

Consisting of:

Output Amplifier	1008.1
Oscillator	1008.2
Pick-up Amplifier	1008.3
Compressor	1008.4
Motor Drive Circuits	1008.5
Position of Components	1008.6
Parts List	1008.7
Circuit Diagram	1008.8

Removal of the Case.

After removing the eight HEX/HD screws on the front panel and the two screws in the bottom, it is possible to slide the chassis and the front panel out of the wooden case.

For rack mounting the metal case can be pulled out after the six HEX/HD screws on the side of the instrument are removed.

Trouble Shooting.

If the reason for a fault is not an obvious one such as a dead tube or transistor, broken down resistor, blown or disconnected fuse etc., then first test the voltages of all the tubes and compare them with the voltages shown in the circuit diagram in order to localize the defect. Should this method of finding the fault prove unsuccessful, then check the instrument by adopting the method described in the adjustment procedure. When the trouble has been found and remedied, the voltages and adjustments which are influenced by the remedy must be rechecked.

The tolerances stated in the instructions can only be used as a guide for adjustment and control, but any deviations must not be corrected without being sure that the tolerances of the instruments used for making the adjustment are so small as to have no influence on the measurements.

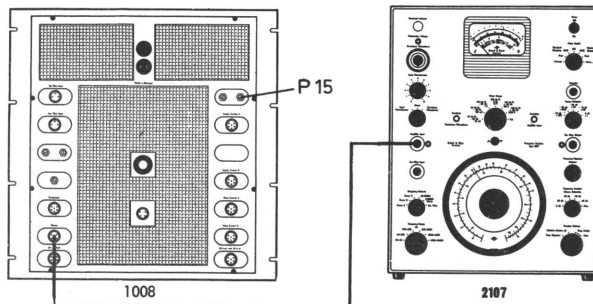
The instructions in this Manual are given purely as a guide to the service of equipment with minor faults. Some faults, as f.inst. small deviations in tolerances require for their correction special control equipment and extensive experience, and in these cases it is necessary to send the instrument to the factory.

Spare Parts.

Please state type and serial number of apparatus when spare parts are ordered.

Instruments necessary for service and repair:

Frequency Analyzer type 2107
Oscilloscope
Frequency Counter
Multimeter (50 μ A)



1.1. Calibration of Indicating Meter.

METER SWITCH: "Output Voltage"
SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5-5000 Hz"
COMPRESSOR SPEED: "Off"
OUTPUT SWITCH: "Linear"
FREQUENCY SCALE: "400 Hz"

Adjust the OUTPUT VOLTAGE for 10 V on OUTPUT socket.

Deflection on type 1008: 10 V

If necessary adjust P 15.

1.2. Output Voltage.

METER SWITCH: "Output Voltage"
SCANNING SWITCH: "Off"
COMPRESSOR SPEED: "Off"
OUTPUT SWITCH: "Linear"
OUTPUT VOLTAGE: "10"

Check that full scale deflection on type 1008 can be obtained in the entire frequency range from 5-10000 Hz.

Possible reason for fault: The blocking range of the cam discs on the rear side of CV 0009 is within the frequency range.

Too low LF signal across R 92. The voltage should be approx. 320 mV. If not check item 2.2.

Too low DC voltage on V 10 cathode.

1.3. Frequency Response.

a. METER SWITCH: "Output Voltage"
SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5-5000 Hz"
COMPRESSOR SPEED: "Off"
OUTPUT SWITCH: "Linear"
FREQUENCY SCALE: "400 Hz"

Adjust the OUTPUT VOLTAGE for an 18 dB deflection on type 1008.

Vary the frequency from 5-5000 Hz.

Deflection on type 1008: 18 dB.

Tolerance: ± 0.5 dB

Possible reason for fault: Defective tube V 8
Defective filter Z 3,4

b. FREQUENCY RANGE to "5005-10000 Hz"

Vary the frequency from 5005-10000 Hz.

Deflection on type 1008: 18 dB.

Tolerance: ± 1 dB.

c. FREQUENCY RANGE to "5-5000 Hz"
OUTPUT SWITCH to "High pass"
FREQUENCY SCALE to "400 Hz"

Adjust the OUTPUT VOLTAGE for a 20 dB deflection on type 1008.

Change frequency to 100 Hz.

Deflection on type 1008: 19.7 dB.

Tolerance: ± 0.2 dB.

Change frequency to 5 Hz.

Deflection on type 1008: 4 dB.

Tolerance: ± 2 dB.

1.4. Noise.

- a. METER SWITCH: "Output Voltage"
SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5-5000 Hz"
COMPRESSOR SPEED: "Off"
OUTPUT SWITCH: "Linear"
FREQUENCY SCALE: "400 Hz"
- b. METER SWITCH to "Output Voltage"

Remove V 4.

Place the instrument in its case or screened it effectively in an other way.
Adjust the OUTPUT VOLTAGE for a 10 V deflection on type 2107.

Measure Noise: min. 70 dB below 10 V.

If the noise level is too high remove tube V 7 and measure the noise from the output amplifier only: min. 75 dB below 10 V.

Possible reason for fault: Defective tube V 8

1.5. Distortion.

METER SWITCH: "Output Voltage"
SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5-5000 Hz"
COMPRESSOR SPEED: "Off"
OUTPUT SWITCH: "Linear"

Adjust the OUTPUT VOLTAGE for a 10 V deflection on type 1008.

Check distortion at different frequencies: max. 0.5%

Attention: Bear in mind that 2107 only allows measurements of distortion down to around 0.5% without a filter type 1607 connected between type 1008 and 2107 for rejection of the fundamental frequency.

Possible reason for fault: Defective tube V 7,8

Removal of Tuning Capacitor CV 0009.

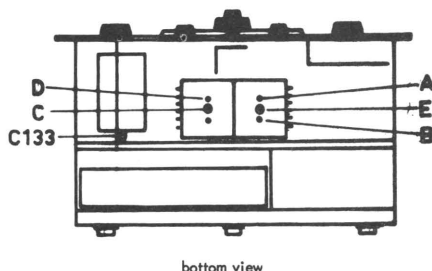
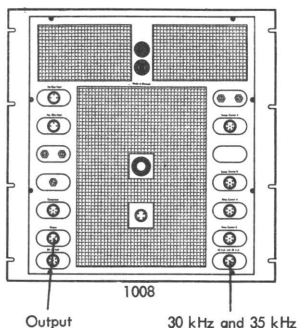
Remove the right hand side cover (when seen from the instrument front plate) of the capacitor unit CV 0009.

Set the condenser to fully "turned in" position. The position of the condenser is checked with a plate of insulating material, which strokes over the stator plates, so that none of the rotor plates is above the stator plates. The scale pointer should now point at 220° . If not, note carefully down the position of the pointer. Remove the multi-plugs and unsoldering the two leads to the oscillator coil assembly. Unscrew the two knobs on the tuning spindle and remove the scale rim, pointer and scale. The four screws, which secure Tuning Capacitor CV 0009 to the front plate, can then be unscrewed

Replacing Tuning Capacitor CV 0009.

After replacing scale, center it with reference to the spindle by means of a centering bush. Check the position of the condenser with a plate of insulating material for fully interleaved capacitor plates and fix the pointer to 220° or to the position noted above.

Attention: Item 2.1. and 2.2. The frequency can only be checked by means of a frequency counter or a frequency standard and an oscilloscope. The voltage should be measured by means of a high impedance (low capacity) tube voltmeter.



2.1. Fixed Oscillator.

- a. FREQUENCY RANGE: "5005-10000 Hz"

Check the signal on the socket "30 kHz and 35 kHz" (pin 4).

The frequency should be 35 kHz.

If necessary adjust the iron core "C" in Z 2.

The voltage should be approx. 2.7 V.

- b. FREQUENCY RANGE to "5-5000 Hz"

The frequency should change to 30 kHz.

If not, adjust the air trimmer "D" in Z 2 and check item a again.

- c. METER SWITCH: "Output Voltage"
SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5-5000 Hz"
COMPRESSOR SPEED: "Off"
OUTPUT SWITCH: "Linear"
FREQUENCY SCALE: "10 Hz"

Check that the frequency at the "Output" socket is $10 \text{ Hz} \pm 0,5\%$.

If not, check item 2.1. b. and 2.2.

Turn FREQUENCY RANGE to 0-5000 Hz.

Check the frequency on the "Output" socket: $5 \text{ Hz} \pm 0,5\%$.

If necessary adjust C 133.

2.2. Variable Oscillator.

- a. METER SWITCH: "Output Voltage"
SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5-5000 Hz"
COMPRESSOR SPEED: "Off"
OUTPUT SWITCH: "Linear"
FREQUENCY SCALE: "5 Hz"

Check that the frequency on the "Output" socket (pin 1) is 5 Hz.

