LIMITED WARRANTY

TEKIN ELECTRONICS, INC. guarantees this speed control 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 unit.
3. Incorrect wiring.
4. Use inconsistent with the instructions.

By the act of using this Speed Control, the user agrees to accept all resulting liability.

TEKIN®

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Formula 10, v1.0

OWNER'S MANUAL

TEKIN®

FORMULA 10

OEM SPEED CONTROL

- Solid state operation reliably replaces mechanical speed controls, while offering much improved performance.
- Built-in 6volt / 2 amp B.E.C.
  - *Eliminates the need for a separate receiver battery.*
- Genuine High Frequency Linear Current Motordrive:
  - *Makes your motors last 2 to 5 times longer, while also extending run time by 15-25%.*
- Regenerative Battery Charging:
  - *Charges your batteries when you apply the brakes.*
- Rugged enough to power the hot modified motors.
- Cool, Efficient, 4 to 8 Cell Operation.
- Built in electronic B.E.C. bypass:
  - *Automatically bypasses the B.E.C. when the voltage drops, for easy 4-cell operation.*
- Uses TEKIN's Universal Radio Connector System.
- Four wire power system for easy hook-up.

1 Step 1 - CONNECTOR SELECTION

The Formula 10 electronic speed control is equipped with the Tekin Universal Radio Connector System. It can be used with Tekin, Airtronics/Sanwa, Futaba J, JR, KO Propo, and Kyosho R/C receivers.

The standard connector supplied with this unit is the Tekin / Futaba J. This plug is used on Tekin and Futaba radio systems. If your receiver is a Tekin or Futaba, then the factory installed plug will fit without modification.

If you have a different receiver, follow the steps below:

1) First make sure the battery is disconnected from the speed control. Using a small hobby knife, or jeweler's screwdriver, press in the three metal tabs only far enough that each of the wires can be removed from the black plastic plug housing. *(page 2, step A)*

2) After removing the wires from the receiver plug, use a hobby knife or jeweler's screwdriver to lift the metal tabs on each of the wires back up. *(page 2, step B)*

3) Select the plug housing that matches your radio system and insert the wires into the housing. Make sure that you put the wires in according to the lettering on the plastic housing. The red wire goes into "RED", the black wire goes into "BLK", and the white wire goes into "WHT" *(page 2, step C)*. Wires will snap into place when inserted into the plug housing correctly.

2 CHANGING RECEIVER PLUGS

IMPORTANT: Wiring the plug incorrectly may damage the speed control or radio receiver, and will void the warranty.

Step 2 - MOUNTING

A) Mount the Formula 10 speed control using the provided double-sided tape. Some airflow over the metal heatsink will help performance. The heatsink is electrically insulated for reliability, but still you should keep it away from any exposed batteries or wiring.

B) Mount the switch with the supplied servo tape, contact cement, or silicone glue. DO NOT USE SUPER GLUE (cyanoacrylic).

C) On a metal or graphite chassis, mount the speed control in the pan and the receiver and antenna on the shock tower to avoid radio interference.

Step 3 - MOTOR & BATTERY HOOK-UP

Please exercise extreme care when installing your speed control, as damage can be easily done. See your dealer if you need assistance.

A) Make sure the battery socket of the receiver is not connected.

Note: The Formula 10 supplies power to the receiver and servo. No additional power supply should be used for the receiver. *(See next page.)*

B) Plug the wire harness from the speed control into the throttle channel of the receiver. The Formula 10 supplies a regulated 6 volts to the receiver and servo when running on 4 to 8 cells. The regulator puts out enough current for a maximum of one servo.

C) The battery and motor wires should be connected as follows:

SPEED CONTROL	BATTERY	MOTOR
Black wire	(-) Negative	
Blue Wire		(-) Negative
Red Wire (1 of 2)	(+) Positive	
Red Wire (2 of 2)		(+) Positive

For maximum motor power, keep the wires as short as practical. If plugs are used be sure there are no exposed pins from the speed control when the motor is unplugged.

HOOK-UP TIPS

CHANGING POWER PLUGS:

As long as the instructions are followed correctly, and proper polarity is observed, changing the motor and battery plugs will not void the warranty. Incorrect wiring or short circuits can damage the speed control and will void the warranty.

RECEIVER PACKS:

A seperate receiver battery pack is recommended only if you are running 4 cells, or if your car is under weight.

