RADIO CONTROLLED ELECTRIC POWERED RACING BUGGY

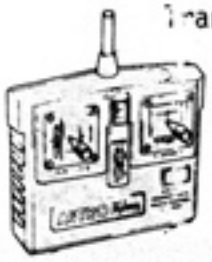
OFF-ROAD RACER TOMAHAWK

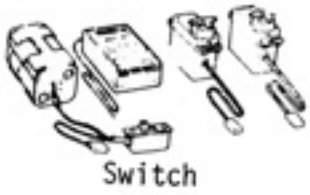
1:10 SCALE MODEL

BATTERY:7.2V-1200mAh/RADIO:2ch
(NOT INCLUDED)

RADIO CONTROL SET

A 2 channel, 2 servo digital proportional radio control unit is required for operating this model car. This type of radio can be used for any models requiring 2-channel control.


Transmitter


Receiver

Servo

Battery Case

Switch


R/C Car


Airplane


Boat

NICAD BATTERY

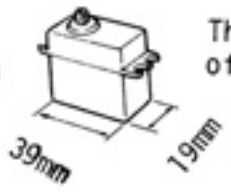
It is formally called a nickel cadminum battery, which is more economical than a dry cell battery, since it can be recharged for reuse over and over again. Also, with its regulated voltage it is an ideal power source for driving radio control models.

THINGS TO BE PROCURED BESIDES THE KIT

As Tomahawk is designed exclusively for racing, use smaller size receiver/servos in order to make it below super light weight. Maximum size of servo which can be used are as shown below.


Battery for Radio control Unit


2 ch. Radio Control System



The maximum dimentions of servo case

[Nicad Battery for Power Source]

6N-1200 battery or 7.2V-1200 racing battery are ideal for the Tomahawk.

6N-1200 Battery

7.2V Racing Battery

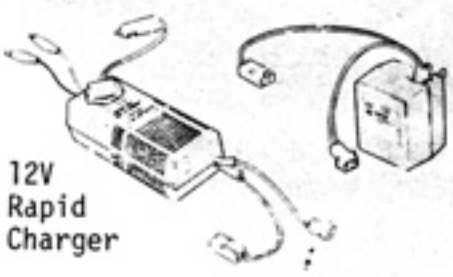
[Motor]

A standard motor is provided with the Tomahawk. However, modelers who require more speed, we would like to recommend a Le Mans 480T (having high torque for 8 minute racing).

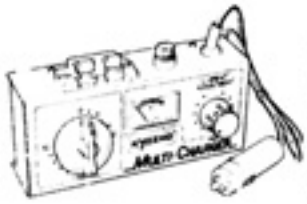
The Le Mans motor includes wires, condensers and screws.

[Charger for Nicad Battery]

Nicad batteries are capable of being recharged over 300 times for repeated use. Two types of chargers can be used. a 15-hour trickle charger which plugs into a 110V household circuit, or a 15 minute quick charger which plugs into a 12V automobile cigarette lighter.


12V Rapid Charger

110V AC Charger from Household Outlet


The multi charger is a multi purpose rapid type charger able to recharge 5N or 6N 1200 batteries and a receiver battery of a radio control set.

Multi Charger
(12V General Purpose Rapid Charger)

TOOLS REQUIRED FOR ASSEMBLING TOMAHAWK

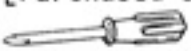
[Included in kit]

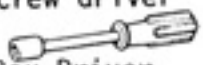

1.5mm Allen Wrench


2mm Allen Wrench

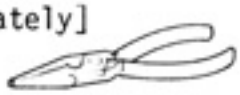

Thread Lock Cement

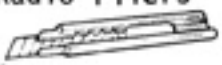
[Purchased separately]


Small Phillips screw driver


Box Driver


Scissors


Radio Pliers


Cutter


Awl


Instant Cement

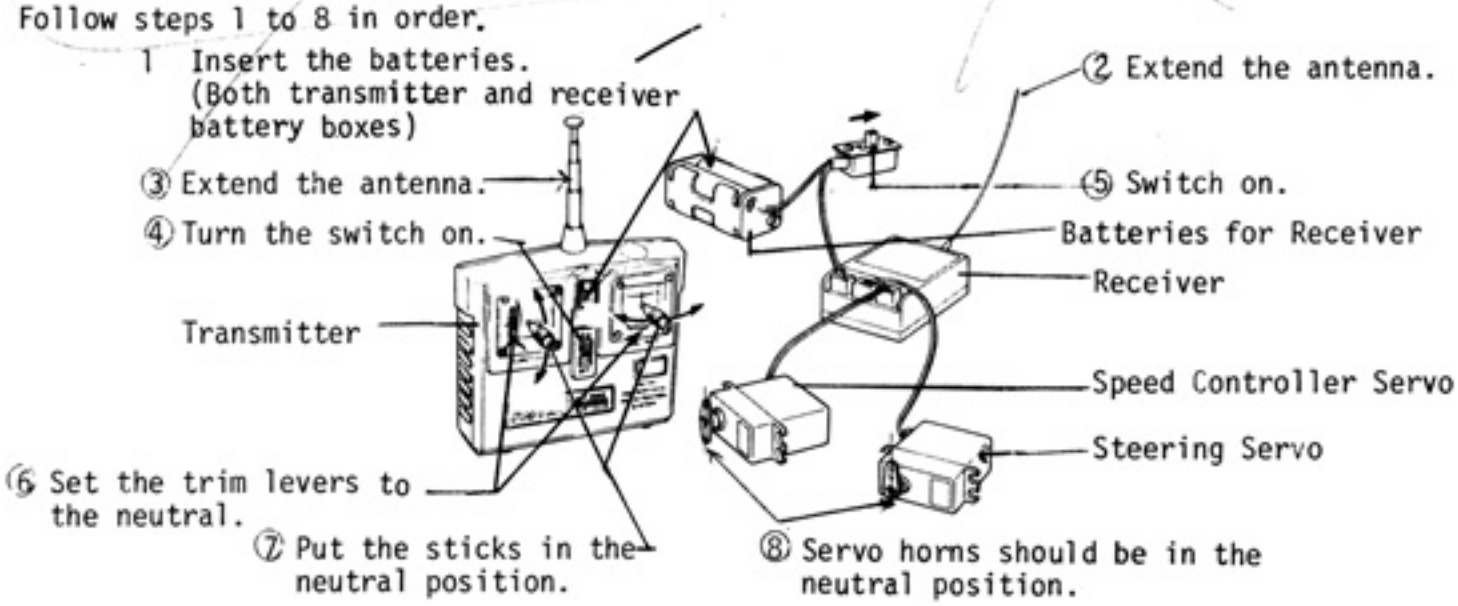

Rubber Cement


Brush

HOW TO CHECK THE RADIO CONTROL UNIT

Follow steps 1 to 8 in order.

1 Insert the batteries. (Both transmitter and receiver battery boxes)



*When turning the switches on, switch on the transmitter first, then the receiver.

A 2 channel radio control set is composed of a transmitter, a receiver, two servos, and a battery box.

*Transmitter ..... This is to control the models. The movement of the control stick is transmitted to the receiver via radio waves eminating from the antenna.

*Receiver ..... Receives the radio signals from the transmitter and sends them to the appropriate servo.

*Servos ..... Operate the controls by means of motor and gears according to signals provided from the receiver.

*Antenna ..... Plays an important role of emitting the radio signals from the transmitter. The receiver antenna accepts the signals. Both antennas must be fully extended when in operation.

*Trim Levers ..... Adjusts the neutral position of the servos. Provides fine tuning of steering, and the speed controller to control forward or backward movement.

*Servo Horn ..... This is to transfer the movements of the servo to a controlled component. There are several shapes available depending upon the application.

BEFORE ASSEMBLY

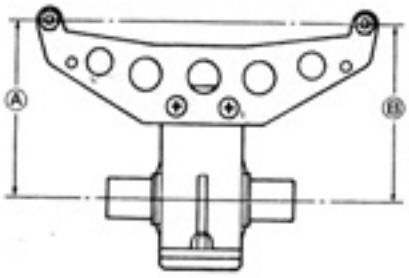
Please read through these instructions before assembly. Your thorough understanding of the assembly will enable you to build the kit without difficulty. Check the components in the kit prior to your startings the assembly. Any claims for replacements or refunds for the model in the process of assembly will not be accepted.

*The bolts and nuts used in the assembly steps are illustrated actual size. Bolts nuts and screw sizes are metric. For your reference 1mm equals approximately .039 inches.

1. INSTRALLATION OF REAR, DAMPER STAY AND MOTOR COVER.

[small parts to be used]

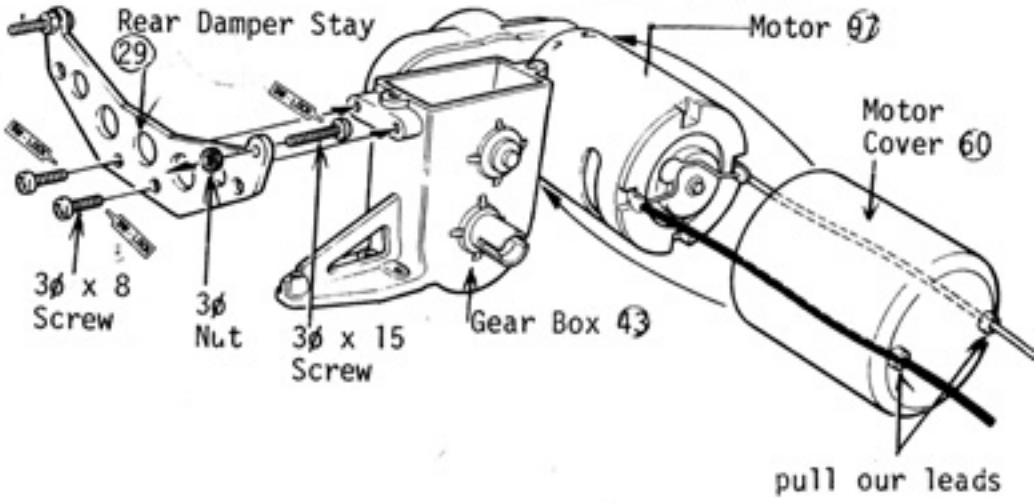
- 3ø x 8 screw .. 2
- 3ø x 15 screw . 2
- 3ø Nut 2



Install rear stay so that A and B are equal.

The rear damper to be bolted here.

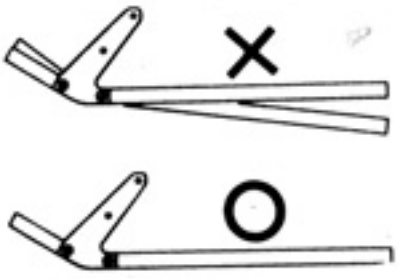
Seal the motor with the motor cover all the way until it stops



2 INSTALLATION OF FRONT DAMPER STAY

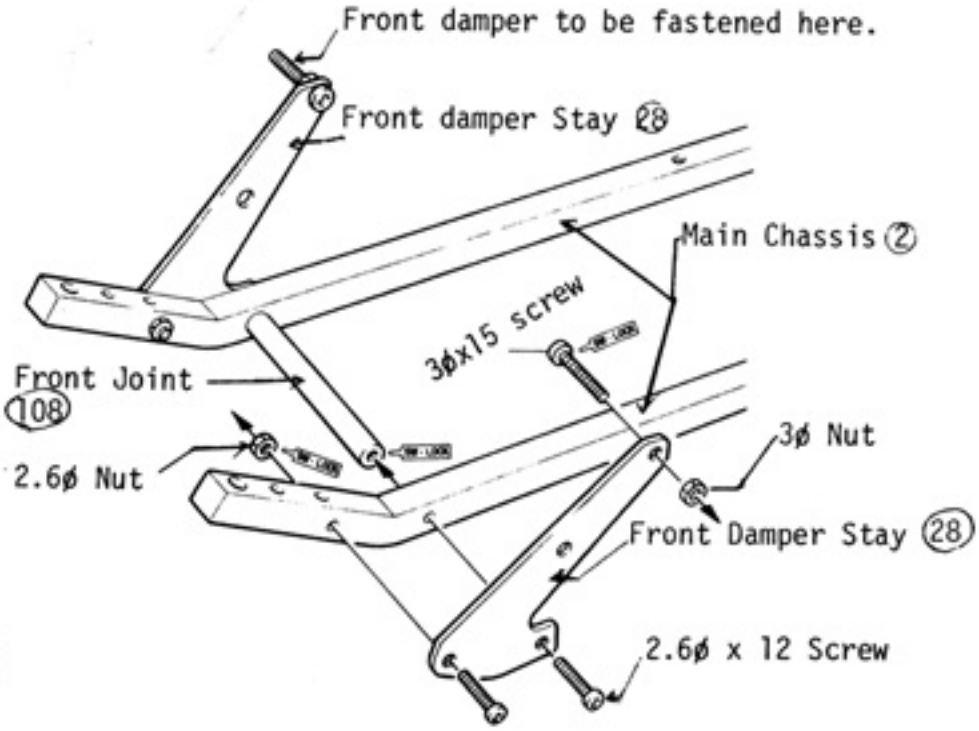
[small parts to be used]

- 2.6ø x12 screw 4
- 3ø x 15 screw 2
- 2.6ø Nut .. 2
- 3ø Nut 2



Assemble the chassis so that the right and left frames are parallel when looking at them from the side.

2 INSTALLATION OF FRONT DAMPER STAY

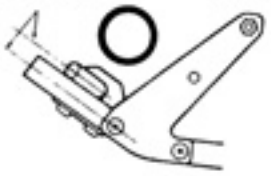


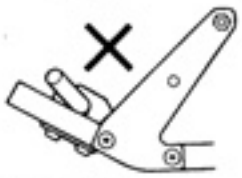
3 INSTALLATION OF ARM SHAFT

[small parts to be used]

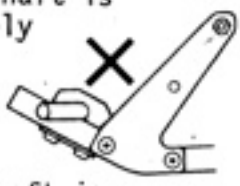
3ø x 15 Screw ... 4

Parallel

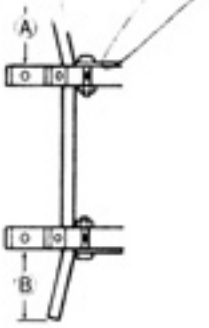




The arm shaft is excessively upward.

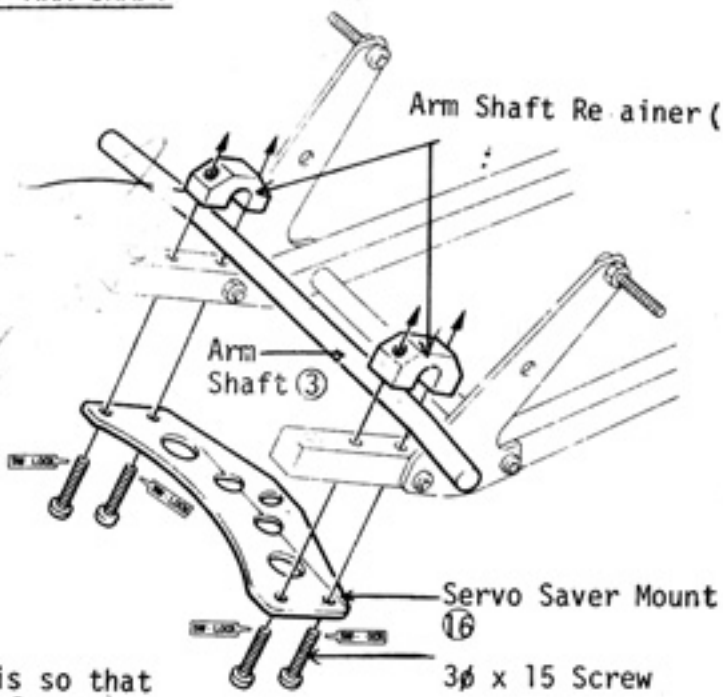


The arm shaft is excessively downward.



Assemble the chassis so that the right and left frames are parallel when looking at them from the side.

