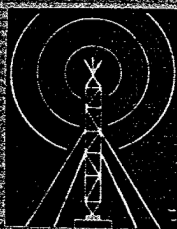


# NOTICE TECHNIQUE

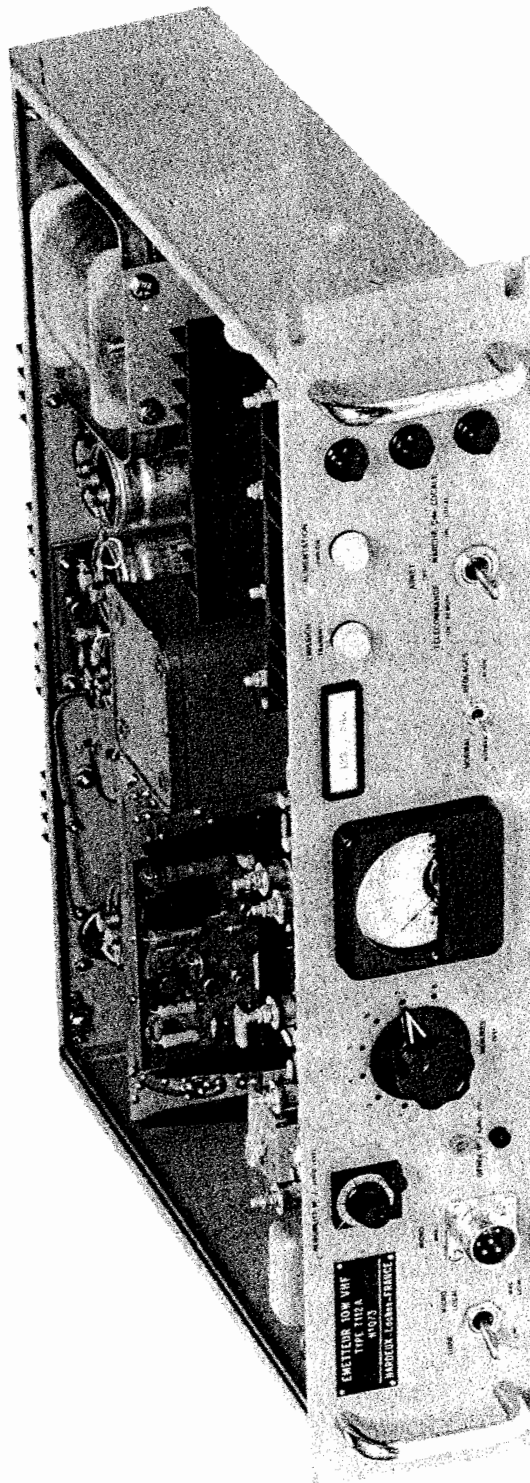
T.112 A\_V H F

10 W. TRANSMITTER



# nardoux

37600 Loches - France



VHF 10W Transmitter Type T112A

T 112 A VHF 10 W. transmitter  
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- Single tuned frequency transmitter
- Designed for air-ground communications
- Fully transistorized
- A3 amplitude modulation, push to talk system

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- Frequency range = 108 to 136 Megacycles
  - High frequency output power (carrier) = 10 watts min.
  - High frequency harmonics and other spurious radiations = less than 25 microwatts
  - High frequency output impedance : 50 ohms (SWR allowed of 2)
  - Frequency control : by crystal foreseen for the half of the transmitting frequency
  - Frequency stability : (from - 10 to + 55°C) =  $\pm 25.10^{-6}$ . On request the transmitter can be provided with a temperature compensated high stability oscillator (without thermostat), having an accuracy and stability of  $\pm 5.10^{-6}$ .
  - Modulation characteristics :
    - Modulation depths = close to 100%
    - Frequency range = 300 - 3000 cycles (tolerance 1,5 dB)
    - Distortion = less than 8% at 1000 cycles for a modulation depth of 80%
    - Background noise = - 40 dB or better
    - Automatic modulation depths control = less than 1 dB variation for 20 dB input level change
    - Nominal input level = 0 dB or 0.775 V (minimum level - 20 dB or 77 mV)
    - Input impedance = 600 ohms symmetrical or not
    - Push to talk system = operates emitting when putting line to mass  
Open circuit voltage = about 9 V  
Short circuit current = about 12 mA.
    - Power requirements = either 24 V  $\pm$  20% DC  
or 50/60 Hz - 110 - 115 - 127 - 220 - 230 - 254 V  $\pm$  10% AC  
(A tension regulator is provided).
    - Approximate consumption =
      - 1°) 24 V.DC
        - a) watch (blocked push to talk) 0,1 A
        - b) service (without modulation) 2,1 A
        - c) service (95% modulation) 2,4 A
      - 2°) Mains
        - a) watch = 15 VA
        - b) service (without modulation) = 70 VA
        - c) service (95% modulation) = 105 VA

- Use = This unit can operate without control = the watch consumption being not important, it eventually can remain under tension for a very long time.
- Description = Standard rack chassis, protected by a housing to be incorporated in a rack.
- Dimensions =
  - Height = 88 mm (2 rack units)
  - Width = 482 mm (rack standard)
  - Depth = 336 mm (external outline 366 mm)
  - Weight = 12 Kg.
- Environment requirements =
  - Temperature = operation from - 20 to + 70°C
  - Humidity = 95% at 55°C.

ELECTRICAL DESCRIPTION (see general diagram)

High frequency oscillator

In a metallic case with plug-in support.

It can be =

- Either a Nardeux model E138 which has a removable case and an interchangeable crystal,
- Or a PST model from CSF (or equivalent, as LMT for example) with high stability, temperature compensated, not removable sealed case,
- In every case the oscillator provides about 250 microwatts into a 50 ohms load impedance and works at the half of the transmit frequency.

Separator

Transistor Q1 - class A.

Frequency doubler

Transistor Q2 - Working in class C - The Q2 resonant circuit is tuned on the double of the crystal frequency.

High frequency preamplifier number 1

The preamplifier is constituted by the two transistors Q3 - Q4 and has an output level of about 500 milliwatts. Following Q4 is a 50 ohms matching circuit (L8, CV4, CV5) and eventually C26 - C27). An incorporated load resistor R17, switchable by a jumper makes the adjustments easier.

High frequency preamplifier number 2

It is constituted by an adaptation circuit CV8 - CV9 - L9 (input) followed by two amplifying stages (transistors Q6 - Q7).

### High frequency last amplifier

It is constituted by the power transistor Q8 and the input and output adaptation circuits (50 ohms matched output).

### High frequency filter

In a sealed water-tight casing. The low-pass filter cancels the harmonics and other spurious radiations.

### Detection

A capacitive divisor C42 - C43 and a diode CR1 followed by the suitable decoupling devices allow to obtain a continuous tension which is about proportional to the H.T. output voltage, for checking (measurement n° 5).

### Low frequency module

The connection of a microphone or a modulation line with push to talk button can be made on the two identical low frequency inputs which are available, one on the front panel and one on the rear panel. The first device of the low frequency module is the input transformer T1, followed by the adjustment potentiometer R31. Then is a transistor MOS-FET Q9 used as a variable resistor and being an executive device of the modulation automatic regulator (compressor); this transistor is controlled by Q11 and by a detector filter circuit (specially diode CR2) with non symmetrical time constantes. The circuit is connected to the main output of the modulation transformer (T2). The whole regulator forms a loop which includes almost all the low-frequency circuits. The potentiometer R11S, factory adjusted, sets the working limit of the regulator and then determines the modulation depths.

The transistors Q12 thru Q14 form a feedback stabilized preamplifier module.

The driver is a series supplied almost complementary class B type. This circuit shows a great negative feedback and has excellent stability and linearity properties. It includes the transistors Q16 thru Q19 and Q21 - Q22. It works on the modulation transformer primary T2 by means of the connection capacity C74

The transformer has a secondary winding and an auxiliary secondary winding. The modulation is applied (with correct relative depths) to the three last high frequency amplifier stages.

### Regulated power supply

The transformer T3 can be mains supplied by means of the switch S2. An optional relay K1 allows the remote switching control (this relay is supplied on demand).

The transformer is constituted by two half primaries with intermediate plugs allowing them to be adapted to the different voltages (parallel or series connection). The secondary works on the rectifier diode bridge CR9 thru CR11.

For want of mains, the unit can be supplied from a 24 V battery (negative to the ground), the straps (S3 - S4 - S5) must be placed in a convenient way, when mounted, according to battery or mains supply.

The capacities C77 - C78 filter.

The regulation chiefly uses the ballast transistor series Q24, piloted by the amplifier Q31 - Q29 - Q28, the voltage reference being supplied by CR 18. The regulating mounting is also used as an electronic switch in connection with the push to talk switch by means of the transistor Q27, working on Q28 - Q24.

The regulated voltage supplied by Q24 is about 19 volts (mains or battery)

Q26 supplies a 14 V auxiliary regulated voltage to be used by the lower HF amplifying stages (Q1 thru Q4).

The transistor Q23 and its related components are a source of regulated current supplying Q6 - Q7 through the auxiliary secondary of the modulation transformer.

#### Measurement

An universal galvanometer M1 can be inserted into the chief circuits by means of a bipolar switch with 8 positions S6 for different voltage and current checkings (see measurement notice).

#### SUMMARY MECHANICAL DESCRIPTION

##### Front panel control and check devices, their use

- Galvanometer and its 8 position switch S6 (see measurement notice)
- Throw over switch "ligne-micro local" switches on either the low frequency input connector push to talk button located at the rear J2 generally used to connect a line, or the homologous connector on the front panel (for local micro with push totalk button).
- Micro connector J5 (see above)
- B.F. generator connector = for modulation tests (any asymmetrical low frequency generator able to support a load of about 1500 ohms can be used ; for this test the throw over switch must be on the "local micro" position and nothing must be connected on the micro input.
- B.F. sensitivity adjustment, with locking dial (R31) = is used as a low frequency input attenuator allowing the matching at the average level existing on the line.
- "Normal - reglage - switch = on the position "reglages" this switch short circuits the keying line, allowing a continuous dash transmission.
- Lamp "alimentation - (white) DS1 = glows when the equipment is under voltage, keyed or not.
- Lamp "emission" (yellow) DS2 : glows during the transmission period (keyed).
- Two fuses " " (F1 - F2) protect both poles of the mains supply line.
- One fuse " " F3 protects the positive pole of direct - current supply (battery).

