

- 1 Index
- Introduction
- 2-4 Enjoying Radio Control
- 5-6 Driving Techniques
- 7 Versatility of Use
- 8-9 Guidance to Participating in Races
- 10-11 Guidance to Organising a Competition
- 12-13 How to Build a Course
- 14-23 Radio Controlled Models
- 24-25 Building up a Car of High Running Capability
- 26-27 Trouble Shooting
- 27 Characterising a Car
- 28 Enjoyment of Improving Performance
- 28 Decoration of Your Car
- 29 Some Ideas of Car Decoration
- 30 Original Car Body
- 30 Electric Source For Power Plant
- 31 Pictures of Running Cars and Tanks
- 32-36 List of R/C Model Parts
- 3 Colouring Samples

TAMIYA RADIO CONTROL GUIDE BOOK

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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, revolutionised 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 the 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

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 1/14 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

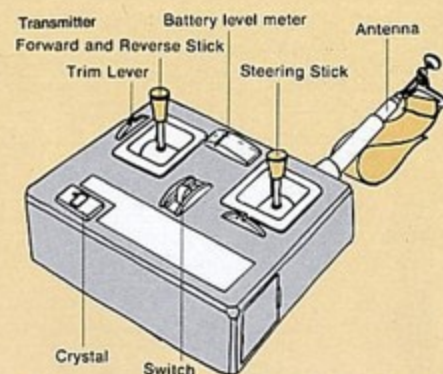
There are many radio controlled toys sold on the market these days. The characteristic of toy products is inferior in capability to models; for instance, they can turn only in one direction or run very slowly. Of course, some of them are close to the border line between models and toys. A conclusive 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

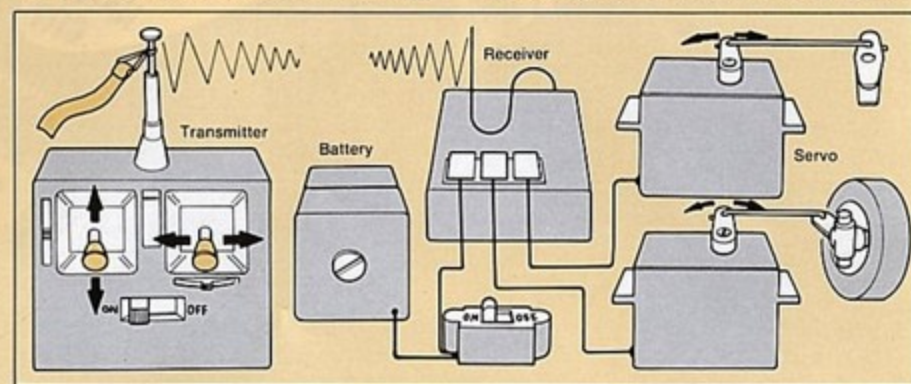
The digital proportional radio control sys-



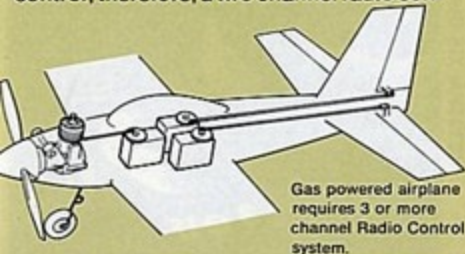
tem consists of a transmitter which is to be operated by a modeler, and a receiver and servos which are mounted into the model, and power supplies for the units. A transmitter functions as control box, fitted with operating sticks and trim levers for fine adjustment. When the transmitter is in operation, it emits signals by means of radio waves. The signals are accepted by a receiver and sent to servos, which transform 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" or "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



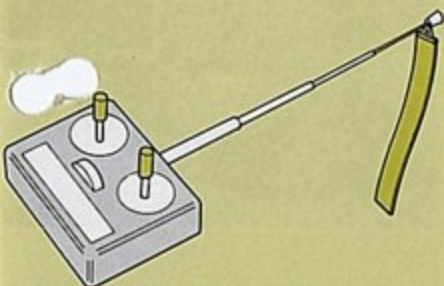
operations to be controlled at a time. A four channel digital proportional system will employ four servos to control four different types of action. The radio controlled electric car is basically designed to be controlled in two ways, speed control and steering control; therefore, a two channel radio con-



trol system is to be employed. In the present market, radio control systems are available with up to seven 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).

3. ABOUT RADIO WAVES—IT IS LEGISLATED

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 BAND

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 and 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 REGULATION BEHAVIOR

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.



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.

* 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 OF 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.

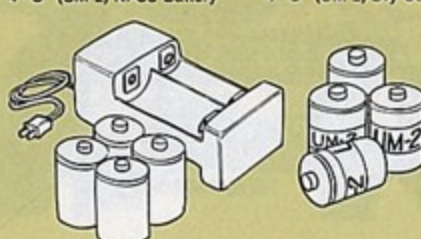
Batteries for R/C system
"AA" (UM3) Dry Cells



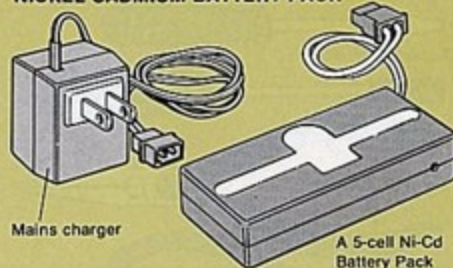
HOW TO SELECT AN ELECTRIC SOURCE FOR POWERING CARS

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.

Battery for power unit (one of the following to be used)
4 "C" (UM 2) Ni-Cd Battery 4 "C" (UM 2) Dry Cell



NICKEL CADMIUM BATTERY PACK



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. Tools which are included in the kit are open wrench, allen wrench, glue, grease, dual sided adhesive tape.



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 for 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, 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.

THE POINT IN 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 KIT AND COMPLETED MODEL

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 provided to be applied 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 details, while hard bodies (plastic bodies) offer much more sense of 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 a question, if any. Also you might as well inquire about the technical guidance and servicing of the store.

TRELL P44 FORD SIX WHEELER



MARTINI PORSCHE 935 TURBO



WEST GERMAN LEOPARD A4



CHEETAH



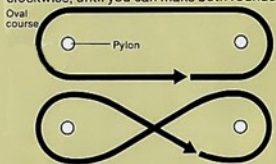
DRIVING TECHNIQUE

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.

1. BASIC TRAINING OVAL COURSE 1

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



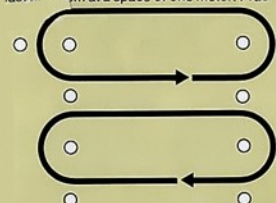
How to take corners



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

2. OVAL COURSE 2

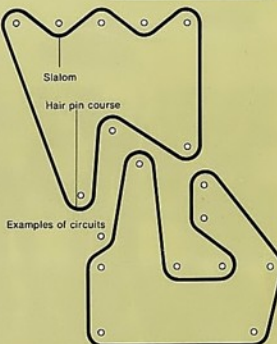
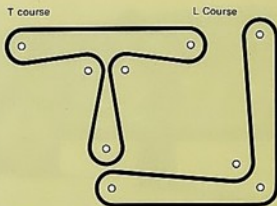
Have two or three pairs of pylons forming gates and run your car through them as accurately as possible. You will find it much harder than the oval course No. 1. For the first period of time, arrange the pylons at a wide space, narrow them gradually, then at last run them at a space of one meter. Prac-



tice in both rotations, clockwise and counter-clockwise.

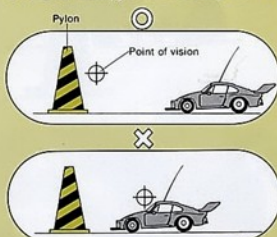
ROAD COURSE

When finishing course No. 1 and No. 2 steps, you must have mastered the basic driving techniques. Now you should proceed to complex course. 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 an important point where you keep your eye upon. 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.

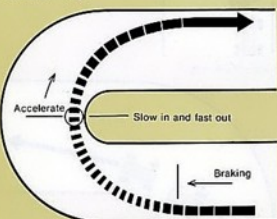
2. CORNERING TECHNIQUES

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.

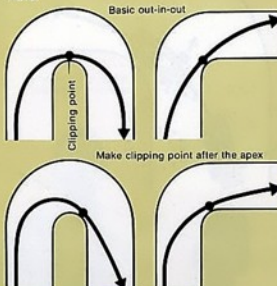
THE BASIC WAY IS SLOW-IN AND FAST-OUT

"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"

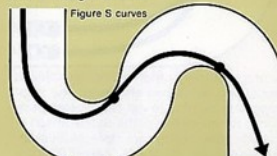
It is, as illustrated above, a way of turning curves from the outside line of a course into the inside line to which the car will come closest at the vertexes (crimping points) and finishing the cornering approaching back to the outside line, thus making the longest possible turning radius. By utilizing 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 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 pick-up 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 CONTINUOUS CURVES.

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

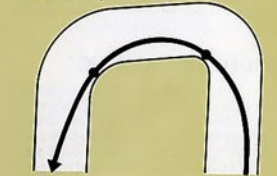


CONSIDER COMPLEX CURVES AS ONE INTEGRATED COMPOUND

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.



Curves with a straight in between



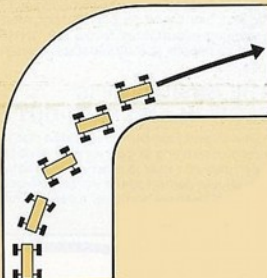
CURVES WITH A STRAIGHT COURSE IN BETWEEN

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.

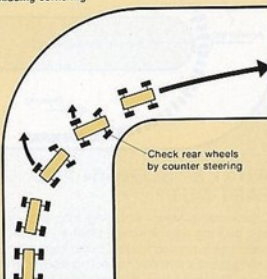
IN A PRACTICAL RACE, GET THE CLOSEST POSITION TO THE INSIDE LINE.

In a practical race, get the closest position to the inside line. The cornering technique explained in the previous chapters is an ideal way which is rather possible to carry on only when a car is running alone. In actual races, however, when several cars under the almost same capability are com-

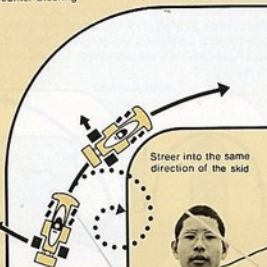
Four wheels drift cornering



Skidding cornering



Counter Steering



peting, naturally other racing techniques have been developed and 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 car A's, and car B will be forced to slow down, but with advantage of smaller radius and may be able to get ahead of car A at a risk that it may be spinned or collided from behind by car A. Otherwise, it may block the right of other cars. Any car slower than other cars should yield the right of way.

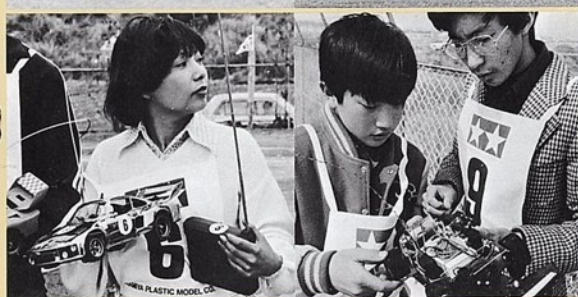
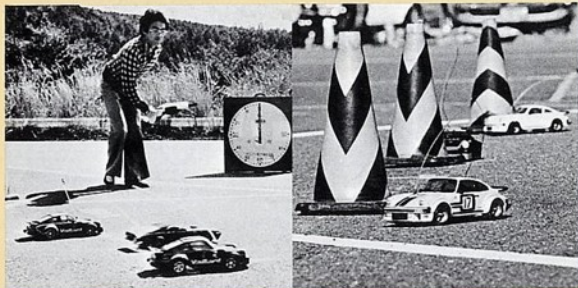
OTHER CORNERING TECHNIQUES

As for other cornering techniques, there exists four wheel drifting and tail sliding like the real wheel cars do. Four wheel drifting is a technique of 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 compared with the four wheel drifting. And it may not be fast enough to get through the curve, though it looks spectacular.

COUNTERSTEERING

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, leading the whole body to spinning. This method is for avoiding the spin by steering the wheel toward the same

direction of the skid which is leading the whole body to spin.



VERSATILITY OF USE

HOW 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

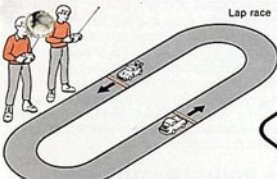
Road course



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



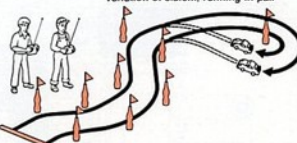
course for only one car, it is recommended to enjoy high-speed gymkhana. Set a course with obstacles of empty bottles or anything like that. The winner is determined by the time required to complete the course.

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

Variation of slalom, running in pair

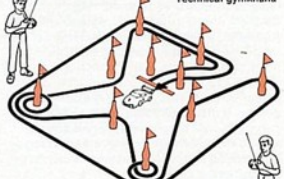


importance. It may be fun to make a slope on the course which requires proper choice of gear ratio. The slalom race is an interesting variation of the drag race. Here cars start one by one and race against time through a number of pairs of empty bottles placed in various positions on the course so that they must take a serpentine zigzag path. Tamiya's Porsche will need a course only about one meter wide.

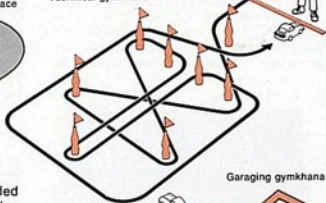
IN SMALL SPACES

You can enjoy Tamiya's Radio Control Porsche even in a space only about 2 meters

Technical gymkhana



Technical gymkhana



Garaging gymkhana



Starting line 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.

