1998 - 2003

HONDA

Electrical Repair and Modification Manual

VT750C / CD / CD2

SHADOW/SHADOW DELUXE/ACE

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Electrical Repairs & Modifications

1.0 Introduction

I decided to write this guide as I have noticed that almost every owner of a motorcycle at one time or another needs to either repair an electrical system on their bikes or chooses to make a modification. With this guide, I am attempting to gather as much useful information as I can and present it in the form of a single resource that owners of the ACE can find useful. I am not an electrician, nor a professional motorcycle mechanic. I do, however have basic training and understanding of electrical and electronic systems in my career as an aircraft mechanic, so I am attempting to use some of that knowledge, combined with information gathered off the internet, to make this guide. I hope everyone who reads it can find some use for it and I will gladly welcome any advice, tips, constructive criticism or just plain comments about what you find here. I am sure that with input from you people, the owners of these bikes, we can make this a great resource!

2.0 The VT750CD Electrical System - A Brief Overview

2.1 Introduction

The Honda Shadow VT750 CDX (ACE) has a basic 12 volt electrical system with a frame ground. The battery is a sealed maintenance free unit and the charging system is a 3-phase Permanent-Magnet system. It has an electronic Regulator/Rectifier which can control the output from the 3-phase alternator as required and the unit is completely sealed and non-repairable. The ignition system used on the ACE is a Digitally Controlled Transistorized Ignition System (TDI) which uses an ignition pulse generator to send a trigger to the Ignition Control Module (ICM). The ICM then controls when the ignition coils will fire the spark plugs. The ACE has two ignition coils (One for each cylinder) and each coil has two outputs for the two spark plugs in each cylinder.

2.2 Charging System Specs

BATTERY/CHARGING SYSTEM

ITEM			SPECIFICATIONS
Battery	Capacity		12 V – 14 Ah
	Current leakage		1.0 mA max
	Voltage (20°C/68°F)	Fully charged	13.0 – 13.2 V
		Needs charging	Below 12.3 V
	Charging current	Normal	1.4 A/5 – 10 h
		Quick	6.0 A/1 h max
Alternator	Capacity		345 W/5,000 rpm
	Charging coil resistance (20°C/68°F)		0.1 – 0.3 Ω
Regulator/rectifier regulated voltage			14 – 15 V/4,000 rpm

2.3 Ignition System Specs

IGNITION SYSTEM

ITEM		SPECIFICATIONS	
Spark plug		NGK	DENSO
	Standard	DPR8EA 9	X24EPR-U9
	For cold climate (below 5°C/41°F)	DPR7EA 9	X22EPR-U9
	For extended high speed riding	DPR9EA 9	X27EPR-U9
Spark plug gap		0.80 – 0.90 mm (0.031 – 0.035 in)	
Ignition coil primary peak voltage		100 V minimum	
Ignition pulse generator peak voltage		0.7 V minimum	
Ignition timing "F" mark		8° BTDC at 1,000 rpm	
Advance	Start	3,000 ± 200 rpm	
	Stop	5,500 ± 200 rpm	
Full advance		24.5° BTDC at 5,500 rpm	

2.4 Lights, Meters and Switches

LIGHTS/METERS/SWITCHES

ITEM			SPECIFICATIONS
Bulbs	Headlight (High/Low beam)		12V – 60/55 W
	Brake/tail light		12V – 32/3 CP
	Front turn signal/running light		12V – 21/5 W X 2
	Rear turn signal light		12V – 21 W X 2
	License light		12V – 4CP
	Speedometer light	VT750C VT750CD/CD2 ('98 – 2000)	12V – 3.4 W
		VT750CD/CD2 (After 2000) VT750C3/CD3	12V – 1.7 W
	Turn signal indicator		12V – 3.4 W
	High beam indicator		12V – 3.4 W
	Neutral indicator		12V – 3.4 W
	Side stand indicator	VT750CD/CD2 (After 2000) VT750C3/CD3	12V – 3.4 W
	Oil indicator	VT750CD/CD2 (After 2000) VT750C3/CD3	12V – 3.4 W
	Temp indicator	VT750CD/CD2 (After 2000) VT750C3/CD3	12V – 3.4 W
Fuse	Main fuse		30 A
	Sub fuse		10 A X 4, 15 A X 1
Fan motor switch	Starts to close (ON)		98 – 102 °C (208 – 216 °F)
	Starts to open (OFF)		93 – 97 °C (199 – 207 °F)
Coolant temperature switch	Starts to close (ON)		112 – 118 °C (259 – 270 °F)
	Starts to open (OFF)		Below 108 °C (252 °F)

2.5 VT750 ACE Wiring Schematics

There are two schematics available for the ACE. One is for models built between 1998 and 2000 and the other is for all models built after 2000 until the ACE stopped production in 2003. The only difference between the early models and the later models is the change to an electronic speedometer and the addition of a control module for the Temp indicator. All other systems are identical. See the schematic foldout pages at the end of the manual.

3.0 Basic Repair Techniques and Practices

3.1 Introduction

One of the most important decisions you will have to make when attempting a repair to your bikes electrical system or when making a modification is whether to use crimp-on connectors or whether to solder the wires. Both have their good points and their bad ones.

We have all seen the new "reality" TV shows like American Chopper, where they make these $100,000 dream machines that we would all love to own. On American Chopper, you see Vinnie wiring up a new machine and he pulls the wires through the frame and makes all the connections with solder and seals them with shrink wrap. This technique is very fast, very neat and very unobtrusive. Practically everyone I talk too seems to think this is the "Proper" way to do wiring. It certainly is the nicest looking way.

However, strictly speaking, solder joints are not necessarily the best choice for wiring, especially on a motorcycle. Now I am sure I just made 90% of the people who read this say "Bullshit!", but please hear me out. Solder connections are a quick, easy, inexpensive and streamlined looking way of making a connection, sure... But they suffer from one very big drawback; they are very susceptible to damage from vibration. Even the best solder joint in the world will degrade and eventually crack under long-term and severe vibration loads. Also, the area where the solder is applied becomes an area where no bending or flexing is possible. Any movement in the wires near this joint can cause the solder joint to become brittle and crack, eventually breaking off all together.

This is the reason why solder connections are not allowed as repairs, expect in very limited circumstances, in almost all modern aircraft wiring. The rate of failures due to vibration, flexing and bad solder joints is unacceptable to modern aviation safety regulators.

