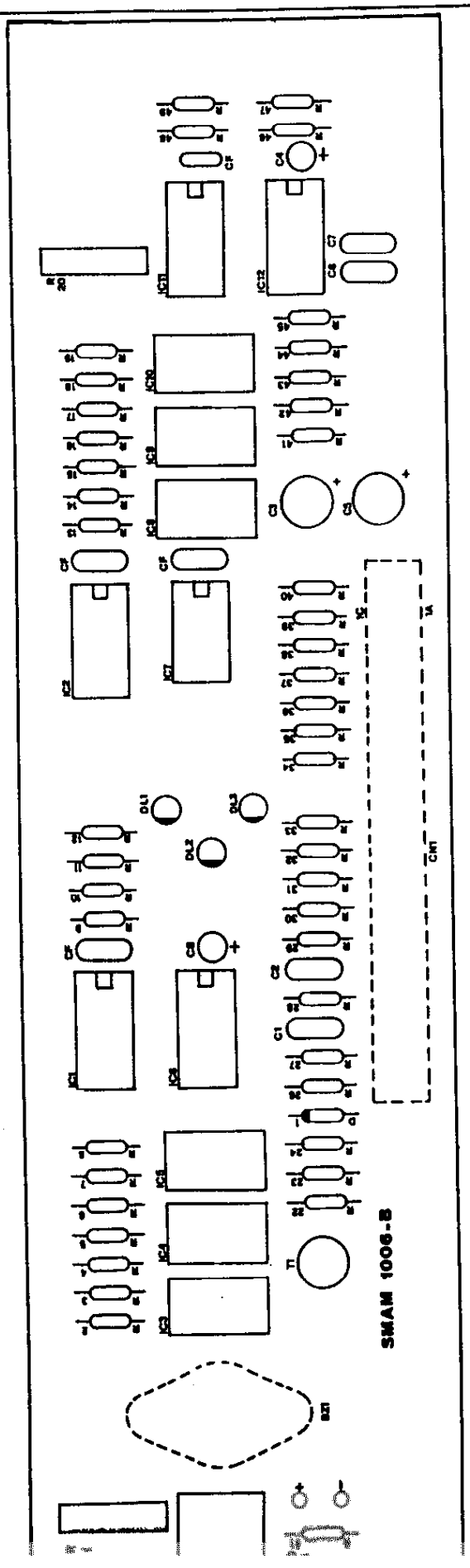
TOPOGRAFICO C.S. 1006 B

Nº 025110 T2 - 8604



T O P 25

I N D E X

CHARACTERISTICS

- POWER TO THE TUBE :

  Continuous adjustment from 40 to 110 kV with digital indication on three figures of preset value.

- CURRENT IN THE TUBE :

  25 mA on X-ray exposure
  3 mA on fluoroscopy exposure

- mAs DISPLAY :

  Continuous adjustment from 1 to 125 mAs with digital indication on three figures of preset value.

- mA FLUOROSCOPY DISPLAY :

  Continuous adjustment from 0,3 to 3 mA with digital indication on three figures of preset value.

- CONNECTION :

  By a two-positions key-switch with extractable key when off.

- POWER SUPPLY :

  220 V $\pm$ 10% single-phase 50 Hz

- LINE RESISTANCE :

  0,6 Ω max

- LINE FUSES :

10A delayed

- TOLLERANCES :

X-ray power ± 5%

X-ray current ± 20 %

mAs ± 1 mAs or ± 5%

BLOCK

- CAPACITY :

110 kVp with 25 mA

- RECTIFICATION :

Double half-way with built-in Silicon rectifiers.

- TUBE :

Anode angle 15°

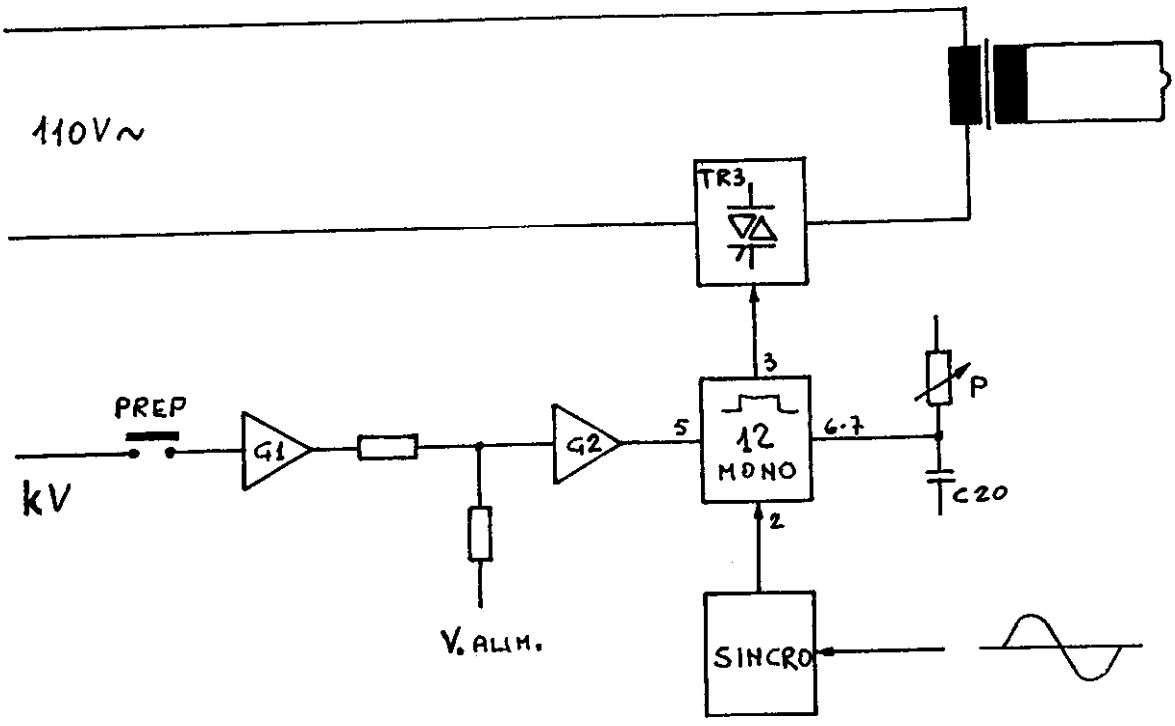
Focus 1,5 X 1,5 mm.

