

Consisting of:

Meter Circuit	1022.1
Output Amplifier	1022.2
Oscillator	1022.3
Compressor	1022.4
Position of Components	1022.5
Spare Parts	1022.6
Circuit Diagram	1022.7

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., the 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.i. 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.

Instruments necessary for service and repair.

Multimeter (50 μ A)

Frequency Analyzer Type 2107

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

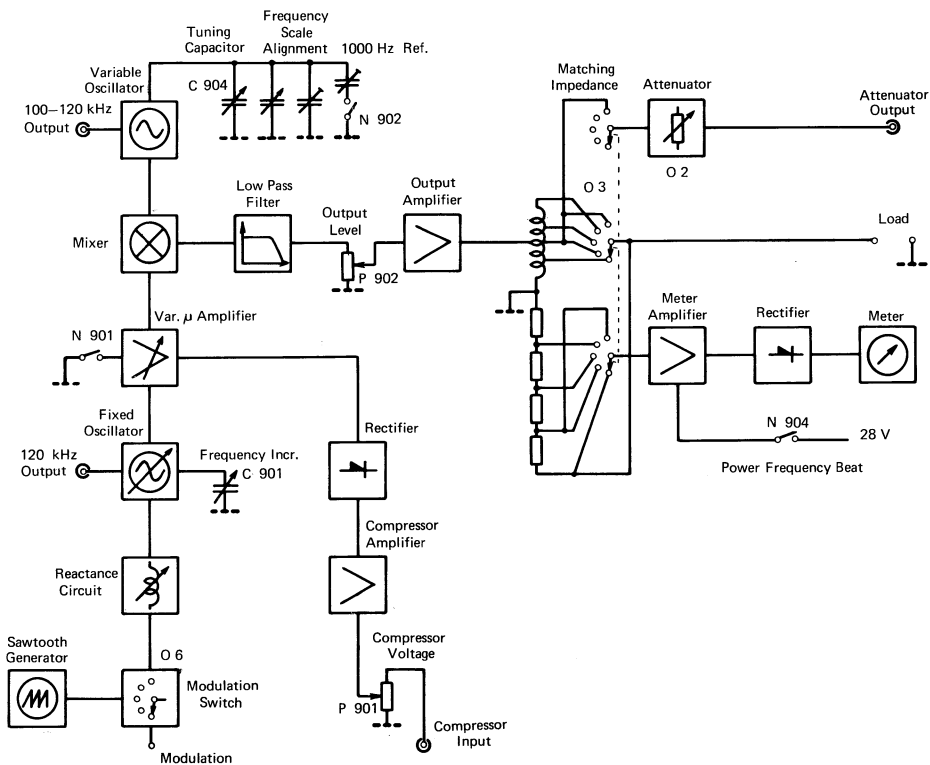
(Vacuum Tube Voltmeter Type 2409)

(Frequency and Distortion Measuring Bridge Type 1607)

Consisting of:

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Parts List	1022.6
Circuit Diagram	1022.7

Block Diagram



Trouble Shooting:

If any problems should occur with this instrument. Then first check the DC working voltages from the Power Supply.

Then use the Block Diagram in order to localize the trouble to be located in one specific circuit.

When a fault has been found and corrected, the voltages and adjustments which are influenced by the correction must be rechecked, and the instrument controlled to see if all basic functions are fulfilled.

The tolerances stated in the instrument can only be used as a guide for adjustment and control.

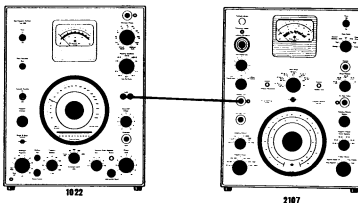
Any deviations must not be corrected without being sure, that the tolerances of the instrument used for making the adjustment are so small as to have influence on the measurement.

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

Voltages at various points throughout the apparatus are indicated on the circuit diagram and the simplified diagram in the service instructions. These voltages are typical nominals only and, with the exception of stabilized power supply voltages, may vary considerably from appatus to apparatus.

Instruments necessary for Service and Repair:

Multimeter (50 μ A)
Frequency Analyzer (Type 2107)
Vacuum Tube Voltmeter (Type 2409)
Frequency Counter
Oscilloscope



1.1 Mechanical Zero-Point

Adjust for 0 with no power on.

1.2 Sensitivity

MATCHING IMPEDANCE: " $60\ \Omega$ "
FREQUENCY SCALE : " $1000\ \text{c/s}$ "

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

Deflection on type 1022: 10 V. If necessary adjust potentiometer P 1.

1.3 Voltage Divider

MATCHING IMPEDANCE: " $60\ \Omega$ "
FREQUENCY SCALE : " $1000\ \text{c/s}$ "

Adjust the OUTPUT LEVEL for a 10 V deflection on type 1022. Check all positions of MATCHING IMPEDANCE by comparison to type 2107.

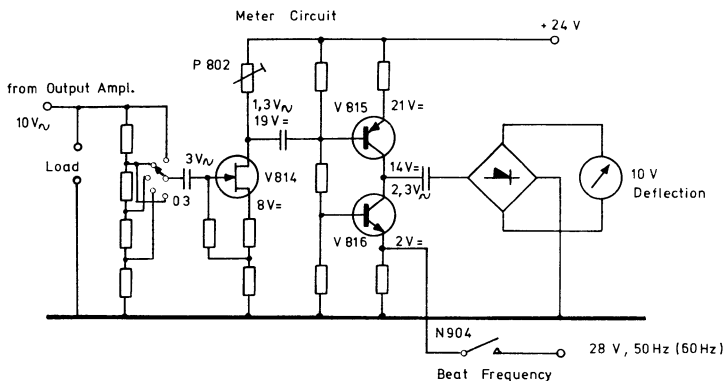
Tolerance: $\pm 1\ \%$ (+ tolerance of 2107: 2 %).

1.4 Frequency Response

MATCHING IMPEDANCE: " $60\ \Omega$ "
FREQUENCY SCALE : " $1000\ \text{c/s}$ "

Adjust the OUTPUT LEVEL for a 10 V deflection on type 2107 (10 V range), while varying the frequency from 20-20,000 c/s and noting the deflection on type 1022.

Tolerance: $\pm 0.1\ \text{dB}$ (+ tolerance of 2107: 0.3 dB).



1.1 Mechanical Zero Point

Adjust for 0 with no power on.

1.2 Sensitivity

MATCHING IMP.: "60 Ω "
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQUENCY SCALE: "1000 Hz"

Adjust the OUTPUT LEVEL for 10 V on LOAD.

Deflection on the meter: 10 V
If necessary adjust P 802.

1.3 Voltage Divider

MATCHING IMP.: "60 Ω "
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQUENCY SCALE: "1000 Hz"

Adjust the OUTPUT LEVEL for 10 V deflection on the meter.

Check the meter deflection for all positions of MATCHING IMPEDANCE.

Max. deviation from 10 V: 2%

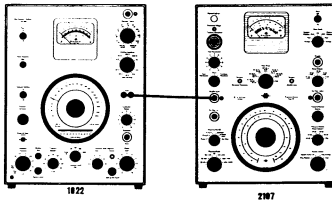
1.4 Frequency Response

MATCHING IMP.: "60 Ω "
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQUENCY SCALE: "1000 Hz"

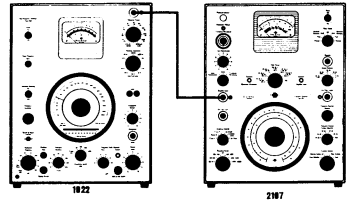
Adjust the OUTPUT LEVEL for a 20 dB deflection on the meter.

Vary the frequency from 20 Hz to 20 kHz and check the meter deflection by comparison to the output voltage on LOAD.

Tolerance: ± 0.1 dB.



Connection: Item 2.1 and 2.2 b.



Connection: Item 2.2 a and 2.6.

2.1. Noise

MATCHING IMPEDANCE : "60 Ω "
FREQUENCY SCALE: "400 c/s"

Adjust OUTPUT LEVEL for a 20 dB deflection on type 2107 (10 V range) and METER SWITCH on type 2107 to "RMS Slow".

Turning the OUTPUT LEVEL to 0 should cause a deflection below 10 dB on type 2107 (0.01 V range).

When OUTPUT LEVEL is turned to max. and OSCILLATOR STOP is depressed, the same condition should be obtained.

2.2. Distortion

- a. MATCHING IMPEDANCE: "Att."
ATTENUATOR: "12000 mV"

Adjust OUTPUT LEVEL for a 10 V deflection on type 2107 (10 V range), and check the distortion at frequencies from 20 to 20000 c/s. Distortion down to 0.5% can be measured with type 2107.

Lower distortion requires the use of 1607 filter for rejection of fundamental frequency. If 1607 is available, check limits:

FREQUENCY SCALE:	"20"	"200"	"2000"	"20000"	c/s
Max. distortion:	1	0.1	0.1	0.7	%

If necessary, adjust P 2 at 200 and/or 2000 c/s.

Possible reasons for distortion: Low plate voltages.

Defective tubes V 2 - V 7 - V 8.

" components in output amplifier.

V 2 oscillator voltage too low.

120 Kc/s to mixer too high (check 3.6)

- b. MATCHING IMPEDANCE: " 6 Ω "

Connect a resistor of 6 Ω to the LOAD terminals and adjust OUTPUT LEVEL for a 2.5 V deflection on type 2107 (3 V range).

FREQUENCY SCALE:	"20"	"200"	"2000"	"20000"	c/s
Max. distortion:	2	0.3	0.3	1.2	%

2.3. Instability

Check all positions of the
MATCHING IMPEDANCE

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

If necessary apply a condenser 0-500 pF between 600 and 6000 Ω terminals on T 1. Check frequency response.

2.4. Power Output

Check all positions of the
MATCHING IMPEDANCE except "Att"

Check that approx. 3 Watts can be obtained.

Connect a load of 6-60-600-6000 Ω to LOAD terminals.

Vary the frequency from 20-20000 c/s. Deflection on type 1022: approx 22 dB.

2.5. Frequency Response

- a. MATCHING IMPEDANCE: "Att."
FREQUENCY SCALE: "1000 c/s"
- b. Check all positions of the
MATCHING IMPEDANCE except "Att."
- c. Check all positions of the
MATCHING IMPEDANCE except "Att."

Adjust the OUTPUT LEVEL for a 20 dB deflection on type 1022.

Vary the frequency from 20-20000 c/s. Deflection on type 1022: 19.75-20.25 dB. If necessary adjust C 64.

Without load connected to LOAD terminals vary the frequency from 20-20000 c/s. Deflection on type 1022: 19.5-20.5 dB.

Connect a load of 6-60-600-6000 Ω to LOAD terminals.

Adjust the OUTPUT LEVEL for a 10 dB deflection on type 1022.

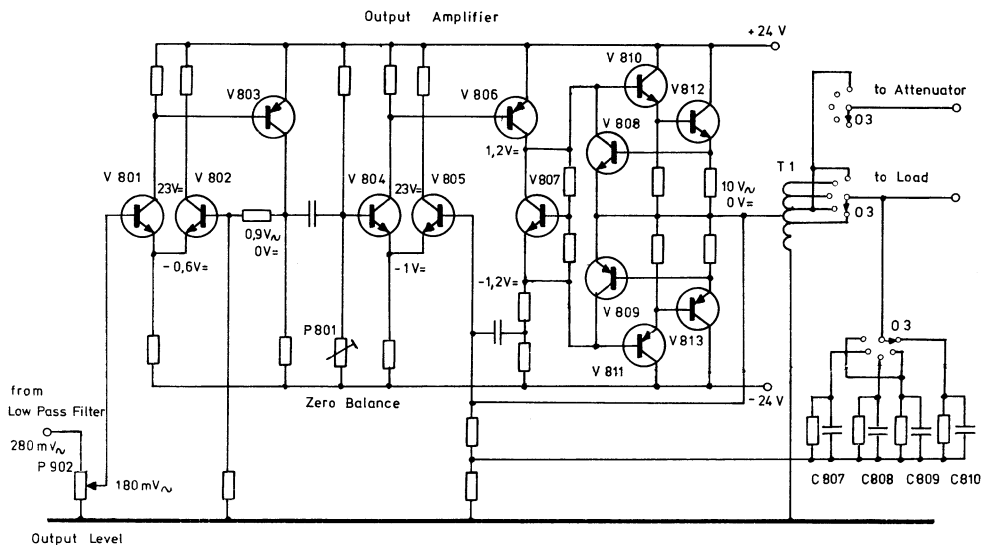
Vary the frequency from 20-20000 c/s. Deflection on type 1022: 9.5-10.5 dB.

2.6 Attenuator

- a. MATCHING IMPEDANCE: "Att" Adjust the OUTPUT LEVEL for a 10 V deflection on type 1022.
FREQUENCY SCALE : "1000 c/s" Check all ATTENUATOR positions by comparison to type 2107.
ATTENUATOR : "12,000 mV" Tolerance: $\pm 2\%$.
- b. FREQUENCY SCALE to "20,000 c/s" As above.

2.7 Output Transformer

- MATCHING IMPEDANCE: "60 Ω " Adjust the OUTPUT LEVEL for a 20 dB deflection on type 1022.
FREQUENCY : "1000 c/s" Check position: 6-600-6000 Ω . Tolerance: $\pm 2\%$.



2.1 DC Balance of Amplifier

MATCHING IMP.: "60 Ω "
OUTPUT LEVEL: "0"

Measure the DC voltage across LOAD and adjust P 801 for 0V \pm 10 mV.

2.2 Frequency Response

MATCHING IMP.: "Attenuator"
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQUENCY SCALE: "1000 Hz"

a. Adjust OUTPUT LEVEL for a 20 dB deflection on the meter.

Vary the frequency from 20 Hz to 20 kHz.
Deflection on the meter: 19.75 — 20.25 dB.

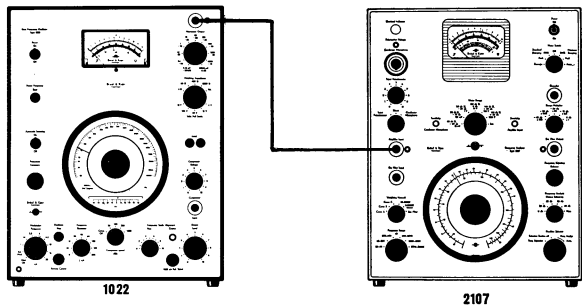
b. Check frequency response for all positions of MATCHING IMP. except "Attenuator".
Deflection on the meter: 19.5 — 26.5 dB.

If necessary change the value of C 807 — 810

2.3 Power Output

MATCHING IMP.: "60 Ω"
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQUENCY SCALE: "1000 Hz"
OUTPUT LEVEL: "10"

- a. Connect a 60 Ω resistor across LOAD and check that a deflection approx. 22 dB can be obtained in the entire frequency range from 20 Hz to 20 kHz.
- b. Check all positions of MATCHING IMP. with a resistor of respectively 6–600–6000 Ω connected to LOAD.



2.4 Distortion

MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"

Distortion down to around 0.25% can be measured by Frequency Analyser type 2107 in Rejection Mode.

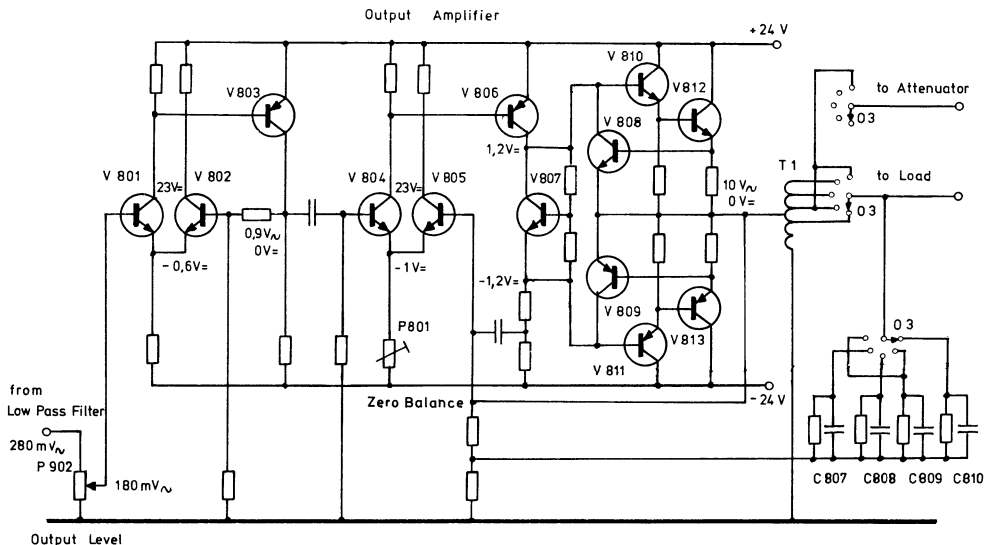
However, to check that the distortion is within the limit a more complex measuring set-up is required.

FREQUENCY SCALE (Hz)	20	200	2 K	20 k
MATCHING IMP.: "Att"; 10 V output voltage unloaded	0.1 %	0.05 %	0.05 %	0.15 %
— 6 Ω 2.45 V output voltage (1W)	0.15 %	0.07 %	0.07 %	0.2 %
— 6000 Ω 77.5 V output voltage (1W)	0.15 %	0.07 %	0.07 %	0.2 %

2.5 Attenuator

MATCHING IMP.: "Attenuator"
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQUENCY SCALE: "1000 Hz"
ATTENUATOR: "12 000 mV"

- a. Adjust OUTPUT LEVEL for a 10 V deflection on the meter.
Check all positions of ATTENUATOR by comparison to type 2107.
Tolerance: ± 2% (+ tolerance of 2107: 2%).
- b. Check also the attenuator steps at 20 and 20 kHz.



2.1 DC Balance of Amplifier

MATCHING IMP.: "60Ω"
OUTPUT LEVEL: "0"

Measure the DC voltage across LOAD and adjust P 801 for 0V ±10 mV.

2.2 Frequency Response

MATCHING IMP.: "Attenuator"
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQUENCY SCALE: "1000 Hz"

a. Adjust OUTPUT LEVEL for a 20 dB deflection on the meter.

Vary the frequency from 20 Hz to 20 kHz.
Deflection on the meter: 19.75 – 20.25 dB.

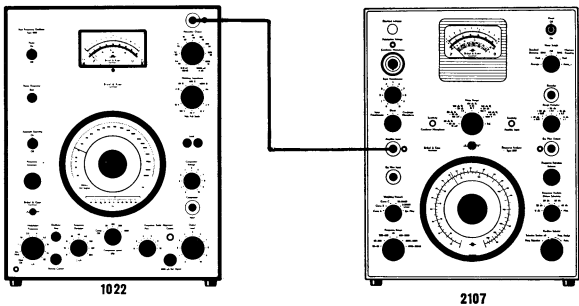
b. Check frequency response for all positions of MATCHING IMP. except "Attenuator".
Deflection on the meter: 19.5 – 26.5 dB.

If necessary change the value of C 807 – 810

2.3 Power Output

- MATCHING IMP.: "60 Ω"
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQUENCY SCALE: "1000 Hz"
OUTPUT LEVEL: "10"
- a. Connect a 60 Ω resistor across LOAD and check that a deflection approx. 22 dB can be obtained in the entire frequency range from 20 Hz to 20 kHz.

b. Check all positions of MATCHING IMP. with a resistor of respectively 6–600–6000 Ω connected to LOAD.



2.4 Distortion

- MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
- Distortion down to around 0.25% can be measured by Frequency Analyser type 2107 in Rejection Mode.
- However, to check that the distortion is within the limit a more complex measuring set-up is required.

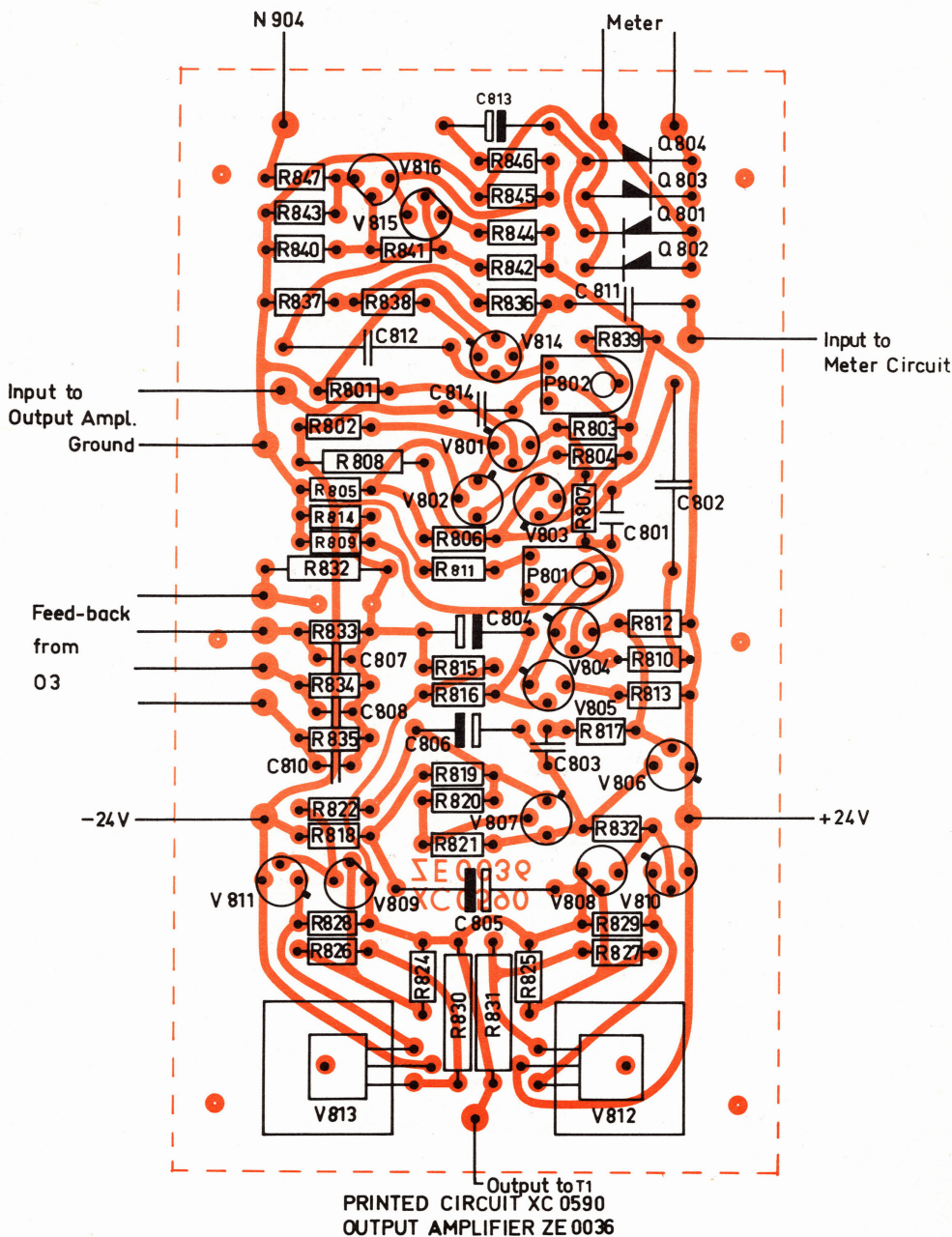
FREQUENCY SCALE (Hz)	20	200	2 K	20 k
MATCHING IMP.: "Att" 10 V output voltage unloaded	0.2 %	0.1 %	0.1 %	0.2 %
— 6 Ω 2.45 V output voltage (1W)	0.3 %	0.15 %	0.15 %	0.4 %
— 6000 Ω 77.5 V output voltage (1W)	0.3 %	0.15 %	0.15 %	0.4 %

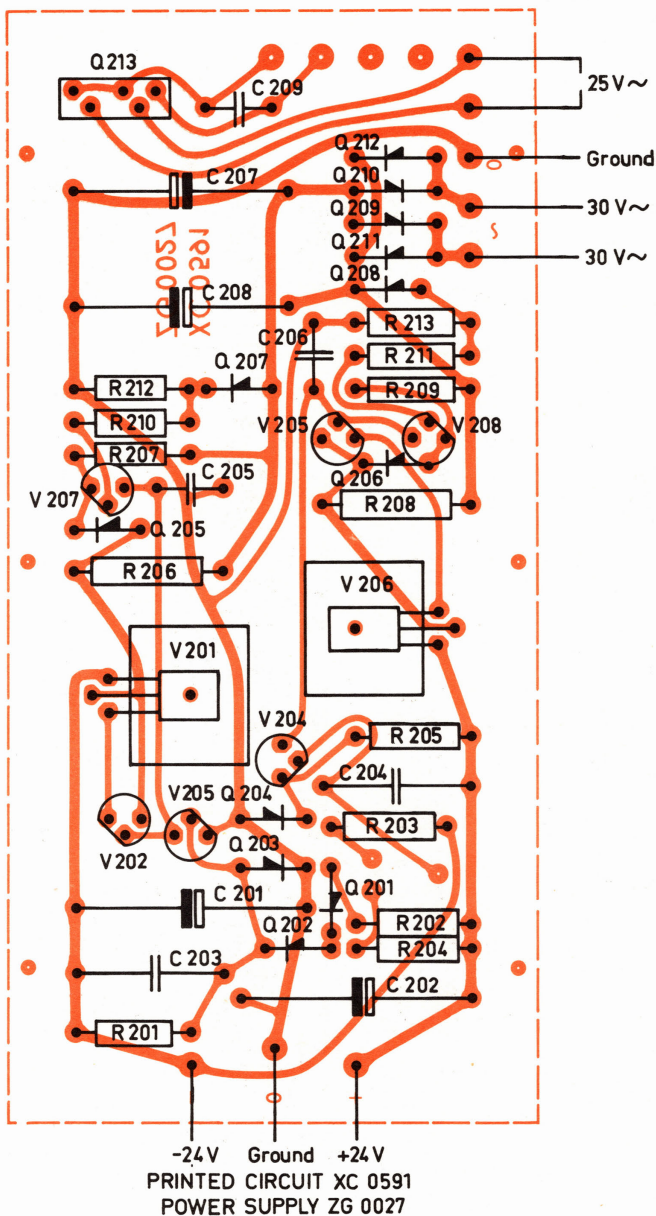
2.5 Attenuator

- MATCHING IMP.: "Attenuator"
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQUENCY SCALE: "1000 Hz"
ATTENUATOR: "12 000 mV"
- a. Adjust OUTPUT LEVEL for a 10 V deflection on the meter.

Check all positions of ATTENUATOR by comparison to type 2107.

Tolerance: ± 2% (+ tolerance of 2107: 2%).
- b. Check also the attenuator steps at 20 and 20 kHz.