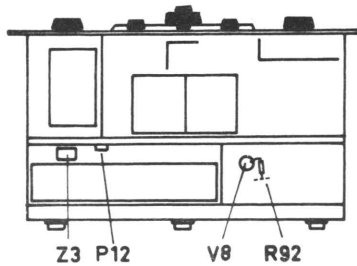
If not, adjust the FREQUENCY SCALE ADJUSTMENT. Fine adjustment by a knob and coarse adjustment by a screwdriver operated capacitor.

In case that the regulation range is too far away set both variable trimmers in mid position and adjust the air trimmer "B" in Z 2 for 5 Hz.

- b. FREQUENCY SCALE to "5000 Hz"

Check that the frequency is 5000 Hz.

If not, adjust the iron core "E" in Z 2 and check item a again.



bottom view

2.3. Oscillator Voltage.

- a. METER SWITCH: "Output Voltage"
SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5005-10000 Hz"
COMPRESSOR SPEED: "300"
OUTPUT SWITCH: "Linear"
- b. COMPRESSOR SPEED to "Off"
FREQUENCY RANGE to "5-5000 Hz"
FREQUENCY SCALE to "5000 Hz"
- c. FREQUENCY RANGE to "5005-10000 Hz"
FREQUENCY SCALE to "5005 Hz"

Adjust the OUTPUT VOLTAGE for an approx. half scale deflection on type 1008.

Adjust the iron core in Z 3 to max. deflection.

When FREQUENCY RANGE is changed to "5-5000 Hz" the deflection must change max. 1 dB.

Turn "Phase" (P 12) on the front plate to min. deflection on type 1008.

Check the voltage across R 92: 320 mV.

If necessary adjust P 3.

Check again the voltage across R 92: 320 mV.

If necessary adjust P 2.

Possible reason for fault: Defective tube V 5
" filter Z 3
" capacitor C 60

2.4. Frequency Drift.

METER SWITCH: "Power Freq. Beat"
SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5-5000 Hz"
OUTPUT SWITCH: "Linear"

Set the FREQUENCY SCALE to exactly the mains frequency

Adjust FREQUENCY SCALE ADJUSTMENT until a very slow beat shows up.

Check the frequency drift after a period of 20 min. and after 1.5 hours by adjustment of the FREQUENCY SCALE for a slow beat and read the frequency deviation on the scale.

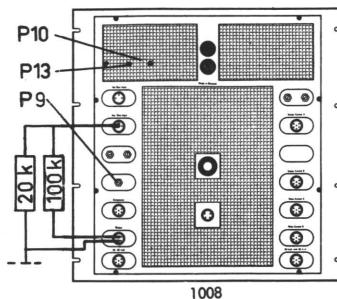
Tolerance: ± 5 Hz for each period.

If necessary adjust the trimmer "A"

After adjustment check item 2.2.

Attention: If an instrument has not been in use for a long period, frequency drift may occur due to humidity in the oscillator circuit. Therefore keep the instrument switched on 1-2 days before any adjustment.

Attention: The pick-up amplifier can only be checked and adjusted by means of a frequency counter or an oscilloscope and a frequency standard. The voltages should be measured by means of a high impedance (low capacity) tube voltmeter.



Check of Pick-up amplifier using "Accel. Gen. Input"

To check this section set the switches as follows:

- METER SWITCH: "Vibration Level"
- SCANNING SWITCH: "Off"
- COMPRESSOR SWITCH: "Off"
- OUTPUT SWITCH: "Linear"

Switches not mentioned here are set in a position according to instructions.

3.1. Frequency Response.

- | | |
|--|--|
| <p>a. FUNCTION SELECTOR: "Accel."
ACCELERATION RANGE: "1" (Acc. Gen.)
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"</p> | <p>Adjust OUTPUT VOLTAGE for an 18 dB deflection on type 1008.
Change the frequency from 10-5000 Hz.
Deflection on type 1008: 18 dB.
Tolerance: ± 0.5 dB.</p> |
| <p>b. FREQUENCY RANGE to "5005-10000 Hz"</p> | <p>Check and tolerance as under item a.</p> |

3.2. Sensitivity of Displacement.

- | | |
|--|---|
| <p>a. FUNCTION SELECTOR: "Displ."
DISPL.-VEL. RANGE: "0.01" (Acc. Gen.)
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"</p> | <p>Adjust OUTPUT VOLTAGE for an input voltage of exactly 904 mV.
Deflection on type 1008: 20 dB.
Tolerance: ± 0.2 dB.</p> <p>If necessary adjust P 10 "Displ./A.G."</p> <p>AC voltage on V 1 pin 1: 7.8 V
 pin 2: 30 mV
 pin 6: 700 mV</p> |
| <p>b. FREQUENCY SCALE to "1000 Hz"</p> | <p>Deflection on type 1008: 8 dB.
Tolerance: ± 0.2 dB.</p> |
| <p>c. DISPL.-VEL. RANGE to "1" (Acc. Gen.)
FREQUENCY SCALE to "5Hz"</p> | <p>Adjust OUTPUT VOLTAGE for an input voltage of exactly 9.04 mV.
Deflection on type 1008: 19.7 dB.</p> <p>If necessary adjust P 4 (located on printed circuit XC 0126)</p> <p>Possible reason for fault: Defective capacitor C 29, 30</p> <p>The sensitivity adjustment of P 10 can be set 1.5% higher or lower if it facilitates the adjustment of P 4.</p> |

3.3. Sensitivity of Velocity.

- a. FUNCTION SELECTOR: "Vel."
DISPL.-VEL.RANGE: "0.1" (Acc.Gen.)
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

Adjust OUTPUT VOLTAGE for an input voltage of exactly 57.6 mV.

Deflection on type 1008: 20 dB.

Tolerance: ± 0.2 dB.

If necessary adjust P 9 "Vel./A.G."

AC voltage on V1 pin 1: 7.8 V
 pin 2: 30 mV
 pin 6: 700 mV

- b. FREQUENCY SCALE to "1000 Hz"

Deflection on type 1008: 14 dB.

Tolerance: ± 0.2 dB.

3.4. Sensitivity of Acceleration.

- FUNCTION SELECTOR: "Accel."
ACCELERATION RANGE: "1" (Accel.Gen.)
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

Adjust OUTPUT VOLTAGE for an input voltage of exactly 7.07 mV.

Deflection on type 1008: 20 dB.

Tolerance: ± 0.2 dB.

If necessary adjust P 13 "Accel./A.G."

AC voltage on V1 pin 1: 190 mV
 pin 2: 7 mV
 pin 6: 165 mV

3.5. Check of Acceleration Range.

- a. FUNCTION SELECTOR: "Accel."
ACCELERATION RANGE: "1" (Accel.Gen.)
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1008.

- b. ACCELERATION RANGE to "10" (Accel.Gen.) Deflection on type 1008: 0 dB.
Tolerance: ± 0.4 dB.

Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1008.

- c. ACCELERATION RANGE to "100" (Accel.Gen.) Deflection on type 1008: 0 dB.
Tolerance: ± 0.4 dB.

Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1008.

- d. ACCELERATION RANGE to "1000" (Accel.Gen.) Deflection on type 1008: 0 dB.
Tolerance: ± 0.4 dB.

Check also "Acceleration Range" at 10 kHz.

3.6. Check of Displ.-Vel. Range.

- a. FUNCTION SELECTOR: "Displ."
DISPL.-VEL.RANGE: "0.01" (Accel.Gen.)
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "55 Hz"

Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1008.

- b. DISPL.-VEL.RANGE to "0.1" (Accel.Gen.) Deflection on type 1008: 0 dB.
Tolerance: ± 0.4 dB.

Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1008.

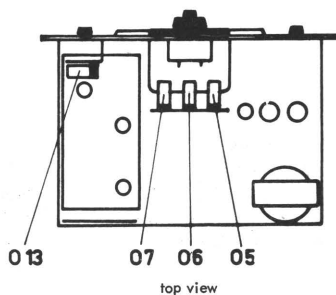
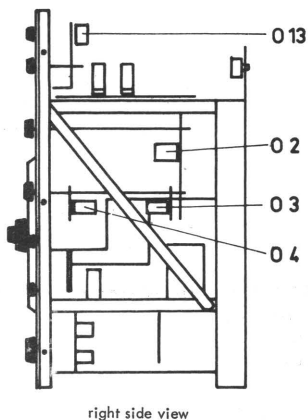
- c. DISPL.-VEL.RANGE to "1" (Accel.Gen.) Deflection on type 1008: 0 dB.
Tolerance: ± 0.4 dB.

Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1008.

- d. DISPL.-VEL.RANGE to "10" (Accel.Gen.) Deflection on type 1008: 0 dB.
Tolerance: ± 0.4 dB.

- e. FREQUENCY SCALE to "500 Hz"
FUNCTION SELECTOR to "Vel."

Check and tolerances as under item a - d.



3.7. Relay Functions.

a.

Check by moving the frequency pointer that the relays O 5-6-7 are energized according to the following table.