- EQUIVALENT FILTRATION :

2 mm.Al/70 kV

1) - FILAMENT IGNITION CIRCUIT

The purpose of this circuit is to supply power for filament heating, uniform as much as possible and independent on the power supply variations and preset kV value.



BLOCK DIAGRAM

Looking at the blocks diagram, support of the system is oneshot -12- which synchronized with the mains frequency, generates control to triac TR3 according to the adjustment of trimmer P, which adjusts the triac conduction angle.

Amplifier G2 changes the conduction angle proportionally to the power supply in order to keep uniform power to the filament independent on the network fluctuations.

Amplifier G1 compensates emission of high voltage value to the variac.

The circuit power supply is 110 kV and is taken from variac V1.

TRUE CIRCUIT (diagram n°025110001)

Triac TR3 (15A) is controlled by a pulse at the gate coming from T1, which allows to isolate electrically that part of power connected to the supply mains, from the low-voltage control circuit.

The primary of the transformer T1 is controlled by transistor TR4, the basic control of which is supplied by oneshot 12 (15C).

"SINCRO" circuit is formed by the two amplifiers IC1 (13D) which supply, through IC3 output 4, a trigger pulse to IC12 pin 2 (syncro Ø) synchronized with the mains voltage.

Circuit IC5-R26-IC4-R108 (14D) has the function to unload completely capacitor C20 in order to avoid possible false controls pulses and to obtain uniform oneshotings.

Amplifier IC8 (14C) serves to compensate power supply fluctuations whereas the other one IC8 (13C) compensates variations of emissions due to kV.

Oneshoting time is given by C20 and :

stand-by (PREIGNITION) : R123 (trimmer) and R106

preparation and X-ray : R124 (trimmer) and R107

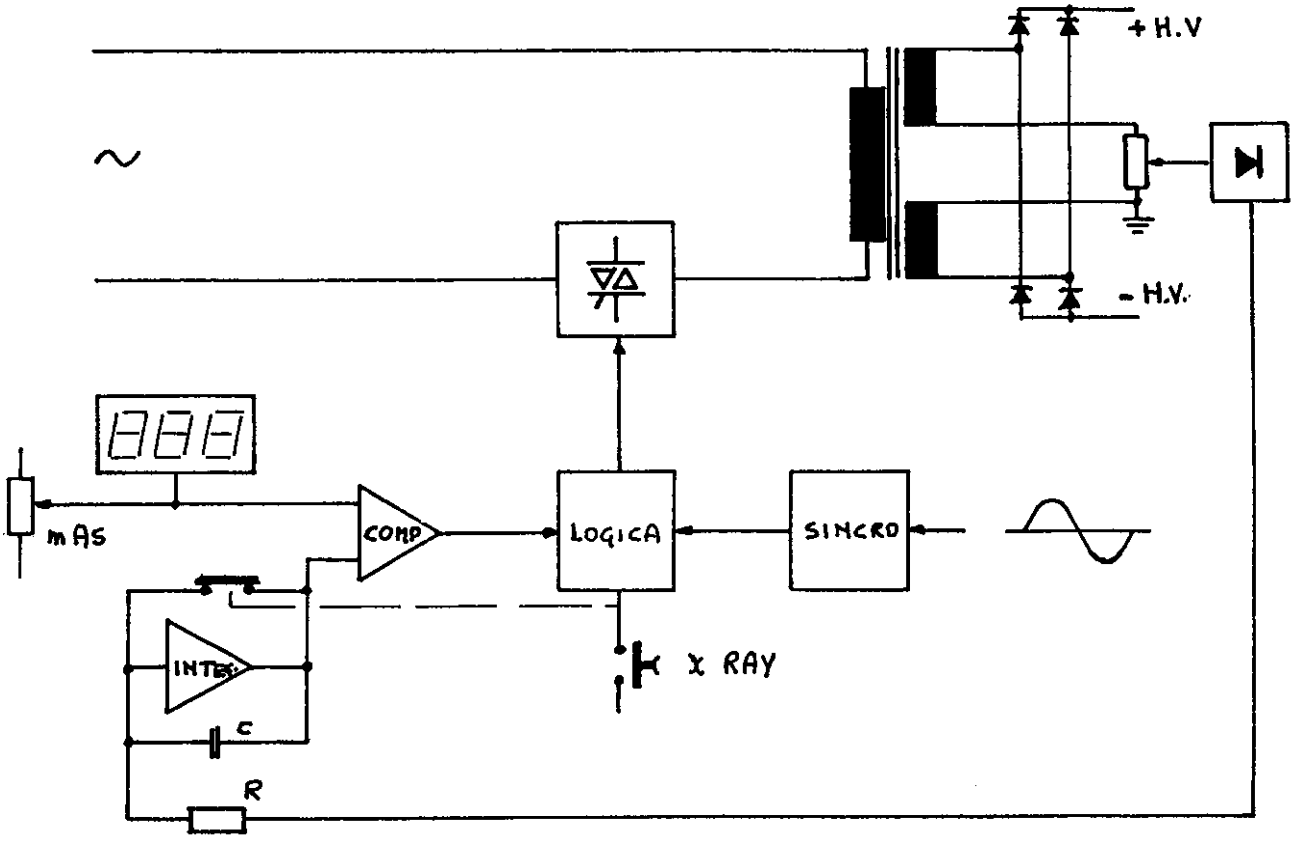
FLUOROSCOPY : R126 (trimmer) and R128,R129 and potentiometer placed in front of the control desk (16B)

Commutation X-ray/fluoroscopy and vice versa is given by flip-flop IC9 (12B) which, when igniting the apparatus, through circuit R109-C40-D49, is set on X-ray operation.

