Service Instructions

Sine - Random Generator

Consisting of:

Removal of the Metal Case

After removing the four threaded retainers at the back of the instrument, it is possible to slide the chassis and the front panel out of the case.

Trouble Shooting

If the reason for a fault is not an obvious one such as a dead tube, 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

Multimeter (50 µA)

Frequency Analyzer Type 2107

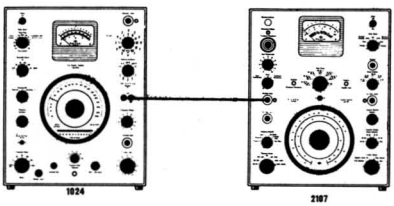
(Frequency counter or a frequency standard and a service oscilloscope)

(Vacuum Tube Voltmeter Type 2409)

(Frequency and Distortion Measuring Bridge Type 1607)

Meter Circuit

valid from serial no. 131481



1.1. Mechanical Zero-point

Adjust for 0 with no power on.

1.2. Meter Circuit Balance

MATCHING IMP.: "60 Ω"
COMPRESSOR SPEED: "Off"
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "o.3 sec. Output Volt."
FREQUENCY SCALE: "1ooo Hz"

Adjust the OUTPUT LEVEL for a 10 V deflection on type 1024. Check that the voltages across R 84 and R 85 are equal (approx. 7 V).

By unbalance: Measure the voltage across R 85 and adjust P 5 for the same voltage across R 84.

1.3. Sensitivity

MATCHING IMP.: "60 Ω"
COMPRESSOR SPEED: "Off"
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "o.3 sec. Output Volt."
FREQUENCY SCALE: "1ooo Hz"

Adjust the OUTPUT LEVEL to exactly 10 V on type 2107.

Deflection on type 1024: 10 V.
If necessary adjust P 4.

1.4. Meter Time Const.

MATCHING IMP.: "60 Ω"
COMPRESSOR SPEED: "Off"
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "o.3 sec. Output Volt."
FREQUENCY SCALE: "1ooo Hz"

Adjust the OUTPUT LEVEL for a 10 V deflection on type 1024 and check the time constant for all OUTPUT VOLTAGE position of METER SWITCH.

Tolerance: ± 20%.

By the meter time constant is meant the time it takes for the meter pointer to fall from 10 V to 3.4 V deflection when the input signal is disconnected (GENERATOR STOP pushed-in).

1.5. Voltage Divider

MATCHING IMP.: "60 Ω"
COMPRESSOR SPEED: "Off"
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "o.3 sec. Output Volt."
FREQUENCY SCALE: "1ooo Hz"

Adjust the OUTPUT LEVEL for a 10 V deflection on type 1024.

Check the deflection on type 1024 in all positions of MATCHING IMP. by comparison to type 2107.

Tolerance: ± 2% (+ tolerance of 2107: 2%).

valid from serial no. 131481

2.1. Frequency Response

a. ATTENUATOR: "12ooo mV"
MATCHING IMP.:"Att"
COMPRESSOR SPEED: "Comp. Off"
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "o.3 sec. Output Volt."
FREQUENCY SCALE: "1ooo Hz"

Adjust the OUTPUT LEVEL for a 20 dB deflection on type 1024.

Vary the frequency from 20 - 20ooo Hz.

Deflection on type 1024: 19.5 - 20.5 dB
If necessary adjust C 103.

b. Check all positions of MATCHING IMP. except "Att."

As under item a, but deflection on type 1024: 19.3-20.7 dB.

2.2. Power Output

a. MATCHING IMP.: "6 Ω"
COMPRESSOR SPEED: "Comp. Off"
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "o.3 sec. Output Volt."
FREQUENCY SCALE: "1ooo Hz"

Check that approx. 3 Watts can be obtained. Deflection above 21 dB on type 1024 in the entire frequency range 20-20ooo Hz with a load of 6 Ω connected to LOAD terminals.

Possible reason for fault: too low LF signal on OUTPUT LEVEL potentiometer

The voltage should be approx. 280 mV. If not check item 3.4, 3.5 and 3.7.

b. Check MATCHING IMP. in position 60 - 600 - 6000 Ω

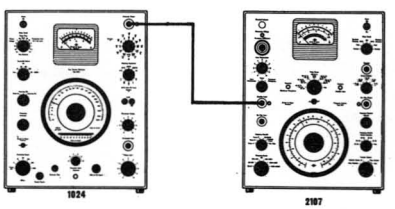
As under item a, but with a load of 60-600-60ooo Ω connected to LOAD terminals.

2.3. Instability

OUTPUT LEVEL: "0"
SWITCH O7: "Stand by"

Check that the amplifier does not start oscillating when a 2 nF condenser is applied to the LOAD terminals.

If necessary apply a condenser 0-500 pF between 600 and 6ooo Ω terminals of T 2 and check frequency response again item 2.1.



2.4. Attenuator

a. ATTENUATOR: "12ooo mV"
MATCHING IMP.: "Att."
COMPRESSOR SPEED: "Comp. Off"
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "o.3 sec. Output Volt."
FREQUENCY SCALE: "200 Hz"

Adjust the OUTPUT LEVEL for a 10 V deflection on type 1024.

Check all positions of ATTENUATOR by comparison to type 2107.

Tolerance: ± 2% (+ tolerance of type 2107: 2%).

b. FREQUENCY SCALE to "20ooo Hz"

Check and tolerances as under item a.

2.5. Distortion

a. ATTENUATOR: "12ooo mV"
MATCHING IMP.: "Att."
COMPRESSOR SPEED: "Comp. Off"
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "o.3 sec. Output Volt."