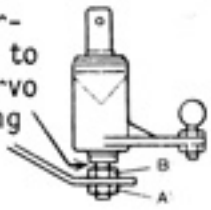
3 INSTALLATION OF ARM SHAFT



4 INSTALLATION OF SERVO SAVER

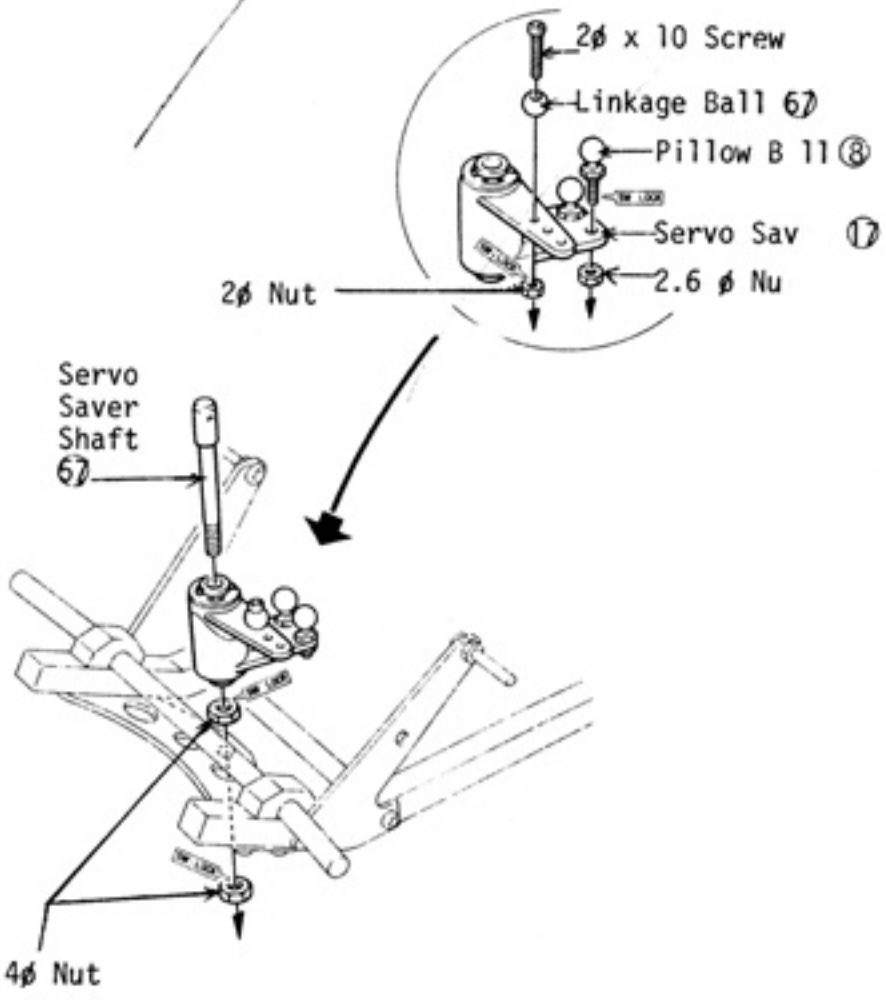
- ⑧ Pillow Ball .. 2
- 67 Linkage Ball . 1
- 2ø x 10 Screw ... 1
- 2ø Nut 1
- 2.6ø Nut 2
- 4ø Nut 2

Leave a clearance of .5mm to allow the servo saver to swing smoothly.



Hold the nut A when tightening B.

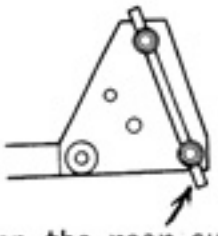
4 INSTALLATION OF SERVO SAVER



5 INSTALLATION OF REAR SUSPENTION STAY.

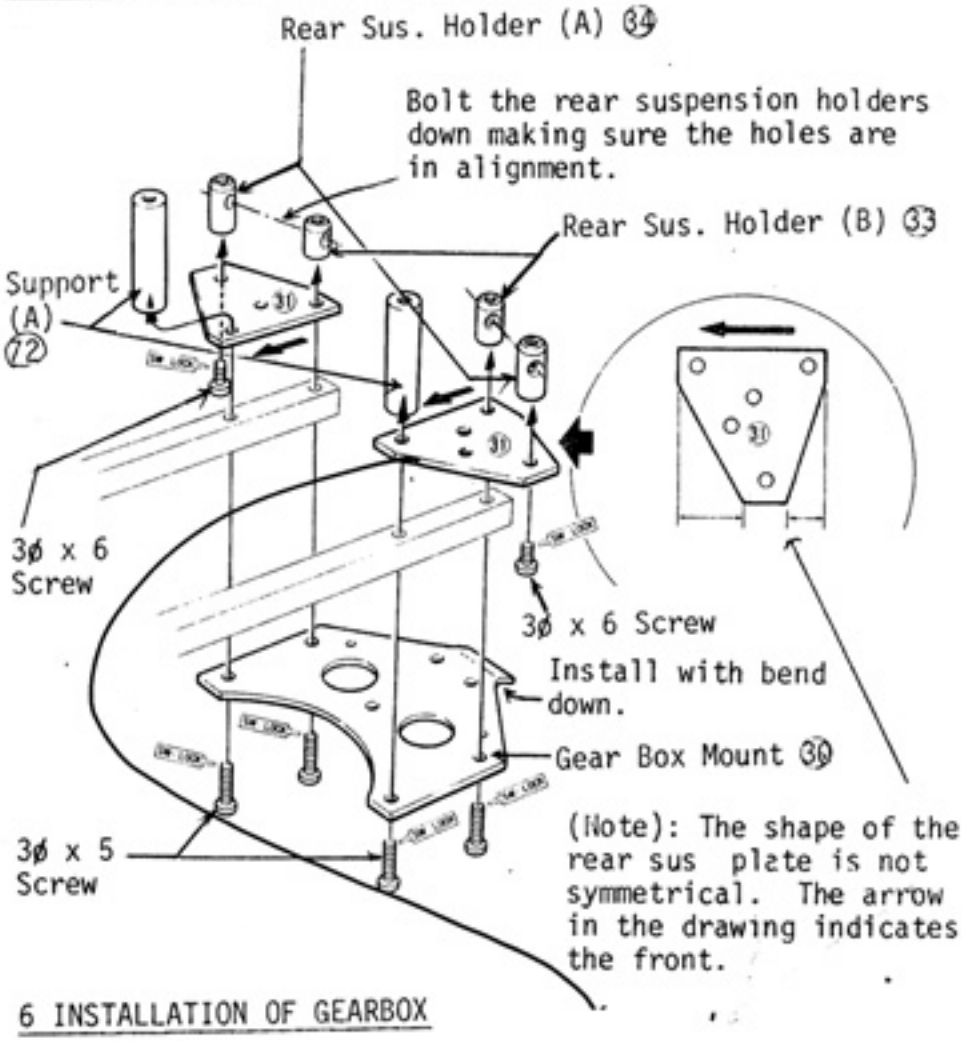
[small parts to be used]

- ㉞ Rear Sus. Holder (A) 2
- ㉝ Rear Sus Holder (B) 2
- 3ø x 6 Screw ... 2
- 3ø x 15 Screw .. 4
- ⑦② Support (A) 2



When the rear sus holders are bolted, shaft ㉜ may be placed in the position through the holders temporarily for alignment. It should be removed after the installation.

5 INSTALLATION OF REAR SUSPENTION STAY.

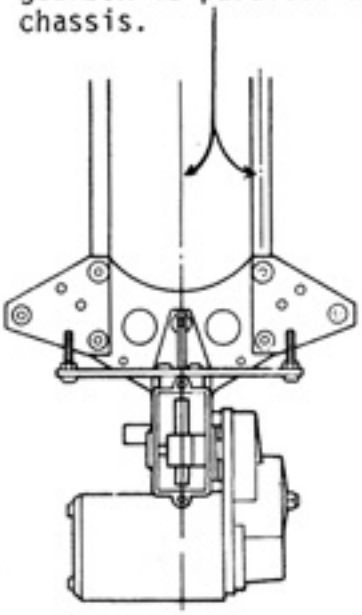


6 INSTALLATION OF GEARBOX

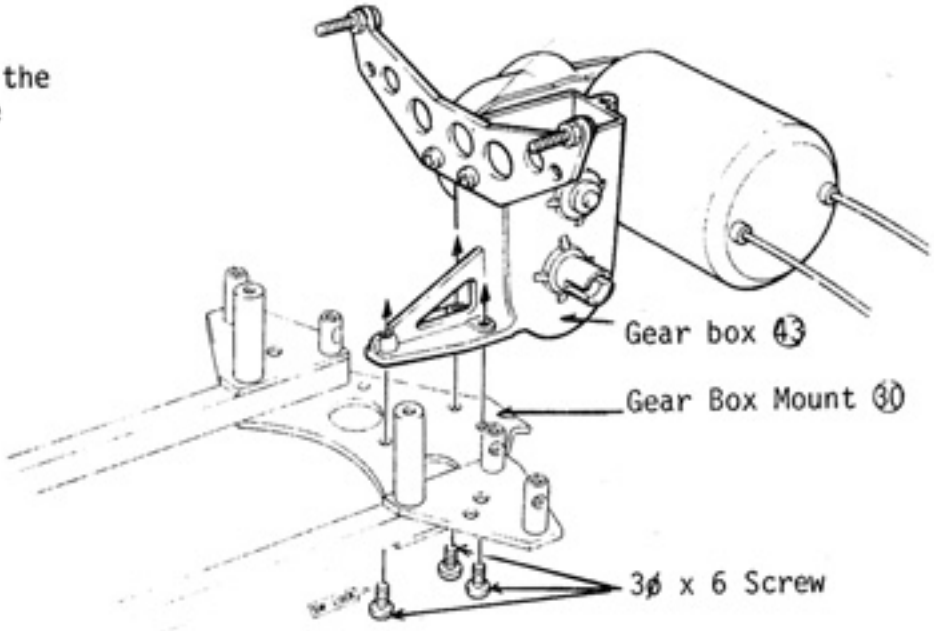
[small parts to be used]

- 3ø x 6 Screw 3

Make sure the centerline of the gearbox is parallel with the chassis.



6 INSTALLATION OF GEARBOX



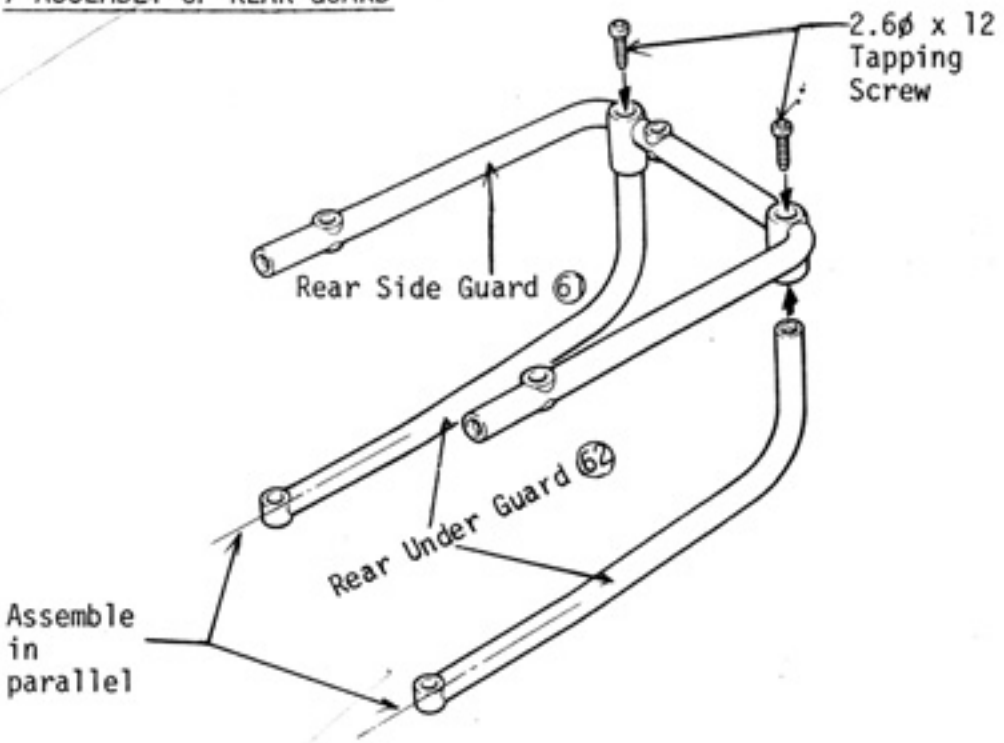
7 ASSEMBLY OF REAR GUARD

[small parts to be used]

2.6ø x 12 Tapping Screw ...2

Do not use excessive force when tightening the self tapping screws, otherwise they may strip out.

7 ASSEMBLY OF REAR GUARD



8 INSTALLATION OF REAR GUARD

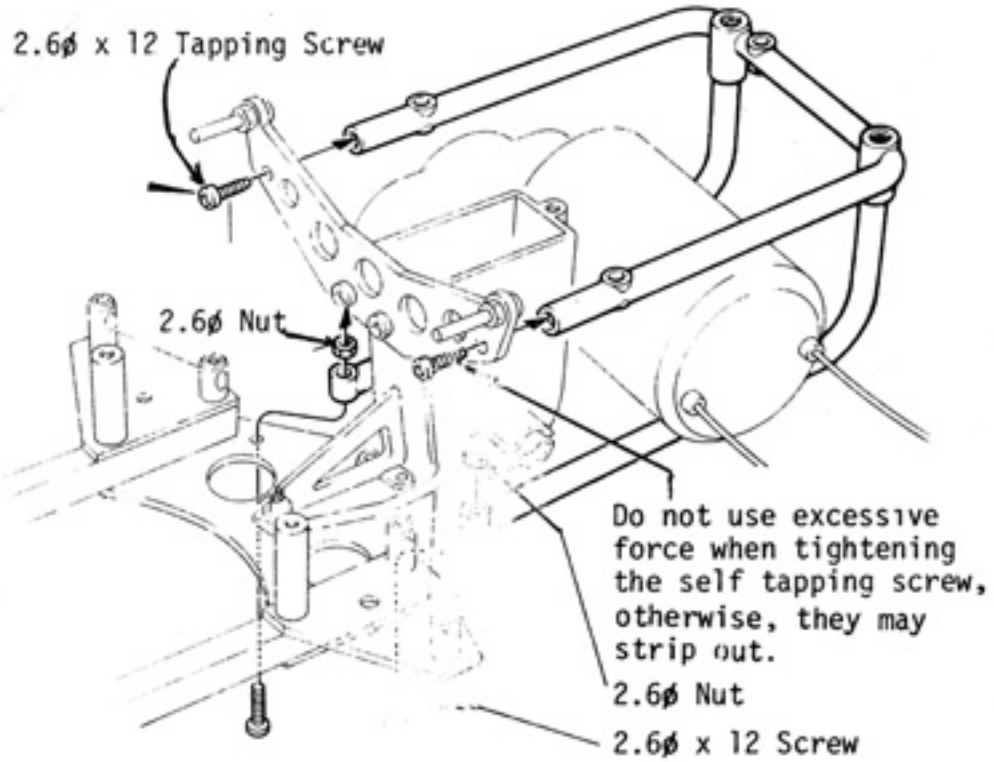
[small parts to be used]

2.6ø x 12 Tapping Screw .. 2

2.6ø x 12 Screw . 2

2.6ø Nut 2

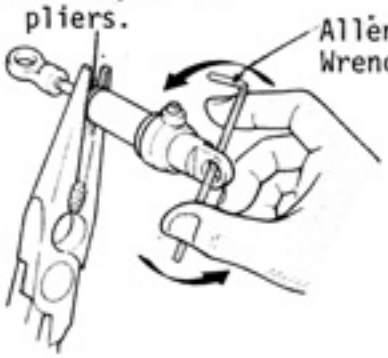
8 INSTALLATION OF REAR GUARD

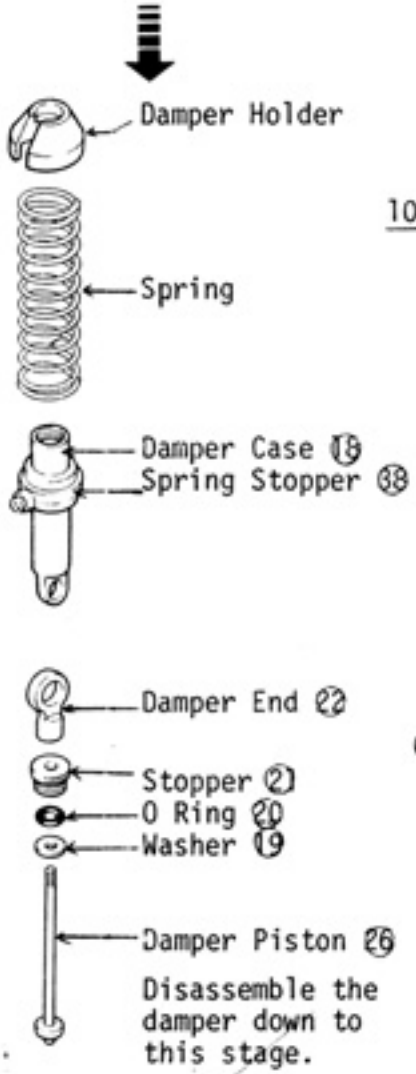


9 DISASSEMBLY OF OIL-DAMPER

Detach the damper and disassemble it as shown in the drawings.

