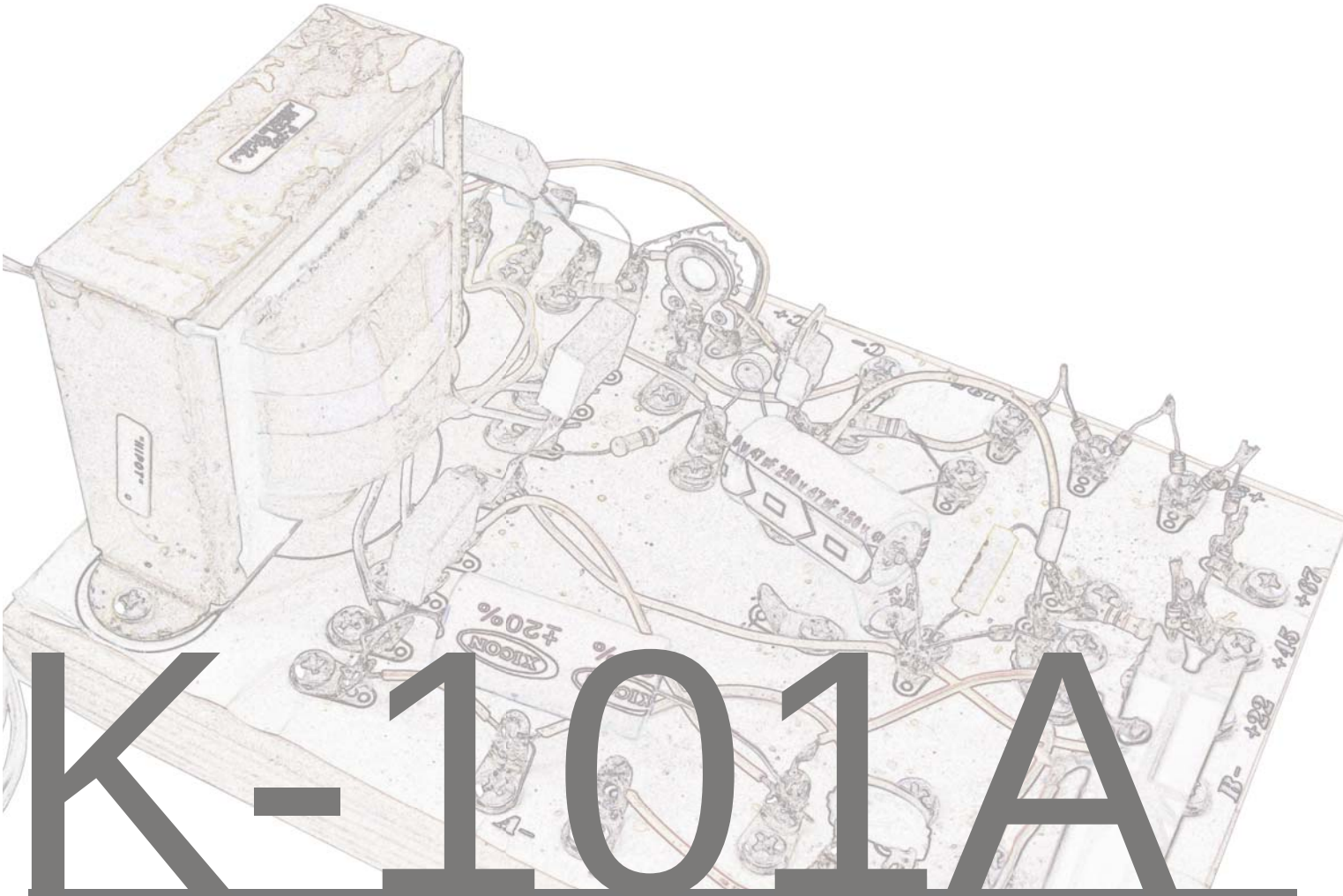

# K-101A

## Regulated A, B & C Battery Eliminator Kit Construction Manual

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# Parts List

| Symbol | Part Number | Description | Quantity |
|---|---|---|---|
| C1 | C-ET47-250 | Cap, Electrolytic - 47 µF, 250v | 1 |
| C2 | C-ET10-160 | Cap, Electrolytic - 10 µF, 160v | 1 |
| C3 | C-ET47-35 | Cap, Electrolytic - 47 µF, 35v | 1 |
| C4 | C-ET4700-16 | Cap, Electrolytic - 4700 µF, 16v | 1 |
| C5 | C-TD01-400 | Cap, Metal Film - 0.01 µF, 400v | 1 |
| D1 | K-PBR84D | Bridge Rectifier - 2 A, 400v | 1 |
| D2, D3 | K-PBR81D | Bridge Rectifier - 2 A, 100v | 2 |
| D4 - D13 | P-Q1N4741A | Diode, Zener - 1w, 11v | 10 |
| D14, D15 | P-Q1N4748a | Diode, Zener - 1w, 22v | 2 |
| Q1 | P-197 | Transistor - High Power NPN, TIP 47 | 1 |
| Q2 | P-198A | Transistor - MPS - W42 | 1 |
| ICI | P-199 | IC - Voltage Regulator, LM - 317T | 1 |
| R1 | P-200 | Thermistor | 1 |
| R2 | R-A100K | Resistor - ½W, 100k ohm, Brown-Black-Yellow | 1 |
| R3, R4, R8 | R-A10K | Resistor - ½W, 10k ohm, Brown-Black-Orange | 3 |
| R5 | R-A15K | Resistor - ½W 15k ohm, Brown-Green-Orange | 1 |
| R6 | R-A4D7K | Resistor - ½W, 4.7k ohm, Yellow-Violet-Red | 1 |
| R7 | P-201 | Potentiometer - 50k ohm | 1 |
| R9 | P-202 | Potentiometer - 1k ohm | 1 |
| R10 | R-A220 | Resistor - ½W, 220 ohm, Red-Red-Brown | 1 |
| T1 | P-T292 | Power Transformer | 1 |
| Wire Nut | S-H408 | Twist Connector | 2 |
| Line Cord | S-W104 | Power Cord | 1 |

## INTRODUCTION

The model K-101A battery eliminator kit is a fully regulated, solid-state power supply designed to operate antique battery radios directly from any 117v AC power source. With five fixed plate ouputs (“B” supply) and adjustable filament and bias supplies, (“A” and “C” sections, respectively), the K-101A can also be used to power custom or experimental circuits, and it can make a handy, addition to the service bench.

## CIRCUIT DESCRIPTION

A single power transformer with three secondary windings provides isolation from the line and between power supply sections.