CIRCUIT DIAGRAM REF.	COMPONENT TYPE		STOCK REF.	CIRCUIT DIAGRAM REF.	COMPONENT TYPE		STOCK REF.
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CAPACITORS:

C 201,202	Electrolytic	100µF/ 25 V	CE 0415
C 203,204	Polyester	2,2µF/100 V	CS 0380
C 205,206	-	10µF/250 V	CS 0403
C 207,208	Electrolytic	400µF/ 40 V	CE 0417
C 209	Polyester	0.1µF/250 V	CS 0402
C 301,302	-	0.22µF/100 V	CS 0339
C 303	-	2.2µF/100 V	CS 0380
C 304	-	10nF/250 V	CS 0403
C 305	-	0.1µF/100 V	CS 0013
C 306	-	10nF/250 V	CS 0403
C 307,308	Polystyrene	5nF/250 V	CT 1202
C 309	-	125pF/500 V	CT 0104
C 310	Electrolytic	250µF/ 25 V	CE 0413
C 311	-	100µF/ 16 V	CE 0312
C 312	Polyester	10nF/250 V	CS 0403
C 313	-	1.5µF/100 V	CS 0343
C 401	-	0.1µF/100 V	CS 0013
C 402	-	10µF/250 V	CS 0403
C 403	Polystyrene	125pF/500 V	CT 0104
C 404	Trimmer	40pF/	CV 0019
C 501,502	Polyster	10nF/250 V	CS 0403
C 503	Polystyrene	100pF/500 V	CT 0103
C 504	-	125pF/500 V	CT 0104
C 505	-	200pF/500 V	CT 0107
C 506	Polyester	0.47µF/100 V	CS 0335
C 601	-	0.22µF/100 V	CS 0339
C 701	-	0.47µF/100 V	CS 0335
C 702	-	2.2µF/100 V	CS 0380
C 703	-	1.5µF/100 V	CS 0343
C 705	Polycarbonate	1µF/ 63 V	CS 0804
C 706	Polyester	1µF/100 V	CS 0336
C 801	Ceramic	200pF/400 V	CK 0078
C 802	Polyester	4.7µF/100 V	CS 0387
C 803	Ceramic	27pF/400 V	CK 1270
C 804	Electrolytic	25µF/ 6 V	CE 0203
C 805	-	50µF/ 25 V	CE 8965
C 806	-	25µF/ 6 V	CE 0203
C 807	Ceramic	68pF/400 V	CK 1680
C 808	-	100pF/400 V	CK 0077
C 810	-	1nF/500 V	CK 3100
C 811	Polycarbonate	22pF/250 V	CS 0005
C 812	Polyester	2.2µF/100 V	CS 0380
C 813	Electrolytic	5µF/ 35 V	CE 0406
C 814	Polyester	0.1µF/250 V	CS 0402
C 901	Trimmer	60pF/	CV 3018
C 902	-(fine)	15pF/	CV 3020
C 903	-(Coarse)	60pF/	CV 3019
C 904	Variable Condenser	20–20000 Hz	CV 0010

COILS AND TRANSFORMERS:

L 901,902	Oscillator Coil Assembly	ZS 0064
L 903	Compressor Coil Assembly	ZS 0053
L 904-906	H.F. Filter	ZS 0056
T 2	Power Transformer	TN C040
T 1	Output Transformer	TV 0007

POTENTIOMETERS:

P 201	Trimmer Carbon	4.7 kΩ	PG 2470
P 301,302	-	47 kΩ	PG 3471
P 501	-	4.7 kΩ	PG 2470
P 701	-	2.2 kΩ	PG 2207
P 801	-	22 kΩ	PG 3221
P 802	-	4.7 kΩ	PG 2470
P 901	Compressor Voltage	25 kΩ	PP 3253
P 902	Output Level	30 kΩ	PR 3301

PRINTED CIRCUITS:

Output Amplifier	XC 0590	ZE 0036
Power Supply	XC 0591	ZG 0027
Mixer and Compressor	XC 0592	ZM 0009
Variable Oscillator	XC 0593	ZI 0006
Fixed Oscillator	XC 0594	ZI 0007
Attenuator Output	XC 0595	PZ 0001
Regulating Amplifier	XC 0596	PZ 0002

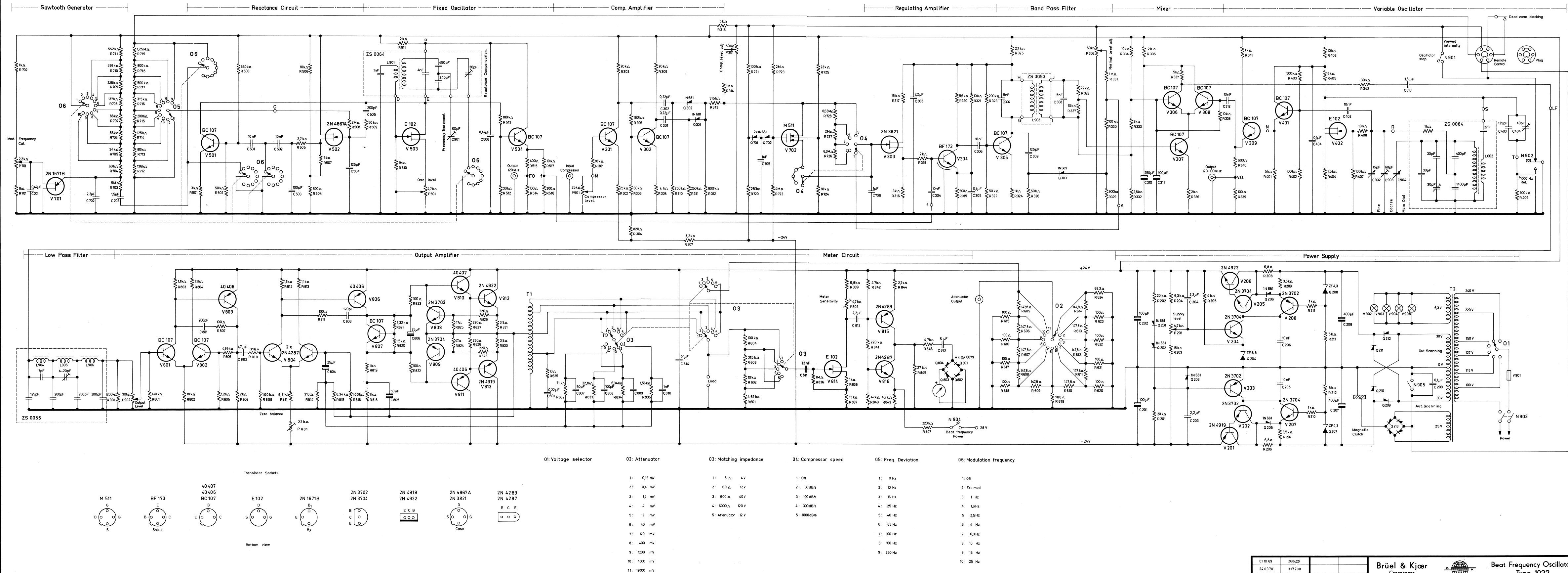
RESTISTORS:

R 201,202	Carbon	1/3 W	10%	20 kΩ
R 203	-	-	-	16 kΩ
R 204	-	-	-	6.3 kΩ
R 205	-	-	-	4 kΩ
R 206	Wire	5 W	-	6.8 Ω
R 207	Carbon	1/3 W	5%	3.5 kΩ
R 208	Wire	5 W	10%	6.8 Ω
R 209	Carbon	1/3 W	5%	3.5 kΩ
R 210,211	-	-	10%	1 kΩ
R 212,213	-	-	-	5 kΩ
R 301	-	-	-	10 kΩ
R 302	-	-	-	2 kΩ
R 303	-	-	-	20 kΩ
R 304	-	-	-	820 Ω
R 305	-	-	-	60 kΩ
R 306	-	-	-	180 kΩ
R 307	-	-	-	8.2 kΩ
R 308	-	-	2%	4 kΩ
R 309	-	-	-	20 kΩ
R 310,311	-	-	10%	250 kΩ
R 312	-	-	-	800 kΩ
R 313	-	-	-	316 kΩ
R 314	-	-	-	1M Ω
R 315	-	-	-	5 kΩ
R 316	-	-	-	3 kΩ
R 317	-	-	-	15 kΩ
R 318	-	-	-	2 kΩ
R 319	-	-	-	500 Ω
R 320	-	-	-	5.6 kΩ
R 321	-	-	-	10 kΩ
R 322	-	-	-	50 kΩ
R 323	-	-	-	200 kΩ
R 324	-	-	-	1 kΩ
R 325	-	-	-	2.7 kΩ
R 326	-	-	-	50 kΩ
R 327	-	-	-	10 kΩ

CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.	CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.
RESISTORS:						RESISTORS:					
R 328	Carbon	1/3 W	10%	22 k Ω		R 718	Carbon	1/3 W	10%	800 k Ω	
R 329	-	-	-	800 k Ω		R 719	-	-	-	1.25 M Ω	
R 330	-	-	-	100 k Ω		R 720	-	-	-	220 k Ω	
R 331	-	-	-	1 M Ω		R 721	-	-	5%	100 k Ω	
R 332	-	-	-	2.5 k Ω		R 722	-	-	10%	4 M Ω	
R 333	-	-	-	3 k Ω		R 723	-	-	-	2 M Ω	
R 334	-	-	-	10 k Ω		R 724	-	-	5%	10 k Ω	
R 335	-	-	-	2 k Ω		R 725	-	-	-	22 k Ω	
R 336	-	-	-	2 k Ω		R 726	-	-	10%	6.3 M Ω	
R 337	-	-	-	5 k Ω		R 727	-	-	-	2 M Ω	
R 338	-	-	-	10 k Ω		R 728	-	-	-	630 k Ω	
R 339	-	-	-	100 Ω		R 801	-	1/4 W	5%	470 k Ω	RB 5470
R 340	-	-	-	600 Ω		R 802	-	-	-	18 k Ω	RB 4180
R 341	-	-	-	1 k Ω		R 803,804	Metal	-	1%	1.1 k Ω	RF 3110
R 342	-	-	-	30 k Ω		R 805	-	-	-	1.21 k Ω	RF 3121
R 401	-	-	-	5 k Ω		R 806	-	-	-	4.99 k Ω	RF 3499
R 402	-	-	-	100 k Ω		R 807	Carbon	-	5%	100 Ω	RB 2100
R 403	-	-	-	500 k Ω		R 808	-	1/3 W	-	2 k Ω	
R 404	-	-	-	1.5 k Ω		R 809	Metal	1/4 W	1%	100 k Ω	RF 5100
R 405	-	-	-	8 k Ω		R 810	-	-	-	316 Ω	RF 2316
R 406	-	-	-	10 k Ω		R 811	Carbon	-	5%	6.8 k Ω	RB 3680
R 407	-	-	-	100 k Ω		R 812,813	Metal	-	1%	1.1 k Ω	RF 3110
R 408	-	-	-	10 k Ω		R 814	-	-	-	316 Ω	RF 2316
R 409	-	-	-	200 k Ω		R 815	-	-	-	6.3 k Ω	RF 3634
R 501	-	-	-	3.15 k Ω		R 816	Metal	-	1%	100 k Ω	RF 5100
R 502	-	-	-	50 k Ω		R 817	Carbon	-	5%	100 Ω	RB 2100
R 503	-	-	-	560 k Ω		R 818,819	-	-	-	1 k Ω	RB 3100
R 504	-	-	-	500 Ω		R 820	Metal	-	1%	1.5 k Ω	RF 3150
R 505	-	-	-	2.7 k Ω		R 821	-	-	-	3.3 k Ω	RF 3332
R 506	-	-	-	10 k Ω		R 822,823	Carbon	-	5%	100 Ω	RB 2100
R 507	-	-	-	5 k Ω		R 824,825	-	-	-	47 Ω	RB 1470
R 508	-	-	-	2 M Ω		R 826-829	-	-	-	220 Ω	RB 2220
R 509	-	-	-	50 k Ω		R 830,831	Wire	1 W	-	3.9 Ω	RR 0004
R 510	-	-	-	1 M Ω		R 832	Carbon	1/3 W	1%	71 k Ω	
R 511	-	-	-	2 k Ω		R 833	Metal	1/4 W	-	22.1 k Ω	RF 4221
R 512	-	-	-	30 k Ω		R 834	-	-	-	6.3 k Ω	RF 3634
R 513	-	-	-	180 k Ω		R 835	-	-	-	1.58 k Ω	RF 3158
R 514	-	-	-	100 Ω		R 836	Carbon	-	5%	1 M Ω	RB 6100
R 515	-	-	-	400 Ω		R 837	-	-	-	15 k Ω	RB 4150
R 516	-	-	-	315 Ω		R 838	-	-	-	1 k Ω	RB 3100
R 517	-	-	-	10 k Ω		R 839	-	-	-	6.8 k Ω	RB 3680
R 601	-	-	1/2%	4.6 k Ω		R 840	-	-	-	47 k Ω	RB 4470
R 602	-	-	-	10 k Ω		R 841	-	-	-	220 k Ω	RB 5220
R 603	-	-	-	31 k Ω		R 842	-	-	-	47 k Ω	RB 4470
R 604	-	-	-	100 k Ω		R 843	-	-	-	4.7 k Ω	RB 3470
R 605-624	Metal	-	-		RO 1003	R 844	-	-	-	2.7 k Ω	RB 3270
One set of high stability resistors for output attenuator						R 845	-	-	-	27 k Ω	RB 4270
R 625	Carbon	-	10%	10 Ω		R 846	-	-	-	4.7 k Ω	RB 3470
R 701,702	-	-	5%	1 k Ω		R 847	-	-	-	220 k Ω	RB 5220
R 703	-	-	10%	5 M Ω		R 901	-	1/3 W	10%	200 k Ω	
R 704	-	-	-	60 k Ω							
R 705	-	-	-	34 k Ω							
R 706	-	-	-	56 k Ω							
R 707	-	-	-	88 k Ω							
R 708	-	-	-	137 k Ω							
R 709	-	-	-	225 k Ω							
R 710	-	-	-	338 k Ω							
R 711	-	-	-	552 k Ω							
R 712	-	-	-	136 k Ω							
R 713	-	-	-	80 k Ω							
R 714	-	-	-	125 k Ω							
R 715	-	-	-	200 k Ω							
R 716	-	-	-	316 k Ω							
R 717	-	-	-	500 k Ω							
						SEMICONDUCTORS:					
						Q 201-203	Si.	IN681	300V/200 mA	QV 0209	
						Q 204	Zener	ZF6.8	6.8V/ 40 mA	QV 1106	
						Q 205,206	Si.	IN681	300V/200 mA	QV 0209	
						Q 207,208	Zener	BZ488	4.3V/100 mA	QV 1110	
						Q 209-212	Si.	ER1	50V/600 mA	QV 0501	
						Q 213-216	-	B30k60	30V/ 60 mA	QV 0012	
						Q 301-303	-	IN681	300V/200 mA	QV 0209	
						Q 701,702	-	IN681	300V/200 mA	QV 0209	
						Q 801-804	Ge.	DA79	45V/100 mA	QV 0079	

CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.	CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.
SWITCHES:			MISCELLANEOUS:		
N 901	Oscillator Stop	NT 0023		Power Cord Eur.	AN 0005
N 902	1000 Hz Ref.	NT 0014		Power Cord USA	AN 0006
N 903	Power Off/On	NN 0014		Moving Coil Instrument	IM 0025
N 904	Frequency Beat	NT 0023	0.5 mA	Screened Socket	JJ 0108
N 905	Automatic Scanning	NN 0017		Screened Plug	JP 0101
O 1	Voltage Switch	OA 0017		Load Socket	JK 6272
O 2	Attenuator Switch	OH 1000		6 pin Plug	JP 4705
O 3	Matching Impedance Switch	OH 1001		Bakelite Knob, 30 mm, flat,	
O 4	Compressor Switch	OH 1002		SN 3202	DB 0850 YQ 2083
O 5	Frequency Deviation Switch	OH 1003		Bakelite Knob, 30 mm	SN 3222 DB 0674 YQ 2083
O 6	Modulation Frequency Switch	OH 1004		Bakelite Knob, 30 mm twin mark,	SN 3227 DB 0674 YQ 2083
				Bakelite Knob, 40 mm	SN 4021 DB 0674 YQ 2083
				Bakelite Knob, 60 mm	SN 6319 DB 0675 YQ 2087
				Frequency Dial Housing	SO 0102
				Frequency Dial Pointer	SV 0037
				Flexible Shaft	UB 0041
				Magnetic Clutch	UM 1011
				Fuse 250V/0.35 A	VF 0009
				Dial Lamp 6.8V/0.5 A	VS 1271
				Dial Lamp 6.8V/0.25 A	VS 1273
TRANSISTORS:					
V 201	Si.	PNP 2N4919	VB 0061		
V 202,203	-	2N3702	VB 0038		
V 204,205	-	NPN 2N3704	VB 0028		
V 206	-	2N4922	VB 0063		
V 207	-	2N3704	VB 0028		
V 208	-	PNP 2N3702	VB 0038		
V 301,302	-	NPN BC107	VB 0032		
V 303	F.E.T.	2N3821	VB 1001		
V 304	Si.	NPN BF173	VB 0065		
V 305-309	-	BC107	VB 0032		
V 401	-	-	VB 0032		
V 402	F.E.T.	2N4302	VB 1027		
V 501	Si.	NPN BC107	VB 0032		
V 502	F.E.T.	2N4867A	VB 1018		
V 503	-	2N4302	1027		
V 504	Si.	NPN BC107	VB 0032		
V 701	Unijunction	2N1671	VB 0016		
V 702	MOS F.E.T.	M511	VB 4001		
V 801,802	Si.	NPN BC107	VB 0257		
V 803	-	PNP 40406	VB 0053		
V 804,805	- matched	NPN 2N4287	VB 1055		
V 806	-	PNP 40406	VB 0053		
V 807	-	NPN BC107	VB 0257		
V 808	-	2N3704	VB 0028		
V 809	-	PNP 2N3702	VB 0038		
V 810	-	NPN 40407	VB 0054		
V 811	-	PNP 40406	VB 0053		
V 812	-	NPN 2N4922	VB 0063		
V 813	-	PNP 2N4919	VB 0061		
V 814	F.E.T.	2N4302	VB 1027		
V 815	-	PNP 2N4289	VB 0049		
V 816	-	NPN 2N4287	VB 0055		

1022.7



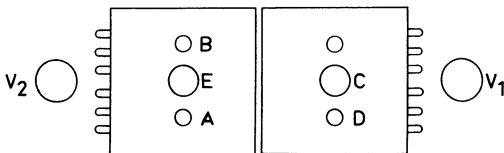


Fig. 1. Oscillator Coil Assembly ZS 0051.

Attention: Item 3.1 - 3.2 - 3.3. The frequency can only be checked by means of a 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

MODULATION FREQ. : "Off"
COMPRESSOR SPEED : "Off"
FREQ. INCREMENT : "0"

Adjust the iron core of L 1 ("C" Fig. 1) for 120 Kc/s \pm 20 c/s on the socket "120 Kc/s". The voltages should be 200 mV \pm 30 %.

3.2 Variable Oscillator

- a. MODULATION FREQ. : "Off"
COMPRESSOR SPEED : "Off"
FREQ. INCREMENT : "0"
FREQ. SCALE ADJ. FINE: "Center position"
FREQ. SCALE ADJ. COARSE: "Center position"
FREQUENCY SCALE : "20 c/s"

Adjust the air trimmer ("B" Fig. 1) of L 2 assembly for 20 c/s at the LOAD terminals.

Voltage on the socket "100 - 120 Kc/s" should be 200 mV \pm 30 %.

- b. FREQUENCY SCALE to "20.000 c/s"

Adjust the iron core ("E" Fig. 1) of L 2 for 20.000 c/s. 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 c/s and 318° at 20.000 c/s and fix the pointer at 320°.

3.3 1000 c/s Ref.

MODULATION FREQ. : "Off"
COMPRESSOR SPEED : "Off"
MATCHING IMPEDANCE: "60 Ω "

Adjust the oscillator at line frequency, and set the FREQUENCY SCALE to 1000 c/s ref.

Press the "1000 c/s ref." button and adjust C 63 for 1000 c/s at the LOAD terminals.

3.4 Frequency Modulation

- a. MODULATION FREQ. : "1 c/s"
FREQUENCY SCALE : "1000 c/s"
FREQ. DEVIATION : "63 c/s"
COMPRESSOR SPEED : "Off"
MATCHING IMPEDANCE: "60 Ω "

Adjust OUTPUT LEVEL for a 10 dB deflection on type 1022.

Check the modulation frequency with a stop watch.

Tolerance: \pm 20 %. If necessary adjust P 4.

- b. FREQUENCY SCALE to "500 c/s"
FREQ. DEVIATION to "160"

Check the frequency deviation by the ear with a loud-speaker. Notice the highest frequency to be heard.

Set FREQUENCY DEVIATION to 0 and adjust FREQUENCY SCALE until this frequency is heard again.

Read the frequency deviation as the difference between this frequency and 500 c/s.

Tolerance: \pm 20 %. If necessary adjust P 3.

- c. MODULATION FREQ. to "Off"
FREQ. INCREMENT to "0"
FREQ. DEVIATION to "0"

Adjust the oscillator at line frequency.

- d. MODULATION FREQ. to "1 c/s"

Adjust the oscillator at line frequency by means of FREQUENCY INCREMENT.

Adjust the 30 pF trimmer in L 1 ("D" Fig. 1), if the frequency varies more than \pm 15 c/s.

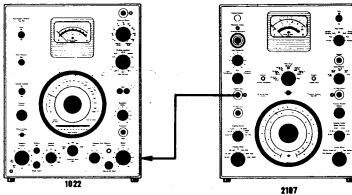
3.5 Frequency Drift

MODULATION FREQ. : "Off"
COMPRESSOR SPEED : "Off"
FREQ. INCREMENT : "0"

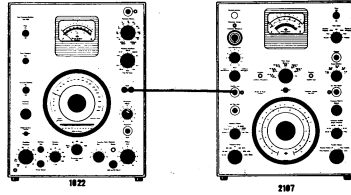
Adjust the oscillator at line frequency after a warm up time of 5 min.

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

Frequency drift: max. + 7 c/s for each period. If necessary adjust the trimmer "A" Fig. 1 and check that trimmer "B" is in a position that it is possible to zero adjust the oscillator.



Connection: Item 3.6



Connection: Item 3.7

3.6 LF-Signal

MODULATION FREQ. : "Off"
FREQUENCY SCALE : "1000 c/s"
COMPRESSOR SPEED : "Off"
MATCHING IMPEDANCE : "60 Ω "

Connect type 2107 across the OUTPUT LEVEL potentiometer.

Adjust L 3 for max. deflection. Adjust C 62 for 280 mV.

3.7 Noise - Microphony

MODULATION FREQ. : "Off"
FREQUENCY SCALE : "400 c/s"
COMPRESSOR SPEED : "Off"
MATCHING IMPEDANCE : "60 Ω "

Adjust the OUTPUT LEVEL for a 20 dB deflection on type 2107 (10 V range).

Press the OSCILLATOR STOP button and measure the noise level, must be at least 70 dB below the 400 c/s level.

Press the OSCILLATOR STOP button and by gently tapping on the front plate the deflection must be 50 dB below the 400 c/s level.

3.8 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 clutch slip-ring and capacitor slipper (located under the cover opposite V 1) 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.

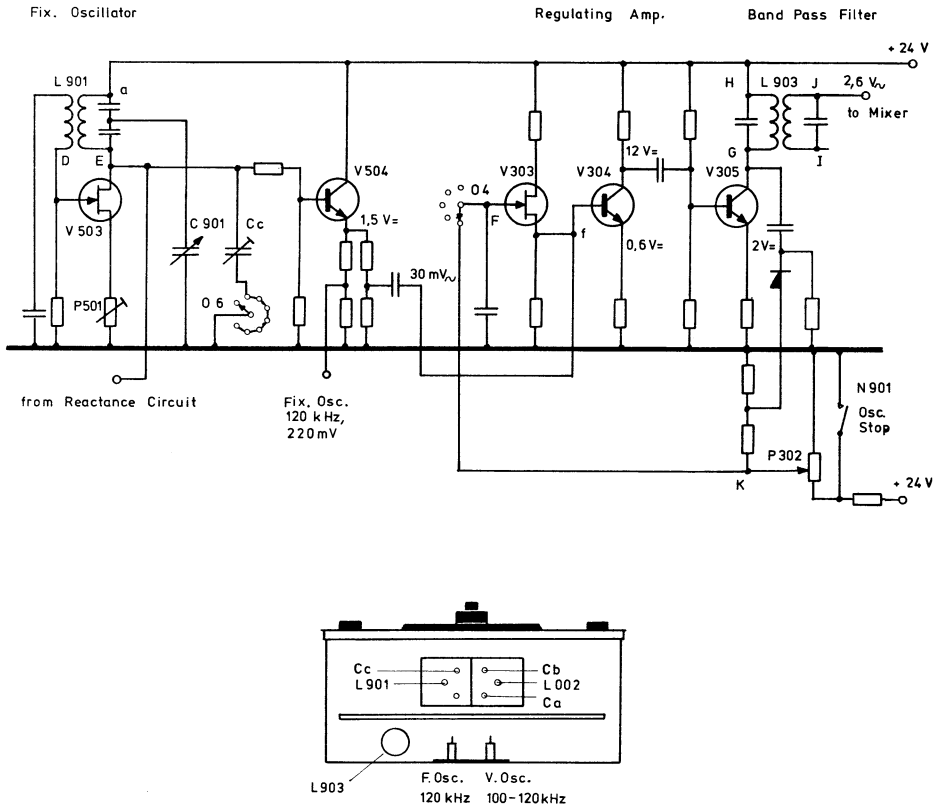
Removal of Tuning Capacitor CV 0010

Remove the right hand side cover (when seen from the instrument front plate) of the capacitor unit CV 0010.

Unscrew the two knobs on the tuning spindle and remove the scale run. 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.

Before the pointer is removed mark the position on the scale and front plate, then draw a circle on the front plate closely following the frequency scale for centering purpose of the scale.

After replacing the tuning capacitor, fasten the frequency scale with reference to the drawn circle on the front plate. Check the position of the condenser with a plate of insulating material for fully interleaved capacitor and fix the frequency pointer at the position marked above.

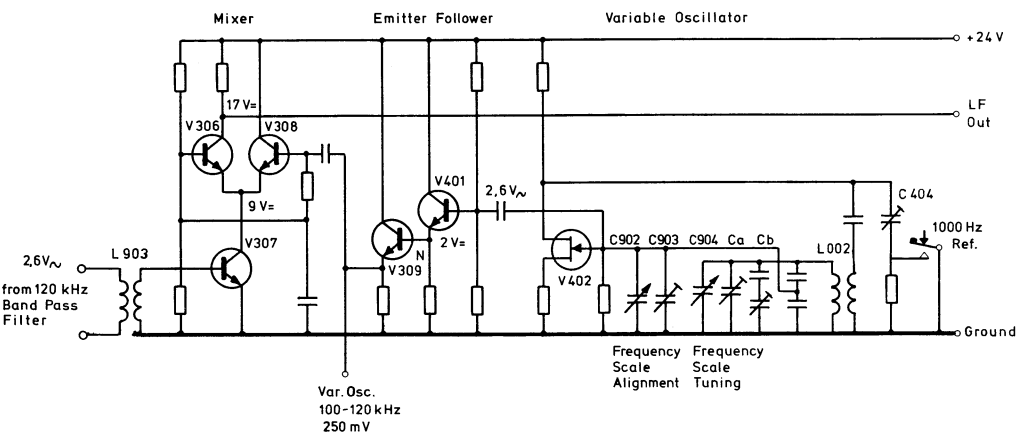


3.1 Fixed Oscillator

MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQ. INCREMENT: "0"

Adjust the iron core of L901 for 120 kHz \pm 20 Hz on "120 kHz Output" socket.

The voltage should be 220 mV \pm 30 %
If necessary adjust P501.



3.2 Variable Oscillator

MOD. FREQUENCY: "Off"
 COMPR. SPEED: "Off"
 FREQ. INCREMENT: "0"
 FREQUENCY SCALE: "20 Hz"

- a. Check that the frequency across LOAD is 20 Hz $\pm 1\%$.

If necessary adjust the FREQ. SCALE ALIGNMENT..

Fine adjustment by means of a knob and coarse adjustment by a screwdriver operated capacitor.

In case that the regulation range is too narrow set both trimmers in mid position and adjust the air trimmer "Ca" for 20 Hz.

- b. Set the FREQUENCY SCALE to 20 kHz.

Check that the frequency is 20 kHz $\pm 1\%$.

If necessary adjust the iron core of L 0002 and check item a again.

