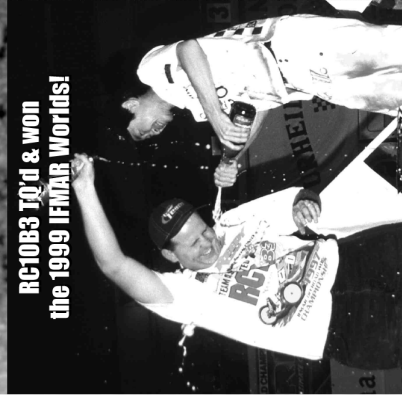


ASSOCIATED 1:10 SCALE ELECTRIC BUGGY MANUAL

RC10B3



**RC10B3 TQ'd & won
the 1999 IFMAR Worlds!**



**INSTRUCTION MANUAL FOR THE RC10B3 BUGGY KITS
#90003, 90113, 9032 & 9043**

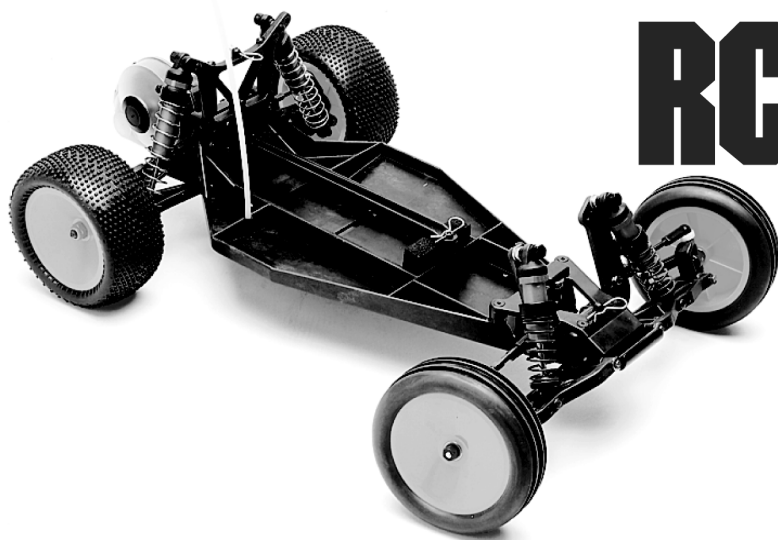


**ASSOCIATED'S RC10B3--
6 TIMES IFMAR WORLD CHAMPION!**



**Masami Hirasaka's RC10B3 won the
'99 IFMAR World Championships!**

©2000 Associated Electrics, Inc.



RC10 B3

All kit versions include:

- 2.40:1 Stealth transmission for effortless power handling.
- Molded composite chassis for better rigidity and Lexan B3 racing body.
- Quadra-symmetric suspension for greater stability and handling.
- Optimized front end geometry improves steering and increases rigidity.
- Adjustable battery placement for fine tuning of traction or steering.
- 2.2" one-piece front and rear wheels.
- Pro-Line 4 Rib M2 front tires and Pro-Line "Holeshot" M2 rear tires.

FACTORY TEAM

Shocks: Hard anodized, PTFE-coated gray.
 Rear Axles: MIP CVD's.
Also includes: Factory Team parts, ball bearings throughout.

TEAM KIT

Shocks: Hard anodized, PTFE-coated gray.
 Rear Axles: MIP CVD's.
Also includes: Ball bearings throughout.

SPORT KIT

Shocks: Gold shocks.
 Rear Axles: Associated dogbones & stub axles.
Also includes: Mechanical speed control and motor. Bushings throughout.

BASIC+ KIT

Shocks: Gold shocks.
 Rear Axles: Associated dogbones & stub axles.
Also includes: Bushings throughout.

REQUIRED EQUIPMENT TO RUN YOUR KIT

for the Factory Team kit #9043

R/C two channel surface frequency radio system with one servo.
 Battery pack (6 cell).
 Battery charger (we recommend a peak detection charger).
 Electronic speed control.
 R/C electric motor.
 Pinion gear, 48 ptich. Teeth to be determined by type and wind of motor.

for the B3 Team kit #9032

R/C two channel surface frequency radio system with one servo.
 Battery pack (6 cell).
 Battery charger (we recommend a peak detection charger).
 Electronic speed control.
 R/C electric motor.
 Pinion gear, 48 ptich. Teeth to be determined by type and wind of motor.

for the B3 Sport kit #9013

R/C two channel surface frequency radio system with two servos.
 Battery pack (6 cell).
 Battery charger (we recommend a peak detection charger).

for the B3 Basic+ kit #9003

R/C two channel surface frequency radio system with one servo.
 Battery pack (6 cell).
 Battery charger (we recommend a peak detection charger).
 Electronic speed control.
 Pinion gear, 48 ptich. Teeth to be determined by type and wind of motor.

YOU WILL NEED THESE TOOLS TO ASSEMBLE YOUR KIT

- Phillips screwdriver #2.
- 1/8" flat head screwdriver.
- 5/16" driver or glow plug wrench.
- Needlenose pliers.
- Super glue (cyanoacrylic glue).
- Hobby knife **WARNING!** This knife cuts plastic and fingers with equal ease, so be careful.
- Precision ruler.



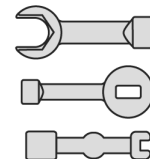
WARNING! Always use hand and eye protection with cyanoacrylic glue!

TOOLS SUPPLIED

Allen wrenches, .050", 1/16", 3/32", 5/64".



Molded tools (#6956):



HELPFUL TOOLS (NOT REQUIRED)

- Allen drivers (straight Allen wrenches with hex shaped handles) such as the following made by Associated:
 - #6957 .050" Allen wrench
 - #6958 1/16" Allen wrench
 - #6959 5/64" Allen wrench
 - #6960 3/32" Allen wrench
 - #6961 2.5mm Allen wrench
- Hand drill with 1/8" & 1/4" bits
- Vernier calipers
- Hobby scissors
- Liquid dish soap
- Nut drivers (screwdriver-handled hex socket tools) such as the following from Associated:
 - #SP-86 3/16" nut driver
 - #SP-85 1/4" nut driver

WARNING!

Do not use a power screwdriver to install screws into nylon, plastic, or composite materials. The fast rotation speed can heat up the screws being installed. They can then break the molded parts or strip the threads during installation.

REACHING US

CUSTOMER SUPPORT

(714) 850-9342
 Fax (714) 850-1744
<http://www.rc10.com/help>
<http://www.rc10.com/kits>



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ASSOCIATED ELECTRICS, INC.

3585 Cadillac Ave.
 Costa Mesa, CA 92626-1401
 USA
<http://www.rc10.com>

READ THIS BEFORE BUILDING

READ THE MANUAL!

This manual is for four different B3 kits and will help you assemble and set up each one. Read the manual before starting your kit and before contacting us for help. "Hello, Associated, I need some help." "Did you read the manual?"

OPEN THE BAGS IN ORDER

The assembly is arranged so that you will open and finish that bag before you go on to the next bag. **Sometimes you will have parts remaining at the end of a bag. These will become part of the next bag.** Some bags may have a large amount of small parts. To make it easier to find the parts, we recommend using a partitioned paper plate for spreading out the parts so they will be easier to find.

SUPPLEMENTAL SHEETS

We are constantly updating parts to improve our kits. These changes, if any, will be noted in supplementary sheets located in a parts bag or inside the kit box. Check the kit box before you start and each bag as it is opened. When a supplement is found, attach it to the appropriate section of the manual.

MANUAL FORMAT

The following explains the format of these instructions.

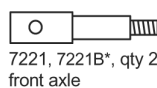
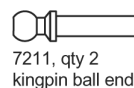
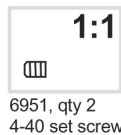
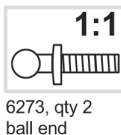
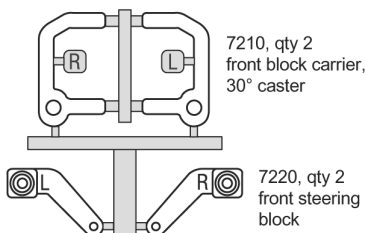
The beginning of each section indicates:

- 1 Which bag to open ("BAG A") and which steps you'll be using those parts for ("FOR STEPS 1-3").
- 2 Which parts you will use for those steps. Remove only the parts shown. "1:1" indicates an actual size drawing; place your part on top and compare it so it does not get confused with a similar part.
- 3 Which tools you should have handy for that section.
- 4 An asterisk (*) next to a part number indicates the part used in the Factory Team B3 kit. (You can use those numbers to upgrade your B3 kits to Factory Team specs.)
- 5 The instructions in each step are ordered in the order you complete them, so read the words AND follow the pictures. The numbers in circles are also in the drawing to help you locate them faster.
- 6 When we refer to left and right sides of the buggy, we are referring to the driver's point of view inside the car.

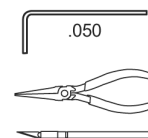
BAG A

REMOVE THESE PARTS FOR:

Step 1



TOOLS USED



step 1 LEFT SIDE

Asterix (*) denotes Factory Team part number. Use this number if you have the Factory Team kit.

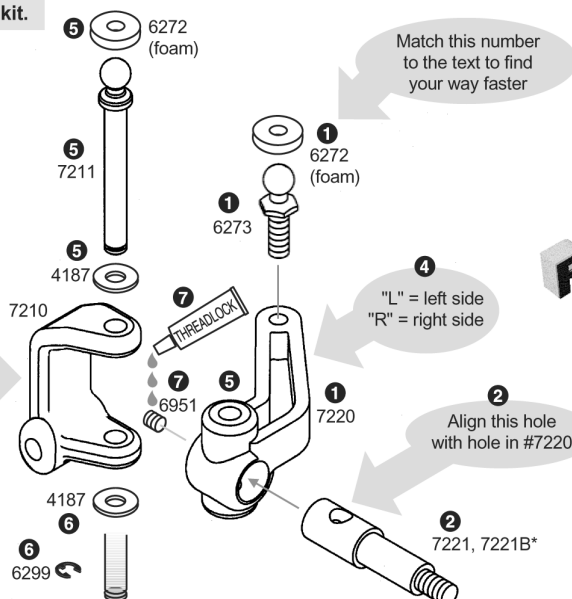
ASSEMBLE STEERING BLOCKS

- 1 Assemble parts #7220, 6273 and 6272.
- 2 Push #7221 (7221B*) axle into the #7220 steering block, lining up holes.
- 3 Push the #7211 kingpin through both to clear any burrs. Then remove the kingpin.

ASSEMBLE BLOCK CARRIERS

- 4 Note location of L and R on #7210 block carriers and #7220 steering blocks.
- 5 Align holes of #7220 (L) inside #7210 (L). Add one #4187 spacer to #7211 kingpin and insert #7211 through block and axle. Add a #6272 dust cover to the ball end as shown.
- 6 Insert one #4187 spacer and then one #6299 E-clip to the bottom of #7211 kingpin.
- 7 Add screw locking compound such as Loctite® (not included in kit) to #6951 set screw and tighten into #7221 (7221B*).
- 8 Now assemble right side.

"L" = left side
"R" = right side



BAG A

REMOVE THESE PARTS FOR:

Step 2



9145, qty 2
ball end



7230, qty 4
large ball cup



6295, qty 2
4-40 nut



6299, qty 8
E-clip



6924, qty 3
4-40 x 3/8



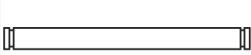
7413, qty 2
4-40 x 3/4



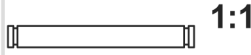
6936, qty 2
#4 washer



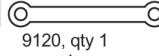
7260, qty 2
4-40 nut



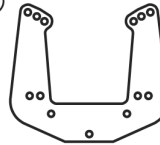
9110, qty 2
front inner hinge pin



9115, qty 2
front outer hinge pin



9120, qty 1
cross brace
steel



9142, 9143*, qty 1
front shock tower



6263, 1406*, qty 2
2.06" turnbuckle

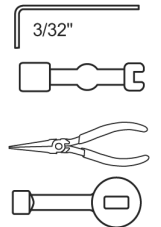


9125, qty 1
front bulkhead



9107, 9108*, qty 2
front suspension arm

TOOLS USED



step 2 LEFT SIDE

REMOVE SUSPENSION ARMS

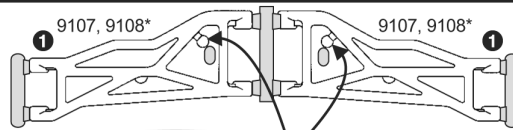
- 1 Twist the #9107 (9108*) suspension arms from the mold runners (shown in gray) with your pliers, and trim away remaining molding with your hobby knife. Do not cut off the antiroll mounting balls. Carefully trim balls so they are perfectly smooth.

ARMS TO BULKHEAD

- 2 Attach the block carrier assembly to the #9107 (9108*) suspension arm with its #9115 hinge pin and #6299 E-clips. Align the #9125 bulkhead with the #9107 suspension arm hinge pin holes as shown. Install #6299 E-clip to one end of #9110 hinge pin. Next hold the #9120 front cross brace in front of the suspension arm while sliding the #9110 hinge pin through the assembly. Install #6299 E-clip to other end of pin. Assemble the other side the same way.

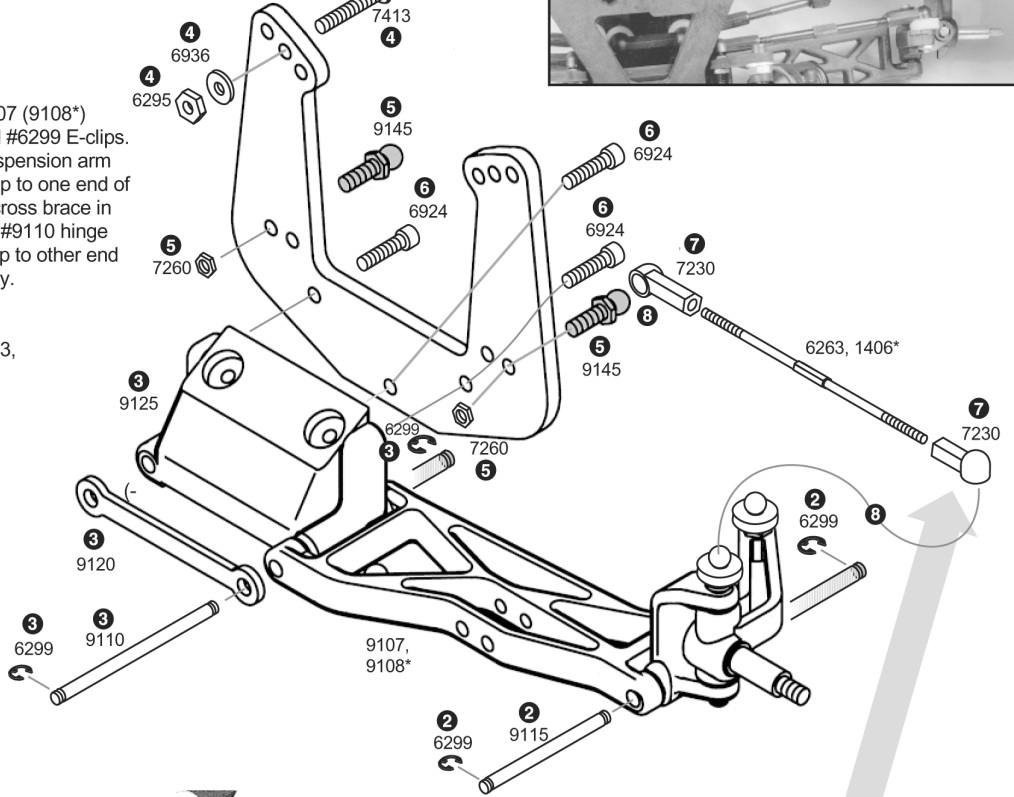
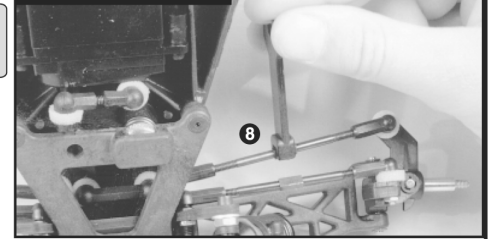
SHOCK TOWER TO BULKHEAD

- 4 Attach the shock screws and hardware #7413, 6936 and 6295. Do other side.
- 5 Attach the #9145 ball ends and #7260 nuts through middle holes.
- 6 Attach the shock tower to the bulkhead with the three #6924 screws.
- 7 Twist #7230 ball cups onto the #6263 (1406*) turnbuckle until you get the dimension shown.
- 8 Connect ball ends with the turnbuckle ball cups as shown, using your needlenose pliers.

