

INTRODUCTION

The Service Section of the SUPER IIIA Manual is divided into two sections. The first section is a general trouble shooting guide and the second is a more detailed section with emphasis on the Super IIIA Electronics.

During Normal operation of the Super IIIA, routine operational problems can occur such as dirty apertures, burned out filaments, etc. When some abnormal symptom occurs that deviates from the normal operation of the instrument it is suggested that the operator check the list of possible problems as outlined in the General Trouble Shooting Guide. If a definite failure of the Super IIIA should occur, it is still wise to go through the General Trouble Shooting Guide first, then proceed to the detailed section of the manual.

In the Trouble Shooting Guide, TS Numbers are item numbers of the symptoms contained in this manual. Table I describes the main units and Table II provides a more detailed list of the individual circuits. Also included is a Reference Guide of the oscilloscope wave forms and voltages at the various check points. One should keep in mind, however, that there is some interaction between the various sections. The detailed Trouble Shooting Guide indicates this when applicable.

A master diagram of the Super IIIA circuitry is provided. This used in conjunction with the information provided in the Trouble Shooting guides should provide enough information to solve any problem that should arise with the use of a volt-ohm-meter and/or an oscilloscope. In most cases, with the exception of the main power supplies, the circuits are of the plug in type and repairs can be made by exchanging the circuit boards which are readily available from International Scientific Instruments, Inc.

TABLE I

<u>UNIT</u>	<u>LOCATION</u>	<u>FUNCTION</u>
A Drawing No. N82M09	Right Section of display console.	Main power supplies, voltage stabilizer, lens, stigmator, vacuum interlock, and photo CRT scan circuitry.
B Drawing No. N82N11	Left Section of display console.	Electron beam, CRT scan, H-sweep, V-sweep and video processing circuitry.
C Drawing No. N83H03	High voltage supply (Dry)	Scintillator, CRT high voltage supplies and stabilizers. Electron gun high voltage stabilizer.
D Drawing No. N83HA08	High voltage supply (oil)	Electron gun high voltage and filament power supplies.
E Drawing No. N82BA03	Sample Chamber	Secondary electron detector and preamplifier.
F Drawing No. N82DB01	Auto valve	Auto valve circuitry.

TABLE II

<u>Unit</u>	<u>Circuit No.</u>	<u>Plug In</u>	<u>Chassis Mounted</u>	<u>Description</u>
A	N82MA01P	X		Vacuum interlock, <u>+15V</u> stabilizer, alignment power source.
A	N80MB01P	X		Lens and stigmator power source
A	N78NC01P	X		Photo CRT Scan.
B	N82NA02P	X		Probe & CRT Scan.
B	N82NB02P	X		H-sweep & Image amp.
B	N82NC02P	X		V-sweep
B	N83ND02P	X		TV probe scan & micron marker.
B	N82NE01P	X		Video amp for TV
B	N82NG01P		X	1/4 divider for line synchronization.
B	N83NF03P	X		Gamma Control
B	N82NJ01P		X	One shot
B	N82NH01P		X	TV Horizontal sweep
B	N30N09P		X	Zoom magnification buffer amplifier.
B	N82NL01P	X		Horizontal dual magnification scan.
B	N82NM01P	X		Vertical dual magnification scan
B	N82NK01P	X		Dual magnification image and X-ray pulse amplifier.
B	N30NP01P	X		<u>+7.5V</u> and +12V stabilizer.
C	N80HB01P		X	Photomultiplier high voltage -300V and +400V supply.
C	N82H01P		X	Scintillator H.V. Drive

<u>Unit</u>	<u>Circuit No.</u>	<u>Plug In</u>	<u>Chassis Mounted</u>	<u>Description</u>
C	N83HC01P	X		Electron gun high voltage stabilizer and oscillator, e.g. high voltage & filament drive.
C	N82HD01P	X		Scintillator & CRT high voltage stabilizer, +70V, <u>+15V</u> power supply.
D	N80HA13P		X	Filament supply.
E	N82BA03P		X	Preamplifier.
E	N78VC01P		X	Preamplifier for TV scan.
F	N83DC01P	X		Auto valve logic circuitry
F	N85DA01P		X	Photo transistor and luminous diode. Inverter.

