

## WARRANTY

TEKIN ELECTRONICS, INC. guarantees this TSC to be free from factory defects in materials and workmanship for a period of 120 days from date of purchase, verified by sales receipt. This warranty does not cover: suitability for specific application, components worn by use, application of reverse or improper voltage (fuse provides protection in most cases), tampering, misuse or shipping. Our warranty liability shall be limited to repairing unit to our original specifications. Because we have no control over the installation or use of this product, in no case shall our liability exceed the original cost of the product. Additionally, these items void the warranty:

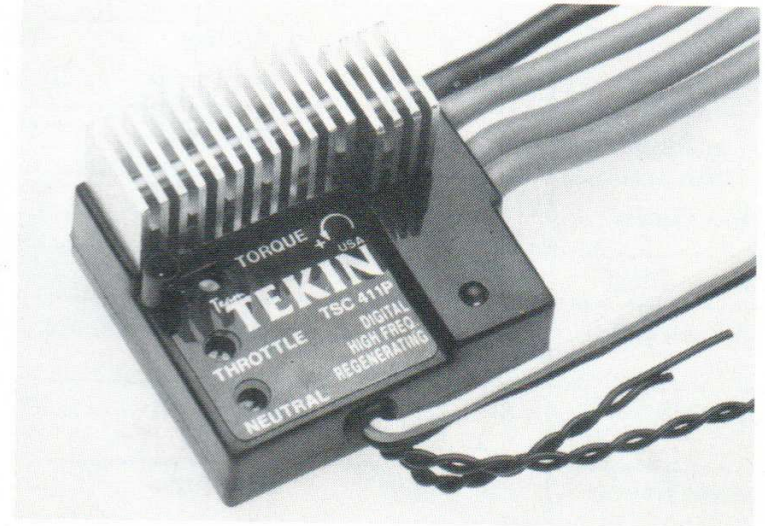
1. Using the same polarity connectors on the battery and motor wires from the Speed Control.
2. Wires or connections which are exposed and not insulated properly.
3. Shorting the BEC.
4. Allowing water or moisture into the ESC.
5. Incorrect wiring.
6. Not using heatsink.

By the act of using this Speed Control the user accepts all resulting liability.

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# TEKIN®

IFMAR World Champions



## TSC410S, TSC411P, and TSC420F

- Digital speed controls
- Digital glitch elimination
- Universal connector system
- Varitorque adjustable Electronic torque control
- High frequency linear current motordrive
- Regenerating battery recharging
- Electronic B.E.C. bypass switching
- Megafet mosfet transistors (411P and 420F)

**USER'S GUIDE**

# TEKIN SPEED CONTROLS

## REGENERATING AND RECHARGING

	Model TSC410 S	Model TSC411 P	Model TSC420 F
Power Plugs	Tamiya/Assoc.	(1) Gold	(1) Gold
Power Wires	(4) 15 GA silicone	(3) 13 GA silicone	(4) 13 GA silicone
Voltage Drop	.0035 OHM	.0025 OHM	.0018 OHM
Voltage Input	4-10 Cells	4-11 Cells	4-20 Cells
Case Size	1.56 x 1.46 x .59	1.56 x 1.46 x .59	2.00 x 1.52 x .62
Current Rating	250 amps	250 amps	400 amps

BEC Output .....5.7V  
 Limiter Current .....20-140 amps  
 Test Point .....Direct Reading, amps  
 Fuse .....TEKIN #Fus 050  
 Plugs Included .....Air/Sanwa, Futaba J,  
 .....Jr., KO, & Kyosho Pulsar  
*Specifications subject to change without notice*

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## INTRODUCTION

The TEKIN TSC Series are the most advanced, best performing speed controls available for the 90's. Here's why:  
They allow motor commutators to last 2-5 times longer than normal Speed Controls.

Batteries charge when brakes are applied.

Motor current is regenerated while driving.

Custom totally digital signal processing circuit chip has built in digital glitch detection and elimination.

