

LIMITED 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. Allowing water or moisture into the TSC.
3. Incorrect wiring.
4. Not using heatsink.
5. Damage occurring from improperly soldering to wire terminal posts.

Tekin, Inc.
McCall, Idaho
(208) 634-5559
www.teamtekin.com

- Digital speed controls
- Universal connector system
- Varitorque adjustable electronic torque control
- Electronic B.E.C. bypass switching
- Convenient gold wire terminal posts (except 410S)
- High freq. linear current motordrive - makes your motor's commutator last 2 to 5 times longer, while also extending run time 15 -25%
- Regenerating battery recharging - charges batteries when you apply brakes
- Protected against reverse battery voltage
- Built-in Schottky diode - no external diodes needed
- High power (6 amp) B.E.C. handles any servo
- Will power large dual motor trucks (411-G2 and 420-G2)
- Dual brake transistors
- New lower voltage drops

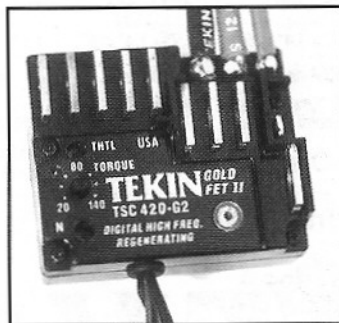
OWNER'S MANUAL

TSC 410-S2

TSC 411-P2

TSC 411-G2

TSC 420-G2



MADE
IN
USA

TEKIN

LEADERS IN RACE QUALITY SPEED CONTROLS

SPECIFICATIONS

Regenerating and Recharging Speed Controls

BEC Output	6.0 V
Limiter Current	20-140 Amps
Test Point	Direct Reading, Amps
Fuse	No-Loss Power Link
Plugs Included	Air/Sanwa, Futaba J, Jr., KO & Kyosho Pulsar

	TSC 410S 2	TSC 411P 2	TSC 411G 2	TSC 420G 2
Power Plugs	Tamiya/Assoc.	(1) Gold	(1) Gold	(1) Gold
Power Wires	(4) 15 GA Silicone	(3) 13 GA Silicone	(3) 13 GA Silicone	(3) 12 GA Silicone
Voltage Drop	.0030 Ohm	.0025 Ohm	.00125 Ohm	.00125 Ohm
Voltage Input	4-10 Cells	4-11 Cells	4-11 Cells	4-20 Cells
Case Size	1.7" x 1.4" x .6"	1.7" x 1.4" x .6"	1.7" x 1.4" x .6"	1.7" x 1.4" x .6"
Current Rating Continuous	250 Amps	300 Amps	300 Amps	300 Amps
Usage	General Purpose	Pro Model	Highest efficiency Pro Model. Twin Motors.	Twin motors Drag Cars, Insane Runs, etc.

Specifications subject to change without notice

Team
TEKIN®

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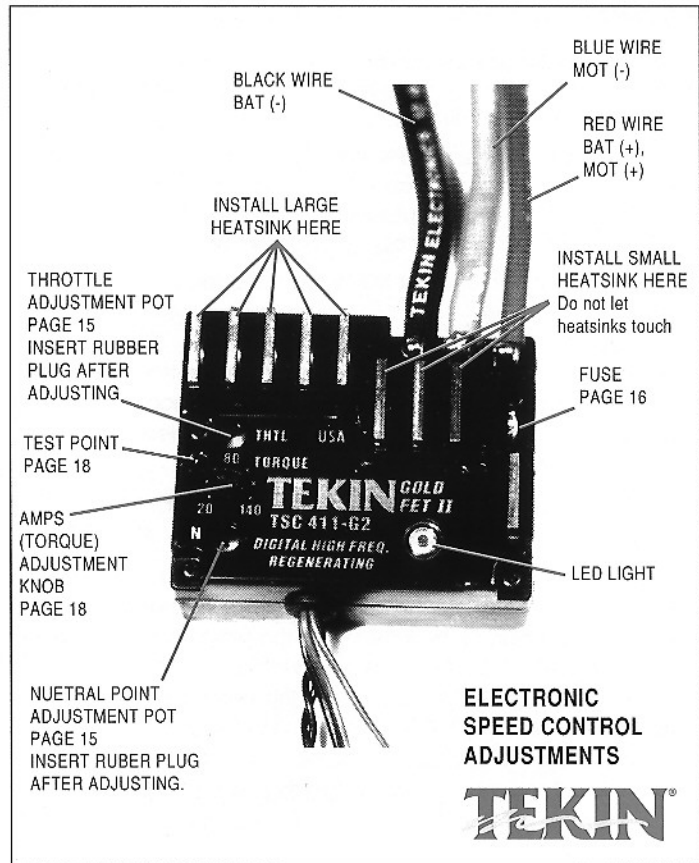
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Introduction