Adjust the OUTPUT LEVEL for a 10 V deflection on type 2107 (10 V range) and check the distortion of frequencies from 20 - 20ooo Hz.

Distortion down to o.5% can be measured with type 2107. Lower distortion requires use of 1607 filter for rejection of fundamental frequency.

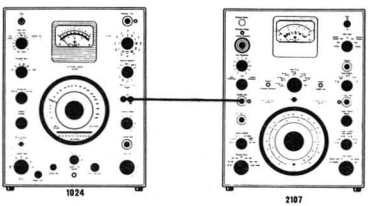
If 1607 is available, check limits.

FREQUENCY SCALE:	20	200	2ooo	20ooo	Hz
max. distortion:	o.7	o.25	o.25	o.7	%

b. MATCHING IMP. to "6 Ω"

Connect a resistor of 6 Ω to LOAD terminals and adjust OUTPUT LEVEL for a 2.5 V deflection on type 1024.

FREQUENCY SCALE:	20	200	2ooo	20ooo	Hz
max. distortion:	1.2	o.5	o.5	1.2	%



2.6. Noise - Hum

a. MATCHING IMP.: "60 Ω"
COMPRESSOR SPEED: "Comp. Off"
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "o.3 sec. Output Volt."
FREQUENCY SCALE: "1ooo Hz"

The instrument must be placed in its case or in other way effectively screened.

Adjust the OUTPUT LEVEL for a 10 V deflection on type 2107 (10 V range).

Depress GENERATOR STOP and measure the noise and hum at line frequency and 2nd and 3rd harmonic.

Noise: min. 65 dB below 10 V
Hum: min. 70 dB below 10 V

b. MATCHING IMP. to "600 Ω"
BANDWIDTH SELECTOR to "10 Hz"

Check and tolerances as under item a.

2.7. Output Transformer

MATCHING IMP.: "60 Ω"
COMPRESSOR SPEED: "Comp. Off"
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "o.3 sec. Output Volt."
FREQUENCY SCALE: "1ooo Hz"

Adjust the OUTPUT LEVEL for a 10 V deflection on type 1024.

Check all other positions of MATCHING IMP. Deflection on type 1024 : 9.8 - 10.2 V.

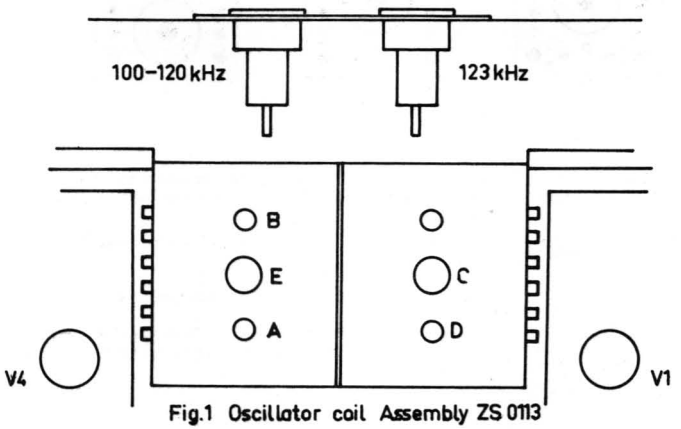


Fig.1 Oscillator coil Assembly ZS 0113

Attention: Item 3.1 - 3.2 - 3.3 - 3.4 - 3.6 and 3.9 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.

3.1. Fixed Oscillator

FREQ. INCREMENT: "0"

Adjust the air trimmer ("D" Fig. 1) for 123 kHz ± 10 Hz on the socket "123 kHz".

Adjust only the iron core ("C" Fig. 1) if the regulation range of the air trimmer is too narrow.

Adjust the iron core of Z 10 to min. voltage on the "123 kHz" socket. The voltage should be 170 - 240 mV.

3.2. Variable Oscillator

a. MATCHING IMP.: "6 Ω"
COMPRESSOR SPEED: "Comp. Off"
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "o.3 sec. Output Volt."
FREQ. SCALE ALIGN. FINE: "Center Position"
FREQ. SCALE ALIGN. COARSE: "Center Position"
FREQUENCY SCALE: "20 Hz"

Adjust the air trimmer ("B Fig. 1) for 20 Hz at the LOAD terminals.

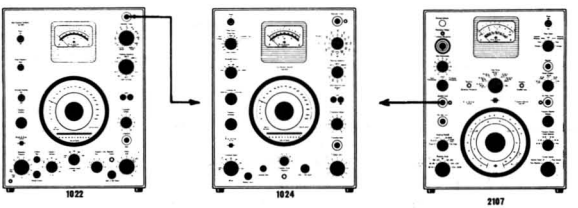
Voltage on the "100-120 kHz socket should be 160-250 mV.

b. FREQUENCY SCALE to "20ooo Hz"

Adjust the iron core ("E" Fig. 1) for 20ooo Hz at the LOAD terminals.

Check a - b again and readjust if necessary.

If the pointer has been removed, 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. Make a degree scale with 102° at 20 Hz and 318° at 20ooo Hz and fix the pointer at 320°.



3.3. 3 kHz Filter

a. MATCHING IMP.: "60 Ω"
COMPRESSOR SPEED: "Comp. Off"
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "10 Hz"
METER SWITCH: "o.3 sec. Output Volt."

Before adjustment of the coils take the instrument out of its case and leave it switched on for 2 hours min. This ensures that condensers and coils have the same temperature.

