PHILIPS

SERVICE DIRECTIONS

for Philips cathode-ray oscillograph

Type GM 3152

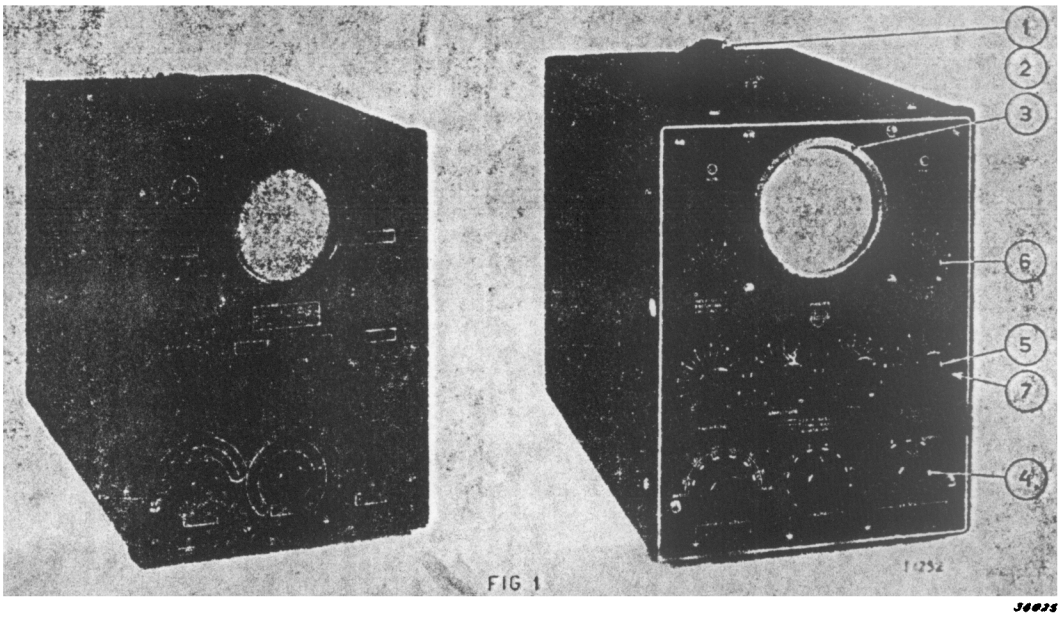


FIG 1

38025

GENERAL.

The oscillograph type GM 3152 is composed of the following component parts:

A. Cathode-ray tube (L1)

B. Feeding apparatus for the cathode-ray tube (L5 and L6)

C. Feeding apparatus for the other tubes (L6)

D. Amplifier for vertical deflection (L2, L3 and L4)

E. Time axis generator for the horizontal deflection plates (L7, L8 and L9).

Note!

1. It is highly dangerous to use the apparatus without its casing. Several elements in the circuits, particularly the framing of C12 and C13, are under very high tension in respect to the chassis. And as the condensers take more time to discharge their load after the apparatus is switched off it is still dangerous to make contact with them. In any case no parts should be touched for at least two minutes after switching off.

2. A spot should never be left on the screen as this may damage the fluorescent layer.

3. Where the expressions "vertical" and "horizontal" are used these refer to the parts, tubes, etc. which produce a vertical or horizontal spot deflection.

INDEX TO THE FIGURES

4. In the apparatus there are two valves type 4673 which are numbered 1 and 2 on the bulb. The valve (L2) marked 1 has been specially selected on account of its low sensitivity for mechanical vibrations; if it should be taken out care must be taken that it is put back again in its right place. If this L2 valve needs renewing it is necessary to select a new valve of low mechanical sensitivity: this can be tested by producing a horizontal line on the screen with the time axis generator and then lightly tapping the new valve - there should then be no easily discernable sudden oscillations in the horizontal line.
   The valve numbered 2 is L7. If this has to be renewed care must be taken that when turning R5 there is no drop in the time axis generator voltage, neither in the extreme left nor in the extreme right position. If there is any drop then another valve must be selected that does not cause this to happen. Such a drop in the time axis generator voltage in the extreme positions of R5 is particularly liable to occur at high frequencies. It is therefore advisable to check this with SK2 in position 10.
5. Furthermore the valves L2, L7 and L8 now have the number. 35 after their type number. These valves have been specially selected in view of the difficulties mentioned above. Should any of these valves need renewing the order for the new special valves should therefore quote types 4673.35 and AL4.35.

AMENDMENTS

1. When checking over the apparatus account is to be taken of the following amendments which have been made in the course of time.
   From serial number 1300 up to and including 1850 the following alterations may have been made wholly or in part:

Part	Original value	Replaced by
C19	2×0.25 μF par.	3×0.5 μF par.
C29	0.125 μF	0.5 μF
C41	1 μF	0.5 μF
C42	0.5 μF	2×0.5 μF par.
R24	2×0.1 M.Ohm par.	3×0.16 M.Ohm par.
R[illegible]	[illegible] Ohm par.	3×20000 Ohm par.
R35	10000 Ohm	16000 Ohm
R52, R53, R54, C46 and C47		

   From serial number 1851 on to the present numbers the following alterations may have been made wholly or partly in addition to those mentioned above:

Part	Original value	Replaced by
R9	0.5 Watt	1 Watt
R19	0.5 Watt	1 Watt
R20	0.5 Watt	1 Watt
R28	0.16 M.Ohm	0.22 M.Ohm
R51	0.16 M.Ohm	82000 Ohm
Added: C51, SK7		
Deleted: C44		

   Should an apparatus be returned for repair of some part or other and the above alterations have not yet been made in it, this may be done at the same time.
2. In apparatus which have the design number 07 behind the type number the following alterations have already been made:
   The two electrolytic condensers C12 and C13 connected in series have been replaced by a vaseline condenser box of 2×1,5 μF, code number 49 177 17.0, with the two condensers in the box connected parallel (see figs 14 and 15). Furhter R47 has been changed for a resistance of 0.12 M.Ohm, code no. 49 377 49.0, thus increasing the sensitivity of the whole apparatus. (In apparatus which still have the electrolytic condensers C12 and C13 the old R17 of 15000 Ohms, code no. 19 407 86.0, is retained.)
3. In order to improve stability for the highest frequencies of the time axis generator the cathode of L8 has been connected with the heating filament. If, therefore, a complaint is made that the time axis generator voltage drops for the highest frequencies this can easily be remedied by making the above named connection (see fig. 16).

Fig. 2 gives the circuiting diagram of the latest construction. For apparatus which have no single time base when SK3 is in position 4 but instead have the circuit EXT/EXT. reference is made to fig. 11.

DESCRIPTION

See fig. 2 and the directions for use supplied with the apparatus.

