Power Supply/Controllers/Electronics

The telemetry war between GM and Chrysler was in full swing during the development of the 1969-70 Era “Wing Cars”. Data loggers with telemetry were used to record real time measurements during track testing, (mainly suspension dynamics, various temperatures and G loads). Chrysler Electronics Wizard Ron Killen figured out how to make it work and live in the harsh race car environment. Ron also invented the crank triggered ignition system, which is used by most production vehicle engines today.

The standard Carrera power supply is lame at best. It produces 14 volts with a measly current of 240 mA, or 0.24 amps. Power is what makes the cars go fast. It is a function of voltage and the power supply’s ability to supply the current to meet demand.

Power (Watts) = V*I where V = voltage, and I = current (amps)

Note that more power at the same voltage comes from greater current. Thus, little gain in vehicle performance will result after installing a more powerful motor (higher current draw) if the standard transformer is used.

Motor Power Demand

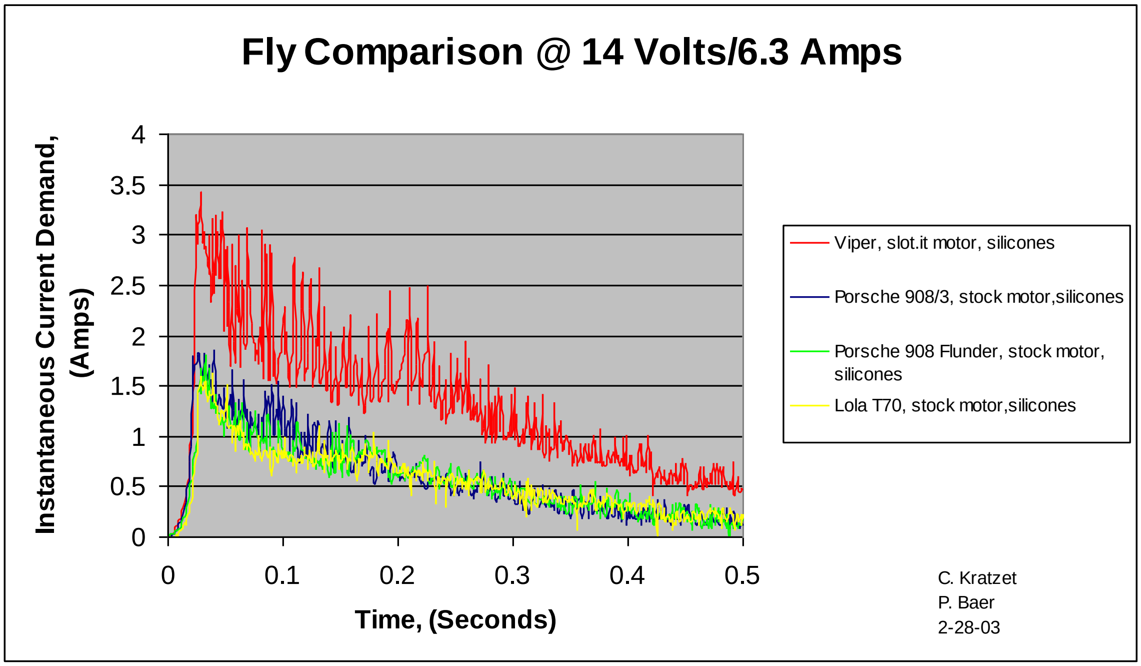
The power demand of an electric motor is greatest during start-up. Power demand increases with "hot" motors or as you improve the tractive force (stronger magnet, reduce the air gap between the magnet and track rail, or race on a track with greater magnetic attraction). To determine the current demand (and thus power supply requirements) of typical ready to run 1/32 scale slot cars, voltage was measured across a 0.161 ohm shunt resistor. Data was recorded and graphed as time on the X-axis, instantaneous current demand on the Y-axis. The graphs do not display power directly. The calculation is:

$$\frac{\text{Vpeak} - \text{Vmin}}{0.161 \text{ ohm}} = \text{Current (amps)}, \qquad \text{Power (Watts)} = 14 \text{ volts} \times \text{Current (amps)}$$

Calculation of current and power requirements for various cars are displayed in Tables 1-3.

The test method, equipment and high speed data acquisition measurements were taken by Cliff "Super Genius" Kratzet, a fellow FCA Engineer and Viper engine man. The cars were launched from a dead stop down 6 straight sections of Carrera track. Measurements on a variety of cars were taken with both the standard 14V/0.24 amp Carrera set power supply and Cliff's 6.3 amp lab quality unit.

Clifford "Super Genius" Kratzet, caught amidst giving his head a quick turn to show his 'best side'. This is no Talladega tip, but rather an observation … The best experiments are the ones that are carried out on the floor, with garage floors being preferred!



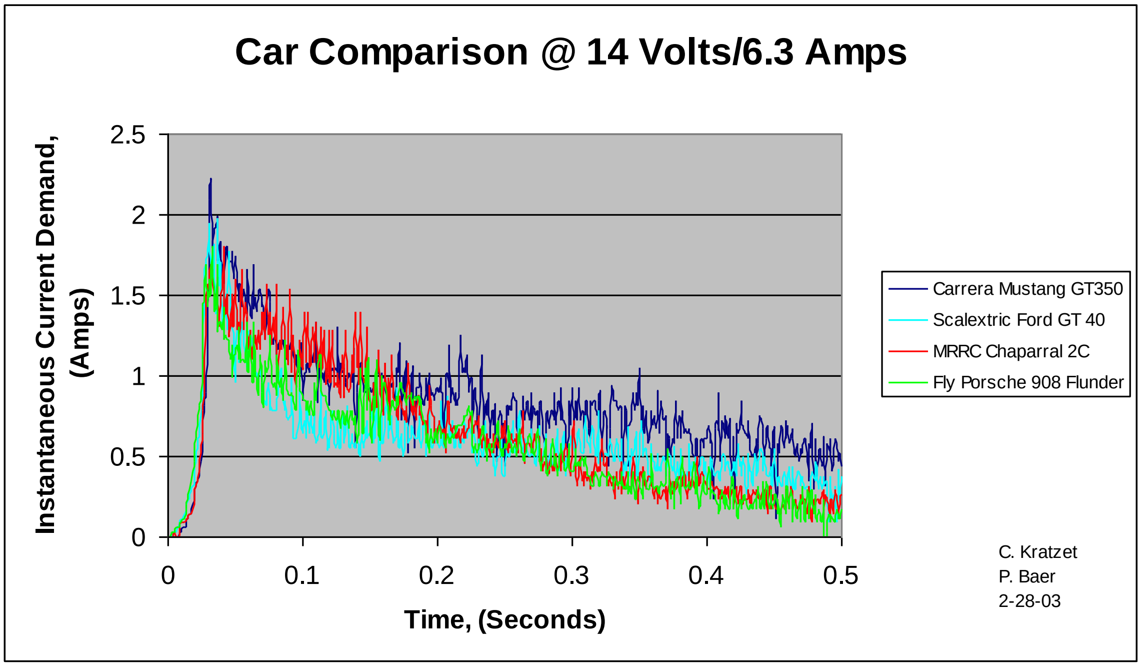
The graph titled "Fly Comparison @ 14 volts/6.3 amps" shows start-up demands for a "hot" motored Fly Viper, compared to 3 stock motored Fly cars. The motor in the Fly Viper was a Slot.it SIMS03 29,000 RPM unit that my friends and I call "amp sucker". All of the cars had run sanded silicone tires. Note the peak start-up demand of the motor(s) occurred at 0.027 seconds after the data acquisition triggered. Cliff did a consistent job of achieving WOT with the 45 ohm Parma controller, considering numerous Heinekin's were involved. Current demand dropped as each vehicle accelerated over the 0.5 second data sample period. I averaged the data from 0.489-0.5 seconds to determine the steady state current and power demand. Some smoothing of the data was done to create the Fly car comparison of table 1.

Peak current for the modified Fly Viper was just over 3 amps. **Thus to support two high power cars the power supply should have at least 7 amps at 14 volts, which is 98 Watts.** If you only race standard motored cars, you can get by with a little less. At 14 volts, a power supply rated for 4 amps surge would have you covered (56 Watts of power) for 2 lanes of stock motored Fly cars shown in Table 1.