Hold the damper stopper with a pair of pliers.





Disassemble the damper down to this stage.

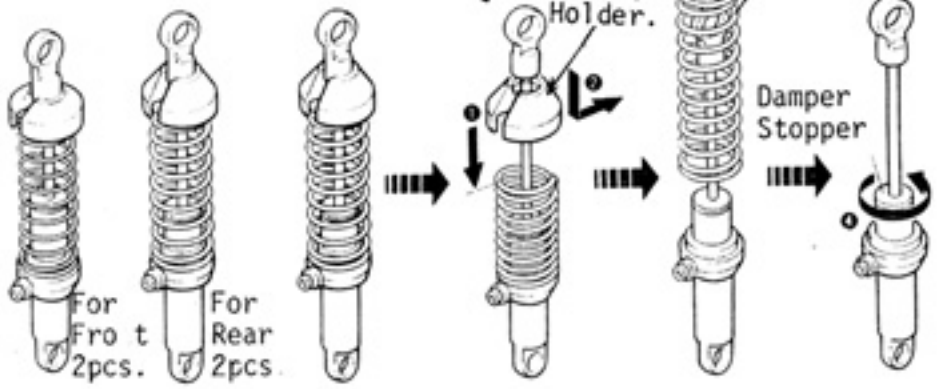
9 DISASSEMBLY OF OIL-DAMPER

The dampers are factory assembled, but disassembly is required when filling oil into them. Since different parts are employ d for the front and rear dampers, the disass mbly filling with oil, and reassembly should be done one by one.

Press down the spring and dismantle the spring receptacle by sliding it sideways.

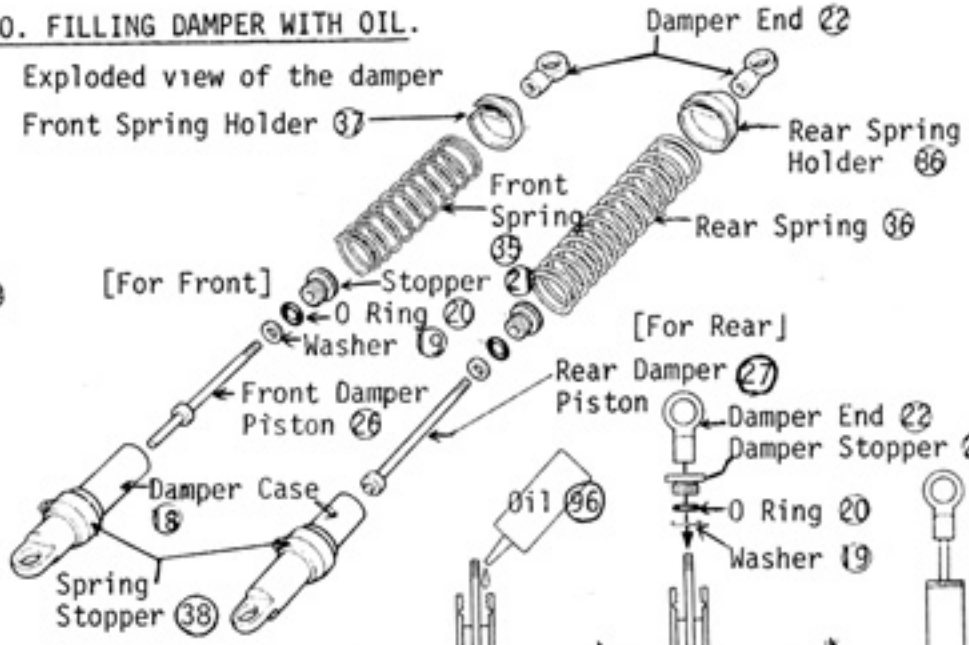
Pull off the spring.

Remove the damper stopper by unscrewing.

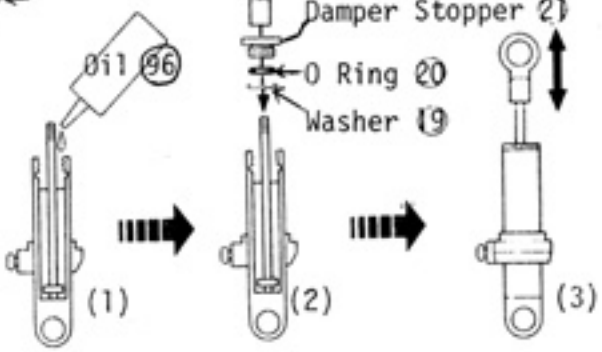


10. FILLING DAMPER WITH OIL.

Exploded view of the damper



Front spring and spring holder differ from the ones for rear. Do not confuse.



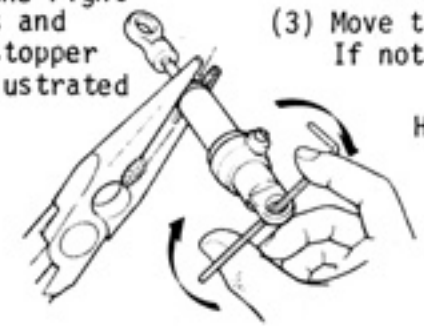
(1) Press down the piston all the way to the bottom. Pour the oil to the point as shown in the diagram. Care should be taken not to get an air bubble in the oil.

(2) Assemble the damper in the sequence as shown in the drawing to completion.

(3) Move the piston up and down to see if it operates smoothly. If not, decrease the amount of oil a little.

10 FILLING OIL INTO DAMPER

Put some oil nto the damper as shown in the right hand drawings and tighten the stopper firmly as illustrated below.



Hold the damper stopper with a pair of pliers.

After filling with oil and assembling the damper, check it as shown below. Adjust the length by screwing the damper end (23) out or in.

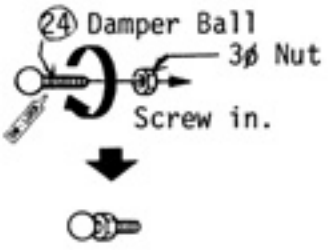
Adjust the length, indicated with arrow in the drowing above, of all four dampers

11 INSTALLATION OF DAMPER BALL

[small parts to be used]

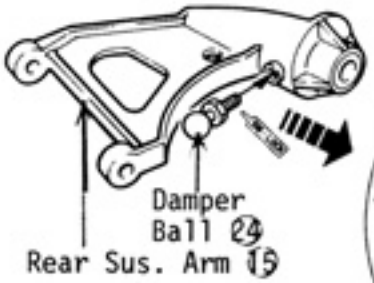
(24) Damper Ball ... 4

(25) Ball Nut 4
(3ø Nut)



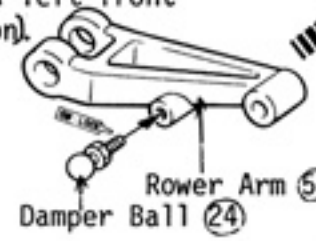
11 INSTALLATION OF DAMPER BALL

Make two of these (for right and eft rear suspension).



Tighten the 3ø nut with a wrench or pliers to lock the damper ball.

Make two of these (for Right and left front suspention).



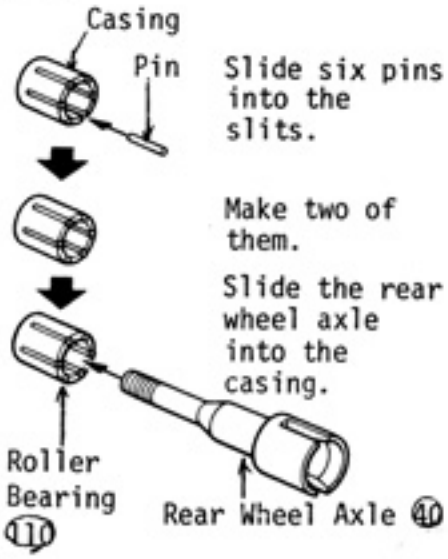
12 INSTALLATION OF REAR WHEEL AXLE

[small Parts to be used]

(110) Roller Bearing

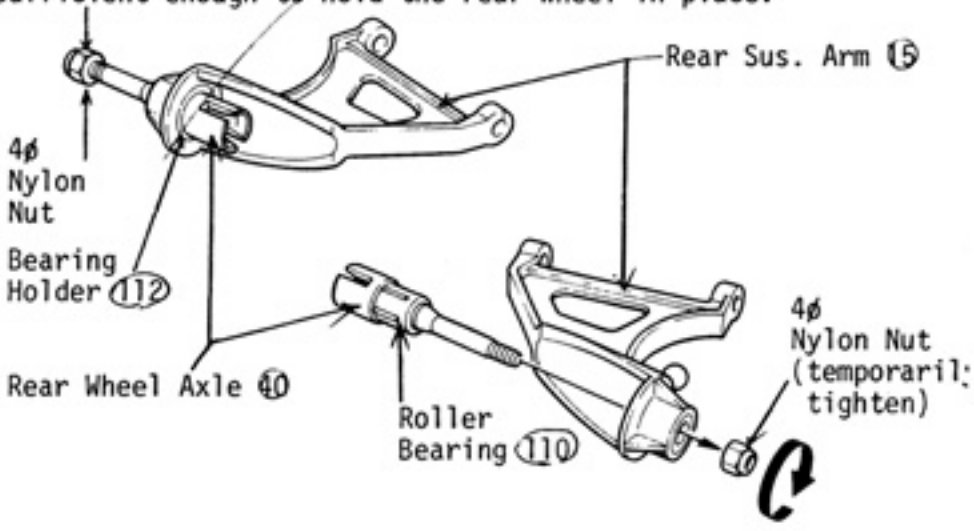
Casing ... 2

Pin .. 12



12 INSTALLATION OF REAR WHEEL AXLE

This nut should not be over tightened, but tightened just sufficient enough to hold the rear wheel in place.

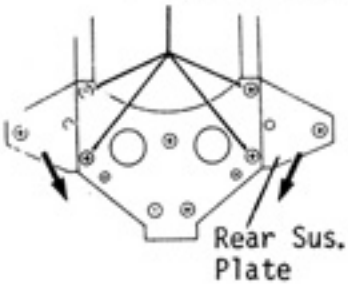


13. INSTALLATION OF REAR SUSPENSION ARM

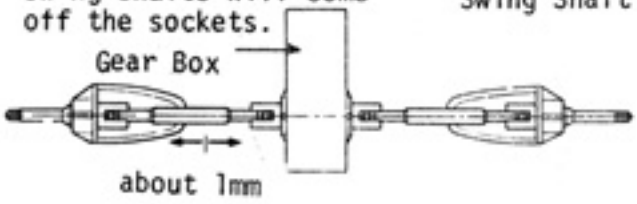
[small parts to be used]

3ø x 4 Screw ... 4

3ø Nylon Nut .. 2



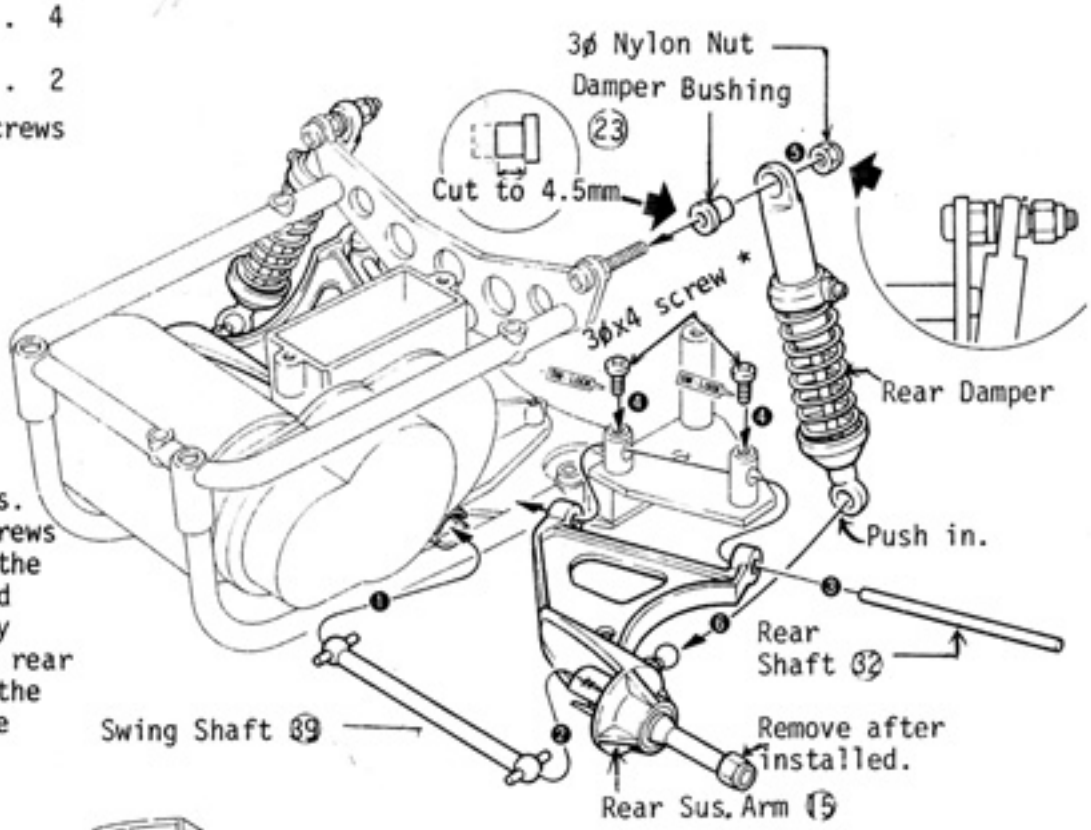
Loosen the 4 screws astening the rear sus. plate, tighten the screws firmly while pushing the rear sus. plate toward the direction shown by the arrows When the rear sus. plate is loose, the swing shafts will come off the sockets.



Check whether or not there is over 1.0mm end play when the swing shafts are horizontal as shown in the drawing. Excessive play may allow the swing shafts to get out of place.

13. INSTALLATION OF REAR SUSPENSION ARM

Assemble in order from 1 to 6.



14 ASSEMBLY OF KNUCKLE ARM

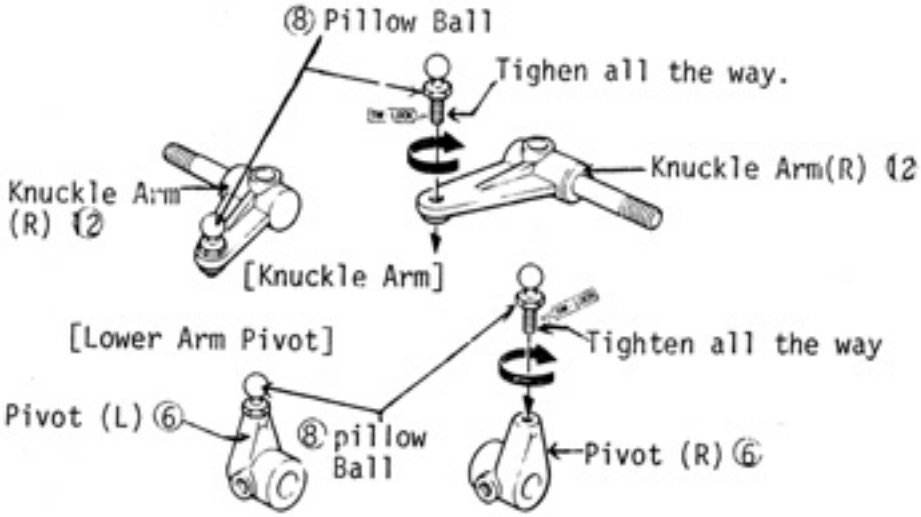
[small parts to be used]

⑧ Pillow Ball..4

6 Pivot(L) ... 1 6 Pivot(R) 1

14 ASSEMBLY OF KNUCKLE ARM

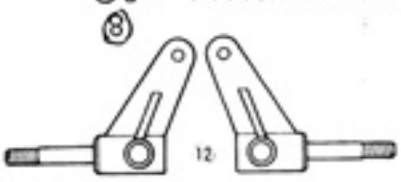
In these instructions, the components on the right side, when looking at the car from the front, are indicated with (R) and those on the left with (L).



15 INSTALLATION OF KNUCKLE ARM

[small parts to be used]

Pillow Ball ... 2



Knuckle Arm(L)...1 Knuckle Arm(R) ... 1

Tighten nut just enough to allow upright to rotate without binding.