RALLY

In rally, the car which runs the course in the closest time at 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.

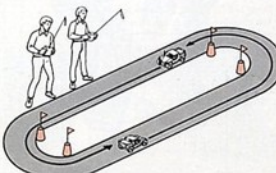


PAIR RACES (THREE LEGGED RACES)

Tie up two cars with a short string and run them along a course. The two racers have to control their cars in synchronization. When the string is broken the racers are disqualified or receive a cut in marks. You can apply this game method to road race, gymkhana and slaloms. There is a patrol car game, in which a car blocks the other car's passage.

HOW TO PLAY WITH 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 a cross country race to enjoy powerful driving.



DIRT GYMKHANA

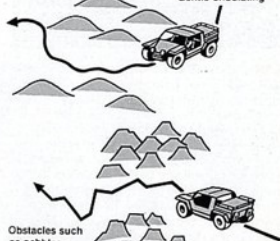
Dirt speed races can be done in flat and vast places such as a playground or a park. The course can be made in a simple oval course or a more complicated track with hairpin curves and figure "S" curves. You have to be careful since the surface of a dirt course is slippery. Advanced techniques of control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

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.

Gentle undulating

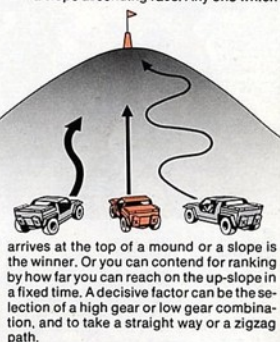


DIRT SPEED RACES

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.

MAKING RAMPS

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:



Run fast before jump
Do not make the take-off too high

In a pebbly 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.

GUIDANCE TO PARTICIPATING RACE

Today the radio controlled electric races are often held in many places promoted by manufacturers and hobby stores. Participate in the official competition where 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

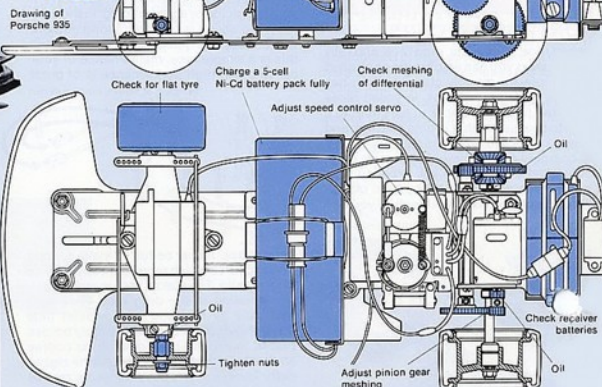
Schedule of races may be announced at the hobby stores or in the magazines. It is mandatory to enroll yourself in the contest



roster; in most of the 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

3. CHECK OUT THE CAR BEFORE THE RACE



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 competitions, 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 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 IN NEED ON THE RACING SITE

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 spend 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 learn this number by heart. Car check may be done after the registration. Your car will be ex-



TAMIYA GRAND PRIX

Xth
TAMIYA GRAND PRIX

Site - Tamiya Circuit
Officials - Steering Committee of Tamiya



X month XX day

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 Concours de elegance
Class	A Class: up to 'C' (UM 2) dry cells • Age limit: 9th graders or under • 3 round on short course 2 heats • a 5-cell Ni-Cd battery pack or Ni-Cd battery 6V 1200 MA exclusively • Preliminary: 2 heats, 3 rounds on long course • Final: 1st-15 winners 1 heat, 10 rounds on long course 1 each Matbuco RS-360 RS-380 RS-540 (modification of motor prohibited)
Motor to be used	All classes: 1st - 6th place Reward of concours de elegance: 6 persons Team reward: 1st - 3rd place Junior prize: 6th grador or under only Prizes for all entrants
Entry Fee	Free. Anyone can join
Requirement & Others	• Entry: 1 car 1 class 1 man • Team prize determined by last results of 1st 3 top rankings • In concours de elegance 6 are selected from all • Body must be of injection process, clear body is eliminated • Minimum Weight (fully equipped) • RS-360, RS-380 1.1 kg • RS-540 1.25 kg (under weight disqualified) • Driver and Front Rear Shield are a must. • Too imaginative shapes can be rejected
Draw Line	Filled out entry card must be in by April 15
Guidance	

TAMIYA GRAND PRIX

TAMIYA GRAND PRIX ENTRY CARD

Name	Age	Occupation	Team's name
One's dwelling			School Grade
Participating race name	A B	User's band	1 2 3 4 5 6 A B
Maker's name		Retail Store	

Registration Card	
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TAMIYA GRAND PRIX

REGISTRATION CARD

amed 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 for to hand your transmitter to the officials. Be sure the switch of the power source is disconnected 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, 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. PRIORITY 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, pri-

ority 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
- ROUND 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 round race, the number of rounds 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 given 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 TO ORGANIZING A COMPETITION

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 such as 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

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			
1 s t	2 n d	3 r d	4 t h
5 t h	6 t h	7 t h	8 t h

ization 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.

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

- DRY BATTERY CLASS
- NICKEL CADMIUM BATTERY CLASS
- MODIFIED CLASS

There are basically these three classes. The MRC-Tamiya Radio Controlled cars yield varied performance according to the power source. On a long straight course where cars can obtain their maximum speed, it is imperative to separate the dry battery class from the nickel cadmium class. As a modeler enriches his experience through numerous races and grows familiar with radio control, he is urged to modify and increase performance of his car. It is clearly unfair to allow modified cars to compete with ordinary models which are just assembled from the box. This is why another class of modified cars should be formed. The next question is how far modifying is permitted. With no limitation to modifying, it would be escalated endlessly and, as a result, only a few people could join in a race of such a class. Limits of remodeling should be set from the beginning. For example, the highest voltage permitted is 6V. Replacement and reconstruction of motors are not allowed, but chassis can be modified. It should be stipulated that modifying should remain within certain specified limitations. These limitations must be made with consideration to cost and techniques which are reasonable to participants.

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 MRC-Tamiya cars can go backward, it might be interesting to adopt parking and reverse going courses.

8. REGISTRATION ON THE DAY

- CAR CHECK
- IMPONDMENT 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 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	2	3	4	5	6
A	Mr. A	Mr. B	Mr. C				
	Mr. D	Mr. E	Mr. F				
B	Mr. G	Mr. H	Mr. I				
	Mr. J	Mr. K	Mr. L				
C	Mr. M	Mr. N	Mr. O				
	Mr. P	Mr. Q	Mr. R				
D	Mr. S	Mr. T	Mr. U				
	Mr. V	Mr. W	Mr. X				

• Contestants to be grouped at the same frequency bands.

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

1st heat (6 races)						
Rank	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. 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)						
Rank	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.

• 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 the tie is 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.

• ROUND RACE

One who makes the most number of rounds 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 SYSTEM

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.

• RETIRING

In case a model cannot proceed in the race due to insufficient previous check up or because 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

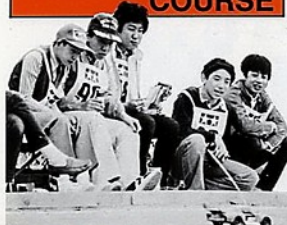
A stand is very convenient to install so that the racers can command the better view of the course and the cars while racing.

• 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.



HOW TO BUILD A COURSE



1. POINTS IN DESIGNING A RACING COURSE

Building a racing course, even a simple one, lets you enjoy it far better than running a car 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 building course is required.

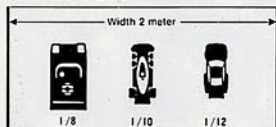
2. A TRACK BEFITTING THE CARS

You cannot expect a pleasant thrill of excitement, but only a feeling of boredom, 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 over 30 meters.

The maximum speed of 30 km/h comes in effect 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 around 15 seconds. In the Tamiya Circuit, a round of the longest course out of a few possible selections measures about 130 meters. A race

• COMPARISON OF 2 METER WIDE COURSE AND MODEL CARS



is held by making three rounds. The average time required is approximately one minute. This must be rather long time to a racer, as he has to bring all his energies in the control of his car. The width of the road should be designed 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 3 meters wide (sometimes 4 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 DETERMINED BY CURVES

Circuits are roughly classified in two

- KIND AND CHARACTERISTICS OF CURVES

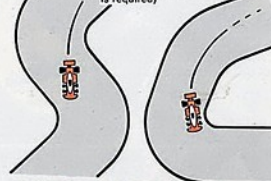
High speed curve Medium speed curve Low speed curve



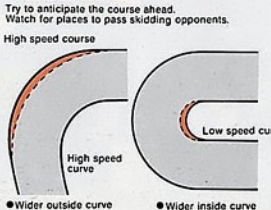
High speed curve = Cars can pass through at high speed (challenging running)

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

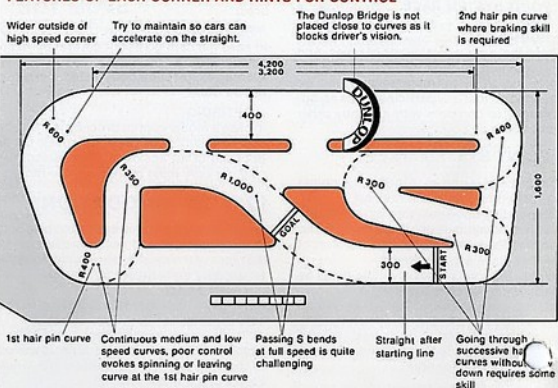
Low speed curve = Hair pin curve (prudent running is required)



High speed course



FEATURES OF EACH CORNER AND HINTS FOR CONTROL



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.
- Vertices 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 "A" for the individual feature of curves. Also, note the point of vertices 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.

4. FROM A VIEWPOINT OF DRIVERS

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 more it is apart from the drivers, the narrower the course looks because of parallax. It would be some problem to a driver. 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 other side. For the same reason, it is not recommended to design a course with complex curves where meticulous controlling is required at a distance away from drivers. 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 a driver's sight.

5. TO MAKE A PACE MORE ENJOYABLE

- Make a straight right after the start.
- A circuit must not necessarily be flat.

Most of the electric cars have the same or similar performance, so they would collide with each other, if there is a sharp bend right after the start line. The accidents will kill the pleasure of races; therefore, it is recommended that some length of straight should be built after the starting mark. It is not necessary to make the circuit in one level; on the contrary, some undulation and a leaping slope or two may be useful to add to the course more variety and the race will be more enjoyable, unless they would hide the racing car from driver's eye.

6. PAVEMENT OF THE 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 firm foundation. Or a Sunday chore by the club members to lay concrete surface may suffice for the purpose. Some unevenness 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 the ideal when considering deviation of cars from the track. However, sodding would call for time and care to grow. On the Tamiya Circuit, artificial turf is employed on the spaces among 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 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 to one level or in gentle slope in the outside being high, if there should be any rise and fall between surface levels, in order to allow a car that de-

viated so it can get back to the course with ease. When the space between courses is very narrow, some device may be in need for avoiding a car to jump into the next course.

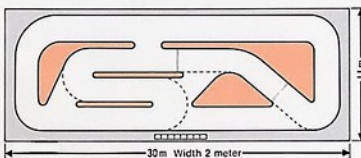
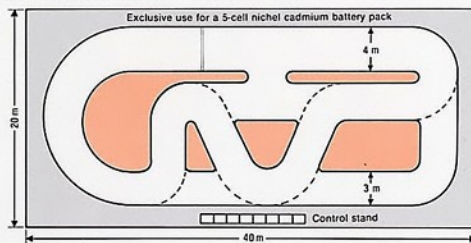
7. CONTROL STAND AND OTHER ACCOMMODATION

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.

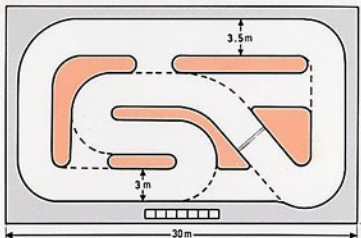
Besides bridges and gates on the circuit, a signal light for starting, a control tower, sign boards of sponsors, and things like those are desirable so as to boost up the atmosphere; hints of such auxiliary props can be obtained in car and racing magazines.

VARIOUS PLANS OF RACE CIRCUIT LAYOUT

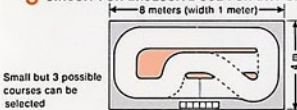
1 LARGE CIRCUIT



3 HIGH SPEED TECHNICAL CIRCUIT



5 CIRCUIT FOR EXCLUSIVE USE FOR DRY CELL



Small but 3 possible courses can be selected

2 LONG AND NARROW CIRCUIT

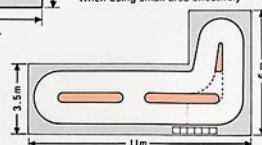
Suitable layout for long narrow space, several curves can be possible

4 SQUARE



6 SMALL CIRCUIT

When using small area effectively



SNAPSHOT OF A RACE



MAKING AN INDOOR COURSE

WITH THE FAMILY



INDOOR COMPETITION



ALL OF THE PARTICIPATING MODELS



Model Specifications: • 1/12 in scale • Overall length: 175mm • Overall width: 125mm • Overall height: 93mm • Wheelbase: 200mm • Front-trump: 110mm • Rear-trump: 110mm • Minimum ground clearance: 5mm • Weight: 1.2 kg • Tyre diameter: 112mm • Tyre width: 33mm • Body: Impactproof styrol (A) • Frame: Duralumin with mechanism plate center pivot assembly • Differential gear: Motor: Mabuchi RS2005 • Gear ratio: 14.7:1, 15.8:1, 15.5:1 • Power source: 4 x C (UM2) dry cells or 4 x C (UM2) nickel cadmium batteries or a 3-cell nickel cadmium battery pack • Speed control system: forward/reverse variable registered speed with braking circuit • Radio control system to be used: 2 channel proportional type • Maximum speed: 26 km/h (with gear ratio of 1:4.7) • Maximum running time: 35 minutes (with gear ratio of 1:15.5)



1 PORSCHE 934 TURBO RSR

ホルンシューター・ポルシェ934レーシング

This model is a perfect vehicle for getting started in radio control. It is equipped with a chassis of duralumin, differential gear, and coil spring rear suspension system. Speed control switch allows for two forward and two reverse speeds. This car features high refined components and ease of control with RS-360 motor. The precisely scaled body makes running this car even more enjoyable.