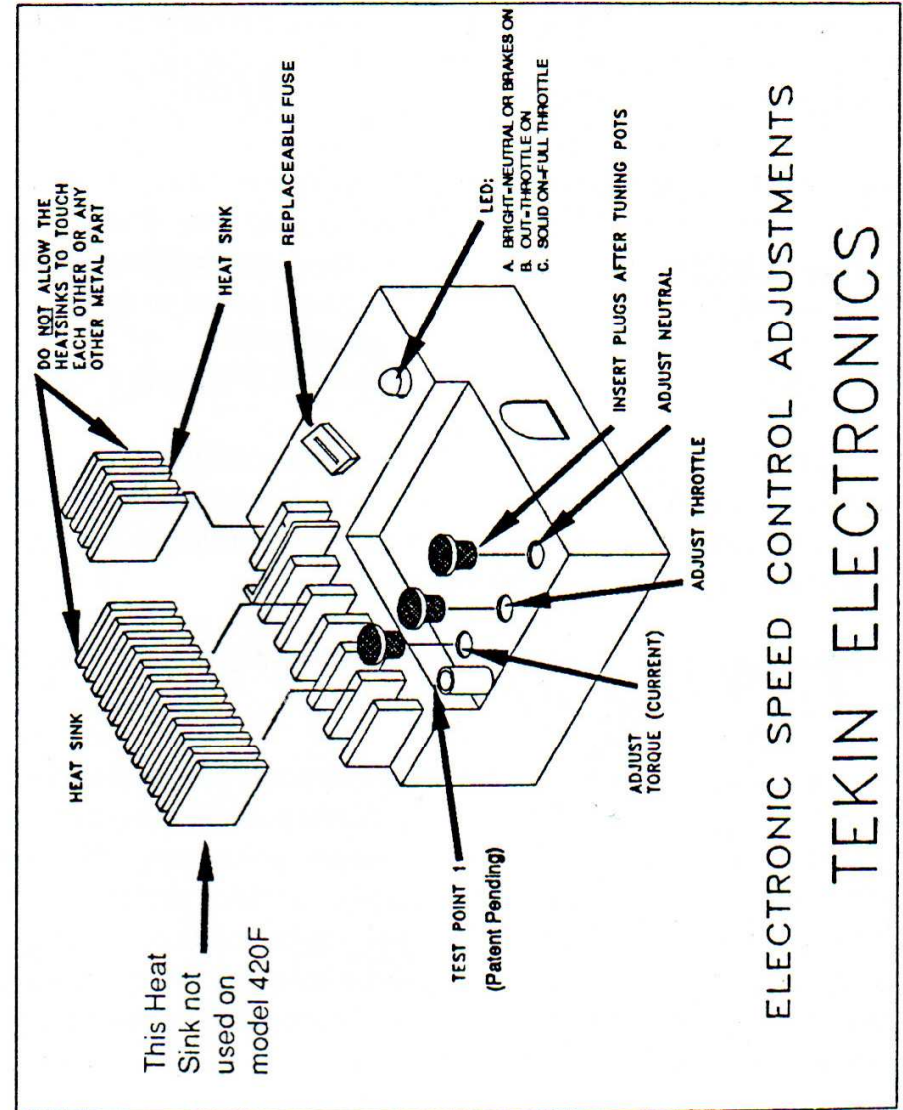
Fully compatible with autocount lap scoring systems.

SMT surface mount technology robotically assembled for highest component density, lightest weight and reduction of through hole parts.

Built in 5.7 volt B.E.C. (Battery Eliminator Circuit) for 10% faster steering response than usual 5 volt systems. Short circuit proof.

Built in electronic B.E.C. bypass. Automatically bypasses the B.E.C. when the voltage drops down. Eliminates need for hassling with the pig tail leads, works on 4 cells without requiring a receiver pack and prevents all cutting out and stuttering which is common with other ESC's, especially in the last minute of the run.

A multilayer circuit board is used for compact size. Four wire power system for easy hook up (TSC410S and TSC420F). One red wire may be removed if desired for maximum power.