Fly Car Comparison @ 14 volts/6.3 amps

	Voltage (Rs @ 0.161 ohm)			Current (amps)		Power (Watts)	
Fly Car	peak	min	steady	peak	steady	peak	steady
Viper	0.570	0.042	0.125	3.28	0.52	45.9	7.2
Porsche 908/3	0.342	0.042	0.069	1.86	0.17	26.1	2.4
Porsche Flunder	0.333	0.042	0.062	1.81	0.12	25.3	1.7
Lola T70	0.305	0.042	0.073	1.63	0.19	22.8	2.7

Table 1



The graph titled "Car Comparison @ 14 volts/6.3 amps" is for 4 cars from different manufactures that I consider fun to drive. Note the Scalextric Ford GT40 has the greatest current demand sag between 0.1-0.2 seconds. This is from tire spin, as the car did not have silicone tires, but rather the stock treaded rubber. Table 2 summarizes the graph results and lists current and power for both start-up and steady state demands. I believe the steady state current demand of the Carrera Mustang GT350 is high due to the number of hours I have on this car. Thus, if you have an adequate power supply, an old car won't get "slow" as its current demand increases due to a dirty commutator and worn motor brushes.

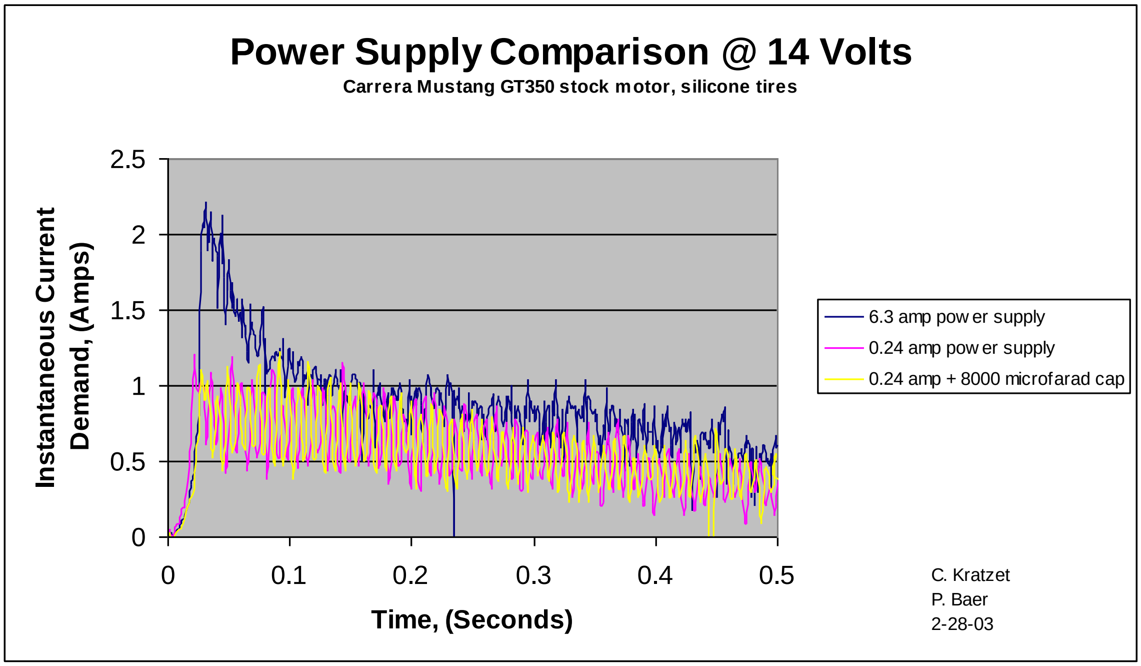
Car Comparison @ 14 volts/6.3 amps

	Voltage (Rs @ 0.161 ohm)			Current (amps)		Power (Watts)	
Car	peak	min	steady	peak	steady	peak	steady
Carrera GT350	0.403	0.047	0.131	2.21	0.52	31.0	7.3
Scalextric GT40	0.356	0.042	0.088	1.95	0.29	27.3	4.0
MRRC Chap	0.333	0.042	0.075	1.81	0.20	25.3	2.8
Fly Porsche 908	0.333	0.042	0.062	1.81	0.12	25.3	1.7

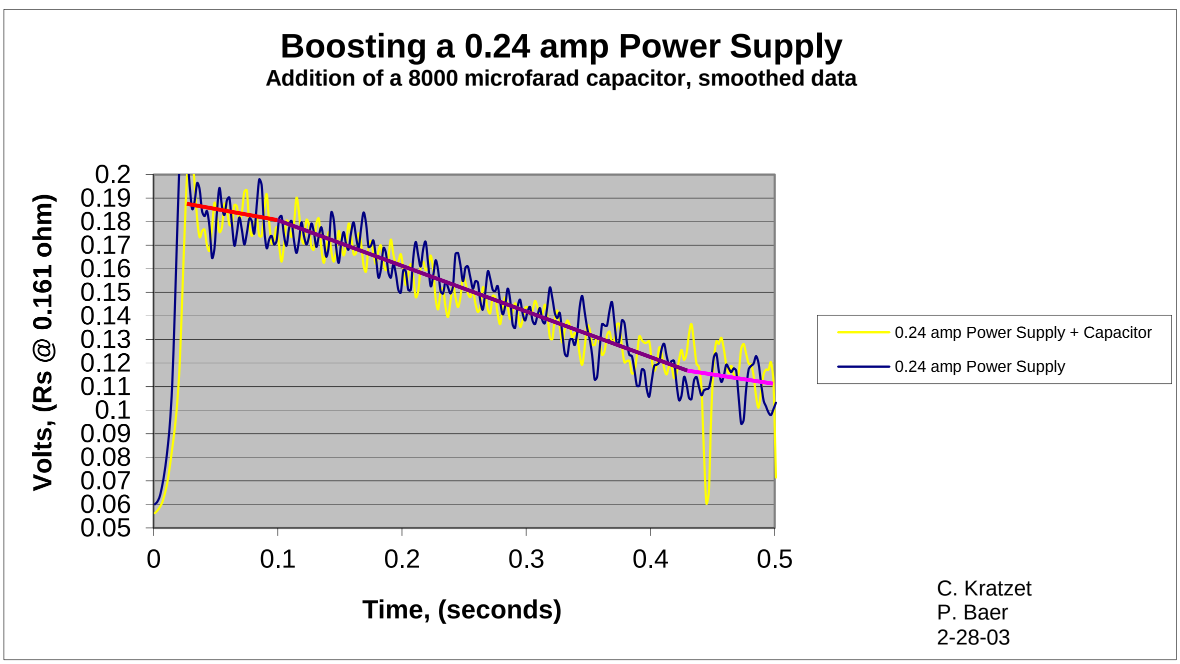
Table 2

The previous measurement examples have been for one car, powered with a power supply of adequate current. What happens when the stock 0.24 amp power supply is used? Basically, the motor only receives enough power to run at half throttle.

The graph titled "Power Supply Comparison @ 14 volts" shows the current hungry stock motored Carrera Mustang GT350 with 6.3 vs. 0.24 amps. For what ever reason, the voltage across the shunt resistor was very noisy for the 0.24 amp power supply which came in the Carrera set. An effort was made to improve the power delivery and smooth the DC voltage by the addition of an 8000 microfarad capacitor. The graph titled "Boosting a 0.24 amp Power Supply" shows smoothed data, with and without the capacitor. There doesn't appear to be any difference. Note the dwell in power required at start-up and then the decline to a steady state current and power delivery that is a fraction of the start up requirement. The little 0.24 amp power supply actually delivered 0.78 amps at start-up then 0.28 amps steady state after 0.5 seconds.



There is a difference between **required power** that is met by a 6.3 amp power supply, and that delivered by a 0.24 amp power supply. The Carrera Mustang GT350 consumes a peak current of 2.21 amps at start-up, which degrades to 0.52 amps as we approach 0.5 seconds of operation. The 0.24 amp power supply that came with the set had a very noisy trace. Cliff added a 8000 microfarad capacitor in an attempt to boost the current start-up supply to meet demand, however it didn't seem to help.



Here is the raw voltage data measured across the shunt resistor, smoothed to reduce the noise for comparison purposes. You can see the addition of the large capacitor was ineffective at boosting the set power supply. The trend line is shown as 3 segments as the slope changed due to start-up dwell, decay as the car accelerated, and the start of "steady state" running load. Table 3 lists the Carrera Mustang GT350 delivered power @ 14 volts as a function of power supply current, (see graphs titled "Power Supply Comparison @ 14 volts" and "Boosting a 0.24 amp Power Supply").

