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# MAIN MAGNET POWER SUPPLY ELECTRONIC PEAKERS INSTRUCTIONS FOR TESTING PLUG-IN MODULES

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**Brookhaven National Laboratory**

**U.S. Department of Energy**

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AGS DIVISION TECHNICAL NOTE

No. 13

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February 21, 1966

MAIN MAGNET POWER SUPPLY  
"ELECTRONIC PEAKERS"  
INSTRUCTIONS FOR TESTING PLUG-IN MODULES

The plug-in modules, whose test procedure is described below, are entitled "TIME BASE" and "PULSE GENERATOR". Schematic number D04-E103 describes both modules electrically. Both are printed boards, and twelve of each are plugged into the "peaker" chassis.

The function of the system is to allow the Power Room Operating Engineer to set the firing times of each of the twelve pairs of ignitrons individually during the RECTIFY and FLAT-TOP segments of the main magnet current cycle. The TIME BASE derives its gate by squaring one of the twelve phases of the alternator and produces a ramp, starting at the negative slope zero crossing and ending 1/2 cycle later. The ramp is an input to a multiar on the PULSE GENERATOR module. The starting level of the ramp, as viewed at the input to the multiar, is determined by either the RECTIFY or FLAT-TOP reference pot. The multiar pulse occurs when the ramp reaches the fixed reference level on the opposite side of the input diode.

The multiar output pulse goes through a gate, which is disabled only during the INVERT time interval. From there, the pulse leaves the PULSE GENERATOR module and goes to a power amplifier mounted on the chassis. The power amplifiers drive the firing thyratrons, which fire the ignitrons.

There are sixteen of each of the two modules, twelve of which are in use. The eight spares are now in a locker located between the ignitrons and the Power Control Room.

Test Procedure

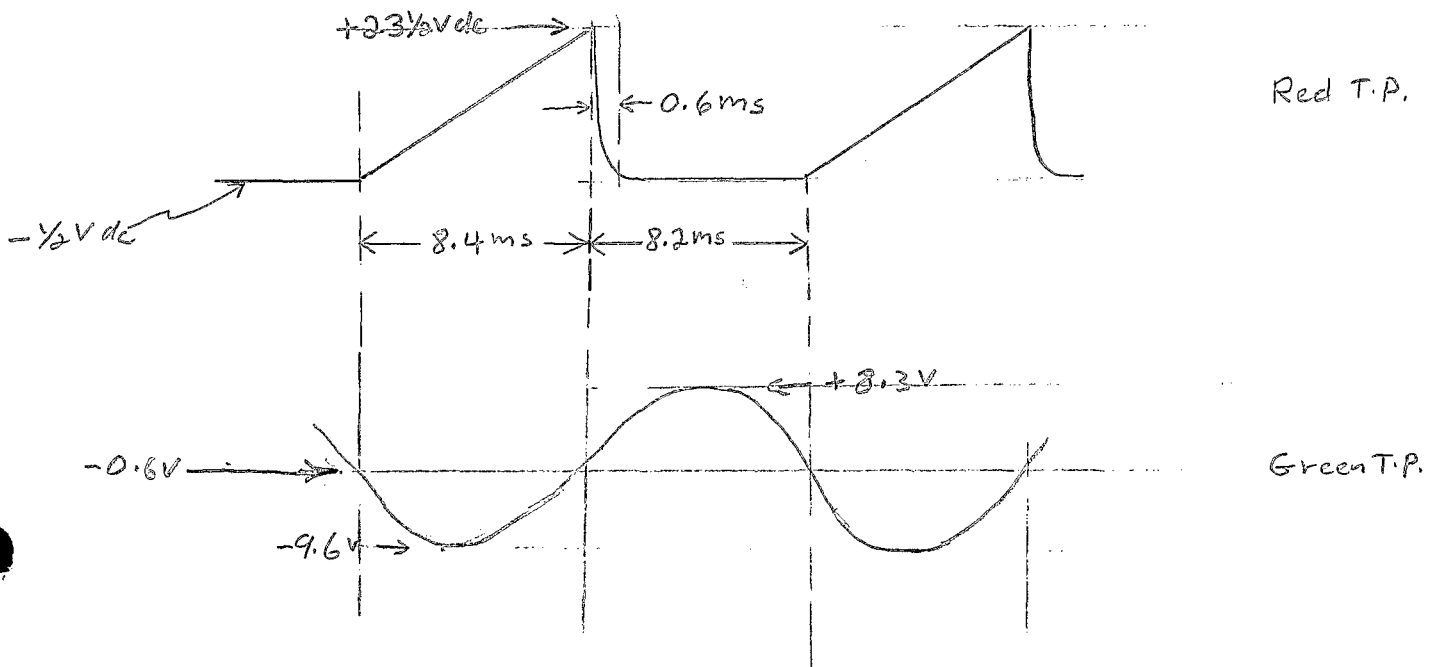
A test jig has been built and tested and is available in the Power Room. The modules can be tested without reference to the schematic (#D04-E103).

