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Introduction

LINX™ Network Bus Electrical System

System Overview:

Simpler, easier installation and comprehensive rider information; these are some of the basic advantages of the LINX™ Network Bus Wiring System. As you read this manual you will realize the significant improvements and advanced features that this system provides over conventional wiring harnesses. Additionally, updates, knowledge base and Q&A for this system will be updated and posted on the LINX™ web-site as they occur at www.SignalDynamics.com/LINX.

How does LINX™ work?

LINX™ is a serial data communication network for connecting the various electrical functions of the motorcycle over a single network cable, eliminating complex electrical wiring, confusion and errors while wiring or troubleshooting the electrical system.

LINX™ System

The LINX™ system is composed of: three communication modules, two handle bar switches, and two wiring harnesses. These modules when connected with the network cables, communicate with each other, transfer information and self-check themselves for proper operation. If a problem does develop, a written text message is displayed on the Liquid Crystal Display (LCD) module. The system is designed to be simple, yet provide more practical and useful information to the user.

Locating Rear Module

The rear module is identified by its' Black Connector, and should be located in an area that is close to the battery and Starter Solenoid, and also central to all of the devices it connects to. The module is splash proof, but should be mounted in an area that has some protection from water and heat. Under the seat on the battery box is usually a good location. The module mounts with the enclosed double sided tape.

Rear Module



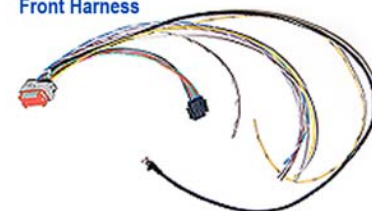
Rear Harness



Locating Front Module

The front module is identified by it's Grey Connector, and should be located in an area that is central to all of the devices it connects to. Under the gas tank, or in the headlight housing are two common locations. The module is splash proof, but should be mounted in an area that has some protection from water and heat. Once the two modules are mounted the 4 wires that connect them should be connected. A 4 pin connector is included, but these wires can be cut or extended as needed. The module mounts with the enclosed double sided tape.

Front Harness



Front Module



Installation

Installing switch cubes

The switch cubes are designed to fit a 1" handlebar, and connect to the front brake switch, and clutch switch (optional). Installing the switch cubes involves drilling a hole in the handlebar where the switch cube will be located, and another where the wires will connect to the display module. These wires come with the ends already crimped on, but they can be cut off and easily re-crimped in the event you need to fish the wire through a small hole (see crimping instructions). After the hole is drilled and the wire fished through, simply plug the connector into the switch, and connect the two wires on the right side to the brake switch, and the two wires on the left side to the clutch (optional). It is recommended that an electrical grease (not included) be used on the connector and socket to help prevent corrosion from moisture. Last insert the switch into the housing, and install the four screws through the back side of the saddle clamp.



Installation

Installing the Display Module

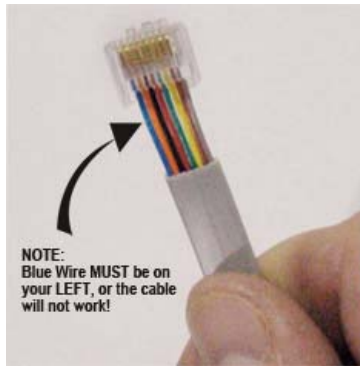
The display module can be mounted either above or below the handlebar by attaching the backing plate mounting tab to a handlebar clamp (not included). The wires from the switch cubes will come out of the handlebars, into the display housing, and plug into the appropriate connector. The data wire from the front module is routed to the display module and plugged into the appropriate connector. The data wire comes with the end already crimped on, but it can be cut off and easily re-crimped in the event you need to fish the wire through a small hole, or shorten it (see crimping instructions). It is recommended that electrical grease (not included) be used on the data cable and socket to help prevent corrosion from moisture. Be sure to plug the cables into the correct sockets as the unit can be damaged from improper installation. They are labeled "L" & "R" (for Left & Right handlebar switches) and "C" for Front Module.



Installation

To Replace the Connector End on a Cable.