Instead, we use solderless connectors. Most people reading this will know these as those crimp-on connectors with the color-coded plastic shells. Now, I know that using cheap Canadian Tire connectors, crimped on with an equally cheap tool makes for a rather ugly connection and that's why so many people prefer to do a nice soldering job instead. But believe me… using the proper connector with the proper tool, will result in a connection that is stronger then the wires it is holding, while still being resistant to vibration stresses.

The biggest complaint about solderless connectors seems to be the fact that they are prone to build ups of road grime and crap that cause the joint to corrode over time. In fact, this is mainly caused by using cheap crimp tools. A proper tool will have two crimps for each color coded connector. One setting is to crimp the metal, joining the wires and the connector. The other setting is to crimp the plastic outer sleeve creating a reasonably weather proof seal. Many people don't even realize that you are supposed to crimp this sleeve as well. There are also newer style connectors called "enviro-connectors" that have two pieces; a small metal crimp for the main connection and a plastic slip on sleeve that is made of heat shrink material. You crimp the metal piece then heat the plastic sleeve around it to create an air-tight and low profile connection that is rated to last many, many years in the worst environments. Just for an example, these connectors are used on aircraft in areas where weather and environment are a major consideration, like the landing gear wheel wells.

In this section, I will try to cover the basic techniques for both soldering and using crimp connectors. Chances are, you will be using both techniques during the life of you motorcycle. Which style you use will be a personal choice. I will also cover some basic maintenance practices and tips for keeping your bike's electrical system as healthy as can be.

3.2 Electrical System Maintenance & Tips

The Battery! The battery is the heart and soul of your bike's electrical system, much as oil is the blood of your bike's engine. It not only stores and releases electricity as needed, but it provides an important role as a "shock absorber" for voltage spikes and current surges. Properly maintained, a good quality battery will give you several years of service.

I'm not going to go into details about servicing older style lead acid batteries nor how to use a hydrometer, because in the vast majority of modern motorcycles, the batteries are now sealed, maintenance-free units. Usually, the only thing you have to do with them is add the acid and install the sealed cap when new. And even then, the store or dealer usually does that for you. Instead, I will just suggest a few simple preventative measures to keep your battery working well and lasting a long time.

- Invest in a battery maintainer/trickle charger! For about $35 nowadays, you can buy a solid state, electronic maintainer that will monitor your battery and charge it as needed while it is being stored. Many units even come with leads that you can install on your bike and then run out to one of the side panels, with a quick disconnect fitting, so you can maintain/charge your battery on the bike.

- Whenever your bike is going to be sitting idle for more then a month, you should pull the battery and keep it on one of these maintainers. Or have the maintainer hook directly up to the bike. For the winter storage, the best thing to do is pull the battery and place it in a cool, dry area, either on the maintainer. At the very least, you should charge it up once a month.

- It's difficult to measure the "health" of your battery. A simple voltage test doesn't tell you much as even a near dead battery can show full voltage, but as soon as a draw is placed on it, it will drop right off. If you start to suspect that your battery is getting bad, take it out and bring it into a shop to have a full load analysis done on it. Most stores will do that for free, or for a small fee; especially if you are giving them some business.

- Avoid leaving your motorcycle running at idle for extended periods. Most motorcycles don't have enough output from their alternators at idle to power all their systems and charge the battery too, so you are actually draining the battery slowly when idling. This is especially critical if you have added any electrical accessories.

3.3 Soldering

There are four basic concepts to understand about soldering that many people do not realize. These are…

- Solder is used to hold two or more conductors (ex: wires) in electrical contact with each other;
- Solder is NOT used to make that electrical contact! ;
- Solder is NOT used to provide the main mechanical support for that contact!; and
- Solder is used to encapsulate that joint, prevent oxidization of the joint and to provide MINOR mechanical support of the joint.

Before you begin soldering, you will need some basic tools and supplies.

Soldering Iron

You have a wide variety to choose from these days and they are all relatively inexpensive, when compared to some other tools.

For small projects and electronics, a simple 25 watt pencil type soldering iron is adequate and very inexpensive at $10 or so.

If you are planning on doing a lot of soldering and if you will be working indoors in a controlled shop area, you might want to invest in a soldering station such as this. They allow precise control of the wattage and are useful for a full range of soldering applications. The price for these is typically in the $50-100 range depending on make and model.

For heavy duty soldering, you can purchase a soldering gun kit like this. They come in various wattages from 100 up to 300 watts and they heat in seconds when you pull the trigger. These are the best tool for soldering heavy gauge wires. Most also come with different tips as well, for other applications such as cutting and shaping plastic and vinyl. These kits range from about $35 up to $60 or so.

The ultimate soldering iron for working outdoors and on the side of the road is the butane powered soldering iron. Similar to a butane lighter, this iron will run for up to two hours on a load of fuel and is equivalent to an electric iron in the 25 watt to 80 watt range. On some models you can also get interchangeable tips, such as a heat shroud for heat-shrinking tubing. Depending on the make, these irons range in price from $60 up to $150 for the best ones.

Solder

Solder is the glue that holds the wires together. It is made from a mixture of Lead and Tin in different ratios that have different melting points and characteristics. There are also silver solders available for stronger joints and lower resistances, but they have a higher melting point and are more expensive.

The most common types of solder are 60/40 and 63/37, meaning they have a ratio of 60% Tin and 40% Lead or 63% Tin and 37% Lead, respectively. This is the only type of solder we need to concern ourselves with for motorcycle wiring.

Flux is a mild organic acid that is used to remove oxidization and prepare the metal surfaces for mating with the solder. Most modern solders have a resin core built in, so you do not have to apply it separately.

NOTE: Never use Acid-Core solders on wiring or electronics! They are intended for plumbing and non-electrical purposes and will corrode wiring and damage components.

Accessories and other helpful tools

- Sponge - a wet sponge is required to keep your soldering iron tip clean, which is the key to good heat transfer and a better solder joint
- Wire cutter
- Wire stripper
- Needle nose pliers
- Heat shrink tubing - Very helpful for finishing off a solder joint. It looks clean, is very easy to apply and makes a nice weather-proof seal over the joint.

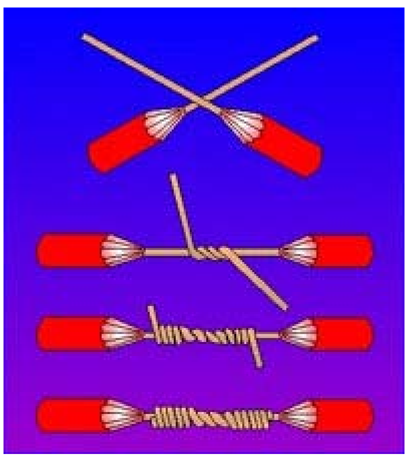
Now that you have the proper tools, you should learn some basic tips and techniques for soldering.

