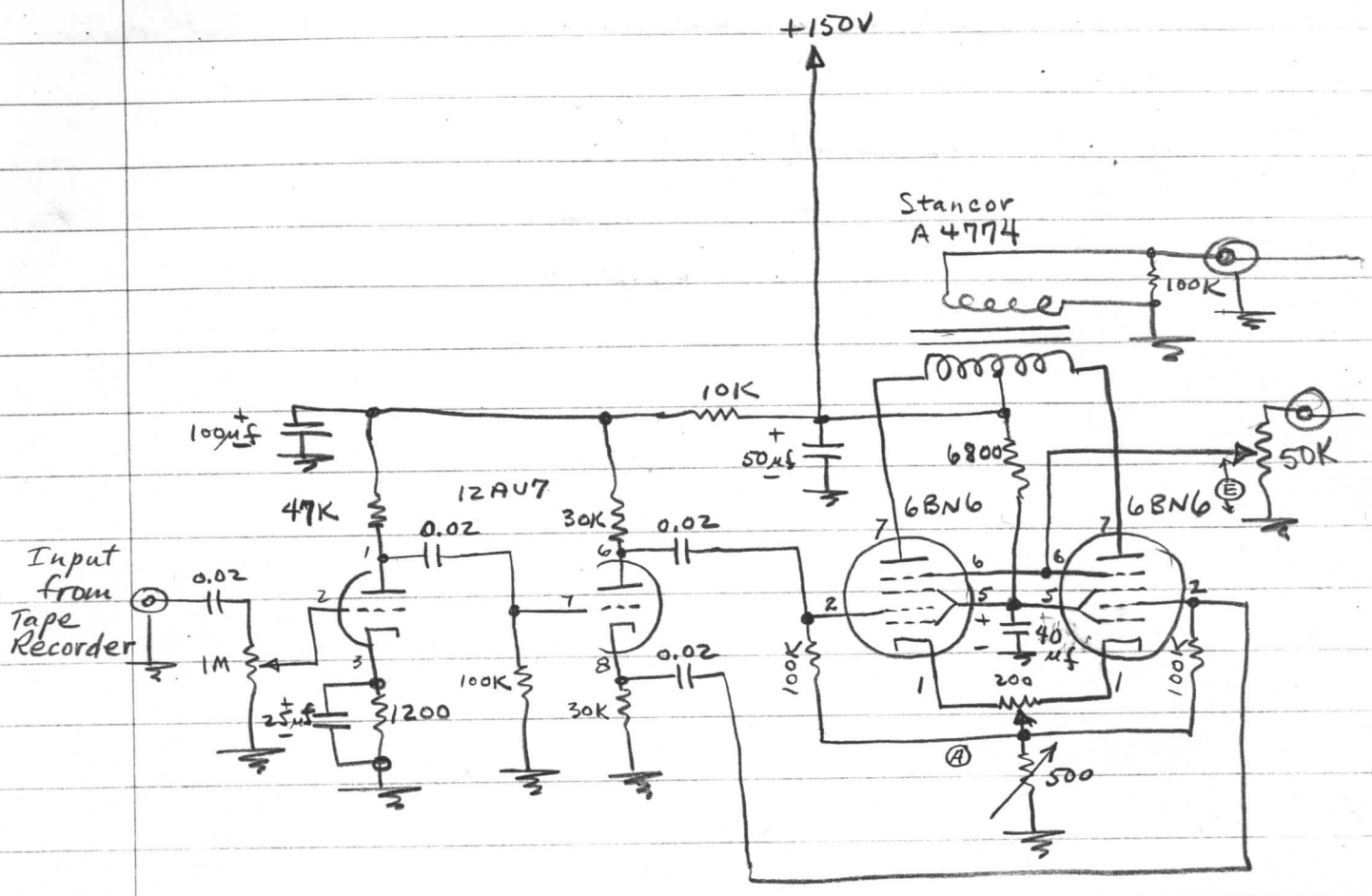
Jan 23, 1965

Started draft of letter to C.L. Strong Amateur Scientist section editor of Scientific American.

I should include schematic of lampdriver, a block diagram of overall system, Cuba photograph with Γ compensation, equipment photos. The last picture (1-17-65) was taken with Γ compensation but the drum motor was running very slow & it lost 10 line periods in the frame. It was quite cold in the basement when the picture was made but I expect the bearings, which were marginal, had deteriorated somewhat because of rust. I rebuilt both bearings. It is still too noisy and does not seem to have very good stability when checked against the strobe pattern. I have used 10 sheets of XXX film to date.

