending upon combination of entrants to a heat, sometimes only 2 or 3 people can contend. Even in such a case, the points of the first place are awarded.

- When the total points of all the heats tie the score, a playoff will be held. When contestants using the same frequency should end in a draw, the winner is chosen by comparing the rankings of each heat, or else they are made to vie for superiority by running one by one for time.

● TIME RACE

Time required at each heat is recorded, and the ranking is determined by the total time. Sometimes the point system is used together with time to get the result more distinctly.

● LAP RACE

One who makes the most number of laps on the course in a given time is the winner. This method is often employed for long distance endurance contests. A notable common feature through point system, time and round races is that entrants have to be classified under a frequency to use. Because participants using the same frequency will never contend at the same time under any circumstances, the final ranking is not necessarily reflected with their real ability of controlling models. This is something which cannot be helped so long as the frequencies are restricted to a limited number. However, the problem can be solved to some extent by arranging races in a series form or assorted with the time race system.

10. PENALTY POINTS

A participant should be penalized when he conducts himself against the spirit of fair play or against the smooth progress of a contest. The punishment is disqualification and then imposition of a cut in marks or additional penalty time.

- It is usual that interference to other cars and remodelling exceeding the limit should be liable to disqualification.
- A breakaway is subject to demerit mark. The penalty system should be constituted from the standard of annoyance to other participants or injustice among the entrants.

11. TROUBLE

When a model gets out of order in the midst of a race and is unable to proceed or out of control, all cars in the race should start again or the car alone should be retired.

- **RESTARTING**

In case the cars go out of control by radio interference, or the race is obstructed by spectators or somebody else, restarting will be done.

- **RETIREMENT**

In case a model cannot proceed in the race due to insufficient previous check up or becauee of an accident while racing, the said car only must retire from the race.

12. ACCOMMODATION

Ample consideration is desired to be given to conveniences and accommodations in the place of the meeting in order to produce an exciting atmosphere to the race.

- **START FLAG**

Generally a national flag or a flag of the host organization is in use.

- Finish Flag (Checker Flag)

A checker flag of black and white is waved to the winner's car just before and when crossing the finish line.

- **SCORE BOARD**

To help the race proceedings, a score board is desirable to be installed for announcing the records of each heat and ranking to the public.

- **CONTROL STAND**

A stand is very convenient to install so that the racers can command the better view of the course and the cars while racing.

- **PROPS IN THE COURSE LAYOUT**

A bridge made of a tire or advertisement sign boards of companies which can be seen along a real racing track, and miniature guard rails used as pylons in the course will enliven the race.

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THE CHALLANGE OF LE MANS

LONG DISTANCE AND ENDURANCE RACES

The Le Mans 24 hour race is done with racing sport cars, and the famous Spa-Francorchamps 24 hour race is done with touring type cars. A combination of driving ability and team-work of the pit crew are necessary for winning this type of race. Fuel (batteries); tire changes and the correction or replacement of broken parts is essential from the pit crew in the minimum time possible to remain competitive. A R/C long distance race should be conducted over a period of at least one hour, and the winner is the vehicle that completed the most laps during the period. Recharging batteries, assembling required spares and changes in the steering and gear ratios are only some of the things that might need to be accomplished during the race. Driver fatigue can also be an important consideration during the race, and changes of drivers should be anticipated during a pit stop. The fastest car on the course is not necessarily going to be the winner. The car that maintains the best total average over the entire race is most likely going to win. Prior race planning and completely understanding the limitations of your vehicle, as to battery duration and speeds over the circuit can give you the edge for winning long distance races. The challenges of long distance racing are completely different from those of sprint races.

THE TORTOISE AND THE HARE

● About "Speed" in long distance racing

In any long distance race, you cannot say for certain that the fastest vehicle is going to be the winner. We are all familiar with the saga of the Tortoise and the Hare. The Turtle was far slower than the rabbit, but won the race by keeping a steady pace throughout the course. Maximum acceleration and high top speed are not that necessary in long distance racing. If you have a very high performance car, tuned up to its capacity, and attempt to run a long distance race, you are likely to spin out often if you are initially concerned with leading the pack at the races outset. Fast acceleration and a high top speed utilize a large current flow from the battery, thereby requiring more pit stops for battery changes. Long distance vehicles also require a greater degree of precision tuning, better maintenance, and durable parts, and perhaps a different gear ratio. The vehicle that makes the fewest pit stops will most likely be the winner.

CARS FOR LONG DISTANCE RACES

● Credibility & durability are the first reqirement

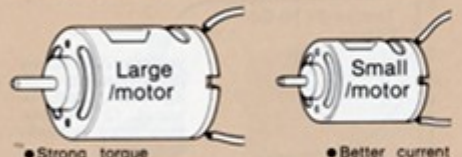
In full sized car racing, the machine used for long distance racing has less high speed performance than a racer for sprints. This is done so that the vehicle will last the entire race, and not become disabled prior to the finish. In radio controlled cars for long distance racing, the same is true. A car made from a kit properly will have this durability and be competitive during the entire race; however, if it is not built and assembled accurately, the chances of it surviving a race is slim. You must make sure that all screws and nuts are tightened firmly and where required, that liquid thread lock is applied to the threads to prevent loosening. It is recommended that all electrical wire splices be soldered, to ensure a good positive electrical contact throughout the race, and that the wiring is tied down firmly to prevent it from becoming entangled in drive gears etc. Prior to the race, use new rubber bands and replace the doubled sided servo tape with fresh tape. A car that is lighter in weight will move faster; however, by lightening the chassis by drilling holes in it, or removing some bracing, you may find you are faster, but the car will not last the race because it is no longer durable. Credibility & Durability are the keys to winning long distance.

● Pit practice and maintenance for victory

The majority of pit work during the race will be battery changes. By saving time during these stops, you can greatly advance your standing in the race. It is very necessary that your crew practice removing the body, change batteries, replace the body and secure it on the chassis. The more this is practiced, the quicker they will be during the race. One second saved in time is a gain of one second on the leader, and races are won and lost in less time than a second. During the race it is necessary to be calm during pit stops. If you are in too much of a hurry you could make mistakes that delay getting back into the race, such as misplacing clip-pins for the body, failure to connect up the battery properly. Practice, and more practice is the key in saving time. Also be prepared to replace motors, wheels and tires during the race. If you use plug type connectors to the motor it can be replaced quickly if necessary. The same is true of the speed controller. Make it easy for your pit crew to keep the car on the track.

● A powerful motor is not always profitable

A large, powerful motor is a necessity in sprint type races where no battery changes are needed; however, the same does not hold true for long distance racing. Small motors which use little electric current are much better as they require fewer pit stops for battery changes. As an example, the Mabuchi RS-540S and RS-380S motors are representative of motors used in radio control racing. The RS-540S has a torque of 200gcm; RPM 11,000 and draws current at 6.25 ampere. The RS-380S on the other hand has a torque of 75gcm, RPM 12,800 and draws 2.9 amperes. This information shows that the RS-540S motor produces more than double the power, but consumes also twice the current. A car using the RS-540S motor will require many more pit stops for battery changes than one using the 380, and even though the car will be somewhat slower on the track, it will still be running while the former is in the pits for battery changes. Another point to consider, is that with the high current flow of



● Strong torque and high top speed and large current drain

● Better current drain with correspondingly less pit stops.

the larger motor, the speed controller is more apt to cause trouble, and in any collision, the faster car is normally damaged to a greater extent because of the higher impact forces. A faster car is also more tiring to drive during long races and mistakes in driving are more likely to happen due to the speed at which it is traveling. All of these considerations must be taken into account when selecting a vehicle and motor for long distance racing. A good rule to follow when working up a vehicle for endurance racing is to use a smaller motor for those tracks which have many tight corners and fewer straight runs, and use a higher performance engine with higher gearing for those tracks with long straight runs and less complex curves.

LONG DISTANCE RACING DEPENDS UPON TEAM EFFORT

● Organizing a racing team

You can, of course be the driver, pit crew, and run an entire long distance race by yourself; however, you will not be overly successful very often doing this. Best results are obtained with a driver, mechanic for battery changes, repair and adjustment, time keeper who records and times the laps, and a team manager who guides the team. Long distance racing can require more than one driver, so it is best if all team members are also drivers.

● Team work gives the edge to your car

Once the team is formed, the next step is to get it working together. Firstly, all members must know and practice the role they are to play. The driver must run the car according to the team manager's instructions. It disrupts the team work when a driver struggles against other cars following his own selfish interests, or delays a pit stop etc. The mechanic is constantly preparing the batteries for changing, and keeping track of which are fresh and those in a discharged state. They look the same and in the flurried atmosphere of a race, more than one dead battery has been replaced by another dead one. He should be adept in quickly removing the car body for battery changing, and adjusting steering and changing tires etc. The time keeper plays an important role in-as-much as he records all of the fundamental data that the team manager uses to formulate his race strategy and tactics. At a minimum, he should record the number of laps run and the lapsed time from the beginning of the race. If possible, he should calculate the average lap time of the team's vehicle, time the pit stop and record what was done, plus keep track of who was driving and when a change of drivers occured. The team manager observes the progress of the other teams, and advises his driver as to pacing, pit stops etc. The team manager and time keeper should not be drivers in this race. During the second half of the race, when there is almost no difference between your car and the rivals team, it is the data provided by the time keeper that will give the team manager the necessary information to guide his driver on to victory. It is the manager who is responsible for victory or defeat in long distance races.

● Periodic pit stop maintenance

The number of pit stops made must be reduced to the absolute minimum. If your

only stops are for battery changes and/or driver change, then your race is progressing well. Keep in mind though, that it is also necessary to periodically oil bearings, and shafts. Polish and oil speed controllers, and to apply spray oil into motors and onto gears. This maintenance, although time consuming during a pit stop, must be done to prevent failure of a part due to lack of lubrication. Also look for any loosening screws and/or missing parts that may require maintenance during the next stop.

Trouble pit stops

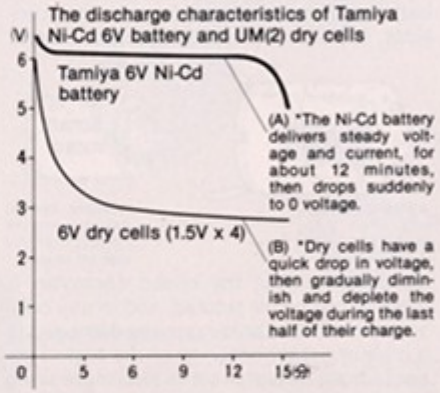
As soon as a problem is noticed by the driver, he should pit the vehicle the next lap. To keep running the car with a problem will only create a worse problem, and perhaps one that can no longer be repaired during the race. After a bad collision or spin out, observe the vehicle for a lap or so, and if there is a problem pit it as soon as possible. During the latter stages of a race, it is difficult to judge if your vehicle is performing the same as at the beginning. You must compare your performance with your rivals, and if your vehicles running compares favorably with your opponent, keep running it, even though you feel that its performance is not as good as at the beginning. If you make a stop and discover that it will take too long to repair the fault, continue running the vehicle, rather than expending the repair time. The managers judgement on this must be accepted.

Pit tools and spare parts

Keep the total number of tools in the pit to a minimum; however, make sure that you have all of the required tools to completely assemble the vehicle. A box wrench, for instance, is much better than an adjustable spanner. Needlenose pliers and tweezers are also required. If you take only one glue, the instant cyanoacrylate is recommended. Gummed tape, vinyl tape and soft iron wire are also very useful for making emergency repairs. Take along enough parts to completely rebuild the vehicle. Extra parts for the front-end and steering, and those parts that require assembly, should be assembled prior to the race, so that they can be installed as a unit, rather than part by part during a pit stop. Sponge type tires do not normally require replacement in races of two hours or under. Semi-pneumatic tires will require replacement two or three times. As for diplo tires, if the center rubber part of the tire is not firmly fastened, it may come off during the race. Wheels sometimes become broken, so even if you are using sponge tires, take along spare wheels on which you have mounted new tires, properly balanced and rounded off. Be prepared for anything that could likely occur. If you don't bring it, that's what will break during the race.

BATTERY CHANGING DURING RACES

One very important, (perhaps the most important) part of racing, is how long your batteries will last during a given time. Ni-Cd batteries have the ability to deliver a constant even voltage and current supply to the motor, until the battery is almost exhausted. If you are familiar with the circuit you will be racing upon, you already know how many laps you can get from your battery on that circuit, however, if you are racing on a different circuit, it will be guess work on your part to know how many laps you will get from battery. During endurance racing, where many battery changes are required, you must have the ability to judge when a pit stop for battery changing is necessary. Normally, you will bring the car into the pits about two or three laps prior to battery exhaustion. Running the car until it stops from lack of power is not good for the battery, nor will you end up winning any races that way. Tires, driving technique, course length, number of laps required, course condition, type of motor, all play a part in how long a battery will last. Be on the safe side and bring your car into the pits after you have run the battery down to its safe limit, by measuring the time or laps run. Make sure that your battery supply for the race is sufficient for the entire race, to include two or three extra batteries, for protection in case of an accident on the track, or battery malfunction. The smooth, steady driver, who makes the required pit stops on time, is the driver who will win endurance racing.



RADIO CONTROL BATTERY LIFE

Normally, you will not require a fresh receiver or transmitter battery during a race that is not longer than one hour, if you start the race with fresh batteries or recharged Ni-Cds. Note however, that the more servos you use, the more the receiver battery is used. Whatever equipment you use, you must be familiar with the nominal life expectancy of the batteries, and if there is a possibility of the race lasting longer than expected, prepare extra batteries beforehand, just in case they are needed at a pit stop.

TECHNIQUES FOR WINNING LONG DISTANCE RACES

Endurance or long distance races are very much like human distance racing. To win, you must establish and keep a steady pace throughout the race, avoiding useless deadheats with other rivals at all times. Keep clear of trouble on the track and run your car at a steady even pace.

Start

You do not have to "Jack Rabbit" start. Take it easy and run carefully at the beginning, especially at the first corner, where accidents often occur. Enter the corner high, even if you are left behind at this curve. Accidents at the beginning of the race often leave the driver irritated and confused, and the original plan of pacing is lost. For the first two or three laps be very deliberate in your driving. You will start to relax, learn the track and how the others are pacing themselves. If you should spin out, don't become upset and dash to catch up. Keep the pace and drive smoothly.

How to pass and get ahead of rivals

Success in long distance racing usually comes from not being in the lead for most of the race. When you are the front runner, you are always concerned about those who are behind you trying to pass. If you cannot maintain enough distance in the lead over your rivals, it is better to let one or two pass you, than constantly worrying about them. You can then use the leader as a pace setter for you, and when the time comes for you to pass, do it right after a corner that is followed by a long straightaway. Even if your car seems to be slower than others in the race, you still have a good chance of winning. Remember that the faster a car runs, the more battery it consumes, and the faster cars will have to make more pit stops. This is your chance to catch up and pass them. If you can just manage to keep your own pace, throughout the race, you have a good chance for the winner's trophy.

RELAX WHEN CORNERING!

During the endurance races, take the middle or high corner, rathern than at the track inside edge. This is where many accidents occur, and those that are trying to catch up from their last spin out will be fighting for that inside lane, and most likely spin out again. If you are there, you could be knocked out in the accident. Stay high in the corner and relax, except for that time when you need the extra speed and dash for winning the race. Relax and win!

RECORD THE RACE

In long distance races, it is advisable to keep a record of the race. Later, you will be able to review it with your team mat[illegible]and determine where time was lost. Th[illegible] a very useful and positive approach to improve and strengthen your team for other long races.

Pit records

This is the record of all pit stops of your car. Which laps the stops occurred, how long the stop was for. The reasons for the stop and what was done to the vehicle at each stop. Perhaps you only changed drivers and batteries, or perhaps changed tires due to new track conditions (rain; oil on track etc.). Whatever the reason, this information will assist you in making a better overall plan for the next long distance race.

Race progress records

This is a record of the progress of the race, lap by lap. It will consist of the lap times, driver's name and any other information deemed necessary during the actual running of the car in the race. This information will provide you with planning data for future races as to which driver is b[illegible] for certain conditions; number of laps [illegible]cted during an hour of driving time; and number of pit stops expected.

Lap record listing

This is the data which the promoter of the race records. The number of laps of each team is recorded every 5 minutes. From this record, the pace of each team is determined, and the progress of the race. He will know which car is ahead and also when another car takes the lead from a rival.

83/84

OFF ROAD DRIVING CARE

OVER RUNNING YOUR CAR CAN CAUSE MISHAPS AND PROBLEMS

Even though you own an off-road vehicle, you must select your driving areas with care to keep your vehicle in good condition. Inconsiderate driving will cause trouble and possible damage to your car.

1. UNSUITABLE DRIVING SURFACES

● DRY RIVER BED

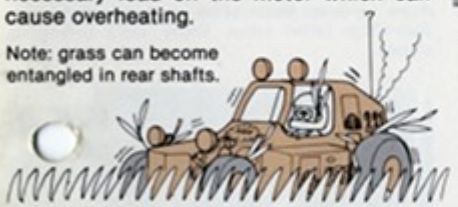
A dry river bed where many large rocks are found is perhaps the worst place for driving an off-roader. In 1/10 scale, even a stone with a 10cm dia is the same as a 10 meter dia boulder in real life. Driving against these objects is like intentionally destroying your vehicle.

Driving in a dry river bed can damage the car.

● GRASSLAND

Grasslands with tall grass and stems are bad for buggies because the grass can become entangled in the rear shafts and universal joints, which cause an unnecessary load on the motor which can cause overheating.

Note: grass can become entangled in rear shafts.



2. SURFACE THAT REQUIRE SPECIAL HANDLING

● ASPHALT AND LAWNS

Highspeed cornering on concrete, asphalt or smooth lawns will cause the vehicle to roll. Slow down a little when cornering on these surfaces.

Do cornering on pavement at lower speeds.

3. DIFFICULT SURFACES

● GRAVEL AND DRY SAND

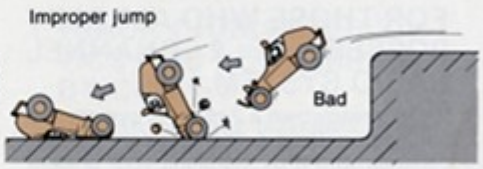
These surfaces offer considerable resistance to your vehicle. There is a burden on the motor and it will use much more current. The vehicle will not move as fast on this type of terrain, and on loose dry sand the tire can become buried and spin, without moving the car.

Tires dig into sand.

4. JUMPS

Dynamic jumping is a part of off road driving; however, you can damage your car if you do it recklessly. A jump must be done so that the rear wheels land first with the vehicle level. In order for it to be in a level/slightly nose high attitude, you must leave the ramp squarely and not enter it from an angle. If you do not do this, the car will tend to tumble while it is in the air and land off balance. Your jumping ramp can be up to 20cm in height for safe, smooth jumps.

Improper jump

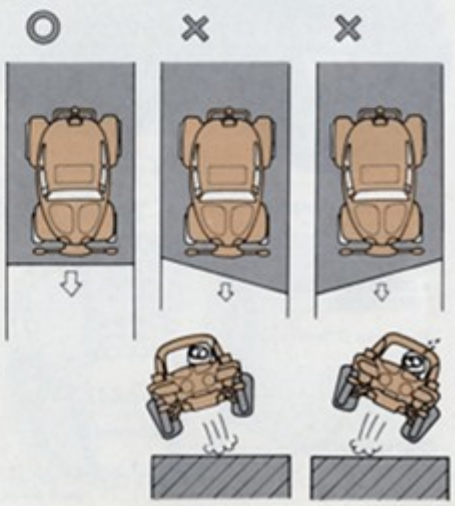


Good ramp: good jumping style.

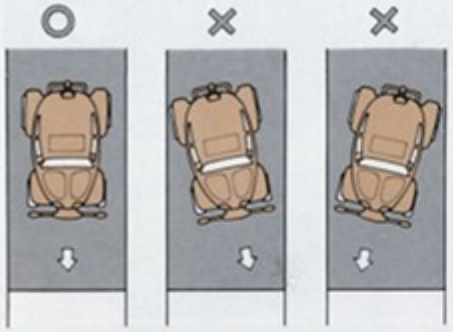
Heights up to 20cm.

Upper surface of jump ramp is level.

Jump ramp must not be distorted.



Straight jump!



5. WATER AND PONDS

Although the rough rider and sand scorcher, plus others are water resistant, water can enter the mechanism box due to water pressure if the car is allowed in deep water. The safe depth of the water hazard is up to the lower edge of the wheels.

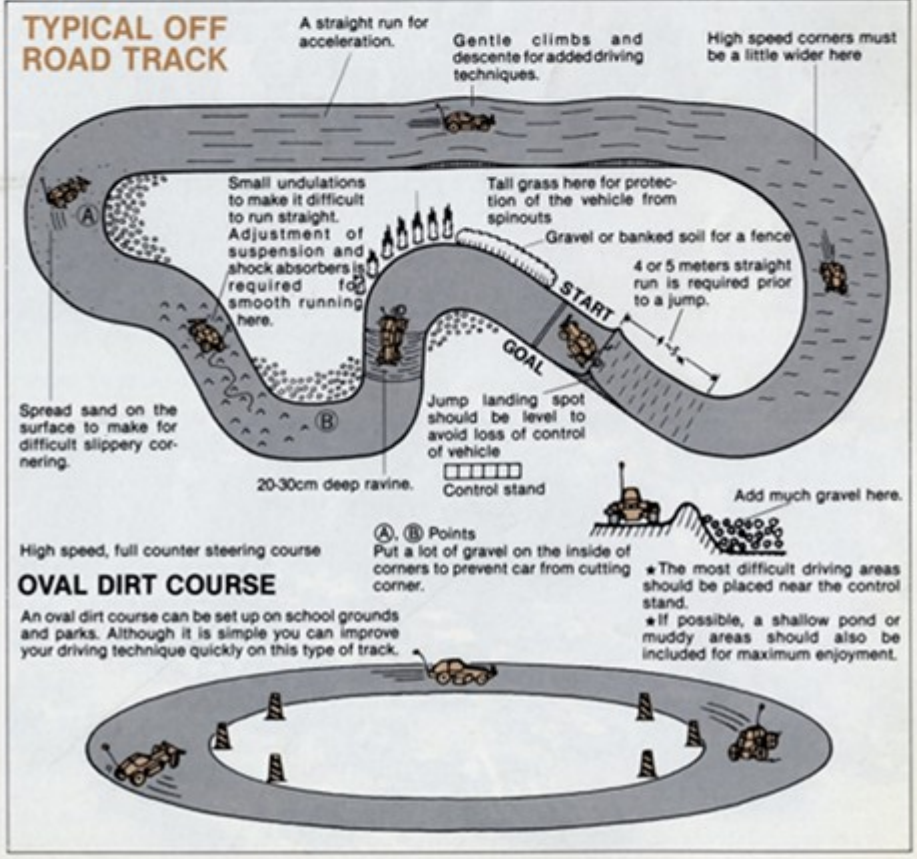
Note depth of pool. Depth is allowed up to wheel.

6. CARE IN WASHING THE CAR

Cars with water resistant mechanics boxes can be washed down with a hose if they are dirty. Hold the vehicle by the front bumper and let it hang down vertically while cleaning off with the hose. Do not dip the car into a bucket of water because the pressure will allow water to enter into the box through the vent holes. For a thorough cleaning, it is best to remove the mechanics box entirely, then immersion in water will not harm the radio gear.

*After running the vehicle through water, or after washing, it is a good idea to open up the mechanics box and wipe out any moisture that may have been induced, then dry it in an airy place. Disassemble the gearbox and oil the gears, bearings and suspension.

TYPICAL OFF ROAD TRACK



High speed, full counter steering course

OVAL DIRT COURSE

An oval dirt course can be set up on school grounds and parks. Although it is simple you can improve your driving technique quickly on this type of track.

HINTS IN BUILDING UP 4X4 VEHICLES

Tamiya's R/C 4WD vehicles offers you the unique enjoyment of working with 4 wheel drive mechanics, and they are very much suited to experienced drivers as well as beginners. Since the radio system is located in a sealed compartment, you can utilize the vehicles for heavy duty driving in all climates.

FOR THOSE JUST GETTING INTO 4X4 VEHICLES

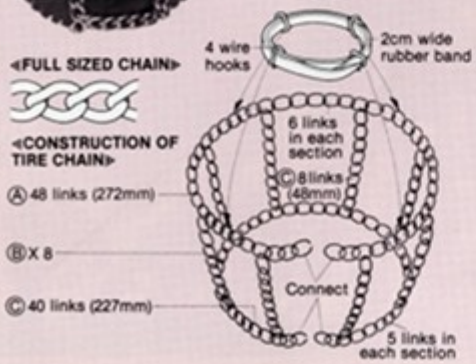
Tamiya's R/C 4WD vehicles are best matched with a 4 channel, 3 servo radio system. There are many radio systems on the market that can be utilized and are very reasonably priced. Use a 4 channel system for maximum flexibility with your Tamiya 4X4's.

FOR THOSE WHO ALREADY POSSESS A 2 CHANNEL RADIO SYSTEM.

If you already own a 2 channel system and purchase a Tamiya 4X4, you can gain experience with it by installing your present system. Although you cannot shift the gears with the radio, you can still enjoy very powerful driving. When you get bored with the inability to shift gears, then it's time to go out and purchase a 4 channel set. You will have the same enjoyment with your 4X4 using a 2 channel radio, as with any of the regular 2 channel R/C cars; however, maximum enjoyment comes with the ability to shift gears with the radio.

HOW TO MAKE SNOW CHAINS

4 wheel drive vehicles can be effective in snow; however, for more positive traction snow chains are suggested. These are easy to construct using small linked chains found at hobby and do-it-yourself shops. Referring to the full sized figures and photos, fabricate a snow chain as shown. Add the four hooks and attach the rubber band. To put it onto the wheel, stretch the rubber band and insert the tire and wheel. Adjust the chain as shown. Length of the chain shown is for the Toyota Hi-lux 4X4. By shortening the chain, it can be used for the 4X4 Blazing Blazer. For best results, the chains are suggested for the rear wheels only.



«FULL SIZED CHAIN»

«CONSTRUCTION OF TIRE CHAIN»

Ⓐ 48 links (272mm)

Ⓑ X 8

Ⓒ 40 links (227mm)

«ATTACHING SNOW CHAINS»

TOYOTA 4x4 PICKUP ON SNOW

Challenge snow driving with rear tire snow chains. Of course the R/C Toyota pickup, can not move in deep fresh snow, but runs easily on 2cm~3cm fallen snow. Enjoy 4x4's on skiing slopes.

Above, Toyota 4x4 pickup pulling a grown-up on skate board. Below, 14 Tamiya R/C 4x4 pickups can pull a real Toyota 4x4 pickup.


TAMIYA PLASTIC MODEL


83/84


TAMIYA PLASTIC MODEL CO.

13 MARCH 782 BMW
マーチ 782 BMW・F-2

This car is recommended for beginners in the hobby of radio controlled models. Designed for simplicity and reliability, it is easy to assemble and to maintain, and the price is very reasonable. It has good stability and manoeuvrability with a 1.2 mm thick duralumin main frame and an ABS resin mechanism deck. Complete with all fundamental features, it is an ideal model for novices.

About the prototype • The March 782 was the champion car in the 1978 European F2 championship races. Driven by Bruno Giacomelli, it gained seven victories from twelve races. With the 300hp BMW engine on a chassis made by March and with a uniquely designed cowling.