About the prototype • It was developed from the 930 for group 4 GT racing and was put on the market to the public in 1976 by Porsche Co. Fitted with a 2.0 litre turbo engine, an excellent suspension system, and a light weight body. This car displayed outstanding performance and high reliability and was far ahead of cars in same class in making racing records.

(Model Specifications) • 1/12 in scale • Overall length 170mm • Overall width 100mm • Overall height 100mm • Wheelbase 190mm • Tread=front 120mm, rear 130mm • Minimum ground clearance 7mm • Weight (all equipped) about 1.2 kg • Tyre diameter=width=front 50/25 mm rear 53/30 mm • Body=Impact-proof styrol resin • Frame duralumin • Differential gear equipped • Coil spring suspension system • Motor=Mabuchi RS-360 • Gear ratio=14.2:1, 15.8:1, 115.5:1, 119.4:1 • Power source=four "C" (UMC) dry cells or four "C" (UMC) size nickel cadmium batteries (not included) • Speed control system=two forward two reverse speeds • Radio control system to be used =two channel proportional (not included)



1/12th SCALE (RA-1201)

MARTINI PORSCHE 935 TURBO

1/12th SCALE RACING CAR SUITABLE FOR RADIO CONTROL



2 MARTINI PORSCHE 935 TURBO

マルティニ・ポルシェ935ターボ

You can enjoy high speed running with this radio controlled electric car. Using the same chassis as used with the 1/12th Porsche 934 Turbo, and the more powerful Mabuchi RS-360 motor and resistor type 2 speed variable speed control switch and a Ni-Cd battery pack. It features high performance running and cornering capabilities.

About the prototype • It was this Porsche 935 Turbo that crowned Porsche Co. with a glory of victory in the Maker's International Championship in 1976. The car boasted the output power of about 590 horse power with 3,857 cc horizontally opposed 6 cylinder engine and won four victories in 7 series. The kit is modeled after the late type which was equipped with an improved turbo.

(Model Specifications) • 1/12 in scale • Overall length 407mm • Overall width 173 mm • Overall height 107 mm • Wheelbase 190 mm • Tread=front 130 mm, rear 136 mm • Minimum ground clearance 8 mm • Weight (all equipped) about 1.2 kg • Tyre diameter=width=front 51/26 mm, rear 58/33 mm • Body=Impact-proof styrol resin • Frame duralumin • Differential gear equipped • Coil spring suspension system • Motor=Mabuchi RS-360S • Gear ratio=14.2:1, 15.8:1, 115.5:1, 119.4:1 • Power source=four "C" (UMC) dry cells or four "C" (UMC) size nickel cadmium batteries, or a 3-cell Ni-Cd battery pack (not included) • Speed control system=resistor type two forward two reverse speeds • Radio control system to be used =two channel proportional (not included)



1/12th SCALE (RA-1202)



3 TYRRELL P34 FORD SIX WHEELER タイヤレ P34 シックスホイーラー

This is a model of the Tyrrell P34 which caused a great sensation among people who saw the first six wheeled machine in the F-1 history. All four wheels are steerable and the front suspension system with coil springs lets the model take corners with ease. A combination of battery pack and the RS-360 motor give it excellent running capabilities. Also its intrepid appearance make this model a very attractive radio control car. About the prototype ● The Tyrrell P34 made its debut in the racing season of 1976. The kit is modeled after the improved type of 1977. After the body cowl had been reshaped and other details improved, the car was showing good records with Ronny Peterson and Patrick Depailler at the wheel.

(Model Specifications) ● 1/10 in scale ● Overall length 416 mm ● Overall width 136 mm ● Overall height 94 mm ● Wheelbase 210/261 mm ● Tread-front 126 mm, rear 151 mm ● Minimum ground clearance 7 mm ● Weight (all equipped) about 1.4 kg ● Tyre diameter-width-front 42/22 mm, rear 66/49 mm ● Body-impact-proof styrol resin ● Frame-duralumin ● Differential gear equipped ● Coil spring front ● Motor-Mabuchi RS-360S ● Gear ratio-1:5.8, 1:7.1, 1:19.4, 1:23 ● Power source-four "C" (UM2) dry cells or four "C" (UM2) size nickel batteries, or a 5-cell Ni-Cd battery pack (not included) ● Speed control system-resistor type two forward two reverse speeds ● Radio control system to be used-two channel proportional (not included) ● Maximum speed 26 km/h (under 1/15.8 gear ratio)

MARTINI PORSCHE 936 TURBO



6 MARTINI PORSCHE 936 TURBO ポルシェ936ターボホルムランタプ

The aerodynamically designed low silhouette body gives it agility for racing circuit running. The frame is of two sections connected together with bolts and its flexibility absorbs the shocks of hard running. These help the model perform very stable at high speed. The speed control system is stepless variable with braking circuit built in. It has general high performance.

About the prototype ● It was built for the 1977 Le Mans 24 hour race basically on the design of the 936 Turbo which won many victories in 1976 races. The machine made Porsche Co. the Le Mans's winner in two years successively, and the last one was the fourth glory for the company.

(Model Specifications) ● 1/12 in scale ● Overall length 410 mm ● Overall width 170 mm ● Overall height 110 mm ● Wheelbase 268 mm ● Tread-front 120 mm, rear 134 mm ● Minimum ground clearance 5 mm ● Weight (fully equipped) about 1.2 kg ● Tyre diameter-width-front 50/25 mm, rear 53/30 mm ● Body-impact-proof styrol resin ● Frame-duralumin (center only) ● Differential gear equipped ● Motor-Mabuchi RS-360S ● Gear ratio-1:4.7, 1:5.8, 1:15.5 ● Power source-four "C" (UM2) dry cells or four "C" (UM2) size nickel cadmium batteries, or a 5-cell Ni-Cd battery pack (not included) ● Speed control system-forward-reverse variable resistor proportional speed control system with electromotive force brake ● Radio control system to be used-two channel proportional (not included)





TOYOTA CELICA LB TURBO Gr.5

1/10 RACING CAR SUITABLE FOR RADIO CONTROL (COMPETITION SPECIAL)



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 powerful 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 Selective ● 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 Barakung Circuit ● Radio Control System Used: 2 Channel Proportional Type.



1/12th SCALE (RA-1209)

countach LP500S

1/10 RACING CAR SUITABLE FOR RADIO CONTROL (COMPETITION SPECIAL)

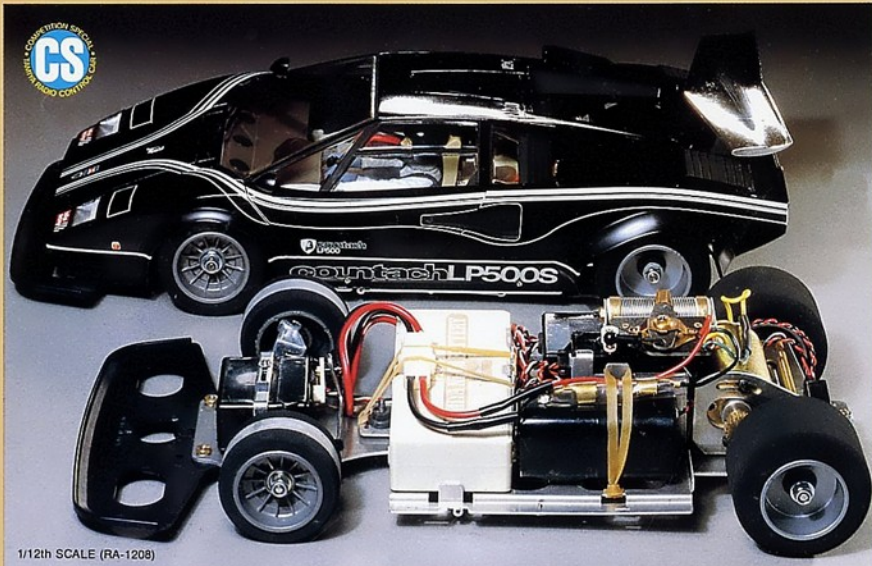


8 COUNTACH COMPETITION SPECIAL カウンタックLP500S-競技用スペシャル

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 Duralumin 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.



1/12th SCALE (RA-1208)

LIGIER JS9 MATRA

1/10th SCALE RACING CAR SUITABLE FOR RADIO CONTROL



10 LIGIER JS 9 MATRA リジエ JS9 マトラ F-1

This model runs in a way which only F-1 cars should. The center pivoted frame made of 1.5 mm thick 17S duralumin ensures excellent stability and maneuverability. Ball bearings can be used on the front and rear axles, and the powerful RS-540 motor can be used in place of the standard RS-380 motor. These tune up kits increase the performance. Besides the precision made plastic body, a polycarbonate body is included in the kit for practice running.

About the Prototype • The Ligier JS 9 performed in competition at the 1978 Monaco G.P. The V-12 engine has an output power of 520 HP. The aerodynamically designed body displays the racing capabilities of this first class car.

(Model Specifications) • Scale: 1/10 • Overall Length: 445 mm • Overall Width: 202 mm • Overall Height: 110 mm • Wheelbase: 240 mm • Tread: Front 152 mm, Rear 152 mm • Minimum Ground Clearance: 10 mm • Weight (Fully equipped) about 1.3 kg • Tire Width/Diameter: Front 30/25 mm, Rear 46/27 mm • Body: Impact Proof Styrol Resin • Frame: 1.5 mm thick 17S Duralumin with Center Pivoted Semi-Flashed Assembly • Either Differential Gear or Direct drive may be used • Motor: Mabuchi RS-380S (RS-540 can also be used) • Gear Ratio: 15:6, 14:7 • Power Source: Nickel Cadmium Battery Pack • Speed Control Switch: Forward/Reverse/Variable Register Proportional with Brake Circuit • Radio Control System used: 2 Channel Proportional Type



1/10th SCALE (RA-1010)

FLAKPANZER GEPARD



3 WEST GERMAN GEPARD 西ドイツ・ゲパルト対空戦車

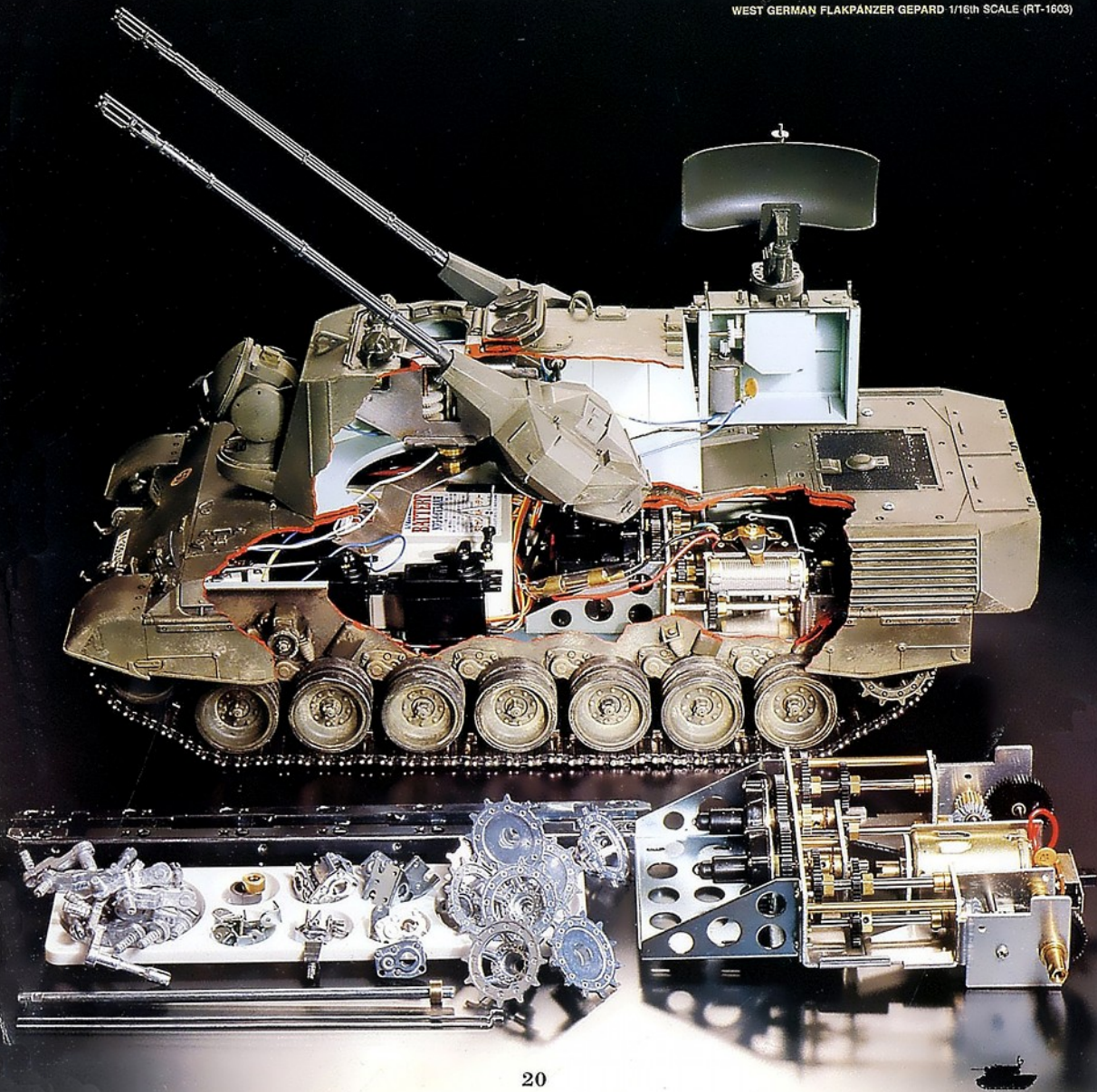
This is a radio controlled model which can be enjoyed not only because of its dynamic maneuverability, but also because of the many unique mechanics. The turret revolves 360°, the twin guns move up and down, and the radar at the rear revolves with the movement of the turret. The tank performs pivot turns and gradual turns through a drive unit utilizing a double clutch. All wheels have individual suspension with torsion plates making it like the prototype. The detailed appearance of the newest anti aircraft tank is very appealing.

