JIM KANESS SYSTEMS ENGINEERING
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R MARTIN E-1100 ELECTRIC BICYCLE RESTORATION

Revised 5 July 2012

INTRODUCTION

In the summer of 2011 I was asked to restore a "basket case" electric bicycle to useful operation. Upon contacting the company whose name was on the bike, R Martin Ltd. told me the E-1100 was their first product, now obsolete, and they had no parts and no wiring diagrams for it. Nevertheless, the bike was reverse engineered and put back into service. In 2012, after the 2011 Sealed Lead Acid (SLA) battery died from heavy use, a lithium-ion bicycle battery was installed. At this writing the bike is in daily use on the streets of Ventura, CA.

CONTACT INFORMATION

NAME	WEBSITE	PHONE
R Martin	http://www.rmartinltd.com	877-324-5329
Dogleg	http://doglegbike.com	805-667-8658
DigiKey	http://www.digikey.com	800-344-4539

REVERSE ENGINEERING

1. A web search turned up the original advertisement for the E-1100, which is linked in this report. The E-1100 offered a 350-watt brushless motor in the rear hub, powered by a single 36-volt 10 ampere-hour sealed lead acid (SLA) battery module.
2. The bike initially had many wires cut, had no battery, and no wiring diagram.
3. An email to Wuxing in China netted the function of each wire in the (now obsolete) throttle control.
4. Three 12-volt car batteries were borrowed for a temporary 36-volt power source and the throttle, controller, and brushless 350-watt hub motor connected together to determine if the motor would run. It ran, but the throttle would not control it.
5. A controller was purchased from Dogleg Bicycles (local here in Ventura) and connected up. It ran the motor and the throttle worked.
6. A wiring diagram was created of how the E-1100 probably had been originally wired. That diagram is included in this report. The Ananda controller that came with the bike may, or may not, have been the original controller.

INITIAL RESTORATION IN 2011

Three 12-volt, 12 ampere-hour sealed lead acid (SLA) batteries were purchased and connected in series for a 36-volt battery. They were taped together end to end to make a single module and fit vertically in the battery space on the bike. A 10-ampere fuse and 1.5-ampere charger were incorporated also.

The restoration required small quantities of 18- and 16-gauge stranded wire in several colors. Buying these new was cost prohibitive, but a trip to the local "Pick-Ur-Part" auto wrecking yard netted a large chunk of automobile wiring harness for $20. This was separated into rolls of various color wire for the restoration.

Bullet connectors and ¼-inch insulated spade connectors were purchased at Loewe's. Other connections were made using 8 millimeter Molex 39100-0906 'Eurostyle' 2-screw insulated terminal strips purchased from DigiKey.

Various other mechanical efforts were done, such as replacing a missing disk brake caliper, and fabricating a missing cover for the electronics housing below the crank. Front and rear lights are standard bicycle items with their own internal batteries.

CURRENT RESTORATION IN 2012

After heavy use the 2011 SLA battery died. It was decided to upgrade to lithium-ion and the best price ($430 with charger and shipping) found for a 36-volt 10 ampere-hour lithium-ion bike battery was from R Martin. Lithium batteries are much lighter weight and longer lived than SLA batteries. The lithium battery came with a mounting rail, built-in battery monitor, 20-ampere fuse, and built-in key lock that turns on power and also unlocks the battery from the rail for removal from the bike. A spacer was made from a piece of 1-inch thick Trex left over from another project and the battery slides onto the rail and locks like it was designed to.

A resistor and diode circuit, shown below, was designed and constructed on a small piece of perfboard to operate the led's in the Wuxing throttle for monitoring battery voltage.

The bike is once again in regular use on the streets of Ventura, CA.