(1) Place the test jig on a bench with knobs facing front, and remove modules. Obtain two power supplies and connect them properly to the plus and minus 24 volt banana connectors on the rear. If time permits, check the voltages with a digital voltmeter. Otherwise, set them equal to each other by the same meter. Warm up a scope, preferably with a CA plug-in and two probes.

(2) Shut off power supplies and install modules to be tested. Plug in line cord to 110 V 60 cps ac line, and switch on toggle switch in rear. Turn on the power supplies again.

(3) On the upper left of the TIME BASE module is a green test point. There should be an 18 V pp (-9.6 to +8.3 V) sine wave at this point, with 16 2/3 millisecond period.

(4) On the upper right of the TIME BASE module is a red test point. Here one should see the ramp function, sketched below.



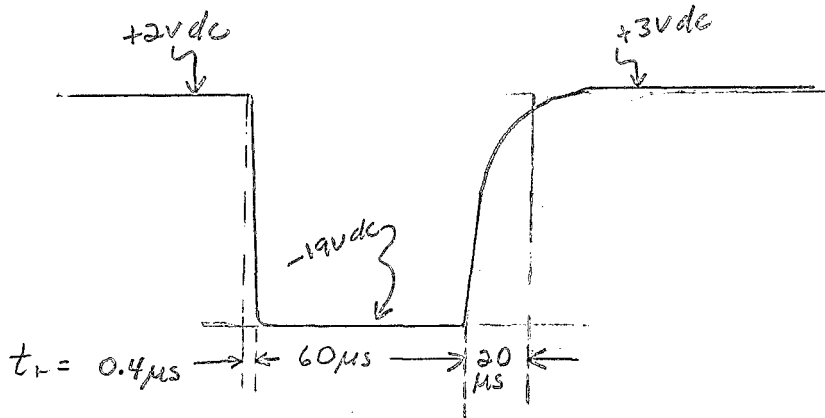
If ramp is not 24 V high, or if there is clipping at the top (see below)



then the slope may need adjustment. Before adjusting slope, be sure that power supplies are correct and that the scope is accurately calibrated. Adjust the pot on the printed board so that the ramp is on the brink of clipping (within 0.1 V of clipping level or not more than 105 milliseconds at clipping level).

(5) On the upper right of the TIME BASE module is a yellow test point. Here, one can view the multiar pulse. The main things to look for are multiple pulsing, absence of pulse, time of occurrence and shape. Put the ramp on the other input to the scope (step 4) so that it can be used as a time reference. Use "chopped" or "add algebraically" mode.

(a) With the function switch on the test jig at the extreme left, a pulse should occur 0.6 ms before the ramp reaches its peak, approximately. The pulse shape is sketched below.



NOTE:  $t_r = 0.25 \mu s$  when viewed on opposite side of 10 K isolating resistor.

The shape and size of the pulse should be the same for all positions of the function switch.

(b) Turn the function switch one step clockwise to INVERT, and the pulse should disappear.