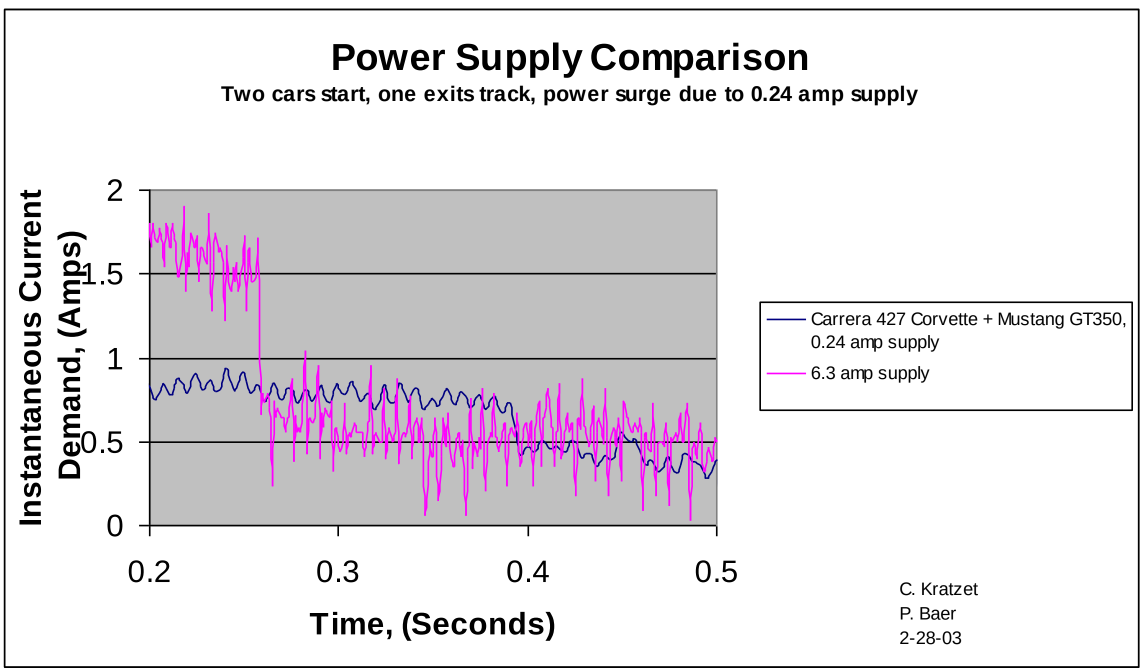
Carrera Mustang GT350 Delivered Power @ 14 volts

	Voltage (Rs @ 0.161 ohm)			Current (amps)		Power (Watts)	
Power Supply	peak	min	steady	peak	steady	peak	steady
6.3 amp supply	0.403	0.047	0.131	2.21	0.52	31.0	7.3
0.24 amp supply	0.187	0.06	0.113	0.79	0.33	11.0	4.6

Table 3

Thus, the 0.24 amp power supply delivers 11.0/31.0 or 35% of WOT during start-up, and 4.6/7.3 or 63% of WOT during steady state. **Even though you have the controller at WOT, the car is racing below 2/3 throttle with the standard Carrera power supply!**

With an inadequate power supply, you will notice when racing two cars *on the edge* side-by-side, if one crashes, the other usually crashes too. This is because the second car got a power surge when the first one came off. A two lane power supply with less than 4 amps doesn't have enough current to support the demand of two cars at WOT. For a visual representation of this, see the graph titled "Power Supply Comparison".



With the 6.3 amp power supply, two stock Carrera cars have a combined steady state current of 1.6 amps which drops to 0.44 amps (almost one quarter) when the Mustang exited the track. WOT current demand was met for both cars. The 0.24 amp power supply surprisingly put out 0.73 amps with two cars, and 0.36 amps for one car. The Corvette was at 82% throttle after the Mustang exited the track with the 0.24 amp power supply. The two cars were around 50% throttle, so the Corvette got over a 30% boost in power. This is what we call a power surge!

Note the Mustang exited the track almost 0.15 seconds sooner with the 6.3 amp power supply. That is an indication of how much faster the cars are when they receive full power.

Upgraded Power Supply

Improving the power supply will make your race cars more predictable and responsive to drive. We have come to the conclusion that stock motored cars need a power supply that can deliver at least 2 amps per lane peak/0.5 amps per lane steady state. Peak current per lane should be upped to at least 3.5 amps for modified motored cars. (Note: Good power supply and cars w/o magnet, 9 VDC +/- 1.5 VDC is typical.)

The first upgrade to a plastic track could be a second power supply and terminal track. The cheapest way to buy this is to get a second slot car set, (at least you should explain it to your spouse this way). You not only get the power supply and terminal track, but more straight sections, two more cars and spare controllers. You know you were planning to buy more cars anyway…

A low cost upgrade could come in the form of an older slot car power supply. The Strombecker unit shown below has selectable voltage from 14-24 volts and delivers 1.5 amps. The increase from 0.24 to 1.5 amps adds tremendous throttle response. Cars with silicone tires will spin their tires at launch, and throttle oversteer will be easier to invoke. On most tracks the additional amperage will make it more difficult to drive the cars smoothly and on the edge of tractive adhesion, but the cars will feel alive (responsive). On a small, technical track lap times with a stock motored Fly Viper were improved 0.1 seconds with 1.5 amps and 14 volts, (from 3.9 to 3.8 seconds). Going to 18 volts improved times an additional 0.2 seconds, (from 3.8 to 3.6 seconds). Racing with 18 volts is like supercharging a 1/32 scale slot car, even my Wife could *hear* the difference from a room away. Cars become unbelievably fast, and more difficult to drive due to wheel spin. Anything more than 18 volts is ridiculous! I would only consider 24 volts for a drag strip, and even then 18 volts is probably a better choice as far as limiting wheel spin and making the cars more dependant upon tuning changes to go fast.

Vintage Strombecker slot car power supply with selectable voltage and 1.5 amps of current. The ability to switch between 14 and 18 volts can change the personality of your layout and cars. Running 18 volts adds greater speed *and difficulty* to driving even your best handling (most magnetic down force) cars.

A transformer with 1.5 amps current is good, but you will still note a power surge when one car crashes. Note the current demand of two Carrera cars at steady state was 1.6 amps, reference graph “Power Supply Comparison”. Thus, you may want to shop for one with at least 6.0 amps, (for a 2 lane track). You can hunt around on the internet or electronic surplus stores for a lab quality power supply, or get a 10 amp peak variable voltage unit from Professor Motor. I am using the Professor Motor unit (MGPS10AD) and am quite happy with its features – namely adjustable 0-20 volts, volt and amp needle gauges so you can set the voltage and monitor the current (amp) draw. It has short circuit and overload protection. I am told the weak link (or fuse) is the printed wires between the Carrera terminal track sockets and rails.

Professor Motor 0-20VDC, 10 amp power supply (MGPS10AD) and 13 gauge (PMTR1048) cables with Carrera specific terminal track pins. A newer version with 15 amps is available (PMTR1400B).

Commercial slot car tracks often use a big honking battery from a car/truck/boat or forklift for their power supply. Note that these batteries will have slightly less voltage, (13.2 volts when fully charged) but way more current. This means their speed will not vary if one car de-slots.

However, if you race cars without magnets, then much less voltage is desirable. Wood routed tracks with non-magnetic braid are very efficient. We typically run 9 VDC +/- 1.5 VDC, and this is what is recommended for a CNC Track Design circuit with non-magnetic braid. More voltage than this and the cars become too fast to hang onto.

