

THE LUCAS C40 DYNAMO & RB106 TEST MACHINE.

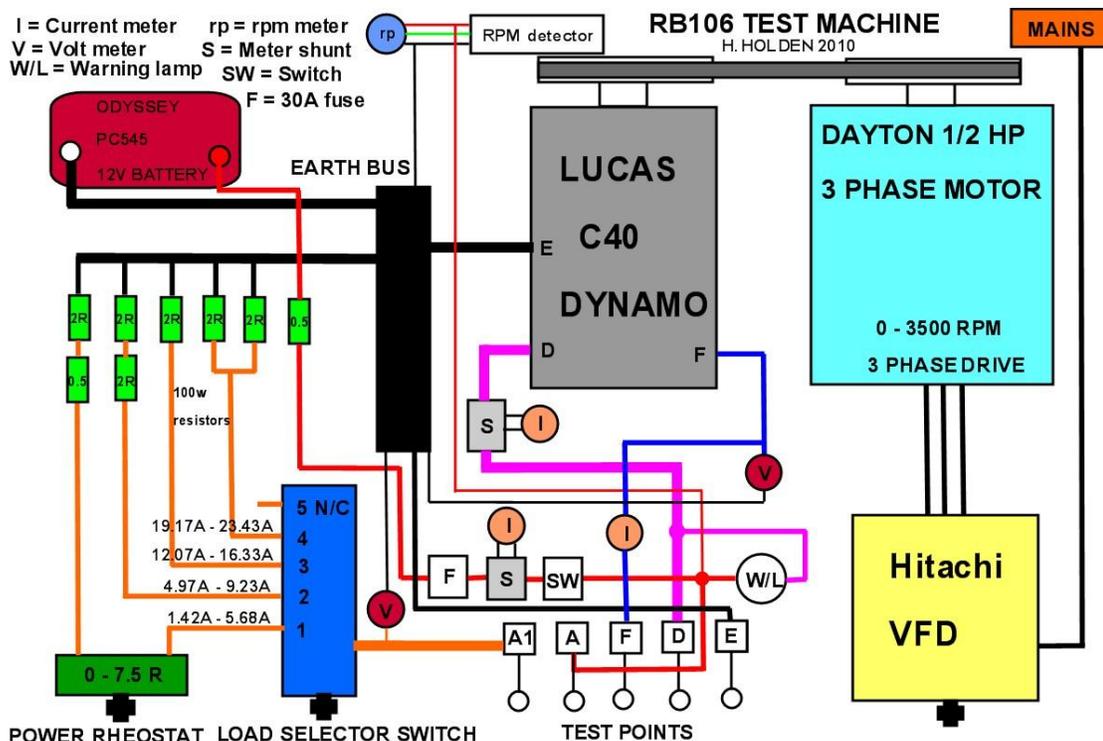
H. Holden, 2010

This machine was specifically constructed to enable laboratory testing of the Lucas RB106 current compensated voltage regulator (or its electronic clones) in conjunction with a genuine Lucas C40 dynamo. The unit drives the dynamo rpm to a maximum of 3500 and with enough power so that a full output current of 22 amps can be achieved. The motor/dynamo unit is mounted on a sub-assembly fitted to the main cabinet on vibration absorbing feet. The 6mm thick white insulating material used throughout the unit is Bramite which is an Australian made heat resistant and tough electrical grade panel typically used in domestic or industrial mains power fuse box applications. The main cabinet is constructed from 15 mm thick plywood and epoxy coated.

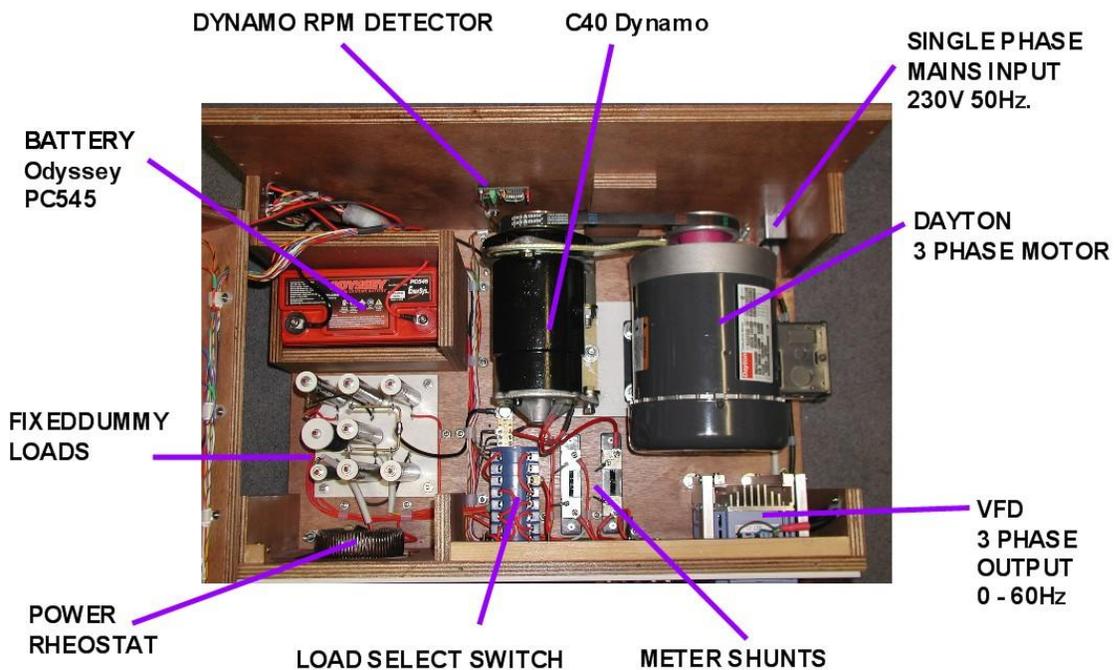
This unit contains a Dayton 3 phase driver motor with a Hitachi speed controller. An assortment of high power dummy load resistors to vary the load from about 1.5A to over 22 amps and all the appropriate meters and shunts to carry out measurements. The unit has outputs for oscilloscope connections. The regulator box under test is in a convenient position to allow other devices to attach to it, such as a thermocouple and digital temperature probe for example to determine the internal regulator temperature and temperature stability under continuous operation at full load.

