

Rebuilding The Yamaha Vision Motorcycle TCI Electronic Igniter Module / Electronic Ignition / Transistor Controlled Ignition

This guide explains the basic theory behind possibly rebuilding a Yamaha Vision TCI (or any motorcycle igniter box for that matter). Have I done it. No. Has it been done by others. Yes. Unfortunately, we don't have any "DETAILED" explanation of a successful rebuilding project. But there is enough info here to get you pointed in a the right direction.

This is linked from the ([Vision Ignition FAQ](#)) & my ([Vision Home Page](#)).
If you have inputs to this page PLEASE email. I will update this for fellow Owners ([Vision Riders Group](#)).

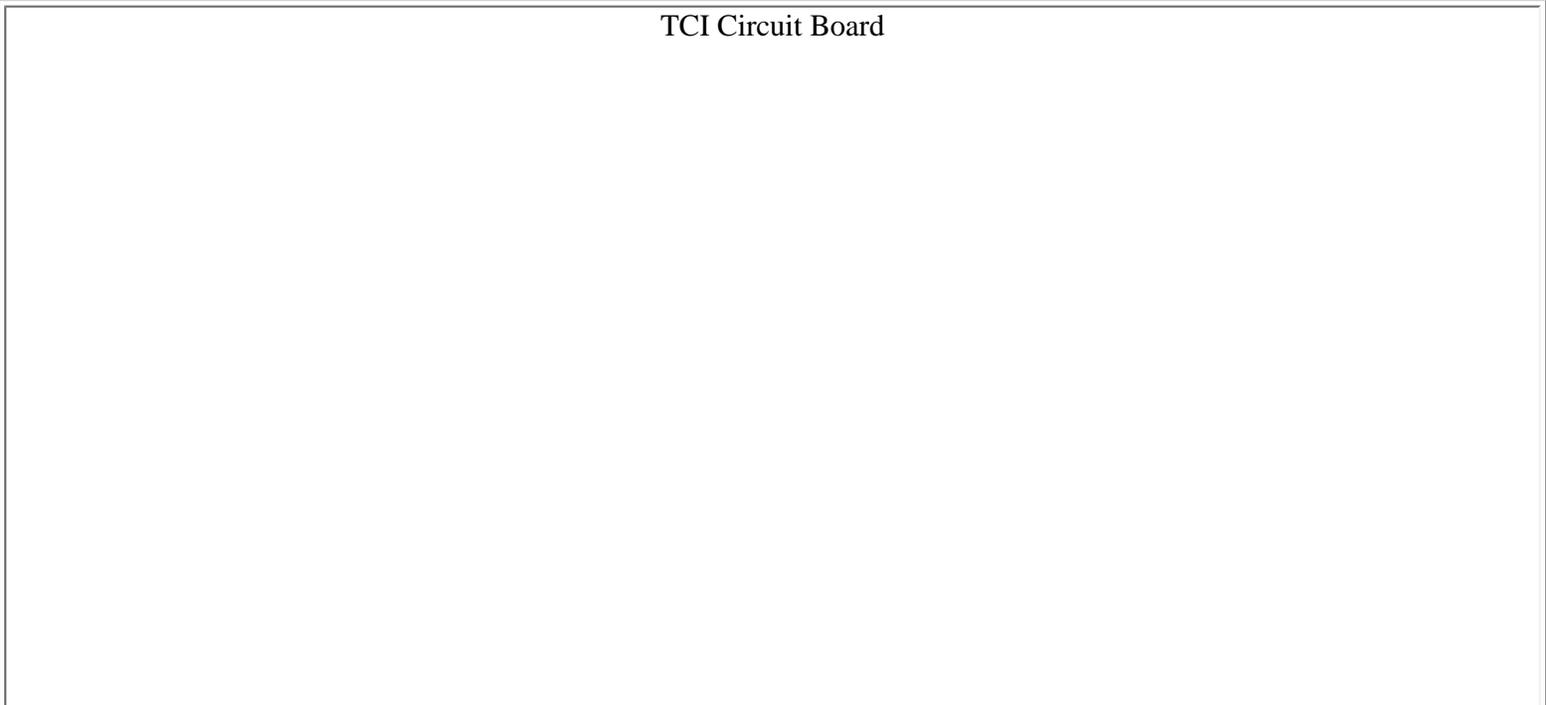
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TCI Circuit Board