First, remember that the solder is not the main mechanical component for securing the components together. Solder itself is very weak and is only used to hold the two surfaces together while providing some stability and support. Therefore you should make your connection strong on it's own before soldering it. Here are a couple of simple examples.

Stranded wires

Most electrical wires today are of the multi-stranded type. First, make sure you strip enough insulation to leave yourself a good length of bare wire to work with. It is better to have too much, because you can just trim the excess with your cutters. After striping the insulation, you should twist the strands so as to provide a stronger end to take the solder and hold the joint.

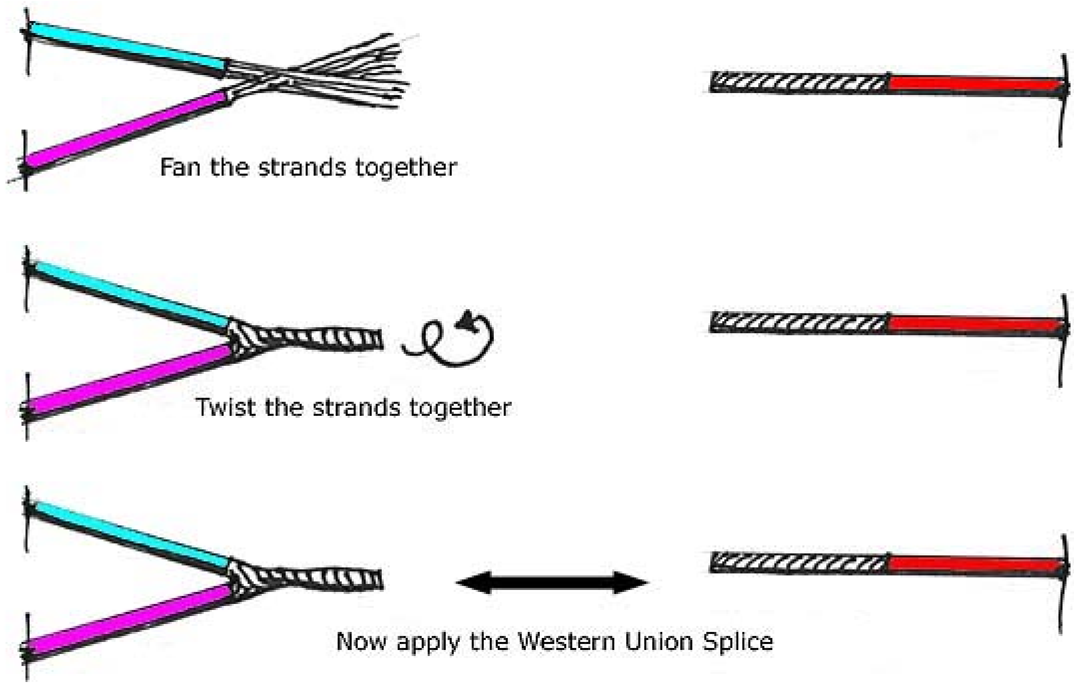
Simple Wire to Wire Splice



The best way to splice two simple wires together is called the **Western Union Splice**. It provides great strength and a long conducting surface. It is also the main splice used in the emergency roadside repair section, because using this splice along with electrical tape is a very good temporary repair. This diagram shows how to make this splice.

Multiple Wire Splice

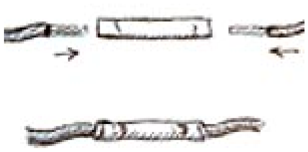
You can use variations of the Western Union Splice to splice three or more wires together as well. First you have to arrange the wires so they are on the appropriate side of the splice to keep everything inline and clean. Then, after you have stripped the wires and BEFORE twisting the stands together, you can join the wires together as shown in the sketches below. This adds extra strength to the bundle and prevents one wire from peeling off on it's own. Note, that you can only add so many wires before the strand becomes too thick and unwieldy to splice.



3.4 Solderless Connectors

Solderless connectors come in a variety of sizes and styles. So which one you use will depend on both the application and the size of the wires you are using them on.

Here are a few of the most common types of connectors…

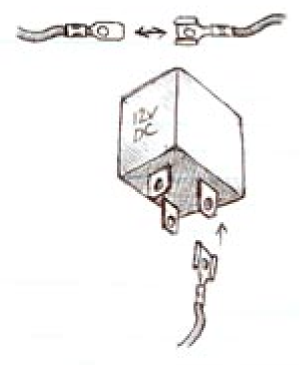


Butt-splice Connector

The most common connector. This one is used to splice two wires together, end to end, or sometimes to connector two wires with another single wire.

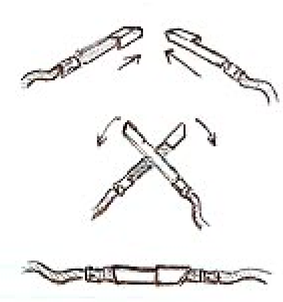
End Cap

The end cap is used to safely terminate a wire end, or sometimes to connect several wires into one end.



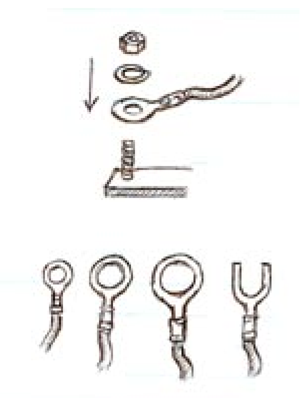
Spade Connector

Another common type, especially in automotive. The spade connector comes in either a male or female. The male end plugs into the female end and is held by a spring action on the ends of the female receptacle. Also, many relays and other electrical components come assembled with terminals that are male ends, so that you can quickly plug in wires already equipped with another spade female end. Useful for when you need to be able to quickly connect and disconnect a wire.



Knife Connector

Another connector which is designed to allow you to quickly disconnect a circuit. However, the knife connector usually has to be secured in place, using a tie wrap or some other similar device.

