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LÖNROTH

MN 124

DIGITAL MULTIMETER

For the measurement of dc and ac
voltages, dc and ac currents and

SCHNEIDER

DEP

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IM 124

DIGITAL MULTIMETER

For the measurement of dc and ac
voltages, dc and ac currents and
resistances

INSTRUCTION MANUAL

Power supply : 127 - 220 V \pm 10% - 50/60 Hz.

IM/IM 124/3.70/2nd issue
code n° : 541.006

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FUNCTIONAL DESIGNATION

The MN 124 is a compact, lightweight digital multimeter offering very large utilization possibilities as dc and ac voltmeter, dc and ac ammeter and ohmmeter.

Its measurement extent (100 μ V to 1.000 V dc, 100 μ V to 500 Vac, 100 nA to 200 μ A dc and ac, 0.1 Ω to 2 M Ω) and its adapting for rack mounting with the possibility to mount two instruments side-by-side, make the MN 124 equally well suited for use in the laboratory or as bench test equipment.

Equipped with roded outputs and an "external trigger" position, the instrument can be incorporated in an automatic measurement system with printing of the results or transfer of these results for remote processing.

SECTION 2

GENERAL DESCRIPTION

Packaging of the MN 124 combines an attractive appearance with rugged construction. The two units (88 mm) high, half-rack width, metallic cabinet can easily be adapted for full-width mounting in a standard 19-inch rack by means of optional brackets.

For table-top operation the instrument is provided with a tilt-down stay allowing it to be inclined for ease of reading.

The controls and indicators are very accessible and located either on the front panel to the right of the display window or on the rear panel (refer to paragraph VI.2).

The "fine" adjustment of the full scale calibration is placed on the front panel ; other adjustments are accessible on top of the instrument (see fig. 1).

The functional arrangement and the wiring on interchangeable plug-in printed circuit boards allow a very easy maintenance of the instrument.

SECTION 3
SPECIFICATIONS

Specifications of the MN 124 are as follows :

- Display : memorized, 4 gas tubes
- Number of measuring points : 2000 in steps by 1, without overrange
- Polarity : Automatic.
+ and - signs display by gas tube indicating also the Ω and \sim functions.
- Overload : bulb-indicated for 200 mV and 2 V dc and ac ranges as well as for all ohmmeter ranges.
Without indication. for the other voltmeter ranges nor for any ammeter range.
- Converter calibration : no zero adjustment
full scale adjustment by internal reference source (+ 1.900 V).
- Operating temperature : 0 to + 50°C
- Storage temperature : - 10 to + 70°C

3.1.- WARRANTED VALUES.

3.1.1.- General specifications.

The specifications table of page 5 indicates the warranted values for an instrument operation at + 25°C.

FUNCTION	RANGE	RESOLUTION	ACCURACY	NUMBER OF POINTS	INPUT IMPEDANCE	PROTECTION	OBSERVATIONS
dc Volts	200 mV	100 μ V	$\pm 0.05\%$ of reading	2,000	10 M Ω $\pm 10\%$	700 times range (140 V)) Overload indication
	2 V	1 mV		2,000		200 times range (400 V)	
	20 V	10 mV	$\pm 0.1\%$ of range	2,000		1,000 V	
	200 V	100 mV		2,000		1,000 V	
	1,000 V	1 V		1,000		1,000 V	
dc Amps	200 μ A	100 nA	$\pm 0.4\%$ of reading $\pm 0.1\%$ of range	2,000		50 times range (10 mA)	1 k Ω incorporated shunt; voltage drop at terminals 200 mV
ac Volts	200 mV	100 μ V	$\pm 0.5\%$ of range	2,000	2 M Ω // ≤ 50 pF	600 times range (120 V)) Overload indication
	2 V	1 mV		2,000		60 times range (120 V)	
	20 V	10 mV	40 Hz to 20 kHz	2,000		500 V	
	200 V	100 mV		2,000		500 V	
	500 V	1 V		500		500 V	
ac Amps	200 μ A	100 nA	$\pm 1\%$ of range from 40 Hz to 20 kHz	2,000		50 times range (10 mA)	1 k Ω incorporated shunt; voltage drop at terminals 200 mV
Ohms	200 Ω	0.1 Ω	$\pm 0.05\%$ of reading	2,000) Max. current in measured resistance. 1 mA 1 mA 100 μ A 10 μ A 1 μ A
	2 k Ω	1 Ω		2,000			
	20 k Ω	10 Ω	$\pm 0.1\%$ of range	2,000) Overload indication	
	200 k Ω	100 Ω		2,000)	
	2 M Ω	1 k Ω		2,000)	

3.1.2.- Particular specifications

- Temperature coefficient of the instrument : $\leq \pm 1 \times 10^{-4}/^{\circ}\text{C}$ in dc
 $\leq 5 \times 10^{-4}/^{\circ}\text{C}$ in ac
 $\leq 2 \times 10^{-4}/^{\circ}\text{C}$ in ohmmeter
- Temperature coefficient of the internal reference source : $\leq \pm 5 \times 10^{-5}/^{\circ}\text{C}$
- Insulation : 500 V dc between interconnected inputs of measuring circuit and frame.
- Reinjected current (on 200 mV dc range) : 5 nA at + 25°C.
drift of about 100 $\mu\text{A}/^{\circ}\text{C}$ from 0 to + 50°C.
- Rejection rate
- in normal mode at 50 Hz with 1 k Ω unbalancing resistor. :
 - 200 mV dc : > 110 dB
 - 2 V dc : > 100 dB
 - 20 V dc : > 70 dB
 - 200 V dc : > 60 dB
 - 1000 V dc : > 40 dB
 - normal mode voltage : 500 V p.p. max.
 - in serie mode :
 - 200 mV dc : \geq 70 dB at 50 Hz
 - other ranges : \geq 30 dB at 50 Hz
- Internal triggering : 3 to 10 c/s
- External triggering :
- a) by pulse :
 - rest level : between 0 and + 0.4 V.
 - control current : 1 mA
 - level of pulse : between 4 and 12 V
 - current : about 10 μA
 - pulse duration : 10 μs
 - rise time : 20 μs
 - b) by push-button : contact by closure to ground

.../...

End of measurement signal : positive pulse
rest level : V max = + 0.4 V
available current : 6 mA
pulse level : V = 6 V \pm 0.5 V
internal resistance : 50 Ω
open-circuit rise time : 1 μ s approx.
pulse width : 4 to 5 ms

Coded outputs : 1.2.4.8 BCD . code, positive logic
a) measurements 4 times 4 outputs
'0' level : V max = + 0.4 V
available current : 6 mA
'1' level : V = + 6 V \pm 0.5 V
internal resistance : 4 k Ω approx.

b) range and function indexing : 2 times 4 outputs
'0' level : V max. = + 0.4 V
available current : 6 mA
'1' level : V = + 6 V \pm 0.5 V
internal resistance : 4 k Ω approx.

3.2.- VALUES GIVEN AS INFORMATION.

Dimensions :

Height : 88 mm (2 U)
Width : 210 mm
Depth : 250 mm

Weight : 3.2 kg (7 lb.3 oz)

Power drain : 25 VA

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SECTION 4

PRINCIPLES OF OPERATION

The HW 124 includes five main parts :

- input circuits
- a voltage-time type analog-digital converter
- a pulse counter with memorized digital display and coded outputs.
- auxiliary circuits (oscillator, end of measurement...)
- power supplies.

4.1.- INPUT CIRCUITS.

Various circuits (dc amplifier and attenuator, linear rectifier or constant current generator) allow to transform the input informations into informations compatible with the sensitivity of the converter (2 V dc full scale, 1 mV dc resolution).

4.1.1.- Measurement of dc voltages.

The measured dc voltages are brought to 2 V dc for the full scale either directly (2 V range) or by means of an amplifier by 10 (200 mV range) or a dc attenuator by 10, 100 or 1,000 (20 V, 200 V and 1,000 V range).

4.1.2.- Measurement of ac voltages.

The measured ac voltages are in a first step transformed into dc voltage by means of a linear rectifier. This dc voltage attacks then the converter either directly (2 V range) or after amplification (200 mV range) or after association between the attenuator and the amplifier in order to obtain a 2 V value for full scale at the converter input.

4.1.3.- Measurement of dc and ac currents.

The measurement of currents consists in measuring the voltage drop produced at the terminals of a shunt by the passage of the current. This voltage is amplified by a gain of 10 in the case of dc currents. For ac currents the amplification is preceded by a rectifying.

.../...

4.1.4.- Measurement of resistances.

The constant current generator determines a certain voltage at the terminals of the measured resistance. This voltage is then attenuated or amplified following the ranges.

4.2.- ANALOG-DIGITAL CONVERTER.

The utilized converter delivers a pulse of duration proportional to the measured voltage. It is constituted by one ramp voltage generator only associated to a comparator. Two linear gates switch the comparator input sequentially first to the unknown voltage then to the zero reference voltage. This method combines the simplicity of a single ramp converter and the performances of a double ramp converter since only one comparator is used.

Zero adjustment is no more necessary and only the full scale adjustment using the internal reference source remains.

Conversion coefficient of the ramp is 2 ms/V. The clock frequency (1 MHz) and a divider by 2 between the counter and the first decade determine a maximum conversion time equal to 13 ms for 2 V applied to the input of the instrument on the 2 V range.

The ± 12 V voltages necessary for the supply of the converter are supplied from stabilized supplies with operational amplifiers of which the rejection on the supply voltages is used.

The internal reference voltage for calibration is delivered by a zener diode.

4.3.- PULSE CONVERTER.

It includes four DCU'S operating in the 1.2.4.8 BCD code. In order to assure an easy reading, a parallel memory register is disposed between the DCU outputs and the display tubes decoding and control circuits. Bistables used are of the double J-K type. Simple RS type flip-flop controlled by a NAND gate are used for the memories composing the register.

The output levels of the memory controlled by the first flip-flop of the DCU, control the emitter lines of the odd-even transistors and the output levels of the three other memories trigger a reduced diode matrix.

It is important to note that the counter capacity is 2,000 without overrange.

The memory register outputs are available on the rear connector of the instrument for recording (printer, tape puncher, etc...).

.../...

4.4.- AUXILIARY CIRCUITS.

They include :

- a 1 MHz crystal oscillator constituting the clock of which pulses are fed into the counter during the conversion duration.
- the transfer signal circuit. This signal is applied to the memory register at the end of each conversion.
- the polarity circuit. This polarity is entirely automatic.
- the converter triggering circuit. (rate of 3 c/s with possible increase to 10 c/s.). The triggering can be either automatic through the incorporated stable oscillator, or external by positive pulse or by acting on a push-button.
- the end of measurement circuit. delivering the printing control pulse immediately after the transfer order.
- the "range indexing" circuits. Functions and ranges positions are coded by the logic of these circuits. These informations, available on the rear connector, complete thus the "measurement" informations for a processing in "systems".

4.5.- POWER SUPPLIES.

The power supplies necessary for the operation of the MI 124 include following voltages :

- + 6 V regulated - Supply of the integrated circuits and of the different circuits (counter, auxiliary circuits, etc...).
- + 16.5 V and - 16.5 V non-regulated -
Supply of the zener diode delivering the reference voltage. Supply of the operational amplifiers which determine the ± 12 V for the input amplifier, the "multimeter" circuits and the linear gates of the converter.
- + 280 V non regulated -
Supply of the display tubes.

.../...

PRELIMINARY INSTRUCTIONS

5.1.- UNPACKING.

The MN 124 is shipped ready for operation with the necessary measuring cords, connectors and spare fuses.

Carefully remove the instrument from its shipping carton.

Check the state of the case, controls and connectors for eventual damage occurred during shipment. If there is damage, immediately notify the carrier and initiate a claim procedure.

5.2.- PACKING.

Should it become necessary to pack the instrument for shipment, proceed as follows :

- A.- After enclosing the instrument in a plastic sheet, place it in a carton having approximately the same dimensions.
- B.- Seal and place this carton in a larger, extra strength one allowing to maintain it with plastic quoins.
- C.- Seal and mark "FRAGILE"

5.3.- PREPARING FOR OPERATION.

The MN 124 is wired to be supplied from a 220 V AC, 50 Hz power source.

To connect the instrument to a 127 V AC mains supply, it is necessary to adapt it as follows :

- A.- Remove the screws maintaining the strap preventing the use of the voltage selector (rear panel).
- B.- Place the selector on 127 V AC
- C.- Re-place the strap.

Check the fuse corresponding to the chosen supply voltage.

Connect the power cord to the mains.

OPERATION6.1.- SAFETY INSTRUCTIONS.

The power supply cord being a three wires cord (2 wires + ground) care must be taken when connecting the instrument to the mains, to connect it also to ground.

Never exceed a 500 V dc voltage between this terminal (frame) and the input terminals.

6.2.- CONTROLS AND INDICATORS.

Figure 51.822 represents the front and rear panel of the MN 124.

The controls and indicators of the instrument are simple, easy to understand, and easy to operate. The main controls are located on the front panel at the right of the display window and have following markings :

- OVF-OVER : Overload indicator. Lights up for the ranges and functions mentioned in table of paragraph 3.4.1.
 ON-OFF : On-off switch.
 ... Ω , ... A, ... V
 : Range selection within the function mentioned by the black coaxial switch designed SKN in text.
 AC , DC = : Selection of the type of current or voltage (ac or dc) by the red coaxial switch designed SKR in text.
 CAL : Position of SKN allowing the "fine" calibration of full scale by means of the corresponding potentiometer.
 ENTREE-INPUT : Measurement input terminals with graphic symbol of ground and earth.

On the rear panel are located following controls :

- J.1.- Sorties BCD Outputs : AMPHENOL type connector
 1.2.4.3 + BCD coded outputs
 (refer to paragraph 6.3. and fig. 51 793)
 J.2.- Entrées-Inputs : DDMO type connector
 transfer of the input terminals located
 on the front panel.
 J.3.- Decl. Trigg. : BNC type connector
 external triggering
 (refer to paragraph 6.4.4.)