Remove tube V 13 and connect type 1022 to filter input (R 115).

Input signal: 2 mV 3ooo Hz ± o.3 Hz.

Adjust Z 3 and Z 4 for max. deflection on type 1024.

b. Check BANDWIDTH SELECTOR in all positions

Change the frequency approx. + and - 100 Hz and check the top of the filter curve. It should be flat within 2 dB and the height of the three tops should be within ± o.5 dB.

BANDWIDTH SELECTOR:

10 Hz		30 Hz		100 Hz		300 Hz	
Frequency Hz	Damping dB	Frequency Hz	Damping dB	Frequency Hz	Damping dB	Frequency Hz	Damping dB
3ooo ± 0	0	3ooo ± 0	0	3ooo ± 0	0	3ooo ± 0	0
5	3	15	3	50	3	150	3
10	min. 10	30	min. 20	100	min. 20	300	min. 20
20	" 20	60	" 40	200	" 40	600	" 50
30	" 30	90	" 50	300	" 50		

3.4. 3 kHz Oscillator

BANDWIDTH SELECTOR: "Sine"

Short-circuit g_1 on V 1 (pin 2) to ground and connect a frequency counter on the secondary of Z 4.

The frequency should be: 3ooo Hz.
Tolerance: ± 1 Hz.

Adjust P 8 to 200 mV measured on the secondary of Z 4.

3.5. Noise Generator

a. MATCHING IMP.: "600 Ω"
COMPRESSOR SPEED: "Comp. Off"
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "10 sec. Output Volt."
FREQUENCY SCALE: "1ooo Hz"

Connect an oscilloscope to LOAD terminals and adjust the OUTPUT LEVEL for a 20 dB deflection on type 1024.

b. BANDWIDTH SELECTOR to 20-2ooo Hz

Check that the amplitude distribution of the noise is symmetrical.

If necessary adjust P 2.

c. BANDWIDTH SELECTOR in positions 10 - 30 - 100 - 300 Hz

Check the deflection on type 1024: 19 - 21 dB.

If necessary adjust P 7.

d. BANDWIDTH SELECTOR to 20-2ooo Hz

Check the deflection on type 1024: 19 - 21 dB.

If necessary adjust P 3.

3.6. 1ooo Hz Reference

ATTENUATOR: "12ooo mV"
MATCHING IMP.: "Att."
COMPRESSOR SPEED: "Comp. Off"
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "o.3 sec. Output Volt."

Adjust the oscillator at line frequency and set the FREQUENCY SCALE to "1ooo Hz Ref."

Press the "1ooo Hz REF. SIGNAL" button and adjust C 102 for 1ooo Hz.

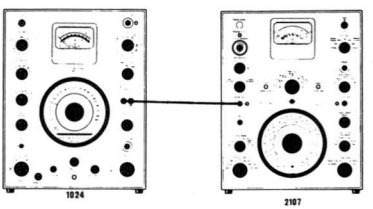
3.7. 120 kHz Selective Amplifier

ATTENUATOR: "12ooo mV"
MATCHING IMP.: "Att."
COMPRESSOR SPEED: "Comp. Off"
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "o.3 sec. Output Volt."
FREQUENCY SCALE: "1ooo Hz"

Adjust OUTPUT LEVEL for a 20 dB deflection on type 1024.

Adjust the iron core in filters Z 5-6-7-8-9 to max. deflection on type 1024.

Adjust potentiometer P 9 for 285 mV on OUTPUT LEVEL potentiometer.



3.8. Balanced Modulator

MATCHING IMP.: "60 Ω"
COMPRESSOR SPEED: "Comp. Off"
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "o.3 sec. Output Volt."
FREQUENCY SCALE: "500 Hz"

Adjust the OUTPUT LEVEL for a 10 V deflection on type 2107.

Short-circuit g_1 on V 12 (C 91, C 92, R 144) to ground.

Measure the 3.5 kHz signal on LOAD. It should be at least 80 dB below 10 V.

If necessary adjust P 1.

3.9. Frequency Drift

COMPRESSOR SPEED: "Comp. Off"
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "Power Freq. Beat"
FREQUENCY INCR.: "0"

Adjust the oscillator at line frequency after a warm up time of 5 min.

Adjust the oscillator at line frequency by means of FREQUENCY INCR. after 20 min. and 15 hours drift.

Frequency drift: max. ± 7 Hz for each period.

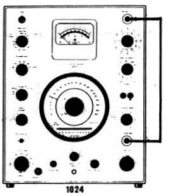
If necessary adjust trimmer ("A" Fig. 1) and check that trimmer "B" is in a position that it is possible to zero adjust the oscillator.

3.10. Magnet Clutch

Should the equipment be used frequently in conjunction with the level recorder, or other instruments whose motors are used to drive the capacitor spindle, then occasional lubrication of the magnet slip-ring and capacitor-slipper is necessary. Petroleum jelly should be used to lubricate these parts.

Note: Do not lubricate the ball bearing of the tuning capacitor spindle and the magnet clutch.

valid from serial no. 131481



4.1. Compressor Balance

ATTENUATOR: "1200 mV"
MATCHING IMP.: "Att."
COMPRESSOR SPEED: "1ooo dB/sec."
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "o.3 sec. Output Volt."
FREQUENCY SCALE: "1ooo Hz"
COMPRESSOR VOLT.: "10"

Adjust the OUTPUT LEVEL for a o.5 V deflection on type 1024.

Check that the signal of the anodes of V 14 are equal.

If necessary adjust P 6.