3.3 1000 Hz Reference

MOD. FREQUENCY: "Off"
 COMPR. SPEED: "Off"
 FREQ. INCREMENT: "0"
 MATCHING IMP. "60 Ω "

Adjust the oscillator at line frequency and set the FREQUENCY SCALE to "1000 Hz ref. signal".

Depress "1000 Hz ref." and check the frequency on LOAD.

If necessary adjust C404.

3.4 Frequency Drift

MOD. FREQUENCY: "Off"
 COMPR. SPEED: "Off"
 FREQ. INCREMENT: "0"
 MATCHING IMP.: "60 Ω "
 FREQUENCY SCALE: "50 Hz"
 ("60 Hz")

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

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

Frequency drift:	max. ± 7 Hz	after 20 min.
	max. ± 14 Hz	after 15 hours

If necessary adjust trimmer "Cb" and check item 3.2 again.

3.5 LF signal

MATCHING IMP.: "60 Ω "
 MOD. FREQUENCY: "Off"
 COMPR. SPEED: "Off"
 FREQUENCY SCALE: "1000 Hz::"

Connect an electronic voltmeter across OUTPUT LEVEL potentiometer P902.

Adjust band-pass filter L903 for max. voltage across P902.

Adjust P302 for 280 mV.

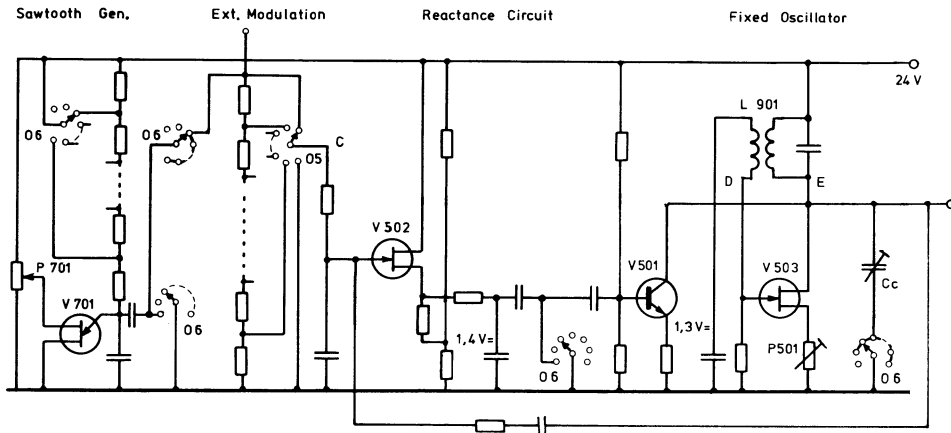
3.6 Noise

MATCHING IMP.: "60 Ω "
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQUENCY SCALE: "400 Hz"

Adjust OUTPUT LEVEL for 10 V on LOAD.

Connect an electronic voltmeter across LOAD and check the noise voltage when OSCILLATOR STOP is depressed.

Tolerance: min. 70 dB below 10 V.



3.7 Frequency Modulation

MATCHING IMP.: "60 Ω "
MOD. FREQUENCY: "Off"
FREQ. DEVIATION: "250 Hz"
COMPR. SPEED: "Off"
FREQUENCY SCALE: "400 Hz"
FREQ. INCREMENT: "0"

- Adjust OUTPUT LEVEL for a 10 V deflection on the meter.

Switch MOD. FREQUENCY to "1 Hz" and check the modulation frequency with a stop watch.

Tolerance: $\pm 20\%$.
If necessary adjust P701.

- Check the frequency deviation by listen to a loudspeaker.

Switch FREQ. DEVIATION to "160 Hz" and notice the highest frequency to be heard (400 Hz + 160 Hz).

- Switch FREQ. DEVIATION to "0 Hz" and adjust FREQUENCY SCALE until this frequency is heard again.

Read the frequency deviation as the difference between this frequency and 400 Hz.

Tolerance: $\pm 20\%$.

Switch MOD. FREQUENCY to "Off" and adjust the oscillator at line frequency by means of FREQ. SCALE ALIGN.

Then switch MOD. FREQUENCY to "Ext. Mod." and adjust the oscillator at line frequency by means of FREQ. INCREMENT.

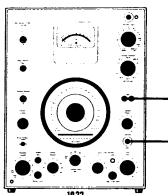
Adjust the trimmer "C_c" if the frequency changes more than ± 15 Hz.

3.8 Magnetic 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 clutch slip-ring and capacitor slipper (located under the right hand side cover) is necessary. Petroleum jelly should be used to lubricate these parts.

DO NOT lubricate the ball bearing of the tuning capacitor and the magnet clutch.

Check the pressure between the magnetic clutch and the contact spring: 50–75 gr.



Connection: Item 4.1 and 4.3.

4.1 Compressor Balance

MATCHING IMPEDANCE : "6 Ω "
COMPRESSOR SPEED : "Off"
COMPRESSOR VOLTAGE : "Max. "
FREQUENCY SCALE : "1000 c/s"

Adjust the OUTPUT LEVEL for a 0.7 V deflection on type 1022.
Check that the signals of the cathodes of Q 9 - Q 10 are equal.
Tolerance: ± 10 %.

4.2 Gain Reserve

a. MATCHING IMPEDANCE : "60 Ω "
COMPRESSOR SPEED : "30 dB/s"
FREQUENCY SCALE : "1000 c/s"

Adjust the OUTPUT LEVEL for a 20 dB deflection on type 1022.
COMPRESSOR input disconnected.

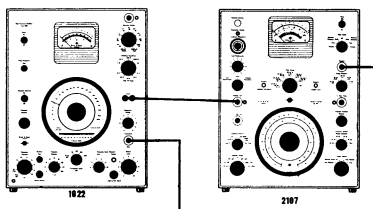
b. COMPRESSOR SPEED to "Off"

Deflection on type 1022: 10 - 12 dB.

4.3 Frequency Response

MATCHING IMPEDANCE : "60 Ω "
MODULATION FREQ. : "Off"
COMPRESSOR SPEED : "30 dB/s"
FREQUENCY SCALE : "1000 c/s"
OUTPUT LEVEL : "Max. "

Adjust COMPRESSOR VOLTAGE for a 20 dB deflection on type 1022.
Vary the frequency from 20-20,000 c/s. Deflection on type 1022: 20 dB.
Tolerance: ± 0.3 dB.

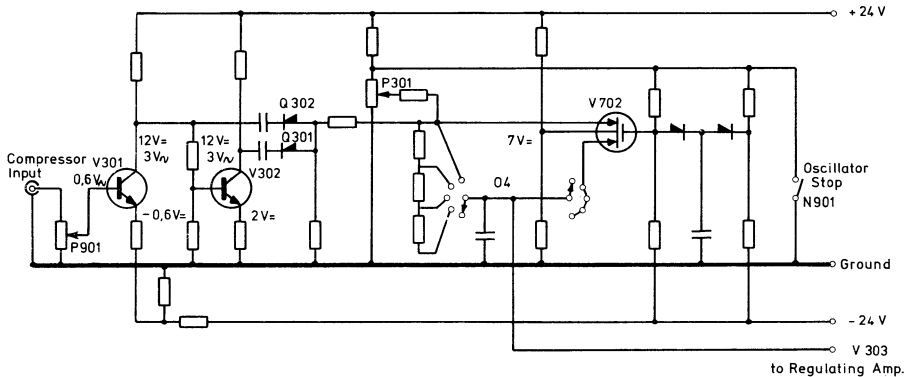


4.4 Compression

MATCHING IMPEDANCE : "6000 Ω "
MODULATION FREQ. : "Off"
COMPRESSOR SPEED : "100 dB/s"
FREQUENCY SCALE : "1000 c/s"
OUTPUT LEVEL : "Max. "

Adjust COMPRESSOR VOLTAGE for an 18 dB deflection on type 2107 (100 V range).
Increase the gain of type 2107 by 50 dB (0.3 V range).
Max. change of deflection on type 2107: 3 dB.

Compressor Amplifier



4.1 Compressor Balance

MATCHING IMP.: "6 Ω "
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
COMPR. VOLTAGE: "10"
FREQUENCY SCALE: "1000 Hz"

Connect COMPR. INPUT to LOAD and adjust OUTPUT LEVEL for a 0.6 V deflection on the meter.

Connect an oscilloscope to the cathodes of Q301 and Q302 and check that the signals are equal within 5 %.

4.2 Gain

MATCHING IMP.: "6 Ω "
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
COMPR. VOLTAGE: "10"
FREQUENCY SCALE: "1000 Hz"

a. Connect COMPR. INPUT to LOAD and adjust OUTPUT LEVEL for a 0.6 V deflection on the meter.

b. Switch COMPR. SPEED to "1000"
Deflection on the meter: 0.6 V.
If necessary adjust P301.

c. Disconnect COMPR. INPUT signal.

Deflection on the meter should increase min. 8 dB.

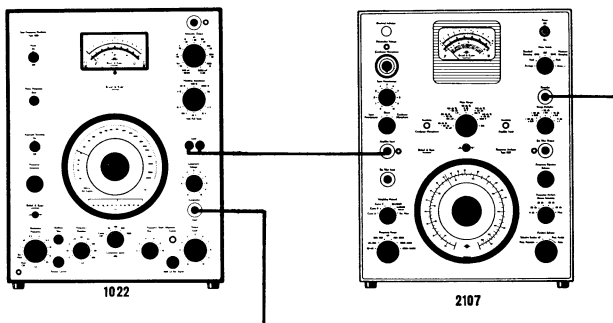
4.3 Frequency Response

MATCHING IMP.: "60 Ω "
MOD. FREQUENCY: "Off"
COMPR. SPEED: "100"
OUTPUT LEVEL: "10"
FREQUENCY SCALE: "1000 Hz"

Connect COMPR. INPUT to LOAD and adjust COMPR. VOLTAGE for a 20 dB deflection on the meter.

Vary the frequency from 20–20 000 Hz

Deflection on the meter: 20 dB
Tolerance: \pm 0.3 dB.



4.4 Compression

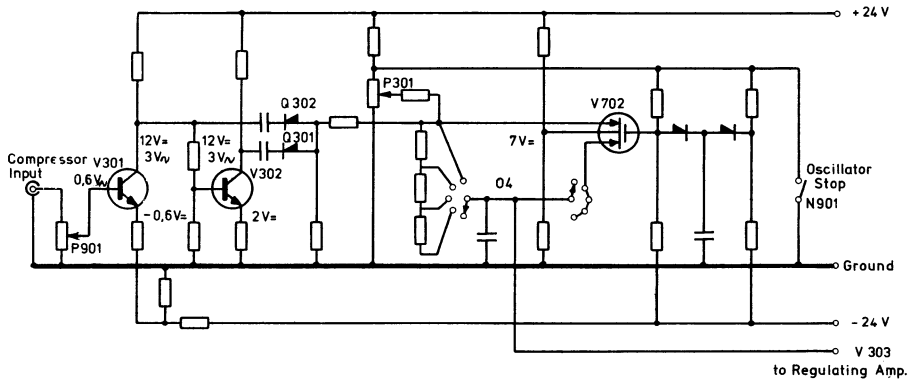
MATCHING IMP.: "6000Ω"
 MOD. FREQUENCY: "Off"
 COMPR. SPEED: "100"
 OUTPUT LEVEL: "10"
 FREQUENCY SCALE: "1000 Hz"

Adjust COMPR. VOLTAGE for an 18 dB deflection on type 2107 (100 V Range)

Increase the gain of type 2107 by 50 dB (0.3 V Range)

Deflection on type 2107: 18 dB.
 Tolerance: 1.5 dB.

Compressor Amplifier



4.1 Compressor Balance

MATCHING IMP.: "6Ω"
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
COMPR. VOLTAGE: "10"
FREQUENCY SCALE: "1000 Hz"

Connect COMPR. INPUT to LOAD and adjust OUTPUT LEVEL for a 0.6 V deflection on the meter.

Connect an oscilloscope to the cathodes of Q301 and Q302 and check that the signals are equal within 5%.

4.2 Gain

MATCHING IMP.: "6Ω"
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
COMPR. VOLTAGE: "10"
FREQUENCY SCALE: "1000 Hz"

a. Connect COMPR. INPUT to LOAD and adjust OUTPUT LEVEL for a 0.6 V deflection on the meter.

b. Switch COMPR. SPEED to "1000"
Deflection on the meter: 0.6 V.
If necessary adjust P301.

c. Disconnect COMPR. INPUT signal.

Deflection on the meter should increase approx. 6 dB.

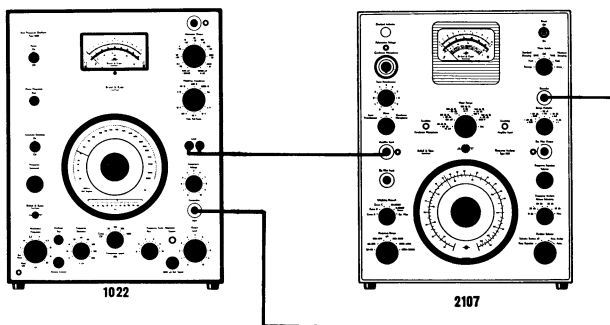
4.3 Frequency Response

MATCHING IMP.: "60Ω"
MOD. FREQUENCY: "Off"
COMPR. SPEED: "100"
OUTPUT LEVEL: "10"
FREQUENCY SCALE: "1000 Hz"

Connect COMPR. INPUT to LOAD and adjust COMPR. VOLTAGE for a 20 dB deflection on the meter.

Vary the frequency from 20–20 000 Hz

Deflection on the meter: 20 dB
Tolerance: ± 0.3 dB.



4.4 Compression

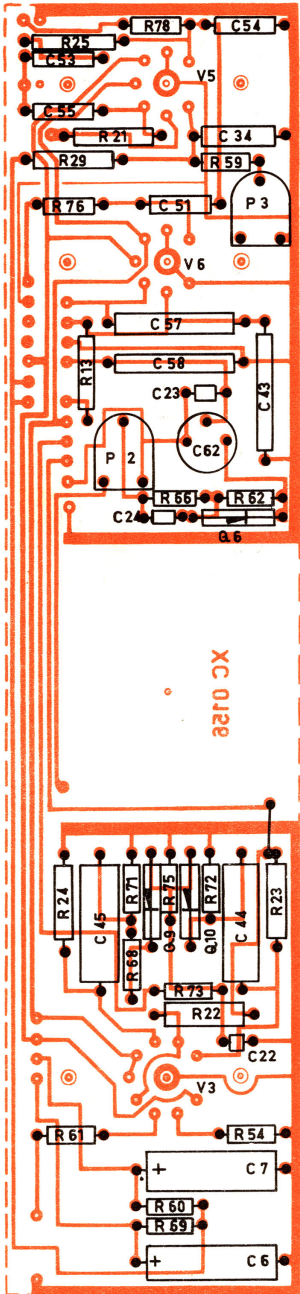
MATCHING IMP.: "6000 Ω "
 MOD. FREQUENCY: "Off"
 COMPR. SPEED: "100"
 OUTPUT LEVEL: "10"
 FREQUENCY SCALE: "1000 Hz"

Adjust COMPR. VOLTAGE for an 18 dB deflection on type 2107 (100 V Range)

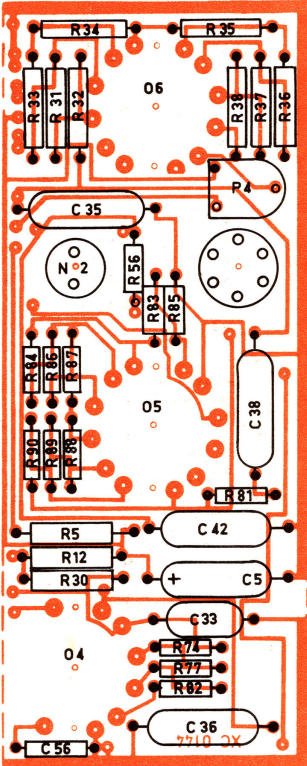
Increase the gain of type 2107 by 50 dB (0.3 V Range)

Deflection on type 2107: 18 dB.

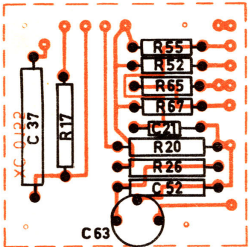
Tolerance: 1.5 dB.



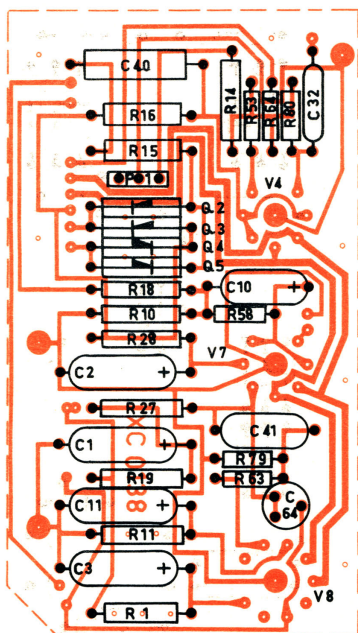
5-64



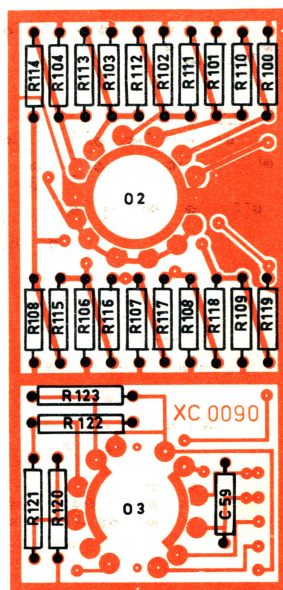
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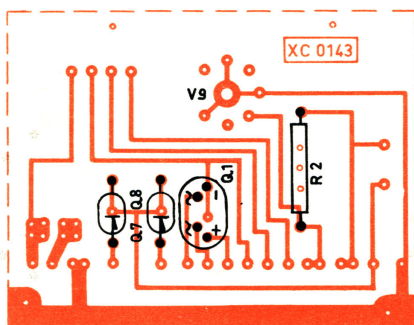
5-64



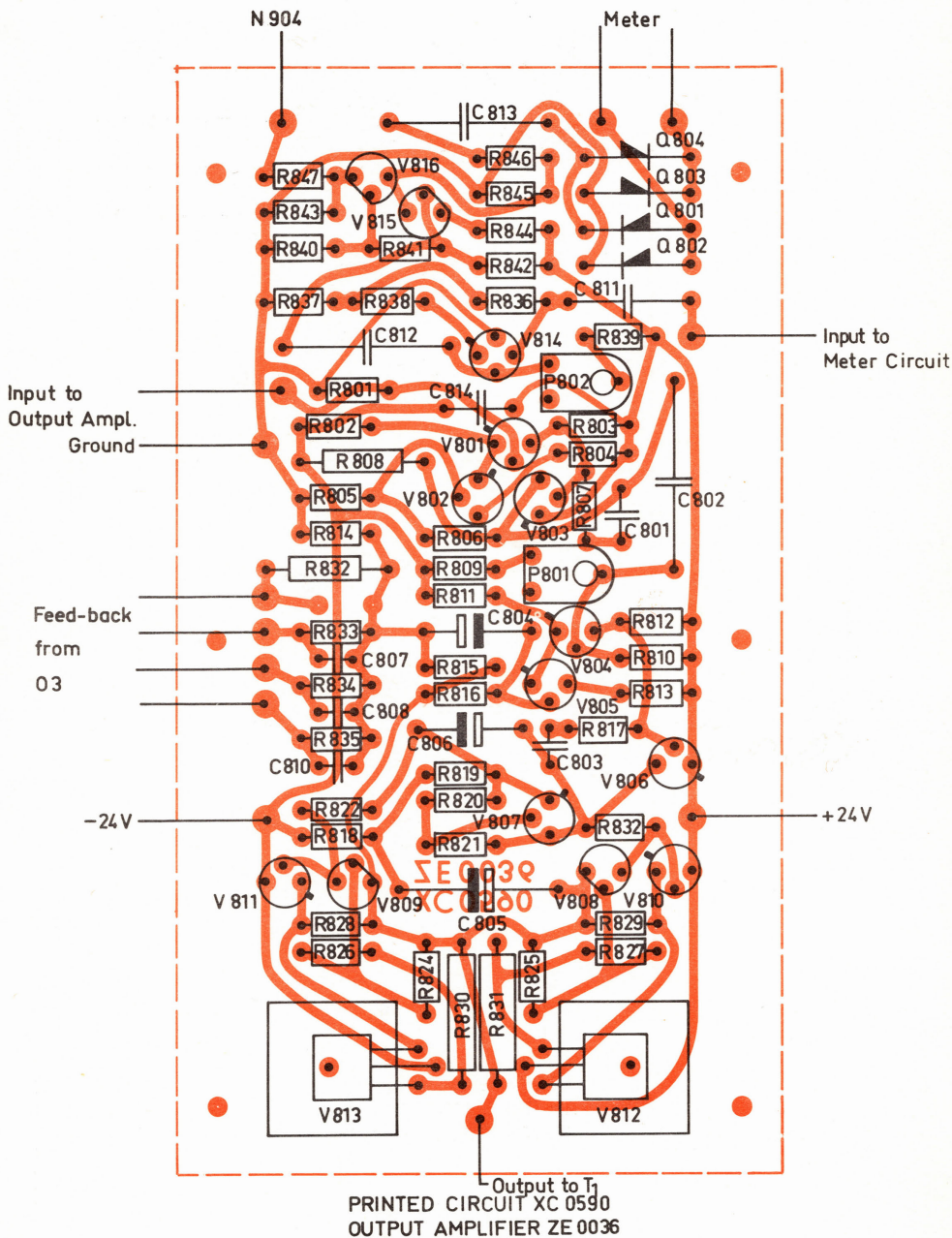
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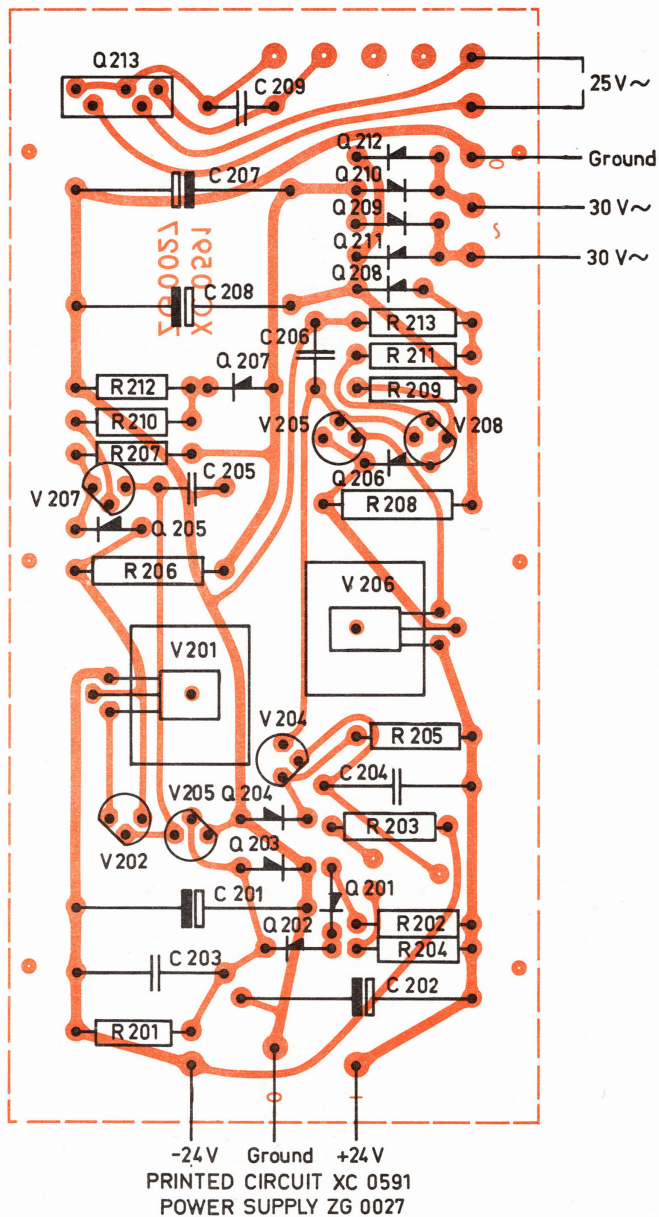


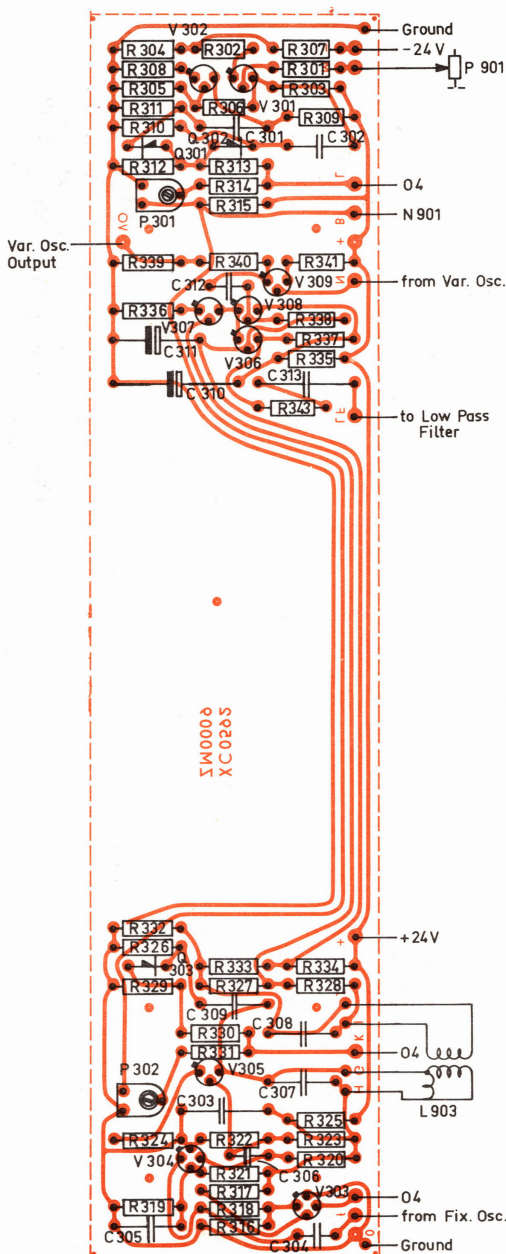
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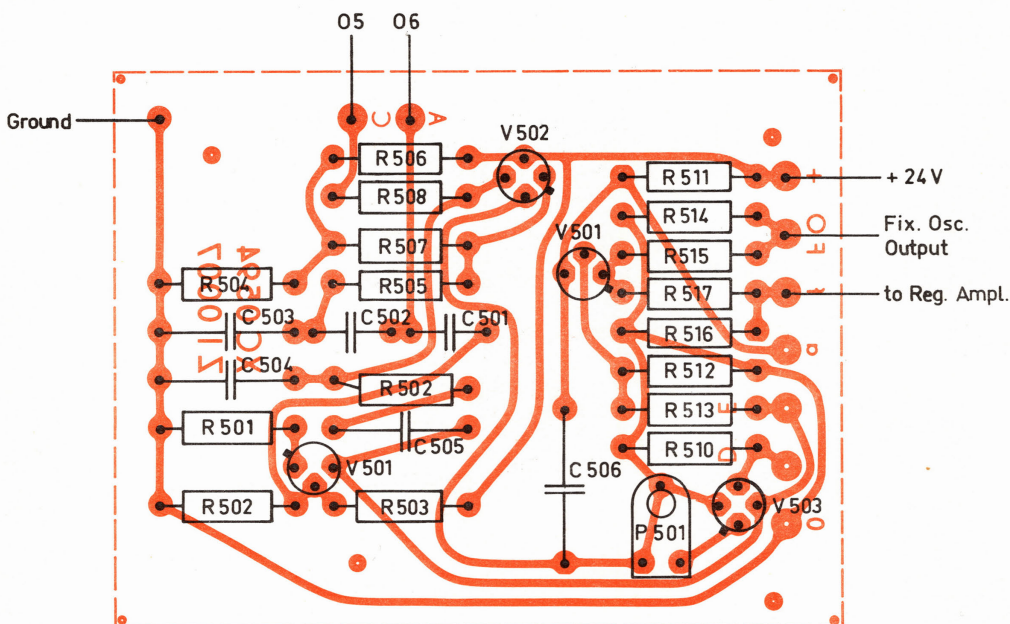
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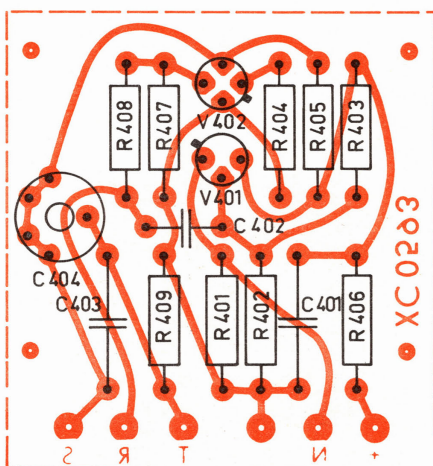