(Model specifications) ● Scale 1/10 ● Overall length 422mm ● Overall width 182mm ● Overall height 96mm ● Wheelbase 240mm ● Tread-front 128mm, rear 140mm ● Minimum ground clearance 8mm ● Weight fully equipped approx. 1.2 kg ● Tyres-semi-pneumatic rubber tyre ● Tyre width/diameter-front 25/48mm, rear 40/62mm ● Body-styrol resin ● Frame-ABS resin mechanism deck-centre pivot type 1.2mm thick 52S duralumin ● With differential gear ● Ball bearings can be fixed on front and rear axles ● Motor-Mabuchi RS-380S ● Gear ratio 1/5.8, 1/7 ● Motor power source-Tamiya Ni-Cd battery ● Speed control system-forward/backward stepless variable speed with braking circuit ● Radio control unit-2-channel 2-servo digital proportional (Not included in this kit)

14 MARTINI Mk.22 RENAULT
マルティニ Mk.22 ルノー・F-2

This is an ideal model for beginning radio controlled car modelling because it is designed for novices, being easy to make and to maintain. However, it is equipped with such components as the centre pivoted frame, as used with some special models for competition. Also, it has been designed so that additional parts, available separatively, may be fitted to obtain higher performance.

About the prototype • It was built by the all-French Martini team supported by "Elf," the French petroleum company. The car won four races, making the Martini the champion car in 1979 F-2 series with Didier Pironi and Rene Arnoux at the wheel.

(Model specifications) ● Scale 1/10 ● Overall length 432mm ● Overall width 82mm ● Overall height 102mm ● Wheelbase 240mm ● Tread-front 128mm, rear 140mm ● Minimum ground clearance 8mm ● Fully equipped weight approx. 1.2 kg ● Tyre-semi-pneumatic rubber tyre ● Tyre width/diameter-front 25/48mm, rear 40/62mm ● Body-styrol resin ● Frame-ABS resin mechanism deck-centre pivot type 1.2mm thick 52S duralumin ● With differential gear ● Ball bearings can be used on front and rear axles ● Motor-Mabuchi RS-380S ● Gear ratio-1/5.8, 1/7 ● Motor power source-Tamiya Ni-Cd Battery ● Speed control system-forward/backward stepless variable speed control with braking circuit ● Radio control unit-2-channel 2-servo digital proportional (Not included in this kit)

83/84

18 RALT RT2 HART 420R
ラルトRT2ハート・F-2

This car has all features and ability that a fine R/C car should have and is recommended for the beginning driver due to its low cost and ease of maintenance. The frame consists of a duralumin chassis and three ABS resin sub frames, which ensures long life, stability and excellent maneouverability. It was designed for easy assembly and in such a manner as to allow, separately available, high performance parts to be added for higher performance.
About the prototype ● The Ralt RT-2 showed its capabilities in the 1979 European F-2 championships. It is a ground effect car adapted from the F-1 series, and mounts the Hart straight four 2,000 cc engine. It took 2nd place in the 1979 championship with Brian Henton at the wheel.

(Model Specifications) ● Scale 1/10 ● Overall length 432 mm ● Overall width 182 mm ● Overall height 103 mm ● Wheelbase 240 mm ● Tread Front 128 mm, Rear 140 mm ● Minimum ground clearance approx. 8 mm ● Weight fully equipped approx. 1.2 kgs ● Tyres Semi-pneumatic rubber ● Tyre width/diameter Front 25/48 mm, Rear 40/62 mm ● Body styrol resin ● Frame - ABS resin mechanism centre pivot type 1.2 mm thick 52S duralumin ● With differential gear ● Ball bearings (not included) can be utilized on front and rear axles ● Motor Mabuchi RS-380S ● Gear ratio 1/5.8, 1/7 ● Power source Tamiya Ni-Cd 6 V battery (not included) ● Speed control Forward/reverse stepless variable speed with braking circuit ● Radio control system required 2 channels digital proportional (not included in kit)

30 HONDA F-2 (COMPETITION SPECIAL)
ホンダF-2(競技用スペシャル)

The Honda motor company is again in the topic of track racing in Japan and Europe. This kit reproduces a model with performance like the prototype. Chassis is composed of 2mm thick FRP and a mechanism deck of a tough resin. The RS-540S motor and the new three gear differential, has great durability and extreme stability. Front diplo tires and rear sponge tires provide excellent control and maneuverability. This is an ideal kit for those just getting into the hobby of R/C.

About the prototype ● We can say that 1981 was a Honda year in F-2 racing. F-2 machines that mounted the Honda V-type 6 cylinder engines did extremely well. In Europe, the RH 6 Honda won 4 victories with M. Thackwell and G. Lees at the wheel. In Japan S. Nakajima won 2 victories with the March 812 Honda.

(Model Specifications) ● Scale: 1/10 ● Overall length: 438mm ● Overall width: 192mm ● Overall height: 100mm ● Wheelbase 240mm ● Tread: Front 150mm, Rear 140mm ● Minimum ground clearance: 8mm ● Weight fully equipped: 1.2kg ● Tires: Front diplo tire, Rear sponge tire ● Tire width/diameter: Front 24/50, Rear 40/62 ● Body: High impact styrol ● Frame: ABS mechanism deck, center pivot type 2mm thick FRP ● Motor: Mabuchi RS-540S ● Gear ratio: 1:2.8, 1:3.1, 1:3.7 ● Power source: Tamiya 6V Ni-Cd battery (not included) ● Speed control: Forward/reverse stepless variable speed with braking circuit ● Radio control unit: 2 channels digital proportional (not included)

11 FERRARI 312 T3
フェラーリ312 T3

The name Ferrari has been held in great esteem throughout the history of F1 racing. The aerodynamically designed red-coloured body attracts the public's attention. The model kit assures stable running with two-piece type chassis composed of 1.5mm thick duralumin main frame and mechanism housing, die-cast gearcase and front arms, the same type as used with the Ligier racing car. As well as the charming Ferrari body, a polycarbonate body is included in the kit for practice running.
About the prototype • The Ferrari 312T3 made its debut in the 1978 South African GP. Mounted with a 510hp horizontally opposed twelve-cylinder engine, it won the South American, British, America East Coast and Canadian G.P. races.

(Model Specifications) ● Scale 1/10 ● Overall length 435mm ● Overall width 200m ● Overall height 105mm ● Wheelbase 250mm ● Treat-front 162mm, rear 152mm ● Minimum ground clearance 10mm ● Weight fully equipped approx. 1.3 kg ● Tyre diameter/width-front 50/25mm, rear 66/49mm ● Body-styrol resin ● Frame-centre pivot type 1.5mm thick 17S duralumin-semi-floating mount ● Ball bearings can be fitted to all journals ● Choice of gear or direct gear included ● Motor-Mabuchi RS-380S (540 can be used too) ● Gear ratio-1/5.6, 1/4.7 ● Motor power source-Tamiya Ni-Cd battery ● Speed control system-forward/backward stepless variable speed with braking circuit ● Radio control unit-2-channel proportional (Not included in this kit)

12 LIGIER JS9 COMPETITION SPECIAL
リジェ JS9 競技用スペシャル

This model is a high performance type, an improvement on the standard Ligier JS9 model. It incorporates precision ball bearings on both front and rear axles and the powerful RS-540 motor. The contacts of the speed controller are silver plated to boost accleration and the maximum speed. Diplo tyres are used for front wheels and sponge tyres on the rear wheels, giving superb manoeuvrability.
About the prototype • The real racing career of the Ligier JS9 began with the Monaco Grand Prix of 1978. With the aerodynamically designed body, which features a sharply pointed nose, a large wing, wide side-pontoons, and a rear wing extended backwards, and with the matra V12 engine which is said to yield 520hp.

(Model specifications) ● Scale 1/10 ● Overall length 445mm ● Overall width 202mm ● Overall height 110mm ● Wheelbese 260mm ● Tread-front 162mm, rear 152mm ● Minimum ground clearance 10mm ● Weight fully equipped 1.4 kg ● Tyre diameter/width-front 50/24mm, rear 70/50mm ● Body-styrol resin ● Frame-Centre pivot type 1.5mm thick 17S duralmin semi-floating mount ● With ball bearings on all wheels ● Differential gear or direct gear can be chosen ● Motor-Mabuchi RS-540 (380S can be used too) ● Gear ratio-1/12.8, 1/3.7 ● Motor power source-Tamiya Ni-cd battery ● Speed control system-forward/backward stepless variable speed with braking circuit ● Radio control unit-2-channel proportional (Not included in this kit)

19 WILLIAMS FW-07 (COMPETITION SPECIAL)
ウイリアムズFW-07(競技用スペシャル)

If you enjoy the high speed running of F-1 competition cars, this Williams FW-07 will be hard to beat. Utilizing the same proven chassis as on the Lotus 79, this competition car has the strength and lightness of duralumin and nylon resins. Ball bearing equipped front wheels are adjustable, as is the ground clearance for different track and road conditions.

About the prototype ● This car won 5 of 15 races and proven itself to be one of the best ground effect cars on the circuit. The light and compact body attracted much favourable comment, and with A. Jones and C. Regazzoni at the wheel, it was a car to be reckoned with.

(Model Specifications) ● Scale 1/10 ● Overall length 430 mm ● Overall width 202 mm ● Overall height 105 mm ● Wheelbase 260 mm ● Tread Front 162 mm, Rear 152 mm ● Minimum ground clearance approx. 8 mm ● Weight fully equipped approx. 1.35 kgs ● Tyre width/diameter Front 24/50 mm, Rear 50/70 mm ● Body High impact styrol resin ● Frame Centre pivot type semi floating mount ● With ball bearings on the front and rear axles ● Differential or direct gear can be selected ● Speed control Forward/reverse stepless variable speed control with braking circuit ● Motor Mabuchi RS-540S ● Gear ratio 1/2.8, 1/3.1, 1/3.7 ● Motor power source Tamiya Ni-Cd 6 V battery (7.2 V is also available) ● Radio control system required 2 channels digital proportional (Battery and R/C unit are not included in kit)

20 J.P.S. LOTUS 79 (COMPETITION SPECIAL)
J.P.S. ロータス79(競技用スペシャル)

This is a special kit for competition of the J.P.S. Lotus 79, which is said to be the originator of winged cars. The chassis is made of 2 mm thick F.R.P., with front arms of durable nylon resin and a duralumin gear case. These quality materials are used for lightness, strength, durability, and to ensure stability and maneuverability during tough competition. Diplo tyres used for the front wheels and sponge tyres on the rear for superb driving control.
About the prototype ● This car won the 1978 F-1 Grand Prix. Mario Andretti and Ronie Peterson distinguished themselves with this car during the season, winning six races, and finishing 1st and 2nd in four of them. This car has had a great influence in the designs of later F-1 cars.

(Model Specifications) ● Scale 1/10 ● Overall length 435 mm ● Overall width 202 mm ● Overall height 110 mm ● Wheelbase 260 mm ● Tread Front 162 mm, Rear 152 mm ● Minimum ground clearance approx. 8 mm ● Weight fully equipped approx. 1.35 kgs ● Tyre width/diameter Front 24/50 mm, Rear 50/70 mm ● Body High impact styrol resin ● Frame Centre pivot type semi floating mount ● With ball bearings on the front and rear axles ● Differential or direct gear can be selected ● Speed control Forward/reverse stepless variable speed with braking circuit ● Motor Mabuchi RS-540S ● Gear ratio 1/2.8, 1/3.1, 1/3.7 ● Motor power source Tamiya Ni-Cd 6 V battery (7.2 V is also available) ● Radio control system required 2 channels digital proportional (Battery and R/C unit are not included in kit)

9 CELICA LB TURBO (COMPETITION SPECIAL)
セリカ LB ターボ（競技用スペシャル）

This is a model of the Celica LB Turbo, employing a center pivoted frame and diplo front tyres, the model has realized stable high speed running capability, sharp maneuverability, easiness to control. The standard equipments of ball bearings on the front and rear axles and the poerfull RS-540 motor add to the enjoyment of fast running.

About the Prototype ● The Celica Turbo made its abrupt debut in the 1977 German National Championship and attracted public attention. With its aerodynamically improved body and the Toyota 18 RG engine equipped with a turbo charger boasting of 560 HP output power, the car won the victory beating the Porsche.

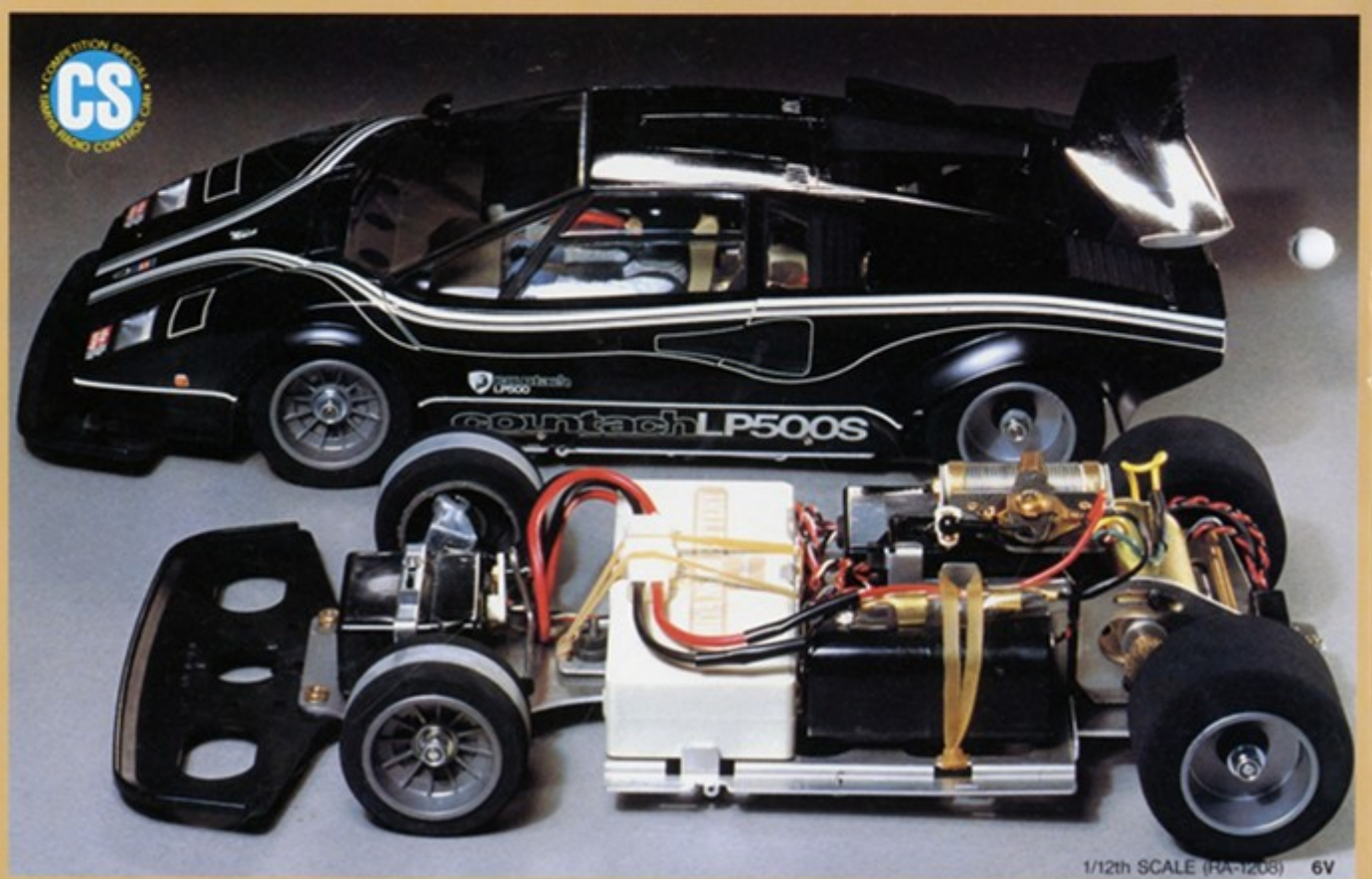
(Model Specifications) ● Scale in 1/12 ● Overall Length 380 mm ● Overall Width 176 mm ● Overall Height 99 mm ● Wheelbase 206 mm ● Tread =Front 128 mm, Rear 134 mm ● Minimum Ground Clearance 5 mm ● Weight (all equipped) about 1.3 kg ● Tyre Width/Diameter =Front 24/50 mm, Rear 40/55 mm ● Body =Impactproof ● Frame =Center Pivoted Semi-Floated Assembly 1.5 mm thick 17S Duralumin ● Ball Bearings on Front & Rear Axles ● Front Arms Die-Cast with Castor Alignment ● Either Differential Gear or Direct Gear Slective ● Motor =Mabuchi RS-540 Gear Ratio =1/2.8, 1/3.7 ● Power Source =Ni-Cad Battery Pack ● Speed Control Switch =Forward/Reverse Stepless Variable Speed with Baraking Circuit ● Radio Control System Used =2 Channel Proportional Type.
(Not included)

8 COUNTACH COMPETITION SPECIAL
カウンタックLP500S・競技用スペシャル

This model is an improved type designed for better performance by reinforcing the chassis and other related parts based upon the standard Countach. The newly designed main frame is made of 1.5 mm duralumin. Special diplo tyres are used for front wheels and sponge tyres as wide as 40 mm in the rear, ensuring excellently stability on the straight away and during sharp cornering. With the powerful RS-540 motor and ball bearings used on front and rear axles, it is a fantastic racing model.

About the Prototype ● The Countach 500S was produced by Lamborghini Co. based upon the Countach LP 400. An improved engine develops 447 horse power. Its many high performance features, such as a maximum speed of 315 km/h, captured the attention of the people.

(Model Specifications) ● Scale in 1/12 ● Overall Length: 355 mm ● Overall Width: 175 mm ● Overall Height: 93 mm ● Wheelbase: 206 mm ● Tread: Front 128 mm, Rear 134 mm ● Minimum Ground Clearance: 5 mm ● Weight (Fully equipped) 1.3 kg ● Tyre Width/Diameter: Front 24/50 mm, Rear 40/55 mm ● Impactproof Styrol Resin ● Frame: 1.5 mm 17S Duralmin with Center Pivoted Semi-Floated Assembly ● Either Differential Gear or Direct drive may be used ● Motor: Mabuchi RS-540 ● Gear Ratio: 1/2.8, 1/3.7 ● Power Source: Nickel Cadmium Battery Pack ● Speed Control Switch: Forward/Reverse Variable Resistor Proportional with Brake Circuit ● Radio Control System used: 2 Channel Proportional Type.
(Not included)



26 RENAULT 5 TURBO COMPETITION SPECIAL
ルノー5ターボ競技用スペシャル

With its unique, boxy, body styling, this turbo Renault will lead the pack in R/C production car races. With the nylon front arms and uprights, and the metal ball joint steering system, this R/C car was designed for fast and rugged racing. The 2mm thick FRP chassis and duralumin R/C deck is easy to use and simple to maintain. The strong, light and durable polycarbonate body is virtually indestructable and will last through many hours of competition racing.
About the prototype ●The Renault 5 Turbo is a modified version of the very popular Renault 5, front wheel drive compact car. Although it utilizes a different chassis, and mounts a 260 HP turbo engine amidships, it still retains the good looks of the standard 5 and it won the Monte Carlo Rally in 1981.

(Model specifications) ●Scale: 1/12 ●Overall length: 354 mm ●Overall width: 180 mm ●Overall height: 113 mm ●Wheel-base: 208 mm ●Front tread: 128 mm ●Rear tread: 134 mm ●Frame: 2 pieces of 2 mm thick F.R.P. and duralumin mechanism deck ●Front arm uprights are made of special nylon resin ●Ball bearing: Front and rear axles ●Diplo front tyres ●Sponge rear tyres ●Polycarbonate body ●RS-540S motor is included.
(Battery and R/C unit are not included in kit)

1/12th SCALE (RA-1226) 6V・7.2V

25 V・W GOLF COMPETITION SPECIAL
V・Wゴルフ競技用スペシャル

The Volkswagen Golf, one of the world's best selling automobiles makes an attractive R/C racing car on any circuit. Designed with a new 2mm FRP frame and aluminium R/C deck and a special servo saving steering system with ball joint connections, and topped off with a scale polycarbonate body, this R/C racing car is sure to take the checkered flag often on many circuits.
About the prototype ●Production car racing is held quite often, all over Europe. As a compact car, with front wheel drive, the Volkswagen Golf has become very popular and due to its high performance, has been regarded as one of the fastest cars in touring races so that many machines are now owned and raced by private teams on tracks all over Europe.

(Model specifications) ●Scale: 1/12 ●Overall length: 354 mm ●Overall width: 178 mm ●Overall height: 112 mm ●Wheel-base: 208 mm ●Front tread: 128 mm ●Rear tread: 134 mm ●Frame: 2 pieces of 2 mm thick F.R.P. and duralumin mechanism deck ●Front arm uprights are made of special nylon resin ●Ball bearing: Front and rear axles ●Diplo front tyres ●Sponge rear tyres ●Polycarbonate body ●RS-540S motor is included.
(Battery and R/C unit are not included in kit)

1/12th SCALE (RA-1225) 6V・7.2V

1/12th HIGH PERFORMANCE RADIO CONTROL CAR

DATSUN 280ZX

22 DATSUN 280ZX (RACING MASTER Mk.2)

フェアレディ280ZXレーシングマスターMk.2

High performance R/C racing at a reasonable price! Using the basic chassis of the Can-Am-Lola, but eliminating some of the high cost parts, and substituting them with proven components, Tamiya was able to bring to you a vehicle that could win now, but made even better as your driving skills improve with the addition of those extremely high performance parts as the need arises. Molded sponge tires and a polycarbonate body, ensures light weight, good road traction, and realistic appearance.

About the prototype ●This widely popular Japanese sports car is being seen more often on racing circuits around the world, and the 280ZX was specifically developed for the SCCA (Sports Car Club of America) competition, where the 911 Porsche and Savanna RX-7 are the rivals to beat.

(Model Specifications) ●Scale: 1/12 ●Overall length: 395mm ●Overall width: 182mm ●Overall height: 98mm ●Wheelbase: 210mm ●Front tread: 140mm ●Rear tread: 133mm ●Frame: One piece 2mm thick FRP. Front and rear wheels are made of reinforced nylon resin ●Toe-in, camber and kingpin angle are fully adjustable. Racing speed control with variable braking ●RS-540S motor included ●Polycarbonate body. (Battery and R/C unit are not included in kit)

1/12th RACING CAR SUITABLE FOR RADIO CONTROL

CAN-AM LOLA

21 CAN-AM LOLA (RACING MASTER Mk.1)

カンナム・ローラ・レーシングマスターMk.1

This car was designed and engineered for the sole purpose of winning competition. With a chassis of 2 mm thick F.R.P.; infinitely adjustable front arms for toe-in; castor; camber and ackerman, and the sophisticated speed control make this car a continuing winner on all tracks.

About the prototype ●Lola T333CS was the winning car in 1979 Can-Am class race where big machines with under 5,000 cc engine competed against one another. T333CS is the developed version of the T333 which was basically built for the F-5000 class. Many were given various modifications to the body; cowl, etc. by their own teams and the T333CS was said to be the most popular machine in the Can-Am class.

(Model Specifications) ●Scale 1/12 ●Overall length 400 mm ●Overall width 180 mm ●Overall height 109 mm ●Wheelbase 210 mm ●Tread Front 140 mm, Rear 133 mm ●Minimum ground clearance approx. 5 mm ●Weight fully equipped approx. 1.2 kgs ●Tyre width/diameter Front 20/45 mm, Rear 47/50 mm ●Body Polycarbonate ●Frame One piece 2 mm thick F.R.P., Front sub-frame made of reinforced nylon ●Sealed metal differential or direct drive ●Motor Mabuchi RS-540SD Black Motor ●Gear ratio 1/2.05, 1/2.24, 1/2.44, 1/2.67 ●Power source Tamiya 6 V Ni-Cd Battery Pack (7.2 V pack is also available) ●Speed control Forward variable resistor and micro switch with braking circuit ●Radio control system required 2 channels digital proportional (Battery and R/C unit are not included in kit)

32 TORNADO (RACING MASTER Mk.3)
トルネード・レーシングマスターMk.3

This kit will produce a Racing Master vehicle of the 1st rank. It was designed light in weight and strong in performance. Chassis is a 2 piece type of 1.5mm thick FRP. Front arms of a special tough resin and has adjustable caster angle. The speed controller has 3 steps forward and one reverse and is adjustable for low and 2nd speeds as well as braking. The design is strictly from Tamiya and incorporates the aerodynamic features found on the finest F-1 and 2 racers of the world. State of the art mechanics and the reduction of many parts provides ease of maintenance, and reduces the total overall weight of the vehicle. Professional drivers will be satisfied with the results of this racer.

(Model Specifications) ● Scale: 1/12 ● Overall length: 340mm ● Overall width: 175mm ● Overall height: 80mm ● Wheelbase: 208mm ● Tread: Front/rear 135mm ● Minimum ground clearance: 8mm ● Tire diameter/width: Front 50/20mm, Rear 52/35mm ● Weight fully equipped: 980g ● Body: Polycarbonate ● Frame: 2 piece type (1.5mm thick FRP main frame and mechanism deck) ● Front arm of special tough resin ● Differential joint with small ball bearing ● Motor: Mabuchi RS-540SD Black Motor ● Gear ratio: 1/3, 1/3.33, 1/3.53, 1/3.75 ● Power source (same battery for motor and receiver): Tamiya Ni-Cd battery 6V, 7.2V or Tamiya 7.2V Ni-Cd Racing Pack (not included) ● Speed control: Forward 3 step/reverse 1 step with braking circuit ● Radio control unit: 2 channel digital proportional (not included)

33 FORD C100 (RACING MASTER Mk.4)
フォードC100・レーシングマスターMk.4

This is a 1/12 scale kit of the Ford Group C endurance racer, that has been active in world endurance championships. Kit layout is fundamentally the same as that of the Tornado Racing Master Mk.III, and has about the same performance characteristics; however it has an injected moulded body, for greater scale realism, of the Ford C-100. Light in weight and very stable in running, this vehicle will please the most sophisticated competitor.

About the prototype ● The Ford Motor Company has been active during 1982 in world endurance racing. It produced this Group C vehicle, in which the displacement of the engines are not limited. The prototype was installed with either a 3.9 liter DFL or the 1.7 liter turbo from the Ford Capri.

(Model Specifications) ● Scale: 1/12 ● Overall length: 368mm ● Overall width: 176mm ● Overall height: 74mm ● Wheelbase: 208mm ● Tread: Front/rear 135mm ● Minimum ground clearance: 8mm ● Tire diameter/width: Front 50/20mm, Rear 52/35mm ● Weight fully equipped: 1.2kg ● Body: High impact styrol ● Frame: 2 piece type (1.5mm thick FRP main frame and mechanism deck) ● Front arm of special tough resin (castor angle adjustable) ● Motor: Mabuchi RS-540S ● Gear ratio: 1/3, 1/3.33, 1/3.53, 1/3.75 ● Power source: Tamiya Ni-Cd battery 6V, 7.2V or Tamiya 7.2V Racing Pack (not included) ● Speed control: Forward 3 step/reverse 1 step with braking circuit ● Radio control unit: 2 channel digital proportional (not included)

24 SAND ROVER
デューンバギー

Tamiya has provided the beginner to the field of radio controlled vehicles, a sophisticated, simple to assemble, durable and highly realistic fun buggy. You can run this buggy for a full 20 minutes, at full power, using one Tamiya 6V Ni-Cd battery. With four wheel independent suspension and plenty of room for all of the R/C equipment, this model will provide years of lasting enjoyment.

About the prototype ● The Sand rover is a buggy version of the Volkswagen "Beetle" which is seen in abundance all over the Southern United States. Born on the west coast, the styling quickly caught on and has become one of the favourite leisure time vehicles for off-road activities and even racing.

(Model specifications) ● Scale: 1/10 ● Overall length: 410 mm ● Overall width: 202mm ● Overall height: 175mm ● Wheelbase: 256 mm ● Tread (both wheels): 178 mm ● Ground clearance: 30 mm ● Chassis frame: Box type housing all mechanical equipment ● Independent front and rear suspension is made from nylon 66 ● Optional ball bearings are available for all axles ● RS-380S motor included (optional RS-540S motor can be installed) ● A realistic and durable body is made from dense polystyrene.
(Battery and R/C unit are not included in kit)

1/10th SCALE (RA-1024) **6V·7.2V**

23 DUAL PURPOSE HOLIDAY BUGGY
ホリデーバギー

Designed for off road as well as street driving, this dual purpose buggy will please the newcomer to the field of R/C buggy driving fun. Easy to assemble, and with a greatly extended running time (20 minutes on a Tamiya 6V Ni-Cd battery), the four wheel independent suspension was built to absorb the rough terrain, and rugged construction ensures a long life in the hands of the learning driver.

