

LETHAL WEAPON™



TRANSMISSION / DIFFERENTIAL ASSEMBLY INSTRUCTIONS

PART LIST

| | | |
|------|-----------------------------|--------------|
| 200 | RC10 Lethal Weapon Tranny | \$134.95 |
| 201 | Ultima Lethal Weapon Tranny | 139.95 |
| 208 | Astute Lethal Weapon Tranny | 139.95 |
| 204 | Case Set (Stock Yellow) | 15.00 |
| 205 | Case Set (Optional Pink) | 15.00 |
| 206 | Case Set (Optional Blue) | 15.00 |
| 219 | Gear Set | 8.95 |
| 222 | Drive Shaft with Gear Set | 14.95 |
| 223 | Gear Hub Adaptor | 7.00 |
| 224 | Gear Cover | 3.50 |
| 225 | Motor Plate | 8.50 |
| 226 | Tranny Top Brace | 3.50 |
| 227 | Drill Jig Plate | 3.95 |
| 228 | Case Screw Set | 6.50 |
| 229 | Gear Mounting Screw Set | 4.50 |
| 230 | Belt, 72 Tooth x 1/4 | 7.50 |
| 5004 | 3/8 x 5/8 Bearing | 1 ea. 8.85 |
| 5005 | 5 x 11 mm Bearing | Pair 8.50 |
| 5006 | Complete Bearing Kit | 34.90 |
| 5007 | 3/8 x .010 Shims | 10 qty. 3.00 |

KEEPING UP TO DATE

We at Team A&L take a great deal of time to produce a quality product before we put it into production. Many hours are spent on prototypes, track testing and research. Once our production parts are made available our research and testing does not end there. We are constantly working to develop more durable parts as well as innovative ideas that will enhance your racing abilities. Information on new belt materials, diff set-ups, track set-ups, and different top pulleys and belts to change internal gear ratios – as well as all the latest “hop up hints” – will keep you in front of the competition.

All this info will be made available to you through your local dealer in a quarterly newsletter we call the “Dealer’s Hot Sheet.” Be sure to ask for the latest racing tips where you purchased your **Lethal Weapon Tranny**.

GOOD LUCK & GOOD RACING!!

TEAM A&L
P.O. BOX 2115
CORONA, CA 91718

LETHAL WEAPON TRANNY INSTRUCTIONS

1. Trim off the excess material from the back side of the gear cover by placing the motor plate inside the gear cover and trimming it flush with the back side of the motor plate.

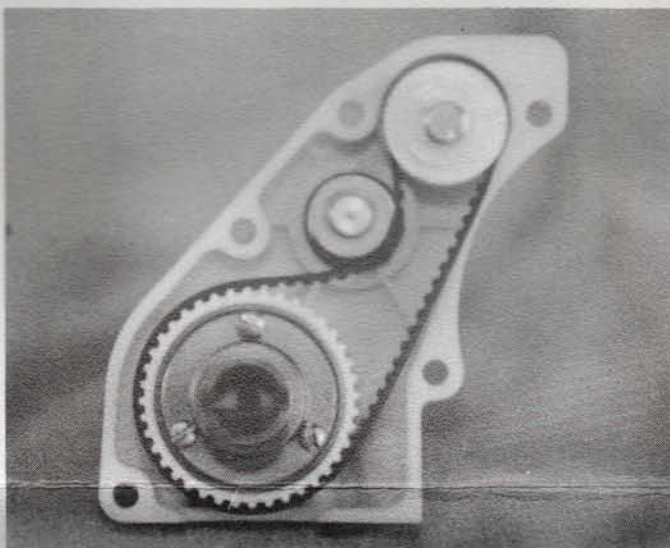


PHOTO #1

2. Push the (4) 5 x 11 mm bearings and the (2) $\frac{3}{8}$ x $\frac{3}{8}$ bearings into the cases. Install completed diff into both case halves and check for side to side play. Place an equal number of the supplied shims on both sides of the diff as needed to eliminate excessive play. There should always be some side to side play so as not to put unwanted pressure on the bearings. Install drive shaft with the top drive pulley through the top hole in the right side case. Install the middle idler wheel and completed differential. (Note: diff must be installed with the adjustment screw on the left side of the car.) Install the belt by first placing it around the top drive pulley, behind the middle idler wheel and then around the differential. You should now have an assembly as show in photo #1.