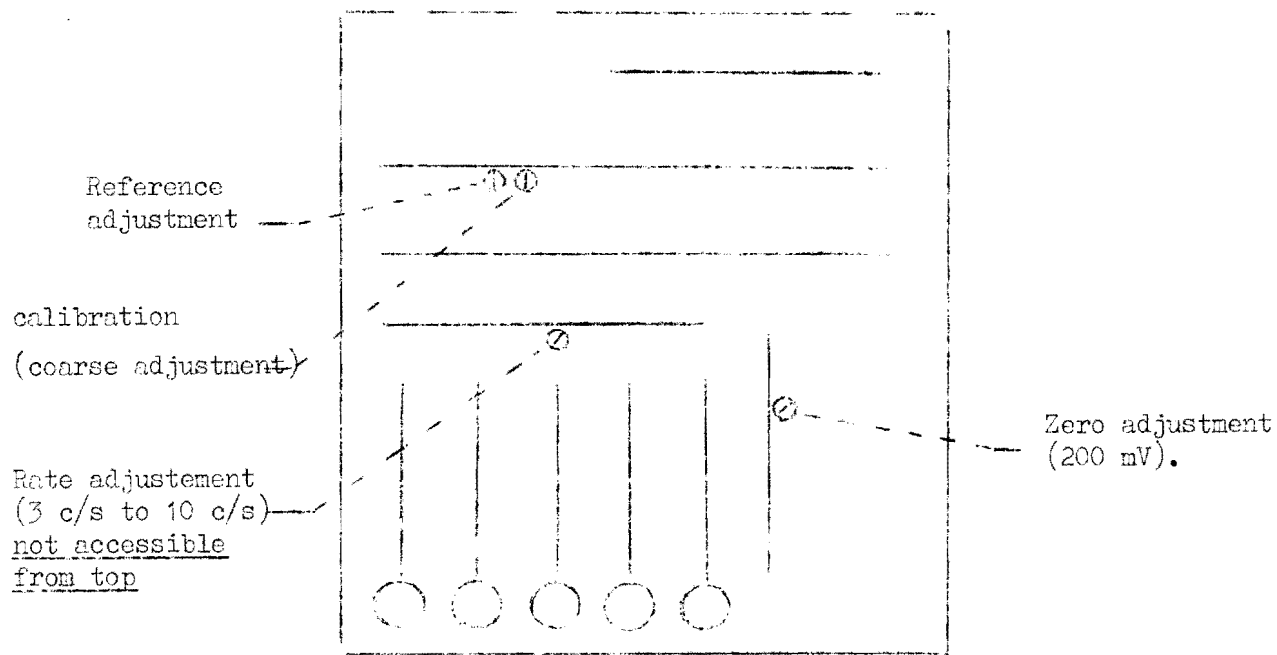
.../...

- Ext. Int. : two positions change-over switch for external or internal triggering selection (refer to paragraph 6.4.4).
- 220 V - 127 V : Voltage selector.
- 100 mA - 200 mA : Fuse corresponding to the supply voltage.
- earth terminal : terminal connected internally to the yellow-black wire of the mains cord.

Three adjustments, represented in figure hereunder, are accessible from the top of the instrument. They are the adjustment of

- the amplifier zero
- the reference voltage
- the full scale ("coarse" adjustment).

Fig. 1



.../...

6.3.- PREOPERATION.

Make sure that the measured values are within the operating limits of the instrument.

The MN 124 being connected to the supply source as described in paragraph 6.5., set the power switch to E-ON.

The display tubes shall light up immediately.

Allow the instrument to warm up for 15 minutes before proceeding with following checkings :

6.3.1.- Zero checking.

SKN switch being positioned on 200 mV and SKR switch on = (dc), shorten the red and black input terminals. The readout shall indicate 000 or 001. If this result is not obtained, adjust the amplifier zero accessible on top of the case (see figure 1)

6.3.2.- Full scale checking.

Set SKN switch on CAL position and SKR indifferently on = (dc) or V. (ac) position.

The readout shall indicate 1.900.

If the readout is not correct, slightly adjust the multi-turn potentiometer on front panel (CAL).

The above mentioned adjustment is a "fine" adjustment.

If, whatever be the reason, this calibration in on abutment, proceed with the centering of this "fine" adjustment by means of the "coarse calibration" potentiometer accessible on top of the housing (fig.1)

6.3.3.- Important remark.

The "reference adjustment" potentiometer accessible on top of the instrument is used when adjusting the reference voltage (1.900 V) with comparison to a voltage standard.

Never touch at this potentiometer during the calibration checking because of risk to no more dispose of a correct internal reference voltage for the adjustment of the instrument.

.../...

6.4.- OPERATION.

6.4.1.- Measurement of dc and ac voltages.

Following the case, SKR switch will be positioned on dc (=) or \sim (ac) and SKN switch on the range corresponding to the measurement to carry-out. Connect the measured voltage between the red and black input terminals, the cold point of the measured source being connected to the black terminal.

The polarity sign (+ or -) for dc voltages or the ac voltage symbol (\sim) is displayed on the first left tube.

The instrument being without overrange, the display is blocked at 2,000 and it is necessary to switch to the upper range.

Overload on 200 mV and 2 V dc and ac ranges is indicated by the DEP-OVER bulb.

On the 200 mV and 2 V dc ranges, this bulb lights up when the voltage becomes destructive i.e. respectively at about 140 V and between 600 and 900 V.

On the 200 mV and 2 V ac ranges, the bulb lights up for a voltage of about 120 V.

On the other ranges, the protection is 1,000 V in dc, 500 V in ac, Without overload indication.

Thus, it is important to always keep in mind that on the 1,000 V position the maximum allowable voltage in ac is 500 V.

6.4.2.- Measurement of dc and ac currents.

SKR switch will be positioned on = (dc) or \sim (ac) and SKN switch on 200 μ A.

Utilization is identical to this described in paragraph 6.4.1.

It is recommended not to overload the instrument in current (50 times the range i.e. 10 mA).

6.4.3.- Measurement of resistances.

SKR switch being indifferently positioned on = or \sim , set SKR on one of the appropriate ohmmeter ranges; the sign Ω is displayed on the first, left display tube. Place the measured resistance between the two input terminals.

.../...

It is necessary to take the same cares as with a classic multimeter for the measurement of high resistances (parasitic noise) or low resistances (measuring cords and contact resistance).

It is recommended, because of risk of deterioration of the instrument, not to measure resistances under voltage.

The overload bulb "DEP-OVER" lights up for 20 to 30 V ac on all ohmmeter ranges.

6.4.4.- Triggering and utilization of the rear connector.

(AMPHENOL CONNECTOR).

A.- Internal triggering.

The two-position switch located on the rear panel will be placed on the INT. position. The MN 124 cycles then on itself at the rate of 3 c/s. This rate can be increased to 10 c/s. by means of a potentiometer shown in figure 1 page 13 .

B.- External triggering.

Place the switch on EXT. the MN 124 can then be triggered in two different ways :

- by a pulse such as defined in paragraph 3.1.2. applied either on the BNC connector of the rear panel, either between ground and pin 33 of the AMPHENOL connector.
- by grounding pin 32 of the AMPHENOL connector by means of a push-button.

C.- Rear Connector.

In addition to the internal and external triggering connections and end of measurement signal, the AMPHENOL connector delivers the "measurement" coded outputs (4 times 4 outputs) "function indexing" (4 outputs) and "range indexing" (4 outputs following the code here after :

a) Function indexing.

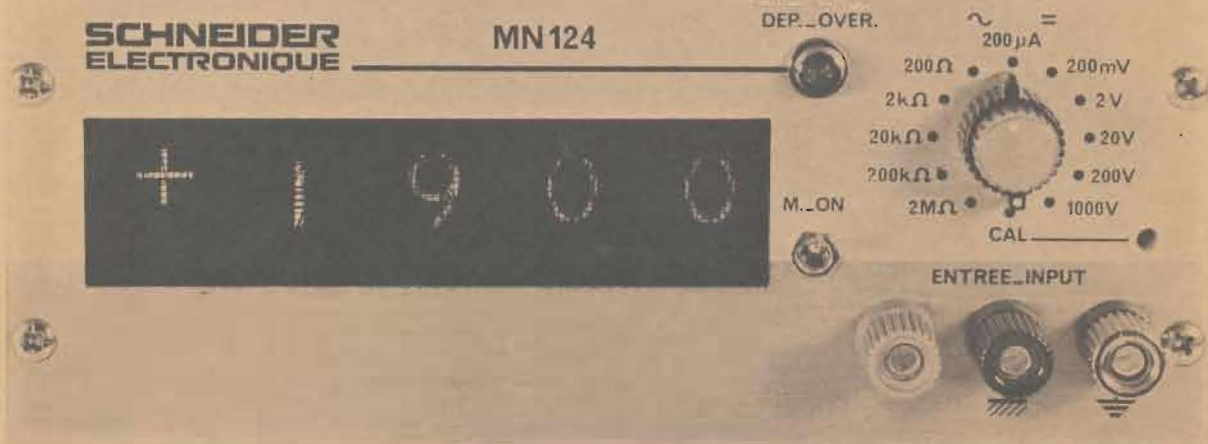
FUNCTION	OUTPUT STATE			
	N° 17	N° 18	N° 19	N° 20
- dc	1	0	1	1
+ dc	0	0	1	1
Ohms	0	1	1	1
ac	0	1	0	1

b.- Range indexing.

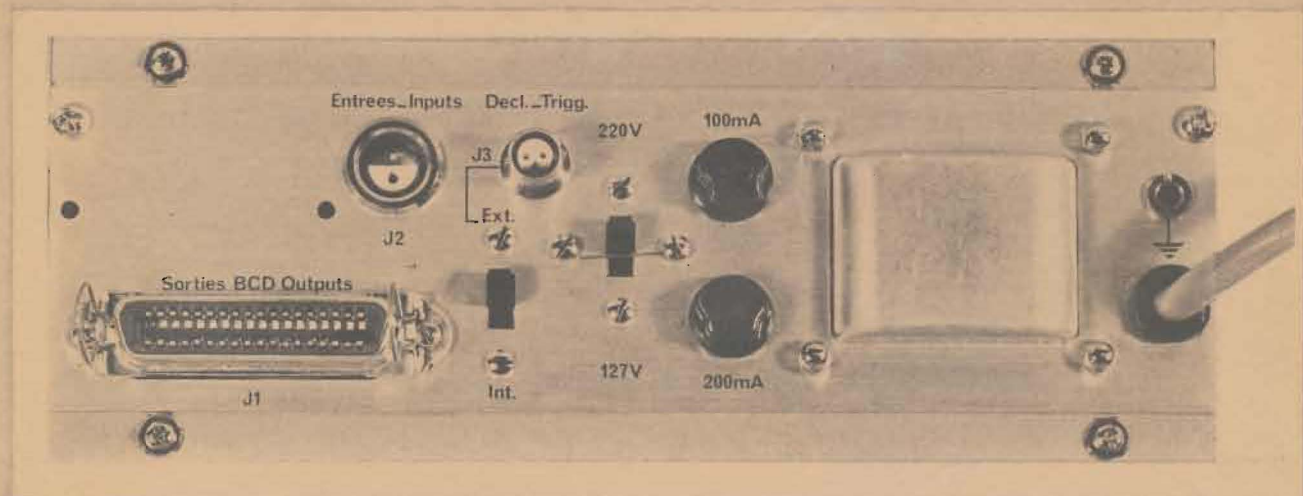
FUNCTION	INDEXING	OUTPUT STATE			
		N° 21	N° 22	N° 23	N° 24
200 mV - 200 Ω	1	1	0	0	0
2 V - 2 k Ω	2	0	1	0	0
20 V - 20 k Ω	3	1	1	0	0
200 V - 200 k Ω	4	0	0	1	0
1000 V - 2 M Ω	5	1	0	1	0
Current	6	0	1	1	0
Calibration	7	1	1	1	0

6.5.- Accuracy Checking.

Refer to the measuring error curves of figure 51.821.



PANNEAU AVANT - FRONT PANEL



PANNEAU ARRIERE - REAR PANEL

Ind	Modifications			Date	Visa	Ind	Modifications			Date	Visa
Tolérances générales:				Traitement:				NOM. N°			
Matière:				Fini:				SCHNEIDER R.T.			
DESIGNATION		ECH:		TYPE				D.E.P.			
PRESENTATION				MN 124				N° 51 822			
Dessiné par:				Le:							
Approuvé par:				Vérifié par:							