A power supply with adjustable voltage is the way to go if you ever plan to entertain kids on your track. You can turn the voltage way down so they don't demolish your prized slot cars. Also, it is fun to be able to vary the voltage for different cars to make them easier/more difficult to drive. **I use this feature a lot!**

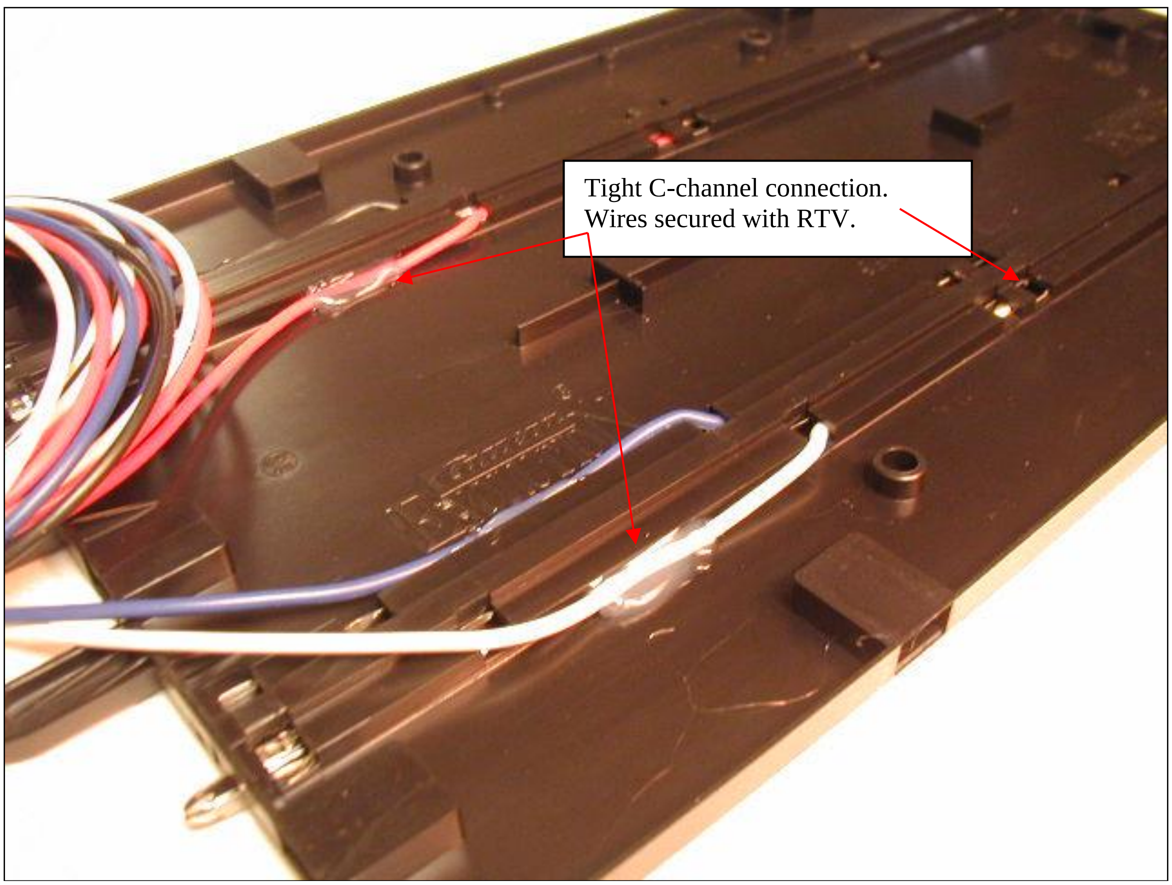
Power Cables

It is important to use good cables between he power supply and track. Professor Motor has 10 foot long 13 gauge silicone cables with spades and the Carrera terminal track pins, reference PMTR1048. Standard cables are available from Professor Motor for hard wired routed tracks, PMTR1064. See the BOM link on the CNC Track Design website for cables, junction blocks, wire spade ends, etc.

Reducing Track Current Drop

On big layouts, you will notice the cars may slow down and become less responsive mid-way around the track. This is due to current drop, which is related to track and joint resistance. You can minimize resistance at the joints by keeping them tight and clean. I use 99% pure isopropyl alcohol on a lint free cloth or paper towel, backed up by an ink eraser to clean the metal joints and rails. Note; most isopropyl alcohol has a greater percentage of water, and is only 70% pure. I use Blue Rhino (a mild degreaser) to clean the plastic part of the track. Baby wipes also work well to clean the plastic part of the track, but will leave a residue on the rails.

'Jumpers' are a good addition to a long track to reduce current drop. A jumper is a set of wires that essentially bridges the power near the terminal track with a point placed approximately mid-way around the layout. It is next to impossible to solder a jumper wire to a piece of Carrera track, due to the stainless in the rails. Carrera sells jumper wires that make a connection by slipping a V clip into the C-channel underside of the rail. However, this does not offer a very secure connection.

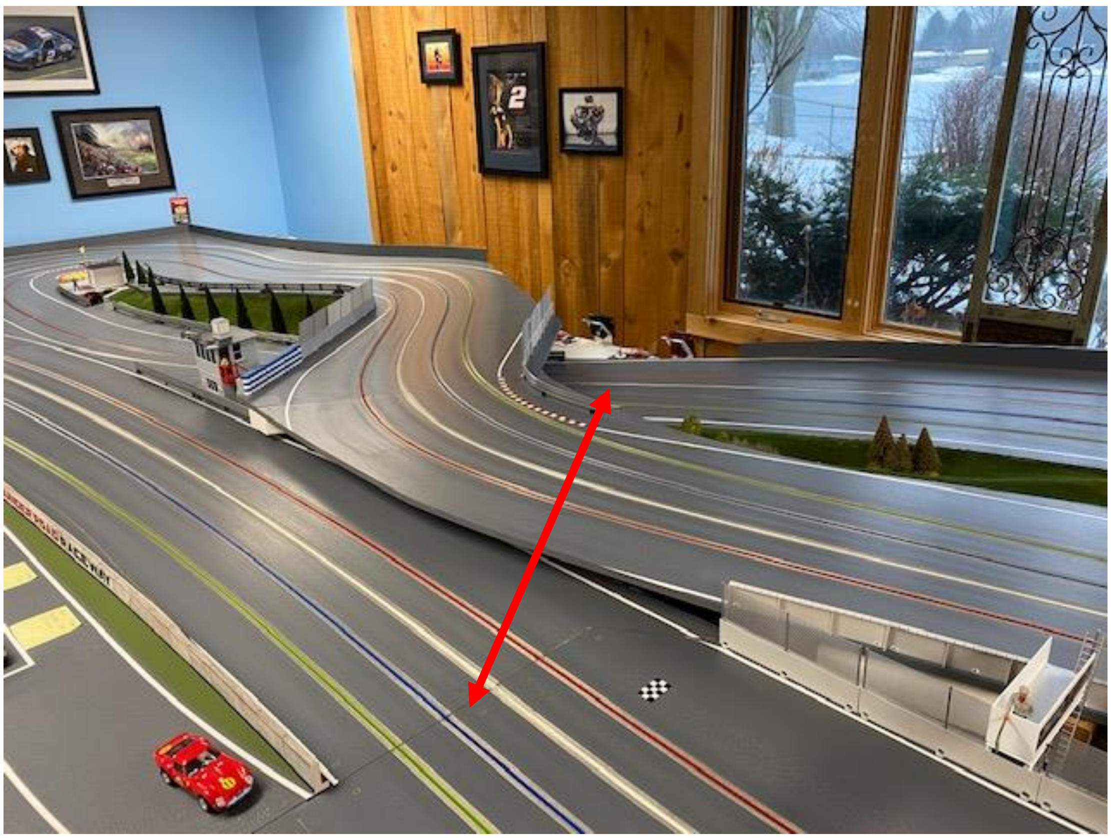


Professor Motor Carrera jumper straight track section (PMTR1085) with secured 6 foot color coded 16 gauge leads. Two or more of these placed equidistant around your layout and wire nutted together will act as "jumpers" to reduce current drop.

Professor Motor offers a better alternative which is a single Carrera straight track section with 16 gauge wires (PMTR1085) attached with a dedicated C-channel clip, and secured with RTV. A pair of these with the corresponding wires nutted together will serve as jumpers. Larger layouts benefit from 3 or 4 jumpers. One of the jumper tracks should be close or next to the terminal track, the other(s) equidistant around the layout.

Talladega Tip #15. You may not want to put a jumper track exactly equidistant from the terminal track if the added current contributes to fish tailing as cars exit from a hairpin turn, or makes a tight grouping of turns more difficult to drive due to increased wheel spin. Try to position them in the middle of long straights if possible.

A routed track with tinned copper braid is very efficient and will have very little current drop around the circuit. However, it takes very little effort to add a jumper, especially if your circuit has a 100' lap length, or more.   Obviously, the jumper will be most efficient if the wiring is a short and heavy gauge/highly stranded copper wire. I was able to place a single jumper between my long "straights" on the Thunder Road Raceway, which were relatively close together.