Three position switch S2 "On - Stop" for local operation - "On" for remote control.

Rear panel connectors

- Supply connector (13 pins) J1 (remote control)
- Low frequency connector (line + keying + transmission antenna relay + receiving (6 pins) J2
- Coaxial connector for contingent exterior pilot (J3)
- Antenna output coaxial connector.

Chassis main internal components

From front to rear =

- Front panel control and check devices
- High frequency mounting (with plugs) = pilot oscillator in a plugging case on the left side
- The line input transformer 600 ohms or micro
- The two regulation transistors Q23 - Q26 on a heat radiator
- The modulation transformer, in sealed container
- The four supply rectification diodes
- The location for the contingent remote control relay K1
- The regulation patchcard (n° 274.104)
- The low frequency patchcard (n° 274.102)
- Several electrochemical condensers (decoupling, filtering, etc....)
- The supply transformer
- The HF output filter (on the right side, in a water-tight case)
- In the back part of the chassis
- The two BF power transistors (Q21 - Q22) on a heat radiator
- The chief regulation ballast transistor Q24, on a heat radiator.

Internal preadjustment devices

The pilot oscillator is located in front and on the left side of the "HF oscillator - preampli - ampli" module.

The internal oscillator can be removed and replaced by a connector cap. The high frequency preamplifier input is then connected to a coaxial connector J3 (at the rear of the unit) for exterior pilot. The high frequency circuits are matched by multi-turn rotating adjustable capacitors. There are 14 capacitors, marked in clear from CV1 thru CV 14.

The variable capacitors adjustments can be defined by first turning them fully clock wise and then unscrewing a certain number of turns counter clock wise, or if necessary by fractions of turn (see adjustment table).

Two additional capacitors connected by jumper (CA1 - CA2) can be set in parallel with CV5 according to the frequency (see adjustment table).

Near the center of the "oscillator - preampli HF driver"- module on the printed card, are three plugs supplied with jumpers. When the white and red plugs are connected together (R position), the HF preamplifier (stage Q4) is loaded by an incorporated 50 ohm resistor (R17), then the adjustments of the stages Q1 to Q4 must be made. When the white and blue plugs are connected (N position), the stage Q4 is connected to the next stage Q6, this is corresponding to a sequence of the adjustments and to the normal operation.

CONNECTIONS

Jack J1 (on the rear part)

- Mains supply, no "On - Stop" remote control

- Mains = C and D
- Ground 2 + 3 + 4

- Battery supply, no remote control

- Ground and battery negative 2 + 3 + 4
- Battery positive (24 V) C

- Mains or battery supply, with "On - Stop" exterior keying

Like above, but with A and B keying

- Mains or battery supply with K1 incorporated relay remote control

Like above with voltage excited relay keying (8 and 9)

Remark - The relay can be intended with DC excitation (24 V. voltage, for instance), then this voltage is to be supplied from external source. The relay can also be designed with AC excitation from mains voltage. In this case, connect together 5 and 8, then connect the remote control key between 1 and 9.

Jack J2 (on the rear part) or/and Jack J5 (on the front part)

- 600 ohms line 0 dB (micro) 1 and 2
- 600 ohms line middle point (4) (to be generally connected to the mass, which means to "strap" 4 and 5
- Mass = 5
- Micro supply = 6 (Jack J5 on the front part)
- Voltage = about 24 V. operating with the push and talk system for antenna relay (6). Jack J2 on the rear part.
- Push and talk system key = 3 (keying is obtained by short circuit of 3 and 5).

Jack J3 (on the rear part) (BNC input jack)

For optional exterior pilot, impedance 50 ohms. Level 250 microwatts (tolerance - 10 + 50% level). In that case the internal pilot must be removed and replaced by the interconnection cap situated close by.

Jack J4 (on the rear part) (N output jack)

To 50 ohms antenna.



Internal connections for mains supply

Remove the under chassis cap. Two brown 8 plug terminal blocks are to be seen on the rear part (behind the modulation transformer).

On the terminal block bearing the printed letters S and B, connect by straps the three lugs separated from one another by letter S. More exactly, strap 2 and 3, then 4 and 5, then 7 and 8 (see S3 - S4 - S5 on general diagram).

The second terminal block is in fact the mains distributor, it is connected to the two half primaries of the supply transformer (it is marked 0 - 110 - 115 - 127 - 0 - 110 - 115 - 127).

The mains wires are respectively yellow-green and purple red.

For 110 V mains

- Yellow-green = 3
- Purple-red = 8
- Strap between = 3 and 7
- Strap between = 4 and 8

For 115 V mains

- Yellow-green = 2
- Purple-red = 8
- Strap between = 2 and 6
- Strap between = 4 and 8

For 127 V mains

- Yellow-green = 1
- Purple-red = 8
- Strap between = 1 and 5
- Strap between = 4 and 8

For 220 V mains

- Yellow-green = 3
- Purple-red = 8
- Strap between = 4 and 7

For 230 V mains

- Yellow-green = 2
- Purple-red = 8
- Strap between = 4 and 6

For 254 V mains

- Yellow-green = 1
- Purple-red = 8
- Strap between = 4 and 6

Internal connections for battery supply

Remove the under chassis cap. Two brown 8 plug terminal blocks are to be seen on the rear part (behind the modulation transformer).

On the terminal block bearing the printed letters S and B connect by straps the two lugs separated one from the other by letter B. More exactly strap 1 and 2 then 6 and 7 (see S3 - S4 - S5 on general diagram).

#### Installation of remote control relay (K1)

The relay is a EP3 type with support (purveyor MTI). It can be set close by the supply transformer by means of an aperture of the chassis.

A four lug terminal block allows =

- To connect the relay excitation to lugs 3 and 4
- To connect the relay "on" key to lugs 1 and 2.

#### ADJUSTMENT METHODS

##### Preliminary observations

The adjustment table shows the number of turns and fractions of turns from which the variable capacitor rotor must be unscrewed. The reference is taken the rotor completely screwed (maximum capacitance). The table is established every 4 megacycles and with an accuracy of a quarter of turn. For every frequency not in the table, it is necessary to make an approximative interpolation.

The stator of each capacitor is marked with a black point, the rotor has a red and green line. When the red line coincides with the black point the capacitor has been unscrewed of an exact number of turns (to be counted) ; when the green line coincides with the black point, the capacitor has been unscrewed of half a turn more. An accuracy better than a quarter of turn is useless.

The table allows only an approximative preadjustment, the exact adjustments must be made according to the following method.

The high frequency can be considered as divided into two parts with successive and separated adjustments.

- 1°) The small stages (Q1 to Q4, CV1 to CV5) materialized on the unit by a printed card, the output of this circuit is about 600 milliwatts (on 50 ohms).
- 2°) The medium stages and the power stage (Q6 to Q8 - CV6 to CV14) materialized by the right side of the high frequency strip (following of the printed card).

To adjust the small stages, their output must be loaded by an incorporated 50 ohms resistor (R17) (output jumper on R position on the printed card). This adjustment must not be changed later.

To adjust the medium stages and the power stage the load used in the antenna. A directive wattmeter (such as ThruLine) is very useful to measure the output power and also the reflected power. This external wattmeter (not provided) must be placed in series with the antenna cable.

## I ADJUSTMENTS OF THE SMALL STAGES

- 1) Operate all the preadjustments (CV1 to CV14) according to the table
- 2) Turn the front panel "sensibilite BF" potentiometer to zero
- 3) Set the front panel "normal - reglages switch on position "reglage
- 4) Put the jumper located on the printed card inside the set on the position R (red and white connectors linked together)
- 5) Energize the transmitter ("On" local key)
- 6) Check the regulated + 19 volts (measurement n° 8)
- 7) Switch being on position 1, adjust CV1 to a maximum current (indication on the galvanometer)
- 8) Switch being on position 2, adjust CV2 to the maximum
- 9) Switch being on position 2, adjust CV3 to the maximum
- 10) Switch being on position 2, adjust CV4 to the minimum. When the minimum is obtained, the galvanometer must deviate to the number 3,5/10 ; to realize this condition, adjust CV5. When CV5 is increased, the galvanometer is decreased (the minimum being made again by turning CV4 and vice versa). If it happens that CV5 is turned maximum without a sufficient result , one or two additional capacitors (jumpers CA1 - CA2) even if it is not prescribed by the table for this working frequency.

Note : Do not worry if the minimum obtained by CV4 is not very important.

- 11) Switch off the transmitter.

## II ADJUSTMENT OF THE MEDIUM STAGES

- 12) Put the jumper on the position N (blue and white connectors linked together)
- 13) Energize the transmitter
- 14) Switch being on position 3 adjust successively CV6 and CV7 to obtain the greatest possible galvanometer deviation
- 15) Adjustment of CV12 - CV13 - CV14 (observe that CV13 - CV14 are in parallel)
  - a) Switch on position 5, adjust CV12 to the maximum (note measurements 5 and 4 after indications of the galvanometer
  - b) Slightly modify the value of CV13 - CV14, (increasing or decreasing). Adjust CV12 to a max. (measurement 5) and note the indications of the galvanometer (m. 5 and m. 4)
  - c) Repeat the precedent checking (b) and try different values for CV12 and CV14
  - d) Choose among these operations the adjustment allowing to simultaneously obtain the highest possible measurement (m. 5) when the galvanometer indicates 5/10 (measure position 4). this is equivalent to extracting the maximum of HF output power from the final transistor Q8 (measure 5) for an imposed nominal supply current (measure 4).

III MODULATION ADJUSTMENTS

- 16) Switch on position 7, adjust the "sensibilite BF" potentiometer (front panel) so that a reading on the galvanometer between 0 and 2 is obtained when peak modulated.

IV OPERATION

- 17) Set on "normal" the front panel switch "normal - reglages".