The A or filament supply is continuously variable from 1.2v to 6v at any current up to l.5A. It uses a single high performance integrated circuit regulator, which is mounted on a heat sink. The regulator has built-in overload protection and thermal shutdown for safety, and reliability.

The B or plate outputs can supply up to a combined total of 50 milliamperes at 22, 45, 67, 90, and/or 135 volts. This section of the supply uses a two-transistor regulator and a string of zener diodes that divide the output voltage. Ql in the accompanying schematic diagram is a series pass transistor whose collector-to-emitter voltage changes to maintain a constant output potential, regardless of changes in line voltage or load current. Ql gets its base current through R3 and R4, which also furnish collector current to Q2. In operation, if the output voltage as sensed at the base of Q2 tries to rise, Q2 is turned on harder, drawing more current through R3 and R4. The resulting increase in voltage drop across these resistors lowers the base voltage at Ql, correcting the output voltage. Conversely, if the output voltage as sensed at the base of Q2 tries to fall, Q2 is moved closer to cutoff, drawing less current through R3 and R4. The consequent reduction in the voltage dropped across these resistors tends to increase the voltage appearing at the base of Ql, correcting the output voltage. The thermistor in series with the collector lead of the pass transistor has a positive temperature coefficient, and protects the B regulator against overload. This device has a cold resistance of about 100 ohms. Excess current heats the thermistor, which causes its resistance to increase, limiting current to a safe level.

The C or bias supply is not called upon to deliver any significant current under normal conditions. Accordingly, it is a simple zener diode regulator circuit with an output continuously variable from 0v to 22v. It uses a simple resistive voltage divider to provide an adjustable output. The C+ output can be strapped to the B- output for circuits that require a negative bias supply.