SCHEMA SYNOPTIQUE

BLOC DIAGRAM

MN 124

**SCHNEIDER
ELECTRONIQUE**

N° 51 857

EDITION

Type

Désignation

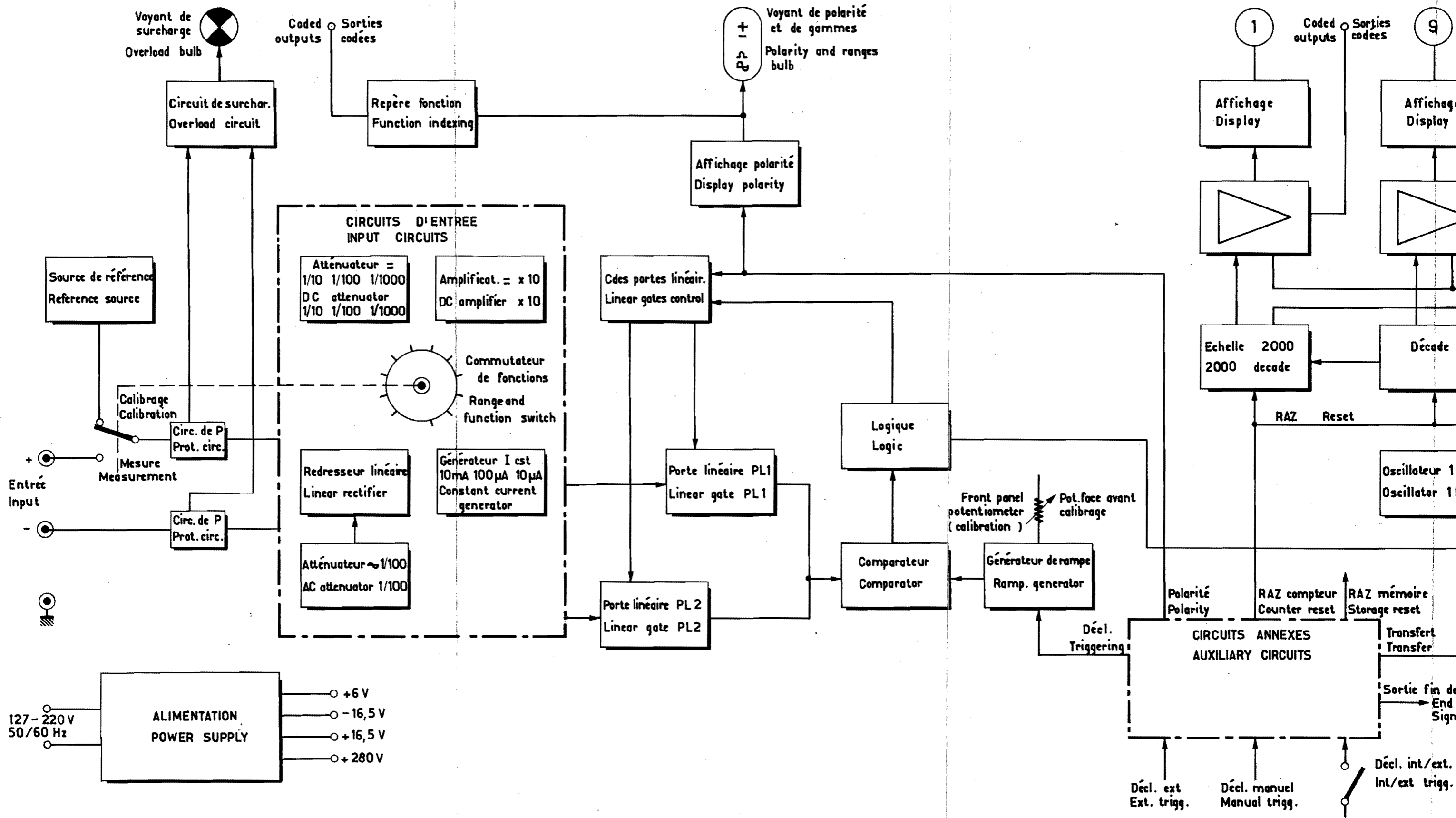
A

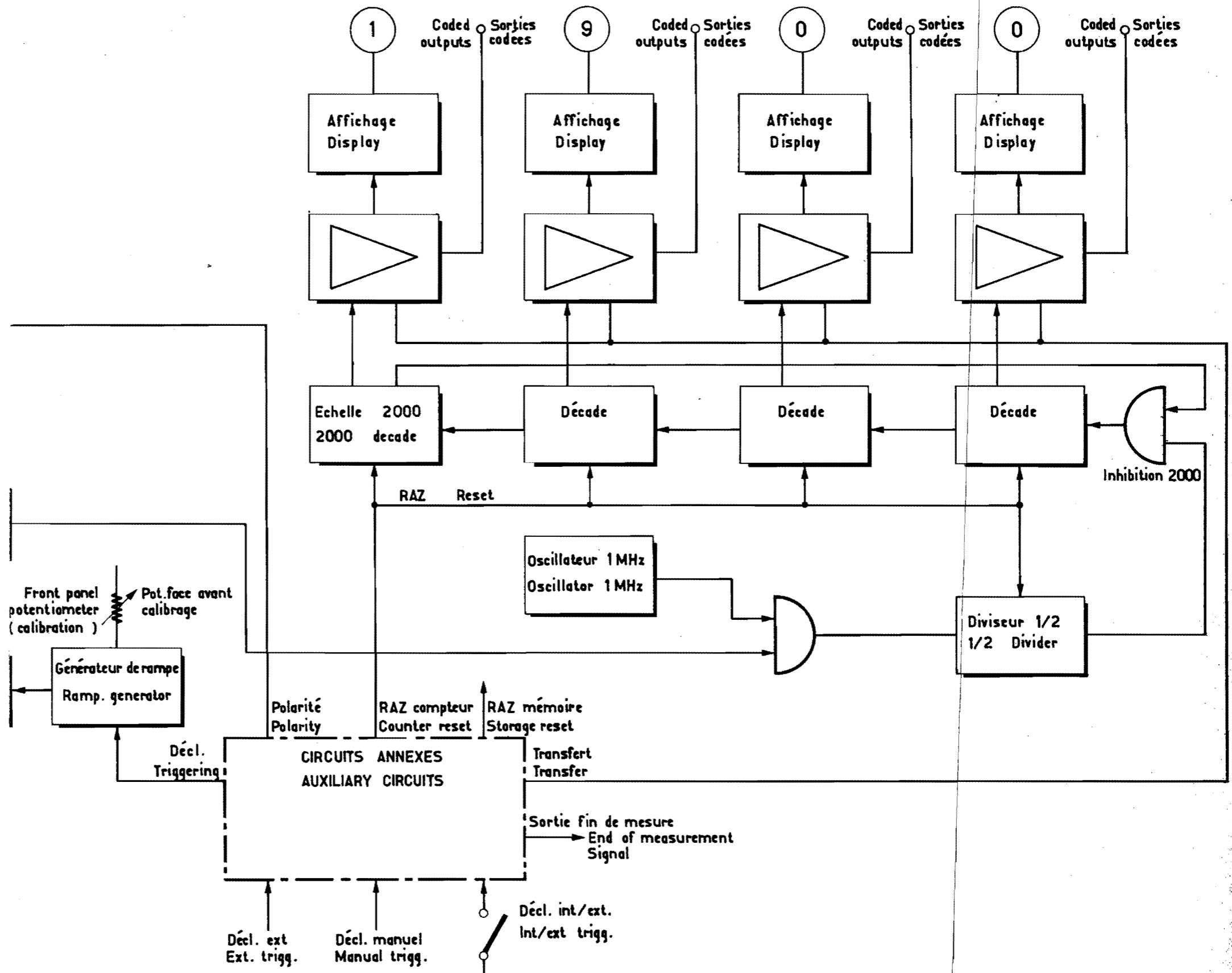
9/2/70

C

B

D





MN 124

CODED OUTPUTS
SORTIES CODEES

**SCHNEIDER
ELECTRONIQUE**

N° 51 793

EDITION

Type

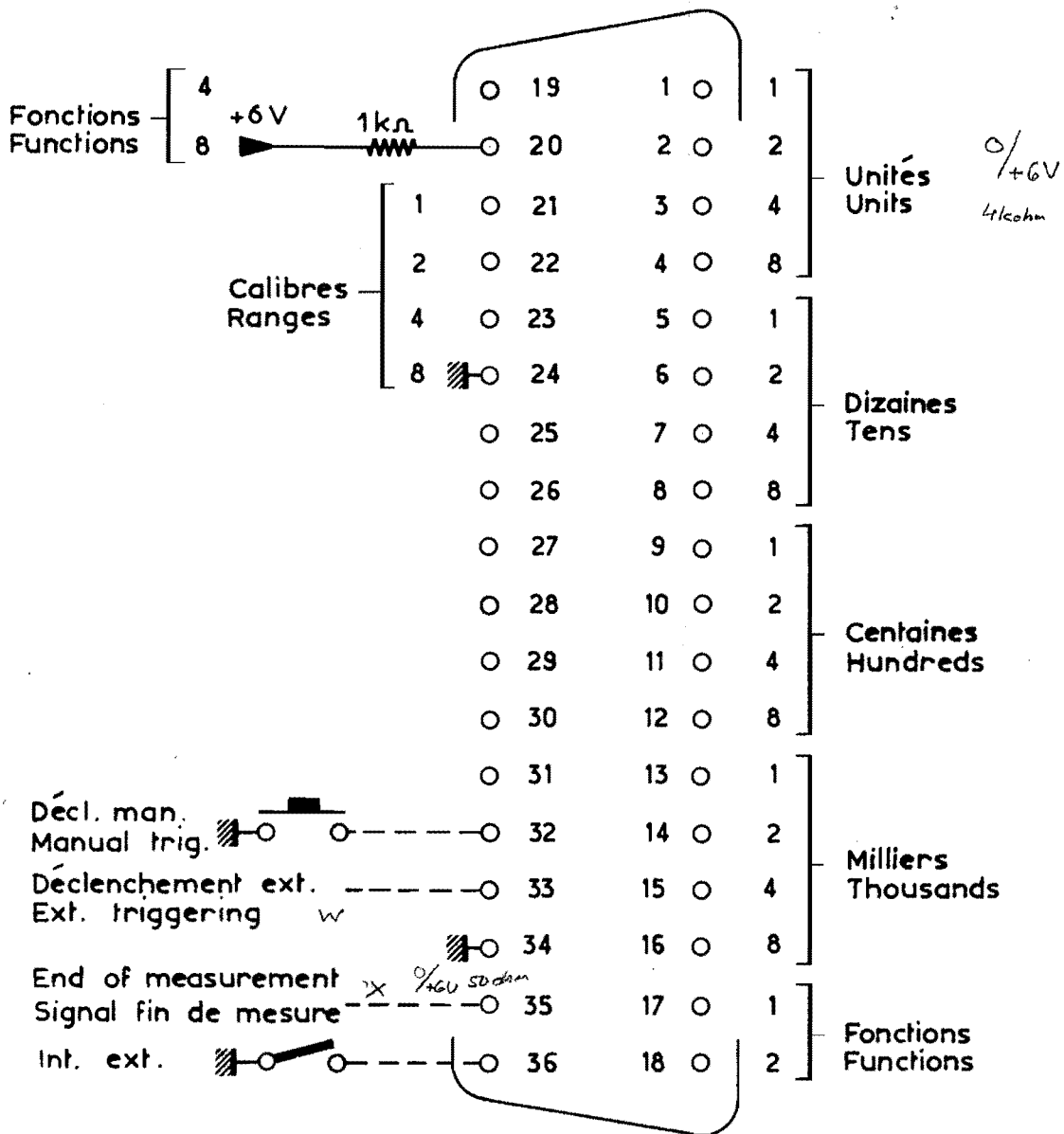
Désignation

A

C

B

D



DIGITAL MULTIMETER
 MULTIMETRE NUMERIQUE

MN 124

MEASURING ERROR
 ERREUR DE MESURES

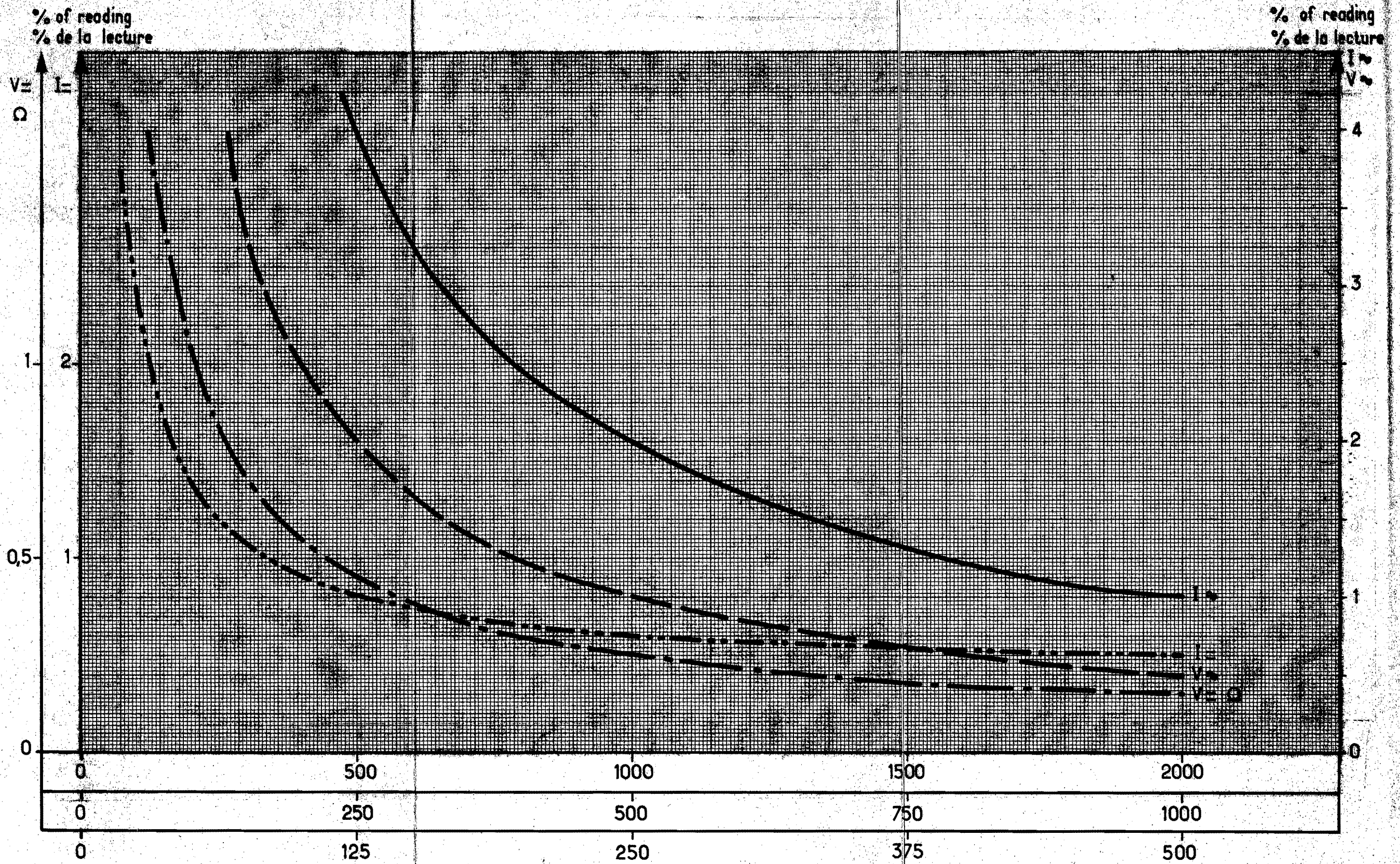
$V = , \Omega : \pm 0,05\%$] de la lecture $\pm 0,1\%$ de la gamme of reading $\pm 0,1\%$ of range
$I = : \pm 0,4\%$	
$V \approx : \pm 0,5\%$] de la gamme de 40 Hz à 20 kHz of range from 40 Hz à 20 kHz
$I \approx : \pm 1\%$	