A. **Feeding** (L5 and L6)

B. The cathode ray tube and the other tubes require for

C. proper working a number of different voltages and currents. These are supplied by a feeding apparatus consisting of S1 to S8 incl., L5 with smoothing filter R47, C12 and C13, L6 with smoothing filter S11, C14 and C15. The negative voltage for the Wehnelt cylinder is drawn from the potentiometer R1 and by this means the brightness of the picture can be regulated.
   The positive voltage on the focus anode and consequently the sharpness of the picture are adjusted by means of the potentiometer R2. The voltages drawn from the potentiometers R7 and R8 are fed respectively to the horizontal plates direct and to vertical plates via R32. By means of these potentiometers R7 and R8 the picture is adjustable both in the horizontal and in the vertical direction.

D. **Circuiting of the amplifier** (L2, L3 and L4)
   In the two-stage vertical amplifier a resistance coupling has been applied. In order to compensate the undesirable parallel capacities the series self-inductions S12 to S17 incl. have been provided, whilst the capacities can be adjusted by means of the trimmers C3, C7, C10 and C43. As the cathode resistances are not bypassed there is inversed feed-back. As it is necessary that the voltage on the vertical deflection plates should be symmetrical in respect to earth, the pentodes L3 and L4 are circuited in push-pull. Part of the voltage arising on the anode circuit of L3 is proportionately drawn off from potentiometer R19-R20 and fed to L4. As the voltage at the anode of L4 will be turned 180° in respect to the control grid it is also precisely in counter-phase to that on the anode of L3. The resultant voltages are fed to the vertical plates via C8 and C11.
   Should one of the condensers C3, C7 or C10 need renewing then before the new condenser is soldered into the apparatus its capacity will have to be adjusted to a certain value:

   C3 to be adjusted to 12 pF
   C7 to be adjusted to 15 pF
   C10 to be adjusted to 12 pF

   C43 consists of two ends of wire (A in fig. 12). In case of repairs to the apparatus care is to be taken that this capacity is not changed as a result of bending of the wires.

F. **Circuiting of the time axis generator** (L7, L8, L9)
   (figs. 3 and 4)

   The condensers C19, C49 and C50 or one of the condensers C20 to C28 incl. are charged via L7. The voltage on the anode of L7 is applied via one of these condensers (e.g. C25). Since the total voltage on L7 and the condenser C25 is constant, in case the voltage on C25 rises then the anode voltage on L7 will drop. As soon as this drops below a certain value the characteristic will no longer be rectilineal (fig. 3b) and consequently the voltage on C25 will then no longer increase in proportion to the time (fig. 3a). Before this point is reached, however, C25 has to be discharged and the charging can begin anew. This gives rise to a voltage slope as shown in fig. 3c.
   The discharge takes place via L8 (fig. 4) with the aid of L9. While C25 is being loaded a certain anode current also flows through the pentode L9, which causes a voltage drop on R38 (e.g. 300 volts). The control grid of L8 then has a negative voltage of 300 V in respect to the anode.
   If at a certain moment during the charging the voltage at C25 amounts to say 200 volts then the control grid of L8 has a negative voltage of 100 V in respect to the cathode, and thus L8 is then cut off.
   The voltage of C25 however increases, and as a consequence the negative voltage of g1-L8 drops. At a certain moment therefore the point is reached where L8 is cut off. Now a

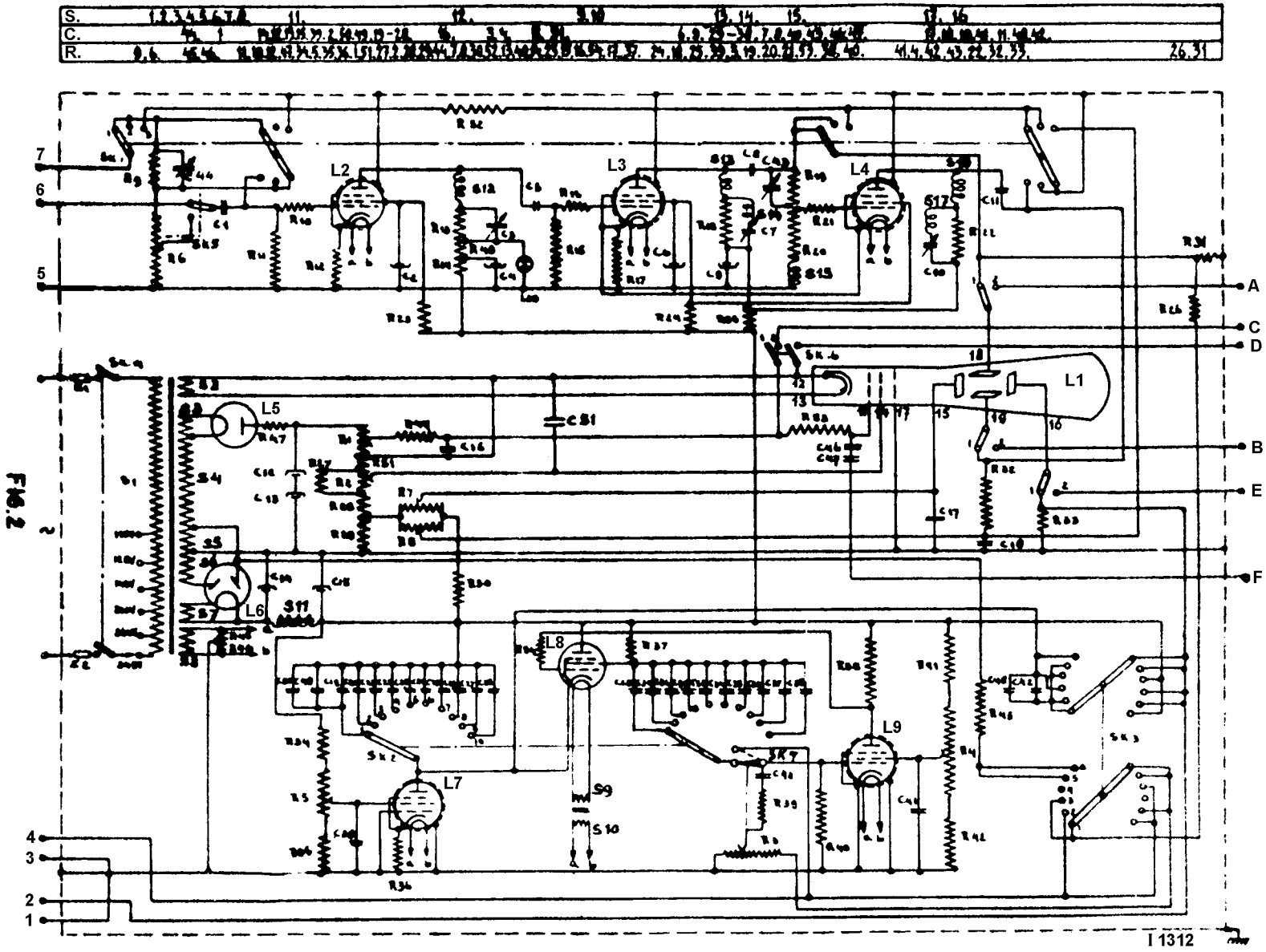
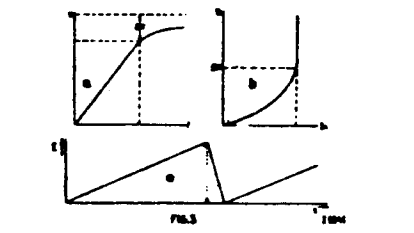


