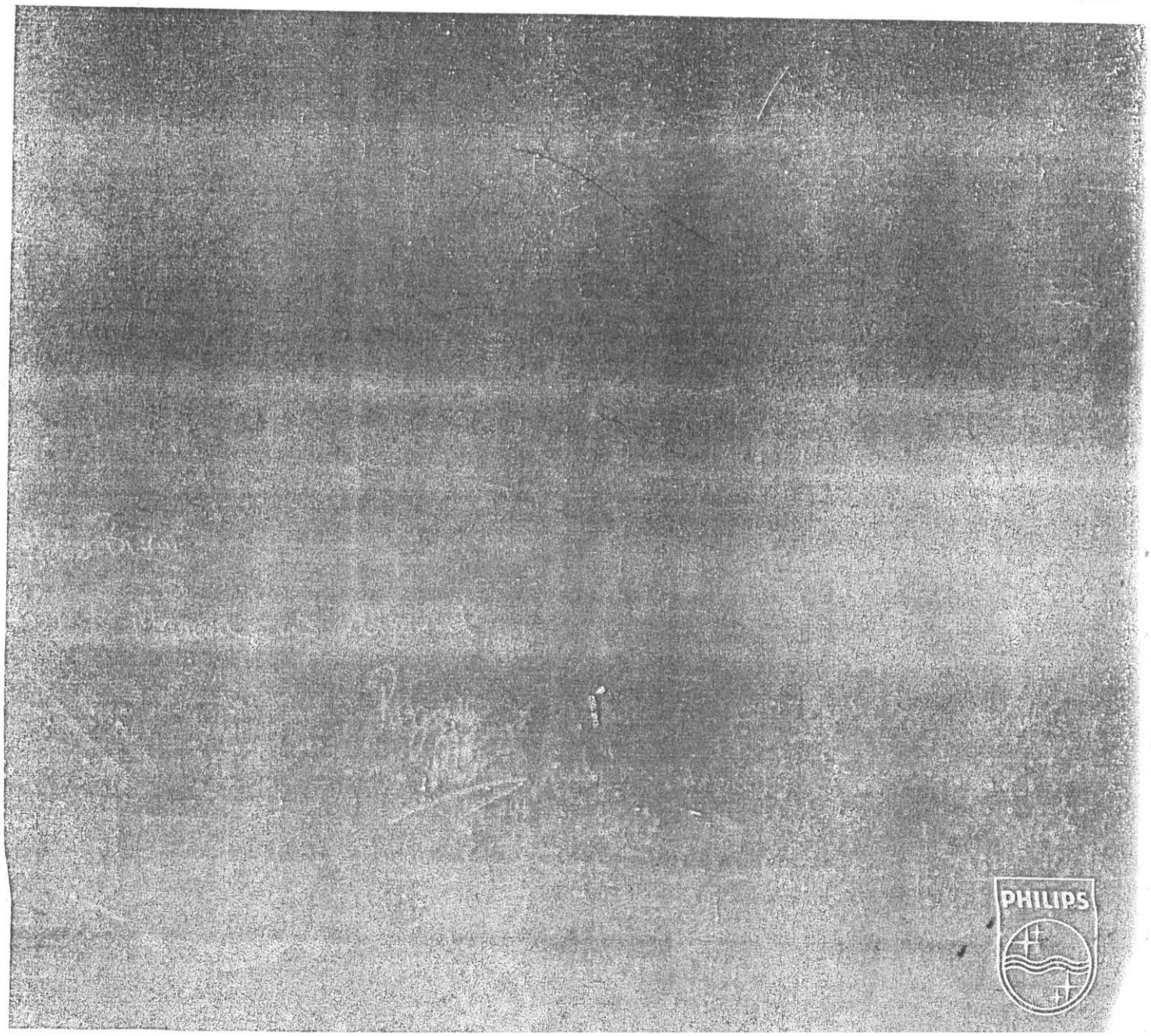
PHILIPS

HF Generator 100kHz-110MHz

PM5324

9452 053 240.1

9499 450 05411 730501/1/01



PHILIPS

Operating manual

HF Generator 100 kHz - 110 MHz PM5324

9452 053 240.1

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730501/1/01

Important

In correspondence concerning this instrument please quote the type number and the serial number as given on the type plate at the rear of the instrument.

Contents

1. GENERAL

1.1. Introduction

AM-FM-Generator PM 5324 produces unmodulated and modulated HF-Signals. It is very useful in radio-servicing and in technical education.

The frequency range is from 0.1 MHz to 110 MHz in 9 sub-ranges.
Fine adjustment of the frequency is effected on a large, illuminated, easy-to-read linear scale. The range which is in use and the scale to be read is indicated by means of LEDs. The output voltage is electronically stabilised and is continuously adjustable.

The AM-FM-Generator may also be used in the frequency range from 150 MHz to 220 MHz, e.g. in band III as a test generator for television sets, or as a generator in the frequency range for taxi-transmission.

With an internal X-tal oscillator the frequency of the generator can be checked and, if necessary, adjusted.

