

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:

- Using the same polarity connectors on the battery and motor wires from the Speed Control.
- Wires or connections which are exposed and not insulated properly.
- Overloading the BEC.
- Allowing water or moisture into the TSC.
- Incorrect wiring.
- Using sharp objects on keyboard.
- Altering tightening torque of case screws.
- Pulling on motor/battery wires

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

Keyboard layout, instruction book, box and software

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Software by Intac Engineering

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Additional Patent(s) Pending

TEKIN

COMPUTER
CONTROLLED!

TSC-410K
KEYPAD ELECTRONIC SPEED CONTROL



Real Racing Gear

TEKIN

OWNER'S MANUAL

Introduction

The TEKIN 410K is the most advanced, most efficient, best performing speed control available for your electric-powered R/C vehicle. Under development for nearly 3 years, and extensively tooled, the 410K is one of the biggest advances in speed control technology since the introduction of the MOSFET itself. The microprocessor's functions are all digitally controlled for pin-point precision that can never be matched by manually adjusted speed controls. There's no additional hardware required to program the 410K. Programming is accomplished through a built-in ultra-lightweight, sealed membrane keypad that's impervious to dirt and most other contaminants.

The high-frequency switching technology used in the 410K is responsible for allowing the R/C motor to last from two to five times longer than conventional speed controls.

The 410K also features technology that allows the batteries to be charged while braking. When applying brakes, the energy generated by the vehicle's motor is channeled back into the battery pack instead of simply wasting it, which extends run time. Surface mount technology is employed in the assembly of the 410K, making the circuit board and components as light and compact as possible. Advanced software microcode keeps everything operating smoothly and under your control. The result is the new 410K . . . it's the best!

410K!



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SPECIFICATIONS

Voltage Input	4 - 10 Ni-Cd Cells
Power Wires	(2) 13-gauge, (1) 15-gauge silicone
Voltage Drop - at 10 Amps	.015 V
Forward Constant Current Rating	300 Amps
Brake Current Rating	120 Amps
Transistor Type	GOLDFET
Torque Limiter Current	10 to 125 Amps (plus override)
Operating Frequency	3000 Hz
B.E.C. Output	5.8 Volts
Case Size	1.4 x 1.7 x .6 inches (35.6 x 43.2 x 15.3 mm)
Weight (with all wires)	1.85 oz. (53 Grams)
Fuse	#FUS 050
Input Pulse Range	5 - 3 mS
BEC short circuit protection	Yes
Thermal Overload Protection	Yes
Reverse Voltage Protection	Yes
Heat sink	Yes
FET-booster Servo Lead	Yes
Plugs Included for:	Airtronics/Sanwa, Futaba, JR, KO Propo, Kyosho/Pulsar, Tekin
Specifications subject to change without notice.	

Step 1: Connector Selection

This speed control is equipped with a universal radio connector system. It can be used with Tekin, Airtronics/Sanwa, Futaba, JR, KO Propo and Kyosho Pulsar R/C receivers.

The standard connector supplied with the 410K is for use with receivers using Tekin or Futaba J-type plugs. This plug is used on all newer Futaba radio systems. If you have a Tekin or a newer Futaba receiver, the plug included with the 410K will fit without modification. Use of the 410K with Airtronics/Sanwa, Hi Tec, JR and Kyosho R/C systems requires that you change or modify the plastic plug housing. When using a JR or Kyosho radio, trim the plastic tab off the standard FUT J housing as shown in figure 1-1.

When using a 410K speed control with Airtronics/Sanwa or KO Propo R/C systems, follow the steps outlined below.

- 1) Make sure no battery is connected to the speed control. Using a hobby knife, or a small jeweler's screwdriver, press the three metal tabs holding the red, black and white wires into the Futaba "J" plug already attached to the speed control (Figure 1-1, step A). Press the metal tabs only far enough that each of the wires can be removed from the black plastic receiver plug housing.
- 2) After removing the wires from the receiver plug, using a hobby knife or jeweler's screwdriver, bend the metal tabs on each of the wires back to their original position (figure 1-1, step B), so they will hold the wires in place when the proper receiver plug housing is installed.
- 3) Select the receiver plug that matches your radio system. Airtronics and Sanwa radio systems use the plug housing marked "AIR," and KO Propo systems use the plug marked "KO" (Figure 1-1, step C).