## CONNECTOR SELECTION

This speed control is equipped with the universal radio connector system. It can be used with Airtronics/Sanwa, Futaba J, JR, KO and Kyosho Pulsar radios.

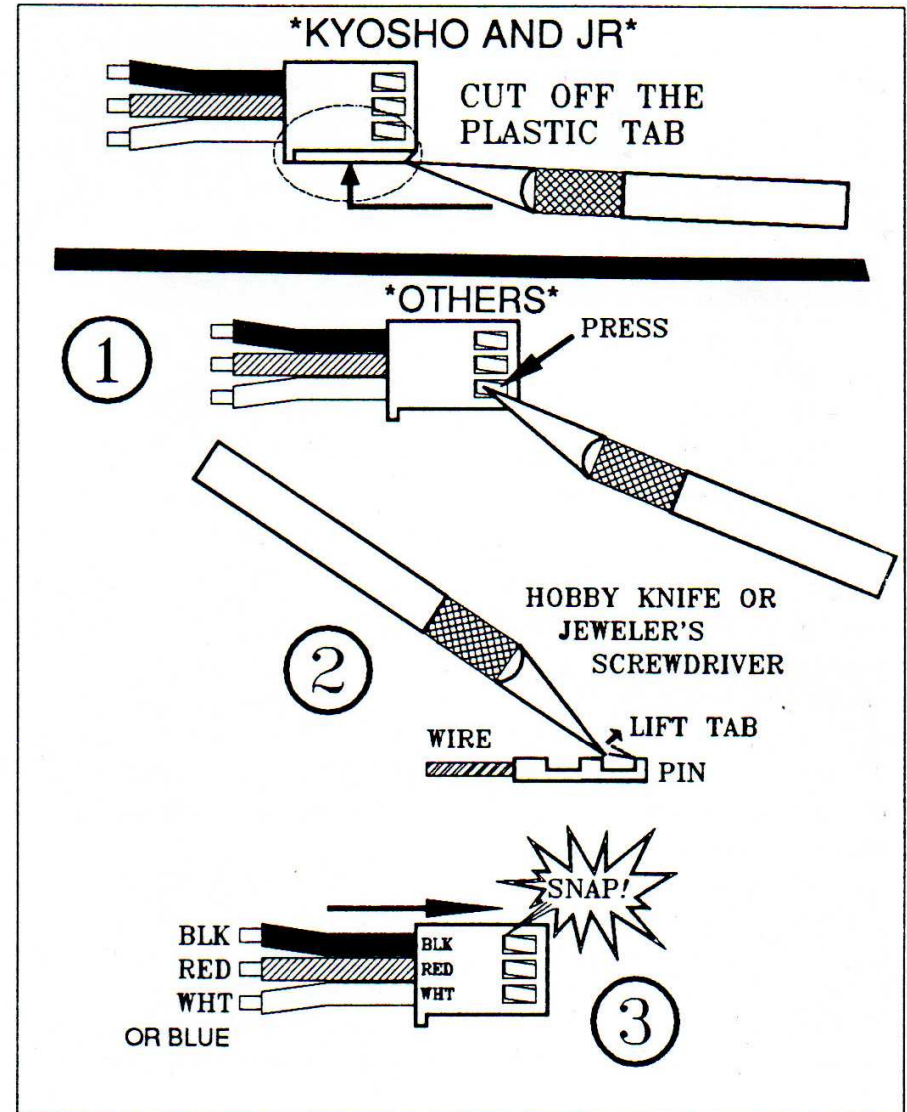
The standard plug supplied with the TSC is the Futaba J. If you have a Futaba radio then you just have to plug it in. If you have a JR or Kyosho radio then use the Futaba J housing and cut the small plastic tab off as shown, using a pair of pliers or cutters.

If you have an Airtronics or KO radio then follow the steps below:

1) First of all make sure the battery is disconnected from the speed control. Using a small hobby knife, or a jewelers screwdriver, press the three metal tabs in slightly in order to release the pins. Remove the pins from the plastic housing.

2.) Again using a hobby knife or jewelers screwdriver, lift the metal tabs back up that you just pressed down.