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: 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: Duralumin • 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



1/16th SCALE (RT-1803)





7 CHEETAH

ランボルギーニ・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, 5.9 litre V8 with a output power of 160 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" (UM) 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 electromagnetic force brake • Radio control system to be used-two channel proportional (not included)



1/12th SCALE (RA-1207)



4 FMC-XR311

FMC-XR311 コンバットバギー

Try this off-the-road vehicle, and you will enjoy running which is somewhat different from that of racing cars. All four wheel independent suspension system, and semi pneumatic large balloon tyre with excellent traction on rough surfaces make for easy running. The precision scale also adds to the enjoyment of assembling.

About the prototype. The XR311 is a high speed combat support vehicle developed by FMC of the U.S.A. With a Chrysler V8 rear engine yielding 190 horse power, and equipped with such advanced devices as automatic transmission, and four wheel independent suspension. This vehicle has a maximum speed of 130 km/h and maneuvers extremely well off the road.

(Model Specifications) • 1/12 in scale • Overall length 400 mm • Overall width 160 mm • Overall height 139 mm • Wheelbase 256 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" (UM 2) dry cells or four "C" (UM 2) size nickel cadmium batteries, or a 5-cell Ni-Cd battery pack (not included) • Speed control system-resistor type two forward two reverse speeds • Radio control system to be used-two channel proportional (not included) • Maximum speed 16 km/h under gear ratio 1/9.3



1/12th SCALE (RA-1204)

I-16 LEOPARD A4



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 exquisite 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=102:1 ● 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

I 16 M4 SHERMAN

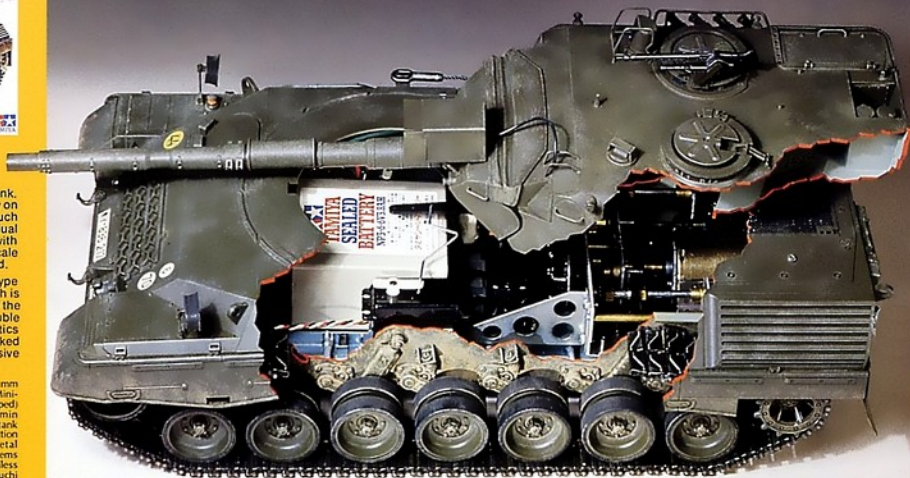


1 M4 SHERMAN 105mm HOWITZER アメリカM4シェーマン105mm榴弾砲後期型

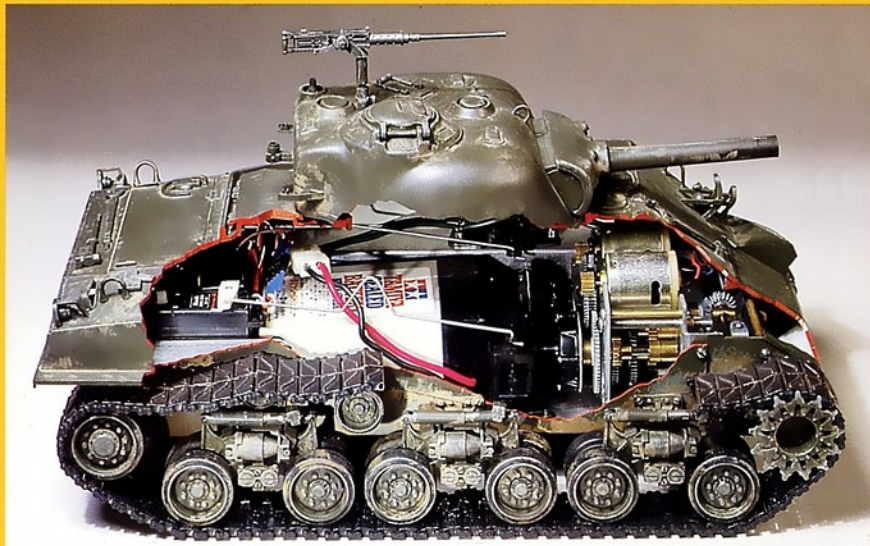
This kit is easy to build and simple to run, and ideal for beginners of radio controlled models. At the same time it can be enjoyed by skilled modelers because it contains highly refined components such as drive mechanism with a dual clutch and workable coil springs, which are patterned after the prototype Sherman tank.

About the prototype ● This tank is mounted with a 105mm Howitzer. The M4 Sherman series was an American masterpiece tank. 50,000 were produced during World War II. They were assigned to the headquarters of tank battalions and acted as strong firing support.

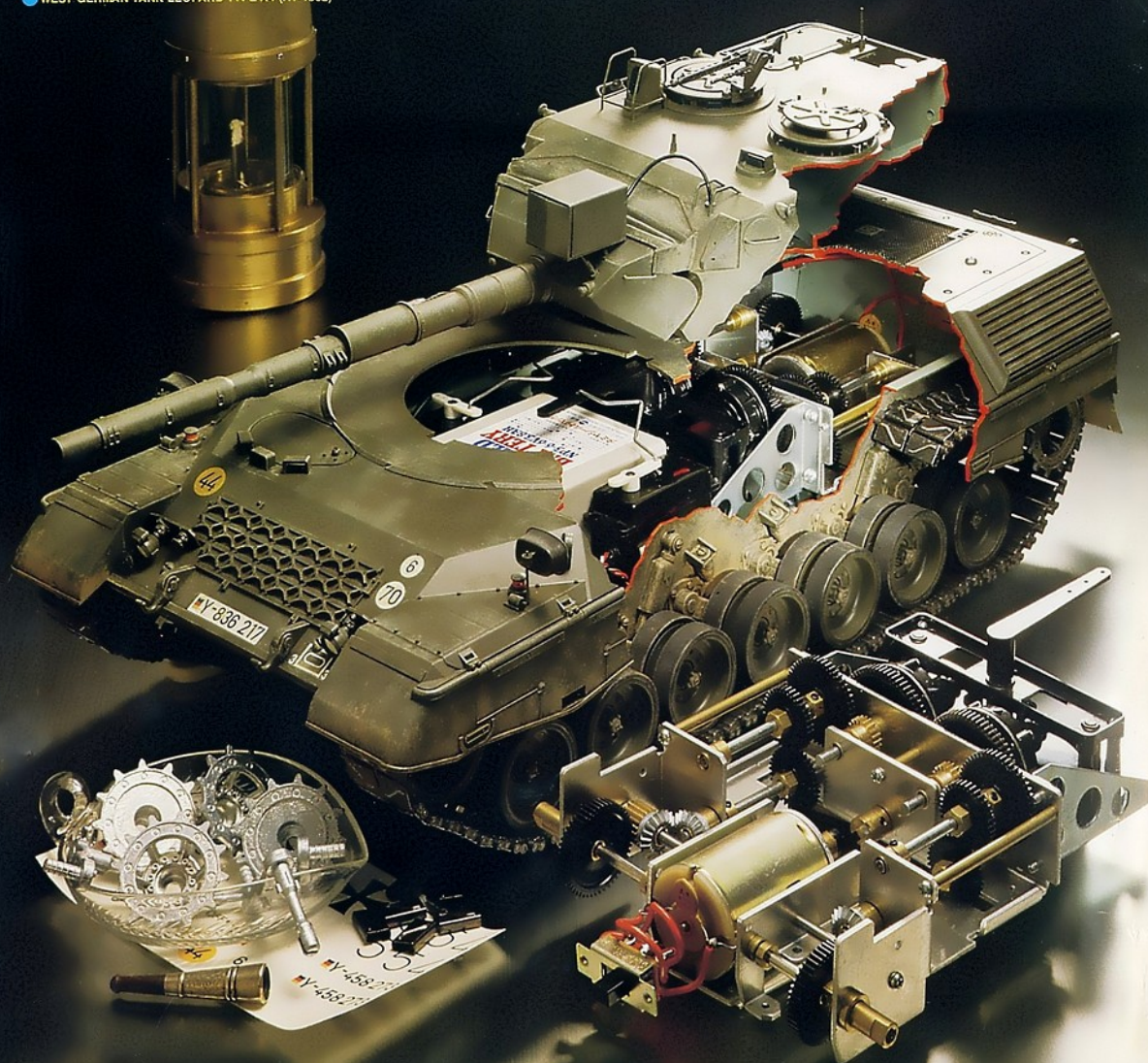
(Model Specifications) ● 1/16 in scale ● Overall 360 mm ● Overall width 183 mm ● Overall height 200 mm ● Minimum ground clearance 29 mm ● Weight (fully equipped) about 4kg ● Body=ABS resin ● Frame=aluminium ● The motor power is transmitted through the clutch mechanism and it is possible to execute slow turns by half engaging either clutch as well as forward and reverse and fast skid turns, when digital proportional system is used. By controlling the motion of the motors through the switch control mechanism it is possible to execute skid turns as well as forward and reverse movements, when single push-button system is used ● Linked metal tracks ● Suspension=diecast Zinc. Movable by coil springs ● Motor=two Mabuchi RS-360G motors ● Power source=6V 3.8A rechargeable storage battery ● Radio control system to be used=two channel proportional or single push-button (not included) ● Tank can climb a 40 degree incline ● Maximum speed 1 km/h



1/16th SCALE (RT-1602)



1/16th SCALE (RT-1601)



BUILDING UP A CAR OF HIGH RUNNING CAPABILITY

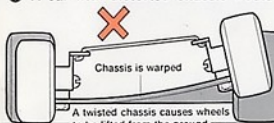


Even the same type of radio controlled electric car kit may produce much diversified performances and characteristics in accordance with a way it is assembled and adjusted; for example, some cars are easy to control and some are not so easy as others.

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:

① A car with distorted chassis would

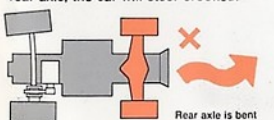


not go straight; therefore correct the chassis so that the four wheels should touch the ground evenly. Particularly after collision, look into it carefully.

② If any wheel should not rotate smoothly, the car would turn to the direction of the wheel. Assemble a car with care so all wheels would revolve evenly. This is related to car's running capability.

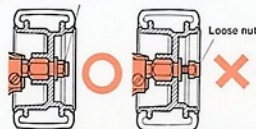


③ If a front axis is not set parallel to the rear axis, the car will steer crooked.



④ With a bent rear axle the car will keep turning.

⑤ 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

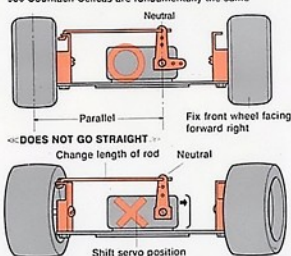


wheel in position in such a way that there is no play between the wheel and the axle, but still allowing the wheel to turn smoothly.

⑥ 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

PORSCHE 934 935 (FRONT VIEW)

936 Countach Coficas are fundamentally the same

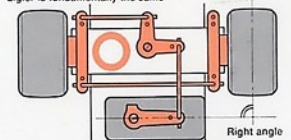


◀ IT GOES STRAIGHT BUT TURNS UNEVENLY RIGHT AND LEFT ▶

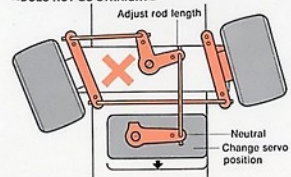


TYRRELL P34, XR311, CHEETAH (TOP VIEW)

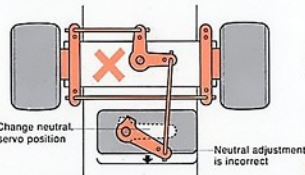
Liger is fundamentally the same



◀ DOES NOT GO STRAIGHT ▶

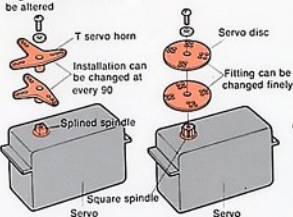


◀ IT GOES STRAIGHT BUT TURNS UNEVENLY ▶



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

Angle of servo horn can be altered

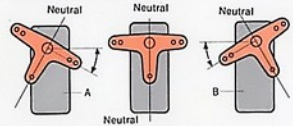


unevenly to right and left. Being installed with a screw, servo horns can be readjusted by unscrewing.