Welcome to the world of R/C Racing. The TEKIN TSC 2-Series are some of the most advanced, best performing speed controls available. **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 6.0 volt B.E.C. (Battery Eliminator Circuit) for 20% faster steering response than usual 5 volt systems. Short circuit and overload 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 cutting out and stuttering which is common with other speed controls, 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 (TSC 410S). One red wire may be removed if desired for maximum power.
- ▲ Easy-solder power terminal post.



**ELECTRONIC
SPEED CONTROL
ADJUSTMENTS**

TEKIN®

FIGURE 1

STEP1: CONNECTOR SELECTION

This speed control is equipped with the TEKIN Universal Radio Connector system. It can be used with Airtronics/Sanwa, Futaba J, JR, KO Propo and Kyosho Pulsar radios.

The standard plug supplied with the TSC is the Futaba J. If you have a Futaba or Tekin 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 cutters or a knife.

If you have an Airtronics or KO Propo 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 jeweler's 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 jeweler's 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.

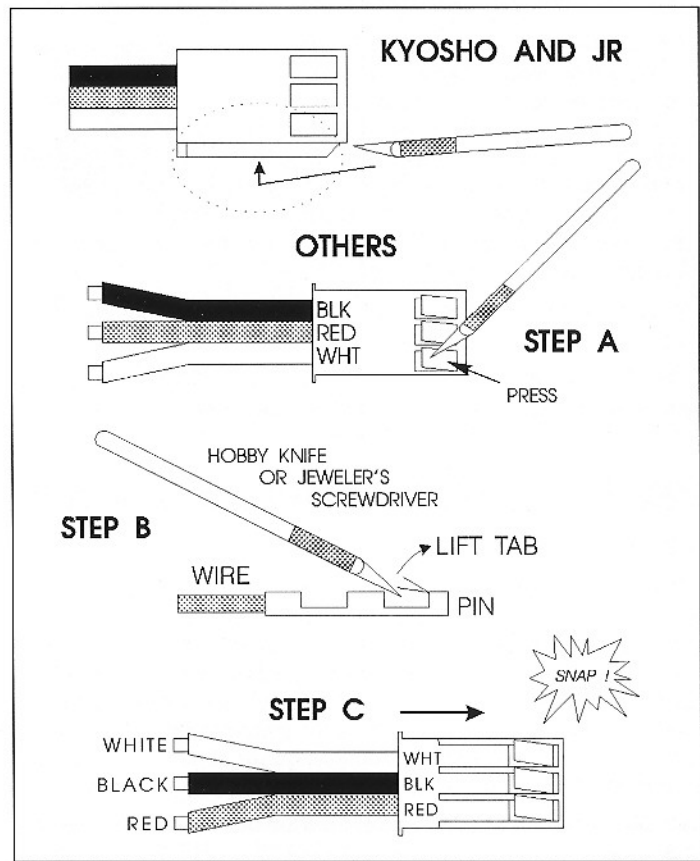


FIGURE 2

STEP 2: MOUNTING

- A) Use double sided servo tape supplied 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 15 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. See Figure 1, page 5.
- B) Mount switch with servo tape, supplied 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 (reception interference).

STEP 3: SOLDER AND HOOK UP

SOLDERING

The new "2" series of speed controls feature TEKIN's solid copper and gold direct solder wire terminal posts to attach your wires to. This allows you to always run wires short and just the right length for any installation, without worrying about them becoming too short. The posts are 10GA copper for lower resistance. You will need a very hot soldering iron, 700 to 850° F, and ordinary 60/40 electronic grade solder to attach or change the wires. **Follow the instructions below.** If you think you may experience difficulty, your local hobby dealer can probably help.

NOTE: Disconnect both battery wires from the battery before soldering to the posts.