1.2. Technical data

General

- Alternative voltages are stated as r.m.s. values.
- Only values with tolerances and or numerical values are guaranteed.
- Deviations (in % or ppm) apply to the adjusted value.
- Temperature coefficients apply within temperature range.
- All specifications are met after a warming-up time of 30 minutes.

1.2.1. HF-GENERATOR

Frequency range

0.1 MHz up to 110 MHz
9 ranges:

0.1	...	0.3 MHz
0.3	...	1 MHz
1	...	3 MHz
3	...	10 MHz
10	...	30 MHz
30	...	80 MHz
75	...	110 MHz
0.4	...	0.5 MHz
10.3	...	11.1 MHz

Scale

6 linear, illuminated scales

Accuracy

< 1.5 % in the ranges 0.1 ... 80 MHz
< 1 % in range 75 ... 110 MHz
< 0.5 % in range 0.4 ... 0.5 MHz
< 0.2 % in range 10.3 ... 11.1 MHz
< 0.1 % on calibrated points

Long-term stability

< 0.1 % at:
- nominal operating conditions
- mains voltage variations +10 %, −15 %
- measured over 7 hours

Temperature coefficient

$\leqslant 5.2.10^{-4}/^{o}C$

Output HF OUT

Connection : BNC connector
Output voltage: 50 mV into 75 Ω, at unmodulated signal

Frequency-response

0.1 MHz ... 110 MHz	:	⩽ 3 dB
0.4 MHz ... 0.5 MHz	}	⩽ 0.2 dB
10.3 MHz ... 11 MHz	}	

Attenuator

⩾ 60 dB, continuous
for frequencies < 15 MHz: ⩾ 60 dB

1.2.2. MODULATION

Modes

unmodulated	: all ranges
AM	: all ranges
FM	: range 75 ... 110 MHz and 10.3 ... 11.1 MHz
Wobble	: ranges 75 ... 110 MHz, 0.4 ... 0.5 MHz and 10.3 ... 11.1 MHz

AM, internal

Modulation frequency: 1 kHz (sine wave)
Modulation depth : 30 %

AM, external

Input : via BNC connector LF IN
Modulation depth : > 70 %
Modulation coefficient : 0.2 V/10 % AM
3 dB-Band width : 20 Hz ... 20 kHz
Input impedance : 10 kΩ

FM, internal

Modulation frequency : 1 kHz (sine wave)
Sweep (Δf) : 25 kHz, at 10.7 MHz and 97 MHz (dependent on frequency)

FM, external

Input : via BNC connector LF IN
Sweep (Δf) : 75 kHz, at 10.7 MHz and 97 MHz
Modulation coefficient : 0.2 V/7.5 kHz at 10.7 MHz and 97 MHz (dependent on frequency)
3 dB-Band width : 20 Hz ... 60 kHz
Input impedance : 10 kΩ

Wobble

Wobbulating sweep (2Δf):
range 0.4 MHz ... 0.5 MHz, 0 ... 40 kHz at 460 kHz
range 10.3 MHz ... 11.3 MHz, 0 ... 600 kHz at 10.7 MHz
Wobble frequency: 25 Hz (sawtooth)

1 kHz Output

BNC connector; combined with sweep output
Voltage : 2 V
Frequency : 1 kHz (sine wave)
Impedance : 1 kΩ

Sweep output

BNC connector; combined with 1 kHz output
Voltage : 10 V_{p-p}
Frequency : 25 Hz (saw tooth)
Impedance : 1 kΩ

1.2.3. CALIBRATION

Frequency

10 MHz
1 MHz
0.1 MHz
} spectrum with at least 10 harmonics for every frequency

Error

< 0.02 %

Frequency distance of the calibration points

Range	Distance
0.1 ... 0.3 MHz	0.1 MHz
0.3 ... 1 MHz	0.1 MHz
1 ... 3 MHz	1 MHz
3 ... 10 MHz	1 MHz
10 ... 30 MHz	10 MHz
30 ... 80 MHz	10 MHz
75 ... 110 MHz	10 MHz
0.4 ... 0.5 MHz	0.1 MHz
10.3 ... 11.1 MHz	0.1 MHz

Zero beat indication

By moving coil instrument, illuminated when button CAL. is pressed

1.2.4. SUPPLY

Nominal mains voltage

220 V
Also possible 110 V, 128 V, 202 V and 238 V

Mains voltage deviation

+10 %, −15 %

Frequency

48 ... 60 Hz

Consumption

11 W, 13 VA

1.2.5. TEMPERATURE RANGE

Reference temperature	+25 °C
Temperature tolerance range	+5 °C ... +40 °C
Storage temperature	−40 °C ... +70 °C

1.2.6. MECHANICAL DATA

Dimensions	Height : 192 mm Width : 287 mm Depth : 290 mm
Weight	5 kg

1.3. Accessories

1.3.1. INCLUDED AS STANDARD

- Mains cable
- Directions for use

1.3.2. OPTIONAL

- Coax cable BNC→2 x 4 mm PM 9072
- Coax cable BNC→BNC, 75 Ω PM 9075
- Impedance transformer PM 9537

1.4. Description of the block diagram

The frequency of the generator is determined by an HF-oscillator the amplitude of which is electronically stabilised. Frequency ranges are selected with push-button MHz. Within the selected range the frequency can be adjusted continuously by control FREQUENCY.