About the prototype ● In Southern California, the off road buggies are widely seen cruising over the sands of the coastal areas. Recently, the dual purpose type of buggy has begun to appear. Equally at home, both on and off the road, with the necessary safety equipment and lighting changeable for different conditions of driving, these home made vehicles are sure to be seen in ever increasing numbers around the world.

(Model Specifications) ● Scale: 1/10 ● Overall length: 410mm ● Overall height: 155mm ● Overall width: 202mm ● Wheelbase: 256mm ● Tread (both wheels): 178mm ● Ground clearance: 30mm ● Chassis frame: Box type, housing all mechanical equipment, and the wheels are made of ABS resin ● Independent front and rear suspension is made from nylon 66 ● Optional ball bearings are available for all axles ● Contains an RS-380S drive motor with a forward and reverse variable resistor speed controller. A realistic and durable body is made from dense polystyrene.
(Battery and R/C unit are not included in kit)

1/10th SCALE (RA-1023) **6V·7.2V**

82/84

35 WILD WILLY
ワイルド・ウイリス

A new concept in radio control off road enjoyment. A truely versatile stunt vehicle that makes spin turns, jump turns and wheelies with ease. Body styling is from the famous "Jeep", which is now utilized by auto sports fans for racing and hill climbing. High strength nylon, ABS resins and injected molded plastics are used in its construction for lasting durability. Precision ball bearings are employed in the system to ensure smooth running. A large differential gear and sealed mechanism box allows running in all types of weather. Large sand type tires and coil spring suspension dampen out all of the rough terrain surfaces. With a realistic driver figure of Wild Willy.

(Model Specifications) ● Scale: 1/10 ● Overall length: 343mm ● Overall width: 242mm ● Overall height: 268mm ● Wheelbase: 165mm ● Tread: Front 166mm, Rear 196mm ● Minimum ground clearance: 30mm (without differential gear case) ● Weight fully equipped: 2.6kg ● Tire width/diameter: Front/rear 46/103mm ● Body: High impact styrol ● Frame: ABS resin ● Suspension: Front swing axle, Rear trailing link ● Ball bearings utilized on front and rear axles ● With differential gear ● Sealed mechanism box ● Motor: Mabuchi RS-540 ● Gear ratio: 1/6.7 ● Tamiya Ni-Cd 7.2V battery, Tamiya Ni-Cd 6V battery available (not included) ● Speed control: Forward/reverse 3 step ● Radio control unit: 2 channel digital proportional (not included)

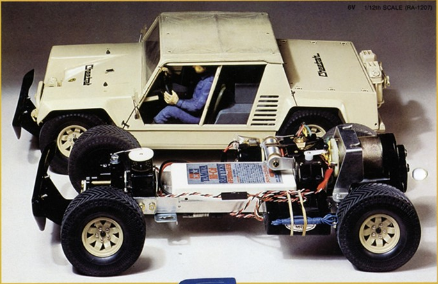
1/10th SCALE(5835) **6V·7.2V**

34 SUPER CHAMP
ファイティング・バギー

This is a high performance off road buggy designed for the serious competitor. With a new rear suspension system that keeps the rear wheels on the ground for maximum control and acceleration. Spiked rear tires and straight tread front tires allow maximum maneuverability and traction on all surfaces. The 3 step racing speed controller has adjustable low and 2nd speeds as well as braking. The sealed aluminum gear box and hardened steel universal joints keep this vehicle running under continued hard use. Front suspension is the famous Tamiya oil damped shock system, and steering remains positive with the hardened ball joint assembly. For those who want to win in off-road competition, the Super Champ is the way to go.

(Model Specifications) ● Scale: 1/10 ● Overall length: 410mm ● Overall width: 218mm ● Overall height: 166mm ● Wheelbase: 250mm ● Tread: Front 170mm, Rear 180mm ● Minimum ground clearance: 35mm ● Weight fully equipped: 2.1kg ● Tire width/diameter: Front 21/73mm, Rear 51/88mm ● Body: High impact styrol ● Frame: 2mm thick FRP ● Suspension: Front/double trailing arm, Rear/F.F.P.D.S. (Free Floating Progressive Damping Suspension) ● Oil damper installed in 4 wheels and with reservoir in rear wheels ● Motor: Mabuchi RS-540 ● Gear ratio: 1/6.5, 1/9.3 ● Power source: Tamiya Ni-Cd 7.2V battery, Tamiya Ni-Cd 6V battery available (not included) ● Speed control: Forward 3 step/reverse 1 step with braking circuit ● Radio control unit: 2 channel digital proportional (not included)

1/10th SCALE(5834) **6V·7.2V**



7 CHEETAH
チーター

You can drive this off-the-road model car in the park of field using its full power and speed. The suspension system is off the four wheel independent type, the chassis is the sturdy channel type, and the gear box is closed to prevent sand and dust from entering it. All are designed for excellent maneuverability along rough courses. The precisely scaled body and excellent handling allow for many pleasure filled hours of driving.
About the prototype ● This is a high performance off-the-road machine made by an Italian sports car maker, Lamborghini. It has a mid engine Chrysler 5.9 litre V8 with a output power of 180 HP and boasts a high speed as 170 km/h on the road and 140 km/h off the road.

(Model Specifications) ● 1/12 in scale ● Overall length 400 mm ● Overall width 174 mm ● Overall height 140 mm ● Wheelbase 246 mm ● Tread=front, rear 138 mm ● Minimum ground clearance 23 mm ● Weight (all equipped) about 1.8 kg ● Tyre diameter/width=front, rear 77/29 mm ● Body=impact-proof styrol resin ● Frame=duralumin (channel type) ● Double wishbone type, torsion bar spring four wheels independent ● Motor=Mabuchi RS-540 ● Gear box is closed type avoiding sand and dust ● Gear ratio=1/9.3, 1/16, 1/21 ● Power source=four "C" (UM2) dry cells or four "C" (UM 2) size nickel cadmium batteries, or a 5-cell Ni-Cd battery pack (not included) ● Speed control system=forward - reverse variable resistor proportional speed control with electromotive force brake ● Radio control system to be used=two channel proportional (not included)

27 FORD F-150 RANGER XLT
フォードF-150レインジャーXLT

Enjoy the speedy running of off road vehicles, with this 1/10 scale R/C model of the Ford Ranger. The functional oil filled shocks smooth out the rough bumps and the water resistant R/C and battery compartment let you run in all weather and on all types of terrain. The sealed transmission and gear train keep out dust and debris that occur from hard and fast running. The attractive body styling of this Ford pickup will add greatly to your driving pleasure.
About the prototype ● The "Flaresides" of this Ford Ranger pickup truck have again become popular, and many are seen all over America working both on and off the road. Recently, the younger generation have taken to "pick-ups" as a means of getting back in the woods and out of doors to those far away recreational sites. Many are also seen at regularly held off road races, as they can stand up to much abuse.

(Model specifications) ●Scale: 1/10 ●Overall length: 426 mm ●Overall width: 222 mm ●Overall height: 176 mm ●Four wheel independent suspension system of die case aluminium ●Front: Dual trailing arms ●Rear: Swing axle ●Sealed radio control box ●Semi-pneumatic off-the-road rubber tyres ●RS-540 motor included. Precision plastic body.
(Battery and R/C unit are not included in kit)

83/84

15 ROUGH RIDER
バギーチャンプ

This is a model racing buggy with realistically functioning mechanisms. For the suspension systems, many components of durable die-cast are employed. All four wheels have independent suspension systems equipped with oil filled shock absorbers. The gearcase and special plastic box housing the radio control units and batteries, are of a sealed type, enabling the car to go through puddles, over sand dunes, or almost anywhere.
About the prototype • Off-the-road races are frequently held in areas of Western America. The racing buggies are purpose-built with chassis of tubularmetal and with tuned up engines of the Volkswagen or other makes, these vehicles sometimes run at a furious speed of 200km/h on deserts and over rough terrains.

(Model specifications) ● Scale 1/10 ● Overall length 400mm ● Overall width 210mm ● Overall height 150mm ● Wheelbase 250mm ● Tread-front 170mm, rear 175mm ● Minimum ground clearance 30mm ● Weight fully equipped 2.1 kg ● Tyre width/diameter-front 19/74mm, rear 35/83mm ● Body-Styrol resin ● Frame-2mm thick FRP ● Suspension front/double trailing arm, rear/swing axle ● All wheels are fitted with oilfilled dampers ● Die cast suspension arms ● Mechanism housing and gearcase are of sealed type ● Die cast aluminium gearcase ● Motor-Mabuchi RS-540 ● Gear ratio 1/4.6, 1/3.7 ● Motor power source-Tamiya Ni-Cd Battery 7.2 volt or 6 volt can be used ● Speed control system-2 stepped speed switch ● Radio control unit-2-channel 2-servo digital proportional (Not included in this kit)

16 SAND SCORCHER
ワーゲン・オフローダー

Scampering along the unmade track raising clouds of dust; this is one of the charms of off-road running. The mechanism housing and the gearcase are sealed to prevent dust and water from entering them. The all wheel independent suspension systems equipped with oil dampers, die-cast aluminium parts, uniquely styled body converted from the Volkswagen Beetle.
About the prototype • The off-the-road races are grouped into several classes by types of car and their engine capacity. This buggy, remodelled from the Volkswagen Beetle, is classified as class 5. Its podgy contour with a short nose and off-the-road tyres of large diameter are very popular among the fans.

(Model specifications) ● Scale 1/10 ● Overall length 400mm ● Overall width 220mm ● Overall height 176mm ● Wheelbase 250mm ● Tread-front 170mm, rear 175mm ● Minimum ground clearance 30mm ● Weight fully equipped 2.2 kg ● Tyre width/diameter-front 21/73mm, rear 41/82mm ● Body-Styrol resin ● Frame-2mm thick FRP ● Suspension front/double trailing, rear/swing axle. ● Oil filled dampers on all wheels ● Die cast aluminium suspension arms ● Close type plastic mechanism housing and die cast aluminium gearcase ● Motor-Mabuchi RS-540 ● Gear ratio-1/4.6, 1/3.7 ● Motor power source-Tamiya Ni-Cd Battery 7.2 volt or 6 volt can be used. ● Speed control system-2 stepped speed switch. ● Radio control unit-2-channel 2-servo digital proportional (Not included in this kit)

28 TOYOTA 4×4 PICKUP
トヨタ ハイラックス4WD

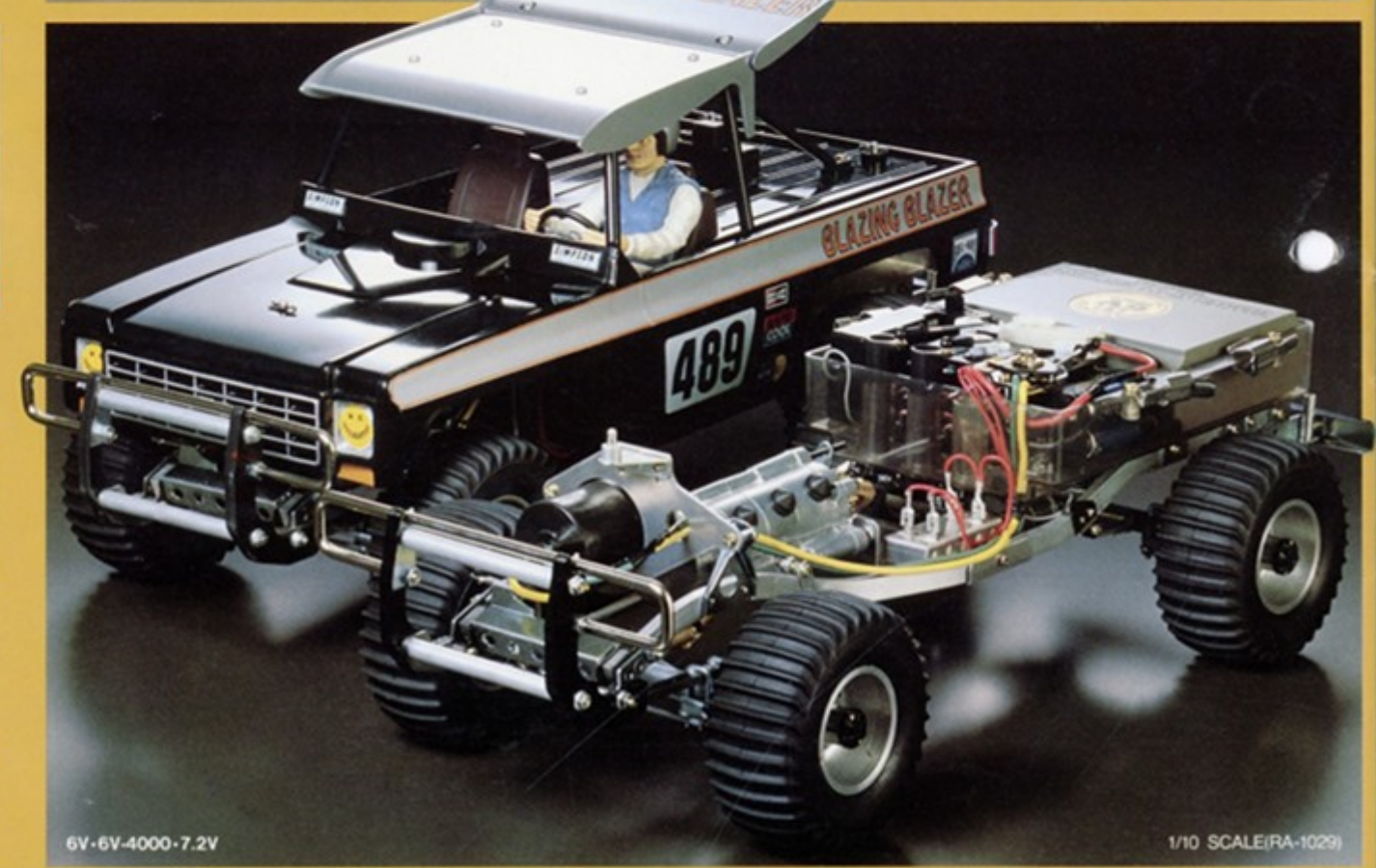
You can enjoy the thrill of sure footed four wheel driving over all types of terrain with this model. Servo controlled three speed transmission and newly designed electronic speed control ensures smooth and positive driving. Low gear, four wheel drive, plus 2 wheel drive at two higher speeds allows full flexibility, and the water resistant R/C and battery compartment provides the safety needed for all weather operation over all trail and road conditions.
About the prototype ●Using a light truck body mounted on a rugged frame, this Hi-Lux pickup truck is well known as a multi-purpose work vehicle. With four wheel independent suspension, it is widely used for recreational activities, business and pleasure.

(Model specifications) ●Scale: 1/10 ●Overall length: 500 mm ●Overall width: 230 mm ●Overall height: 200 mm ●Wheelbase: 287 mm ●Front tread: 125 mm ●Rear tread: 145 mm ●Duralumin ladder frame ●Rigid axle leaf spring suspension ●Servo selected 4 or 2 wheel drive and high or low speed 2 wheel drive ●Sealed radio control box and gear case ●RS-540S motor included ●Transistorized speed controller ●A realistic and durable body made of dense polystyrene. (Battery and R/C unit are not included in kit)

29 4×4 BLAZING BLAZER
シボレー・ブレイザー4×4

With its impressive body and large roof wing, plus three speed transmission and four wheel drive, the Blazing Blazer will provide enjoyment for the entire family. The factory assembled three speed transmission is controlled from your transmitter for positive traction on all surfaces. Up to 30 minutes of exciting driving is available with each charge of the Tamiya 6V-4000mAh battery. Chassis and all running gear are made from metal for extreme durability. Water resistant mechanism box protects your valuable radio equipment from moisture damage. Even the front wheel hubs are lockable, just like the full sized vehicle.

(Model Specifications) ● Scale: 1/10 ● Overall length: 510mm ● Overall width: 240mm ● Overall height: 228mm ● Wheelbase: 287mm ● Tread: Front 125mm, Rear 145mm ● Minimum ground clearance: 35mm ● Weight fully equipped: 4.7kg (installation of Tamiya Ni-Cd 6V-4000mAh battery) ● Tire diameter/width: 103/46mm ● Body: High impact styrol ● Frame: Duralumin ladder frame ● Suspension: Rigid axle leaf spring, oil damper available (not included) ● Sealed mechanism box and gear case ● Motor: Mabuchi RS-540S ● 3 step gear change by operating R/C transmitter, 4 wheel drive in low speed ● Front wheels with free wheel hub ● Speed control: Forward/reverse 3 step ● Power source: Tamiya Ni-Cd 6V-4000mAh or 6V, 7.2V-1200mAh battery (not included) ● Radio control unit: 4 channel digital proportional and 3 servos



31 BRABHAM BT 50 BMW TURBO
ブラバムBT50 BMWターボ（競技用スペシャル）

The slim styling of this Formula 1 racer without the front wing, makes you feel that it is running faster than the other cars. Chassis of this R/C racer is the same as used on the Tamiya Williams FW-07. With the newly designed 3 gear differential and an adjustable ground clearance this racer incorporates the latest features found in competitive R/C race cars. Ball bearings are used on the front wheels and kit contains the famous Mabuchi RS-540S racing motor.

About the prototype ● The first turbocharged F-1 machine for the Brabham team is the BT-50 with the BMW turbo engine. It made is first appearance in the South African GP in 1982. This small straight 4 cylinder engine put out 570hp and with driver Nelson Piquet at the wheel, won the 1982 Canadian Grand Prix.

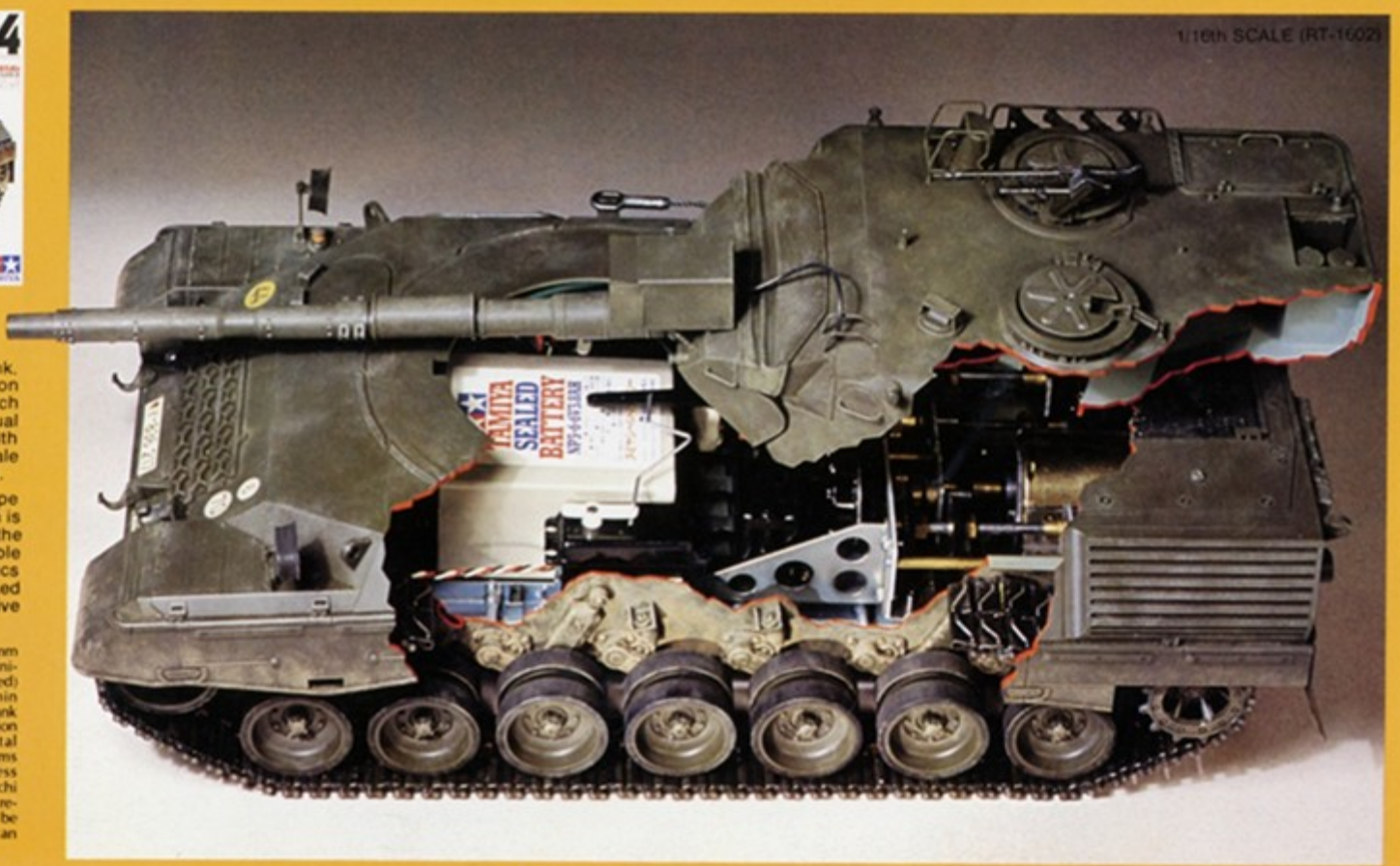
(Model Specifications) ● Scale: 1/10 ● Overall length: 430mm ● Overall width: 202mm ● Overall height: 95mm ● Wheelbase: 260mm ● Tread: Front 162mm, Rear 152mm ● Minimum ground clearance: 8mm ● Weight fully equipped: 1.35kg ● Tire diameter/width: Front 50/24mm, Rear 70/50mm ● Body: High impact styrol resin ● Frame: Center pivot type semi-floating mount system ● Speed control: Forward/reverse stepless variable speed with braking circuit ● Motor: Mabuchi RS-540 ● Gear ratio: 1/2.8, 1/3.1, 1/3.7 ● Power source: Tamiya Ni-Cd 6V battery, 7.2V battery available (Not included) ● Radio control unit: 2 channel digital proportional (not included)

2 WEST GERMAN LEOPARD A4
西ドイツ・レオパルドA4戦車

This is a model of the West German's latest tank. You will be satisfied with its excellent mobility on rough surfaces. It is a challenge to work on such exquisit mechanisms as the drive train with a dual clutch and independent suspension system with torsion plates. Also the precisely detailed scale model is very appealing when it is completed.

About the prototype ● The newest improved type of West German Leopard tank is the A4 which is one of the most formidable combat vehicles of the world. The spaced armour on the turret (double shells) gives it excellent defensive characteristics and the computerised firing control system linked with its main 105mm gun augments the offensive power of the tank.

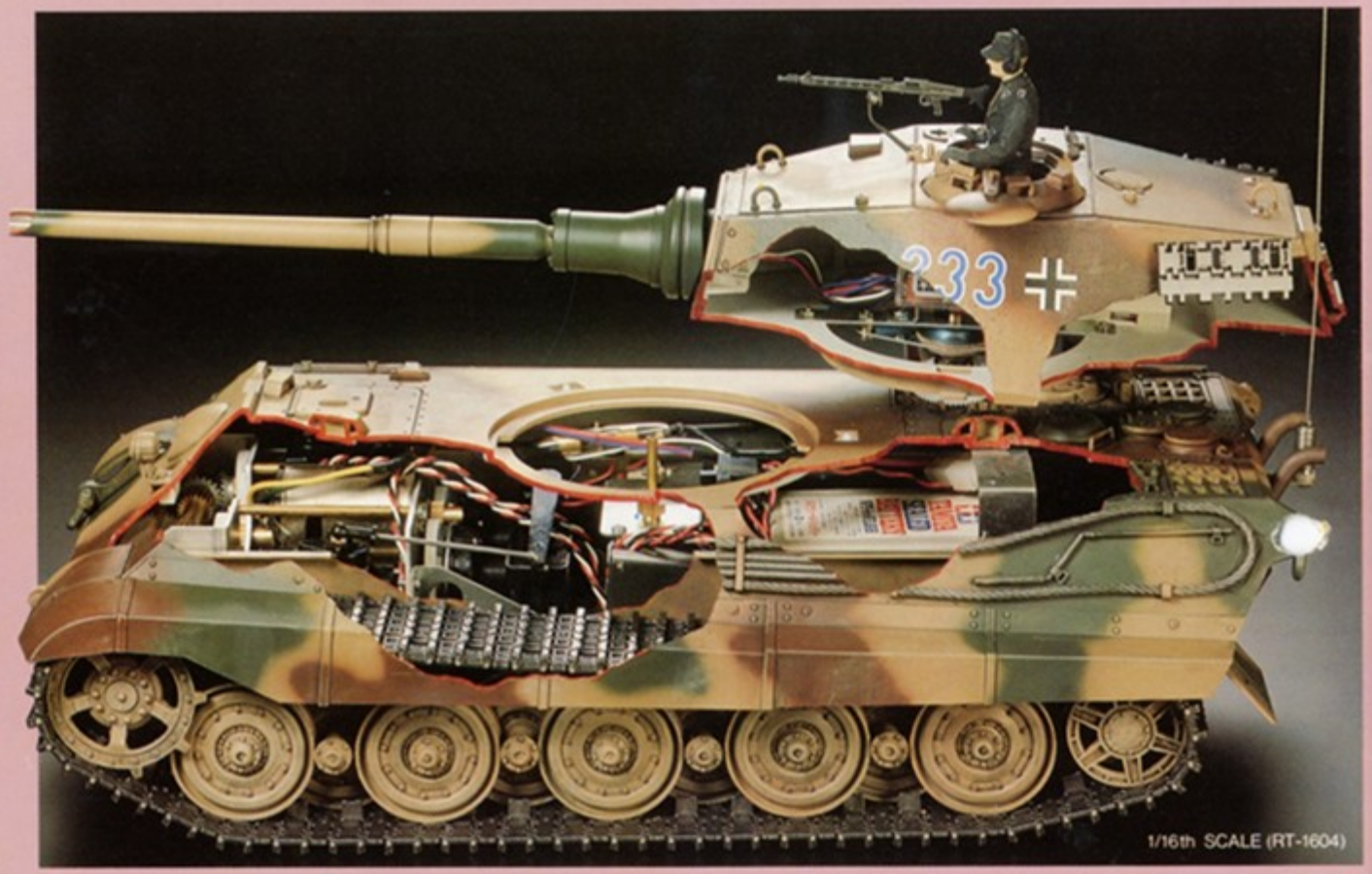
(Model Specifications) ● 1/16 in scale ● Overall 600 mm ● Overall width 216 mm ● Overall height 167 mm ● Minimum ground clearance 28 mm ● Weight (fully equipped) about 4 kg ● Body=styrol resin ● Frame=duralumin ● Motor power is transmitted through clutches. The tank can be made to run in either forward or reverse direction and simultaneously steer left or right ● Linked metal tracks ● All road wheels independent suspension systems with torsion plates and die cast suspension with stainless steel springs for prototypical operation ● Motor=Mabuchi RS-540 ● Gear ratio=1/26.7 ● Power source=6V 3.8A rechargeable storage battery ● Radio control system to be used=two channel proportional (not included) ● Tank can climb a 40 degree incline



4 GERMAN HEAVY TANK KING TIGER
ドイツ重戦車キングタイガー

An exact 1/16 scale radio controlled model of the famous German King Tiger tank, said to have been the finest overall combat tank during world war 2. Model will accept up to four channels of radio control for turret rotation and gun flashing light. A minimum of two channels is required for operation. Individually linked with metal rods, the catapiller tracks are made from a new type of plastic for long life and ease of maintenance. Chassis and suspension system is of heavy duty aluminium and cast metal.
About the prototype ●Entering the front lines late in 1944, the German King Tiger tank was regarded as the most formidable battle tank to be introduced during the conflict. Mounting the well known 88mm, model 43 gun, plus two 7.62mm machine guns, and powered by a Maybach, water cooled, V12 engine, this tank had a top speed of 14-19km/h. A total of 487 King Tigers were produced during the war.