GENERAL TROUBLE SHOOTING GUIDE

<u>Problem</u>	<u>Possible Cause</u>
G-1 No response when power switch is turned on.	Fuse F1 on back of display console.
G-2 Vacuum pump does not operate when power switch is turned on.	Fuse F2 on back of display console.
G-3 Vacuum pump does not quiet down after 30 sec. of rough pumping.	Loose vacuum seals or dirty o-rings in specimen chamber and gun area.
G-4 No response when diffusion pump switch is turned on.	Improper flow of cooling water. Reset* thermostat on diffusion pump. F3 on back of display console.
G-5 Vacuum indicator light does not light after about 15 minutes of pumping with diffusion pump on.	Burned out indicator lamp. Small vacuum leak most probably in gun or specimen chamber area.
G-6 No response when operation switch is turned on.	Poor vacuum, green lamp must be lit indicating that vacuum is better than 10^{-3} Torr before operation can be obtained. F4 on back of display console.
G-7 No emission current when control is at approximately the 3 o'clock position.	Burned out filament, replace electron gun cartridge.
G-8 Abnormally high emission current ($250\mu\text{A}$).	Filament shorted to grid cup or badly contaminated electron gun cartridge. Poor vacuum in gun area.
G-9 Unstable emission current.	Arcing in electron gun caused by badly contaminated electron gun cartridge or filament touching grid cup - replace electron gun cartridge. Poor vacuum.
G-10 Brightness of image decreases when emission is rotated clockwise beyond the point where saturation is observed on gun current meter.	Electron gun misaligned - set both X and Y alignment controls on display console to center position and mechanically align gun for maximum brightness, then touch up alignment with controls on display console.

* Reset button is white button seen through hole in back of column (which is the DP). Press it in

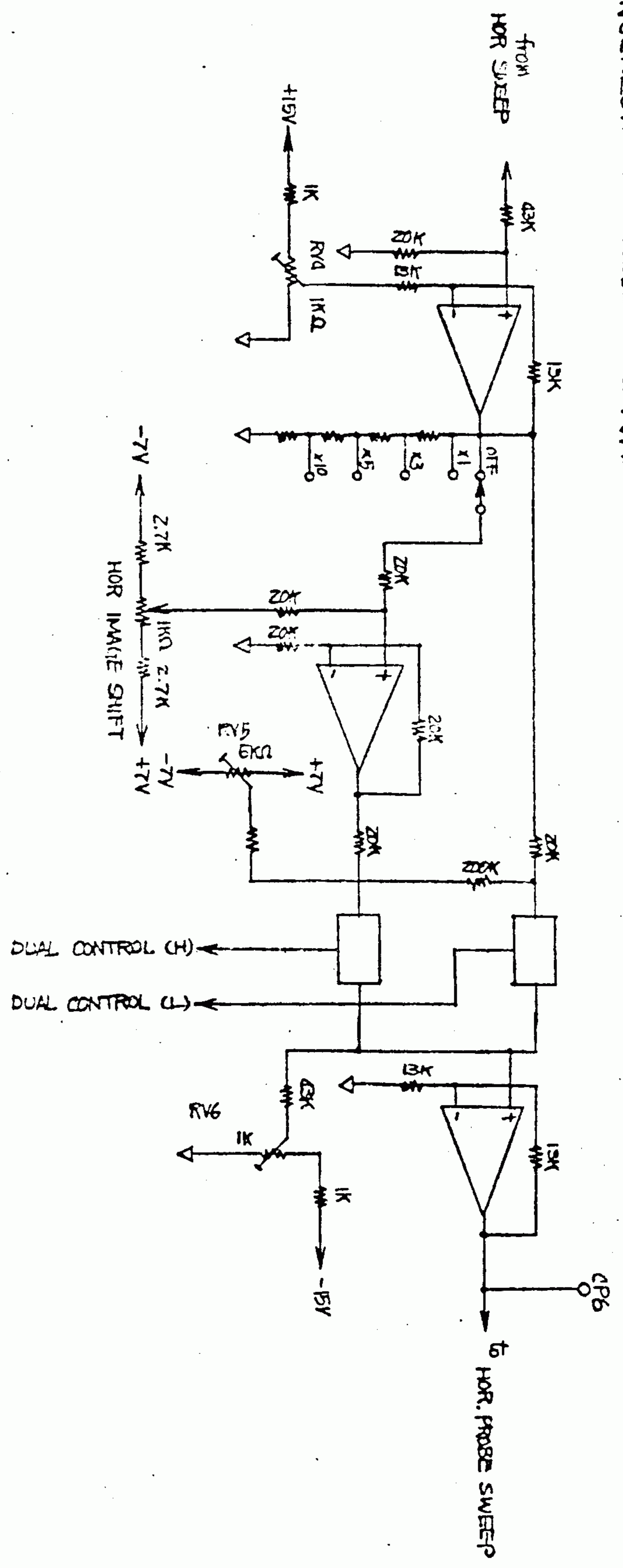
<u>Problem</u>	<u>Possible Cause</u>
G-11 Maximum brightness of image can not be obtained.	Electron gun not aligned and/or filament not saturated. Align as described in G-10.
G-12 Image brightness and/or focus changing.	Emission current fluctuating. See G-9.
G-13 Image cannot be focused.	Sample mounted either too high or too low in specimen stage. Obstruction in column. Excessive astigmatism - See G-14.
G-14 Cannot compensate for astigmatism.	Contaminated aperture and/or column sleeve.
G-15 Image vibration (ragged edges)	Sample loose in specimen stage.
G-16 Very bright areas on image and/or streaking or smearing of image.	Sample charging because of nonconductive areas such as improper coating of sample or contamination on sample.
G-17 Poor image quality because of the following:	Scintillator.
A. Poor contrast. B. Excessive noise or grain. C. Bright white spots.	