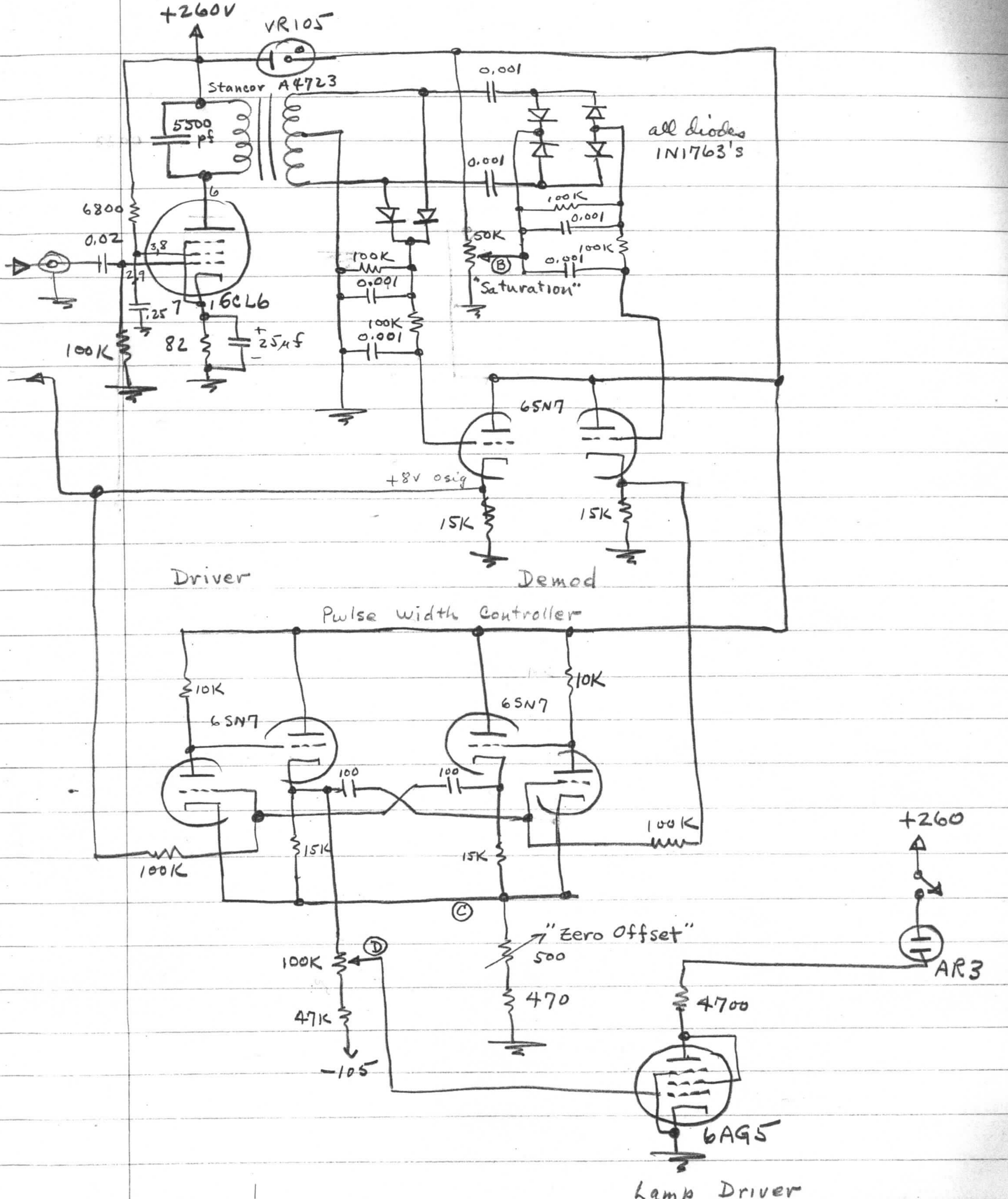


Preamp

Expander

This page built as separate chassis
See p 49.

1/25/65


+260V
VR105
Stancor A4723
5500 pf
6800
0.02
6CL6
.25
100K
82
25µf
0.001
all diodes 1N1763's
100K
0.001
50K
"Saturation"
6SN7
+8V osig
15K
15K
Driver
Demod
Pulse width Controller
10K
6SN7
6SN7
10K
100
100
100K
15K
15K
100K
+260
"Zero Offset"
500
470
100K
47K
-105
4700
AR3
6AG5
Lamp Driver

1/31/65 Readings for negative made 1/30/65.
Sync established using magnetic tape recorder head and magnet in rolling pin. Monitored average value of lamp (AR3) current with direct coupled Heathkit scope. I tried to maintain constant flanking level but I apparently did more harm than good.

Zero signal

(A) +0.7v (E) 8500 ohms

(B) +19 v

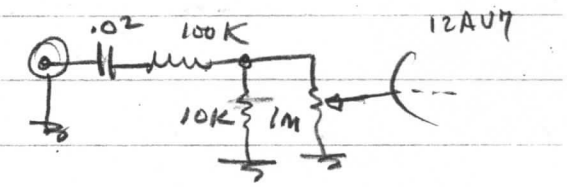
(C) +24v

(D) −7.5v

I lamp 0.25ma

Developed 15 mins in 1:31 HC110

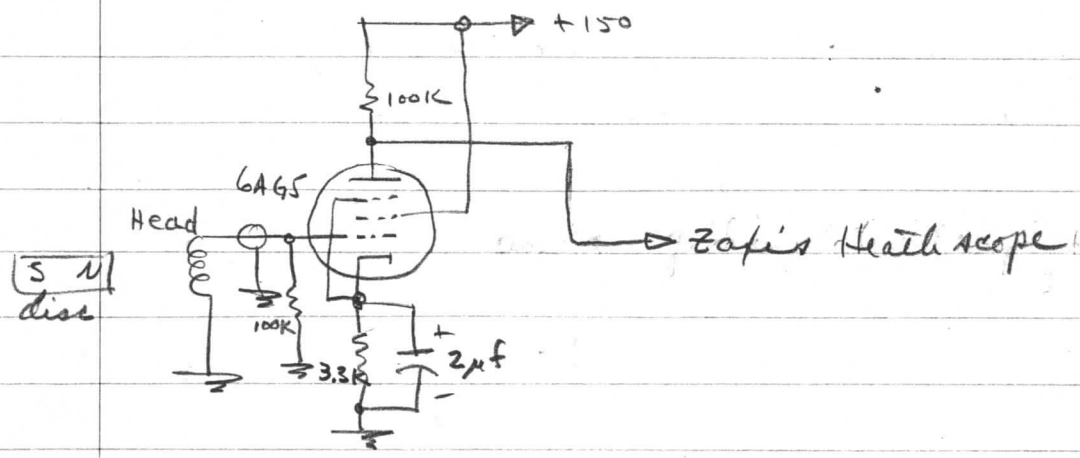
Included 10:1 divider at input.