## GETTING STARTED

You will need a medium sized screwdriver, an awl or other sharp tool for starting screws in wood, a pair of diagonal cutters, long-nosed pliers, some rosin core solder, and a soldering iron or gun of 25 watts or more. You will also need to drill two small holes in the breadboard for the locating pins of the heat sink. The exact size isn’t critical, but we recommend a 5/64-inch drill for a press fit. If you have a set of number drills, you may use a #47.

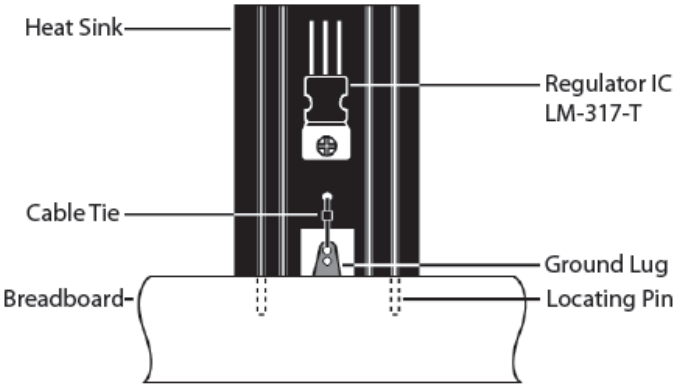
Unpack the kit carefully to avoid losing any of the small parts and check carefully against the schematic and pictorial diagrams. Identify all of the components and become generally familiar with the physical layout of the circuit before you begin construction.

## MECHANICAL ASSEMBLY

The K-101A is built on a wooden breadboard, the way many home built radios were constructed in the 1920s and 30s.

The power transformer is screwed directly to the board, and all of the other parts are secured by ground lugs. A template is supplied with each kit to help you locate the necessary holes accurately. Peel off the protective backing and apply the template to the surface of the board. The pressure sensitive adhesive will prevent it from moving about as you make the screw starting holes with an awl or other pointed tool. Be sure to drill the two holes used for mounting the heat sink. After making all the holes, you may carefully remove the template, or you may leave it on, if you wish, and begin mounting components.

Using the template as a guide, screw all of the ground lugs to the board exactly as shown. Next, mount the heat sink with the regulator IC attached. Place a piece of scrap wood on top and carefully tap the heat sink until the locating pins are driven fully into the breadboard. Secure the assembly by strapping it to the ground lug under the heat sink using the cable tie supplied with the kit. Finally, prepare to mount the power transformer. Prewire the transformer terminals using the pictorial diagram as a guide. Anchor it to the board using two of the 46 screws provided.



## WIRING

In order to reduce errors, we recommend that you go over each wire on the accompanying pictorial diagram with a colored pencil as you put it in place. This will make progress obvious, and the unfinished portion easily identified. The chance of error will be greatly reduced, particularly if you don't do all of the wiring in one session. Wiring will also be easier if you don't solder a connection until all of the leads to that tie point are hooked up.

Begin wiring by connecting the transformer leads to the proper lugs, making sure the lead colors are followed. The line cord splices to the black transformer leads using the wire nuts supplied. Then hook up all of the wires that run between tie points. Dress these close to the surface of the board. Next, connect the leads to the regulator IC. Finally, mount, all of the remaining components between the proper lugs. Be certain to observe correct polarity on the semiconductors and capacitors C1 to C4. Interchanging leads on these parts can cause permanent damage. The color code for each resistor is listed in the replacement parts list. After completing the wiring, make sure all connections are securely soldered and that there are no short circuits caused by adjacent lugs or bare wires touching one another.

Check carefully to make certain that all joints have been soldered and that all parts and leads have been connected exactly as shown. It is a good idea to set your work aside for a while and check it again later.

## OPERATION

Before plugging in your completed kit,**STOP AND CHECK YOUR WORK AGAIN FOR SHORTS OR MISWIRES**. If your kit is improperly wired when power is first applied, some of the parts may be destroyed.