Button P1 (11B) allows to change from X-ray to fluoroscopy and vice versa everytime it is pushed.

2) - mA·INTEGRATOR

The purpose of this circuit is to supply the exposure starting signal and to stop emission when the X-ray preset value is reached.



BLOCK DIAGRAM

On one comparator input there is a voltage proportional to the preset mAs and the integrator is kept at 0V by the contact of one relay.

By giving the contact, the control is generated and, synchronized with the mains voltage, triac TR8 closes up, feeding thus the generator H.T.

On the secondary of the generator, it circulates a current which get rectified and sent to the integrator, which integrates such current into the capacitor C. Once this value reaches the preset one, the comparator changes the output and determine the end of exposure.

TRUE CIRCUIT (diagram n°025110002)

On output of IC11 (23B) there is a voltage proportional to the preset X-ray mAs; integrator IC11 (23B) is kept at 0V by the contact RL1 closed. Output of integrator IC8 (24B) is negative.

Output of IC2 (25B) is at "1"; output of IC3 (25B) is "0" and triac is not controlled.

By pushing the preparation button, a 12V voltage comes to terminal 15 (21C) and excites relay RL1.

Output 4 of IC3 goes to "0" and, with about 1 second delay, output 1 of IC8 get high, switching on the LED READY (26C) and setting for the second release.

By second release, 12V come to terminal 17 (21C) and output.3 of IC13 goes to "0" and, synchronized with the passage through "0" of the supply voltage at terminal 1 (21D), output 10 of IC2 (25B) goes to "0", IC3 (10) goes to "1" and IC5 (25B) oscillations arrive at transistors TR7 and TR9, which control triac TR8 through transformer T2, which provides the electrical insulation between the two circuits.

In this way feeding of the transformer H.T. (26A) primary circuit is supplied, obtaining the X-ray emission.

The current which circulates in the tube is taken from centre of the high voltage secondary and is at terminals 11 and 12 (21B); it get rectified by diodes D29-30 and is stored in R90 where there is a voltage proportional to the same current.

The current mirror is integrated by C34 through R119 (trimmer) and R44. Output 8 of IC11 (23B) assumes a voltage value linearly decreasing in time and compared (through R41) to the value of preset mAs.

When it reaches the fixed value, output 7 of IC8 (24B) becomes positive, determining the end of exposure.

The positive pulse at output 2 of IC5 (24A) serves to assure a clear commutation of the integrator.

By releasing the control button, release of relay RL1 is obtained, the contact of which unloads C34 (23B) getting the circuit ready for a subsequent exposure.

3) - kV DISPLAY AND SAFETY

The voltage supplied by the cursor of the variac is also on the primary of the transformer T2 (03C), whose secondary is connected to terminals 8 and 9 (31B), voltage of which is rectified and filtrated.

From cursor R117 (trimmer) it arrives at card 1006B (through the connector) where converter A/D IC12 and driver IC11 show on display the compensated value in kVp.

The same voltage, through TR6 connected to "emitter follower", is used for "max kV safety". IC11 (35C) adjusted with R121.

The intervention of one of these safeties does not allow exposure through the signal $\overline{\text{INIB}}$ and switches on the LED DL3 (36C).

4) - mAs DISPLAY ACOUSTIC SIGNAL

The voltage proportional to the X-ray preset mAs, through R120 (trimmer) and R43 (42B) arrives to converter A/D IC6, which converts it on digital and shows it on three displays through IC1.

Thermic safety contact is connected to terminals 4 and 14 (42D) and allows an intermittent tone signal of the ringer, when said contact closes up.

The same ringer sends a continuous tone signal when current circulates in the tube, through IC1 (43C), which is an indicator whose output becomes positive lighting up also DL2 (44C).

5) - FLUOROSCOPY

To prepare the apparatus for the fluoroscopy operation, it is sufficient to push button P1 (11B), whose effect is to commutate outputs Q and $\overline{Q}$ of flip-flop 9 (12B). Output $\overline{Q}$ becomes "1" and output Q becomes "0".

By pushing again the button, a new commutation is obtained and thus everytime it is pushed.

During fluoroscopy operation the light L1 (43B) of the button switches on; preset mAs disappear and point of mAs 2° display switches on. The displays follow 00.0 and will indicate the current circulating in the tube during emission.

Fluoroscopy control is obtained by the same X-ray control button, except for the mAs integrator IC11 (23B) which is kept at 0V as relay RL1 is not excited.

kV control and display during fluoroscopy operation is carried out as during X-ray operation, except that the compensation of the drops of generator H.T. (32B) is not connected.

mA READING

The current mirror which circulates in the tube is across R90 (22B) and therefore in 42C.

Network R118,C7,R42,C26 filtrates the out coming voltage and adjusts it in impedance; IC10 (42B) carry this voltage to converter A/D IC6 (44B) which shows it on the three displays.

mA ADJUSTMENT

Adjustment of current during fluoroscopy operation takes advantage of the existing components for X-ray operation, with the difference that constant R is commutated and R129,R128 and R126 (14B) are used.