Fig. 2

current begins to flow also through L8, which reduces the screen grid voltage. This drop of Vg^2-L8 will compensate itself via one of the condensers C29 to C38 incl. (corresponding to position 6 of C25-SK2 is C35), with the result that this discharge current sets up on R40 a voltage which has a negative character for the control grid of L9. Thus the anode current from L9 decreases and with it also the voltage loss on R38. The negative voltage of g1-L8 thus also drops, while the anode current increases and the screen grid voltage of L8 drops further, the process repeating itself. In consequence of this alternating action the whole process very quickly reaches to the maximum current of L8 (governed by L7). C25 will therefore also be discharged at this rapid rate. At the maximum current of L8 however a change of g2-L8 no longer takes place, so that there will be no discharge current through R40. Vg1-L9 then becomes less negative, the anode current of L9 again increases, the voltage drop at R38 is again larger and g1-L8 again receives a voltage in the direction of the cut-off point. The anode current of L8 thus diminishes and Vg2-L8 increases. A current then begins to flow through R40, setting up a positive voltage for the control grid of L9. The anode current of L9 thus increases and the phenomenon is repeated very rapidly. L8 is therefore again cut off in a very short space of time and C25 can again be charged.

Now at the moment that L8 is closed again the control grid of L9 has a positive charge, and when the charging of C25 has begun again the L9 grid has to adjust itself to the cathode voltage. C35 and C40 have therefore been so chosen that this takes place before a new discharge of C25 begins. By applying different condensers for C35 and switching these over simultaneously with C25 it is ensured that the R-C time of C35-C40 is approximately correct for the various frequencies.



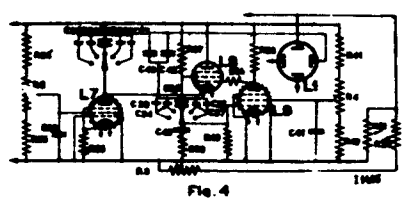
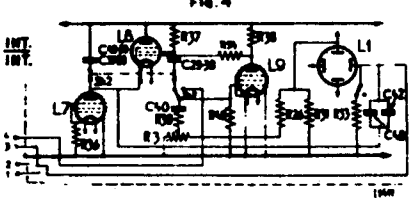


Fig. 4



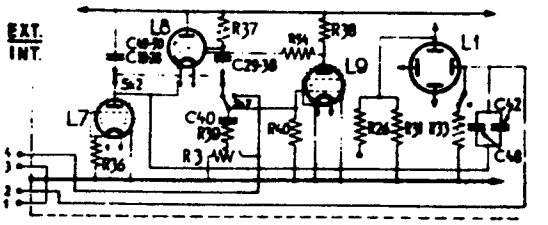


Fig. 6

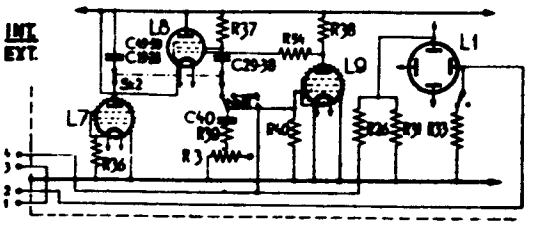


Fig. 7

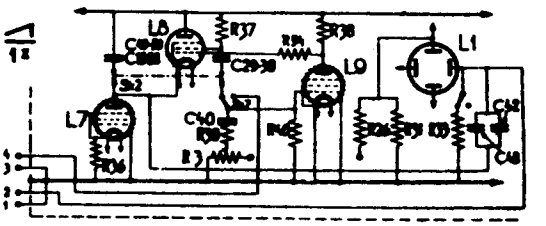


Fig. 8

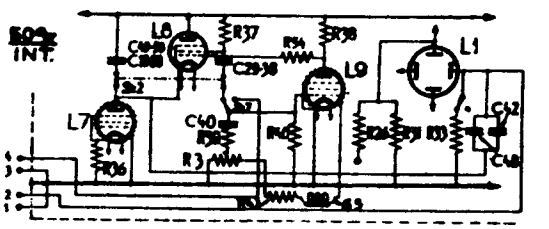


Fig. 9

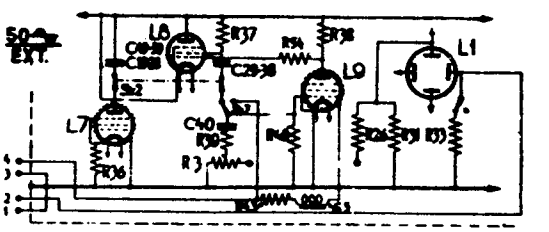


Fig. 10

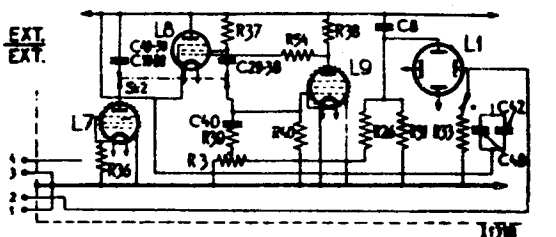


Fig. 11

VOLTAGES AND CURRENTS OF THE TUBES

Tube type	Va (V)	Ia (mA)	Vg2 (V)	Ig2 (mA)	Vf (V)	Ik (mA)	fusing current (A)
L1-DN 9/3					4.0		
L2-4673	55	6.3	125	1.4	4.0		
L3-4673	150	8.5	170	1.6	4.0		
L4-4673	150	8.5	170	1.6	4.0		
L5-1876					4		
L6-AZ1					4		
L7-4673 SK2 and SK3 to the left R4 and R5 to the right	180	8.7	125	1.5	4	8.5	
L8-AL4 SK2 to the right; SK3 position 4 R4 and R5 to the right	320	7.0	290	0.5	4.0	7.5	
L9-4673 SK2 and SK3 to the right R4 and R5 to the right	30	4.2	80	1.3	4	5.5	
L10-7475							
Z1-fuse 08 117 41.0							1.0
Z2-fuse 08 117 41.0							1.0

