Turret Rotation R/C Upgrade Kit
For
Tiger I, 1/6 scale Tank Kit

Items needed:
- ABS Glue or Modeler Super Glue. (ABS glue can be purchased at most hardware stores).
- Trimmers (Plastic Clippers, knife)
- Power Tools (Drill and/or hobby tool such as a Dremel Tool)
- 1/16", 3/32", 1/8", 3/16", 3/8" Drill Bits
- Hand Tools (Pliers, Screwdrivers, Hex Head Driver, Tape Measure)
- Masking Tape
- Marker Pen or Pencil
- Clamps

ABS Parts
Servo Mounting Set.
Fixed Servo Arm.
Three Piece Ring Set.
Ring Retainer Set.
Servo Sprocket.

Hardware (Note, head types may vary)
High Torque Servo.
Servo Mounting Hardware Packet.
Screws 8 x ½" (12).
Screws 4-40 x ½" (13)
Nuts 4-40 (13)
Bearing Sets (4)

IMPORTANT WARNINGS:
Small parts may pose chocking hazard to small children and other mammals.
CAUTION: READ THE COMPLETE INSTRUCTIONS BEFORE BEGINNING WORK.

NOTE - The flat black plastic pieces have a smooth side and a rough side. The smooth side is meant to be the exterior surface. When in doubt - SMOOTH SIDE OUT.

There are no jigs needed to build this assembly. Masking tape will be used to secure all joints. Make sure that the joints are held tight when secured with masking tape to ensure a strong joint.

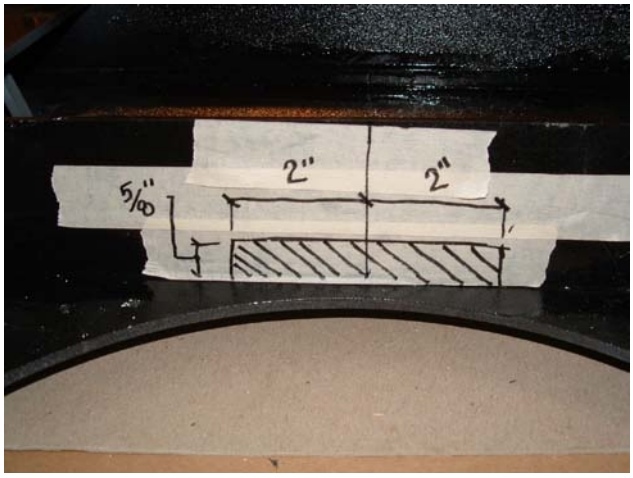
Super Glue, Modelers Cement and ABS Glue can be sanded easily when cured. If glue joints aren't as clean as liked, let the glue fully cure then sand and fill as necessary. ABS Glue can also be used as fillet and as a filler material between ABS parts.

Note: High Torque and High Power Servo Operation: *The servos used for this application are high torque which requires the use of a 1200 milliamp battery connected into the " Y' wiring harness of the servo. A direct connection of the servo to the receiver, without a high capacity battery may damage the radio receiver.*

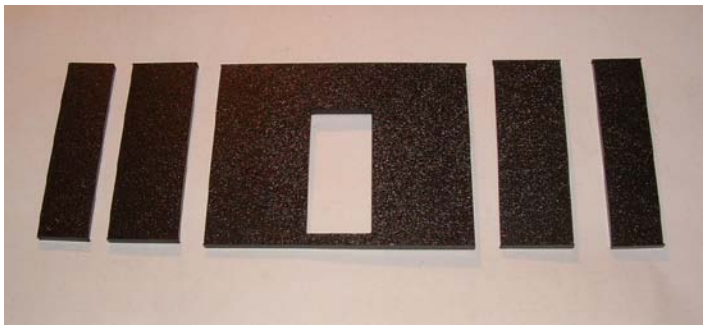
Step 1: Preliminary Work: If the basic Tiger tank has already been completed, remove the turret from the tank hull. Turn the turret upside down and position on a flat surface. To protect the top of the turret, it is recommended to use a layer of foam or a towel between the top of the turret and the flat surface.

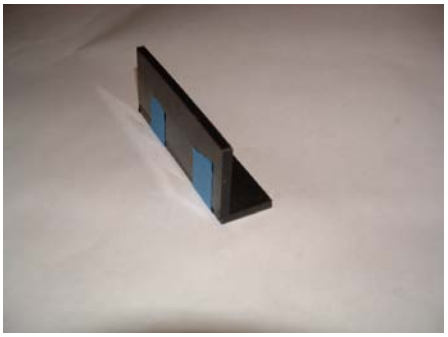
Step 2: Gun Tube Balance: It will be necessary to balance the main gun tube, by adding a weight to the end of the gun tube located within the turret. Weights can be bolts, fishing weights, or any other object of the necessary mass. If the main gun is not properly balanced, the forces exerted on the turret and hull will cause binding and jamming of the mechanism, and excessive wear to the drive servo. Refer to further steps concerning the installation of these weights. If the main gun elevation kit is to be installed, balancing should be done after the installation is complete.