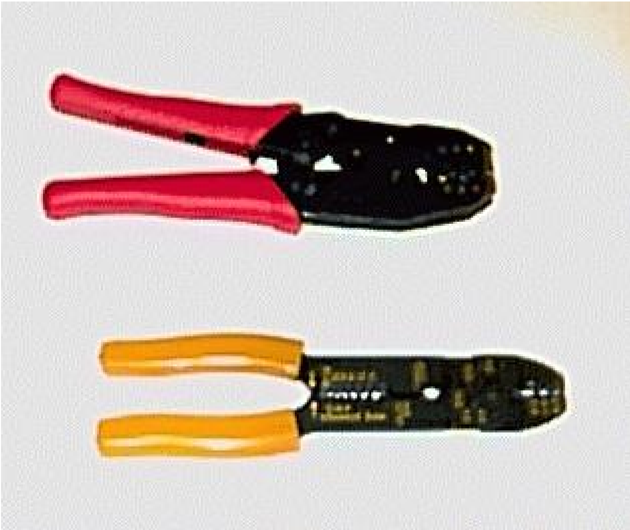


Terminal End

A ringed end for a wire that allows it to be attached to a terminal post or device with a similar arrangement. The end is then held in place by a nut and lockwashers usually. This makes for a very sturdy connection. There are many variations on this type of connector with different sized rings for different sized terminals and screws and other ones with a "U" shaped end that allows you to remove it without having to take the nut right off the post.

Color Coding: All of these connectors are color coded to reflect the wire sizes they are meant for.

Yellow	10-12 Gauge Wire
Blue	14-16 Gauge Wire
Red	16-22 Gauge Wire



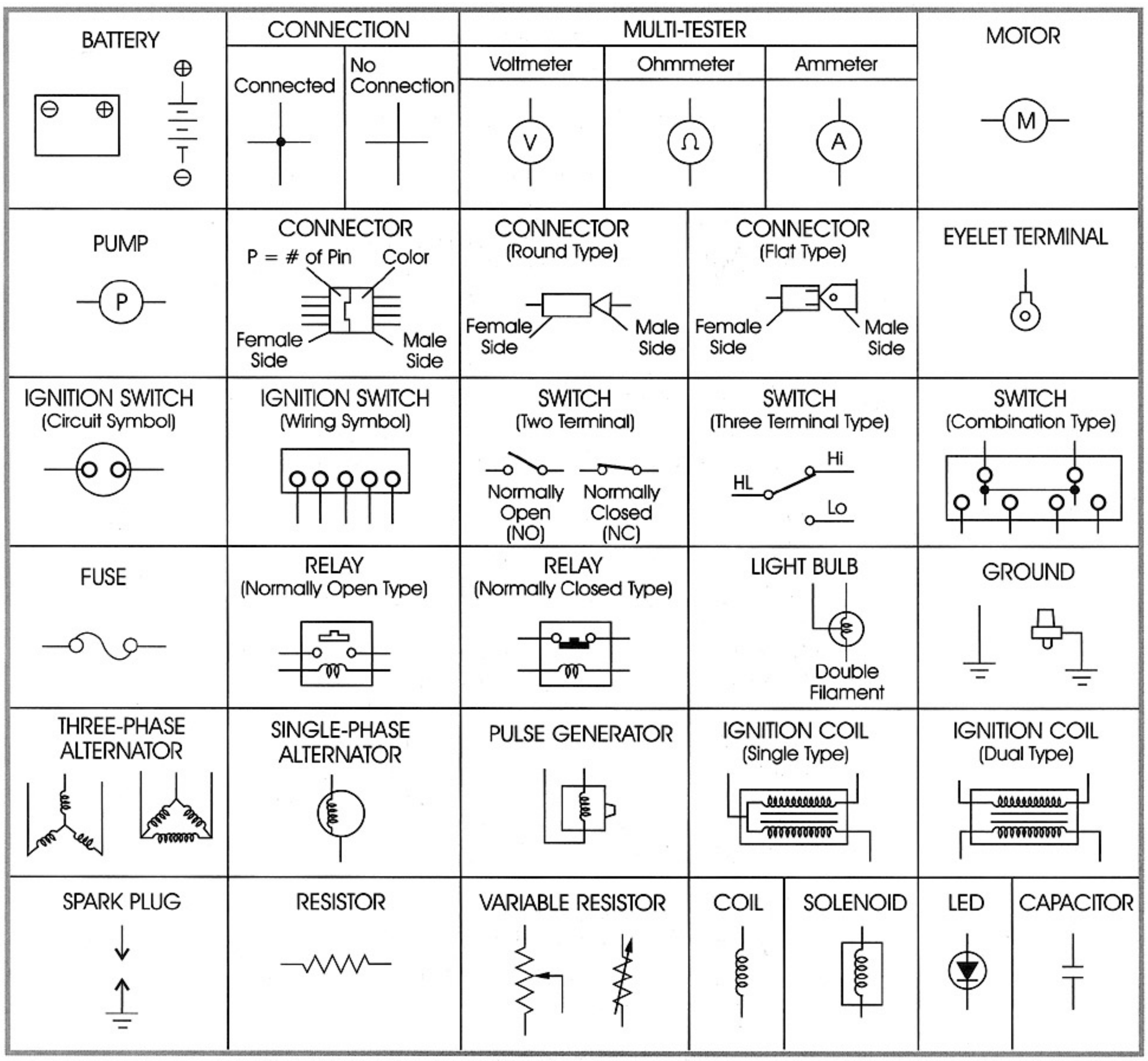
Crimpers

There are two basic styles of crimpers available to use on solderless connectors. The one at the top of this picture is a professional quality ratcheting type. These crimpers are fairly expensive ($200 range) but they apply a preset pressure on the connector for a perfect connection every time. The ones pictured on the bottom are the type you will most likely see. These are just basic crimp pliers and you have to control the pressure on the connector yourself. You can buy them in many styles and sizes. Look for a pair that are sturdy and do not flex when squeezing them. Also, pick a small pair up for use in your motorcycle tool kit. One advantage to the cheaper hand crimpers is that they usually incorporate a wire stripper into the handle.

3.5 Reading a Wiring Schematic

When it comes to diagnosing and troubleshooting electrical problems, the most useful tool you can have at hand is a proper electrical schematic of your motorcycle. Learn to read it and become familiar with it and your time chasing electrical problems will be greatly reduced. When troubleshooting any electrical problem on a motorcycle, keep in mind that the Conventional Theory of Electricity is used. This theory is that electrons flow from the positive side of the battery to the negative side or ground. While this theory has in fact been proven to be faulty, it is still used as a standard and therefore, you should follow it..

To better understand a schematic, you need to learn the basic symbols used on them. See the chart below that shows some of the most common symbols used in motorcycle schematics.