The control potentiometer (16B) at disposal of the operator, is set in parallel to R128 and adjusted to obtain the variation from 0?3 to 3 mA approx.

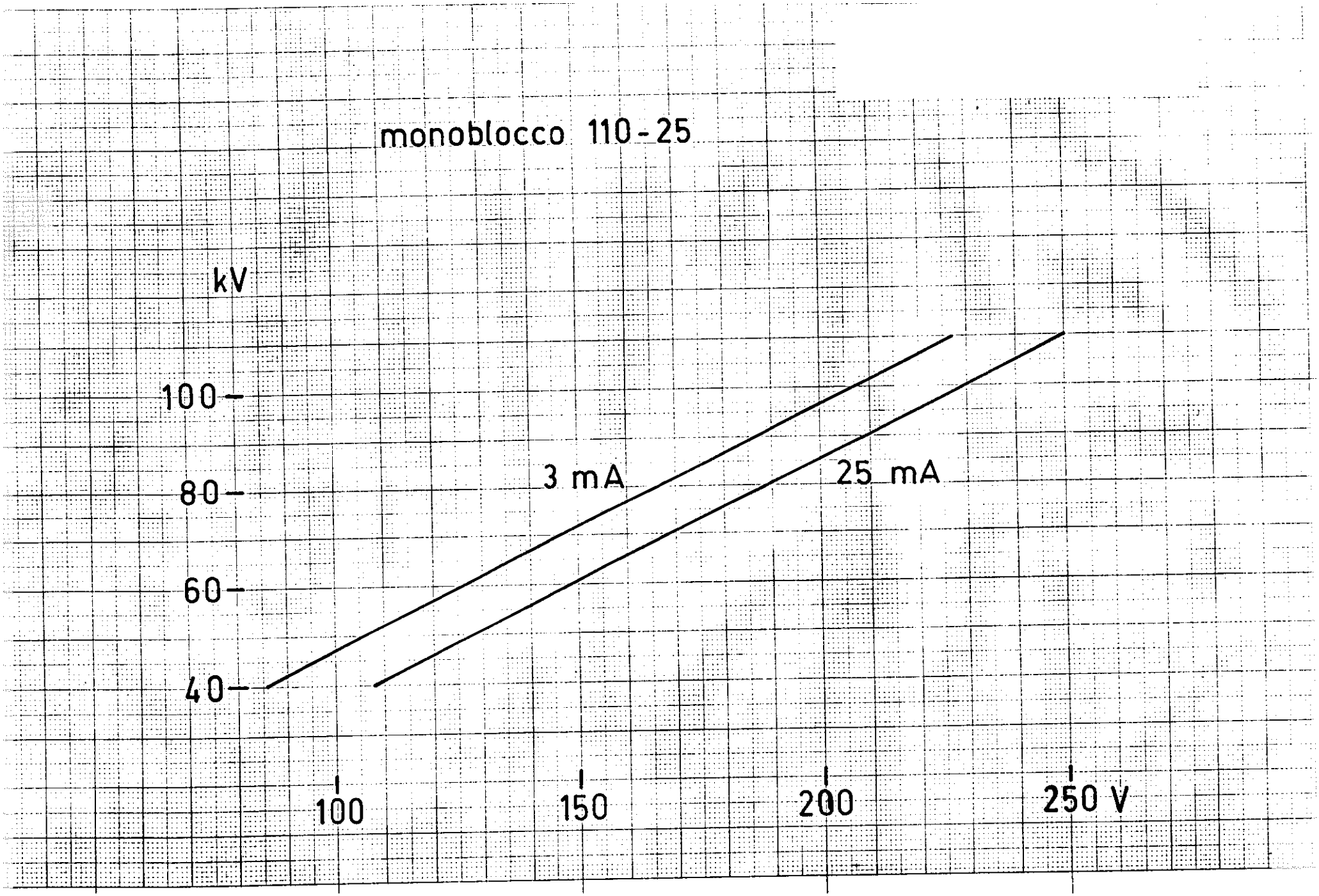
6) - TRIMMERS FUNCTION

C.S. 1006 A

R117 (32B)	generator curve adjustment
R118 (42C)	mA display adjustment
R119 (22B)	mAs adjustment
R120 (42B)	max. mAs display adjustment
R121 (33C)	max. kW adjustment
R122 (33D)	max. kVp adjustment
R123 (14B)	preignition adjustment
R124 (14C)	X-ray mA adjustment
R125 (24B)	mAs offset adjustment
R126 (14C)	fluoroscopy max. mA adjustment
R127 (22B)	min. mAs display adjustment

C.S. 1006 B

R 1 (44B)	mAs converter offset adjustment
R20 (34B)	kV converter offset adjustment