A frequency-modulator provides voltage-controlled frequency modulation of the HF-oscillator - e.g. for wobbulating purposes - in the ranges 75 MHz ... 110 MHz, 0.4 MHz ... 0.5 MHz and 10.3 MHz ... 11.1 MHz (⩘).

In the amplitude-modulator the amplitude of the HF-signal can be modulated in all frequency ranges and the HF-signal blanked during fly-back at mode WOB (⩘).

The HF-output stage amplifies the power of the HF-signal, the amplitude of which is adjustable continuously with attenuator HF AMPLITUDE.

The output signal is available at connector HF OUT; the output impedance amounts to 75 Ω.

If button CAL. is pressed an X-tal controlled calibration oscillator produces harmonics to check the calibration of the scale. The markers are at a distance of 10 MHz, 1 MHz or 0.1 MHz, depending on the selected frequency range.

In the mixer the signals of the HF-output stage and of the calibration oscillator are mixed. The low-frequency signal which is obtained at approximately equal frequencies of both signals is amplified, limited, rectified and indicated by a moving coil meter. If the HF-frequency control is set at a calibration frequency, the indicator, at exactly equal frequencies, indicates a sharp, limited minimum between two full scales. (Fig. 1).

A 1 kHz-sine wave signal, produced by a 1 kHz oscillator, is used for amplitude- or frequency modulation and selected by push-buttons AM or FM. The 1 kHz signal is also available at connector 1 kHz/SWEEP OUT if button WOB has not been depressed. If button AM EXT. or FM EXT. has been depressed the HF-signal can be modulated by an external signal supplied to connector LF IN.
If button WOB has been depressed, a saw-tooth signal, produced by a saw-tooth generator, is supplied to the frequency modulator. The sweep of the frequency can be adjusted by potentiometer SWEEP WIDTH. At the same time the saw-tooth signal with constant amplitude is available at connector 1 kHz/SWEEP OUT.
A square-wave pulse derived from the saw-tooth signal blanks the output stage during fly-back.

The supply section delivers two stabilised direct voltages (−12 V and −18 V) and an alternating voltage for illumination of the scale.