TO REMOVE A WIRE FROM A POST, PROCEED AS FOLLOWS:

- 1) Have the iron very hot. Clean the tip and apply a small amount of solder. Quickly, with the tip still smoking from the flux in the solder, touch the tip to the top of the post. You may need to wiggle the iron tip slightly.
- 2) With the speed control secured in place, pull on the wire you wish to remove while applying the smoking, hot, iron to the top of the post. It will pull right off.
- 3) If there is a large quantity of solder remaining on the post you can remove it by heating up the post until the solder just starts to melt. Then quickly tap the side of the speed control firmly against the work bench and the excess will fly off.

TO ATTACH A WIRE, FOLLOW THESE STEPS:

NOTE: Disconnect both battery wires from the battery before soldering to the posts. Refer to the label on the end of the speed control for proper wire locations.

- 1) First, Strip the insulation of the wire back a small amount, 3/32" to 1/8" (about 2.7 mm). Then "Pre-tin" the wire by applying solder to the end until the end is thoroughly covered with solder. (You can shake any excess off the end while still hot, but be very careful where you do so.)
- 2) There should be a small amount of solder on the post. If there is none, touch the iron tip to the post and apply a small amount of solder to the post. Wipe the iron tip clean then apply a small amount of fresh solder. Proceed to step 3.
- 3) The speed control should be secured in place. Hold the wire's end in position, in contact with the flat spot on the post. Then touch the iron tip to the wire and press the wire toward the post. Wait about 2 seconds for the solder to flow, then remove the iron. It should only take 2 to 3 seconds to complete the soldering. If you have not com-

pleted the solder joint in 3 seconds remove the iron, clean the tip, apply fresh solder and start over.

- 4) Inspect the solder joint for shorts (a solder bridge going from one wire to the next), and repair if necessary.

HOOK UP

NOTE: 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. Make sure the battery plug of the receiver is disconnected. If the receiver has a B.E.C. do not use the receiver's B.E.C. Be careful to avoid turning on the speed control when the batteries are charging.
- B) Plug the small wire harness from the Speed Control into the throttle channel of the receiver. The TSC supplies a regulated 5.8 volts for the receiver and servo with 8 or less cells. You can use up to 4 micro servos, or 1 high power servo.
- 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 from the positive (+) battery 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. Install 2 small disk type (.1uf) and 1 Tantalum type (2.2uf 25v) (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 47uf aluminum "Barrel" type capacitor with this TSC, it will cause the batteries to dump and may explode. **NOTE:** Changing the motor and battery plugs will not void the warranty, as long as the unit is not hooked up incorrectly.

SPECIAL INSTRUCTIONS FOR TSC 411P AND 411G: The TSC 411P & 411G have heavier wires for oval and high power applications. Each has one large red wire running out of it. This should be connected to the positive battery. Run a separate second red wire from the positive battery directly to the positive motor giving maximum power to motor.

SPECIAL INSTRUCTIONS FOR TSC 420G: The 420G can handle up to 20 cells. When running over 8 cells, you must use a supplemental Schottky diode(s) on the motor (one Schottky diode in the speed control is good for up to 8 cells). When running over 14 cells you must use 2 extra diodes. Proper diodes are available separately-TEKIN part #SCH500. The Cathode (banded end) goes to + (pos., red) motor terminal & the Anode goes to the (-) (neg., black) motor terminal. Follow instructions enclosed with the SCH500. **WARNING:** When running over 15 cells, you must *disconnect the battery* from the speed control before charging or non-warranty damage will occur. If running 19 or 20 cells you must let the cells sit 2-3 min after charging so voltage can settle before connecting speed control or non-warranty damage will occur.



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 3.3uH choke soldered in between.

SPECIAL INSTRUCTIONS FOR DUAL MOTORS: The 411-G2 & 420-G2 handle dual motors up to 10 cells. If running 8 or less w/ stock motors, be sure to use enclosed heatsinks. If running modified motors or 9-10 cells, you must install external Schottky Diode (part #SCH500) on each motor or *non-warranty damage* will occur. Follow instructions enclosed with diodes. To wire up dual motors, connect one motor as shown in drawing on pg. 13. Run additional wires from + terminal of first motor to + terminal of the second & from the (-) terminal of first to (-) terminal of second motor.