3. Place the left side case over the completed assembly and align all shafts and locating pins until the two cases are seated flat together. Install the (4) 4/40 x 1.25" allen screws through the top 4 holes in the left case and lightly tighten into the motor plate on the right side case. Screw the remaining 4/40 x $\frac{7}{8}$ allen screws into the bottom front hole and evenly tighten all of the 5 case screws. **Do not overtighten** case bolts as this could cause deformity in the shape of the case and promote unwanted binding.

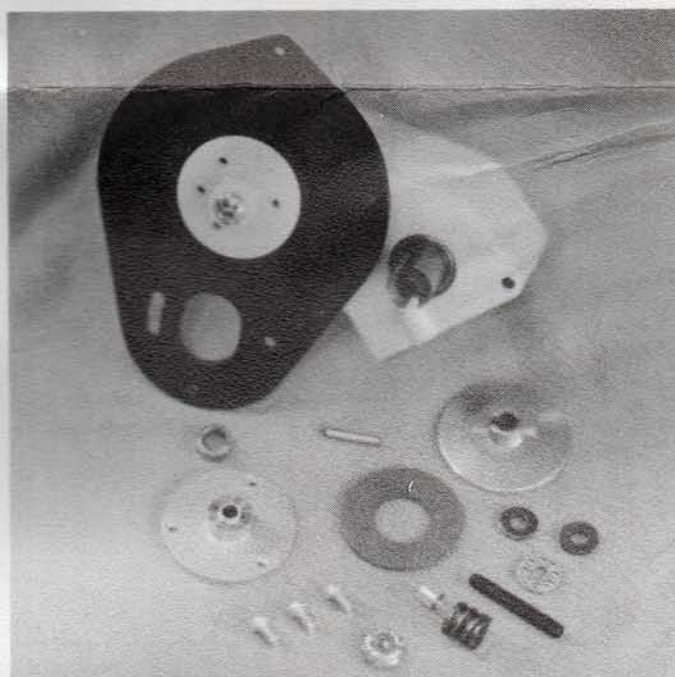


PHOTO #2

OPTIONAL POWERCLUTCH #280

4. Mount the #223 gear hub adapter to the drive shaft with the 2 x 12 mm dowel pin and the 6/32 x $\frac{1}{4}$ screw (See Photo #2). We recommend replacing the gear hub with the optional Powerclutch #280. This will greatly improve the life of the drive train, differential and also enhance car handling. Refer to the gear chart for recommended gear ratios.

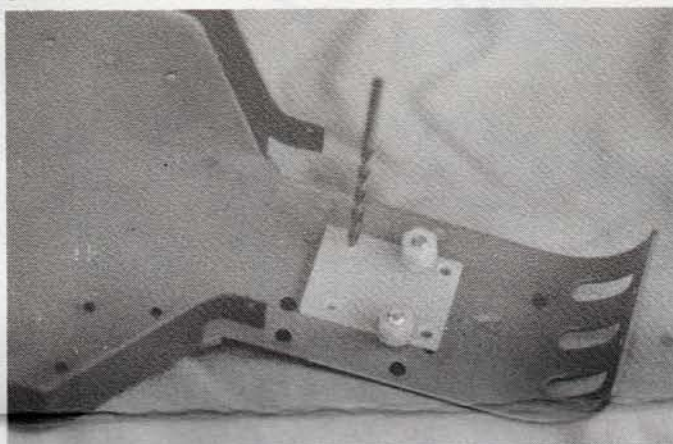


PHOTO #3

RC10 TRANNY MOUNTING INSTRUCTIONS

It is recommended to drill two new mounting holes in the chassis for the two front bottom case screws. Remove the rear bulkhead from the chassis. Using two of the stock 8/32 screws in the **two front stock gearbox chassis holes**, bolt down the supplied drill jig to the **top** of the chassis using the two middle holes in the jig (See Photo #3). Disregard the back two holes in the jig which are used for the Ultima cars. It is important to use the countersink screw from the bottom of the chassis with the drill jig on top of the chassis. This helps to center the jig in a straight position. Once you have checked to make sure the jig is straight, drill the two front holes with a $\frac{1}{8}$ drill. Remove the drill jig and use a countersink on the two holes to make the supplied 4/40 x $\frac{3}{8}$ flathead screws flush with the chassis. Now mount the tranny into the car using the supplied 8/32 x $\frac{3}{8}$ screws for the back set of holes. **Do not** use the stock 8/32 screws as they are too long. Install the top plate with the supplied (2) 4/40 x $\frac{1}{4}$ screws to the top of the tranny. Use two longer 4/40 screws (not supplied) with the supplied black spacer between the top of the bulkhead and top plate (See Photo #4).

