**SERVICE INSTRUCTIONS** 

Consisting of:

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#### How to open the instrument.

Unscrew the frequency knob by means of a 2 mm Allen key. Unscrew the two screws in the lower part of the case. The filter unit can then be pulled out of its housing.

#### Trouble Shooting.

If any problems should occur with this instrument, then use the Simplified Diagram in order to localize the trouble to be located in one specific circuit.

When a fault has been found and corrected, the 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 instructions 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 instruments used for making the adjustment are so small as to have no influence on the measurements. The instructions in this Manuel 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 send the instrument to the factory.

#### Spare Parts.

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

#### Instruments necessary for Service and Repair.

Precision Sound Level Meter Type 2203 (2204) Beat Frequency Oscillatór Type 1022 (1013) Frequency Analyzer Type 2107 Frequency Counter 2 mm Allen Key (0A 0043) Coaxial cable for connecting 1613 to standard B & K sockets AO 0007 (AO 0034) The same cable with built in shunt resistance 162k ohm in plug AO 0035 161:



# **CHECK OF FILTER CURVES**

Valid from Serial No. 81978



#### 1.1. Check of the Filter Curves

a. Reference adjustment.

2203	SWITCH 03:	"Ext.Filter"
	SWITCH 01 (black):	"100 dB"
	SWITCH 02 (transp):	"Fully Clockwis
1613	FREQUENCY:	"Lin"
	WEIGHTING SWITCH	:"Off"

Set the frequency from the Beat Frequency oscillator to the cente frequency of the filter and adjust the input voltage for an 8 dB deflec e" tion on Type 2203.

1613.1

b. Filter Band-pass 1613 FREQUENCY to required position 31,5-16 000 Hz

> 1613 FREQUENCY to "31,5 kHz" Band limit

Vary the frequency around the center frequency at the filter and check the filter curve. According to Fig.1.

Deflection on Type 2203: 8,0-8,5 dB for the tops 7,5-8,0 dB for the valleys

To check this filter it is necessary to use a high frequency oscillato f.inst. Type 1013.

As the frequency response for Type 2203 is only flat up to around 2! kHz it is necessary to compare the deflections on Type 2203 in the two positions "31,5 kHz" and "Lin" of the FREQUENCY switch.

Tolerance of the filter curve: 0,5 dB for the tops ~0,5 dB for the valleys with reference to "Lin" position of FREQUENCY switch.

c. Attenuation at <u>+</u> 1/2 octave 1613 FREQUENCY to required position 31.5-31 500 Hz At the band limit i.e.  $\pm 1/2$  octave from the center frequency the at tenuation is approx. 3 dB see Fig.1.

Set the frequency to a point where the deflection on Type 2203 has de creased 3 dB with reference to "Lin" position of FREQUENCY switch When the FREQUENCY switch is turned to the next filter the deflec tion on Type 2203 must not change more than  $\pm$  1 dB.

- d. Attenuation at ± 1 octave.
  - 1613 FREQUENCY to required position 31,5-31 000 Hz

Check the attenuation at  $\pm 1$  octave from the center frequency.

To prevent overloading of the input amplifier of Type 2203, increase the sensitivity of the output amplifier only (transparent knob) for a suitable reading.

Attenuation at ± 1 octave: Approx. 25 dB.

## ADJUSTMENT OF FILTER CURVES

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1613.: sheet

Attention

Adjustment of the filter curves requires use of a frequency counter as the accuracy of the signal frequency should be within 0,1 - 0,2%.



The resistors  $P_a$ ,  $P_b$ ,  $P_c$  and R are, changed with each frequency range.



These drawings show the combination at the various coils and condensors in the resonant circuits for the octave filters. After adjustment of one of the octave filter it is then necessary to check the other filters which might be influenced by the adjustment.



MODULATION: "Off" COMPRESSOR: "Off" MATCHING IMP.: "6 ohm" INPUT SWITCH: "I WEIGHTING NETW: "I METER SWITCH: "F FUNC,SELECTOR: "S

"Direct" "Lin 2 - 40 000 Hz" "RMS fast" "Sel. section off"

#### 2.1. Adjustment of the Filter Curves

- a. Reference adjustment 1613 FREQUENCY to required position 31,5-31 500 Hz
  - 2107 RANGE MULT: "X1" METER RANGE: "1V"

Connect the input of 2107 direct to INPUT of 1613.

Set the frequency of the input signal to the center frequency of the filter in question and adjust the input voltage for an 18 dB deflection on Type 2107.