1. Strip about 1" of the outer insulation with an RJ-45 stripper/crimping tool, the inner insulation does not need to be stripped. These tools are commonly used to crimp computer network cables, and are available at most electronic stores.
2. Insert the wires into the low profile connector. Be sure the blue wire is to your left with the clip of the connector away from you, and the connector pointing up.



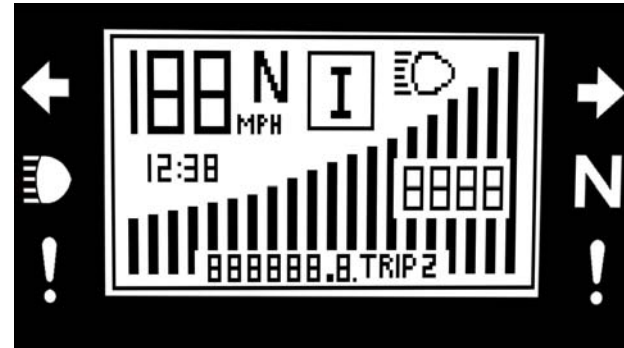
3. Insert the connector into the crimper, and crimp. Be careful not to push the connector too far into the crimper as the low profile connectors do not have a stop to position the connector at the correct position. Also be sure the wires are all of the way into the connector when you make the crimp. It is a good idea to crimp the connector twice to be sure that all of the conductor pins have pierced the wires.



Instrumentation

Display Module:

When the system is powered-on, a self-test will run and if any faults are noted, they will be displayed. After this, the logo will be displayed for 3 seconds, and then the module will enter the operational mode. The following items will be displayed on the screen in the operational mode:



Information & Icons on LCD Screens:

- Speed (in MPH or KPH).
- Engine RPM (digital readout and bar graph).
- Clock.
- High Beam “ON” Icon.
- Bike in “Neutral” Icon.
- Information Window (one of the following)
 - Turn Signal Left / Right
 - Hazard Flasher On.
 - Run / Kill Status.
- Text information window: (toggles between the following with the # key on the right handlebar switch).
 - Odometer
 - Trip 1 (Reset by pressing the # key for 3 seconds)
 - Trip 2 (Reset by pressing the # key for 3 seconds)

Instrumentation

- Temperature and Voltage.
- System Alert text message. (If Present)

Indicators:

The indicator icons are located to the left and right sides of the LCD display screen. When they are active they are back-lit with LED lighting.

- **Turns Signal Direction Arrows** – Located at the top and to the left and right of the LCD display screen. These indicators are backlit with green LED's and will flash when the turns signals or hazards flashers are activated.



- **High Beam Headlight Indicator** – Located below the left turns signal arrow. This indicator is backlit with a blue LED to indicate when the high beam has been selected.



- **Neutral Indicator** – Located below the right turn signal arrow. This indicator is backlit with a green LED to indicate when the transmission's neutral switch circuit is completed.



- **Alert Condition Indicator** – Located at the bottom of the indicators on both sides of the LCD display screen. When an “event” or “fault” condition occurs, these backlit indicators will alternately flash for ten seconds then remain steady until the condition has been cleared. A text message of the Alert Condition can be read in the odometer area of the display. The fault will also be logged in the systems error log.



Front (Tank) Module

The following outputs and operations are controlled by the Front Module:

- Ignition
- Compression Release
- NOS solenoid (optional)
- Left & Right Front Turns Signals
- Headlight High & Low beam
- Horn

Rear Module

The following inputs/outputs and operations are controlled by the Rear Module:

- Speedometer Input (Transmission)
- Tachometer Input (Cam / Crank Sensor or Ignition Coil)
- Neutral
- Oil Pressure
- Rear Brake Input
- Rear Brake Light
- Right & Left Rear Turn Signals
- Starter Solenoid
- Horn (This is an optional secondary circuit for those who prefer the horn to be mounted near the rear of the bike.)

Operation / Function

Switches:

The handlebar switches are designed for easy installation or removal with plug-in connector. They are also LED back-lit for easier button identification during night time conditions. They provide a positive tactile click when depressed.

Left Handlebar Switch Module Functions



Left Turn

Starts or cancels left turn signal function. (See turn signal function below)



High / Low

Toggles the headlight from high to low beam. Low beam is automatically selected when the key is turned "On". "Up" key in menu mode.