1. Disassembly of Display Console, High Voltage Power Supply and Preamplifier.

- 1-1. Turn off the instrument as indicated in the procedure in Section 17 "Shutdown Procedure" of the instruction manual.
- 1-2. Remove the screws which are used for attaching the rear panel of the display console and then the screws from the rear of the display console.
- 1-3. Remove the screws which are used for attaching the front panel.
- 1-4. Push the rear panel of the display unit A chassis, and the chassis will come out of the console cabinet. (The chassis of display unit B can be moved using the same procedure.) When electrical continuity is to be checked in this disassembled condition, it is sufficient to take out the chassis to such a position as to permit checking the printed circuit boards and the chassis. In taking out the chassis, however, take care not to forcibly stretch the cables connected to the rear panel of the chassis.
- 1-5. When it is necessary to completely remove the chassis from the console, disconnect the cable connectors and pull the chassis toward the front.
- 1-6. When it is necessary to energize the chassis while it is pulled out in the condition described in 1-4 above, make sure that all the cables are properly connected and then proceed as instructed in Section 3 of the instruction manual.
- 1-7. After the chassis has been removed as described in 1-5 above, it can be placed on the right or left side for parts replacement or other purposes.
- 1-8. For replacing a printed circuit board, be sure to turn OFF the OPERATION switch. Then remove the printed circuit board clamp and take out the circuit board so that electrical parts are oriented the same as adjacent boards. If a printed circuit board is inserted in the reverse direction, damage to the instrument will occur.

- 1-9. When it is necessary to replace a part other than a printed circuit board, be sure to shut down the instrument. Electrical shock may be caused or the instrument may be damaged if a part is replaced with a new one while the instrument is on.
- 1-10. After part replacement or inspection has been completed, reassemble the display console in its original condition. Push the front panel of the chassis to set the chassis completely in the console and then fasten the chassis by tightening the screws on the rear.
- 1-11. When it is necessary to replace the printed circuit board in the high voltage power supply, remove the P.C. Board clamp screw from the high voltage power supply box located below the display unit of the display console. Then proceed as instructed in 1-8 above.
- 1-12. For replacing a part other than the printed circuit boards in the high voltage power supply, be sure to shut down the instrument. Electrical shock may be caused if the operator touches the interior while the instrument is on.
- 1-13. When replacing the preamplifier, be sure to turn OFF the OPERATION switch. After loosening the set screws on the preamplifier, pull out the preamplifier from the photomultiplier cover. Note that the photomultiplier is taken out together with the preamplifier.
- 1-14. Disconnect the cables from the preamplifier and connect the cables to a new preamplifier.