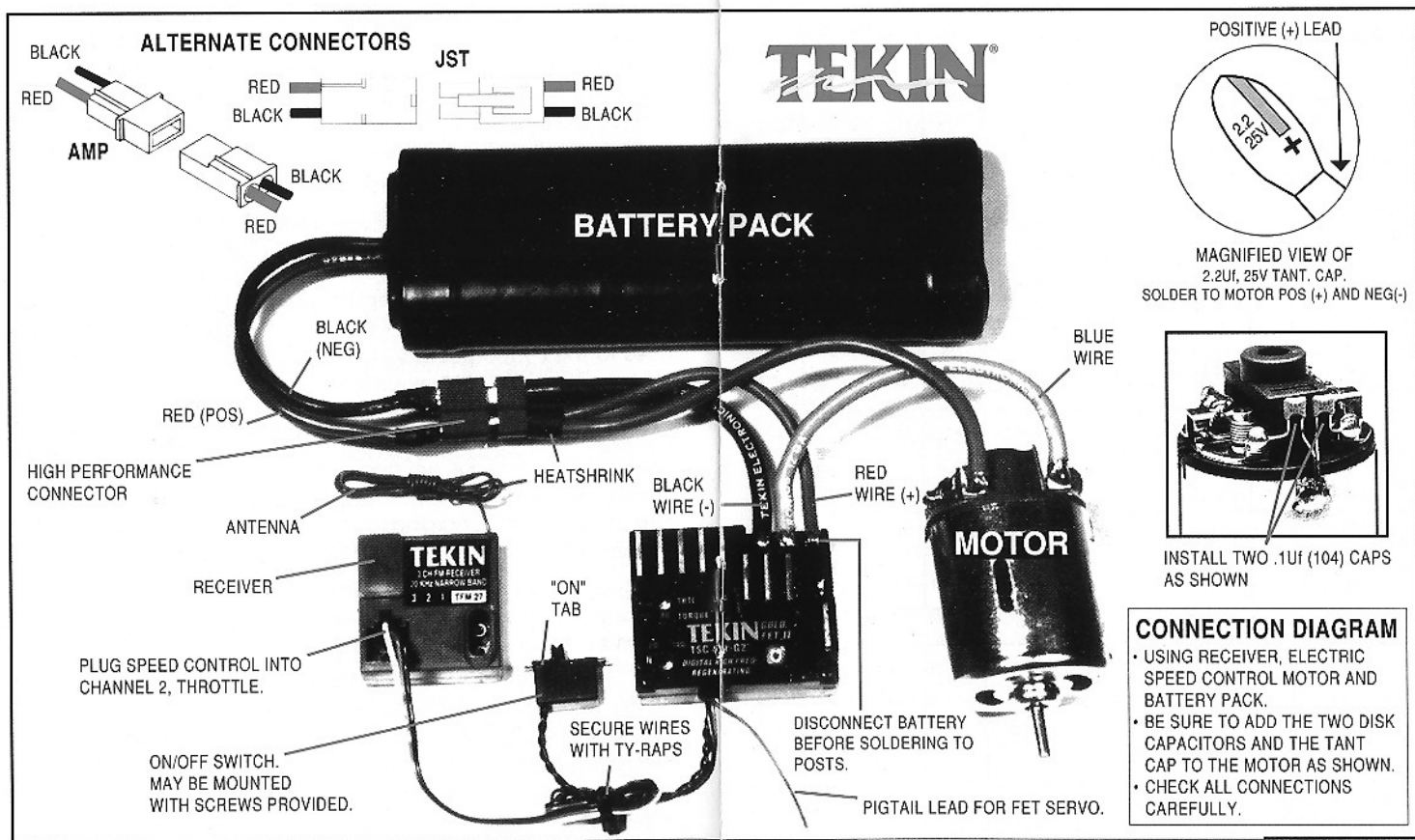


FIGURE 3

TRANSMITTER ADJUSTMENTS

TX TYPE	TH EXPO	ATL	ATV or EPA HIGH	LOW	TH. TRIM	SUB TRIM	REV SW	MECH ADJ	COAST BRAKE
FUTABA									
FP-T2PKA	--	--	5	6	--5	--	Right	Pos. 2	ATV Low
FP-3PG	0	--	10	--	--5	--	NOR	Pos. 2	Brake Trim
FP-T2P	--	--	--	--	--5	--	Rev.	1/2	None
FP-T2PB	--	--	--	--	--5	--	Rev.	Left	None
FP-T2PD	--	5	5	6	Low 5	0	Rev.	1/2	ATL
FP-T2PBKA	--	--	10	10	Low 5	--	Rev.	Left	ATV Low Pot
FP-T2NCS	--	--	--	--	Down	--	--	--	None
FP-T2NBR	--	--	--	--	Down	--	Rev.	Up	None
PCM 1024	--4	10	10	10	N	8	Rev.	1/3	Throttle Trim
AIRTRONICS/SANWA									
3P-FM	--	--	140%	CW	CW	--	NOR	--	Throttle Trim
XL-2P	--	--	Max.	Max.	Mid.	--	NOR	--	Throttle Trim
CS-2P	NOR	--	CW	CW	Mid.	--	NOR	--	Throttle Trim
VT-2P	--	--	--	--	Low	--	Left	Down	None
JR PROPO									
ALPINA-2	--	--	10	10	Mid.	--	NOR	--	Throttle Trim
PCM	--	--	--	--	CCW	--	NOR	1:1	None
KO PROPO									
EX-1	Min.	--	Max.	--	Mid.	--	Left	--	CH 2 Trim
EX-1 FM	Min.	--	CW	--	B	--	Down	--	Brake Dial
EX-II	--	--	Max.	--	Mid.	--	Up	--	Brake Trim
EX-5	--	--	Max.	--	Mid.	--	Right	--	Brake Trim
EX-7	--	--	--	--	CCW	--	Down	Pos. B	None
EX-9	Min.	--	Max.	Max.	Mid.	--	Left	--	CH 2 Trim
KYOSHO/PULSAR									
PRO 2001	--	--	H	L	Up	--	NOR	1/2	EPA Low

CCW = Counter Clockwise CW = Clockwise

STEP 4: TRANSMITTER ADJUSTMENTS

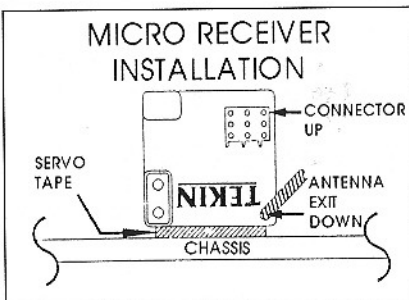
Refer to the chart on page 14 to make adjustments to your transmitter. **OTHER TRANSMITTERS:** For all other transmitters, the transmitter adjustments are patterned after one in the chart.

STEP 5: ADJUST THE SPEED CONTROL

- It is recommended that you remove the Pinion gear from the motor and/or make sure the car is on a stand before adjusting. This helps prevent any accidents.
- Turn on the transmitter and Speed Control.
- Rotate the neutral (N) pot on the Speed Control until the motor just stops. A red LED will be on at neutral. NOTE: on the 420G, there is a red light. Use a 3/32" or 1/8" screw driver supplied (Phillips or flat head will work) and exercise care.