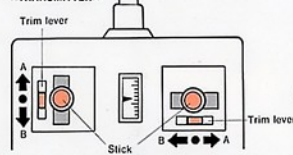
⑦ Try to mount radio control units and batteries into a car, balancing the car evenly.

⑧ 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 a fine adjustment of servo

◀ SERVO HORN MOVEMENT ▶

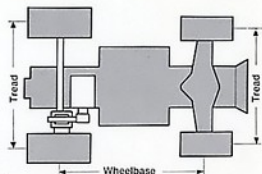


◀ TRANSMITTER ▶



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.

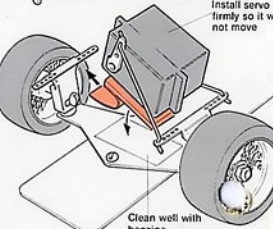
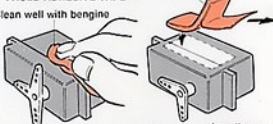


2. HOW YOUR CAR TAKES CORNERS

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.

① The direction of front wheels are controlled by the movement of a servo. In the case a servo is not secured in position firmly, the car tends to be unstable, jerking or not responding to the control properly, or turning unevenly right and left. When dual-sided adhesive tape is

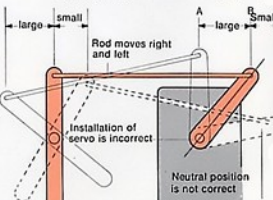
② HOW TO APPLY DOUBLE FACED ADHESIVE TAPE



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

◀ INSTALLATION OF SERVO HORN ▶

Turn unevenly or switch will not work properly

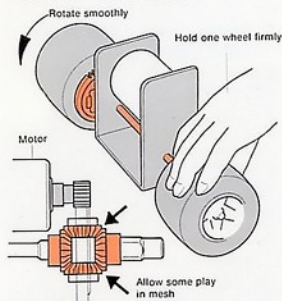


Travel of servo horn between B & C is almost vertical and shows less horizontal movement than from A to B.

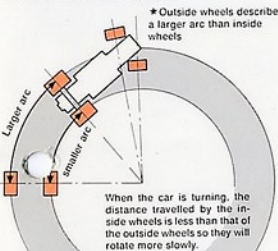
2 In most cases where the car does not curve evenly, i.e. a small turn to the right and a bigger turn to the left under the same steering angle, it is caused by incorrect installation of a servo horn to the servo. In such a case, straighten the problem by taking the procedures as per stated in the previous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

3 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.

CHECKING DIFFERENTIAL GEAR

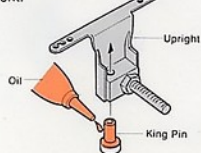


WHY DIFFERENTIAL IS USED

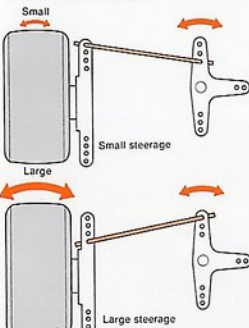


tion. When it does not, try to give some play in the gear meshing.

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



5 Oil the king pin of the front wheels. Steering will then operate lightly. (HINT) Steering (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 steering.



3. FOR SPEEDING UP (HOP UP)

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



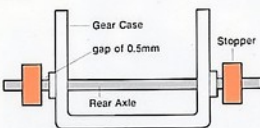
applying oil or grease to the places required.

1 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.

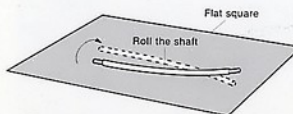
2 Clean the surfaces of gear teeth with a used toothbrush or scrape them with the tip of a screwdriver if there is any deposit of dust and dirt which would kill the smooth rotation.



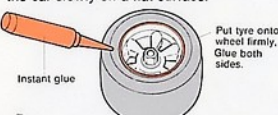
3 A chipped or deformed gear tooth will diminish the rotation. Particularly a brass gear is easily warped; in such a case, re-shape it with a file carefully.



4 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.



5 A bend in the rear shaft will be a cause of unsteadiness 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 car slowly on a flat surface.

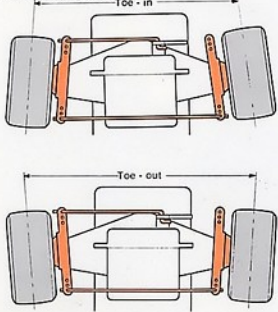


6 When a tire is not glued firmly or the wheel hub is warped, the effect is the same as if the axle is bent; the car cannot go fast.

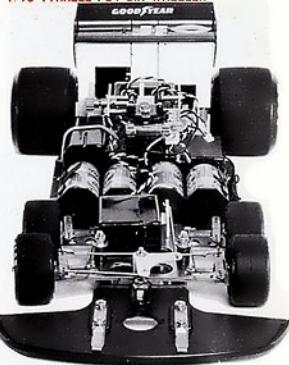
7 Oiling of the front axle is often overlooked. Do it without fail. Poor rotation on the front wheels influences the car's speed more unfavorably than you may think.

8 Improper toe-in and toe-out adjustments are resistant to the car. The model car runs well without toe-in and toe-out at all or with a little degree of either.

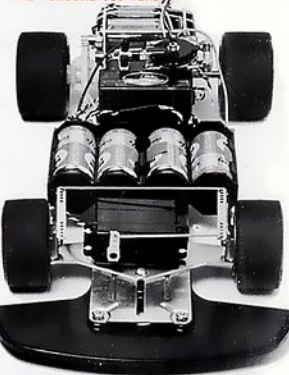
934, 935 TOP VIEW



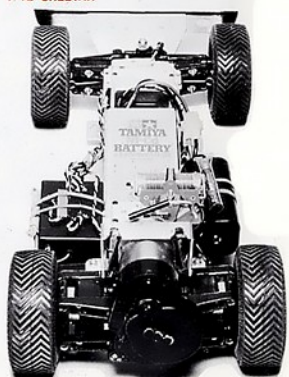
1/10 TYRRELL P34 SIX WHEELER



1/12 PORSCHE 935 TURBO



1/12 CHEETAH



TROUBLE SHOOT- ING



When the model car does not run satisfactorily, do not give up, but try to find out the problem. There is no breakdown which cannot be fixed. Troubleshooting is a good way to gain experience which can help you to become a skilled modeler.

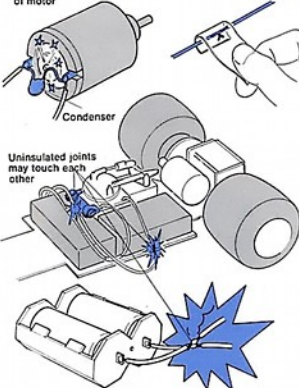
1. CAUSES OF BLOWN FUSE

Nickel cadmium batteries feature the ability to discharge a lot of current at a time. Therefore, once short circuited, a large amount of current may damage the motor, switch or wiring. A fuse is installed in the circuit to protect the motor and switch by means of the fuse itself blowing out.

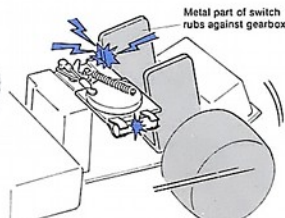
One of the frequent causes of a burnt out fuse, though hard to notice, is a contact between the metal part of the speed control switch and the gearbox or the chassis. Other causes are: erroneous wiring, poor insulation on the connection points of wiring and contact of the motor wires and motor shaft.

● Condenser wire is in contact with shaft or other metal part of motor

● Insulate with vinyl tape

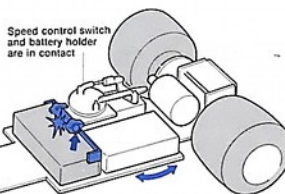


① In the case of the Porsche 935 particularly, a short circuit between the speed control switch and the gearbox is often found.



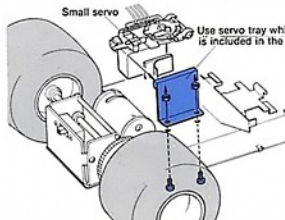
② With the Tyrell P34, a short circuit is often found between the speed control switch and the holder for the nickel cadmium battery pack.

● If the fuse burns out when the car collides with something, or when the car is put on the ground, it can be suspected that the chassis is warped and the metal part of the speed switch is in contact with another metal part of the car. The speed control switch should be mounted with enough distance from the gearbox and battery holders. If there cannot be sufficient clearance between them, it is a good idea to apply vinyl tape for insulation.



● Some servos are so small that there is not much space left between the servo and the battery holder. This will cause the problem of a short circuit. Use the servo tray (which is included in the kit) for a small servo.

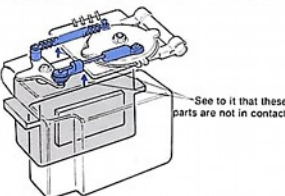
<< TYRELL P34 >>



2. WHEN THE CAR DOES NOT MOVE

① 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.

② 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

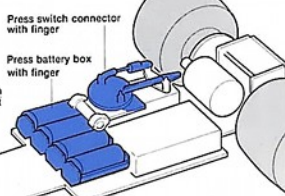


the movement of the speed control switch. Please also refer to (3)-(1) in "When the Car Does Not Gain Speed" for methods of mounting a servo correctly.

③ 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.

④ 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.

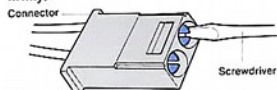
<< CHECK POOR CONTACT >>



⑤ 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.

⑥ 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.

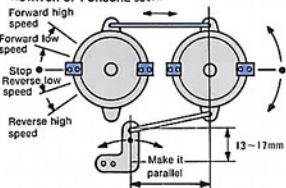


Since the motor is precision made, it can become damaged when dropped, dipped into water, short circuited, or connected to too many batteries.

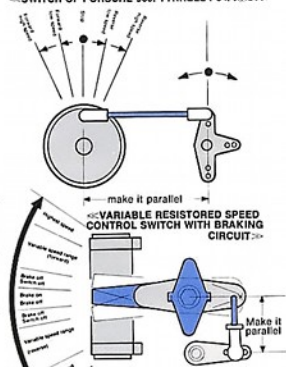
3. WHEN THE CAR DOES NOT GAIN SPEED

① Make sure the speed control switch operates properly. If the switch goes into high speed only in the reverse position, or 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

<< SWITCH OF PORSCHE 934 >>

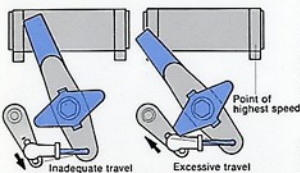


<< SWITCH OF PORSCHE 935, TYRELL P34, XR31 >>



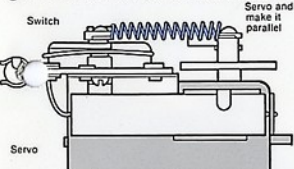
way to the maximum speed end. When the adjustment is incorrect and the switch blade does not move all the way to the end or goes over it, problems may arise.

2 See if something is in the way of the ser-



vo horn or the speed control switch which can block their proper movement.

3 If the motor does not run at the maxi-



mum speed when the speed control switch is in its maximum position, poor contact of batteries or of the switch terminals can be suspected. Especially with the Porsche 934, when the battery terminals are making poor contact, high speed may not be obtained. The poor contact can be found by pressing the switch as it is moved into the high speed position.

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

4. WHEN THE CAR DOES NOT TURN

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

2 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.

3 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".

5. WHEN A CAR DOES NOT STOP

1 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".

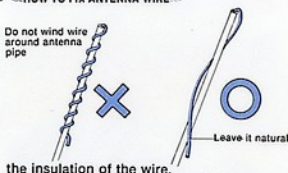
2 Excessive play in the connection between the switching servo and the speed control switch may cause the switch to fail to return to the stop position even when the servo is at the neutral position.

6. IF THE RADIO CONTROL DOES NOT OPERATE

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

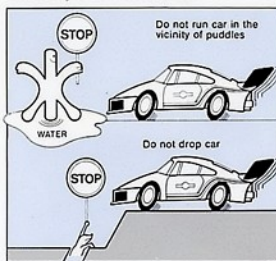
2 Are the antennas of the transmitter and receiver ok? The following actions make the reception of radio signals poor: shortening the receiver antenna wire, winding the wire around the antenna tube, leaving the wire inside the model car, or removing

<<HOW TO FIX ANTENNA WIRE>>



3 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.

4 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.



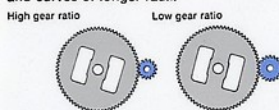
CHARACTERIZING A CAR

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)

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.

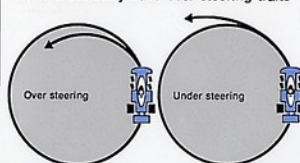


TIRES

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

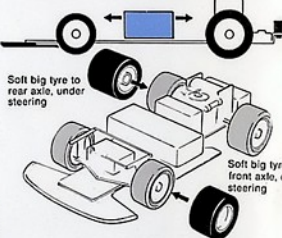
(1) Place a heavy load, such as batteries, at rear portion of the car.