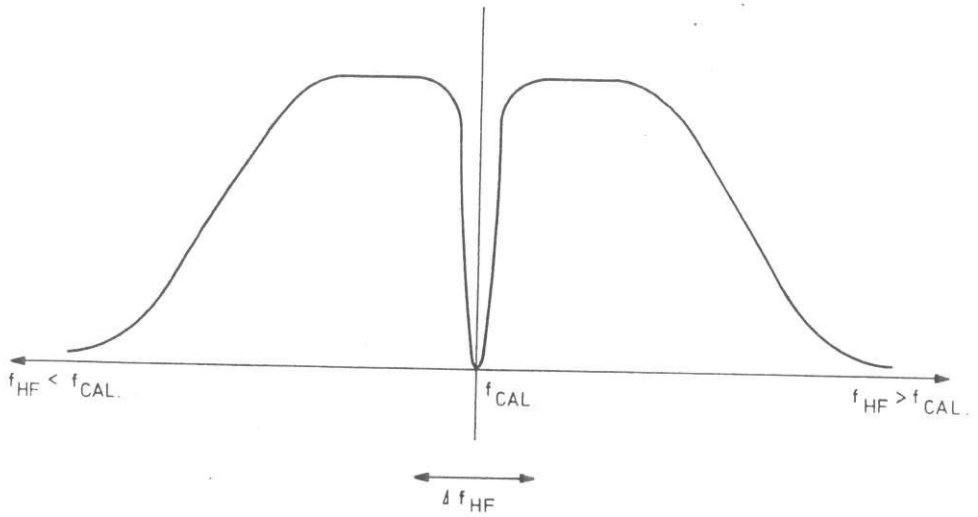


Fig. 1. Zero beat indication

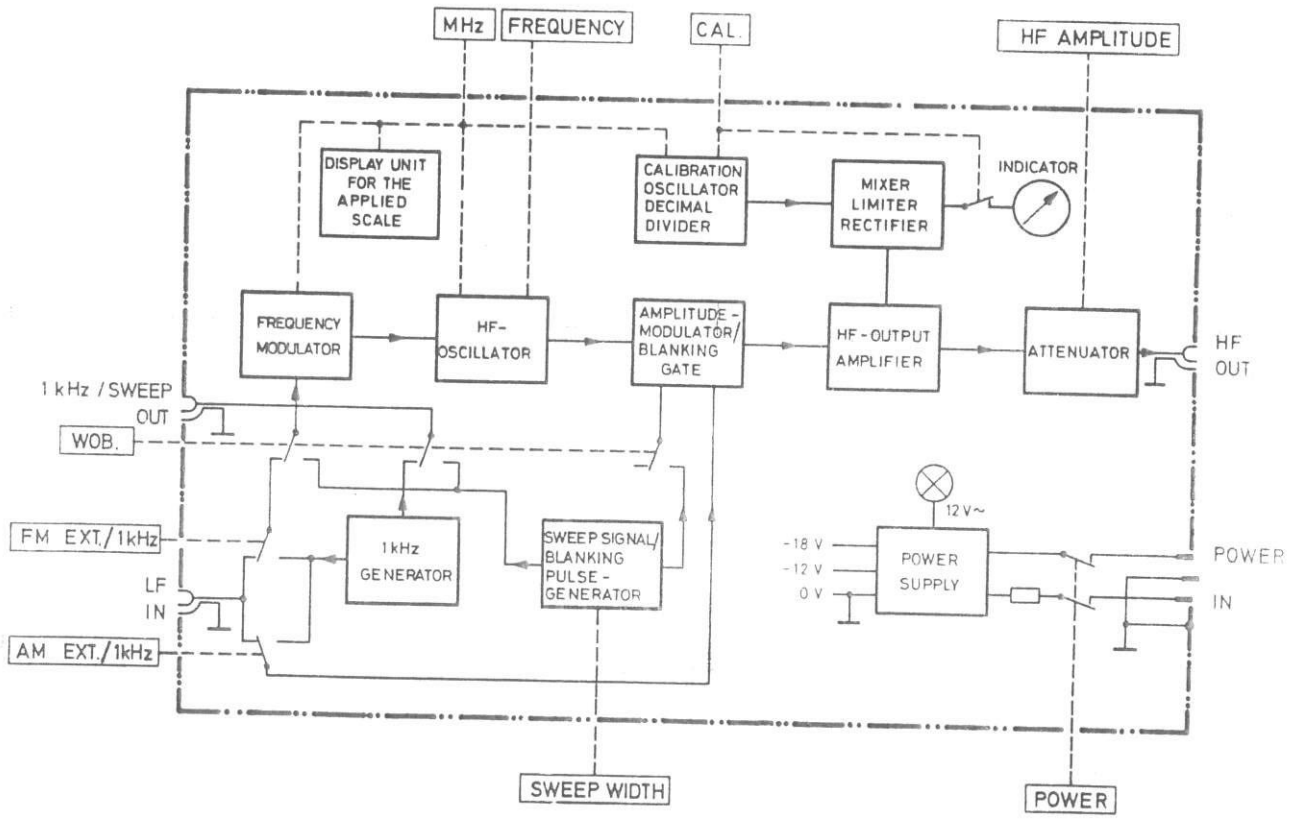


Fig. 2. Block diagram

2. DIRECTIONS FOR USE

2.1. Installation

2.1.1. POSITION

The instrument may be used in any position except on its rear end. Make sure that the instrument is not exposed to excessive heat.

2.1.2. CONNECTION TO THE MAINS

The instrument must have a.c. supply only. On delivery, it is set for a mains voltage of 220 V. Setting for a different mains voltage is done as follows:

- Remove the left screw of the handle bar and take off the left side-plate.
- Change the primary connections of the mains transformer according to Fig. 3, a diagram of which is in the inside of side-plate.
- Change the mains voltage indication-plate at the rear.
- Refit the handle bar.
- Connect up the instrument.

2.1.3. EARTHING

The instrument must be earthed in accordance with the local safety regulations. The mains cable supplied is provided with an earth core which is connected to the earth contacts of the mains plug. If the instrument is connected to a mains socket with earth contacts, the cabinet is automatically earthed.

The circuit earth of the instrument and the chassis-connection of the BNC-connectors are at chassis potential.

Earthing the instrument via the chassis-connection of the BNC-connectors is not permitted.

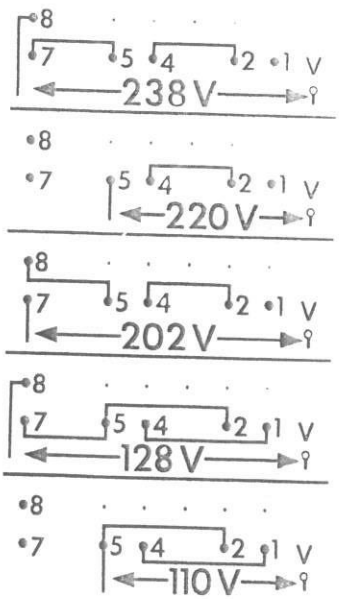


Fig. 3. Changing the primary connections of the mains transformer

2.2. Operation

2.2.1. SWITCHING ON

- Connect the instrument to a mains socket with earthing contacts.
- Switch on by means of switch POWER; the scale illumination lights up and a white field in the button-cap shows that the mains switch is on.

2.2.2. ADJUSTING THE FREQUENCY

- Select the required frequency range with one of the range buttons MHz; the corresponding range-scale is indicated by a LED at the left side of the scale window.
- Adjust to nominal frequency with potentiometer FREQUENCY.