Most schematics will also have what's called "Switch Matrix" charts. These show the various switch positions and the switch leads that have continuity for each position. And example switch matrix is shown below. It shows that when you have the switch in the 'Left' position, the Orange and Gray wires are connected. When the switch is in the 'Normal' position, none of the wires are connected and when the switch is in the 'Right' position, the Gray and Blue wires are connected.

WIRE COLOR / SWITCH POSITION		ORANGE	GRAY	BLUE
L	(LEFT)	○	○	
N	(NORMAL)			
R	(RIGHT)		○	○

4.0 Troubleshooting & Emergency Roadside Repairs

4.1 Introduction

Eventually, every motorcycle owner has a problem with their bike's electrical system. If you are lucky, it's a simple problem that happens in your driveway that you can get your dealer to fix. However, we should all be prepared for problems happening on the road, when we are far from any garages and their help. I'll try to offer some basic troubleshooting tips here as well as techniques for repairing those problems on the side of the road, so you can get the bike back home.

4.2 Troubleshooting

There are some basic things you must know before you can troubleshoot an electrical problem. First, all circuits on a motorcycle have four basic requirements... Power Supply, Conductor, Load and a Switch.

- **Power Supply** is the battery. It is NOT the alternator! All power for all systems on a motorcycle comes directly from the battery. The alternator is only used to charge the battery and prevent it from becoming depleted during normal use.
- **Conductors** are the wires
- **Loads** are the devices that actually consume electricity to operate. Examples would be a light bulb, starter motor, horn, etc. All circuits have a load. Even if you just jumper two wires across a battery, then the wires would then become the load as well as a conductor and they would consume electricity to produce heat.
- **Switches** are the devices used to control the circuit. They can be mechanical (ex: turn signal switch) or electronic (ex: transistor)

Next, there are three unwanted circuit conditions that we will run into on our motorcycles. They are Open, Shorted and Grounded. It is important to learn how to recognize what type of failure you have in your electrical system.

- An **Open circuit** is one where the power does not reach the load. Usually caused by an open fuse, broken wire or a faulty switch
- A **Short Circuit** is one where the power is 'shorted' to ground before the load. This usually results in a blown fuse or circuit breaker. It can be a wire that is cut or chaffed through and shorting to the frame or, again, by a faulty switch. Sometimes it can also be a sealed electronic unit that has failed internally, causing a shorted condition. Examples of this would be a sealed turn signal relay, starter solenoid or ICM box
- A **Grounded Circuit** is one where the power is shorted to ground after the load but before the switch or controlling device. So the load may be powered (light on for example) but there is no control over it.

There are two basic tools that can help you troubleshoot almost every electrical problem… the multimeter and the test light. A test light is nothing more then a 12 volt light with two leads that allows you to quickly and easily check for power in a circuit. The multimeter can also do this, but it has many, many other functions. It can check continuity, test diodes, measure resistance and check for bad grounds, measure amperage draw… the list is endless. And these days, you can buy a really decent multimeter for very little money.

Make sure to read the instructions that came with the multimeter before attempting to use it on your motorcycle. Here are some basic guidelines for the use of multimeters in troubleshooting...

Resistance Measurements

- Always remove all power from the circuit you are measuring
- Remember that electricity can have several paths, so if you are measuring for resistance or conductivity, then you need to make sure that what you are measuring is isolated from the rest of the electrical system. Figure out how to do this by removing a fuse, disconnecting a wire or some other way
- Use the OHM setting on your meter and adjust the scale as necessary to get a reading that is as high as you can display on the scale you have selected. (Ex: don't read 100 ohms on the 2000 ohm scale, if you have a 200 ohm scale available)
- Always turn off the meter after use, or you can drain the internal battery

Voltage Measurements

- For most measurements, you will be using the DC scales. The exception to this would be if you were measuring the output of the alternator phases, where you would use the AC scales
- Always pick a scale higher than the anticipated voltage you expect to see, then reduce the scale down to where you get the most accurate reading
- Be very careful not to touch the leads to yourself, other wires and/or the bike's frame

DC Current Measurement

- To measure current, you MUST connect the leads in series with the circuit. This will involve breaking the circuit in some way so you can connect the meter. DON'T ever try to measure current by placing the leads across or in parallel with a circuit. This can damage your meter
- There are usually two plugs that you can connect your red lead too when measuring current. The one that you measure resistance and voltage on is usually used for low current measurements (mA's) while the separate red plug is for higher current measurements, and usually is in the 10amp DC range. Use this one for large current measurements like starter loads. Failure to use the proper scale and plug can result in a fuse being blown inside the meter

4.3 Emergency Roadside Repairs

Sooner or later, you are going to run into an electrical problem with your motorcycle while you are on the road. With a little preparation and planning, you may be able to deal with the problem yourself and avoid the call home for a ride.

First, evaluate the situation... If it's just a turn signal burnt out, then you can probably continue your day's ride and just use hand signals till you get home. If it's your headlight, then see if the high beam still works and use that until you can get it replaced. However, it's something causing fuses to blow, or a drain on your battery or your starter won't crank, then you are going to have to deal with it.

If you are planning on traveling more than an hour's drive away from home, then you should carry a basic toolkit on your bike. In addition to the normal tools you would have in your tool kit, I would recommend the following for electrical roadside repairs...

- Black electrical tape
- spare headlight bulb (wrapped in foam to protect it)
- one each - 1050 bulb and 1057 bulb
- combination wire cutters/strippers/crimpers
- An assorted selection of solderless crimp connectors
- spare fuses
- tie wraps (also known as zip ties)
- simple 12VDC test light
- small LED flashlight to see at night or into dark areas of your bike
- Printed copy of your bike's wiring schematic (laminated is nice!)

With just these few items, you will most likely be able to deal with 90% of the problems you might run into with your electrical system on the road. Everything listed above would easily fit in a waterproof ziploc bag and take up very little space in your bags. And, because they are so cheap now, you could add a small electronic multimeter to your kit for only $15 or so.

5.0 Modifications

5.1 Introduction

Most ACE owners are in love with their bikes. We didn't just buy them because we wanted cheap transportation to work and back. We bought them because they are as much works of art as they are machines. We baby them, polish them and in most cases, we strive to customize them so they are unique to us. Some expressions of customization come as light bars, LED lighting accents, radios, interphones and other things that become a part of the bike's electrical system. Unfortunately, motorcycles are designed to a very strict tolerance. It's a balancing act for the designers to make a package that looks good, falls within a certain weight, produces a certain horse power and has all the bells and whistles that consumers want these days. What that means is that the bikes we receive usually have very little extra capacity for additional electrical loads. These are not big one-ton trucks with 20 pound alternators that have gobs of excess capacity. So we have to be careful when making modifications or additions to the electrical loads on our bikes.