Besides the variation in level apparently due to overenthusiastic gain riding, there is also video stretching.

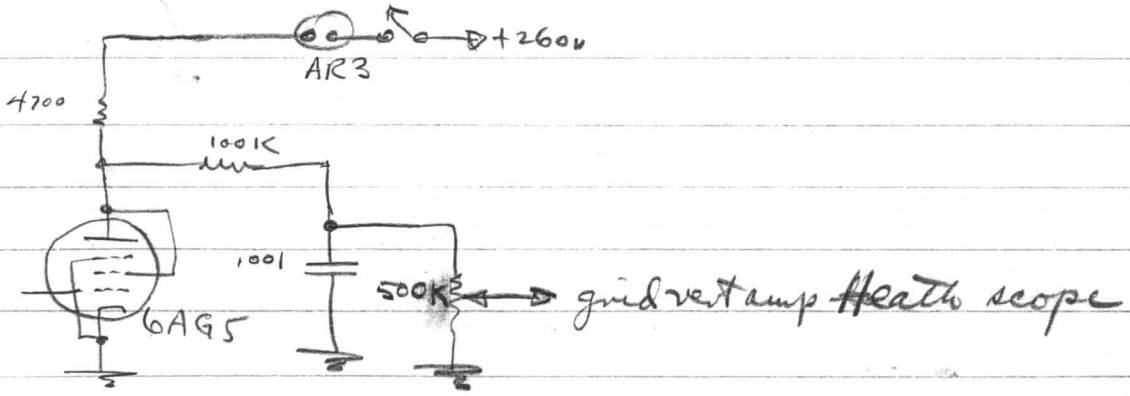
Used double sided Scotch tape to hold film — very satisfactory. Only marks are outside the picture area.

The sync signal circuit



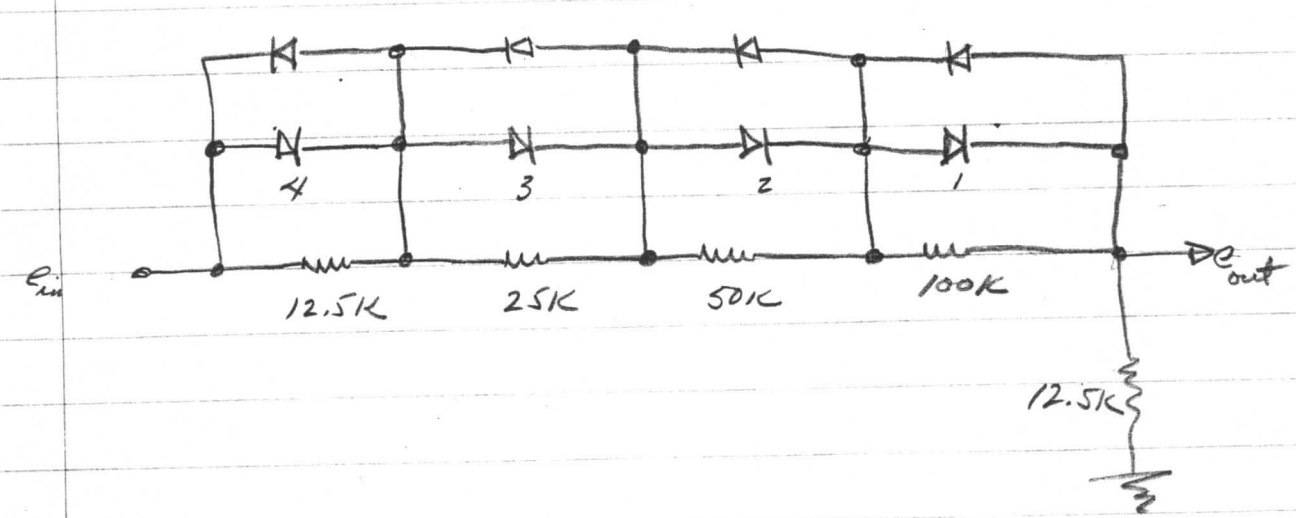
Lafayette
Head is F 928 Record-playback head for transistorized tape recorders. Magnet to head spacing about ½ mm. Output from head is about ½ volt peak. Erase head gives about twice as much but it was ruined when I tried to file the plaster potting smooth. I cut the wires in the bobbin.