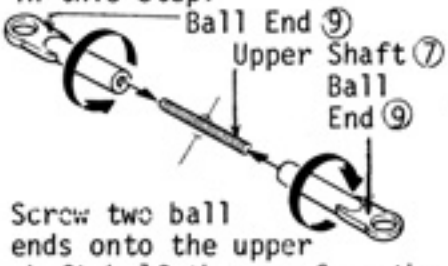
16 INSTALLATION OF LOWER ARM

[Small parts to be used]

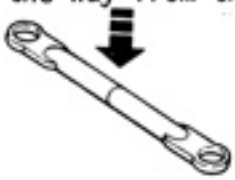
3ø Nylon Nut .. 2

4ø x 4 Set Screw .. 2

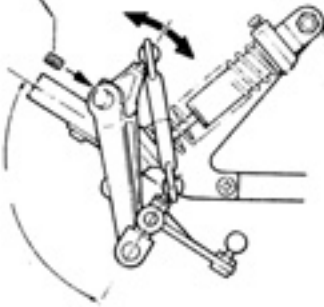
Make two of upper shafts in this step.



Screw two ball ends onto the upper shaft half the way from the both ends.



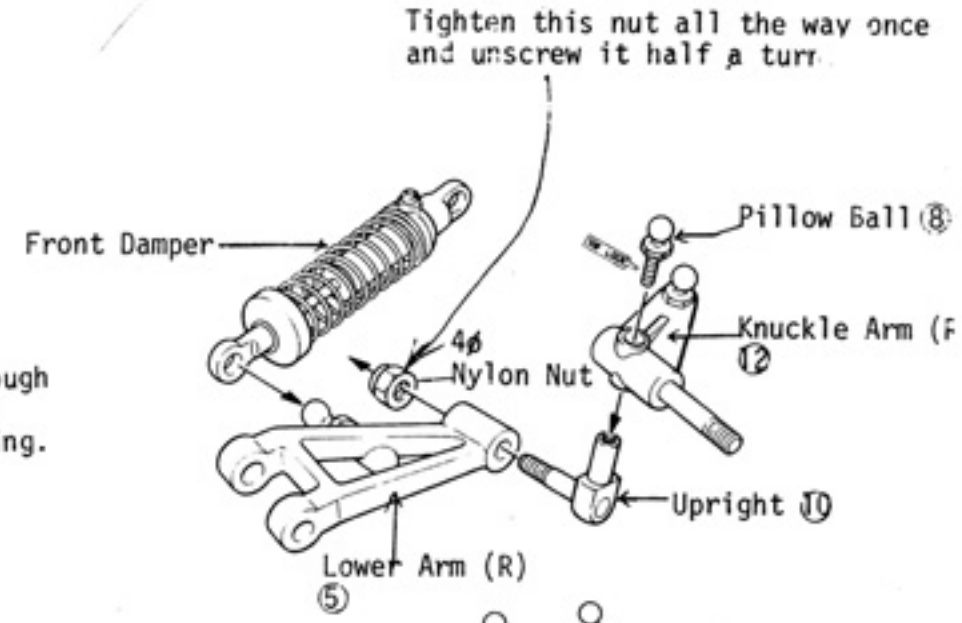
4ø x 4 Set Screw

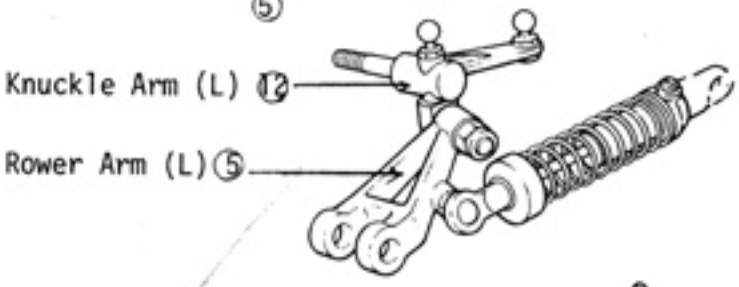


From 85° to a little under 90°

Adjust the pivot angle so the angle between the king pin and front chassis rail is 85° to 90° as illustrated.

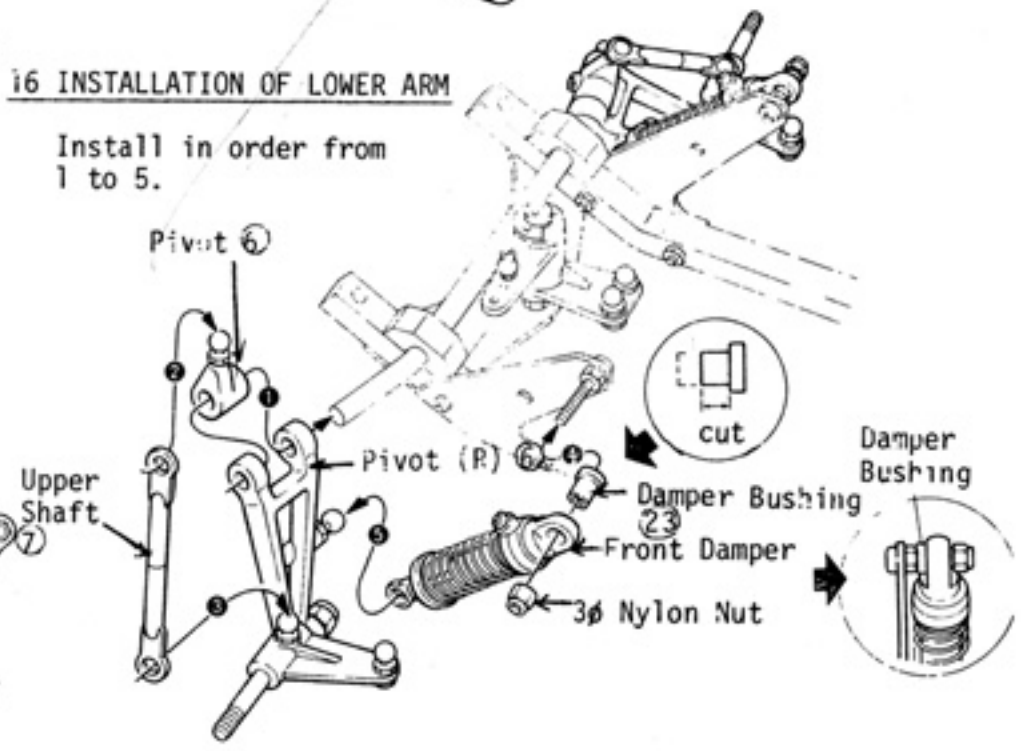
15 INSTALLATION OF KNUCKLE ARM

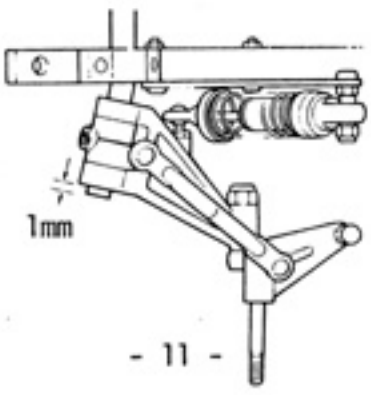




16 INSTALLATION OF LOWER ARM

Install in order from 1 to 5.

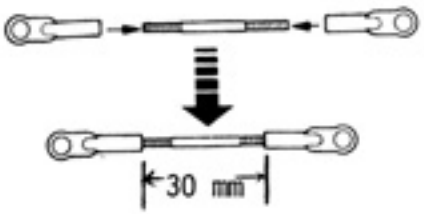




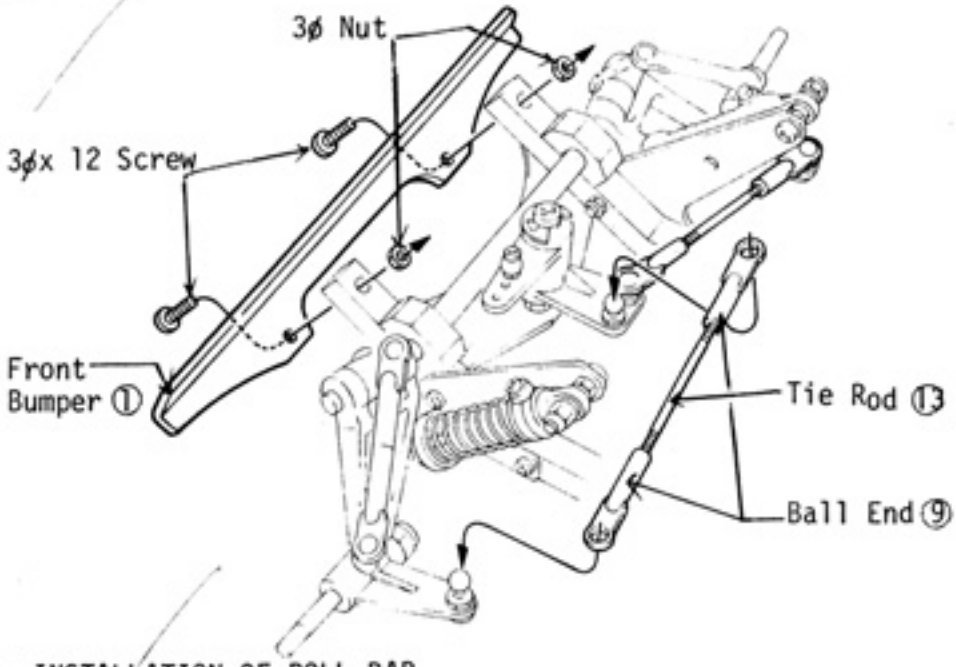
17 INSTALLATION OF TIE ROD

[small parts to be used]

- ⑨ Ball End ... 4
- ⑬ Tie Rod .. 2
- 3ø×12 Screw . 2
- 3ø Nut 2



17 INSTALLATION OF TIE ROD

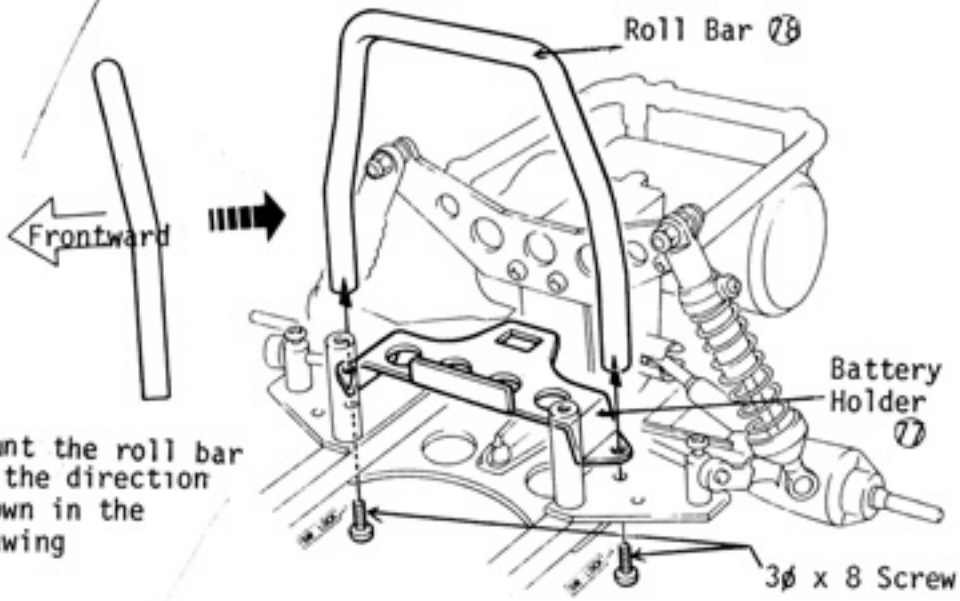


18. INSTALLATION OF ROLL BAR AND BATTERY HOLDER.

[small parts to be used]

- 3ø x 8 Screw .. 2

18 INSTALLATION OF ROLL BAR AND BATTERY HOLDER.



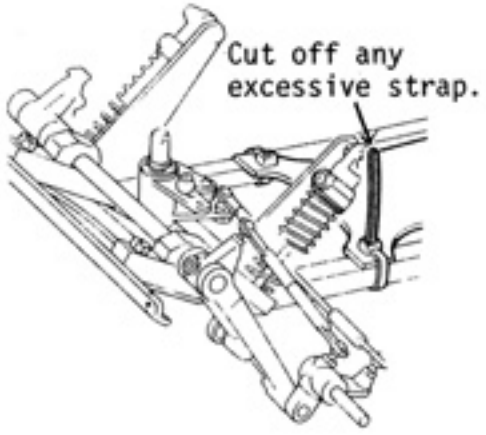
Mount the roll bar in the direction shown in the drawing

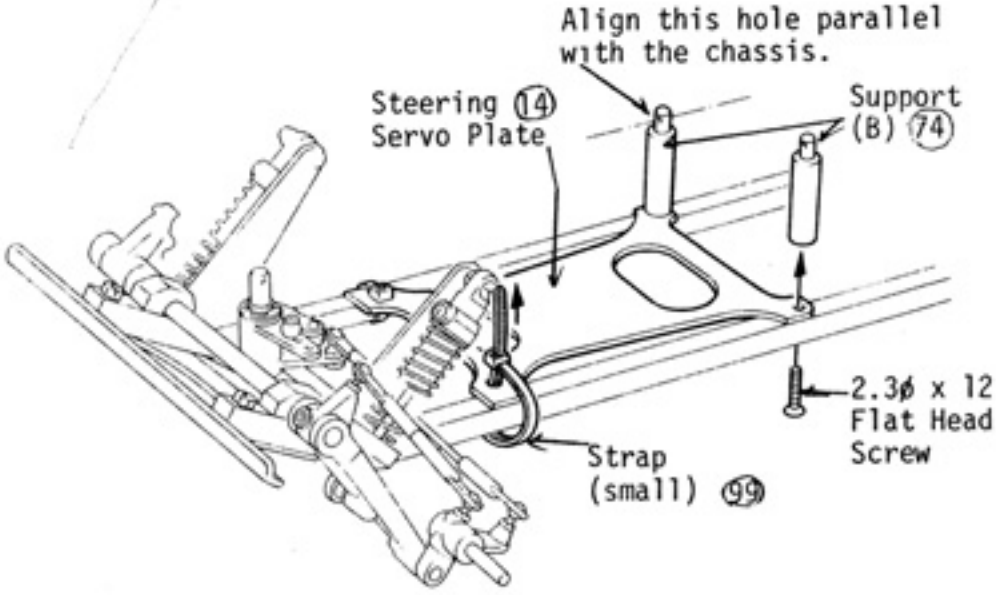
19 INSTALLATION OF STEERING SERVO PLATE

[small parts to be used]

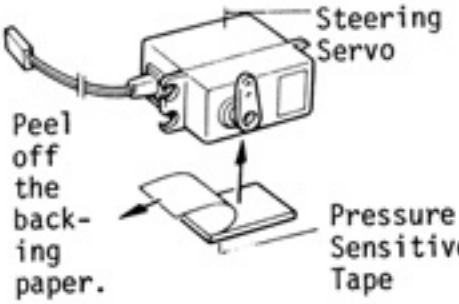
- 74 Support (B) 2
- 2.3ø x 12 Flat Head Screw

19 INSTALLATION OF STEERING SERVO PLATE

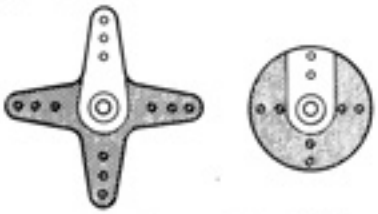




20 MOUNTING OF STEERING SERVO



Affix pressure sensitive tape to the bottom of the servo.

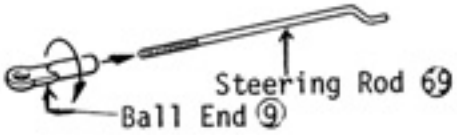


Cut off the part of the servo horns as shown in the illustration.