Horn

Activates the Horn circuit. "Down" key in menu mode



*(*)*

Used for programming, in the program mode. (Optional – can be used to activate NOS system if installed.) "Select" key in menu mode.



Right Handlebar Switch Module Functions



Right Turn

Starts or cancels right turn signal function. (See turn signal function below)



Start

Will activate the engine starter solenoid circuit if: the Run/Kill switch is set to Run, the bike is in neutral, and the engine is not running (RPM =0).



Run / Kill

Will allow the bike to start if the Run function is selected. Will kill the engine or prevent a start if the Kill function is selected. An X will be visible on the LCD display screen if the kill switch has been selected and is in the kill mode.



(#)

Toggles between Odometer, Trip 1, Trip 2, and Voltage / Temperature if pressed quickly.

Press and hold on trip 1 or 2, for 3 seconds to reset trip mileage to 0. Used for calibrating the speedometer in calibration mode (see programming section).



Initial LINX™ Power-UP & Starting

Key Switch Operation:

When the key switch is turned on, power is applied to the LINX™ system and a self-test will run. If any faults are noted, they will be displayed on the LCD screen. After this, a Logo and VIN # (if programmed) will be displayed for 3 seconds, and then the LINX™ system will enter the operational mode. The following items will be displayed on the screen in the operational mode:

- Digital Speedometer
- Digital & Bar-graph Tachometer
- Digital Odometer
- Time
- Information Window
- Neutral (if transmission is in neutral)

Auto Battery Conservation:

To conserve battery energy, when the key is first turned on, the headlight will automatically be selected to low beam. Additionally, the LINX™ system will turn the headlight off during starter engagement. Once the start button is released, the headlight will turn back on.

System Auto Shut Down:

If the key is turned on for 10 minutes, and the engine is not started, the LINX™ system will include the headlight will turn off to avoid battery drain; however, the marker lights will remain lit if the bike is wired with marker lights. To reinitialize the system and start the bike, the key will have to be turned off, and then back on.

Starting:

To start the motor while stopped: the transmission must be in neutral and the Run/Kill switch must be in the "Run" Mode. If an "X" is displayed in the information window the bike is in the kill mode, if nothing is displayed it is in the run mode. To complete the start, press

Operation / Function

the start button on the right handlebar switch to initiate the engine starter. The starter motor can not be accidentally engaged if the LINX™ system recognizes that the motor is already running. If a start is necessary while the bike is rolling, a start with the electrical starter motor can be accomplished above 5 MPH, by assuring the Run/Kill switch is in the “Run” position and the clutch is pulled in. To complete the start, press the start button.

Starter Motor Safety Shut Down:

To prevent the starter motor from being damaged from overheating, the LINX™ system will only allow for a total of 10 seconds of cranking time in any one-minute period. If this cranking time is exceeded, the LINX™ system will automatically shut down the starter circuit and not allow any further starts for the remainder of one minute or until the key switch is turned off, and then back on. Normally, an engine should easily start within this time period. If it does not, it should be checked to determine the cause and then corrected.

Compression Release:

When the start button is pressed, the compression release circuit is activated providing power to the compression release solenoid.
(Optional on some bikes)

Nitrous Oxide System (N.O.S.):

If your bike has a Nitrous Oxide System, the star (*) button on the left handlebar switch cube controls its operation. With the motor running and RPM increasing above 1000 RPM the NOS circuit is enabled to providing power to the Nitrous Oxide solenoids.

Note: When using NOS, be sure to follow the NOS manufacturers recommended procedures. Failure to comply can cause engine damage and bodily harm.

Information & Alert Conditions

Text information window:

The Text information window is located at the bottom of the LCD screen. To toggle between the following items, press the (#) key on the right handlebar switch.

- Odometer
- Trip 1 (Reset by pressing the # key for 3 seconds)
- Trip 2 (Reset by pressing the # key for 3 seconds)
- Temperature and Voltage.
- System Alert text message.