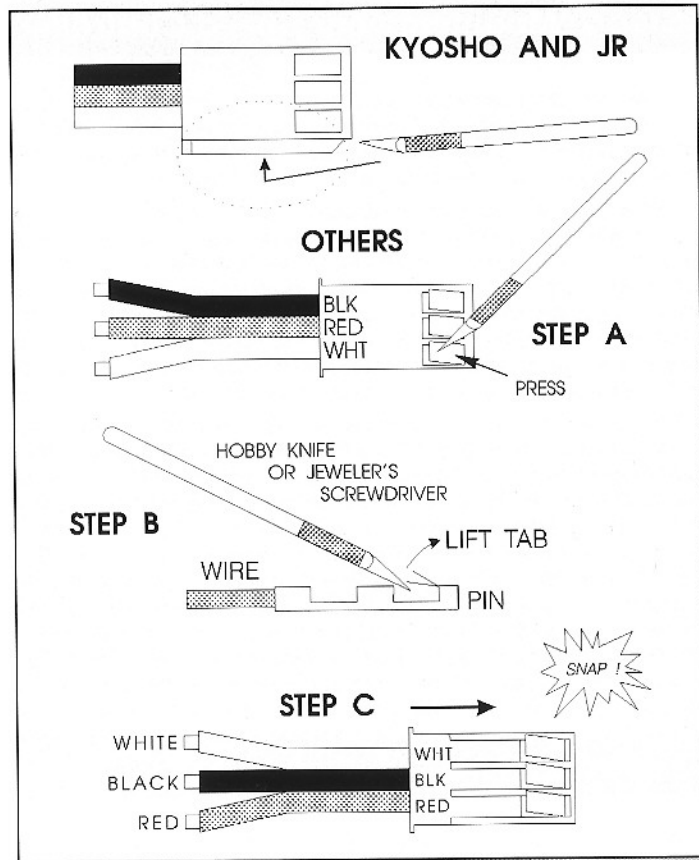


FIGURE 1-1

Step 2: Mounting your Speed Controller

The primary concern when mounting your 410K speed control is to keep the connecting wires for the motor and main battery pack as short as possible, **while still keeping them away from the receiver**. The shorter these wires are, the better performance you can expect.

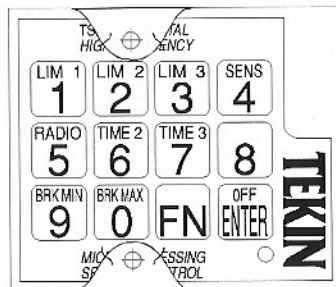
Mount the speed control to the chassis of your R/C vehicle with the one-inch square, two-sided tape included in the package. To insure the best possible adhesion, make sure both surfaces, the bottom of the speed control and the vehicle's chassis, are very clean. Spraying a small amount of window cleaner on a paper towel for cleaning should be sufficient. The tape provides adhesion up to about 60°C. In extreme heat conditions or under heavy load however, you must either bolt the speed control to the chassis or purchase optional part #SRP001 high temperature mounting tape.

For most applications, the heat sink housing of the 410K offers more than adequate temperature control. For additional heat sinking however, there are two extra holes in the bottom of the speed control's housing which can be used to bolt it directly to a chassis. When mounted to aluminum chassis, the speed control can use the whole chassis as a heat sink! This is recommended when running very low turn motors or, in extreme heat conditions. See figure 2-1 for drilling template for mounting direct to chassis. Regardless of the application, the aluminum housing is electrically isolated from the speed control's internal components, which allows it to be mounted directly to any surface including graphite, without any adverse affects. Two nylon #2-56 screws are included with the speed control for this purpose. Use only the nylon screws supplied with the speed control. Do not use metal screws to mount. Do not over-tighten these screws as they can be easily stripped. Keep in mind that when deciding on a mounting location for the 410K, to allow access to the keypad for easy operation.

FIGURE 2-1

DRILL GUIDE

Drilling template to bolt 410K to chassis. USE: .093" (3.5mm) DRILL.



Special mounting notes: For most off-road cars, it's best to mount the speed control on the chassis, and the radio receiver on the shock tower. Both the battery pack and the speed control pass heavy amounts of current which is a potential source of interference. By keeping both these sources on the chassis plate and isolating the receiver on the shock tower, the chance for interference is substantially reduced. Keep in mind however, these are basic guidelines and location of the electronic components will vary depending on the application. The JRX cars for instance, usually work best with the speed control on the shock tower and receiver on the chassis pan. If for any reason, the speed control must be relocated, **DO NOT PULL ON THE SPEED CONTROL BY ANY OF THE WIRES OR PLASTIC ENDS**. The plastic screws holding the housing together may shear, causing the speed control to come apart. Remove the speed control by pulling, or slowly prying with a small screwdriver, on the strong aluminum housing only.