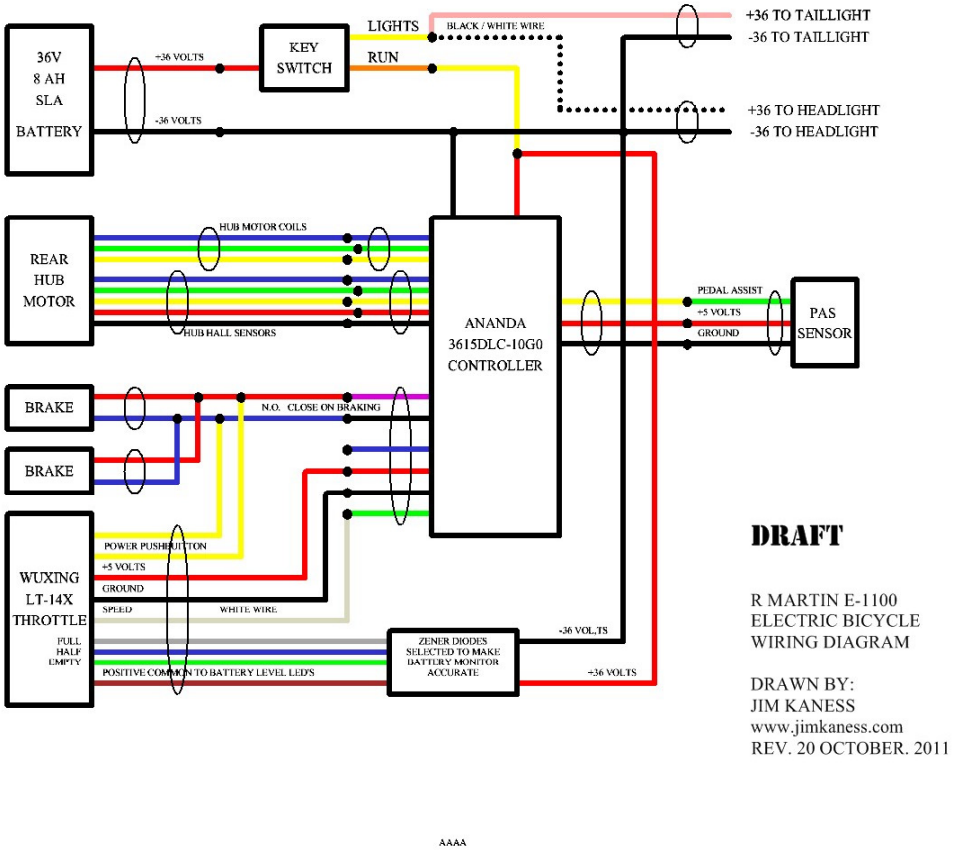
DIAGRAMS AND PHOTOS ON THE FOLLOWING PAGES

1. Link to the original advertisement for the E-1100
2. Reverse engineered "original" wiring diagram.
3. 2012 Wiring Diagram (2 pages)
4. Photo of the lithium battery mounting

ORIGINAL E-1100 ADVERTISEMENT

Click on http://www.rmartinbikes.com/e1100.html to see the original advertisement.

"ORIGINAL" E-1100 WIRING DIAGRAM



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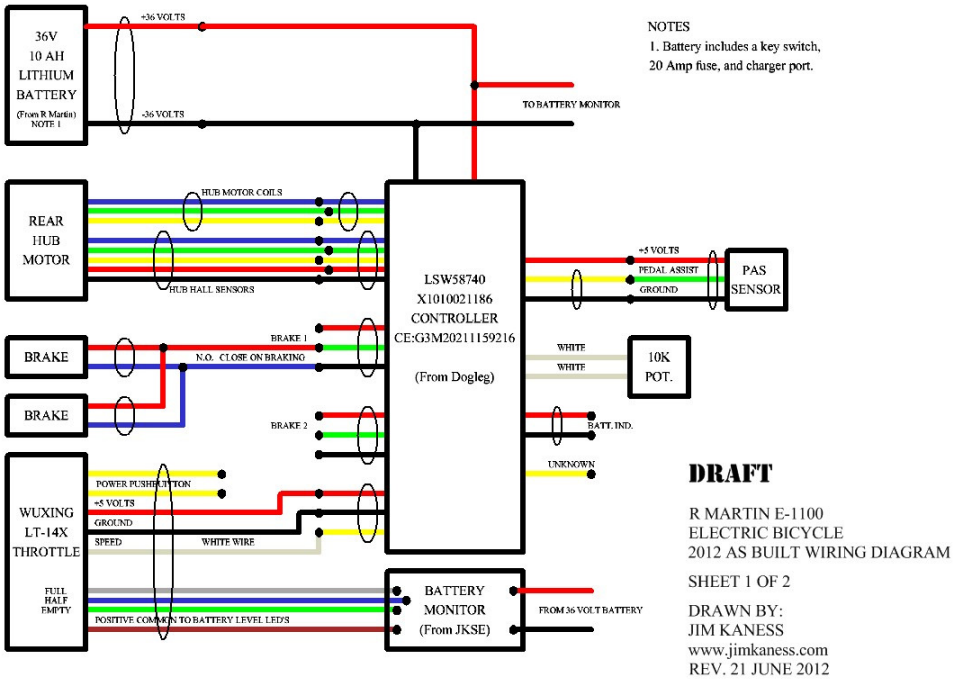
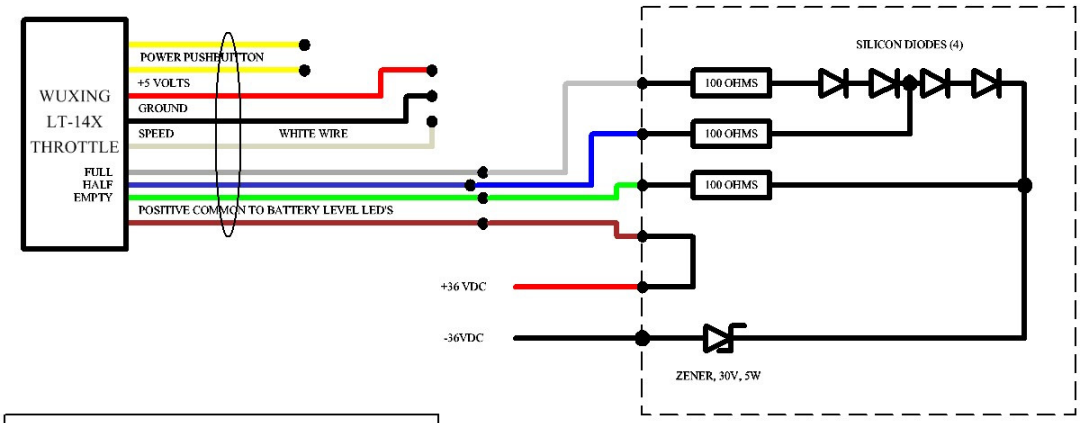
E-1100 WIRING DIAGRAM 2012, PAGE 1 OF 2



E-1100 WIRING DIAGRAM 2012, PAGE 2 OF 2



BATTERY INFORMATION

MALE POWER CONNECTOR ON BATTERY
IEC-320 C-13

RCA FEMALE CHARGER PORT ON BATTERY

DRAFT

R MARTIN E-1100
ELECTRIC BICYCLE
2012 AS BUILT WIRING DIAGRAM

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REV. 21 June 2012

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LITHIUM BATTERY MOUNTING