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D R A F T

TESTS OF THE MODIFIED THYRATRON TRIGGER SYSTEM WITH THE SPARK GAP

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1. GENERAL

The main aim of this test is to try a thyratron trigger for the master gap, using the H.V. power supply of the master gap. Another feature of the scheme is the application of the coil L (see fig. 1) for the transmission of the pulse to the trigger pin. In such a way one can get a somewhat higher amplitude of the pulse than the thyratron plate voltage.

2. SCHEME DESCRIPTION

The essential parts of the scheme are shown on fig. 1. This is a usual delay-line pulser with a characteristic impedance of 5 Ω and a max. voltage of 80 kV on the line. The thyratron type CX1159 is used as trigger for the spark gap (see fig. 2). The divider which gives half of the voltage to the middle electrode is also used to feed the thyratron.

For the divider, the thyratron scheme is practically a capacitive load and therefore the upper cells of the divider are also loaded by capacitors in order to compensate the thyratron load. Since the thyratron is triggered, the capacitor C_3 is being discharged through the thyratron and the pulse arises on the 100 Ω resistor. Due to this pulse the transient process in the chain L_1, C_4, C_5 starts, forming the pulse on the trigger pin (see fig. 1). One, of course, loses a little bit the rise time of the pulse applying such a chain (L_1 C_5). The compromise is to gain in the amplitude of the pulse , not losing too much of the rise time.

3. RESULTS

3.1 The parameters of the pulse on the trigger pin :

a) rise time ≈ 40 nsec
b) amplitude ≈ 35 kV (80 kV on the line, 30 kV charging voltage for thyratron)

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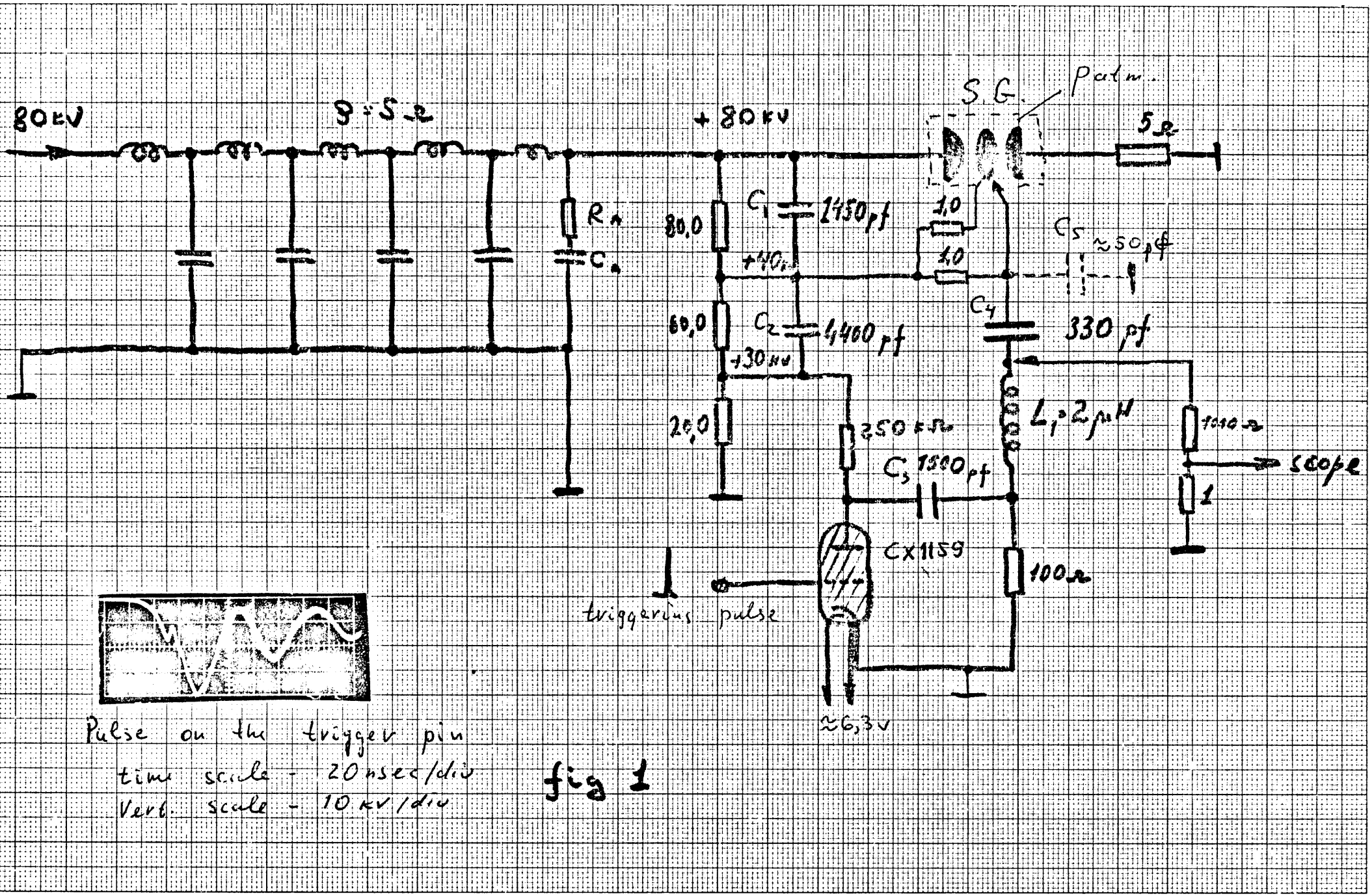
3.2 Jitter of the spark-gap (including thyratron jitter)