3.) Select the plastic housing that matches your radio system and insert the pins back into the housing. Make sure that you put the wires in according to the lettering on the plastic housing. The red wire is labeled "red", the black wire is labeled "blk", and the white wire is labeled "wht". If you do this wrong the speed control or the radio may be damaged. This will void the warranty. When putting the pins back in the housing make sure the metal tabs line up and snap into the openings on the housing.



## MOUNTING

**A** Use double sided servo tape to mount. Position unit for maximum air-flow over the heatsinks. Heatsinks are MANDATORY for all races less than 8 minutes (or any model which pulls more than 10 amps average current) and are recommended for 8 minute races. When installing heatsinks **DO NOT USE SUPER GLUE** or any type of glue or damage can result. If heatsinks are too loose, press end fins of heatsink inward to increase tension. Make sure the heatsinks are away from any metal where a short circuit could occur.

**B** Mount switch with servo tape, contact cement, or silicone glue. **DO NOT USE SUPER GLUE.**

**C** Special mounting notes. On RC10 cars mount TSC in the pan and put the receiver and antenna on the shock tower to avoid radio glitches.

## HOOK UP

**AA** Use extreme caution when installing and using your Speed Control, as extensive damage can easily be done. See your dealer if you need assistance.

**A** The Speed Control supplies power to the receiver and servo. No additional power supply should be used for the receiver. Make sure the battery plug of the receiver is disconnected. If receiver has B.E.C. do not use receiver's B.E.C. Be careful to avoid turning on the radio when the batteries are charging.

**B** Plug the wire harness from the Speed Control into the throttle channel of the receiver. The TSC supplies a regulated 5.6 volts for receiver and servo when running on 4 to 10 cells. The regulator puts out enough current for one servo maximum.

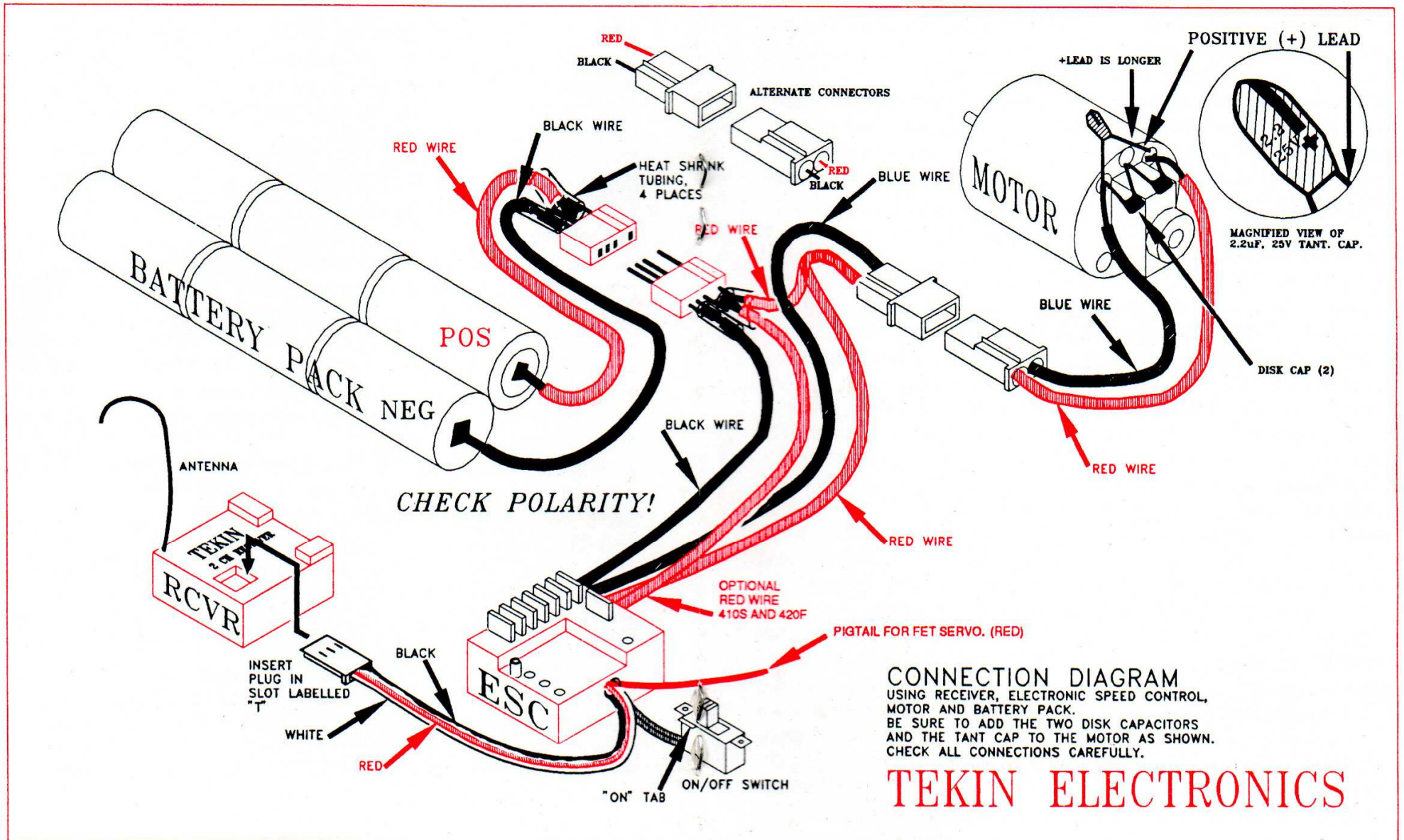
**C** Wires should be connected as follows; the black wire from the Speed Control to the negative (-) battery; the light blue wire from the