Lamp current monitor:



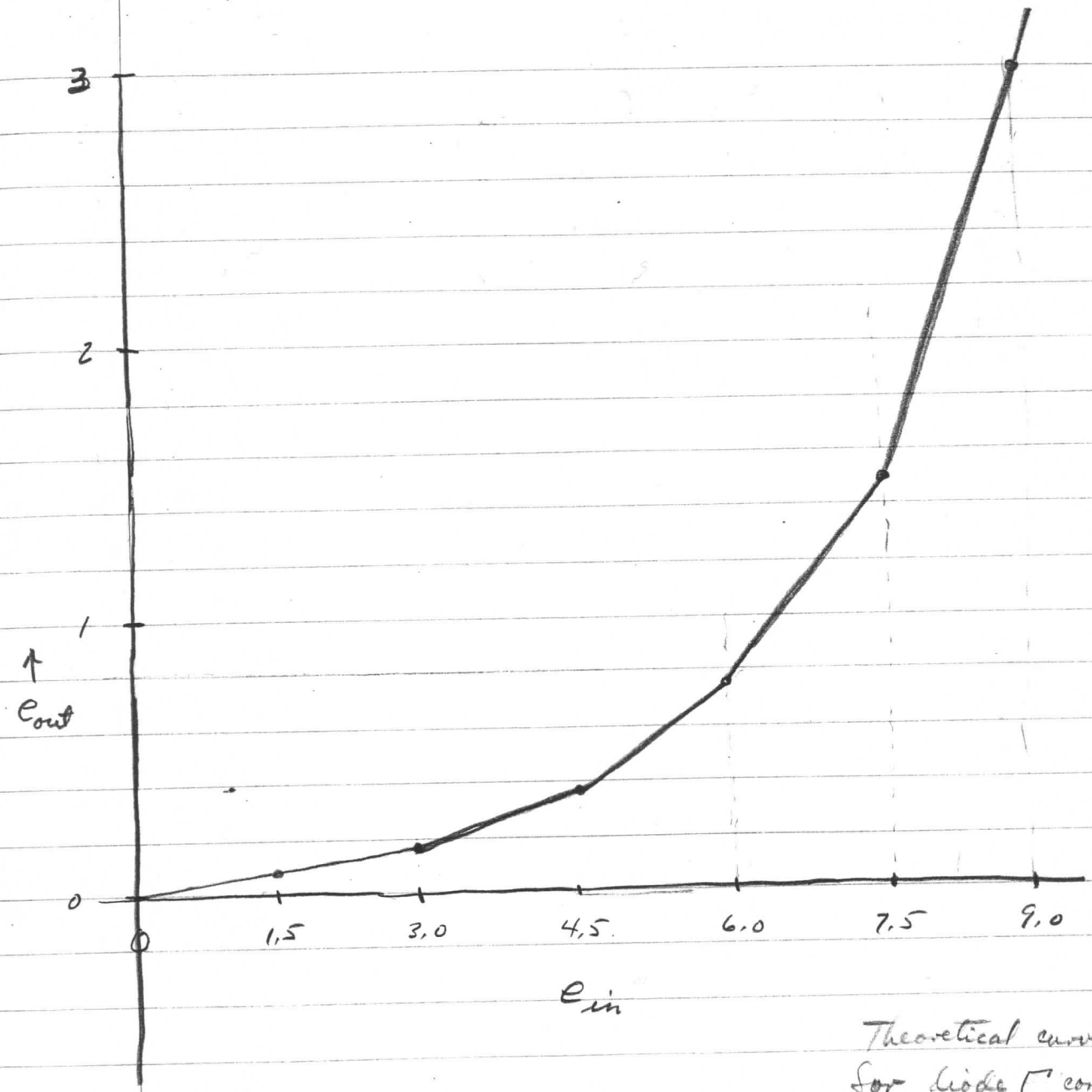
2/2/65 Since Γ correction based on envelope feedback is limited by the demodulator time constant, a diode approach may be better.
I have not seen it before, but the following might work:

at step:	9.0V	1.5V	1.5V	1.5V	1.5V	3.0V
just conducts:	7.5V	1.5V	1.5V	1.5V	1.5V	1.5V
not conducts:	6.0V	0.75V	1.5V	1.5V	1.5V	0.75V
just conducts:	4.5V	0.375V	0.75V	1.5V	1.5V	0.375V
not conducts:	3.0V	0.1875V	0.375V	0.75V	1.5V	0.1875V



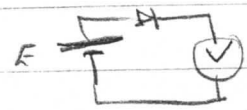
Assume 1.5V/diode before conduction

Relation of doubling per step would hold if $R_{source} + R_{load} \cong 12.5K$.