**SCHNEIDER
 ELECTRONIQUE**

N° 51 821

EDITION

Type	Désignation	A	C
		B	D



**CONVERTISSEUR
MN 124**

**CONVERTER
MN 124**

SOUS - ENSEMBLE _ _ _ _ _ } 295 539
 SUB - ASSEMBLY _ _ _ _ _ }

CIRCUIT IMPRIME _ _ _ _ _ } 453 669
 PRINTED CIRCUIT BOARD _ }

KODATRACE _ _ _ _ _ } 501 257
 PRINTED CIRCUIT PATTERN }

**SCHNEIDER
ELECTRONIQUE**

N° 51.405

EDITION

Type

Désignation

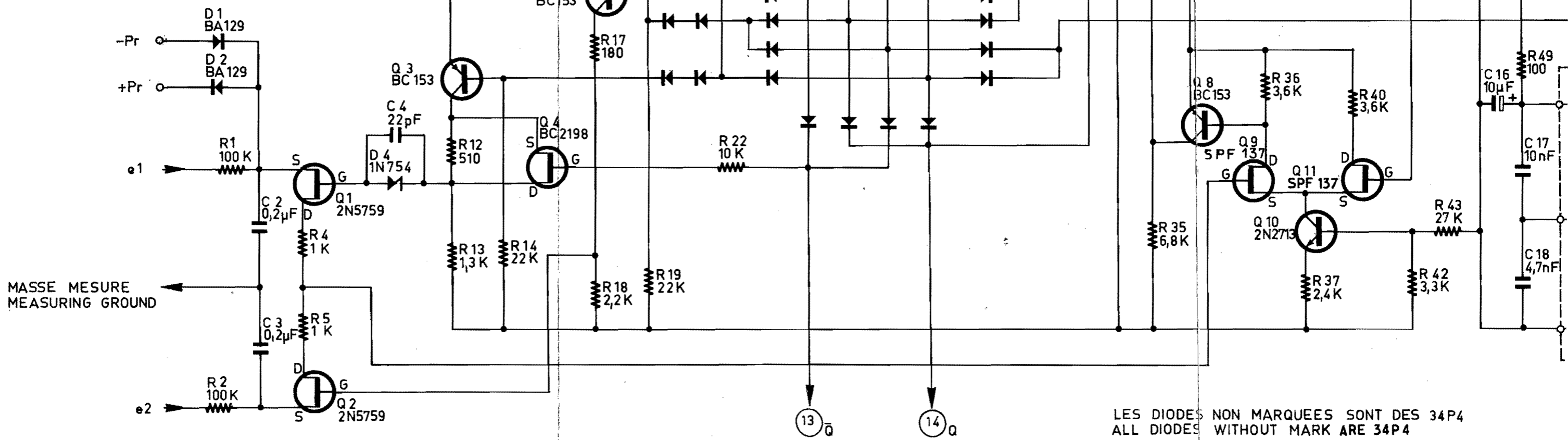
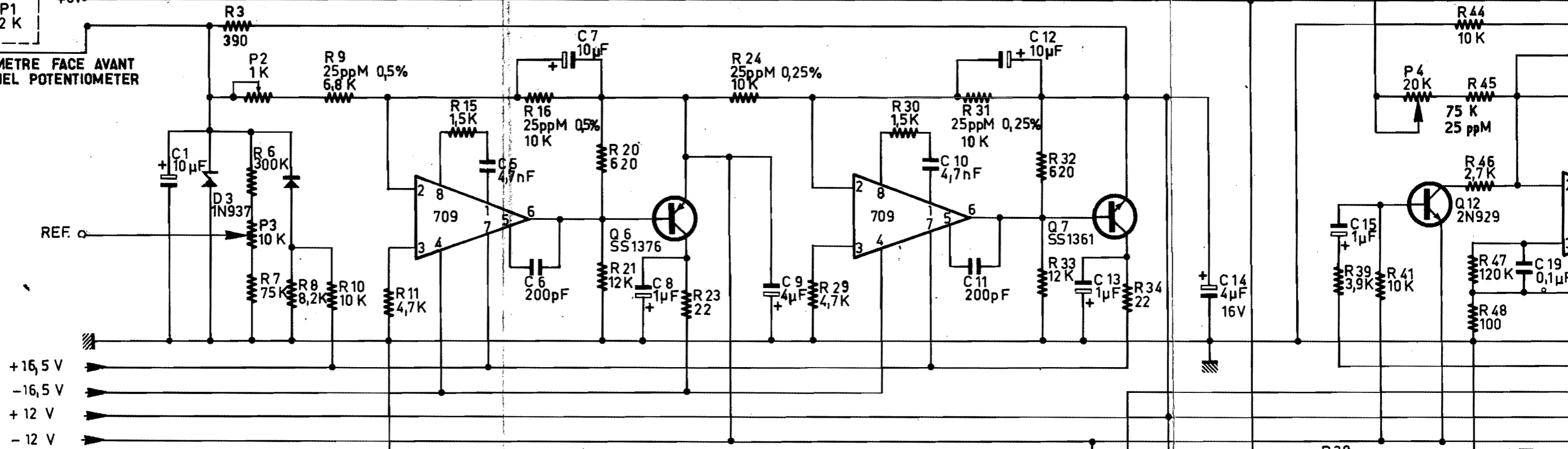
A 2/70