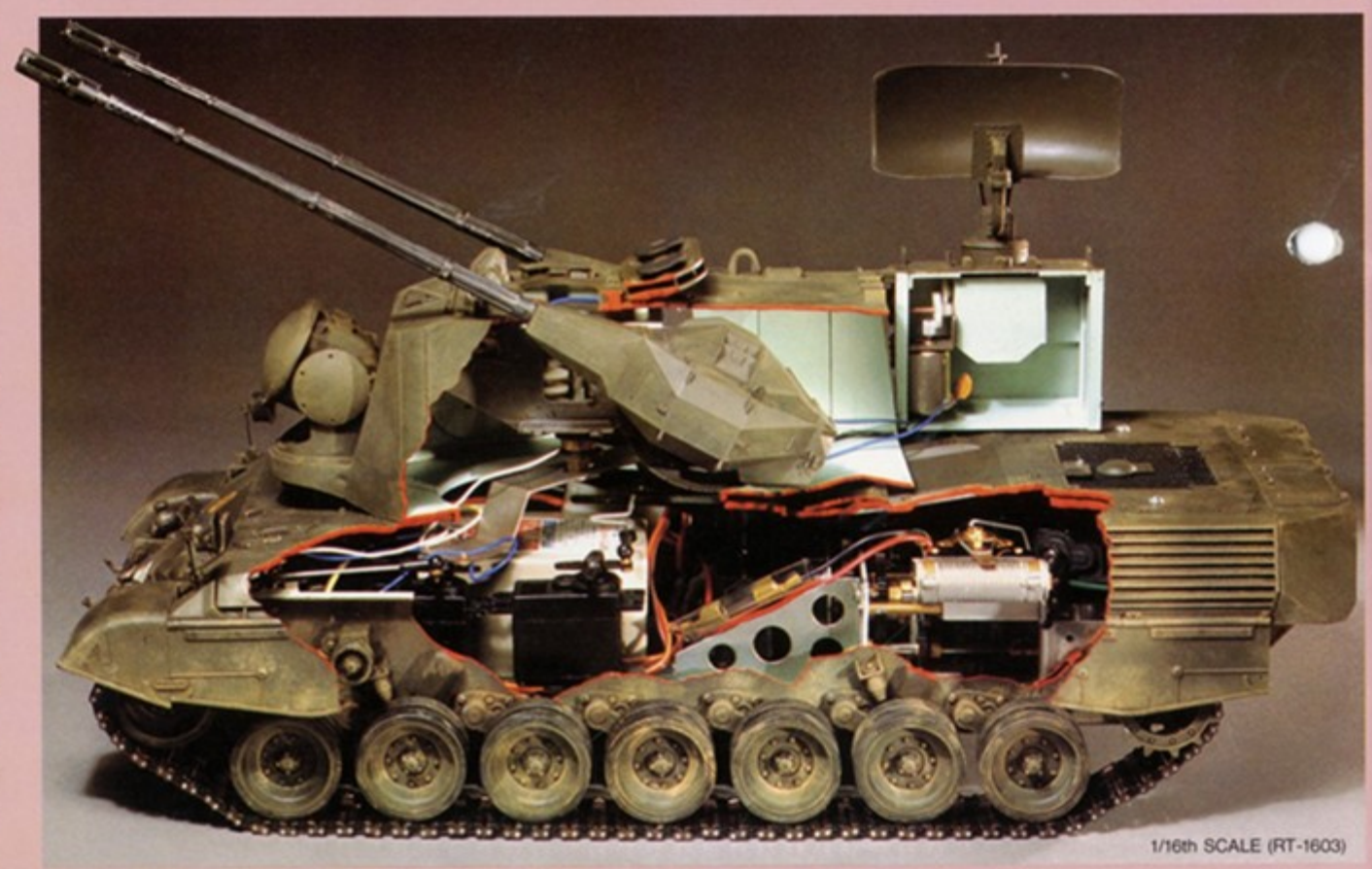
(Model specifications) ●Scale: 1/16 ●Overall length: 640 mm ●Overall width: 236 mm ●Overall height: 195 mm ●Utilizes a heavy duty aluminium chassis with torsion bar suspension ●Requires a 2-4 channel radio and a Tamiya sealed or Ni-Cd battery for power ●Servo controlled 360 degree turret rotation and gun flashing ●Strobe unit contained in kit ●Factory assembled, twin clutch drive unit with heavy duty gears. (Battery and R/C unit are not included in kit)



1/16th SCALE (RT-1604)

3 WEST GERMAN GEPARD
西ドイツ・ゲパルト対空戦車

This is a radio controlled model which can be enjoyed not only because of its dynamic maeuverability, but also because of the many unique mechanics. The turret revolves 360°, the twin guns move up and down, and the radar at the rear revolves with the movement of the turret. The tank performs pivot turns and gradual turns through a drive unit utilizing a double clutch. All wheels have individual suspension with torsion plates making it like the prototype.
About the Prototype ● The West German Gepard is the newest self propelled anti aircraft gun. It is basically the Leopard, a West German master piece tank, with the ordinary turret replaced by a larger turret with twin 35 mm anti aircraft guns which are operated under a superb firing control system which is coupled with a computer and highly advance radars. It is capable of intercepting enemy airplanes flying at super sonic speed and at low altitudes.
(Model Specifications) ● Scale: in 1/16 ● Overall Length: 495 mm ● Overall Width: 216 mm ● Overall Height: 256 mm ● Minimum Ground Clearance: 28 mm ● Weight (Fully equipped) about 5 kg ● Body: Styrol Resin ● Frame: Duralmin ● Drive Unit System: Twin Clutch Mechanism, Forward/Reverse, Pivot and gradual Turning ● Turret Revolution: 360°, Guns Movement: Up and Down, Rear Radar Rotation ● Linked Metal Tracks
● Radio control system used: 2 channel proportional system is minimum requirement (Not included)


1/16th SCALE (RT-1603)

83/84

HOW TO BUILD A CIRCUIT

1. POINTS IN DESIGNING A RACING CIRCUIT

Building a racing course, even a simple one, lets you enjoy it far better than running [illegible] in a large open space freely. You can make one very easily, i.e., by drawing lines with chalk or using empty bottles for pylons (when using a space of someone's possession, like a parking lot; of course, permission should be acquired beforehand). To make races more fun, some knowledge of courses are required.

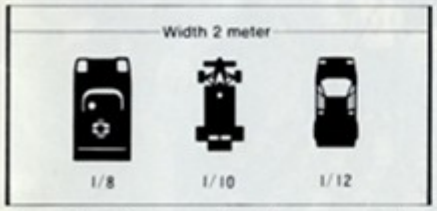
2. A TRACK BEFITTING THE CARS

You cannot expect a thrill of excitement in running cars along a too wide circuit. In a too narrow track, you cannot enjoy speedy driving. The maximum speed of 1/12 electric R/C cars is around 30 km/h and the width of the car body is about 20 centimeters. Based upon these figures, the following designing data will be introduced:

- The length of a course is 100-150 meters.
- The width of the course is 3-4 meters.
- The length of a straight way section is [illegible]0 meters.

The maximum speed of 30 km/h comes to a little over 8 meters per second. Taking the slow down at corners into consideration, the car will make a round of a 150 meters long circuit in about 15 seconds. In the Tamiya Circuit, a round of the longest course out of the possible selections measures about 140 meters. A race is held by making three rounds. The average time required is approximately one minute. This is a rather long time to a racer, as he has to apply all his energies in the control of his car.

• COMPARISON OF 2 METER WIDE COURSE AND MODEL CARS



The width of the road should be desinged from the size (breadth) of the models. The 1/12 cars are 20 centimeters wide. So having 10 centimeters in between cars, then 2.5 meters of width is required for 8 racing cars. If a way should be established in that all cars do not start from the starting line in a row, a narrower width of the course would be permissible. But for avoiding collisions and bumping while passing each other, the breadth of over 2 meters 50 centimeters is desirable. The Tamiya Circuit is 4 meters wide (sometimes 3 meters), but still it does not look too broad. There should be at least one portion of a straight line in a course where cars are allowed to run at their maximum speed. The longest straight in the Tamiya Circuit is 42 meters long. 1/12 electric cars can cover this length in 5 seconds or so. Here, on this straight, the racer can take a breather. A longer straight course, depending on cars' ability, may be desirable. A drag race can be held in a straight of over 40 meters to contend for 0-400 meter pick-up performance (converted in 1/12, it should be about 33.4 meters.)

3. TRACK CHARACTERISTICS ARE DETERMINED BY CURVES

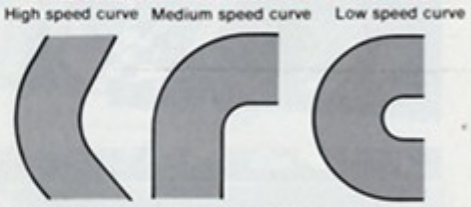
Circuits are roughly classified in two groups; a high speed course where velocity is important, and a low speed course where control techniques are more important. The features of a track are formed with the number and characteristics of many curves. An ideal circuit conceivable is a mixture of high and low speed courses for 1/12 electric model cars which boast of excellent maneuverability due to the differential gear device equipped.

- Assorted curves should be incorporated.
- Vertexes of curves should be made with some bluntness.

Curves can be divided in three groups in terms of passing speed: High speed curve which a car can go through with almost no deceleration, medium speed curve where some slow down is required, and low speed curve. And in terms of layout, a simple curve is one built with a single radius, and a complex curve consists of multiple radii. Straights between curves are also influential. With all these features being incorporated, quite a challenging circuit can be made with curves of different characteristics.

Please refer to the illustration of the Tamiya Circuit and the drawing left for the individual feature of curves. Also, note the point of vertexes are made not too sharp. According to the data gathered at the Tamiya Circuit, cars are apt to deviate from the course towards the outside at high speed curves and inside at low speed curves. The road surface of the curves have been modified accordingly.

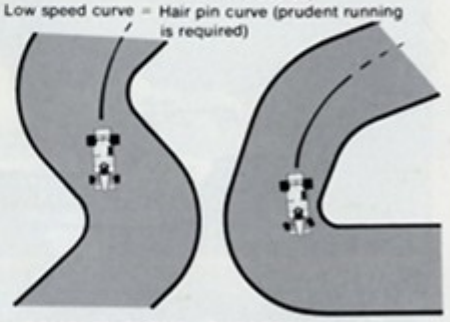
• KIND AND CHARACTERISTICS OF CURVES



High speed curve = Cars can pass through at high speed (challenging running)

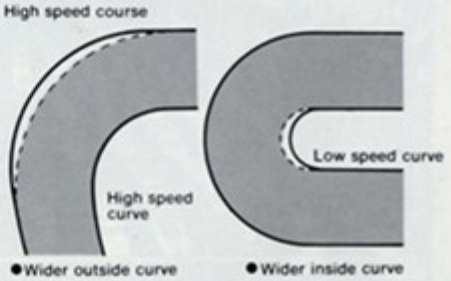
Medium speed curve = Some slow down is called for (this is where passing is done. Many car will be spinning and leave the course)

Low speed curve = Hair pin curve (prudent running is required)



• COMPLEX CURVE - SUCCESSION OF MULTIPLE CURVES

Try to anticipate the course ahead.
Watch for places to pass skidding opponents.

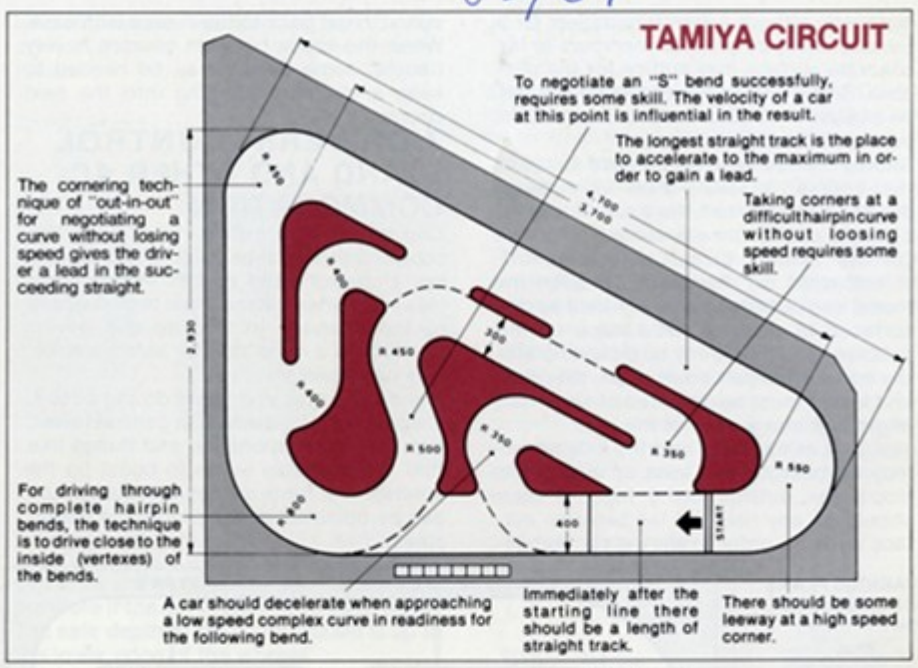


4. FROM A DRIVER'S VIEW POINT

The biggest difference between the real car and the radio controlled model is, of course, the position of drivers. Hence, the following hints have been brought about:

- Portion of a circuit away from the drivers should be made broader.
- Complex course layout is not to be built away from the drivers.
- A circuit is to be designed with consideration from the driver's vision.

The farther away from the driver, the narrower the course looks because of parallax. It could be some problem to drivers. To compensate for this, this particular portion of a circuit should be widened. In case of the Tamiya Circuit, the opposite side of the track to the driver's stand is 4 meters wide. One meter wider than the near side. For the same reason, it is not recommended to design a course with complex curves where meticulous controlling is required a distance away from the driver. Some bridges and gates on the circuit are very useful auxiliary articles to make the circuit lifelike; however, again, attention must be paid not to block the view of curves from the driver's sight.



5. TO MAKE A RACE MORE ENJOYABLE

Most of the electric cars have the same or similar performance, so there is a likelihood that they could collide if there is a sharp curve right after the start of a race. Therefore, it is recommended that some length of straight running be available just after starting. It is not necessary to have the circuit at one level. On the contrary, some undulation and a leaping slope or two may be useful to add to the course more variety and making the race more enjoyable, unless these objects would hide the car from their vision.

6. TRACK SURFACE AND COURSE SIDE

- The pavement of the track need not be very smooth.
- Drainage is important.
- Lawn is ideal for course side.

Pavement of simple surfacing asphalt is

adequate without a firm foundation. Or a Sunday chore by the club members to lay concrete surface may suffice for the purpose. Some uneveness and slope will not be a cause of trouble, but drainage should be planned carefully.

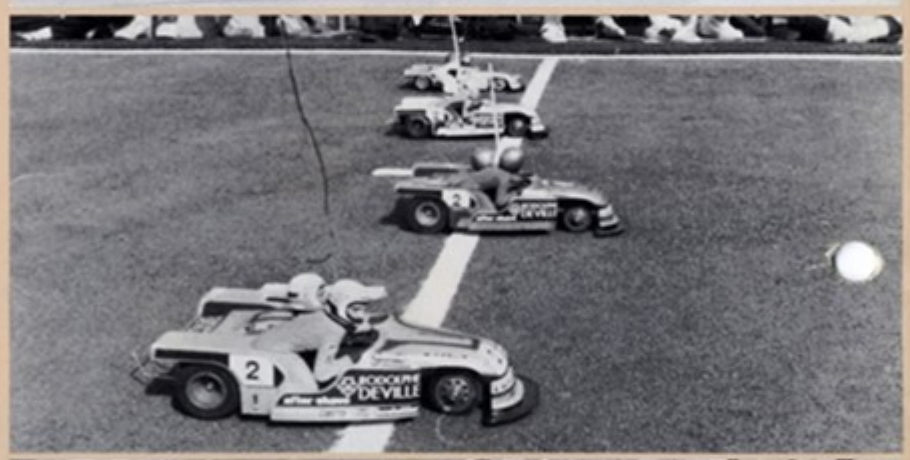
Shortly mowed lawn on the side space of the course is ideal when considering deviation of cars from the track. However, it would call for time and care to grow. On the Tamiya Circuit, artificial turf is employed on the space between the roads, and outside spaces are kept as dirt surfaces. In cases of dirt surface, all the pebbles should properly be picked up and the surface tamped down. Also, tall grass and leaves must be disposed of since they might jam into a shaft of the car.

The joint of the track and the side space may be built on one level or in a gentle slope, the outside being high, if there should be any rise and fall between surface levels, in order to allow a car that deviated to get back to the course with ease. When the space between courses is very narrow, some device may be needed to keep a car from jumping into the next course.

7. DRIVERS CONTROL STAND AND OTHER ACCOMMODATION

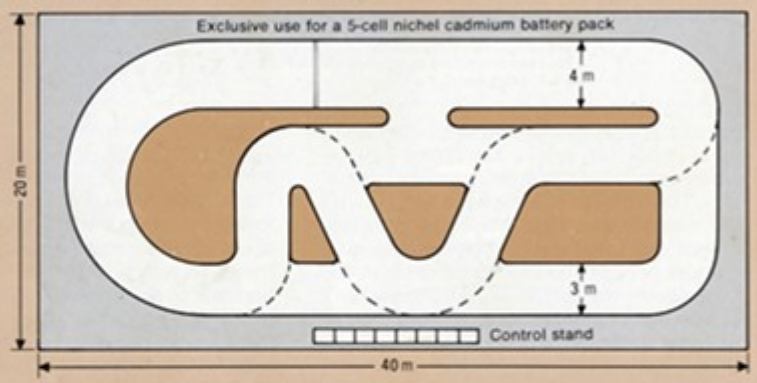
The larger a circuit is, the taller the control stand must be. The Tamiya Circuit has a control stand of 1.20 meters high. However, when a stand is too high, it would be inconvenient to step up and down. Sometimes a hand rail, for safety's sake, may be necessary.

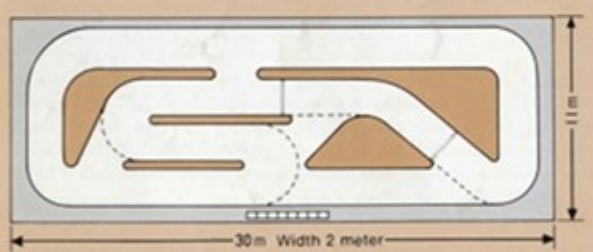
Besides bridges and gates on the circuit, a signal light for starting, a control tower, sign boards of sponsors, and things like that are desirable so as to boost up the atmosphere; hints of such auxiliary props can be obtained in car and racing magazines.



VARIOUS PLANS OF CIRCUIT LAY-OUT

1 LARGE CIRCUIT

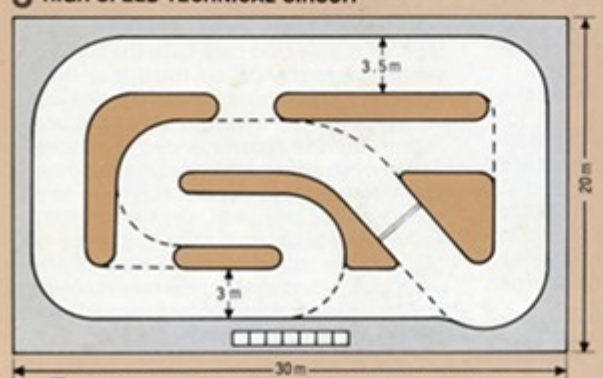




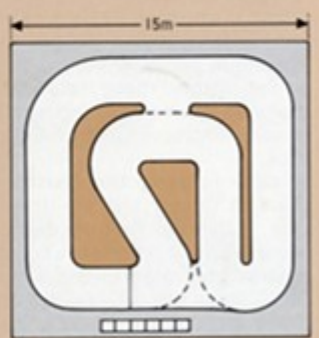
2 LONG AND NARROW CIRCUIT

Suitable layout for long narrow space, several curves can be possible

3 HIGH SPEED TECHNICAL CIRCUIT

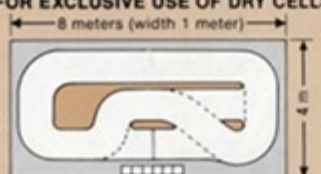


4 SQUARE



Width of course over 2 meters

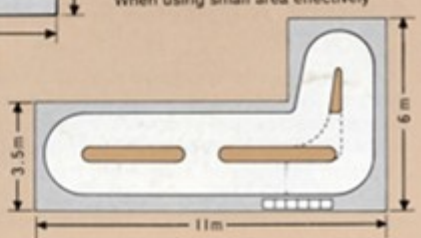
5 CIRCUIT FOR EXCLUSIVE USE OF DRY CELLS



Small but 3 possible courses can be selected

6 SMALL CIRCUIT

When using small area effectively



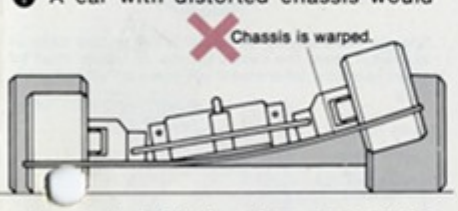
BUILDING A HIGH PERFORMANCE CAR

Even the same type of radio controlled car kit may produce much diversified performances and characteristics in accordance with a way it is assembled and adjusted; for example, some cars are easy to control and some are not so easy as others.

1. FUNDAMENTAL REQUIREMENT IS THAT THE CAR RUNS STRAIGHT

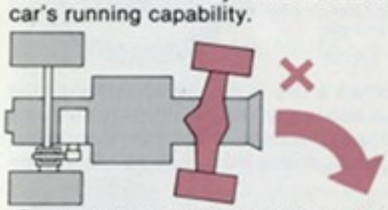
Even with a real automobile, moving in a straight line is the essential condition. A model should be so adjusted that it takes in a beeline for 5 meters or so without touching the steering wheel. A car which does not go straight cannot be controlled easily. Note the following points:

❶ A car with distorted chassis would

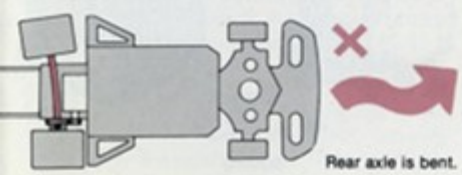


not go straight; therefore correct the chassis so that the four wheels should touch the ground evenly. Particularly after collision, look into it carefully.

❷ If any wheel should not rotate smoothly, the car would turn in the direction of that wheel. Assemble a car with care so all wheels revolve evenly. This is related to car's running capability.

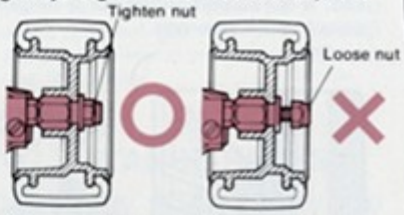


❸ If a front axle is not set parallel to the rear axle, the car will steer crooked.



❹ With a bent rear axle the car will keep turning.

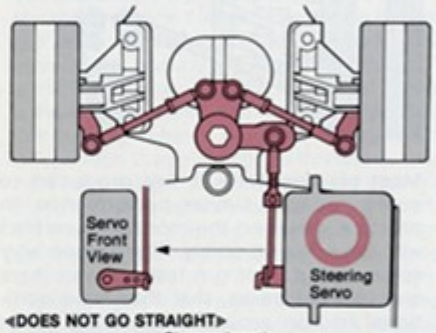
❺ When a wheel is not secured firmly with the nut, the car may be going in a zigzag way. Tighten the nut to keep the



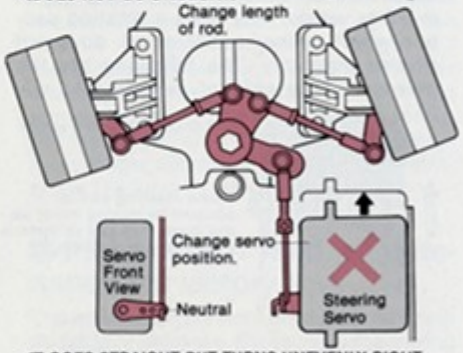
wheel in position in such a way that there is no play between the wheel and the axis, but still allows the wheel to turn smoothly.

❻ The steering servo and servo horn should be arranged so that the front wheel will head forward right and the attitude of the servo horn is parallel to the front

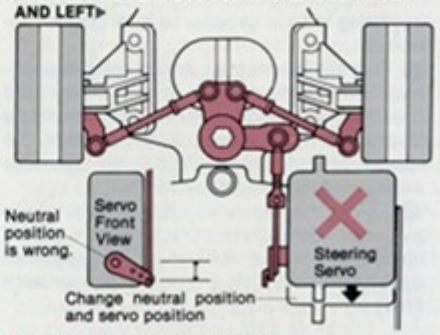
GOLF, RENAULT 5 (TOP VIEW)



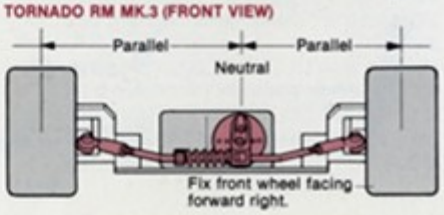
《DOES NOT GO STRAIGHT》

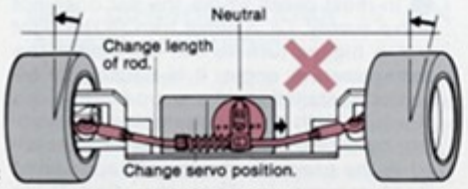


《IT GOES STRAIGHT BUT TURNS UNEVENLY RIGHT AND LEFT》

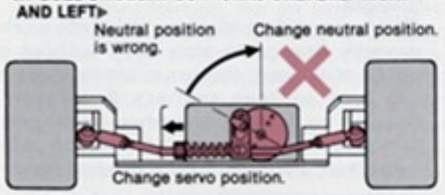


TORNADO RM MK.3 (FRONT VIEW)

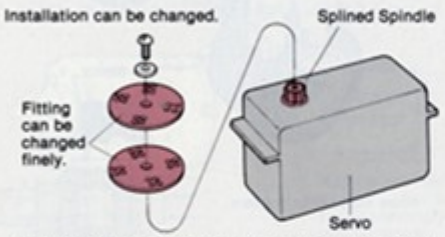




《IT GOES STRAIGHT BUT TURNS UNEVENLY RIGHT AND LEFT》



wheels (some cars requiring a right angle), when the steering servo (consequently the steering stick and trim lever) is in the neutral position. When this arrangement is not right, the car would not go straight or it will change its course

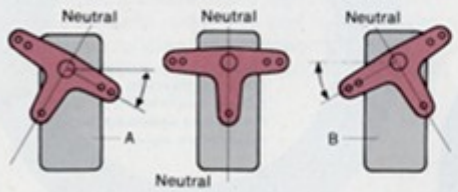


unevenly to right and left. Being installed with a screw, servo horns can be readjusted by unscrewing.

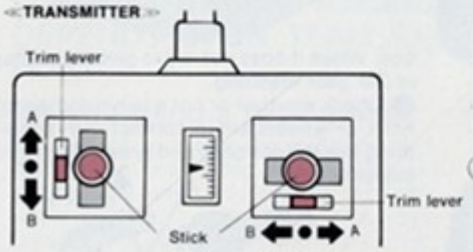
❼ Try to mount radio control units and batteries into a car, balancing the car evenly.