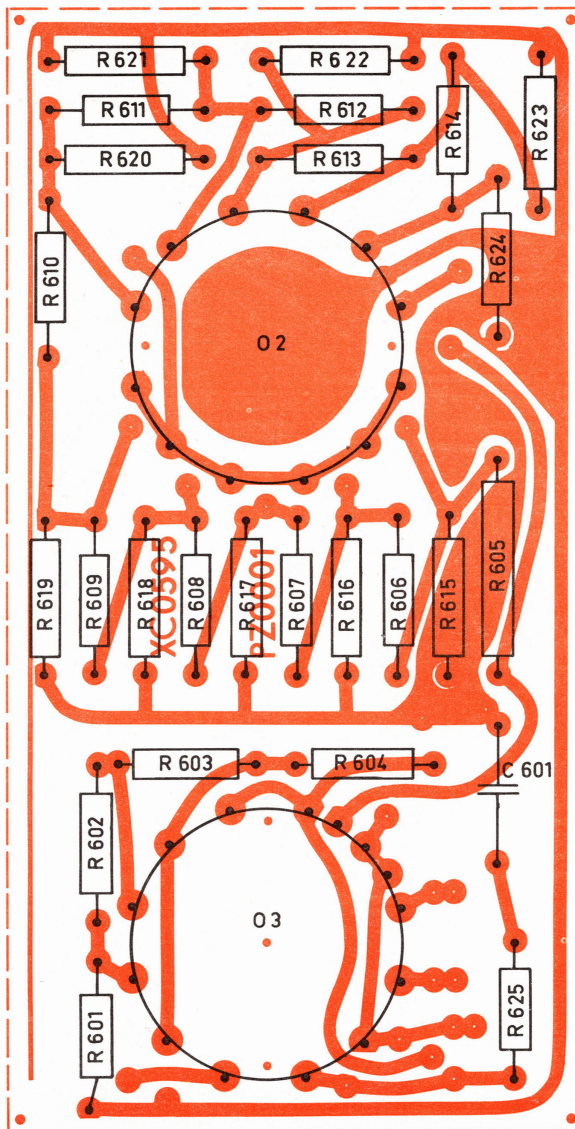
PRINTED CIRCUIT XC 0592
MIXER and COMPRESSOR ZM 0009



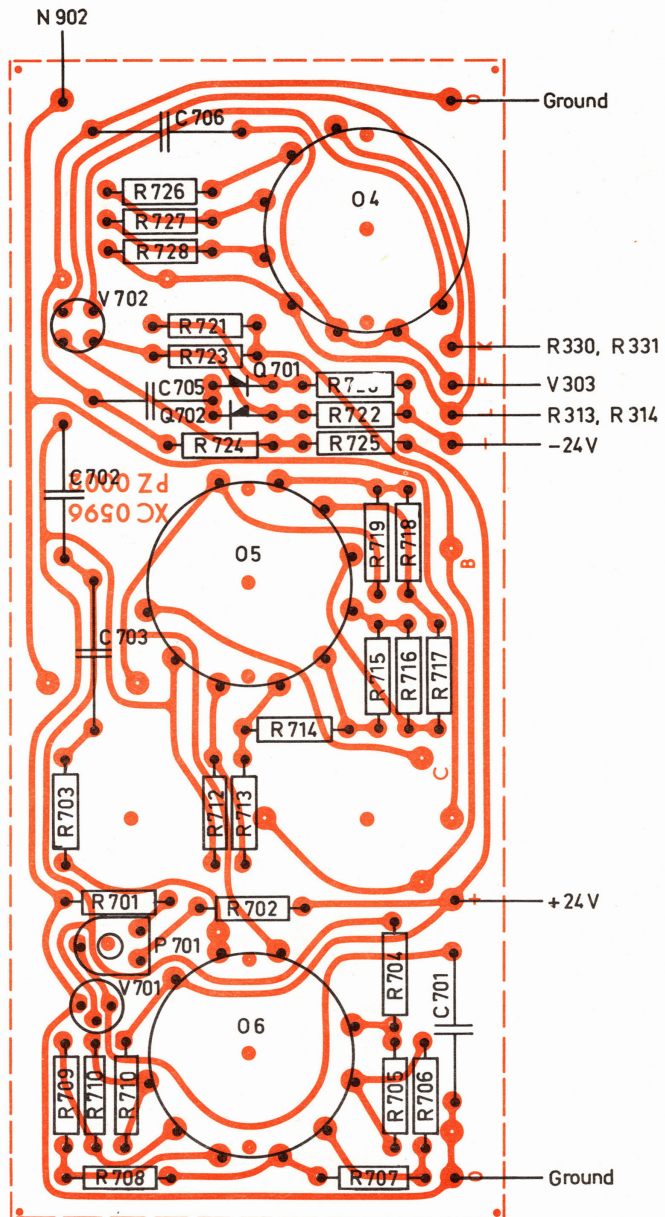
PRINTED CIRCUIT XC 0594
FIXED OSCILLATOR ZI 0007



PRINTED CIRCUIT XC 0593
VARIABLE OSCILLATOR ZI 0006



PRINTED CIRCUIT XC 0595
ATTENUATOR OUTPUT PZ 0001



PRINTED CIRCUIT XC 0596
REGULATING AMPLIFIER PZ 0002

COMPONENT TYPE	STOCK REFERENCE	CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REFERENCE	CIRCUIT DIAGRAM REF.
Power cord	AN 0005		Impedance switch	OS 1022	O 3
Instruction manual	BA 1022		Compressor switch	OT 1022	O 4
CONDENSERS:			Freq. deviation switch	OU 1022	O 5
Electrolytic			Mod. freq. switch	OV 1022	O 6
8 µF/320 V	CE 0800	C 1,2,3	Trimmer pot.	PG 2200	P 1
" 50 µF/450 V	CE 0901	C 4	" 2 kΩ	PG 3102	P 2,3
" 40 µF/150 V	CE 2038	C 5,6,7	" 10 kΩ	PG 4201	P 4
" 2x48 µF/450 V	CE 2269	C 8,9	Comp. input pot.	PP 3253	P 11
" 100 µF/ 3 V	CE 8943	C 10	Output level pot.	PR 3301	P 12
" 100 µF/ 12 V	CE 8946	C 11	Selenium rectifier	QV 0012	Q 1
Ceramic			Silicon diode	QV 0023	Q 7,8
2 pF/500 V	CK 0032	C 21	Germanium diode	QV 0079	Q 2-5
" 7 pF/500 V	CK 0035	C 22	" "	QV 0085	Q 6,9,10
" 30 pF/500 V	CK 0062	C 23			
" 35 pF/500 V	CK 0102	C 24			
Polyester			PRECISION RESISTORS:		
22 nF/125 V	CS 0005	C 32	Carbon film		
" 47 nF/125 V	CS 0009	C 33	1/2 W \pm 0.5%	RK 4.62 kΩ	R 120
" 100 nF/125 V	CS 0013	C 34	" " "	RK 10 kΩ	R 121
" 470 nF/125 V	CS 0021	C 35	" " "	RK 31.5 kΩ	R 122
" 680 nF/125 V	CS 0023	C 36,37	" " "	RK 100 kΩ	R 123
" 1 µF/125 V	CS 0025	C 38	Wire-wound		
" 2 µF/250 V	CS 0028	C 40	1 W \pm 0.5% 68.3kΩ	RO 0001	R 100
" 47 µF/400 V	CS 0109	C 41	" " 100 Ω	RO 0002	R 101-109
" 100 nF/400 V	CS 0113	C 42,43	" " 147.8kΩ	RO 0003	R 110-119
" 220 nF/400 V	CS 0117	C 44,45			
Polystyrene			RESISTORS:		
50 pF/500 V	CT 0101	C 51	Wire-wound		
" 125 pF/500 V	CT 0104	C 52	5 W 6.2kΩ	RX 0303	R 1
" 200 pF/500 V	CT 0107	C 53,54	" 8 W 5.6kΩ	RX 0408	R 2
" 500 pF/500 V	CT 0113	C 55,56	Carbon film		
" 5 nF/500 V	CT 0126	C 57,58	1 W \pm 10%	RK 31.5 kΩ	R 5
" 400 pF/500 V	CT 0111	C 59	" 1/2 W \pm 5%	RK 160 Ω	R 10
Variable(20 to 20000 c/s)	CV 0010	C 61	" " "	RK 200 Ω	R 11
Trimmer, ceramic 40 pF	CV 0019	C 62,63	" " 10%	RK 2	R 12,13
" " 3.5 pF	CV 0021	C 64	" " "	RK 2.5 kΩ	R 14
" air 60 pF	CV 3007	C 65	" " "	RK 8 kΩ	R 15
" " 15 pF	CV 3009	C 66	" " "	RK 25 kΩ	R 16
Variable(-50 to +50 c/s) 60 pF	CV 3018	C 67	" " 5%	RK 31.5 kΩ	R 17,18
			" " 10%	RK 50 kΩ	R 19,20
MISCELLANEOUS:			" " "	RK 80 kΩ	R 21
Rubber foot	DF 7010		" " 3%	RK 100 kΩ	R 23-24
Clutch plate with worm wheel	DG 0163		" " "	RK 125 kΩ	R 22,25
Handle f. metal cab.	DH 0052		" " 10%	RK 200 kΩ	R 26
Handle f. wooden cab.	DH 0054		" " "	RK 315 kΩ	R 27
Front plate, painted & printed	FA 1022		" " "	RK 400 kΩ	R 28
Back plate	FB 0099		" " "	RK 2 MΩ	R 29
Meter	IM 1022		" " 5%	RK 10 MΩ	R 30
Coaxial jack	JJ 0014		" " "	RK 400 kΩ	R 31
6-pin jack	JJ 4704		" " "	RK 630 kΩ	R 32,33
Binding post	JK 6270		" " "	RK 1 MΩ	R 34
Coaxial plug	JP 0018		" " "	RK 1.6 MΩ	R 35
6-pin plug	JP 4705		" " "	RK 2.5 MΩ	R 36
Jack for grounding	JT 6204		" " "	RK 4 MΩ	R 37
Case, wood	KA 0010		" " "	RK 6.3 MΩ	R 38
Plastic cover	KF 0028		" " 1/3 W \pm 10%	RK 100 Ω	R 51,52
Frame for 19"	KS 0001		" " "	RK 500 Ω	R 53
Case, metal	KQ 0017		" " 5%	RK 700 Ω	R 54
Filter choke	LJ 0005	L 7	" " 10%	RK 900 Ω	R 55
" "	LJ 0006	L 8	" " "	RK 1 kΩ	R 56
Power on-off switch	NN 0563	N 3	" " "	RK 2 kΩ	R 57,58
Aut. scanning switch	NN 0567	N 5	" " "	RK 5 kΩ	R 59,60
1000 c/s Ref. switch	NT 0014	N 4	" " "	RK 10 kΩ	R 61-63
Power freq. beat switch	NT 1775	N 1	" " "	RK 25 kΩ	R 64
Osc. stop switch	NT 1776	N 2	" " "	RK 30 kΩ	R 65
Power voltage selector	OA 0013	O 1	" " "	RK 50 kΩ	R 66
Camdisc for dead zone switch	OD 0133		" " "	RK 70 kΩ	R 67
Attenuator switch	OR 1022	O 2	" " "	RK 80 kΩ	R 68
			" " "	RK 125 kΩ	R 69
			" " "	RK 200 kΩ	R 70
			" " "	RK 250 kΩ	R 71,72
			" " "	RK 315 kΩ	R 73
			" " "	RK 630 kΩ	R 74
			" " "	RK 800 kΩ	R 75
			" " "	RK 1 MΩ	R 76
			" " "	RK 2 MΩ	R 77-80
			" " "	RK 6.3 MΩ	R 81,82

COMPONENT TYPE	STOCK REFERENCE	CIRCUIT DIAGRAM REF.
Carbon film 1/3 W \pm 5%	RK 80 k Ω	R 83
" " "	RK 125 k Ω	R 84
" " "	RK 136 k Ω	R 85
" " "	RK 200 k Ω	R 86
" " "	RK 315 k Ω	R 87
" " "	RK 500 k Ω	R 88
" " "	RK 800 k Ω	R 89
" " "	RK 1.25 k Ω	R 90

MISCELLANEOUS:

Bakelite knob 30 mm flat	SN 0807	
" 30 "	SN 0814	
" 40 "	SN 0989	
" 40 mm twin mark.	SN 0991	
" 53 "	SN 1014	
Frequency dial housing	SO 0188	
Frequency dial pointer	SV 0001	
Power transformer	TN 9801	T 2
Output transformer	TU 0006	T 1
Flexible shaft	UB 0040	
Clutch magnet	UM 1011	
Chain drive adaptor	UT 0014	
Oscillator coil assembly	ZS 0051	L 1,2
Compressor coil assembly	ZS 0053	L 3
Saw-tooth gen.coil assembly	ZS 0054	L 9
H.F. filter	ZS 0056	L 4,5,6

PRINTED WIRING:

Printed wiring for attenuator	XC 0090
" amplifier	XC 0138
" rectifier	XC 0143
" saw-tooth gen.	XC 0144
" oscillator	XC 0155
" compressor	XC 0156
Printed wiring XC 0090 with comp.	1022b1.800
" XC 0138	1022b1.801
" XC 0143	1022b1.802
" XC 0144	1022b1.804
" XC 0155	1022b1.805
" XC 0156	1022b1.803

TUBES ETC:

Twin triode 12AT7(ECC81)	VA 0009	V 1-3
Ampl.pentode 6AU6(EF94)	VA 0021	V 4-7
Out.pentode 6BQ5(EL84)	VA 0023	V 8
Stabilizer OA2	VA 0037	V 9
Fuse 1 amp.	VF 0008	V 10
Meter lamp 6.3/o.5	VS 1271	V 11
Dial lamp 6.3/o.5	VS 8024	V 12

COMPONENT TYPE	STOCK REFERENCE	CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REFERENCE	CIRCUIT DIAGRAM REF.
Power cord	AN 0005		Impedance switch	OS 1022	O 3
Instruction manual	BA 1022		Compressor switch	OT 1022	O 4
<u>CONDENSERS:</u>			Freq. deviation switch	OU 1022	O 5
Electrolytic			Mod. freq. switch	OV 1022	O 6
8 µF/320 V	CE 0802	C 1,2,3	Trimmer pot.	PG 2200	P 1
50 µF/450 V	CE 0901	C 4	" 2 kΩ	PG 3102	P 2,3
40 µF/150 V	CE 2038	C 5,6,7	" 10 kΩ	PG 4201	P 4
2x48 µF/450 V	CE 2269	C 8,9	" 200 kΩ		
100 µF/ 3 V	CE 8943	C 10	Comp. input pot.	PP 3253	P 11
100 µF/ 12 V	CE 8946	C 11	Output level pot.	PR 3301	P 12
Ceramic			Selenium rectifier	QV 0012	Q 1
4 pF/350 V	CK 0097	C 25	Silicon diode	QV 0023	Q 7,8
2 pF/500 V	CK 0032	C 21	Germanium diode	QV 0079	Q 2-5
7 pF/500 V	CK 0035	C 22	" "	QV 0085	Q 6,9,10
30 pF/500 V	CK 0062	C 23			
35 pF/500 V	CK 0102	C 24			
Polyester			<u>PRECISION RESISTORS:</u>		
22 nF/125 V	CS 0005	C 32	Carbon film 1/2 W ± 0.5%	RK 4.62 kΩ	R 120
47 nF/125 V	CS 0009	C 33	" "	RK 10 kΩ	R 121
100 nF/125 V	CS 0013	C 34	" "	RK 31.5 kΩ	R 122
470 nF/125 V	CS 0021	C 35, 46	" "	RK 100 kΩ	R 123
680 nF/125 V	CS 0023	C 36, 37	Wire-wound 1 W ± 0.5% 68.3Ω	RO 1003	R 100
1 µF/125 V	CS 0025	C 38	" 100 Ω		R 101-109
2 µF/250 V	CS 0028	C 40	" 147.8Ω		R 110-119
47 nF/400 V	CS 0109	C 41			
100 nF/400 V	CS 0113	C 42, 43			
220 nF/400 V	CS 0117	C 44, 45			
Polystyrene			<u>RESISTORS:</u>		
50 pF/500 V	CT 0101	C 51	Wire-wound 5 W 6.2 kΩ	RX 0303	R 1
125 pF/500 V	CT 0104	C 52	" 8 W 5.6 kΩ	RX 0408	R 2
200 pF/500 V	CT 0107	C 53, 54	Carbon film 1 W ± 10%	RK 31.5 kΩ	R 5
500 pF/500 V	CT 0113	C 55, 56	" 1/2 W ± 5%	RK 160 Ω	R 10
5 nF/500 V	CT 0126	C 57, 58	" "	RK 200 Ω	R 11
400 pF/500 V	CT 0111	C 59	" 10%	RK 2 kΩ	R 12, 13
Variable (20 to 20000 c/s)	CV 0010	C 61	" "	RK 2.5 kΩ	R 14
Trimmer, ceramic 40 pF	CV 0019	C 62, 63	" "	RK 8 kΩ	R 15
" 3.5 pF	CV 0021	C 64	" "	RK 25 kΩ	R 16
" air 60 pF	CV 3007	C 65	" 5%	RK 31.5 kΩ	R 17, 18
" 15 pF	CV 3009	C 66	" 10%	RK 50 kΩ	R 19, 20
Variable (-50 to +50 c/s) 60 pF	CV 3018	C 67	" "	RK 80 kΩ	R 21
<u>MISCELLANEOUS:</u>			" 3%	RK 100 kΩ	R 23-24
Rubber foot	DF 7010		" "	RK 125 kΩ	R 22, 25
Clutch plate with worm wheel	DG 0163		" 10%	RK 200 kΩ	R 26
Handle f. metal cab.	DH 0052		" "	RK 315 kΩ	R 27
Handle f. wooden cab.	DH 0054		" "	RK 400 kΩ	R 28
Front plate, painted & printed	FA 1022		" "	RK 2 MΩ	R 29
Back plate	FB 0099		" "	RK 10 MΩ	R 30
Meter	IM 1022		" 5%	RK 400 kΩ	R 31
Coaxial jack	JJ 0014		" "	RK 630 kΩ	R 32, 33
6-pin jack	JJ 4704		" "	RK 1 MΩ	R 34
Binding post	JK 6270		" "	RK 1.6 MΩ	R 35
Coaxial plug	JP 0018		" "	RK 2.5 MΩ	R 36
6-pin plug	JP 4705		" 1/3 W ± 10%	RK 4 MΩ	R 37
Jack for grounding	JT 6204		" "	RK 6.3 MΩ	R 38
Case, wood	KA 0010		" 5%	RK 100 Ω	R 51, 52
Plastic cover	KF 0028		" 10%	RK 500 Ω	R 53
Frame for 19" rack	KS 0001		" 5%	RK 700 Ω	R 54
Case, metal	KQ 0017		" 10%	RK 900 Ω	R 55
Filter choke	LJ 0005	L 7	" "	RK 1 kΩ	R 56
" "	LJ 0006	L 8	" "	RK 2 kΩ	R 57, 58
Power on-off switch	NN 0563	N 3	" "	RK 5 kΩ	R 59, 60
Aut. scanning switch	NN 0567	N 5	" "	RK 10 kΩ	R 61-63
1000 c/s Ref. switch	NT 0014	N 4	" "	RK 25 kΩ	R 64
Power freq. beat switch	NT 1775	N 1	" 5%	RK 30 kΩ	R 65
Osc. stop switch	NT 1776	N 2	" 10%	RK 50 kΩ	R 66
Power voltage selector	OA 0017	O 1	" 5%	RK 70 kΩ	R 67
Camdisc for dead zone switch	OD 0133		" 10%	RK 80 kΩ	R 68
Attenuator switch	OR 1022	O 2	" "	RK 125 kΩ	R 69
			" "	RK 200 kΩ	R 70
			" "	RK 250 kΩ	R 71, 72
			" "	RK 315 kΩ	R 73
			" "	RK 630 kΩ	R 74
			" "	RK 800 kΩ	R 75
			" "	RK 1 MΩ	R 76
			" "	RK 2 MΩ	R 77-80
			" "	RK 6.3 MΩ	R 81, 82

COMPONENT TYPE	STOCK REFERENCE	CIRCUIT DIAGRAM REF.
Carbon film 1/3 W \pm 5%	RK 80 k Ω	R 83
" " "	RK 125 k Ω	R 84
" " "	RK 136 k Ω	R 85
" " "	RK 200 k Ω	R 86
" " "	RK 315 k Ω	R 87
" " "	RK 500 k Ω	R 88
" " "	RK 800 k Ω	R 89
" " "	RK 1.25 k Ω	R 90

MISCELLANEOUS:

Bakelite knob 30 mm flat	SN 0807	
" 30 "	SN 0814	
" 40 "	SN 0989	
" 40 mm twin mark.	SN 0991	
" 53 "	SN 1014	
Frequency dial housing	SO 0188	
Frequency dial pointer	SV 0001	
Power transformer	TN 9801	T 2
Output transformer	TU 0006	T 1
Flexible shaft	UB 0040	
Clutch magnet	UM 1011	
Chain drive adaptor	UT 0014	
Oscillator coil assembly	ZS 0064	L 1,2
Compressor coil assembly	ZS 0053	L 3
Saw-tooth gen.coil assembly	ZS 0054	L 9
H.F. filter	ZS 0056	L 4,5,6

PRINTED WIRING:

Printed wiring for attenuator	XC 0090
" amplifier	XC 0138
" rectifier	XC 0143
" saw-tooth gen.	XC 0144
" oscillator	XC 0155
" compressor	XC 0156
Printed wiring XC 0090 with comp.	1022bl.800
" XC 0138	1022bl.801
" XC 0143	1022bl.802
" XC 0144	1022bl.804
" XC 0155	1022bl.805
" XC 0156	1022bl.803

TUBES ETC.:

Twin triode	ECC81/12AT7	VA 0009	V 1-3
Ampl.pentode	EF94/6AU6	VA 0021	V 4-7
Out.pentode	EL84/68Q5	VA 0023	V 8
Stabilizer	OA2	VA 0037	V 9
Fuse	1 amp.	VF 0008	V 10
Meter lamp	6.3 V/0.5 A	VS 1271	V 11
Dial lamp	6.3 V/0.5 A	VS 8024	V 12

COMPONENT TYPE	STOCK REFERENCE	CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REFERENCE	CIRCUIT DIAGRAM REF.
Power cord	AN 0005		Impedance switch	OW 1022	O 3
Instruction manual	BA 1022		Compressor switch	OY 1022	O 4
<u>CONDENSERS:</u>			Freq. deviation switch	OZ 1022	O 5
Electrolytic	8 µF/320 V	CE 0802 C 1, 2, 3	Mod. freq. switch	OQ 1022	O 6
"	50 µF/500 V	CE 0913 C 4	Trimmer pot.	" 2 kΩ	PG 2200 P 1
"	40 µF/150 V	CE 2038 C 5, 6, 7	"	10 kΩ	PG 3102 P 2, 3
"	2 x 50 µF/450 V	CE 0909 C 8, 9	"	200 kΩ	PG 4201 P 4
"	100 µF/ 15 V	CE 0310 C 10	Comp. input pot.	25 kΩ log	PP 3253 P 11
"	100 µF/ 25 V	CE 0415 C 11	Output level pot.	30 kΩ wire	PR 3301 P 12
Ceramic	4 pF/350 V	CK 0097 C 25	Selenium rectifier	QV 0012	Q 1
"	2 pF/500 V	CK 0032 C 21	Silicon diode	QV 0025	Q 7, 8
"	7 pF/500 V	CK 0035 C 22	Germanium diode	QV 0079	Q 2-5
"	27 pF/500 V	CK 1270 C 23	"	QV 0085	Q 6, 9, 10
"	35 pF/500 V	CK 0102 C 24			
Polyester	22 nF/125 V	CS 0005 C 32	<u>PRECISION RESISTORS:</u>		
"	47 nF/125 V	CS 0009 C 33	Carbon film 1/2 W ± 0.5%	RK 4.62 kΩ	R 120
"	100 nF/125 V	CS 0013 C 34	"	RK 10	kΩ R 121
"	470 nF/125 V	CS 0021 C 35, 46	"	RK 31.5	kΩ R 122
"	680 nF/125 V	CS 0023 C 36, 37	"	RK 100	kΩ R 123
"	1 µF/125 V	CS 0025 C 38	Wire-wound 1 W ± 0.5% 68.3Ω	RO 1003	R 100
"	2 µF/250 V	CS 0028 C 40	"	" 100 Ω	R 101-109
"	47 nF/400 V	CS 0109 C 41	"	" 147.8Ω	R 110-119
"	100 nF/400 V	CS 0113 C 42, 43			
"	220 nF/400 V	CS 0117 C 44, 45			
Polystyrene	50 pF/500 V	CT 0101 C 51	<u>RESISTORS:</u>		
"	125 pF/500 V	CT 0104 C 52	Wire-wound 5 W 6.2kΩ	RX 0303	R 1
"	200 pF/500 V	CT 0107 C 53, 54	" 8 W 5.6kΩ	RX 0408	R 2
"	500 pF/500 V	CT 0113 C 55, 56	Carbon film 1 W ± 10%	RK 31.5	kΩ R 5
"	5 nF/500 V	CT 0126 C 57, 58	" 1/2 W ± 5%	RK 160	Ω R 10
"	400 pF/500 V	CT 0111 C 59	"	RK 200	kΩ R 11
Variable(20 to 20000 c/s)		CV 0010 C 61	"	RK 2	kΩ R 12, 13
Trimmer, ceramic 40 pF		CV 0019 C 62, 63	"	RK 2.5	kΩ R 14
" 3.5 pF		CV 0021 C 64	"	RK 8	kΩ R 15
" air 60 pF		CV 3007 C 65	"	RK 25	kΩ R 16
" 15 pF		CV 3009 C 66	"	RK 31.5	kΩ R 17, 18
Variable(-50 to +50 c/s) 60 pF		CV 3018 C 67	"	RK 50	kΩ R 19, 20
<u>MISCELLANEOUS:</u>			"	RK 80	kΩ R 21
Rubber foot	DF 7010		"	RK 100	kΩ R 23-24
Clutch plate with worm wheel	DG 0163		"	RK 125	kΩ R 22, 25
Handle f. metal cab.	DH 0052		"	RK 200	kΩ R 26
Handle f. wooden cab.	DH 0054		"	RK 315	kΩ R 27
Front plate, painted & printed	FA 1022		"	RK 400	kΩ R 28
Back plate	FB 0099		"	RK 2	MΩ R 29
Meter	IM 1022		"	RK 10	MΩ R 30
Coaxial jack	JJ 0014		"	RK 400	kΩ R 31
6-pin jack	JJ 4704		"	RK 630	kΩ R 32, 33
Binding post	JK 6270		"	RK 1	MΩ R 34
Coaxial plug	JP 0018		"	RK 1.6	MΩ R 35
6-pin plug	JT 4705		"	RK 2.5	MΩ R 36
Jack for grounding	JP 6204		"	RK 4	MΩ R 37
Case, wood	KA 0010		"	RK 6.3	MΩ R 38
Plastic cover	KF 0028		"	RK 100	Ω R 51, 52
Frame for 19" rack	KS 0001		"	RK 500	Ω R 53
Case, metal	KQ 0017		"	RK 700	Ω R 54
Filter choke	LJ 0005 L 7		"	RK 900	Ω R 55
"	LJ 0003 L 8		"	RK 1	kΩ R 56
Power on-off switch	NN 0014 N 3		"	RK 2	kΩ R 57, 58
Aut. scanning switch	NN 0017 N 5		"	RK 5	kΩ R 59, 60
1000 c/s Ref. switch	NT 0014 N 4		"	RK 10	kΩ R 61-63
Power freq. beat switch	NT 1775 N 1		"	RK 25	kΩ R 64
Osc. stop switch	NT 1776 N 2		"	RK 30	kΩ R 65
Power voltage selector	OA 0017 O 1		"	RK 50	kΩ R 66
Camdisc for dead zone switch	OD 0133		"	RK 70	kΩ R 67
Attenuator switch	OX 1022 O 2		"	RK 80	kΩ R 68