Sensitivity per cm image height:

Position 1 mV effect	Position 2 mV effect	Position 3 mV effect
6	100	10

Consumption and dimensions

Consumption in Watts	Height cm	Width cm	Length cm	Weight kilos
±100	29	22.5	42	±19

DEFECTS IN THE OSCILLOGRAPH

General remarks

1. In the event of a defect in an apparatus the tubes should be replaced one by one in order to localise any tube faults.
2. The chassis is easily removed from the casing by removing six screws on the front and at the back one screw and the earth terminal, after which the chassis can be pulled forward.
3. In order to trace the source of a defect properly a good measuring instrument is essential. The universal measuring instrument GM 4256 is recommended because all the measurements quoted in this booklet, thus also those which do not relate to the point-to-point table, can be carried out with it. The measured voltages depend on the current consumption of the average voltmeter The above mentioned table has been established with the aid of a measuring instrument GM 4256, the voltmeter of which has an internal resistance of 2000 Ohm/Volt.
4. The following guide for tracing a defect is as complete as possible, but it cannot be entirely so on account of the various combinations that may occur.

Test of feeding parts

When taking measurements on the feeding part extreme care has to be taken because sometimes the instrument is connected to high tensions.

GM 4256 to be connected for the voltage range of 500 V

a. Between points 11 and 13 with R1 to the right 0 V to 65 V with R1 to the left.

b. Between points 13 and 14 with R2 to the left 120 V to 440 V with R2 to the right.

c. Between points 15 and 17 with R7 to the right 70 V to 0 V with R7 in about the middle and a pole-inverted voltage of 50 V with R7 to the left.

d. Between point 17 and 19 with R8 to the right 15 V to 0 V with R8 in about the middle and a pole-inverted voltage of 20 V with R8 to the left.

If an abnormal, too low or no voltage is measured at the above points the cause is to be sought in the following interruptions (the letters a, b, etc. corresponding to those above):

a. 11-13 Interruption in R1, R44 or R53. Circuiting in C16.

b. 13-14 Interruption in R2, R27 or R51. (abnormal or too high voltages). Circuiting in C51.

c. 15-17 Interruption in R7, R30, R28 or R29. Circuiting in C17.

d. 17-19 Interruption R8, R28, R29, R30 or R32. Circuiting in C18.

If no voltage is measured between any of the above points the fault may lie in interruption of R47, S1, S2, S3, S4, S5, S6, C12 or C13, or in circuiting of C12 or C13.

Test of vertical-amplifier

When there is alternating voltage on K5-K6/K7 with time axis generator switched on (SK3 pos. 1.) and only a horizontal line, this points to a defect in the vertical-amplifier.

Ia of L12 too low

Interruption in R10, R11, R13, R13', R14, R23, R48 or S12. Circuiting in C2 or C4.

Ia of L3 too low

Interruption in R16, R17, R18, R24, R25 or S13. Circuiting in C6 or C9.

Ia of L3 too high

Interruption in R15. Circuiting in C5 or C7.

Ia of L4 too low

Interruption in R17, R20, R22, R24, R25, S15 or S16.

Ia of L4 too high

Interruption in R21. Circuiting in C8 or C10.

If no or too low voltage is measured at all anodes of the amplifier the fault may lie in interruption of S5, S6, S7, S11, C14 or C15 or circuiting in C14 and C15.
If none of the tubes has emission then S8 will be interrupted.

TIME-AXIS GENERATOR

When there is alternating voltage on K5-K6/K7 with time axis generator switched on (SK3 pos. 1) and only a vertical line, this indicates a defect in the time axis generator.

Cathode current of L7 too low

Interruption in R5, R34 or R36. Circuiting in C39.

Cathode current of L7 too high

Interruption in R35

Cathode current of L8 too low

Interruption in R37, S9 or S10.

Cathode current of L8 too high

Interruption in R4, R41 or R54. Circuiting in L7 (anode in respect to brake grid). No emission from L9.

Cathode current of L9 too low

Interruption in R4, R38 or R41. Circuiting in C41.

Cathode current of L9 too high

Interruption in R40 or R42. Circuiting in one of the condensers C29 to C38 incl.

If the frequency of the time axis generator with R5 cannot be properly adjusted, so that the frequencies of the fixed positions of SK2 do not connect up, then either R5 or R35 is interrupted.
If it is found very difficult to adjust the intensity of the time axis generator then either R4 or R42 is interrupted.
If there is no saw-tooth voltage in one of the positions of SK2 then the fault is to be sought in an interruption or short-circuiting in the condenser for the respective position, i.e. in the combinations C19-C28, C49 and C50, or C29-C38.

FURTHER DEFECTS LIKELY TO OCCUR

With SK3 in position $\frac{\text{INT}}{\overline{\text{INT}}}$ no synchronisation

Cause: interruption in R3, R26, R39, C40 or SK3.

50 ~ synchronisation not functioning

Cause: interruption in R43 or SK3.

If no or too low voltage is measured on all anodes of the time axis generator then the fault may lie in an interruption in S5, S6, S7, S11, C14 or C15, or short circuiting of C14 and C15.
If neither of the tubes gives emission then S8 will be interrupted.