4.2. Frequency Response

ATTENUATOR: "12ooo mV"
MATCHING IMP.: "Att."
COMPRESSOR SPEED: "100 dB/sec."
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "o.3 sec. Output Volt."
FREQUENCY SCALE: "1ooo Hz"
OUTPUT LEVEL: "10"

Adjust COMPRESSOR VOLTAGE for a 20 dB deflection on type 1024.

Vary the frequency from 20 - 20ooo Hz.

Deflection on type 1024: 19.5 - 20.5 dB

4.3. Gain Reserve

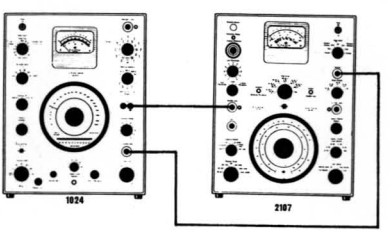
a. COMPRESSOR SPEED: "3 dB/sec."
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "o.3 sec. Output Volt."
FREQUENCY SCALE: "1ooo Hz"

Adjust the OUTPUT LEVEL for a 20 dB deflection on type 1024.

COMPRESSOR INPUT disconnected.

b. COMPRESSOR SPEED to "Comp. Off"

Deflection on type 1024: 10 - 12 dB.



4.4. Compression

MATCHING IMP.: "6ooo Ω"
COMPRESSOR SPEED: "100 dB/sec."
SWITCH O7: "Scanning Off"
BANDWIDTH SELECTOR: "Sine"
METER SWITCH: "o.3 sec. Output Volt."
FREQUENCY SCALE: "1ooo Hz"
OUTPUT LEVEL: "10"

Adjust COMPRESSOR VOLTAGE for an 18 dB deflection on type 2107 (100 V range)

Increase the gain of type 2107 by 40 dB (1 V range).

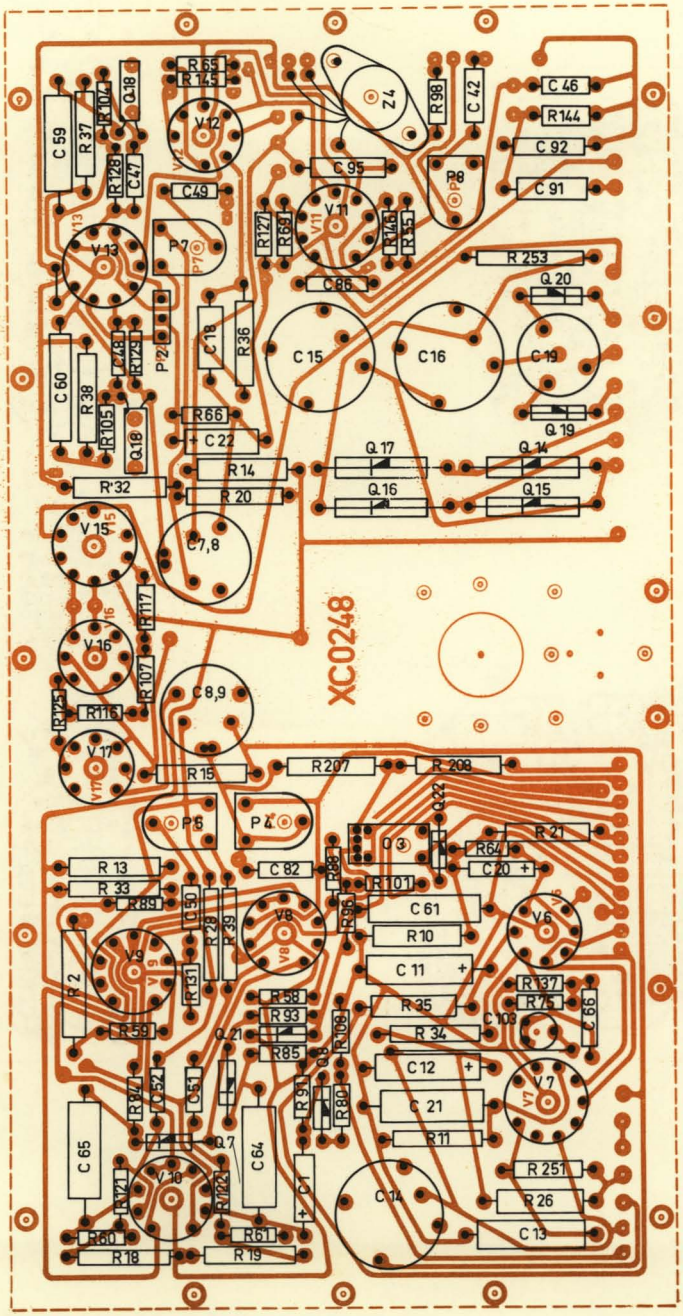
Max. change of deflection on type 2107: 1.5 dB.