COMPONENT TYPE	STOCK REFERENCE	CIRCUIT DIAGRAM REF.
Carbon film 1/3 W \pm 5%	RK 80 k Ω	R 83
" " "	RK 125 k Ω	R 84
" " "	RK 136 k Ω	R 85
" " "	RK 200 k Ω	R 86
" " "	RK 315 k Ω	R 87
" " "	RK 500 k Ω	R 88
" " "	RK 800 k Ω	R 89
" " "	RK 1.25 k Ω	R 90

MISCELLANEOUS:

Bakelite knob 30 mm flat	SN 0807	
" 30 "	SN 0814	
" 40 "	SN 0989	
" 40 mm twin mark.	SN 0991	
" 53 "	SN 1014	
Frequency dial housing	SO 0188	
Frequency dial pointer	SV 0001	
Power transformer	TN 9801	T 2
Output transformer	TU 0006	T 1
Flexible shaft	UB 0040	
Clutch magnet	UM 1011	
Chain drive adaptor	UT 0014	
Oscillator coil assembly	ZS 0064	L 1,2
Compressor coil assembly	ZS 0053	L 3
Saw-tooth gen.coil assembly	ZS 0054	L 9
H.F. filter	ZS 0056	L 4,5,6

PRINTED WIRING:

Printed wiring for attenuator	XC 0342
" amplifier	XC 0138
" rectifier	XC 0143
" saw-tooth gen.	XC 0343
" oscillator	XC 0155
" compressor	XC 0156
Printed wiring XC 0342 with comp.	1022bl.800
" XC 0138	1022bl.801
" XC 0143	1022bl.802
" XC 0343	1022bl.804
" XC 0155	1022bl.805
" XC 0156	1022bl.803

TUBES ETC:

Twin triode	ECC81/12AT7	VA 0009	V 1-3
Ampl.pentode	EF94/6AU6	VA 0021	V 4-7
Out.pentode	EL84/6BQ5	VA 0023	V 8
Stabilizer	OA2	VA 0037	V 9
Fuse	1 amp.	VF 0008	V 10
Meter lamp	6.3 V/o.5 A	VS 1271	V 11
Dial lamp	6.3 V/o.5 A	VS 8024	V 12

COMPONENT TYPE	STOCK REFERENCE	CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REFERENCE	CIRCUIT DIAGRAM REF.
Power cord	AN 0005		Impedance switch	OW 1022	O 3
Instruction manual	BA 1022		Compressor switch	OY 1022	O 4
CONDENSERS:			Freq. deviation switch	OZ 1022	O 5
Electrolytic	8 µF/320 V	CE 0802	Mod.freq. switch	OQ 1022	O 6
"	50 µF/500 V	CE 0913	Trimmer pot.	2 kΩ	PG 2200
"	40 µF/150 V	CE 2038	"	10 kΩ	PG 3102
"	2 x 50 µF/450 V	CE 0909	"	200 kΩ	PG 4201
"	100 µF/15 V	CE 0310	Comp.input pot.	25 kΩ log	PP 3253
"	100 µF/25 V	CE 0415	Output level pot.	30 kΩ wire	PR 3301
Ceramic	4 pF/350 V	CK 0097	Selenium rectifier	QV 0012	Q 1
"	2 pF/500 V	CK 0032	Silicon diode	QV 0025	Q 7,8
"	7 pF/500 V	CK 0035	Germanium diode	QV 0079	Q 2-5
"	27 pF/500 V	CK 1270	"	QV 0085	Q 6,9,10
"	35 pF/500 V	CK 0102			
Polyester	22 nF/125 V	CS 0005	PRECISION RESISTORS:		
"	47 nF/125 V	CS 0009	Carbon film	1/2 W ±0.5%	RK 4.62 kΩ R 120
"	100 nF/125 V	CS 0013	"	"	RK 10 kΩ R 121
"	470 nF/125 V	CS 0021	"	"	RK 31.5 kΩ R 122
"	680 nF/125 V	CS 0023	"	"	RK 100 kΩ R 123
"	1 µF/125 V	CS 0025			
"	2 µF/250 V	CS 0028	Wire-wound	1 W ±0.5% 68.3Ω	R 100 R 101-109 R 110-119
"	47 nF/400 V	CS 0109	"	100 Ω	
"	100 nF/400 V	CS 0113	"	147.8Ω	
"	220 nF/400 V	CS 0117			
Polystyrene	50 pF/500 V	CT 0101	RESISTORS:		
"	125 pF/500 V	CT 0104	Wire-wound	5 W 6.2kΩ	RX 0303
"	200 pF/500 V	CT 0107	"	8 W 5.6kΩ	RX 0408
"	500 pF/500 V	CT 0113	Carbon film	1 W ±10%	RK 31.5 kΩ R 5
"	5 nF/500 V	CT 0126	"	1/2 W ±5%	RK 160 Ω R 10
"	400 pF/500 V	CT 0111	"	"	RK 200 Ω R 11
Variable(20 to 20000 c/s)		CV 0010	"	"	RK 2 kΩ R 12,13
Trimmer,ceramic 40 pF		CV 0019	"	"	RK 2.5 kΩ R 14
"	3.5 pF	CV 0021	"	"	RK 8 kΩ R 15
"	air 60 pF	CV 3007	"	"	RK 25 kΩ R 16
"	15 pF	CV 3009	"	5%	RK 31.5 kΩ R 17,18
Variable(-50 to +50 c/s) 60 pF		CV 3018	"	10%	RK 50 kΩ R 19,20
MISCELLANEOUS:			"	"	RK 80 kΩ R 21
Rubber foot	DF 7010		"	3%	RK 100 kΩ R 23-24
Clutch plate with worm wheel	DG 0163		"	"	RK 125 kΩ R 22,25
Handle f.metal cab.	DH 0052		"	10%	RK 200 kΩ R 26
Handle f.wooden cab.	DH 0054		"	"	RK 315 kΩ R 27
Front plate, painted & printed	FA 1022		"	"	RK 400 kΩ R 28
Back plate	FB 0099		"	"	RK 2 MΩ R 29
Meter	IM 1022		"	5%	RK 10 MΩ R 30
Coaxial jack	JJ 0014		"	"	RK 400 kΩ R 31
6-pin jack	JJ 4704		"	"	RK 630 kΩ R 32,33
Binding post	JK 6270		"	"	RK 1 MΩ R 34
Coaxial plug	JP 0018		"	"	RK 1.6 MΩ R 35
6-pin plug	JP 4705		"	"	RK 2.5 MΩ R 36
Jack for grounding	JT 6204		"	"	RK 4 MΩ R 37
Case, wood	KA 0010		"	1/3 W ±10%	RK 6.3 MΩ R 38
Plastic cover	KF 0028		"	"	RK 100 Ω R 51,52
Frame for 19" rack	KS 0001		"	5%	RK 500 Ω R 53
Case, metal	KQ 0017		"	"	RK 700 Ω R 54
Filter choke	LJ 0005	L 7	"	10%	RK 900 Ω R 55
"	LJ 0003	L 8	"	"	RK 1 kΩ R 56
Power on-off switch	NN 0014	N 3	"	10%	RK 2 kΩ R 57,58
Aut.scanning switch	NN 0017	N 5	"	"	RK 5 kΩ R 59,60
1000 c/s Ref.switch	NT 0014	N 4	"	5%	RK 10 kΩ R 61-63
Power freq.beat switch	NT 0023	N 1	"	10%	RK 25 kΩ R 64
Osc.stop switch	NT 0025	N 2	"	"	RK 30 kΩ R 65
Power voltage selector	OA 0017	O 1	"	"	RK 50 kΩ R 66
Camdisc for dead zone switch	OD 0133		"	5%	RK 70 kΩ R 67
Attenuator switch	OX 1022	O 2	"	10%	RK 80 kΩ R 68

COMPONENT TYPE	STOCK REFERENCE	CIRCUIT DIAGRAM REF.
Carbon film 1/3 W \pm 5%	RK 80 k Ω	R 83
" " "	RK 125 k Ω	R 84
" " "	RK 136 k Ω	R 85
" " "	RK 200 k Ω	R 86
" " "	RK 315 k Ω	R 87
" " "	RK 500 k Ω	R 88
" " "	RK 800 k Ω	R 89
" " "	RK 1.25 k Ω	R 90

MISCELLANEOUS:

Bakelite knob 30 mm flat	SN 0807	
" 30 "	SN 0814	
" 40 "	SN 0989	
" 40 mm twin mark.	SN 0991	
" 53 "	SN 1014	
Frequency dial housing	SO 0188	
Frequency dial pointer	SV 0001	
Power transformer	TN 9801	T 2
Output transformer	TU 0006	T 1
Flexible shaft	UB 0040	
Clutch magnet	UM 1011	
Chain drive adaptor	UT 0014	
Oscillator coil assembly	ZS 0064	L 1,2
Compressor coil assembly	ZS 0053	L 3
Saw-tooth gen.coil assembly	ZS 0054	L 9
H.F. filter	ZS 0056	L 4,5,6

PRINTED WIRING:

Printed wiring for attenuator	XC 0342	
" amplifier	XC 0138	
" rectifier	XC 0143	
" saw-tooth gen.	XC 0343	
" oscillator	XC 0155	
" compressor	XC 0156	
Printed wiring XC 0342 with comp.	1022bl.800	
" XC 0138	1022bl.801	
" XC 0143	1022bl.802	
" XC 0343	1022bl.804	
" XC 0155	1022bl.805	
" XC 0156	1022bl.803	

TUBES ETC:

Twin triode	ECC81/12AT7	VA 0009	V 1-3
Ampl.pentode	EF94/6AU6	VA 0021	V 4-7
Out.pentode	EL84/6BQ5	VA 0023	V 8
Stabilizer	OA2	VA 0037	V 9
Fuse	1 amp.	VF 0008	V 10
Meter lamp	6.3 V/0.5 A	VS 1271	V 11
Dial lamp	6.3 V/0.5 A	VS 8024	V 12

Valid from Serial No. 228667

COMPONENT TYPE	STOCK REFERENCE	CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REFERENCE	CIRCUIT DIAGRAM REF.
Power cord	AN 0005		Impedance switch	OW 1022	O 3
Instruction manual	BA 1022		Compressor switch	OY 1022	O 4
<u>CONDENSERS:</u>			Freq. deviation switch	OZ 1022	O 5
Electrolytic	8 μ F/320 V	CE 0802 C 1,2,3	Mod.freq. switch	OQ 1022	O 6
"	50 μ F/500 V	CE 0913 C 4	Trimmer pot.	2 k Ω	PG 2200 P 1
"	40 μ F/150 V	CE 2938 C 5,6,7	"	10 k Ω	PG 3102 P,2,3
"	2 x 50 μ F/450 V	CE 0909 C 8,9	"	200 k Ω	PG 4201 P 4
"	100 μ F/ 15 V	CE 0310 C 10	Comp.input pot.	25 k Ω log	PP 3253 P 11
"	100 μ F/ 25 V	CE 0415 C 11	Output level pot.	30 k Ω wire	PR 3301 P 12
Ceramic	4 pF/350 V	CK 0097 C 25	Selenium rectifier		QV 0012 Q 1
"	2 pF/500 V	CK 0032 C 21	Silicon diode		QV 0025 Q 7,8
"	7 pF/500 V	CK 0035 C 22	Germanium diode		QV 0079 Q 2-5
"	27 pF/500 V	CK 1270 C 23	"		QV 0085 Q 6,9,10
"	35 pF/500 V	CK 0102 C 24			
Polyester	22 nF/125 V	CS 0005 C 32	<u>PRECISION RESISTORS:</u>		
"	47 nF/125 V	CS 0009 C 33	Carbon film	1/2 W \pm 0.5%	RK 4.62 k Ω R 120
"	100 nF/125 V	CS 0013 C 34	"	"	RK 10 k Ω R 121
"	470 nF/125 V	CS 0021 C 35,46	"	"	RK 31.5 k Ω R 122
"	680 nF/125 V	CS 0023 C 36,37	"	"	RK 100 k Ω R 123
"	1 μ F/125 V	CS 0025 C 38	Wire-wound	1 W \pm 0.5% 68.3 Ω	RO 1003 [R 100 R 101-109 R 110-119
"	2 μ F/250 V	CS 0028 C 40	"	"	
"	47 nF/400 V	CS 0109 C 41	"	100 Ω	
"	100 nF/400 V	CS 0113 C 42,43	"	147.8 Ω	
"	220 nF/400 V	CS 0117 C 44,45			
Polystyrene	50 pF/500 V	CT 0101 C 51	<u>RESISTORS:</u>		
"	125 pF/500 V	CT 0104 C 52	Wire-wound	5 W 6.2 k Ω	RX 0303 R 1
"	200 pF/500 V	CT 0107 C 53,54	"	8 W 5.6 k Ω	RX 0408 R 2
"	500 pF/500 V	CT 0113 C 55,56	Carbon film	1 W \pm 10%	RK 31.5 k Ω R 5
"	5 nF/500 V	CT 0126 C 57,58	"	1/2 W \pm 5%	RK 160 Ω R 10
"	400 pF/500 V	CT 0111 C 59	"	"	RK 200 Ω R 11
Variable(20 to 20000 c/s)		CV 0010 C 61	"	"	RK 2 k Ω R 12,13
Trimmer,ceramic 40 pF		CV 0019 C 62,63	"	"	RK 2.5 k Ω R 14
"	3.5 pF	CV 0021 C 64	"	"	RK 8 k Ω R 15
"	air 60 pF	CV 3019 C 65	"	"	RK 25 k Ω R 16
"	15 pF	CV 3020 C 66	"	"	RK 31.5 k Ω R 17,18
Variable(-50 to +50 c/s) 60 pF		CV 3018 C 67	"	"	RK 50 k Ω R 19,20
<u>MISCELLANEOUS:</u>			"	"	RK 80 k Ω R 21
Rubber foot	DF 7010		"	"	RK 100 k Ω R 23-24
Clutch plate with worm wheel	DG 0163		"	"	RK 125 k Ω R 22,25
Handle f.metal cab.	DH 0052		"	"	RK 200 k Ω R 26
Handle f.wooden cab.	DH 0054		"	"	RK 315 k Ω R 27
Front plate, painted & printed	FA 1022		"	"	RK 400 k Ω R 28
Back plate	FB 0099		"	"	RK 2 M Ω R 29
Meter	IM 1022		"	"	RK 10 M Ω R 30
Coaxial jack	JJ 0014		"	"	RK 400 k Ω R 31
6-pin jack	JJ 4704		"	"	RK 630 k Ω R 32,33
Binding post	JK 6270		"	"	RK 1 M Ω R 34
Coaxial plug	JP 0018		"	"	RK 1.6 M Ω R 35
6-pin plug	JP 4705		"	"	RK 2.5 M Ω R 36
Jack for grounding	JT 6204		"	"	RK 4 M Ω R 37
Case, wood	KA 0010		"	"	RK 6.3 M Ω R 38
Plastic cover	KF 0028		"	"	RK 100 Ω R 51,52
Frame for 19" rack	KS 0001		"	"	RK 500 Ω R 53
Case, metal	KQ 0017		"	"	RK 700 Ω R 54
Filter choke	LJ 0005 L 7		"	"	RK 900 Ω R 55
"	LJ 0003 L 8		"	"	RK 1 k Ω R 56
Power on-off switch	NN 0014 N 3		"	"	RK 2 k Ω R 57,58
Aut.scanning switch	NN 0017 N 5		"	"	RK 5 k Ω R 59,60
1000 c/s Ref.switch	NT 0014 N 4		"	"	RK 10 k Ω R 61-63
Power freq.beat switch	NT 0023 N 1		"	"	RK 25 k Ω R 64
Osc.stop switch	NT 0025 N 2		"	"	RK 30 k Ω R 65
Power voltage selector	OA 0017 O 1		"	"	RK 50 k Ω R 66
Camdisc for dead zone switch	OD 0133		"	"	RK 70 k Ω R 67
Attenuator switch	OX 1022 O 2		"	"	RK 80 k Ω R 68
			"	"	RK 125 k Ω R 69
			"	"	RK 200 k Ω R 70
			"	"	RK 250 k Ω R 71,72
			"	"	RK 315 k Ω R 73
			"	"	RK 630 k Ω R 74
			"	"	RK 800 k Ω R 75
			"	"	RK 1 M Ω R 76
			"	"	RK 2 M Ω R 77-80
			"	"	RK 6.3 M Ω R 81,82

COMPONENT TYPE	STOCK REFERENCE	CIRCUIT DIAGRAM REF.
Carbon film 1/3 W \pm 5%	RK 80 k Ω	R 83
" " "	RK 125 k Ω	R 84
" " "	RK 136 k Ω	R 85
" " "	RK 200 k Ω	R 86
" " "	RK 315 k Ω	R 87
" " "	RK 500 k Ω	R 88
" " "	RK 800 k Ω	R 89
" " "	RK 1.25 k Ω	R 90

MISCELLANEOUS:

Bakelite knob	30 mm flat	SN 3202, DB 0850, YQ 2083	
"	30 "	SN 3222, DB 0674, YQ 2083	
"	40 "	SN 4021, DB 0674, YQ 2083	
"	40 mm twin mark.	SN 4026, 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 9801	T 2
Output transformer		TU 0006	T 1
Flexible shaft		UB 0040	
Clutch magnet		UM 1011	
Chain drive adaptor		UT 0014	
Oscillator coil assembly		ZS 0064	L 1,2
Compressor coil assembly		ZS 0053	L 3
Saw-tooth gen.coil assembly		ZS 0054	L 9
H.F. filter		ZS 0056	L 4,5,6

PRINTED WIRING:

Printed wiring for attenuator	XC 0342
" amplifier	XC 0138
" rectifier	XC 0143
" saw-tooth gen.	XC 0343
" oscillator	XC 0155
" compressor	XC 0156
Printed wiring XC 0342 with comp.	1022bl.800
" XC 0138	1022bl.801
" XC 0143	1022bl.802
" XC 0343	1022bl.804
" XC 0155	1022bl.805
" XC 0156	1022bl.806

TUBES ETC:

Twin triode	ECC81/12AT7	VA 0009	V 1-3
Ampl.pentode	EF94/6AU6	VA 0021	V 4-7
Out.pentode	EL84/6BQ5	VA 0023	V 8
Stabilizer	OA2	VA 0037	V 9
Fuse	1 amp.	VF 0008	V 10
Meter lamp	6.3 V/0.5 A	VS 1271	V 11
Dial lamp	6.3 V/0.5 A	VS 8024	V 12

CIRCUIT DIAGRAM REF.	COMPONENT TYPE		STOCK REF.	CIRCUIT DIAGRAM REF.	COMPONENT TYPE		STOCK REF.
CAPACITORS:				POTENTIOMETERS:			
C 201,202	Electrolytic	100µF/ 25 V	CE 0415	P 201	Trimmer Carbon	4.7 kΩ	PG 2470
C 203,204	Polyester	2,2µF/100 V	CS 0380	P 301,302	-	47 kΩ	PG 3471
C 205,206	-	10µF/250 V	CS 0403	P 501	-	4.7 kΩ	PG 2470
C 207,208	Electrolytic	400µF/ 40 V	CE 0417	P 701	-	2.2 kΩ	PG 2207
C 301,302	Polyester	0.22µF/100 V	CS 0339	P 801	-	10 kΩ	PG 3109
C 303	-	2.2µF/100 V	CS 0380	P 802	-	4.7 kΩ	PG 2470
C 304	-	10nF/250 V	CS 0403	P 901	Compressor Voltage	25 kΩ	PP 3253
C 305	-	0.1µF/100 V	CS 0013	P 902	Output Level	30 kΩ	PR 3301
C 306	-	10nF/250 V	CS 0403				
C 307,308	Polystyrene	5nF/250 V	CT 1202				
C 309	-	125pF/500 V	CT 0104				
C 310	Electrolytic	250µF/ 25 V	CE 0413				
C 311	-	100µF/ 16 V	CE 0312				
C 312	Polyester	10nF/250 V	CS 0403				
C 313	-	0.68µF/250 V	CS 0023				
C 401	-	0.1µF/100 V	CS 0013		Output Amplifier	XC 0590	ZE 0036
C 402	-	10µF/250 V	CS 0403		Power Supply	XC 0591	ZG 0027
C 403	Polystyrene	125pF/500 V	CT 0104		Mixer and Compressor	XC 0592	ZM 0009
C 404	Trimmer	40pF/	CV 0019		Variable Oscillator	XC 0593	ZI 0006
C 501,502	Polyster	10nF/250 V	CS 0403		Fixed Oscillator	XC 0594	ZI 0007
C 503	Polystyrene	100pF/500 V	CT 0103		Attenuator Output	XC 0595	PZ 0001
C 504	-	125pF/500 V	CT 0104		Regulating Amplifier	XC 0596	PZ 0002
C 505	-	200pF/500 V	CT 0107				
C 506	Polyester	0.47µF/100 V	CS 0335				
C 601	-	0.22µF/100 V	CS 0339				
C 701	-	0.47µF/100 V	CS 0335				
C 702	-	2.2µF/100 V	CS 0702				
C 703	-	1.5µF/100 V	CS 0343	R 201,202	Carbon 1/3 W 10%	20 kΩ	
C 705	-	1µF/100 V	CS 0335	R 203	- - -	16 kΩ	
C 706	-	2.2µF/100 V	CS 0380	R 204	- - -	6.3 kΩ	
C 801	Ceramic	200pF/400 V	CK 0078	R 205	- - -	4 kΩ	
C 802	Polyester	4.7µF/100 V	CS 0387	R 206	Wire 5 W	6.8 Ω	
C 803	Ceramic	27pF/400 V	CK 1270	R 207	Carbon 1/3 W 5%	3.5 kΩ	
C 804	Electrolytic	25µF/ 6 V	CE 0203	R 208	Wire 5 W 10%	6.8 Ω	
C 805	-	50µF/ 25 V	CE 8965	R 209	Carbon 1/3 W 5%	3.5 kΩ	
C 806	-	25µF/ 6 V	CE 0203	R 210,211	- - 10%	1 kΩ	
C 807	Ceramic	68pF/400 V	CK 1680	R 212,213	- - -	5 kΩ	
C 808	-	100pF/400 V	CK 0077	R 301	- - -	10 kΩ	
C 810	-	1nF/500 V	CK 3100	R 302	- - -	2 kΩ	
C 811	Polyester	22µF/250 V	CS 0005	R 303	- - -	20 kΩ	
C 812	-	2.2µF/100 V	CS 0380	R 304	- - -	820 Ω	
C 813	-	2.2µF/ 63 V	CS 0805	R 305	- - -	60 kΩ	
C 814	-	0.1µF/250 V	CS 0402	R 306	- - -	180 kΩ	
C 901	Trimmer	60pF/	CV 3018	R 307	- - -	8.2 kΩ	
C 902	-(fine)	15pF/	CV 3020	R 308	- - -	3.9 kΩ	
C 903	-(Coarse)	60pF/	CV 3019	R 309	- - -	20 kΩ	
C 904	Variable Condenser	20-20000 Hz	CV 0010	R 310,311	- - -	250 kΩ	
				R 312	- - -	800 kΩ	
				R 313	- - -	316 kΩ	
				R 314	- - -	1MΩ	
				R 315	- - -	5 kΩ	
				R 316	- - -	3 kΩ	
				R 317	- - -	15 kΩ	
				R 318	- - -	2 kΩ	
				R 319	- - -	500 Ω	
				R 320	- - -	5.6 kΩ	
				R 321	- - -	10 kΩ	
				R 322	- - -	50 kΩ	
				R 323	- - -	200 kΩ	
				R 324	- - -	1 kΩ	
				R 325	- - -	2.7 kΩ	
				R 326	- - -	50 kΩ	
				R 327	- - -	10 kΩ	

COILS AND TRANSFORMERS:

L 901,902	Oscillator Coil Assembly	ZS 0064
L 903	Compressor Coil Assembly	ZS 0053
L 904-906	H.F. Filter	ZS 0056
T 2	Power Transformer	TN 0040
T 1	Output Transformer	TV 0007

CIRCUIT COMPONENT
DIAGRAM TYPE
REF.

STOCK
REF.

CIRCUIT COMPONENT
DIAGRAM TYPE
REF.

STOCK
REF.