$j = \pm 2$ nsec ($p = 3{,}6$ atm., $U_i = 80$ kV)

$j = \pm 4$ nsec ($p = 5{,}2$ atm., $U_i = 80$ kV)

(see also fig. 3).

3.3 Correlation between the line voltage and the pressure in the spark-gap and corresponding margins of the operation (see fig. 4).



Pulse on the trigger pin
time scale - 20 nsec/div
Vert. scale - 10 kV/div

fig 1

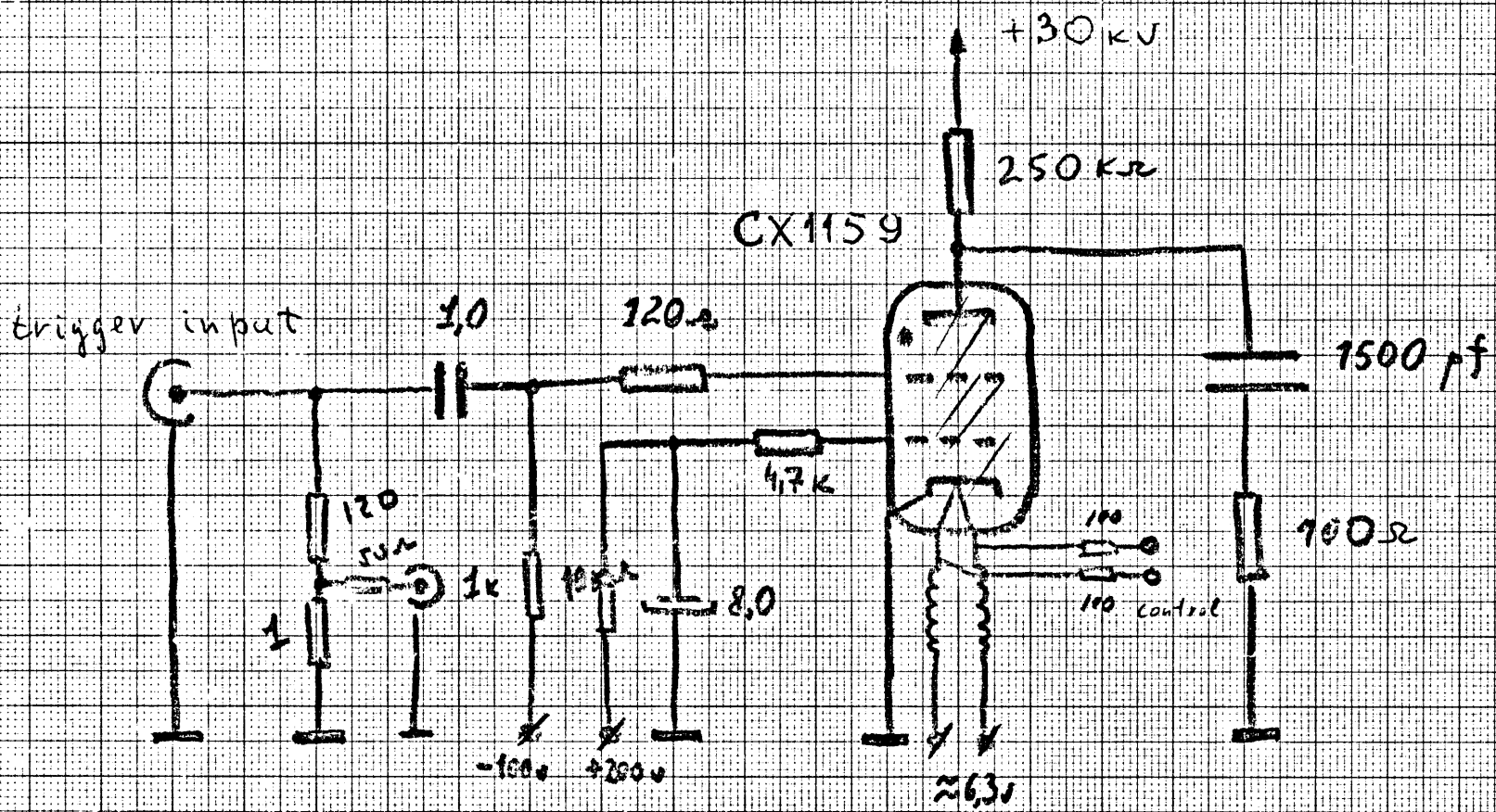

+30 KV
250 KΩ
CX1159
trigger input
1,0
120Ω
1500 pf
4,7 K
120
1 K
8,0
100
100 control
100Ω
-100 V
+200 V
≈6,3 V