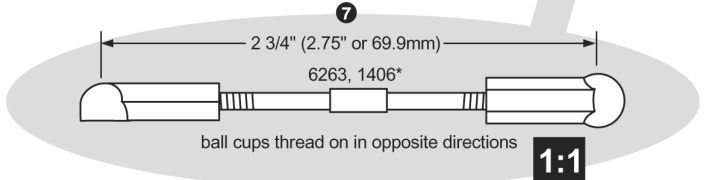


DO NOT CUT OFF BALLS.
REMOVE FLASHING SO BALLS
ARE PERFECTLY SMOOTH.

HOW TO USE THE TURNBUCKLE WRENCH



REAR

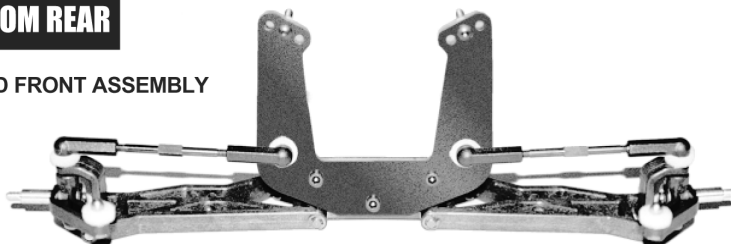


REMOVING BALL CUPS

- 4 Hold the cup next to the ball with your pliers and twist the cup off.

VIEWED FROM REAR

COMPLETED FRONT ASSEMBLY



BAG B

REMOVE THESE PARTS FOR:

Steps 1-3



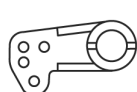
6270, qty 5 ball end



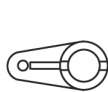
6272, qty 5 dust cover



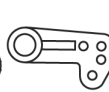
9155, 9162*, qty 4 left hand servo saver bushing



9155, qty 1 servo saver arm



9155, qty 1 servo saver arm



9155, qty 1 bell crank

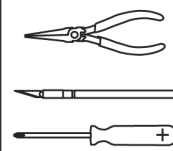


9155, qty 2 bell crank bushing

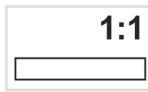


9162*, qty 2 bell crank ball bearing

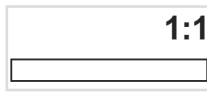
TOOLS USED



9158, 9156B*, qty 1 adjusting nut



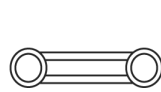
9160, qty 1 mounting pin, right hand



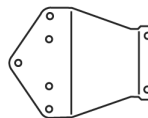
9160, qty 1 mounting pin, left hand



9215, qty 3 6-32 x 3/16



9165, qty 1 drag link



9210, 9210B*, qty 1 kickup



9158, 9156B*, qty 1 tube, aluminum

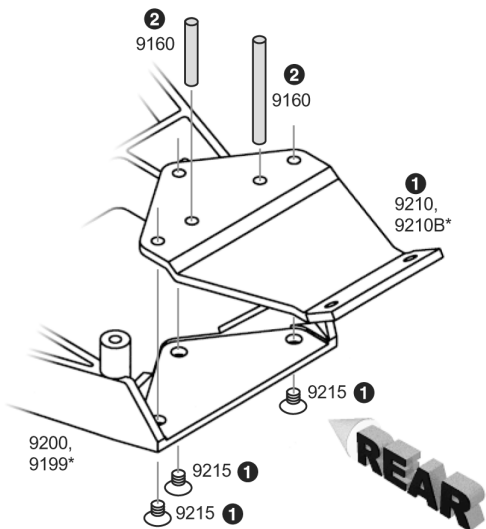


9158, qty 1 servo saver spring

step 1

KICKUP TO CHASSIS

- 1 Add screw locking compound such as Loctite® (not included in kit) to the three #9215 screws and attach the #9210 (9210B*) aluminum kickup (nose plate) to the #9200 (9199*) chassis.
- 2 Place the two #9160 servo saver/bell crank mounting pins in the locating holes.



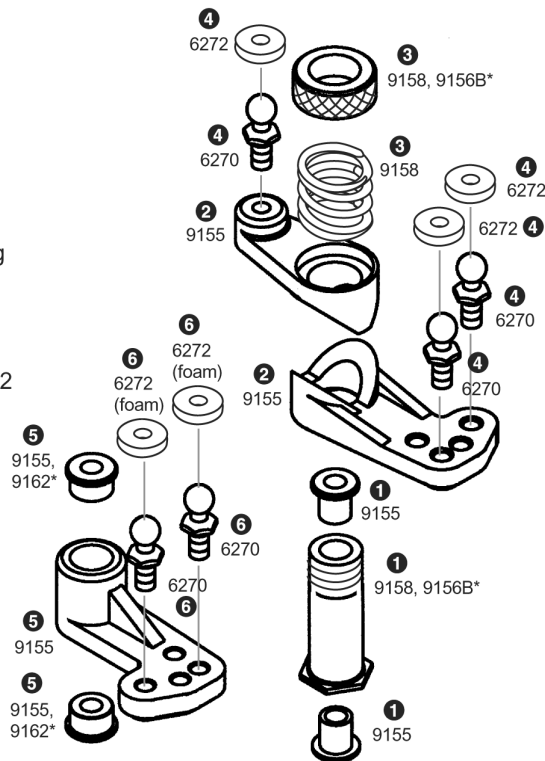
step 2

SERVO SAVER

- 1 Push one #9155 servo saver bushing into each end of the #9158 (9156B*) aluminum tube.
- 2 Slide the two #9155 servo saver arms onto the tube.
- 3 Slide the spring and adjusting nut on the tube. Tighten the nut until 1/32" of the tube threads are exposed.
- 4 Add three #6270 ball ends where shown and three #6272 foam dust covers onto them.

BELLCRANK

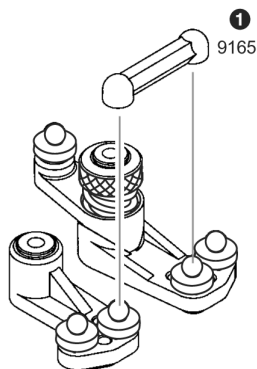
- 5 Install the two #9155 (9162*) bushings into the bell crank.
- 6 Add two #6270 ball ends where shown and two #6272 foam dust covers onto them.



step 3

DRAG LINK

- 1 Install the #9165 drag link over the two ball ends with your needle nose pliers.



PROFILE

IFMAR 2WD World Champion

Masami has a long string of wins for Associated 2WD and Yokomo 4WD cars. Masami drove the fastest car at the '97 World's with his RC10B3 buggy, and took top honors in the 4WD category.

At the '99 Worlds in Finland Mark Pavidis (left) TQ'd with his RC10B3 and Masami (right) was crowned as World Champion driving his B3.



IFMAR WORLD CHAMPIONSHIPS, 1999

Mark Pavidis TQ

Masami Hirohata 2WD World Champion



The RC10B3 TQ'd and won the 1999 IFMAR World Championship

BAG B

REMOVE THESE PARTS FOR:

Steps 4-6



6292, qty 2
4-40 x 3/8



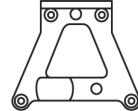
6922, 6934*, qty 2
4-40 x 1/2



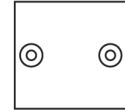
6923, qty 2
4-40 x 3/4



7673, 6933*, qty 2
4-40 x 5/16



9130, 9131*, qty 1
front top plate



9220, qty 1
front bumper

TOOLS USED

1/16"

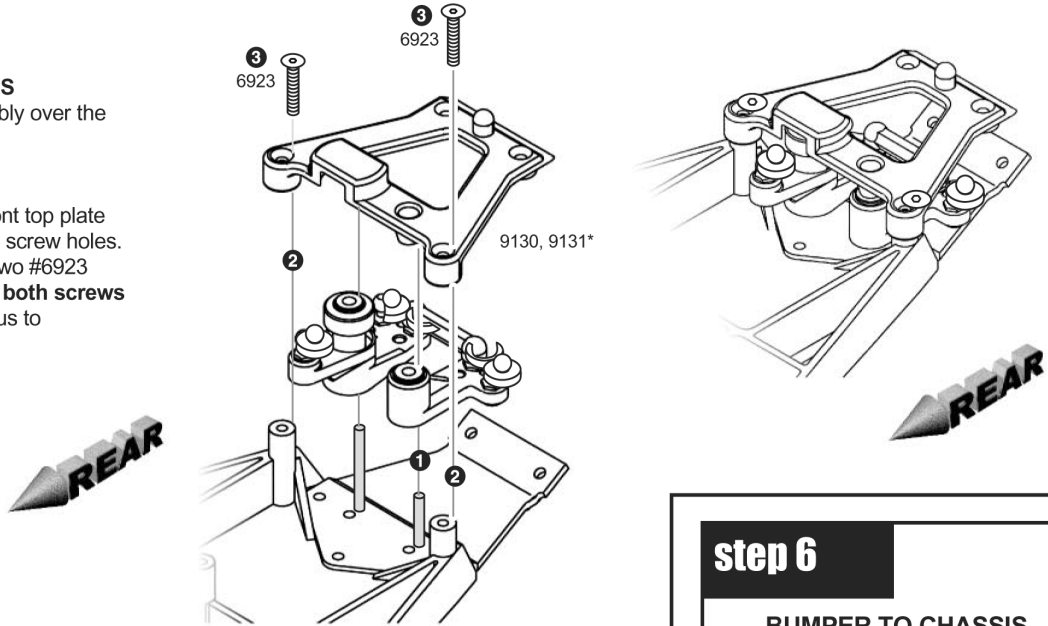
step 4

SERVO SAVER TO CHASSIS

- 1 Place the servo saver assembly over the pins.

TOP PLATE TO CHASSIS

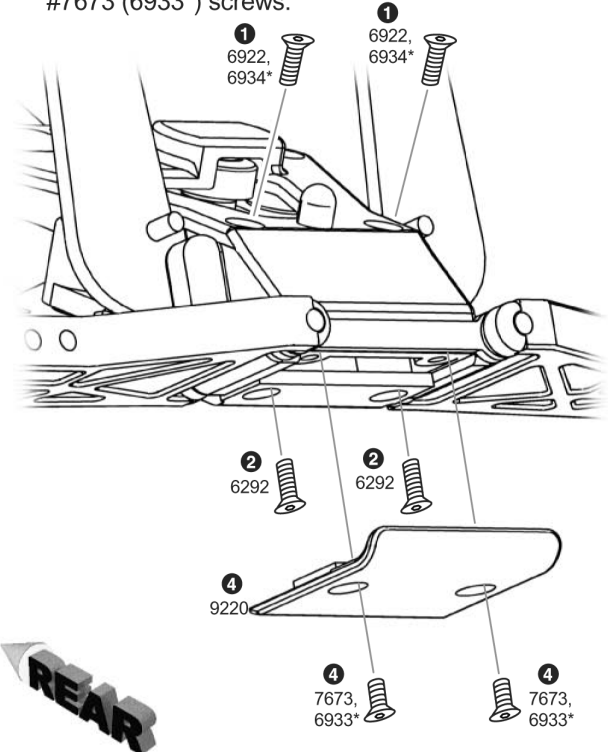
- 2 Line up the #9130 (9131*) front top plate with the servo saver pins and screw holes.
- 3 Bolt down the top plate with two #6923 screws tightly, then back off both screws one full turn. This will allow us to accomplish step 5 below.



step 6

BUMPER TO CHASSIS

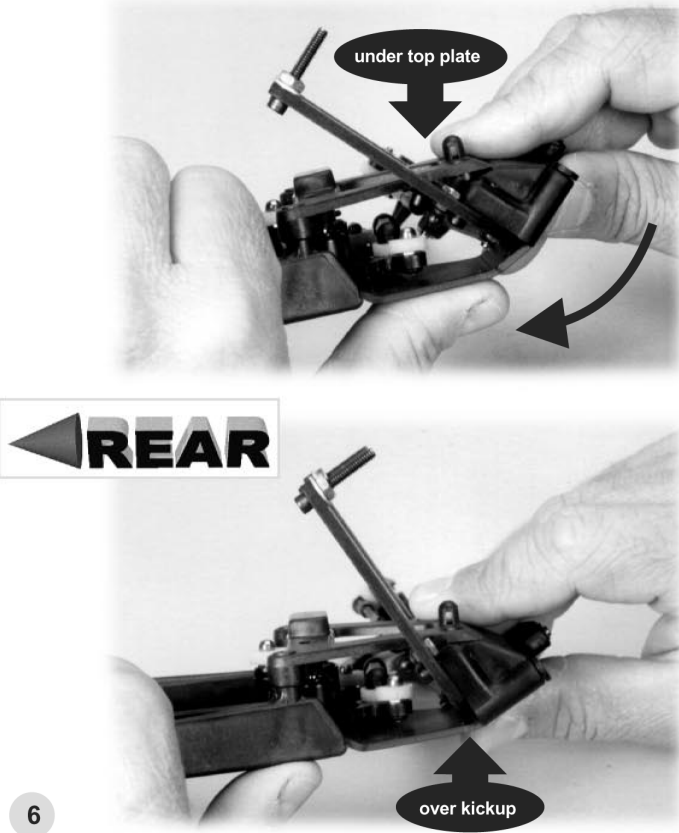
- 1 Use two #6922 (6934*) screws to secure the top plate to front bulkhead.
- 2 Secure front bulkhead to kickup plate with two #6292 screws.
- 3 Go back and tighten the two #6923 screws from Bag B, step 4.
- 4 Bolt on the #9220 bumper with the two #7673 (6933*) screws.



step 5

FRONT END TO CHASSIS

Slip front end under top plate, then push rearward over kickup.