Speed Control to the negative (-) motor; one red wire from the Speed Control to the positive (+) battery, and another red wire to the positive motor. Be sure to use large wires or they can melt. To get maximum power to the motor keep the wires as short as practical. If plugs are used be sure there will not be any exposed pins from the Speed Control if the motor is unplugged.

**SPECIAL INSTRUCTIONS FOR TSC 411P.** The TSC411P has heavier wires for oval and high power applications. The TSC411P has one large red wire running out of it. This should be connected to the positive battery. Run a second, separate, red wire from the positive battery directly to the positive motor. See drawing. This gives maximum power to the motor. **NOTE:** If connectors are used with the TSC 411P they should be gold types for maximum power. 3 capacitors are required on the motor. 2 small disk type (.1uf) and 1 Tantalum type (2.2 uf 25 v) (see drawing p.11). If these type and size capacitors are not used the unit may glitch or not lap count. **DO NOT** use a 47 uf aluminum "Barrel" type capacitor with this TSC, it will cause the batteries to dump.

**SPECIAL INSTRUCTIONS FOR USING A FET BOOSTER SERVO.** A red pigtail lead comes out of the TSC. Connect this to the blue Servo lead with a 3.3 uH choke soldered in between. The model TSC420F does not use a pigtail. The TSC420F has a special high AMP. B.E.C., the world's first, and can drive FET and SANWA and other super servos directly from the B.E.C.

**SPECIAL INSTRUCTIONS FOR THE TSC 420F.** The B.E.C. on the TSC 420F will operate up to 20 cells, saving the weight of the receiver pack, a further advantage when drag racing or boat racing. When running over 10 cells you may need to place a heatsink on the B.E.C. transistor (the single metal tab sticking out by itself) in order to prevent radio cut-outs.



## FUSE

This speed control has an exclusive TEKIN replaceable fuse to protect against reverse voltage battery connection. In most cases there will be no damage to the speed control or radio system. If the fuse blows the speed control operation will become erratic when throttle is applied, until the fuse is replaced. To replace the fuse pull straight out. Make sure there are no metal pieces left behind on the two gold posts inside the fuse opening. Then replace the fuse with TEKIN part #FUS 050.