❽ Be careful that tires and steering linkage will not rub against the body. Lastly, have a test run to see if it advances in a beeline. If not, adjust it with the trim lever on the transmitter. With the trim lever, you can do the fine adjustment of servo

《SERVO HORN MOVEMENT》

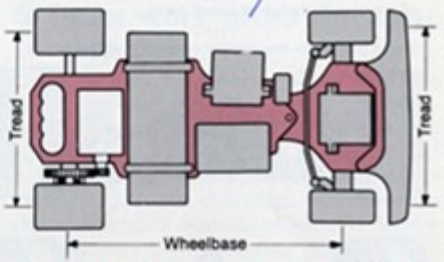


《TRANSMITTER》



movement, having the same effect of shifting servo position.

(HINT) A car with long wheel base in relation to tread has stability and tendency of going straight.

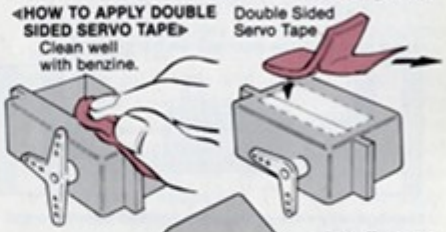


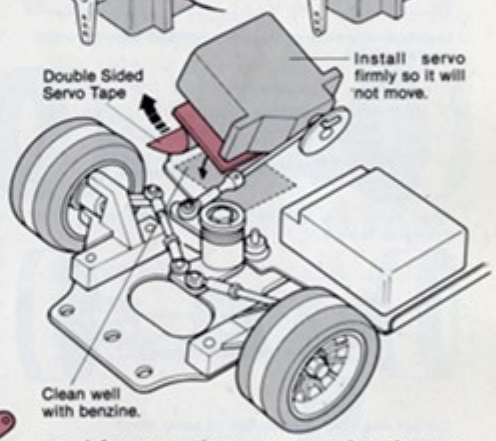
2. HOW YOUR CAR TAKES CORNERS

A car which goes straight is easy to control in principle. Such a car should have no peculiar action when taking corners. Cars with a peculiar way when turning can be corrected in the following ways.

❶ The direction of front wheels are controlled by the movement of a servo. In case a servo is not secured in position firmly, the car tends to be unstable having a jittering or not responding to the control properly, or turning unevenly right and left. When dual-sided adhesive tape is

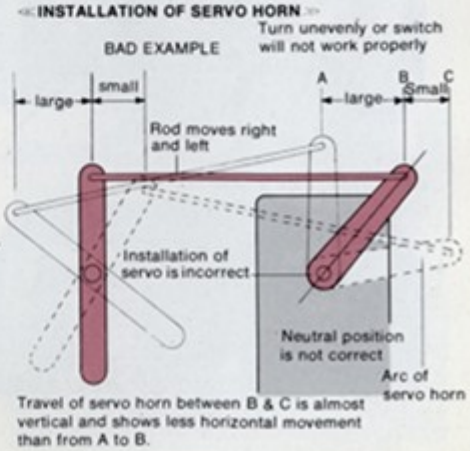
《HOW TO APPLY DOUBLE SIDED SERVO TAPE》





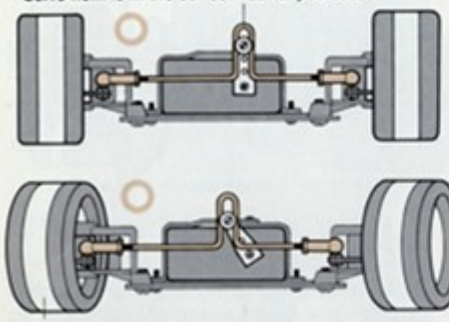
used for mounting a servo, wipe the surface of the servo with cloth dampened with benzine or solvent carefully. (Lacquer thinner may dissolve servo cases.)

《INSTALLATION OF SERVO HORN》

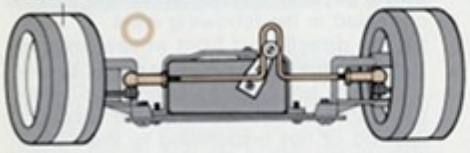


(Correct installation of servo horn)

Servo horn is in the correct neutral position.

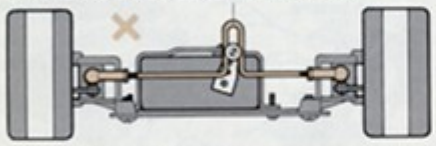


The steerage of the right and left tyres corresponds to the arc of the servo horn.

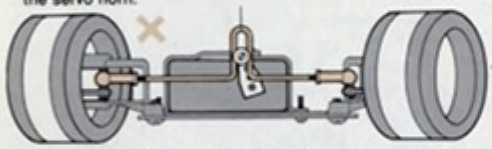


(When servo horn is installed incorrectly)

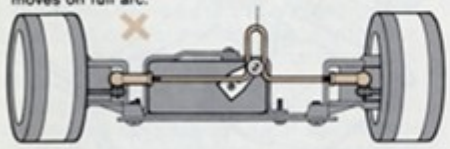
Servo horn is in the incorrect neutral position.



Steerage of tyres is improperly amplified from the arc of the servo horn.



Tyres move only a little even when the servo horn moves on full arc.



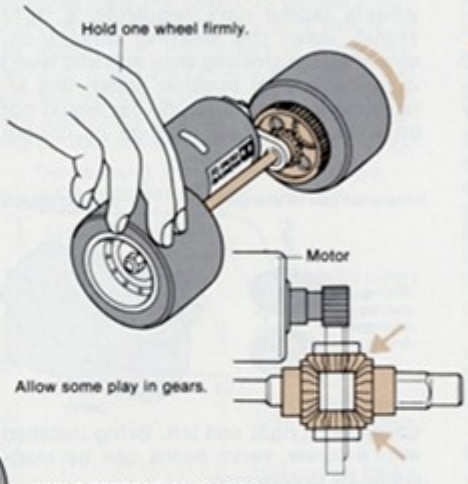
Correct example (installation of servo horn)

Bad example (installation of servo horn)

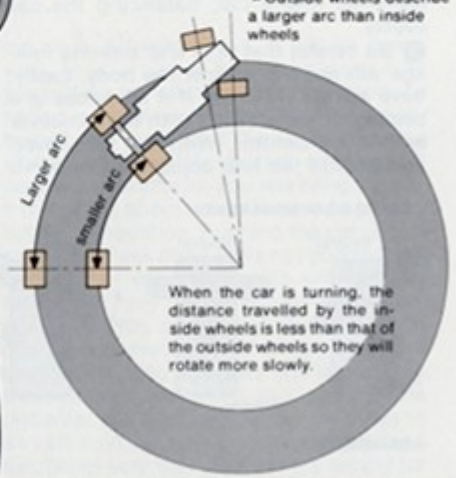
❷ In most cases where the car does not curve evenly, i.e. a small turn to the right and a bigger turn to the left under the same steering angle, it is caused by incorrect installation of a servo horn to the servo. In such a case, straighten the problem by taking the procedures as per stated in the previous chapter "Fundamental Requirement is That the Car Runs Straight".

❸ When a differential gear does not work properly (the same state as if without a differential gear), the car is apt to make a big turn or take corners awkwardly. Check it by holding one wheel firmly and turn the other wheel; smooth rotation indicates the differential gear is in good condition. When it does not, try to give some play in the gear meshing.

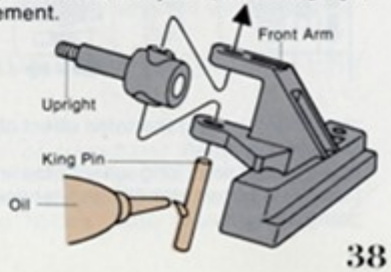
«CHECKING DIFFERENTIAL GEAR»



«WHY DIFFERENTIAL IS USED»

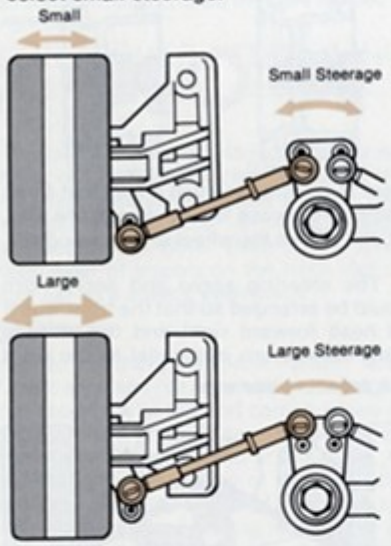


❹ Check whether or not a servo rod, servo horn, or wheels are in contact with something like the car body and preventing right movement.



❺ Oil the king pin of the front wheels. Steering will then operate lightly.

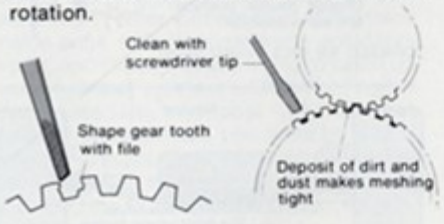
(HINT) Steerage (degree of changing direction of front wheels) can be varied by shifting the connecting point of the servo rod. It is recommended for a beginner to select small steerage.



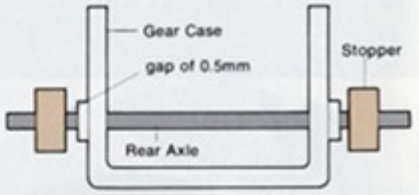
Most electric car kits are produced to come out with similar performance. In practice, however, the models assembled will show varied ability. The reason why some cars do not run faster than others are, in most cases, that they have additional friction around the rotating parts; in other words, they have a rotating section which, either partly or all, does not revolve smoothly. The following are the points to take care of, needless to say applying oil or grease to the places required.

❶ Furnish some play in the meshing between the pinion gear of the motor and the differential gear. Too tight meshing degrades the rotation and hampers the speed; on the contrary, too loose meshing would damage the gear teeth.

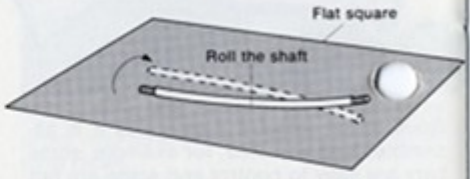
❷ Clean the surfaces of gear teeth with a used toothbrush or scrape them with the tip of a screwdriver if there is any deposit of dust and dirt which would kill the smooth rotation.



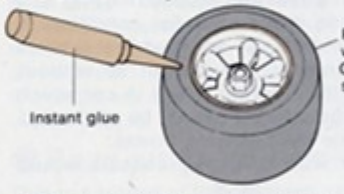
❸ A chipped or deformed gear tooth will diminish the rotation. Particularly a brass gear is easily warped; in such a case, reshape it with a file carefully.



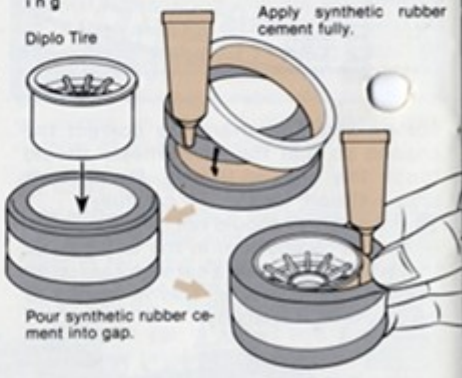
❹ The collar should not be located against the bearing too tightly. Secure them in such a way that there is some leeway so that the shaft would move slightly right and left.



❺ A bend in the rear shaft will be a cause of unstableness of the car, especially when running at high speed since it may make the car slower compared to other cars. The bend can be found out easily by rolling the shaft slowly on a flat surface.

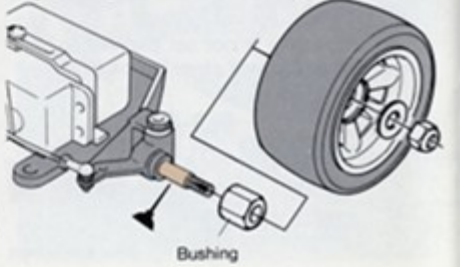


Sponge tyres should be glued firmly. In the case of sandwich tyres, the centre portion of rubber must be glued carefully, otherwise it will come off when corner-i n g



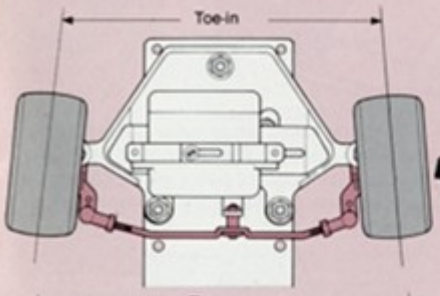
❻ When a tire is not glued firmly or the wheel hub is warped, the effect is the same as if the axle is bent; the car cannot go fast.

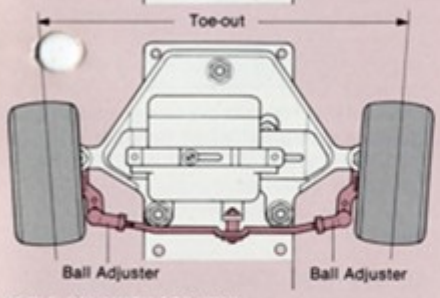
❼ Oiling of the front axle is often over-



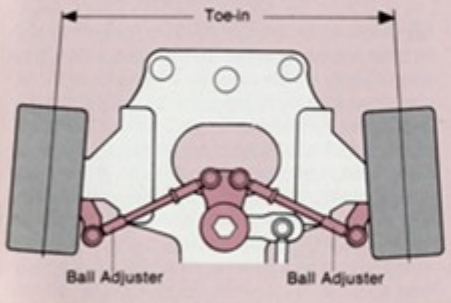
looked. Do it without fail. Poor rotation on the front wheels influences the car's speed more unfavorably than you may think.

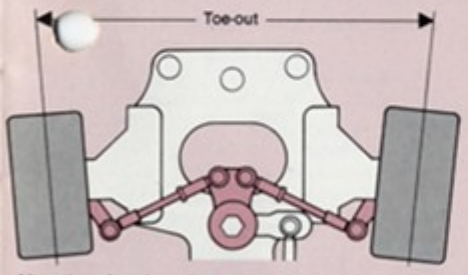
❽ Improper toe-in and toe-out adjustments are resistant to the car. The model car runs well without toe-in and toe-out or with a few degrees of either.





≪GOLF, RENAULT 5 TOP VIEW≫





Alteration of toe-in and toe-out can be made by altering the ball adjusting joints. Adjust it as illustrated below. The 5068 Ball Adjusting Joint Set may be fitted on other model cars.

≪ADJUSTMENT OF THE LENGTH OF THE ROD≫

The length of the rod is shortened by turning clockwise.

The length is extended when turning anti-clockwise.

DAILY MAINTENANCE

Daily up-keep of your cars is important for maintaining performance. This will help you to find any possible defect. Without daily care the capabilities of acceleration and maximum speed of your models can deteriorate. Keep your cars in the best condition possible at all times.

1. CARE AFTER RUNNING

After running your model be sure to clean it and carry out any necessary repairs ready for the next time you wish to run the car.

ATTENDING TO CONTROL MECHANISMS

The radio control units and switches will be covered with dust after the model has been running. The contacts of the switches must be cleaned in order to avoid poor contact. Any component damaged or out of position must be replaced or repositioned. Dry cells may be in need of exchange. Also check the batteries of the radio control units. As a general guide, the receiver batteries are exhausted sooner than those of the transmitter. Inadequate batteries tend to be a cause of many breakdowns.

DIRTY COMPONENTS AROUND THE CHASSIS

After a day's activity, all parts and sections around the chassis will be in a dirty condition. Look particularly at the moving parts; any foreign objects in the bearings influence the rotation of the wheels. For inaccessible places use Tamiya Oil Spray, which has a detergent effect and is very useful for cleaning. Check if any nut or bolt is loose and oil all journal sections. See if the rear axle is bent; replace if necessary.

DAMAGE TO BODY

Radio controlled racing cars are not only for running, but are also fine scale models. It is certainly not recommended to run the cars without a windscreen, with a door broken, or with a big hole on the body or any similar damage. Always keep your model in the best condition possible. Items you will probably need for repairing are plastic sheet and different kinds of glue. Synthetic rubber cement and instant glue are useful, as well as plastic glue.

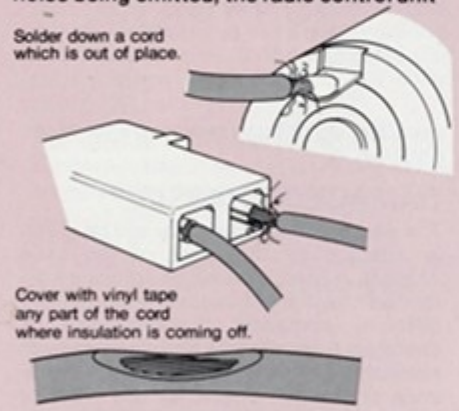
2. TO KEEP YOUR CAR AT PEAK PERFORMANCE

Parts will wear out or become broken after periods of high speed running and use. Replace any damaged parts and keep your model constantly rejuvenated.

MAINTENANCE OF ELECTRIC SYSTEMS

•REPAIRING ELECTRIC WIRE

The electric wire is able to withstand to some degree moisture and stretching. Accidental contact of exposed wires will result in a short-circuit, which may damage the battery, motor or switch; sometimes causing components to burn up. A wire out of place may jam into a shaft of the car. When the wiring of radio control units or antenna becomes short-circuited, or when the wiring of a car rubs against a gearcase or other parts which results in a noise being emitted, the radio control unit

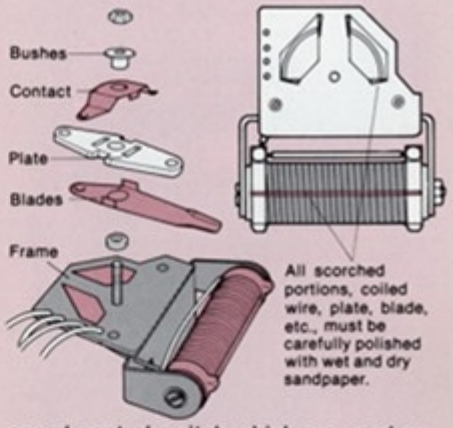


will be disturbed and will not operate correctly. If the insulation should come off any part of the exposed electric cord, it must be mended immediately and thoroughly. Any joins in the wiring about to break should be rejoined firmly, preferably by soldering. If a radio control unit or antenna should fail to work correctly, it must be repaired by a competent radio repairer.

• POOR CONTACT OF WIRING

Since it draws a lot of current, the speed control switch when it sparks will scorch its contact points. This scorching will, after a while, cause poor contact. The points of the connectors and switches must be polished once in a while to allow electricity to flow with less resistance. Most poor contacts in the connectors may be repaired by a screw driver; refer to the chapter headed "Trouble Shooting." Scorched contacts of a switch should be carefully polished with very fine sandpaper. Metal contact surfaces wear away after repeated use, particularly ones in a

Exploded view of stepless variable speed switch



speed control switch which are used excessively, and should be replaced after some period of operation.

MAINTENANCE OF MECHANISM AND CHASSIS

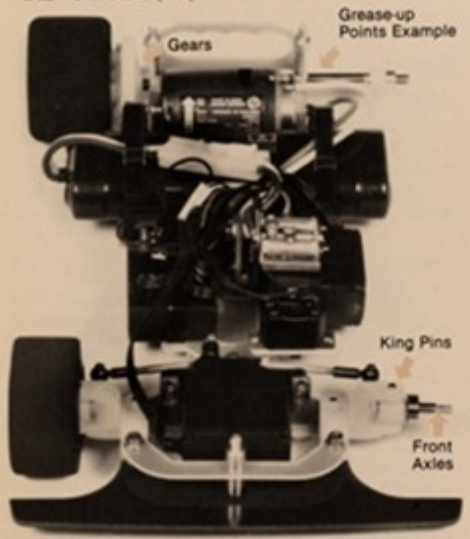
• LOOSENED INSTALLATION OF RADIO CONTROLLED UNITS

The adhesive power of double-sided tape is much reduced after one application. If the tape is reused to install servos or receivers, the units will be moved out of position due to accidents or vibrations. Loose bolts and nuts fixing the servo bands and servo trays may result in inaccurate control of the car. For installing steering servo and speed control servo firmly, renew the tape and tighten loosened bolts and nuts. Keep the double-sided adhesive tape in a cool and dry place, otherwise its adhesive properties may deteriorate. On the other hand, if the tape applied will not come off easily, wipe with a cloth dampened with benzine or water. The same cloth moistened with benzine assures strong adhesion if used to clean the surfaces of objects, i.e. servos and servo mounts, before applying the new tape.

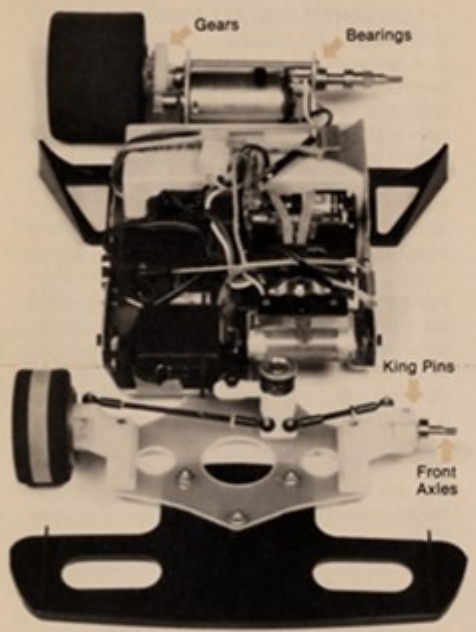
LOOSENING AND DETERIORATION OF BOLTS AND NUTS

Nuts and bolts are indispensable assembly parts and can become damaged during the running of the car or by misuse. Screws tightened excessively may twist off, or the thread may become worn. Bolts can be bent during collision and if not replaced could snap off during racing with disastrous results. Therefore, it is sensible to always change any bolts and screws that are bent, cracked or damaged in any way, before the next race.

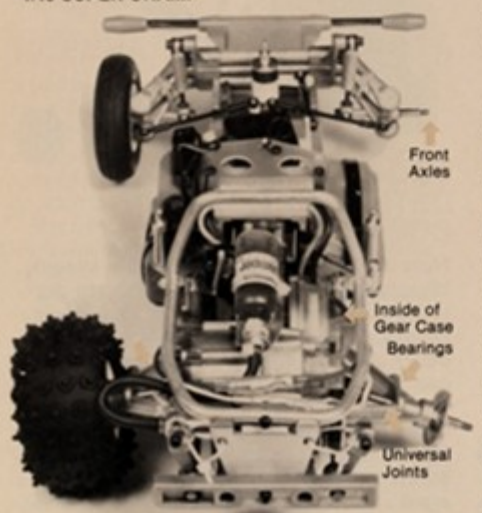
1/12 TORNADO (RM)



1/10 BRABHAM BT-50 BMW TURBO (CS)



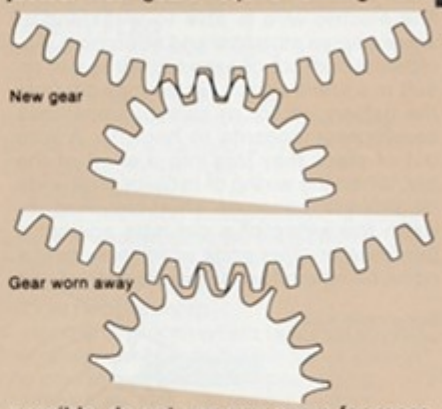
1/10 SUPER CHAMP



Check that all nuts and bolts, including lock nuts for fixing the shafts and all other small screws, have not slackened. Retighten if necessary.

MESHING OF GEARS

The gears play a vital role in transmitting the motor power and they are subject to wear. Any dirt and dust between the gear teeth will act as a file and abrase the surfaces and any such deposit should be removed carefully. Occasionally, gears may be broken by small pebbles and these must be replaced. Your car will run much better if regular attention is given to the careful cleaning etc. of the gears. Check that the gears have not worn away so that they have to much play and cannot be adjusted. New gears require running in. If



possible, do not use new gears for races until run in.

DAMAGED CHASSIS

The performance of your car will be greatly affected by the state of the car's chassis. A bent, warped, or otherwise deformed chassis will cause the car to have different cornering characteristics. A damaged front chassis and gearcase will similarly adversely effect the performance of the car. Check for any twist or bend of the chassis by placing it on a flat surface. Some twisted chassis may be reformed. A crooked chassis may possibly be repaired by pounding with a plastic hammer. However, this may weaken the structure and make it impossible to fit perfectly.

• GREASE-UP POINTS

It is necessary to grease around the front and rear axles where parts rub against each other to reduce friction and abrasion. After races, besides checking of structural or mechanical parts, it is important, especially after races in the rain or through puddles, to look for signs of rust on metal parts and to check if rotating parts require oil or grease. Correct lubrication gives not only smooth rotation of wheels, but also allows proper adjustment to the steering and gives smooth operation. Lubricate the meshing of the gear teeth, suspension systems and around the rear axles which are influential in giving effective power transmission. The Tamiya Oil Spray is very useful for taking care of these sections.

TROUBLE SHOOTING

1. WHEN THE CAR FALLS TO MOVE

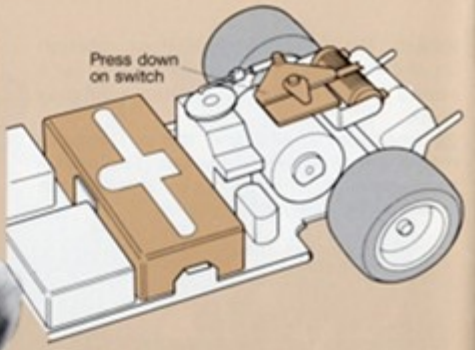
❶ See if the switching servo operates properly. If not, you may have neglected to switch on either or both your transmitter and receiver, or your batteries are dead. You may have even failed to install batteries. Also, the wiring between the receiver switch and the receiver or between the receiver and the servo may be disconnected. Inoperative radio control units can be detected by replacing them with another unit.

❷ Remove the pushrod between the speed control switch and the switching servo. If the servo operates correctly, then the method of installing the rod, or the position of the servo may be wrong and excessive resistance may hinder the movement of the servo. Something may also be in the way of the movement of the speed control switch. Please also refer to (2-❶) in "When the Car Does Not Gain Speed" for methods of mounting a servo correctly.

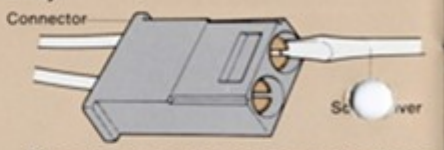
❸ When the switching servo and the speed control switch are operative and the motor does not rotate, see if the batteries are fresh or charged, and the fuse is in good condition. If the fuse is blown, repair the short circuited portion, referring to "Causes of Blown Fuse" before replacing the fuse.

❹ Remove the motor from the gearbox and see if it will run. If it does, the meshing of the gears may be too tight, or the rear axle or the drive shaft may be seized. Remove the axle or shaft and carefully polish the seized part with sandpaper and lubricate it. Determine if the axle or shaft will revolve smoothly in the bearings. "For Speeding Up" in "Building Up a Car of High Running Capability" is good reference material for this.

❺ When the motor is removed from the gearbox and does not run, incorrect wiring, or poor contacts in the battery box, switch, or in the connectors are possible. Check the wiring first. If nothing is wrong with it, press down on the battery box, switch and connectors. If the motor starts to run, it indicates that the component pressed on may have a poor contact or connection.



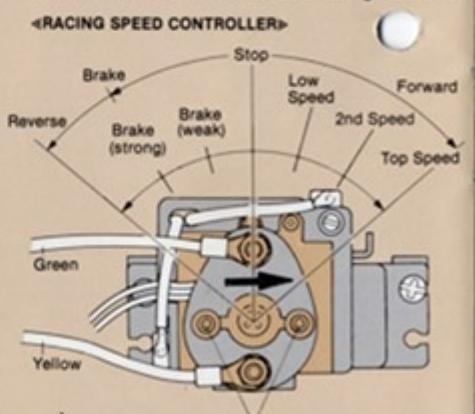
*The connector may wear out and develop a bad contact after repeated use. Crimp the tubular contact point using the tip of a screwdriver to make the contacts slip in firmly.