TRANSMITTER T 112 B

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Measurement table

Measure position number	Measure description	Calibration voltage or current value for full scale indication	Reading in normal operation (1) number indication of the scale	True corresponding value
1	IC of Q2 (frequency doubler)	50 mA	3,6	18 mA
2	Ic of Q4 (HF preamplifier)	200 mA	3,5	70 mA
3	Ib of Q8 (HF final)	200 mA	5	100 mA
4	Ic of Q8 (HF final)	2 A	5	1 A
5	HF output voltage	not calibrated	(2)	
6	Modulation	not calibrated	4,5 (3)	
7	Modulation regulator control	not calibrated	(4)	
8	Supply voltage (+ 20 A)	30 V	6,5	19,5 V

- (1) The indicated values are an average, some of them can change with the frequency, the crystal activity, etc....
- (2) Variable value according to load and frequency, it can vary from 4 to 6 for a well adapted antenna.
- (3) Approximate value for 80% modulation.
- (4) Deviates with the modulation, when the regulator operates.

ADJUSTMENT NOTICE TABLE

The adjustment table shows the number or fraction of turns from which the rotor of the variable capacitors must be unscrewed. The reference is taken the rotor turned fully (maximum capacitance).

	108 MHz	112 MHz	116 MHz	120 MHz	124 MHz	128 MHz	132 MHz	136 MHz
CV 1	3/4	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/4	2 1/2
CV 2	1/2	1	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3
CV 3	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3	3 1/4
CV 4	3 1/2	3 1/4	3 1/2	3 1/2	3 1/2	3 1/2	3 3/4	3 3/4
CV 5	1 1/2	2 3/4	1	1 1/2	2 1/4	2	2 1/2	3
CA1 (1)	x	x				x	x	x
CA2 (1)	x	x	x	x	x			
CV 6	1/4	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/4
CV 7	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/4	2 1/4
CV 8	1/4	3/4	3/4	1 1/4	1 1/4	1 1/2	1 3/4	2
CV 9	1 1/2	1 1/2	2	2	2 1/2	2 1/2	3	3 3/4
CV 10	1	2	2	2	2 1/2	2 1/2	3	3 3/4
CV 11	3 3/4	3 3/4	3 3/4	3 3/4	3 3/4	3 3/4	3 3/4	3 3/4
CV 12	1 1/4	1 3/4	2	2 1/4	2 1/4	2 3/4	3	3 1/4
CV 13	2	2 1/2	2	2	2 1/2	2 1/2	1 1/2	1 1/2
CV 14	2	2 1/2	2	2	2 1/2	2 1/2	2 1/2	2 1/2

(1) CA1 and CA2 are fixed capacitors to add with jumpers.

Nomenclature

Diagram index	Designation and characteristics	Supplier	Supplier's reference
	Card "preamplification - low frequency regulator"	NARDEUX	274.102
	Card "regulation (weak currents)	NARDEUX	274.104
C1	Metallized polyester capacitor 0,1 uF $\pm$ 20% TS 250 Vcc	COGECO	C280 AE/P 100K
C2	Tubular ceramic capacitor 1000 pF - 20 + 50% TS 500 Vcc	COGECO	C301 GA/H 1K
C3	Ceramic capacitor isolated plate 1000 pF $\pm$ 10% TS 63 Vcc	L.C.C.	GOZ 744 J4
C4	Ceramic capacitor isolated plate 2200 pF $\pm$ 10% TS 63 Vcc	L.C.C.	GOZ 745 J4
C6	Metallized polyester capacitor 47 nF $\pm$ 20% TS 250 Vcc	COGECO	C280 AE/P 47K
C7	Like C4		
C8	Like C4		
C9	Tubular ceramic capacitor 22 pF $\pm$ 5% TS 500 Vcc	COGECO	C304 GB/B 22E
C11	Like C4		
C12	Ceramic capacitor type button 1000 pF 0 + 100% TS 500 Vcc	L.C.C.	DBX 020
C13	Tubular ceramic capacitor 33 pF $\pm$ 5% TS 500 Vcc	COGECO	C304 GB/B 33E
C14	Like C6		
C16	Like C6		
C17	Like C4		
C18	Like C4		
C19	Like C6		
C20	Tubular ceramic capacitor 10 pF $\pm$ 0,5 pF TS 500 Vcc	COGECO	C304 GB/L 10E
C21	Like C12		
C22	Like C1		
C23	Like C6		
C24	Like C12		
C26	Like C9		
C27	Tubular ceramic capacitor 18 pF $\pm$ 5% TS 250 Vcc	COGECO	C280 AE/P 18E
C28	Like C2		
C29	Ceramic capacitor "terminal" 1000 pF - 20 + 80% TS 350 Vcc	L.C.C.	D.D.W. 002
C31	Like C1		
C32	Like C29		
C33	Like C1		
C34	Like C1		
C35	Like C1		
C36	Like C29		
C37	Metallized polyester capacitor 0,22 uF $\pm$ 20% TS 250 Vcc	COGECO	C280 AE/P 220K
C38	Like C1		
C39	Like C1		
C41	Like C2		
C42	Tubular ceramic capacitor 4,7 pF $\pm$ 0,5 pF TS 500 Vcc	COGECO	C304 GB/L 4E7

Diagram index	Designation and characteristics	Supplier	Supplier's reference
C43	Tubular ceramic capacitor 47 pF $\pm$ 5% TS 500 Vcc	COGECO	C304 GB/B 47E
C44	Like C2		
C46	Tantalum capacitor 100 uF $\pm$ 10% TS 20 Vcc	PRECIS	CTS 13 B
C47	Like C2		
C50	Like C2		
C74	Electrochemical capacitor 2200 uF 40/48 Vcc	SIC SAFCO	Felsic
C76	Electrochemical capacitor 1000 uF 40/48 Vcc	SIC SAFCO	Relaisic
C77	Like C74		
C78	Like C74		
C79	Like C74		
C84	Like C2		
C86	Like C2		
C87	Like C2		
CR1	Diode	SESCO	1N 914
CR8	Zener diode 10 V 500 mW	SESCO	110 Z4
CR11	Diode	SESCO	42 R2
CR9	Diode	SESCO	42 R2
CR12	Diode	SESCO	42 R2R
CR13	Like CR12		
CV1	Adjustable air capacitor 4 pF to 25 pF + 20% TE 500 V	R.T.C.	CO05 BC/25E
CV2	Like CV1		
CV3	Adjustable air capacitor 4 pF to 10 pF + 20% TE 500 V	R.T.C.	CO05 BC/10E
CV4	Like CV1		
CV5	Like CV1		
CV6	Adjustable air capacitor (not isolated) 4 to 25 pF + 20% TE 500 V	R.T.C.	CO05 BA/25E
CV7	Like CV6		
CV8	Like CV6		
CV9	Adjustable air capacitor (isolated model) 4 to 25 pF + 20% TE 500 V	R.T.C.	CO05 AA/25E
CV10	Like CV9		
CV11	Like CV9		
CV12	Like CV9		
CV13	Like CV6		
CV14	Like CV6		
DS1	Midjet signal lamp 24/28 V 40 mA	RUSSENBERGER	Ref. 527
DS2	Like DS1		
F1	Glass tube fuse (fast series) 6,3 A	CEHESS	DI/6,3 A
F2	Glass tube fuse (fast series) 2 A	CEHESS	DI/2 A
F3	Glass tube fuse (fast series) 6,3 A	CEHESS	DI/6,3 A
F4	Glass tube fuse (fast series) 0,3 A	CEHESS	DI/0,3 A
FL1	Low pass filter	NARDEUX	F108
J1	Fixed male jack 13 pins Mobile female plug 13 pins with nut Cable-grip SC2-9-11	SOCAPEX SOCAPEX	EM 213 AN FFD 213 AN
J2	Fixed male jack 6 pins (fast series) Mobile female plug 6 pins (fast series) With cable-grip 532.900	JAEGER JAEGER	536.006 532.006
J4	Coaxial jack (N series)(it isa component part of the filter FL 108) Mobile coaxial plug (N series)	OTTAWA RADIALL	UG 58/AU 06 UG 21 B/U



Diagram index	Designation and characteristics	Supplier	Supplier's reference
J3	Coaxial jack (BNC series)	RADIALL	UG 290/U
J5	Fixed male jack 6 pins (fast series)	JAEGER	536.006
J6	Ceramic noval socket	R.T.C.	B 870.019
	Noval cap	M.F.O.M.	692
J7	Coaxial jack without flange (BNC series) it is a component of the filter FL 108 Mobile coaxial plug (BNC series)	RADIALL	UG 290/U
L1	High frequency tuning coil	RADIALL	UG 88/U
L2	Choke coil 47 uH $\pm$ 5%	NARDEUX	N282
L3	High frequency tuning coil	STANWICK	24.701 M
L4	High frequency tuning coil	NARDEUX	N283
L5	Choke coil 10 uH $\pm$ 10%	NARDEUX	N284
L6	High frequency tuning coil	STANWICK	21.001 M
L7	Choke coil 2,2 uH	NARDEUX	N285
L8	High frequency tuning coil	STANWICK	92.202 M
L9	High frequency tuning coil	NARDEUX	N286
L10	High frequency tuning coil	NARDEUX	N287
L11	High frequency tuning coil	NARDEUX	N288
L12	Choke coil	NARDEUX	N289
L13	Like L10	R.T.C.	VK 200-09
L14	Like L11		
L15	Choke coil 1 uH $\pm$ 10%	STANWICK	91.002 M
L16	High frequency tuning coil	NARDEUX	N290
L17	High frequency tuning coil	NARDEUX	N291
L18	Choke coil 10 uH $\pm$ 10%	STANWICK	21.001 M
L19	Choke coil 47 uH $\pm$ 5%	STANWICK	24.701 M
M1	Continuous current magnetoelectric galvanometer model with adjusted internal resistor caliber 1 mA - 100 ohms - $\pm$ 1% - 100 mV class 1,5 graduation with twin calibration scales and ciphers n° 202 and 216 without indication of unity (superior scale n° 202)	PEKLY	Hermetrop 48
Q1	Transistor	COSEM	2N 918
Q2	Transistor	R.C.A.	40.405
Q3	Transistor	COSEM	2N 3137
Q4	Transistor	R.C.A.	40.290
Q6	Transistor	R.C.A.	40.291
Q7	Transistor	R.C.A.	40.292
Q8	Transistor	R.C.A.	2N 5102
Q21	Transistor	R.C.A.	2N 3055
Q22	Like Q21		
Q23	Like Q21		
Q24	Like Q21		
Q26	Like Q21		
R1	Carbon film resistor 68 ohms $\pm$ 5% 1/4 W	L.C.C.	RBX 001
R2	Carbon film resistor 6,8 Kohms $\pm$ 5% 1/4 W	L.C.C.	RBX 001
R3	Carbon film resistor 1 Kohms $\pm$ 5% 1/4 W	L.C.C.	RBX 001
R4	Like R3		
R6	Carbon film resistor 2,2 Kohms $\pm$ 5% 1/4 W	L.C.C.	RBX 001
R7	Carbon film resistor 100 ohms $\pm$ 5% 1/4 W	L.C.C.	RBX 001
R8	Wirewound resistor 5,26 ohms $\pm$ 1% (measuring shunt 20 mA)	GEKA	CAB
R9	Like R3		
R11	Carbon film resistor 8,2 Kohms $\pm$ 5% 1/4 W	L.C.C.	RBX 001