ELECTRICAL COMPONENTS

No.	Description	Code number
S1 S2 S3 S4 S5 S6 S7 S8	Feeding transformer	E1 320 41.1
S9 S10	Transformer	E1 420 40.2
S11	Choke 1000 ohm	E1 300 30.0
S12	H.F. coil 46 ohm	E1 365 98.0
S13	H.F. coil 46 ohm	E1 365 98.0
S14	H.F. coil 46 ohm	E1 366 00.0
S15	H.F. coil 40 ohm	E1 365 99.0
S16	H.F. coil 46 ohm	E1 365 98.0
S17	H.F coil 25 ohm	E1 366 00.0
R1	Carb. pot. lin. 0.05 Mohm	49 500 20.0
R2	Carb. pot. lin. 0.5 Mohm	49 470 44.0
R3	Carb. pot. lin. 0.5 Mohm	49 500 61.0
R4	Carb. pot. lin. 0.2 Mohm	49 504 01.0
R5	Carb. pot. lin. 0.2 Mohm	49 504 01.0
R6	Carb. pot. lin. 10000 ohm	49 500 59.0
R7	Carb. pot. lin. 0.5 Mohm	49 470 44.0
R8	Carb. pot. lin. 0,5 Mohm	49 470 44.0
R9	Carb. resistance 0.15 Mohm	19450.B
R10	Carb. resistance 39 ohm	49 407 98.0
R11	Carb. resistance 1 Mohm	49 408 02.0
R12	Carb. resistance 120 ohm	49 407 78.0
R13	Carb. resistance 7200 ohm	49 407 90.0
R14	wire wound res. 15000 ohm	49 358 41.0
R15	carb. resistance 39 ohm	49 407 98.0
R16	carb. resistance 0.47 Mohm	49 407 95.0
R17	carb. resistance 100 ohm	49 407 79.0
R18	carb. resistance 7200 ohm	49 407 90.0
R19	carb. resistance 0.47 Mohm	19 456 B
R20	carb. resistance 15000 ohm	19 438 B
R21	carb. resistance 39 ohm	49 407 98.0
R22	carb. resistance 7200 ohm	49 407 90.0
R23	carb. resistance 0.15 Mohm	49 407 92.0
R24	carb. resistance 3 × 0.15 Mohm	49 407 92.0
R25	carb. resistance 3 × 22000 ohm	49 408 01.0
R26	carb. resistance 0.1 Mohm	49 407 91.0

ELECTRICAL COMPONENTS

No.	Description	Code number
R27	carb. resistance 0.47 Mohm	49 407 80.0
R28	carb. resistance 0.22 Mohm	49 407 81.0
R29	carb. resistance 47000 ohm	49 407 96.0
R30	carb. resistance 0.47 Mohm	49 407 80.0
R31	carb. resistance 2.2 Mohm	49 407 82.0
R32	carb. resistance 2.2 Mohm	49 407 82.0
R33	carb. resistance 2.2 Mohm	49 407 82.0
R34	carb. resistance 0.1 Mohm	49 407 99.0
R35	carb. resistance 1500 ohm	49 408 00.0
R36	carb. resistance 100 ohm	49 407 79.0
R37	carb. resistance 27000 ohm	49 407 83.0
R38	carb. resistance 3×0.15 Mohm	49 407 92.0
R39	carb. resistance 0.47 Mohm	49 407 95.0
R40	carb. resistance 47000 ohm	49 407 96.0
R41	carb. resistance 0.15 Mohm	49 407 92.0
R42	carb. resistance 10000 ohm	49 407 93.0
R43	carb. resistance 3.9 Mohm	49 407 84.0
R44	carb. resistance 0.22 Mohm	49 407 94.0
R45	carb. resistance 39 ohm	49 407 85.0
R46	carb. resistance 39 ohm	49 407 85.0
R47	carb. resistance 120000 ohm	49 377 49.0 (RS. M 20)
R48	carb. resistance 220 ohm	49 407 87.0
R51	carb. resistance 82000 ohm	49 407 88.0
R52	carb. resistance 10000 ohm	49 407 89.0
R53	carb. resistance 5600 ohm	49 408 03.0
R54	carb. resistance 47 ohm	49 376 08.0
C1	Press block condenser 0.22 µF	49 128 30.0
C2	Electrolytic condenser 32 µF	28 185 64.0
C3	Wire trimmer* 30 pF	28 212 06.0
C4	Electrol. condenser 32 µF	28 185 64.0
C5	Press block condenser 0.47 µF	49 128 34.0
C6	Electrol. condenser 32 µF	28 185 64.0
C7	Wire trimmer* 30 pF	28 212 06.0
C8	Press block condenser 0.47 µF	49 128 34.0
C9	Electrol. condenser 32 µF	28 185 64.0
C10	Wire trimmer* 30 pF	28 212 06.0
C11	Press block condenser 0.47 µF	49 128 34.0
C12	Electrol. condenser 8 µF	28 185 70.0
C13	Electrol. condenser 8 µF	28 185 70.0
C14	Electrol. condenser 32 µF	28 185 64.0
C15	Electrol. condenser 32 µF	28 185 64.0
C16	Press block condenser 0.22 µF	49 128 30.0
C17	Press block condenser 0.47 µF	49 128 34.0
C18	Press block condenser 0.47 µF	49 128 34.0
C19	Press block condenser 0.47 µF	49 128 34.0
C20	Press block condenser 0.22 µF	49 128 30.0
C21	Press block condenser 0.1 µF	49 128 26.0
C22	Press block condenser 47000 pF	48 128 22.0
C23	Press block condenser 22000 pF	48 128 18.0
C24	Press block condenser 8200 pF	48 128 13.0
C25	Press block condenser 2200 pF	49 128 06.0
C26	Mica condenser 400 pF	4424
C27	Mica condenser 160 pF	4420
C28	Mica condenser 50 pF	4415
C29	Press block condenser 0,47 µF	49 128 34.0
C30	Press block condenser 82000 pF	49 128 25.0
C31	Press block condenser 27000 pF	49 128 19.0
C32	Press block condenser 22000 pF	49 128 18.0
C33	Press block condenser 12000 pF	49 128 15.0
C34	Press block condenser 3900 pF	49 128 09.0
C35	Mica condenser 640 pF	4426
C36	Mica condenser 125 pF	4419
C37	Mica condenser 32 pF	4413
C38	Mica condenser 16 pF	4410
C39	Press block condenser 2 × 0.47 µF	49 128 34
C40	Press block condenser 3300 pF	49 128 03
C41	Press block condenser 0.47 µF	49 128 34
C42	Press block condenser 0.47 µF	49 128 34
C43		
C46	Press block condenser 10000 pF	49 129 14
C47	Press block condenser 10000 pF	49 129 14
C48	Press block condenser 0.47 µF	49 128 34
C49	Press block condenser 0.47 µF	49 128 34
C50	Press block condenser 0.47 µF	49 128 34
C51	Press block condenser 0.47 µF	49 128 34

*) see "Circuiting of the amplifier"

MECHANICAL COMPONENTS

Item	Fig.	Description	Code number
1	1	Spring hand grip	17 694 17.0
2	1	Spring hand grip (design 22)	E1 964 14.0
3	1	Ornamental edge	E1 230 65.0
4	1	Knob 34 mm dia.	23 667 63.1
5	1	Knob 28 mm dia.	23 610 84.1
6	1	Knob 20 mm dia.	23 612 92.0
7	1	Set screw	07 854 10.0
8	13	Plug block	23 009 10.0
9	12	Tube holder	28 225 90
10	12	Holder for cathode ray tube	28 226 01.0
11	12	Milled screw	07 774 06.0
12	12	Low capacity cable	06 107 20.0
13	13	Contact spring	28 942 42.0
14	13	Holder	28 914 34.0
15	13	Contact socket	25 754 42.0
16	12	Rubber shield	06 280 13.0
17	12	Rubber lead-in	25 655 51.0
		Cap	28 937 03.0
		Plate	28 341 05.0
		Diagram scala	28 258 45.0
		Screened lead	33 988 41.0
		Mains lead	33 983 25.0
		Female plug	08 280 95.0
		Plate with pins of tension disc	28 871 70.2