RESISTORS:

R 328	Carbon	1/3 W	10%	22 k Ω
R 329	-	-	-	800 k Ω
R 330	-	-	-	100 k Ω
R 331	-	-	-	1M Ω
R 332	-	-	-	2.5 k Ω
R 333	-	-	-	3 k Ω
R 334	-	-	-	10 k Ω
R 335	-	-	-	200 Ω
R 336	-	-	-	2 k Ω
R 337	-	-	-	5 k Ω
R 338	-	-	-	10 k Ω
R 339	-	-	-	100 Ω
R 340	-	-	-	600 Ω
R 341	-	-	-	1 k Ω
R 342	-	-	-	30 k Ω
R 401	-	-	-	5 k Ω
R 402	-	-	-	100 k Ω
R 403	-	-	-	500 k Ω
R 404	-	-	-	1.5 k Ω
R 405	-	-	-	8 k Ω
R 406	-	-	-	10 k Ω
R 407	-	-	-	100 k Ω
R 408	-	-	-	10 k Ω
R 409	-	-	-	200 k Ω
R 501	-	-	-	3.15 k Ω
R 502	-	-	-	50 k Ω
R 503	-	-	-	560 k Ω
R 504	-	-	-	500 Ω
R 505	-	-	-	2.7 k Ω
R 506	-	-	-	10 k Ω
R 507	-	-	-	5 k Ω
R 508	-	-	-	2M Ω
R 509	-	-	-	50 k Ω
R 510	-	-	-	1M Ω
R 511	-	-	-	2 k Ω
R 512	-	-	-	20 k Ω
R 513	-	-	-	180 k Ω
R 514	-	-	-	100 Ω
R 515	-	-	-	400 Ω
R 516	-	-	-	315 Ω
R 517	-	-	-	10 k Ω
R 601	-	-	1/2%	4.6 k Ω
R 602	-	-	-	10 k Ω
R 603	-	-	-	31 k Ω
R 604	-	-	-	100 k Ω
R 605-624	Metal	-	-	
One set of high stability resistors for output attenuator				
R 625	Carbon	-	10%	10 Ω
R 701,702	-	-	5%	1 k Ω
R 703	-	-	10%	60 k Ω
R 705	-	-	-	34 k Ω
R 706	-	-	-	56 k Ω
R 707	-	-	-	88 k Ω
R 708	-	-	-	137 k Ω
R 709	-	-	-	225 k Ω
R 710	-	-	-	338 k Ω
R 711	-	-	-	552 k Ω
R 712	-	-	-	136 k Ω
R 713	-	-	-	80 k Ω
R 714	-	-	-	125 k Ω
R 715	-	-	-	200 k Ω
R 716	-	-	-	316 k Ω
R 717	-	-	-	500 k Ω

RO 1003

RESISTORS:

R 718	Carbon	1/3 W	10%	800 k Ω	
R 719	-	-	-	1.25M Ω	
R 720	-	-	-	220 k Ω	
R 721	-	-	5%	100 k Ω	
R 722	-	-	10%	4M Ω	
R 723	-	-	-	2M Ω	
R 724	-	-	5%	10 k Ω	
R 725	-	-	-	22 k Ω	
R 726	-	-	10%	6.3M Ω	
R 727	-	-	-	2M Ω	
R 728	-	-	-	630 k Ω	
R 801	-	1/4 W	5%	470 k Ω	RB 5470
R 802	-	-	-	18 k Ω	RB 4180
R 803,804	Metal	-	1%	1.1 k Ω	RF 3110
R 805	-	-	-	1.21 k Ω	RF 3121
R 806	-	-	-	4.99 k Ω	RF 3499
R 807	Carbon	-	5%	100 Ω	RB 2100
R 808	-	1/3 W	-	2 k Ω	
R 809	-	1/4 W	-	33 k Ω	RB 4330
R 810	-	-	-	39 k Ω	RB 4390
R 811	-	-	-	22 k Ω	RB 4220
R 812,813	Metal	-	1%	1.1 k Ω	RF 3110
R 814	-	-	-	316 Ω	RF 2316
R 815	-	-	-	6.3 k Ω	RF 3634
R 816	Carbon	-	5%	470 k Ω	RB 5470
R 817	-	-	-	100 Ω	RB 2100
R 818,819	-	-	-	1 k Ω	RB 3100
R 820	Metal	-	1%	1.5 k Ω	RF 3150
R 821	-	-	-	3.3 k Ω	RF 3332
R 822,823	Carbon	-	5%	100 Ω	RB 2100
R 824,825	-	-	-	47 Ω	RB 1470
R 826-829	-	-	-	220 Ω	RB 2220
R 830,831	Wire	1 W	-	39 Ω	RR 0004
R 832	Carbon	1/3 W	1%	71 k Ω	
R 833	Metal	1/4 W	-	20 k Ω	RF 4200
R 834	-	-	-	6.3 k Ω	RF 3634
R 835	-	-	-	2 k Ω	RF 3200
R 836	Carbon	-	5%	1M Ω	RB 6100
R 837	-	-	-	15 k Ω	RB 4150
R 838	-	-	-	1 k Ω	RB 3100
R 839	-	-	-	6.8 k Ω	RB 3680
R 840	-	-	-	47 k Ω	RB 4470
R 841	-	-	-	220 k Ω	RB 5220
R 842	-	-	-	47 k Ω	RB 4470
R 843	-	-	-	4.7 k Ω	RB 3470
R 844	-	-	-	2.7 k Ω	RB 3270
R 845	-	-	-	27 k Ω	RB 4270
R 846	-	-	-	4.7 k Ω	RB 3470
R 847	-	-	-	220 k Ω	RB 5220
R 901	-	1/3 W	10%	200 k Ω	

SEMICONDUCTORS:

Q 201-203	Si.	IN681	300V/200 mA	QV 0209
Q 204	Zener	ZF6.8	6.8V/ 40 mA	QV 1106
Q 205,206	Si.	IN681	300V/200 mA	QV 0209
Q 207,208	Zener	BZ488	4.3V/100 mA	QV 1110
Q 209-212	Si.	ER1	50V/600 mA	QV 0501
Q 213-216	-	B30k60	30V/ 60 mA	QV 0012
Q 301-303	-	IN681	300V/200 mA	QV 0209
Q 701,702	-	IN681	300V/200 mA	QV 0209
Q 801-804	Ge.	DA79	45V/100 mA	QV 0079

CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.	CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.
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SWITCHES:

N 901	Oscillator Stop
N 902	1000 Hz Ref.
N 903	Power Off/On
N 904	Frequency Beat
N 905	Automatic Scanning
O 1	Voltage Switch
O 2	Attenuator Switch
O 3	Matching Impedance Switch
O 4	Compressor Switch
O 5	Frequency Deviation Switch
O 6	Modulation Frequency Switch

NT 0023
NT 0014
NN 0014
NT 0023
NN 0017
OA 0017
OH 1000
OH 1001
OH 1002
OH 1003
OH 1004

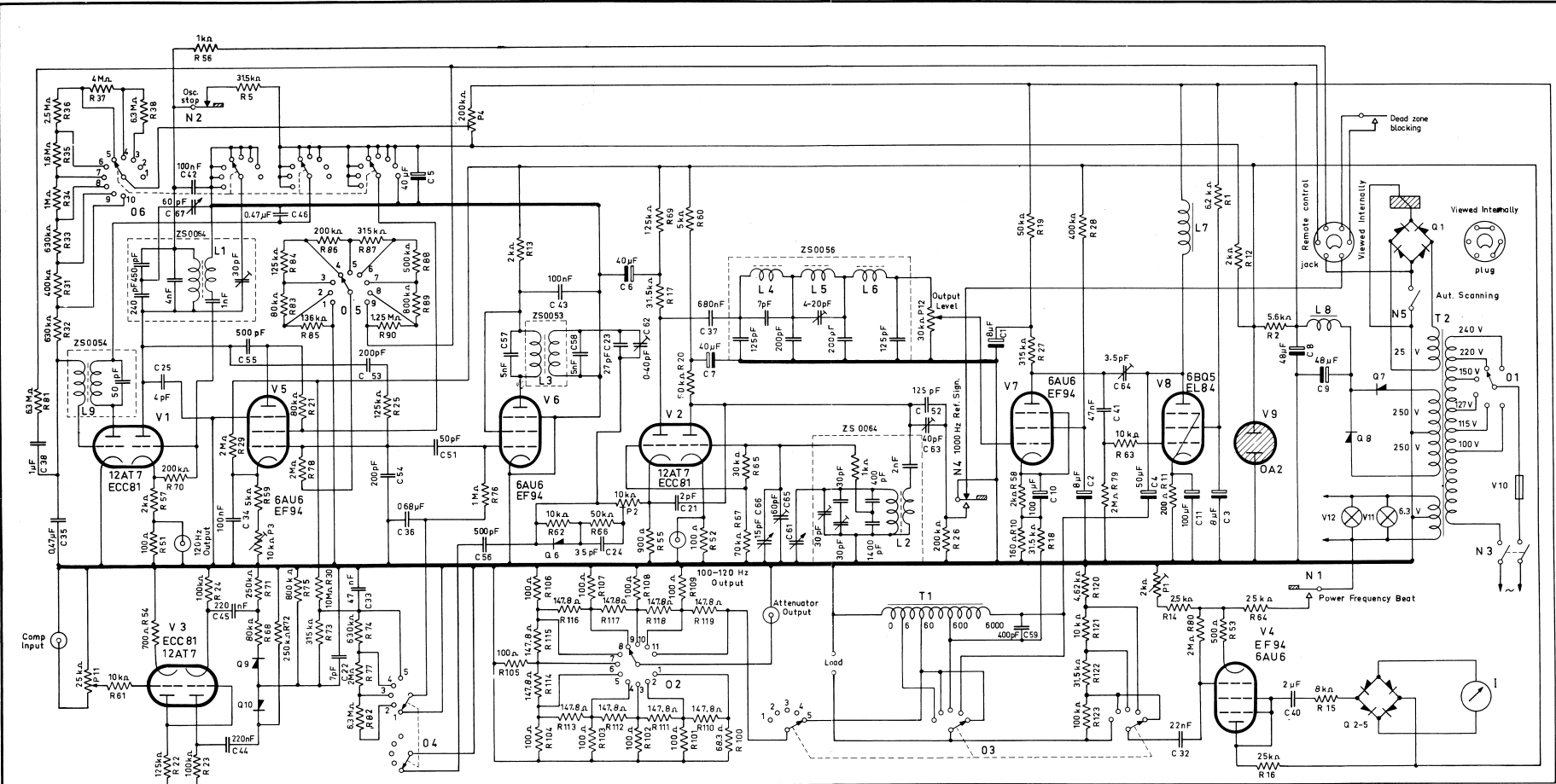
MISCELLANEOUS:

Power Cord Eur.			AN	0005
Power Cord USA			AN	0006
Moving Coil Instrument	0.5 mA		IM	0025
Screened Socket			JJ	0108
Load Socket			JK	6272
6 pin Plug			JP	4705
Bakelite Knob, 30 mm, flat,	SN 3202	DB 0850	YQ	2083
Bakelite Knob, 30 mm	SN 3222	DB 0674	YQ	2083
Bakelite Knob, 30 mm				
twin mark,	SN 3227	DB 0674	YQ	2083
Bakelite Knob, 40 mm	SN 4021	DB 0674	YQ	2083
Bakelite Knob, 60 mm	SN 6319	DB 0675	YQ	2087
Frequency Dial Housing			SO	0102
Frequency Dial Pointer			SV	0037
Flexible Shaft			UB	0041
Magnetic Clutch			UM	1011
Fuse 250V/0.35 A			VF	0009
Dial Lamp 6.8V/0.5 A			VS	1271
Dial Lamp 6.8V/0.25 A			VS	1273

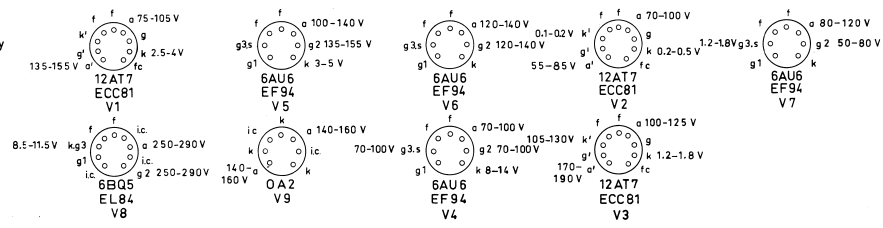
TRANSISTORS:

V 201	Si.	PNP	2N4919
V 202,203	-	-	2N3702
V 204,205	-	NPN	2N3704
V 206	-	-	2N4922
V 207	-	-	2N3704
V 208	-	PNP	2N3702
V 301-303	-	NPN	BC107
V 303	F.E.T.	-	2N3821
V 304	Si.	NPN	BF173
V 305-309	-	-	BC107
V 401	-	-	-
V 402	F.E.T.	-	E102
V 501	Si.	NPN	BC107
V 502,503	F.E.T.	-	E102
V 504	Si.	NPN	BC107
V 701	Unijunction	-	2N1671
V 702	MOS F.E.T.	-	M511
V 801,802	Si.	NPN	BC107
V 803	-	PNP	40406
V 804,805	-	NPN	BC107
V 806	-	PNP	40406
V 807	-	NPN	BC107
V 808	-	-	2N3704
V 809	-	PNP	2N3702
V 810	-	NPN	40407
V 811	-	PNP	40406
V 812	-	NPN	2N4922
V 813	-	PNP	2N4919
V 814	F.E.T.	-	E102
V 815	-	PNP	2N3702
V 616	-	NPN	2N3704

VB 0061
VB 0038
VB 0028
VB 0063
VB 0028
VB 0038
VB 0032
VB 1001
VB 0065
VB 0032
VB 0032
VB 0045
VB 0032
VB 0045
VB 0032
VB 0016
VB 4001
VB 0257
VB 0053
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VB 0054
VB 0053
VB 0063
VB 0061
VB 0045
VB 0038
VB 0028

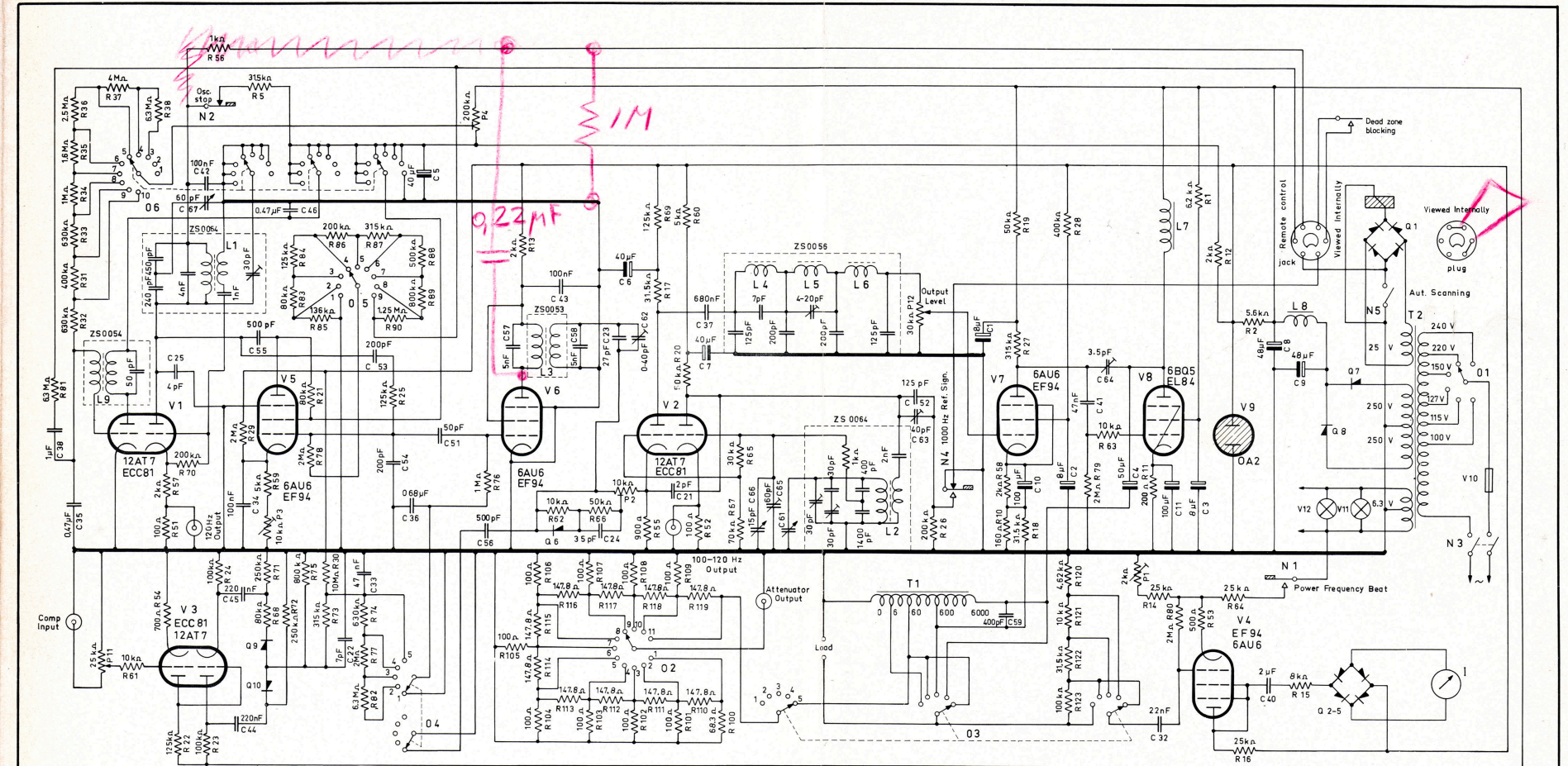


- 02: Attenuator 03: Matching impedance 04: Compressor speed 05: Freq. Deviation 06: Modulation frequency
- | Control | Setting | Value |
|---------|---------|-------|
| 1: | 0.12 | mV |
| 2: | 0.4 | " |
| 3: | 1.2 | " |
| 4: | 4 | " |
| 5: | 12 | " |
| 6: | 40 | " |
| 7: | 120 | " |
| 8: | 400 | " |
| 9: | 1200 | " |
| 10: | 4000 | " |
| 11: | 12000 | " |
- | Control | Setting | Value |
|---------|------------|-------|
| 1: | 6 A | 4 V |
| 2: | 60 A | 12 V |
| 3: | 600 A | 40 V |
| 4: | 6000 A | 120 V |
| 5: | Attenuator | 12 V |
- | Control | Setting | Value |
|---------|---------|-------|
| 1: | Off | |
| 2: | 30 dB/s | |
| 3: | 100 | " |
| 4: | 300 | " |
| 5: | 1000 | " |
- | Control | Setting | Value |
|---------|---------|-------|
| 1: | 0 Hz | |
| 2: | 10 | " |
| 3: | 16 | " |
| 4: | 25 | " |
| 5: | 40 | " |
| 6: | 63 | " |
| 7: | 100 | " |
| 8: | 160 | " |
| 9: | 250 | " |
| 10: | 25 | " |



Arrangement til fjernelse af subharm i forbindelse med Lodo.

Rør



02: Attenuator

1: 0.12	mV
2: 0.4	"
3: 1.2	"
4: 4	"
5: 12	"
6: 40	"
7: 120	"
8: 400	"
9: 1200	"
10: 4000	"
11: 12000	"

03: Matching impedance

1: 6 Ω	4V
2: 60 Ω	12V
3: 600 Ω	40V
4: 6000 Ω	120V
5: Attenuator	12V

04: Compressor speed

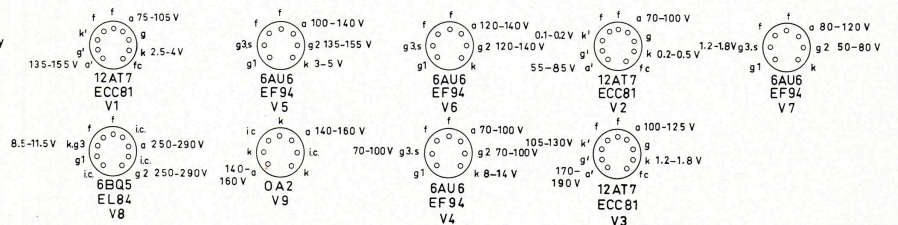
1: Off
2: 30 dB/s
3: 100 "
4: 300 "
5: 1000 "

05: Freq. Deviation

1: 0 Hz
2: 10 "
3: 16 "
4: 25 "
5: 40 "
6: 63 "
7: 100 "
8: 160 "
9: 250 "

06: Modulation frequency

1: Off
2: Ext. mod.
3: 1 Hz
4: 1.6 "
5: 2.5 "
6: 4 "
7: 6.3 "
8: 10 "
9: 16 "
10: 25 "



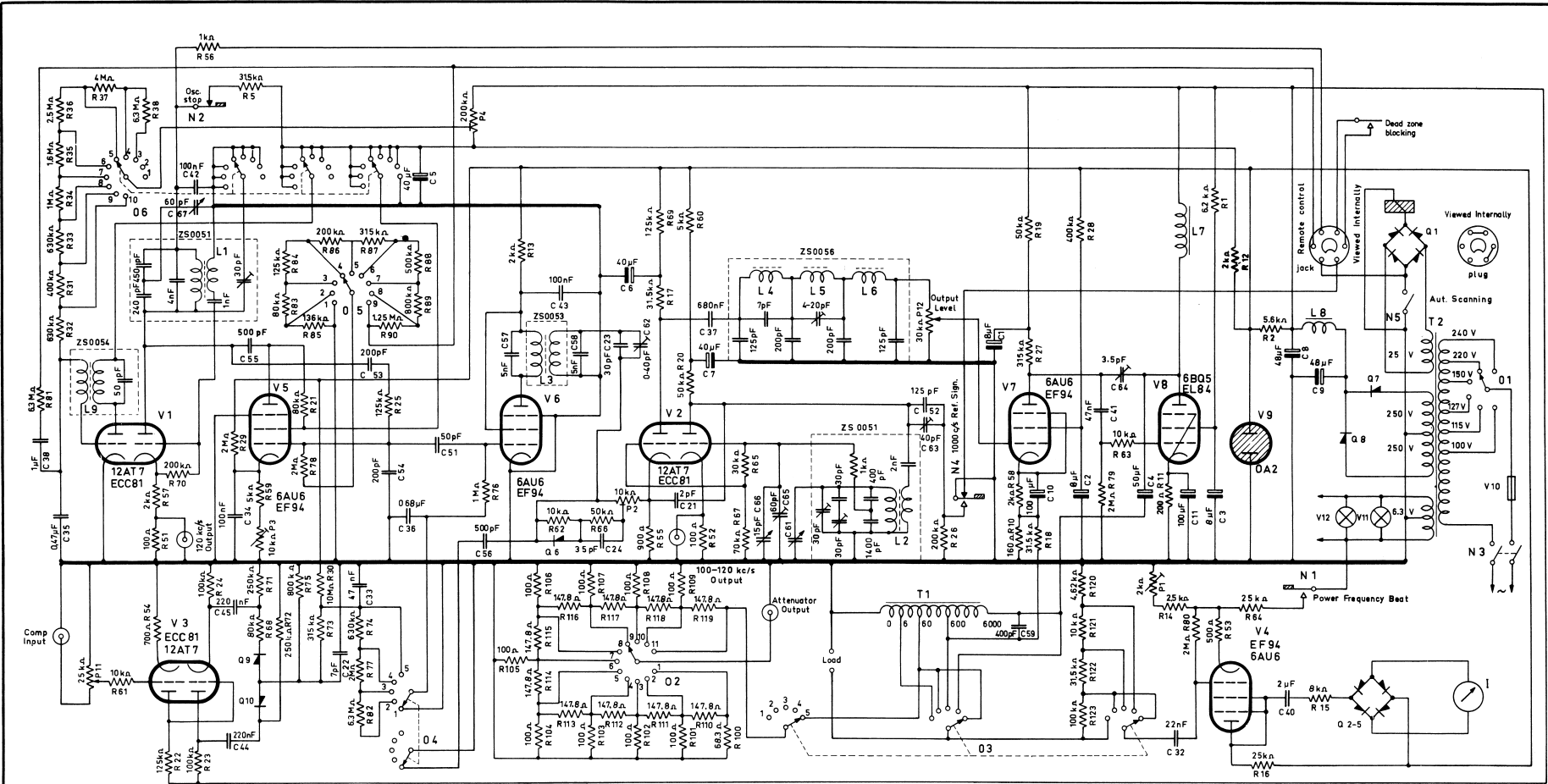
3-4-64	120039
25-8-64	125686
21-10-66	157707

Brüel & Kjær
Copenhagen



Beat Frequency Oscillator
Type 1022

6/2-69.
J.K.



02: Attenuator

- 1: 0.12 mV
- 2: 0.4 "
- 3: 1.2 "
- 4: 4 "
- 5: 12 "
- 6: 40 "
- 7: 120 "
- 8: 400 "
- 9: 1200 "
- 10: 4000 "
- 11: 12000 "

03: Matching impedance

- 1: 6 Ω 4 V
- 2: 60 Ω 12 V
- 3: 600 Ω 40 V
- 4: 6000 Ω 120 V
- 5: Attenuator 12 V

04: Compressor speed

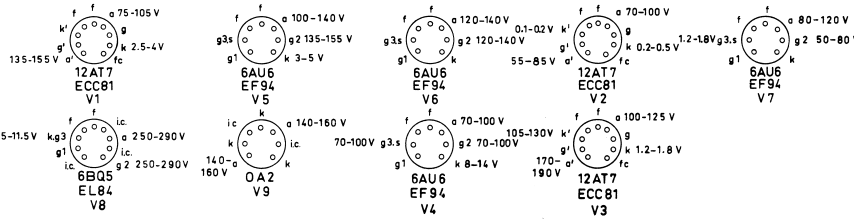
- 1: Off
- 2: 30 dB/s
- 3: 100 "
- 4: 300 "
- 5: 1000 "

05: Freq. Deviation

- 1: 0 c/s
- 2: 10 "
- 3: 16 "
- 4: 1.8 "
- 5: 40 "
- 6: 63 "
- 7: 100 "
- 8: 160 "
- 9: 250 "
- 10: 25 "

06: Modulation frequency

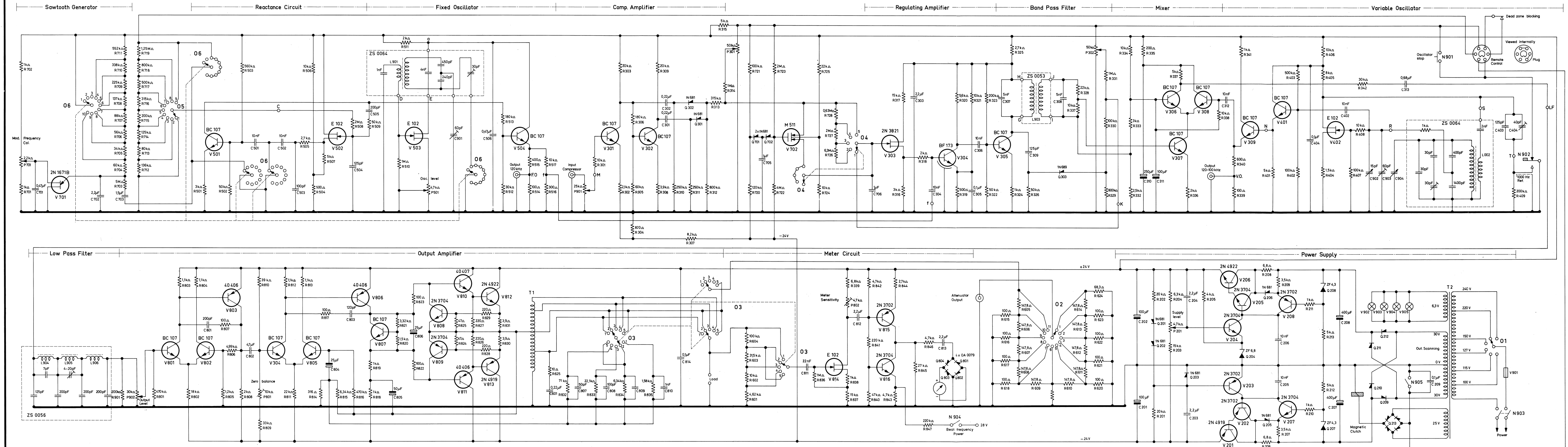
- 1: Off
- 2: Ext. mod.
- 3: 1 c/s
- 4: 1.8 "
- 5: 2.5 "
- 6: 4 "
- 7: 6.3 "
- 8: 10 "
- 9: 16 "
- 10: 25 "



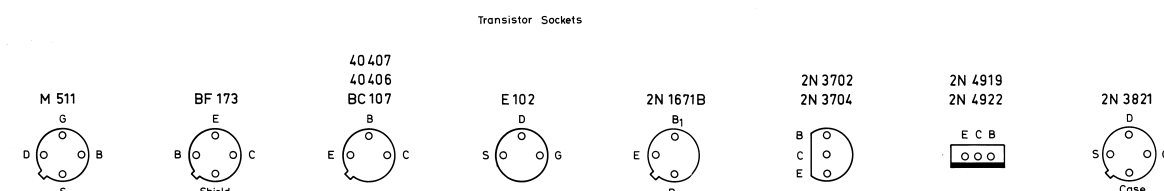
Circuit Diagram

valid from serial no. 268295

1022.7



02: Attenuator 03: Matching impedance 04: Compressor speed 05: Freq. Deviation 06: Modulation frequency



Transistor Socket

Bottom view

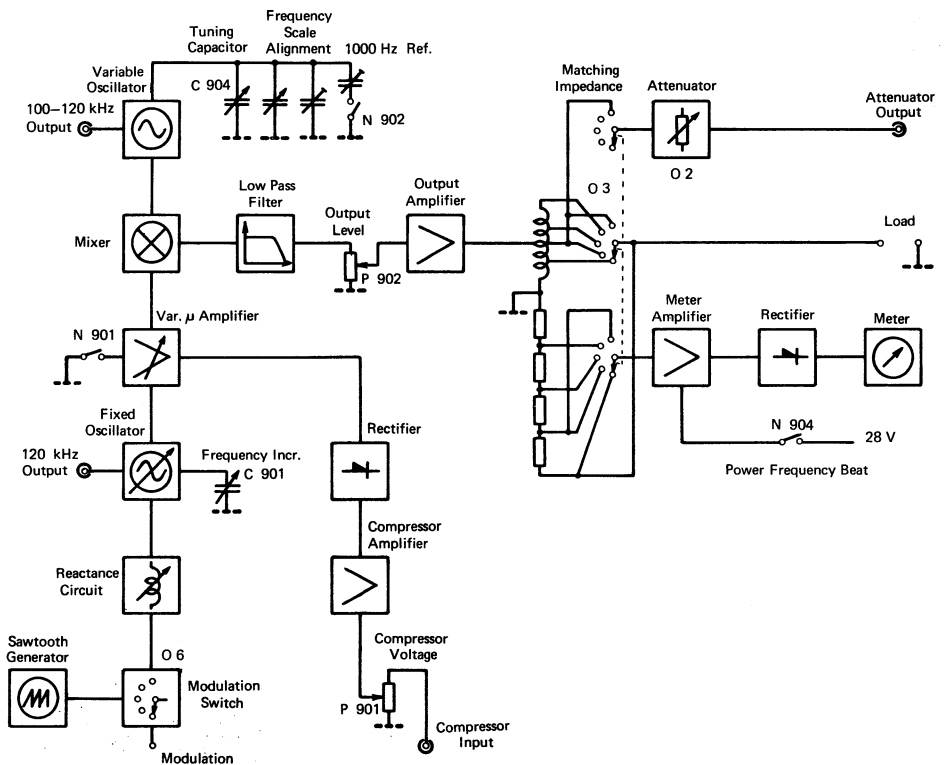
- | | | | | |
|--------------|------------------------|-------------|-----------|-------------|
| 1: 0.02 mV | 1: 6 Ω 4 V | 1: Off | 1: 0 Hz | 1: Off |
| 2: 0.4 mV | 2: 60 Ω 12 V | 2: 30 dBs | 2: 10 Hz | 2: Ext. mod |
| 3: 1.2 mV | 3: 600 Ω 40 V | 3: 100 dBs | 3: 16 Hz | 3: 1 Hz |
| 4: 4 mV | 4: 6000 Ω 120 V | 4: 300 dBs | 4: 25 Hz | 4: 16 Hz |
| 5: 12 mV | 5: Attenuator 12 V | 5: 1000 dBs | 5: 40 Hz | 5: 2.5 Hz |
| 6: 40 mV | | | 6: 63 Hz | 6: 4 Hz |
| 7: 120 mV | | | 7: 100 Hz | 7: 6.3 Hz |
| 8: 400 mV | | | 8: 160 Hz | 8: 10 Hz |
| 9: 1200 mV | | | 9: 250 Hz | 9: 16 Hz |
| 10: 4000 mV | | | | 10: 25 Hz |
| 11: 12000 mV | | | | |

01 10 69	268420			Brüel & Kjær		Beat Frequency Oscillator
				Copenhagen		Type 1022

Consisting of:

Meter Circuit	1022.1
Output Amplifier	1022.2
Oscillator	1022.3
Compressor	1022.4
Position of Components	1022.5
Parts List	1022.6
Circuit Diagram	1022.7

Block Diagram



Trouble Shooting:

If any problems should occur with this instrument. Then first check the DC working voltages from the Power Supply.