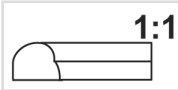


6

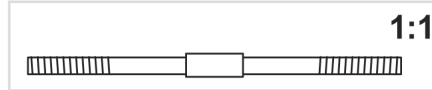
BAG B

REMOVE THESE PARTS FOR:

Step 7



7230, qty 4
large ball cup



6263, 1406*, qty 2
2.06" turnbuckle

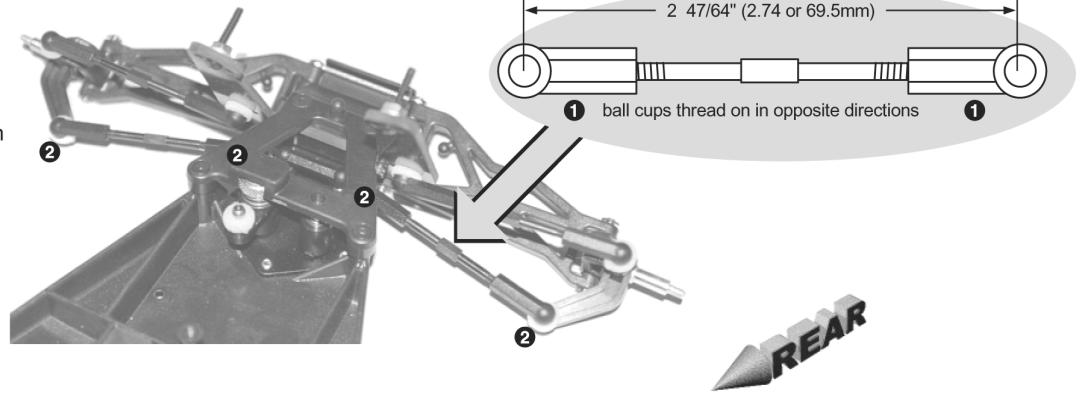
TOOLS USED



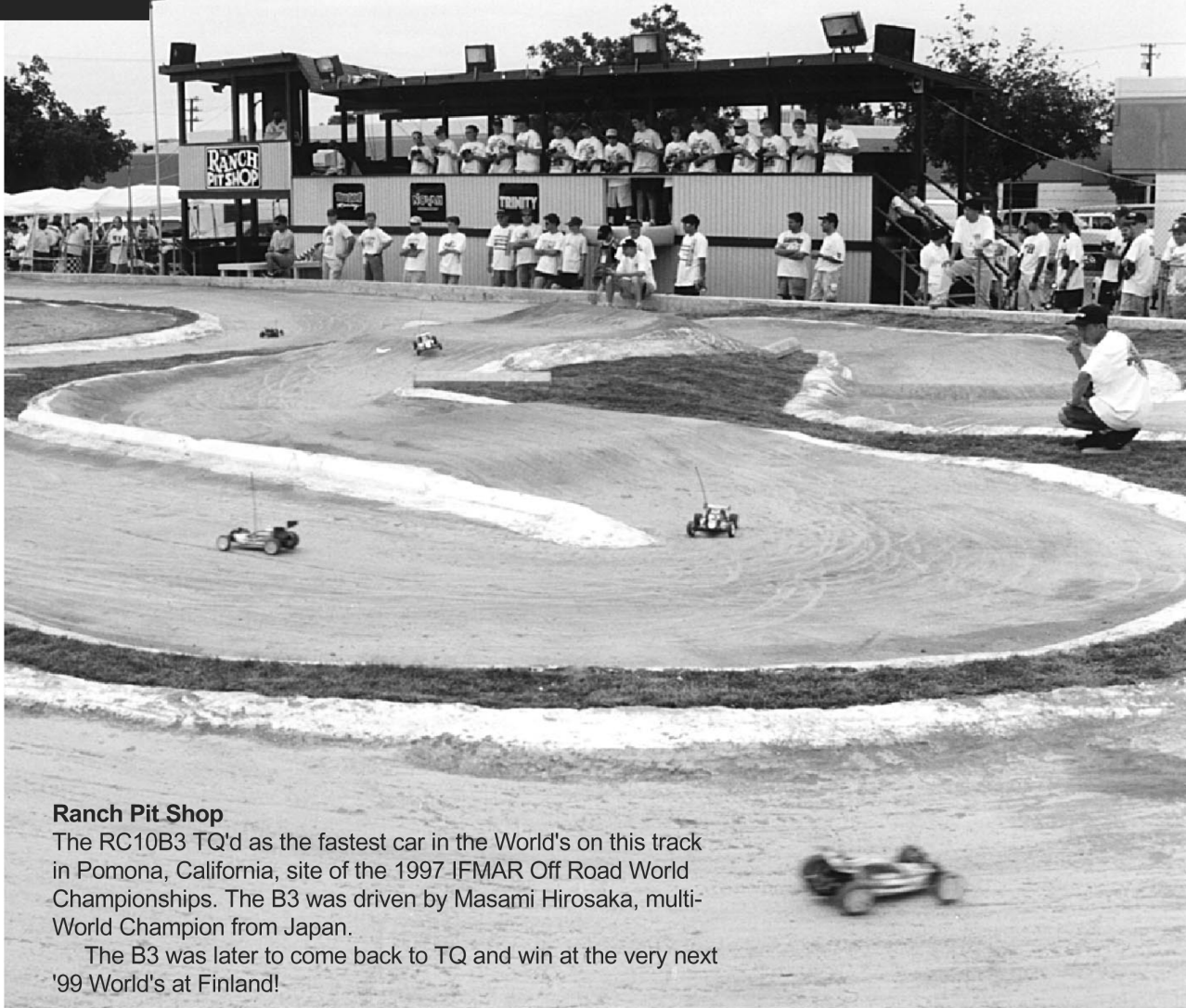
step 7

TURNBUCKLES

- 1 Add #7230 ball cups to two #6263 or 1406* turnbuckles to the dimension shown.
- 2 Pop on the turnbuckles. Do both sides.



PROFILE



Ranch Pit Shop

The RC10B3 TQ'd as the fastest car in the World's on this track in Pomona, California, site of the 1997 IFMAR Off Road World Championships. The B3 was driven by Masami Hirotsuka, multi-World Champion from Japan.

The B3 was later to come back to TQ and win at the very next '99 World's at Finland!

BAG C

REMOVE THESE PARTS FOR:

Steps 1-3



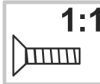
7260, qty 2
4-40 nut



6272, qty 2
dust cover



6273, qty 2
ball end



6292, qty 4
4-40 x 3/8



6299, qty 4
E-clip



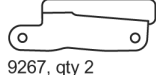
9269, qty 4
5-40 x 1/2



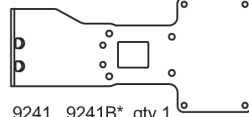
6936, qty 2
#4 washer



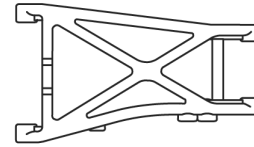
9260, qty 2
rear inner hinge pin



9267, qty 2
rear suspension mount, 3-3
(3° toe-in, 3° anti-squat)

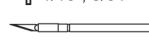
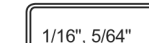
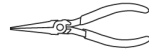
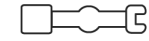


9241, 9241B*, qty 1
rear chassis plate



9257, 9258*, qty pr
rear suspension arm

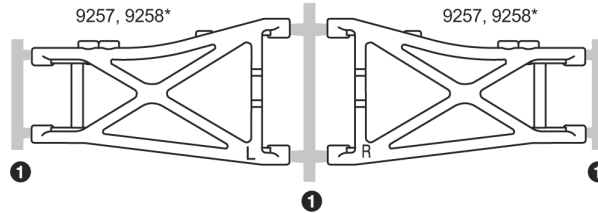
TOOLS USED



step 1

TRIM SUSPENSION ARMS

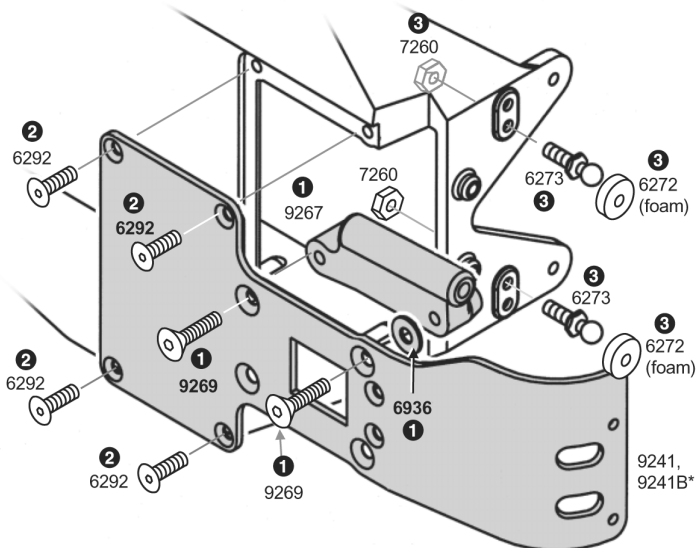
- 1 Twist the #9257 (9258*) suspension arms from the mold runners (shown in gray) with your pliers, and trim away the remaining molding with your hobby knife.



step 2 LEFT SIDE

REAR PLATE TO CHASSIS

- 1 Attach the two #9267 (3-3) rear suspension arm mounts to the #9241 (9241B*) chassis plate with two #9269 5-40 x 1/2 screws and a single #6936 washer as shown. These mounts are marked L3-3 (left) and R3-3 (right). The coding stands for 3° toe in and 3° anti-squat. *NOTE: by using the #4 washer, your anti-squat is effectively reduced to 1.5°.*
- 2 Fasten the chassis plate to the bottom of the chassis with four #6292 screws.
- 3 Add two #6273 ball ends to the inside holes of the chassis, then thread on the #7260 nuts to the ball ends. Then add the #6272 foam dust covers.

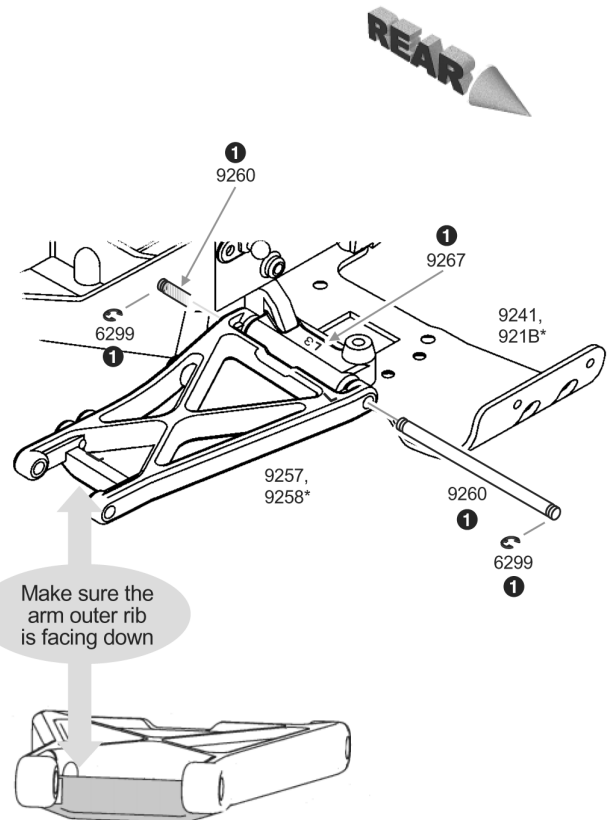


8

step 3 LEFT SIDE

SUSPENSION ARMS TO MOUNTS

- 1 Attach the #9257 (9258*) left suspension arm to the #9267 left mount with the #9260 hinge pin and #6299 E-clips.
- 2 Now do the right side.



BAG D

REMOVE THESE PARTS FOR:

Steps 1-5



6573, qty 2
diff thrust
washer



6574, qty 6
diff thrust
ball



6575, qty 1
T-nut



6575, qty 1
diff thrust bolt
cover, nylon



6575, qty 1
2-56 diff bolt



6581, qty 12
diff balls
carbide



6582, qty 1
diff spring



6588, qty 1
black grease



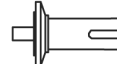
6591, qty 1
diff lube



9365, qty 1
diff gear



9367, qty 2
diff drive ring

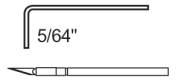


9370, qty 1
left diff
outdrive hub



9375, qty 1
right diff
outdrive hub

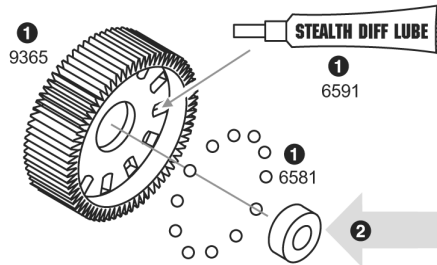
TOOLS USED



step 1

SET UP DIFF GEAR

- 1 Add a generous amount of #6591 diff lube to the #9365 diff gear ball holes and push in the twelve #6581 diff balls. Then push in the lube that was pushed out.
- 2 Insert one #6597 bushing or #6589 bearing into the gear.



TEAM & F.T.



6589, qty 1
5/32 x 5/16
ball bearing

BASIC & SPORT

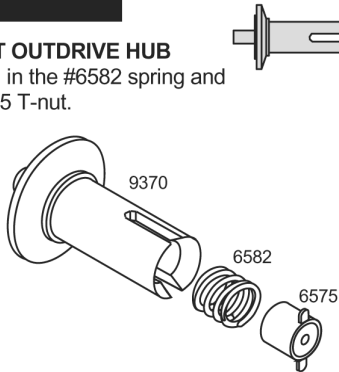


6597, qty 1
5/32 x 5/16
bushing

step 2

LEFT OUTDRIVE HUB

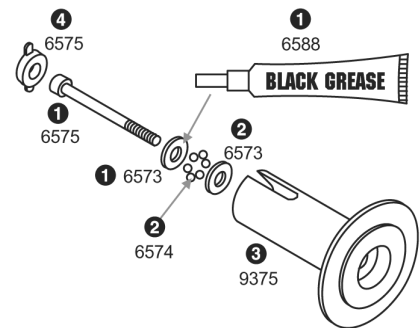
Push in the #6582 spring and #6575 T-nut.



step 3

RIGHT OUTDRIVE HUB

- 1 Slide one #6573 washer onto the #6575 bolt. Apply a generous amount of #6588 black grease to the washer on the side facing away from the bolt head.
- 2 Stick six #6574 balls into the grease against the bolt and washer. Add the other #6573 washer. The grease will hold the balls in place during assembly.
- 3 Slide all this into the #9375 right outdrive hub, being careful not to lose any of the balls.
- 4 Insert the #6575 bolt cover.



step 4

RIGHT OUTDRIVE HUB

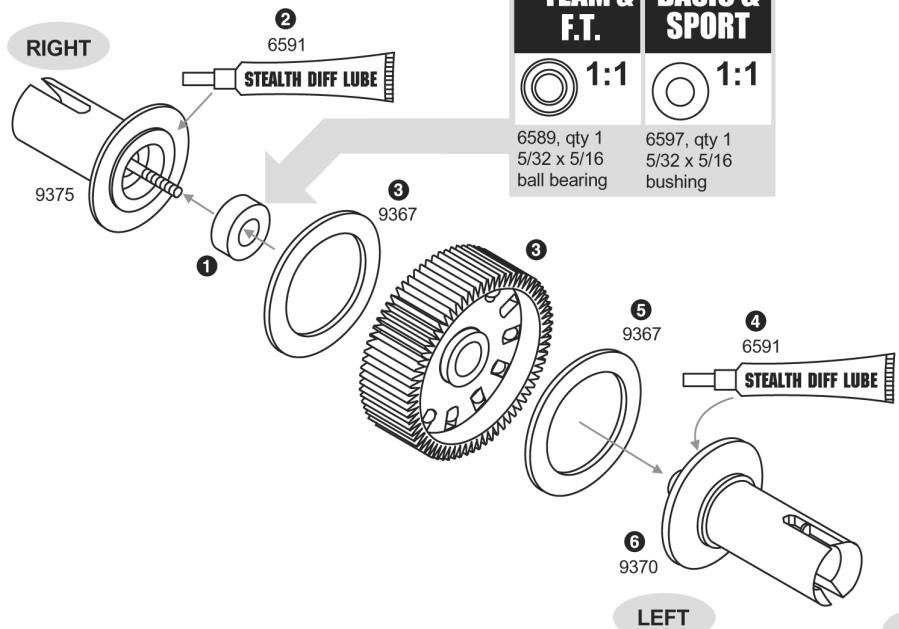
- 1 Insert one #6597 bushing or #6589 bearing into the #9375 right hub.
- 2 Add a **light** coat of #6591 diff lube to right hub where shown.
- 3 Place a #9367 diff drive ring and then the gear assembly on the hub.

ASSEMBLE THE HUBS

- 4 Add a **light** coat of #6591 diff lube to left hub where shown.
- 5 Place a #9367 diff drive ring on the hub.
- 6 Push the #9370 hub over the diff bolt and center the hub.

CHECK ALIGNMENT OF HUBS

- 7 Tighten the diff with your 5/64" Allen wrench, but not completely.
- 8 Rotate the diff hubs several times as you are tightening the bolt to check for proper alignment of the parts.
- 9 We'll adjust the diff on the next page.



TEAM & F.T.



6589, qty 1
5/32 x 5/16
ball bearing

BASIC & SPORT



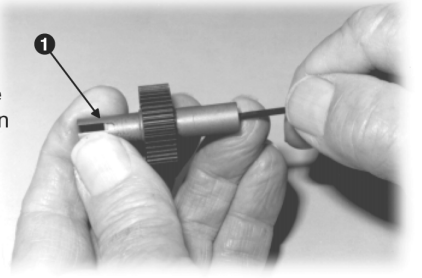
6597, qty 1
5/32 x 5/16
bushing

step 5

ADJUST THE DIFFERENTIAL

1 As you tighten the diff bolt, you will notice the T-nut ears moving closer to the bottom of the diff hub slot. This compresses the spring behind the T-nut. The spring should be fully compressed at the same time the T-nut reaches the end of the slot. **Caution:** Pay close attention to feeling when

the spring is fully compressed. **Do not overtighten the bolt.** When you feel the spring fully compressed, loosen the diff bolt 1/8 of a turn. No more, no less. Your diff should now operate very smoothly when turning the hubs in opposite directions. After you have driven the car once, recheck the diff adjustment. Never adjust the diff any other way.