2.2.3. ADJUSTING THE MODE

The mode is selected by depressing one of the 6 buttons in the left row of buttons.
If no button has been pressed the generator supplies an unmodulated HF-signal with the adjusted frequency and amplitude.
Buttons CAL., AM/EXT., AM/1 kHz, FM/EXT. and FM/1 kHz unlock each other automatically, thus only one button can be depressed at a time.
Button WOB. may be unlocked by pressing the button a second time, independently of the other buttons.
The mode-buttons may be combined with the frequency-range buttons according the table given below.

Range button	Mode button (selectable)				extra
(MHz)	CAL	AM	FM	WOB	WOB + AM
0.1 – 0.3	X	X			
0.3 – 1	X	X			
1 – 3	X	X			
3 – 10	X	X			
10 – 30	X	X			
30 – 80	X	X			
75 – 110	X	X	X	X	X
0.4 – 0.5	X	X		X	X
10.3 – 11.1	X	X	X	X	X

2.2.4. APPLICATION

2.2.4.1. Unmodulated HF-signal generator

- Depress the required range button MHz.
- The selected range scale is indicated by a LED.
- Set the pointer at the required frequency by means of potentiometer FREQUENCY.
  Not marked frequency values should be interpolated between two marks.
- If necessary, calibrate the frequency at the nearest calibration-mark according to sub-para 2.2.4.5.
- Unlock the mode-buttons (left row of buttons).
- Apply the HF-signal, available at BNC connector HF OUT, across a cable to the object to be measured (see accessories, chapter 1.3.).
- Adjust the required output voltage with potentiometer HF AMPLITUDE.