monoblocco 110-25
kV
100
80
60
40
3 mA
25 mA
100
150
200
250 V

INTERCONNESSIONI

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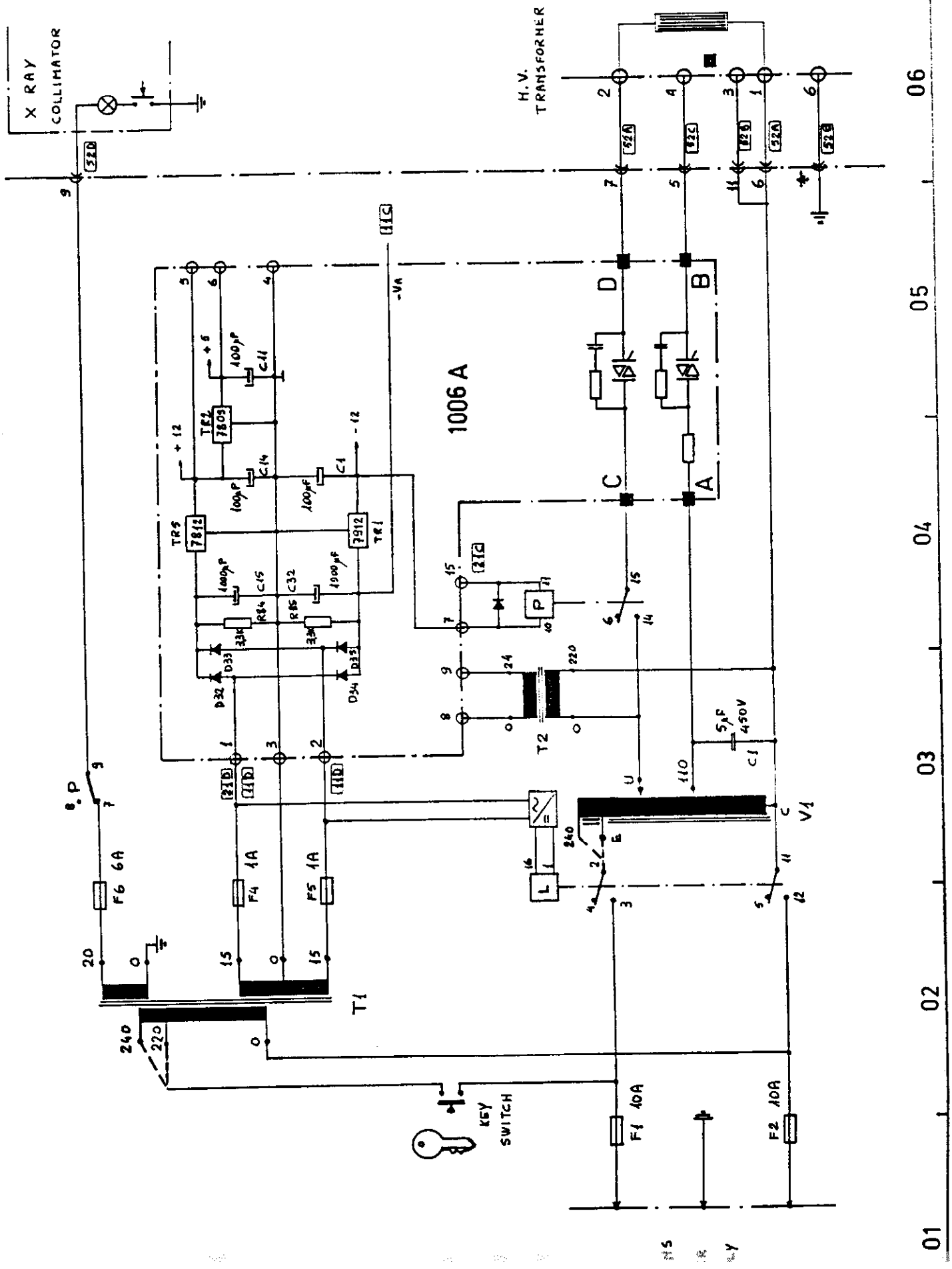