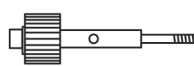
BAG D

REMOVE THESE PARTS FOR:

Steps 6-7



6292, 6934*, qty 1
4-40 x 3/8



6571, qty 1
drive shaft/gear



6572, qty 1
drive shaft
roll pin



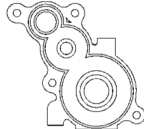
6928, 6935*, qty 3
4-40 x 1



7669, qty 2
drive shaft
spacer



9352, qty 1
right tranny case



9352, qty 1
left tranny case



9360, qty 1
idler gear

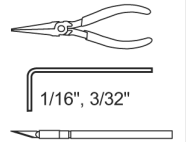


9361, qty 1
idler gear shaft



7337, qty 3
washer, gold

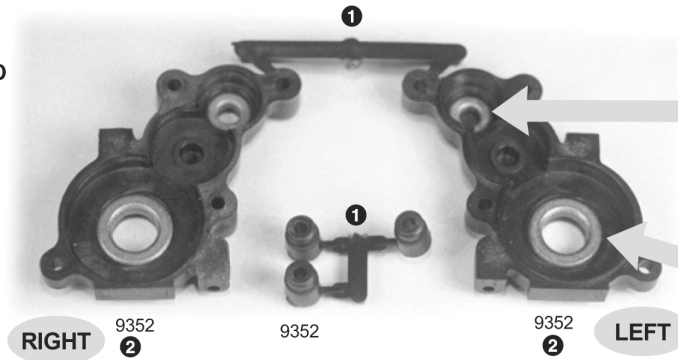
TOOLS USED



step 6

ADD BUSHINGS OR BEARINGS TO THE CASE HALVES

- 1 Cut the two #9352 transmission case halves and the three #9352 spacers from the runner.
- 2 Add bushings or bearings to each case half.



TEAM & F.T.



3977, qty 2
3/16 x 3/8
unflanged bearing



3976, qty 2
3/8 x 5/8
unflanged bearing

BASIC & SPORT



6599, qty 2
3/16 x 3/8
bushing



6598, qty 2
3/8 x 5/8
bushing

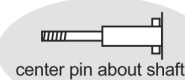
step 7

INSIDE THE TRANNNY

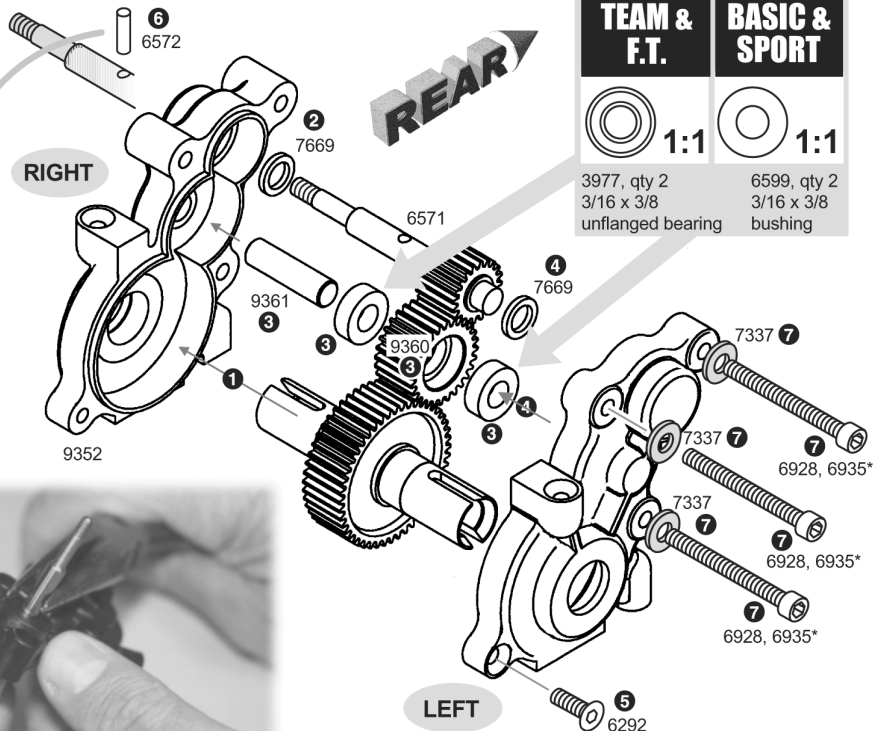
- 1 Install the right side diff assembly into the right case. (Page 9, Step 3 will show you which diff hub is the right side.)
- 2 Add the #7669 spacer to the #6571 drive shaft and put both into the case.
- 3 Install the two bushings or bearings in the #9360 gear, followed by the #9361 shaft. Insert the assembly into the case.
- 4 Add the other #7669 spacer to the #6571 shaft and put the case halves together.

OUTSIDE THE TRANNNY

- 5 Screw the halves together with one #6292 (6934*) bolt.
- 6 Insert the #6572 roll pin into the shaft hole with your needlenose pliers.
- 7 Push the three #6928 (6935*) bolts through, each with its own #7337 washer.



center pin about shaft



TEAM & F.T.



3977, qty 2
3/16 x 3/8
unflanged bearing

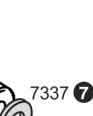


3976, qty 2
3/8 x 5/8
unflanged bearing

BASIC & SPORT



6599, qty 2
3/16 x 3/8
bushing

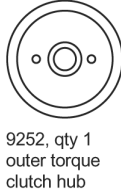
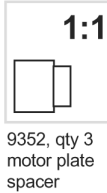
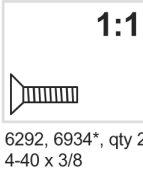


6598, qty 2
3/8 x 5/8
bushing

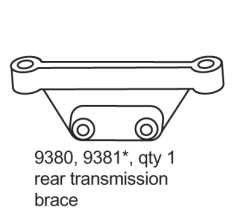
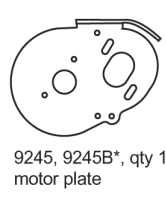
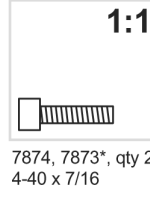
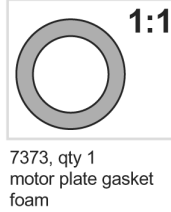
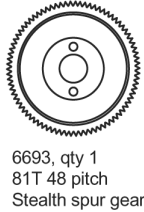
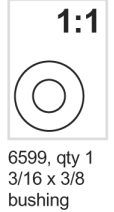
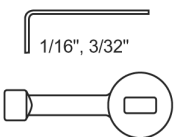
BAG D

REMOVE THESE PARTS FOR:

Steps 8-11



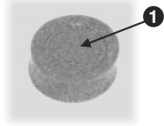
TOOLS USED



step 8

REMOVE THE BACKING

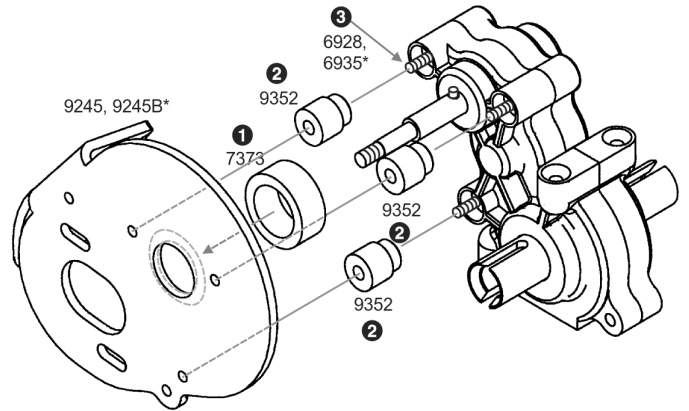
- 1 Remove the backing and center from the #7373 gasket.



step 9

INSTALL THE MOTOR PLATE

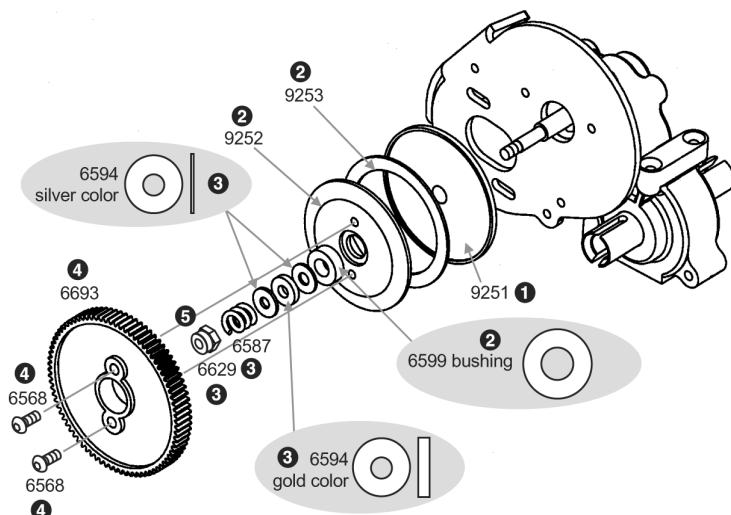
- 1 Center the #7373 gasket around the large round hole of the 9245 (9245B*) plate.
- 2 Install the three #9352 spacers.
- 3 Line up the #9245 (9245B*) plate and fasten with the three #6928 (6935*) screws.



step 10

INSTALL THE ASSOCIATED TORQUE CLUTCH (ATC)

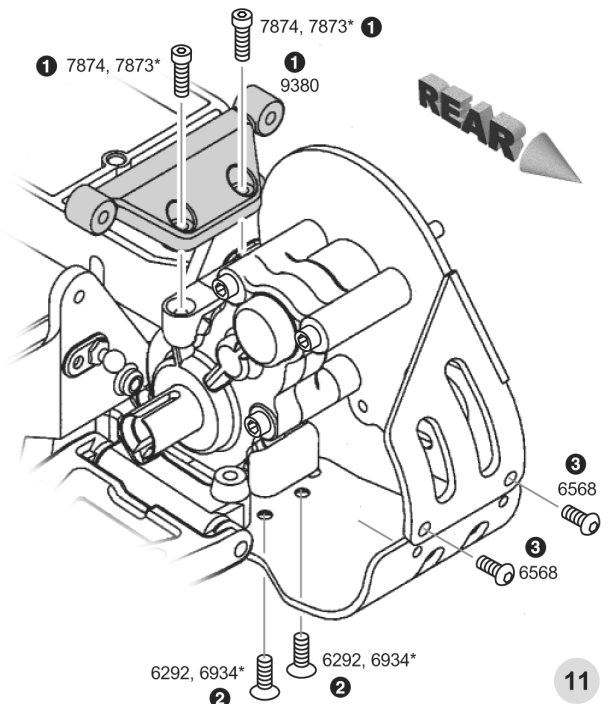
- 1 Add the #9251 inner hub to the shaft, lining up the notch with the roll pin.
- 2 Install the #9253 clutch disc into the inner hub, then add the #9252 outer hub and #6599 bushing.
- 3 Install parts in the following order: #6594 (thin), 6594 (thick), 6594 (thin), 6587 black spring, 6629 locknut.
- 4 Orient the #6693 spur gear side facing out as shown and mount to #9252 with two #6568 screws.
- 5 Tighten the #6629 locknut so the end of the shaft is flush with the end of the nut. This is a good initial adjustment. For further info on the torque clutch, see the tuning section on page 27.



step 11 LEFT SIDE

MOUNT THE TRANSMISSION

- 1 Mount the #9380 brace with two #7874 (7873*) screws.
- 2 Mount the tranny with the two #6292 (6934*) screws from below, lining up the motor plate holes as shown.
- 3 Bolt the motor plate to the rear chassis with two #6568 screws.



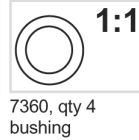
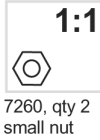
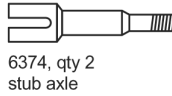
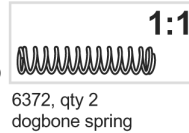
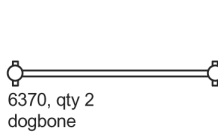
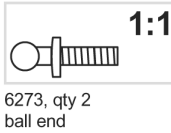
BASIC & SPORT KITS ONLY

BAG E

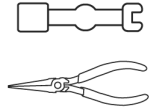
REMOVE THESE PARTS FOR:

Basic: step 1

Sport: step 1

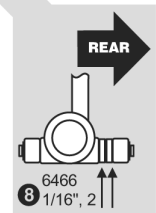
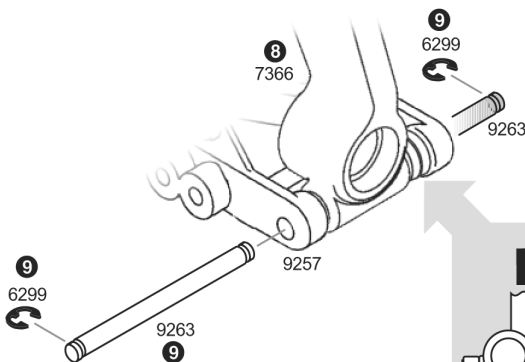
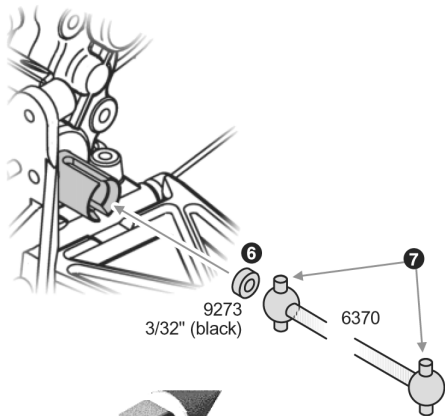


TOOLS USED



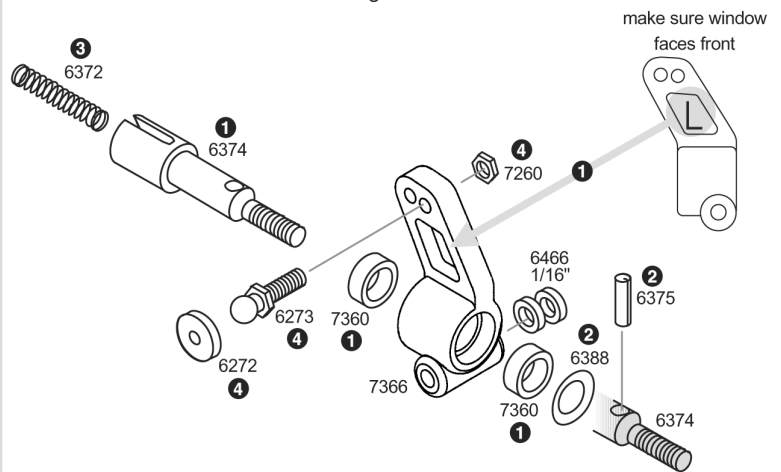
step 1 LEFT SIDE

BASIC & SPORT KITS ONLY



ASSEMBLE REAR HUB CARRIERS

- Note that the #7366 hub carriers are marked for left and right. Insert #7360 bushings into each side of the left hub carrier. Install the #6374 stub axle as shown.
- Insert #6388 cone washer, raised outer edges facing out. Add #6375 roll pin.
- Insert the #6372 spring into the stub axle.
- Thread on the #6273 ball end and add the #7260 nut to the other side. (When you do the other hub carrier, thread the ball end into the other side so both will point to the front when assembled.) Add a #6272 dust cover to the ball end.
- Follow the above for the right hub carrier.



HUB CARRIERS TO REAR ARMS

- (Upper left drawing:) Push the #9273 spacer into the outdrive of the transmission.
- (Upper left drawing:) Insert the dogbone pins into the stub axle and outdrive hub as shown.
- Place the hub carrier between the arm holes as shown and add two #6466 spacers where shown.
- Add one #6299 E-clip to the end of the #9263 hinge pin, insert it as shown, then add the other #6299 E-clip.
- Now install the axle assembly for the right side.