Step 3: Bulkhead Modification: Remove the Upper Hull from the Tiger and turn it upside down. Place the Upper Hull on a flat surface. Use a piece of foam or towel between the exterior hull and the flat surface. Locate the bulkhead that is part of the upper Hull and is just in front of the turret opening. Older Tiger kits will have a solid bulkhead which will need to be modified. Since it is difficult to mark on the ABS plastic, and then to be readable, it is suggested that masking tape be applied to the bulkhead, as shown below. A four inch long by five-eight inch high portion of the bulkhead is to be removed. This can be done by carefully removing the entire bulkhead or by using a hobby tool such as a dremel unit. DO NOT try to cut out the ABS section using a knife or other such instrument. It will be hard to control and could damage the tank, as well as the person doing the work. A soldering iron can also be used to cut out the plastic. This method should only be done IN A WELL VENTILATED LOCATION AND WITH THE PROPER BREATHING MASK. The fumes are dangerous.

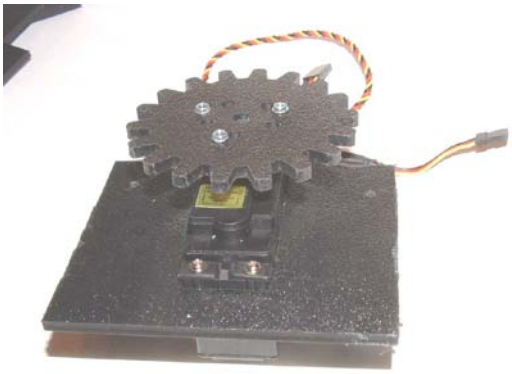


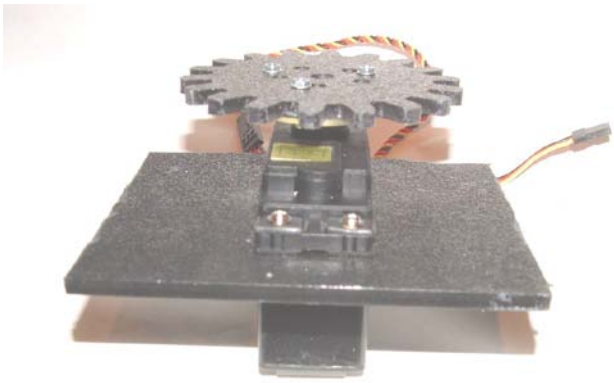
Step 4: Servo Mount: Locate the servo tray and mount unit, consisting of the parts shown below. These parts have been designed for use with a generic large size servo. Build the two side panels by gluing the narrow panel to the top of the wide panels. Use a triangle to ascertain that the unit is built with ninety degree angle. The large top panel with the servo cut out is to be screwed into the two “L” bracket mounts.





Step 5: Servo Sprocket Installation: Install the servo into the servo tray. Insert the servo into the tray and mark the four locations for the servo mounting screws. Remove the servo and drill a 1/16" hole for each of the four screw locations. Reinstall the servo and secure with the servo mounting hardware, which consists of four rubber vibration inserts, four brass inserts and four mounting screws.





The Servo Sprocket is screwed into the round servo disk which is supplied with the servo. Make sure that the servo sprocket is centered on the round servo disk. Drill through the servo disk with a 1/16" drill bit and screw in five of the 4-40 screws. If the screws are tight enough and will not back out, the excess portion of the screws can be cut off so that they will not interfere with the operation of the servo. There are five 4-40 nuts which are included and can be used if necessary. For some brands of servos, the screws should be installed from the bottom, so that they will not interfere with the servo operation.

Step 6: Servo "L" Bracket Installation: Install the servo "L" brackets, centered on the opening that was made in the bulkhead of Step 3. Brackets are to be located against the front side of the bulkhead – between the bulkhead and the front of the tank. The out to out dimension of the "L" brackets is to be five inches. The flat panel with the servo is to be mounted to the top of the brackets. Glue the brackets to the bulkhead and to the upper hull panel.

Step 7: Bearing Installation: There are four plastic units with roller bearings. These are to be mounted at quarter points to the underside of the turret. Locate the first bearing unit directly in line with the main gun, and the other three bearings at ninety degrees around the turret ring. It may be necessary to trim the plastic frame the roller bearing so that the plastic will not interfere with the upper hull.