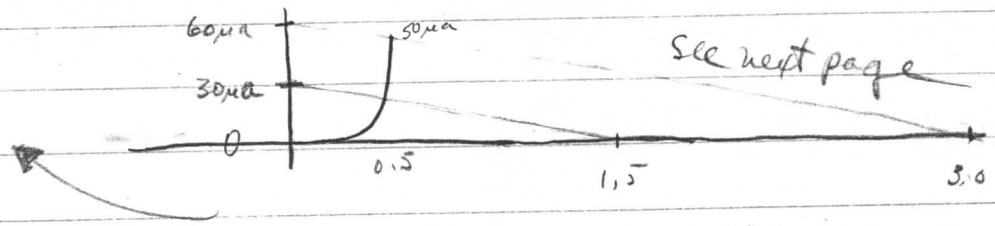


Theoretical curve
for diode Γ correction

2/3/65 Actual drop IN1763 0.5V



2.5V = 50K
reads 1.0V for E = 1.5
2.5V for E = 3.0

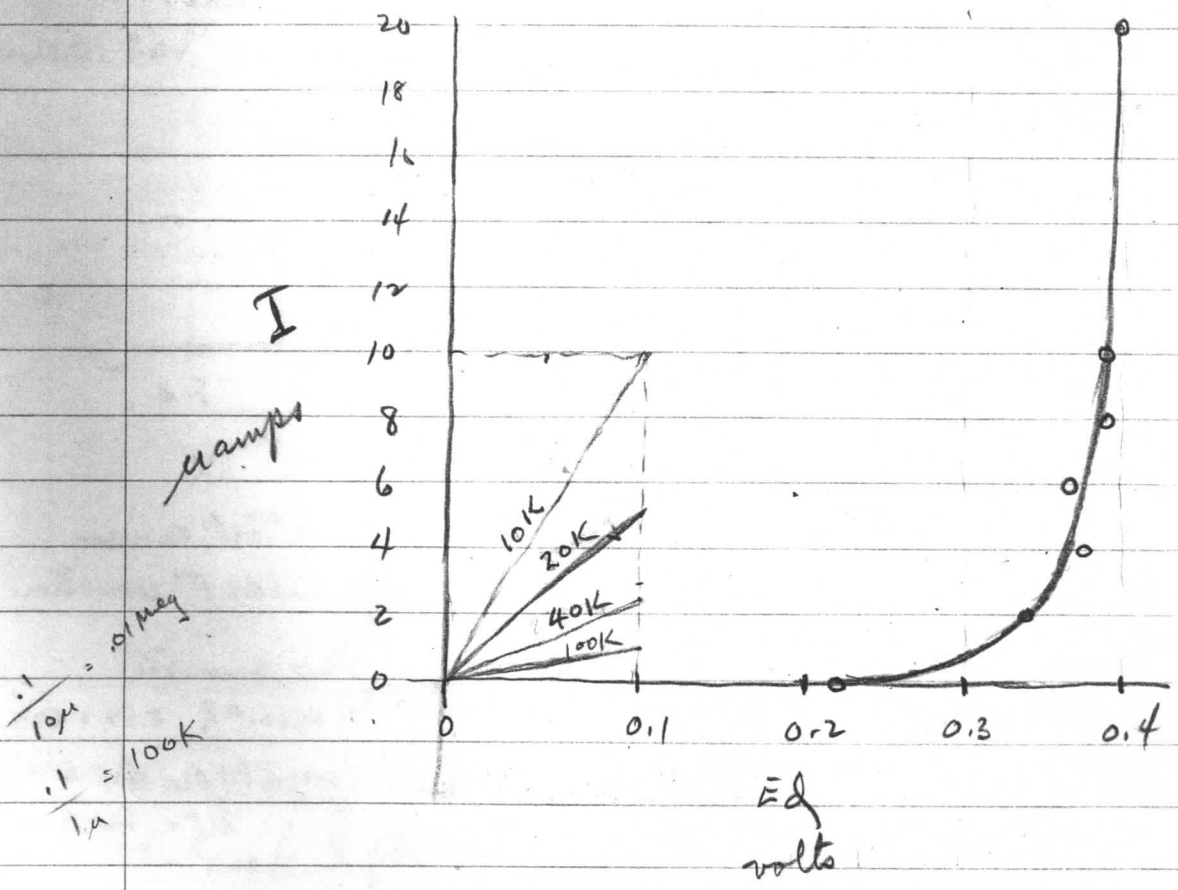


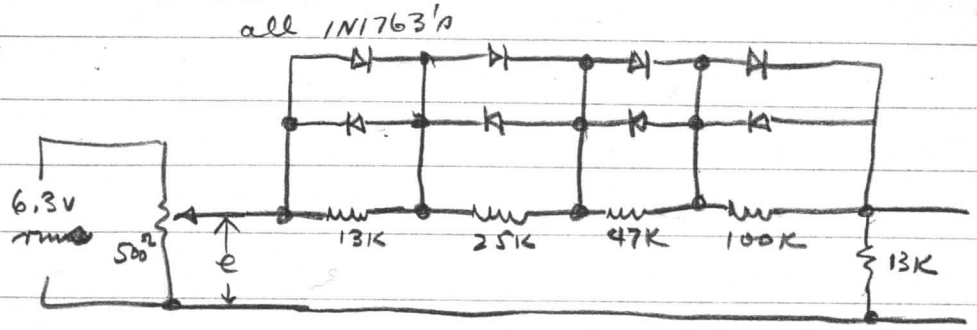
See next page

So calculations are 3 X in voltage

Simpson 260 | IN1763 one unit.

E	V	Scale	I	Ed
2.9	2.5	2.5	50μa	0.4
1.4	1.0	2.5	20μa	0.4
0.22	0	"	0	0.22
0.44	0.1	↓	2μa	0.34
0.57	0.2		4μa	0.37
0.66	0.3		6μa	0.36
0.78	0.4		8μa	0.38
0.88	0.5	↓	10μa	0.38