Diagram index	Designation and characteristics	Supplier	Supplier's reference
R12	Carbon film resistor 27 ohms $\pm$ 5% 1/4 W	L.C.C.	RBX 001
R13	Like R3		
R14	Insulated hot molded resistor 22 ohms $\pm$ 5% 1/2 W	VITROHM	SBT
R16	Wirewound resistor 0,5 ohm $\pm$ 1% (measuring shunt 200 mA)	GEKA	CAB
R17	Insulated hot molded resistor 47 ohms $\pm$ 5% 1/2 W	VITROHM	SBT
R18	Insulated hot molded resistor 100 ohms $\pm$ 5% 1/2 W	VITROHM	SBT
R19	Like R17		
R21	Vitreous wirewound resistor 10 ohms $\pm$ 5% 3 W	SFERNICE	RB 59 V
R22	Like R16		
R23	Wirewound resistor 0,05 ohm $\pm$ 1% (measuring shunt 2 A)	GEKA	CAB
R24	Carbon film resistor 470 ohms $\pm$ 5% 1/4 W	L.C.C.	RBX 001
R26	Carbon film resistor 1,5 Kohms $\pm$ 5% 1/4 W	L.C.C.	RBX 001
R27	Carbon film resistor 47 ohms $\pm$ 5% 1/4 W (adjustment set)	L.C.C.	RBX 001
R28	Carbon film resistor 220 ohms $\pm$ 5% 1/2 W	L.C.C.	RBX 003
R29	Like R2		
R31	Moulded tract potentiometer 1 Kohms $\pm$ 20% linear curve spindle diameter 6 mm ; length from the fixing plan 19 mm	OHMIC	MP1A
R35	Like R3		
R76	Vitreous wirewound resistor 10 ohms $\pm$ 5% 7 W (adjustment set)	SFERNICE	RB 57 V
R77	Like R28		
R78	Vitreous wirewound resistor 330 ohms $\pm$ 5% 7 W	SFERNICE	RB 57 V
R79	Carbon film resistor 150 ohms $\pm$ 5% 1/2 W	L.C.C.	RBX 003
R81	Wirewound resistor 0,47 ohm $\pm$ 10% 2 W	GEKA	M2
R85	Carbon film resistor 240 ohms $\pm$ 5% 1/2 W	L.C.C.	RBX 003
S1	Triple pole inverter	A.P.R.	11.156 A
S2	Bipolar inverter with middle dead centre	A.P.R.	649 T2
S6	Double section switch - Every section has a eight position circuit - Narrowed contact finger according to Nardeux plan n° 191101	JEANRENAUD	MAB
S7	Single pole inverter	A.P.R.	11.136 A
T1	LF input transformer	NARDEUX	K474
T2	Modulation transformer	NARDEUX	K473
T3	Supply transformer	NARDEUX	K472
X-DS1	Insulated jack	RUSSENBERGER	D 855 SI
X-DS2	Head (model D)- white amber		
X-F1 - X-F2	Fuse block	ARNOULD	FEP + FEK 704M + 709
X-F2			
X-F3			
	Male switch 17 pins of the high frequency driver preamplifier - oscillator module	SOCAPEX	254-17 AM
	Female switch 17 pins for receiving the high frequency driver preamplifier - oscillator module	SOCAPEX	254-17 AFZ
	Female switch 17 pins for receiving the preamplification low frequency regulator card	SOCAPEX	254-17 AFZ
	Female switch 11 pins for receiving the delayed keving card (weak current part)	SOCAPEX	254-11 AFZ

## Card "Preamplication - low frequency regulator" No 274.102

## List of components

Diagram Index	Designation and characteristics	Supplier	Supplier's reference
C48	Tantalum capacitor 15 $\mu$ F $\pm$ 20% TS 16 Vcc	PRECIS	CTS 13 B
C49	Ceramic capacitor isolated plate 1.000 pF $\pm$ 10% TS 63 Vcc	L.C.C.	GOZ 745 J4
C51	Metallized polyester capacitor 0,22 $\mu$ F TS 250 Vcc $\pm$ 20%	COGECO	C280 AE/P 220K
C52	Like C49		
C53	Like C49		
C54	Tantalum capacitor 10 $\mu$ F $\pm$ 20% TS 16 Vcc	PRECIS	CTS 13 B
C56	Like C51		
C57	Like C49		
C58	Metallized polyester capacitor 0,1 $\mu$ F $\pm$ 20% TS 250 Vcc	COGECO	C280 AE/P 100K
C59	Like C51		
C61	Tantalum capacitor 47 $\mu$ F $\pm$ 20% TS 20 Vcc	PRECIS	CTS 13 C
C62	Like C54		
C63	Tantalum capacitor 22 $\mu$ F $\pm$ 20% TS 16 Vcc	PRECIS	CTS 13 B
C64	Like C49		
C66	Ceramic capacitor isolated plate 4.700 pF $\pm$ 10% TS 63 Vcc	L.C.C.	GOZ 767 J4
C72	Like C69		
C73	Like C51		
CR2	Diode	R.T.C.	15 P 2
CR3	Zener diode 8,2 V	SILEC	1N 959 B
CR4	Diode	SILEC	1N 647
CR6	Diode	SILEC	1N 645
CR7	Like CR6		
L21	Interference suppressor choke	COPRIM	VK 200-09-3B
L22	Like L21		
L23	Like L21		
Q9	MOS transistor	R.C.A.	3N 138
Q11	Transistor	SESCOSEM	2N 2907
Q12	Transistor	SESCOSEM	BSX 51 A
Q13	Like Q12		
Q14	Like Q12		
Q16	Like Q11		
Q17	Transistor	SESCOSEM	2N 1711
Q18	Like Q17		
Q19	Transistor	SESCOSEM	2N 2904 A
R32	Carbon film resistor 68 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R33	Carbon film resistor 1 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R34	Carbon film resistor 10 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R36	Carbon film resistor 470 $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R37	Like R34		
R38	Carbon film resistor 6,8 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R39	Carbon film resistor 3,9 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R41	Like R33		
R42	Carbon film resistor 15 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R43	Carbon film resistor 47 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R44	Carbon film resistor 27 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R46	Like R34		
R47	Like R33		
R48	Carbon track potentiometer 10 K $\Omega$ $\pm$ 20%	DRALOWID (COREL)	Type 61 HD-P

Diagram Index	Designation and characteristics	Supplier	Supplier's reference
R49	Like R34		
R51	Carbon film resistor 1,8 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R52	Carbon film resistor 22 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R53	Like R33		
R54	Carbon film resistor 75 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R56	Carbon film resistor 4,7 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R57	Like R56		
R58	Carbon film resistor 620 $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R59	Carbon film resistor 2,2 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R61 *	Carbon film resistor 7,5 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R62	Carbon film resistor 5,6 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R63	Like R34		
R64	Carbon film resistor 82 $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R66	Like R33		
R67	Carbon film resistor 390 $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R68	Like R36		
R69	Like R59		
R71 *	Carbon film resistor 270 $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R72	Carbon film resistor 2,35 $\Omega$ , made of two working in parallel resistors, the value of each one being 4,7 $\Omega$ $\pm$ 5% 1 W	VITROHM	ABT
R73	Carbon film resistor 150 $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R74	Like R73 Male connector for board, 17 contacts	SOCAPEX	254-17-CM
	* This value may be changed during final adjustments.		