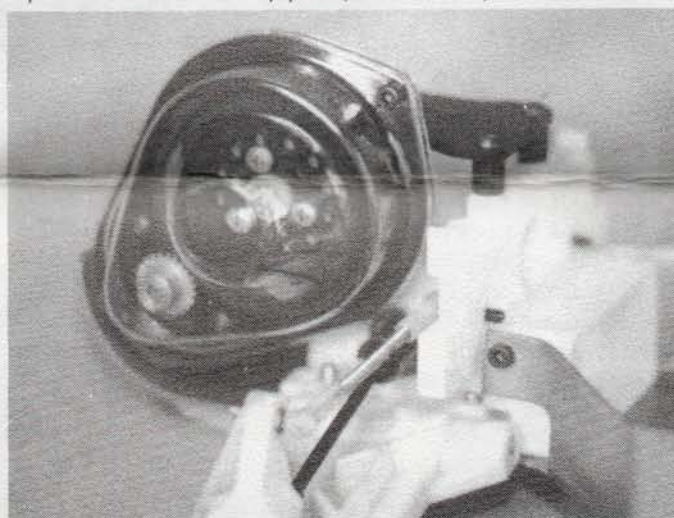


PHOTO #4

ULTIMA TRANNY MOUNTING INSTRUCTIONS

It is necessary to drill two new mounting holes in the chassis for the two front bottom case screws. Remove the rear bulkhead from the chassis. Using the **two rear stock gearbox chassis holes**, bolt down the supplied drill jig to the **top** of the chassis using the two larger holes in the rear of the jig (See Photo #5). Disregard the two middle holes in the jig which are used for the RC10 car. It is important to use a countersink screw from the bottom of the chassis; this helps to center the jig in a

straight position. Once you have checked to make sure the jig is straight, drill the two front holes with a 1/8 drill. Remove the drill jig and use a countersink on the two holes to make the supplied 4/40 x 1/4 flathead screws flush with the chassis. Now mount the tranny into the car.



PHOTO #5

Note: If you have an Ultima Pro, read the "Ultima Pro Special Instructions" before mounting tranny into car.

Use the supplied 8/32 x 3/8 for the two rear tranny screws. Install the top plate with the supplied (2) 4/40 x 1/4 screws to the top of the tranny. Using the top plate as a template, two holes must be drilled into the bulkhead using a #38 - #40 drill bit. Use two stock 3mm screws (not supplied) with the supplied yellow spacer between the top of the bulkhead and top plate (See Photo #6).



PHOTO #6

ULTIMA PRO SPECIAL INSTRUCTIONS

Due to the long rear suspension arms on the Ultima Pro, it will be necessary to grind or trim off the two bubbles on the sides of the case. These are used for mounting the tranny in the RC10 and are not used for the Ultima. Clearance is also needed to keep the suspension arms from hitting the differential outdrives. This can be done in one of two ways. The drill jig can be used as a spacer between the chassis and the tranny to raise the outdrive height (longer 1/2" screws not supplied must be used to bolt in tranny) or you can grind clearance in the suspension arms for the outdrives.

TRANNY MAINTENANCE

You'll find your Lethal Weapon tranny will give you many hours of trouble-free operation. The original prototype trannys were tested one year before the production trannys were released. We have had well over 100 runs with one belt and pulleys when used with a properly adjusted diff and Powerclutch. Eventually, parts will wear out and need to be replaced. This tranny will give you a warning when it is time to replace belt and pulleys. You will hear a clicking sound under hard acceleration; this is the belt starting to skip over the top pulley. You will still be able to run many times without damage to the tranny, but it is recommended to change the belt. This is one of its good advantages over a gear tranny, which will give no warning - usually resulting in not finishing the race due to stripped gears.

When replacing the belt, compare the top pulley and bottom diff gear teeth to new ones. If the teeth are starting to round off at the ends, it is time to replace them. In general, the top pulley and diff gear will last longer than the belt and not need to be replaced for some time. Inspect the bottom 3/8 x 3/8 diff bearings on a regular basis, especially when running on dusty tracks. They can be visually checked by turning the wheels and looking at the inner race of the bearing, it should turn with the diff outdrive. If the diff outdrive turns inside the inner race of the bearing it is time to clean or replace them. Never give throttle to a car when holding both rear wheels or if the car is stuck against an object; this can cause damage to the belt.