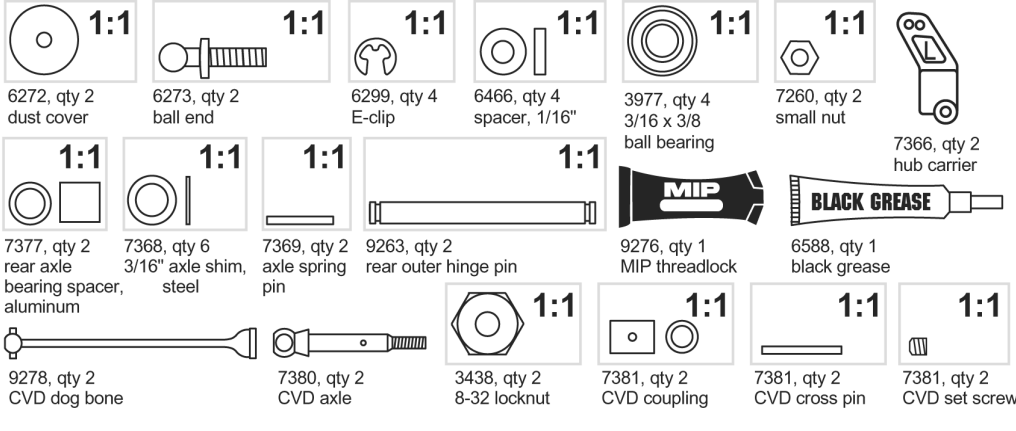
TEAM & FACTORY TEAM KITS ONLY

BAG E

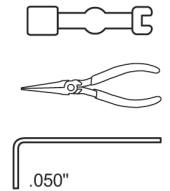
REMOVE THESE PARTS FOR:

Team: step 1

Factory Team: step 1



TOOLS USED

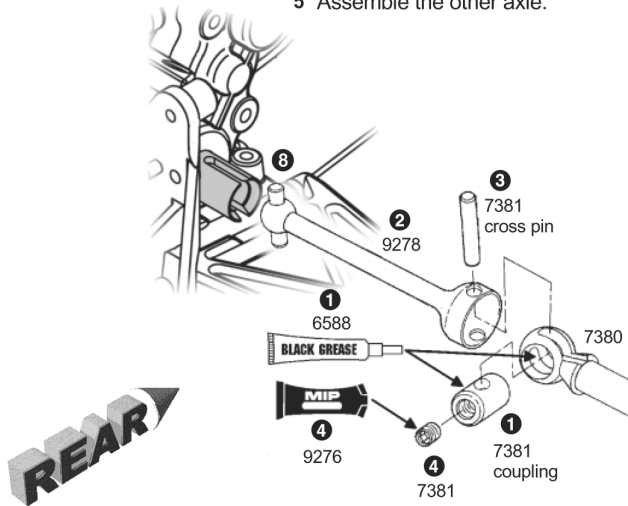


step 1 LEFT SIDE

TEAM & FACTORY TEAM KITS ONLY

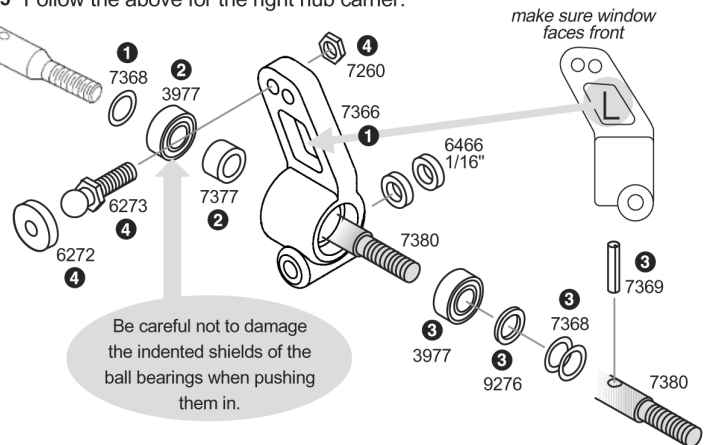
ASSEMBLE THE #9276 MIP CVD™ (Constant Velocity Drive™)

- 1 Spread some Associated #6588 black grease inside the #7380 axle hole where shown, then on the #7381 coupling, and insert the coupling into the axle.
- 2 Slide the axle into the #9278 dogbone, aligning the cross holes.
- 3 Insert the #7381 cross pin, making sure it is evenly spaced on both sides of the #9278 bone.
- 4 Add the #9276 MIP thread lock to the #7381 set screw. Angle and turn the MIP CVD™ so the set screw can be screwed in with the Allen wrench.
- 5 Assemble the other axle.



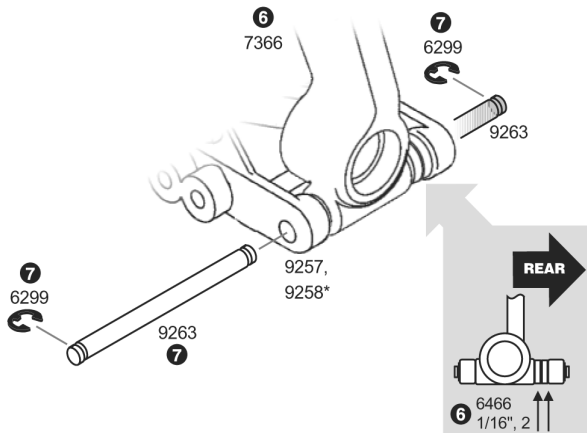
REAR HUB CARRIERS

- 1 Note that the #7366 hub carriers are marked left and right. Slide one of the thin #7368 3/16" axle shims onto the axle.
- 2 Install one #3977 bearing, then the #7377 bearing spacer. **NOTE: You MUST use the bearing spacer.** Slide the axle assembly into the hub carrier from the rear.
- 3 Install the second #3977 bearing into hub carrier and onto the axle, followed by the #9276 thick spacer and two #7368 thin spacers. Insert the #7369 roll pin into axle.
- 4 Thread on the #6273 ball end into the hole shown and add the #7260 nut to the other side. (When you do the other hub carrier, thread the ball end into the other side so both ball ends will point to the front when assembled.) Add a #6272 dust cover to the ball end.
- 5 Follow the above for the right hub carrier.



HUB CARRIERS TO REAR ARMS

- 6 Place the left hub carrier between the arm holes as shown and add two #6466 spacers where shown.
- 7 Add a #6299 E-clip to the #9263 hinge pin insert it as shown, then add an E-clip at the other end of the hinge pin.
- 8 Insert the universal dog bone into the slots of the outdrive hub.
- 9 Now install the axle assembly for the right side.



ALL KITS

BAG E

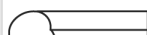
REMOVE THESE PARTS FOR:

Steps 2-3



1:1

6262, 1403*, qty 2
1.65" turnbuckle



1:1

7230, qty 4
large ball cup



1:1

7260, qty 2
4-40 nut



1:1

7413, qty 2
4-40 x 3/4



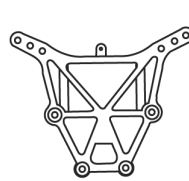
1:1

6292, 6934*, qty 2
4-40 x 3/8

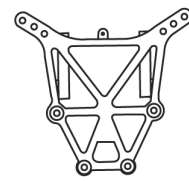


1:1

6915, qty 2
4-40 x 5/8

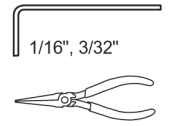


TEAM & F.T. ONLY
9279, 9280*, qty 1
rear shock tower



BASIC & SPORT ONLY
9270, qty 1
rear shock tower

TOOLS USED

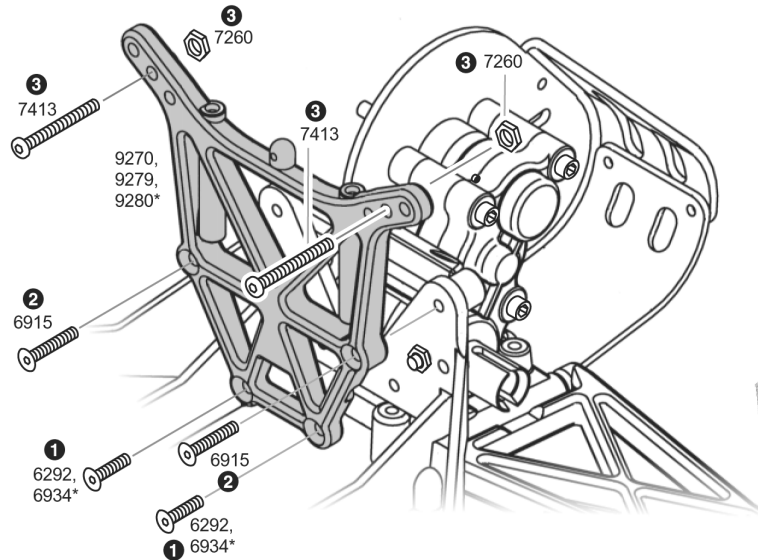


1/16", 3/32"

step 2 LEFT SIDE

MOUNT THE REAR SHOCK TOWER

- 1 Orient the tower outward as shown and mount to bulkhead with #6292 (6934*) screws.
- 2 Fasten the tower to the transmission brace with the #6915 screws.
- 3 Add two #7413 screws in the middle holes at top, then thread on #7260 nuts.

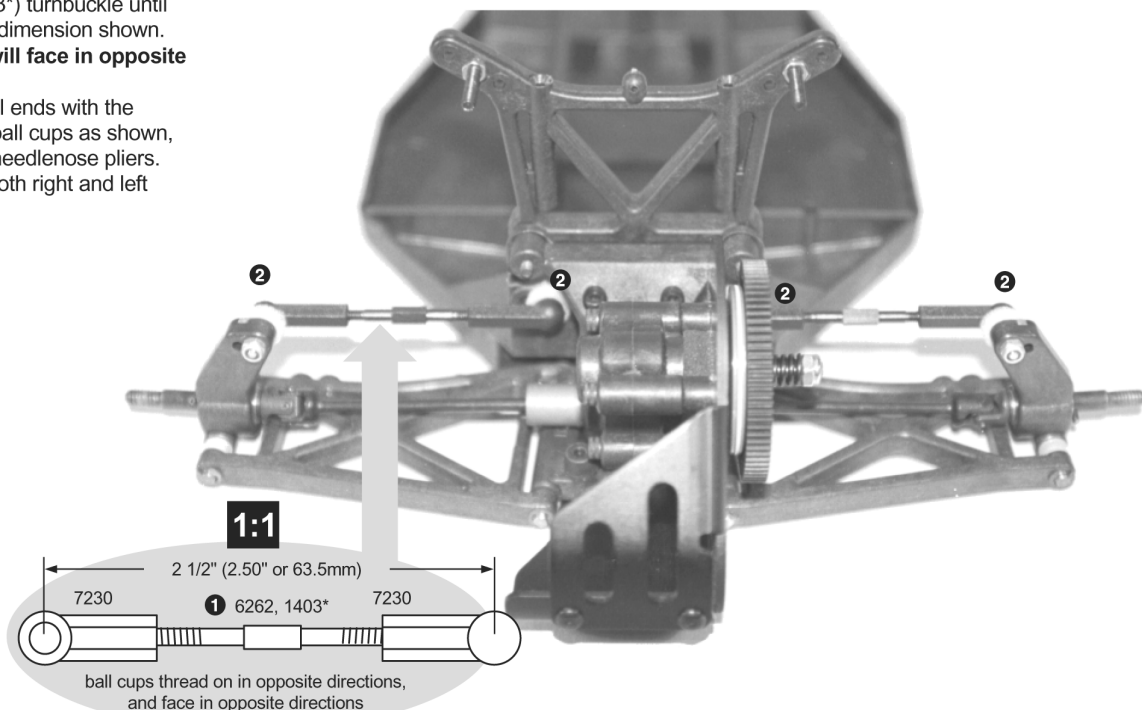


step 3 REAR VIEW

COMPLETED REAR ASSEMBLY

ADD TURNBUCKLES



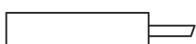



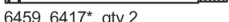
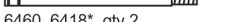




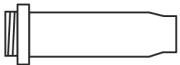
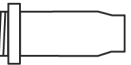



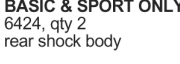
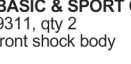
- 1 Twist #7230 ball cups onto the #6262 (1403*) turnbuckle until you get the dimension shown. **Ball cups will face in opposite directions.**
- 2 Connect ball ends with the turnbuckle ball cups as shown, using your needlenose pliers. Assemble both right and left sides.



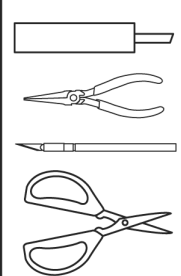
BAG F

REMOVE THESE PARTS FOR:

Steps 1-4

 1:1 5407, qty 8 red O-ring	 1:1 6299, qty 8 E-clip	 6429, qty 1 shock assembly tool	 1:1 6440, qty 4 split locking washer	 1:1 6440, qty 8 small washer	 1:1 6440, qty 4 large spacer	 6459, 6417*, qty 2 rear shock shaft  6460, 6418*, qty 2 front shock shaft
 1:1 6465, qty 2 shock piston #1	 1:1 6465, qty 2 shock piston #2	 6428, qty 4 shock cap	 1:1 6469, qty 4 large O-ring	 TEAM & F.T. ONLY 6435, qty 2 rear shock body	 TEAM & F.T. ONLY 9310, qty 2 front shock body	
 1:1 7217, qty 4 pivot ball plastic	 7217, qty 4 eyelet nylon	 5428, qty 1 25 wt silicone oil		 BASIC & SPORT ONLY 6424, qty 2 rear shock body	 BASIC & SPORT ONLY 9311, qty 2 front shock body	

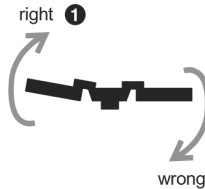
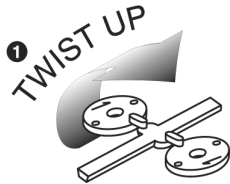
TOOLS USED



step 1

TRIM SHOCK PISTONS

- 1 Burrs interfere with smooth shock action within the shock body. To remove from tree without creating burrs, twist up, not down. Remove two each of #1 and #2.
- 2 Remove remaining burrs carefully with hobby knife.



TRIM SHOCK WASHERS & SPACERS

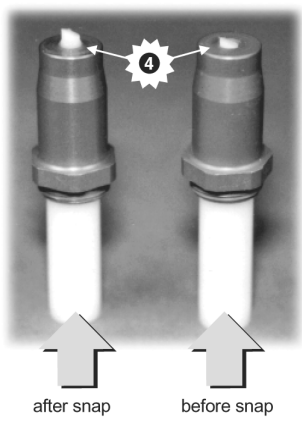
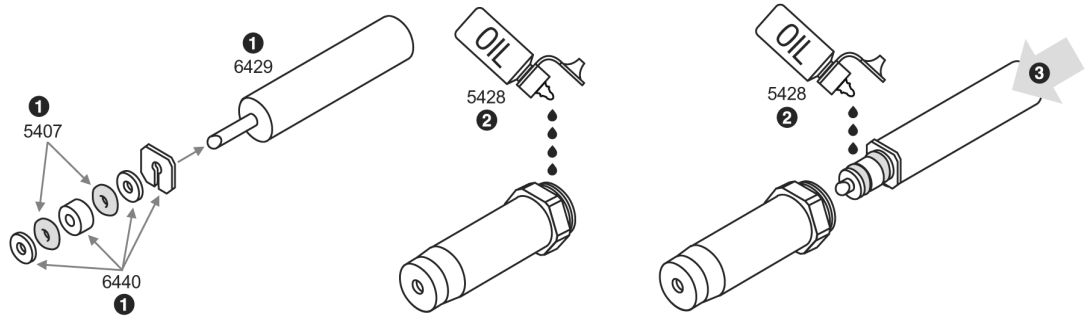
- 3 For best shock performance, trim each part from the parts tree so no part of the two molding runners remain. It is safer to remove a tiny amount of the part than to risk the chance of a burr remaining. Short blade scissors or a hobby knife will work fine, as shown at right. Run your finger over the edges to feel for burrs you cannot see. Remove the ones you find. Burrs can keep the parts from snapping in correctly, and can cause the shock to leak or the shaft to jam.



step 2

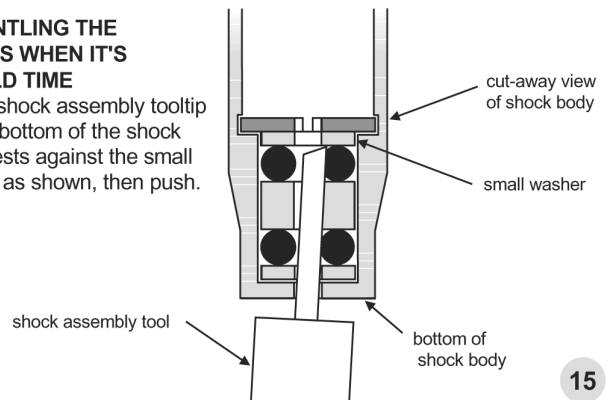
SHOCK SEAL PARTS

- 1 Install the #5407 and #6440 parts shown onto the #6429 tool tip.
- 2 Add 3-4 drops of #5428 oil to the inside of the shock body, and to the shock seal parts.
- 3 Insert the tool tip into the shock body all the way. Push **easily** until the parts snap into place.
- 4 Check the tool height in photo. The right shock shows just before snapping parts in place, the left shows after.
- 5 If your shocks do not snap together easily, check the parts for burrs again.
- 6 Assemble the other shock bodies the same.