## Card "Regulation" (weak currents) No 274.104

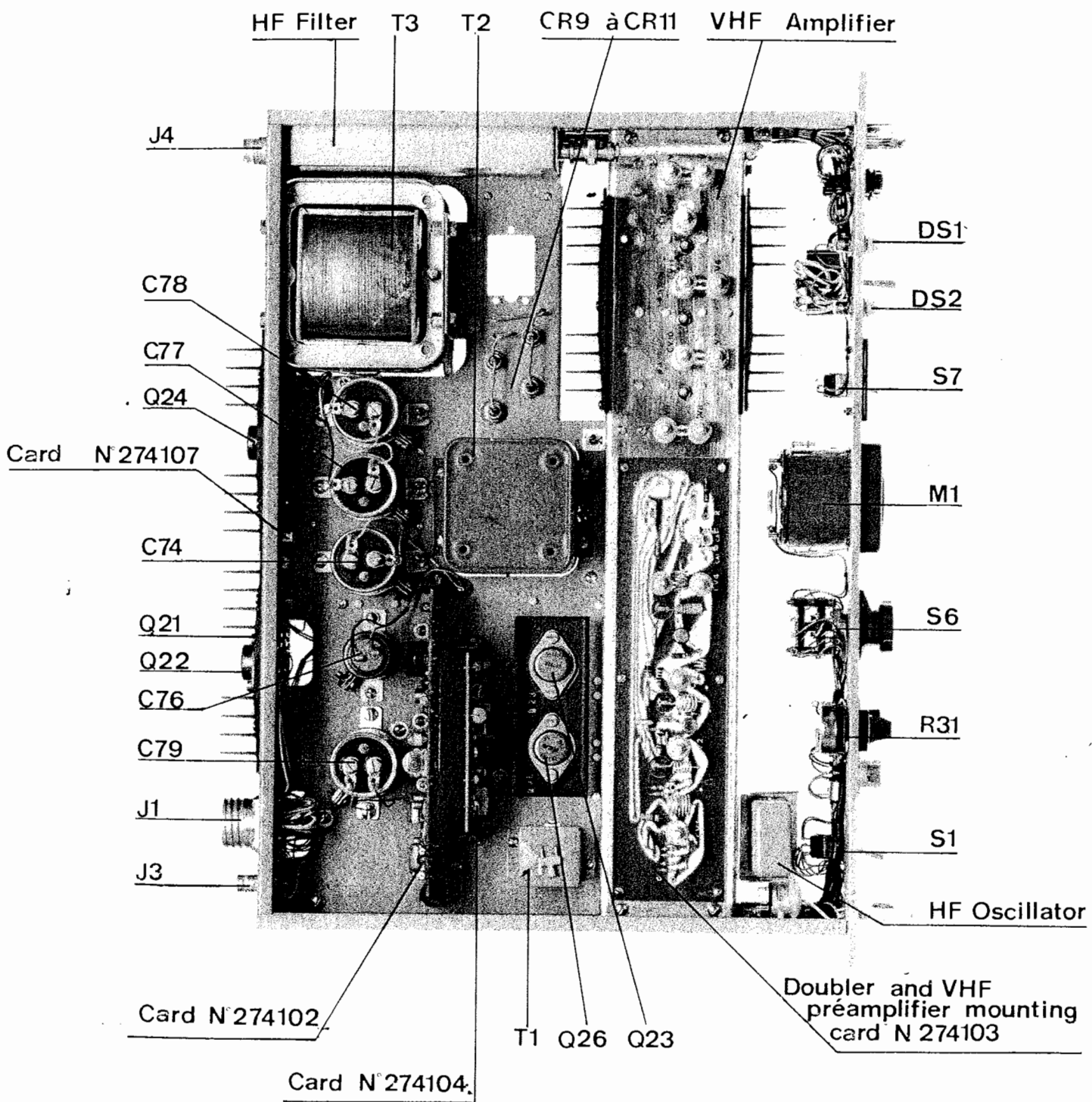
List of components

Diagram Index	Designation and characteristics	Supplier	Supplier's reference
C81	Tantalum capacitor 47 $\mu$ F $\pm$ 20% TS 35 Vcc	PRECIS	CTS 13 D
C82	Metallized mylar capacitor 0,47 $\mu$ F $\pm$ 10% TS 63 Vcc	EFCO	MMDR
C83	Like C82		
CR14	Zener diode 8,2 V	SILEC	1N 959 B
CR16	Diode	R.T.C.	1N 914
CR17	Zener diode 10 V	SESCOSEM	110 Z 4
CR18	Zener diode 12 V	SILEC	1N 963 B
CR19	Zener diode 16 V	SILEC	1N 965 B
CR21	Diode	SILEC	1N 4383
F4			
Q27	Transistor	SESCOSEM	2N 1711
Q28	Like Q27		
Q29	Like Q27		
Q31	Transistor	SESCOSEM	2N 2907
R82	Carbon film resistor 1 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R83	Carbon film resistor 2,2 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R84	Carbon film resistor 100 $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R86	Insulated hot molded resistor 680 $\Omega$ $\pm$ 5% 2 W	VITROHM	BBT
R87	Carbon film resistor 150 $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R88	Carbon film resistor 220 $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R89 *	Carbon film resistor 3,3 K $\Omega$ $\pm$ 1% 1/4W	GEKA	516
R91 *	Carbon film resistor 1,8 K $\Omega$ $\pm$ 1% 1/4W	GEKA	516
R92	Carbon film resistor 1,5 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R93	Carbon film resistor 30 K $\Omega$ $\pm$ 1% 1/4W	GEKA	516
XF-4	Fuse-holder for P.C. board	SCHURTERAG	700 + 729
	Male connector for board, 11 contacts	SOCAPEX	254-11-CM
	* This value may be changed during final adjustments.		

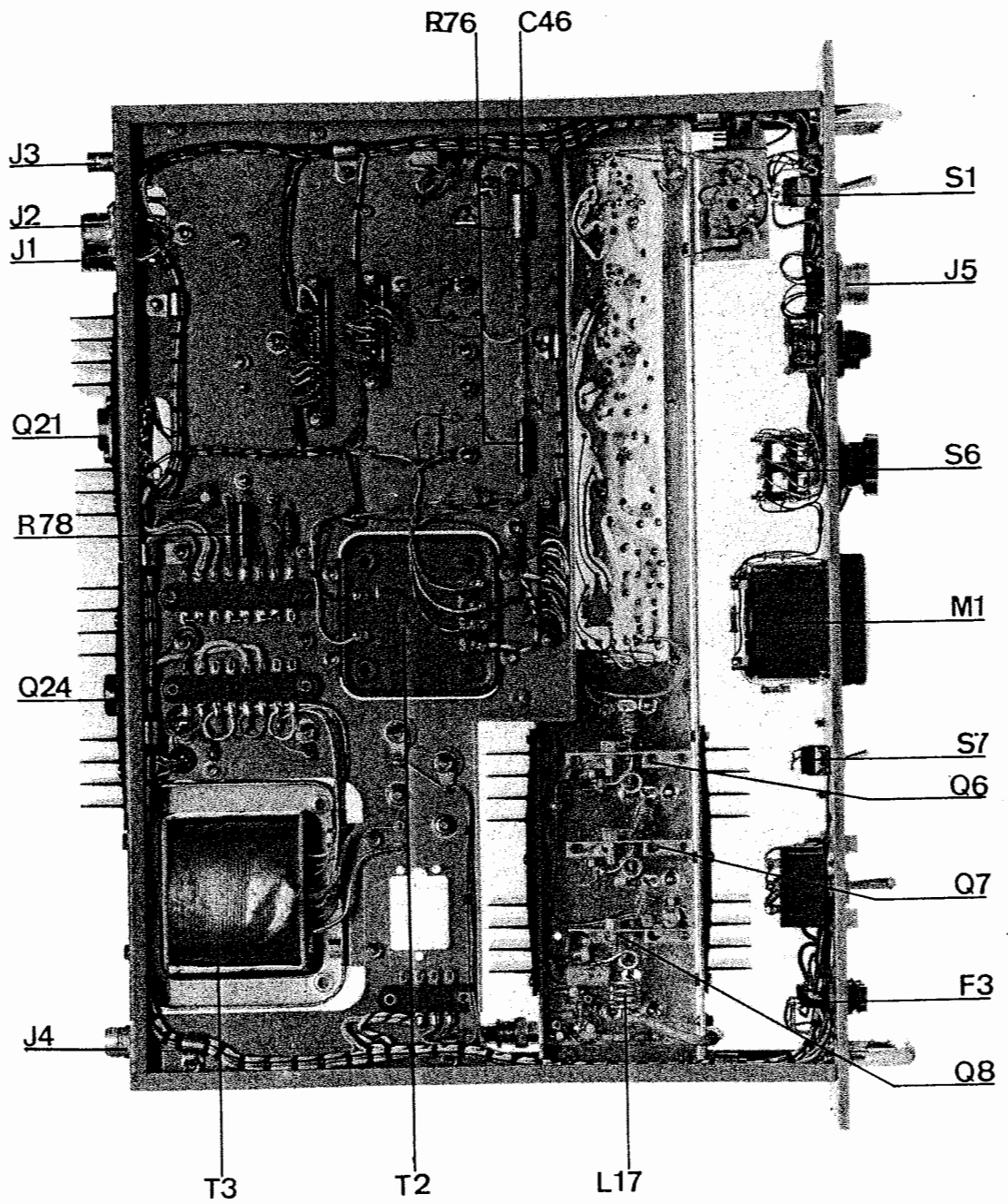
## Card "Antenna Relay operation" No 274.107

List of components

Diagram Index	Designation and characteristics	Supplier	Supplier's reference
C101	Electrochemical capacitor 4,7 $\mu$ F - 10 + 50% TS 63 Vcc	COGECO	CO 21
CR101	Diode	SESCOSEM	1N 645
Q101	Transistor	SESCOSEM	2N 1711
Q102	Like Q101		
R101	Carbon film resistor 15 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R102	Carbon film resistor 4,7 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R103	Carbon film resistor 470 $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R104	Carbon film resistor 2,2 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001
R105	Carbon film resistor 10 K $\Omega$ $\pm$ 5% 1/4W	L.C.C.	RBX 001