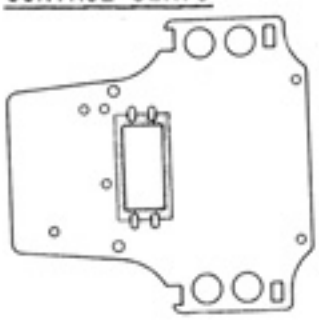
21 STEERING CONTROL LINKAGE

[small parts to be used]


Ball End ... 1



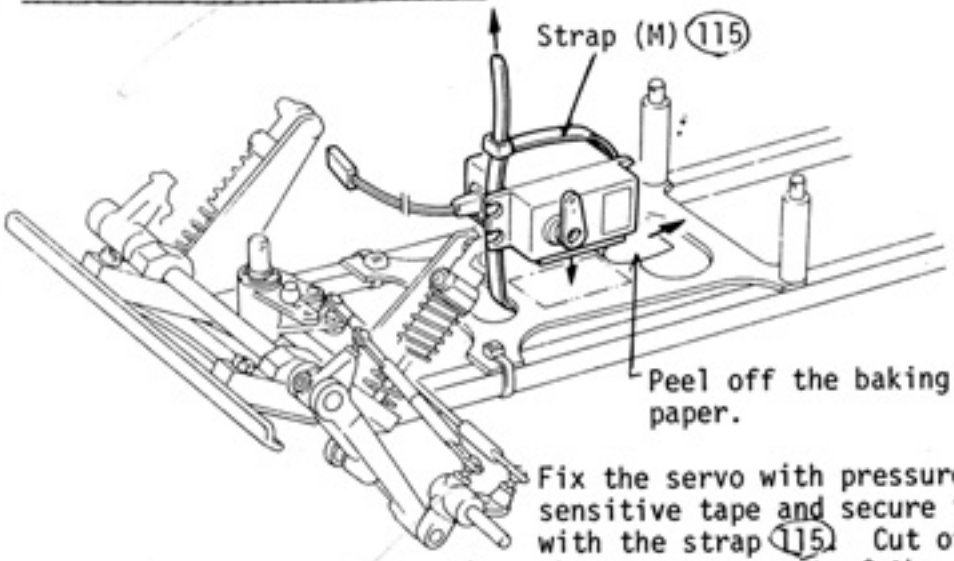
22 MOUNTING OF SPEED CONTROL SERVO



[Adapting R/C Unit Plate]

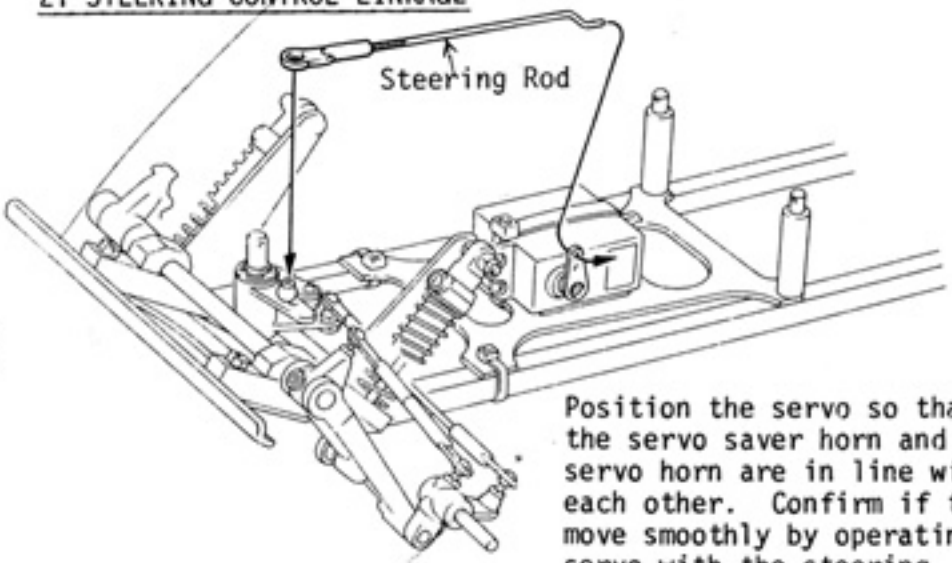
*Sanwa SM-401 and Futaba S20 can be mounted onto the R/C unit plate as they are.
Other types of servos may require enlarging the servo cut-out with a file as indicated with dotted lines in the illustration.

20 MOUNTING OF STEERING SERVO



Fix the servo with pressure sensitive tape and secure it with the strap ⑮. Cut off the excessive part of the strap.

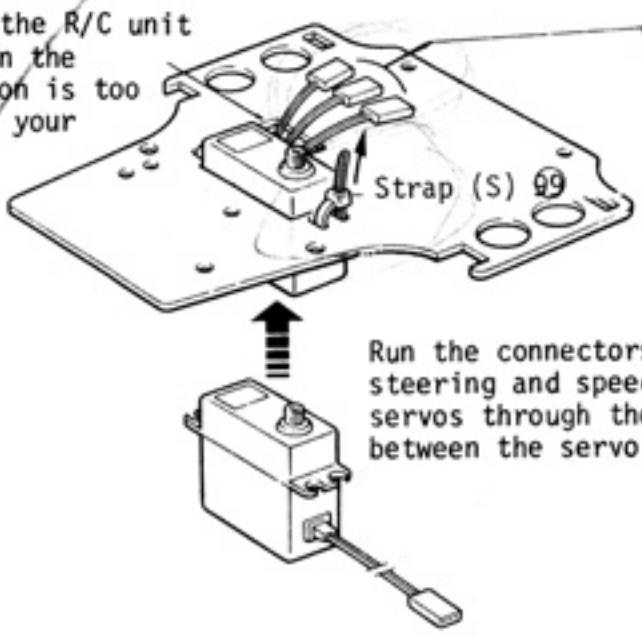
21 STEERING CONTROL LINKAGE



Position the servo so that the servo saver horn and the servo horn are in line with each other. Confirm if they move smoothly by operating servo with the steering control stick on your transmitter.

22 MOUNTING OF SPEED CONTROL SERVO

File out the R/C unit plate when the perforation is too small for your servo.

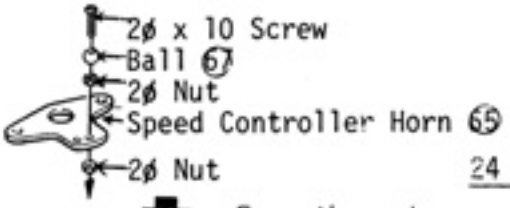


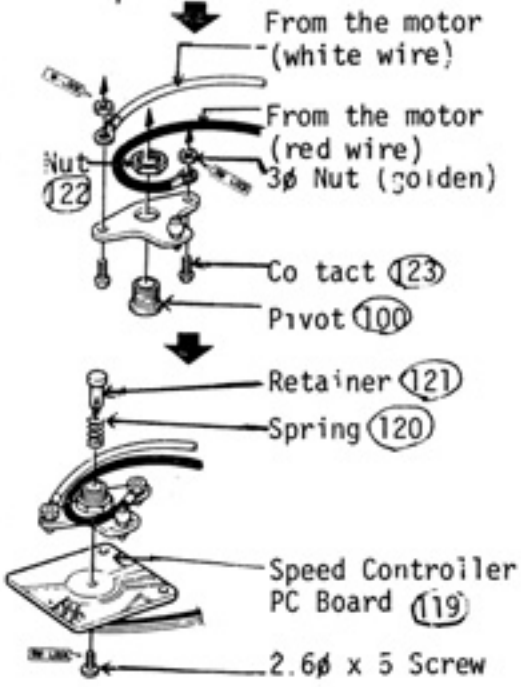
Run the connectors from the steering and speed control servos through the opening between the servo and the pla

23 INSTALLATION OF SPEED CONTROLLER

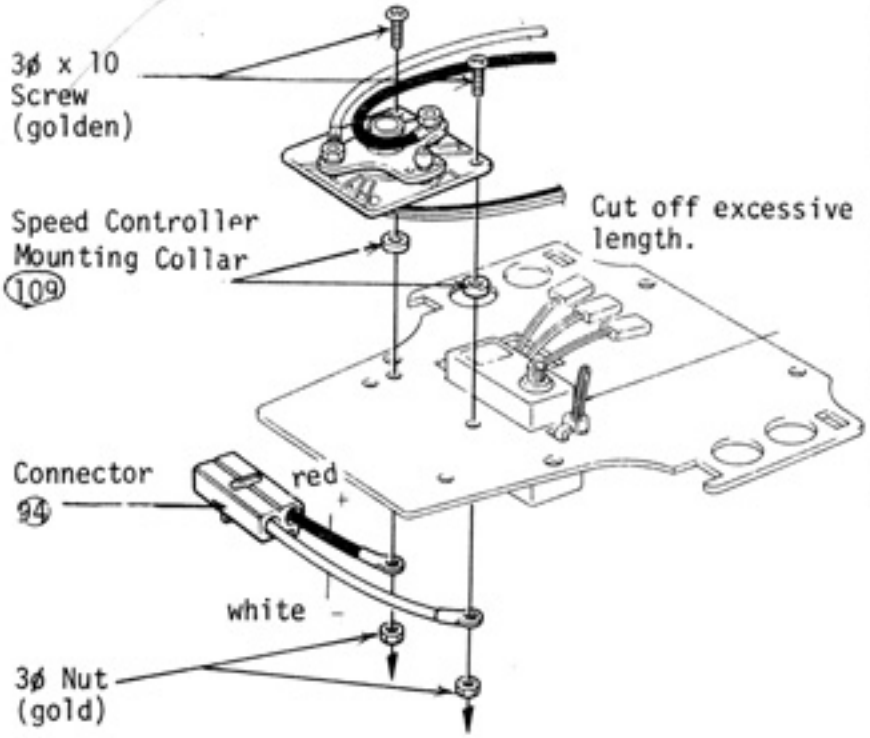
[small parts to be used]

- (67) Ball 1
- (100) Speed Controller Pivot .. 2
- (109) Speed Controller Mounting Collar 2
- (120) Speed Controller Spring . 1
- (121) Speed Controller Retainer 1
- (122) Speed Controller Nut 1
- (123) Speed Controller Contact. 2
- 2ø x 10 Screw 1
- 3ø x 10 Screw (golden colored) 2
- 2ø Nut 2
- 3ø Nut (golden) 4
- 2.6ø x 5 Screw 1

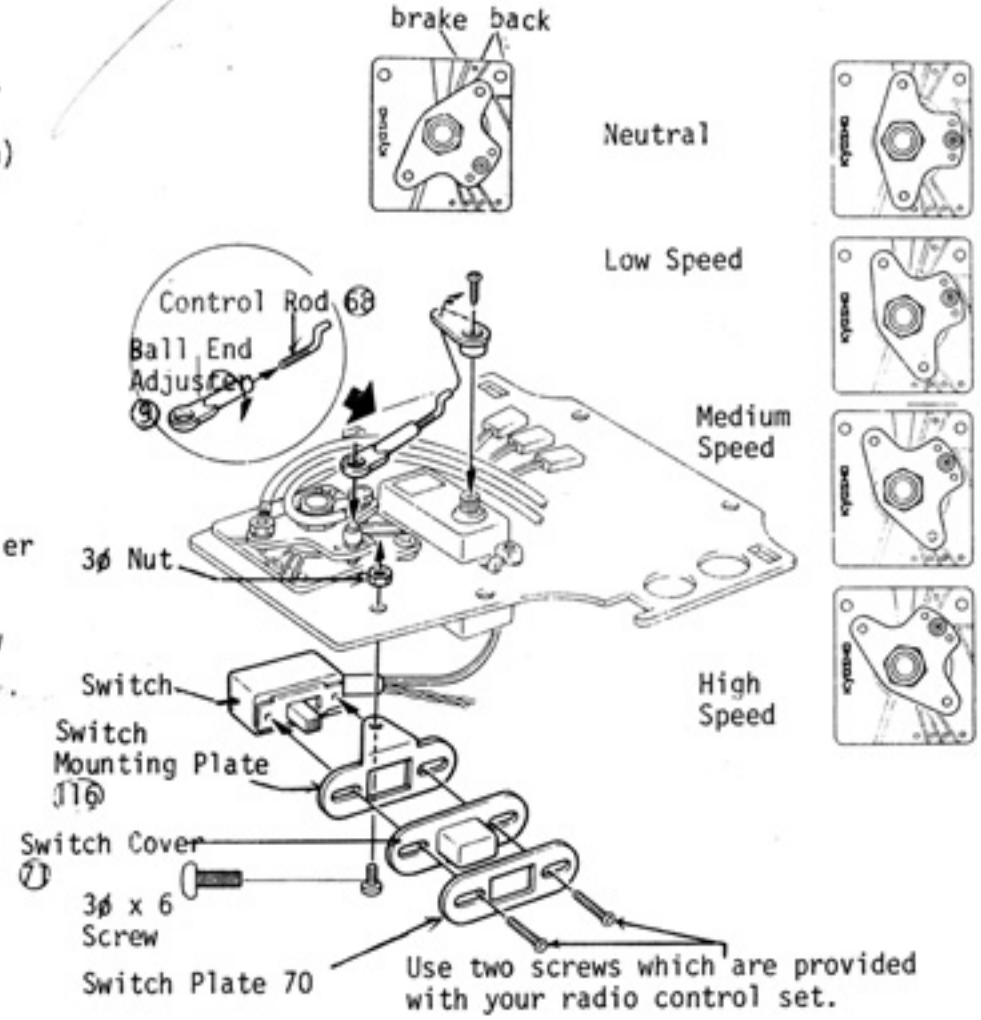




23 INSTALLATION OF SPEED CONTROLLER



24 SPEED CONTROLLER LINKAGE

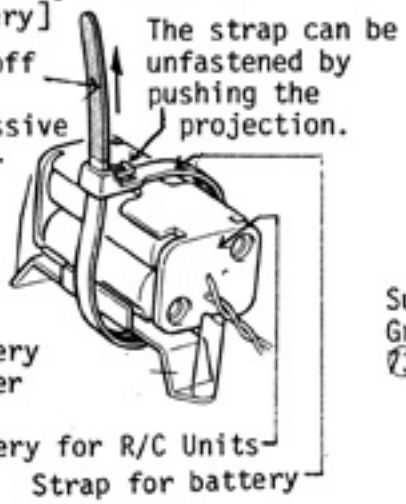


25. MOUNTING R/C UNIT PLATE

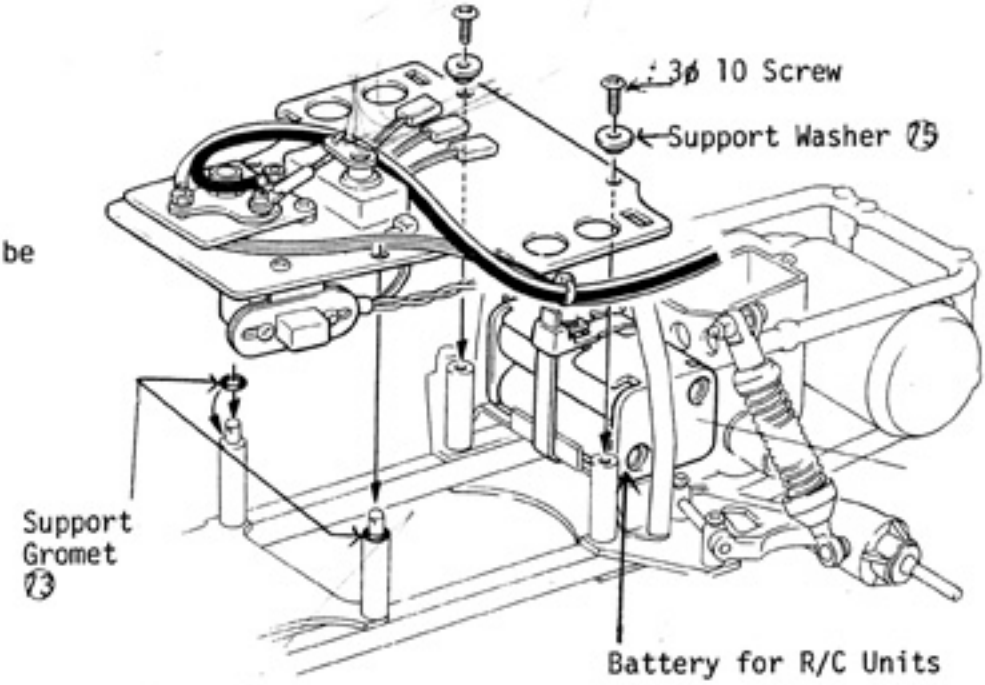
[small parts to be used]

- ⑬ Support Gromet .. 2
- ⑮ Support Washer .. 2
- 3ø x 10 Screw 2

[Mounting of R/C Unit Battery]



25. MOUNTING R/C UNIT PLATE



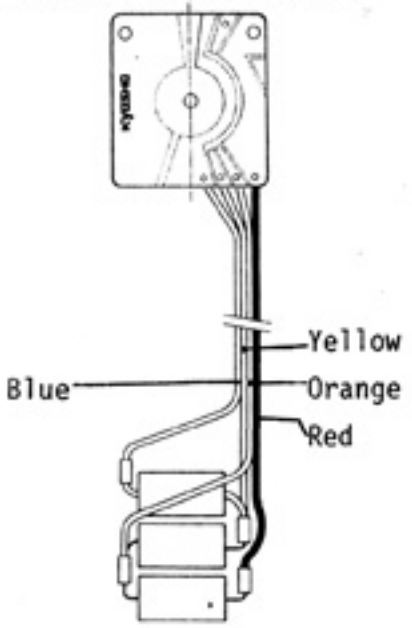
26. MOUNTING RESISTOR

[small parts to be used]

3ø x 8 Screw 2

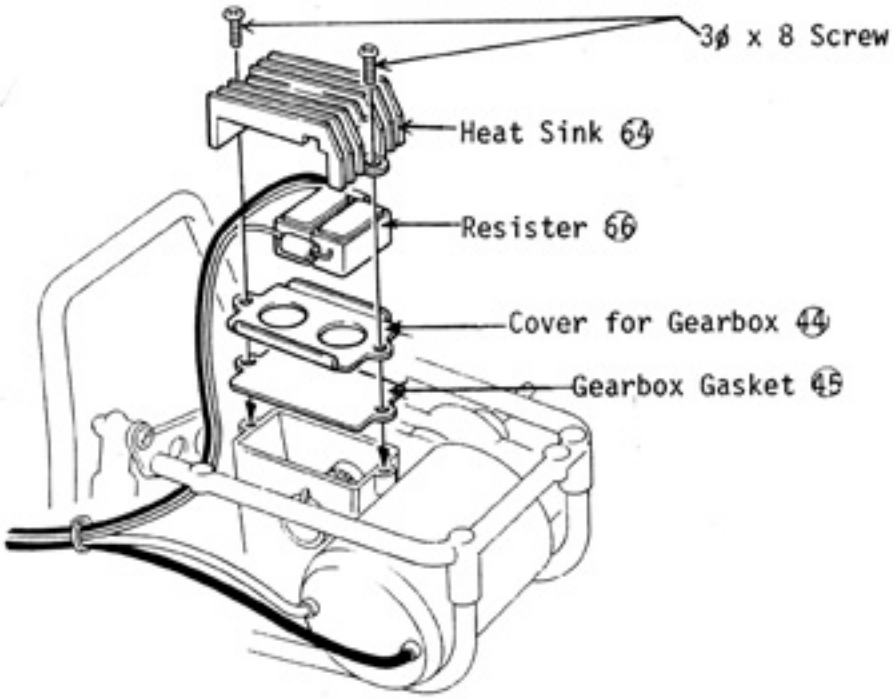
[How to convert into 4 Speed]

This model is designed to go three speeds forward and one backward. You can modify it into four forward speeds with an optional resister which is wired in to give the fourth speed ahead.