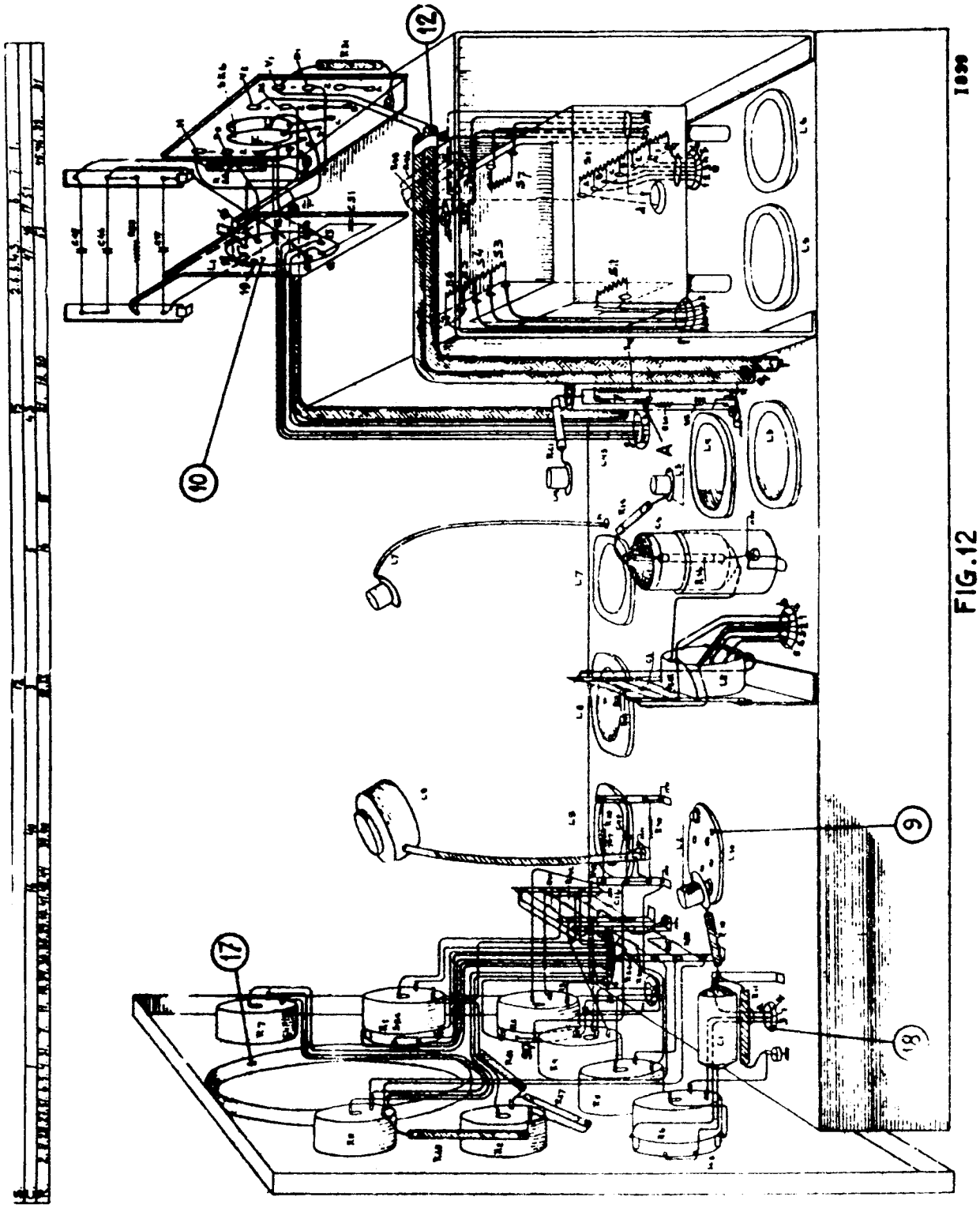


FIG.12

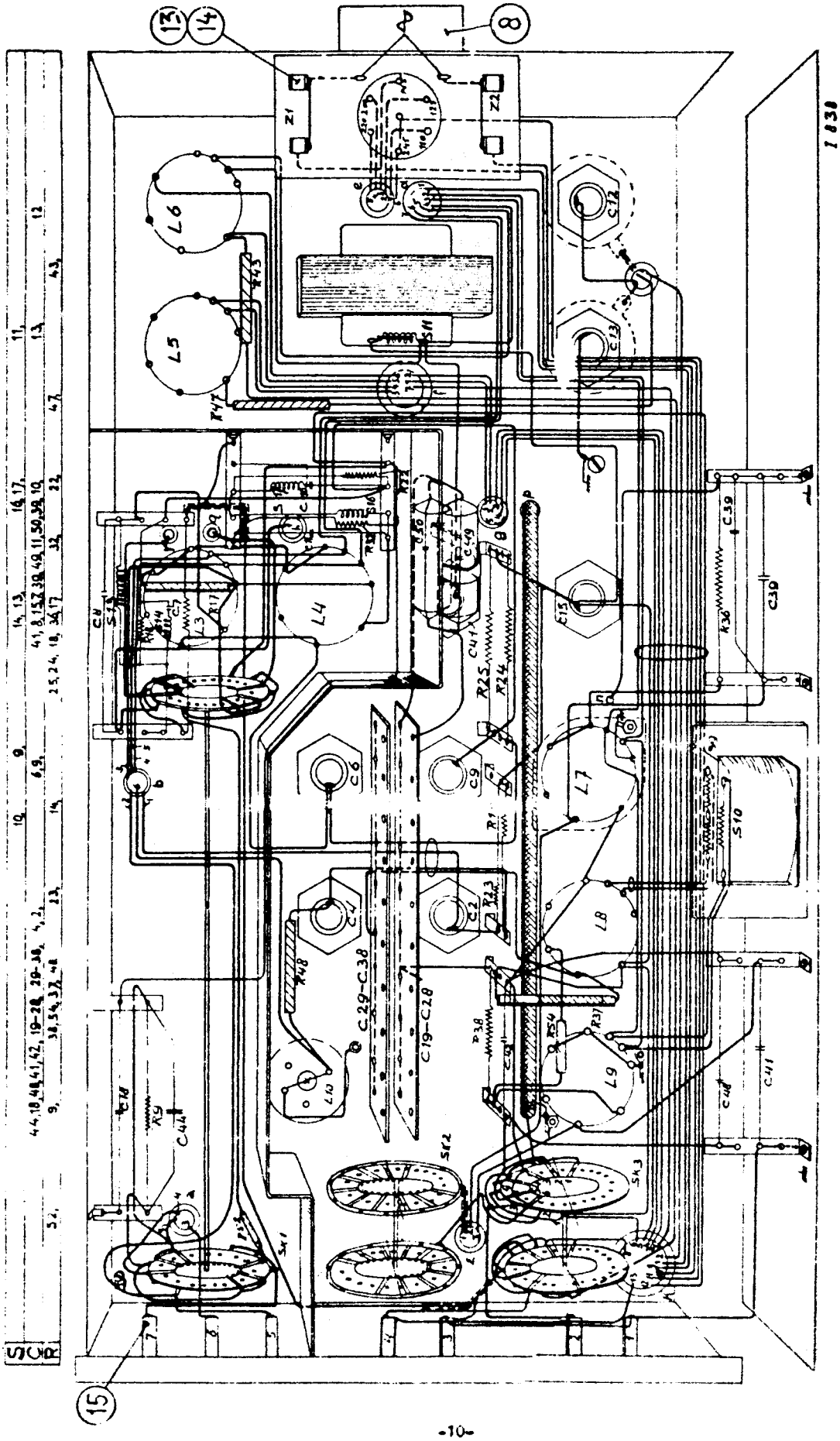
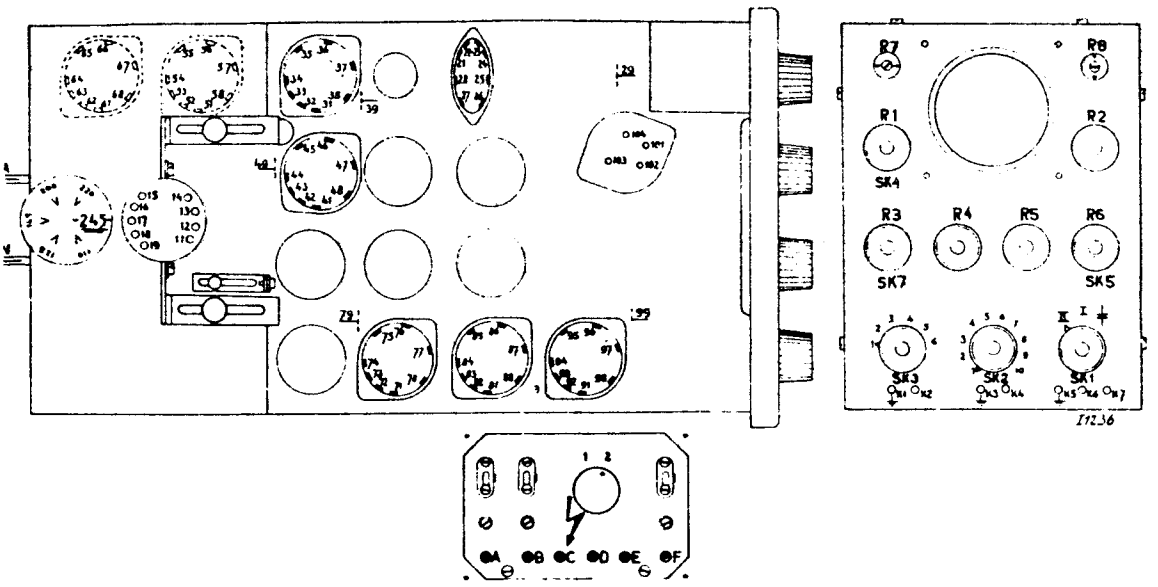


FIG. 13

N.V. PHILIPS EINDHOVEN HOLLAND	MEETTABEL TABLEAU DE MESURAGE MESSTABELLE MEASURING TABLE	GM 3152	NR: I1235
SERVICE			DAT:



*R

12	12/13	32/33	52/53	62/63	82/83	N/A										
	15	10	15	15	10	320										
11	24	34	52/68	62/88	74											
	180	165	440	415	165											
10	27/37	28	38/62	48/62	47/62	49	58	62/77	77	86/88	87/88	88/97	99	19	97 a	K4 b
	100	340	290	290	155	285	200	100	100	135	205	90	150	55	330	150
9	11/58	15	16	18	39	58	Sk1 Pos 1: 18/49	Sk1 Pos 2				Sk1 pos 3	Sk3 pos 6	Sk3 pos 2	Sk3 pos 3	C/D
	280	330	65	230	225	195	250	29	19	29	K7	K7	K4	K4	K4	320
								130	65	130	350	225	40	235	220	

*C

12	Sk2 pos 5: 78/88	pos 6: 78/88	pos 7: 78/88	pos 8: 78/88	pos 9: 78/88	pos 10: 78/88	F/11									