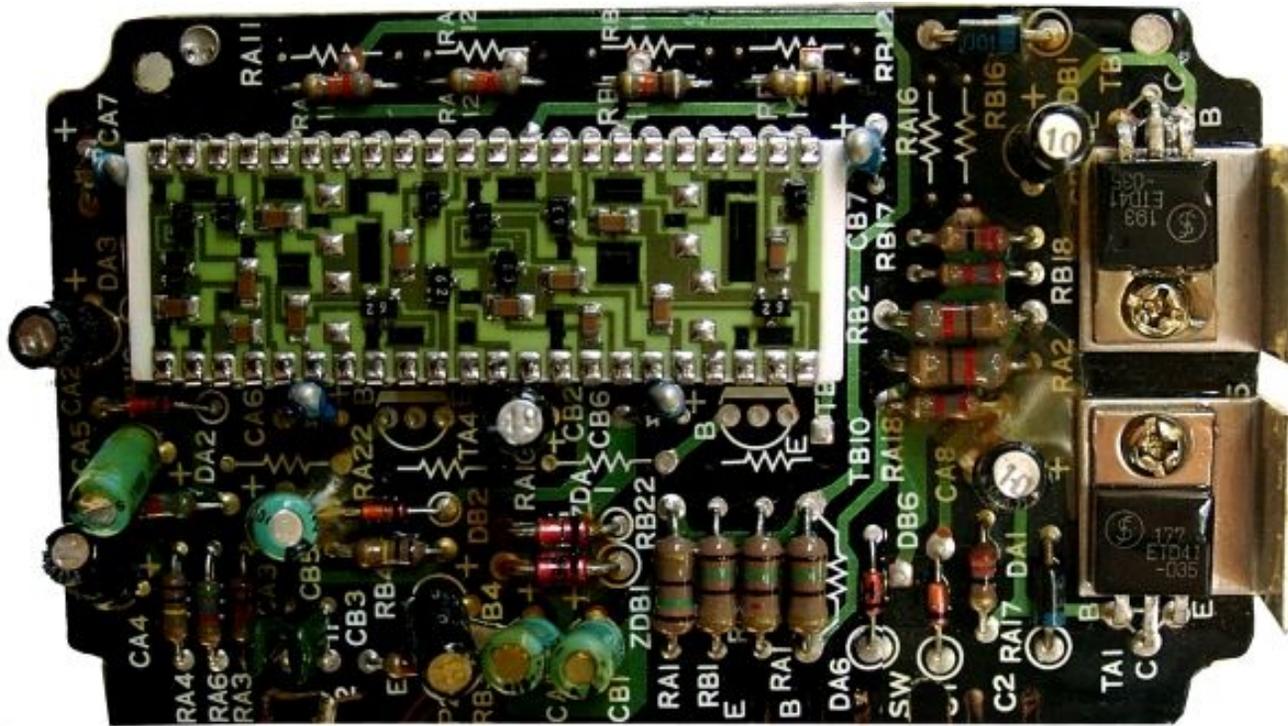


Photo at left is TCI box with "porthole" cut in bottom to view top of circuit board