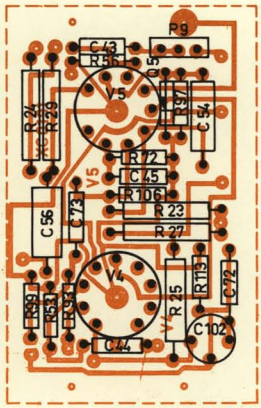
Position of Components

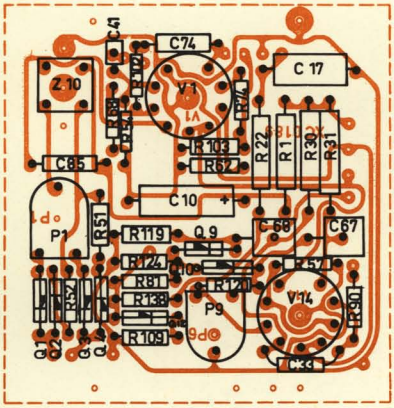
valid from serial no. 197678

1024.5

sheet 1




P9
C43
R56
R24
R26
V5
R97
C54
R72
C45
R106
R23
R27
C56
C73
V4
R115
C72
R99
R53
R34
R25
C102
C44


C41
C74
C17
Z10
V1
R102
R97
R74
R103
R62
R22
R1
R30
R31
C85
C10
P1
R51
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C67
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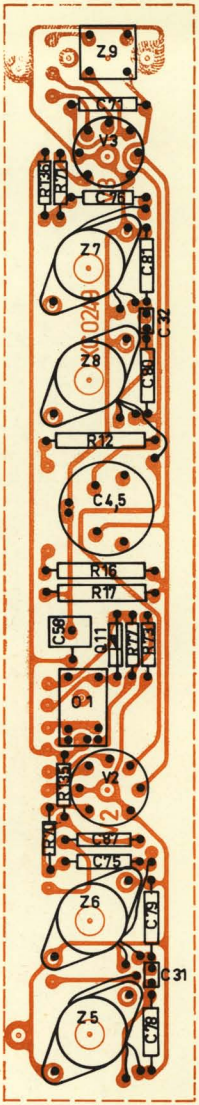
R120
R138
P9
V14
R90
R52
R109
C33


Z9
C74
V3
R135
R73
C76
Z7
C81
C32
Z8
C80
R12
C4,5
R16
R17
C58
Q11
R77
R74
Q1
R145
V2
R14
C87
C75
Z6
C79
C31
Z5
C78

Position of Components

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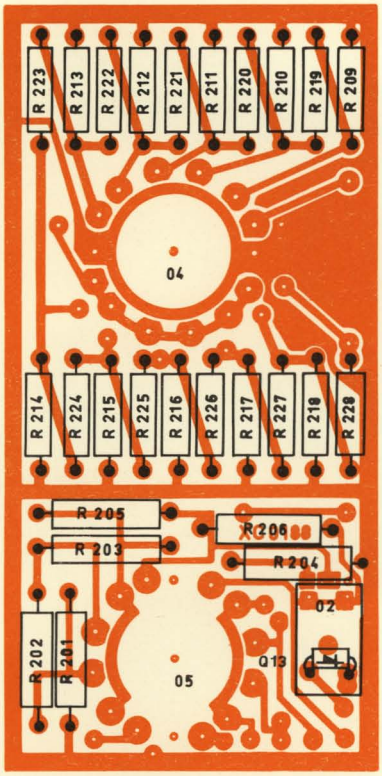
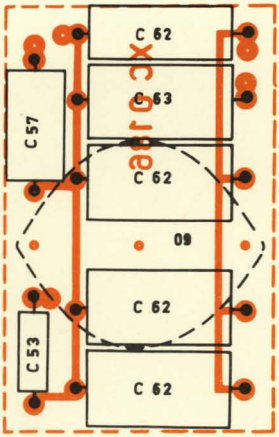
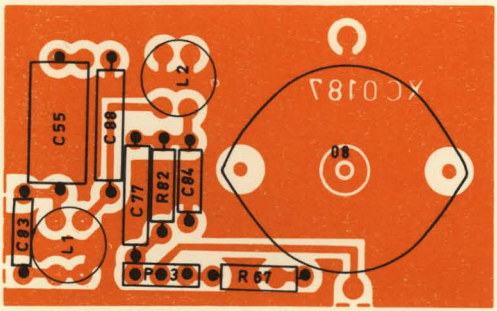