Center the roller bearing between the outer edge and the inner ring of the turret. It will be necessary to cut a slot in the turret for the roller bearing, otherwise the upper side of the bearing will hit the turret. Mark the location of the roller bearing and cut a ¼" by ½" slot. The recommended method is to drill two 1/8" holes with centers separated by 3/8". Then drill out the 1/8" holes with a ¼" drill bit. Carefully clean the hole with a hobby knife.

Place the roller bearing over the hole and mark the two screw holes. This can be done using white-off, or by using masking tape as described in an earlier step. Mark the two mounting holes and use a 1/8" drill bit. Secure the roller bearing with two 4-40 screws and nuts. Repeat for all four roller bearings.

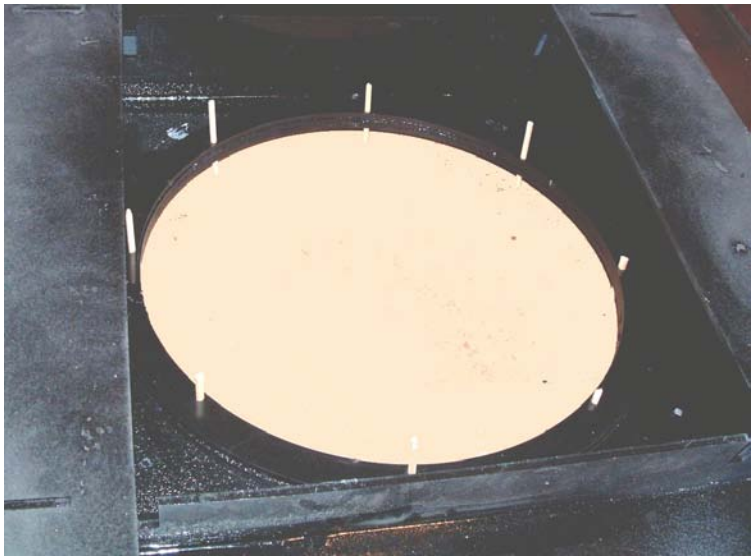
Step 8: Ring Assembly: There are three large ABS rings, two are smooth and one with teeth. The three rings are to be glued together, with the tooth ring in the center.

Note: Arrange the rings so that the holes line up. Use the supplied wooded dowel and cut into approximately two inch long pieces. Insert a dowel into each of the lined up holes so that the holes will remain lined up during the gluing process.

Make sure that each of the outer rings are glued so that the SMOOTH side is facing OUTWARDS. Use clamps to hold the rings in place while the glue is drying.

After the ring assembly has dried, remove the clamps and sand smooth the inner surface of the rings. Also sand and bevel the four edges of the ring assembly. The ring assembly will rotate with the turret, and smooth surfaces will provide much improved operation of the system.

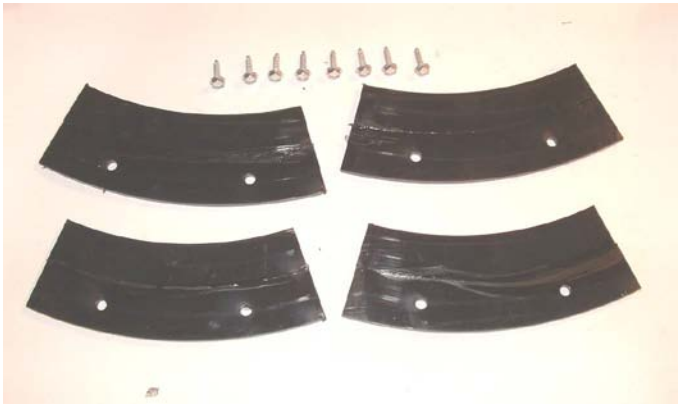
Step 9: Ring Assembly Installation: Tape the wooden dowels in place so that they will not fall out of the ring assembly. Lay the Ring Assembly on the inside surface of the upper hull. The wooden dowels will help to make sure that the Ring Assembly is centered over the turret opening in the upper hull. Once the ring assembly is centered, use the clamps to hold it in place.



Step 10: Ring Retainer Assembly: Locate the twenty ABS arc pieces. Glue these into four stacks, with five pieces per stack. Use a triangle to keep the inside of the arc pieces stacked in line. It is the inside surface of the arcs that will be critical. Sand the inside surface of the arcs to a smooth finish.