Step Three: Wiring the Speed Control

The first step to wiring the speed control is to plug it into the receiver. At this stage, the speed control should already have the proper plug housing installed for

the type of receiver you'll be using (refer to step one). For Tekin receivers, plug the speed control into channel number two, for standard or other after-market receivers, refer to the owner's manual to determine which channel is for throttle operation.

Installation Note: Many radio systems include a battery box for four (4) AA-size batteries and an on/off switch for supplying power to the receiver and servos. The 410K has a built-in B.E.C. (Battery Eliminator Circuit) that supplies power to the receiver and steering servo from the main battery through the receiver wiring harness. A separate pack is therefore, not required. There are certain applications where a separate receiver pack may be desired. For more information, refer to page 16.

Because the 410K is designed to provide the racer with optimum efficiency and performance, no connectors are attached to the power leads. It's been determined that soldering the leads of the speed control directly to the motor and main battery pack provides the best performance. If you choose to use connectors however, there are a few precautions and hints that should be followed to insure the best possible performance.

When looking for a connector, it's best to choose one that is polarity protected. That is, one that can't be connected backwards. Connecting the speed controller backwards will result in a blown fuse. You also want to choose a connector with male and female halves. When installing plugs on the speed control, be sure to use different connectors. For example, you would want to use a male connector for the battery leads, and a female connector for the motor leads. This prevents the battery from accidentally being plugged into the motor leads which will damage the speed control and void the warranty. Finally, the ideal connector must not have any exposed live contacts when disconnected, which can be easily shorted. Note: Don't apply an outside voltage source to the motor, to test the motor for instance, while the speed control wires are still connected! This would be the same as connecting a battery to the motor leads of the speed controller, resulting in damage to the speed control and voiding the warranty.

You will notice that the 410K has only three wires for connecting to the battery and motor. The blue lead is to be connected to the motor's negative (-) lead. The black lead is connected to the battery negative (-). The red lead is connected to the battery positive (+), as close to the battery (+) as possible, for minimum glitching and maximum efficiency. A final red jumper lead that's included with the speed control

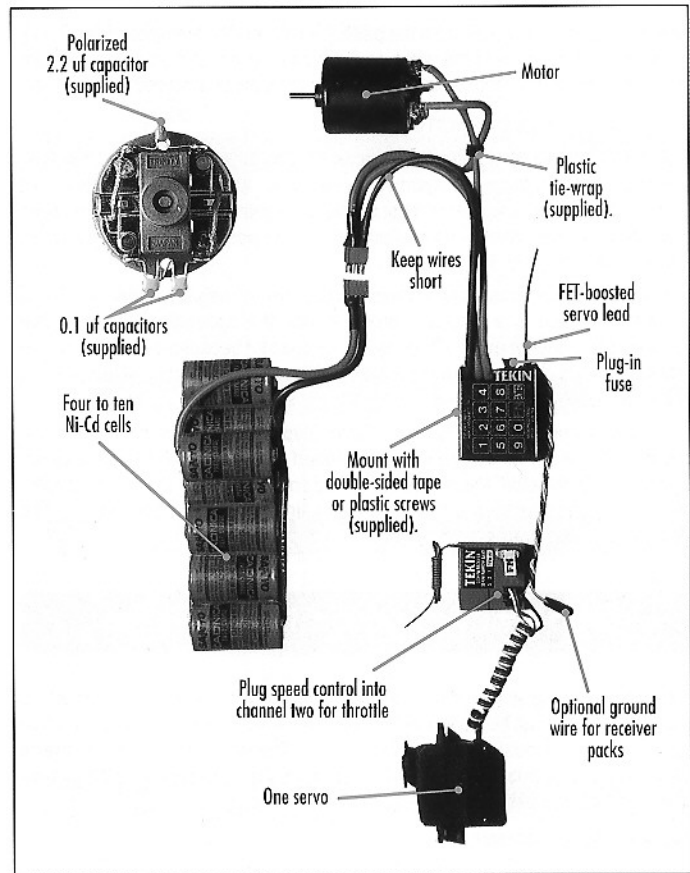


FIGURE 3-1

should be connected directly from the battery positive (+) to the motor positive (+). Pay close attention to keep the wires as short as possible and do not route them closer than 1/2-inch from the receiver as this will insure the best possible performance.

INSTALLING MOTOR CAPACITORS

To limit the amount of interference generated by arcing of the motor brushes, capacitors must be attached. Regardless of the motor, at least two capacitors must be installed. Two .1 uf capacitors must be attached with one lead grounded to the motor's can, and the other leads attached to the motor positive (+) and negative (-) terminals (refer to figure 3-1, PAGE 7).