DISMANTLING THE SHOCKS WHEN IT'S REBUILD TIME

Put the shock assembly tooltip into the bottom of the shock until it rests against the small washer, as shown, then push.



step 3

FINAL INTERNAL SHOCK ASSEMBLY

- 1 Add #6469 O-ring over threads of shock body.
- 2 For the #6460 (6418*) front shock shafts, install a #6299 E-clip on either side of a #6465 (#2) piston.
For the #6459 (6417*) rear shock shafts, install a #6299 E-clip on either side of a #6465 (#1) piston.
- 3 Place a couple drops of #5428 oil on threaded part of shaft and insert into shock body.
- 4 Push the #7217 pivot ball and eyelet together, then screw the eyelets onto the end of the shock shaft. Hold shaft with rag and needlenose pliers next to threads.

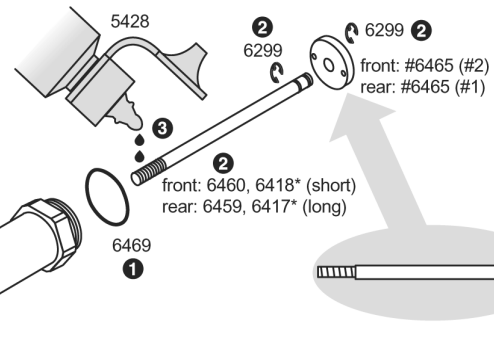
FOR BASIC & SPORT

front: 9311 gold (short)
rear: 6424 gold (long)

FOR TEAM & F.T. ONLY

front: 9310 (short)
rear: 6435 (long)

4
7217
4
7217



step 4

FILLING THE SHOCKS

- 1 Holding the shocks upright, fill with oil to the top of the shock body.
- 2 Slowly move the shaft up and down several times to allow air bubbles to escape to the top.
- 3 Refill with oil to the top of the shock body.
- 4 Push the shaft in until the piston is level with top of shock body. The oil will slightly bulge up above the shock body.
- 5 Install the #6428 shock cap and tighten. There should be no gap between the cap and the hex portion of the shock body when tight.

SETTING THE REBOUND

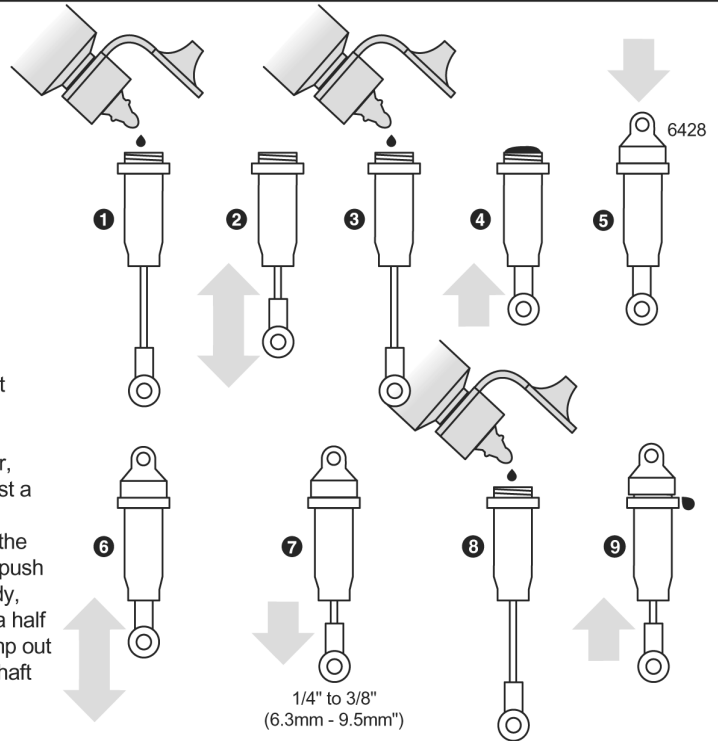
- 6 Move the shock shaft in and out a few times and then push it all the way in. It should be easy to push the shaft in until the eyelet hits the body.

7 Then the shaft should push itself out approximately 1/4" to 3/8" (6.3mm - 9.5mm").

8 If the shocks do not push out this far, there is not enough oil in them. Add just a little oil and try steps 6-7 again.

9 If the shocks push out farther than the distance in step seven, or you cannot push the shaft in until the eyelet hits the body, there is too much oil. Loosen the cap a half turn (with the shaft extended) and pump out a small amount of oil by pushing the shaft in. Retighten the cap and try steps 6-7 again.

5
HOW TO
TIGHTEN
THE CAP
ON YOUR
SHOCK



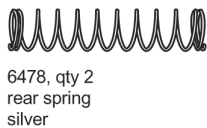
BAG F

REMOVE THESE PARTS FOR:

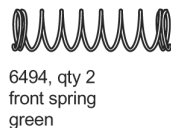
Step 5



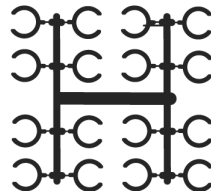
6474, qty 4
spring collar



6478, qty 2
rear spring
silver



6494, qty 2
front spring
green



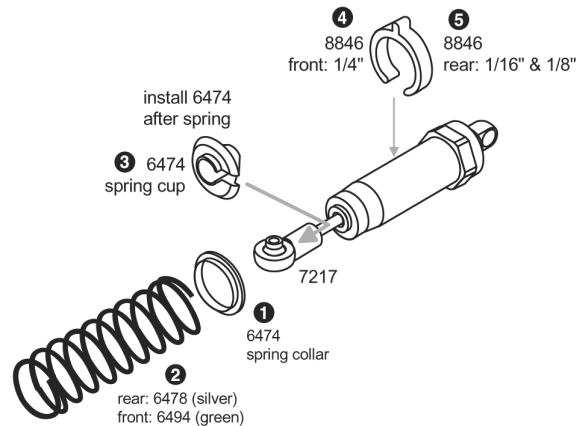
8846, qty 6
preload spacer



step 5

FINAL SHOCK ASSEMBLY

- 1 Install one #6474 spring collar onto the shock body.
- 2 Install the correct spring for front and back shocks.
- 3 Pull the shock shaft out as far as it will go, compress the spring, then insert the #6474 spring cup over the #7217 eyelet.
- 4 Twist two 1/4" thick #8846 preload spacers from the tree. For the front shocks, slide a preload spacer between the spring collar and shock body hex.
- 5 Twist two 1/16" and 1/8" thick preload spacers off the tree. Slide them onto the rear shocks between the spring collar and shock body hex.



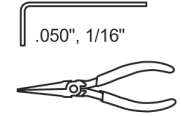
BAG G

REMOVE THESE PARTS FOR:

Step 2



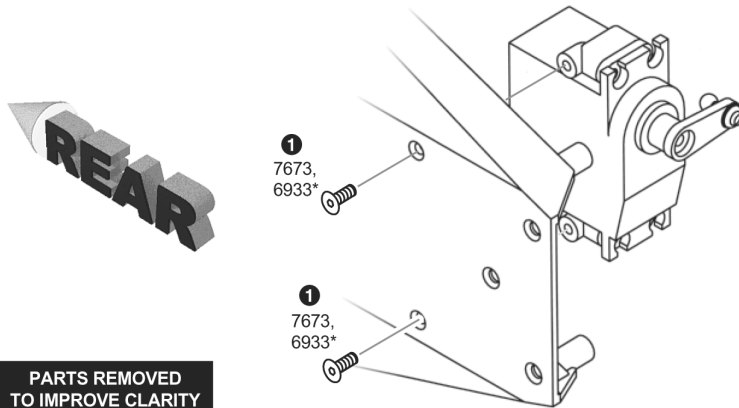
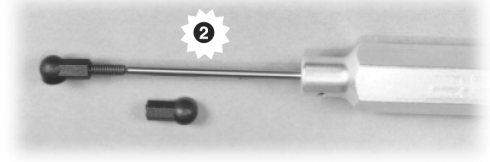
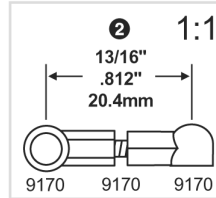
TOOLS USED



step 2 RIGHT SIDE

MOUNT THE SERVO

- Mount the servo with two #7673 (6933*) screws.
- Assemble the #9170 servo link, matching the length to the true scale drawing.
- Use needle-nose pliers to attach link to ball ends.



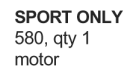
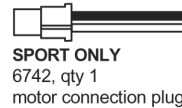
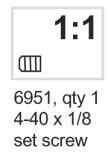
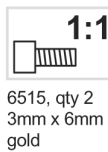
PARTS REMOVED TO IMPROVE CLARITY



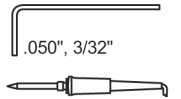
BAG G

REMOVE THESE PARTS FOR:

Step 3



TOOLS USED



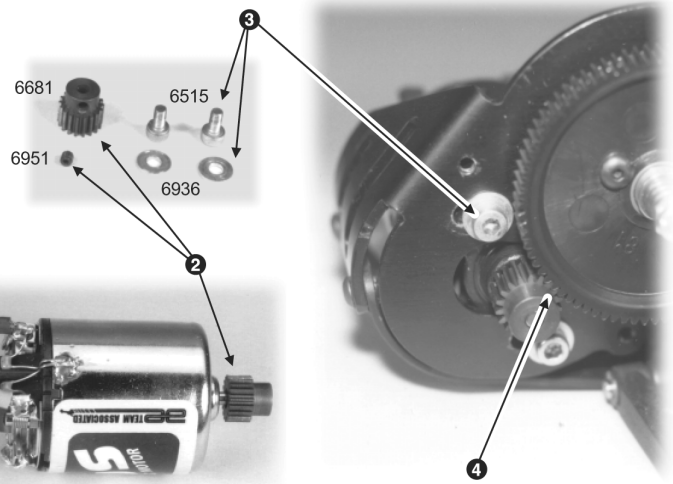
step 3 RIGHT SIDE

INSTALL THE MOTOR

- Attach three capacitors to your motor according to the instructions that came with your motor, if they are not on already. For the **Sport kit**, solder the colored plug wire to a positive tab on the motor and the black wire to a negative tab. For the **Basic, Team & Factory Team kits**, you must buy your own motor, then follow this step.
- Install the #6681 gear with the #6951 set screw going to the flat side of the shaft. For the **Basic, Team & Factory Team kits**, you must buy your own pinion gear. If you use an electronic speed control, see its directions for installing motor capacitors.
- Use two #6515 screws and two #6936 washers to mount the motor as shown so the gears mesh.

SET THE GEAR MESH

- You should be able to rock the spur gear back and forth in the teeth of the pinion gear without making the pinion gear move. If the plastic gear is tight, then loosen the #6515 screws and move the motor away, then try again. A gear mesh that is too tight or too loose will reduce power and damage the gear



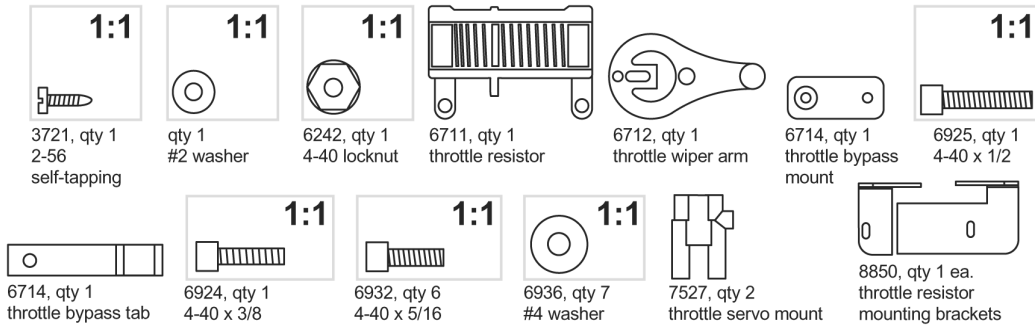
REAR

SPORT KIT ONLY

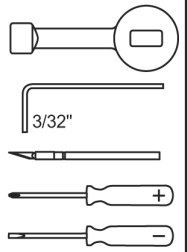
BAG G

REMOVE THESE PARTS FOR:

Sport: steps 4-6



TOOLS USED



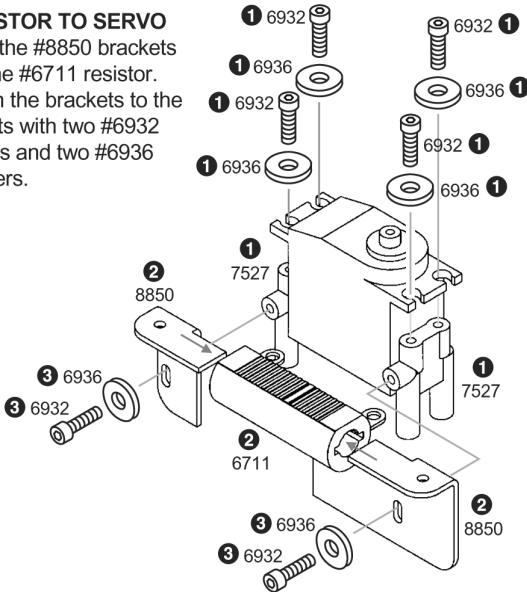
step 4

MOUNTS TO SERVO

- 1 Attach the #7527 mounts to the servo with four #6932 screws and four #6936 washers. Orient your servo output shaft as shown here.