C

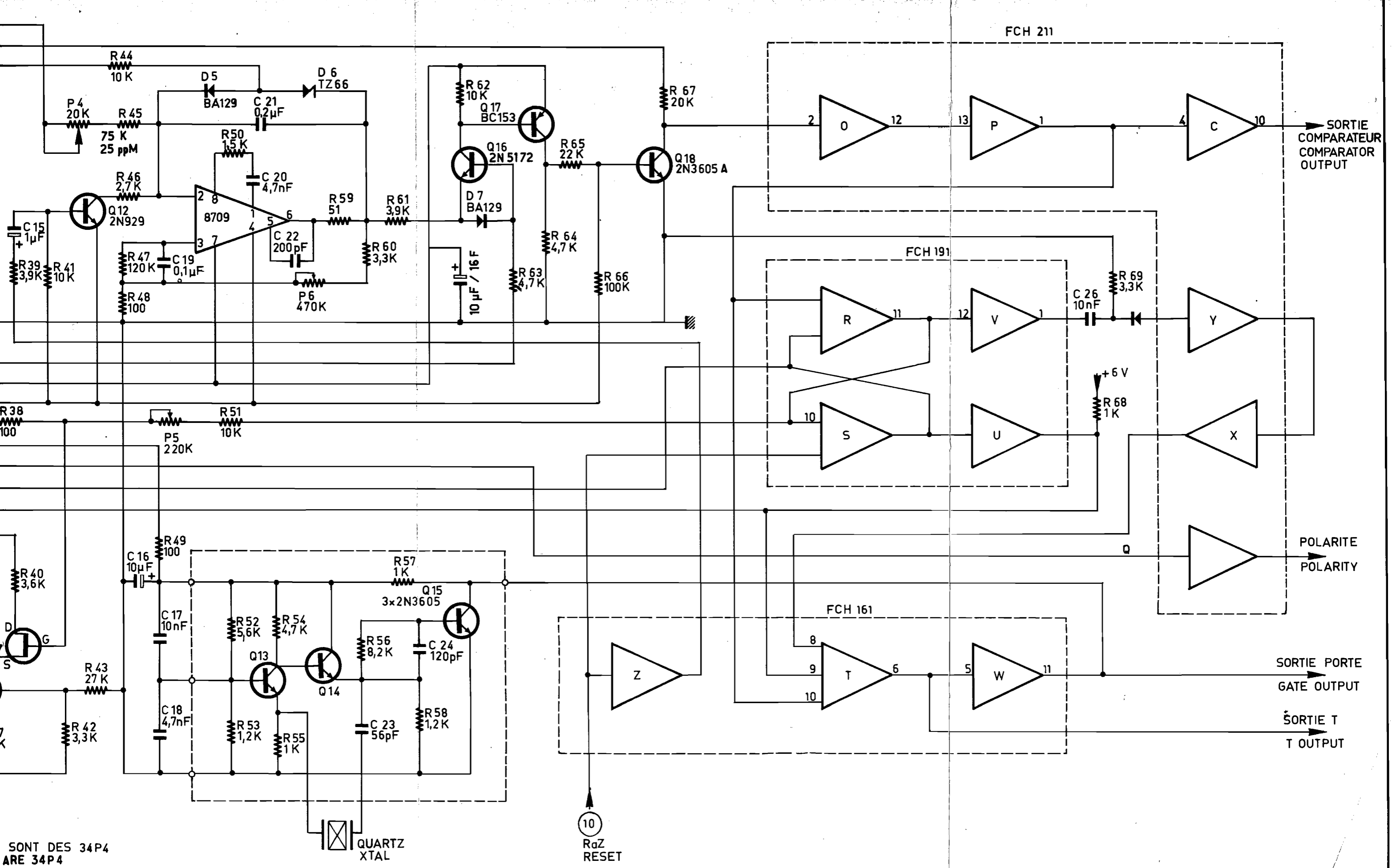
B

D

P1
2 K
+6V
POTENTIOMETRE FACE AVANT
FRONT PANEL POTENTIOMETER



LES DIODES NON MARQUEES SONT DES 34P4
ALL DIODES WITHOUT MARK ARE 34P4



SONT DES 34P4
ARE 34P4

QUARTZ
XTAL

10
RaZ
RESET

SORTIE COMPAREUR
COMPARATOR OUTPUT

POLARITE
POLARITY

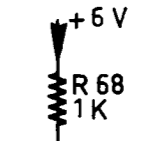
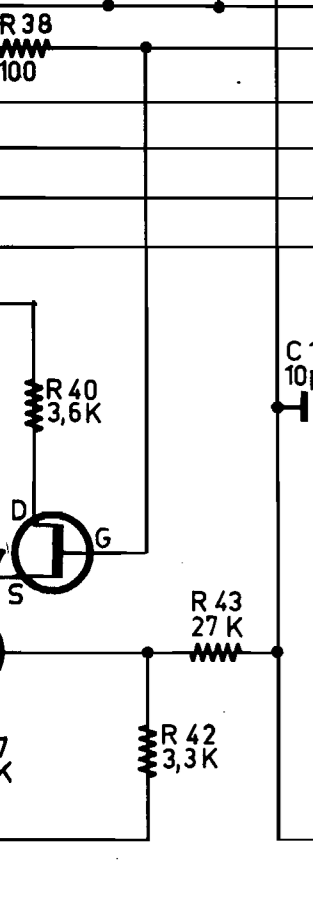
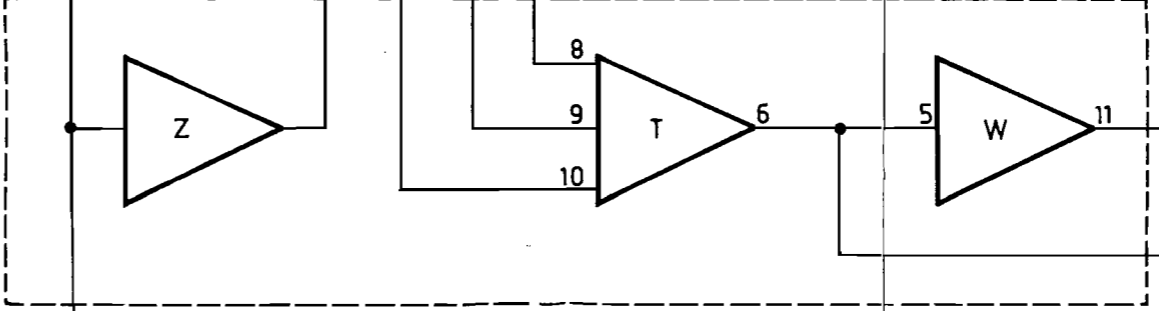
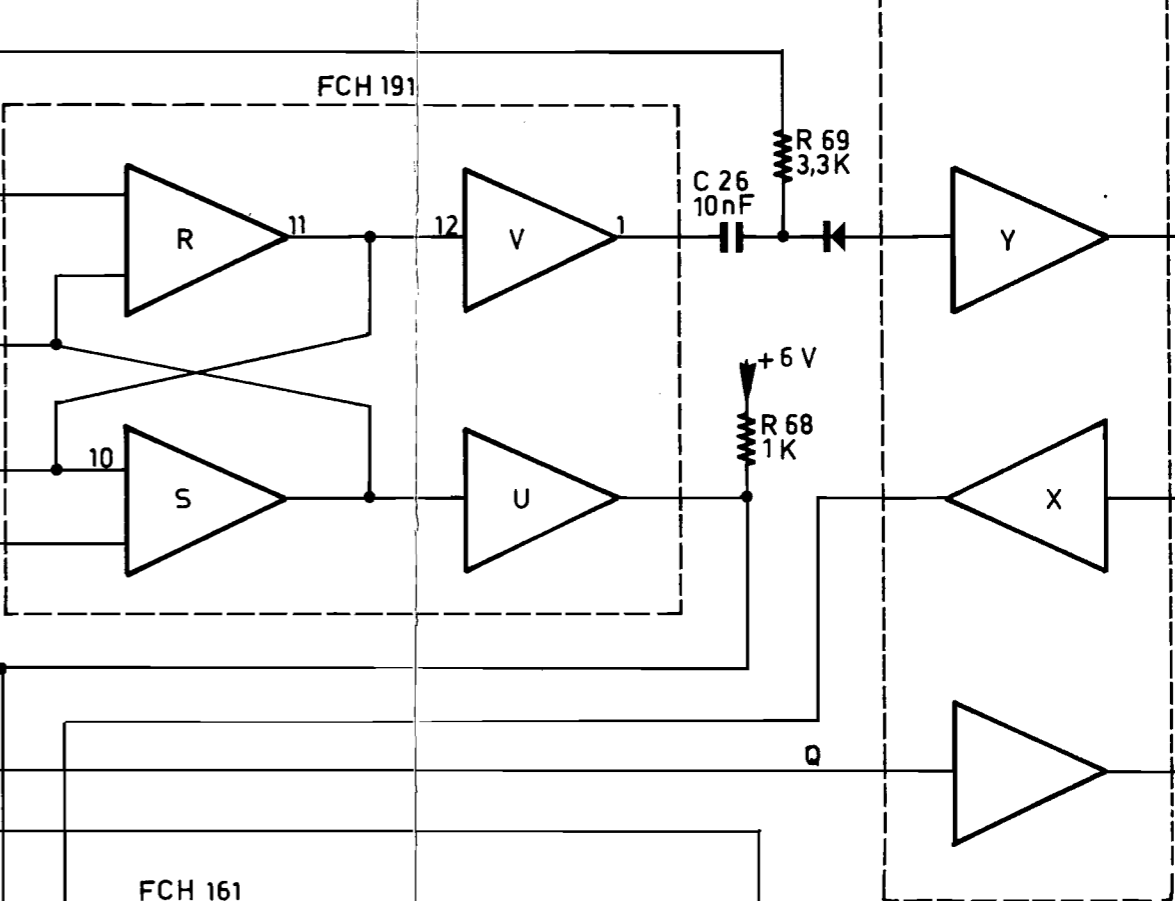
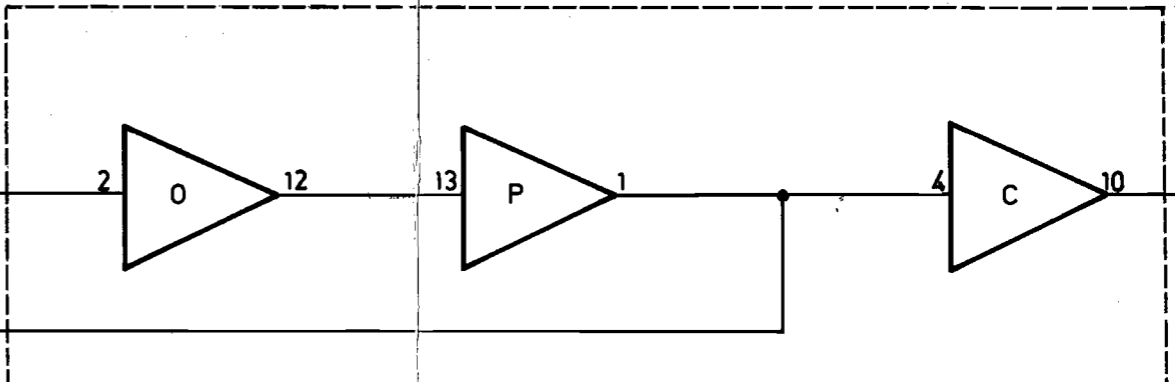
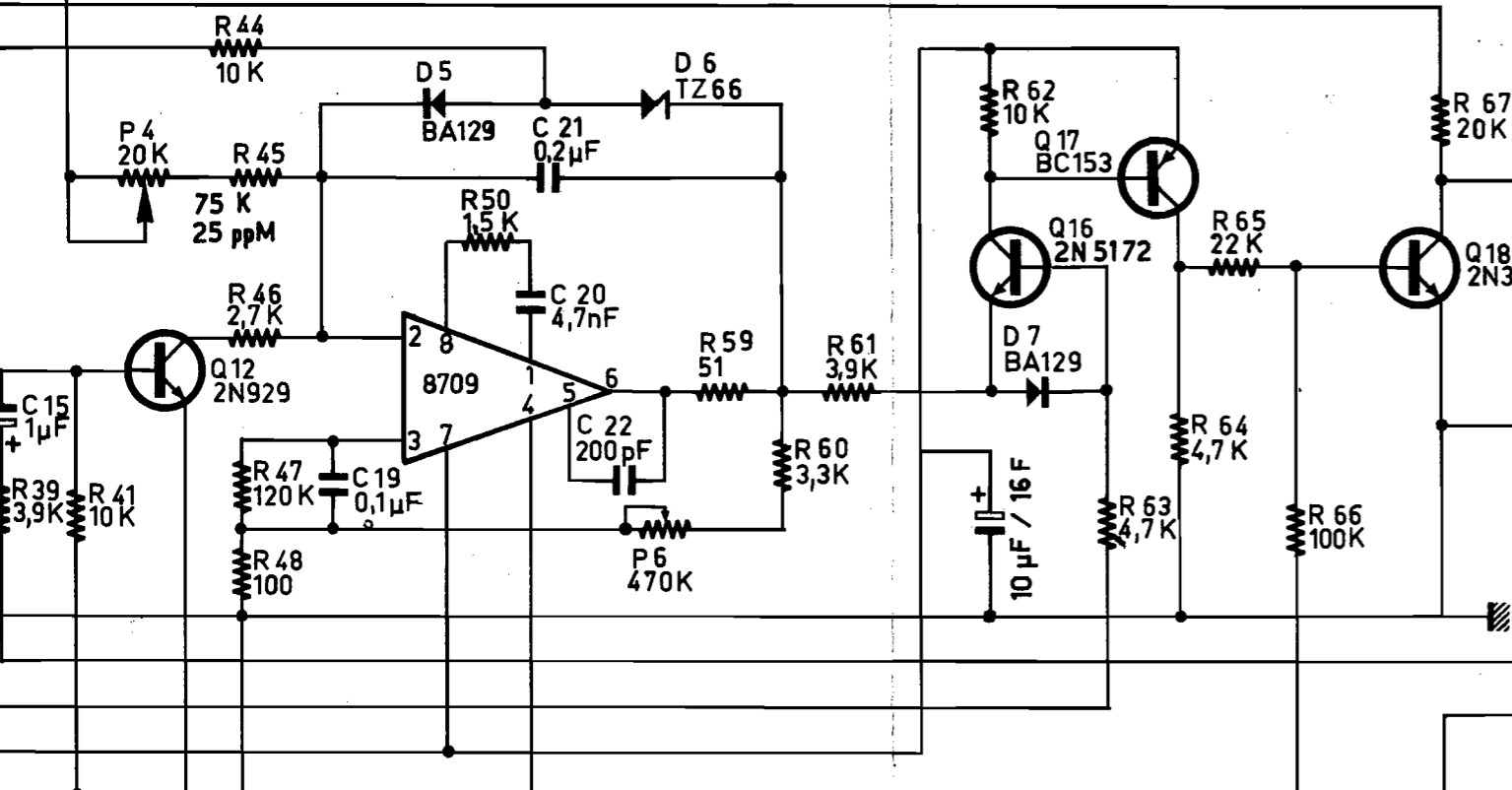
SORTIE PORTE
GATE OUTPUT

SORTIE T
T OUTPUT

FCH 211

FCH 191

FCH 161



**CARTE ALIMENTATION
MN 124**

**POWER SUPPLY
MN 124**

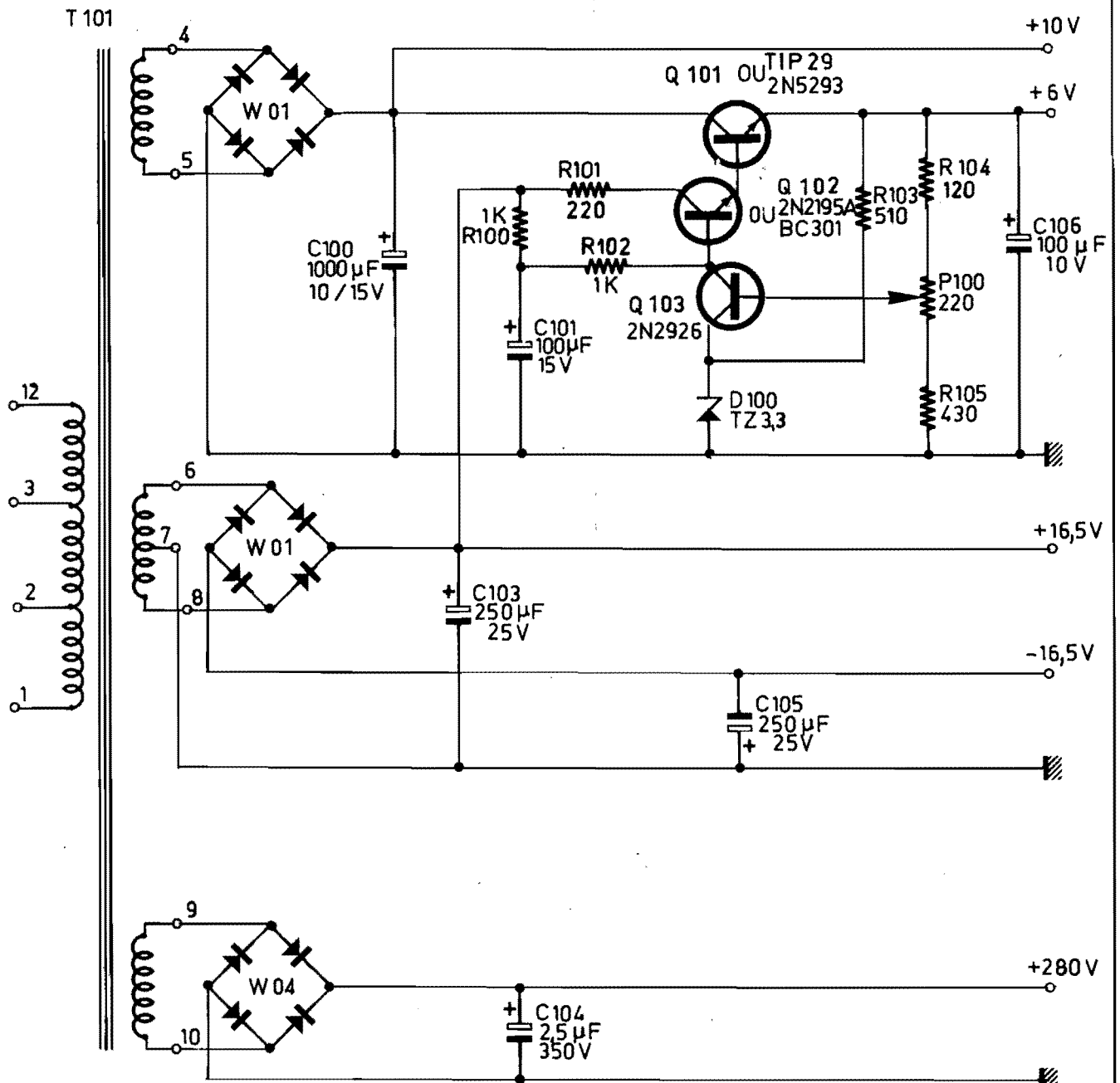
SOUS-ENSEMBLE -----	}	295 525
SUB - ASSEMBLY -----		
CIRCUIT IMPRIME -----	}	453 670
PRINTED CIRCUIT BOARD --		
KODATRACE -----	}	501 258
PRINTED CIRCUIT PATTERN]		

**SCHNEIDER
ELECTRONIQUE**

N° 51 406

EDITION

Type	Désignation	A	2/70	C
		B		D



CIRCUITS ANNEXES
MN 124

AUXILIARY CIRCUITS
MN 124

SOUS-ENSEMBLE _____	} 295 526
SUB - ASSEMBLY _____	
CIRCUIT IMPRIME _____	} 453 671
PRINTED CIRCUIT BOARD _____	
KODATRACE _____	} 501 259
PRINTED CIRCUIT PATTERN _____	