The third capacitor is attached across the positive and negative terminals (figure 3-1). If interference is a recurring problem, use the optional 2.2 uf capacitor (included). Be careful when installing the 2.2 uf capacitor because it's polarized. The positive lead (+) is clearly marked on the side of the capacitor and must be attached to the positive (+) motor terminal.

Warning: Don't use a 47 uf aluminum "barrel"-type capacitor on the motor when using the 410K or any other high-frequency speed control. The 47 uf capacitors are only for use with the older low-frequency speed controls. Use of this type capacitor may cause erratic operation and effect lap counting with auto-count systems. The capacitor may also overheat and explode!

Step Four: Transmitter Set-up

Prior to powering up your new 410K speed control, there are some initial set-up requirements that must be performed on the transmitter. Figure 4-1 is a chart that includes settings for most popular systems. Note: **The fail-safe feature on Futaba PCM transmitters must be switched off to allow the remote shut-off function of the 410K to operate properly.**

OTHER TRANSMITTERS

If you don't find your transmitter listed in the chart, generally, settings should

FIGURE 4-1: TRANSMITTER ADJUSTMENTS

TX TYPE	TH EXPO	ATL	ATV or HIGH	EPA 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	5	5	N	8	Rev.	1/3	Throttle Trim
AIRTRONICS/SANWA									
3P-FM	--	--	140%	CCW	CW	--	NOR	--	EPA LOW
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-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

remain in their neutral position and the throttle channel should be switched to the reverse position. For racing applications with transmitters that have adjustable throttle throw, throttle is set at 2/3 forward and 1/3 brake for more precise forward throttle control.

Step Five: Speed Control Calibration

Before turning on the speed control for initial calibration, it's best to disconnect the drive system from the motor by removing the pinion gear (leaving the speed control's wiring in place), and to place the vehicle on a secure stand. This will allow fine-tuning of radio and speed control functions while preventing any potential accidents. Transmitter batteries should also be completely charged to insure proper operation and calibration.

Attach the main battery pack to the speed control, and turn on your radio transmitter. Press any key on the keypad to turn on the speed control. To confirm the speed control is turned on, it will emit an audible signal, and the L.E.D. will blink.

To set neutral and throttle/brake end-points, press the "FN" function key, then the "RADIO" ("5") key. The speed control is then ready to be calibrated to your transmitter. See Figure 5-1.

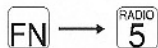


FIGURE 5-1:
Calibrating the Transmitter

Apply full throttle, full brake, then return the throttle to the neutral position. You have approximately 5 seconds to complete this sequence before the speed control automatically enters the end-points. The speed control's LED should illuminate, indicating it's in the neutral position and ready to go. To insure the speed control has recognized full throttle and full brake during the programming procedure, make sure your throttle movement is slow and deliberate. Note: *Where ever the trigger is*

positioned when the audible tone sounds (signalling the end of the calibration sequence) will be considered the neutral point. Some racers desire a slight amount of brakes when the trigger is released. To accomplish this, squeeze the trigger slightly to the throttle position and hold it until the end of the calibration sequence. If the sequence is not completed within five seconds, it must be repeated.

There are three ways to turn off the 410K. To turn off the unit from the keypad, press the "FN" key followed by the "OFF" key. To turn off the unit from the transmitter, apply full brake for more than five seconds, then shut off the transmitter. The speed control will automatically shut-off with the transmitter. The third method is to simply disconnect the main battery pack from the speed control. **WARNING:** When using a separate receiver battery pack, the keypad and remote shut-off functions are disabled. Refer to page 16 for more information about operation with a separate receiver battery pack. See Figure 5-2.

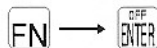


FIGURE 5-2:
Turning Off the 410K

Advanced Programming Functions

TORQUE (CURRENT) LIMITERS

The 410K includes three digitally-controlled, timer-operated torque (current) limiters. The purpose of the three timer-activated torque limiters is to allow the speed control to be programmed to change as the performance characteristics of the Ni-Cd batteries change during the course of a race or to allow some other specialized characteristic such as slow take off during oval racing. For instance, an off-road racer may want to begin the race with no torque limiting at all for a quick start. Therefore, the speed control would be programmed for maximum current on the first limiter. After the start, to conserve the battery, you may want to dial the power down to 60

amps. The second torque limiter would then be programmed for 60 amps to be activated after 15 seconds. For the final minute of the race when battery voltage is diminishing, you might want to increase the current limiter slightly to maintain the same level of acceleration. To accomplish this, the third limiter could be programmed for 70 amps to activate at 180 seconds (3 minutes).