Alert Text By-Pass:

If an alert condition exists (an event or fault) it will be displayed in the LCD information window and LED warning alert indicator icons will illuminate. If the rider would like to bypass the warning message he can toggle back to his previous setting by momentarily pressing the “pound (#)” button on the right handle bar switch.

Event or Fault Clearing:

If the LINX™ system detects an abnormal condition, a message will be displayed on the LCD screen and the Alert Icons will illuminate. The message and alert icons will remain until the fault is cleared. If the condition requires a repair, such as a bulb replacement or a short, once the repair has been made and the key switch has been cycled off then on, the alert message will be cleared from the LCD screen.

Lighting

Marker Lights:

Turn Signal Lights also function as marker lights. This function enables single intensity incandescent or LED bulbs to have a marker light feature.

Headlight Features & Operation:

Low Beam When the key switch is first turned on, the headlight is automatically selected to low beam to conserve battery power. When an engine start is initiated, the headlight is automatically cycled to “off “. However, the turn signal/marker lamps remain “on”. This feature conserves battery power during the start, but provides marker lights for conspicuity. The system automatically switches to high beam in the event of a low beam failure.

High Beam When “High” beam is selected on the handlebar switch, power is supplied to the high beam. When in high beam, the LCD display screen shows a high beam icon as well as a blue LED indicator light is illuminated to the right side of the display screen. The system automatically switches to low beam in the event of a high beam failure.

Operation / Function

Turn Signal Function:

The turn signal selection buttons are located on the left and right handle bar switch cubes. The turn signals are activated by pressing the appropriate button. The turn signals will flash for 7 seconds then automatically cancel. The number of flashes or seconds remaining will be displayed in the information window of the LCD Screen. If more flash time is required simply press and hold the turn signal button, and the number of seconds or flashes increases. The signal can be cancelled manually by pressing the same button again. If the brakes are applied while the turn signal is flashing they will continue to flash until the brakes are released plus 10 seconds.

Additional Features:

- ***Turn Signal Count Down:*** With self-canceling turn signals, it is a definite advantage to be able to know when the self-canceling feature will stop flashing the turn signal. This feature shows you the remaining flashes on the LCD display screen. When the turn signal has been activated, it will alternately flash an arrow and then remaining time (seconds) of flashes.
- ***Turn Signal Hold:*** If the brakes are applied after a turn signal has been selected, the flashers will continue to flash as long as the brakes are applied plus 10 seconds. This feature is beneficial when stopped at a signal light, it will keep the turn signal engaged until the brake is released, and it will then flash an additional 10 seconds.
- ***Hazard Flashers:*** When selected will flash until cancelled and a hazard icon will be shown on the LCD display screen. To engage, depress both the left and right turn signal buttons for 1 second. To cancel, depress both buttons again for one second.

Operation / Function

- **Brake Lights:** When the brakes are applied and the motorcycle is stopped, the brakes remain on until the bike accelerates. This will also cause the turn signals to continue to flash 10 seconds after the bike accelerates.

Circuit Protection

The LINX™ system does not require external fuses for circuit protection. The sophistication of this system automatically checks each circuit thousands of times per second to assure it is operating properly. If it detects an anomaly, it will shut down the faulty circuit before damage can occur and it will send an alert message to the LCD display screen. Once the fault is corrected and the key switch has been cycled “off” then “on”, the system checks itself again and if no fault is present, normal operation resumes.

Programming

Program Mode:

To enter the program mode, the bike's run/kill switch must be in "kill" position. After selecting "kill", the press (*) and (#) together for 5 seconds. The program menu will then pop-up on the LCD screen.

The following keys are used to program the module:

<u>Key</u>	<u>Function</u>
High / Low	-Scroll Up
Horn	-Scroll Down
(*)	-Select

Programmable Items:

- **Screen Contrast** – To adjust the contrast of the display.
- **Time** – This is the time displayed on the screen in the Operating Mode and is used for error logging.
- **Date** – This is the date used for error logging.
- **Metric or SAE** – toggles the display from MPH/KPH, Fahrenheit/Celsius on the thermometer and from Miles/Kilometers on the odometer and trips display.
- **Calibrate Temperature** – Use this setting to calibrate your bikes temperature to a known thermometer.
- **Tach Multiplier** – Used to set the number of pulses sent per engine revolution.
- **Max RPM** - Set or View Max RPM (Max RPM may only be set once on some bikes).