5.2 Calculating the Total Electrical Load

To figure out the capacity of a bike's electrical system, you basically just have to determine what the output of the alternator is and compare it to all the loads on the bike. However, it's never that easy. First, the output changes as your speed (and therefore RPM) changes and the loads are not always constant.

Thankfully, someone has already gone to the effort of gathering the data for the ACE and he created a very nice chart that shows it clearly. So all we have to do now is figure out how much of a load any new accessories we add are and then see if the bike has the excess capacity to handle it. We also have to examine the rpm/speed/gear ranges and determine a "profile" of our own riding technique to determine what sort of average output we have during the conditions we do most of our riding.

So let's take an example…

After looking at the chart (shown at the end of this manual) and with my riding style, I can expect an average output of 220 Watts. I choose conservatively here so that I don't over estimate and think I can handle more power then I can. The ACE's Static loads (those loads that are constant and don't vary) are 90 Watts. So that leaves us 130 Watts available to be used.

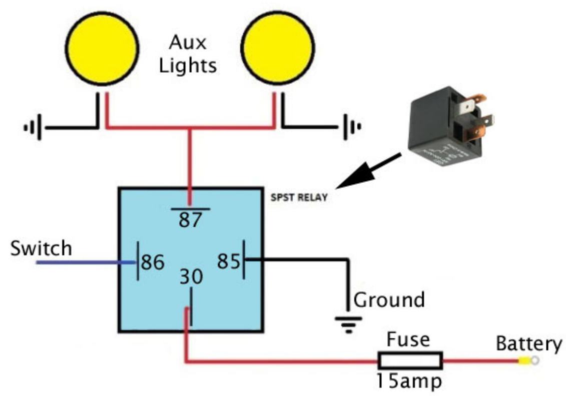
I want to add heated grips and a light bar to my ACE, so I find out what the draw is and add them up.

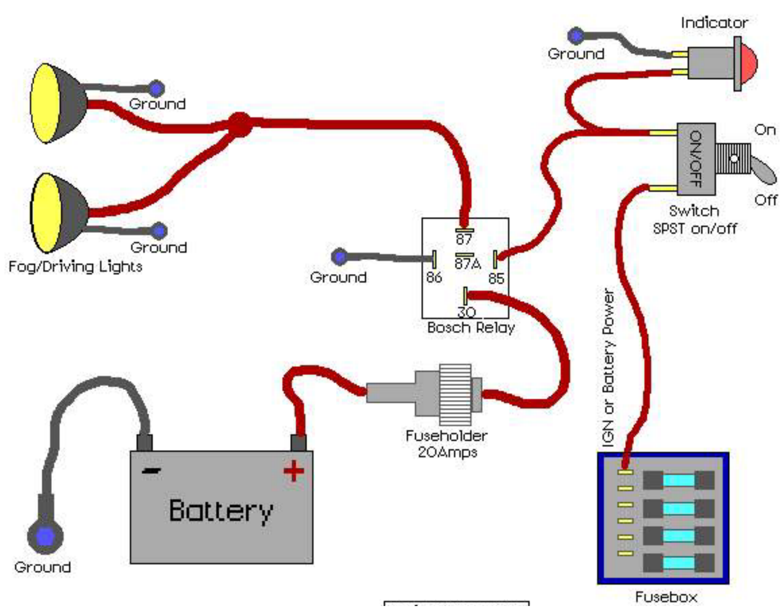
22 Watts = Heated Grips
80 Watts = Lightbar (40 Watts x 2)
========
102 Watts total

So we can safely add these accessories and still keep our battery charged. Just remember that at idle, as mentioned before, we have a lot lower output and will actually be draining the battery, so it's a good idea not to idle for long and/or reduce your load (switch off those Aux. Lights, for example)

Driving Light - Direct Wiring Using and SPST Relay (simple automotive type)

1. Use 18 gauge insulated wire and securely fasten to frame with cable ties.
2. Run a new wire from the battery with an inline fuse at the battery end (15 amp) or alternatively, build and run an entire cable harness if you have this technical ability. Run the wiring under the right side cover, along the frame, under the tank, then up through the hole into the headlight can if just a single wire or directly to the driving lights if a complete cable harness.
3. Place the relay in the headlight can if using a single wire, or attach the relay to the frame under the right side cover if using a cable harness.
4. Attach the ground to the lower tree (use one of the studs for the chrome fork covers and just run three ground wires from it, using 1/4" ring ends) or use an existing ground lug, found on the frame under the gas tank.
5. For the "Switch" wire, there are a couple of options....
    - Wire the relay to the Low Beam headlight wire (in the headlight can). If you wire to the White wire, the AUX lamps will be on all the time when you are in Low Beam. Wire to your Blue wire on the headlight, the AUX lights will only come on when you switch to HI Beam (not recommended as this is illegal in some areas and will fail inspection).
    - Another option is to run a new wire and install a switch to turn your AUX lights on and off. Use the Black/Brown wire that is your turn signal relay in the headlight can as a power source or if using a cable harness, a connection can be made at the fuse box.