## TRANSMITTER ADJUSTMENTS

**A** Adjust transmitter as follows:

**MAGNUM JUNIOR:** (refer to Futaba FP-2P instructions)

1. Set mechanical throttle neutral adjuster to position 2 as per Fig. 5. Skip this step on newer model FPT2PBKA.
2. Set throttle trim fully counterclock-wise. Do not adjust again.
3. Set throttle ATV high pot to 5.
4. Set throttle ATV low pot to 6. This is the adjustment you use for more or less brakes, not throttle trim.

**MAGNUM SENIOR:** (refer to Futaba FP-3PG instructions)

1. Set throttle neutral adjuster 2 as per Fig. 3.
2. Set brake trimmer knob to minimum.
3. Set throttle high side trim knob to maximum.
4. Set throttle exponential knob to minimum.

**FUTABA MAGNUM PCM1024**

1. Set channel 2 reversing switch to reverse (up).
2. Set throttle sub trim pot to 8.
3. Set throttle trim to neutral.
4. Set throttle ATL pot to position 10.
5. Set throttle ATV low and high pots to 5.
6. Set throttles exponential pot to -4.
7. Set mechanical throttle neutral adjuster to 1/3.

**PULSAR EXP 2001**

1. Set throttle reversing switch to normal (to the right).

2. Set throttle EPA to HI (fully clockwise).
3. Set throttle EPA to LOW (fully clockwise). Use for brake adjustment.

**KRAFT KB2KW & KO PROPO:**

1. Set the high and throttle trim adjustments to maximum.
2. Set throttle exponential to minimum.
3. Set brake trim to minimum.

**AIRTRONICS XL2P & CS2P:**

1. Set brake trim to HI. This gives zero brakes.
2. Set throttle EPA low and back adjustments to maximum. Set EPA high in the middle.

**OTHER TRANSMITTERS:**

The transmitter adjustments should be similar to one of the above.

**B** It is recommended that you remove the Pinion gear from motor and/or make sure the car is on a stand before adjusting. This helps prevent any accidents.

**C** Turn on the transmitter and Speed Control.

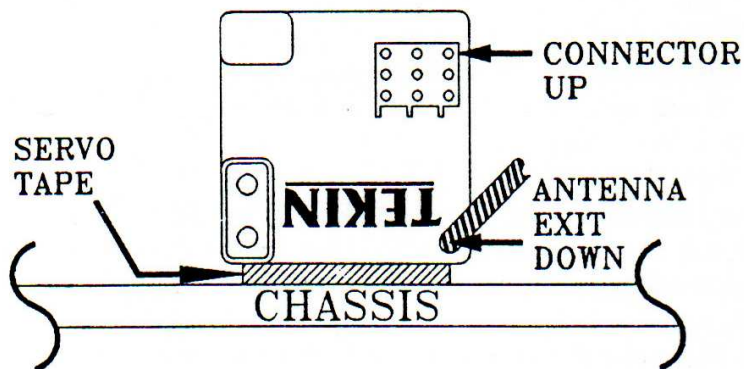
**D** Rotate the neutral (N) pot on the Speed Control until the motor just stops. The LED will be on bright indicating neutral. Use a 3/32" or 1/8" screw driver (Phillips or straight type will work) and exercise care. **NOTE:** The TSC 420F uses a dual color LED. When the Speed Control is in neutral the light is red. At full speed the light is bright green, when brakes are applied the light is dim green.

**E** Advancing the throttle slightly should cause the throttle to come on. If not, flip the throttle reversing switch on the transmitter and repeat step D.

**F** Advance the throttle on the transmitter, then adjust the throttle (T) pot on the Speed Control until the LED suddenly comes on bright, then increase a little more. The LED should go out when the transmitter trigger is about 1/8" from full throttle.

**G** Adjust the brakes with the transmitter brake trim. As brakes are applied the LED will come on brighter. When the throttle is ON the LED will go out, except when full throttle is reached, when it will come

## MICRO RECEIVER INSTALLATION



on solid. The LED is more precise than digital voltmeters and is your guarantee that you are reaching full throttle.

H Feel free to readjust as required for best operation, then place a rubber plug over the holes.