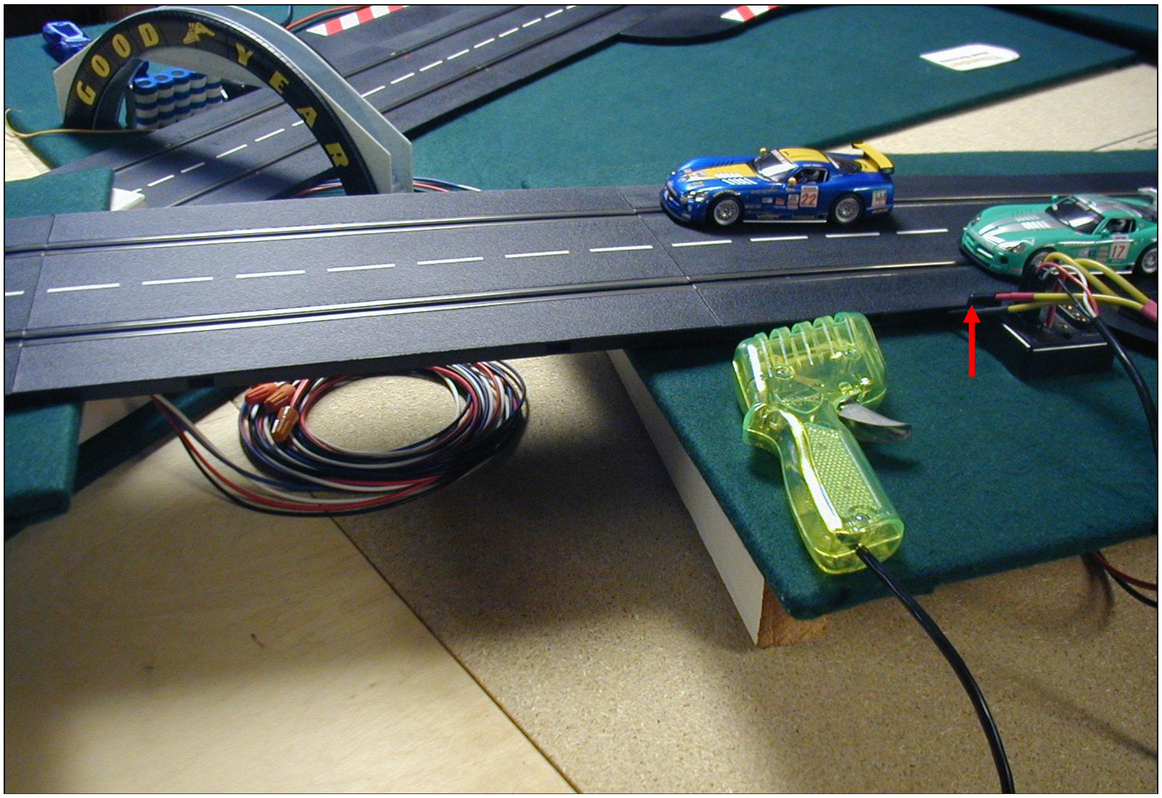
A single "jumper" set of wires was added between the sections noted between the red arrow on Thunder Road Raceway, which has a lap length of 94'. The tinned copper braid is very efficient and low current loss, but a jumper was added just for extra insurance. Very large circuits (150') may need an additional jumper.

On the topic of current drop, you would think it would be advantageous to have one continuous braid all the way around the track, with one terminal connection. This is probably true, but should NEVER be done! The reason for this is not related to current loss, but rather shrinking/growth of the track due to humidity and temperature. As the routed MDF changes length, there will be strain on the braid. Even though there is some elasticity in the braid, you don't want to take the chance it will stay put in a corner as the MDF changes length. Braid under strain will creep towards the apex of the turn, and "crowd" the groove. Thus, plan to have a junction block at each intersection where your CNC routed track sections join.

Each length of CNC routed track section should have a terminal block to join the ends of the braid. The 2" x 4" board connects the two pieces of routed track, and is drilled with separate holes and shrink wrap to keep the braid separated. The braid ends are soldered to eyelets and joined at the terminal block.

Driver's Stations

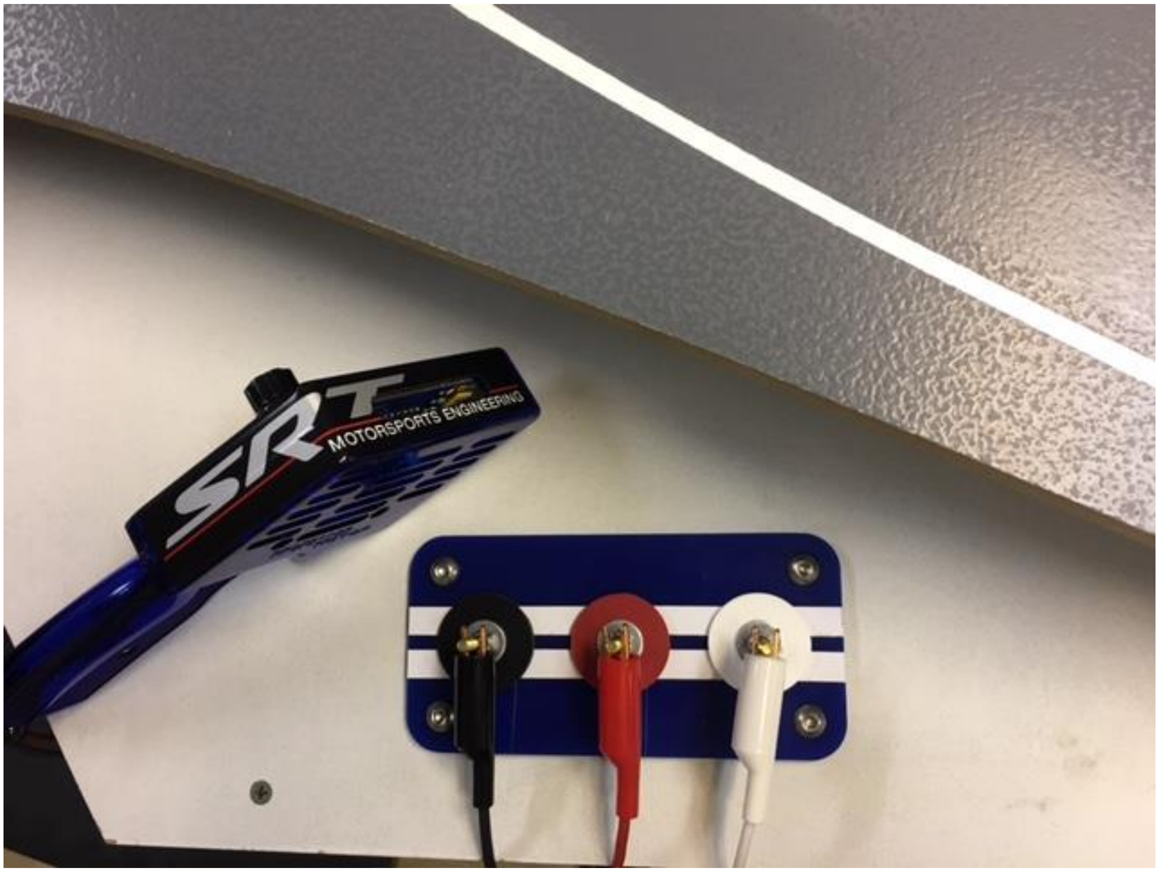
On table top layouts, it is advantageous to have a terminal track and controller for each side of the layout. These can be referred to as "Driver's Stations". By separating the Drivers, and putting them on opposite sides of the table, you are not constantly reaching in front of, or having to run around to the other side of the table to fetch your crashed car. Confucis say, "He who falling behind in race, will misjudge furthest corner!". There are other advantages to being across the table from your Competitor, like being able to direct your glare when he/she knocks you out of the slot for the 20th time, or just having more room to move around on your side of the table.



The picture above shows two things that will make your layout more enjoyable. The coil of black/red/blue/white wires with orange wire nuts are from two Professor Motor PMTR1085 track sections being used as jumpers. I orientate the PMTR1085 track sections so that one lane has the black/red wires, and the other blue/white. Then I just wire nut the black wires together, red wires together, etc. This particular track was not very large, but the addition of jumpers made the power delivery even all the way around. I run jumper wires on almost every layout, unless it is very small. The other thing to note is that two terminal tracks are being used, even though this is only a 2 lane layout. By having a terminal track and controller on each side of the table, the Drivers can more effectively marshal a table top layout. Note the red arrow points to a set of un-used PMTR1048 cables from the power supply. You can not deliver power directly from the power supply to two points on the track. The power supply will back feed current to the lane even though the controller is in the closed throttle position. Eventually the wires in the terminal track will overheat and/or melt the track! I wrapped the un-used cable ends with black electrical tape to keep them from shorting against each other. You will only use the +/- cables from the power supply for the lane that the controller is plugged into.