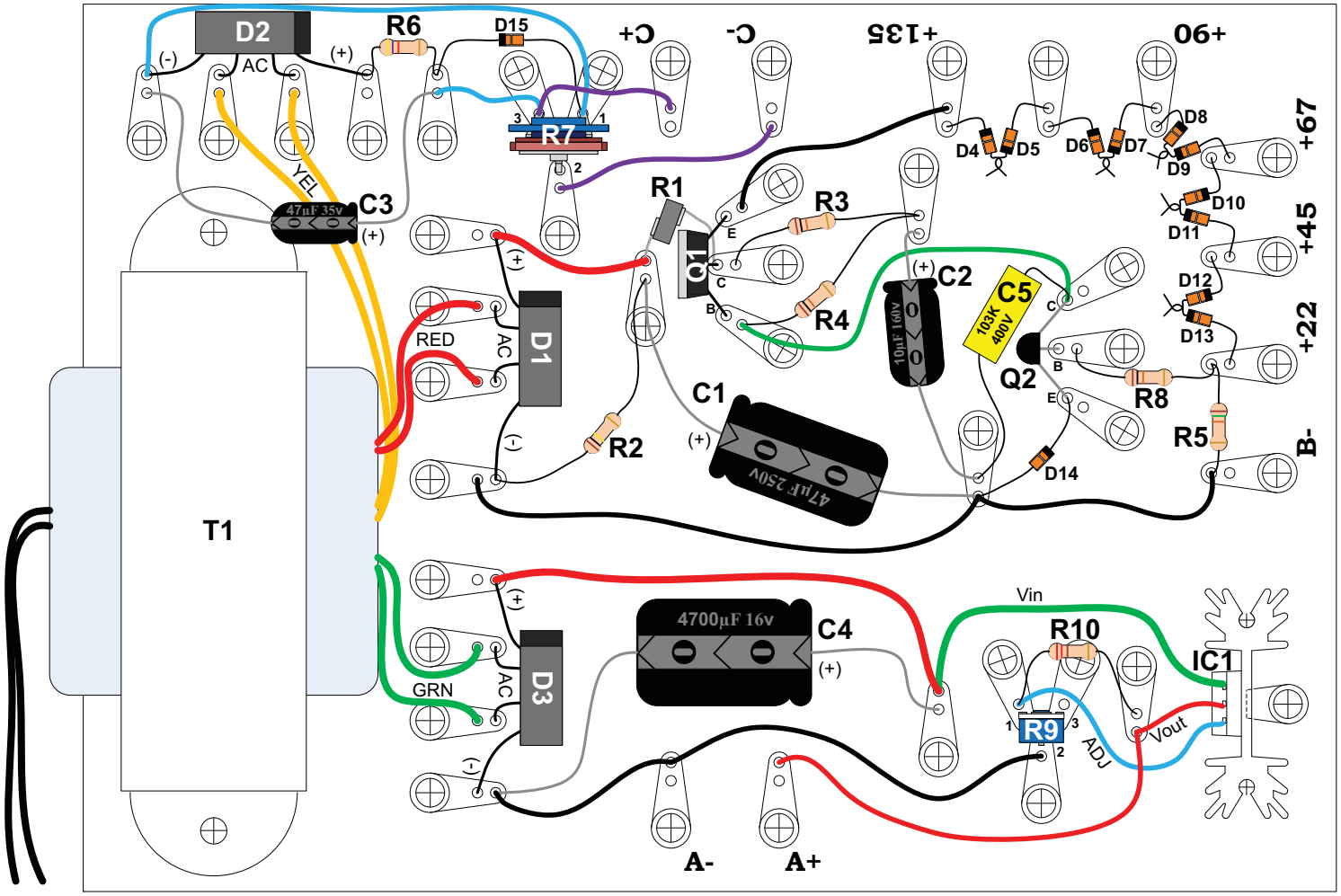
Now that you are ready to test your supply, be sure to observe all safety precautions:

Test the supply and set the A and C voltages before attaching a load. Plug in the unit and test for the appropriate voltages at each of the B outputs with a meter. Next, set the A (filament) and C (bias) voltages to the values recommended for your particular radio. It is very important not to set the A voltage too high, as excess voltage can burn out all the tube filaments in your radio as soon as it is turned on.

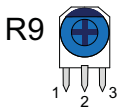
After checking the supply and adjusting the filament and bias voltages, unplug the unit and make the connections to your radio by clamping its battery leads under the correct ground lug screws (output terminals). Once again, use caution to avoid miswires. B voltage across the filament circuit can destroy all your tubes instantly.