N82N101P HOR PROBE DUAL MAG.

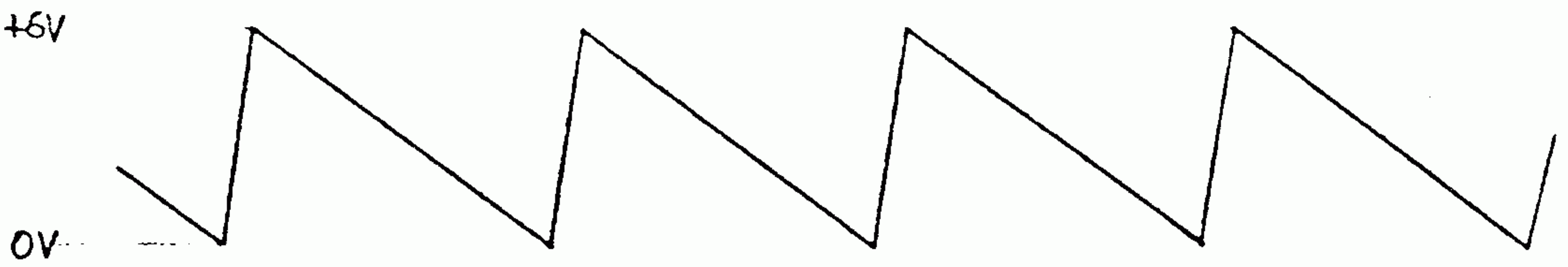


RV4
DUAL HIGH MAG CALIBRATION

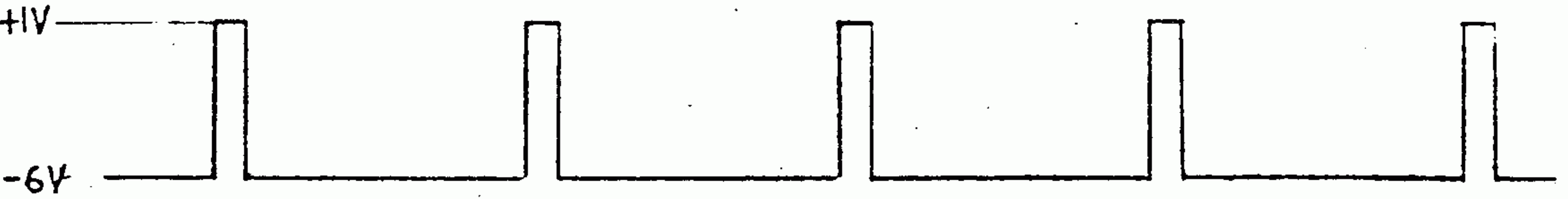
RV5
DUAL LOW MAG SHIFT

RV6
DUAL MAG SHIFT