SCHNEIDER
ELECTRONIQUE

N° 51407

EDITION

Type

Désignation

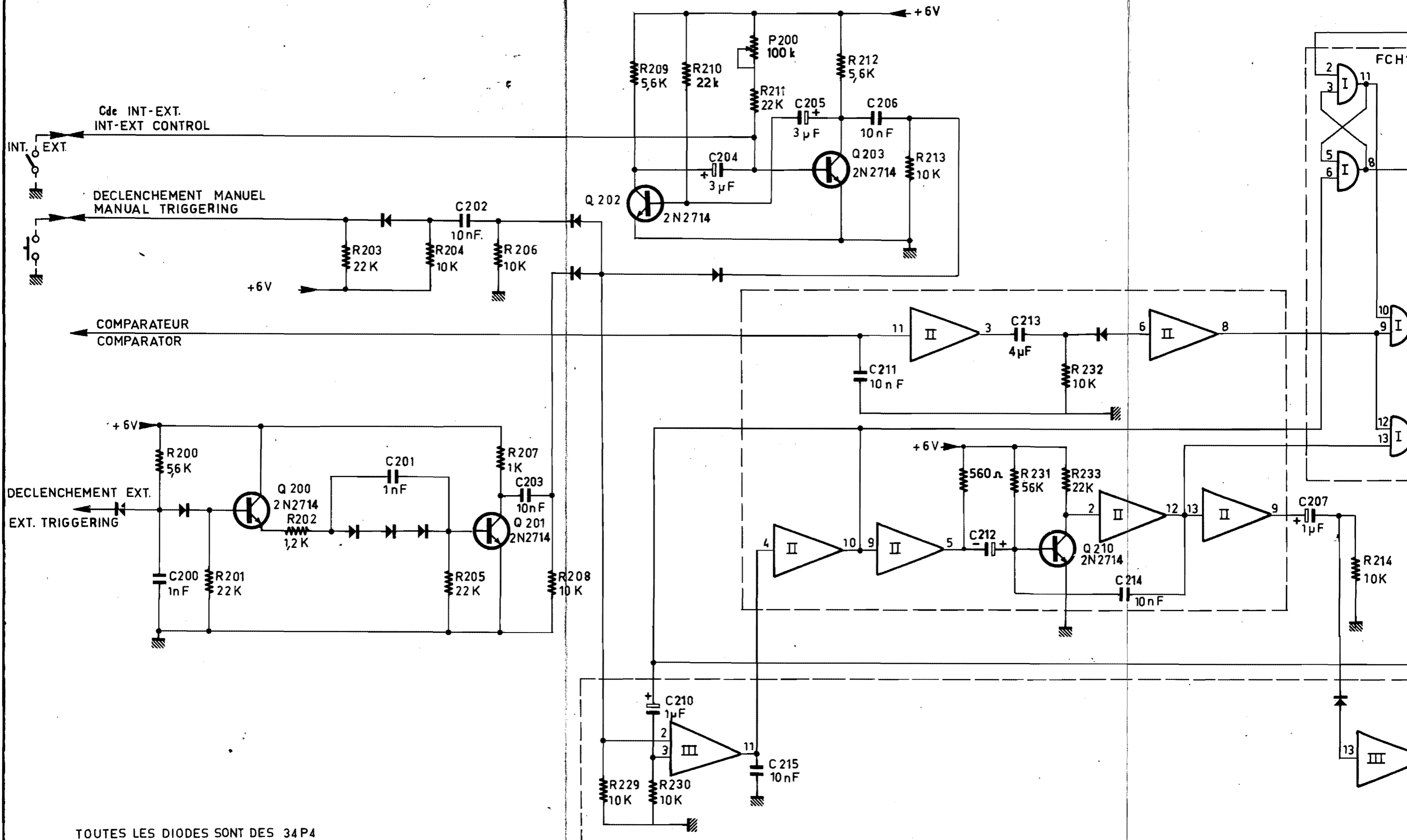
A

2/70

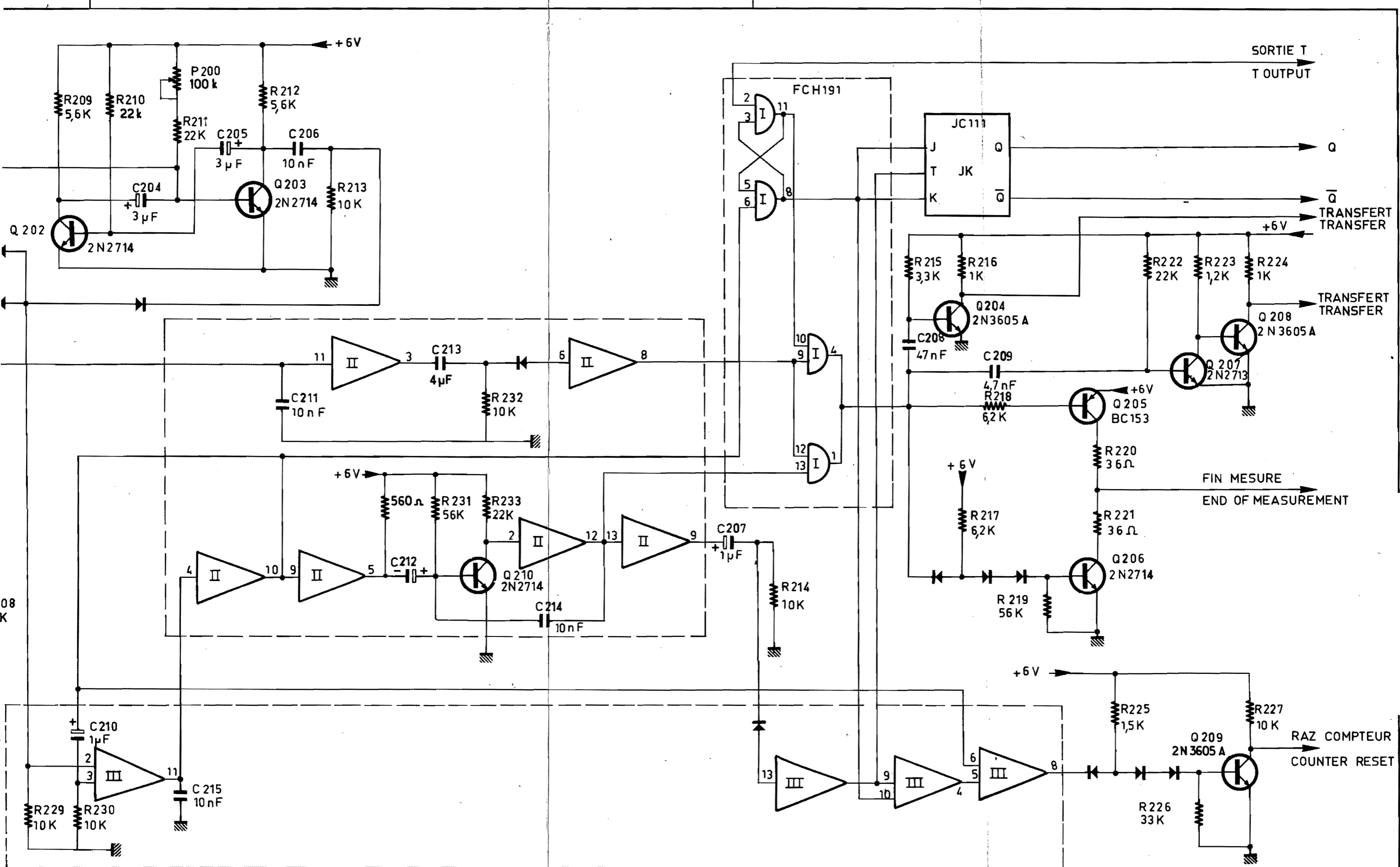
C

B

D



TOUTES LES DIODES SONT DES 34P4
 ALL DIODES ARE 34P4



**AMPLIFICATEUR - ATTENUATEUR CONTINU
MN 124**

**DC AMPLIFIER - ATTENUATOR
MN 124**

SOUS - ENSEMBLE _ _ _ _ _ } 295 527
 SUB - ASSEMBLY _ _ _ _ _ }
 CIRCUIT IMPRIME _ _ _ _ _ } 453 672
 PRINTED CIRCUIT BOARD _ _ }
 KODATRACE _ _ _ _ _ } 501 260
 PRINTED CIRCUIT PATTERN _ }