Metering on the unit includes battery charge current, field coil current and voltage, dynamo output current and regulator output voltage. Moving coil analogue meters were used specifically for their time averaging properties and lack of response to brief transients from the commutator which can upset digital meter readings. External digital meters are attached if required to the test points. A high quality automotive VDO RPM meter is used to read the dynamo pulley (shaft) RPM. This was achieved by embedding two rare earth magnets in the dynamo pulley surface and detecting these with a sensor and small signal conditioning circuit.

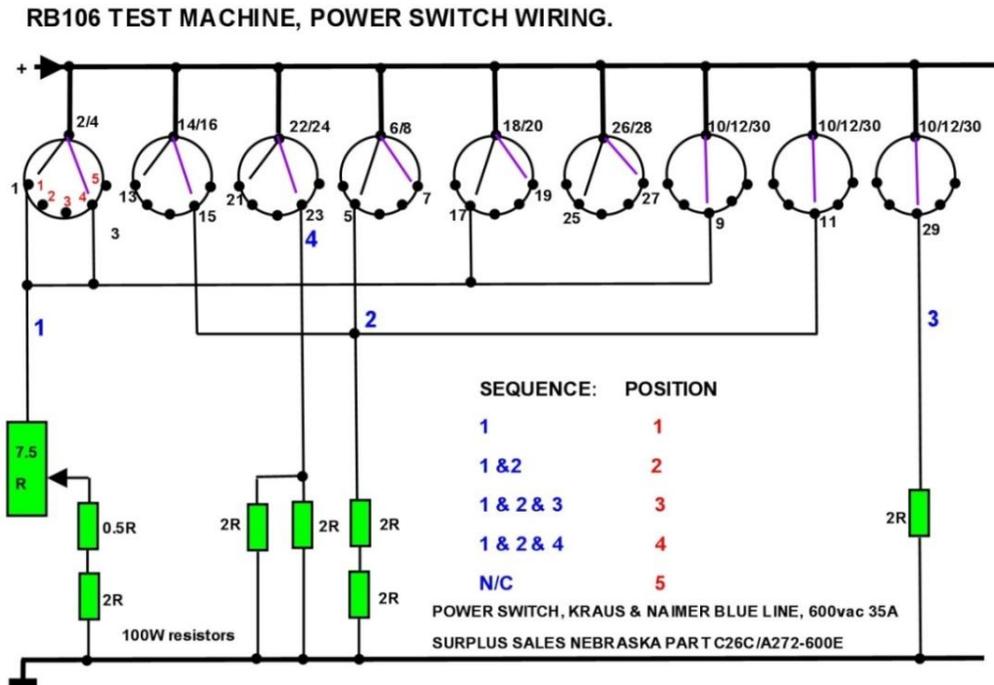
The basic internal setup of this unit is shown below:



The unit is shown below in the photos. This unit is a tremendous asset for both testing and adjusting original RB106 regulators (or any type of 12V dynamo regulator) but also in the R&D of electronic replacements for the RB106 and similar regulators.



The load selector switch was difficult to obtain, however a suitable massive switch rated at 35A was obtained from Surplus Sales Nebraska. The wiring required some thought to obtain the appropriate load resistor selections for increasing current with advancement of the switch due to the way the particular switch was configured. The numbers on the diagram relate to the markings on the switch. The slash between the numbers means that those terminals are connected together:



The circuit below shows the RPM detector. Small reed switches with a low mass work very well. The frequency response of a small reed switch can be well over 500Hz. In this application, for example at 3500 rpm the frequency of the signal from the two pulley magnets is around 116.7 Hz, well within the reed's capabilities. A Hall device would be another option for this application. The reed, like all mechanical switches, has some bounce when it closes. It is eliminated by the RC network and Schmitt trigger combination.