(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.

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

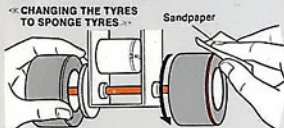
As you attain proficiency in controlling cars, you will be tempted to improve your car. This chapter will introduce handy ways of increasing performance. The most important matter you have to keep in mind when you modify your car is to keep everything in balance. By putting a big motor on your car, you 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 Tyrell 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. DIVERTING 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 360 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.



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 UTENSILS

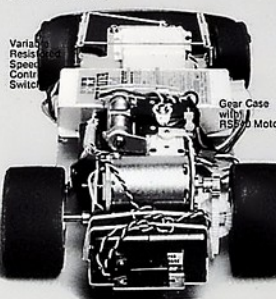
Many sorts of parts are available on the market, other than radio controlled electric car parts. For instance, a type of push rod connecting servo horns and control units in a model are sold which have threaded ends and easy to adjust length. Also, a velcro pad with one-sided adhesive may be used for 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

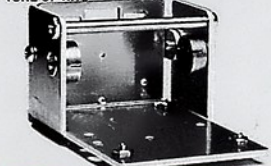
Lightening the weight of a model car is another effective way to enhance the performance. Cutting off part of chassis and gearbox case is often done. Also, the window shield is made of thin 0.2 mm transparent plastic plate or only 1 battery unit supplies energy to both the radio control receiver and 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. AUGMENTATION 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. Nevertheless, 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.

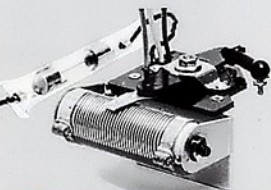


TUNE UP KITS



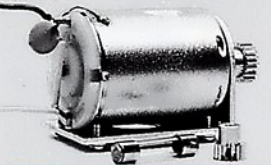
22 GEAR CASE WITH BALL BEARINGS for Tyrell P34 SP1022

This is for modifying the Tyrell P34. Gear case is specially made with both sides having sealed ball bearings which increases acceleration and speed.



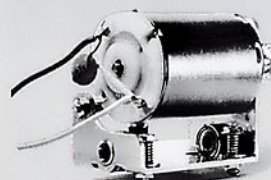
54 VARIABLE RESISTOR SPEED CONTROL SWITCH With Braking Circuit and Fuse SP1054

This is a variable resistor speed control switch enabling smooth change of speed. First product of this kind to have braking circuit built in which can be used easily by a touch of the trim lever. A fuse protects the motor and power supply. This switch can be used with any Tamiya R/C model.



23 RS-540 MOTOR SET for Tyrell P34, XR311 and Cheetah SP1023

This is a larger motor for the Tyrell P34, the same one used for the XR 311 and Cheetah. The powerful RS-540 improves the performance of the Tyrell P34 drastically. Motor bracket and pinion gear are included to allow for easy installation.



53 GEAR CASE WITH RS-540 MOTOR for Porsche SP1059

This is a modification kit for the Porsche 934 and 935. Consisting of a special gear case with ball bearings and RS-540, it improves acceleration and maximum speed of the cars. All parts are included in the kit.

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

Finished example of Tyrell P34 six wheeler



Finished example of Cheetah



chance of painting your car in your original way.

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
Australia Stripes of Blue and Silver
Belgium Yellow

SOME IDEAS OF CAR DECORATION

Decorate your car, the fruit of your effort, as pretty as possible. Plastic bodies of the radio controlled electric 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 in 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 RM1201

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.



2 MECHANIC<WHEEL CHANGING> RM1202

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.



3 MECHANIC<ENGINE TUNING> RM1203

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 RM1204

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. The set is of great use and helpful accessories.

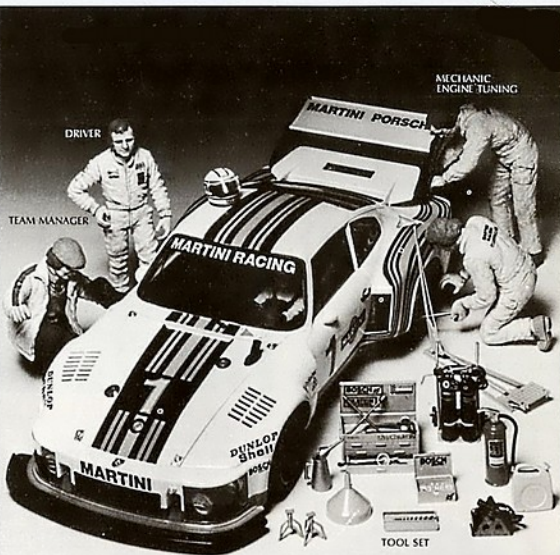


5 TEAM MANAGER RM1205

Taking the leadership of the team aiming at victory, the team manager is giving a piece of direction 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.



PORSCHE RACING TEAM



CHEVROLET RACING TEAM



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 BODIES OF PLASTIC MODELS

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 be 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 ON KIT BODY

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.

CHALLENGE OF MAKING MODELS RADIO CONTROLLED

Some Tamiya models can be converted to radio controlled versions besides those kits originating as radio controlled models from the factory. If you have the desire and skill, it would be great fun to try the conversion. One essential condition for conversion is that the model has space to mount the radio control units and batteries. The following 1/72 PT-15 and 1/350 Bismarck are big enough and can be readily converted to radio controlled models.



Bismarck - A great asset of the German Navy

The Bismarck is a superbly detailed German battleship, leaving its name in a page of history under a caption of the Battle of Bismarck Chase. It was mounted with eight 38 cm main guns, boasting a maximum speed of 30 knots and excellent defensive capability. It had a displacement of 41,700 tons and was said to be the world's most formidable and unsinkable battleship until the advent of the Japanese Yamato class. Tamiya's Bismarck is 70 cm in length and is precisely reduced to a scale of 1/350, large enough to show the beauty of its functional structure. It is a comparatively easy kit to assemble.



Japan Torpedo Boat PT-15 A Jet Fighter on the Sea

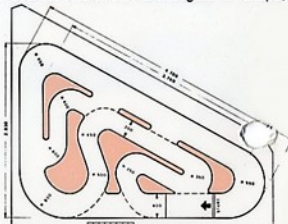
The torpedo boat, PT-15, is another model which can be converted to radio control. The big scale of 1/72 allows accurate reproduction with a mode of high speed movement of a torpedo boat. The length is 488 mm with a deep V hull shape which has good maneuverability and stability. It is equipped with 4 torpedo tubes and 2 Bofors machine guns. All of these and the detail down to the inside of the bridge are faithfully reproduced, offering you a detailed model to work on. Furthermore, 12 crew members are posed in a tense fighting stance, helping the model look real. You will be able to imagine the appeal of a real

torpedo boat, PT-15, dashing through the high waves of the Japanese sea at 40 knots powered by 2 diesel and 2 gas turbine engines.

Either model can be converted to radio controlled by using the parts for motorization. Two channel radio control units are sufficient.

TAMIYA NEW CIRCUIT LOCATED IN JAPAN

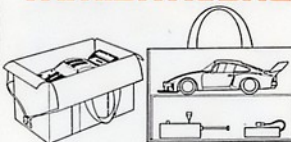
This is a newly designed racing circuit used exclusively for radio controlled cars, and it is composed of high speed technical course; more than 10 different varieties of the tracks can be chosen over about 18,000 sq. ft. of area, paved with asphalt. The inside and outside of the courses are covered with artificial turf for preventing damages to the cars due to collision caused by running off the course. The circuit is triangular in shape,



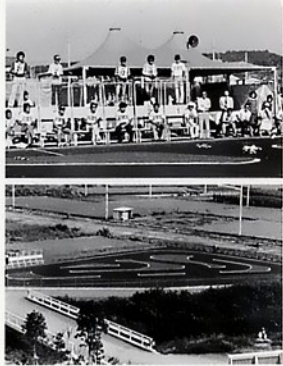
and 100 meters (328 ft) in perimeter. The width of the tracks is 4 meters (13.12 ft), wide enough to let cars steer at top speed. The maximum length of the technical course, using inside tracks of 3 meters (9.84 ft) wide, is 140 meters (459 ft). It is a complicated circuit with levels of 25 cm (9.84") difference and combined with figure "S" curves where timely steering is required. A 180° hair pin bend is included where deceleration is a must. The new circuit is ready for use for competition promoted by hobby stores or for driving practice gatherings, free of charge. For further details, please refer to persons in charge of the circuit in the sales section. It is not open for all individuals; however, you are welcomed to come and use it on the second Saturday and Sunday of every month, under the instruction of the attendants.



TAMIYA RC BAG

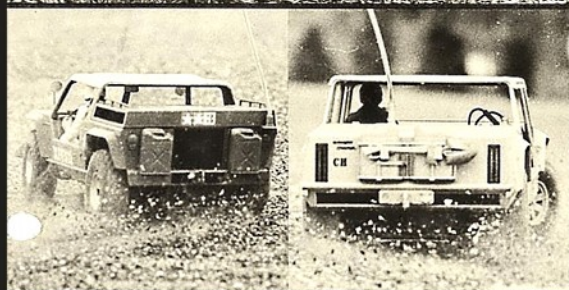


This is a handy bag to carry things for radio control models. The size is 47 cm (18.5") x 25 cm (9.84") x 27 cm (10.63") deep, big enough for any Tamiya electrical radio controlled car. The material is canvas with a hard plastic form inside making a double bottom. Opening and closing it with slide fasteners is easy and firm, and the length of the fastener is long enough to allow you to put large items into it. The strap is also long enough to carry the bag on your shoulder. An outside pouch can be used for small items. The bag is also handy for transporting assembled plastic models.





XR3H(1/12)



CHEETAH(1/12)



LEOPARD A4(1/6)



M4 SHERMAN(1/6)



ALL PHOTOS IN THIS PAGE ARE OF TAMIYA KITS PRECISION BUILT

REPAIR OF R/C MODELS

Replace worn out parts with new ones and keep the model in good operating condition at all times. Tamiya is producing spare parts for this purpose. Caution is required since some parts can be used commonly with the Porsche, Tyrrell, and XR311; and some parts should be used exclusively for one type. You can obtain the parts at hobby stores.

No.
SP-1001

PORSCHE 934 WHEEL SET



No.
SP-1002

PORSCHE 934 DECAL 'A'



No.
SP-1003

PORSCHE 934 DECAL 'B'



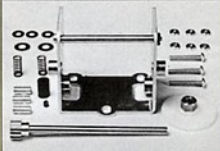
No.
SP-1004

PORSCHE 934 DECAL 'C'



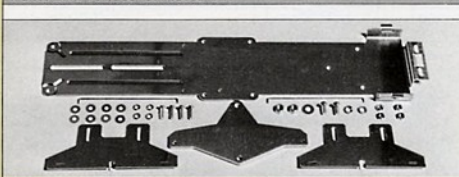
No.
SP-1006

PORSCHE 934/935 GEAR BOX SET



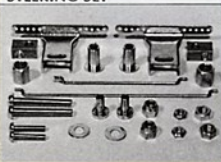
No.
SP-1007

PORSCHE 934/935 CHASSIS SET



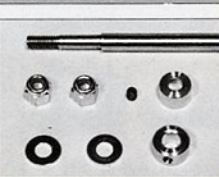
No.
SP-1008

PORSCHE 934/935 STEERING SET



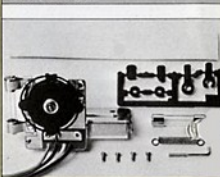
No.
SP-1009

REAR SHAFT SET



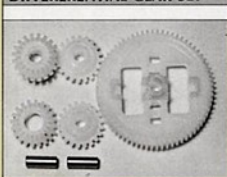
No.
SP-1010

SWITCH SET



No.
SP-1011

DIFFERENTIAL GEAR SET



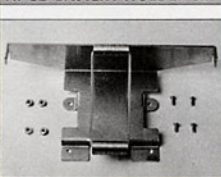
No.
SP-1012

PINION GEAR SET FOR RS-380



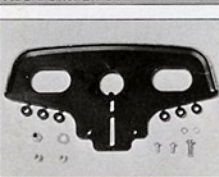
No.
SP-1013

NI-CD BATTERY HOLDER SET



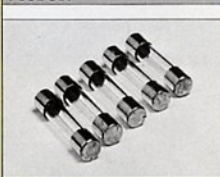
No.
SP-1014

ABS BUMPER SET



No.
SP-1015

FUSE SET



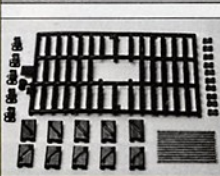
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SP-1016

PORSCHE 935 DECAL



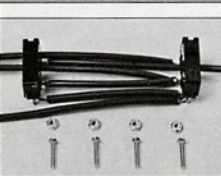
No.
SP-1017

TRUCK SET



No.
SP-1018

MICRO SWITCH SET



No.
SP-1019

TYRRELL P34 DECAL

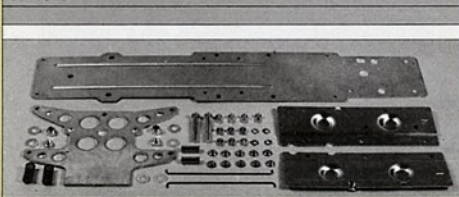


No.
SP-1022

TYRRELL P34 GEAR BOX SET

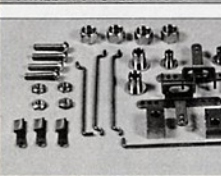


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SP-1020



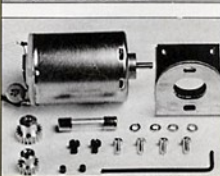
No.
SP-1021















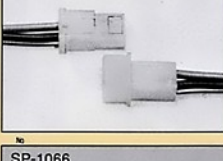




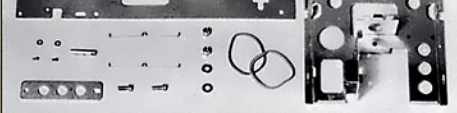


TYRRELL P34 STEERING SET




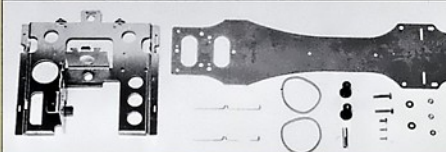
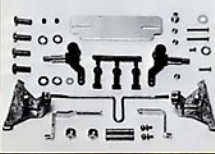
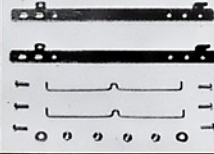
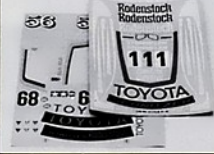