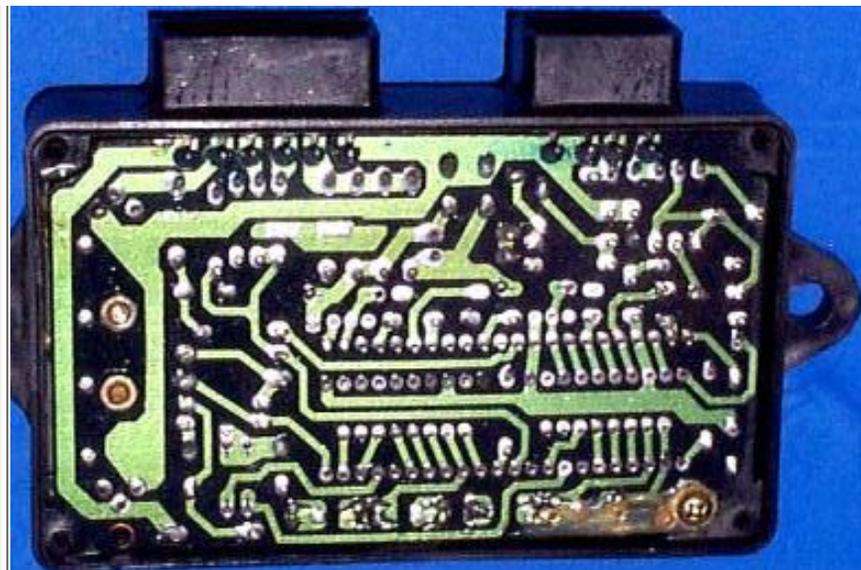
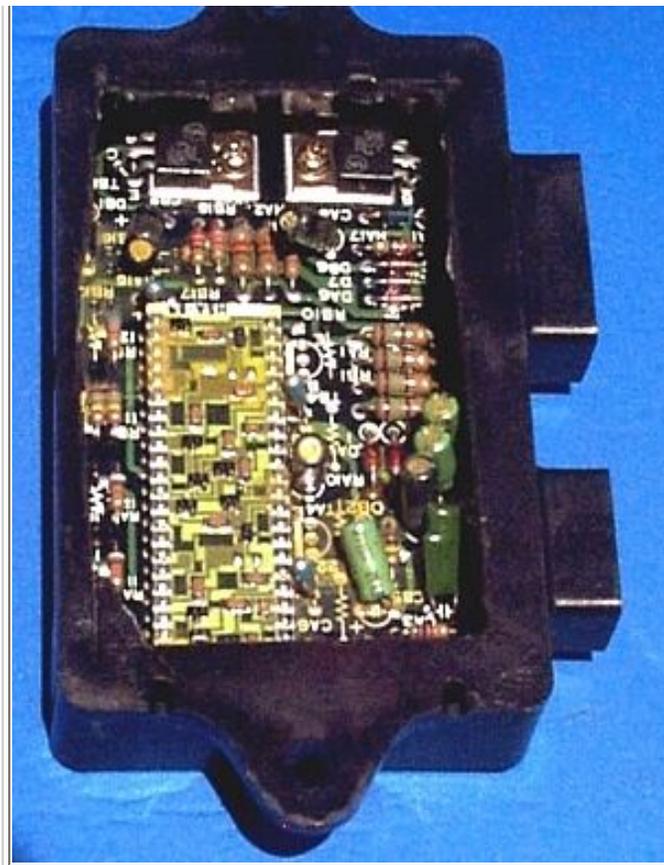


Photo above is bottom of circuit board (bottom cover is removed).

Component List for Yamaha Vision Hitachi 12-06 TCI ignition

| TA1 / TB1 | Made By | Type Size | Transistors are FAST Switching Power Transistors "Darlington NPN" | Comments |
|--|-------------|-----------|---|---|
| | Fuji | T-220 | ETD41 | |
| Recommended Replacements. Has been tested successfully !!!! | | | | |
| \$1.60 | ON | T-220 | MJE5742 Spec Sheet is MJE5740Specs.pdf Found at www.Digi-Key.com | Perfect for this application Same size as original |
| \$2.50 | NTE | T-218 | NTE2317 nte2317.pdf | Good heavy duty alternative Larger Footprint Than Original |

| Resistors | | |
|-----------------------|------|-------------------|
| RA1 | RB1 | 150 Ohm 1/4 w |
| RA2 | RB2 | 620 Ohm 1/4 w |
| RA3 | RB3 | 1000 Ohm 1/4 w |
| RA4 | RB4 | 100,000 Ohm 1/4 w |
| RA6 | RB6 | 5600 Ohm 1/4 w |
| RA17 | RB17 | 22 Ohm 1/4 w |
| RA18 | RB18 | 2700 Ohm 1/4 w |
| ** Run-time Resistors | | |
| RA11 | RB11 | 62,000 Ohm 1/4 w |
| RA12 | RB12 | 90,000 Ohm 1/4 w |

** RA11/RB11, RA12,RB12 are "run-time" components. That means they are selected at the time of actual assembly to adjust some values on the board. No 2 TCI are alike here and the resister values can't be predicted. The values here are examples of what was found in the TCI module we dismantled.