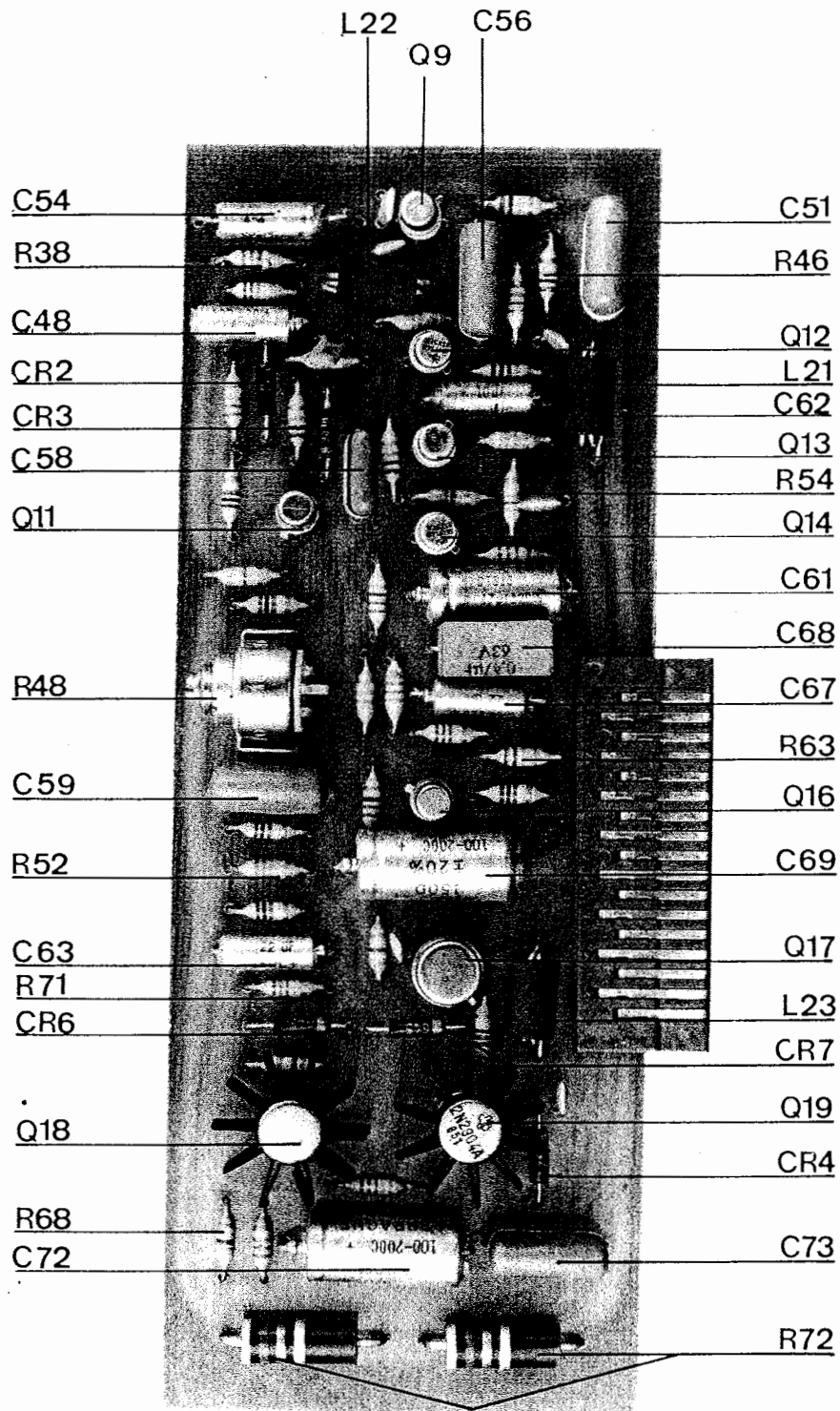


VHF 10W Transmitter T112A  
Top view

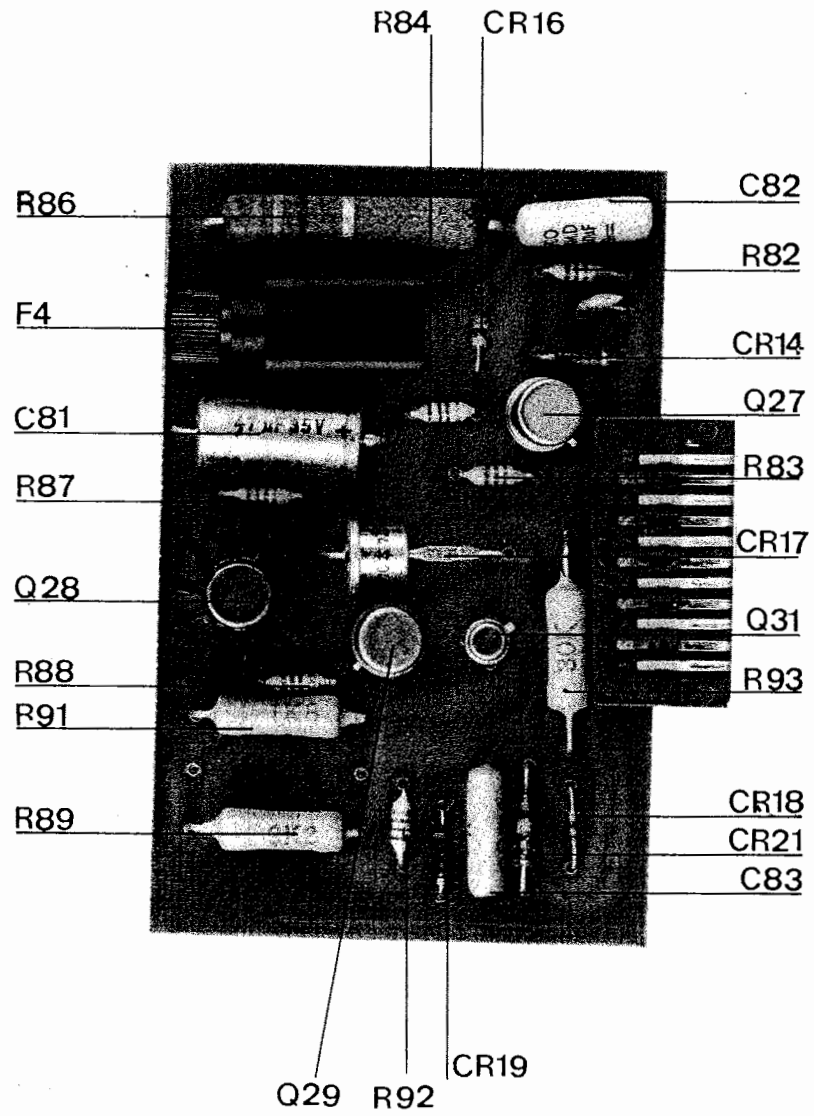


VHF 10W Transmitter Type T112A  
Under view





VHF 10W TRANSMITTER TYPE T112A  
 Card Préamplification low frequency regulator N 274102



VHF 10W TRANSMITTER TYPE T112A  
 Card Régulation (weak currents) N274104

CRYSTAL OSCILLATOR E 138

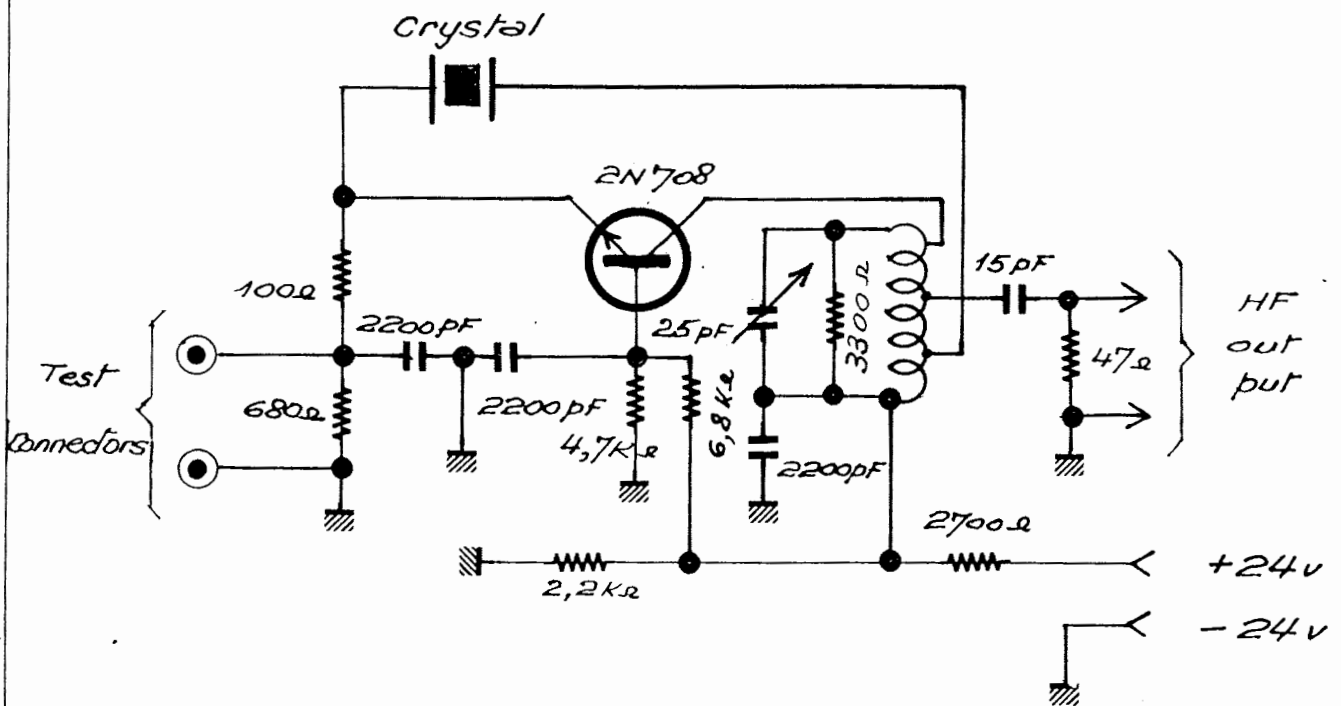
- Unscrew the two fixation screws of the case : take off this one.
- Set up the crystal (model QA 52 or QA 54 half a frequency to the emission frequency).
- Set up the pilote E 138 on the transmitter
- Connect a voltmeter (caliper 3 volts, resistance at least 10.000 ohms/V), positive on the red socket, negative on the black socket.
- Put in the transmitter.
- Turn slowly the adjustable capacity of the oscillator E 138, till a maximum is obtained on the voltmeter : mind, this maximum though it was clearly visible, doesn't matter.
- Switch out the transmitter, take off the oscillator, get up again his hood.
- Set up definitively the oscillator E 138 into the transmitter.