CONTROLLO mA

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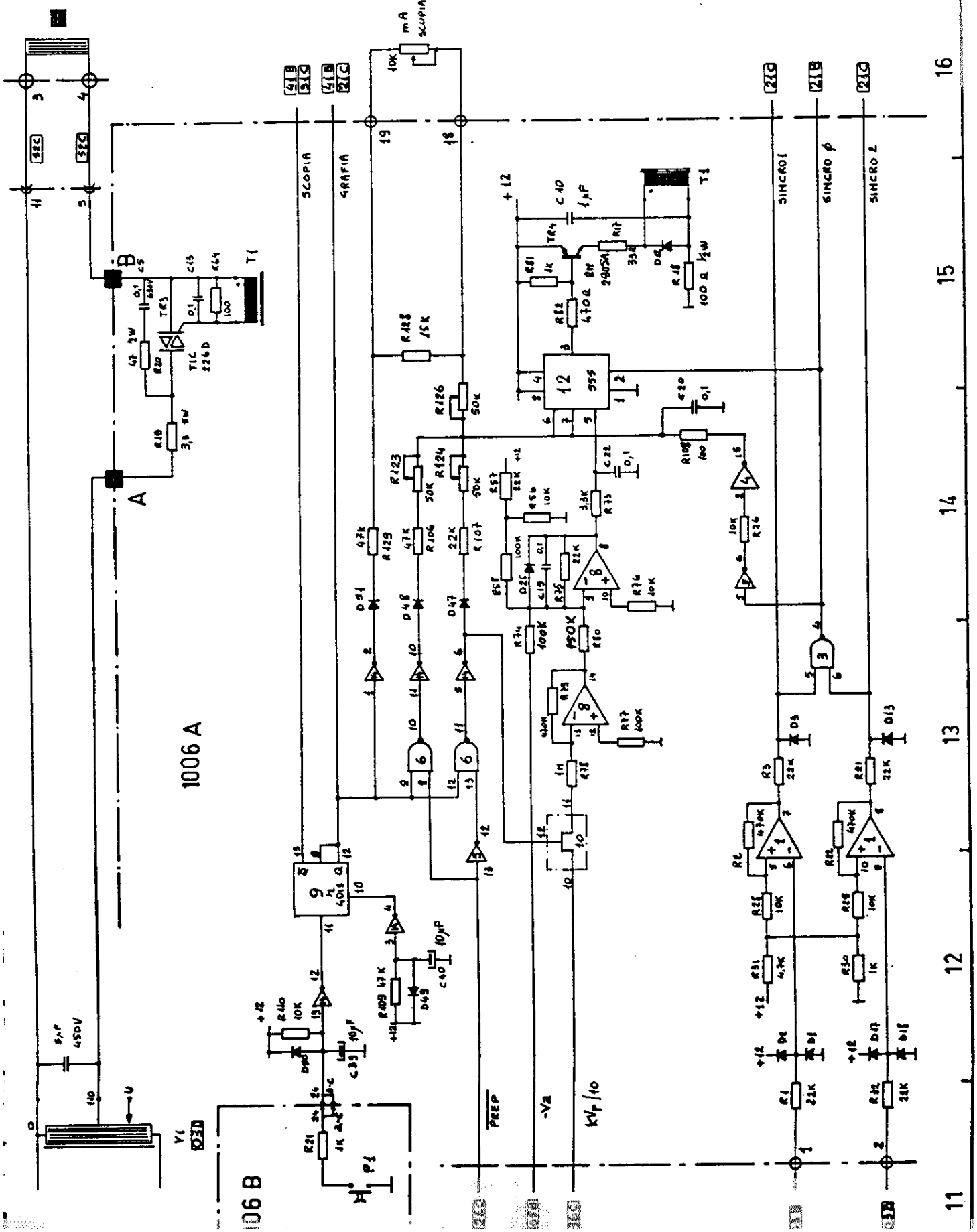
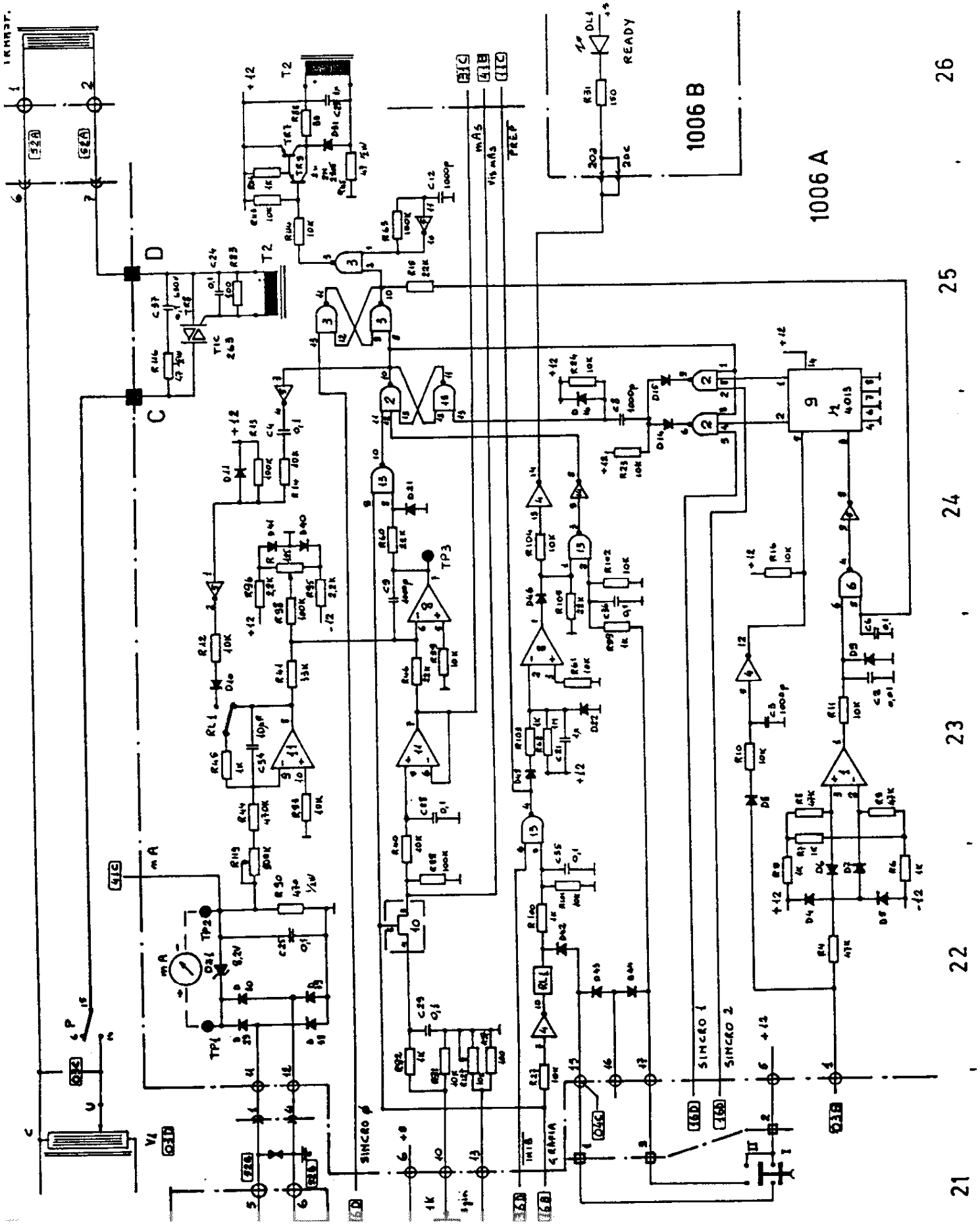