Solder the optional resister (5W-0.15 ohm x 3) as shown in the illustration.

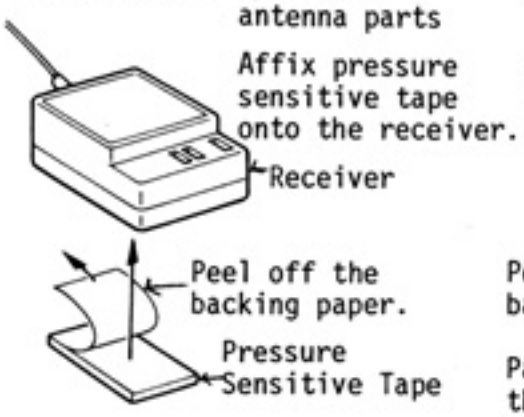
26. MOUNTING RESISTER



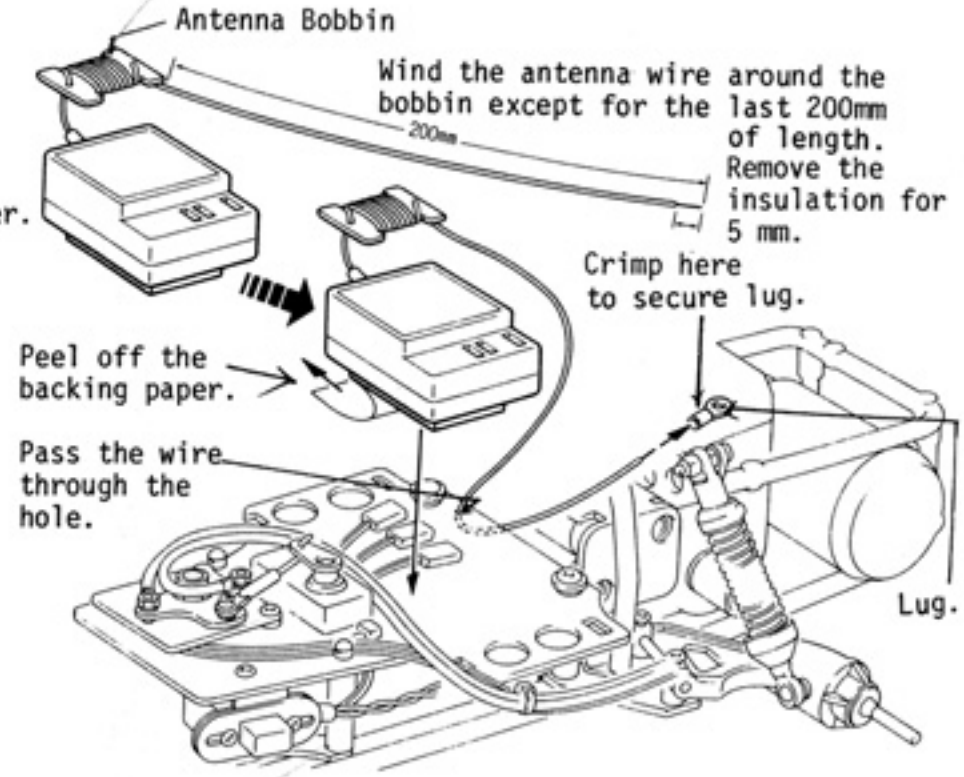
27. MOUNTING RECEIVER

[Small parts to be used]

Lug .. 1 (95) one of antenna parts



27. MOUNTING RECEIVER

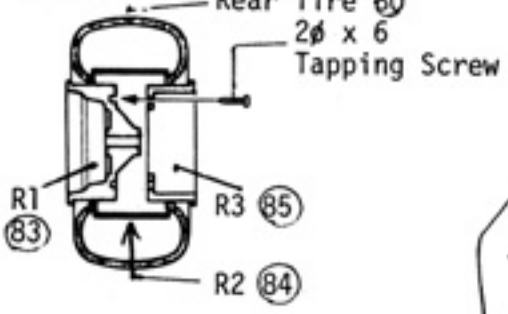


28 ASSEMBLY OF TIRE

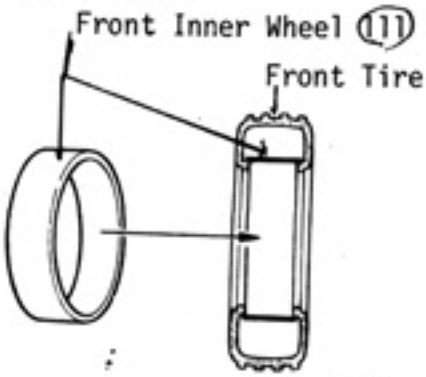
[small parts to be used]

2ø x 6 Tappin Screw 10

[Cross-Sectional View of Rear Wheel]

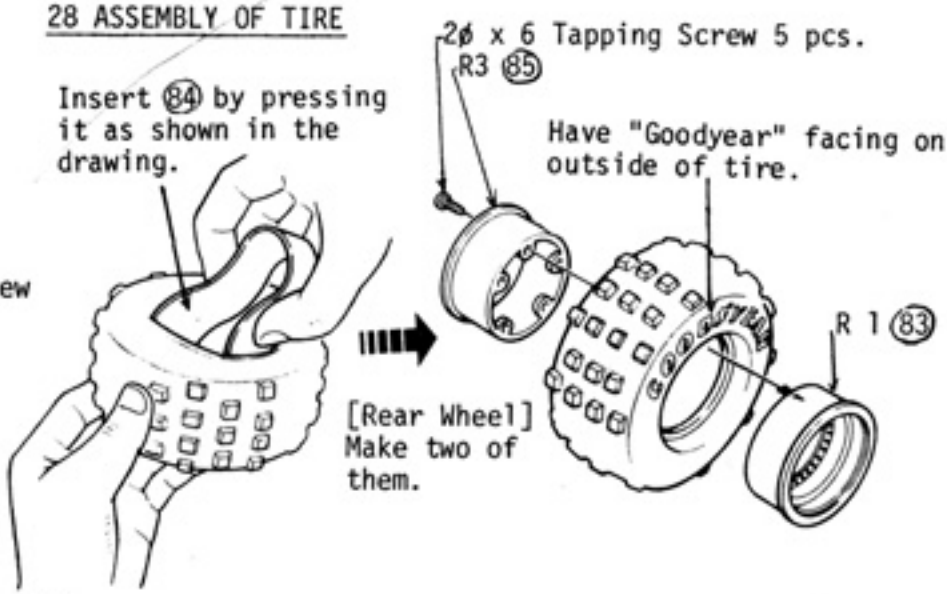


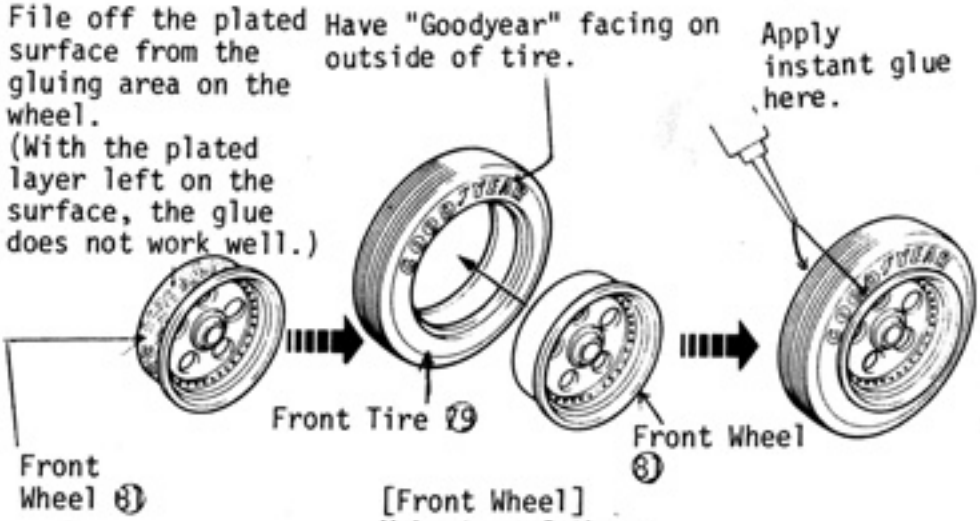
[Cross-Sectional View of Front Tire]



Put the inner wheel (117) into the front tire.

28 ASSEMBLY OF TIRE





29. MOUNTING WHEELS

[small parts to be used]

42 Drive Washer... 2

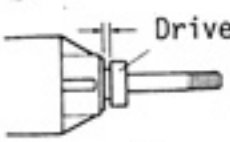
82 Front Wheel Bearing ... 2

113 Rear Axle Shim . 4

4ø Nylon Nut 4

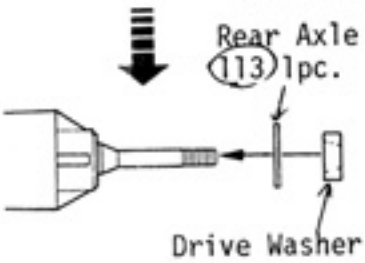
4ø Washer 4

If the rear axle has too much end play, insert the shim #113 between the drive washer and suspension arm.



Drive Washer 42

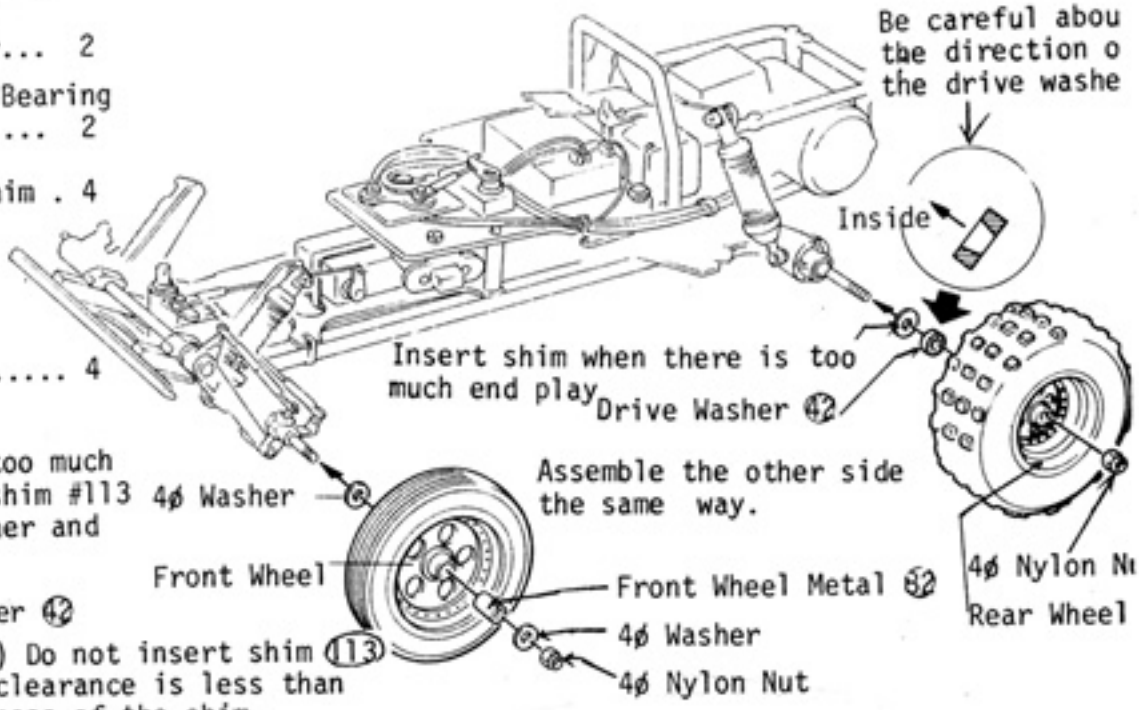
(Note) Do not insert shim 113 when clearance is less than thickness of the shim.



Rear Axle Shim 113 1pc.

Drive Washer 42

29. MOUNTING WHEELS



Be careful abou the direction o the drive washe

Inside

Insert shim when there is too much end play

Drive Washer 42

Assemble the other side the same way.

4ø Washer

Front Wheel

Front Wheel Metal 82

4ø Washer

4ø Nylon Nut

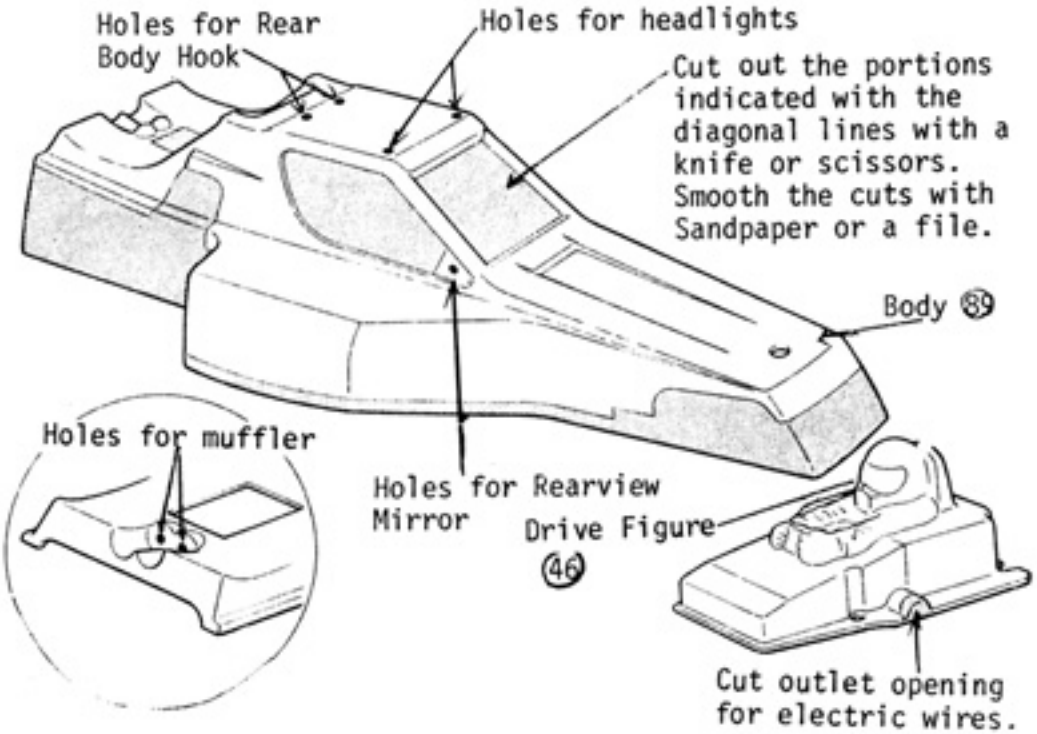
4ø Nylon Nu

Rear Wheel

30. PREPARING BODY

Scribe a groove on the body along the cutting lines. Bend the plastic along the scribed lines to break off excess plastic.