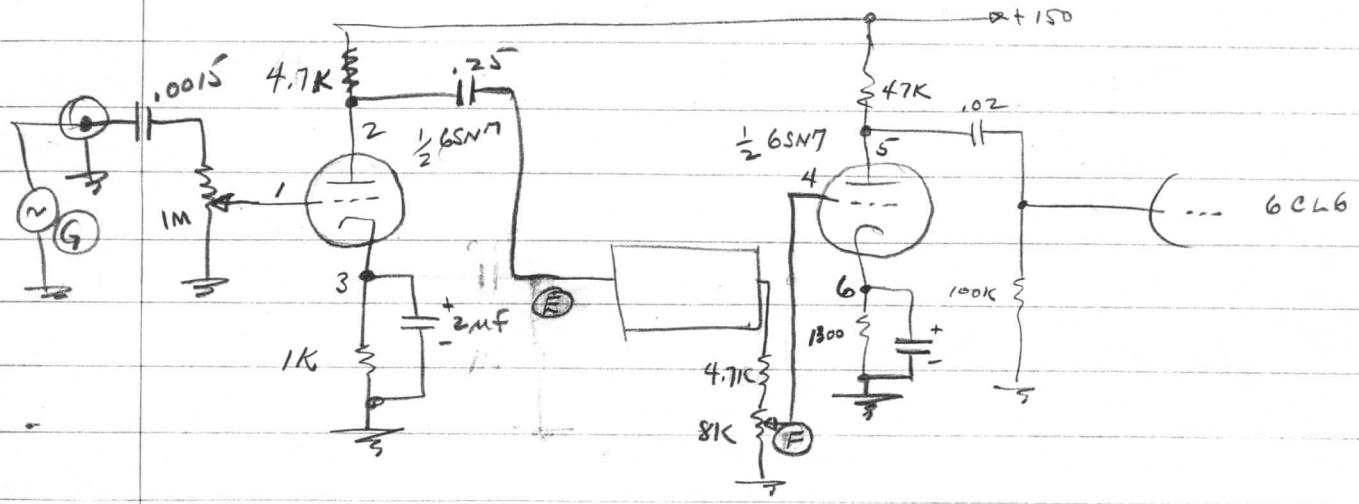
output looks good for e = 1.75 V rms or 2.5 V peak 5 V p-p.