Programming

- **Vehicle Identification Number** - Set or View VIN# (Vin # may only be set once on some bikes).
- **View Logs** - This will display a history of “events” and “faults” encountered by the system. This log erases the oldest message when the amount of space for storage is maxed out. Faults are not erasable, but events are.

The format for the error log is: Time / Date of Condition - Condition Text Message

- **Clear Event Log** - Used to clear event logs. Note: error logs cannot be erased.
- **User Options:**
 - Brake to Start** – Must apply brakes to start bike (default off)
 - Lights Off with Kill** – Turns off lights when bike is turned off with a 5 second time delay (default off) “timedelay”.
- **Module Info** – Shows software revisions of all modules on the network.
- **Exit Program mode:** Selecting this will exit configuration screen and enter operating mode. (Bike will return to operating mode after 30 seconds of inactivity)

Measured Mile Mode:

This mode is used to calibrate the speedometer for your bikes particular final drive/ wheel-tire configuration.

- To calibrate the speedometer, select a location that has one mile measured with a beginning and ending point (mile markers on an interstate are a good place to do this).
- To enter this mode press the # button for 5 seconds while in operating mode with the odometer displayed. (The system will not enter the measured mile mode if Trip1, Trip2, or

Programming

Voltage/Temperature are displayed) This will take you to a screen prompting you to press the # button at the beginning of a measured mile. When you pass the beginning mile marker press the # button. The screen will then prompt you to press the # button at the end of the ending mile marker. When you do this, the speedometer will be calibrated and return to the operating mode. (It does not matter at what speed this is done, or if the bike accelerates or decelerates during the measured mile)

- After calibration is complete, verify the accuracy by checking the accuracy of the odometer over a 5 measured mile course. It is important that verification of the speed is made. If your measured mile was not exactly one mile the speed readout may be incorrect. Also, any time a change is made to the diameter of the wheels, drive sprockets, or tires, this may affect the accuracy of the speedometer and recalibration may be necessary.

Memory:

The LINX™ Network Bus electrical system has 3 independent modules, which each record and keeps a copy of your stored settings and information. In the event of a module failure, simply turn the key “Off”, replace the defective module, and then turn the key “On”. When the power is restored by turning the key “On”, the new module will be programmed with your stored settings from the other two modules. (Modules must be replaced one at a time, and powered up between changes in order to synchronize settings) These stored settings include:

- VIN#
- Odometer and Trip Values
- Error Log
- Software revision #
- Number of pulses that equal 1 mile
- Max RPM
- Vendor configuration (Logo and vendor specific settings)
- Screen Contrast
- Metric or SAE

System Specification:

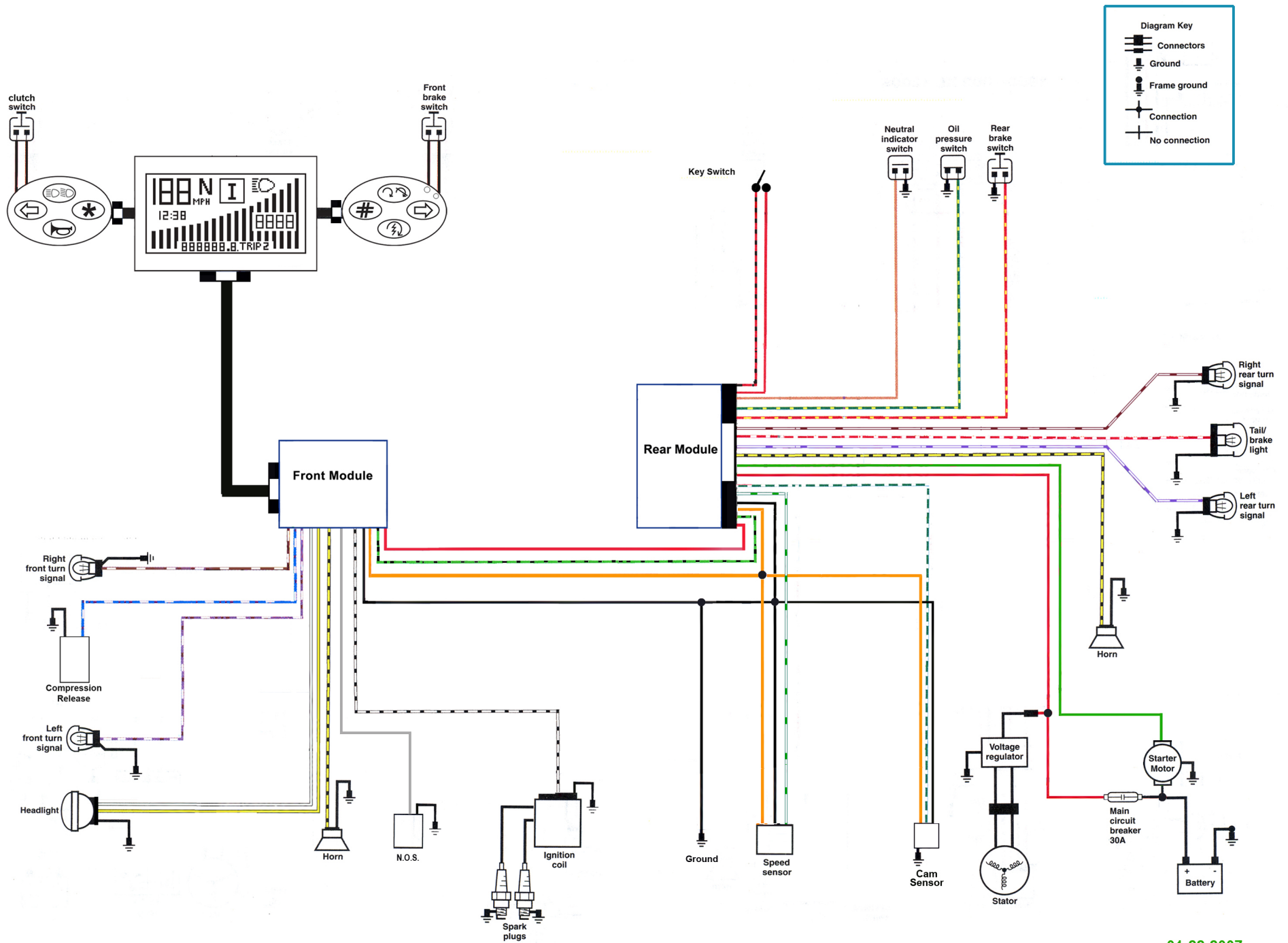
System Power	12VDC 30Amps
Operating Temperatures	32°F to 122°F (0°C to 50°C)
Physical Size	Front / Rear Module 2.0" X 3.0" x 1.5" Display Module 2.0" X 3.5" X 1"

Maximum Amperage Load:

Headlight	
High Beam	10A
Low Beam	10A
Turn Sign/Marker Light	5A each
Brake/Running Light	5A
Horn	5A
Starter Solenoid	100A Momentary (50A Continous)
NOS Solenoid	5A
Compression Release	5A
Ignition Coil	5A

Note:

The LINX™ system draws a very small amount of current in the “Off” mode. It is recommended that the battery be maintained with a charger if the bike is not ridden regularly. A properly maintained battery adds life and dependability to your battery.



01-22-2007

Warranty

One Year Limited Warranty

Signal Dynamics Corporation warrants this product at time of purchase to be free from defects in materials or workmanship to the original purchaser.

Signal Dynamics Corporation's obligation under this warranty is limited to repairing or exchanging the unit if the unit is returned, postage prepaid, to Signal Dynamics Corporation within one (1) year from date of purchase.

The warranty is void if the unit has been incorrectly installed, damaged, or tampered with. The foregoing warranty is exclusive and is given and accepted in lieu of any and all other warranties, expressed or implied, including without limitation, the implied warranties of merchantability and fitness for a particular purpose.

This warranty specifically limits Signal Dynamics Corporation's liability to unit replacement only and specifically excludes any consequential damage arising from use, proper or improper, or failure to properly function.

A copy of your purchase receipt or other proof of purchase is required when applying for warranty consideration.

01-22-2007

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