Frequency scale:	30	100	300 Hz
Relay:	05	05-06	05-06-07

Tolerance: $\pm 10\%$

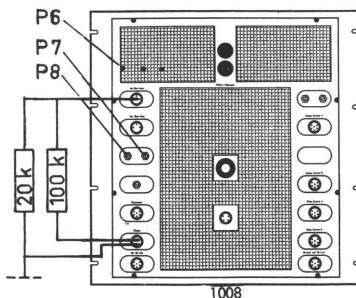
If necessary loosen rotating contact of switch O 27 (located on the tuning spindle of CV 0009) and adjust the switching point according to table.

b. FUNCTION SELECTOR: "Acc."

Relays O 2-3-4 should energize.

c. FUNCTION SELECTOR to "Auto D-A"

Relays O 2-3 and O 13 should energize according to position of frequency scale and cross over switch.



Check of Pick-up amplifier using "Vel. Gen. Input"

3.8. Frequency Response.

- a. FUNCTION SELECTOR: "Vel."
DISPL.-VEL-RANGE: "0.01" (Vel.Gen.)
VEL. GEN. RESPONSE: "Flat"
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

Adjust the OUTPUT VOLTAGE for a 15 dB deflection on type 1008.

Change the frequency from 5-2000 Hz.

Deflection on type 1008: 15 dB.

Tolerance: ± 0.2 dB.

b. VEL.GEN.RESPONSE to "Shaped"
FREQUENCY SCALE to "10 Hz"

Adjust the OUTPUT VOLTAGE for a 10 dB deflection on type 1008.
Change the frequency from 10-2000 Hz and check the deflection on type 1008.

Frequency scale	Hz	10	100	200	300	400	500	600
Deflection on type 1008	dB	10	10.26	10.83	11.24	11.63	11.94	12.30
Frequency scale	Hz	700	800	900	1000	1250	1500	2000
Deflection on type 1008	dB	12.58	12.92	13.15	13.52	14.16	14.80	16.19

Tolerance, for frequencies 10-1000 Hz: $\pm 0,3$ dB
1250-2000 Hz: $\pm 0,5$ dB

3.9. Sensitivity of Velocity.

FUNCTION SELECTOR: "Vel."
DISPL.-VEL.RANGE: "0.01" (Vel.Gen.)
VEL.GEN.RESPONSE: "Flat"
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

Adjust OUTPUT VOLTAGE for an input voltage of exactly 6.8 mV.

Deflection on type 1008: 20 dB.
Tolerance: ± 0.2 dB.

If necessary adjust P 6 "Vel./V.G."

AC voltage on V 1 pin 1: 450 mV
 pin 2: 1,8 mV
 pin 6: 45 mV

3.10. Sensitivity of Displacement.

a. FUNCTION SELECTOR: "Displ."
DISPL.-VEL.RANGE: "0.01" (Vel.Gen.)
VEL.GEN.RESPONSE: "Flat"
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

Adjust the OUTPUT VOLTAGE for an input voltage of exactly 1.07 V.

Deflection on type 1008: 20 dB.
Tolerance: ± 0.2 dB

If necessary adjust P 8 "Displ./V.G."
After adjustment of P 8 check item 3.11

AC voltage on V 1 pin 1: 7,6 V
 pin 2: 28 mV
 pin 6: 680 mV

b. FREQUENCY SCALE to "1000 Hz"

Deflection on type 1008: 14 dB.
Tolerance: ± 0.2 dB.

3.11. Sensitivity of Acceleration.

a. FUNCTION SELECTOR: "Accel."
VEL.GEN.RESPONSE: "Flat"
ACCELERATION RANGE: "1" (Vel.Gen.)
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

Adjust the OUTPUT VOLTAGE for an input voltage of exactly 8.36 mV.

Deflection on type 1008: 20 dB.
Tolerance: ± 0.2 dB.

If necessary adjust P 7 "Accel./V.G."
After adjustment of P 7 check item 3.10

AC voltage on V 1 pin 1: 340 mV
 pin 2: 3,5 mV
 pin 6: 29 mV

b. FREQUENCY SCALE to "250 Hz"

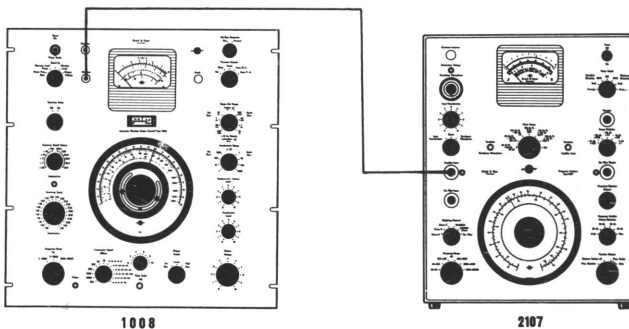
Deflection on type 1008: 14 dB.
Tolerance: ± 0.2 dB.

3.12. Check of Acceleration Range.

- a. FUNCTION SELECTOR: "Accel." Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1008.
VEL.GEN.RESPONSE: "Flat"
ACCELERATION RANGE: "1" (Vel.Gen.)
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"
- b. ACCELERATION RANGE to "10" (Vel.Gen.) Deflection on type 1008: 0 dB.
Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1008.
- c. ACCELERATION RANGE to "100" (Vel.Gen.) Deflection on type 1008: 0 dB.
Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1008.
- d. ACCELERATION RANGE to "1000" (Vel.Gen.) Deflection on type 1008: 0 dB.

3.13. Check of Displ.-Vel. Range.

- a. FUNCTION SELECTOR: "Displ." Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1008.
VEL.GEN.RESPONSE: "Flat"
DISPL.-VEL.RANGE: "0.01" (Vel.Gen.)
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "5 Hz"
- b. DISPL.-VEL.RANGE to "0.1" (Vel.Gen.) Deflection on type 1008: 0 dB.
Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1008.
- c. DISPL.-VEL.RANGE to "1" (Vel.Gen.) Deflection on type 1008: 0 dB.
Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1008.
- d. DISPL.-VEL.RANGE to "10" (Vel.Gen.) Deflection on type 1008: 0 dB.
- e. FUNCTION SELECTOR to "Vel." Check Displ.-Vel. Range again at 500 and 2000 Hz.
Check and tolerances as under item a-d.



3.14. Noise-Microphony.

- a. FUNCTION SELECTOR: "Vel."
DISPL.-VEL.RANGE: "0.01" (Vel.Gen.)

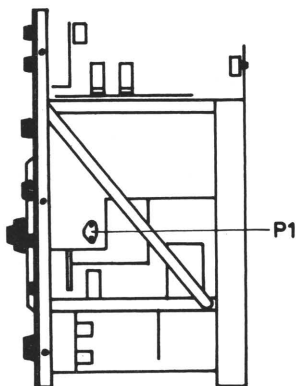
The instrument must be in its case or in other way effectively screened.
Disconnect input signal to both input amplifier "Vel." and "Acc."
Check the microphony by gently tapping on the front plate of the apparatus.
All deflections are read in dB below 10 V.
Velocity with velocity generator.

Noise: 45 dB
Microphony: 30 "

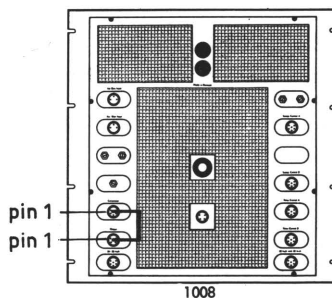
b. FUNCTION SELECTOR to "Displ."	Displacement with velocity generator.	Noise: 45 dB Microphony: 40 "
c. FUNCTION SELECTOR to "Accl."	Acceleration with velocity generator.	Noise: 32 " Microphony: 25 "
d. FUNCTION SELECTOR to "Vel." DISPL.-VEL.RANGE: "0.01" (Acc.Gen.)	Velocity with acceleration generator.	Noise: 32 " Microphony: 25 "
e. DISPL.-VEL.RANGE to "0.1" (Acc.Gen.)		Noise: 45 " Microphony: 40 "
f. FUNCTION SELECTOR to "Displ." DISPL.-VEL.RANGE to "0.01" (Acc.Gen.)	Displacement with acceleration generator.	Noise: 45 " Microphony: 35 "
g. FUNCTION SELECTOR to "Accel." ACCELERATION RANGE to "1" (Acc.Gen.)	Acceleration with acceleration generator.	Noise: 50 " Microphony: 30 "
Possible reason for Noise:		Defective tube V 2 Defective capacitor C 15, 16 Defective relay O 2
Possible reason for Microphony:		Defective tube V 1

To check this section set the switches as follows: SCANNING SWITCH: "Off"
OUTPUT SWITCH: "Linear"
VEL.GEN. RESPONSE: "Flat"

Switches not mentioned here are set in a position according to instructions.



right side view



1008

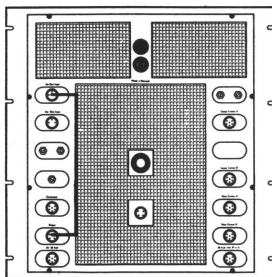
4.1. Compressor Balance.