Since the motor is precision made, it can become damaged when dropped, dipped into water, short circuited, or connected to too many batteries.

2. WHEN THE CAR DOES NOT GAIN SPEED

❶ Make sure the speed control switch operates properly. If the switch goes into high speed only in the reverse position, or when manipulated by hand with the servo rod disconnected, the neutral position of the servo may be out of adjustment. Adjust it with the trim lever of the transmitter. After that adjustment, if it does not shift into the reverse speed but it works correctly in the forward setting, see if the servo and the servo rod are installed correctly as illustrated below so that the switch blade can go all the

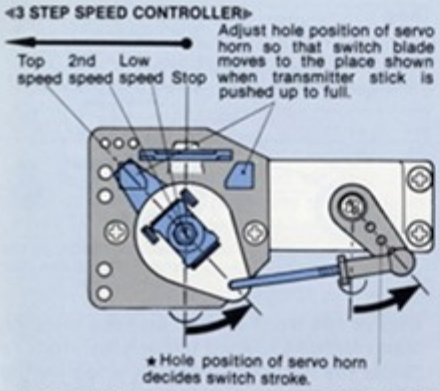


If the switch blade does not make contact with the top speed position, loosen screws and move switch arm in direction of arrow. Operation angle of the servo horn must be at least 37 degrees. If less, you may not put vehicle into reverse speed if you have adjusted the blade for contact with the top speed position.

★This new type of speed controller has the switching plate connected directly to the servo horn. Make sure that the connection wires are free to move with the servo horn, and not obstructed in any way.

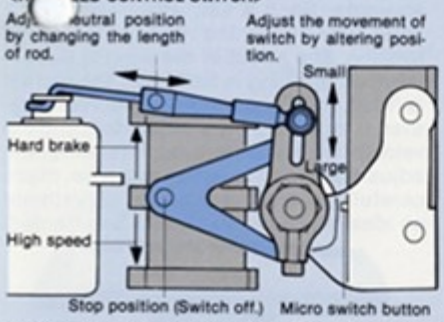
83/84

<3 STEP SPEED CONTROLLER>



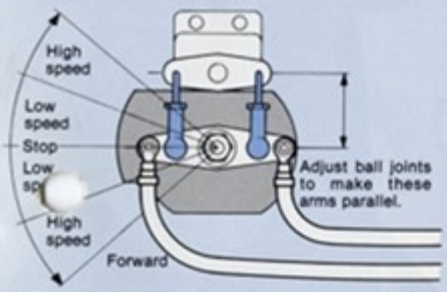
★Adjust the height of servo horn and switch plate as even as possible. Bad contact happens in top speed position, if the difference between the two is large.

<SPEED CONTROL SWITCH>



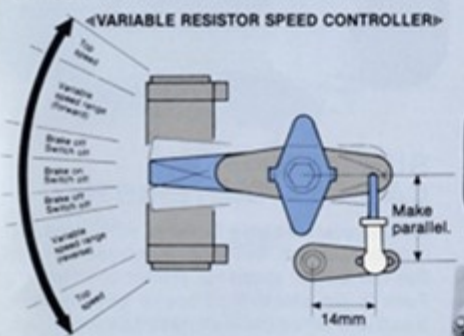
★Micro switch works when the wiper arm rests on the top speed position.

<BUGGY SWITCH>



★Wires move with switch plate and are required full length. If they are restricted by the battery, contact can be bad and control difficult.

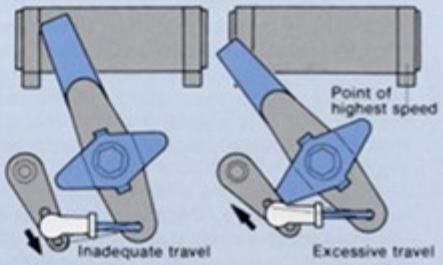
<VARIABLE RESISTOR SPEED CONTROLLER>

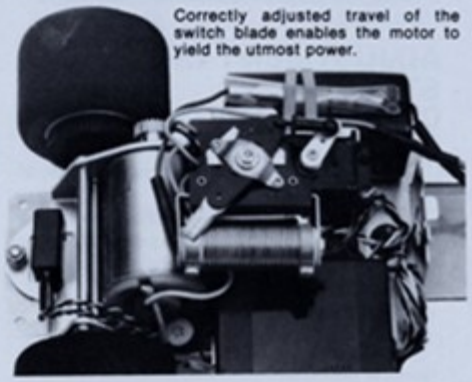


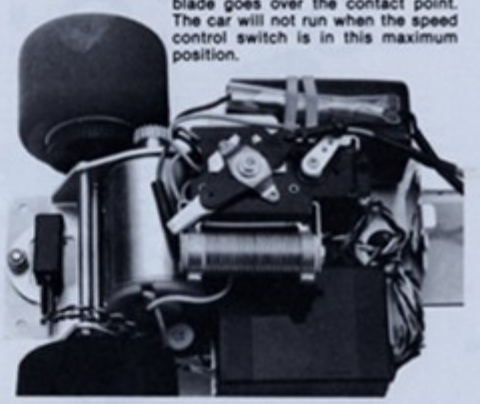
★When you use a variable resistor speed controller, attach servo so that switch plate moves to top speed position. If the switch plate doesn't move correctly, troubles can occur.

way to the maximum speed end. When the adjustment is incorrect and the switch blade does not move all the way to the end or goes over it, problems may arise.

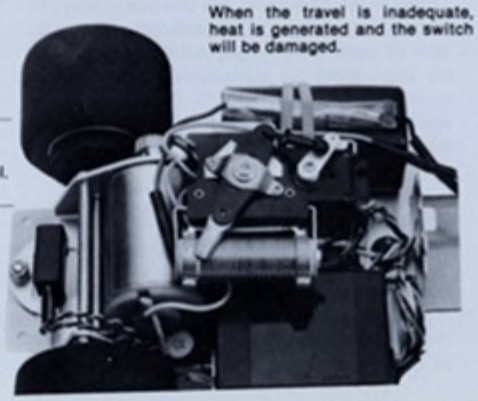
❷ See if something is in the way of the servo horn or the speed control switch which can block their proper movement.

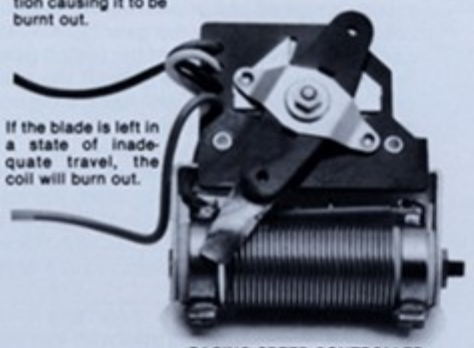




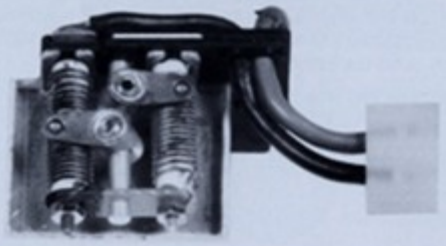


★The adjustment of the blade should be made referring to the assembly instruction sketch of the kit.





<RACING SPEED CONTROLLER>



*Coils of Racing Speed Controllers get burnt and its color will change, but this is not a problem.

With inadequate travel of the switch blade, the coil produces heat and the colour of the lever or bakelite plate will change, sometimes causing the coil to burn out.

❸ If the motor does not run at the maximum speed when the speed control switch is in its maximum position, poor contact of batteries or of the switch terminals can be suspected. The poor contact can be found by pressing the switch as it is moved into the high speed position.

❹ Check to see if the gear meshing or the shaft are too tight. Make sure the wheels rotate smoothly. Be sure to lubricate shaft and gearbox.

3. WHEN THE CAR DOES NOT TURN

❶ Does the steering servo operate properly? If not, the wiring from the receiver to the steering servo may be disconnected.

❷ Remove the steering servo. If it operates normally, the servo horn or the servo rod may be rubbing against something. Also, it is possible that the king pins of the front wheels do not move smoothly.

❸ When the car does not take corners well, refer to 1 and 2 on the page of "Building up a Car of High Running Capability".

4. WHEN A CAR DOES NOT STOP

❶ Do the speed control switch and the switching servo stop at the neutral position? If not, adjust it with the trim lever on the transmitter. After the adjustment, if the car runs at high speed even though the switch is in the stop position, the switching servo or the servo rod may be mounted improperly. Correct them referring to 1 in "When the Car Does Not Gain Speed".

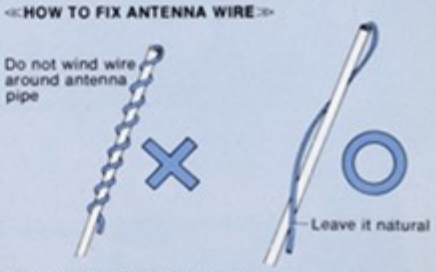
❷ Excessive play in the connection between the switching servo and the speed control switch may cause the switch to fail to return to the stop position even when the servo is at the neutral position.

5. IF THE RADIO CONTROL DOES NOT OPERATE

❶ If the batteries of the transmitter or receiver are low, the radio control will not operate. Replace with new batteries.

❷ Are the antennas of the transmitter and receiver ok? The following actions make the reception of radio signals poor: shortening the receiver antenna wire, winding the wire around the antenna tube, leaving the wire inside the model car, or removing

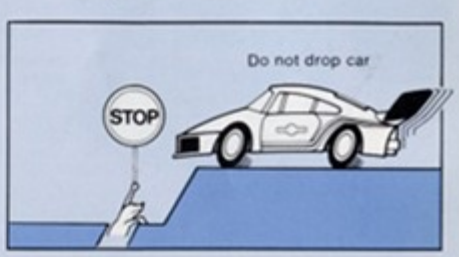
<HOW TO FIX ANTENNA WIRE>



the insulation of the wire.

❸ Make sure that metal parts of the car do not rub together under vibration. Rubbing between metal parts will sometimes generate radio noise which disturbs radio control.

❹ Hold the transmitter away from the car with the control stick in the neutral position. If the servos are glitching, it is most likely caused by radio interference.

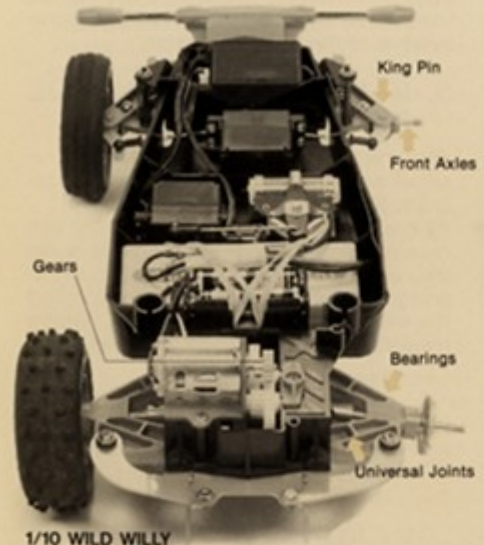


CHARACTERIZING A CAR

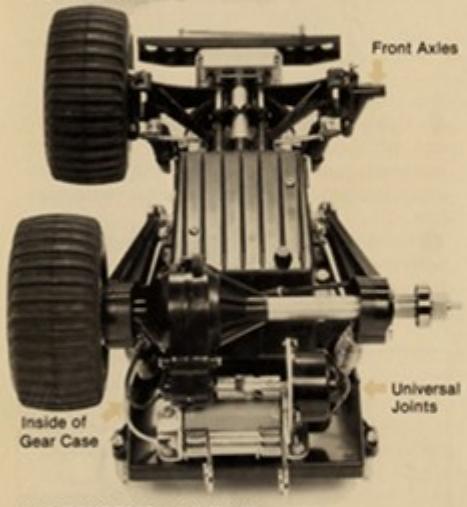
There are a variety of car characters: fast cars, cars with excellent acceleration, cars with good cornering capability, and so forth. Cars assembled from kits come out diversified in quality because they are built up through the assembler's own techniques. Build your car in your own way. The most apparent characterizations are formed in the gear ratio and the steering characteristics.

1. MAXIMUM SPEED AND ACCELERATION CAPABILITIES (GEAR RATIO AND SPEED)

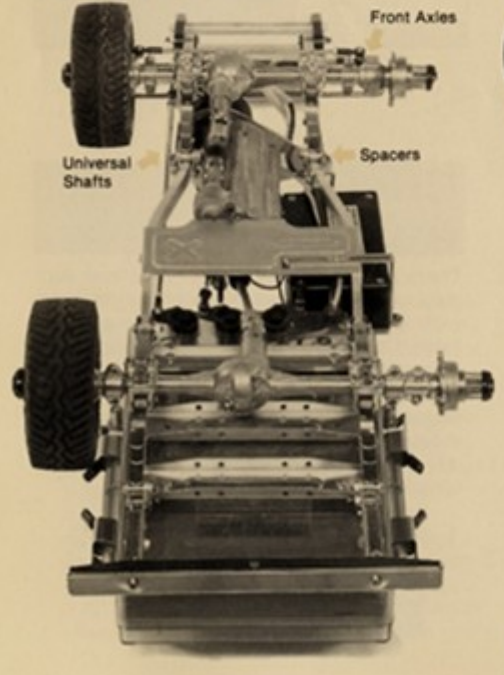
GREASE-UP POINTS
1/10 DUAL PURPOSE HOLIDAY BUGGY



1/10 WILD WILLY

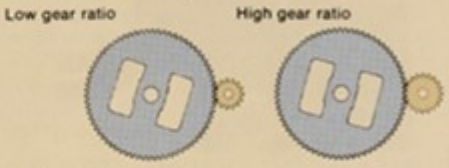


1/10 TOYOTA 4×4 PICKUP



At a given output power of the motor, the maximum speed and acceleration capabilities are determined by the gear ratio. With electric cars, the relation of the pinion gear on the motor shaft to the gear of the rear axle is important. You will have a higher gear ratio with a smaller pinion gear (smaller number of teeth) and a larger gear on the rear axle. The opposite makes a low gear ratio. With a high gear ratio, the car has a better acceleration capability, but a limited maximum speed. A car with a low gear ratio has poor acceleration but a high maximum speed.

A car with high gear ratio is suitable for a technical course which is built with hair pin curves demanding low speed driving, while a car with a low gear ratio is for a speed course consisting of longer straightaways and curves of longer radii.

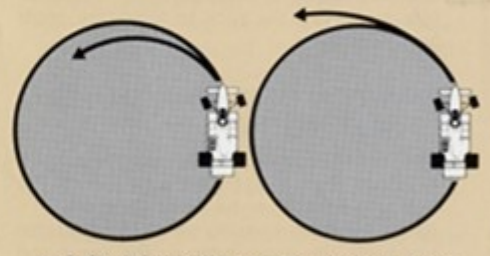


TIRES

The diameter of the drive tires is also related to the speed and acceleration characteristics. The larger the diameter of the drive tires, the higher the speed the car will develop within certain limitations.

2. UNDER STEERING AND OVER STEERING (STEERING TENDENCY)

When the steering wheel is turned, the car will also turn in the same direction. However, most cars have the tendency to turn excessively or inadequately. These characteristics are called steering traits. Cars that turn excessively have over steering traits



and the others have under steering traits. Cars that turn in close proportion to the control have neutral steering. This is hardly achieved except with cars that are running at a low speed.

STEERING WHICH IS EASY TO CONTROL

A car with slight under steering is easy to drive. A car with over steering will spin when taking corners at a high speed. Even on a straight course, it is unstable. An under steering car has difficulty making sharp turns, and at a high speed it may not be able to take corners and could leave the course. In either case, excessive steering makes a car difficult to control.

FACTORS TO DETERMINE STEERING CHARACTERISTICS

The steering characteristics are affected by the difference between the traction of the front and rear tires. When the traction of the front tires is greater than that of the rear tires, the result is over steering. The opposite condition causes under steering. Therefore, adjust the traction of the rear tires so that it is a little greater. You will then attain a slight degree of under steering.

The traction of a tire is determined by the weight it carries, by the area of contact of the tires on the road surface, and by the softness of the tire surface. The heavier the weight a tire carries, the larger the contact area becomes, and the softer a tire is the greater the traction becomes with certain limitations.

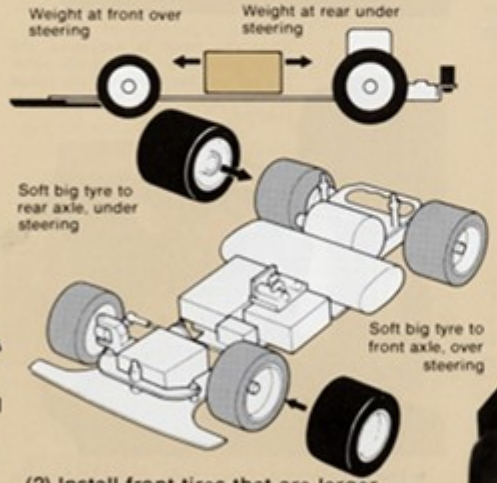
ADJUSTMENT OF STEERING CHARACTERISTICS

• DECREASING OVER STEERING

(1) Place a heavy load, such as batteries, at rear portion of the car.
(2) Replace the rear tires with larger ones or replace the front tires with smaller ones.
(3) Replace only the rear tires with sponge tires.

• DECREASING UNDER STEERING

(1) Place a heavy load at the front of the car.

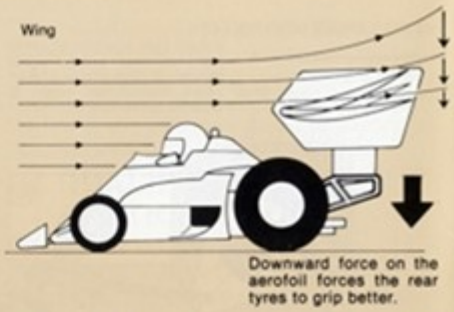


(2) Install front tires that are larger.
(3) Replace only the front tires with sponge tires.

These three remedies are the basic ways to change steering characteristics. The traction of cars with suspension systems can be increased by decreasing suspension spring tension. 30% -40% of the car's full weight should be on the front wheels and 60% -70% on the rear wheels.

• WING

The wing attached on many racing cars is employed to gain stability at high speed running. With your radio controlled cars, the rear wing is used to press down the rear wheels for improving the traction on the road. In this way, the gripping power of the rear wheel becomes greater than



Downward force on the aerofoil forces the rear tyres to grip better.

that of the front wheels and the steering trait changes toward under-steering. The faster the car goes, the more effective the wing becomes, that is, the greater the down thrust on the rear wheels. Depending upon the way you adjust the wing, the car can have an excellent cornering characteristic on a low speed curve, but still keep superb stability on the high speed straights. Such a car, also, will have a good adhesion to the road at high speed running. The effect of the wing is lessened when the wing is flattened. The more it is lifted, the greater the down-force. However, it increases the air drag, too, and the velocity of the car slowed. Therefore, the adjustment of the wing must be made carefully, and with the proper adjustment an ideal maneuverability will be attained.

SUMMARY OF CAR CHARACTERISTICS

Before you become familiar with controlling techniques, it is recommended to keep the car under steering. (Refer to "How to Turn"). Adjustment of toe-in and toe-out, tread and wheelbase all have some connections with steering characteristics. These adjustments interact closely. Test your car in various ways and find out the most proper steering characteristic for good control.

ENJOYMENT OF IMPROVING PERFORMANCE

As you attain proficiency in controlling cars, you will be tempted to improve your car. This chapter will introduce handy ways of increasing performance. The most important matter you have to keep in mind when you modify your car is to keep everything in balance. By putting a big motor on your car, you can make it run faster. Still it cannot be an improvement of performance if it has lost stability. Most kits on the market are produced by the manufacturer with all factors considered such as speed, maneuverability and durability. So try to enhance the collective performance of your car.

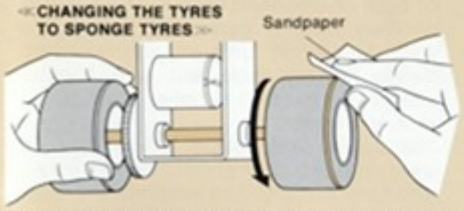
1. UTILIZING AVAILABLE PARTS FOR IMPROVEMENT

Some car kits have optional parts for tuning up available on the market, such as a more powerful motor and a gearbox with ball bearings. For instance, the powerful Mabuchi RS 540 motor and special made ball bearing gearbox case are available for the Tamiya Tyrrell P34 and the Porsche 935. It is the most ready and effective way to use these parts for tuning up. These parts can also be used for other kinds of car kits with some reworking.

2. ADOPTING PARTS MADE FOR OTHER KITS

Another convenient way is to adopt the replacement, repair and tune up parts which are made for other types of car kits. For example, the Tamiya Porsche 934 kit is designed to use RS 360 motor and the change-over switch in parallel or series, using only "C" size nickel cadmium batteries. However, since the chassis is almost the same as the Porsche 935, the performance of the Porsche 934 can be easily increased by using parts produced for the Porsche 935. First, change the motor to the RS 380S type and next use the speed control switch with the resistor type variable speed control switch or the stepless variable speed switch with built in braking circuit, and the battery box with the battery pack holder, so that a nickel cadmium battery pack can be employed. Just this much of modification boosts up the capability of the Porsche 934 to that of the Porsche 935.

CHANGING THE TYRES TO SPONGE TYRES



You can enjoy other tricks by using components for other kits like changing the tires to sponge tires according to the condition of road surface or installing ball bearings into front wheels.

3. UTILIZATION OF PARTS OF OTHER KINDS OF MODELS AND EVERYDAY LIFE COMPONENTS

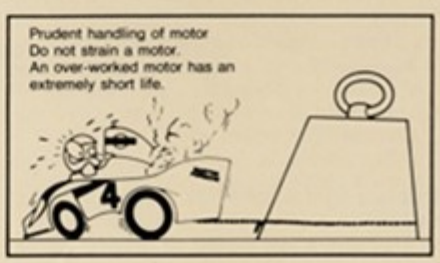
Many sorts of parts are available on the market, other than radio controlled electric car parts. For instance, a type of push rod connecting servo horns and control units in a model are sold which have threaded ends and easy to adjust length. Also, a velcro pad with one-sided adhesive may be used for binding the wiring and installing car bodies, etc. So these items of other crafts besides model building and components of daily necessities can be of good use for your radio controlled electric model cars.

4. LIGHTENING WEIGHT

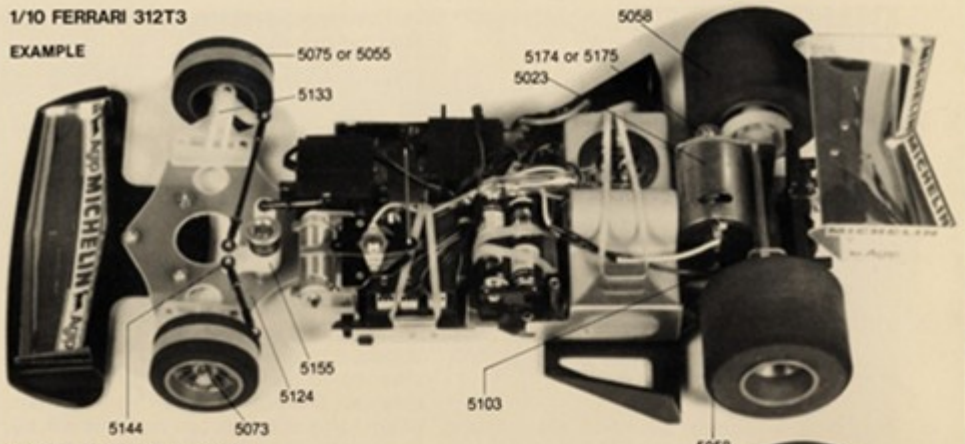
Lightening the weight of a model car is another effective way to enhance the performance. Cutting off part of chassis and gearbox case is often done. Also, the window shield is made of thin 0.2 mm transparent plastic plate or only 1 battery unit supplies energy to both the radio control receiver and the drive motor is employed. But radio controlled cars are subject to shocks from road surfaces while running, and to the impact of collisions. So the car must be very sturdily built.

5. SUPPLEMENTARY OF BATTERY POWER AND REMODELLING MOTOR

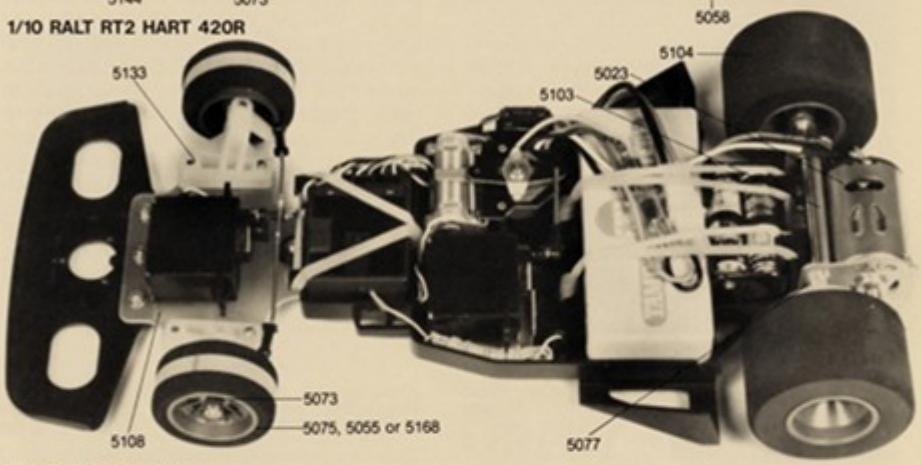
By increasing the number of batteries, improvement of performance can be certainly achieved. However, this must be done very carefully because the motor and the switch may be overstrained. Rewinding a motor armature with thicker wire makes a motor rotate faster, but it will draw much more current. Also, filling up the gap between the armature and the magnets amplifies the torque; this can be done by inserting 2 or 3 sheets of cellophane in the place. Neverthless, the motor is such a precision made item that these renovations may decrease performances or deteriorate the durability of the motor. And chances are in many official racing events that the maximum voltage is placed under restriction; sometimes reworking the motor is prohibited at all.