Waveform looks ok with 2.5KC from oscillator

$\frac{1}{\omega C} = R \qquad C = \frac{1}{\omega R}$

$\frac{1}{900\pi \; 2\pi \; 1K} = 0.16\,\mu f$

$\frac{}{6000\,000}$

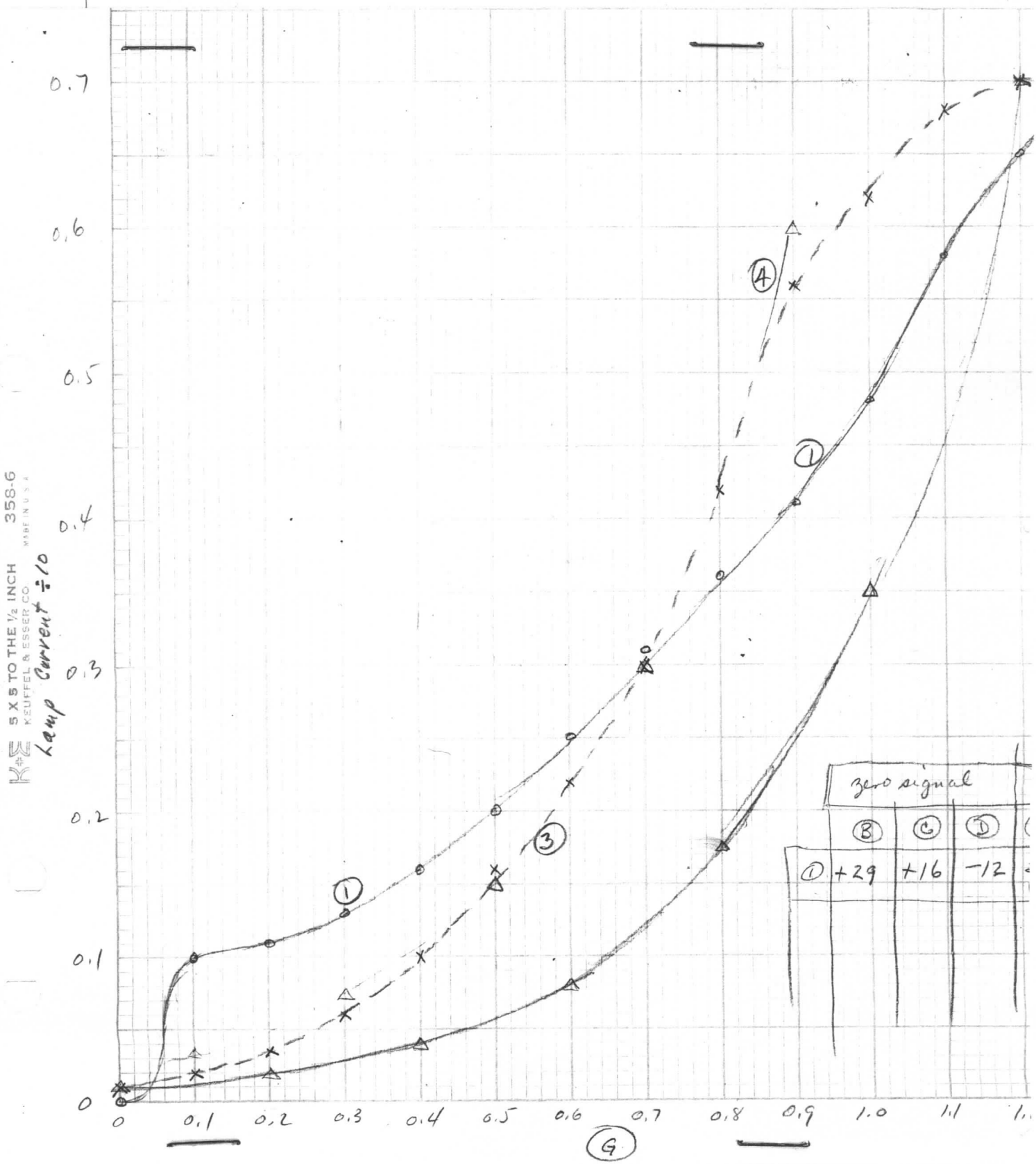


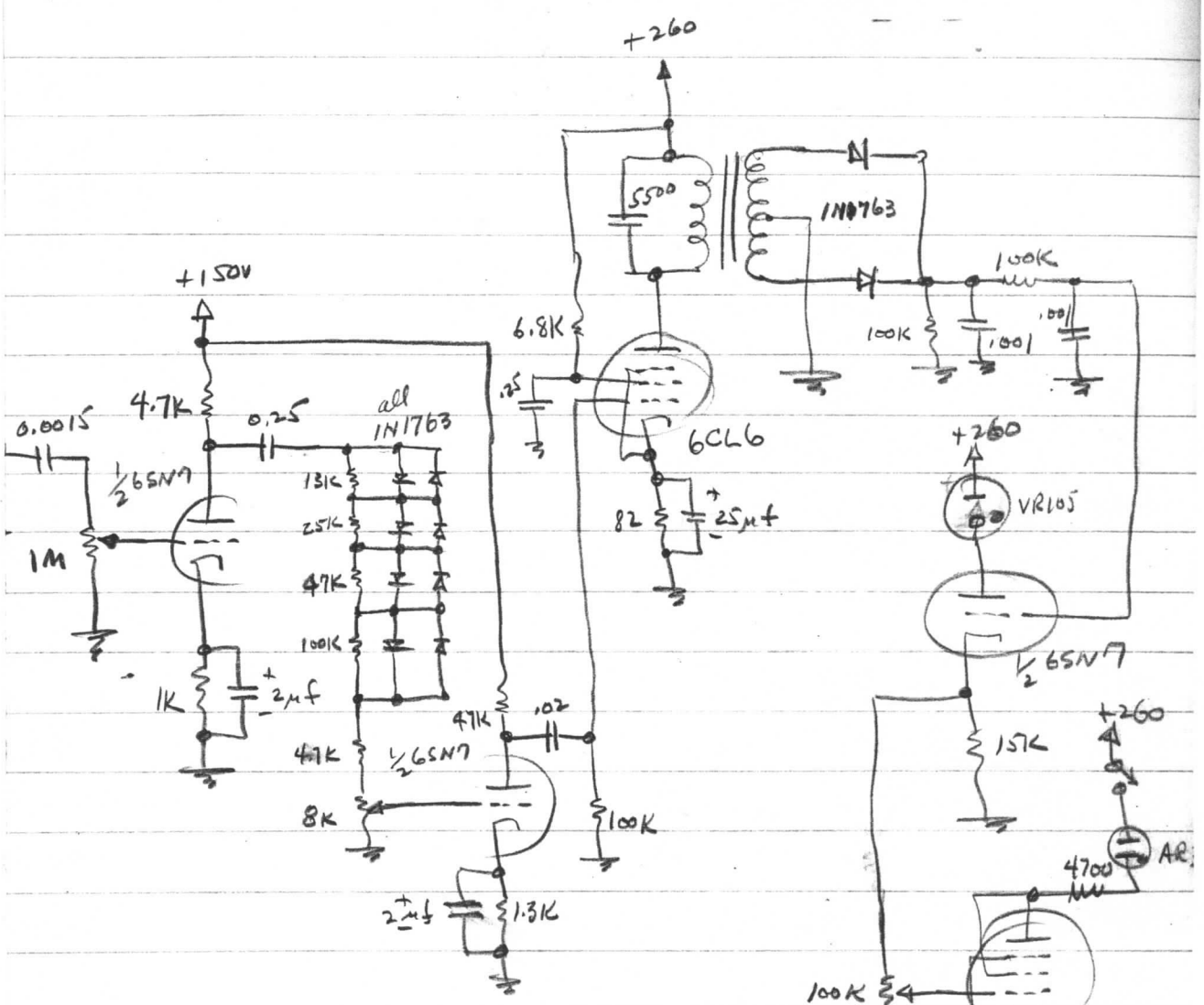
Curve ① taken - Conditions shown

② desired Δ

③ "bypassed multivibrator" points

④ desired Δ


0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1
G
Lamp Current ÷10
5 X 5 TO THE ½ INCH 358-6
KEUFFEL & ESSER CO. MADE IN U.S.A.
A
1
3
Zero signal
B C D
1 +29 +16 −12



Circuit Curve (3)