(c) Turn it another step clockwise to RECTIFY, and the pulse should reappear near the bottom of the ramp. Its phase can be set with the RECTIFY pot from 0.4 ms to 2.4 ms from start of ramp. FLAT-TOP pot should have no control at all.

(d) Turn the function switch to FLAT-TOP. The pulse should occur further up the ramp now, and should be adjustable with the FLAT-TOP pot from 0.6 to 2.3 ms from the point at which the ramp starts to fall. The RECTIFY pot setting should not control the position of the pulse.

On the upper left of the TIME BASE module is a black test point. This is not needed unless one of the modules fails to pass the tests described above. With the function switch on RECTIFY, there should be 0.6 V dc level. In FLAT-TOP position, this level is controlled by the FLAT-TOP pot from zero to +5.5 volts, approximately.

Faulty or questionable modules should be reported to Ira Collier, and to William Michaelson or Arthur Otis. A schematic of the test jig is attached.

AO/ah

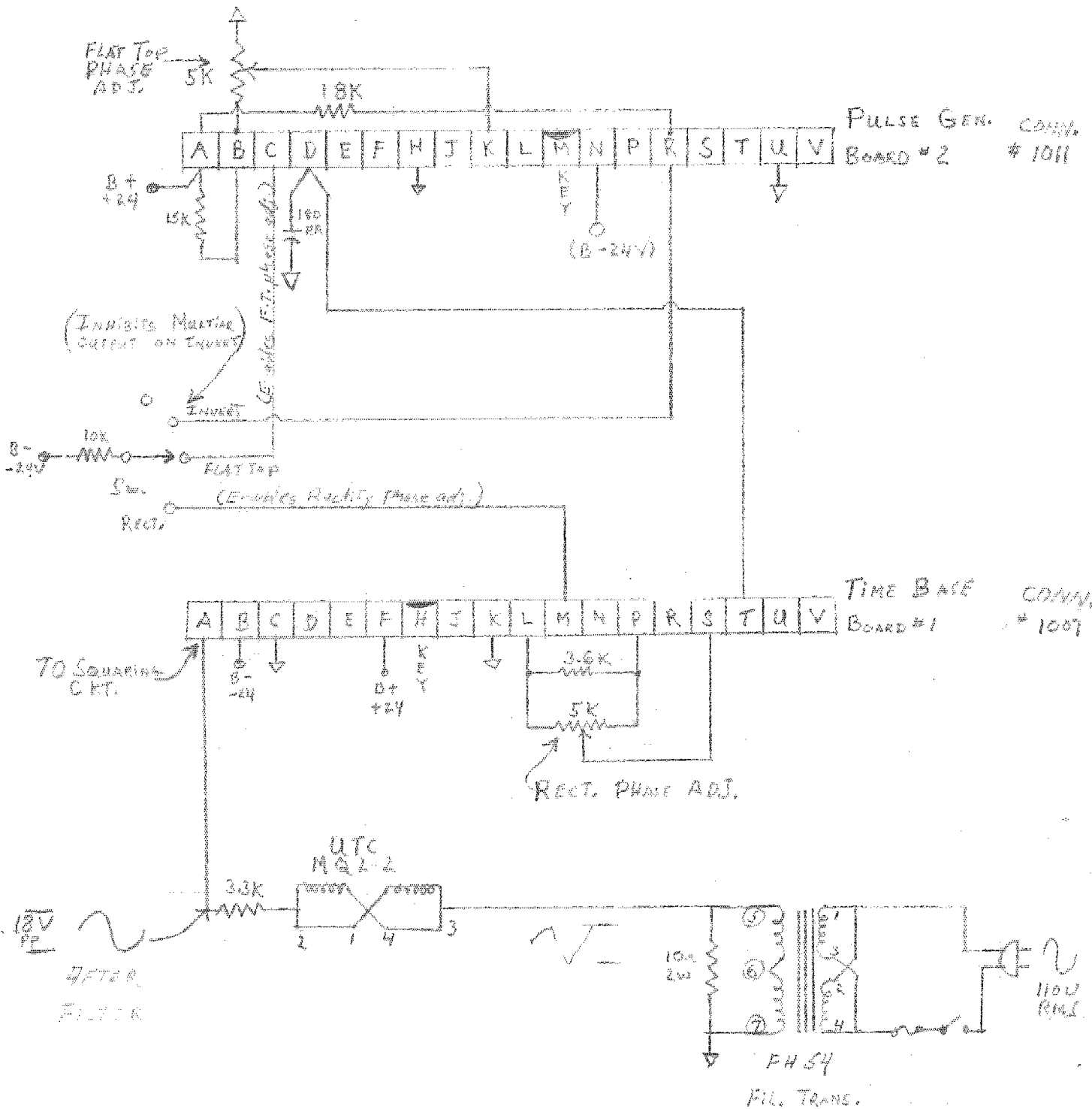
cc I. Collier (15)  
W. Michaelson (1)  
A. Otis (4)