	CONTROLLO mAs	Nº 025110002-8604



DISPLAY kV - SICUREZZE

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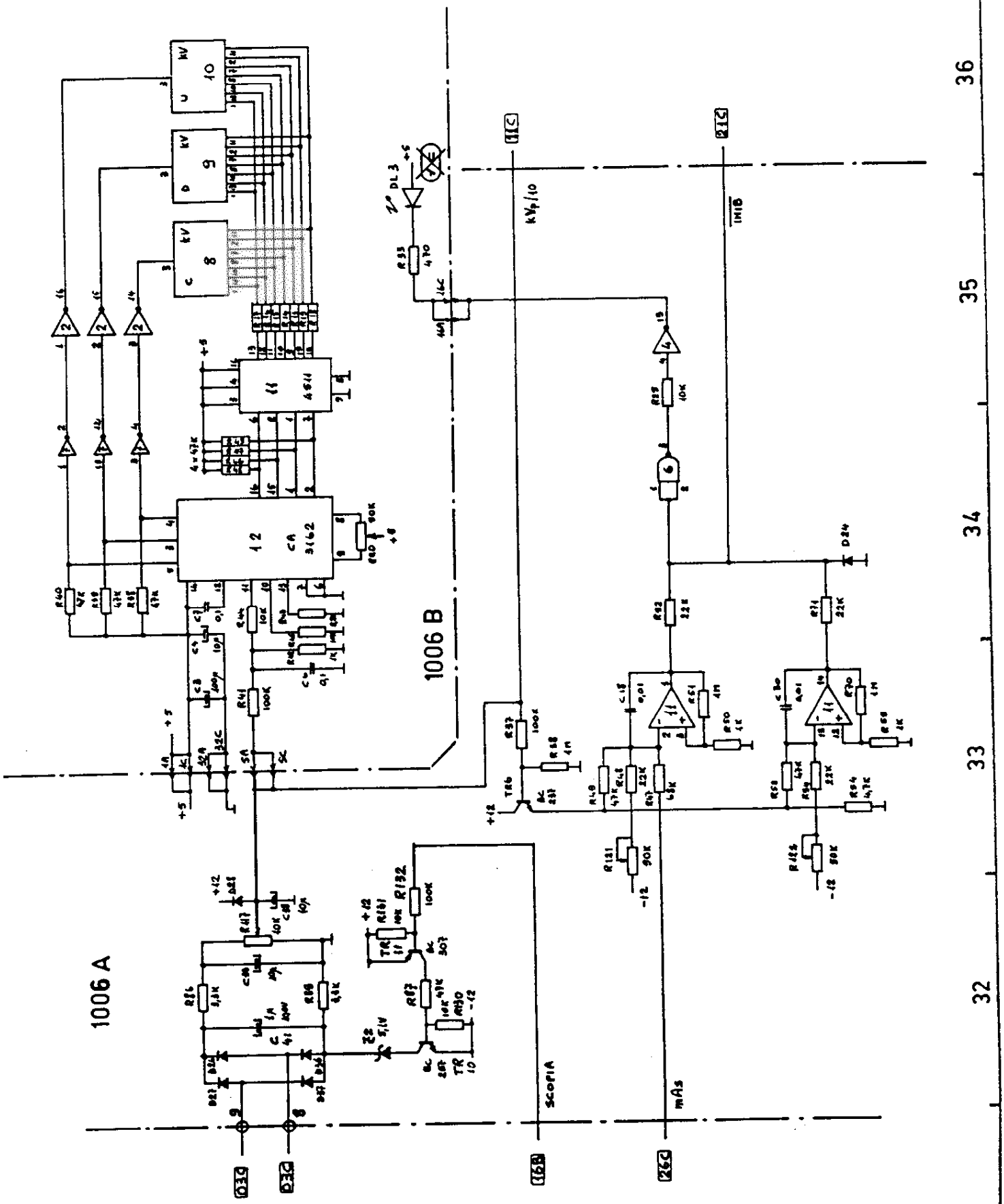

DISPLAY mAs

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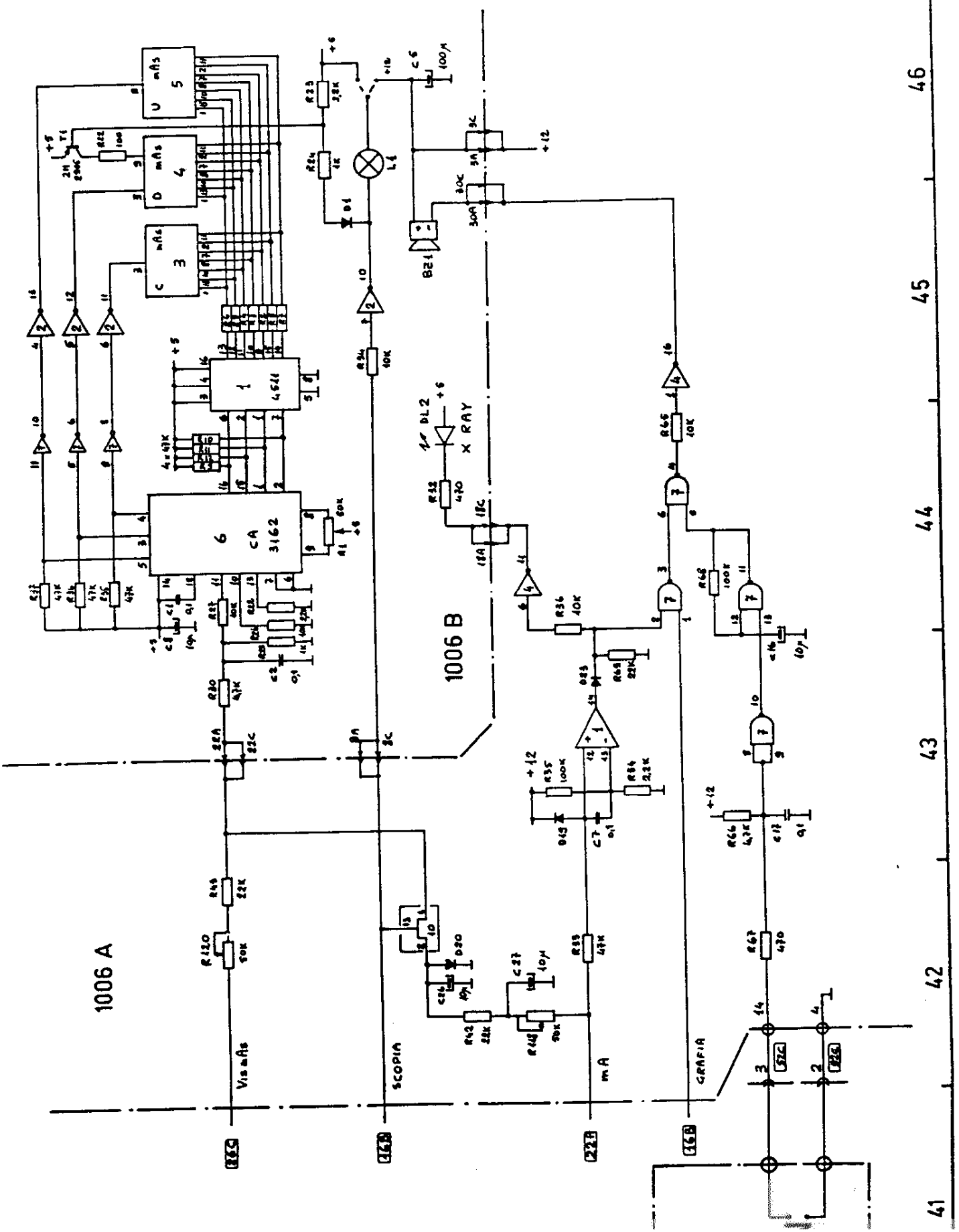