I RADIO INSTALLATION TEST. The Tekin TSC uses a high frequency pulse to the motor. This improves performance, but a little extra care must be used to prevent radio glitches. When the speed control is installed and the batteries charged you should turn the car on. Hold the rear wheels so that the motor is stalled and apply PARTIAL throttle. Check to see that the steering servo stays steady. If it does not, then you will need to move the receiver and /or motor wires around in the car. Do not run a large battery power wire near the receiver. You may need to install the receiver on its side. Tekin receivers are highly recommended. They should be installed on their side with the plugs up and the antenna and crystal down.

## SET - UP TIPS

Due to the advanced design of this speed control, operation is a bit different.

First of all, if you are running 8 cells or less there is no need to run a receiver pack with this speed control, in fact it will just slow the car down. The power drawn by the SERVO and radio gear is enough to power the car for less than 4 seconds, and the extra weight of the receiver pack will slow the car down more than this. This is possible only with TEKIN regenerating speed controls, and is due to the built in BEC bypass circuit which keeps the receiver voltage up until the end of the run. On 9-11 cells a receiver pack is required.

A receiver pack may be used if desired by simply plugging into the "bat" socket on the receiver. When doing this the speed control must be left turned off. Place a piece of tape on the switch or remove it in order to make sure it does not get turned on. If the speed control switch is accidentally turned on it can damage the TSC and void the warranty. A small switch should be used on the receiver pack to operate the radio. The receiver pack must be 4 - 5 cells maximum. Charge the receiver pack at the 1/2 amp setting on the TEKIN BC100L linear charger. Sometimes a receiver pack is helpful on 4 cells, or if you are under weight.

When charging your race batteries, you do not need to get them quite so hot before racing, noticeably warm is best with this speed control. Be sure to use the heatsinks supplied at all times. This speed control has thermal overload protection circuitry, but heatsinks are required for proper operation. Not using the heatsinks voids the warranty. (The TSC420F does not require the large heatsink, just the smaller one.)



Changing the motor and battery plugs will **not** void the warranty, as long as the unit is not hooked up backward.

1.) The torque pot is used to adjust the torque of the motor. When setting up the car we recommend you start with a pretty hot motor, something with good bottom end. Gear the motor just a little bit on the high side, so that run time would normally be a problem. Then go out and drive the car, start with the torque control turned down, then slowly increase it until the bottom end power comes back, and it is just starting to spin out when you punch it out of the corners.

There is a test point provided to check the setting. To use the test point you need a digital voltmeter. Set the meter to the 20V range. Connect one lead of the meter to the negative (black) lead of the Speed Control, where the wire connects to the battery. Touch the other lead to the test point. Turn on the Speed Control; you do not have to have the transmitter on, but you can if you want. If you are in the pits and cannot turn on the transmitter, then unplug the Speed Control from the receiver to prevent the car from going crazy. Check the reading on the meter. It will adjust from about 0 - 1.20 by turning the pot. This is approximately the amperage output of the Speed Control. The actual amperage will be slightly higher due to the varitorque design. 75 amps is the recommended starting point, and will work well for most applications.

This will be very close to the optimum setting. Increasing the torque control beyond this point will cause very little increase in power, but will dramatically reduce the run time. Turning the torque control up too high will only cause the motor to get hotter,

the power to fade excessively after a few laps, and the batteries to dump quicker. Overall the car will be slower.

When you apply brakes with a TEKIN TSC the batteries are actually recharged at up to 30 amps. When you then come out of the corner you will notice a little top charge on the batteries. Because of this you can run some brakes in many cases.

You will notice the commutators on your motor lasting an amazing 2-5 times longer than any speed control you previously owned. This is TEKIN technology at it's finest. There is nothing to do but enjoy the improved performance and much reduced motor costs.

#### **DRAG RACING:**

The torque control adjusts up to about 120 amps. Some drag racing motors can pull more current than this. If there is good traction and you need the maximum amperage, then we recommend you go to the TSC420F. With the TSC 420F you can run a jumper wire from the test point to the red receiver wire (5.7v) in order to bypass the torque control. In this case the TSC can put out over 1000 amps peak.