**SCHNEIDER
ELECTRONIQUE**

N° 51.408

EDITION

Type

Désignation

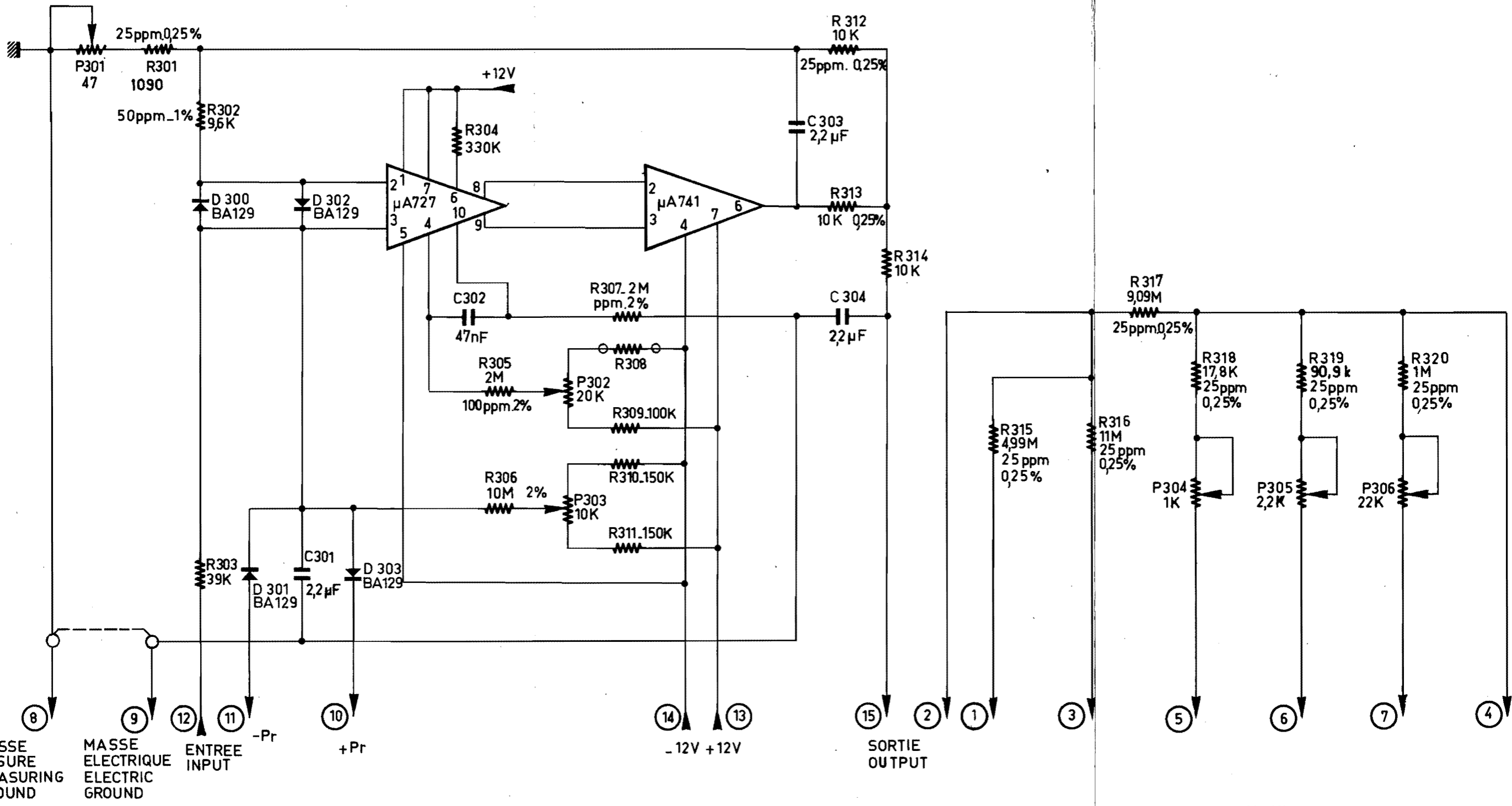
A

2/70

C

B

D



AMPLIFICATEUR CONTINU G=10
DC AMPLIFIER

ATTENUATEUR CONTINU
DC ATTENUATOR

**REPERE DE GAMME
MN 124**

**RANGE INDEXING
MN 124**

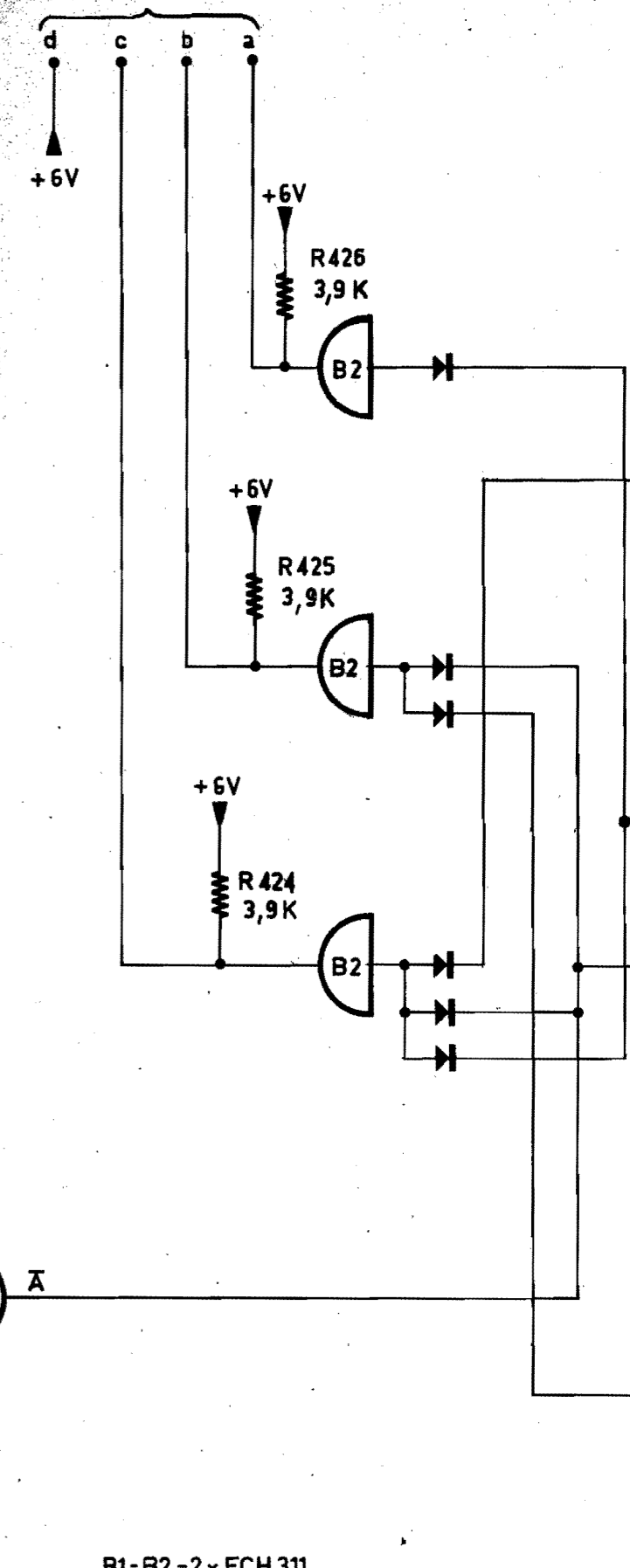
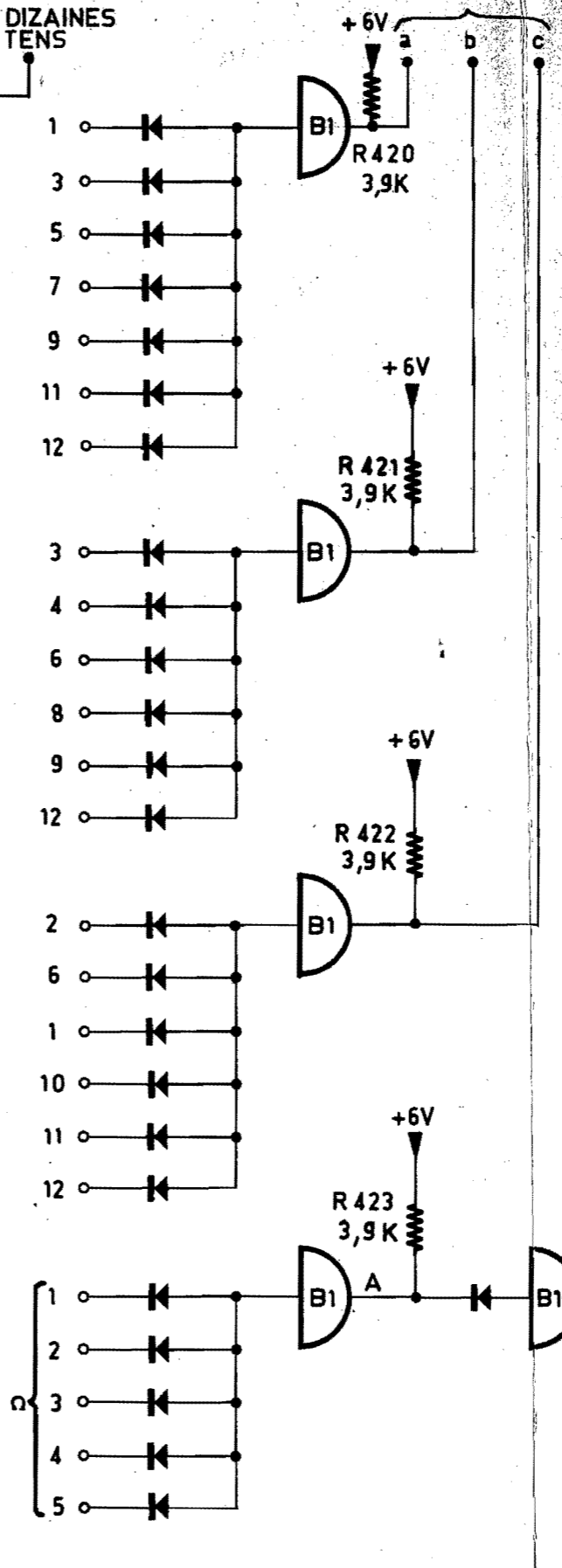
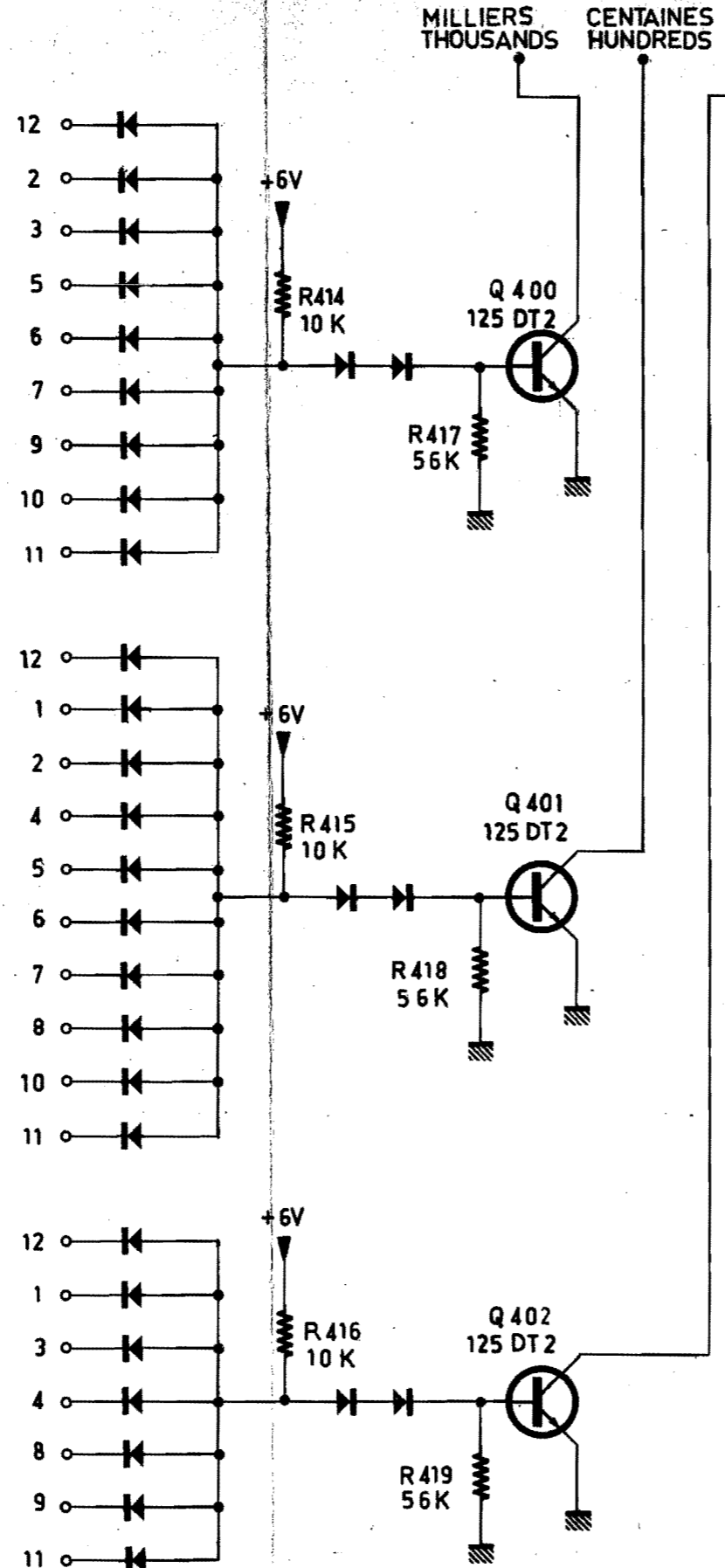
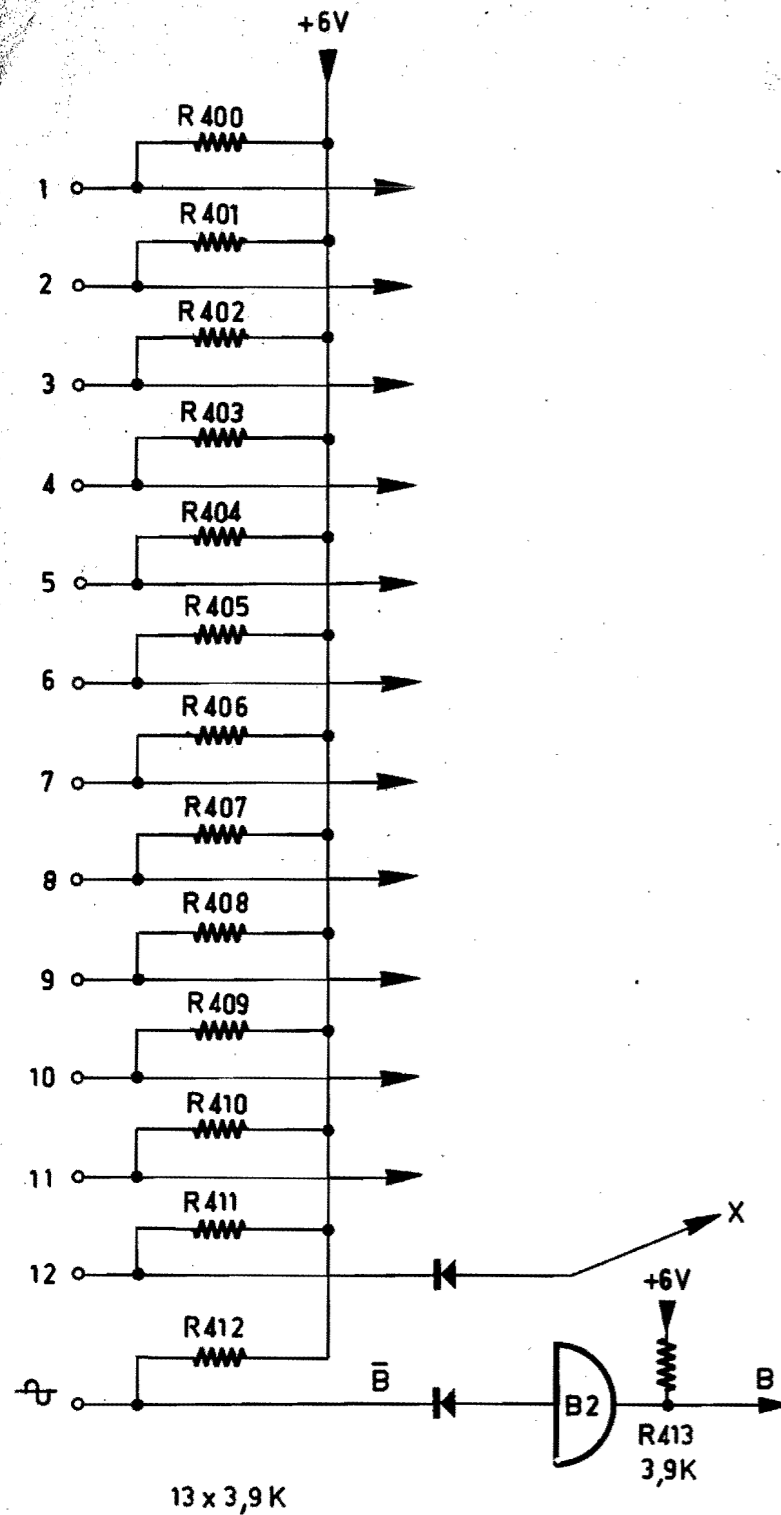
SOUS-ENSEMBLE _____	} 295 528
SUB-ASSEMBLY _____	
CIRCUIT IMPRIME _____	} 453 666
PRINTED CIRCUIT BOARD _____	
KODATRACE _____	} 501 261
PRINTED CIRCUIT PATTERN _____	

**SCHNEIDER
ELECTRONIQUE**

N° 51 409

EDITION

Type	Désignation	A	2/70	C	
		B		D	



TOUTES LES DIODES SONT DES 34P4
ALL DIODES ARE 34P4

B1-B2=2 x FCH 311

**CARTE MULTIMETRE
MN 124**

**MULTIMETER CIRCUIT BOARD
MN 124**

SOUS - ENSEMBLE _ _ _ _ _	}	295 529
SUB - ASSEMBLY _ _ _ _ _		
CIRCUIT IMPRIME _ _ _ _ _	}	453 667
PRINTED CIRCUIT BOARD _ _		
KODATRACE _ _ _ _ _	}	501 262
PRINTED CIRCUIT PATTERN		

**SCHNEIDER
ELECTRONIQUE**

N° 51.410

EDITION

Type

Désignation

A

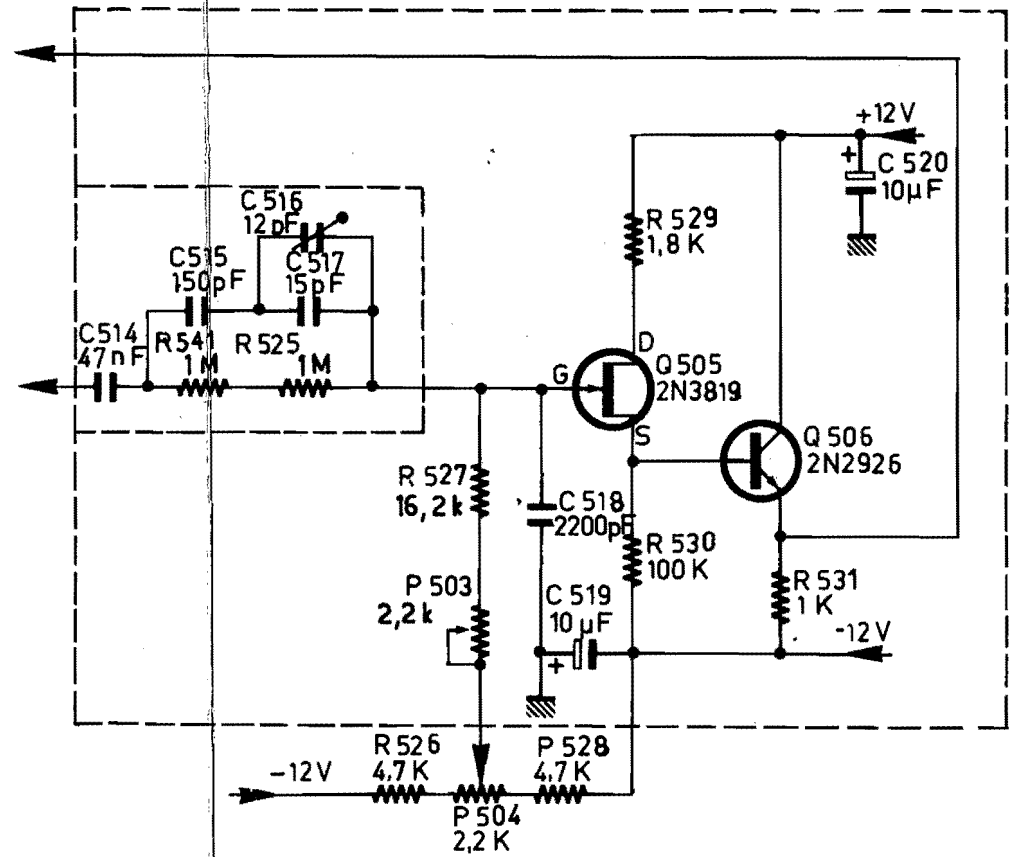
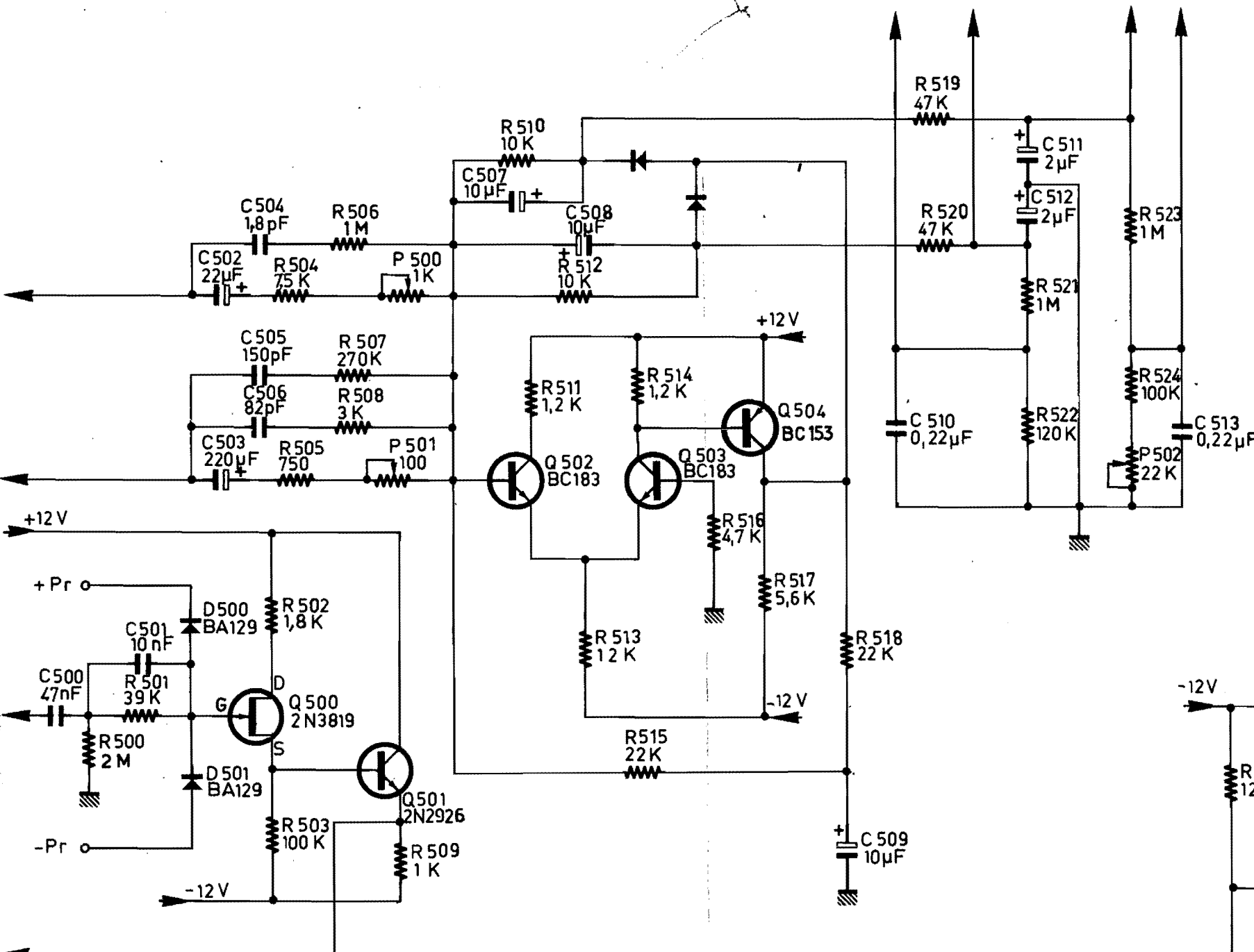
2/70