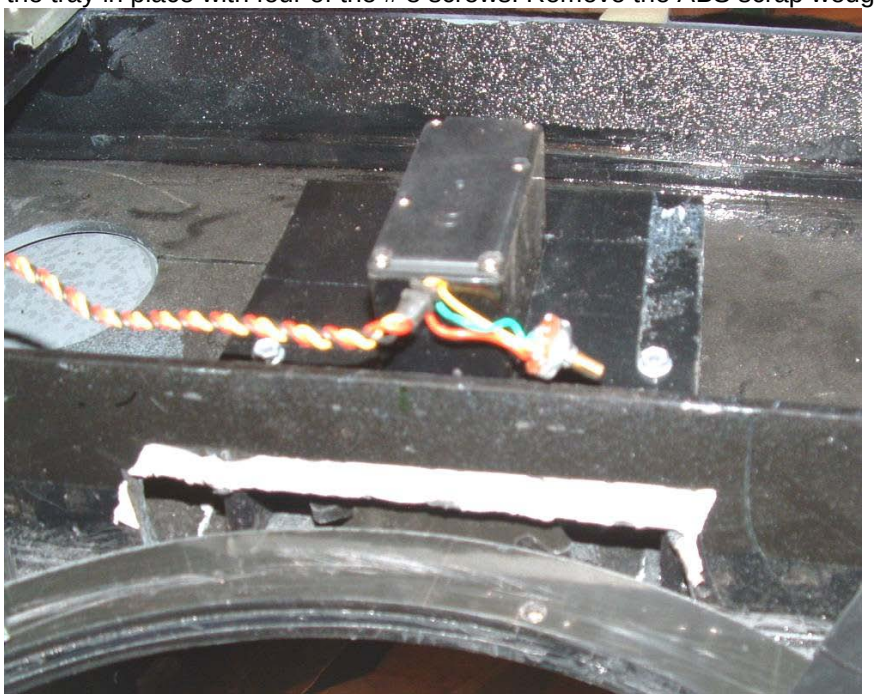
Step 11: Ring Retainer Installation: With the ring assembly still clamped in place, arrange the four Ring Retainer stacks at equal distances around the ring assembly. The Ring Retainers will keep the Ring Assembly in place as the turret is rotated. Glue the Ring retainers to the Upper Hull, with the inner arc of the Ring Retainers just clear of the Ring Assembly. Too tight of a fit will result in too much friction during operation. Too loose of a fit will allow the Ring Assembly to wobble and will damage the teeth of the Ring Assembly as well as the teeth of the servo sprocket.

Step 12: Ring Retainer Caps: There are four Ring Retainer Caps. Each of the caps consists of two arcs. Glue the inner piece to the outer arc. The reason for the cap being two pieces is as a safety break away in the even that the Ring Assembly binds. This will allow the cap to split without damaging further parts. Note that each of the outer caps have two holes. Place a Retainer Cap over each of the four Ring Retainer stacks. Mark the hole locations and drill out using a 1/8" drill bit. Secure the caps in place with two screws.



Step 13: Ring Assembly Postioning: Remove the clamps holding the Ring Assembly in place. With the clamps removed, there should be some play in the vertical direction for the Ring Assembly. There should be almost no play in the horizontal direction. Use some pieces of scrap ABS as wedges between the Upper Hull and the Ring Assembly. Install the servo which is mounted on the servo plate and with the servo sprocket in place. Slide the servo tray in place so that the servo sprocket meshes with the Ring Assembly tooth gear. Install so that the gears mesh, without binding.

When satisfied with the fit, drill two holes through the servo tray into each of the "L" brackets. Secure the tray in place with four of the # 8 screws. Remove the ABS scrap wedges.



Step 14 Servo Operation: The photo above shows the potentiometer which is the knob protruding from the servo. This should only be adjusted to set the center point of the servo travel. This is checked with the servo plugged into the battery and the receiver and the transmitter turned on. The transmitter trim adjustments need to be centered. If the servo is not operating, the potentiometer is set properly. If the servo is operating, the potentiometer needs to be adjusted until the servo stops moving. Once it is set, it is recommended to mark the knob location and to apply a tiny drop of glue to stop any movement of the knob due to vibration.

Step 15 Fitting Upper to Lower Hulls: It may be necessary to cut out a section of the sidewalls on the Lower Hull. Place the Upper Hull on to the Lower Hull. Check the fit and the clearance required for the Ring Assembly to the Lower Hull. Mark the Lower Hull where material needs to be removed. Lift off the Upper Hull, and remove the sidewall material as necessary. Refit the Upper Hull and recheck for proper clearance.

Step 16 Turret Keying: With the turret turned upside down, pick up the upper hull and place over the turret. With the dowels removed from the Ring Assembly, mark the locations of two the holes on the bottom surface of the turret. Select two holes that are across from each other. Drill out the two holes with 3/16” drill bit. Use two of the wooden dowels and round one end of each of the dowels. Glue the dowels to the Ring Assembly with the bottom of the dowel flush with the bottom of the Ring Assembly. These two dowels are to be used as keys when attaching the turret to the Upper Hull. The turret is removable for access to the hull and for transportation. Note that the hatches have been taped in place to avoid damage when turning the Upper Hull upside down and during work.