#### **TROUBLESHOOTING**

**1 SERVO AND THROTTLE DEAD:** Batteries dead, bad connections to Speed Control, receiver plug connection bad, customer installed receiver plug wired wrong, switch needs replacing, broken wires, bad crystals, radio equipment or blown fuse. Internal Speed Control damage caused by connecting battery backward. Return to factory.

**2 SERVO WORKS, THROTTLE DEAD:**

Motor bad, bad connectors to motor, motor brushes hanging up. Speed Control not adjusted correctly, receiver plug or connection bad, ESC not plugged into throttle channel on receiver.

**3 THROTTLE WORKS, SERVO DEAD:**

Servo plug or wiring bad or incorrect, servo bad.

**4 STUTTERING UNDER HEAVY ACCELERATION:**

Magnetic field interference of receiver. Mount receiver on it's side. Space receiver up off chassis 3/16". Rotate or mount receiver on it's other side. Move power wires away from receiver. Blown fuse, replace fuse.

**5 MOTOR CUT OUT OR RADIO INTERFERENCE OR ERRATIC BRAKES:**

NO CAPACITORS ON MOTOR, try 2 sets of capacitors. Speed Control wiring to receiver or servo incorrect. TRANSMITTER BATTERIES LOW, radio out of tune. Also, 3 wire cable from Speed Control to receiver too long, should be 6" maximum. Tips: this TSC radiates less than 1/10 the noise of most popular ESC'S, and you should have no trouble, but if you do then mount the TSC in the pan and the receiver at the top of the shock tower. Mount antenna at the top of shock tower, too. Do not run antenna along a metal or graphite chassis; it should exit receiver and then go straight up. Keep receiver and antenna away from motor. RECHECK STEP J (page 13-14)

**6 DOESN'T AUTOCOUNT:**

3 caps required on motor, see drawing page 11. Mount transponder in front of car, not directly over or under wires or batteries. Move autocount pickup to place on track where throttle is wide open, not accelerating.

**7 MOTOR WON'T SHUT OFF, RUNS SLOWLY:**

Moisture in Speed Control. Disconnect battery and let dry.

**8 TSC SHUTS DOWN:**

Motor shorted or stalled, motor capacitor shorted. Gears or transmission binding. Heatsinks needed, more airflow needed.

**9 BRAKES DON'T WORK AT ALL:**

Improper TSC adjustments, Damaged TSC. Brake heatsink needed.

**REPAIRS**

This electronic Speed Control is the most advanced unit available and we believe also the most reliable. As long as it is not abused it will give years of frequent service. In the rare event you do have a problem, you may proceed as follows.

**WARRANTY:** Hobby dealers and distributors are not authorized to replace units thought to be defective. Repairs must be returned directly to the factory. A sales receipt must be enclosed. If unit is working properly and you just want it checked over there will be a small inspection charge.

**NON WARRANTY** repairs may be sent directly to the factory. We are not responsible for independent service stations. No estimate is provided. Customer assumes responsibility for charges, which will never exceed 50% of the list price. Repairs are returned via UPS/COD/CASH. You must enclose a note stating the problem, the legible return address, and any special shipping instructions. We can not return units to a P.O. Box unless payment is sent with TSC. Please allow sufficient shipping time, up to 2 weeks. **Hobby Dealers** will not replace units thought to be defective, these units must be returned directly to **TEKIN ELECTRONICS, INC.** for repair. Repair prices are as follows; flat rate labor \$7.00, replace wires \$4.00, replace switch \$5.00, replace plug \$5.00, repair brakes \$6.00, COD \$4.00, 2 day return shipping \$4.00, next day return shipping \$14.00. Most repairs are shipped back out within 3 working days. Rates subject to change. Sorry, we do not repair non-TEKIN ESC's.  
**SEND REPAIRS TO:**

**TEKIN ELECTRONICS**

970 CALLE NEGOCIO, SAN CLEMENTE, CA 92672