TRASFORMATORE A. T.

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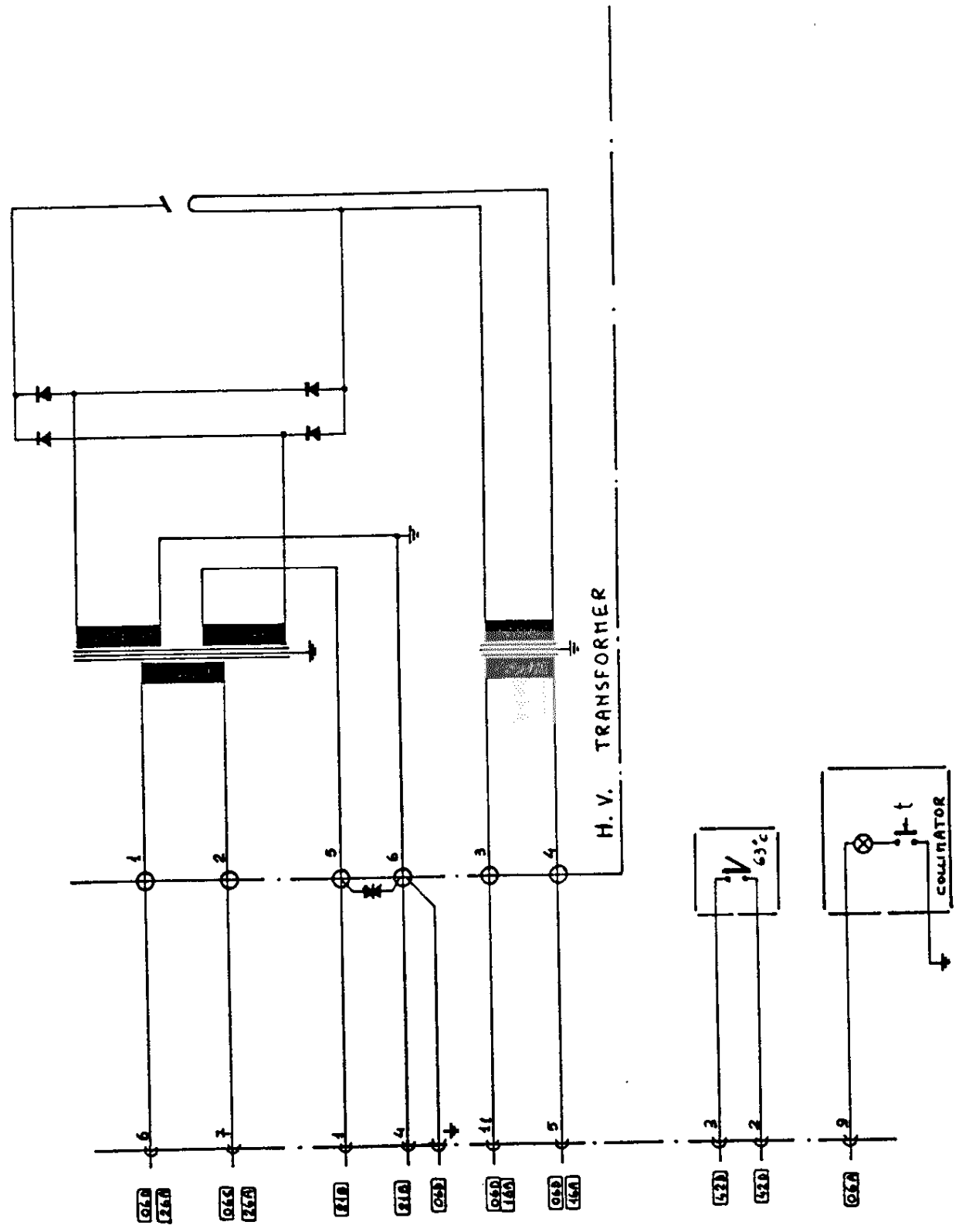

	TOPOGRAFICO C.S. 1006 A	Nº 025110T1 - 8604