CURRENT LIMITER PROGRAMMING

The current limiters may be programmed in any sequence. To program "LIM 1," start by pressing the function key ("FN"), followed by the "1" or "LIM1" key. Next enter the desired amperage limit from 10 to 125 amps. Once you've entered the desired limit, press the "Enter" key to store it in memory. The value will then be saved, even if the battery is disconnected, until it is changed to a new value. See Figure 5-3.

NOTE: After pressing the function "FN" key, you have 10 seconds to press the next key. After 10 seconds, the speed control will return to normal operation, and the entries will be cancelled. If you make a mistake when programming the speed control or inputting values, you can wait 10 seconds for the entry to clear (without pressing enter). If you make an improper entry (say inputting 1000 amps when the maximum is 999) the alarm will sound and the entry will not be saved. You may then try again.

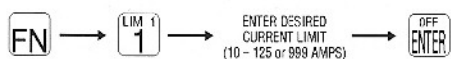


FIGURE 5-3:
Programming Current
Limiter 1

The programming for the second limiter starts by pressing the "FN" key, followed by the "LIM 2" key. Next, enter the desired amperage limit from 10 to 125 amps. Press the "Enter" key to store in memory. See Figure 5-4.

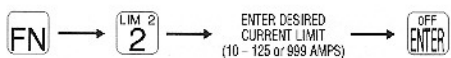


FIGURE 5-4:
Programming Current
Limiter 2

The programming for the third limiter starts by pressing the "FN" key, followed by the "LIM 3" key. Next, enter the desired amperage limit from 10 to 125 amps. Press the "Enter" key to store in memory. See Figure 5-5.

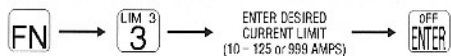


FIGURE 5-5:
Programming Current
Limiter 3

Note: Entering a value of 999 amps will bypass the current limiter for unlimited current flow. This is useful for drag racing applications and other conditions that require maximum current flow.

TIMER PROGRAMMING

The 410K has a built-in timer for activating the current limiters in sequence. The first current limiter is always activated when the speed control is first turned on. The "TIME 2" key controls when the second current limiter will be activated, "TIME 3" controls the third. For instance, if "TIME 2" is programmed for 30 seconds, the first current limiter will be active for 30 seconds from the time full-throttle first is applied (applying full-throttle starts the timer). At the 30 second mark, "TIME 2" will activate the second current limiter, or "LIM 2." All the timers are reset when the speed control is turned on or anytime you press the "FN" key. They will start timing as soon as full throttle is applied for the first time.

To program the timer to activate the second current limiter, first press the "FN" key, followed by the "TIME 2" key. Enter the desired time in seconds for activating the second current limiter, then press the "ENTER" key to store in memory. See Figure 5-6.

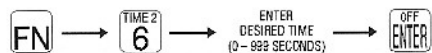


FIGURE 5-6:
Setting Time 2

To program the timer to activate the third current limiter, first press the "FN" key, followed by the "TIME 3" key. Enter the desired time in seconds for activating the third current limiter, then press the "ENTER" key to store in memory. Keep in mind that if no time is entered for "TIME 2" or "TIME 3," the second and third current limiters will not activate until the timer reaches the factory default setting of 999 seconds. See Figure 5-7.

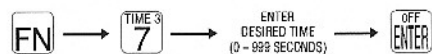


FIGURE 5-7:
Setting Time 3

BRAKE PROGRAMMING

The revolutionary braking system of the 410K is digitally adjustable. The amount of amperage developed by the motor under braking is constantly monitored for the most precise control ever! The speed control's microprocessor provides perfectly linear braking response regardless of speed.

The 410K has a factory default setting of 0 amps for brake minimum and 120 amps for brake maximum. The brake minimum setting determines how much brake will be applied as soon as the throttle is moved from the neutral point to brake. The brake maximum setting determines the amount of braking when full brake is applied. With the factory default settings, the brake response is perfectly linear, up to maximum possible amperage.

To program the brakes, start by pressing the "FN" key, then the "BRK MIN" key. Enter how many amps of braking you'd like as soon as the brakes are applied, then press the "ENTER" key. The factory default setting is 1 amp. If you desire stronger initial braking, a higher value can be programmed. See Figure 5-8.

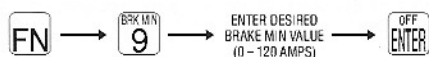


FIGURE 5-8:
Programming Brake
Minimum

To program brake maximum, press the "FN" key, the "BRK MAX" key. Enter the number of braking amps you'd like at maximum braking (120 amps is the maximum setting), then press the "ENTER" key. The value of brake max should be at least 15 amps more than the value set for brake min, or improper operation could result. See Figure 5-9.