Attenuator



Meter Switch



Bandwidth selector

Parts-List

1024.6

valid from serial no. 232248

COMPONENT TYPE		STOCK REFERENCE	CIRCUIT DIAGRAM REF.
CONDENSERS:			
Electrolytic	50 µF/450 V	CE 0907	C 14-16
"	1 µF/320 V	CE 0512	C 1
"	8 µF/350 V	CE 0802	C 10-13
"	4 µF/250 V	CE 2034	C 17,18
"	2 x 50 µF/250 V	CE 0706	C 4-9
"	2 x 100 µF/250 V	CE 0707	C 2,3
"	320 µF/ 64 V	CE 0511	C 19
"	50 µF/ 25 V	CE 8965	C 22
"	100 µF/ 12 V	CE 0415	C 21
"	100 µF/ 3 V	CE 0310	C 20
Ceramic	2.2 pF/400 V	CK 0220	C 31
"	1.8 pF/400 V	CK 0180	C 32
"	3.3 pF/400 V	CK 0330	C 33
Polyester	47 nF/400 V	CS 0109	C 66
"	o.22 µF/400 V	CS 0117	C 67,68
"	10 nF/250 V	CS 0001	C 41-45,69
"	68 nF/250 V	CS 0011	C 46-48
"	o.1 µF/250 V	CS 0013	C 49-52
"	o.22 µF/250 V	CS 0017	C 53
"	o.33 µF/250 V	CS 0019	C 54
"	o.68 µF/250 V	CS 0023	C 55-57
"	1 µF/250 V	CS 0025	C 59-61
"	2 µF/250 V	CS 0028	C 63-65
Polycarbonat	4,7 µF/100 V	CS 0333	C 58
Polystyrene	125 pF/500 V	CT 0104	C 71
"	125 pF/500 V	CT 0104	C 72
"	200 pF/500 V	CT 0107	C 73
"	250 pF/500 V	CT 0108	C 74-76
"	300 pF/500 V	CT 0109	C 77
"	400 pF/500 V	CT 0111	C 78-82
"	500 pF/500 V	CT 0113	C 85,86
"	600 pF/500 V	CT 0114	C 87
"	800 pF/500 V	CT 0116	C 88
"	5 nF/400 V	CT 1202	C 91,92
"	13.5 nF/200 V	CT 1205	C 93-95
"	400 pF/125 V	CT 1011	C 83,84
Variable(20-20ooo Hz)		CV 0010	C 101
" (-50 +50 Hz)	60 pF	CV 3018	C 106
Trimmer, ceramic	3.5 pF	CV 0021	C 103
" "	40 pF	CV 0019	C 102
" air	15 pF	CV 3021	C 105
" "	60 pF	CV 3019	C 104
SWITCHES:			
Power On-off		NN 0563	N 1
1ooo Hz Ref.		NT 0014	N 2
Generator stop		NT 0023	N 3
Relay		OC 0016	O 1-3
Attenuator		OR 1024	O 4
Matching Imp.		OS 1024	O 5
Compressor		OT 1024	O 6
Stand by		OU 1024	O 7
Bandwidth		OV 1024	O 8
Meter		OW 1024	O 9
Power voltage selector		JS 0005	O 11
POTENTIOMETERS:			
Compressor input	25 kΩ log.	PP 3253	P 10
Output level	30 kΩ wire	PR 3301	P 11
Trimmer pot.m.carbon	200 Ω lin.	PG 1201	P 1
" "	2 kΩ lin.	PG 2200	P 2
" "	5 kΩ lin.	PG 2502	P 3,9
" "	10 kΩ lin.	PG 3102	P 4,5
" "	20 kΩ lin.	PG 3201	P 6
" "	200 kΩ lin.	PG 4201	P 7
" "	500 kΩ lin.	PG 4501	P 8
RECTIFIERS:			
Germanium diode	OA85	QV 0085	Q 1-4
Silicon diode	200 V/o.04 A	QV 0022	Q 5-10
"	1000 V/o.15 A	QV 0023	Q 11-13,22,23
"	1200 V/o.15 A	QV 0025	Q 14-17

COMPONENT TYPE		STOCK REFERENCE	CIRCUIT DIAGRAM REF.
RECTIFIERS:			
Silicon diode	200 V/o.6A	QV 0502	Q 19,20
Zener diode	13 V	QV 1117	Q 21
Noise diode		QV 0093	Q 18
RESISTORS:			
Carbon film	1 W ± 10%	RK 63 kΩ	R 2
"	1/2 W "	RK 10 Ω	R 9
"	" "	RK 2 kΩ	R 12-15
"	" "	RK 10 kΩ	R 1,16
"	" "	RK 20 kΩ	R 17
"	" "	RK 25 kΩ	R 20
"	" "	RK 31.5 kΩ	R 22-24
"	" "	RK 50 kΩ	R 25,26,39
"	" "	RK 63 kΩ	R 27,28
"	" "	RK 100 kΩ	R 29-31
"	" "	RK 200 kΩ	R 32,33
"	" "	RK 315 kΩ	R 34
"	" "	RK 400 kΩ	R 35
"	" "	RK 500 kΩ	R 36
"	" "	RK 10MΩ	R 37,38
"	" 5%	RK 160 Ω	R 10
"	" "	RK 31.5 kΩ	R 21
"	" 3%	RK 200 Ω	R 11
"	" "	RK 25 kΩ	R 18,19
"	1/3 W ± 10%	RK 100 Ω	R 51-53
"	" "	RK 500 Ω	R 54-56
"	" "	RK 1 kΩ	R 57,74
"	" "	RK 1.25 kΩ	R 58
"	" "	RK 1.6 kΩ	R 59-61
"	" "	RK 2 kΩ	R 62,64
"	" "	RK 3.15 kΩ	R 65
"	" "	RK 4 kΩ	R 66
"	" "	RK 6.3 kΩ	R 68-72
"	" "	RK 10 kΩ	R 75
"	" "	RK 20 kΩ	R 81
"	" "	RK 31.5 kΩ	R 87-90
"	" "	RK 40 kΩ	R 92
"	" "	RK 63 kΩ	R 97,98
"	" "	RK 100 kΩ	R 102-106
"	" "	RK 160 kΩ	R 109
"	" "	RK 200 kΩ	R 113
"	" "	RK 315 kΩ	R 117
"	" "	RK 350 kΩ	R 119,120
"	" "	RK 500 kΩ	R 121,122
"	" "	RK 630 kΩ	R 124
"	" "	RK 1MΩ	R 127-131,14
"	" "	RK 2MΩ	R 135-138
"	" "	RK 10MΩ	R 144,145
"	" 5%	RK 180 kΩ	R 112
"	" "	RK 520 kΩ	R 123
"	" "	RK 1.8MΩ	R 133
"	" "	RK 5.2MΩ	R 141
"	" "	RK 6.3MΩ	R 142,143
"	" 3%	RK 5 kΩ	R 67
"	" "	RK 7 kΩ	R 73
"	" "	RK 15 kΩ	R 76
"	" "	RK 16 kΩ	R 77
"	" "	RK 20 kΩ	R 78,79,80
"	" "	RK 25 kΩ	R 82
"	" "	RK 30 kΩ	R 83
"	" "	RK 31.5 kΩ	R 84-86
"	" "	RK 40 kΩ	R 91
"	" "	RK 50 kΩ	R 93
"	" "	RK 63 kΩ	R 95,96
"	" "	RK 70 kΩ	R 99
"	" "	RK 100 kΩ	R 100,101
"	" "	RK 120 kΩ	R 111
"	" "	RK 160 kΩ	R 107,108
"	" "	RK 165 kΩ	R 110
"	" "	RK 250 kΩ	R 114
"	" "	RK 315 kΩ	R 115,116