30. PREPARING BODY



Holes for Rear Body Hook

Holes for headlights

Cut out the portions indicated with the diagonal lines with a knife or scissors. Smooth the cuts with Sandpaper or a file.

Body 89

Holes for muffler

Holes for Rearview Mirror

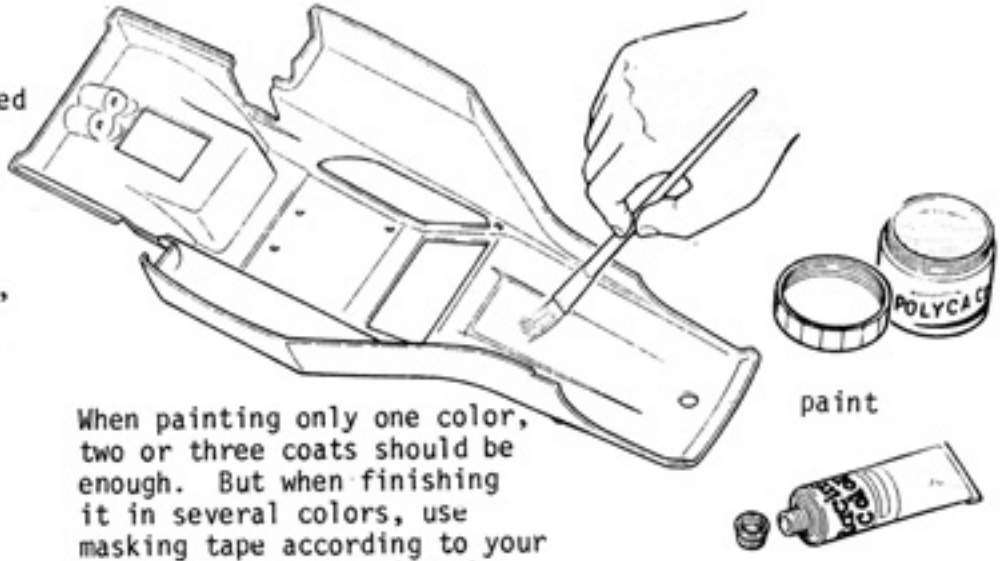
Drive Figure 46

Cut outlet opening for electric wires.

31 PAINTING ON BODY

The Tomahawk's body is made of clear plastic, polycarbonate: which can be best finished by painting the inside. For better adhesion of the paint, wash the body with neutral detergent and let it dry. Care should be taken not to touch the surface with fingers, nor allow it to get oiley.

31 PAINTING ON BODY



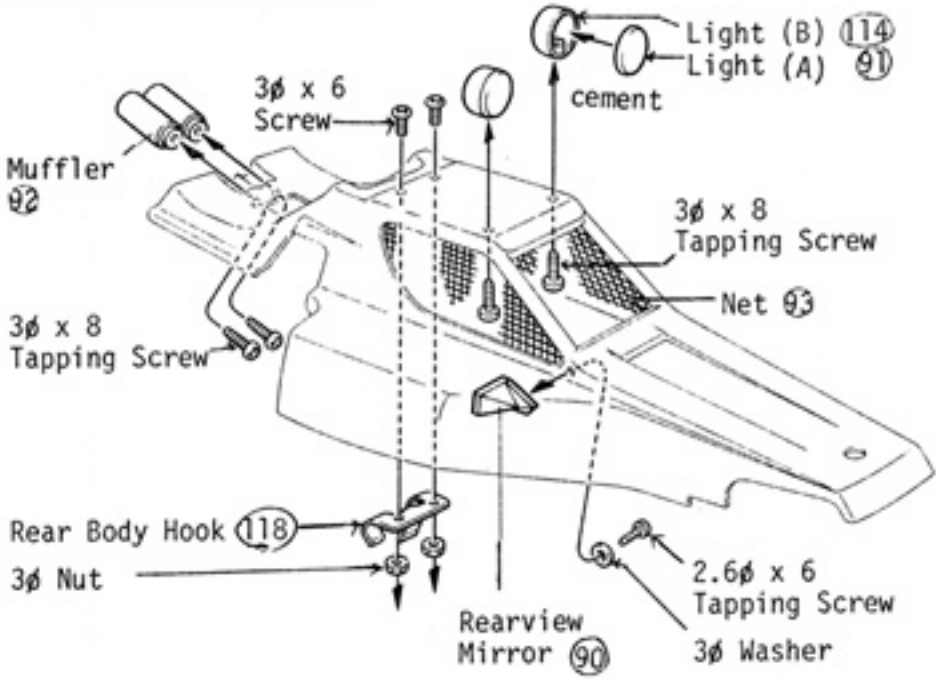
When painting only one color, two or three coats should be enough. But when finishing it in several colors, use masking tape according to your coloring scheme Paint the darkest colors first, then lighter colors over all.

32. APPLYING ACCESSORIES

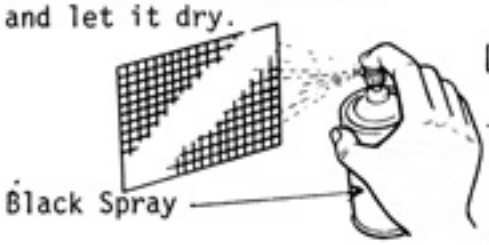
[small parts to be used]

- (90) Rearview Mirror 1
- (91) Headlight 2
- (92) Muffler 2
- (114) Light (B) 2
- 3ø x 6 Screw 2
- 3ø x 8 Tapping Screw 4
- 2.6ø x 6 Tapping Screw ... 1
- 3ø Nut 2
- 3ø Washer 1

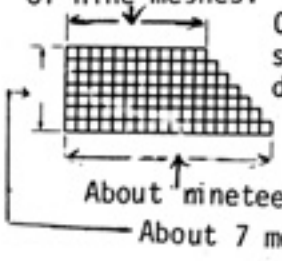
32. APPLYING ACCESSORIES



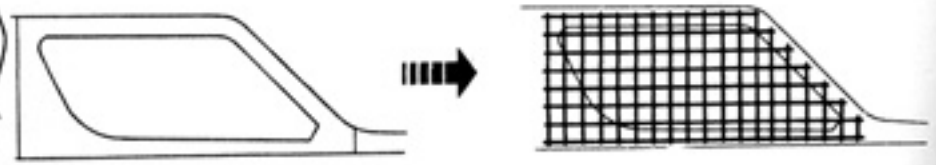
Spray black paint on the both sides of the net (93) and let it dry.



About the length of nine meshes.



[How to apply net]



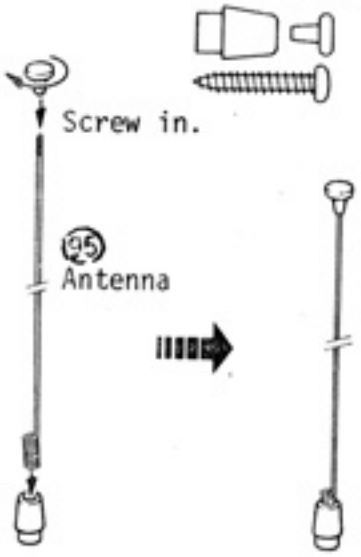
Apply a thick coat of contact cement on the inside of the window and leave it till it sets.

Affix the net (93) by pressing it to the surface where the contact cement has been applied.

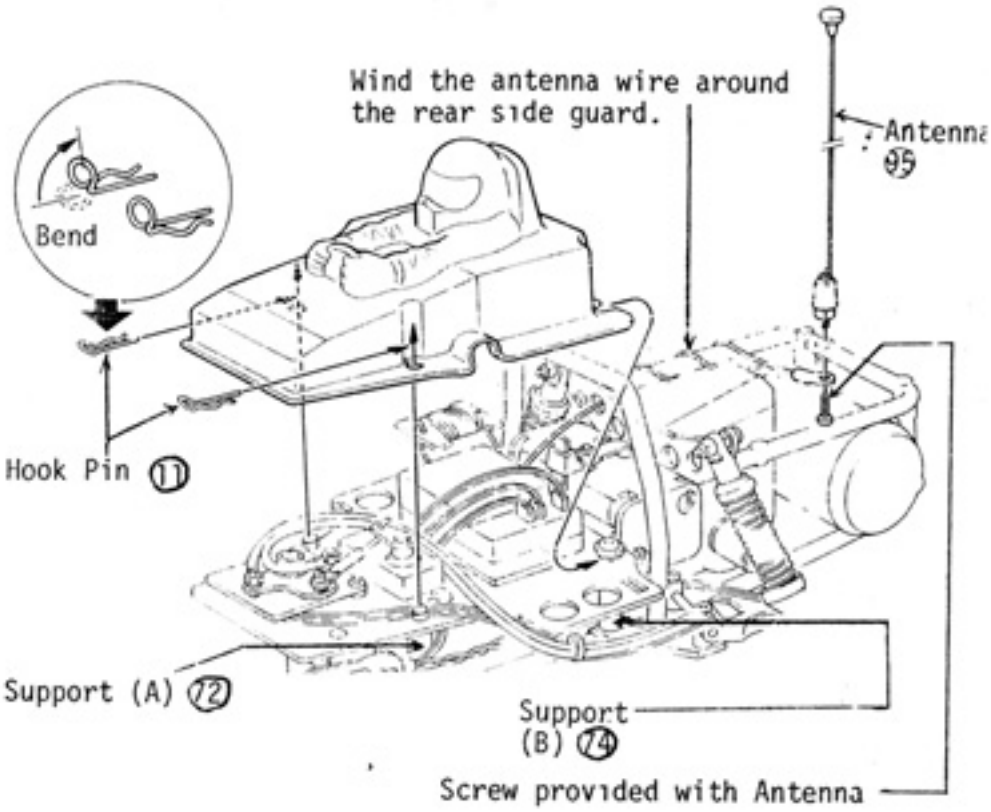
33. MOUNTING DRIVER AND ANTENNA

[small parts to be used]

11 Hook Pin ... 2
95 Parts provided with antenna. 1



33. MOUNTING DRIVER AND ANTENNA

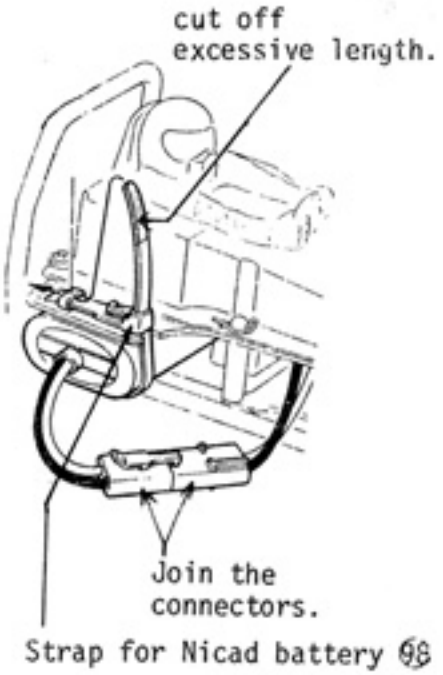


34 MOUNTING OF BODY

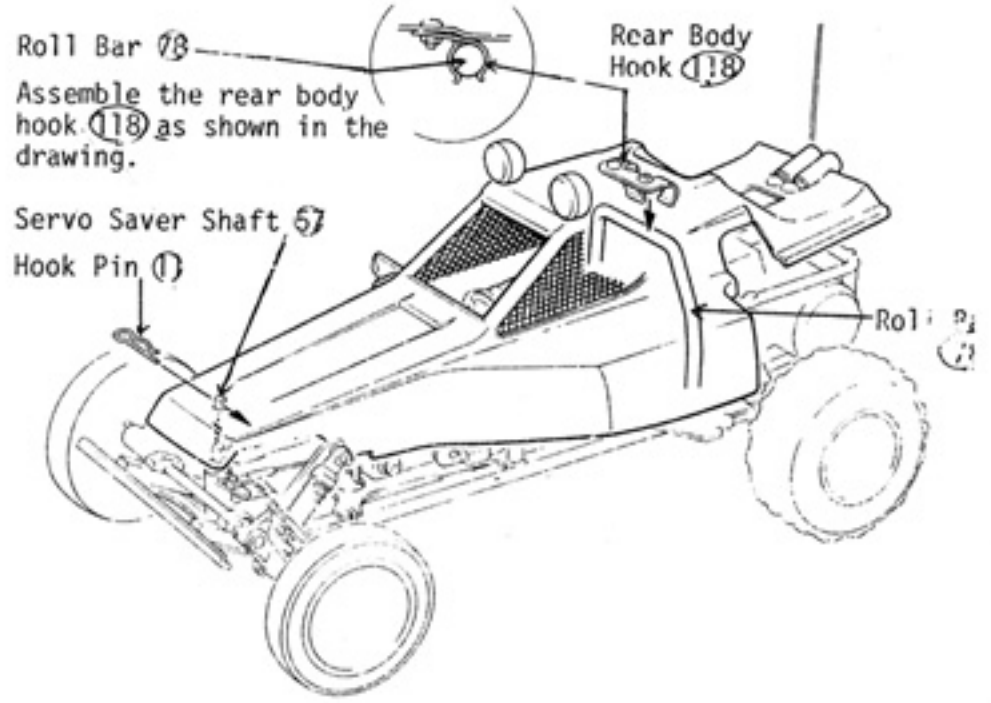
[small parts to be used]

11 Hook Pin 1
41 Strap Loop ... 2

[Mounting of Nicad Battery]



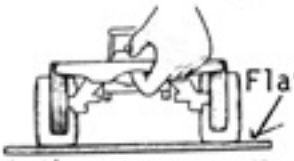
34 MOUNTING OF BODY



ADJUSTMENT BEFORE RUNNING

[Adjustment of Tire Load]

. The right and left tires should be equally loaded in order to assure balanced steering.
The front tire loads can be checked and adjusted if necessary as shown in the following drawings.



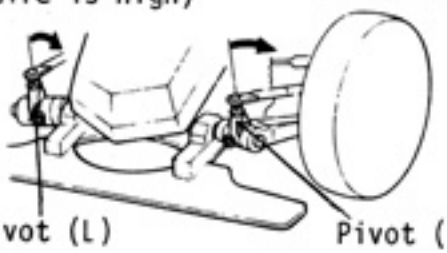
Set the car on a flat surface and raise the front bumper with one finger.

2 Then lower the bumper gently to see if the both tires touch the surface at the same time. If not, adjustment is required.

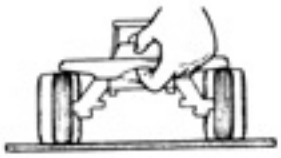
3.As shown in the picture 2 where the right tire is still above the surface, move the pivot (R) toward the rear of the car a little at a time. If the left tire does not touch the surface, shift the pivot (L) rearward.

(When the left tire is high)

(When the right tire is high)

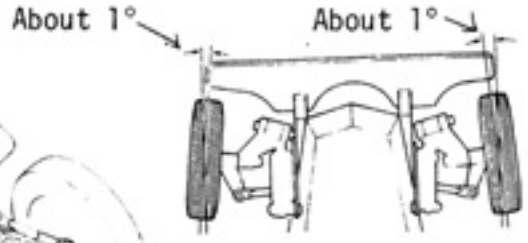


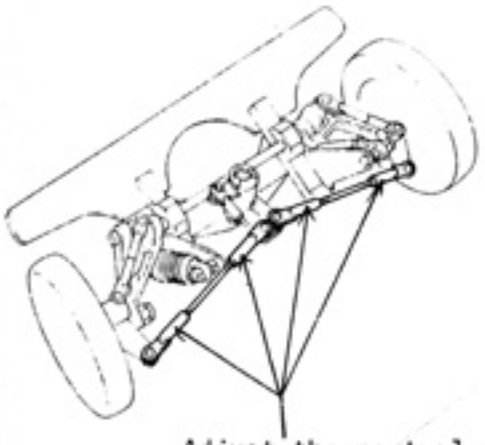
4. When both front tires are in touch with the flat surface at the same time, they are in proper adjustment.

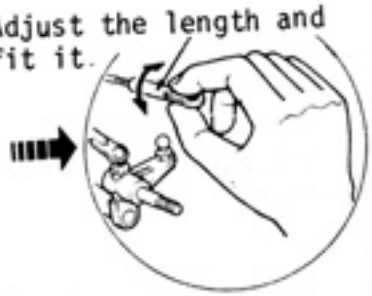


[Adjustment of Steering System]

This is a very important system. Set the front wheels to toe-in slightly. This setting is called "toe-in". It makes steering straight easier and improves cornering.