### ADJUSTMENT OF FILTER CURVES Valid from Serial No. 81978

ь.	Adjust	ment of pass-band.				
	1613 FREQUENCY to required		red	Connect the input of 2107 to OUTPUT on 1613		
			L	Vary the frequency around the cer the tops and valleys.	nter frequency of the filter and check	
	2107	RANGE MULT: METER RANGE:	"X1" "1V"	Deflection on Type 2107:	18,1 - 18,5 dB for the tops 17,6 - 17,9 dB for the valleys	
				if necessary, adjust the level at:	top 2 to 18,2 dB by $P_{C}$ top 1 and 3 to 18,2 dB by $P_{D}$ if the level for the two tops 1 and 3 are not equal adjust $L_{C}$	
					top 3 to 18,2 by P <sub>a</sub> if any (some of the filters have no P <sub>a</sub> )	
					Valley 1 and 2 by changing the value of the resistor R, or by adjustment of $L_{a}$ and $L_{b}$	
				If the resonant frequency of circuidy $L_a$ and circuit II is changed to will have a higher level and valley the frequencies for the band limit v	it I is changed to a higher frequency b a lower frequency by L <sub>b</sub> . Valley 1 2 a lower level and at the same time vill change.	
				After any adjustment of L <sub>a-b-c</sub> or be influenced by the adjustment. Se	<sup>.</sup> C <sub>a-b-c</sub> check all filters which might se Fig.3.	
c.	Adjust	ment of band limit	$\begin{array}{llllllllllllllllllllllllllllllllllll$		5,7 dB. 1/2 octave L <sub>C</sub> at-1/2 octave.	
				If the band limit of the filters are checked by increasing the frequency to the band-limit (-3 dB point) and then change FREQUENCY switch to the next filter, the output level must not change more than 1 dB.		
				After any adjustment of L <sub>a-b-c-</sub> cho ced by the adjustment.	eck all filters which might be influen-	

# Position of Components 1613.3

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PRINTED CIRCUIT XC 0041



PRINTED CIRCUIT XC 0042

C

## Parts-List

1613.4

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CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.	CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.
CAPACITOR			COILS:		
C 1-6 C 7-9 C 10-12	Polystyrene 1 μF/125 V ± 10% 126,6 nF/100 V ± 1% 31,8 nF/100 V ± 1% 118 nF/100 V ± 1%	CS 0025 CT 1601 CT 1600	L 1 L 2 L 3	12,5 Hy	LB 01 90 LB 01 91 LB 01 90
C 13-15 C 16-18 C 19 C 20	" /,92 nF/100 V ± 1% " 1,98 nF/400 V ± 1% " 250 pF/500 V Electrolytic 1 μF/350 V	CT 1101 CT 1303 CT 0108 CE 0512	L 4 L 5 L 6	0,8 Hy " "	LB 01 92 LB 01 93 LB 01 92
RESISTORS:			L7	50 mHy	LB 0194
R 1 R 2	Carbon 1/3 W 1% 10 kΩ " 20 kΩ " 20 kΩ		L 8 L 9		LB 0195 LB 0194
к 3 R 4	" " 10 kΩ		MISCELLAN	FOUS	
R 5	" " 10 kΩ		moceebaa	Matel and upper part	EA 1412
R 6	" " 20 kΩ			Metal case lower part	FB 1613
к / R 8	" " 10 kΩ			Screened socket	77 0009
R 9	" " 10 kΩ			Connection bar Knob	JP 0400
R 10	20 kΩ			Short bolt	YS 0406
R 12	" " 146,2 kΩ			Long bolt	YS 0417
POTENTION	ETERS:				
P1	Trimmer Carbon lin, 250 kΩ	PG 4251			
P 2	" 1 MΩ	PG 5102			
P 3 P 4	" 500 kΩ	PG 4502			
P 5	" <sup>μ</sup> " 250 kΩ	PG 4251			
Ρ6	""1MΩ	PG 5102			
P 7	" " 500 kΩ	PG 4502			
P 11	" " 150 kΩ	PG 4151			
P 12	" " 80 kΩ	PG 3800			
P 13	" " 30 kΩ	PG 3301			
P 14-10 P 17	" 50 kΩ	PG 3502 PG 3301			
P 18-20	" " 50 kΩ	PG 3502			
P 21	" " 30 kΩ	PG 3301			
P 22	" " 150 kΩ " " 250 kΩ	PG 4151			
P 24	" " 80 kΩ	PG 3800			
P 25	" " 25 kΩ	PG 4151			
P 26	" " 80 kΩ	PG 3800			
P 28	" " 50 kΩ	PG 3502			
P 29	" " 150 kΩ	PG 4151			
P 30	" " 80 kΩ	PG 3800			
P 31 P 32	" " 80 kΩ	PG 3800			
P 33-43	" log. 500 kΩ	PG 4503			
P 44	" " 50 kΩ	PG 3503			
SWITCHES:					
01-5	Frequency Hz Weighting Switch	OR 1613 NN 0005			
PRINTED CIR	CUIT:				
	without components	XC 0041 XC 0042			
	XC 0041 with components	848 1613			
	XC 0042	848 1613			



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# **Circuit Diagram**

Valid from Serial No. 223328





22-3-62	61
23-10-67	22