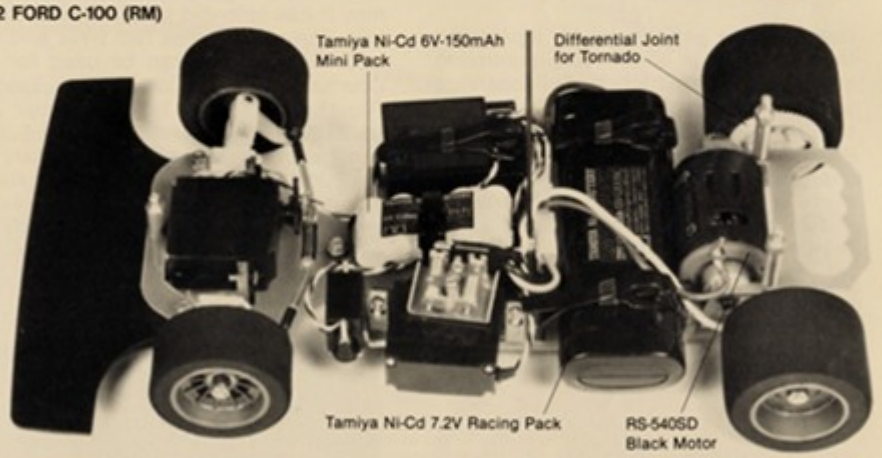
1/10 FERRARI 312T3



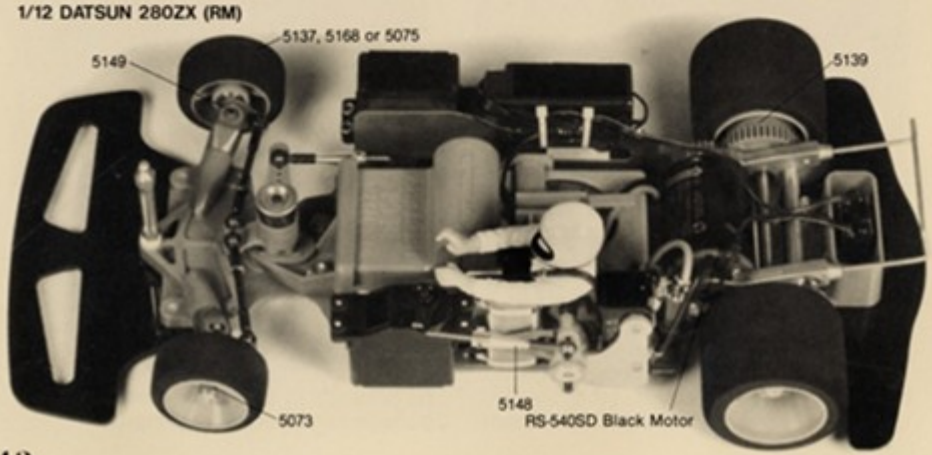
1/10 RALT RT2 HART 420R



1/12 FORD C-100 (RM)



1/12 DATSUN 280ZX (RM)



SWITCH SET

Racing Speed Controller (5172)

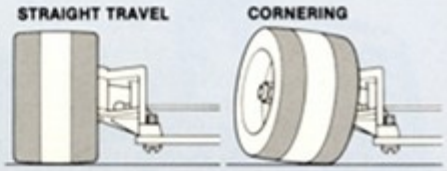
By using a terminal of silver alloy, this speed controller will transmit the battery power to the motor with little current loss, providing very high performance. It has three forward speed steps and one reverse. The top speed in the low and 2nd steps are adjustable as well as the braking force. For slippery road surfaces, a slow acceleration and soft braking are desired. By installing a diode, the 7.2V battery used for motor supply voltage, can also be used as the receiver battery, thereby saving weight in the vehicle.

PRECISION BALL BEARINGS

Ball bearings are a must for increasing the performance of all radio controlled cars by reducing friction. Ball bearings used on the front axle boost cornering capability. At the same time, they help to prolong the battery life since the loss of energy decreases considerably. Ball bearings can be used for the Porsche 935 when installed with the semi-pneumatic front tyres A.

DIPLO TYRE SET

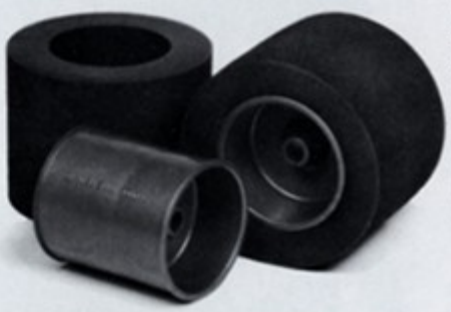
These tyres are the result of a new idea; the centre portion of the tyre is of rubber, sandwiched in between sides of sponge. It accomplishes both excellent stability on the straight and superb cornering capability. Beginning with the Countach Competition Special, it can be fitted to all other Tamiya radio control cars. The set contains 2 tyres, 2 wheels, other bearing parts. The wheels are designed to accept ball bearings, available on the market as optional extras.



The front wheels affect the control of the car more than you may think. For gaining stability in straight travel, the traction force of the front wheels should be reduced. However, this will give understeering on bends. Reversely, with the increased traction of the front wheels, sharp turns at bends can be achieved, but on the straight, the car will lose stability and with a little turn of the steering wheel will weave and zig-zag. Diplo tyres are the answer to this problem. On a straight track, the centre portion of rubber will grip the road assuring a mild response and stable running; at curves the side sponge section of the tyre, which has better gripping characteristics, will be in contact with the ground and will make sharp turns. The diplo tyres are produced to utilize the difference between the tractability traits of rubber and sponge. They have created a new enjoyment in model car driving.

SPONGE TYRE

This is a sponge tyre with a width of 40 mm. It has splendid traction characteristics. The set includes two tyres and two wheels. The tyres can be used for the Countach LP500S Competition Special. Together with 5091 Wheel Stopper and 5072 Gear Case & RS-540 Motor Set, it can be employed as a tune-up part for the Porsche 936 and the Countach standard model. A sponge tyre, with its excellent road grip, will not only enhance the cornering capabilities of your model, but also improves its acceleration as less energy is lost by skidding.

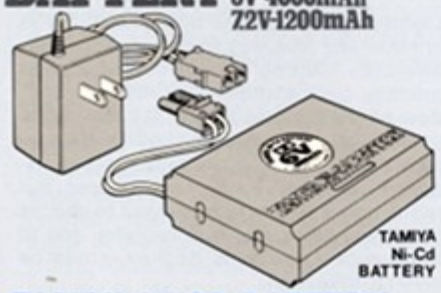


• The sponge tyre with its excellent gripping trait is ideal for a rather coarse surface, such as asphalt or concrete pavement. Because of their light weight, the tyres allow the wheels to rotate easier. Against wet or smooth surfaces, the semi-pneumatic rubber tyres will sometimes give better traction. So it is recommended that the tyres to be used should be selected in accordance with the road surface conditions prevailing.

POWER SOURCE

Dry cell batteries are not powerful enough to enable you to get full enjoyment from radio controlled cars and tanks. We recommend that you use a rechargeable nickel cadmium battery or wet cell battery. The Tamiya Ni-Cd Battery packs are widely used for powering electric radio controlled models. For radio controlled tanks, the Tamiya Sealed Battery is the most appropriate. Both batteries are rechargeable and, therefore, more economical.

TAMIYA Ni-Cd BATTERY 6V-1200mAh 6V-4000mAh 7.2V-1200mAh

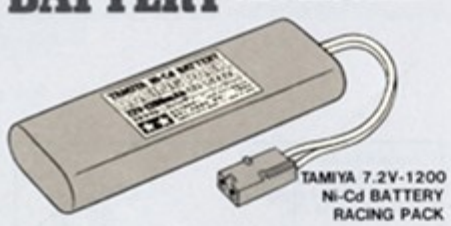


TAMIYA NI-CD BATTERY

These batteries were developed for powering Tamiya radio controlled models in cooperation with the Sanyo Electric Co., Ltd. They are high performance rechargeable batteries consisting of 5 or 6 nickel cadmium cells connected in series to produce 6V or 7.2V, and are packaged in a durable plastic case for ease of handling and safety. The compact rectangular case and customized safety connector requires no extra housing of packing for installation in your model. Being rechargeable over 300 times, they are very economical.

• Nominal capacity (5 hour)—1200mAh/4000mAh • Nominal voltage—6V/7.2V • Final discharge voltage—5V/6V • Standard charging current—120 mAh/400mAh • Maximum discharge current—4.8A/16A • Standard charging time—14-16 hours • Temperature range—discharge: −20°C to +60°C, Charge: 0°C to +45°C, Long preservation: −30°C to +45°C • Dimensions & weight— 117 × 50 × 25 mm about 305 g (6V 1200mAh), 130 × 104 × 37 mm about 900 g (6V 4000mAh), 117 × 50 × 46 mm about 370 g (7.2V 1200mAh) • Produced by Sanyo Electric Co. Ltd.

TAMIYA Ni-Cd BATTERY 7.2V-1200mAh



This is a light weight 7.2V 1200mAh racing battery consisting of 6 cells arranged flat to maintain a low center of gravity. Using the tabless method of current collection the battery can be utilized with those powerful motors requiring large current flows. Size is 46 x 130 x 24mm and weighs only 320g. Tamiya Ni-Cd quick charger or the standard trickle charger can be used. Designed for use in the Tamiya Tornado; Ford C100 and Racing Master vehicles. By employing this battery in your competition racing car, your machine will have greater running performance and maneuverability than ever before.

• Nominal capacity (5 hour) — 1200mAh • Nominal voltage — 7.2V • Final discharge voltage — 6.0V • Standard charging current — 120mAh • Standard charging time — 14~16 hours • Maximum discharge current — 4.8A • Temperature range — discharge: −20°C to +60°C, Charge: 0°C to +45°C, Long preservation: −30°C to +35°C • Dimensions — 130 x 46 x 24mm • Weight — about 320g • Produced by Sanyo Electric Co. Ltd.

TAMIYA Ni-Cd BATTERY 6V-1200mAh 7.2V-1200mAh QUICK CHARGER

EXCLUSIVE QUICK CHARGER FOR USE WITH TAMIYA NI-CD BATTERIES

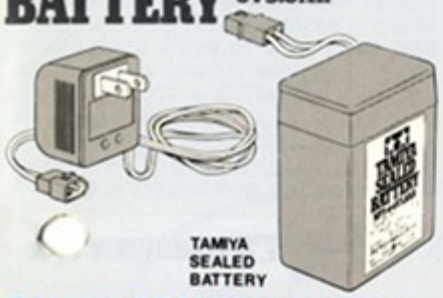
This is an exclusive fully automatic charger designed for safety and reliance, for quick recharging of Tamiya Ni-Cd batteries. The charger is powered from a cigarette lighter socket in a car which makes it excellent for field use. The standard charging time is only fifteen minutes; short enough to recharge the battery during an interval of the races. When the charging is completed, the charger automatically switches off and the pilot lamp goes out. A different circuit is incorporated and whilst charging, the charger is constantly checking the state of the battery. Inadequate or over-charging is impossible and an already saturated battery cannot be damaged by continued charging. Also, the charger is designed for safety against over-heating of both charger and battery. If any extra-ordinary heat is generated from either unit, the switch turns off automatically. Safety is very important with a quick charger, because it supplies a lot of current at a time.

The size is about 11cm x 7cm x 5.5cm, weighing only 220 grams; very compact and easy to carry. The length of the input cord is 80cm and the outlet cord 35cm—long enough to use. The pilot lamp will light while charging and go out when the charging is complete as an extra safe guard. All in all the Tamiya quick charger features a safe and prudent design for reliable and handy operation, adding to the

enjoyment of radio controlled cars.

• Battery to charge—Tamiya ni-cd battery 6V 1200mAh/7.2V 1200mAh • Power source for charging—car cigarette lighter (12V negative earth) • Charging time—about 15 minutes • Temperature range for operation—0°C to 40°C • Charging capacity—70% (nominal capacity ratio is variable according to ambient conditions) • Resistance cord is provided with over-heating protection • Dimensions 111mm × 70mm × 55mm • Weight—about 220 gram • Length of input cord—880mm • Length of output cord—350mm.

TAMIYA SEALED BATTERY 6V3.8Ah



TAMIYA SEALED BATTERY

The Tamiya sealed battery is a closed type wet cell battery of 6 volts 3.8 amperes. Since it is sealed, you can lay it down without fear of leakage and it does not require to be replenished with water. You can recharge it about 100 times.

Tamiya sealed battery • Voltage—6 volts • Nominal capacity/(20 hours rate) 3.8Ah • Standard charging current/early stage 250mA/later 100mA • Charging time/10 to 12 hours • Dimensions/105mm x 71mm x 47mm • Weight/720 gram • Produced by Yuasa Battery Co., Ltd.

TAMIYA Ni-Cd BATTERY 6V-150mAh MINI PACK

• Nominal capacity (5 hour) — 150mA • Nominal voltage — 6.0V • Final discharge voltage — 5.0V • Standard charging current — 15mA • Standard charging time — 14 ~ 16 hours • Maximum discharge current — 60mA • Temperature range — discharge: −20°C to +45°C, Charge: 0°C to +45°C, Long preservation: −30°C to +35°C • Dimensions −60 x 30 x 12mm • Weight — about 50g • Produced by Sanyo Electric Co. Ltd.

TAMIYA Ni-Cd BATTERY MINI PACK IS CONVENIENT, ECONOMICAL AND SUITABLE FOR GOOD PERFORMANCE

Tamiya Ni-Cd 6V Battery Mini Pack can be used conveniently as a power source for the receiver. Its size is half that of four UM(3) batteries and its weight is 2/3rd. It is effective in making performance better by lightening the weight of the R/C car. Using charging wire included with the 6V Mini Pack, it can be charged easily and quickly from a Tamiya Ni-Cd 7.2V battery. In addition to a power source for R/C cars, it can be used with other R/C models.

TAKE CARE IN HANDLING

The Motor, the power plant; nickel cadmium battery, source of electricity; charger, to restore the energy to the batteries; speed control switch, to control velocity; all of these are essential components for enjoying the dynamic running of your cars. Misuse of them leads to unsatisfactory performance, could lead to dangerous over-heating or to a breakdown. Therefore, you are best advised to read and understand the instruction of "do's and don'ts" before use.

● MOTOR

There are various kinds of motor, classified by size, the number of windings on the commutator, current draw, etc. Each motor has proper voltage and load under which they are designed to operate; excessive strain shortens their life greatly. Any defect in a motor is hard to detect from the outside. So careful handling of your motor is advised.

(1) Excessive voltage will shorten motor life.

The motor RS-380 and RS-540 are most frequently used with the radio controlled cars. They are designed to work under 6 volts. The maximum permissible voltage is 12 volts. Any excessive voltage will burn the coil in the motor and ruin it.

(2) Over-load also shortens motor life.

Output power of the motor is designated from the beginning in accordance with its size and the prospected voltage. Forcing it to overwork lets superfluous current flow in the motor which will turn to heat, resulting in over-heating. In the worst case, the electric wires of the motor will be fused together. Improper gear ratio, tight gear meshing, poor rotation of the wheels, these could be sources of strain on the motor. See if there is any part of the motor over-heating. If so, you must find out the cause. An over hot motor results in loss of speed, requiring more flow of electricity, and the battery will discharge sooner. It is almost impossible to repair a motor which has burnt out.

(3) Modified motors require more attention. You can boost up the performance of a motor, such as its revolutions and torque, by altering the inside constituents. But the motors available on the market have been researched and developed for their well balanced factors, such as the output power, the velocity of rotation in relation to their durability. Therefore, an immoderate change in the performance elements may make the motor less powerful or have poorer durability, even when the motor's r.p.m. is improved. When you mount a modified motor in your car, you should be extra cautious not to impose any over-strain on the motor than when you are using a stock type of the motor. Chances are the conversion of a motor deteriorates the performance of the motor unless you are well qualified to do it.

● SPEED CONTROL SWITCH

Improper usage of the speed control switch will easily ruin it. Read the instruction thoroughly before use. From Tamiya, the resistor type two stepped speed control switch and the stepless variable speed control switch, which enables gradual speed change by employing a coil resistor, are on sale.

● NI-CD BATTERY

The Tamiya ni-cd battery is such a high performance power source that it is able to push out more than 30 amperes, which is equivalent to 200 watts. An erroneous handling of the battery may evoke overheating or melting of the electric cord or the case. Possibly the battery itself will be marred completely.

(1) Short circuit with a lot of current will melt the cord. This is one of the most dangerous faults with the Ni-Cd battery and occurs frequently. With a short circuit, a large amount of electricity will flow through the circuit in a short period of time and will generate heat. This could cause the cord to burn and the battery pack to melt. When the battery appears normal, the internal soldered points may melt and the wiring may be out of contact. An accident during a race may cause an extraordinary load to be put on the motor, having the same effect as a short circuit resulting in the ruin of the motor, wiring, switch or battery.

(2) Breaking of wiring by shock

The Tamiya ni-cd battery is packed in a hard plastic case, firm enough protect the cells from some degree of shock. However, it may be damaged by a strong impact; for example, when dropped from a high place. Although the outside case appears undamaged, the inside wiring and contacts may have broken. In either event, of course, no current would flow. Pulling or kinking the electric cord is another taboo as it may cause the contacts and connectors to become out of position.

(3) Water in the battery.

Water which penetrates into a battery may cause a short circuit or corrode the internal wiring when the electricity flows through the wet wiring. When the contacts are corroded, the internal resistance increases and the discharging characteristics decreases. Therefore, if the battery becomes wet, stop running the car and dry the battery thoroughly.

(4) Heat by over-charging is dangerous.

Over-charging shortens the battery life rapidly, especially so when the charger used is a quick charging type incorporating a timer. For instance, a charger with a 15 minutes timer charges about 5 amperes of current into a nickel cadmium battery during one charging cycle. In such a case, nickel and cadmium are expedited to react chemically and produce a gas at a rapid rate. If the charging is continued beyond the limit, chances are that heat is generated along with the gas and will melt the case or the wiring. So over-charging should be avoided under any circumstances. A feature of the Tamiya quick charger is to prevent this danger by a cut-off circuit which detects the amount of electricity in the battery and switches off the charger automatically, assuring safety of use.

• There is almost no danger of over-charging with a charger requiring 14 to 16 hours to charge. Although over-discharging is not dangerous, you are required to be careful, because the battery may become impossible to recharge. After running your cars, make it a rule to always switch off the speed controller and disconnect the battery.

● CHARGER

It is important to have the correct charger to enable you to obtain the very best performance possible from your battery.

(1) Breaking of the wiring in the circuit.

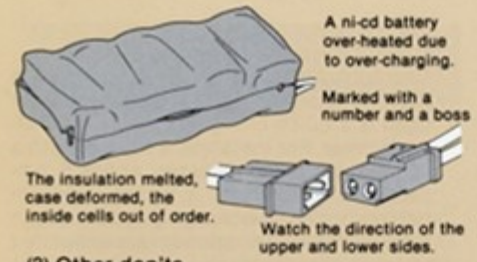
When a charger is knocked or jolted, the pilot lamp or the internal circuit may become damaged. If the portion of the circuit which controls the charging voltage and amperes snaps, the charger will not function at all.

* An overnight type charger shows a difference in voltage from 3.5 to 4.5 volts when measured between the terminals without a battery connected. This indicates the charger works correctly. In the case of a quick charger, it does not read any voltage; this is a normal condition, if the pilot lamp is on.

(2) The reverse connection will break down the charger.

Most breakdowns to a charger can be attributed to reverse connections. Enormous current will flow through the circuit between the charger and the battery in a moment if connected reversely. An overnight type charger especially is designed to allow a little current to flow for a long time and it will burn out in a moment if connected wrongly. The Tamiya system allows that an exclusive socket is fitted to each size of battery. The charger is fitted with an equivalent exclusive plug so that only the correct charger may be used on that battery.

With the quick charger in exclusive use for the Tamiya Ni-Cd battery, you are required to watch not only the direction of the connectors, but also polarity of the 12 volt power source (negative earth). Mistakes will cause the battery to burn inside and become useless.



(3) Other don'ts.
A specific length of cord (produced with a designated resistance value) is used on the input side of the quick charger for the ni-cd battery. This cord should not be cut, otherwise the resistance value varies and the cord will heat or melt. Also, do not attach any connector or clip anywhere on the cord. When a cigarette lighter of a car is not used as the power source, a cigarette lighter socket available on the market should still be used. Watch the polarity!!
When a transformer from 100 or 200 volts down to 12 volts is used as the power source instead of a car cigarette lighter, though it is not recommended, the capacity of the transformer has to be 6 to 8 amperes, or else the desired charging cannot be performed.

DECORATION OF YOUR CAR

People say that a beautiful car runs fast. Real international racing cars in top rankings are beautifully finished. Your car which has been assembled through laborious work should be painted nicely. Finishing is very important and strongly influences the impression of a machine. A color scheme for a car kit is designated in the assembly pamphlet, but you are challenged to enjoy your own coloring. Tamiya presents all car bodies only on the market under a commercial name of "Spare Body Set". These are useful not only when your car body is torn up, but also it offers you a chance of painting your car in your original way.

● FINISHING OF PLASTIC BODIES

A plastic body enables you to enjoy the life-likeness of full scale models. Unlike the clear bodies which should be painted from inside, the plastic bodies can be painted on the outside allowing you to paint with more freedom. Finishing is easier than you might imagine.
(1) Plan first your colouring scheme.
Your originality cannot be expressed just by putting paint on the plastic body. You can get great satisfaction and enjoyment from your own well-designed colour scheme. Bringing out the differing textures of rubber and metal etc. is another technique. You should first of all decide on your pattern and the colours you are going to use.
(2) Preparation is important.
Prepare the undercoat in accordance to your finishing schedule. Assemble sections such as body and a wing loosely. It is useful to put all the parts to be painted in one colour together. Previous washing of parts and sections with detergent is necessary also to remove oil and dust from surface to be painted.
(3) Masking
For painting patterns of overlaying one colour upon another, masking tape is very useful to create sharp contour lines. You can also employ paper to cover larger areas. When applying masking tape, the edges should be pressed down firmly since the ahesive substance on the tape is not very strong and the colours could seep under the tape. It is a golden rule to apply light colours first and then the darker colours when overlapping paints.
(4) Colours and polish
For finishing large parts and bodies, spray paints are handy to use. For the finishing touches, a polish compound may be used.

● FINISHING POLYCARBONATE BODIES

Polycarbonate bodies have a different finished effect. In comparison with the plastic bodies, they lack somewhat the feasibility of being finished in a more precise design. However, they have their own beauty when painted on the inside. The polycarbonate bodies are much tougher for collisions and ideal for practice running, although it requires some knack to finish them beautifully.

Polycarbonate Body for 5811 Ferrari 312T3

(1) Cutting out the body.
With a knife or scissors, clip off the extra edges of the body along the groove. Try not to cut off the body portion. For thicker places, draw a line first with a knife, then cut it out with scissors. The same method can be adopted to cut the detailed parts. Wheel arches should be properly rounded.
(2) Painting and masking
When painted from the inside, the polycarbonate bodies appear to be glossy as if they had a transparent layer over the surface. Painting must be done only after the surface is washed with detergent to remove any grease or dirt. Masking also should be done from inside. However, it can be applied on the outside surface for protecting the body from being daubed with paints. The masking tape can be peeled off more easily before the paint dries completely. In contrast to painting plastic bodies, when several coats are being applied, the darker colours must be painted first and then the lighter ones. The previous coat should have dried thoroughly before the next coat is applied. Some planning is required to enable the masking tape to be removed in the correct order. Water soluble paints are often used for this kind of body as ordinary plastic paint tends to come off.

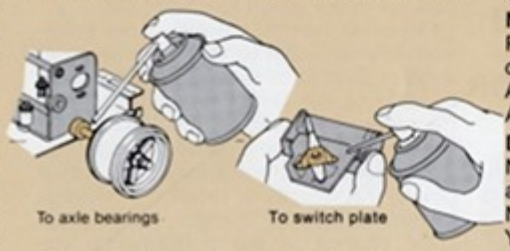
HINTS FOR FINISHING

Until the latter half of the 1960s, the racing cars at the International Races were painted in National Racing Colors which were designated for each country. However, lately they are painted in colors representing the image of sponsoring companies or the design of the merchandise package. Among the well known are the Martini stripes in red and blue; navy blue of the Porsche Works; a design from a cigarette pack in the black and yellow of the JP Lotus; red and white of the Marlboro McLaren. Think out your own design, assuming you were a sponsoring firm.
The following is a list of some National Colors:

Japan	2 tones Red and White
UK	Green
USA	2 tones Blue and White
Italy	Red
France	Blue
Germany	Silver
Austria	Stripes of Blue and Silver
Belgium	Yellow

TAMIYA SPRAY OIL

After your cars have been running in the rain or through puddles, spray Tamiya Spray Oil onto the chassis or other metal surfaces. This will penetrate between the water and the metal surface to form a layer which helps to dry up the surface and also protects the metal from rusting.

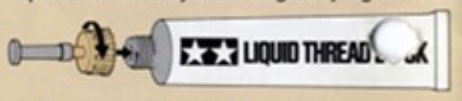


Since it has a cleansing function, the spray promotes the conductive power of electricity and guards the contacts of a switch against abrasion. This is a must for maintaining your radio controlled models.

LIQUID THREAD LOCK

LIQUID THREAD LOCK

It is essential that this liquid thread lock be applied to all nuts and screws when the model is assembled. This liquid is not a glue, but a securing agent. It will prevent screws from working loose, which will happen if it is not used. It is very effective and easy to use. At any time, screws can be loosened or removed for maintenance or repairs by using about twice the force required when they were originally tightened.



SILICONE SEALANT

Apply the silicone sealant to all areas where the instruction manual says. Apply it with your finger and smooth it out. It will harden into a rubber like material overnight, and protect the gears and bearings from dust and moisture, plus retain the oil and grease applied during assembly. If more is required, it can be purchased from your nearest hobby supply house.

PAINT MARKER

EXCITING NEW RELEASE FOR FINISHING MODELS OF PLASTIC AND OTHER MEDIUMS.

Easy and professional results can now be yours with Tamiya's new paint markers. Use it as you would a marking pen. Enamel paint formulated for the painting of plastics. Even the unskilled painter can now achieve beautiful results on their models. For the expert modeler, it is indispensable for detail painting and time saving. Excellent for wood, metal, glass as well as on all plastics. Shake paint marker well first, then push tip against a firm surface to break seal and start paint flow. Tamiya's paint marker ensures you of safe, easy painting without brushes and messy cleanup.

CEMENT PEN

NEW HANDY TYPE
Press the tip down lightly on the model, the cement will flow out freely.
After use cap the tip.
A new, safe, easy to use product.
DELICATE TOUCH
Narrow tip for clear application & greater adhesivity.
No cement overflow.
You figurines, bikes & tanks will look all the better.
ECONOMICAL
7ml of cement to each pen, no waste or loss through dryout. Enough to cement 15-1/12 scale bike kits.
Why not give it a try!

5009 REAR SHAFT SET

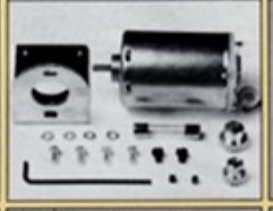
5011 DIFFERENTIAL GEAR SET

5012 PINION GEAR SET FOR RS-380 MOTOR

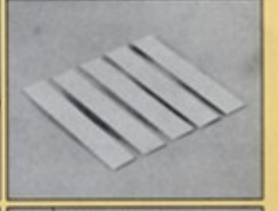
5014 ABS BUMPER SET

5015 FUSE SET

5023 RS-540 MOTOR SET



5025 DOUBLE SIDED SERVO TAPE SET



5036 BALL BEARING SET (2 PCS.)

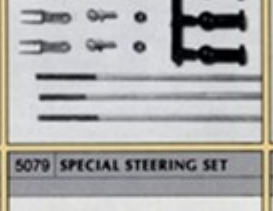
5038 TOOL SET

5039 BATTERY CONNECTOR SET (6V)

5054 VARIABLE RESISTOR SPEED CONTROL SWITCH

5064 COUNTACH STICKER

5068 BALL LINK & ADJUSTER ROD SET



5069 BUSHING SET

5072 COUNTACH/PORSCHE 936 GEAR CASE & RS-540 MOTOR SET

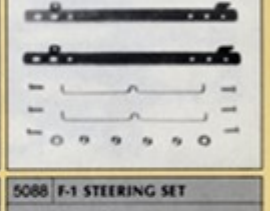
5073 BALL BEARING SET (4 PCS.)