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Wiring : Pin n° 1                    + 24 V  
          Pins n° 3 - 7 - 9        Ground and - 24 V  
          Pin n° 5                    R F out put

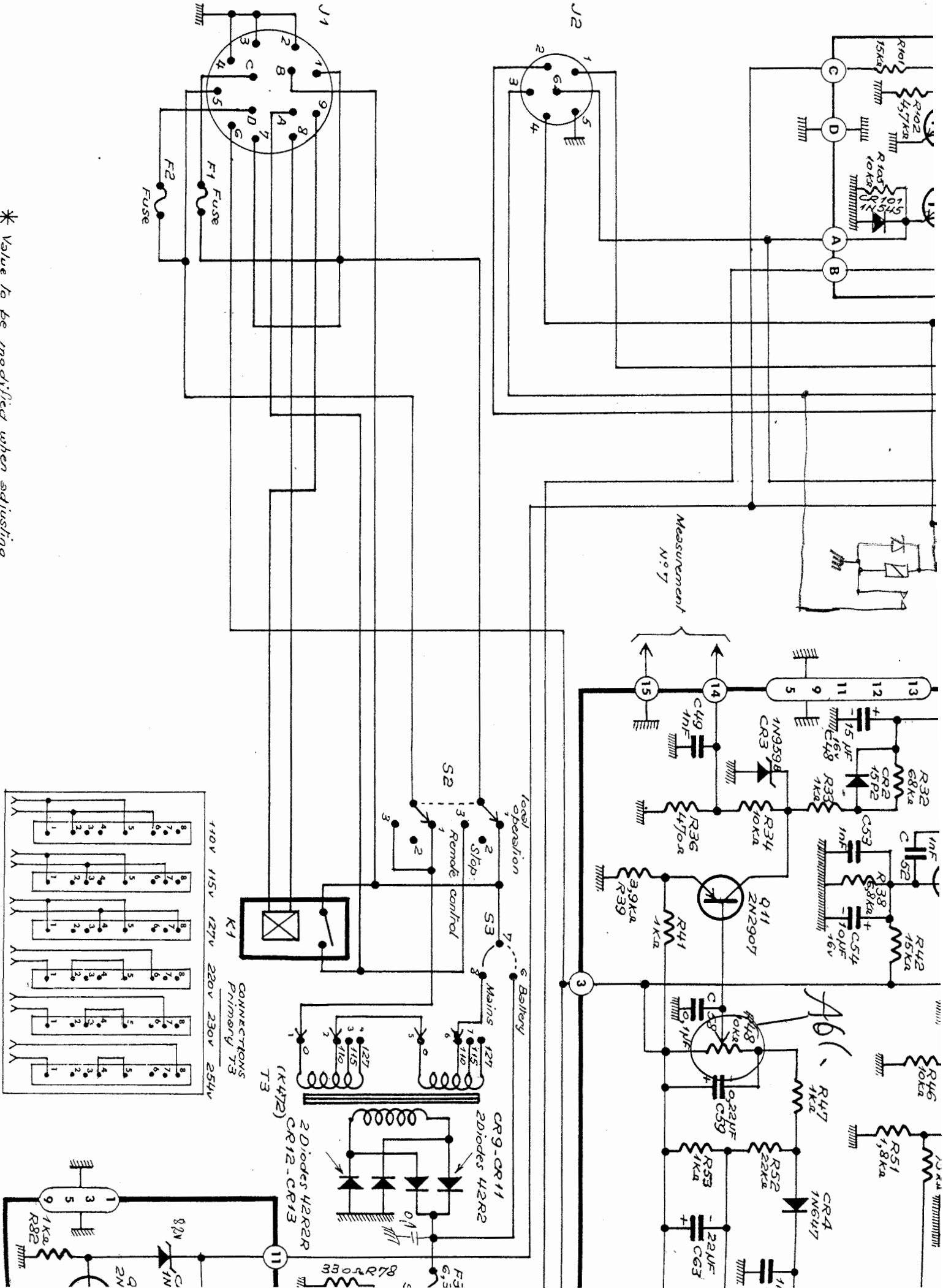
# CRYSTAL OSCILLATOR

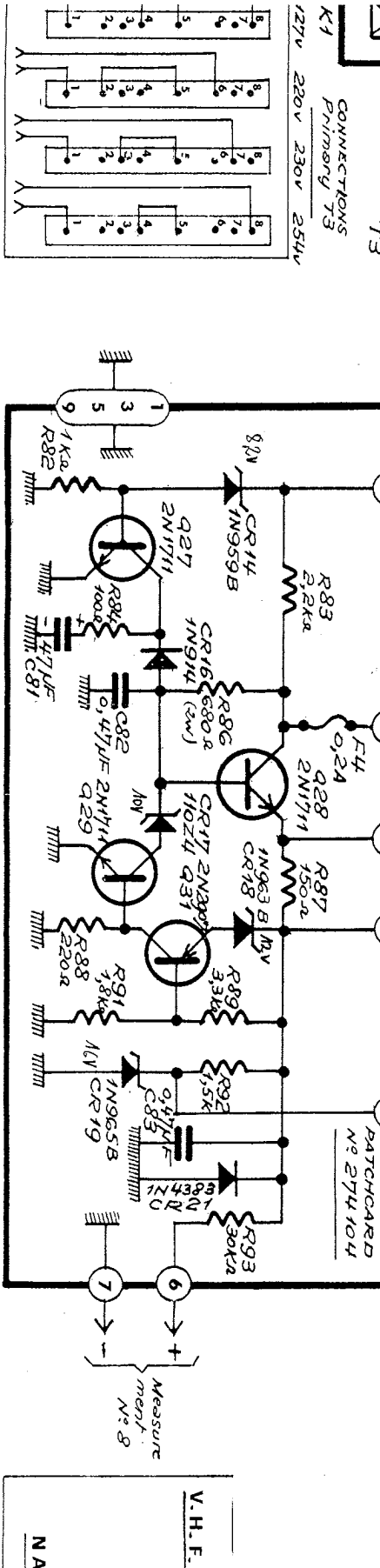
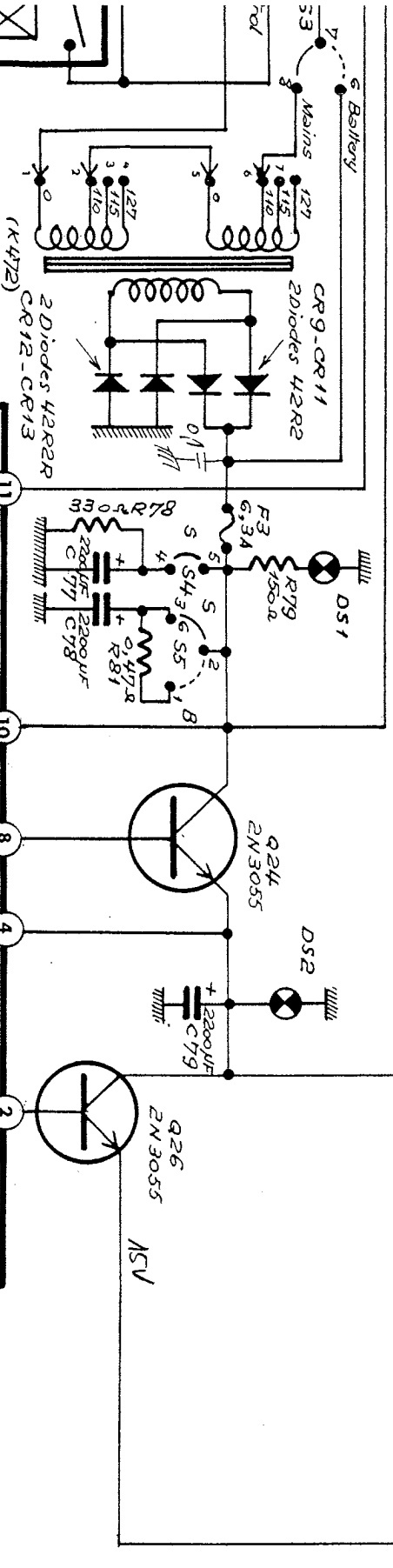
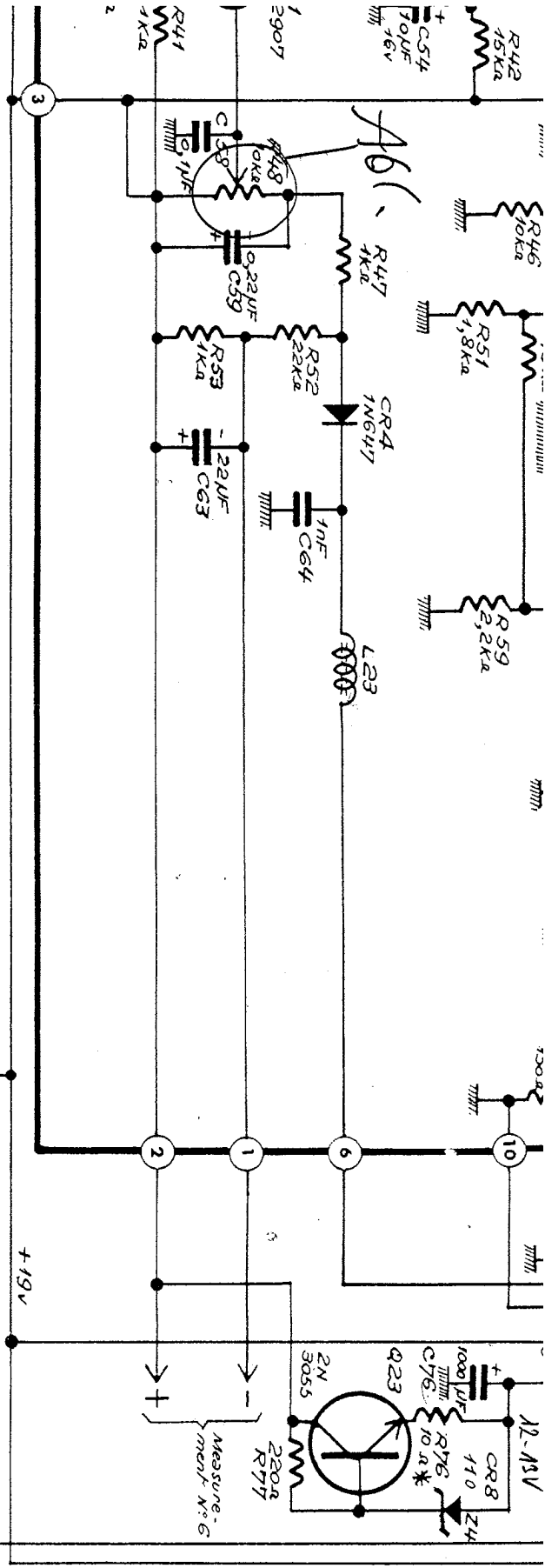
Type E.138