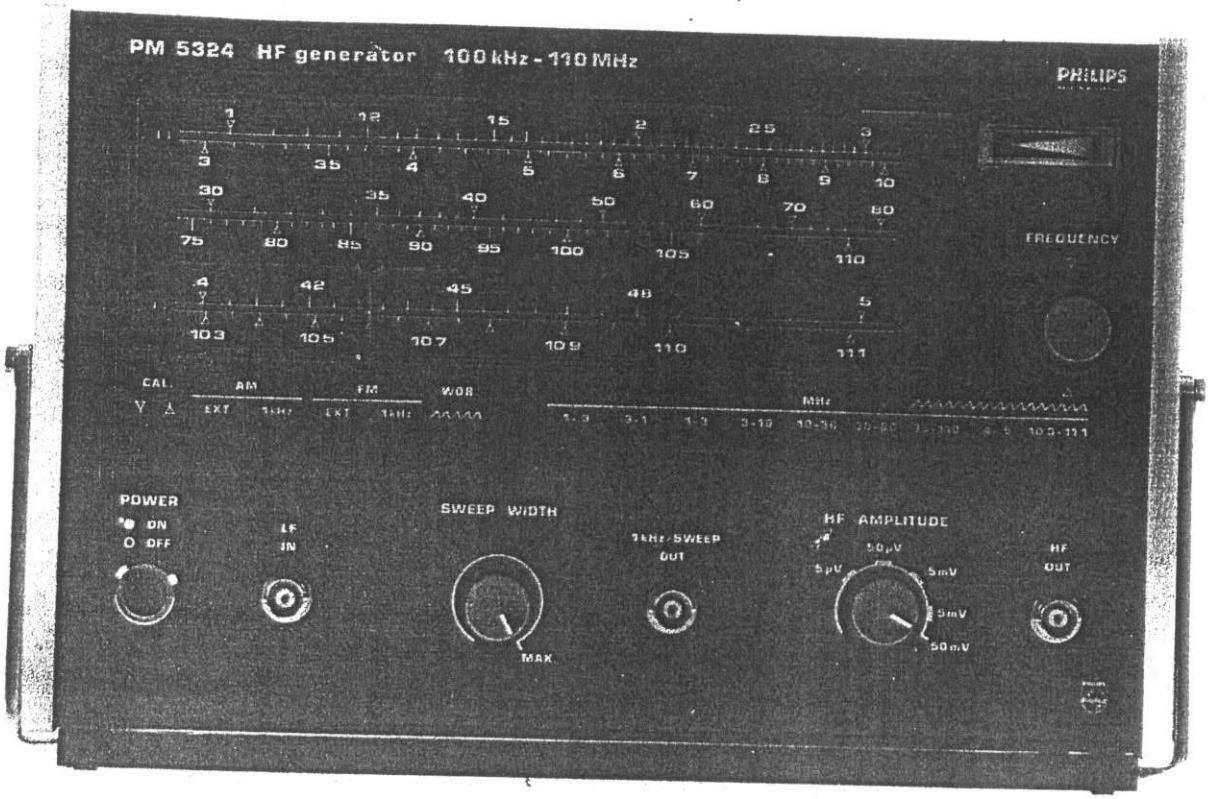


Fig. 4. Front view

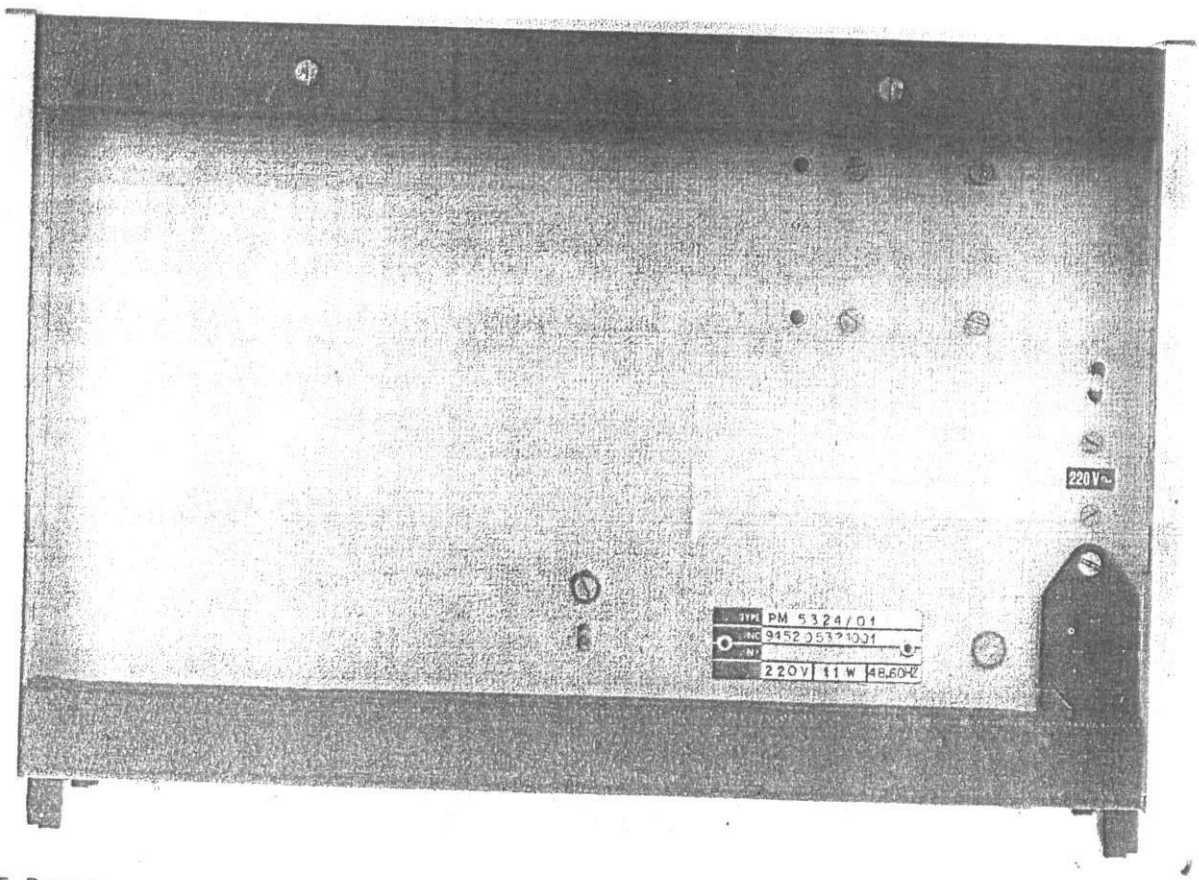


Fig. 5. Rear view

2.2.4.2. Amplitude-modulated (AM) HF-signal generator

Internal

- Preliminary adjustment according to chap. 2.2.4.1. .
- Press button AM/1 kHz. The HF-signal is modulated in amplitude by 30 % at an internal frequency of 1 kHz.
- For indications on checking and adjusting, see the individual checking and adjusting procedures for the object to be measured or chapter 2.3. .

External

- Preliminary adjustment according to chap. 2.2.4.1. .
- Press button AM/EXT.
- Supply the modulation voltage to connector LF IN; maximum 16 V peak-peak, maximum d.c. level ±12 V.
- External modulation frequency 20 Hz ... 20 kHz.
- Adjust the modulation depth by the amplitude of the modulation voltage; voltage necessary 0.2 V/10 % amplitude-modulation.

2.2.4.3. Frequency-modulated (FM) HF-signal generator

Internal

- Press buttons 75 - 110 or 10.3 - 11.1 MHz.
  The selected range scale is indicated by a LED.
- Set the pointer at the required frequency by potentiometer FREQUENCY.
  Not marked frequency values should be interpolated between two marks.
- If necessary, calibrate the frequency at the nearest calibration-mark according to sub-para 2.2.4.5. .
- Press button FM/1 kHz; the HF-signal is modulated in frequency by 1 kHz and a frequency sweep of about 25 kHz.
- Apply the signal, available at BNC connector HF OUT, across a cable to the object to be measured. (see accessories, chapter 1.3.).
- Adjust the required output voltage by means of potentiometer HF AMPLITUDE.

Note

When using harmonics the frequency sweep is multiplied by the order-number of the harmonics.