	RPM (1)					Watts Avail (2)					Excess Watts After Static Load					Accessories Powered Sufficiently					
MPH	1st	2nd	3rd	4th	5th	1st	2nd	3rd	4th	5th	1st	2nd	3rd	4th	5th	1st	2nd	3rd	4th	5th	MPH
10	1,723	1,088	816	639	567	119	75	56	44	39	28	-	-	-	-	-	-	-	-	-	10
15	2,585	1,633	1,224	958	850	178	113	84	66	59	88	22	-	-	-	OK	-	-	-	-	15
20	3,447	2,177	1,633	1,278	1,134	238	150	113	88	78	147	60	22	-	-	OK	-	-	-	-	20
25	4,308	2,721	2,041	1,597	1,417	297	188	141	110	98	207	97	50	20	7	OK	OK	-	-	-	25
30	5,170	3,265	2,449	1,917	1,701	345	225	169	132	117	255	135	79	42	27	OK	OK	OK	-	-	30
35	-	3,809	2,857	2,236	1,984	-	263	197	154	137	-	172	107	64	46	-	OK	OK	-	-	35
40	-	4,354	3,263	2,555	2,267	-	300	225	176	156	-	210	135	86	66	-	OK	OK	OK	OK	40
45	-	4,898	3,673	2,875	2,551	-	338	253	198	176	-	248	163	108	86	-	OK	OK	OK	OK	45
50	-	5,442	4,081	3,194	2,834	-	345	282	220	196	-	255	191	130	105	-	OK	OK	OK	OK	50
55	-	5,986	4,490	3,514	3,118	-	345	310	242	215	-	255	219	152	125	-	OK	OK	OK	OK	55
60	-	-	4,898	3,833	3,401	-	-	338	264	235	-	-	248	174	144	-	-	OK	OK	OK	60
65	-	-	5,306	4,153	3,685	-	-	345	287	254	-	-	255	196	164	-	-	OK	OK	OK	65
70	-	-	5,714	4,472	3,968	-	-	345	309	274	-	-	255	218	183	-	-	OK	OK	OK	70
75	-	-	-	4,791	4,252	-	-	-	331	293	-	-	-	240	203	-	-	-	OK	OK	75
80	-	-	-	5,111	4,535	-	-	-	345	313	-	-	-	255	223	-	-	-	OK	OK	80
85	-	-	-	5,430	4,818	-	-	-	345	332	-	-	-	255	242	-	-	-	OK	OK	85
90	-	-	-	5,750	5,102	-	-	-	345	345	-	-	-	255	255	-	-	-	OK	OK	90
95	-	-	-	-	5,385	-	-	-	-	345	-	-	-	-	255	-	-	-	-	OK	95
100	-	-	-	-	5,669	-	-	-	-	345	-	-	-	-	255	-	-	-	-	OK	100
105	-	-	-	-	5,952	-	-	-	-	345	-	-	-	-	255	-	-	-	-	OK	105

Stator output	345	watts
at	5,000	RPM
watts/RPM	0.07	

Static Loads (3)

Headlight	60	
Tail light	5	
Fr. Run. lights	10	
License light	5	
Speedo	3	
Safety Margin	7	
Total	90	watts

Note that there are also 68 watts of intermittent loads (signals, indicators)

Electrial Accessories

Vest	44
Gloves	22
Item 3	-
Item 4	-
Item 5	-
Total	66

(1) The RPMs were taken from a website (can't remember which) that was doing a comparison of RPM with the stock 41-tooth sprocket relative to RPM with a smaller sprocket. The RPMs assume STOCK sprocket.

(2) The wattage available is based on the assumption (right or wrong) that the stator's output is linear across the RPMs. The shop manual quotes a maximum output of 345 watts at 5,000 RPM. Therefore, available watts is 345/5000*RPM.

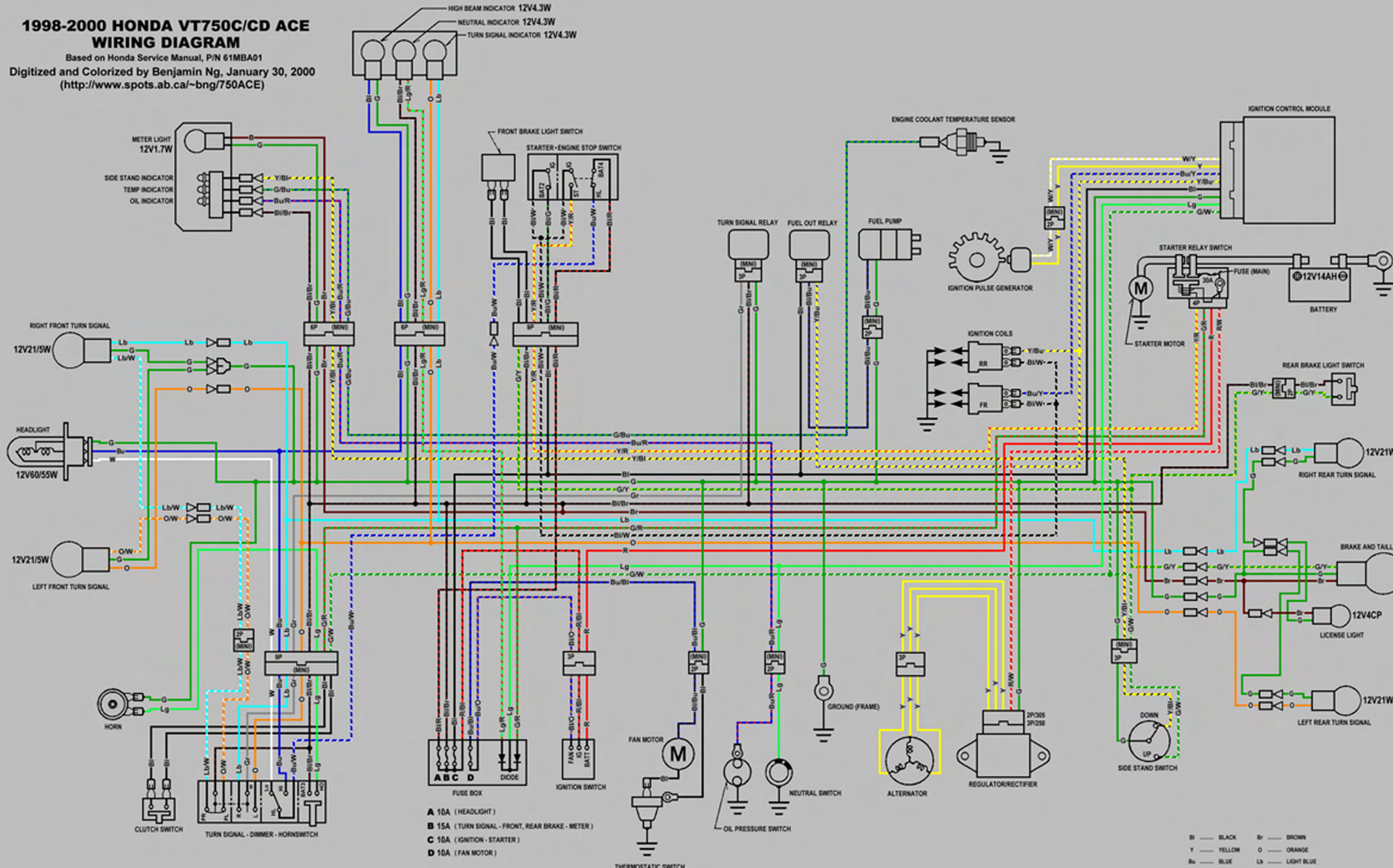
(3) The static loads were taken from the shop manual.