If you want to connect a receiver battery, you must first turn the speed control power switch OFF. Then simply plug the battery into the **BAT** socket on the receiver. A small switch should be used on the receiver pack to operate the radio instead of using the switch on the speed control.

CAUTION: If the speed control power switch gets turned on accidentally while a receiver pack is connected, the speed control can be damaged. This will void the warranty. To prevent this from happening, place a piece of tape over the speed control power switch while it is OFF, or remove the switch entirely.

The receiver pack must have no more than 5 cells and should be charged on a Tekin digital battery charger for maximum accuracy.

5 CAPACITOR INSTALLATION

A minimum of two .1 microfarad (marked 104) capacitors should be attached to the drive motor to prevent radio interference. If the motor you are using does not have capacitors, you must install them.

It is easiest to install the two .1uF capacitors next to each other on one side of the endbell. Take a capacitor and solder one of its leads to the positive tab of the motor. Solder a lead from the other capacitor to the negative tab of the motor. Solder the remaining leads from both capacitors directly to the body of the motor. **Note:** Modified class motors have a third tab held in place by the motor endbell screw. In this case solder the remaining capacitor leads to the tabs.

It's best to cut the leads of the capacitors as short as possible, while still allowing proper installation. This will keep the capacitors closer to the motor and reduce the chance for damage from flying debris.

A closed endbell, or Mabuchi motor has only two tabs, one positive and one negative. This requires the capacitors be installed on opposite sides of the motor using the same procedure as the stock class motor. Solder one lead of each capacitor to the positive and negative tabs of the motor. Solder the remaining leads to the body of the motor.

.1uf capacitors (2): Solder as shown from motor wires to motor body.

Scrape away any paint or finish before soldering to motor body.

8 FRONT PANEL & ACCESSORIES

Solder Drop Fuse Link on back of unit. *(page 11)*

Throttle Adjustment *(page 10)*

Adjustment LED *(page 10)*

Neutral Adjustment *(page 10)*

Servo Tape

Rubber Hole Plugs

Receiver Plug Housings

.1uf Motor Caps

Wire Ties

Adjustment Tool

WIRING DIAGRAM

Step 4 - TRANSMITTER ADJUSTMENT

TX TYPE	* THR EXPO	ATL	ATV or EPA HIGH	ATV or EPA LOW	THR 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	--	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 PROPPO									
ALPINA-2	--	--	10	10	Mid.	--	NOR	--	Throttle Trim
PCM	--	--	--	--	CCW	--	NOR	1:1	None
R756	0	--	H100	B100	Up	0	Left	--	Trim Tab, Knob
KO PROPPO									
EX-1	Min.	--	Max.	--	Mid.	--	Left	--	CH 2 Trim
EX-1 FM	Min.	--	CW	--	B	--	Dowm	--	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

** Adjust Throttle Exponential control for best balance of low speed and high speed driving power.*

Step 5 - SPEED CONTROL ADJUSTMENT

Before you get started, we recommend that you remove the pinion gear from the motor, or make sure that the vehicle is held securely in place with tires off the ground to prevent the vehicle from moving during adjustment. Also be sure that your transmitter batteries are fully charged.

1) Turn on the transmitter, then the speed control *(if using a receiver pack, see page 4)*. Small tab on switch marks ON position.

2) Using the provided adjustment tool, carefully rotate the **Neutral** pot on the speed control until the motor just stops. The LED will come on bright indicating neutral.
   Note: The adjustment pots spin all the way around. For proper operation, adjust back and forth with the plastic adjustment tool supplied or a 1/16" jeweler's screwdriver. *(If you use a metal screwdriver, the setting will change slightly after the screwdriver is removed from the pot.)*

3) Advancing the throttle slightly should cause the motor to spin. If not, flip the throttle reversing switch on the transmitter and repeat step 2.

4) Advance to full throttle on the transmitter, then adjust the **Throttle** pot on the speed control just until the LED suddenly comes on bright, then increase it a tiny bit more. The LED should go off when the transmitter trigger is backed off about 1/8 inch from full throttle.

5) Adjust the brakes with the transmitter brake trim. As brakes are applied, the LED will come on. When the throttle is on, the LED will turn off. Full throttle causes the LED to come on bright. *The LED is more precise than a digital voltmeter and is your guarantee that you are reaching full throttle.*

6) Feel free to readjust as required for best operation.