Then use the Block Diagram in order to localize the trouble to be located in one specific circuit.

When a fault has been found and corrected, the voltages and adjustments which are influenced by the correction must be rechecked, and the instrument controlled to see if all basic functions are fulfilled.

The tolerances stated in the instrument can only be used as a guide for adjustment and control.

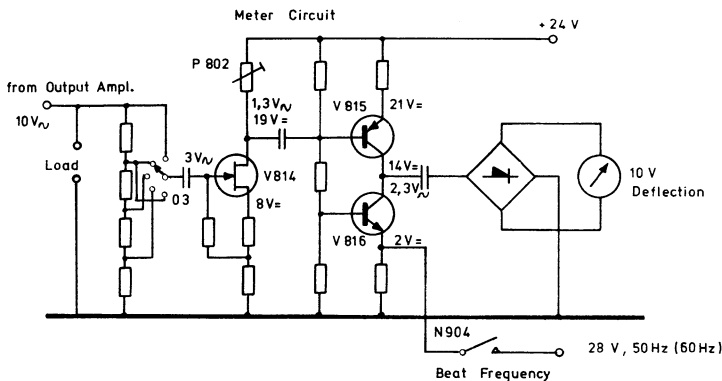
Any deviations must not be corrected without being sure, that the tolerances of the instrument used for making the adjustment are so small as to have influence on the measurement.

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

Voltages at various points throughout the apparatus are indicated on the circuit diagram and the simplified diagram in the service instructions. These voltages are typical nominals only and, with the exception of stabilized power supply voltages, may vary considerably from appatus to apparatus.

Instruments necessary for Service and Repair:

Multimeter (50 μ A)
Frequency Analyzer (Type 2107)
Vacuum Tube Voltmeter (Type 2409)
Frequency Counter
Oscilloscope



1.1 Mechanical Zero Point

Adjust for 0 with no power on.

1.2 Sensitivity

MATCHING IMP.: "60 Ω "
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQUENCY SCALE: "1000 Hz"

Adjust the OUTPUT LEVEL for 10 V on LOAD.

Deflection on the meter: 10 V
If necessary adjust P 802.

1.3 Voltage Divider

MATCHING IMP.: "60 Ω "
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQUENCY SCALE: "1000 Hz"

Adjust the OUTPUT LEVEL for 10 V deflection on the meter.

Check the meter deflection for all positions of MATCHING IMPEDANCE.

Max. deviation from 10 V: 2%

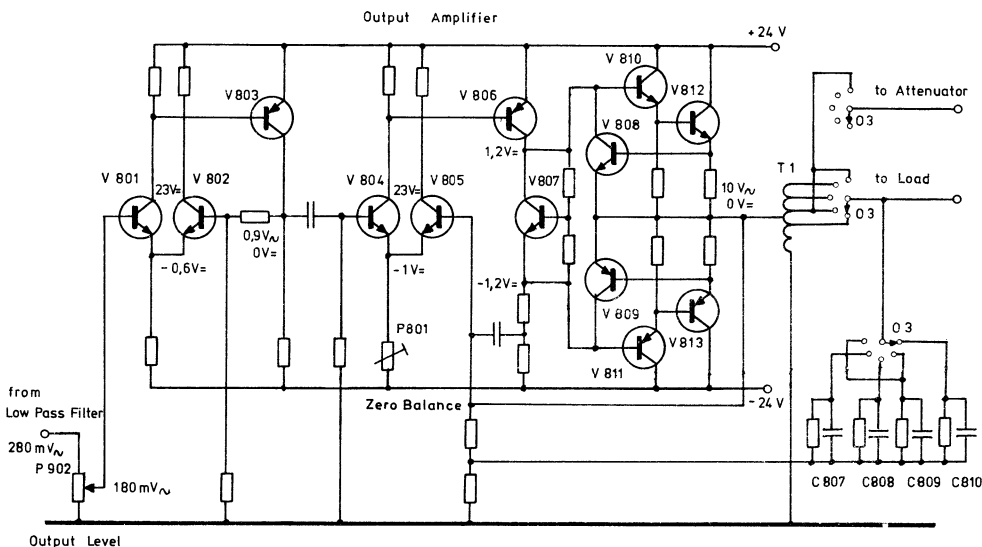
1.4 Frequency Response

MATCHING IMP.: "60 Ω "
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQUENCY SCALE: "1000 Hz"

Adjust the OUTPUT LEVEL for a 20 dB deflection on the meter.

Vary the frequency from 20 Hz to 20 kHz and check the meter deflection by comparison to the output voltage on LOAD.

Tolerance: ± 0.1 dB.



2.1 DC Balance of Amplifier

MATCHING IMP.: "60Ω"
OUTPUT LEVEL: "0"

Measure the DC voltage across LOAD and adjust P 801 for 0V ±10 mV.

2.2 Frequency Response

MATCHING IMP.: "Attenuator"
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQUENCY SCALE: "1000 Hz"

a. Adjust OUTPUT LEVEL for a 20 dB deflection on the meter.

Vary the frequency from 20 Hz to 20 kHz.
Deflection on the meter: 19.75 – 20.25 dB.

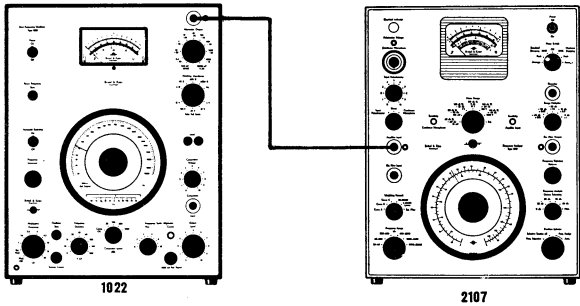
b. Check frequency response for all positions of MATCHING IMP. except "Attenuator".
Deflection on the meter: 19.5 – 26.5 dB.

If necessary change the value of C 807 – 810

2.3 Power Output

MATCHING IMP.: "60 Ω"
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQUENCY SCALE: "1000 Hz"
OUTPUT LEVEL: "10"

- a. Connect a 60 Ω resistor across LOAD and check that a deflection approx. 22 dB can be obtained in the entire frequency range from 20 Hz to 20 kHz.
- b. Check all positions of MATCHING IMP. with a resistor of respectively 6–600–6000 Ω connected to LOAD.



2.4 Distortion

MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"

Distortion down to around 0.25% can be measured by Frequency Analyser type 2107 in Rejection Mode.

However, to check that the distortion is within the limit a more complex measuring set-up is required.

FREQUENCY SCALE (Hz)	20	200	2 K	20 k
MATCHING IMP.: "Att" 10 V output voltage unloaded	0.2 %	0.1 %	0.1 %	0.2 %
— 6 Ω 2.45 V output voltage (1W)	0.3 %	0.15 %	0.15 %	0.4 %
— 6000 Ω 77.5 V output voltage (1W)	0.3 %	0.15 %	0.15 %	0.4 %

2.5 Attenuator

MATCHING IMP.: "Attenuator"
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQUENCY SCALE: "1000 Hz"
ATTENUATOR: "12 000 mV"

- a. Adjust OUTPUT LEVEL for a 10 V deflection on the meter.

Check all positions of ATTENUATOR by comparison to type 2107.

Tolerance: ± 2% (+ tolerance of 2107: 2%).
- b. Check also the attenuator steps at 20 and 20 kHz.

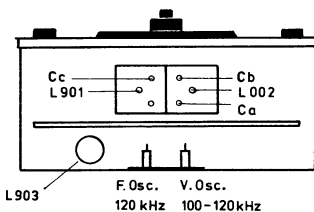
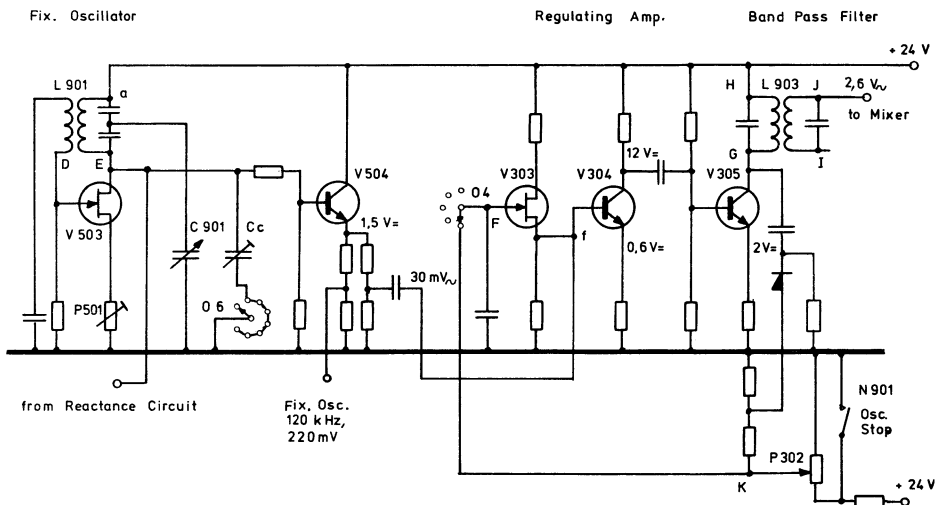
Removal of Tuning Capacitor CV 0010

Remove the right hand side cover (when seen from the instrument front plate) of the capacitor unit CV 0010.

Unscrew the two knobs on the tuning spindle and remove the scale run. 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.

Before the pointer is removed mark the position on the scale and front plate, then draw a circle on the front plate closely following the frequency scale for centering purpose of the scale.

After replacing the tuning capacitor, fasten the frequency scale with reference to the drawn circle on the front plate. Check the position of the condenser with a plate of insulating material for fully interleaved capacitor and fix the frequency pointer at the position marked above.

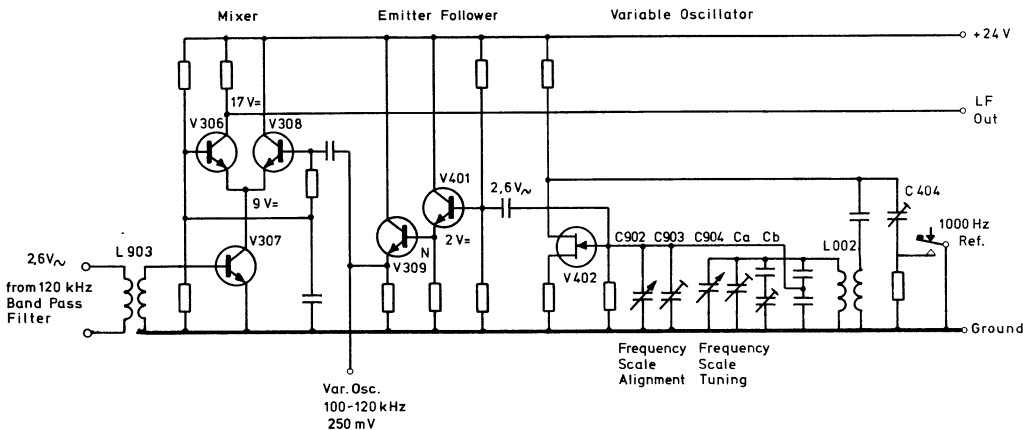


3.1 Fixed Oscillator

MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQ. INCREMENT: "0"

Adjust the iron core of L901 for 120 kHz \pm 20 Hz on "120 kHz Output" socket.

The voltage should be 220 mV \pm 30 %
If necessary adjust P501.



3.2 Variable Oscillator

MOD. FREQUENCY: "Off"
 COMPR. SPEED: "Off"
 FREQ. INCREMENT: "0"
 FREQUENCY SCALE: "20 Hz"

- Check that the frequency across LOAD is 20 Hz $\pm 1\%$.

If necessary adjust the FREQ. SCALE ALIGNMENT..

Fine adjustment by means of a knob and coarse adjustment by a screwdriver operated capacitor.

In case that the regulation range is too narrow set both trimmers in mid position and adjust the air trimmer "C_a" for 20 Hz.

- Set the FREQUENCY SCALE to 20 kHz.

Check that the frequency is 20 kHz $\pm 1\%$.

If necessary adjust the iron core of L 0002 and check item a again.

3.3 1000 Hz Reference

MOD. FREQUENCY: "Off"
 COMPR. SPEED: "Off"
 FREQ. INCREMENT: "0"
 MATCHING IMP.: "60 Ω "

Adjust the oscillator at line frequency and set the FREQUENCY SCALE to "1000 Hz ref. signal".

Depress "1000 Hz ref." and check the frequency on LOAD.

If necessary adjust C404.

3.4 Frequency Drift

MOD. FREQUENCY: "Off"
 COMPR. SPEED: "Off"
 FREQ. INCREMENT: "0"
 MATCHING IMP.: "60 Ω "
 FREQUENCY SCALE: "50 Hz"
 ("60 Hz")

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

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

Frequency drift: max. ± 7 Hz after 20 min.
 max. ± 14 Hz after 15 hours

If necessary adjust trimmer "C_b" and check item 3.2 again.

3.5 LF signal

MATCHING IMP.: "60 Ω "
 MOD. FREQUENCY: "Off"
 COMPR. SPEED: "Off"
 FREQUENCY SCALE: "1000 Hz::"

Connect an electronic voltmeter across OUTPUT LEVEL potentiometer P902.

Adjust band-pass filter L903 for max. voltage across P902.

Adjust P302 for 280 mV.

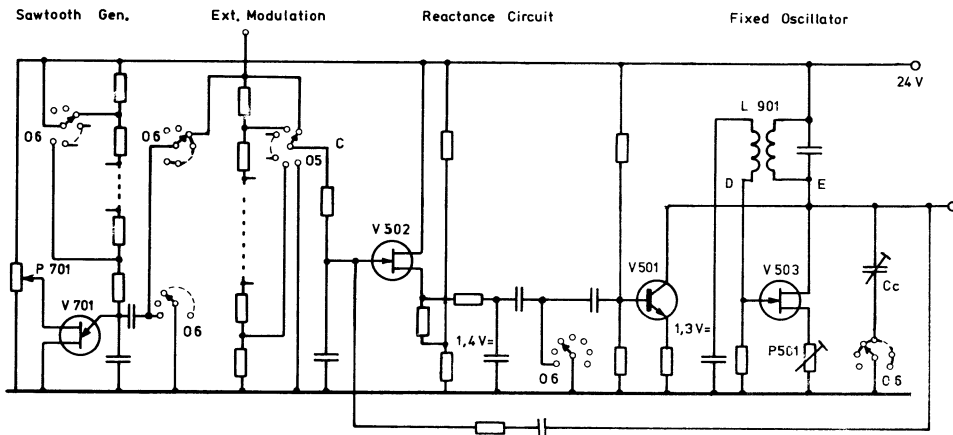
3.6 Noise

MATCHING IMP.: "60 Ω "
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
FREQUENCY SCALE: "400 Hz"

Adjust OUTPUT LEVEL for 10 V on LOAD.

Connect an electronic voltmeter across LOAD and check the noise voltage when OSCILLATOR STOP is depressed.

Tolerance: min. 70 dB below 10 V.



3.7 Frequency Modulation

MATCHING IMP.: "60 Ω "
MOD. FREQUENCY: "Off"
FREQ. DEVIATION: "250 Hz"
COMPR. SPEED: "Off"
FREQUENCY SCALE : "400 Hz"
FREQ. INCREMENT: "0"

- Adjust OUTPUT LEVEL for a 10 V deflection on the meter.

Switch MOD. FREQUENCY to "1 Hz" and check the modulation frequency with a stop watch.

Tolerance: $\pm 20\%$.
If necessary adjust P701.

- Check the frequency deviation by listen to a loudspeaker.

Switch FREQ. DEVIATION to "160 Hz" and notice the highest frequency to be heard (400 Hz + 160 Hz).

- Switch FREQ. DEVIATION to "0 Hz" and adjust FREQUENCY SCALE until this frequency is heard again.

Read the frequency deviation as the difference between this frequency and 400 Hz.

Tolerance: $\pm 20\%$.

Switch MOD. FREQUENCY to "Off" and adjust the oscillator at line frequency by means of FREQ. SCALE ALIGN.

Then switch MOD. FREQUENCY to "Ext. Mod." and adjust the oscillator at line frequency by means of FREQ. INCREMENT.

Adjust the trimmer "Cc" if the frequency changes more than ± 15 Hz.

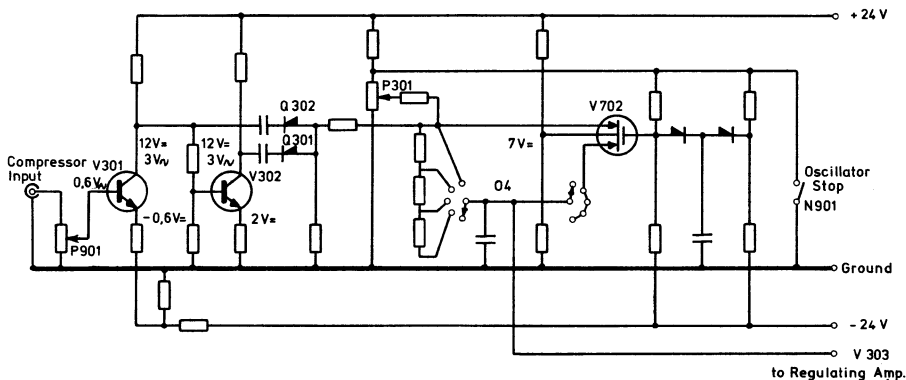
3.8 Magnetic clutch

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 clutch slip-ring and capacitor slipper (located under the right hand side cover) is necessary. Petroleum jelly should be used to lubricate these parts.

DO NOT lubricate the ball bearing of the tuning capacitor and the magnet clutch.

Check the pressure between the magnetic clutch and the contact spring: 50–75 gr.

Compressor Amplifier



4.1 Compressor Balance

MATCHING IMP.: "6Ω"
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
COMPR. VOLTAGE: "10"
FREQUENCY SCALE: "1000 Hz"

Connect COMPR. INPUT to LOAD and adjust OUTPUT LEVEL for a 0.6 V deflection on the meter.

Connect an oscilloscope to the cathodes of Q301 and Q302 and check that the signals are equal within 5 %.

4.2 Gain

MATCHING IMP.: "6Ω"
MOD. FREQUENCY: "Off"
COMPR. SPEED: "Off"
COMPR. VOLTAGE: "10"
FREQUENCY SCALE: "1000 Hz"

a. Connect COMPR. INPUT to LOAD and adjust OUTPUT LEVEL for a 0.6 V deflection on the meter.

b. Switch COMPR. SPEED to "1000"
Deflection on the meter: 0.6 V.
If necessary adjust P301.

c. Disconnect COMPR. INPUT signal.

Deflection on the meter should increase approx. 6 dB.

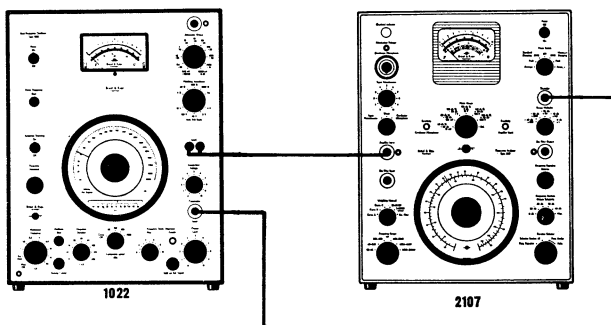
4.3 Frequency Response

MATCHING IMP.: "60Ω"
MOD. FREQUENCY: "Off"
COMPR. SPEED: "100"
OUTPUT LEVEL: "10"
FREQUENCY SCALE: "1000 Hz"

Connect COMPR. INPUT to LOAD and adjust COMPR. VOLTAGE for a 20 dB deflection on the meter.

Vary the frequency from 20–20 000 Hz

Deflection on the meter: 20 dB
Tolerance: ± 0.3 dB.



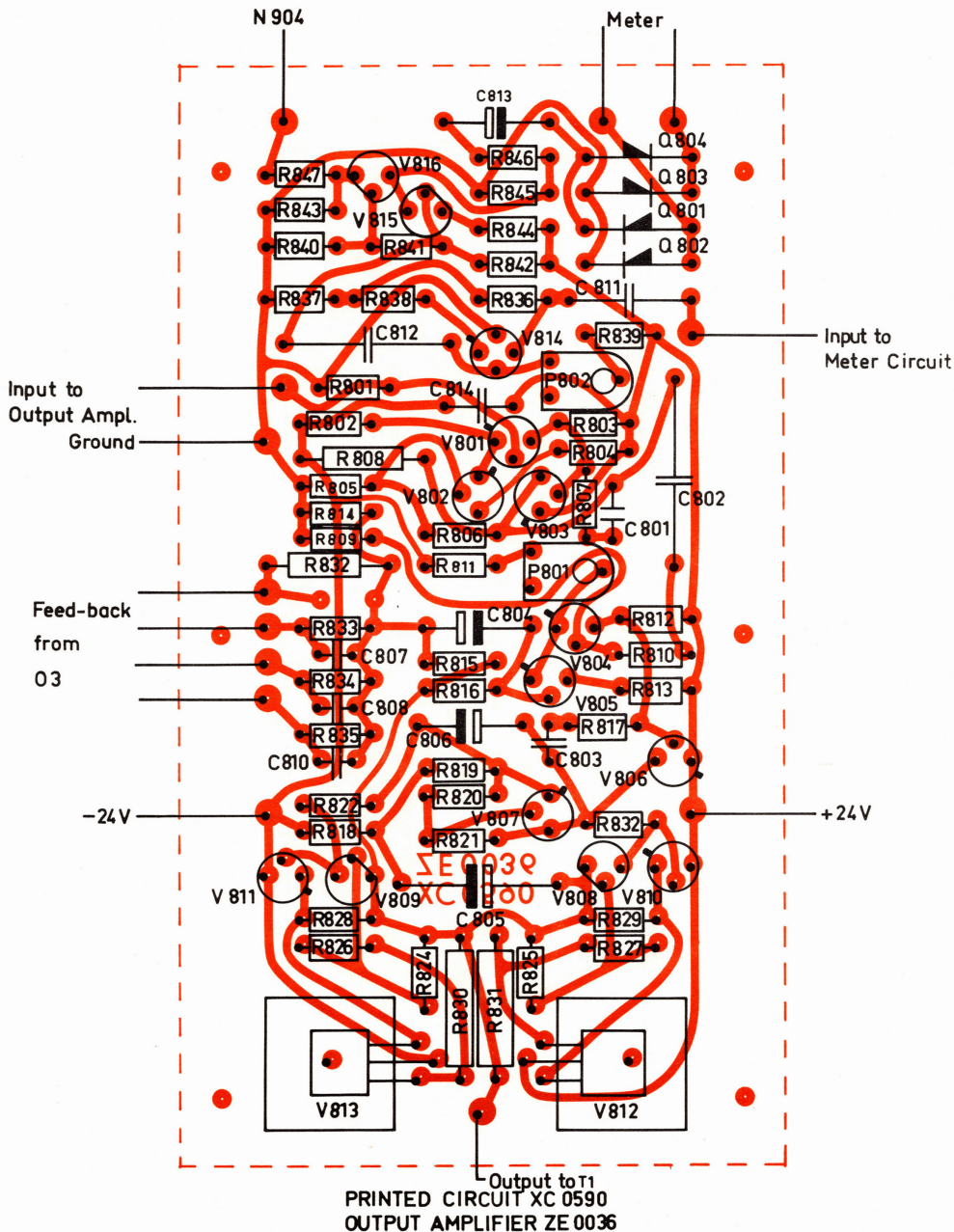
4.4 Compression

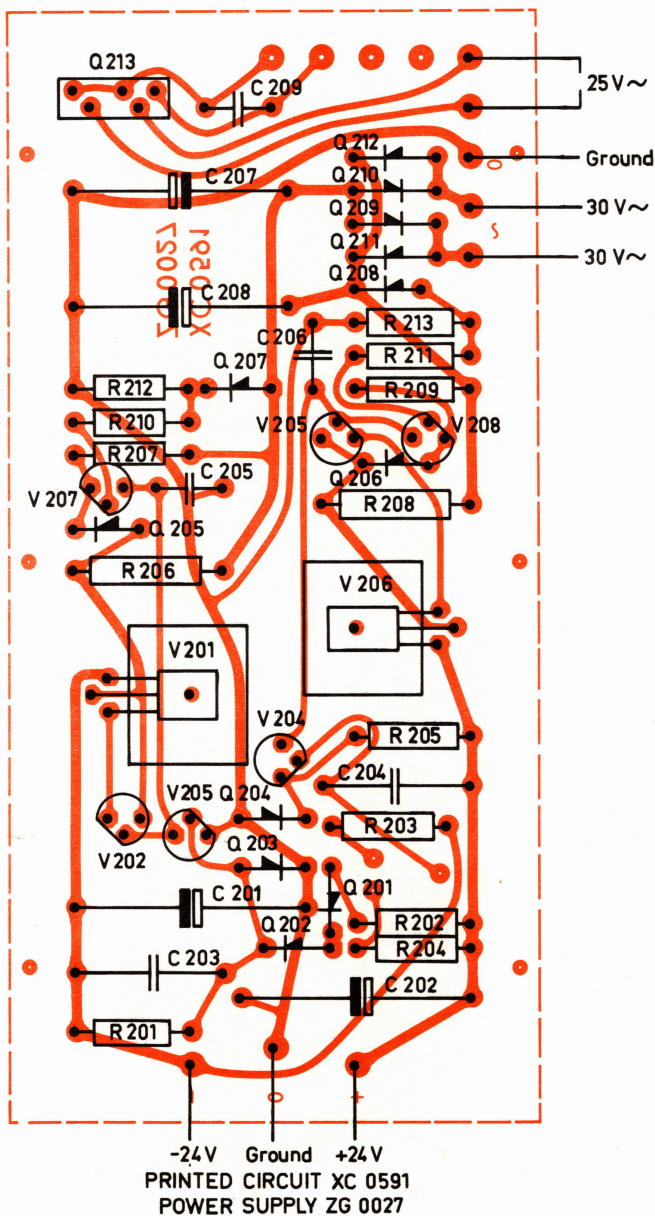
MATCHING IMP.: "6000 Ω "
 MOD. FREQUENCY: "Off"
 COMPR. SPEED: "100"
 OUTPUT LEVEL: "10"
 FREQUENCY SCALE: "1000 Hz"