RESISTOR TO SERVO

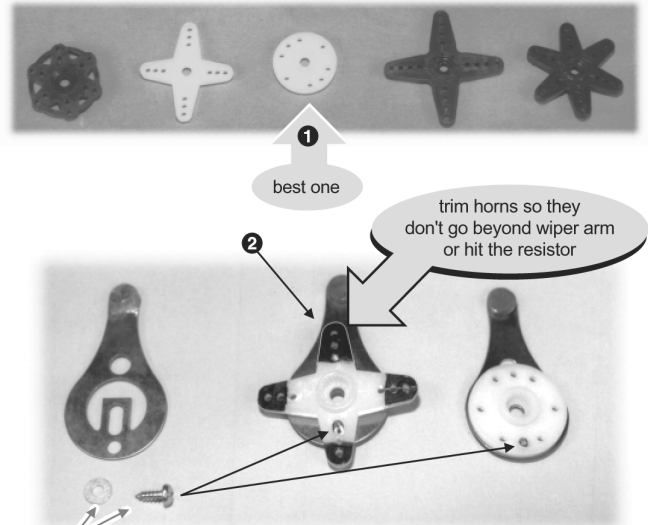
- 2 Push the #8850 brackets into the #6711 resistor.
- 3 Attach the brackets to the mounts with two #6932 screws and two #6936 washers.



step 5

MODIFY THE SERVO HORN

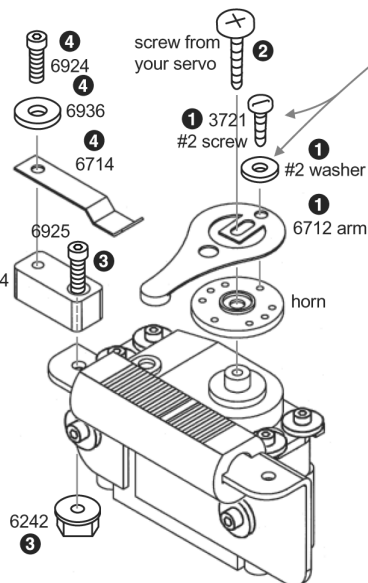
- 1 There are many servo horns available. The round one is the best one.
- 2 You must modify the horn if you are not using the round one. Trim them so they don't go beyond the #6712 throttle wiper arm outer edge. Also trim so it will clear the resistor.



step 6

FINAL RESISTOR/ SERVO ASSEMBLY

- 1 Attach the #6712 arm to the horn with the #3721 screw and #2 washer. Mount the arm and horn to the servo with the screw from your servo.
- 2 Trim the #3721 screw tip if it contacts the servo body.
- 3 Add the #6714 mount using #6925 screw and #6242 locknut. Add the #6714 bypass tab to the #6714 mount with a #6924 screw and #6936 washer.
- 4



ASSEMBLED THROTTLE ARM AND RESISTOR

SPORT KIT ONLY

BAG G

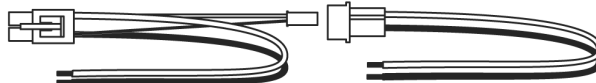
REMOVE THESE PARTS FOR:

Sport: steps 7-9

1:1

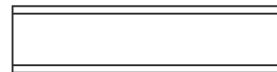


6917, qty 2
4-40 x 3/8



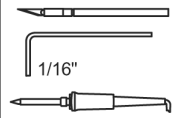
6747, qty 1
battery input harness

6745, qty 1
motor output harness



qty 1
servo tape
(roll, #6726)

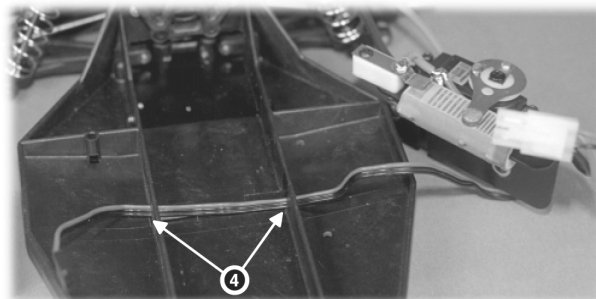
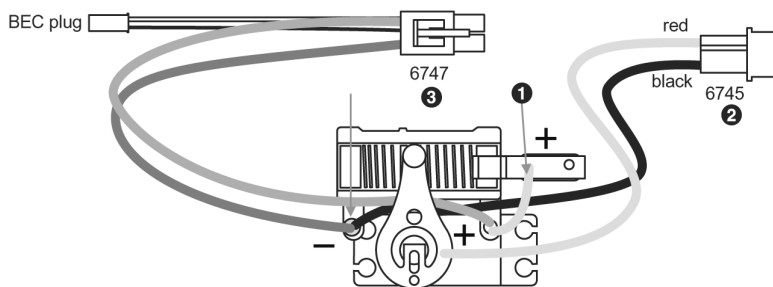
TOOLS USED



step 7

WIRE THE RESISTOR

- 1 Solder the short red wire between the positive resistor tab and the brass bypass tab.
- 2 Solder the #6745 harness wires to the wiper arm and negative tab on the resistor.
- 3 Solder the #6747 harness to the positive and negative tabs on the resistor.
- 4 Run the wire of the servo attached to the resistor through the battery slot area.

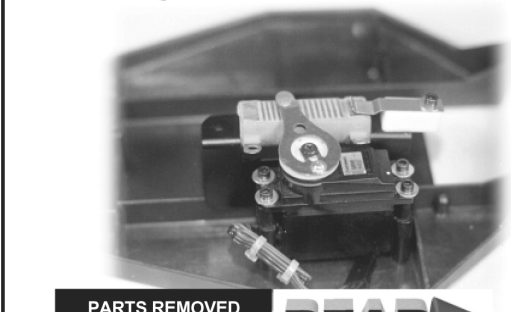
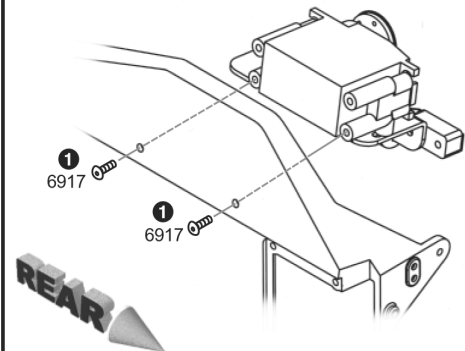


PARTS REMOVED
TO IMPROVE CLARITY

step 8 LEFT SIDE

SPEED CONTROL TO CHASSIS

- 1 Attach speed control to chassis with two #6917 screws from the bottom.



PARTS REMOVED
TO IMPROVE CLARITY

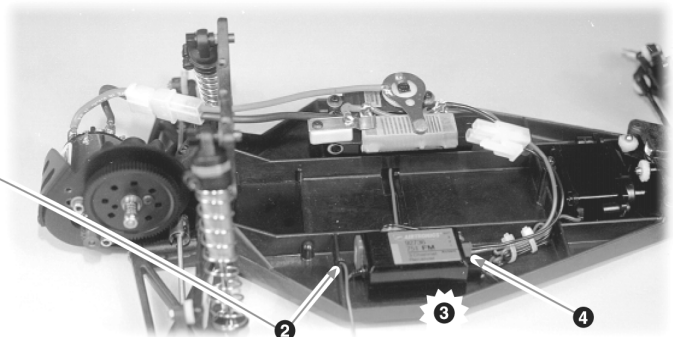
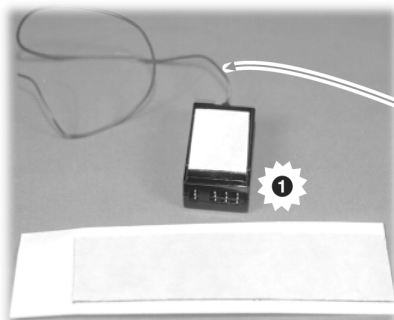
REAR

ALL KITS

step 9 LEFT SIDE

RADIO RECEIVER TO CHASSIS

- 1 Cut a piece of servo tape, remove the paper from one side, and attach it to the bottom of your receiver.
- 2 Slip the receiver wire through the built-in chassis antenna mount.
- 3 Remove the paper from the other side and attach to the chassis as shown.
- 4 Plug the small #6747 BEC plug (of step 7) into the receiver's on/off switch.
- 5 Follow the instructions that accompany your radio receiver system.

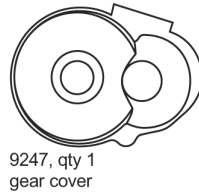
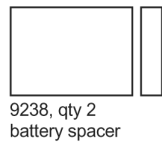
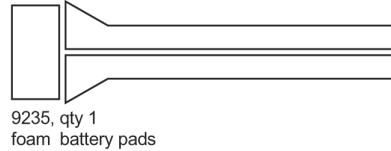
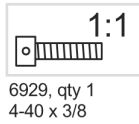
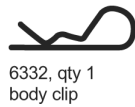
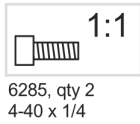


REAR

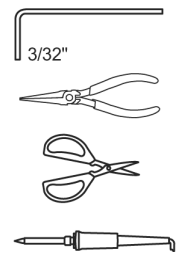
BAG H

REMOVE THESE PARTS FOR:

Steps 1-2



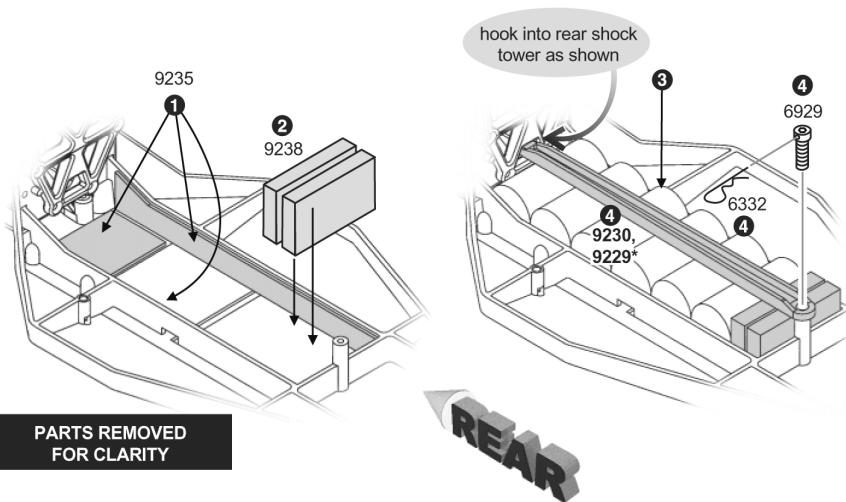
TOOLS USED



step 1 LEFT SIDE

INSTALLING THE BATTERY PACK

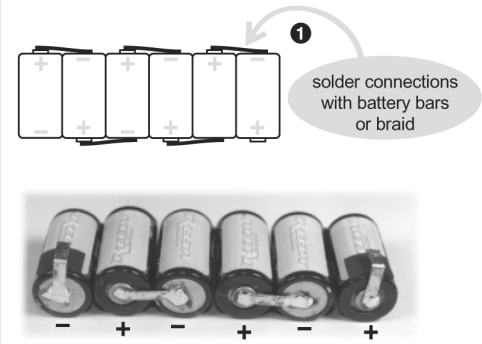
- 1 Install the three #9235 foam battery pads.
- 2 Install the two #9238 foam battery spacers. (The tuning section will show you how to adjust your steering or traction by moving these spacers.)
- 3 Install your battery pack. (See step 5 if you need to assemble it first.)
- 4 Thread on the #6929 screw. Aim the body clip hole across the chassis. Add the #9230 (9229*) battery hold down strap. Adjust the screw so the batteries are held tight, but you are still able to push the #6332 body clip through the screw.



PARTS REMOVED FOR CLARITY

SOLDERING INDIVIDUAL CELLS

- 1 Solder connections properly to assemble a battery pack from individual cells.
TIP: Team racers prefer battery bars or braid for sturdier connections. Insulated wire will not allow the pack to fit in the battery slot.



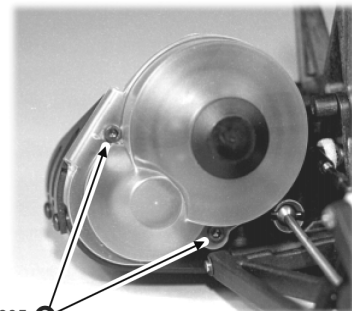
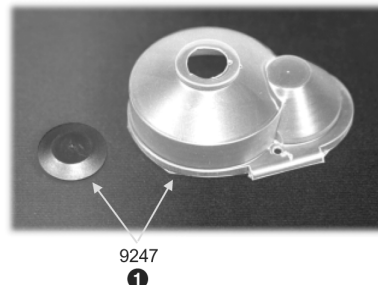
REAR →

BATTERY PRODUCTS ARE NOT INCLUDED IN KIT

step 2 RIGHT SIDE

GEAR COVER

- 1 Trim the #9247 gear cover, cutting out three holes shown. Insert the #9247 insert button into the large hole cut into the gear cover.
- 2 Mount the cover with two #6285 screws.



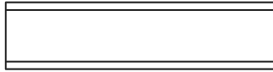
6285 2

← **REAR**

BAG H

REMOVE THESE PARTS FOR:

Step 3



qty 1
servo tape

TOOLS USED

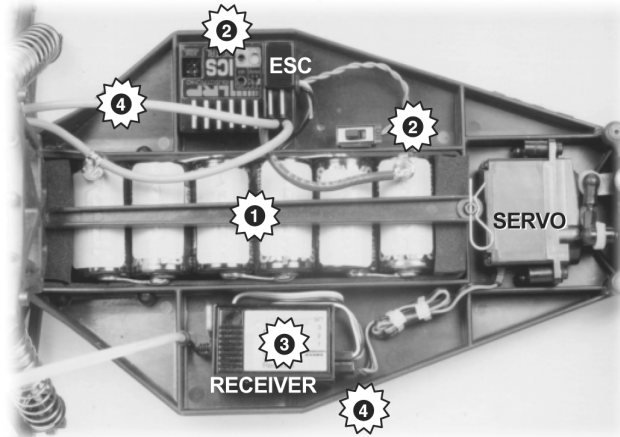


step 3

RADIO AND RECEIVER INSTALLATION

- 1 Install your battery pack as shown. If you need to assemble the battery, see step 1 #5 on page 21.
- 2 Cut a piece of servo tape and use it to attach your ESC and switch where shown.
- 3 Cut a piece of servo tape and use it to attach your receiver where shown.
- 4 Connect the ESC and steering servo to your receiver according to your radio or ESC instructions, then connect the motor to your ESC.


← REAR




BAG H

REMOVE THESE PARTS FOR:

Step 4


6338, qty 1
antenna tube cap

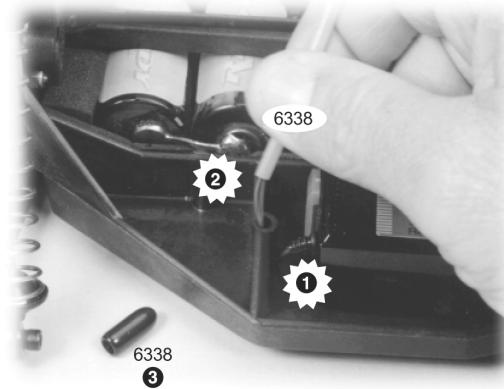

6338, qty 1
antenna tube

step 4

MOUNT THE ANTENNA

- 1 Push your receiver wire through the built-in antenna mount hole.
- 2 Thread the wire through the #6338 antenna and push the antenna firmly into the chassis' antenna mount hole.
- 3 Add the #6338 cap to the other end of the antenna tube.

← REAR



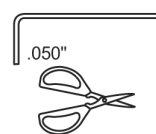
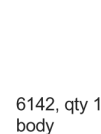
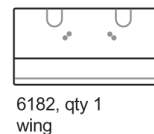
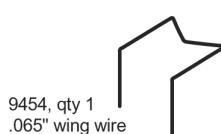
BAG H

BASIC & SPORT KITS ONLY

TOOLS USED

REMOVE THESE PARTS FOR:

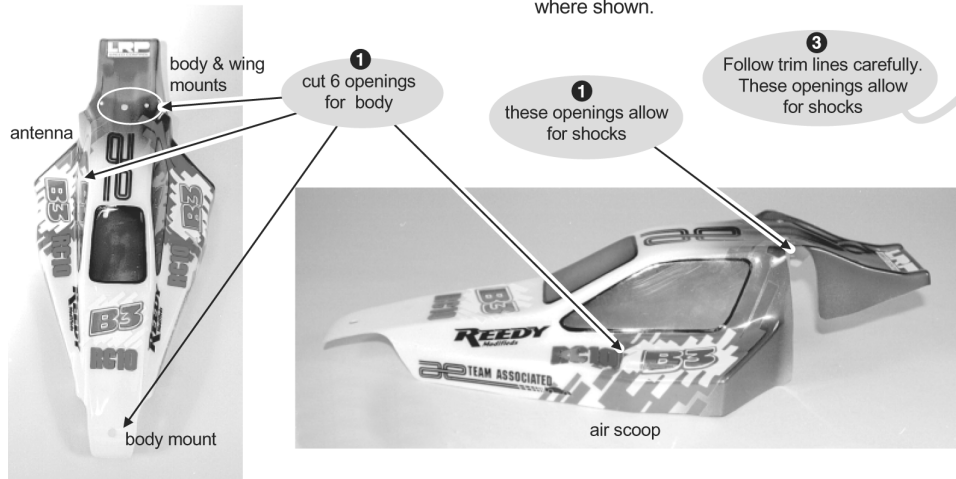
Basic & Sport:
Step 5



step 5

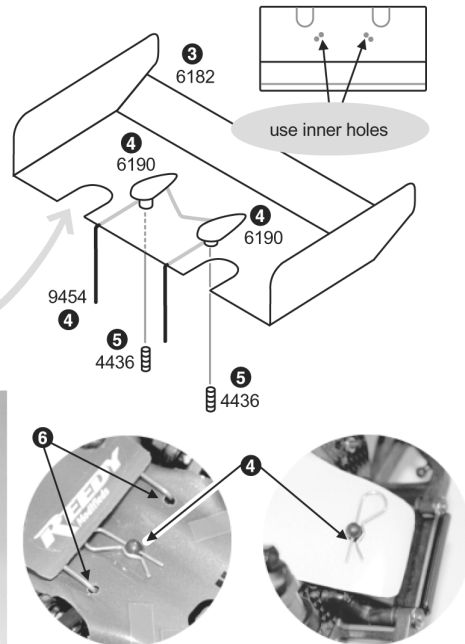
BODY MOUNTING

- Trim and paint the body. (See painting instructions on page 25 if you have not done this before.)
- Secure the #6142 body to the chassis with two #6332 body clips where shown.