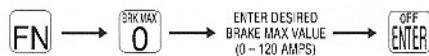


FIGURE 5-9:
Programming Brake
Maximum

Note: Entering a value greater than 120 amps will result in the maximum setting of 120 amps. Not all motors will generate 120 amps of braking current. If, for example, the motor will only generate 60 amps brake current, setting to a value of 120 amps will only result in wasted trigger movement, with no increase in brakes. In this case, set brake max to 60 amps for smoothest response.

SENSITIVITY PROGRAMMING

The sensitivity function of the 410K allows the user to program how quickly the speed control will respond to throttle input. It is not the same as the exponential control on the transmitter. For certain types of racing, track conditions may require either a faster or slower response to throttle input for maximum control. The 410K has a factory default setting of "5." A setting of "5" will provide normal, linear throttle response.

To begin programming the throttle sensitivity, press the function key ("FN"), followed by the "SENS" key. Enter the amount of sensitivity 1 through 9. A value of less than 5 gives reduced sensitivity, which is good for slippery tracks or oval racing; a value of greater than 5 gives increased sensitivity, and is good for high bite surfaces and stock class. Finish by pressing the "ENTER" key to store the new value into memory. See Figure 5-10.

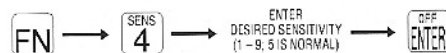


FIGURE 5-10:
Programming Sensitivity

Note: Selecting the "5" or "0" during programming will result in normal sensitivity.

RADIO PROGRAMMING

When calibrating your radio to the speed control, altering throttle trigger/stick input will change the throttle response of the speed control to suit certain applications. Drag racing for instance, requires very quick acceleration. If the throttle trigger is moved only 1/4 of the travel during the radio calibration sequence, the speed control will deliver full throttle when the trigger is moved 1/4 of the travel and beyond.

Boaters or model airplane fliers may want no braking at all. This is possible by applying throttle only during the calibration sequence. During calibration, apply full throttle then return the trigger/stick to the neutral point. When the speed control beeps signaling the end of the calibration sequence, it will be followed by a long continuous tone indicating an error was made in setting brakes, but the speed control will still operate at the end of the sequence.

BRAKE PROGRAMMING

The revolutionary braking system of the 410K is digitally adjustable. The amount of amperage developed by the motor under braking is constantly monitored for the most precise control ever! The speed control's microprocessor provides perfectly linear braking response regardless of speed.

The 410K has a factory default setting of 0 amps for brake minimum and 120 amps for brake maximum. The brake minimum setting determines how much brake will be applied as soon as the throttle is moved from the neutral point to brake. The brake maximum setting determines the amount of braking when full brake is applied. With the factory default settings, the brake response is perfectly linear, up to maximum possible amperage.

To program the brakes, start by pressing the "FN" key, then the "BRK MIN" key. Enter how many amps of braking you'd like as soon as the brakes are applied, then press the "ENTER" key. The factory default setting is 1 amp. If you desire stronger initial braking, a higher value can be programmed. See Figure 5-8.

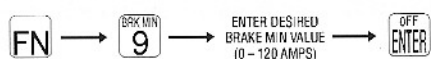


FIGURE 5-8:
Programming Brake
Minimum

To program brake maximum, press the "FN" key, the "BRK MAX" key. Enter the number of braking amps you'd like at maximum braking (120 amps is the maximum setting), then press the "ENTER" key. The value of brake max should be at least 15 amps more than the value set for brake min, or improper operation could result. See Figure 5-9.

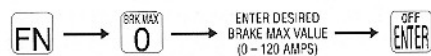


FIGURE 5-9:
Programming Brake
Maximum

Note: Entering a value greater than 120 amps will result in the maximum setting of 120 amps. Not all motors will generate 120 amps of braking current. If, for example, the motor will only generate 60 amps brake current, setting to a value of 120 amps will only result in wasted trigger movement, with no increase in brakes. In this case, set brake max to 60 amps for smoothest response.

SENSITIVITY PROGRAMMING

The sensitivity function of the 410K allows the user to program how quickly the speed control will respond to throttle input. It is not the same as the exponential control on the transmitter. For certain types of racing, track conditions may require either a faster or slower response to throttle input for maximum control. The 410K has a factory default setting of "5." A setting of "5" will provide normal, linear throttle response.

To begin programming the throttle sensitivity, press the function key ("FN"), followed by the "SENS" key. Enter the amount of sensitivity 1 through 9. A value of less than 5 gives reduced sensitivity, which is good for slippery tracks or oval racing; a value of greater than 5 gives increased sensitivity, and is good for high bite surfaces and stock class. Finish by pressing the "ENTER" key to store the new value into memory. See Figure 5-10.