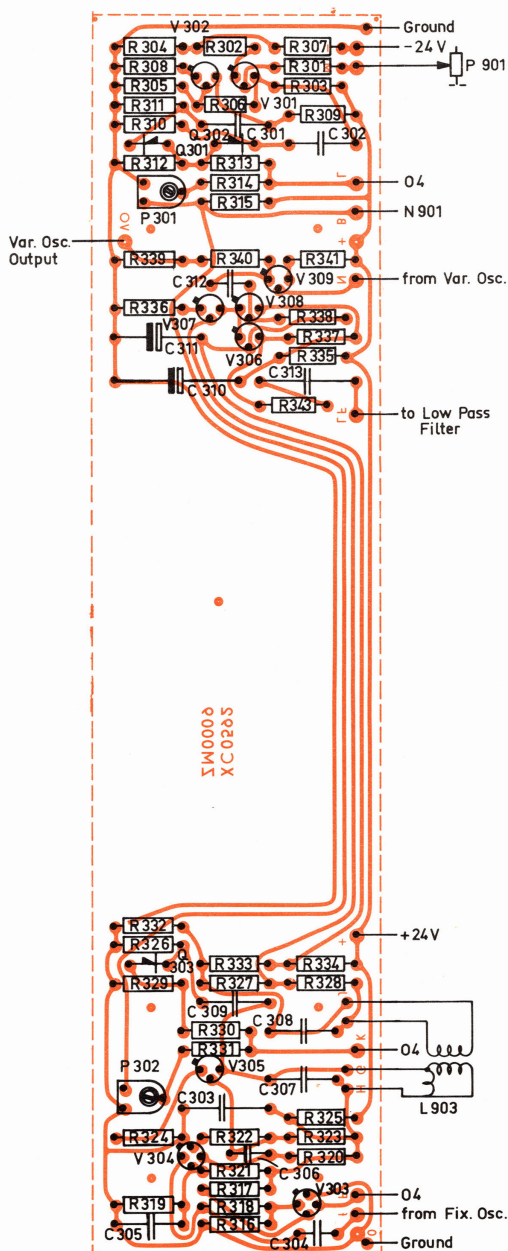
Adjust COMPR. VOLTAGE for an 18 dB deflection on type 2107 (100 V Range)

Increase the gain of type 2107 by 50 dB (0.3 V Range)

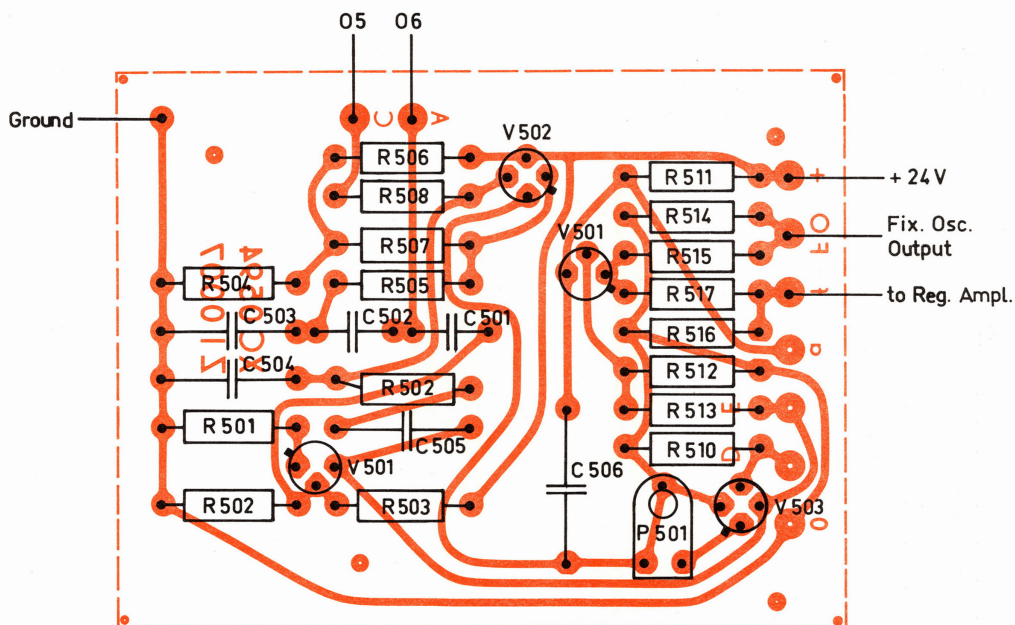
Deflection on type 2107: 18 dB.
 Tolerance: 1.5 dB.



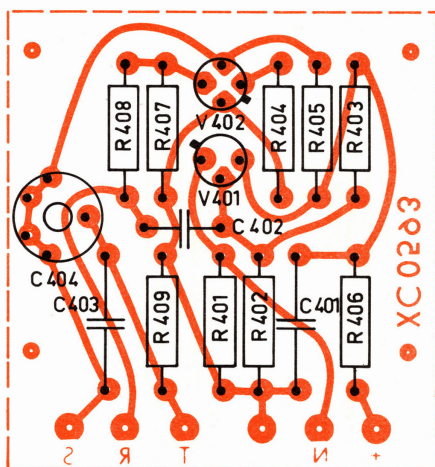




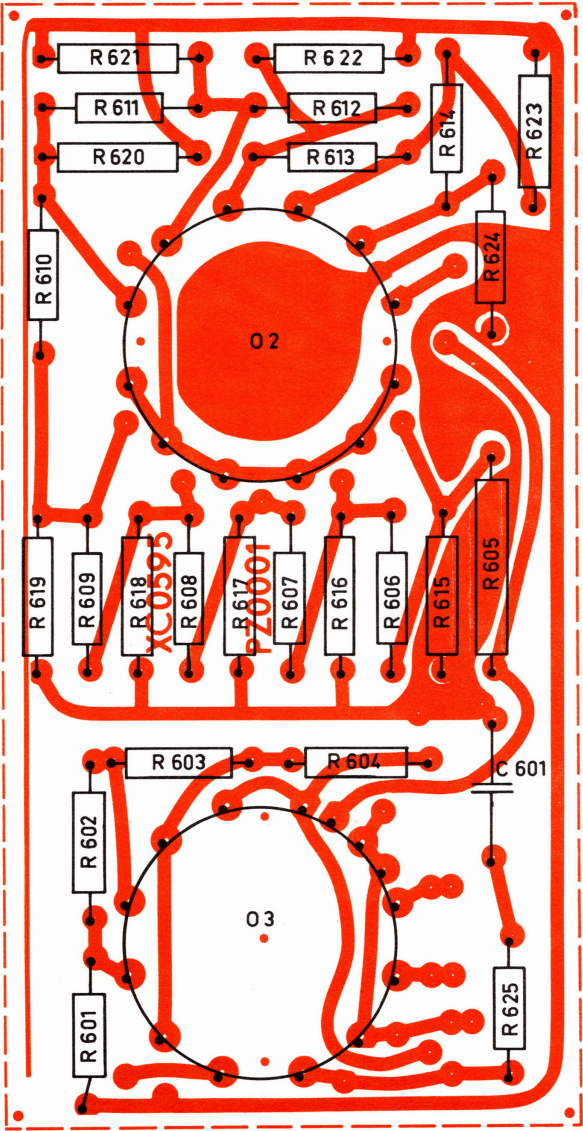
PRINTED CIRCUIT XC 0592
MIXER and COMPRESSOR ZM 0009



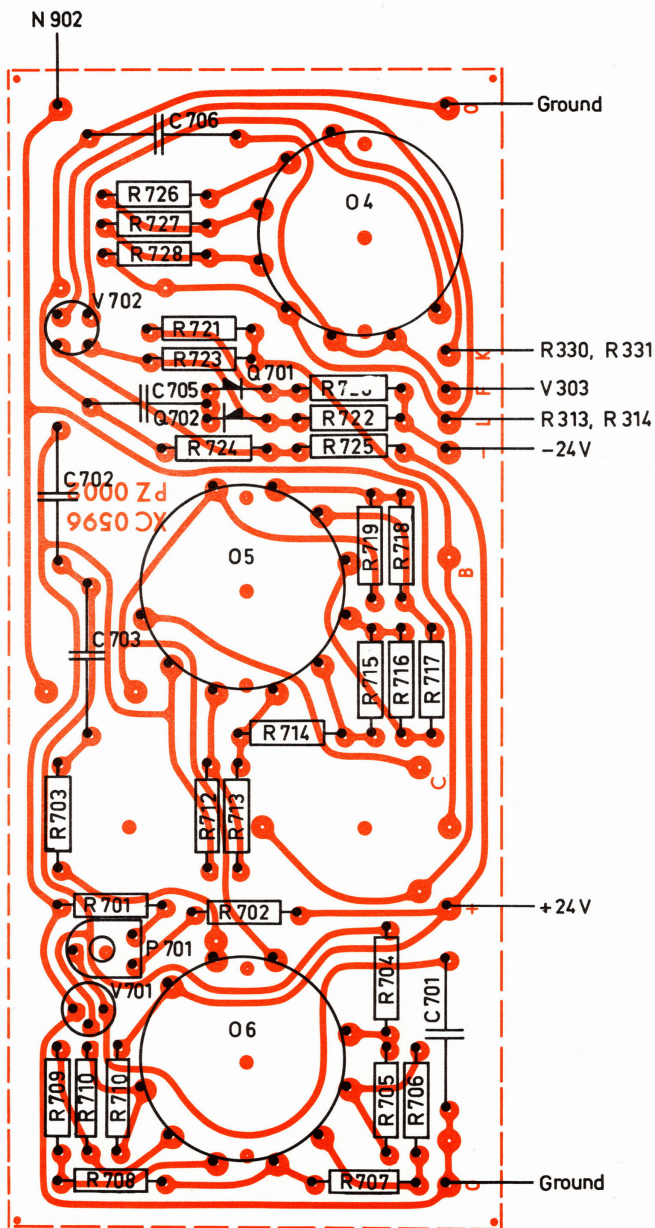
PRINTED CIRCUIT XC 0594
FIXED OSCILLATOR ZI 0007



PRINTED CIRCUIT XC 0593
VARIABLE OSCILLATOR ZI 0006



PRINTED CIRCUIT XC 0595
ATTENUATOR OUTPUT PZ 0001



PRINTED CIRCUIT XC 0596
REGULATING AMPLIFIER PZ 0002

CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.	CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.
CAPACITORS:			POTENTIOMETERS:		
C 201,202	Electrolytic	100µF/ 35 V CE 0443	P 201	Trimmer Carbon	4.7 k Ω PG 2470
C 203,204	Polyester	2,2µF/100 V CS 0380	P 301,302	-	47 k Ω PG 3471
C 205,206	-	10 nF/250 V CS 0403	P 501	-	4.7 k Ω PG 2470
C 207,208	Electrolytic	400µF/ 40 V CE 0417	P 701	-	2.2 k Ω PG 2207
C 209	Polyester	0.1µF/250 V CS 0402	P 801	-	22 k Ω PG 3221
C 301,302	-	0.22µF/100 V CS 0339	P 802	-	4.7 k Ω PG 2470
C 303	-	2.2µF/100 V CS 0380	P 901	Compressor Voltage	25 k Ω PP 3253
C 304	-	10nF/250 V CS 0403	P 902	Output Level	30 k Ω PR 3301
C 305	-	0.1µF/100 V CS 0013			
C 306	-	10nF/250 V CS 0403			
C 307,308	Polystyrene	5nF/250 V CT 1202			
C 309	-	125pF/500 V CT 0104			
C 310	Electrolytic	220 µF/ 63 V CE 0617			
C 311	-	100µF/ 15 V CE 0310		Output Amplifier	XC 0590 ZE 0036
C 312	Polyester	10nF/250 V CS 0403		Power Supply	XC 0591 ZG 0027
C 313	-	1.5µF/100 V CS 0343		Mixer and Compressor	XC 0592 ZM 0009
C 401	-	0.1µF/100 V CS 0013		Variable Oscillator	XC 0593 ZI 0006
C 402	-	10µF/250 V CS 0403		Fixed Oscillator	XC 0594 ZI 0007
C 403	Polystyrene	125pF/500 V CT 0104		Attenuator Output	XC 0595 PZ 0001
C 404	Trimmer	40pF CV 0019		Regulating Amplifier	XC 0596 PZ 0002
C 501,502	Polystyrene	10nF/250 V CS 0403			
C 503	Polystyrene	100pF/500 V CT 0103			
C 504	-	125pF/500 V CT 0104			
C 505	-	200pF/500 V CT 0107			
C 506	Polyester	0.47µF/100 V CS 0335			
C 601	-	0.22µF/100 V CS 0339			
C 701	-	0.47µF/100 V CS 0335			
C 702	-	2.2µF/100 V CS 0380			
C 703	-	1.5µF/100 V CS 0343			
C 705	Polycarbonate	1µF/ 63 V CS 0804			
C 706	Polyester	1µF/100 V CS 0336			
C 801	Ceramic	200pF/400 V CK 0078			
C 802	Polyester	4.7µF/100 V CS 0387			
C 803	Ceramic	120 pF/400 V CK 2121			
C 804	Electrolytic	25µF/ 6 V CE 0203			
C 805	-	50µF/ 25 V CE 8965			
C 806	-	25µF/ 6 V CE 0203			
C 807	Ceramic	68pF/400 V CK 1680			
C 808	-	100pF/400 V CK 0077			
C 810	-	1nF/500 V CK 3100			
C 811	Polycarbonate	47 nF/250 V CS 0401			
C 812	Polyester	2.2µF/100 V CS 0380			
C 813	Electrolytic	5µF/ 70 V CE 0200			
C 814	Polyester	0.1µF/250 V CS 0402			
C 901	Trimmer	60pF CV 3018			
C 902	- (fine)	15pF CV 3020			
C 903	- (coarse)	60pF CV 3019			
C 904	Variable Condenser Unit	(20—20000 Hz) CV 0010			
COILS AND TRANSFORMERS:			RESTISTORS:		
L 901,902	Oscillator Coil Assembly	ZS 0064	R 201,202	Carbon 1/3 W 10%	20 k Ω
L 903	Compressor Coil Assembly	ZS 0053	R 203	-	16 k Ω
L 904-906	H.F. Filter	ZS 0056	R 204	-	6.3 k Ω
T 2	Power Transformer	TN 0040	R 205	-	4 k Ω
T 1	Output Transformer	TU 0007	R 206	Wire 5 W	6.8 Ω RX 0305
			R 207	Carbon 1/3 W 5%	3.5 k Ω
			R 208	Wire 5 W 10%	6.8 Ω RX 0305
			R 209	Carbon 1/3 W 5%	3.5 k Ω
			R 210,211	-	1 k Ω
			R 212,213	-	5 k Ω
			R 301	-	10 k Ω
			R 302	-	2 k Ω
			R 303	-	20 k Ω
			R 304	-	820 Ω
			R 305	-	60 k Ω
			R 306	-	180 k Ω
			R 307	-	8.2 k Ω
			R 308	-	4 k Ω
			R 309	-	20 k Ω
			R 310,311	-	250 k Ω
			R 312	-	800 k Ω
			R 313	-	316 k Ω
			R 314	-	1M Ω
			R 315	-	5 k Ω
			R 316	-	3 k Ω
			R 317	-	15 k Ω
			R 318	-	2 k Ω
			R 319	-	500 Ω
			R 320	-	5.6 k Ω
			R 321	-	10 k Ω
			R 322	-	50 k Ω
			R 323	-	200 k Ω
			R 324	-	1 k Ω
			R 325	-	2.7 k Ω
			R 326	-	50 k Ω
			R 327	-	13 k Ω

CIRCUIT COMPONENT
DIAGRAM TYPE
REF.

STOCK
REF.

CIRCUIT COMPONENT
DIAGRAM TYPE
REF.

STOCK
REF.

RESISTORS:

R 328	Carbon	1/3 W	10%	19 k Ω
R 329	-	-	-	800 k Ω
R 330	-	-	-	100 k Ω
R 331	-	-	-	1 M Ω
R 332	-	-	-	2.5 k Ω
R 333	-	-	-	3 k Ω
R 334	-	-	-	10 k Ω
R 335	-	-	-	2 k Ω
R 336	-	-	-	2 k Ω
R 337	-	-	-	5 k Ω
R 338	-	-	-	10 k Ω
R 339	-	-	-	100 Ω
R 340	-	-	-	600 Ω
R 341	-	-	-	1 k Ω
R 342	-	-	-	30 k Ω
R 401	-	-	-	5 k Ω
R 402	-	-	-	100 k Ω
R 403	-	-	-	500 k Ω
R 404	-	-	-	1.5 k Ω
R 405	-	-	-	8 k Ω
R 406	-	-	-	10 k Ω
R 407	-	-	-	100 k Ω
R 408	-	-	-	10 k Ω
R 409	-	-	-	200 k Ω
R 501	-	-	-	3.15 k Ω
R 502	-	-	-	56 k Ω
R 503	-	-	-	560 k Ω
R 504	-	-	-	500 Ω
R 505	-	-	-	2.7 k Ω
R 506	-	-	-	10 k Ω
R 507	-	-	-	5 k Ω
R 508	-	-	-	2 M Ω
R 509	-	-	-	56 k Ω
R 510	-	-	-	1 M Ω
R 511	-	-	-	2 k Ω
R 512	-	-	-	36 k Ω
R 513	-	-	-	180 k Ω
R 514	-	-	-	100 Ω
R 515	-	-	-	400 Ω
R 516	-	-	-	315 Ω
R 517	-	-	-	10 k Ω
R 601	-	-	1/2%	4.6 k Ω
R 602	-	-	-	10 k Ω
R 603	-	-	-	31 k Ω
R 604	-	-	-	100 k Ω

R 605-624 Metal

RO 1003

One set of high stability resistors for output attenuator

R 625	Carbon	-	10%	10 Ω
R 701,702	-	-	5%	1 k Ω
R 703	-	-	10%	4 M Ω
R 704	-	-	-	60 k Ω
R 705	-	-	-	34 k Ω
R 706	-	-	-	56 k Ω
R 707	-	-	-	88 k Ω
R 708	-	-	-	137 k Ω
R 709	-	-	-	225 k Ω
R 710	-	-	-	338 k Ω
R 711	-	-	-	552 k Ω
R 712	-	-	-	136 k Ω
R 713	-	-	-	80 k Ω
R 714	-	-	-	125 k Ω
R 715	-	-	-	200 k Ω
R 716	-	-	-	315 k Ω
R 717	-	-	-	500 k Ω

RESISTORS:

R 718	Carbon	1/3 W	10%	800 k Ω	
R 719	-	-	-	1.25 M Ω	
R 720	-	-	-	220 k Ω	
R 721	-	-	5%	100 k Ω	
R 722	-	-	10%	4 M Ω	
R 723	-	-	-	2 M Ω	
R 724	-	-	5%	10 k Ω	
R 725	-	-	-	22 k Ω	
R 726	-	-	10%	6.3 M Ω	
R 727	-	-	-	2 M Ω	
R 728	-	-	-	630 k Ω	
R 801	-	1/4 W	5%	470 k Ω	RB 5470
R 802	-	-	-	18 k Ω	RB 4180
R 803,804	Metal	-	1%	1.1 k Ω	RF 3110
R 805	-	-	-	1.21 k Ω	RF 3121
R 806	-	-	-	4.99 k Ω	RF 3499
R 807	Carbon	-	5%	100 Ω	RB 2100
R 808	-	1/3 W	-	2 k Ω	
R 809	Metal	1/4 W	1%	100 k Ω	RF 5100
R 810	-	-	-	316 Ω	RF 2316
R 811	Carbon	-	5%	6.8 k Ω	RB 3680
R 812,813	Metal	-	1%	1.1 k Ω	RF 3110
R 814	-	-	-	316 Ω	RF 2316
R 815	-	-	-	6.3 k Ω	RF 3634
R 816	Metal	-	1%	100 k Ω	RF 5100
R 817	Carbon	-	5%	100 Ω	RB 2100
R 818,819	-	-	-	1 k Ω	RB 3100
R 820	Metal	-	1%	1.5 k Ω	RF 3150
R 821	-	-	-	3.3 k Ω	RF 3332
R 822,823	Carbon	-	5%	100 Ω	RB 2100
R 824,825	-	-	-	47 Ω	RB 1470
R 826-829	-	-	-	220 Ω	RB 2220
R 830,831	Wire	1 W	-	3.9 Ω	RR 0004
R 832	Carbon	1/3 W	1%	71 k Ω	
R 833	Metal	1/4 W	-	22.1 k Ω	RF 4221
R 834	-	-	-	6.3 k Ω	RF 3634
R 835	-	-	-	1.58 k Ω	RF 3158
R 836	Carbon	-	5%	2.2 M Ω	RB 6220
R 837	-	-	-	12 k Ω	RB 4120
R 838	-	-	-	6.34 k Ω	RF 3634
R 839	-	-	-	10 k Ω	RB 4100
R 840	-	-	-	47 k Ω	RB 4470
R 841	-	-	-	220 k Ω	RB 5220
R 842	-	-	-	47 k Ω	RB 4470
R 843	-	-	-	4.7 k Ω	RB 3470
R 844	-	-	-	2.7 k Ω	RB 3270
R 845	-	-	-	27 k Ω	RB 4270
R 846	-	-	-	4.7 k Ω	RB 3470
R 847	-	-	-	220 k Ω	RB 5220
R 901	-	1/3 W	10%	200 k Ω	

SEMICONDUCTORS:

Q 201-203	Si.	1N 4004	400V/1A	QV 0237
Q 204	Zener	ZF6.8	6.8V/ 40 mA	QV 1106
Q 205,206	Si.	1N 4004	400V/1A	QV 0237
Q 207,208	Zener	BZ488	4.3V/100 mA	QV 1110
Q 209-212	Si.	1N 4004	400V/1A	QV 0237
Q 213	-	830k60	30V/ 60 mA	QV 0012
Q 301-302	-	13 P2	200V/40 mA	QV 0022
Q 303	-	1N 4004	400V/1A	QV 0237
Q 701,702	-	1N 4004	400V/1A	QV 0237
Q 801-804	Ge.	OA 79	45V/100 mA	QV 0079

CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.	CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.
SWITCHES:			MISCELLANEOUS:		
N 901	Oscillator Stop	NT 0023		Power Cord	AN 0010
N 902	1000 Hz Ref.	NT 0014			
N 903	Power Off/On	NN 0014		Moving Coil Instrument	0.5 mA IM 0025
N 904	Frequency Beat	NT 0023		Screened Socket	JJ 0108
N 905	Automatic Scanning	NN 0017		Screened Plug	JP 0101
O 1	Voltage Switch	OA 0044		Load Socket	JK 6272
O 2	Attenuator Switch	OH 2078		6 pin Plug	JP 4705
O 3	Matching Impedance Switch	OH 2079		Bakelite Knob, 30 mm, flat,	SN 3202 DB 0850 YQ 2083
O 4	Compressor Switch	OH 2080		Bakelite Knob, 30 mm	SN 3222 DB 0674 YQ 2083
O 5	Frequency Deviation Switch	OH 2081		Bakelite Knob, 30 mm	
O 6	Modulation Frequency Switch	OH 2082		twin mark,	SN 3227 DB 0674 YQ 2083
				Bakelite Knob, 40 mm	SN 4021 DB 0674 YQ 2083
				Bakelite Knob, 60 mm	SN 6319 DB 0675 YQ 2087
				Frequency Dial Housing	SO 0102
				Frequency Dial Pointer	SV 0037
				Flexible Shaft	UB 0041
				Magnetic Clutch	UM 1011
				Fuse 250V/0.35 A	VF 0009
			V 901	Dial Lamp 6.8V/0.5 A	VS 1271
			V 902, 903	Dial Lamp 6.8V/0.25 A	VS 1273
			V 904, 905	Dial Lamp 6.8V/0.25 A	
TRANSISTORS:					
V 201	Si.	PNP 2N4919	VB 0061		
V 202,203	-	- 2N3702	VB 0038		
V 204,205	-	NPN 2N3704	VB 0028		
V 206	-	- 2N4922	VB 0063		
V 207	-	- 2N3704	VB 0028		
V 208	-	PNP 2N3702	VB 0038		
V 301,302	-	NPN BC107	VB 0032		
V 303	F.E.T.	- 2N3821	VB 1001		
V 304	Si.	NPN BC 199	VB 0065		
V 305-309	-	- BC107	VB 0032		
V 401	-	-	VB 0032		
V 402	F.E.T.	- 2N4302	VB 1027		
V 501	Si.	NPN BC107	VB 0032		
V 502	F.E.T.	SI 242 NA	VB 1018		
V 503	-	- 2N4302	VB 1027		
V 504	Si.	NPN BC107	VB 0032		
V 701	Unijunction	2N 4892	VB 2000		
V 702	MOS F.E.T.	M511	VB 4001		
V 801,802	Si.	NPN BC107	VB 0257		
V 803	-	PNP 40406	VB 0053		
V 804,805	- matched	NPN 2N4287	VB 1055		
V 806	-	PNP 40406	VB 0053		
V 807	-	NPN BC107	VB 0257		
V 808	-	- 2N3704	VB 0028		
V 809	-	PNP 2N3702	VB 0038		
V 810	-	NPN 40407	VB 0054		
V 811	-	PNP 40406	VB 0053		
V 812	-	NPN 2N4922	VB 0063		
V 813	-	PNP 2N4919	VB 0061		
V 814	F.E.T.	E 102	VB 1041		
V 815	-	PNP 2N4289	VB 0049		
V 816	-	NPN 2N4287	VB 0055		

BD C08