continued

COMPONENT TYPE		STOCK REFERENCE	CIRCUIT DIAGRAM REF.
Carbon film	1/3 W ± 3%	RK 335 kΩ	R 118
"	" "	RK 700 kΩ	R 125
"	" "	RK 1MΩ	R 126
"	" "	RK 1.2MΩ	R 132
"	" "	RK 2MΩ	R 134
"	" "	RK 2.5MΩ	R 139
"	" "	RK 3.15MΩ	R 140
Wire-wound	8 W 390 Ω	RX 0406	R 253
"	" 6.8 kΩ	RX 0401	R 252
"	5 W 6.2 kΩ	RX 0303	R 251

PRECISION RESISTORS:

Carbon film	1/2 W ± o.5%	RK 4.62 kΩ	R 201
"	" "	RK 10 kΩ	R 202
"	" "	RK 11.1 kΩ	R 207
"	" "	RK 31.5 kΩ	R 203
"	" "	RK 67.6 kΩ	R 204
"	" "	RK 100 kΩ	R 205,206,208
Wire-wound	1 W ± o.5% 68.3 Ω	RO 0001	R 209
"	" " 100 Ω	RO 0002	R 210-218
"	" " 147.8 Ω	RO 0003	R 219-228

TUBES etc.:

Twin triode	ECC81/12AT7	VA 0009	V 1,4,5,8,11,14
"	ECC82/12AU7	VA 0011	V 9,10
"	ECC83/12AX7	VA 0012	V 13
Pentode	EF94/6AU6	VA 0021	V 2,3,6,12,16
" low.micr.	EF94/6AU6	VA 0070	V 6
"	EL84/6BQ5	VA 0023	V 7
"	EL86/6CW5	VA 0024	V 15
Stabilizer	OA2	VA 0037	V 17
Fuse	1.6 Amp.	VF 0007	V 18
Meter Lamp	6.3V/o.5A	VS 1271	V 19
Dial lamp	6.3V/o.5A	VS 8024	V 20

PRINTED CIRCUIT:

Output amplifier	XC 0248
Meter switch	XC 0186
Bandwidth selector	XC 0187
Attenuator	XC 0188
Fixed oscillator	XC 0189
Variable μ.ampl.	XC 0249
Variable oscillator	XC 0191
XC 0248 with components	XC 0248 bl.800
XC 0186 "	XC 0186 bl.801
XC 0187 "	XC 0187 bl.802
XC 0188 "	XC 0188 bl.803
XC 0189 "	XC 0189 bl.804
XC 0249 "	XC 0249 bl.805
XC 0191 "	XC 0191 bl.806

MISCELLANEOUS:

Power cord, Eur.	AN 0005	
Power cord, USA	AN 0006	
Rubber foot	DF 7010	
Clutch plate with worm wheel	DG 0163	
Handle f.metal cab.	DH 0052	
Handle f.wooden cab.	DH 0054	
Front plate, painted & printed	FA 1024	
Back plate	FB 0162	
Meter	IM 0006	I
Coaxial jack	JJ 0115	
6-pin jack	JJ 4704	
Binding post	JK 6270	
Coaxial plug	JP 0018	
6-pin plug	JP 4705	
Jack for grounding	JT 6204	
Case, wood	KA 0010	
Plastic cover	KF 0028	
Frame for 19" rack	KS 0001	
Case, metal	KQ 0017	
Transformer	LB 0401	Z 4

COMPONENT TYPE	STOCK REFERENCE	CIRCUIT DIAGRAM REF.