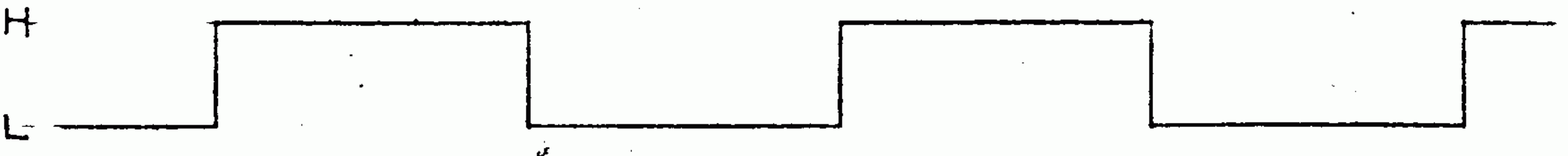
N82NB02P CP2



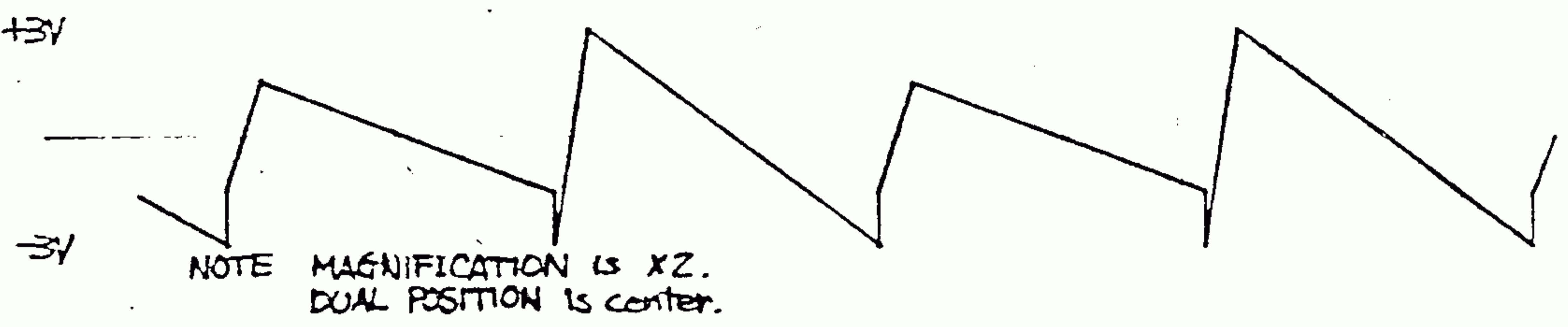
N82NB02P CP3



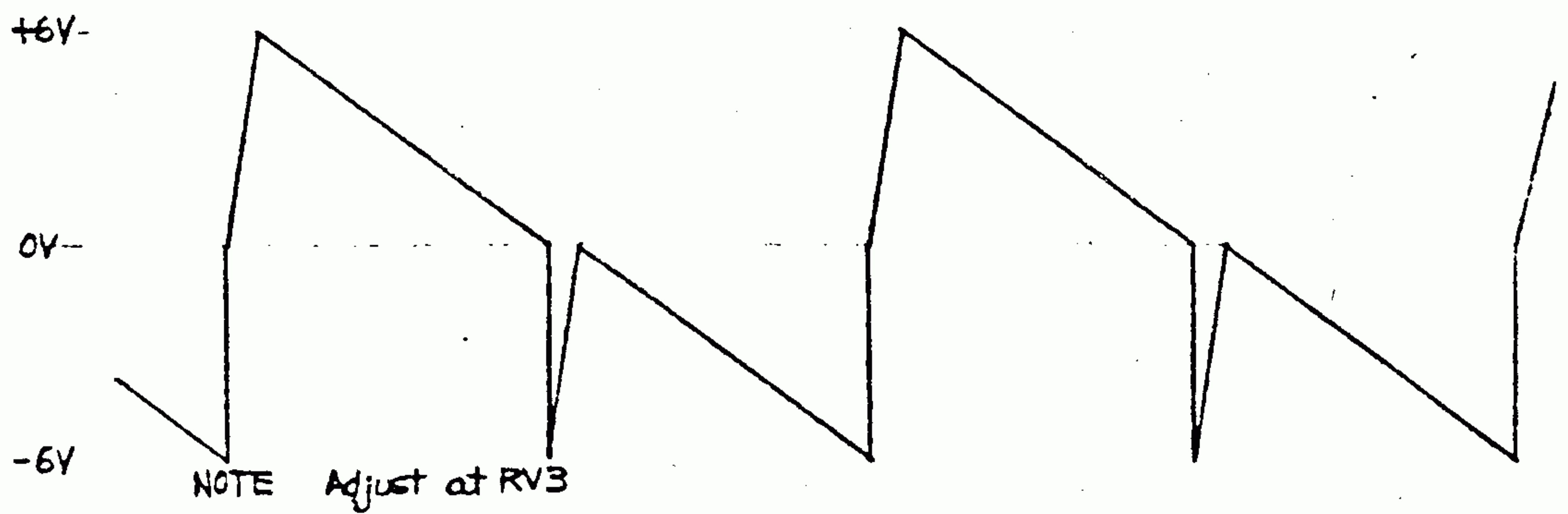
N82NLOIP CP5 (DUAL CONTROL)