Polarity can not be reversed on a Carrera terminal track using the standard controllers. Thus, 4-lane layouts require a special terminal track, which can be procured from Carrera, if you are using the standard Carrera controllers. If you are using aftermarket resistor controllers, you can change polarity, (direction of travel), by simply swapping the +/- cables at the terminal. Even though one could potentially build a 6 or 8-lane Carrera layout with the four different radii turn segments, I wouldn't recommend it. It would severely limit what you could do with changing radii turn segments.

On a routed track the Driver's Stations can be made as generic or custom as desired. I chose to use "posts" for alligator hook ups, but you could also do XLR panel mount receptacles, 3 prong household style outlets, or hard-wired controllers. Since I knew a wide range of folks would be racing at my house, I chose the most generic "post" method.



Professor Motor track wiring panel with posts for controllers with alligator clips. I added "Viper racing stripes" to the PMTR2082 blue panel. Likewise added "SRT Motorsports Engineering" to my PMRT2110 controllers to help identify them when people come over to race and replace with their own controllers.

<u>Controllers</u>

Aftermarket trigger finger controllers are available from Parma, Professor Motor, Slot.it, 3rd Eye, etc.

Talladega Tip #16. The standard Carrera thumb controller should be replaced by a finger trigger unit.

I recall a study done in the late 1960's whence it was found that the pointer (or trigger) finger was twice as fast achieving WOT position as the thumb. I have proven this to myself in testing with a Parma economy controller, as I can cut 0.1 second faster lap times, and the Parma unit makes the car feel more responsive. I also find the trigger style to be less fatiguing. Another possibility for the faster lap times could be better current delivery of the larger wire on my Parma finger trigger controllers. I suspect it's a little of both.

Parma makes economy and upgraded controllers of the original Russkit design. They come in many different colors, are made from a tough plastic, and have passed the 'drop test' many times on my basement floor. The upgraded controller has a plastic trigger and heat sink on the rheostat. I find these easy to hold and operate. Other brands of controllers may be more comfortable for smaller hands, like the Ninco units.

An understated black Russkit housing with updated Parma economy guts. The new Parma housings come in a rainbow of fluorescent colors, as well as clear.

Controllers can be purchased or built with a variety of Ohm ratings. A 45 Ohm controller will allow precise control at low vehicle speeds, so it is a good choice for layouts with a lot of tight radius or linked S-turns. Very fast tracks and modified motor/high down force magnet cars may benefit from a 15 Ohm controller. A modified motor car may not begin to move until 1/3 to 1/2 throttle with a 45 Ohm controller, so the 15 Ohm unit will return a “normal” throttle range.

Talladega Tip #17. Cliff “Super Genius” Kratzet recommends that the controller resistance measure 5 times the resistance of the car’s motor.

I have found this to be a good rule of thumb for providing linear control of the car with the controller. By “linear control” I mean that finger movement and power delivery to the car (throttle) are proportional. For example, a 25% finger movement provides approximately 25% throttle to the car. You will have better low speed control if you “match” the controller to the car. This should provide you with the control and confidence to cut the fastest possible lap times with each of your cars. At least in theory, read on…

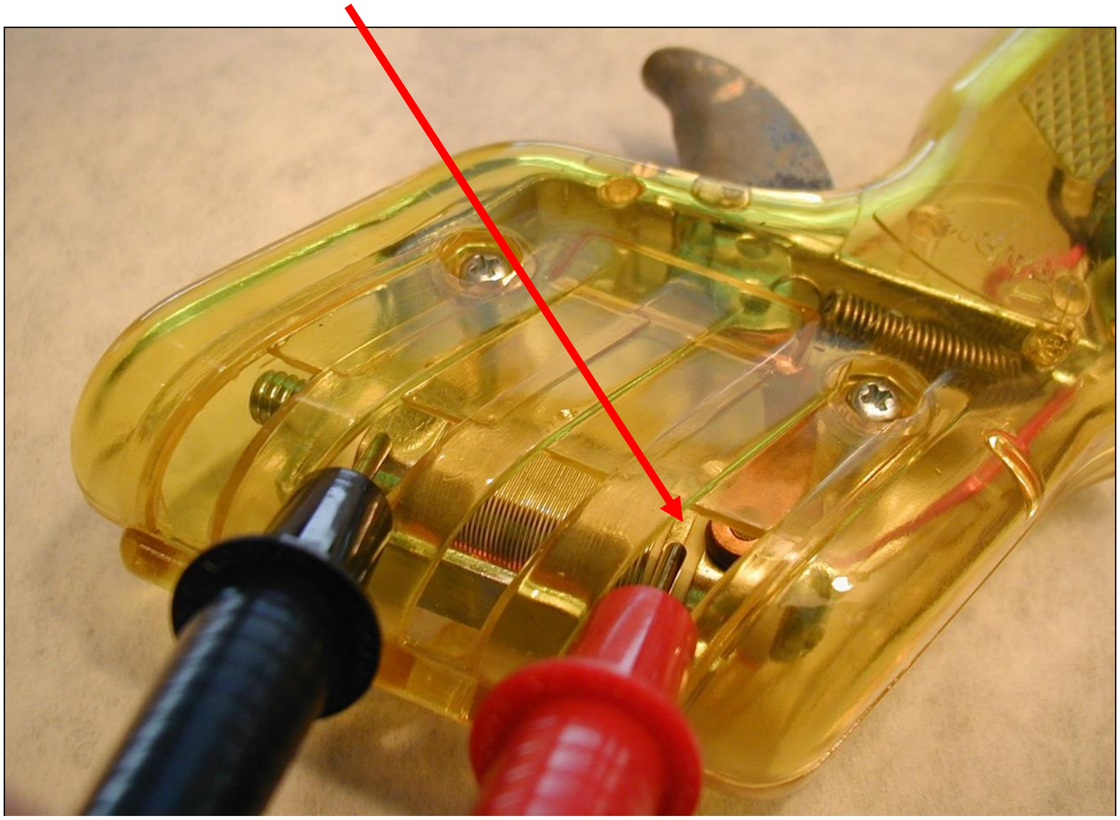
To determine a suitable Ohm rating controller for your car, just measure the resistance across the pick-up braids with a Digital Volt and Ohm (DVO) meter. In the case of this Revell Jaguar, a 5 x 4.9 Ohm = 24.5 Ohm controller would provide linear response. Bias your Ohm calculation to 4.5 times the measured resistance for high magnetic down force cars.

It is safe to say that a 20-25 Ohm controller will meet the needs of most cars and layouts. The controllers I used most often on Carrera plastic track measure just below 23 Ohms, as the newer cars have quite a bit of magnetic down force.

Talladega Tip #18. Most Ohm ratings on controllers are wrong!

Wrong! What do I mean? Well, if you actually measure the Ohm rating of the resistive element at the first winding you will find it to vary up to 20%. For example, the 45 Ohm controller used for the power supply evaluations actually measured 40.2 Ohms, (over 10% error). Thus, you should measure each controller, mark it directly on the housing or element, see the following pictures.

This 35 Ohm controller actually measures 33.5 Ohms. To measure the actual resistance of your controller, place the DVO probes on the first (narrow) and last (wide) windings of the element.



Professor Motor (and others) sell electronic (non-resistive element) controllers. Electronic controllers are the way to go if you race a variety of cars. A series of diodes gives them a progressive throttle response with no heat heat build-up from a resistive element. The Professor Motor controllers have a light and smooth trigger feel. They are very nice, but cost two or three times more than the Parma units.

However, if you are racing in a Club format, you will likely get your rear end handed to you by the Competitors using electronic controllers. I know, it happened to me. Even with my superior car prep and being on the younger end of the range of participants, I was a mid-pack Racer until I bought a Professor Motor electronic controller. What makes the difference is being able to control the "sensitivity" and "brake".

The Professor Motor silver knob controls sensitivity, or how quickly your car responds to throttle. I usually prefer a "linear control", but there are times when you really have to "Drive like you stole it" to be competitive. This requires a car that has good traction. The red knob controls the effectiveness of the brake. I generally run about 90 - 100% effective brake, again dependent on the traction of the car. Most cars don't have enough grip to take 100% brake, which will cause it to fishtail when applied.