HELPFUL HINTS

Do not expect a belt tranny to spin like a gear or chain tranny. Under load, chain trannys have drag when the chain disengages from the teeth; gear trannys have drag from the teeth rubbing each other. These both limit top speed. Under load situations a belt drive is more efficient, delivers more acceleration, top speed and running time. You will need to use less brake in the car as a belt tranny will come to a stop quicker.

THANK YOU FOR USING A&L QUALITY PRODUCTS.

RECOMMENDED GEAR RATIOS

These gear ratios are recommended starting points only. Due to variations in tire size, track conditions and batteries you should experiment to achieve the best combination for your track and car.

The Lethal Weapon internal gear ratio is 2.22

Bottom diff gear is 40 teeth ÷ 18 top pulley teeth = 2.22

To find the final drive gear ratios not listed below use the following formula:

$$\text{OVERALL GEAR RATIO} = \frac{\text{SPUR GEAR}}{\text{PINION GEAR}} \times \text{TRANNNY RATIO (2.22)}$$

Example: Using an 87 tooth spur and a 25 tooth pinion:

$$(87 \div 25) = 3.48 \times 2.22 = 7.73 \text{ final drive}$$

This would be a good starting point for a stock motor.

Below starting points are for off road car (not truck)
7 cell modified motors 6 cell stock motors

| GEAR | PINION | RATIO | (x 2.22) FINAL DRIVE | APPROX. MOTOR WIND |
|------|--------|-------|-------------------------|--------------------|
| 96 | 18 | 5.33 | 11.83 | HOT WIND |
| 93 | 18 | 5.16 | 11.46 | |
| 96 | 19 | 5.05 | 11.21 | |
| 93 | 19 | 4.89 | 10.86 | 15 TURN |
| 93 | 20 | 4.65 | 10.33 | |
| 93 | 21 | 4.42 | 9.83 | |
| 93 | 22 | 4.22 | 9.38 | 17 TURN |
| 90 | 22 | 4.09 | 9.08 | |
| 90 | 23 | 3.91 | 8.69 | |
| 90 | 24 | 3.75 | 8.32 | 21 TURN |
| 90 | 25 | 3.60 | 7.99 | |
| 87 | 25 | 3.48 | 7.73 | |
| 87 | 26 | 3.34 | 7.42 | 27 TURN STOCK |
| | | | | |

HOT
WIND
↑
MILD
WIND

COMPLETED ASSEMBLY

STEP 1

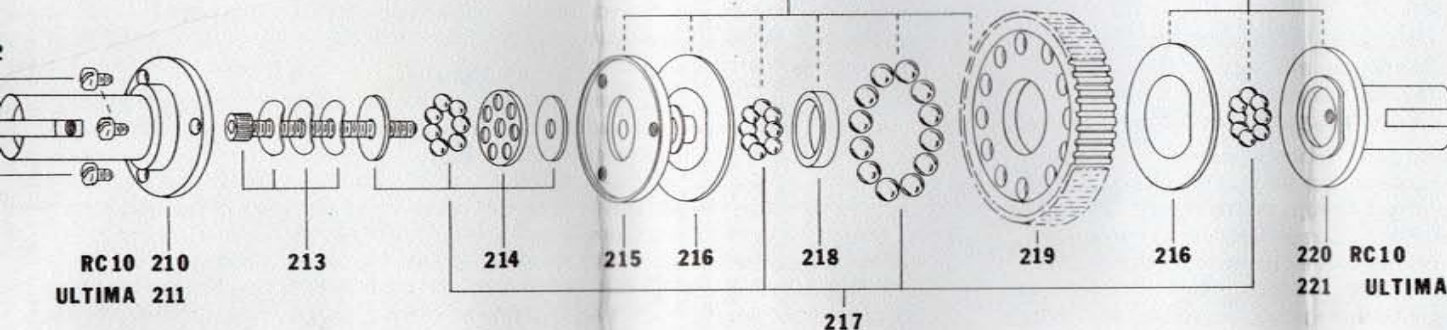
STEP 2

READ ALL INSTRUCTIONS BEFORE YOU START ASSEMBLY. IT IS IMPORTANT THAT YOU FOLLOW THE CORRECT SEQUENCE. WE SUGGEST ASSEMBLING THE DIFF OVER A CLOTH OR TOWEL SO THAT PARTS WILL NOT GET LOST.