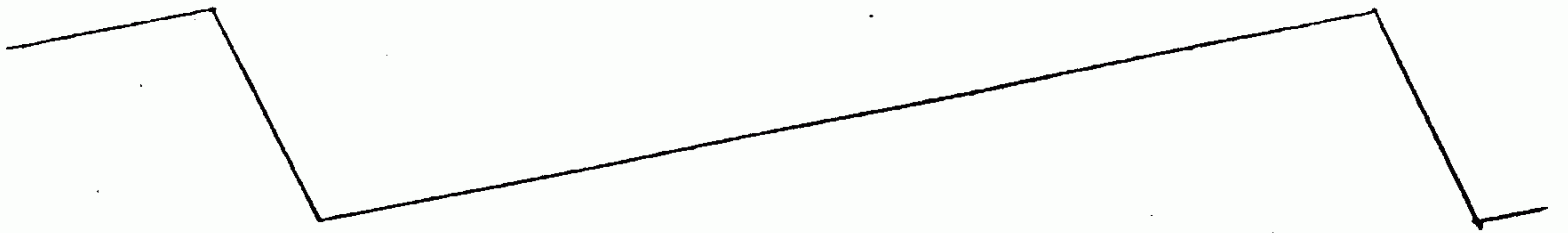
N82NLOIP CP6 (HOR. PROBE DUAL OUT)



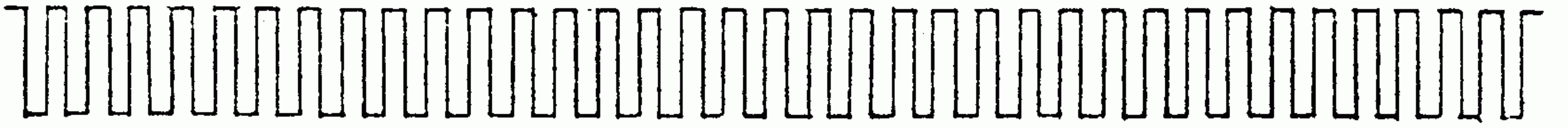
N82NLOIP CP7 (HOR. CRT DUAL OUT)



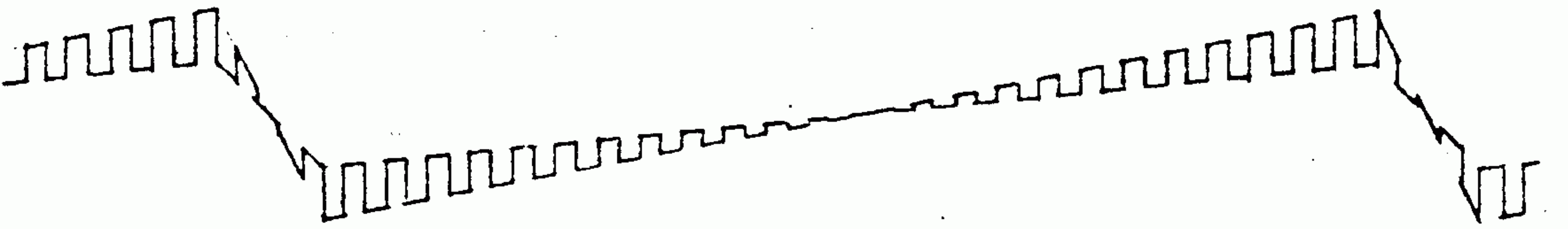
NBZNC02P CPI (OUT)



NBZNL01P CP5 (DUAL CONTROL)



NBZNM01P CPI (VER. DUAL OUT)