External

- Preliminary adjustment according to chap. 2.2.4.3. .
- Press button FM/EXT.
- Supply the modulation voltage to BNC connector LF IN; maximum input voltage 70 V peak-peak.
- Adjust the external modulation frequency; 20 Hz ... 60 kHz.
- Adjust the modulation sweep with the external voltage; necessary voltage 0.2 V/7.5 kHz sweep (maximum sweep 75 kHz).
- If necessary, supply a multiplex-signal to BNC connector LF IN

2.2.4.4. Wobble generator

- Press range-button 75 ... 110 or 10.3 ... 11.1 MHz.
  The selected range-scale is indicated by a LED.
- Set the pointer to the required frequency by potentiometer FREQUENCY.
  Not marked frequency values should be interpolated.
- Press button WOB.
- Connect BNC-connector 1 kHz/SWEEP OUT to the X-input of an oscilloscope.
- Adjust the X-amplitude of the oscilloscope.
- Apply the wobbulated signal across a cable to the object to be tested.

- Set the band-pass curve at the middle of the picture with potentiometer FREQUENCY.
- Adjust the height of the band-pass curve with potentiometer HF AMPLITUDE.
- Adjust the width of the band-pass curve with potentiometer SWEEP WIDTH.
- Check the band-pass curve; if necessary, correct it. The effect of an adjustment can be determined immediately on the band-pass curve.

Note

When using harmonics the frequency sweep is multiplied by the order number of the harmonics.

Determining the band width

By defined shifting in the horizontal direction the band width (at 70 % of the height of the picture) can be determined as follows:

- Position the point of intersection, e.g. of the right edge of the band-pass curve and a fictitions horizontal line at 70 % of the height of the curve on a prominent point on the graticule by means of potentiometer FREQUENCY.
- Read the frequency at the scale and note the value.
- Shift the band-pass curve horizontally with potentiometer FREQUENCY so that the second edge is positioned at the same fictitions point of intersection (at 70 % of the height of the picture) as in the first adjustment.
- Read the frequency; the difference between the two frequencies is the band width.

Note

Use a d.c. indicator (oscilloscope or meter) so that the base line is horizontal and undistorted at a large wobbulating-sweep.

2.2.4.5. Calibration

The calibration points are indicated on the scale by the symbol ▽ or △ . A moving coil meter, which is illuminated at calibration mode, serves as indicator.

Checking

If a very accurate HF-signal, e.g. of 21.5 MHz is needed, this can be checked as follows:

- Switch on the instrument and wait at least 30 minutes for it to warm up.
- Depress range-button 10 - 30 MHz; the diode alongside the top scale will light up.
- Depress button CAL.; the indicator will light up. If necessary, unlock button WOB. .
- Set the scale pointer to that calibration mark (▽ at mark .2) which is nearest to the nominal value of 21.5 MHz.
- Set the scale pointer exactly on the minimum which lies between two full-scale deflections of the indicator.
- Check, that the line of the scale pointer corresponds to the calibration mark.

Calibration

If the line of the scale pointer is not exactly over the calibration mark calibrate as follows:

- Set the scale pointer exactly on the calibration mark.
- Hold the largest knob of control FREQUENCY with one hand.
- Adjust the smaller knob – against the resistance of the slipping clutch – to obtain the required minimum (zero beat) between two maxima.
- Release the large button.
- Adjust for exact zero beat.
- Check that the line of the scale pointer corresponds to the calibration mark. Repeat the calibration procedure, if necessary.

2.2.4.6. 1 kHz-Generator

- Release all push-buttons, especially button WOB.
- The 1 kHz-signal, with an amplitude of 2 $V_{r.m.s.}$, is available at BNC-connector 1 kHz/SWEEP OUT.

List of parts

MECHANICAL

Item	*Fig.*	*Qty*	*Ordering number*	*Description*
1		2	5322 460 60017	Ornamental strip
2		2	5322 460 60014	Ornamental surround
3		1	5322 414 74024	Knob, Ø 18.7
4		1	5322 414 74025	Knob, Ø 24
5		1	5322 414 74022	Knob cover
6		1	5322 447 94107	Securety cover
7		2		Washer handle-bracket
8		2	5322 310 10044	Handle-bracket screw
9		2		Handle bar
10		2		Screw for handle bar
11		1	5322 276 84034	Push-button switch
12		3	5322 267 10004	BNC-connector 851-853
13		2	5322 414 74021	Knob cover
14		2	5322 414 74023	Knob, Ø 18.7
15		1	5322 455 74022	Textplate
16		1	5322 276 14128	Mains switch 801
17		1	5322 276 64009	Push-button switch 803
18		1	5322 450 84015	Pointer
19		1	5322 450 64041	Plexiglass window
20		4	5322 462 50101	Foot
21		4	5322 462 40157	Rubber stud
22		1	5322 492 64347	Spring
23		1	5322 265 30066	Mains input connector 854
24		1	5322 255 44064	Heat sink
25		1	5322 255 44065	Mica washer
26		1	4822 390 20023	Silicon grease
27		1	5322 450 34022	Scale
28		1	5322 528 24057	Drive
29		1	5322 502 14083	Grub screw
30		1	5322 358 54039	Ball-cord
31		2	5322 522 34452	Return sheave
32		1	5322 321 10071	Mains cable

This parts list does not contain multi-purpose and standard parts. These components are indicated in the circuit diagram by means of identification marks. The specification can be derived from the survey below.

Diese Ersatzteilliste enthält keine Universal- und Standard-Teile. Diese sind im jeweiligen Prinzipschaltbild mit Kennzeichnungen versehen. Die Spezifikation kann aus nachstehender Übersicht abgeleitet werden.