C

B

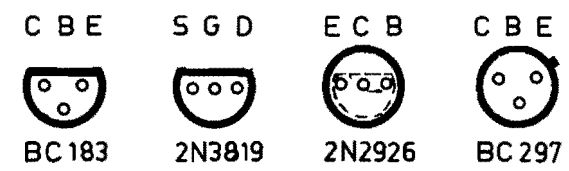
D

REDRESSEUR LINEAIRE
LINEAR RECTIFIER

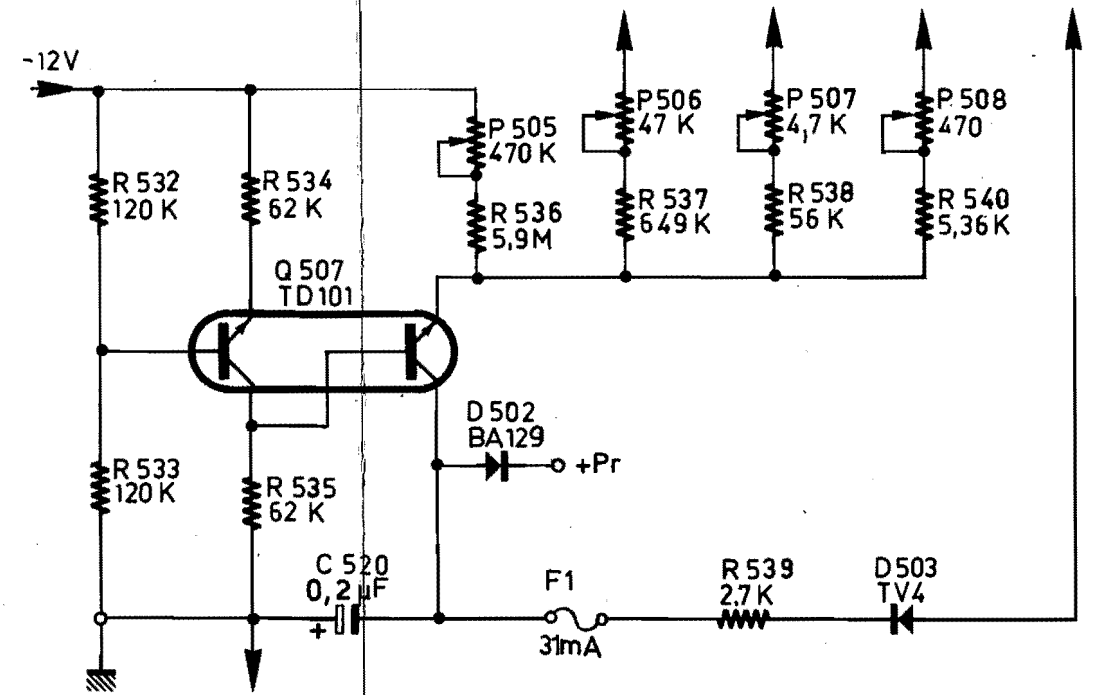


ATTENUATEUR
d.c. ATTENUATOR

ADAPTATEUR
ADAPTOR



TOUTES LES DIODES NON MARQUEES
SONT DES 34 P4
ALL DIODES WITHOUT MARK ARE 34P4



GENERATEUR DE COURANT CONSTANT
CONSTANT CURRENT GENERATOR

STORAGE DECADE
ECHELLE MEMOIRE

VT 200 - VT 300

FT 300 - MN 124

SOUS-ENSEMBLE -----	}	295 418
SUB - ASSEMBLY -----		
CIRCUIT IMPRIME -----	}	453 620
PRINTED CIRCUIT BOARD -----		
KODATRACE -----	}	501 136
PRINTED CIRCUIT PATTERN -----		

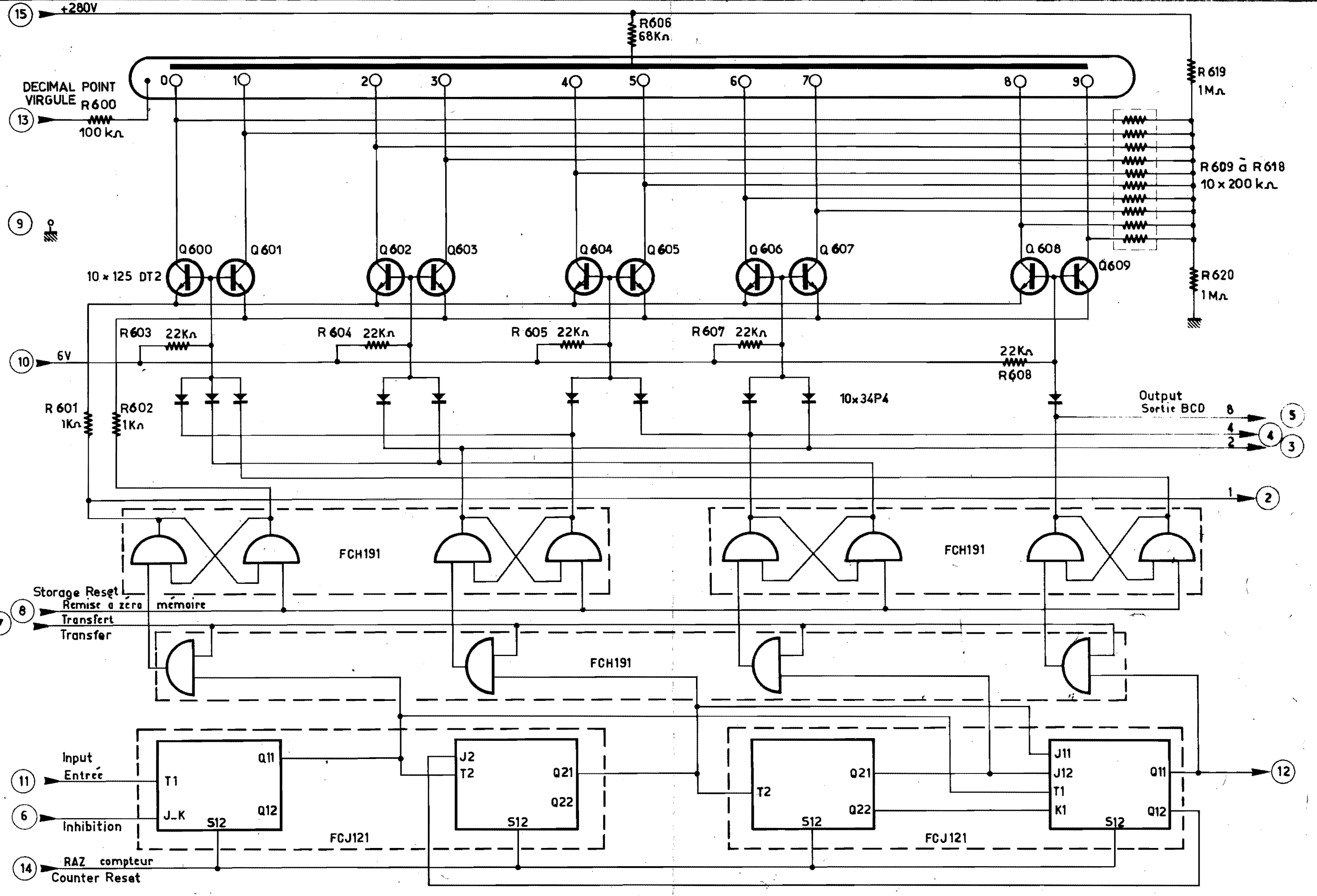
SCHNEIDER R.T
ELECTRONIQUE

DIVISION : ELECTRONIQUE PROFESSIONNELLE

51 229

EDITION

A	4/69	C	
B		D	



ECELLE 2 000
MN 124

2 000 DECADE
MN 124

SOUS-ENSEMBLE _____	} 295 555
SUB-ASSEMBLY _____	
CIRCUIT IMPRIME _____	} 453 684
PRINTED CIRCUIT BOARD _____	
KODATRACE _____	} 501 271
PRINTED CIRCUIT PATTERN _____	

SCHNEIDER
ELECTRONIQUE

N° 51 429

EDITION

Type

Désignation

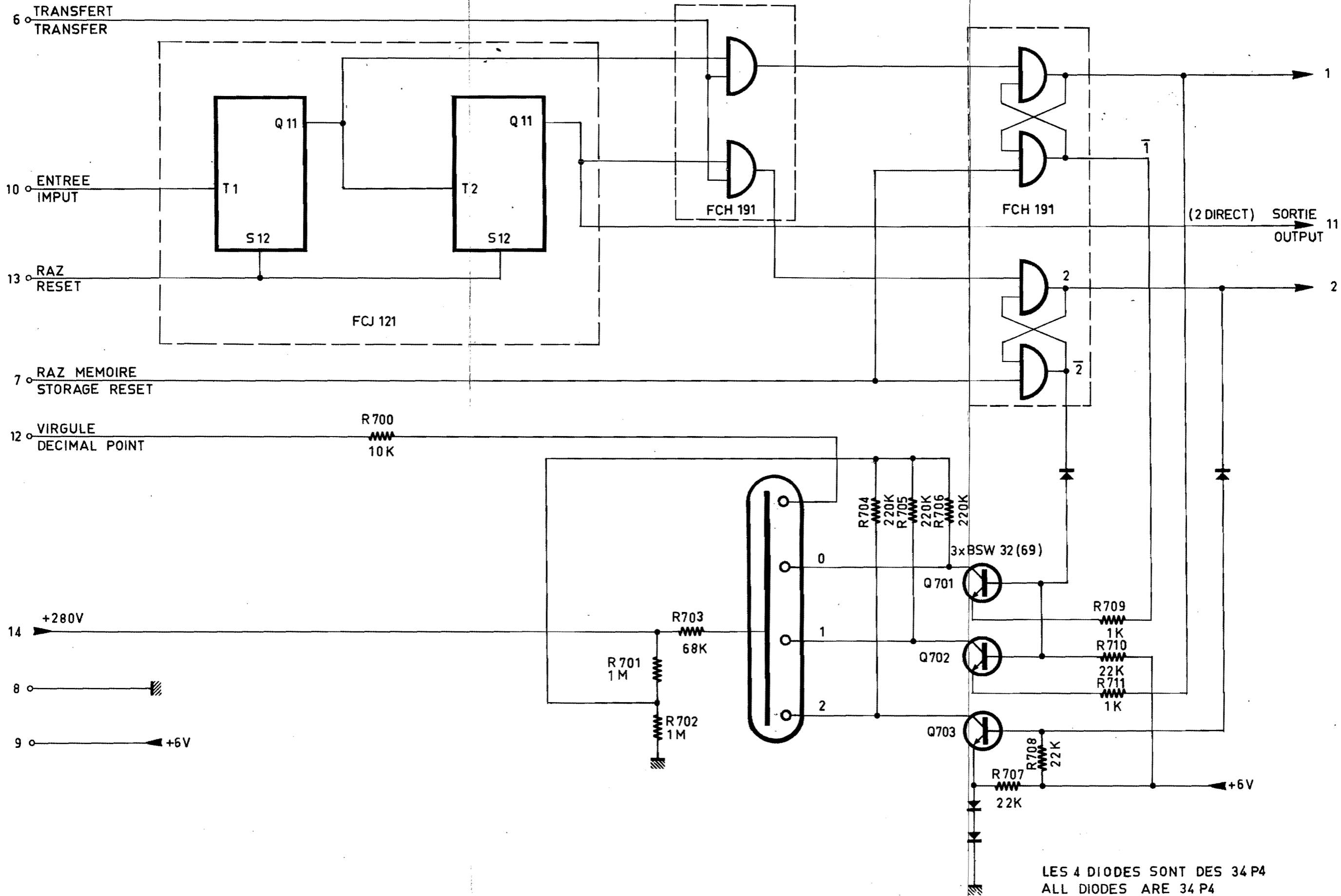
A

2/70

C

B

D



LES 4 DIODES SONT DES 34 P4
ALL DIODES ARE 34 P4