| Electrolytic Capacitors | | |
|--|-----|--------------------|
| CA1 | CA2 | 10 • @ 25v |
| CA2 | CB2 | 2.2 • @ 50v |
| CA4 | CB4 | .47 • @ 50v |
| CA5 | CB5 | 10 • @ 25v |
| CA6 | CB6 | .1 • @ 35 tantalum |
| CA7 | CB7 | .1 • @ 35 tantalum |
| <p>Note: There should be two values of tantalums. One will have .1 35 and the other 1 35. Due to the age of the part and many times how the part is inserted in the system, the decimal is often overlooked or are missing. The part marked 1 35 is a radial leaded tantalum rated 1 uF (1000 nF) at 35 volts. The other is rated .1 uF (100 nF) at 35 volts. These can be replaced with ceramic, non-polarized, as a preferred option are equivalent tantalums.</p> <p>Given the technology improvements in both ceramic and tantalum capacitors, the aluminum electrolytic I highly suggest replacing with tantalum equivalents as the first option with ceramic as the second option.</p> | | |

| | | |
|-----|-----|-------------|
| CA8 | CB8 | .22 • @ 50v |
|-----|-----|-------------|

| Mylar Capacitors | | |
|------------------|-----|--|
| CA3 | CA3 | 472k @ 50g "Greenies" 472K 50 G is a 4700 pF 50 volt Mylar film capacitor. Replacement with any ceramic of equivalent value is acceptable and preferred. |

| Diodes | | |
|--------|------|--------------------|
| DA1 | DA2 | 1N1001 |
| DA2 | DB2 | Small Signal Glass |
| DA6 | DB6 | Small Signal Glass |
| ZDA1 | ZDB1 | Zener 8.2volts |

Rebuilding a TCI Ignition (Igniter Box , TZ Box)

We know some have repaired their own ignitor boxes. General speaking, it is most likely the transistors which have failed on the circuit board. Also, some have reported loose solder connections that have been corrected with some cleaning and resoldering.

DO NOT rule out simple moisture. The Vision TCI is NOT encased in resin or rubber like most ignition modules are. So.... if there is moisture on the board it would not work well. WD-40 and let it sit in the sun would be good advice here.

The Vision TCI circuit board is a "double-sided plated thru design". This means the components are mounted on one side but soldered both top and bottom (and thru the board). This is a strong rugged design and makes weak solder joints less likely. The Virago TCI which is very similar uses a single sided design where the components are mounted on the topside but soldered only on the single circuit foil on the bottom. This makes it more prone for the circuit foil to peel up and fail due to vibration. This problem less likely on the Vision TCI board which has circuit foil both sides and soldered all the way through. Look at the pictures above. The Vision TCI is more prone to component failure where the Virago TCI often fails to mechanical failure (bad connection on board).

David Denowh is currently reconditioning TCI for the Virago group. He has been VERY successful doing this but comments that many Virago TCI have simply failed from loose components. Dave is so busy in fact that he has (for now) declined the possibility of repairing Vision TCI. But

he demonstrates that it can be done. The problem of course is testing what you have done and Dave has no easy way to test a reconditioned Vision module (since he has no bike).

Here are some of Dave's comments (circa 2000): "I have been very lucky with the Virago repairs thus far. I have done over 240+ TCI units and they ALL have had similar problems. Re-soldering the board has repaired them all with only a few needing the transistors replaced. I suspect these went bad because the bike either had a bad coil or had a wire pinched somewhere. The transistors on the Virago are a bit different. The part number is either a ETD051-030 or a D1071. Both have the S with a line through and a circle around the logo like the Vision ETD41. I have replaced these with a RCA part #SK9431. I suspect that any transistor that is similar or stronger will work as a replacement. It is just a switch after all :-)".

His link current as of 2/22/2006 is worth a look: <http://members.aol.com/ddenowh/TCI/>

His Email : tcirepair@insightbb.com

If these links are old search for ddenowh.

In the UK Brian Fosh was successfully rebuilding TZI and testing them with a test bench setup. He mechanically rotates a magnet with a variable speed 15,000rpm motor past the pickups to simulate the engine RPM.

This USED to be his link. Now ????: <http://tzrewinds.co.uk/>

His email then : brianfosh@tzrewinds.co.uk

There is no way (no test bench box) to test a TCI module. Basically, you need to use your bike to test one. Just BE AWARE that you risk taking out other components equally important (like the magnetic pickup sensors).

