

Take case off tape deck (plastic part)

From the side loosen and remove reel table and brake drum will come with it.

Take a soldering iron and before unsoldering motor leads write on the aluminum frame the order of the wires. It would be Red, Ground and White in one order or another then unsolder those wires. Next take out the two screws that mount the frame-board to the motor rear.

Now take a Philips screwdriver and remove two screws from the bottom most mount of the motor on the front - there are three of them. The last screw at the top area should be loosened and taken out while the other hand holds the motor from the back. When that screw comes out the motor will drop if you do not hold onto it and it could damage something.

Now that the motor is out, take a ruler or straight edge and place it along the motor length wise and draw a line at both end caps of the motor and body with a Sharpie felt tip pen. This is for alignment of the magnet and end cap during re-assembly.

Now place the motor down on a table edge with wire end down as the two long screws that are lacquer sealed might take a bit of pressure to turn them. You don't want to use tools that will strip them. I always use Xcelite hardened tip drivers on my bench and I get them out every time. Take out the two screws and set them aside.

Now on the part of the motor without the wire coming out or the front part of the motor you can take that cap off. Keep track of the wave washer that pushes up against the bearing - now you will see one of the ball bearings. The NEXT part is the dangerous part.

#### Dangerous part of removal

Place a finger and push down on the motor shaft keeping the motor rotor in the wired end cap. While you do this you want to pull up on the magnet section (middle of the motor) and get it high enough so that you can grab the coils of the rotor section as they become visible always keeping the rotor in place. It will try to come out as you pull the magnetic section up off the motor. Once you have the magnet section off and set aside that is past the dangerous part or most of it. What you have left is the rotor sitting in the bearing of the brush containing end cap. Next take a 6-9" piece of solid copper telephone wire the 30 gauge type. I bend a small greater than 90 degree hook in them at end about 1/4". Now with two of these you can place the hooks into the holes in the spring stock at the rear of the brushes. When both wires are in place gripping the end cap and pinching the wires between cap and fingers, on each wire pull on it and maintain the brushes back on each side so that the white washer on the motor shaft will pass through the brushes without contact. The most delicate issue is not to destroy the brushes. I have rebuilt hundreds of motor like this and two the other day. Once the rotor is out of the bearing and end cap, it can be set aside.

The rotor has the commutator on it. This needs to be cleaned out in the grooves where carbon likes to collect. I have found that the Trac II blades from old razor blade cartridges seem to be thin and made of some form of stainless that is tough. I slide these blade parts - I cut some off with a scissor or wire cutters to leave a small 1/8" piece for this work. They seem to be about 15/1000" thick material. Once the carbon is all pushed out I blow on the gaps with a small straw the kind that are used for mixing drinks, then I place the motor shaft in my drill chuck and I rotate the rotor so that a 400 grit sandpaper piece can resurface the commutator not taking much off but removing scratches or marks left by the brush, then clean all of the commutator surface with alcohol leaving no fibers behind. Now it is just a matter of putting it back together in reverse. The oil on the rear motor shaft does no good for the motor but it helps you get the shaft to slide into the bearing. Hold the brushes apart and slide the motor shaft down into the bearing and until the commutator is at the place where it should be then let go of the brushes and take the hooks out of the spring holes and rotate the motor rotor. The brushes need to be in contact with the commutator if not take apart again and push the spring copper inward and do not pull back so hard this time. Now with that done comes the magnet structure again. Hold the shaft down in the wired end cap and place the magnet structure down to meet the end cap. Then just place the top end cap on and rotate the magnet

structure until the lines line up. Then it is just a matter of getting the long screws started and the motor back together.

Now you can mount the motor back in the deck and solder the wires where they go. Next is the alignment of the reel table. Of course if the motor is on the left make sure to place the counter belt back onto the pulley section of the brake drum. Then place it on the motor shaft approximately on position and mount a mechanical tape. You can adjust the reel table so that the tape is exactly in the middle of the reel flanges or when the tape is played that it packs on the center of the reel hub. Do not tighten the reel table screws with mega force as this is only an aluminum part. I have seen the fast wind time go from 2:44 time to less than 90 seconds for a 1800 foot roll of tape. One X10R I did had tape finish in under a minute which is not that typical. Nakmandan saw it.