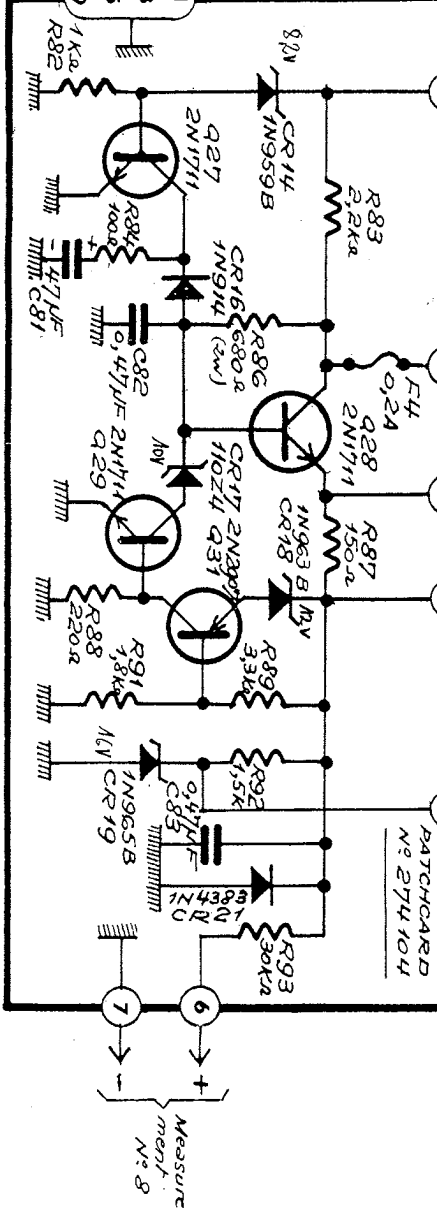
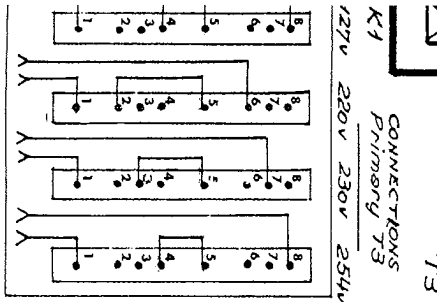
SCHEMA Nardoux N° 273.104

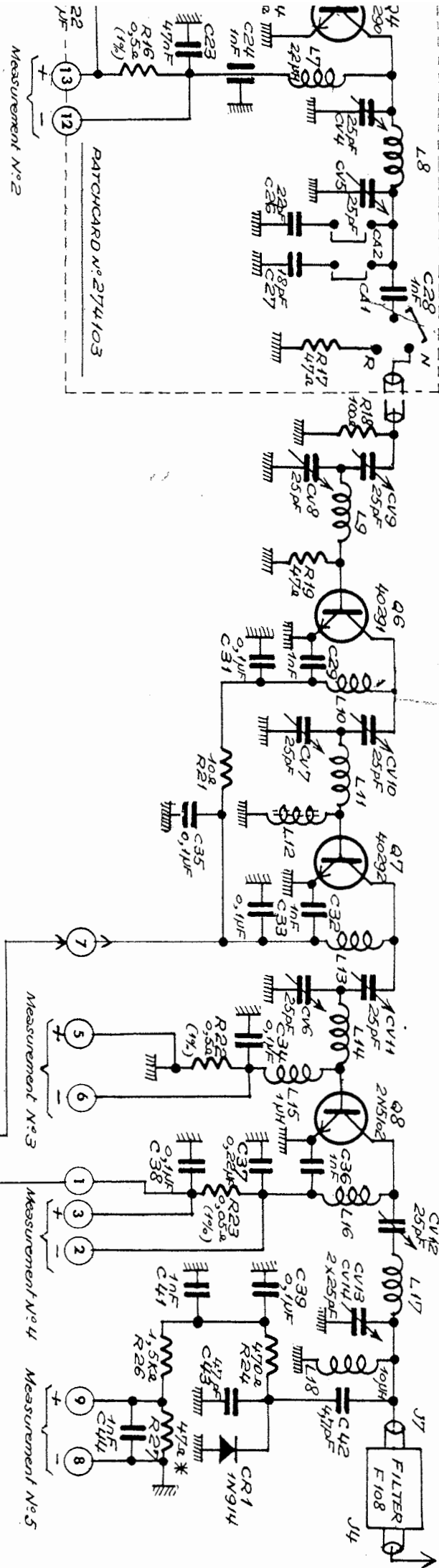
\* Value to be modified when adjusting





V.H.F. 10W. TRANSISTORIZED  
TRANSMITTER  
Type T 112 A  
NARDEUX N° 274105



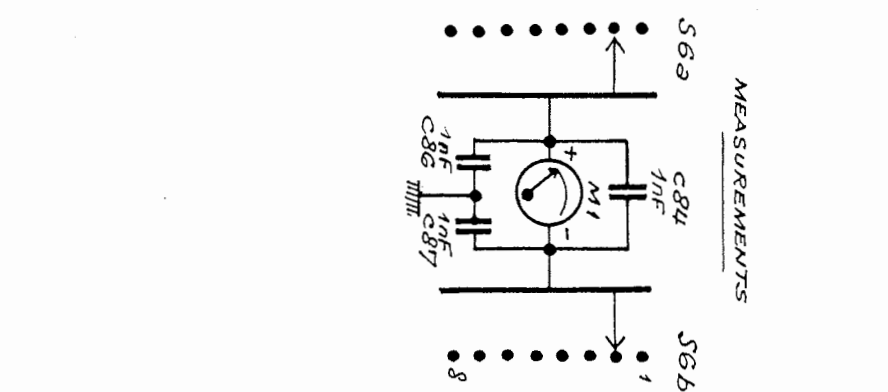
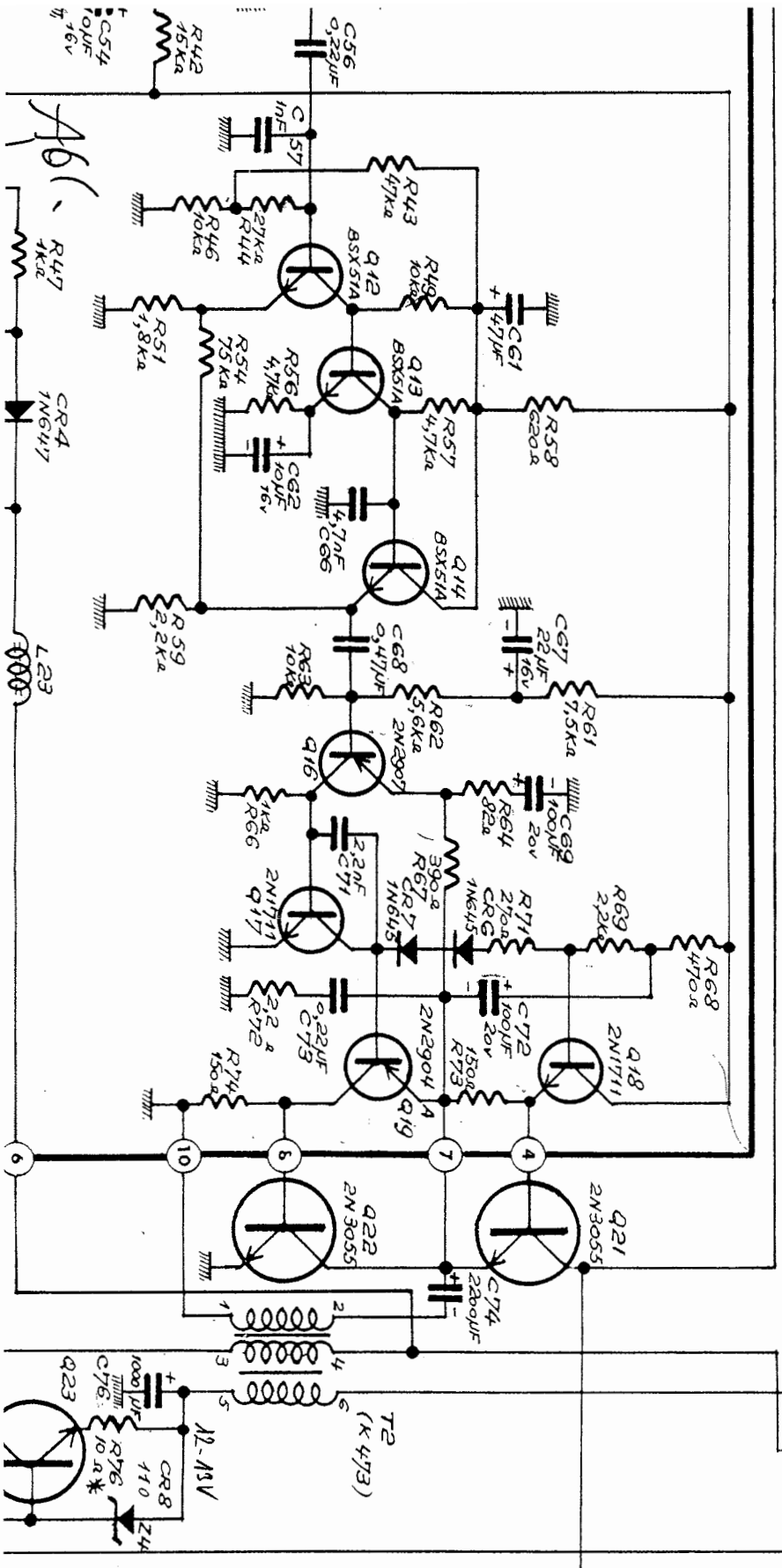


Measurement N°2

Measurement N°3

Measurement N°4

Measurement N°5



MEASUREMENTS

S6a  
 S6b  
 1  
 8