METER SWITCH: "Output Voltage"
FREQUENCY RANGE: "5-5000 Hz"
COMPRESSOR SPEED: "Off"
FREQUENCY SCALE: "400 Hz"

Adjust OUTPUT VOLTAGE for a 0.7 V deflection on type 1008.

Adjust P 1 until signals on the anodes of V 3 are equal.
Tolerance: $\pm 2\%$

Possible reason for fault: Defective diode Q 13
Defective capacitor C 87, 88



1008

4.2. Compression.

a. METER SWITCH: "Vibration Level"
FREQUENCY RANGE: "5-5000 Hz"
COMPRESSOR SPEED: "100"
FUNCTION SELECTOR: "Vel."
DISPL.-VEL.RANGE: "0.1" (Vel.Gen.)
OUTPUT VOLTAGE: "10"
FREQUENCY SCALE: "200 Hz"

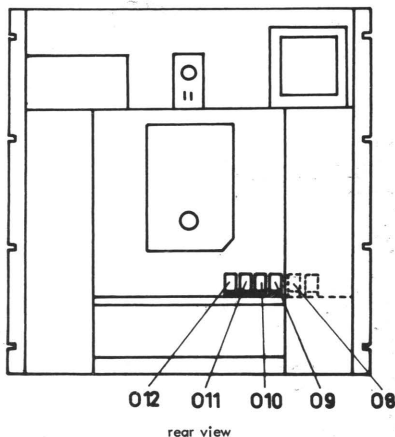
Adjust DISPLACEMENT VELOCITY LEVEL for an 18 dB deflection on type 1008.

b. DISPL. VEL. RANGE to "1" (Vel. Gen.)

Deflection on type 1008: 18 dB.
Tolerance: ± 0.5 dB.

c. DISPL. VEL. RANGE to "10" (Vel. Gen.)

Deflection on type 1008: 18 dB.
Tolerance: ± 1.3 dB.



4.3. Compressor Speed.

- a. METER SWITCH: "Vibration Level"
FREQUENCY RANGE: "5-5000 Hz"
COMPRESSOR SPEED: "300 dB/sec."
FUNCTION SELECTOR: "Vel."
DISPL.-VEL. RANGE: "1" (Vel. Gen.)
OUTPUT VOLTAGE: "10"
FREQUENCY SCALE: "500 Hz"

Adjust DISPLACEMENT VELOCITY LEVEL for a 20 dB deflection on type 1008.

By changing DISPL.-VEL. RANGE from "1" to "10", the meter pointer will move against 0 and up again. Read the lowest pointer deflection for all positions of COMPRESSOR SPEED.

COMPRESSOR SPEED:	10	Deflection read on the meter (approx.):	6 dB
	30		10 "
	100		14 "
	300		17 "
	1000		18 "
	3000		19 "

	Frequency Hz				
	15	50	150	500	1500
	dB deflection read on the meter (approx.)				
Auto 1	6	10	10	10	10
" 2	6	10	14	14	14
" 3	6	10	14	17	17
" 4	6	10	14	17	18
" 5	6	6	10	14	17
" 6	6	6	6	10	14

COMPR. SPEED position

- Auto 1: 10 - 30 - 30 - 30 - 30 dB/sec.
2: 10 - 30 - 100 - 100 - 100 dB/sec.
3: 10 - 30 - 100 - 300 - 300 dB/sec.
4: 10 - 30 - 100 - 300 - 1000 dB/sec.
5: 10 - 10 - 30 - 100 - 300 dB/sec.
6: 10 - 10 - 10 - 30 - 100 dB/sec.

b. OUTPUT VOLTAGE to "0"

Check that the compressor relays are energized according to the following table.

COMPRESSOR SPEED		Independent of position of FREQUENCY SCALE			
10		08 08-09 08-09-010 08-09-010-011 08-09-010-011-012			
30					
100					
300					
1000					
3000					
		FREQUENCY SCALE Hz			
		30-100	100-300	300-1000	1000-5000
Auto	1	08	08	08	08
"	2	08	08-09	08-09	08-09
"	3	08	08-09	08-09-010	08-09-010
"	4	08	08-09	08-09-010	08-09-010-011
"	5		08	08-09	08-09-010
"	6			08	08-09

4.4. Frequency Response with Velocity Generator.

METER SWITCH: "Vibration Level"
COMPRESSOR SPEED: "300 dB/sec."
FUNCTION SELECTOR: "Vel."
DISPL.-VEL. RANGE: "1" (Vel.Gen.)
OUTPUT VOLTAGE: "10"
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

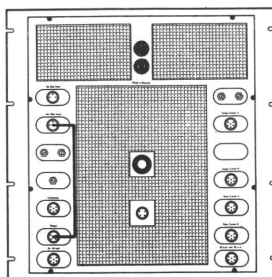
Adjust DISPLACEMENT VELOCITY LEVEL for a 19 dB deflection on type 1008.

Vary the frequency from 5-2000 Hz.

Deflection on type 1008: 19 dB.

Tolerance: ± 0.5 dB.

By turning DISPLACEMENT-VELOCITY LEVEL it should be possible to obtain deflections from -2 dB to 21 dB.



1008

4.5. Frequency Response with Acceleration Generator.

METER SWITCH: "Vibration Level"
FREQUENCY RANGE: "5-5000 Hz"
COMPRESSOR SPEED: "300 dB/sec."
FUNCTION SELECTOR: "Accel."
ACCELERATION RANGE: "1000" (Accel.Gen.)
OUTPUT VOLTAGE: "10"
FREQUENCY SCALE: "1000 Hz"

Adjust ACCELERATION LEVEL for a 19 dB deflection on type 1008.

Vary the frequency from 10-10000 Hz.

Deflection on type 1008: 19 dB.

Tolerance: ± 0.5 dB.

By turning ACCELERATION LEVEL it should be possible to obtain deflections from -2 to 21 dB.

4.6. Gain Reserve.

a. METER SWITCH: "Output Voltage"
FREQUENCY RANGE: "5-5000 Hz"
COMPRESSOR SPEED: "300 dB/sec."
FREQUENCY SCALE: "1000 Hz"

COMPRESSOR input disconnected

Adjust the OUTPUT VOLTAGE for a 20 dB deflection on type 1008.

b. COMPRESSOR SPEED to "Off"

Deflection on type 1008: Max. 12 dB.

Possible reason for fault: Defective tube V 5.

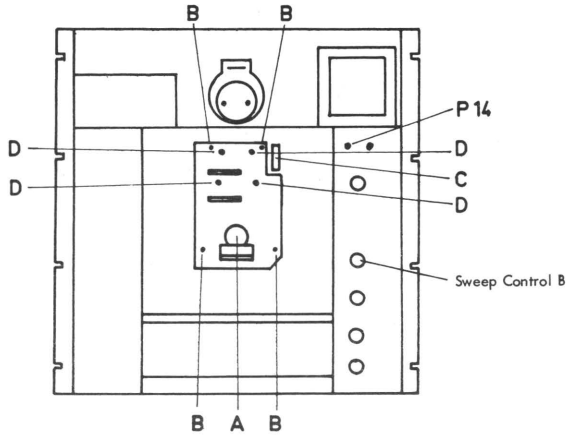
4.7. Compressor Meter.

METER SWITCH: "Vibration Level Preset"
FREQUENCY RANGE: "5-5000 Hz"
COMPRESSOR SPEED: "3000 dB/sec."
FUNCTION SELECTOR: "Accel."
FREQUENCY SCALE: "500 Hz"

Adjust ACCELERATION LEVEL for a 0 dB deflection on type 1008.

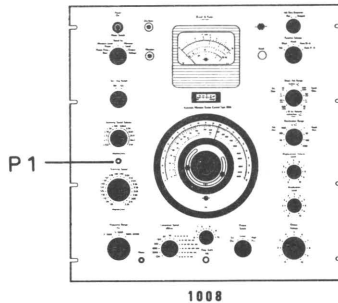
Check that the deflection on the Compressor Meter is 20 dB.

If necessary adjust P 17 (located on printed circuit XC 0355).



Removal of the Motor Unit.

Remove the meter and the lamp for frequency dial. By removing the cam "A" and the four screws "B" it is possible to pull the back plate away. After removing the multiplug "C" and the four screws "D" holding the motor unit, it is possible to lift the motor up through the hole in the upper Chassis.



5.1. Adjustment of Motor Speed.

- a. SCANNING SWITCH: "On"
- SCANNING SPEED SELECTOR: "X 1"
- SCANNING SPEED: "1.80"

The speed should be 1.80° per min.

Tolerance: $\pm 3\%$

If necessary adjust P 14 (Motor).