A&L MANUFACTURING

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| | | | | | |
|--------------------------------|---------|--------------------------------------|---------|--|---------|
| 202 RC10 DIFF ASSEMBLY | \$64.95 | #213 CLAMP SCREW / SET WASHERS | \$ 2.95 | #218 RADIAL RING | \$ 3.60 |
| 203 ULTIMA DIFF ASSEMBLY | \$69.95 | #214 THRUST BALL ASSEMBLY | \$ 6.95 | #219 GEAR SET & IDLER | \$ 8.95 |
| 210 RC10 DRIVE ADAPTER | \$16.95 | #215 THRUST PLATE | \$13.50 | #220 RC10 THRUST DRIVE ADAPTER | \$14.95 |
| 211 ULTIMA DRIVE ADAPTER | \$19.35 | #216 DIFF RINGS | \$ 3.00 | #221 ULTIMA THRUST DRIVE ADAPTER | \$17.25 |
| 212 DIFF HARDWARE | \$ 2.50 | #217 BALL SET | \$ 3.50 | | |

ALL PARTS MADE IN THE U.S.A.

Gather the parts shown in step 1 to begin assembly of the diff. Start the diff assembly with the #218 radial ring (note tapered end of ring) and press it into the #219 diff gear with the tapered end first. Now take the #215 thrust plate and apply a **small** circle of grease around the inside lip and place (8) 3/32 balls around the lip; refer to step 1 diagram. Place one of the #216 diff rings onto the #215 thrust plate. Make sure the "D" shape in the diff ring locks into place on the thrust plate. Now install the diff gear with the installed radial ring over the circle of (8) 3/32 balls to keep them in place. Place (12) 1/8 balls into the diff gear and apply a **small** amount of grease to each ball. You should now have a completed assembly as shown in step 1 diagram.

Gather the parts shown in step 2. Locate the #216 diff ring onto the #220 RC10 or #221 Ultima thrust drive adapter. Apply a **small** circle of grease to the outside wall of the inside lip in the thrust drive adapter. Install (8) 3/32 balls to the outside wall of the thrust drive adapter. You should now have a completed assembly as in step 2 diagram.

Care must be taken to join step 1 and step 2 assemblies together so you will not lose any of the balls. Hold the step 1 assembly together with your index finger under the #215 thrust plate, your thumb and middle finger on the outside of the diff gear to keep assembly together. Now pick up step 2 assembly. You must locate the circle of balls in this assembly over the outside ball retaining lip of the #215 thrust plate in the step 1 assembly. Once both assemblies are together, hold it by the thrust drive adapter in a vertical position to keep it from separating.

4. Now take one of the thrust washers from the #214 thrust ball assembly and install it into the recessed hole in the outside of the #215 thrust plate. Install (7) 3/32 balls into the ball retainer case with a **small** amount of grease and place it over the thrust washer in the #215 thrust plate. Install the three spring washers and the outside thrust washer to the adjustment screw. While holding the (#220, 221) thrust drive adapter, tighten the adjustment screw into the diff assembly until you achieve diff action. Final adjustment will be made later when completed assembly is in the car.

5. Align hole pattern in the (#210, 211) drive adapter with the #215 thrust plate and screw in the (3) #2 x 1/8 screws. You now have a completed diff ready for installation. Install the #4 set screw after final adjustment of the diff has been made (see diff set up) to keep dirt from entering.

DIFF SET UP

Diff set up is best tested on a short carpet surface with a modified motor. This allows for high traction and the most load for testing the differential. Slowly adjust the differential a little at a time (1/12 of a turn) until you reach a point that it will not slip past a distance of 2 to 3 feet. If you have an A&L Power Clutch (refer to Power Clutch instructions) tighten the diff so it will not slip past a distance of 1 foot. Never tighten the diff to a point that there is no diff action. If you do not have an A&L Power Clutch we recommend you purchase one. The Power Clutch will enable the diff to do what it was designed to — be a differential, not a slipping device. This will greatly improve the life of the diff, drive train (especially for monster trucks) and, more importantly, improve car handling for winning races. Lap times are also greatly improved when using a properly adjusted diff with an A&L Power Clutch. -

THANK YOU FOR USING A&L QUALITY PRODUCTS. GOOD LUCK & GOOD RACING!!

Special thanks to MIP for their co-design and manufacturing of differential.