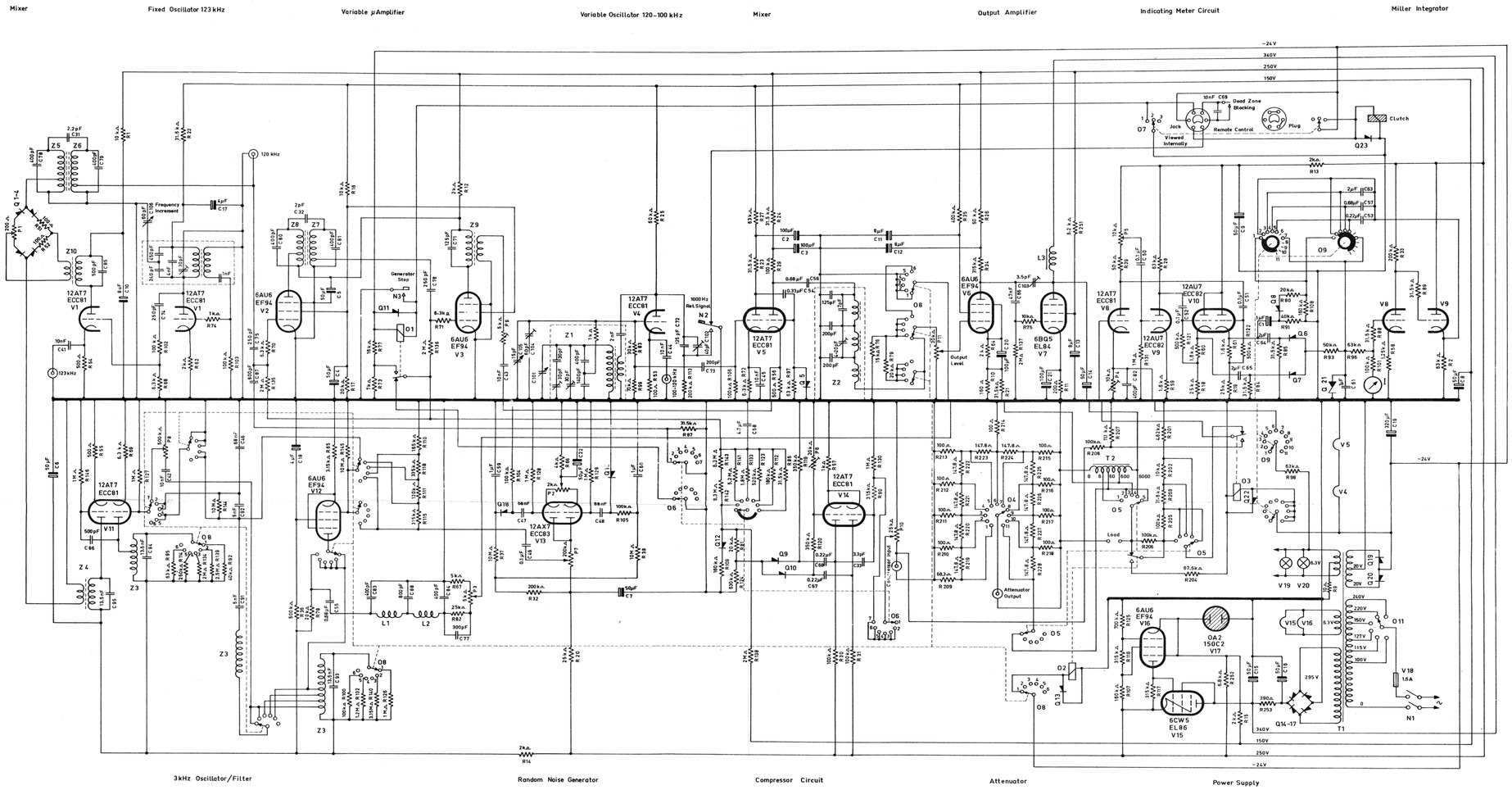
MISCELLANEOUS:

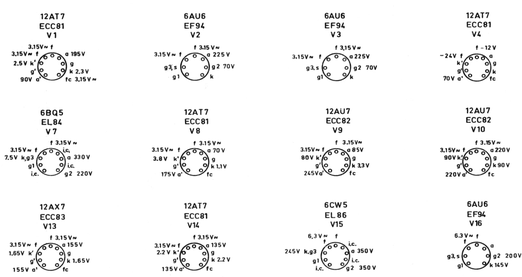
Var.μ ampl.coil assembly	LB 0402	Z 6,7
" "	LB 0403	Z 5
" "	LB 0404	Z 8
Coil for H.F. filter	LB 0552	L 1,2
Choke	LJ 0004	L 3
Cam disc for dead zone switch	OD 0133	
Bakelite knob 25 mm	SN 2522 + DB 0674 + YQ 2083	
" 30 mm flat	SN 3207 + DB 0850 + YQ 2083	
" 30 mm	SN 3222 + DB 0674 + YQ 2083	
" 30 mm twin mark	SN 3227 + DB 0674 + YQ 2083	
" 40 mm	SN 4027 + DB 0674 + YQ 2083	
" 53 mm	SN 6319 + DB 0675 + YQ 2087	
Frequency dial housing	SO 0188	
Frequency dial pointer	SV 0001	
Power transformer	TN 0004	T 1
Output transformer	TU 0006	T 2
Flexible shaft	UB 0041	
Clutch magnet	UM 1011	
Chain drive adaptor	UT 0014	
H.F. filter	ZS 0057	Z 2
Var.μ ampl.coil assembly	ZS 0058	Z 9
123 kHz transformer	ZS 0059	Z 10
3 kHz filter	ZS 0111	Z 3
Oscillator coil assembly	ZS 0113	Z 1

BRÜEL & KJÆR
Nærum - Denmark

Circuit Diagram
valid from serial no. 220546

1024.7





O4: Attenuator

1: 0.04 mV
2: 0.12 "
3: 0.4 "
4: 1.2 "
5: 4 "
6: 12 "
7: 40 "
8: 120 "
9: 400 "
10: 1200 "
11: 4000 "

O5: Matching Impedance

1: 8 Ω
2: 60 "
3: 600 "
4: 6000 "
5: Att.

O6: Compressor Speed

1: Comp. Off
2: 3 dB/sec.
3: 10 "
4: 30 "
5: 100 "
6: 300 "
7: 1000 "

O7

1: Stand by
2: Scanning Off
3: Scanning On

O8: Bandwidth Selector

1: Sine
2: 10 Hz
3: 30 "
4: 100 "
5: 300 "
6: 20-20000 Hz

O9: Meter Switch

1: 30 sec. Output Voltage
2: 10 " " "
3: 3 " " "
4: 1 " " "
5: 0.3 " " "
6: Power Freq. Beat
7: 30 sec. Compressor Input
8: 10 " " "
9: 3 " " "
10: 1 " " "
11: 0.3 " " "

17-11-64	131481			Brüel & Kjær Copenhagen
15-8-65	147707			
19-9-67	220546			

Sine-Random Generator
Type 1024

BD 1024-19