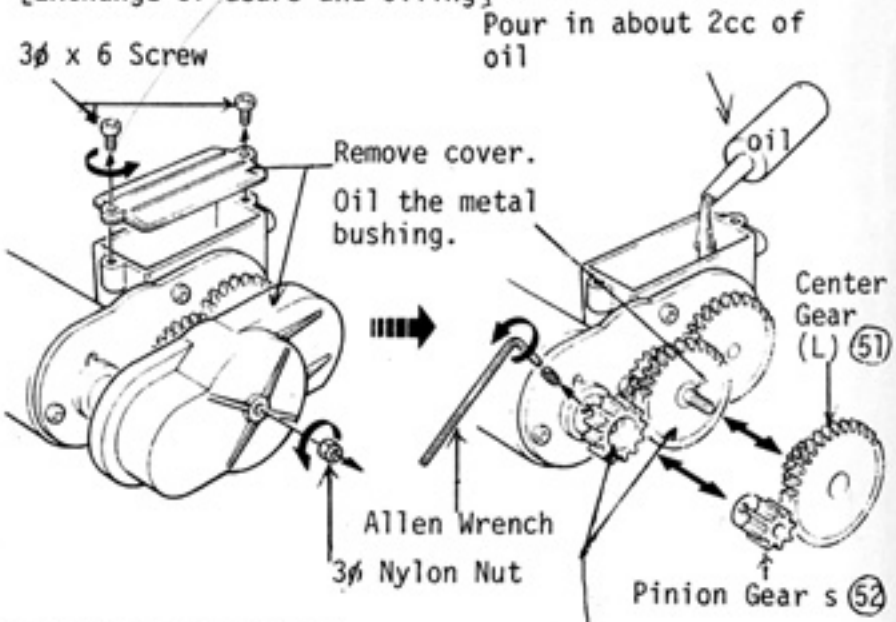






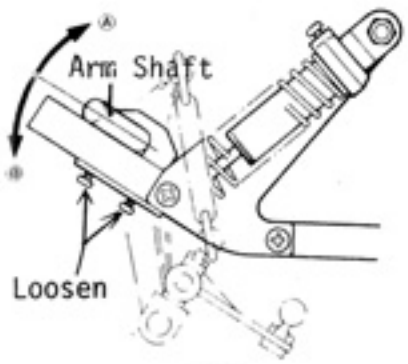
Adjust the neutral and toe-in setting with four ball fitted adjusters on the control rods.

[Exchange of Gears and Oiling]



The gearbox is factory assembled with high speed gears When running the car on rough terrain or sandy soil, change the gears for low speed operation. Low speed gears are included in kit. They are contained in a plastic bag.

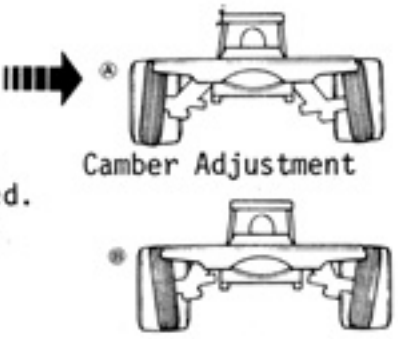
When installing the low speed gears, change the pinion gear (52) and the center gear (51).



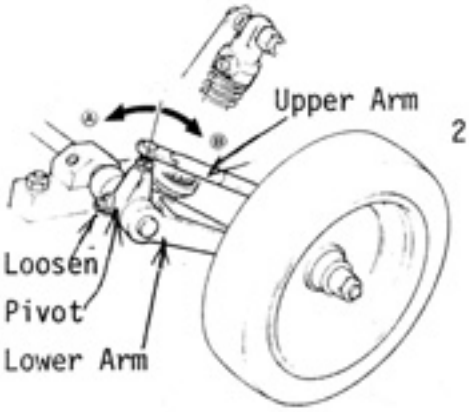
*The model is designed to run well when assembled according to the steps of the assembly instructions. However, you should understand how to adjust the front suspension to your own liking.

[Method of Adjusting]

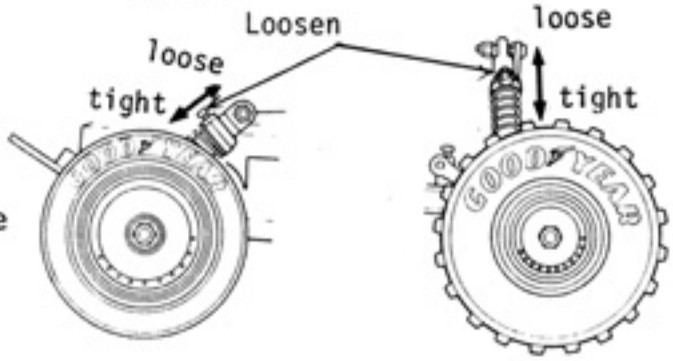
1. More camber adjustment is achieved by raising the arm axle in the direction indicated by the arrow A. Toward B inversed camber is achieved. (Note) Since camber adjustment will affect the toe-in setting, check toe-in whenever camber is modified.



2. When the pivot is tilted toward A (frontward) caster adjustment is diminished, and toward B increased.



[Adjustment of Spring]



Do not use excessive force when tightening plastic screw, otherwise it may become too loose.

Set front/rear springs a little bit softer, so that springs will absorb more cushion.

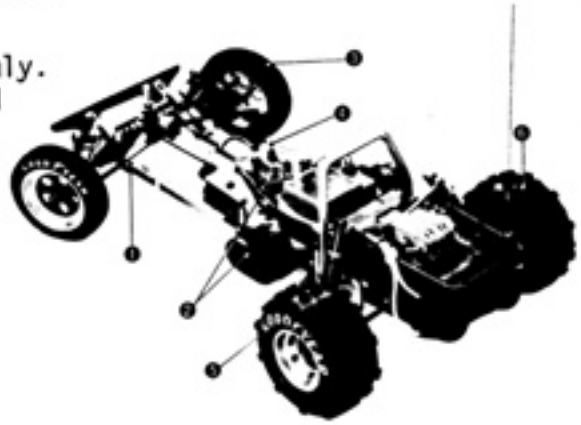
CHECK BEFORE RUNNING

[Check before Running]

Before running the car, check the parts in order of the numbers as shown in the picture.

* Drive slowly the first time the car is run. Continue driving slowly until the battery needs recharging. Check all moving parts on the car.

1. Check to see if all bolts and nuts are tightened firmly.
2. Check to see if batteries for radio control units and the motor are charged fully.
3. Check to see if the front wheels steer in proportion to your control of the transmitter.
4. Check to see if the forward and reverse movement of the car responds accurately to your control.
5. Check to see that all wiring is properly insulated with vinyl tape.
6. Check to see that the rear wheels are free and can be turned by hand.



[Steps of Operating]

1. Put batteries into radio control units. Install main Nicad running battery.
2. Turn transmitter switch on.
3. Switch on the receiver.
4. Check to see that the sticks of your transmitter operate correctly, right and left for steering, and up and down for throttle.

* When turning off the switches, turn off the receiver first then transmitter. Otherwise, the car servos may be left in a position other than neutral.

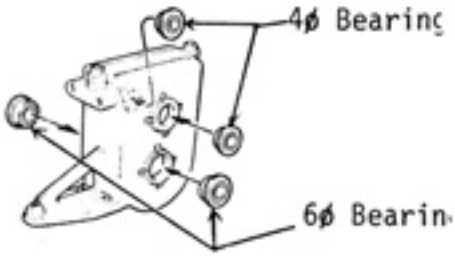
[Trouble Shooting when the Car does not Start]

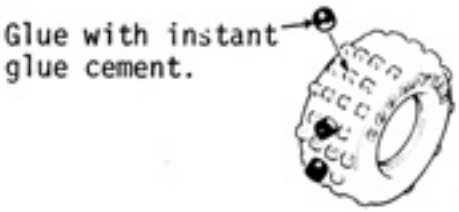
1. Poor contact of connectors of receivers, servos, batteries or of electric wiring.
2. Poor contact of the speed controller wiper blade.
3. Radio control units are out order.
4. Signal jamming from other radios.

OPTIONAL PARTS

Plain bearings are installed in the gear box and the front wheels. For more less friction, replace them with the ball bearings which are available as optional parts.

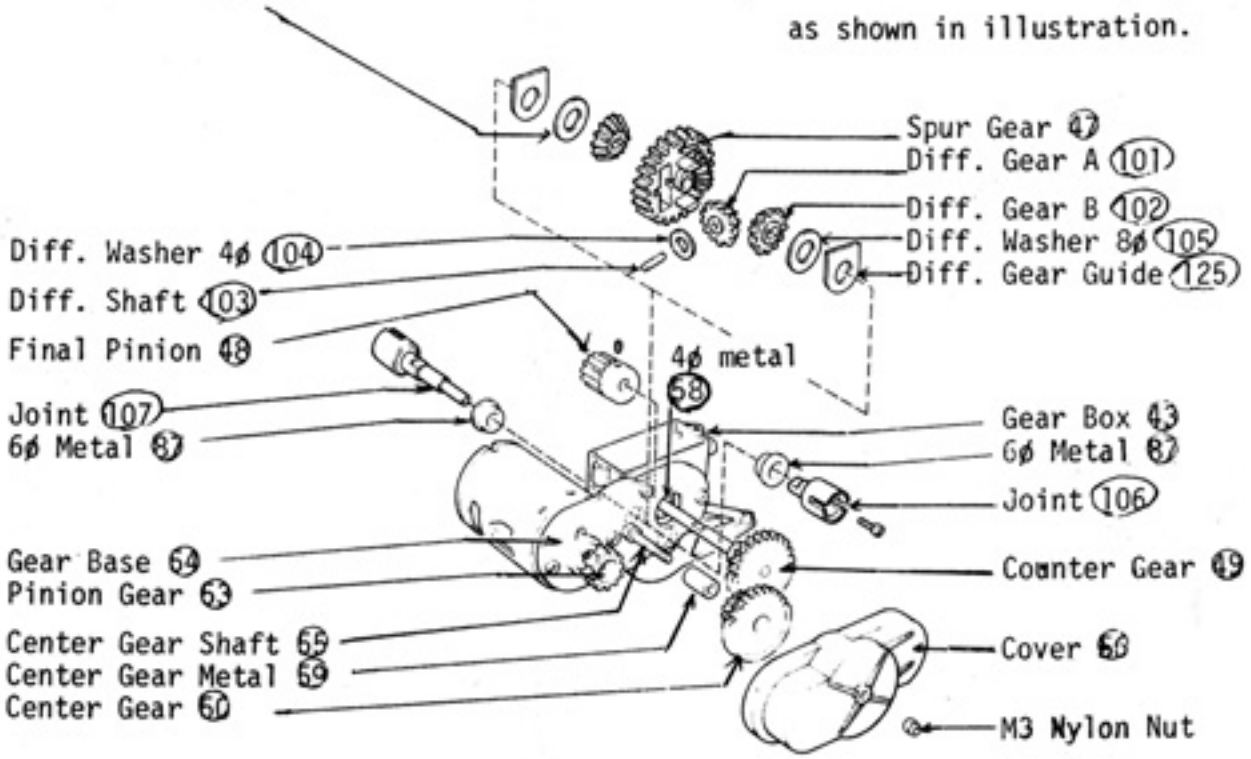
For increasing traction maneuverability on sandy courses, use the nylon super spike tire which is optionally available. (CB-86).





EXPLODED VIEW OF GEAR BOX

(Note) Diff washer 8ø (105) is not built in. If each gears have too much end play, install as shown in illustration.



PARTS LIST

No.	Parts Name	Q'ty
1	Front Bumper	1
2	Main Chassis	2
3	Arm Shaft	1
4	Arm Shaft Stopper	2
5	Lower Arm (L.R)	1 set
6	Pivot (L.R)	1 set
7	Upper Shaft	2
8	Pillow Ball	9
9	Ball End	10
10	Upright	2
11	Hook Pin	3
12	Knuckle Arm (L R)	1 set
13	Tie Rod	2
14	Steering Servo plate	1
15	Rear Sus. Arm	2
16	Servo Saver Mount	1
17	Servo Saver	1 set
18	Damper Case	4
19	Damper Washer	4
20	Damper O Ring	4
21	Damper Stopper	4
22	Damper End	4
23	Damper Bushing	4
24	Damper Ball	4
25	Damper Ball Nut	4
26	Front Damper Piston	2
27	Rear Damper Piston	2
28	Front Damper Stay	2
29	Rear Damper Stay	1
30	Gear Box Mount	1
31	Rear Sus. Plate	2
32	Rear Sus. Shaft	2
33	Rear Sus. Holder(S)	2
34	Rear Sus. Holder(L)	2
35	Front Spring	2
36	Rear Spring	2
37	Front Spring Holder	2
38	Spring Stopper	4
39	Swing Shaft	2
40	Rear Whee Shaft	2
42	Drive Washer	2
43	Gear Box	1
44	Gear Box Cover	1
45	Gear Box Seal	1
46	Driver	1
47	Spur Gear	1
48	Final Pinion	1
49	Counter Gear (w/shaft)	1
50	Center Gear (S) (for High speed)	1
51	Center Gear (L) (for Low speed)	1
52	Pinion Gear(S) (for Low Speed)	1
53	Pinion Gear(L) (for High Speed)	1
54	Gear Base	1
55	Center Gear Shaft	1
56	Gear Cover	1
57	Servo Saver Shaft	1
58	4ø Metal	2
59	Center Gear Metal	1
60	Motor Cover	1
61	Rear Side Guard	1
62	Rear Under Guard	2
63	R/C Unit Plate	1
64	Heat Sink	1
65	Controller Horn	1
66	Resister	2
67	Linkage Ball	2
68	Controller Rod	1
69	Steering Rod	1
70	Switch Plate	1
71	Switch Cover	1
72	Support (A)	2
73	Support Gromet	2
74	Support (B)	2
75	Support Washer	2
76	Pressure Sensitive Tape	1
77	Battery Holder	1
78	Roll Bar	1
79	Front Tire	2
80	Rear Tire	2
81	Front Wheel	2
82	Front Wheel Metal	2
83	Rear Wheel (R-1)	2
84	Rear Wheel (R-2)	2
85	Rear Wheel (R-3)	2
86	Rear Spring Holder	2
87	6ø Metal	2
88	Decal	1
89	Body	1
90	Rearview Mirror	1
91	Light (A)	2
92	Muffler	2
93	Net	1
94	Connector	1
95	Antenna	1 set
96	Oil	1
97	Motor (RS-540)	1
98	Nicad Strap (L)	3
99	Strap (S)	4
100	Controller Pivot	1
101	Diff. Gear (A)	2
102	Diff Gear (B)	2
103	Diff. Shaft	2
104	Diff. Washer (4ø)	2
105	Diff. Washer (8ø)	2
106	Joint (A)	1
107	Joint (B)	1
108	Front Joint	1
109	Speed Controller Mounting Collar	2
110	Speed Controller Bearing	2 set
112	Roller Bearing Holder	2
113	Rear Shaft Shim	4
114	Light (B)	2
115	Strap (Medium)	1
116	Switch Mounting Plate	1
117	Front Inner Wheel	2
118	Rear Body Hook	1
119	Speed Controller PC Board	1
120	Speed Controller Spring	1
121	Speed Controller Retainer	1
122	Speed Controller Nut	1
123	Speed Controller Contact	2
124	Speed Controller Pivot	1
125	Diff. Gear Guide	2

25. Replacement Parts List

No.	Description
9080-8502	Chassis Rails
-8503	Front Chassis Set
-8504	Front Suspension (L)
-8505	Front Suspension (R)
- 8506	Tie Rod Set
-8507	Front Shock Set
- 8508	Rear Shock Set
-8509	Rear Chassis Set
-8510	Drive Shaft Set
-8511	Rear Drive Set
-8512	Radio Box and Cover
-8513	Speed Control Set
-8514	Linkage and Boot Set
-8522	Gear Base and Cover
-8523	Gear Box Set
-8524	Gear Box Gears
-8525	Gear Set (2 Ratios)
-8526	Servo Saver
- 8527	Rear Suspension Arm
-8531	Motor and Cover
-8532	Oil for Shocks and Gears
-8533	Hardware Set A
-8534	Hardware Set B
-8535	Racing Bearings
- 8536	Differential
-8537	Racing Gears
9095-0078	P.C. Board
-0079	Controller Connector
-0056	Differential Gear Set
-0064	Front Bumper
-0066	Plate
-0067	Controller Set
-0069	Roll Bar
-0070	Driver Figure
-0071	Body
-0072	Accessory Set
-0074	Heat Sink
-0076	Post Set
-0058	Motor Heat Sink
-0061	Second Gear
-0062	Resistor for 4-speed