5077 DIFFERENTIAL GEAR (SMALL) SET

5078 SPECIAL CHASSIS SET

5079 SPECIAL STEERING SET

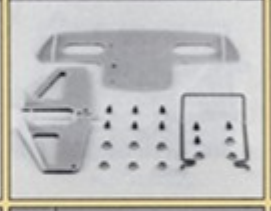
5080 COUNTACH/PORSCHE 936 CATCH PIN SET



5083 CELICA LB TURBO STICKER

5084 LIGIER JS9 STICKER

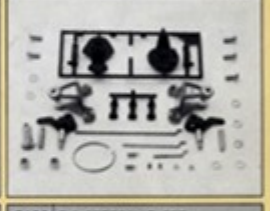
5085 F-1 BUMPER SET



5086 F-1 GEAR BOX SET

5087 F-1 CHASSIS SET

5088 F-1 STEERING SET

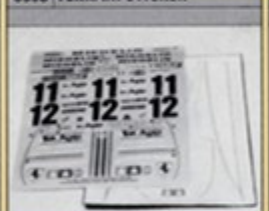


5089 UPRIGHT SET (2 PCS.)

5090 SPECIAL PINION GEAR SET FOR RS-540 MOTOR (22 AND 24T)

5091 WHEEL STOPPER SET

5093 FERRARI STICKER



5097 MARCH STICKER

5098 MARTINI STICKER

5100 F-2 STEERING SET

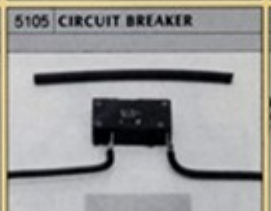
5099 F-2 CHASSIS SET

5101 F-2 SWITCH SET

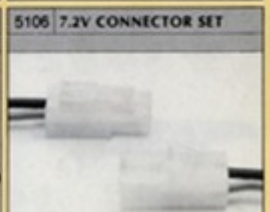
5102 F-2 BUSHING SET

5103 F-2 GEAR CASE FOR RS-540 MOTOR

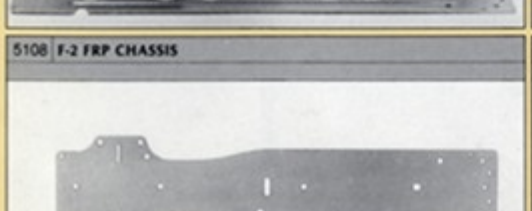
5105 CIRCUIT BREAKER



5106 7.2V CONNECTOR SET



5108 F-2 FRP CHASSIS



5112 1/10 RACING BUGGY STICKER SET

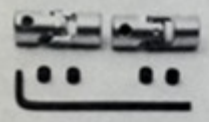
5113 1/10 RACING BUGGY SWITCH SET

5114 1/10 RACING BUGGY REAR GUARD

5115 1/10 RACING BUGGY FRONT SUSPENSION

5116 1/10 RACING BUGGY REAR SUSPENSION

5117 1/10 RACING BUGGY UNIVERSAL JOINT



5118 1/10 RACING BUGGY DAMPER SET

5123 CS FRP CHASSIS

5124 F-1 FRP CHASSIS

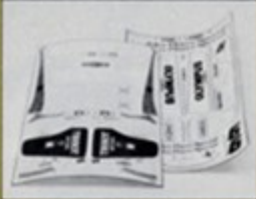
5128 1/10 RACING BUGGY UPRIGHT SET

5130 RALT STICKER

5132 WILLIAMS STICKER

5133 NYLON ARM & UPRIGHT SET

5134 LOTUS 79 STICKER



5135 BUGGY BUMPER SET

5136 RS-540SD BLACK MOTOR & GEAR CASE

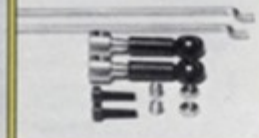
5139 RM SPUR GEAR & PINION SET

5140 RM FRP CHASSIS

5141 6MM BALL BEARING SET (2 PCS.)

5142 6MM REAR SHAFT

5144 SPECIAL ROD END SET



5146 RM BUMPER

5147 RM DIFFERENTIAL GEAR SET

5148 RM SPEED CONTROL SWITCH

5149 RM STEERING BALL BEARING SET

5154 HOLIDAY BUGGY FRONT ARM SET

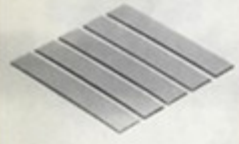
5155 SERVO SAVER SET

5160 TRANSISTORIZED SPEED CONTROLLER

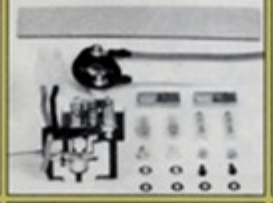
5163 TOYOTA/BLAZER LEAF SPRING SET

5170 NYLON BAND SET

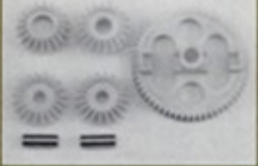
5171 HEAT RESISTANT DOUBLE SIDED SERVO TAPE SET



5172 RACING SPEED CONTROLLER



5173 DIFFERENTIAL GEAR (MEDIUM) SET



5174 ALUMINUM PINION GER SET (16 AND 17T)

5175 ALUMINUM PINION GEAR SET (18 AND 20T)

5176 TORNADO REAR SHAFT SET

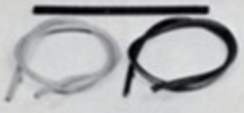
5177 TORNADO FRONT ARM SET

5178 TORNADO BUMPER

5181 WILD WILLY FRONT ARM SET

5182 3 STEP SPEED CONTROLLER

5186 SILICONE INSULATED WIRE



5188 FORD C-100 BUMPER

5005 RS-380 MOTOR SET

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5055 SPONGE TIRE SET 'FRONT-A' WITH WHEEL	5056 SPONGE TIRE SET 'REAR-A' WITH WHEEL	5057 SPONGE TIRE SET 'REAR-B' WITH WHEEL	5058 SPONGE TIRE SET 'REAR-C' WITH WHEEL	5060 CHEETAH SPARE TIRE SET	5074 RUBBER TIRE SET 'FRONT-A' WITH WHEEL	5075 DIPLO TIRE SET 'FRONT-A' WITH WHEEL
						
5076 SPONGE TIRE SET 'REAR-D' WITH WHEEL	5096 RUBBER TIRE SET 'REAR-D' WITH WHEEL	5104 SPONGE TIRE 'REAR-E' WITH WHEEL	5119 ROUGH RIDER SPARE TIRE 'FRONT' WITH WHEEL	5120 ROUGH RIDER SPARE TIRE 'REAR' WITH WHEEL	5121 SAND SCORCHER SPARE TIRE 'FRONT' WITH WHEEL	5122 SAND SCORCHER SPARE TIRE 'REAR' WITH WHEEL
						
5137 SPONGE TIRE SET 'FRONT-B' WITH WHEEL	5138 SPONGE TIRE SET 'REAR-F' WITH WHEEL	5150 MOLDED SPONGE TIRE 'FRONT-A' WITH WHEEL	5152 HOLIDAY BUGGY SPARE TIRE 'FRONT' WITH WHEEL	5153 HOLIDAY BUGGY SPARE TIRE 'REAR' WITH WHEEL	5156 FORD RANGER TIRE WITH WHEEL	5162 TOYOTA 4X4 PICKUP TIRE WITH WHEEL
						
5165 BLAZING BLAZER SPARE TIRE SET	5168 SPONGE TIRE (FRONT-C)	5169 SPONGE TIRES (REAR-G)	5179 WILD WILLY TIRES	5183 BUGGY SPIKE TIRES (REAR)	5185 BUGGY SPONGE TIRES (REAR)	
						

1/10 SUPER CHAMP (5834)
◂USAGE EXAMPLE▸

5185 Buggy Sponge Tires (Rear)

1/10 SAND SCORCHER (5816)

5185 Buggy Sponge Tires (Rear)

5061 CHEETAH BODY PARTS SET

5062 COUNTACH BODY PARTS SET

5081 CELICA LB TURBO BODY PARTS SET

5082 LIGIER JL9 BODY PARTS SET

5092 FERRARI BODY PARTS SET

5094 MARCH BODY PARTS SET

5095 MARTINI BODY PARTS SET

5107 PORSCHE 908 BODY PARTS SET

5109 MARTINI LOTUS 79 BODY PARTS SET

5110 ROUGH RIDER BODY PARTS SET

5111 SAND SCORCHER BODY PARTS SET

5129 RALT BODY PARTS SET

5131 WILLIAMS BODY PARTS SET

5143 CAN-AM LOLA BODY PARTS SET

5145 TORNADO RM-1 BODY PARTS SET

5151 DATSUN 280ZX BODY PARTS SET

5157 GOLF RACING BODY PARTS SET

5158 RENAULT 5 TURBO BODY PARTS SET

5159 FORD RANGER BODY PARTS SET

5161 TOYOTA 4X4 PICKUP BODY PARTS SET

5164 BLAZING BLAZER BODY PARTS SET

5166 HONDA F-2 BODY PARTS SET

5167 BRABHAM BT50 BODY PARTS SET

5180 WILD WILLY BODY PARTS SET

5184 SUPER CHAMP BODY PARTS SET

5187 FORC C100 BODY PARTS SET

R/C SPARE PARTS

NO.		Leopard	Gepard	King Tiger	Countach CS	Celica CS	Ferrari	Ligier CS	March	Martini	Ralt
5009	Rear Shaft Set				●	●	●	●	●	●	●
5011	Differential Gear Set								●	●	●
5012	Pinion Gear Set for RS-380 Motor						●		●	●	●
5014	ABS Bumper Set				●	●			●	●	●
5015	Fuse Set		●	●	●	●	●	●	●	●	●
5023	RS-540 Motor Set	●	●	●	●	●	●	●			
5025	Double Sided Servo Tape Set	●	●	●	●	●	●	●	●	●	●
5036	Ball Bearing Set (2 Pcs.)				●	●	●	●	●	●	●
5038	Tool Set	●	●	●	●	●	●	●	●	●	●
5039	Battery Connector Set (6V)	●	●	●	●	●	●	●	●	●	●
5054	Variable Resistor Speed Control Switch	●	●	●	●	●	●	●			
5055	Sponge Tire Set 'Front-A' with Wheel				●	●	●	●	●	●	●
5056	Sponge Tire Set 'Rear-A' with Wheel					●					
5057	Sponge Tire Set 'Rear-B' with Wheel					●					
5058	Sponge Tire Set 'Rear-C' with Wheel						●	●			
5060	Cheetah Spare Tire Set										
5061	Cheetah Body Parts Set										
5062	Countach Body Parts Set				●	●					
5064	Countach Sticker				●						
5068	Ball Link & Adjuster Rod Set	●	●	●	●	●	●	●	●	●	●
5069	Bushing Set				●	●	●	●			
5072	Countach/Porsche 936 Gear Case Set				●	●					
5073	Ball Bearing Set (4 Pcs.)				●	●	●	●	●	●	●
5074	Rubber Tire Set 'Front-A' with Wheel				●	●	●	●	●	●	●
5075	Diplo Tire Set 'Front-A' with Wheel				●	●	●	●	●	●	●
5076	Sponge Tire Set 'Rear-D' with Wheel				●						
5077	Differential Gear (Small) Set				●	●	●	●			
5078	Special Chassis Set				●	●					
5079	Special Steering Set				●	●					
5080	Countach/Porsche 936 Catch Pin Set				●	●					
5081	Celica LB Turbo Body Parts Set				●	●					
5082	Ligier JS9 Body Parts Set						●	●			
5083	Celica LB Turbo Sticker					●					
5084	Ligier JS9 Sticker							●			
5085	F-1 Bumper Set						●	●			
5086	F-1 Gear Box Set						●	●			
5087	F-1 Chassis Set						●	●			
5088	F-1 Steering Set				●	●	●	●			
5089	Upright Set (2 Pcs.)				●	●	●	●	●	●	●
5090	Special Pinion Gear Set for RS-540 Motor				●	●		●			
5091	Wheel Stopper Set				●	●	●	●	●	●	●
5092	Ferrari Body Parts Set						●	●			
5093	Ferrari Sticker						●				
5094	March Body Parts Set								●	●	●
5095	Martini Body Parts Set								●	●	●
5096	Rubber Tire Set 'Rear-D' with Wheel								●	●	●
5097	March Sticker								●		
5098	Martini Sticker									●	
5099	F-2 Chassis Set								●	●	●
5100	F-2 Steering Set								●	●	●
5101	F-2 Switch Set								●	●	●
5102	F-2 Bushing Set								●	●	●
5103	F-2 Gear Case for RS-540 Motor								●	●	●
5104	Sponge Tire 'Rear-E' with Wheel								●	●	●
5105	Circuit Breaker	●	●	●	●	●	●	●	●	●	●
5106	7.2V Connector Set	●	●	●	●	●	●	●			
5107	Porsche 908 Body Parts Set				●	●					
5108	F-2 FRP Chassis								●	●	●
5109	Martini Lotus 79 Body Parts Set						●	●			
5110	Rough Rider Body Parts Set										
5111	Sand Scorcher Body Parts Set										
5112	1/10 Racing Buggy Sticker Set										
5113	1/10 Racing Buggy Switch Set										
5114	1/10 Racing Buggy Rear Guard										
5115	1/10 Racing Buggy Front Suspension										
5116	1/10 Racing Buggy Rear Suspension										
5117	1/10 Racing Buggy Universal Joint										
5118	1/10 Racing Buggy Damper Set										
5119	Rough Rider Spare Tire 'Front' with Wheel										
5120	Rough Rider Spare Tire 'Rear' with Wheel										
5121	Sand Scorcher Spare Tire 'Front' with Wheel										
5122	Sand Scorcher Spare Tire 'Rear' with Wheel										
5123	CS FRP Chassis				●	●					
5124	F-1 FRP Chassis						●	●			
5128	1/10 Racing Buggy Upright Set										
5129	Ralt Body Parts Set								●	●	●
5130	Ralt Sticker										●
5131	Williams Body Parts Set						●	●			
5132	Williams Sticker										
5133	Nylon Arm & Upright Set						●	●			
5134	Lotus 79 Sticker										
5135	Buggy Bumper Set										
5136	RS-540SD Black Motor & Gear Case	●	●	●	●	●	●	●			
5137	Sponge Tire Set 'Front-B' with Wheel				●	●	●	●	●	●	●
5138	Sponge Tire Set 'Rear-F' with Wheel										
5139	RM Spur Gear & Pinion Set										
5140	RM FRP Chassis										
5141	6mm Ball Bearing Set (2 Pcs.)										
5142	6mm Rear Shaft										
5143	Can-Am Lola Body Parts										
5144	Special Rod End Set	●	●	●	●	●	●	●	●	●	●
5145	Tornado RM-1 Body Parts Set										
5146	RM Bumper										
5147	RM Differential Gear Set										
5148	RM Speed Control Switch										
5149	RM Steering Ball Bearing Set										
5150	Molded Sponge Tire 'Front-A' with Wheel				●	●	●	●	●	●	●

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R/C SPARE PARTS

NO.		Leopard	Gepard	King Tiger	Countach QS	Celica QS	Ferrari	Ligier QS	March	Martini	Rait	Williams QS	Lotus 79 QS	Can-Am Lola	Datsun 280ZX	Golf	Renault 5	Honda F-2	Brabham BT-50	Tornado	Ford C100	Cheetah	Rough Rider	Sand Scorcher	Holiday Buggy	Sand Rover	Ford Ranger	Tyota 4X4 Pickup	Blazing Blazer	Super Champ	Wild Willy
5151	Datsun 280ZX Body Parts Set														●											●	●	●	●		
5152	Holiday Buggy Spare Tire 'Front' with Wheel																					●	●	●	●	●			●	
5153	Holiday Buggy Spare Tire 'Rear' with Wheel																					●	●	●	●	●			●	
5154	Holiday Buggy Front Arm Set																							●	●					
5155	Servo Saver Set						●	●				●	●			●	●		●										●	
5156	Ford Ranger Tire with Wheel																					●	●			●			●	
5157	Golf Racing Body Parts Set															●	●													
5158	Renault 5 Turbo Body Parts Set															●	●													
5159	Ford Ranger Body Parts Set																									●				
5160	Transistorized Speed Controller																										●	●		
5161	Toyota 4X4 Pickup Body Parts Set																										●			
5162	Toyota 4X4 Pickup Tire with Wheel																										●	●		
5163	Toyota/Blazer Leaf Spring Set																										●	●		
5164	Blazing Blazer Body Parts Set																										●	●		
5165	Blazing Blazer Spare Tire Set																											●		
5166	Honda F-2 Body Parts Set								●	●	●							●												
5167	Brabham BT50 Body Parts Set						●	●				●	●						●												
5168	Sponge Tire (Front-C)				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●									
5169	Sponge Tires (Rear-G)					●										●	●			●	●										
5170	Nylon Band Set	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5171	Heat Resistant Double Sided Servo Tape Set	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5172	Racing Speed Controller				●	●										●	●			●	●	●							●		
5173	Differential Gear (Medium) Set																			●	●									
5174	Aluminum Pinion Gear Set (16 and 17T)				●	●		●				●	●			●	●	●	●	●	●									
5175	Aluminum Pinion Gear Set (18 and 20T)				●	●		●				●	●			●	●	●	●	●	●									
5176	Tornado Rear Shaft Set																			●	●									
5177	Tornado Front Arm Set																			●	●									
5178	Tornado Bumper																			●										
5179	Wild Willy Tires																													●
5180	Wild Willy Body Parts Set																													●
5181	Wild Willy Front Arm Set																													●
5182	3 Step Speed Controller																											●		●
5183	Buggy Spike Tires (Rear)																						●	●			●		●	
5184	Super Champ Body Parts Set																												●	
5185	Buggy Sponge Tires (Rear)																						●	●			●		●	
5186	Silicone Insulated Wire	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5187	Ford C100 Body Parts Set																			●	●									
5188	Ford C-100 Bumper																				●									
5005	RS-380 Motor Set						●		●	●	●														●	●				

POWER SOURCE

NO.		Leopard	Gepard	King Tiger	Countach QS	Celica QS	Ferrari	Ligier QS	March	Martini	Rait	Williams QS	Lotus 79 QS	Can-Am Lola	Datsun 280ZX	Golf	Renault 5	Honda F-2	Brabham BT-50	Tornado	Ford C100	Cheetah	Rough Rider	Sand Scorcher	Holiday Buggy	Sand Rover	Ford Ranger	Tyota 4X4 Pickup	Blazing Blazer	Super Champ	Wild Willy
5502	Ni-Cd Battery 6V				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5508	Ni-Cd Battery 7.2V				⊙	⊙	●	●				●	●	●	●	●	●		●	●	●		●	●	●	●	●	●	●	●	●
5512	Ni-Cd 6V-4000mAh Battery																										●	●		
5515	Ni-Cd Racing Pack 7.2V-1200mAh				⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙			⊙	⊙	⊙	⊙	●	●										
5516	Ni-Cd Mini Pack 6V-150mAh	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●
5504	Sealed Lead Acid Battery 6V	●	●	●																										
5506	Ni-Cd Battery Quick Charger 6V				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5514	Ni-Cd Battery Quick Charger 6V-4000mAh																										●	●		
5510	Ni-Cd Battery Quick Charger 7.2V				⊙	⊙	●	●				●	●	●	●	●	●		●	●	●		●	●	●	●	●	●	●	●	●

⊙ denotes modification to be used.

SOME IDEAS OF CAR DECORATION

Decorate your car, the fruit of your effort, as pretty as possible. Plastic bodies of the radio controlled electric model cars today are made so lifelike that they can be displayed as stationary models.
From Tamiya, figures of the driver, mechanic, team manager and a tool set in 1/12 scale are already on the market. Arrange them around your car and you can make a nice lively decoration for display where your car certainly will look better.

1/12th SCALE MOTOR RACING TEAM SERIES

1 DRIVER 2201

This is a doll of a driver in a racing suit with a helmet in his hand. The helmet is a full face type, a visor is furnished as a separate part, a pair of gloves can be put into the helmet.

With Renault 5 Turbo

2 MECHANIC <WHEEL CHANGING> 2202

Tires play a vital role for a racing car. The tire manufacturers are struggling for better quality so intensely that it is called a "War of Tires". This is a figure of a mechanic holding a wheel wrench and unscrewing the nuts. A cross wrench, an air wrench, and a hammer are included in the kit.

With Celica LB Turbo

With Countach LP500

3 MECHANIC <ENGINE TUNING> 2203

A powerful racing car engine requires very delicate tuning up. This is a doll of a mechanic handling a plug wrench in his hand and checking plugs of the engine. The garment he wears is a mechanic's suit, called a coverall. A plug box and a plug wrench are included in the kit.

4 TOOL SET 2204

Repair of the machine is done in the pit; also a piece of advice or two may be given to the driver. Many typical tools for racing cars are included: from big devices as a jack and a welder to small tools which are supposed to function as fingertips of a mechanic. A set of very useful and helpful accessories.

With V.W. Golf Racing

5 TEAM MANAGER 2205

Taking the leadership of the team aiming at victory, the team manager is giving a piece of advice to the driver with one hand placed upon the car body. He is in a sweater and a jacket, having a sport cap on; the jacket consists of separate parts to create a feeling of reality.

ORIGINAL CAR BODY

In the real car world, there are many kinds of races: of formula cars, of 2 seater open racing cars, of remodelled machines from the cars on the market. It must be delightful to create model cars which cannot be obtained from the kits. These days many modelers are to be seen participating in races with their own car body or with remodelled cars from plastic model kits. It might be an exciting idea to run a classic car on the circuit. Some skillfulness at model building may be a must, but it is a challenging job.

1. USING PLASTIC MODEL BODIES

The most handy and simple way of creating your own body is to utilize car bodies of plastic models in the same scale. The scale allows reproducing the details; as a result, some portion of parts may be going to waste. And you have to figure it out previously whether or not there is enough space to install radio control units. When not, the chassis is sometimes transformed considerably. Also, the body may have to be reinforced sufficiently in case of collision.

2. MAKING BODIES OF YOUR OWN

Your bodies can be made based upon a real car or on your own design. In either case, some dexterity is called for. As for material, plastic plate and thin cardboard are often used.

3. MINOR CHANGE IN KIT BODIES

Only a little modification on a kit body may be needed for making an enjoyable car, from a roofed car to an open type vehicle or an additional wing to the body or changing the front silhouette of a car.

ADVICE FOR REMODELLING

You can remodel a car in any way you like for your own enjoyment. But if you have an intention of joining a race with it, it is recommended that your work will not be too different from real cars. Always keep in consideration to make it well balanced in function and in make up of each portion of a car. Some races will not allow cars to participate which are excessively remodelled.

TAMIYA COLOR ACRYLIC PAINT

TAMIYA ACRYLIC PAINTS

The new Tamiya paints are made from water-soluble acrylic resins and are safe, non-toxic, easy to use and will ensure an excellent finish to your prize models. These new paints come in 16 glossy colors, 45 matt finish colors and 7 transparent colors plus an exclusive thinner and flat base for producing a semi-gloss from the gloss colors. Each bottle contains 23ml and because of its excellent coverage, will last longer and be more economical than other paints.

USE ON ANY MATERIAL

The Tamiya Acrylic paints are excellent for painting wood, metal, home appliances, styrol resins, styro-foam and in fact just about any surface will accept acrylics. It retains its high gloss permanently, will not fade and once dry, can only be removed or marred with its own thinner. Since it is smooth flowing, unwanted bubbles are never a problem. Since it contains no lead, it is safe and completely non-toxic. Sprayed or brushed, Tamiya acrylics add the final touch to your modeling and artistic skills.

REQUIRES NO SPECIAL HANDLING

Cleanup after painting is no chore as plain water will cleanse all brushes and painting implements if done prior to drying. If the paint has already dried, the special acrylic thinner will dissolve the paint left on the brush. The large heavy glass jar is stable and hard to tip over, and with the large mouth, large flat brushes can be utilized. As the bottle caps are moulded in the exact same colour as the paint, location of that special colour is never a problem.

THINNER AND FLAT BASE

In addition to the 68 colours offered in the New Tamiya Acrylic Paints, a special thinner and flat base are available. The thinner is used for adjusting the thickness of the paints for brushing and spraying. When brush painting add thinner a little at time to achieve a moderate thickness that flows smoothly and evenly. For spray painting about 15% of thinner to paint is recommended. The flat base is an agent for making glossy paints any degree of dullness desired. For semi-gloss you would add about 15% flat base, and for a full matt dullness add about 30% flat base. Be sure to mix well the added flat base.


GOLF RACING & RENAULT 5 TURBO (1/12 RC)
9


ROUGH RIDER (1/10 RC)


SUPER CHAMP (1/10 RC)
Budweiser
805


WILD WILLY (1/10 RC)


4×4 BLAZING BLAZER (1/10 RC)
489


805


SAND ROVER (1/10 RC)


110


FORD RANGER (1/10 RC)
805

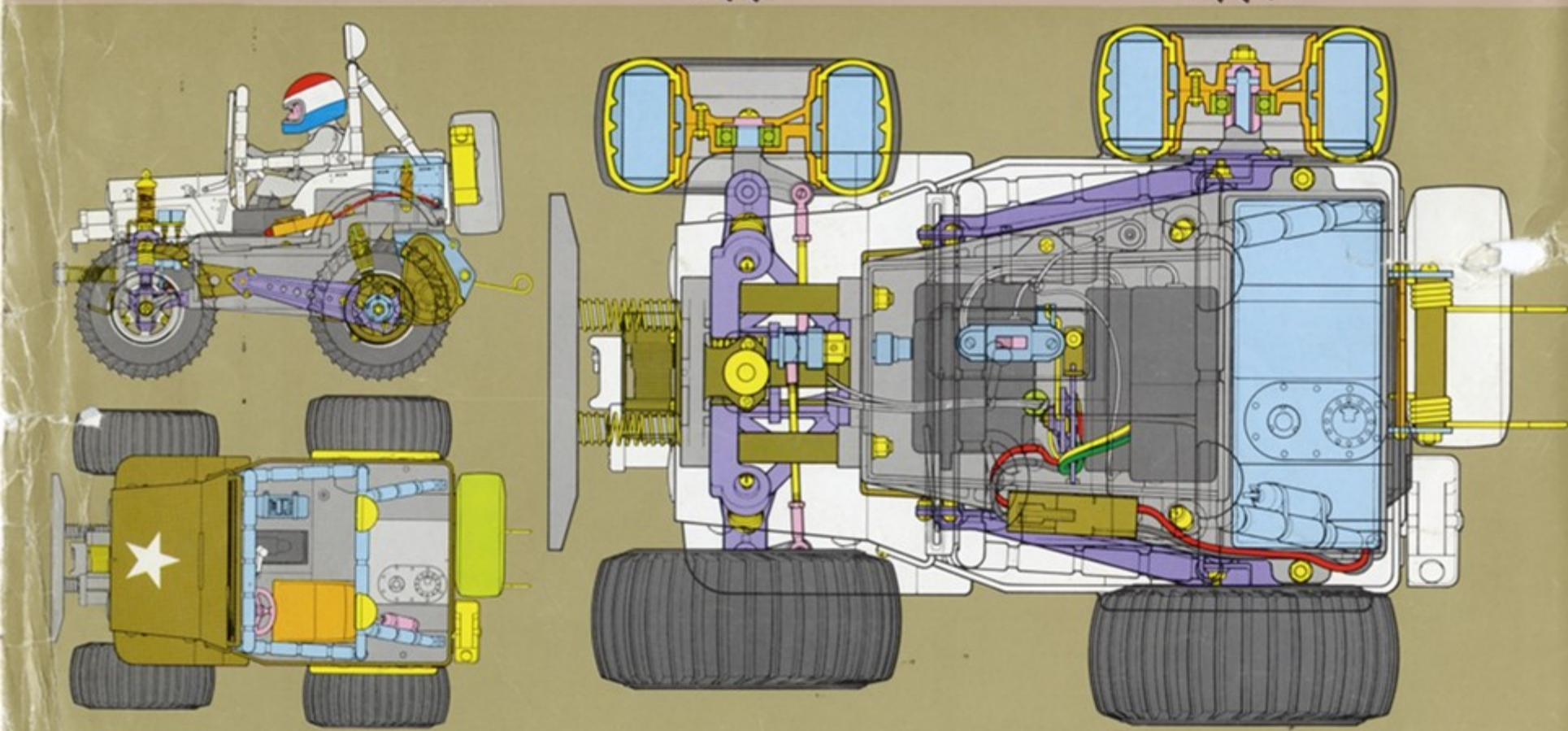

KING TIGER (1/16 RC)


LEOPARD A4 (1/16 RC)


FLAKPANZER GEPARD (1/16 RC)

TAMIYA RADIO CONTROL GUIDE BOOK

TAMIYA PLASTIC MODEL CO.
3-7, ONDAWARA, SHIZUOKA-CITY, JAPAN.



PRINTED IN JAPAN