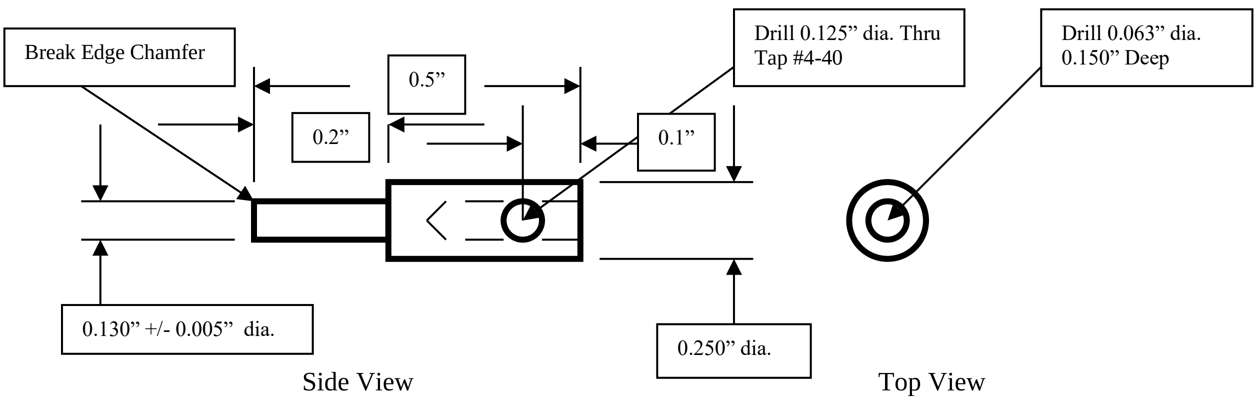
I recommend the Professor Motor PMTR2110 low voltage Scale Racer PRO unit shown below. They are targeted for 10 – 15 volts, but can be tailor built (when ordered) to your voltage range. I recommend 9 DVC +/- 1.5 VDC for CNC routed tracks with non-magnetic braid and "stock" motored cars running silicone rear tires.

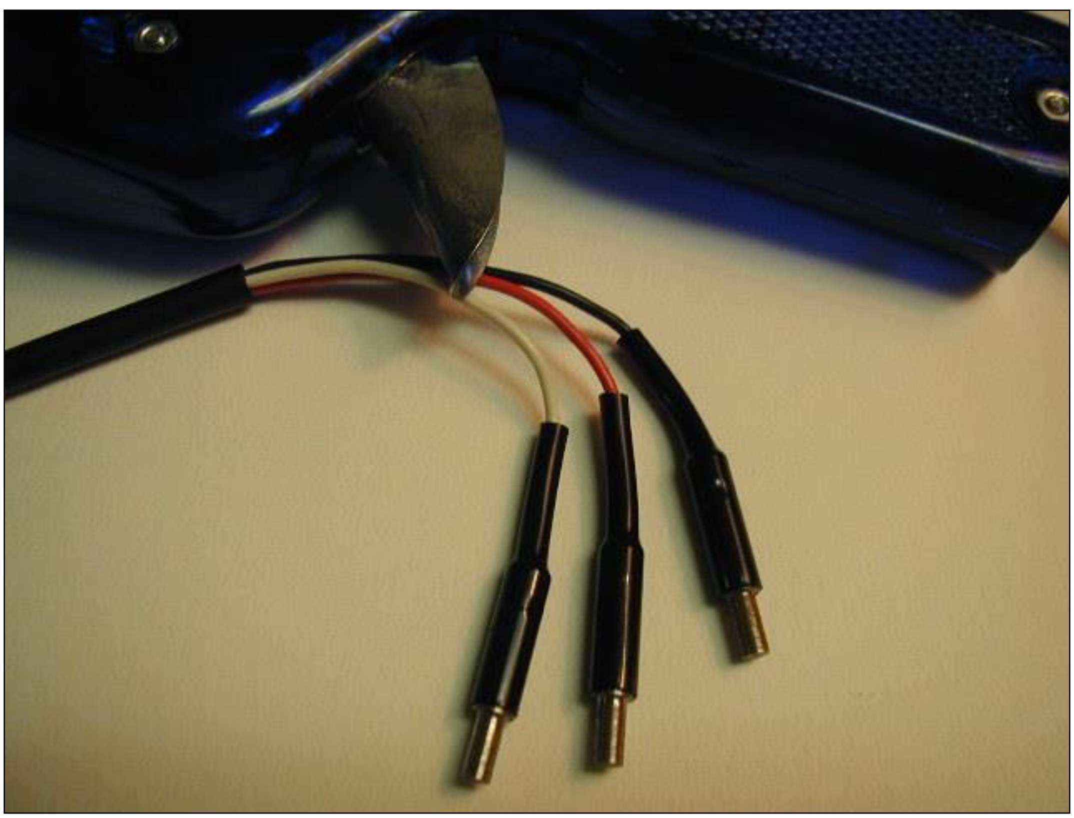
Most Professor Motor controllers come with "sensitivity" and "brake" control knobs. The trigger feel is light and quick. Handle is available in a variety of colors. Other (more sophisticated) controllers are available, if you can figure them out – more power to you!

Terminal Track Connections

A way to connect your high current power supply and trigger style controller to the Carrera terminal track is with individual pins. The pins can easily be made by turning down a shoulder on a length of 0.25” steel rod. I attach 14 gauge wire by capturing it with a #4-40 set screw, see sketch. The wire hole should be center drilled deeper than the threaded cross hole. I found that tinning the wires increases their diameter beyond the 1/16” hole I used, so you may want to consider a # 50 drill instead. Likewise, if you can’t find #4-40 set screws, then drill and tap for a #6-40. Note the pin and wire need to be insulated with shrink wrap.

Carrera Terminal Track Pins, (not to scale)