11 FUSE

The Formula 10 uses a zero-loss solder-drop fuse for the highest performance, and cool operation. This reusable type of fuse, located on the back of the speed control, functions by melting away a small amount of solder.

The Tamiya style battery plug supplied with the Formula 10 is polarity protected. Generally the fuse will not blow unless reverse battery power is applied. If you ever do connect the battery backward, you may need to service the fuse.

To service the fuse, use a small-tipped soldering iron. Touch the tip of the iron to the metal pads on the fuse, then apply a small amount of solder as close to the pads as possible. Hold the iron upright so the solder can drip down the iron onto the pads. When both pads are joined by a drop of solder, you are finished.

IMPORTANT: Apply just enough solder to close the gap between the pads. Excess solder may damage the speed control. If you do apply too much solder, pull the iron tip away, and wipe the excess solder off the tip before starting over.

Blown Fuse

Repaired Fuse

12 TROUBLESHOOTING

1) SERVO AND THROTTLE DEAD

Dead batteries. Bad connections to speed control. Bad receiver plug connection *(page 1)*. Customer-installed receiver plug is wired wrong. Switch needs replacing. Broken wires or blown fuse. Bad crystals or radio equipment. Speed control is damaged internally; return to the factory.

2) SERVO WORKS, THROTTLE DEAD

If the ESC light works: Check the motor, motor connections, and check if brushes are hanging up. If the adjustment light does not work: Check speed control adjustments *(page 10)*; and make sure the Formula 10's receiver connector is assembled correctly, and is plugged into the throttle channel of the receiver *(page 1)*.

3) THROTTLE WORKS, SERVO DEAD

Bad Servo. Servo plug or wiring bad or incorrect. Servo not plugged into channel 1 (steering) of the receiver.

4) STUTTERING UNDER HEAVY ACCELERATION

Receiver getting magnetic field interference: Try mounting receiver on its side and/or spacing it 3/16 inch up from the chassis. If this does not work, try mounting it on its other side. Move power wires away from receiver. Keep receiver at least 1/2" away from all power wires, as well as the battery pack.

5) MOTOR CUTS OUT, RADIO INTERFERENCE or ERRATIC BRAKES

No capacitors or insufficient capacitors on motor: Try 2 sets of capacitors (page 5). Transmitter Batteries Low or radio out of tune. Also, the fuse may be blown. (page 11).

5) ...continued

On some cars, it is best to mount the receiver on the chassis and the speed control on the shock tower. On the Tekin Chassis, mount the receiver on its side in the front. Do not run the receiver antenna along a metal or graphite chassis; it should go straight up from where it exits the receiver. **It is always a good idea to keep the receiver and antenna away from the motor, batteries, and power wires.**

6) AUTOCOUNT NOT WORKING

Capacitors needed on the motor: Refer to page 5 to install caps. Mount transponder at front of car away from batteries and wires. Move autocount pickup to a place on the track where throttle is wide open (not accelerating). If these do not fix the problem, go to new autocount system #20.

7) MOTOR WILL NOT SHUT OFF OR RUNS SLOWLY

Moisture in speed control: Unhook batteries and let the speed control dry.

8) SPEED CONTROL SHUTS DOWN

Motor or wiring shorted, or motor stalled. Gears or transmission are binding: Shut off power right away and locate problem.

9) BRAKES DO NOT WORK AT ALL

Formula 10 damaged or improperly adjusted. Fuse is blown (see page 11).

As long as it is not abused, this speed control can give years of frequent service. In the rare event you do have a problem, fill out the Service Return Card that is included with the Formula 10 and 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 or billed to a Credit Card. All addresses outside the US require a credit card number. You must enclose a filled out service return card stating the problem, a legible return address, the Credit Card number (or COD) and any special shipping instructions. We cannot return units to a P.O. Box unless payment is made by Credit Card. Hobby Dealers will not replace units thought to be defective, these units must be returned directly to the factory for repair. Repair prices are as follows: Flat rate labor $8.00, Replace wires $4.00, Replace switch $5.00, Replace plug $5.00, Repair brakes $6.00, COD $4.50, 2-Day return shipping $6.00, Next day return shipping $15.00, Handling $3.00. Most repairs are shipped back out within 3 working days. Please allow sufficient delivery time (up to 2 weeks). Rates subject to change. Sorry, we do not repair non-Tekin speed controls.

SHIP REPAIRS TO:

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