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BY C.E.R. DATE 2-24-56  
 CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_

SUBJECT Rectifier & Flat Top  
Pulse Generator for Test Circuit  
 DEPT. OR PROJECT for Van Allen & 1011

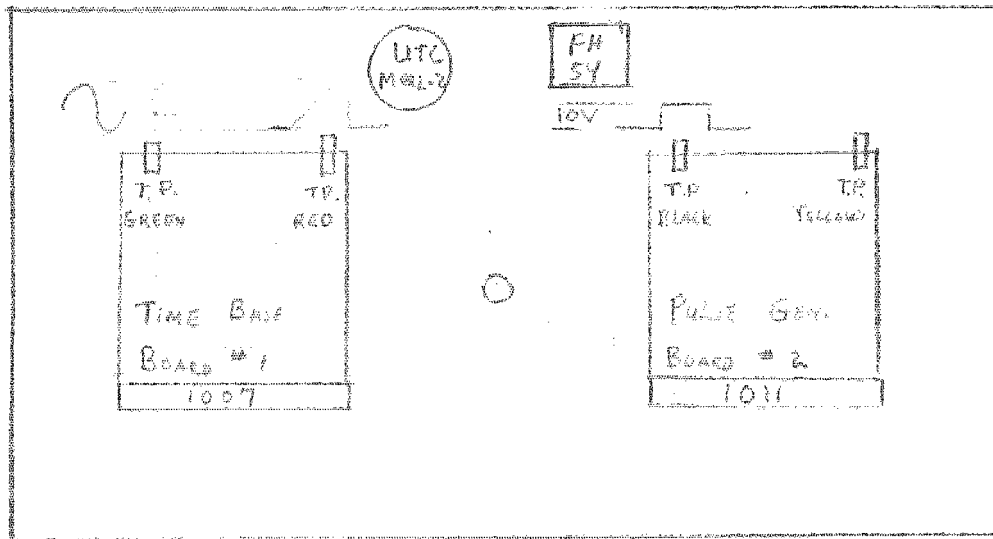
SHEET No. 1 OF 1  
 JOB No. DOE-4-113



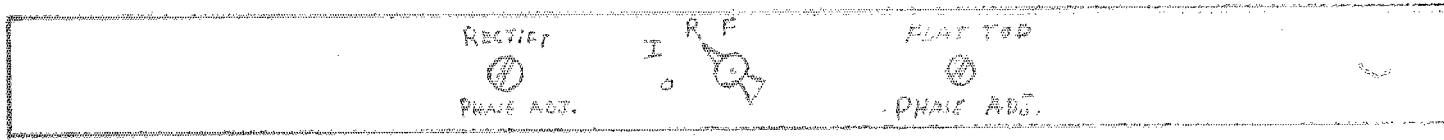
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BY CEA DATE 2-23-50 SUBJECT \_\_\_\_\_  
CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_  
DEPT. OR PROJECT \_\_\_\_\_

SHEET No. 1 OF 2  
JOB No. \_\_\_\_\_



TOP View



FRONT PANEL