	465	250	75	30	27	27	140									
11	19/38	Sk2 pos 2: 78/88	pos 3: 78/88	pos 4: 78/88	pos 2: 87/99	pos 3: 87/99	pos 4: 87/99	pos 5: 87/99	pos 6: 87/99	pos 7: 87/99	pos 8: 87/99	pos 9: 87/99	pos 10: 87/99			
	270	400	275	125	205	100	95	90	92	92	92	92	92			
10	19/48	28/39	78/88	87/99	Sk1 c pos 3: K6	Sk3 pos 2: K2										
	240	235	430	240	85	385										
9	27	37	68													
	465	465	190													

* R1, R2, R3, R4, R5, R6, R7, R8, SK1 ↻. SK2 SK3: ↻. I1235

a) R4: ↻.
b) R3: ↻.
c) R6, SK5: ↻.

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PHILIPS

KATHODESTRAAL-OSCILLOGRAAF GM 3152

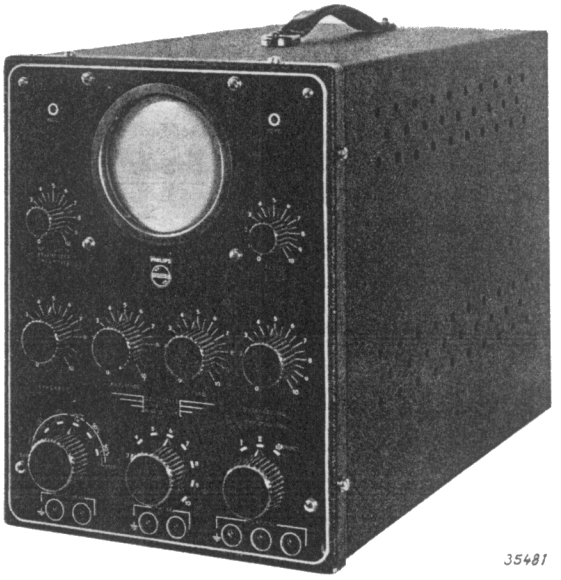


Fig. 1

De draagbare Philips Kathodestraal-Oscillograaf GM 3152 is een zeer veelzijdig, nauwkeurig werkend instrument, dat gebruikt kan worden voor het zichtbaar maken en registreeren van electrische trillingen.