1998-2000 HONDA VT750C/CD ACE WIRING DIAGRAM

Based on Honda Service Manual, P/N 61MBA01

Digitized and Colorized by Benjamin Ng, January 30, 2000

(http://www.spots.ab.ca/~bng/750ACE)



A 10A (HEADLIGHT)

B 15A (TURN SIGNAL - FRONT, REAR BRAKE - METER)

C 10A (IGNITION - STARTER)

D 10A (FAN MOTOR)

SWITCH CONTINUITY

IGNITION SWITCH

	FAN	IG	BAT1
ON	○	○	○
OFF			

TURN SIGNAL SWITCH

	W	R	L	BAT3	PR	PL
R	○	○		○		○
N				○	○	○
L	○		○	○	○	

DIMMER SWITCH

	HL	Lo	Hi
Lo	○	○	
N	○	○	○
Hi	○		○

HORN SWITCH

	HO	BAT3
FREE		
PUSH	○	○

ENGINE STOP SWITCH

	IG	BAT2
OFF		
RUN	○	○

STARTER SWITCH

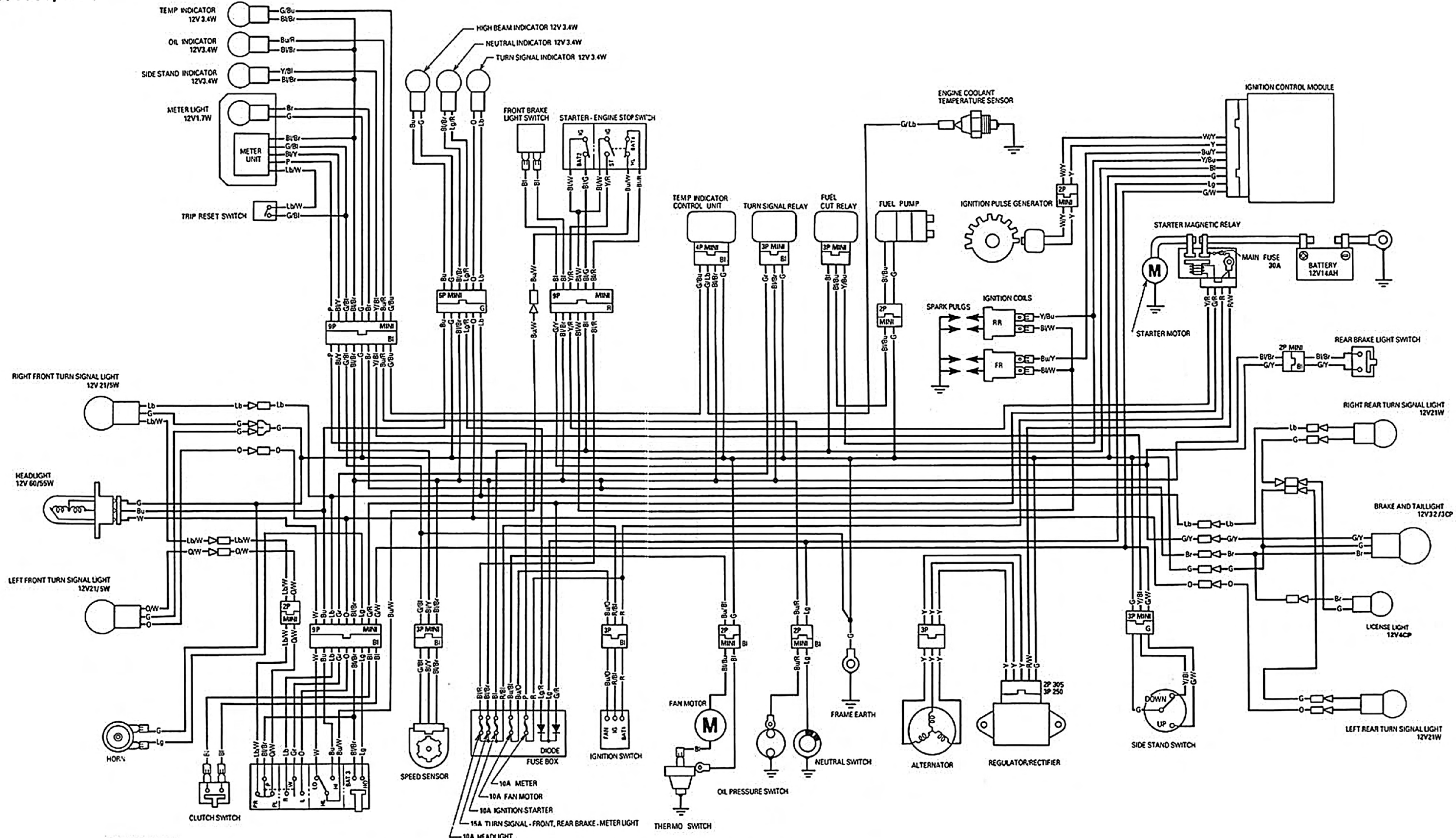
	ST	IG	BAT4	HL
FREE			○	○
PUSH	○	○		

Bl	BLACK	Br	BROWN
Y	YELLOW	O	ORANGE
Bu	BLUE	Lb	LIGHT BLUE
G	GREEN	Lg	LIGHT GREEN
R	RED	P	PINK
W	WHITE	Gr	GRAY

0030Z-MBA-6700

WIRING DIAGRAM

VT750CD/CD2 (After 2000) :
VT750C3/CD3:



SWITCH CONTINUITY

IGNITION SWITCH

	FAN	IG	BAT1
ON	○	○	○
OFF			

TURN SIGNAL SWITCH

	W	R	L	BAT3	PR	PL
R	○	○		○		○
N				○	○	○
L	○		○	○	○	

DIMMER SWITCH

	HL	LO	HI
LO	○	○	
(N)	○	○	○
HI	○		○

HORN SWITCH

	HO	BAT3
FREE		
PUSH	○	○

ENGINE STOP SWITCH

	IG	BAT2
OFF		
RUN	○	○

STARTER SWITCH

	ST	IG	BAT4	HL
FREE			○	○
PUSH	○	○		

Bl ---- BLACK
Y ---- YELLOW
Bu ---- BLUE
G ---- GREEN
R ---- RED
W ---- WHITE
Br ---- BROWN
O ---- ORANGE
Lb ---- LIGHT BLUE
Lg ---- LIGHT GREEN
P ---- PINK
Gr ---- GRAY