- 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.
- 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.
- 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 on solid. The LED is more precise than digital voltmeters and is your guarantee you are reaching full throttle. If you don't have enough brake, try turning down the ATV or EPA high speed on the transmitter, then re-adjusting the throttle (T) on the speed control.
- Feel free to re-adjust as required for best operation, then place a rubber plug (supplied) over the holes.

STEP 6: 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 or battery wires around in the car. Do not run a large battery power wire or battery "strap" or "bar" 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. Keep at least 1/2" (13mm) away from the batteries or any power wires. **NOTE:** If the receiver must be mounted close to the battery or wires then a piece of metal foil may be wrapped around the receiver to shield the receiver from noise pickup.



FUSE

This speed control uses a zero loss solder-drop fuse, for good performance, and to eliminate the need to replace a fuse or schottky diode if you should accidentally connect the speed control to the battery backwards. Instead, just the solder will blow out. When repairing the fuse, it is essential that you use only the minimum amount of solder possible.

To repair the fuse, use a small tipped soldering iron. Wipe the tip off before starting. Touch the tip to the metal pins and apply a small amount of solder, as close to the pins as possible. Hold the soldering iron upright, so the solder will drip down the iron and onto the pins. If you apply too much solder, hold the speed control upside down, then touch the iron to the solder, so the solder can drip down onto the iron tip, then start over.