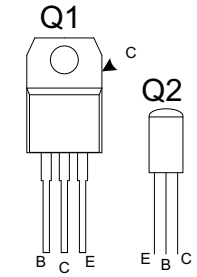
The power transformer and regulator heat sink are designed to run warm to the touch under normal conditions. These are premium quality parts, and should provide years of trouble-free service. We hope you enjoy building and using your battery eliminator, and we invite you to inquire about other quality breadboard kits available from Antique Electronic Supply.

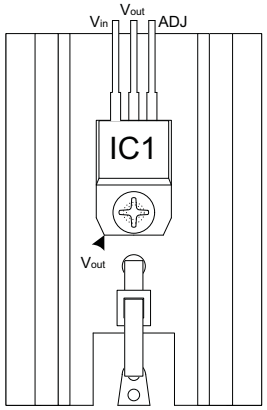
**Warning!**
Dangerously high voltages are present when power is applied. **NEVER** touch any portion of the circuit when it is operating. **NEVER** make connections with the power on. Carelessness can result in a serious or fatal shock.



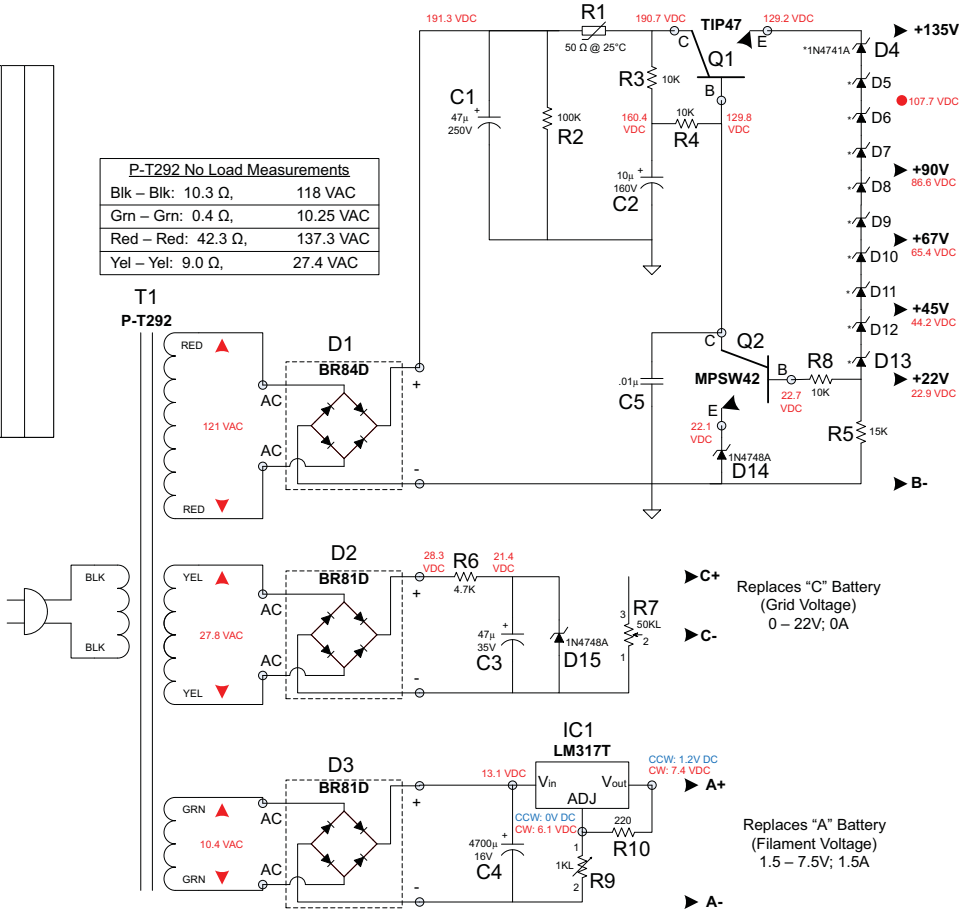




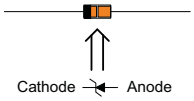




| P-T292 No Load Measurements | |
|---|---|
| Blk – Blk: 10.3 Ω, | 118 VAC |
| Grn – Grn: 0.4 Ω, | 10.25 VAC |
| Red – Red: 42.3 Ω, | 137.3 VAC |
| Yel – Yel: 9.0 Ω, | 27.4 VAC |




D4 – D13 = 1N4741A

D14 & D15 = 1N4748A




*Be sure to connect components according to their correct polarity.*