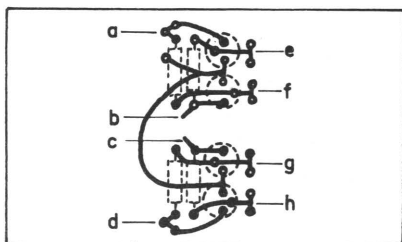
The periodic time of the pulses should be 24 m.sec. measured on "Sweep Control "B" pin 6.

- b. SCANNING SPEED SELECTOR to "2.59"

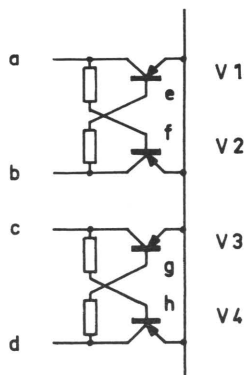
The speed should be 2.59° per min.

If necessary adjust potentiometer P 1

The periodic time of the pulses should be 18.69 m.sec.



Printed circuit XC 0130



5.2. Fault Tracing for Motor Unit.

- a. SCANNING SWITCH: "Off"
SCANNING SPEED SELECTOR: "1"
SCANNING SPEED: "1.80"

If the motor does not work, check the 24 m.sec. pulses on SWEEP CONTROL B socket (pin 6) in order to localize the defect to be in the pulse generator or in motor unit.

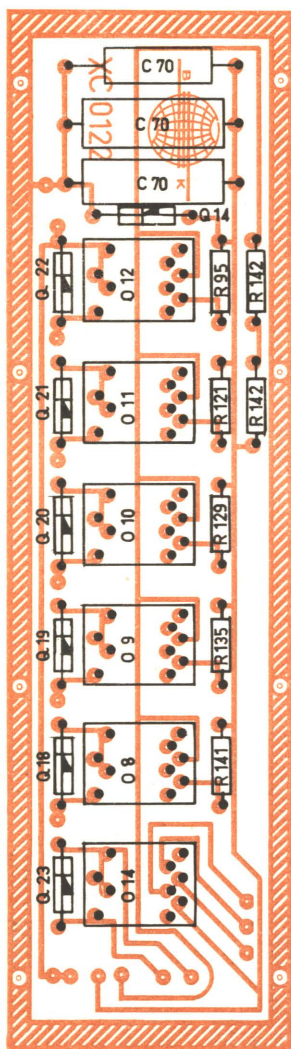
If the pulses are present on SWEEP CONTROL B socket check the dc voltages on the transistors in the multivibrator.

Measuring Point	a	b	c	d	e	f	g	h	
DC Voltage	- 10 V	- 10 V	- 10 V	- 10 V					The two multivibrations are working.
	0 V	- 20 V	- 20 V	0 V	- 0,5 V	+ 2 V	+ 2 V	- 0,5 V	Transistor V 1 should change over.
	- 20 V	0 V	0 V	- 20 V	+ 2 V	- 0,5 V	- 0,5 V	+ 2 V	Transistor V 2 should change over.
	0 V	- 20 V	0 V	- 20 V	- 0,5 V	+ 2 V	- 0,5 V	+ 2 V	Transistor V 3 should change over.
	- 20 V	0 V	- 20 V	0 V	+ 2 V	- 0,5 V	+ 2 V	- 0,5 V	Transistor V 4 should change over.

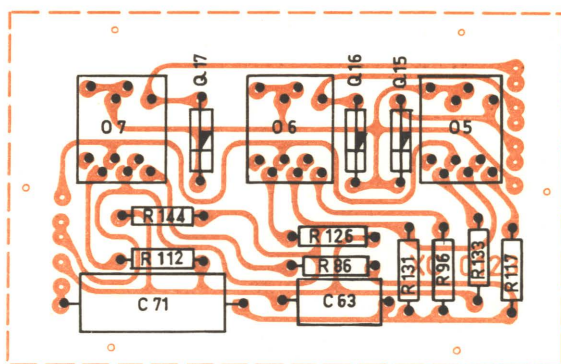
Connect an oscilloscope to the collector of the transistor which should change over according to the table.

- a. The pulses can not be obtained on the collector but the pulses are on the base. This transistor or accompanying components may be defective.
- b. The pulses can be obtained on the collector. The transistor with which it is matched is defective.

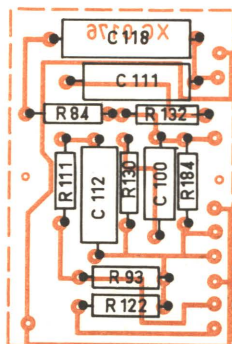




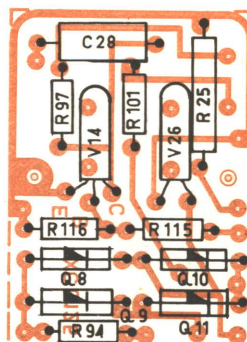
Compressor Relays



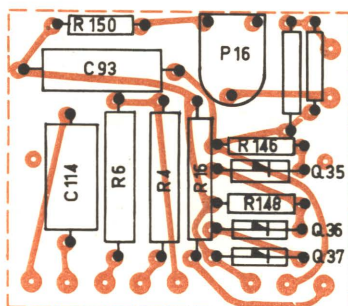
Differentiating and Integration Circuits