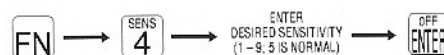


FIGURE 5-10:
Programming Sensitivity

Note: Selecting the "5" or "0" during programming will result in normal sensitivity.

RADIO PROGRAMMING

When calibrating your radio to the speed control, altering throttle trigger/stick input will change the throttle response of the speed control to suit certain applications. Drag racing for instance, requires very quick acceleration. If the throttle trigger is moved only 1/4 of the travel during the radio calibration sequence, the speed control will deliver full throttle when the trigger is moved 1/4 of the travel and beyond.

Boaters or model airplane fliers may want no braking at all. This is possible by applying throttle only during the calibration sequence. During calibration, apply full throttle then return the trigger/stick to the neutral point. When the speed control beeps signaling the end of the calibration sequence, it will be followed by a long continuous tone indicating an error was made in setting brakes, but the speed control will still operate at the end of the sequence.

Using a Separate Receiver Pack

The 410K speed control includes a very high-quality BEC unit that should provide trouble-free operation for all but the most extreme situations. If you still prefer using a separate receiver pack for extending run time slightly, they're compatible with the 410K speed control. **A receiver battery MUST be used for:**

- More than 1 servo (steering or otherwise).
- More than 8 cells connected in series.
- Maximum radio range.
- Certain four-cell applications (most often when using very powerful modified motors that may cause a sudden voltage drop when accelerating).

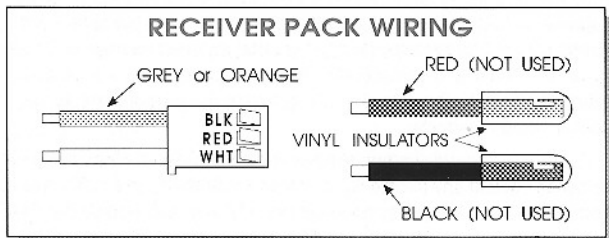
Four- and five-cell 50 mAh receiver battery packs are available at most hobby shops. These small packs include a wiring harness similar to those used between the speed control and the receiver. The battery's harness, however, only uses two wires instead of three. The connector used on the end of the batteries harness must be compatible with the type of receiver you're using.

When using a separate receiver battery pack, the 410K can sense the voltage through the receiver, and disable its internal BEC. There's no need to remove the power lead from the speed control's radio wiring harness. In this configuration however, caution must be taken to **not turn on the speed control**. Connecting a receiver battery pack will automatically turn-on the speed control, but turning on the speed control first, then plugging in a receiver battery pack may cause damage to the receiver pack and the speed control's BEC. In the case of the speed control it will still operate, but a damaged BEC will *require* the use of a separate receiver pack until the unit can be returned for repair. Proper procedure for activating the speed control when using a separate receiver pack is therefore, to plug in or turn-on the receiver pack.

When using a separate receiver pack, you must un-plug or turn off the receiver battery to turn off the speed controller. Pressing the "FN" and "OFF" keys will not shut off the speed control, nor will the remote (from transmitter) shut-off function.

A second method of attaching a receiver battery pack offers improved reception and much greater range. It does not, however, provide the very lowest operating voltage, and is not recommended for 4-cell use. It is also not compatible with FET-boosted servos. A fourth grey or orange colored wire in the radio wiring harness of the speed control is included for use with receiver battery packs. Use of this lead helps filter out interference that may pass through the standard ground (black) lead.

To use this arrangement, unplug the speed control from the receiver and remove the red and black wires from the receiver plug housing. Place a black insulator cap over each the red and black pins. Insert the grey or orange wire into the "BLK" location on the receiver plug, then insert the plug back into the receiver. Turn on both the receiver battery and the speed control (from the key pad).



FET-BOOSTED SERVOS

The 410K has an extra red lead that exits the speed control's case near the radio wiring harness. This extra lead is for using FET-boosted high-performance servos. These servos require a higher level of voltage than a standard servo. The power supplied through the FET servo lead comes directly from the battery pack. To install a FET-Boosted servo, solder a 3.3 uH choke to the red lead from the speed control (available at retail electronic outlets), the attach the appropriate lead from the servo to the 3.3 uH choke. The purpose of the choke is to filter out voltage spikes from the battery that may cause erratic operation. It is possible the servo will be damaged if you do not use a choke.

Error Codes

When an error is made with the 410K either in programming or certain wiring, the speed control will emit a long audible signal, followed by a series of short beeps. The L.E.D. will also blink. By counting the number of short beeps or blinks, you can refer to the following outline, to determine the cause of the problem.