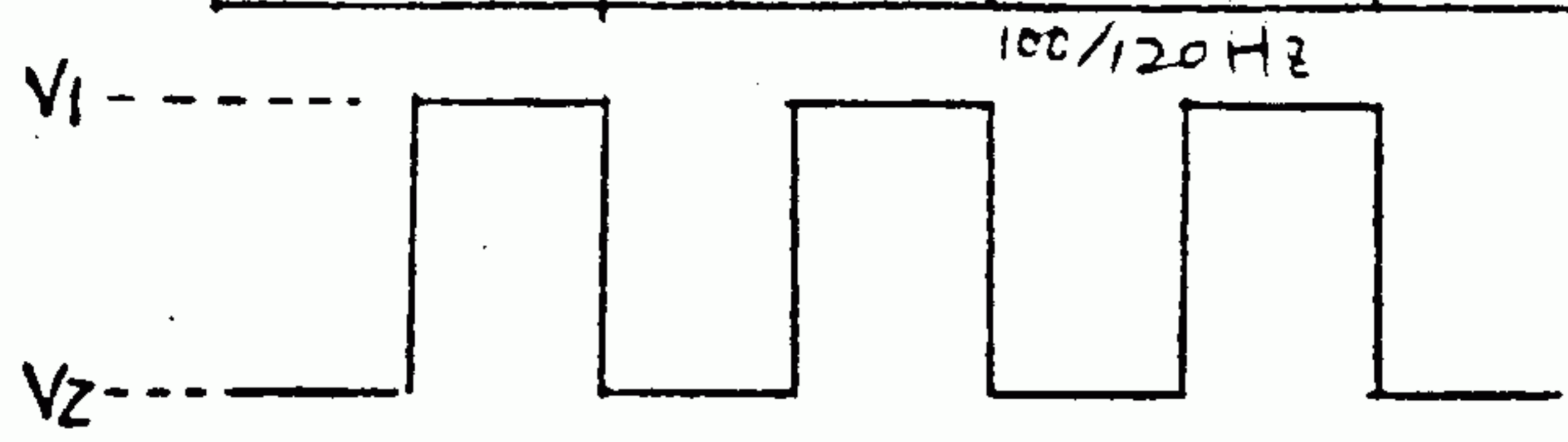
N82NLC1P

CP1 50/60Hz V1 = +13V V2 = -13V
 CP2 100/120Hz V1 = +4V V2 = 0V
 CP3 2000Hz V1 = +4V V2 = 0V

CP4

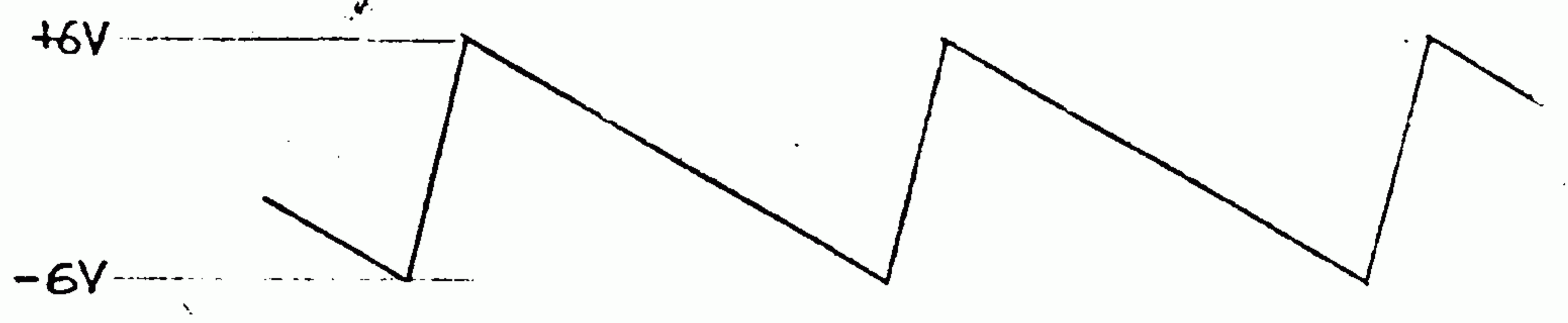
V1 = +13V V2 = 0V

	PHOTO	NORMAL	RAPID (Full)	RAPID (Reduced)
DUAL OFF	15/12.5Hz	50/60Hz	500Hz	1000Hz
DUAL	30/60Hz	25/30Hz	1000Hz	1000Hz



N82NB0Z

CP2 when DUAL OFF



CP2 when DUAL