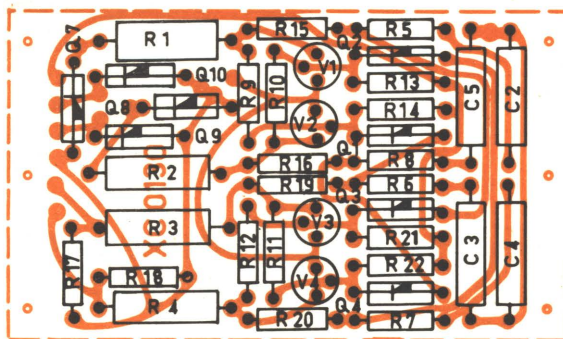


Vel. Gen. Input

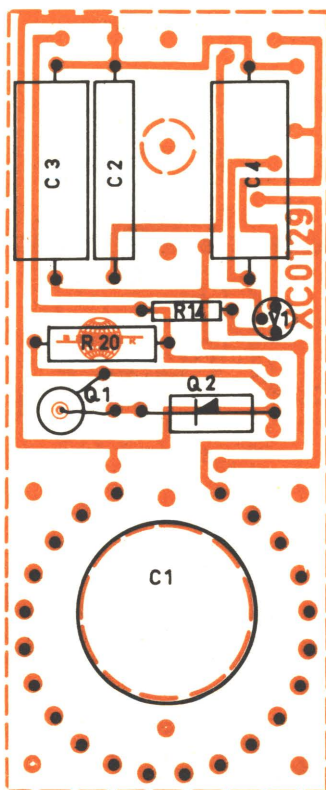


Meter Circuit

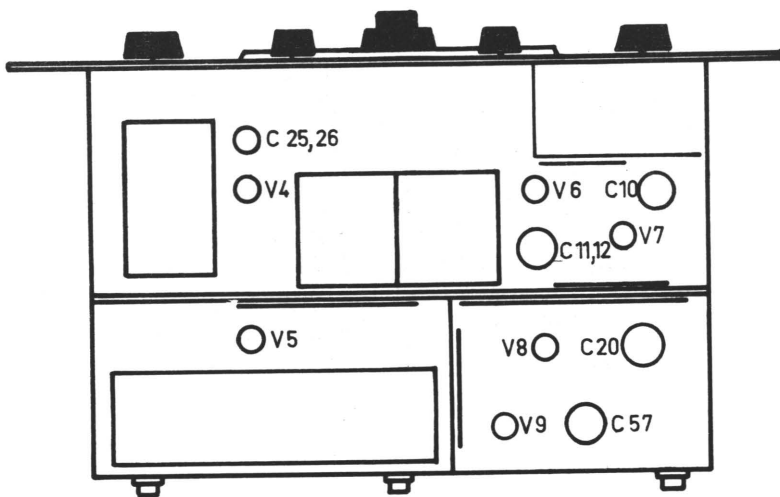




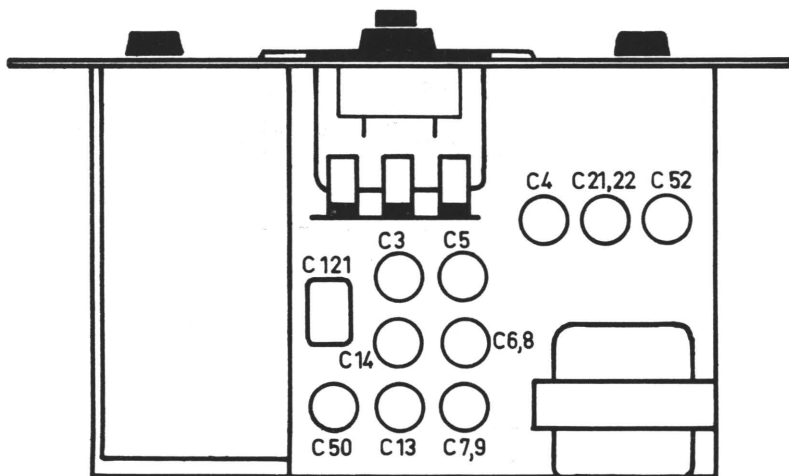
Motor Circuit



Scanning Speed



bottom view



top view

CIRCUIT DIAGRAM REF.	COMPONENT TYPE			STOCK REFERENCE	CIRCUIT DIAGRAM REF.	COMPONENT TYPE			STOCK REFERENCE
CAPACITORS:					RESISTORS:				
C 1,2	Electrolytic	640 µF/ 16 V	CE 0201	R 30-32	Carbon	1/2 W	5%	100. kΩ	
C 3	"	5000 µF/ 15 V	CE 0301	R 33,34	"	"	10%	200 kΩ	
C 4,5	"	1000 µF/ 75 V	CE 0501	R 35-37	"	"	"	315 kΩ	
C 6-12	"	2 × 100 µF/250 V	CE 0704	R 38,39	"	"	5%	350 kΩ	
C 13	"	2 × 100 µF/450 V	CE 0902	R 40	"	"	10%	500 kΩ	
C 14	"	50 µF/500 V	CE 0903	R 41	"	"	2%	500 kΩ	
C 15	"	4 µF/250 V	CE 0703	R 42	"	"	5%	630 kΩ	
C 16	"	4 µF/250 V	CE 2034	R 43,44	"	"	"	800 kΩ	
C 17,18	"	40 µF/150 V	CE 2038	R 45	"	"	"	1 MΩ	
C 19	Polyester	10 µF/160 V	CS 0722	R 46	"	"	"	1.25 MΩ	
C 20	Electrolytic	1000 µF/350 V	CE 2948	R 47	"	"	10%	1.6 MΩ	
C 21,22	"	2 × 100 µF/450 V	CE 0902	R 48,49	"	"	"	2 MΩ	
C 23,24	"	100 µF/ 12 V	CE 8946	R 60	"	1/3 W	"	10 Ω	
C 25,26	"	2 × 24 µF/350 V	CE 6896	R 61	"	"	2%	100 Ω	
C 27	"	1000 µF/ 16 V	CE 0309	R 62	"	"	10%	150 Ω	
C 28	"	50 µF/ 25 V	CE 8965	R 63	"	"	"	80 Ω	
C 29,30	"	100 µF/ 3 V	CE 8943	R 64,65	"	"	"	315 Ω	
C 40	Ceramic	1.8 pF/500 V	CK 0180	R 66-68	"	"	"	500 Ω	
C 41	"	3.3 pF/500 V	CK 0330	R 69	"	"	2%	600 Ω	
C 42	"	10 pF/500 V	CK 1100	R 70	"	"	10%	1 kΩ	
C 43	"	18 pF/500 V	CK 1180	R 71	"	"	2%	1.5 kΩ	
C 44,46	"	27 pF/500 V	CK 1270	R 72-75	"	"	10%	2 kΩ	
C 50	Paper	3.5 µF/200 V	CP 0342	R 76	"	"	"	2.5 kΩ	
C 51,52	"	8 µF/150 V	CP 0888	R 77,78	"	"	"	3.15 kΩ	
C 60	Polyester	10 nF/125 V	CS 0001	R 79,80	"	"	"	4 kΩ	
C 61,62	"	0.1 µF/125 V	CS 0013	R 81	"	"	"	5 kΩ	
C 63	"	0.15 µF/125 V	CS 0015	R 82,83	"	"	"	6.3 kΩ	
C 64	"	0.33 µF/125 V	CS 0019	R 84	"	"	2%	10 kΩ	
C 65	"	0.47 µF/125 V	CS 0021	R 85-91	"	"	10%	10 kΩ	
C 66,67	"	0.68 µF/125 V	CS 0023	R 92	"	"	2%	20 kΩ	
C 68-70	"	0.47 µF/125 V	CS 0021	R 93,94	"	"	"	31.5 kΩ	
C 70,71	"	1 µF/125 V	CS 0025	R 95	"	"	5%	31.5 kΩ	
C 72	"	10 nF/125 V	CS 0001	R 96,97	"	"	10%	31.5 kΩ	
C 80	"	47 nF/400 V	CS 0109	R 98-100	"	"	2%	40 kΩ	
C 81-84	"	0.1 µF/400 V	CS 0113	R 101	"	"	10%	40 kΩ	
C 85	"	0.22 µF/400 V	CS 0117	R 102-104	"	"	2%	63 kΩ	
C 86-89	"	1 µF/350 V	CS 0500	R 105	"	"	10%	63 kΩ	
C 93	"	1 µF/250 V	CS 0025	R 106	"	"	5%	70 kΩ	
C 100	Polystyrene	75 pF/500 V	CT 0102	R 107-109	"	"	2%	100 kΩ	
C 102,103	"	200 pF/500 V	CT 0107	R 110	"	"	5%	100 kΩ	
C 104	"	300 pF/500 V	CT 0109	R 111-116	"	"	10%	100 kΩ	
C 105	"	400 pF/500 V	CT 0111	R 117,118	"	"	"	150 kΩ	
C 106	"	450 pF/500 V	CT 0112	R 119	"	"	5%	160 kΩ	
C 107,110	"	500 pF/500 V	CT 0113	R 120	"	"	2%	175 kΩ	
C 111	"	1 nF/400 V	CT 0218	R 121	"	"	5%	180 kΩ	
C 112	"	400 pF/500 V	CT 0111	R 122	"	"	2%	200 kΩ	
C 113	"	1 nF/400 V	CT 0218	R 123,124	"	"	10%	200 kΩ	
C 114	"	6.3 nF/200 V	CT 3234	R 125	"	"	5%	315 kΩ	
C 115	"	10 nF/200 V	CT 3331	R 126	"	"	10%	315 kΩ	
C 116	"	+0, -2% 100 nF/100 V	CT 3359	R 127,128	"	"	5%	500 kΩ	
C 117	"	" 1 µF/100 V	CT 3345	R 129	"	"	"	600 kΩ	
C 118,119	"	1.25 nF/400 V	CT 3358	R 130	"	"	2%	1 MΩ	
C 120	"	+0, -2% 200 nF/100 V	CT 3362	R 131	"	"	5%	630 kΩ	
C 121	"	±1% 2 µF/100 V	CT 5041	R 132	"	"	2%	1 MΩ	
C 122	"	175 pF/500 V	CT 0106	R 133,134	"	"	10%	1 MΩ	
C 123	"	400 pF/500 V	CT 0111	R 135	"	"	5%	1.8 MΩ	
C 130	Variable Tuning Capacitor		CV 0009	R 137,138	"	"	10%	2 MΩ	
C 131	Trimmer	60 pF/	CV 3007	R 139,140	"	"	"	3.15 MΩ	
C 132	"	15 pF/	CV 3013	R 141,142	"	"	5%	6 MΩ	
					R 143,144	"	10%	6.3 MΩ	
RESISTORS:					R 145	"	"	1 MΩ	
R 1,2	Carbon	1 W	10%	10 kΩ	R 146	"	5%	20 Ω	
R 3-5	"	"	"	20 kΩ	R 148	"	"	25 kΩ	
R 6	"	"	"	31.5 kΩ	R 149	"	"	16 kΩ	
R 10	"	1/2 W	"	160 Ω	R 150	"	"	29.5 kΩ	
R 11	"	"	"	500 Ω	R 157	"	2%	40 kΩ	
R 12,13	"	"	"	1 kΩ	R 160-162	"	0.5%	111.1 Ω	
R 14	"	"	2%	1.6 kΩ	R 163	"	"	222.2 Ω	
R 15	"	"	10%	2 kΩ	R 164-166	"	"	1 kΩ	
R 16,17	"	"	5%	3.15 kΩ	R 167	"	"	2 kΩ	
R 18	"	"	"	6.3 kΩ	R 168	"	"	222.2 kΩ	
R 19	"	"	"	20 kΩ	R 169-171	"	"	10 kΩ	
R 20-23	"	"	10%	31.5 kΩ	R 172,173	"	"	20 kΩ	
R 24,25	"	"	5%	50 kΩ	R 174-176	"	"	100 kΩ	
R 26	"	"	10%	63 kΩ	R 177,178	"	"	200 kΩ	
R 27,28	"	"	"	80 kΩ	R 179	"	"	11.11 kΩ	
R 29	"	"	"	100 kΩ	R 180	"	"	100 kΩ	

CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REFERENCE
RESISTORS:		
R 181	Carbon 1/2 W " 1% 980 k Ω	
R 182,183	" " " 1 M Ω	
R 184	" " " 143 k Ω	
R 185	" " " 1% 140 k Ω	
R 186	" " " 315 k Ω	
R 187	" " " 700 k Ω	
R 200	Wire 10 W " " 10 k Ω RO 0210	
R 201,202	" " " 4.7 k Ω RX 0102	
R 203	" " " 82 Ω RX 0107	
R 204	" " " 100 Ω RX 0108	
R 205	" " 5.5 W " 13 k Ω RX 0308	
R 206	" " 8 W " 390 Ω RX 0406	
R 210	NTC " " 15 k Ω RN 0003	

POTENTIOMETERS:				
P 1-3	Trimmer	carbon lin.	10 k Ω	PG 3100
P 4	"	"	10 k Ω	PG 3102
P 5	Accel. Level	carbon log.	50 k Ω	PP 3507
P 6	Vel. /V.G.	carbon lin.	50 k Ω	PP 3508
P 7	Acc. /V.G.	"	100 k Ω	PP 4108
P 8	Displ. /V.G.	"	100 k Ω	PP 4108
P 9	Vel. /A.G.	"	100 k Ω	PP 4108
P 10	Displ. /A.G.	"	100 k Ω	PP 4108
P 11	Displ.-Vel. Level	" log.	500 k Ω	PP 4507
P 12	Phase	"	10 k Ω	PP 3106
P 13	Accel./A.G.	wire lin.	10 k Ω	PQ 3109
P 14	Motor	"	20 k Ω	PQ 3209
P 15	Meter	"	20 k Ω	PQ 3209
P 16	Output Voltage	carbon	100 k Ω	PP 4104
P 17	Trimmer	"	22 k Ω	PG 3201

SWITCHES - RELAYS:		
N 1	Power On-Off	NN 0563
O 1	Power voltage selector	OA 0017
O 2-14	Relay	OC 0006
O 16	Frequency Range	OP 1025
O 17	Compressor Speed	OQ 1025
O 18	Function Selector	OS 1028
O 19	Scanning Switch	OT 1041
O 20	Displ.-Vel. Range	ON 1028
O 21	Acceleration Range	ON 1028
O 22	Vel. Gen. Response	OX 1016
O 23	Meter Switch	OX 1028
O 24	Output Switch	OX 1025

RECTIFIERS:				
Q 1-3	Silicon	200 V/o.04 A	QV 0022	
Q 4-7	"	1200 V/o.15 A	QV 0025	
Q 8-11	Germanium	115 V/ 150 mA	QV 0085	
Q 12-23	Silicon	1000 V/o.15 A	QV 0023	
Q 24-27	"	200 V/ o.6 A	QV 0502	
Q 28-31	"	65 V/ o.6 A	QV 1003	
Q 32	Zener	6.5 V/ 140 mA	QV 1308	
Q 34	Silicon	1000 V/o.15 A	QV 0023	
Q 35-37	"	50 V/o.75 A	QV 0501	

TRANSISTORS - TUBES:			
V 1	Triode, pentode	ECF80/68L8	VA 0061
V 2	"	ECF82/6U8	VA 0062
V 3	Twin triode	ECC83/12AX7	VA 0012
V 4	"	ECC81/12AT7	VA 0009
V 5	Pentode	EF94/6AU6	VA 0035
V 6-8	Twin triode	ECC81/12AT7	VA 0009
V 9	Pentode	12BY7	VA 0063
V 10	"	EL86/6CW5	VA 0024
V 11	"	EF94/6AU6	VA 0035
V 12	Stabilizer	OA2	VA 0039
V 13	Germ. transistor	ASZ16	VB 0029
V 14	"	OC44	VB 3044
V 20	Fuse	1.6 A	VF 0007
V 21	Fuse	2.5 A	VF 0011
V 22	Meter lamp	6.3 V/ o.5 A	V5 1271
V 23,24	Accel.ind.lamp	6.3 V/o.15 A	V5 8008
V 25	Dial lamp	6.3 V/ o.3 A	V5 8024
V 26	Cold Cathode tube	90 V	VA 0072

CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REFERENCE
PRINTED CIRCUIT:		
	Compressor Relays	XC 0122
	Diff. and Integr. Circuits	XC 0123
	Meter Circuit	XC 0125
	Compressor, Pick-up Amplifier	XC 0126
	Vel. Gen. Input	XC 0176
	Compressor Meter	XC 0355
	XC 0122 with components	8061019
	XC 0123	8051019
	XC 0125	8011019
	XC 0126	8041019
	XC 0176	8091019
	XC 0355	8141019

MISCELLANEOUS:		
	Bakelite knob 25 mm	SN 0701
	" 30 mm x 17	SN 0814
	" 30 mm x 11	SN 0807
	" 35 mm	SN 0989
	" 55 mm	SN 1014
L 1	Choke	LJ 0003
Z 2	Coils for Oscillator	ZS 0081
Z 3	Coil for compressor	ZS 0100
	Coil for magnet clutch	LB 1011
	Cabinet, wood	KA 1018
	Cabinet, metal	KQ 0052
	Frequency dial	SA 0006
	Housing for freq. dial	SO 0189
Z 4	Low-pass filter	ZS 0110
	Magnet clutch	UM 1008
I 1	Moving coil meter	IM 1028
I 2	Compressor Meter	IM 2025
	Magnet clutch	UM 1009
	Plug 3 pin	JP 0304
	Plug 4 pin	JP 1004
	Plug 6 pin	JP 1005
	Plug 20 pin	JP 2000
	Plug, Vibration/Oscillator	JP 0009
	Painter for freq. dial	SV 0018
	Power cord. EUR	AN 0005
	Power cord. USA	AN 0006
T 1	Power transformer	TN 0015
	Socket 3 pin	JJ 0304
	Socket 4 pin	JJ 1004
	Socket 6 pin	JJ 1005
	Socket 20 pin	JJ 2000
	Socket Vibration/Oscillator	JJ 1006
	Socket Fuse V 20,21	JS 0006
	Socket Tube V 5, 11, 12	JV 7503
	Socket Tube V 4, 6-10	JV 9011
	Socket Tube V 1-3	JV 9012
	Socket Relay O 2, 5-14	JJ 0012
	Socket Relay O 3, 4, 30	JJ 0008

CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REFERENCE	CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REFERENCE
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COMPONENTS FOR MOTOR DRIVE

Pulsegenerator ZI 0001

CAPACITORS:

C 1	Polystyrene	+0,-2%	1 μ F/100 V	CT 3345
C 2	"	"	50 nF/100 V	CT 3355
C 3	"	"	150 nF/100 V	CT 3356
C 4	"	"	300 nF/100 V	CT 3357

RESISTORS:

R 1	Metal	1/2 W	10%	510 k Ω	RF 0100
R 11	Carbon	1/3 W	2.5%	30,2 Ω	
R 12	"	"	"	39,8 Ω	
R 13	"	"	"	60,3 Ω	
R 14	"	"	"	800 Ω	
R 16	"	"	0.5%	64,6 k Ω	
R 17	"	"	"	501 k Ω	
R 20	Wire	5,5 W	10%	6,8 k Ω	RX 0305
R 21	Carbon	1/3 W	0.5%	94,4 k Ω	
R 22	"	"	"	85,1 k Ω	
R 23	"	"	"	75,9 k Ω	
R 24	"	"	"	79,4 k Ω	
R 25	"	"	"	70,8 k Ω	
R 26	"	"	"	73,3 k Ω	
R 27	"	"	"	79,4 k Ω	
R 28	"	"	"	69,2 k Ω	
R 29	"	"	"	61,7 k Ω	
R 30	"	"	"	55 k Ω	
R 31	"	"	"	49 k Ω	
R 32	"	"	"	43,2 k Ω	
R 33	"	"	"	47,3 k Ω	
R 34	"	"	"	42,2 k Ω	
R 35	"	"	"	38 k Ω	
R 36	"	"	"	39,4 k Ω	
R 37	"	"	"	38 k Ω	
R 38	"	"	"	33,9 k Ω	
R 39	"	"	"	39,8 k Ω	
R 40	"	"	"	26,6 k Ω	
R 41	"	"	"	31,6 k Ω	

POTENTIOMETER:

P 1	Carbon, lin	100 k Ω	PP 4108
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SWITCHES:

O 1	Scanning Speed Selector	OV 1040
O 2	Scanning Speed	OY 1040

RECTIFIERS:

Q 1	Zener	7 V/140 mA	QV 1309
Q 2	Zener	19,5 V/ 70 mA	QV 1310

TRANSISTORS:

V 1	Germanium	2N1671B	VB 0016
V 2	Germanium	ASZ16	VB 0029

PRINTED CIRCUIT:

	Scanning Speed	XC 0129
	XC 0129 with components	8000056

Motor Circuit CV 0009

CAPACITORS:

C 1	Polyester	10 nF/125 V	CS 0001
C 2-5	Polyester	33 nF/125 V	CS 0007

RESISTORS:

R 1-4	Wire	5,5 W	5%	120 Ω	RX 0307
R 5-8	Carbon	1/3 W	"	56 Ω	
R 9-12	"	"	"	3 k Ω	
R 13-22	"	"	"	16 k Ω	

SWITCHES:

O 1	Relay	OD 0006
O 2	Stabilizing Network	OY 1029
O 3	Reversing Arm	NT 0007

RECTIFIERS:

Q 1-4	Germanium	115 V/150 mA	QV 0085
Q 5-11	Silicon	50 V/750 mA	QV 0501
Q 12	Zener	21 V/ 70 mA	QV 1314

TRANSISTORS:

V 1-4	Germanium	ACY20	VB 0017
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PRINTED CIRCUIT:

	Motor Circuit	XC 0130
	XC 0130 with components	8000054

MOTOR:

M 1	Motor	AU 5050/22	UM 0008
	Gearbox	AU 5300/83 AA	UG 0032

Constant Level Output ZE 0012

CAPACITORS:

C 1	Electrolytic	200 μ F/6,4 V	CE 0208
C 2	"	2 μ F/ 70 V	CE 0401
C 3	"	8 μ F/ 40 V	CE 0414
C 4-6	Polyester	10 μ F/250 V	CS 0001
C 7	Polystyrene	600 pF/500 V	CT 0114
C 8	"	500 pF/500 V	CT 0213
C 9	"	400 pF/125 V	CT 1011
C 10-11	"	1.25 nF/500 V	CT 3219

RESISTORS:

R 1	Carbon	1/3 W	10%	180 k Ω
R 2	"	"	"	500 Ω
R 3	"	"	5%	1 k Ω
R 4	"	"	2%	4 k Ω
R 5	"	"	5%	4,5 k Ω
R 6,7	"	"	"	5 k Ω
R 8,9	"	"	10%	5 k Ω
R 10	"	"	5%	5 k Ω
R 11,12	"	"	"	20 k Ω
R 13,14	"	"	10%	20 k Ω
R 15	"	"	2%	30 k Ω
R 16	"	"	10%	70 k Ω
R 17-19	"	"	"	31,6 k Ω
R 20	"	"	5%	20 k Ω
R 21,22	"	"	10%	70 k Ω
R 23	"	"	"	200 k Ω

POTENTIOMETERS:

P 1	Carbon, lin	25 k Ω	PG 3250
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RECTIFIERS:

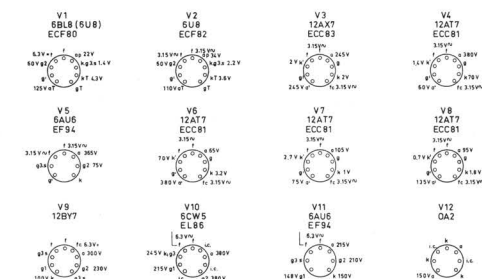
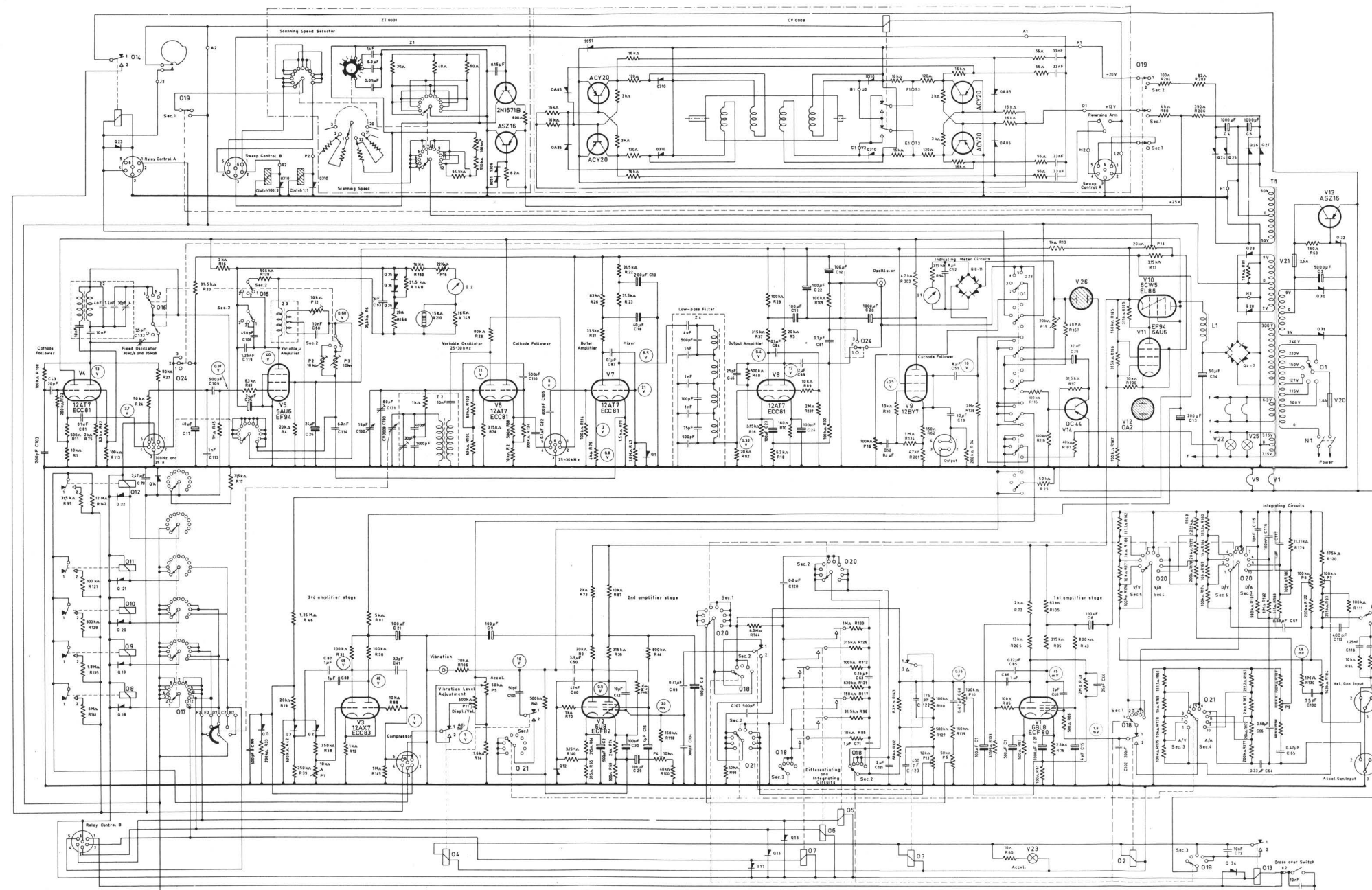
Q 1,2	Germanium	115 V/150 mA	QV 0085
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TRANSISTORS:

V 1-3	Silicon Transistor	2N3702	VB 1043
V 4	"	BC 107	VB 1032

COILS:

L 1	Low Pass Filter	LB 0567
L 2	"	LB 0567
L 3	"	LB 0602
L 4	Balanced Modulator	LB 0603



Voltage checks:
Switches: Position X
Adjust "Output Voltage" for 10V

O1: Mains Voltage Selector	1: Off	Scanning Speed	1: 0.01 inches/sec
	2: On	2: 0.1	2: 0.1
O2-O3: 0-4 Function Selector Relays	1: Displ.-Velocity Operation	3: 1	3: 1
	2: Acceleration Operation	4: 10	4: 10
O5-O6: 0-7 LF Cut-off Relays	1: Operation	8: 100	8: 100
	2: Stand by	9: 1000	9: 1000
O8-O9: 0-10 Automatic Compressor Control Relays	1: Resistor connected in positive current	10: 10000	10: 10000
	2: in active	11: 100000	11: 100000
O11: 0-12 Automatic Compressor Control Relays	1: Resistor connected in positive current	12: 1000000	12: 1000000
	2: in active	13: 10000000	13: 10000000
O13: Cross-over Relay	1: Operation	14: 100000000	14: 100000000
	2: Stand by	15: 1000000000	15: 1000000000
O14: Stand by Relay	1: Operation	16: 10000000000	16: 10000000000
	2: Stand by	17: 100000000000	17: 100000000000
O15: Reset Switch Relay	1: Operation	18: 1000000000000	18: 1000000000000
	2: Stand by	19: 10000000000000	19: 10000000000000
O16: Frequency Range	1: 10-5000 Hz	20: 100000000000000	20: 100000000000000
	2: 20-10000 Hz	21: 1000000000000000	21: 1000000000000000
O17: Compressor Speed	1: 1000	22: 10000000000000000	22: 10000000000000000
	2: 2000	23: 100000000000000000	23: 100000000000000000
O18: Function Selector	1: 1000	24: 1000000000000000000	24: 1000000000000000000
	2: 2000	25: 10000000000000000000	25: 10000000000000000000