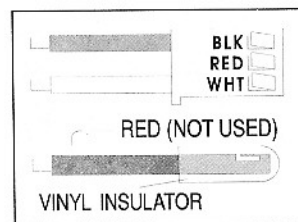
RECEIVER BATTERY PACKS

To use a receiver battery pack, first of all you need to adapt the plug going from the speed control and running to the receiver. Just remove the red wire from the receiver plug and place an insulating sleeve over the metal pin.

Plug the receiver battery, TEKIN part #RBP 030, 5 cells maximum, into the "BAT" socket on the receiver. Both the receiver battery switch and speed control switch must be turned on.

Charge the receiver battery on a TEKIN charger at 0.20 amps setting.

The built-in BEC regulator can handle 1 servo (even high power types) and up to 8 cells with no heatsink. For up to 10 cells, or 7 cells with 4 small servos and a gyro, you must use a heatsink on the regulator. With a heatsink, the 420 G2 (only) can handle up to 20 cells with a single small servo in a drag car.



SPECIAL INSTRUCTIONS FOR 4 CELL USE:

When running on 4 cells, especially with a modified motor, better performance can be obtained by doing the following:

- 1) Plug a 4 or 5 cell receiver battery pack into the "BAT" socket on the receiver. Leave all three wires from the speed control going to the receiver wired and connected normally. Turn the radio on and off with the switch on the receiver battery pack, **leave the speed control switch turned off at all times.** This will give the lowest operating voltage and best performance on 4 cells.

ADJUSTING THE TORQUE CONTROL

- 1) The torque pot is used to adjust the maximum torque of the motor. On a DC electric motor torque is proportional to amp flow.

There is an exclusive TEKIN test point provided to accurately check the setting. The test point allows precise adjustments for accurate tuning. 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 Volts (0-120 amps) by turning the pot. This is approximately the amperage output of the Speed Control. Seventy five amps is the recommended starting point, and it will work well for most applications.

DRAG RACING AND PULLING:

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 connect the red pig-tail lead coming out of the speed control to the test point, in order to bypass the torque control. In this case the TSC can put out over 1000 amps peak. Also, we recommend you go to the 420 G2.

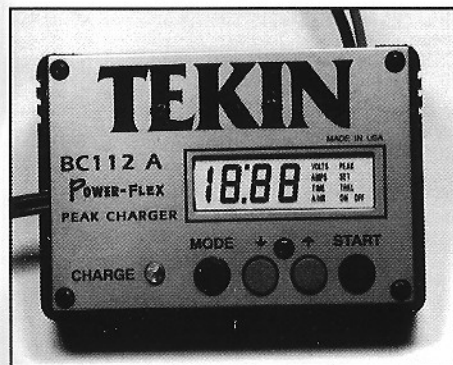
When you apply brakes with a TEKIN TSC the batteries are actually recharged at up to 30 amps. When you then come out of the corner you will notice a little top charge on the batteries. Because of this you can run some brakes in many cases.

You may notice the commutators on your motor lasting an amazing 2-5 times longer than previously. This is TEKIN technology at its finest. There is nothing to do but enjoy the improved performance and much reduced motor costs.

TROUBLESHOOTING

- 1) **SERVO AND THROTTLE DEAD:** Batteries dead, bad connections to Speed Control, 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 its side. Space receiver up off chassis 3/16". Rotate or mount receiver on its 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 ESCs, 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 the 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. On some cars, such as the JRX, it is best to put the receiver on the chassis, and the speed control on the shock tower. Keep receiver away from batteries and power wires. RE-CHECK Step 6, Page 14.
- 6) **DOESN'T AUTOCOUNT:** 3 caps required on motor, see drawing Page 13. Mount transponder in front of car, not directly over or under wires or batteries. Move autcount pickup to place on track where throttle is wide open, not accelerating. Go to new autcount system 20.
- 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 DO NOT WORK AT ALL:** Improper TSC adjustments, damaged TSC. Brake heatsink needed.



BATTERY CHARGERS FROM TEKIN

All New Models Feature:

- Dual Precision 12 Bit, High Resolution Analog To Digital Converters.
- Large, Easy To Read Custom LCD Display.
- Adjustable Trickle Charge; Easy One Button Charge Start Sequence.
- Remembers Your AMP Settings When Power is Removed.
- Multiple Charge Modes.
- All Digital Electronics.
- Microprocessor Controlled.
- Coming July.