I_{dc} = 7ma

+270 – 85 55 vdc

185 vdc across lamp

2/3/65

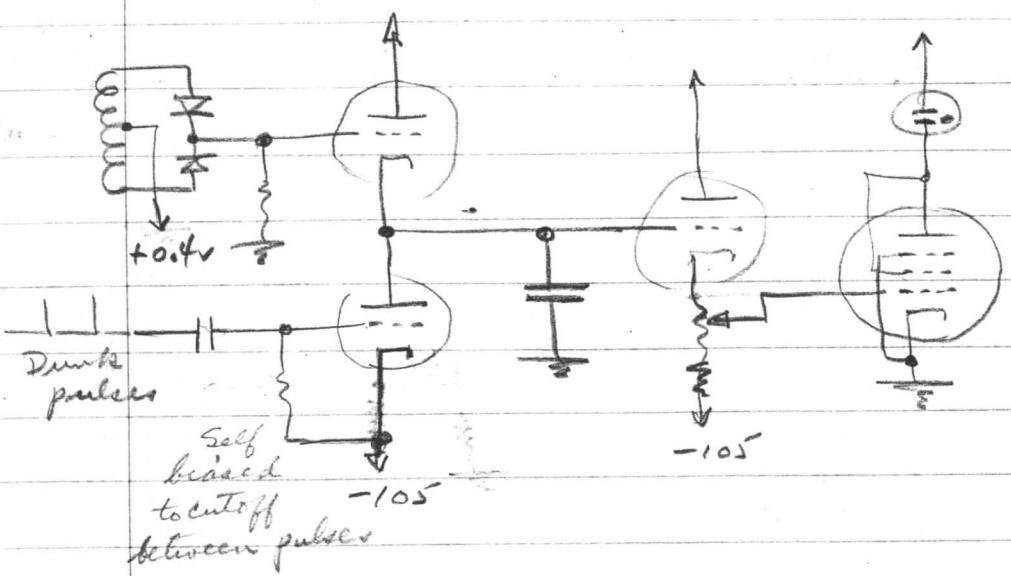
-at signal	
F	I
0.5V p-p	7ma

1.3 1.4

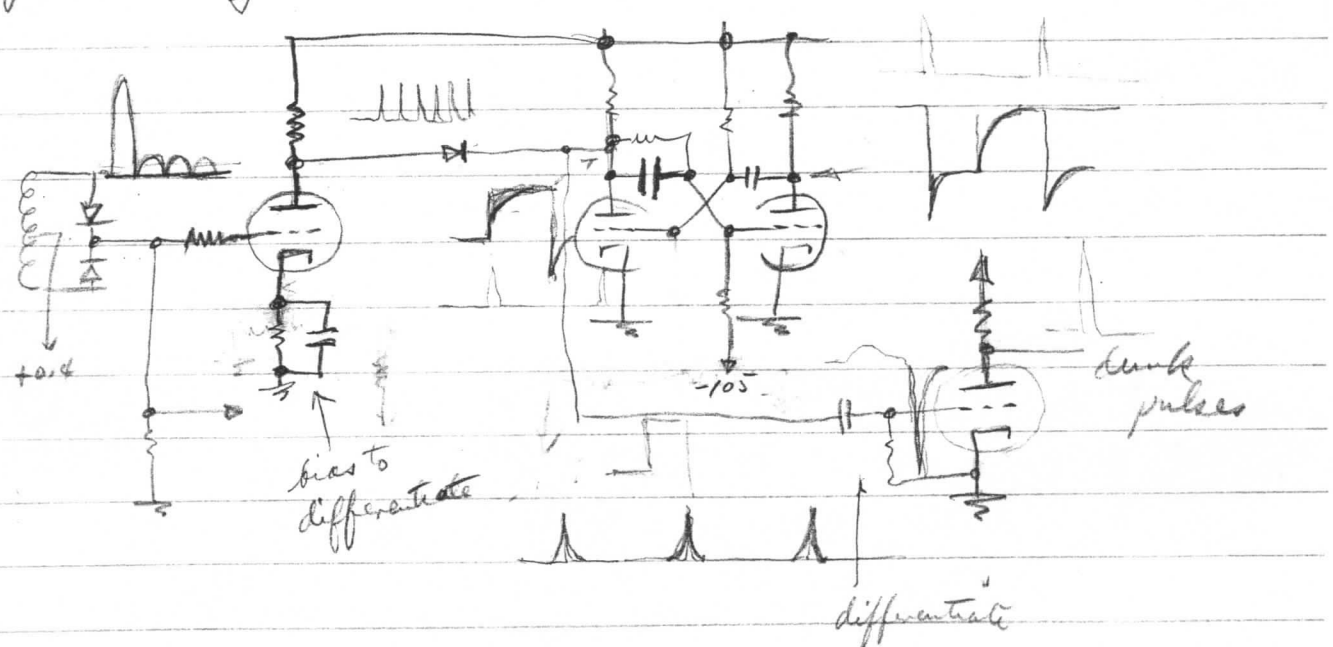
2/4/65 The far simpler circuit is apparently better. I am not sure that the light output will be linear with current now since I am not using pulse-width control. The original tests & linearity were made with an NE2 instead of the AR3.

Referring back to pages 6 & 7, the source impedance should be subtracted from the calculated load impedance for the proper theoretical operation. The 4.7K should be taken out of series with the 8K pot. This should boost the high current end of the curve slightly. Further boost at the high end might be obtained by an additional section of 13K, or by reducing load below 8K.

With an 800 line system at 4 lines/sec or 3200 lines/sec the 2400 cps carrier there is more than 1 line per cycle. Full wave rectification brings input sample rate to 4800 sps which is not overly generous at best - $\frac{3}{2}$ × Nyquist. A boxcar detector appears to be very desirable [both for response speed and symmetry but for high duty cycle].



The source of dumb pulses is the major problem.
One possibility might be ¼-cycle-delayed zero-crossing pulses using a one shot MV.



May need phase inverter to trigger with neg pulses