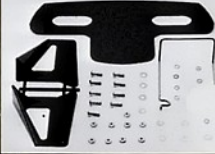
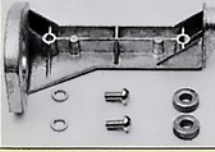












No.
SP-1023

RS-540 MOTOR SET



<div>No</div> <div>SP-1024</div> <div>PINION GEAR SET FOR RS-540</div> <div></div>	<div>No</div> <div>SP-1025</div> <div>DOUBLE FACED ADHESIVE TAPE SET</div> <div></div>	<div>No</div> <div>SP-1026</div> <div>XR311 CHASSIS SET</div> <div></div>	<div>No</div> <div>SP-1027</div> <div>XR311 UNDER-GUARD SET</div> <div></div>	
<div>No</div> <div>SP-1028</div> <div>XR311 BEVEL GEAR SET</div> <div></div>	<div>No</div> <div>SP-1029</div> <div>XR311 PARTS 'E'</div> <div></div>	<div>No</div> <div>SP-1030</div> <div>XR311 PARTS 'G'</div> <div></div>	<div>No</div> <div>SP-1031</div> <div>XR311 PARTS 'Z' FIGURE</div> <div></div>	<div>No</div> <div>SP-1032</div> <div>XR311 PARTS 'D' WHEEL</div> <div></div>
<div>No</div> <div>SP-1033</div> <div>XR311 GEAR SET</div> <div></div>	<div>No</div> <div>SP-1034</div> <div>XR311 SHAFT SET</div> <div></div>	<div>No</div> <div>SP-1035</div> <div>XR311 UNIVERSAL SHAFT SET</div> <div></div>	<div>No</div> <div>SP-1036</div> <div>BALL BEARING SET</div> <div></div>	<div>No</div> <div>SP-1037</div> <div>PORSCHE 934/935 BODY CATCH SET</div> <div></div>
<div>No</div> <div>SP-1038</div> <div>TOOL SET</div> <div></div>	<div>No</div> <div>SP-1039</div> <div>BATTERY CONNECTER SET</div> <div></div>	<div>No</div> <div>SP-1040</div> <div>CHEETAH WHEEL SET</div> <div></div>	<div>No</div> <div>SP-1063</div> <div>COUNTACH WHEEL SET</div> <div></div>	<div>No</div> <div>SP-1064</div> <div>COUNTACH DECAL</div> <div></div>
<div>No</div> <div>SP-1065</div> <div>COUNTACH/PORSCHE 936 GEAR BOX</div> <div></div>	<div>No</div> <div>SP-1066</div> <div>COUNTACH/PORSCHE 936 CHASSIS SET</div> <div></div>	<div>No</div> <div>SP-1067</div> <div>COUNTACH/PORSCHE 936 STEERING SET</div> <div></div>	<div>No</div> <div>SP-1068</div> <div>BALL JOINT & ADJUSTER ROD SET</div> <div></div>	

No SP-1069 BUSH SET 	No SP-1071 PORSCHE 936 DECAL 	No SP-1077 DIFFERENTIAL GEAR (SMALL) SET 	No SP-1078 SPECIAL CHASSIS SET 	
No SP-1079 SPECIAL STEERING SET 	No SP-1080 COUNTACH/PORSCHE 936 CATCH PIN SET 	No SP-1083 CELICA LB TURBO DECAL 	No SP-1084 LIGIER JS9 DECAL 	No SP-1085 F-1 BUMPER SET 
No SP-1086 F-1 GEAR BOX SET 	No SP-1087 F-1 GEAR CHASSIS SET 	No SP-1088 F-1 STEERING SET 		
No SP-1054 VARIABLE RESISTOR SPEED CONTROL SWITCH 	No SP-1059 PORSCHE 934/935 GEAR BOX & RS-540 MOTOR SET 	No SP-1072 COUNTACH/PORSCHE 936 GEAR CASE & RS-540 MOTOR SET 	No SP-1073 BEARING SET 	
SPARE TYRE AND SPARE BODY Change tyres before they wear out completely since they are improvement for good running. The spare bodies are essential after collisions. Decals and hardware are included in the kit. It is a good idea to have two or three differently painted bodies ready and change them from time to time. You can buy these tyre and body sets at model retail stores.				
No SP-1041 PORSCHE 934 SLICK RACING TYRE 'FRONT' 	No SP-1042 PORSCHE 934 SLICK RACING TYRE 'REAR' 	No SP-1043 PORSCHE 934 ALL-WEATHER TYRE 'FRONT' 	No SP-1044 PORSCHE 934 ALL-WEATHER TYRE 'REAR' 	

<div>No</div> <div>SP-1046</div> <div>PORSCHE 935 SPARE TYRE WITH WHEEL 'FRONT'</div> <div></div>	<div>No</div> <div>SP-1047</div> <div>PORSCHE 935 SPARE TYRE WITH WHEEL</div> <div></div>	<div>No</div> <div>SP-1049</div> <div>TYRRELL P34 SPARE TYRE 'FRONT'</div> <div></div>	<div>No</div> <div>SP-1050</div> <div>TYRRELL P34 SPARE TYRE 'REAR'</div> <div></div>	<div>No</div> <div>SP-1052</div> <div>XR311 SPARE TYRE SET</div> <div></div>
<div>No</div> <div>SP-1055</div> <div>SPONGE TYRE SET 'FRONT-A'</div> <div></div>	<div>No</div> <div>SP-1056</div> <div>SPONGE TYRE SET 'REAR-A'</div> <div></div>	<div>No</div> <div>SP-1057</div> <div>SPONGE TYRE SET 'REAR-B'</div> <div></div>	<div>No</div> <div>SP-1058</div> <div>SPONGE TYRE SET 'REAR-C'</div> <div></div>	<div>No</div> <div>SP-1060</div> <div>CHEETAH SPARE TYRE SET</div> <div></div>
<div>No</div> <div>SP-1074</div> <div>RUBBER TYRE SET (FRONT-A)</div> <div></div>	<div>No</div> <div>SP-1075</div> <div>DIPLO TYRE SET</div> <div></div>	<div>No</div> <div>SP-1076</div> <div>SPONGE TYRE SET 'REAR-D'</div> <div></div>		
			<div>No</div> <div>SP-1045</div> <div>PORSCHE 934 SPARE BODY SET</div> <div></div>	
<div>No</div> <div>SP-1048</div> <div>PORSCHE 935 SPARE BODY SET</div> <div></div>	<div>No</div> <div>SP-1051</div> <div>TYRRELL P34 SPARE BODY SET</div> <div></div>	<div>No</div> <div>SP-1053</div> <div>XR311 SPARE BODY SET</div> <div></div>	<div>No</div> <div>SP-1061</div> <div>CHEETAH SPARE BODY SET</div> <div></div>	
<div>No</div> <div>SP-1062</div> <div>COUNTACH SPARE BODY SET</div> <div></div>	<div>No</div> <div>SP-1070</div> <div>PORSCHE 936 SPARE BODY SET</div> <div></div>	<div>No</div> <div>SP-1081</div> <div>CELICA LB TURBO SPARE BODY SET</div> <div></div>	<div>No</div> <div>SP-1082</div> <div>LIGIER JS9 SPARE BODY SET</div> <div></div>	

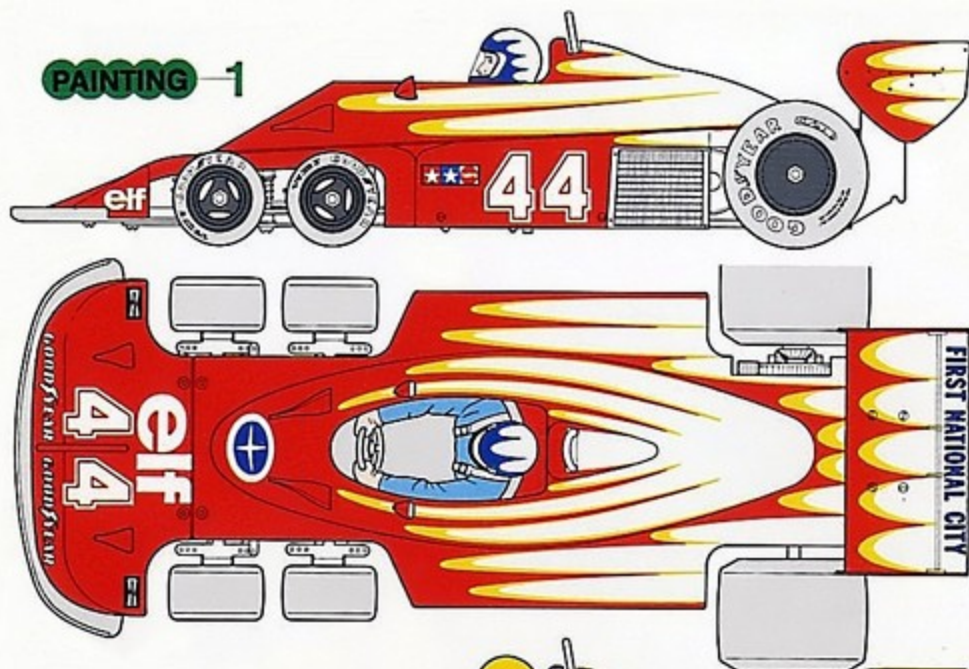
RADIO CONTROL CAR		
KIT NO.	Name of Article	Motor POWER SOURCE
RA-1201	Porsche 934 Turbo RSR	RS-300 Four "C" (UM42 dry cells or four "C" UM42 size nickel cadmium batteries)
RA-1202	Martini Porsche 935 Turbo	RS-300S Four "C" (UM42 dry cells or four "C" UM42 size nickel cadmium batteries, or a Scotti No. 66 battery pack (not included).
RA-1003	Tyrelli P34 Six Wheeler	"
RA-1204	FMC-XR311	RS-540
RA-1205	Lamborghini Countach LP500S	RS-300S "
RA-1206	Martini Porsche 935 Turbo	"
RA-1207	Cheetah	RS-540 "
RA-1208	Lamborghini Countach LP500S Competition Special	" Nickel cadmium battery pack (not included).
RA-1209	Toyota Celica LB Turbo Gr.5 Competition Special	"
RA-1010	Ligier JS9 Matra	RS-300S
RA-1011	Ferrari 312T3	"

		SUITABLE FOR									
R/C SPARE PARTS		Porsche 934 Type 86C	Porsche 935 Type 86D	Jaguar XJ XJS	Lamborghini Countach	Porsche 938 Conquest	Cougar Special Edition	Corvette Special Edition	Saboteur Special	Ferrari F372F	
KIT NO.	Name of Article										
SP-1001	Porsche 934 Wheel Set	●									
SP-1002	Porsche 934 Decal 'A'	●									
SP-1003	Porsche 934 Decal 'B'	●									
SP-1004	Porsche 934 Decal 'C'	●									
SP-1006	Porsche 934/935 Gear Box Set	●									
SP-1007	Porsche 934/935 Chassis Set	●									
SP-1008	Porsche 934/935 Steering Set	●									
SP-1009	Rear Shaft Set	●	●			●	●	●	●	●	
SP-1010	Switch Set	●	●	●							
SP-1011	Differential Gear Set	●				●	●				
SP-1012	Pinion Gear Set for RS-380	●									
SP-1013	Ni-Cd Battery Holder Set	●	●								
SP-1014	ABS Bumper Set	●				●	●	●	●		
SP-1015	Fuse Set	●	●	●					●	●	
SP-1016	Porsche 935 Decal	●									
SP-1017	Truck Set (17 links)				●	●				●	
SP-1018	Micro Switch Set				●	●					
SP-1019	Tyrrrell P34 Decal			●							
SP-1020	Tyrrrell P34 Chassis Set										
SP-1021	Tyrrrell P34 Steering Set										
SP-1022	Tyrrrell P34 Gear Box Set										
SP-1023	RS-540 Motor Set			●	●			●	●	●	
SP-1024	Pinion Gear Set for RS-540					●					
SP-1025	Double Faced Adhesive Tape Set	●	●	●	●	●	●	●	●	●	
SP-1026	XR311 Chassis Set			●	●						
SP-1027	XR311 Under-guard Set			●	●						
SP-1028	XR311 Bevel Gear Set			●	●						
SP-1029	XR311 Parts 'E'			●	●						
SP-1030	XR311 Parts 'G'			●	●						
SP-1031	XR311 Parts 'Z' Figure			●	●						
SP-1032	XR311 Parts 'D' Wheel			●	●						
SP-1033	XR311 Gear Set					●					
SP-1034	XR311 Shaft Set					●					
SP-1035	XR311 Universal Shaft Set					●					
SP-1036	Ball Bearing Set (2 pcs.)					●					
SP-1037	Porsche 934/935 Body Catch Set	●	●	●							
SP-1038	Tool Set	●	●	●							
SP-1039	Battery Connector Set	●	●	●		●	●	●	●	●	
SP-1040	Cheetah Wheel Set					●	●				
SP-1041	Porsche 934 Slick Racing Tyre 'Front'	●				●	●				
SP-1042	Porsche 934 Slick Racing Tyre 'Rear'					●	●				
SP-1043	Porsche 934 All-weather Tyre 'Front'					●	●				
SP-1044	Porsche 934 All-weather Tyre 'Rear'					●	●				
SP-1045	Porsche 934 Spare Body Set	●									
SP-1046	Porsche 935 Spare Tyre with wheel 'Front'	●									
SP-1047	Porsche 935 Spare Tyre with wheel 'Rear'	●									