TWO (2) BEEPS: Brake end-point adjustment - This signal will sound when the receiver doesn't detect any braking input from the receiver during initial calibration. Re-calibrate the speed control by pressing the "FN" key, followed by the "RADIO" ("5") key. Be *sure* to apply full throttle and *full brake* before 5 seconds are up. After 5 seconds the programming sequence is complete. If you're sure full brake was applied during calibration and you still get the same error code, the radio's end-point adjustments may not be set according to the chart included on page 9. Check the settings on the radio and re-calibrate. If you receive another error code, the transmitter may be defective. Also try re-entering brake current limits as they may have been entered incorrectly.

THREE (3) BEEPS: Throttle end-point adjustment - This signal will sound when the receiver doesn't detect any throttle input from the receiver during initial calibration. Re-calibrate the speed control by pressing the "FN" key, followed by the "RADIO" ("5") key. Be sure to apply full throttle and full brake before 5 seconds are up. After 5 seconds the programming sequence is complete. If you're sure full throttle was applied during calibration and you still get the same error code, the radio's end-point adjustments may not be set according to the chart included on page 9. Check the settings on the radio and re-calibrate. If you get another error code, the transmitter may be defective.

FOUR (4) BEEPS: Receiver battery being used or receiver overload - When using a receiver battery pack, you will get an error code 4 when the receiver pack is turned off or disconnected (this is normal). If a short is present in the receiver wiring harness, this error code will also sound. This is to protect the B.E.C. inside the speed control. Check that the insulation on the receiver wiring harness isn't damaged allowing the individual wires to touch, and that the receiver is wired correctly.

FIVE (5) BEEPS: Radio signal quality - If during the calibration mode, the signal from the transmitter is weak or interrupted, it will effect proper calibration of the speed control and this error code will sound. It's imperative that the radio signal be uninterrupted during calibration. If this code is repeated, check the condition of the radio crystals, the condition of the battery powering the transmitter, and that other racers are not operating or the same frequency as your transmitter.

Troubleshooting

- **Servo Works, Throttle Dead:**
Motor bad, bad motor connector, motor brushes not in contact with commutator, speed control not calibrated properly. White wire to receiver loose or broken. Speed control not plugged into channel 2, throttle, of the receiver.
- **Throttle Works Servo Dead:**
Servo plug or wiring bad or incorrect. Receiver bad. Servo bad. Blown B.E.C., return for service.
- **Keyboard, Motor, LED, and Servo All Inoperative:**
Dead battery, bad connections to speed control.
- **Keyboard Dead, L.E.D. Light Works:**
Motor not connected or bad connection to speed control, Motor brush(es) not in contact with commutator.
- **Keyboard Beeps But Throttle Dead:**
Receiver plug wired incorrectly or bad connection. Speed control not plugged into throttle channel of receiver, faulty crystals, faulty radio equipment, blown B.E.C. due to over loading, return unit for service.
- **No Brakes:**
Incorrect radio calibration, re-calibrate. Blown fuse. Blown brake FETs. Brake max (BRKMAX) set too low.
- **Neutral And High Speed Settings Drift:**
Transmitter batteries low, transmitter drift from age or temperature, receiver drift. The speed control does not drift.

• **Stuttering Under Normal Acceleration:**

Blown Fuse: Pull straight out and replace with TEKIN part # FUS 050.

Magnetic field interference of receiver: Move power wires and battery pack at least 1/2" (12mm) away from receiver. Mount receiver on its side. Space receiver up off chassis 3/16" (2mm). Mount receiver in different location or on its other side. Shield receiver by wrapping in metal or aluminum foil. Battery wires to long leading to speed control: Shorten wires.

Battery connector worn or bad: Replace or remove.

• **Random Radio Interference:**

No Capacitors on Motor: Install capacitors as shown (see page 7), transmitter batteries low, radio out of tune, poor receiver location.

HINT: Don't run antenna along metal or a graphite chassis; it should exit the receiver and then go straight up. Keep receiver and antenna away from motor and brushes.

Receiver Sensitive to Voltage Changes: Use a receiver battery pack (see page 16), or use a Tekin high-performance receiver.

"SENS" (page 15) set too high. The higher the entered value (1 - 9), the more susceptible to radio interference.

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 of the unit. Repairs are returned via UPS/COD/CASH. You must enclose a note stating the problem, a legible return address and any special shipping instructions. We cannot return units to a P.O. Box unless payment is sent with the 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 speed controls. **SEND REPAIRS TO:**

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