Test firing the TCI may be possible: I will pass on a backyard trick as told to me by "roadrunner" but I HAVE NEVER TRIED. But it sounds like it should work. He writes:

"Just a quick backyard test. you can use one of them soldering guns, you know the hi current pistol type. It will trick the magnetic pickups to send pulses. Because the gun creates a dense magnetic field around the tip. Careful not to burn something doing this. The pickups will sense these magnetic fields and send firing pulses at 60 hz to the module . It makes it a lot easier to troubleshoot without kicking the starter each time ."

Of course.... this has limited use even if it does work since you would need spare pickups to try this. But just passing the info on.

Here's what we know so far about replacement parts for the Vision TCI ignition.

The Vision TCI ignitor was supplied by Hitachi as part #TID 12-06. The semiconductor (fast switching transistor) inside marked ETD41 was made by Fuji Electronics. Fuji also produces ignitors and maybe even builds them for Hitachi too! They also produce a line of after market ignitors, some advertised under other brand names for homebuilt aircraft. The ETD41's are diode protected Darlington NPN transistors. You want to replace these with heavier duty substitutes. We can make a good guess at what that would be based on the TCI and coil voltages/currents. This should probably be something that can handles 10 amps+ at the collector and double that for peak. The best replacement so far would seem to be the MJE5742 listed above. It was available from

www.digi-key.com. It is a T-220 footprint so the same size as the original. The NTE2317 should also work. The NTE2317 is slightly more expensive (we're talking a couple dollars total here) but is more readily available on the net. It is a T-218 so is larger than the original and would require you to "shoehorn" it to the board somehow with heat sink.

Specs for this transistor : nate2317.htm

Again, the Virago is similar in vintage and electrical design so notice that the power semiconductors in a Virago ignitor are marked D1071. They have also been replaced successfully with the BU806 and ST9431. All the components in the Vision TCI have been identified and are listed below. The exception is the 'piggy back' board on the printed circuit board (called a Hybrid) which has an IC mounted on it. This is most likely the timing curve. This can't be fixed and there's no obvious replacement.

Fixing the TCI (This would be my recommended order of things till you get it working).

1. Gain access to the PCB ("Printed Circuit Board").

Remove the top cover to the TCI (held by 4 screws).

**** DO NOT TRY TO PRY IC-BOARD OUT OF THE TCI CASE!!! ****

It is held in by one small Philip screw, and MORE IMPORTANTLY, is soldered to the plug pins molded into the side of the case. To get the board out you have to desolder the pins or break them off when you take it out. You'd then have to solder them (or wires connecting them) back together.

There is an another way.

Try to avoid pulling the PCB out of the case. Replacing any components while leaving the PCB still in the plastic box would be good. Ultimately you'd like to reuse the case / wire plugs, the whole setup. To get to the other side cut a large "port-hole" into the plastic "bottom" (other side of the case). Use a dremel tool small cutting wheel. This is risky because you can accidentally cut into IC components on the board. MAYBE BETTER, a sharp knife heated with a torch (so your melting through the plastic). Anyway.... GOOD LUCK (Could be a Darwin award recipient!).

Lay the case flat. Cut down (knife straight up + down) into the case about 1/2" in from the sides. Another words you're cutting a rectangular hole out of the bottom cover 1/2" smaller than the bottom cover size. One end of the module has the metal heat sinks which is why you need to cut about 1/2" in from the sides.

****** Cut no deeper than about 1/8" or you will cut into IC components ******

2. Look for obvious melted components, bad solder joints, corrosion points, or moisture and correct.

3. Replace transistors. Try it.

4. Replace capacitors and/or diodes. Try it.

5 . Replace resistors. Try it.

Related Emails

"I have read your instructions on fixing Yamaha TCI units with glee, since I have been long searching for information on the control box for my 1988 VX250. However, I believe I have stumbled upon a more suitable replacement for the T-220 footprint NPN Darlington power transistors used in my box. It is MJE5742. Using this device will be a simple swap, rather than requiring shoehorning the larger T-18 size devices you list. Hopefully this information can help others. This device is readily available for \$1.60 each from Digi-Key (www.Digi-Key.com), with no minimum order."

Dennis Meyers

Hi Dave -- Want to thank you for the CD Spark Unit repair information.