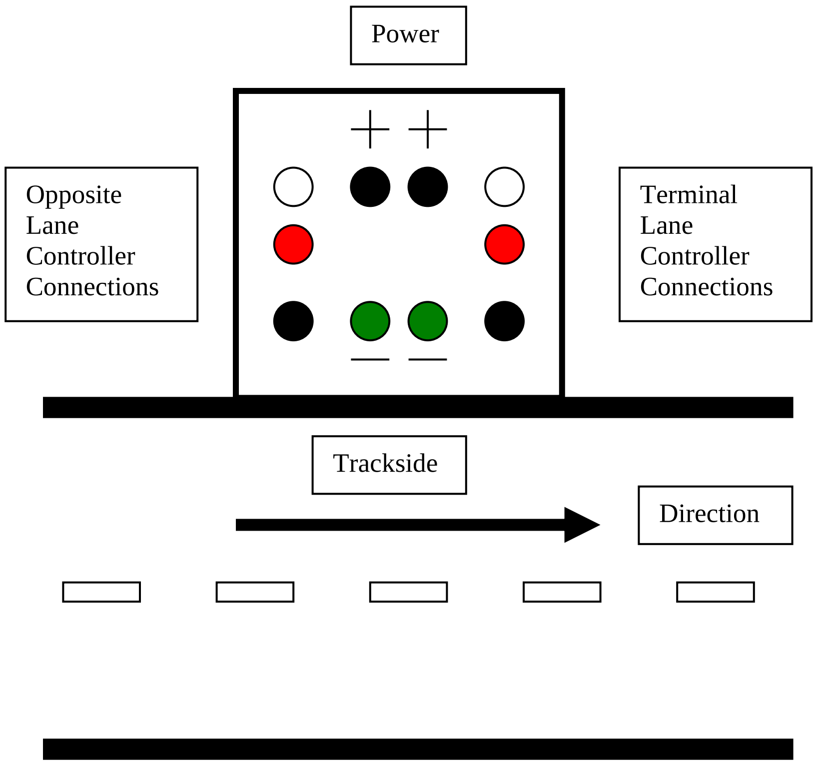


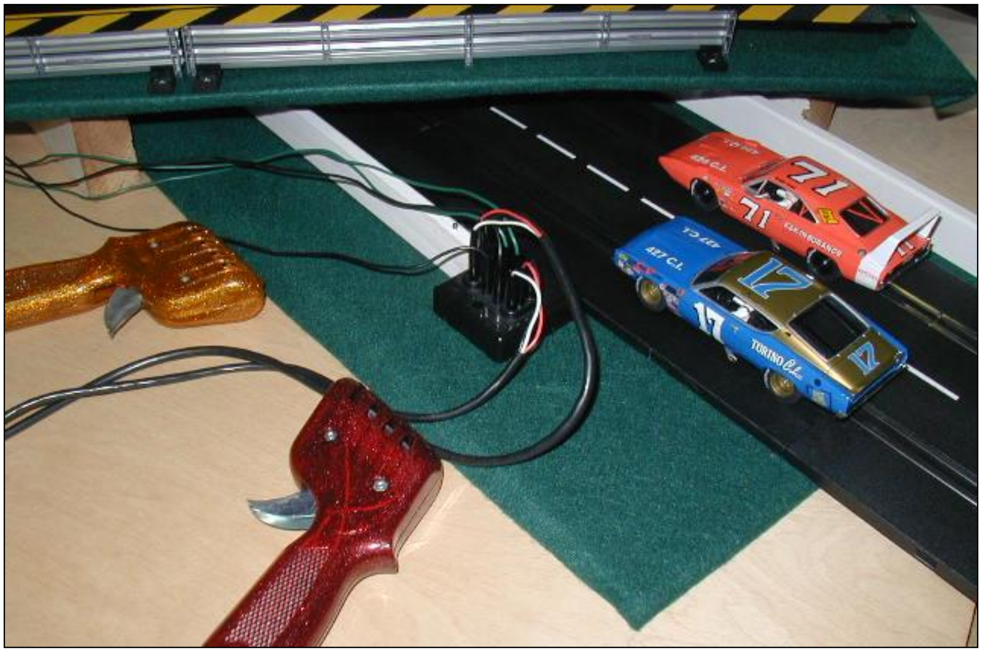


Parma economy controller updated with Carrera terminal track pins. These are relatively simple to make from ¼” steel rod. You can see mine are starting to rust from being in the basement, and should be plated or at least coated with WD-40. Shrink wrap is trimmed just above the turned shoulder.

Obviously, it would be easier to cut the multi prong ends off of the Carrera power supply and controllers, but the Carrera wire molded into the standard connectors is so tiny! Big power needs big wire. Wiring for the individual pin modified controllers is as noted below. The plus and minus wires can be reversed for opposite direction with a standard resistor controller.

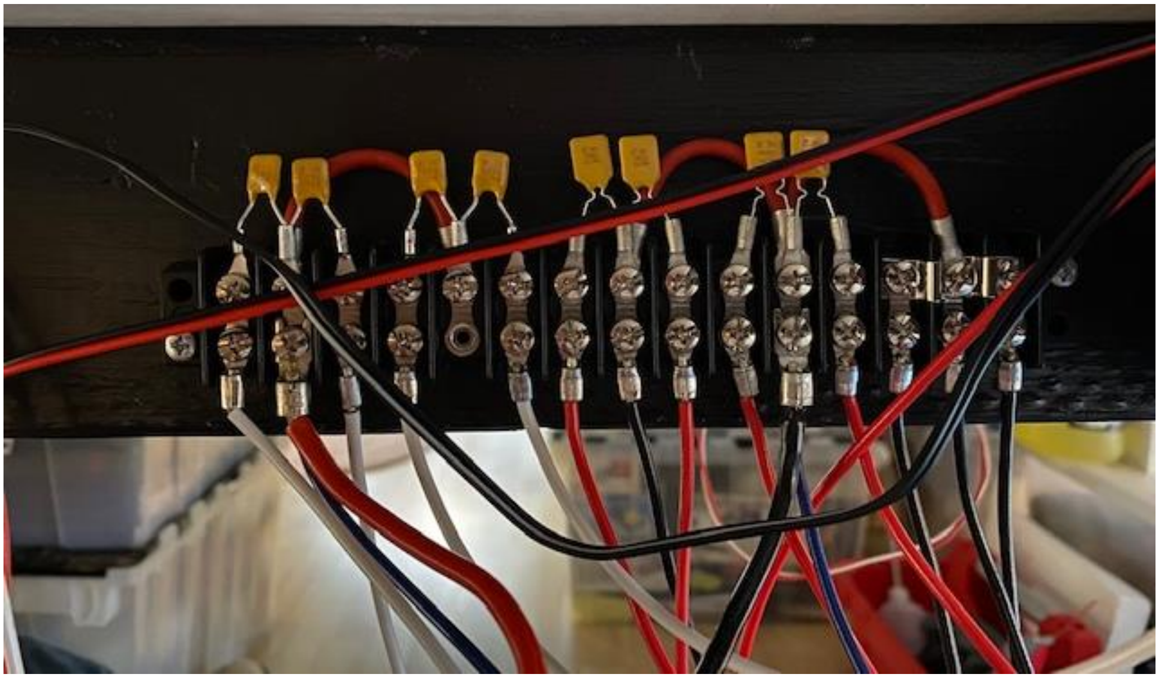
Terminal Track Wire Color Code Diagram





Parma “economy” controllers in ‘disco’ gold and red metal flake housings, modified with terminal track pins. All of the pins need to be shrink wrapped to avoid shorting against an adjacent pin. The Carrera Dodge Charger Daytona and Ford Torino Talladega work well with 25 ohm controllers.

If you can’t get terminal track pins made for your power supply cables and controllers, you can purchase controllers and cables with the correct pins. Professor Motor sells 13 gauge power cables and the Parma or Professor Motor controllers can be ordered with Carrera specific pins.



This is the Professor Motor 4 lane wiring center (PMTR1027). Two and three lane versions are also available. Can handle up to 10 amps per lane and has all-electronic self resetting circuit breakers to provide electrical protection against short circuits and overloads. Looks like a wiring nightmare, but with the excellent instructions included, it is easy to set-up.

<u>Electronics</u>

Lap counters/timers fall under the catch all heading of ‘electronics’. I find the timer feature to be much more useful than counting laps. My friends and I typically just race each other until someone crashes, and we find it more entertaining to monitor “fast laps” with various cars. I guess we do this because we are not skilled enough to run more than about 10 laps or so before someone crashes. This has been coined “Crash and Burn” racing. ‘Racing’ like this takes the pressure off those Marshaling, so that everyone can have a relaxing, good time, (no need to rush to get a car back on the proper lane). Otherwise, some idiot is always yelling a lane color like, “Blue, blue, blue, blue!”, during the heat of a race when in need of Marshalling.

Talladega Tip #19. You don’t have to keep track of laps to know who is kicking your butt on the race track!

The Carrera lap counter/timer #71590 is easy to use. I just drop it on my track when I am “tuning” a car to monitor lap times. My only complaint is that another significant digit to the right of the decimal would be useful. It only records lap times to the nearest tenth of a second. On short tracks, a tenth of a second variation is a big deal. Obviously, battery life (4-AA) is shortened when left on for hours at a time. It counts down from 99 laps and displays the lap time for each lap. It only beeps after you complete 100 laps, (or how many you set). Once you learn a track, you will know when you are about to set a hot lap.

Scalextric 1969 Trans-Am Camaro and Mustang take the checkered flag as they pass under the Carrera #71590 counter/timer. I let the ‘smoke’ out of mine, whilst converting it from battery power to a power supply. It consumes batteries at a pretty good rate. It is of marginal use on small tracks for tracking car development because it only displays lap time to the nearest tenth, or 0.1 second.
It can also be used in a ‘timer’ mode, where you record the number of laps completed after say 2 minutes. I never liked this mode because it doesn’t display lap times, and there is no partial credit for almost completed final laps. Unless you are racing for 12 or 24 hours, to me the timer mode is useless. All other real car races are based on distance (laps) or elapsed time.

The Sport/Scalextric RMS (Race Management System) records driver/car/lane positions, rotations, laps and times. It also displays current (real time) driver standings. Graphics of cars can be downloaded via the internet from the Sport/Scalextric site. My only complaint is that the lap time display is rather small, and no data buffer is available for plotting lap times. There are other systems that have similar features, and would be easier to integrate into a Carrera plastic or routed track. For example, Professor Motor makes a laptop driven scoring/timing system with a much larger lap time display. It is not as fancy looking as the Sport/Scalextric display, but is more functional.

Talladega Tip #20. Recording lap times is a great asset and aid to car testing.

Recommending any sort of electronic software is a bad deal. Software changes so often that it is best to do a little internet research on what is new and available prior to your decision to purchase.