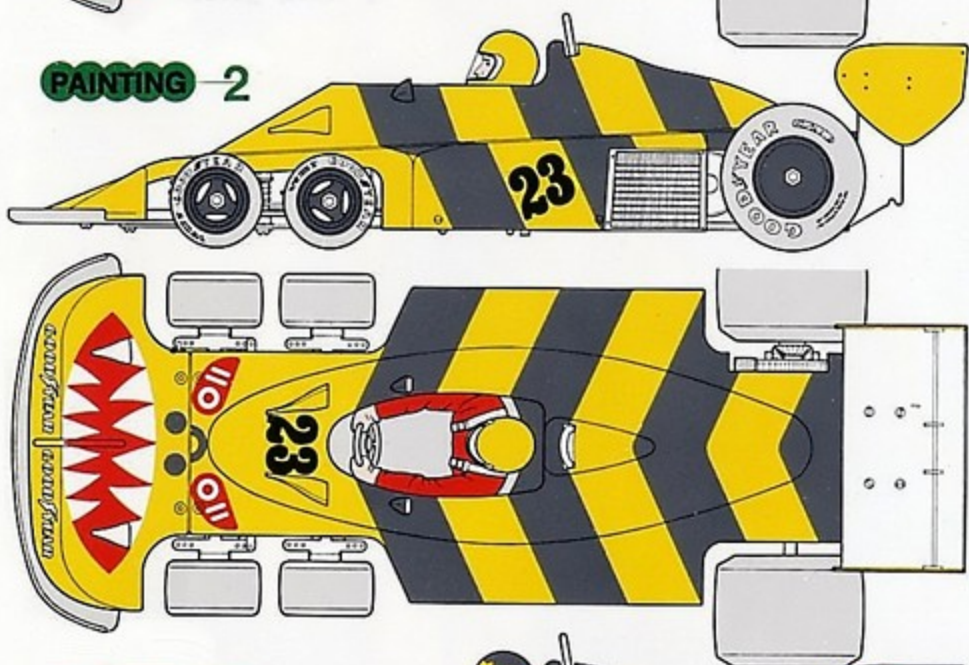
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R/C	Spare Parts
KIT NO.	Name of Article
SP-1048	Porsche 93S Spare Body Set
SP-1049	Tyrell P34 Spare Tyre 'Front'
SP-1050	Tyrell P34 Spare Tyre 'Rear'
SP-1051	Tyrell P34 Spare Body Set
SP-1052	XR311 Spare Tyre Set
SP-1053	XR311 Spare Body Set
SP-1054	Variable Resistor Speed Control Switch Set
SP-1055	Sponge Tyre Set 'Front-A'
SP-1056	Sponge Tyre Set 'Rear-A'
SP-1057	Sponge Tyre Set 'Rear-B'
SP-1058	Sponge Tyre Set 'Rear-C'
SP-1059	Porsche 934/935 Gear Box & RS-540 Motor Set
SP-1060	Cheetah Spare Tyre Set
SP-1061	Cheetah Spare Body Set
SP-1062	Countach Spare Body Set
SP-1063	Countach Wheel Set
SP-1064	Countach Decal
SP-1065	Countach/Porsche 936 Gear Box
SP-1066	Countach/Porsche 936 Chassis Set
SP-1067	Countach/Porsche 936 Steering Set
SP-1068	Ball Joint & Adjuster Rod Set
SP-1069	Bush Set
SP-1070	Porsche 936 Spare Body Set
SP-1071	Porsche 936 Decal
SP-1072	Countach/Porsche 936 Gear Case & RS-540 Motor Set
SP-1073	Ball Bearing Set (4 pcs.)
SP-1074	Rubber Tyre Set (Front-A)
SP-1075	Diplo Tyre Set
SP-1076	Sponge Tyre Set 'Rear-D'
SP-1077	Differential Gear (Small) Set
SP-1078	Special Chassis Set
SP-1079	Special Steering Set
SP-1080	Countach/Porsche 936 Catch Pin Set
SP-1081	Celica LB Turbo Spare Body Set
SP-1082	Ligier JS9 Spare Body Set
SP-1083	Celica LB Turbo Decal
SP-1084	Ligier JS9 Decal
SP-1085	F-1 Bumper Set
SP-1086	F-1 Gear Box Set
SP-1087	F-1 Gear Chassis Set
SP-1088	F-1 Steering Set
SP-1089	Upright Set (2 pcs.)
SP-1090	Special Pinion Gear Set for RS540 Motor
SP-1091	Wheel Stopper
SP-1092	Ferrari Spare Body Set
SP-1093	Ferrari Decal

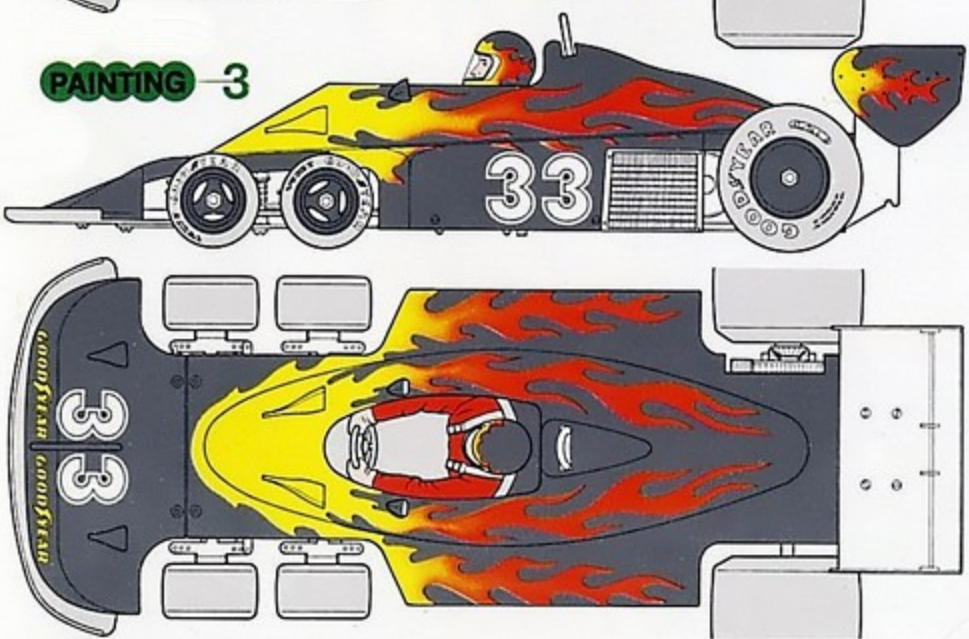
PAINTING 1



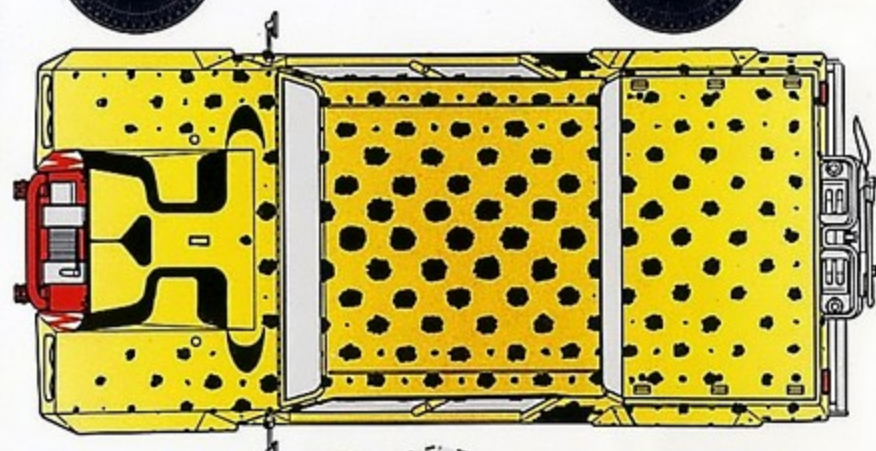
PAINTING 2



PAINTING 3



PAINTING 4

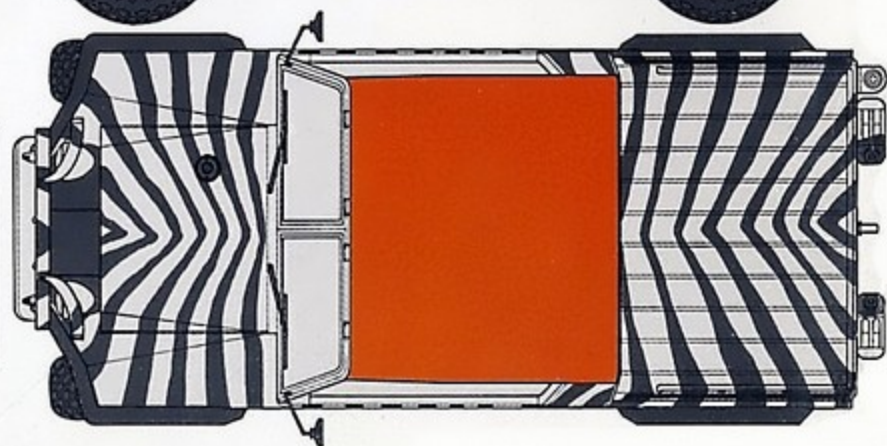


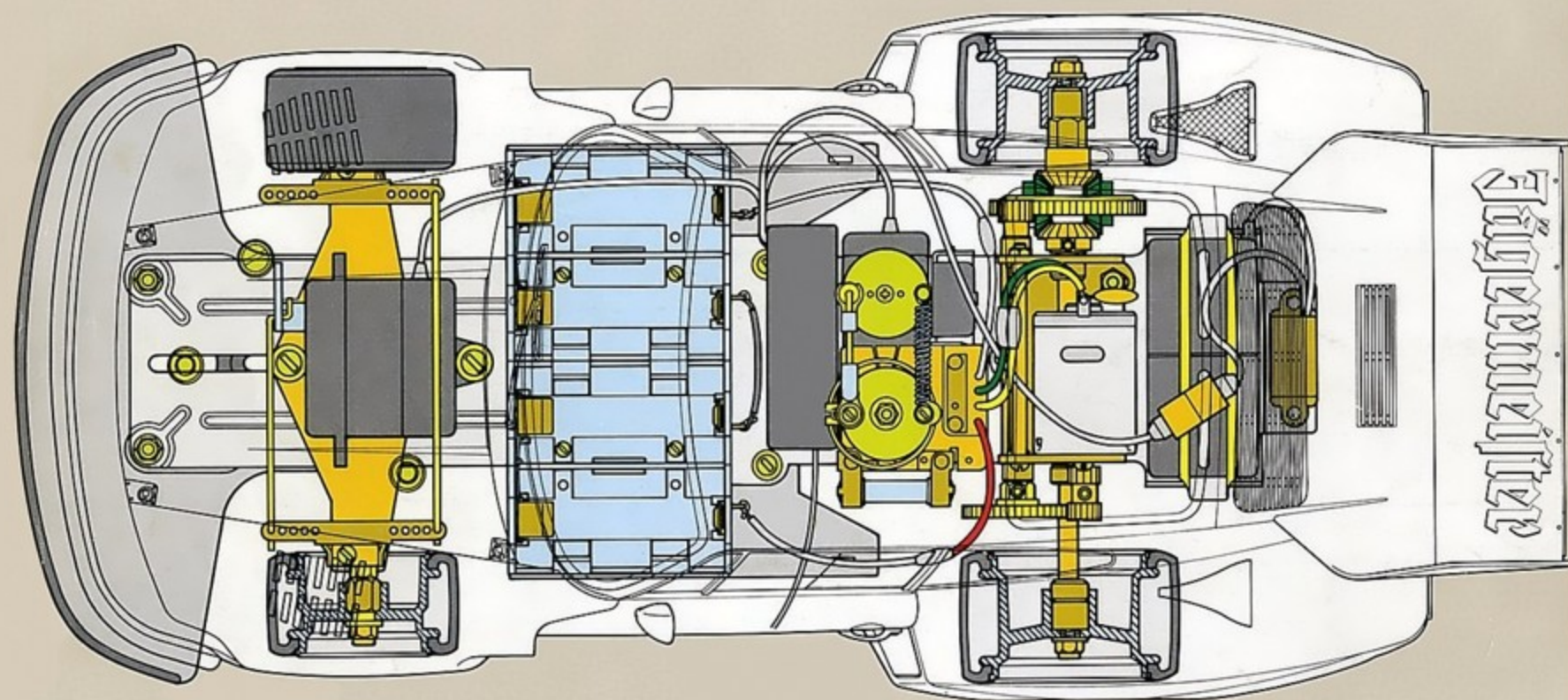
XR311



CHEETAH

PAINTING 5





TAMIYA RADIO CONTROL GUIDE BOOK