I bought a 1983, 650 Honda Nighthawk about 4 years ago to use as a commuter. It had 12,000 miles when purchased. The Spark Unit failed at 20K. I purchased a new unit from Honda for about \$250. It failed at 41K.

I had taken the unit apart and figured that the failure was most likely either the two power transistors or the chip. Your web page confirmed my suspicion, but most importantly provided replacement part numbers and sources.

Though the Honda unit looks quite a bit different than the unit on your web page I thought the transistors you recommended would work ok. I'm most happy to report that the new Darlington's work perfectly. It only cost a little over \$20 for four transistors to repair both Spark Units. Again, Thank You for making your informative web page.

Best Regards,
Ed Sanford

"You were right. ZDB1 and ZDA1 are the same and equal 8,2 [V].

In my case, it turned out, that the only ZDB1 diode was broken. I exchanged this zener diode to new one and finally I've got a sparks on both cylinders. Both transistors (ETD41-035) were ok."

Best regards,
Kriss (from Poland).

"I own a 90' Suzuki gs-1100R. Nice bike, except that recently the TCI module went bad.

One of the transistors that drive the coil was shorted. So I couldn't find a replacement anywhere, its code is D1071. This doesn't appear in any replacement book I've searched national, ECG (now NTE), Archer (RCA)), nor on the webpages of these manufacturers.

I found that in your page you make a comment that this transistor (D1071) was replaced successfully with the BU806 and/or SK9431. I know this is not the same ign. module than in a virago, but I decided to give it a try. Tried the NTE2315. To make a long story short, I'll just say that it worked for less than 10 seconds. After this short time, the new transistor blew again.

I was lucky enough to find a guy here that says he has new D1071's. In any case, I was able to learn that there is another replacement, the NTE2317, specifically designed for ignition modules, that according to this guy does work in my bike's TCI.

See: <http://www.nteinc.com/specs/2300to2399/NTE2317.html>

This is a bigger chip, that will require some mods to the heat sink to make it work. I don't know if it will handle the 10k+ rpms of the bike, but I wish I had tried it.

At 12.000 rpms, my bike wasted spark coil setup are making 200 sparks per second per coil. That is a spark every 5ms, not important when compared to the longer fall time from the 2317: 15us.

I looked for your heavier-duty recommendation, the TIP142 (nte270). This doesn't seem appropriate for ignition circuits. The nte2317 can handle way more current (15amps continuous!), and can handle spikes of up to 500volts(almost a must in coil circuits)."

Francisco

1) "Greenies" 472K 50 G is a 4700 pF 50 volt Mylar film capacitor.
Replacement with any ceramic of equivalent value is acceptable and preferred.

2) There should be two values of tantalums. One will have .1 35 and the other 1 35. Due to the age of the part and many times how the part is inserted in the system, the decimal is often overlooked are missing. The part marked 1 35 is a radial leaded tantalum rated 1 uF (1000 nF) at 35 volts. The other is rated .1 uF (100 nF) at 35 volts. These can be replaced with ceramic, non-polarized, as a preferred option are equivalent tantalums.

3) Given the technology improvements in both ceramic and tantalum capacitors, the aluminum electrolytic I highly suggest replacing with tantalum equivalents as the first option with ceramic as the second option.

Best regards,

Chris Ph.D. EE, ME, Phys

My thanks to Dick Stelter, David Denowh, Uwe Werner, Brian Fosh of TzRewinds, Dennis Meyers, Chris Hulgan, Ken Wagnitz, Glen, Ed Sanford, Francisco, and many others for what follows.

Related Links:

David Denowh Virago TCI site

<http://members.aol.com/ddenowh/TCI/index.html>

Allied Semiconductors

<http://www.alliedsemiconductors.com/>

NTE Semiconductors

<http://www.nteinc.com/>

Digi-key

www.Digi-Key.com

Fairchild Semiconductors

<http://www.fairchildsemi.com/>

MSD Ignition Systems

<http://www.msdition.com/>

Accell Ignition Systems

<http://www.mrgasket.com/accel.htm>

Misc Ignition Stuff:

<http://www.newcovenant.com/features/motors/ignition.htm>

<http://w3.one.net/~ryanr/triplesite/tech.html>

http://dmoz.org/Recreation/Motorcycles/Maintenance_and_Tech_Tips/

http://www.electrosport.com/electrosport_electrical_yamaha.html