fig 2

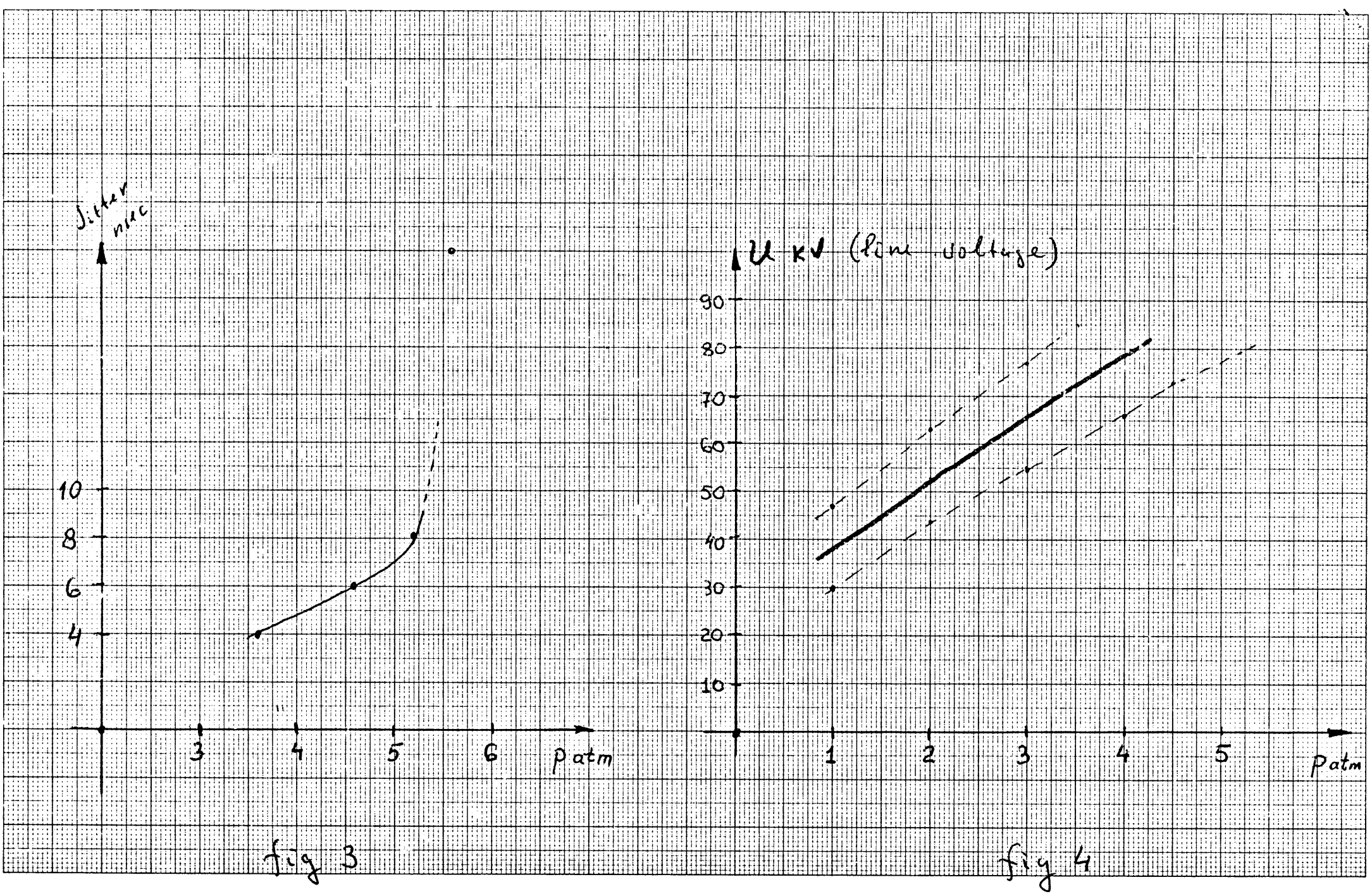

Jitter nsec
10
8
6
4
3
4
5
6
patm
U kV (line voltage)
90
80
70
60
50
40
30
20
10
1
2
3
4
5
patm

fig 3

fig 4