WING ASSEMBLY

- Trim and paint the #6182 wing. Make two holes for the wing things.
- Insert the #6190 wing things. Insert the #9454 wire through the wing things.
- Secure the wire to the wing things with the #4436 set screws.
- Push wires through holes of rear shock tower where shown.



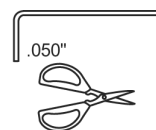
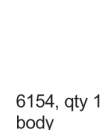
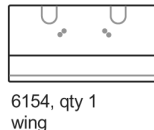
BAG H

TEAM & FACTORY TEAM KITS ONLY

TOOLS USED

REMOVE THESE PARTS FOR:

Team & F.T.:
Step 5



step 5

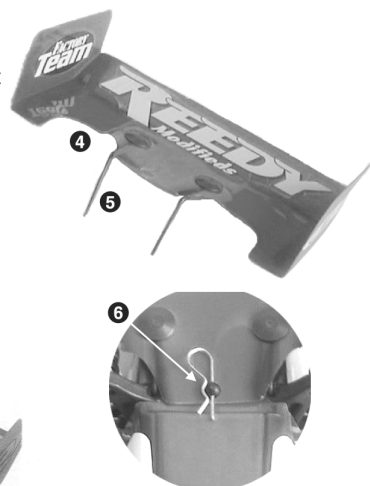
BODY MOUNTING

- Trim and paint the body. (See painting instructions on page 25 if you have not done this before.)
- Secure the front of the #6154 body to the chassis with one #6332 body clip where shown.



WING ASSEMBLY

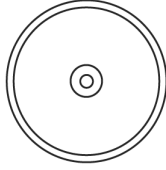
- Trim and paint the #6154 wing. Make one hole for the body mount.
- Insert the #6193B wing things as shown in above illustration. Insert the #9454 wire through the wing things.
- Secure the wire to the wing things with the #4436 set screws.
- Push wires through holes on rear shock tower and add a body clip where shown.



BAG 1

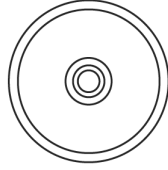
REMOVE THESE PARTS FOR:

Steps 1-2



Basic & Sport ONLY
9490Y, qty pr
1 piece rear wheels

Team & F.T. ONLY
9491, qty pr
Pro-Line rear wheels



Basic & Sport ONLY
9480Y, qty pr
1 piece front wheels

Team & F.T. ONLY
9482, qty pr
Pro-Line front wheels



6825, qty 2
Holeshot rear tire



6878, qty 2
M2 front tire



3438, qty 2
8-32 locknut



Basic & Sport ONLY
6599, qty 4
3/16 x 3/8
unflanged bushing

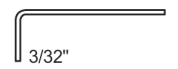


6222, qty 2
4-40/5-40
locknut



Team & F.T. ONLY
3977, qty 4
3/16 x 3/8
unflanged ball bearing

TOOLS USED

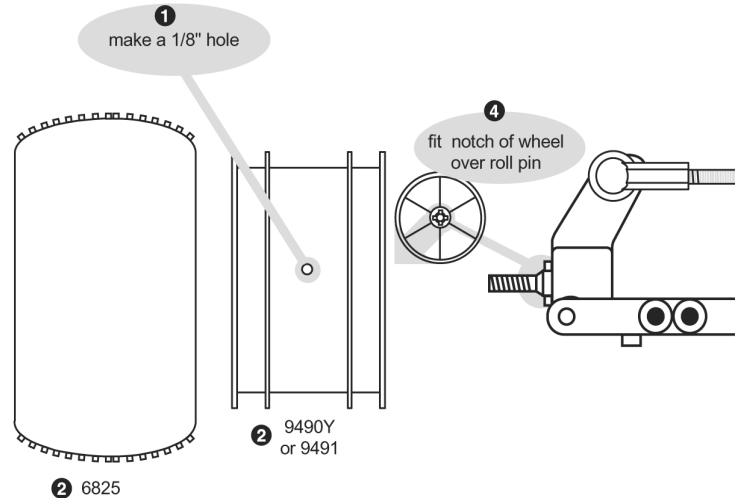
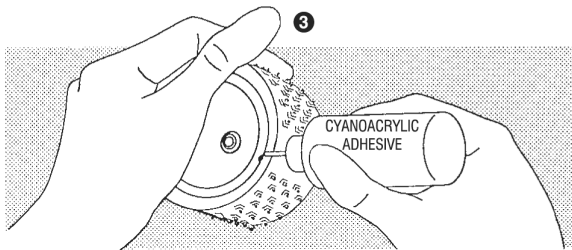


3/32"

step 1

REAR WHEELS AND TIRES

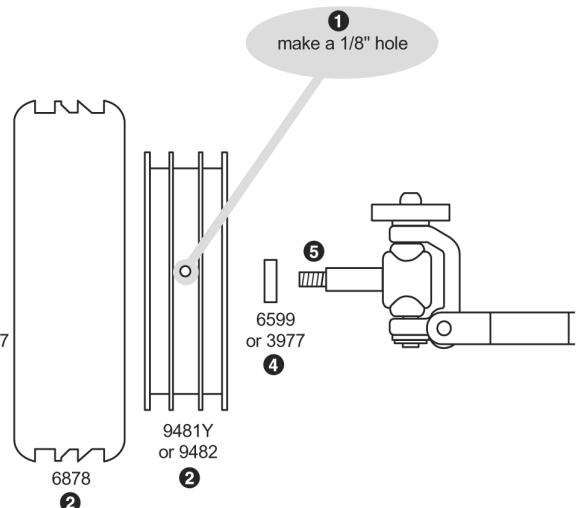
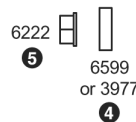
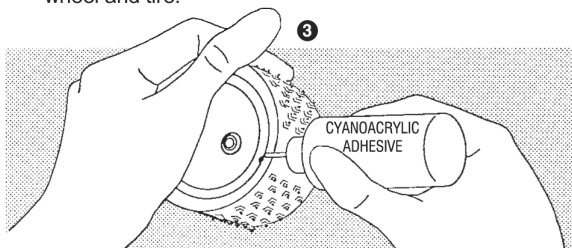
- 1 Make a 1/8" hole in the wheel. Make sure foam insert is centered in tire.
- 2 Install the #6825 tire to the #9490Y or #9491 wheel.
- 3 Glue the tire to the wheel with super glue (cyanoacrylic glue) in four spots around the tire on both sides. **WARNING!** Follow the adhesive manufacturer's instructions for proper use and safety. Wear eye and hand protection.
- 4 Install wheel onto axle, lining up roll pin with slot in the wheel. Thread on the #3438 locknut. Finish second rear wheel and tire.



step 2

FRONT WHEELS AND TIRES

- 1 Make a 1/8" hole in the wheel.
- 2 Install the #6878 tire to the #9480Y or #9482 wheel.
- 3 Glue the tire to the wheel with super glue (cyanoacrylic glue) in four spots around the tire on both sides. **WARNING!** Follow the adhesive manufacturer's instructions for proper use and safety. Wear eye and hand protection.
- 4 Insert the #6599 bushings or #3977 bearings into both sides of the front wheel.
- 5 Install wheel onto axle. Thread on #6222 locknut. Finish second front wheel and tire.



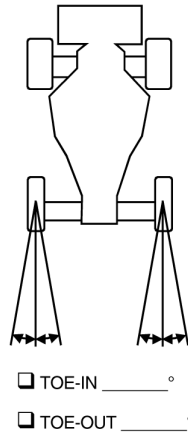
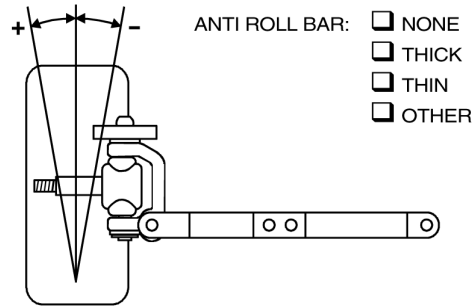
setup sheet for the RC10B3

TEAM ASSOCIATED

driver _____
 track _____
 date _____

FRONT SUSPENSION

FRONT BLOCK CARRIER (caster setting)
 25° 30°
 FRONT RIDE HEIGHT: _____
 STEERING BLOCK _____
 CAMBER _____

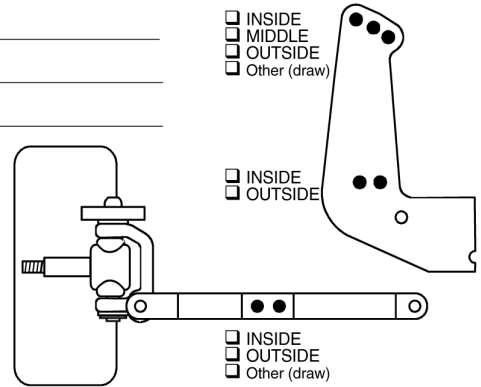


FRONT SHOCKS

STD OTHER OIL _____ PISTON _____
 BODY _____ SHAFT _____ SPRING _____
 LIMITERS, inside _____ outside _____

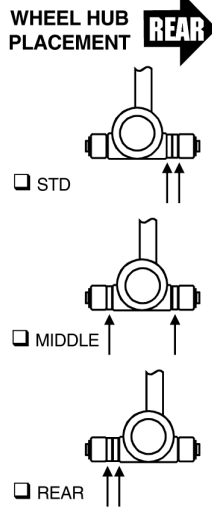
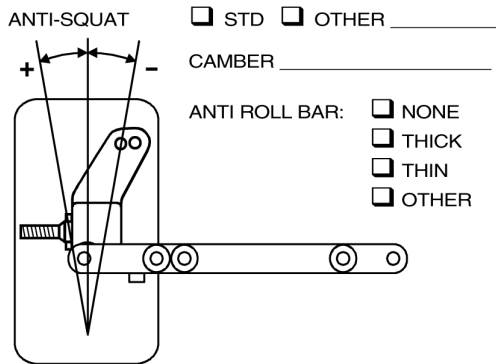
NOTES _____

- INSIDE
- MIDDLE
- OUTSIDE
- Other (draw)



REAR SUSPENSION

SUSPENSION MOUNTS: 2-3 3-3 3-0
 WHEEL HUB: STANDARD OTHER
 REAR RIDE HEIGHT: _____

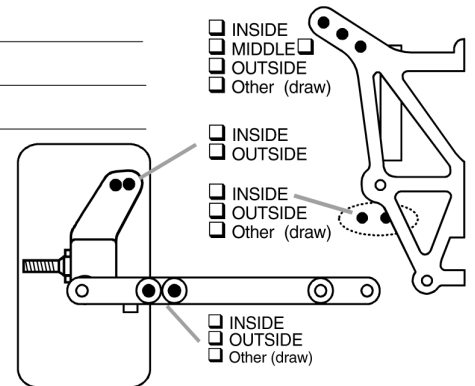


REAR SHOCKS

STD OTHER OIL _____
 PISTON _____ SPRING _____
 LIMITERS, inside _____ outside _____

NOTES _____

- INSIDE
- MIDDLE
- OUTSIDE
- Other (draw)



OTHER

TIRES & WHEELS

FRONT TIRES _____ FOAM _____
 REAR TIRES _____ FOAM _____
 FRONT WHEELS 1 PIECE 3 PIECE OTHER
 CHASSIS STD SHORT LONG GRAPHITE

MOTOR, TRANSMISSION & ELECTRICAL

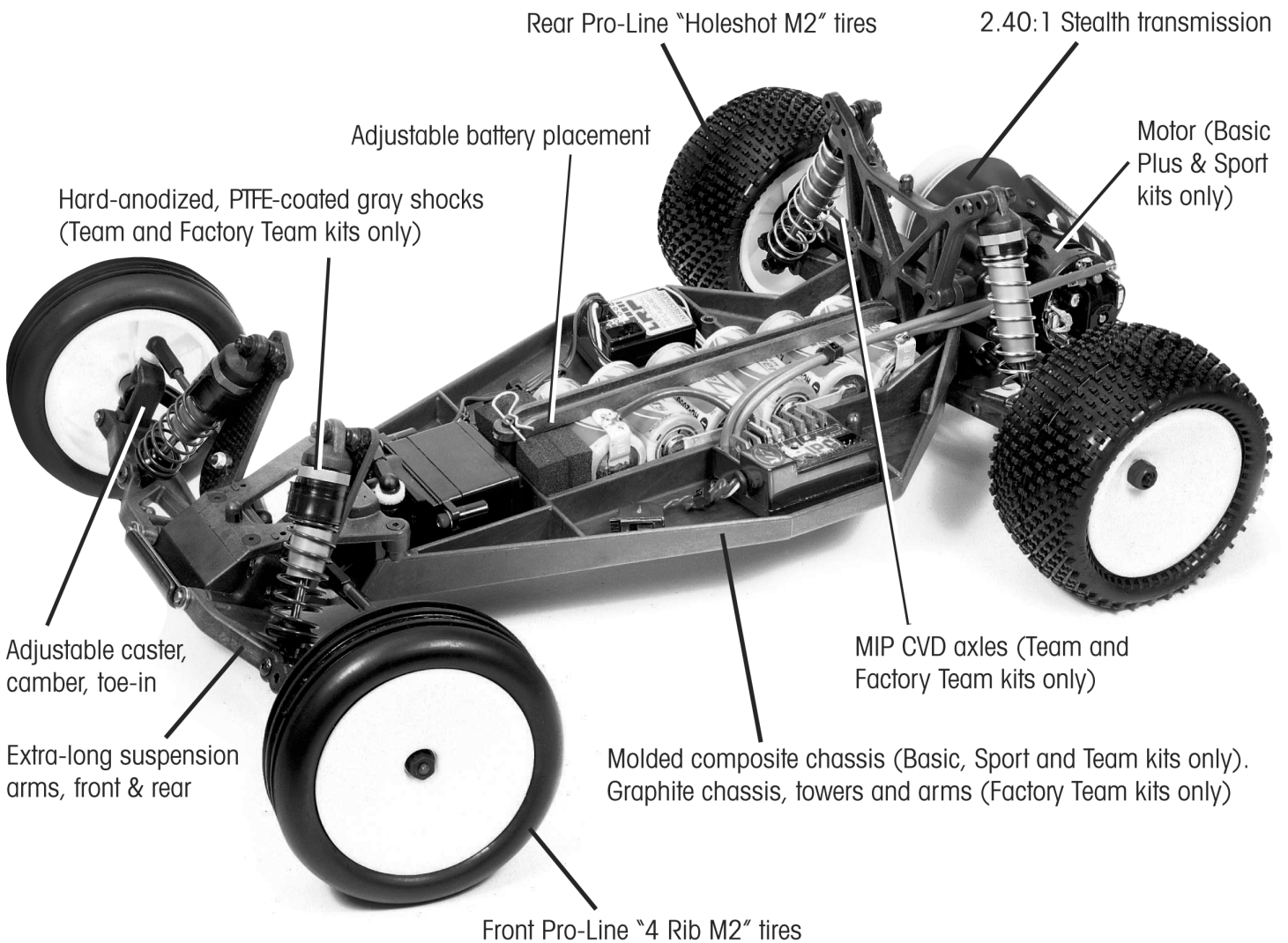
MOTOR _____ PINION _____ SPUR GEAR _____
 DRIVESHAFTS _____
 SLIPPER STD HYDRA VISCO OIL _____
 BATTERY TYPE _____ PLACEMENT θ FRONT θ MIDDLE θ REAR
 RADIO _____ SPD. CONT. _____ SERVO _____

COMMENTS/EXCUSES

RC10 B3

FEATURES

See page 2 for complete specs on what is included in each kit.
Factory Team Kit shown. Radio and electronics are not included in kits.



TEAM ASSOCIATED RECOMMENDS



Factory Team performance parts



Reedy Modifieds motors & batteries



LRP digital speed controls