Door het uitgebreide frequentiebereik van *10 per/sec—1 megaper sec* kan de GM 3152 dienen voor het waarnemen van lage frequenties, zooals die voorkomen bij mechanische en acoustische verschijnselen, zoomede van de frequenties die optreden in de hoogfrequent-techniek. Het instrument vindt hierdoor een zeer uitgebreid toepassingsgebied in verschillende bedrijven, laboratoria, enz.

De Philips Kathodestraal-Oscillograaf GM 3152, die in een robust metalen huis is ondergebracht, is van een frontplaat met duidelijke opschriften voorzien. De functie en de stand van de bedieningsknoppen zijn daarop aangegeven. De continu regelbare knoppen loopen langs een schaalverdeeling, zoodat bepaalde standen gemakkelijk kunnen worden teruggevonden.

Door het betrekkelijk lage gewicht, de geringe afmetingen en de robuste bouw is het instrument gemakkelijk verplaatsbaar.

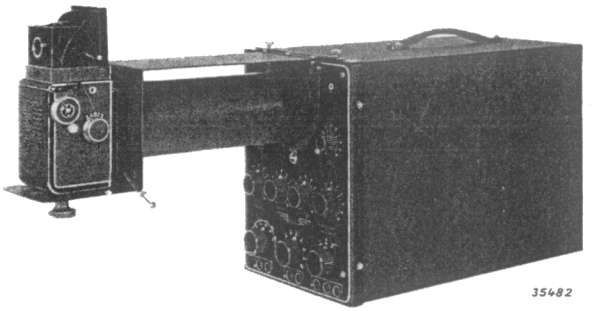


Fig. 2

Registreeren

Het opklapbare fotostatief GM 4192 is bijzonder geschikt voor het registreeren van oscillogrammen. Fig. 2 laat zien hoe het statief gebruikt wordt op den Kathodestraal-Oscillograaf GM 3152 met een normale camera, zooals die in den handel verkrijgbaar is.

PHILIPS

Stilstaande beelden

Voor het verkrijgen van stilstaande beelden (b.v. voor het registreeren met tijdopnamen) kan de tijdbasis naar verkiezing worden gesynchroniseerd met de frequentie, welke men wenscht te meten, met de frequentie van het lichtnet of met een andere uitwendige frequentie.

Tijdsaanduiding

Voor de tijdsaanduiding kan de kathodestraal door een bekende frequentie telkens voor korten tijd worden onderdrukt. Door deze modulatie ontstaat, in plaats van een doorloopende lijn, een gestippelde lijn. De afstand tusschen twee punten is een directe maat voor den tijd.

Ultra-korte golven

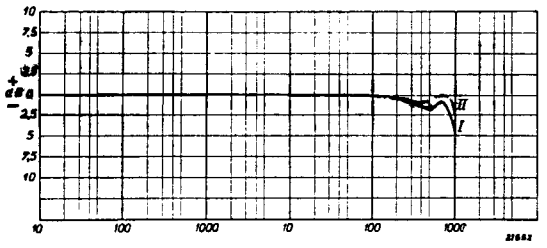
Voor metingen op ultra-korte golven zijn aparte aansluitklemmen aangebracht, die direct met de afbuigingsplaten verbonden zijn.

TECHNISCHE GEGEVENS

Hoogvacuum kathodestraalbuis DN 9—3
met nalichtend scherm, dat groen licht geeft.

Verticale versterker

Een tweetraps versterker met een balans-eindtrap geeft een versterking van omstreeks 1600 maal. Binnen het frequentiebereik van *10 per/sec* tot *1000 kiloper/sec* is de afwijking van het lineaire verloop geringer dan *2 dB* (zie fig. 3).



Frequentiekarakteristiek van den versterker
Fig. 3

Grootste gevoeligheid

Deze bedraagt *6 mV_{eff}/cm* beeldhoogte bij een ingangsimpedantie van *10 000 ohm* en een ingangscapaciteit van omstreeks *10* $\mu\mu F$. De gevoeligheid is continu regelbaar.

Hooge ingangsimpedantie

Bij dezelfde gevoeligheid van *6 mV_{eff}/cm* kan ook een ingangsimpedantie worden verkregen van *1 megohm* met een ingangscapaciteit van ongeveer *12* $\mu\mu F$.

Verminderde gevoeligheid

100 mV_{eff}/cm beeldhoogte bij een ingangsimpedantie van *170 000 ohm* en een ingangscapaciteit van omstreeks *5* $\mu\mu F$.

Aansluiting rechtstreeks aan de afbuigingsplaten

Gevoeligheid *10 V_{eff}/cm* beeldhoogte, ingangsimpedantie *2 megohm*, ingangscapaciteit ongeveer *30* $\mu\mu F$.

Tijdbasis

De frequentie aan de horizontale afbuigingsplaten is in 10 trappen instelbaar tusschen *2 per/sec* en *150 000 per/sec*; bovendien is iedere trap continu regelbaar.

Aansluiting aan het lichtnet

Spanningscarrousel voor *110 V*, *125 V*, *145 V*, *200 V*, *220 V en 245 V* wisselspanning, *40* tot *100 per/sec*. Het instrument kan worden aangesloten op een gelijkstroomnet door middel van een trilleromvormer „Vibraphil", type 7710 voor 110 V—145 V en type 7711 voor 200 V—245 V gelijkspanning. Het totale energieverbruik bedraagt ongeveer *100 W*.

Buizen

Kathodestraalbuis	*DN 9—3*
Versterker:	
3 penthoden	*4673*
Tijdbasis:	
2 penthoden	*4673*
1 penthode	*AL 4*
Voedingsgedeelte:	
Gelijkrichterbuis	*1876*
Gelijkrichterbuis	*AZ 1*
Neon stabilisatiebuis	*7475*

Gewicht:

ongeveer *19 kg*.

Afmetingen:

lengte *42 cm*, breedte *22,5 cm*, hoogte *29 cm*.

Uitvoering voor de tropen

De electrische en mechanische uitvoering is van dien aard, dat het instrument in de tropen gebruikt kan worden.

Een uitvoerige gebruiksaanwijzing wordt bij alle Philips meetinstrumenten geleverd.