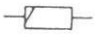
In deze stuklijst zijn geen universele en standaardonderdelen opgenomen. Deze componenten zijn in het principeschema met een merkteken aangegeven. De specificatie van deze merktekens is hieronder vermeld.

La présente liste ne contient pas des pièces universelles et standard. Celles-ci ont été repérées dans le schéma de principe. Leurs specifications sont indiquées ci-dessous.

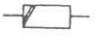
Esta lista de componentes no comprende componentes universales ni standard. Estos componentes están provistos en el esquema de principio de una marca. El significado de estas marcas se indica a continuación.

Carbon resistor E24 series
Kohleschichtwiderstand, Reihe E24
Koolweerstand E24 reeks
Résistance au carbone, série E24
Resistencia de carbón, serie E24
0,125 W 5%

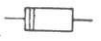
Carbon resistor E12 series
Kohleschichtwiderstand, Reihe E12
Koolweerstand E12 reeks
Résistance au carbone, série E12
Resistencia de carbón, serie E12
0,25 W ≦ 1 MΩ, 5%
> 1 MΩ, 10%



Carbon resistor E24 series
Kohleschichtwiderstand, Reihe E24
Koolweerstand E24 reeks
Résistance au carbone, série E24
Resistencia de carbón, serie E24
0,5 W ≦ 5 MΩ, 1%
> 5 ≦ 10 MΩ, 2%
> 10 MΩ, 5%

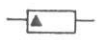


Carbon resistor E12 series
Kohleschichtwiderstand, Reihe E12
Koolweerstand E12 reeks
Résistance au carbone, série E12
Resistencia de carbón, serie E12
0,5 W ≦ 1,5MΩ, 5%
> 1,5MΩ, 10%



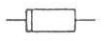
Wire-wound resistor
Drahtwiderstand
Draadgewonden weerstand
Résistance bobinée
Resistencia bobinada
10 W 5%

Carbon resistor E12 series
Kohleschichtwiderstand, Reihe E12
Koolweerstand E12 reeks
Résistance au carbone, série E12
Resistencia de carbón, serie E12
1 W ≦ 2,2 MΩ, 5%
> 2,2 MΩ, 10%



Carbon resistor E12 series
Kohleschichtwiderstand, Reihe E12
Koolweerstand E12 reeks
Résistance au carbone, série E12
Resistencia de carbón, serie E12
2 W 5%

Wire-wound resistor
Drahtwiderstand
Draadgewonden weerstand
Résistance bobinée
Resistencia bobinada
0,4 – 1,8 W 0,5%



Wire-wound resistor
Drahtwiderstand
Draadgewonden weerstand
Résistance bobinée
Resistencia bobinada
5,5 W ≦ 200 Ω, 10%
> 200 Ω, 5%

Tubular ceramic capacitor
Rohrkondensator
Keramische kondensator, buistype
Condensateur céramique tubulaire
Condensador cerámico tubular
500 V

Tubular ceramic capacitor
Rohrkondensator
Keramische kondensator, buistype
Condensateur céramique tubulaire
Condensador cerámico tubular
700 V

Ceramic capacitor, "pin-up"
Keramikkondensator "Pin-up" (Perltyp)
Keramische kondensator "Pin-up" type
Condensateur céramique, type perle
Condensador cerámico, versión "colgable"
500 V

"Microplate" ceramic capacitor
Miniatur-Scheibenkondensator
"Microplate" keramische kondensator
Condensateur céramique "microplate"
Condensador cerámico "microplaca"
30 V

Mica capacitor
Glimmerkondensator
Micakondensator
Condensateur au mica
Condensador de mica
500 V

Polyester capacitor
Polyesterkondensator
Polyesterkondensator
Condensateur au polyester
Condensador polyester
400 V

Flat-foil polyester capacitor
Miniatur-Polyesterkondensator (flach)
Platte miniatuur polyesterkondensator
Condensateur au polyester, type plat
Condensador polyester, tipo de placas planas
250 V

Paper capacitor
Papierkondensator
Papierkondensator
Condensateur au papier
Condensador de papel
1000 V

Wire-wound trimmer
Drahttrimmer
Draadgewonden trimmer
Trimmer à fil
Trimmer bobinado

Tubular ceramic trimmer
Rohrtrimmer
Buisvormige keramische trimmer
Trimmer céramique tubulaire
Trimmer cerámico tubular

For multi-purpose and standard parts, please see PHILIPS' Service Catalogue.
Für die Universal- und Standard-Teile siehe den PHILIPS Service-Katalog.
Voor universele en standaardonderdelen raadplege men de PHILIPS Service Catalogus.
Pour les pièces universelles et standard veuillez consulter le Catalogue Service PHILIPS.
Para piezas universales y standard consulte el Catálogo de Servicio PHILIPS.

Resistors

Item	*Ordering number*	*Value (Ω)*	*%*	*Type*	*Description*
601	5322 105 40007	75	25	0.1 W	HF-voltage divider
602	5322 101 24012	22 k			Potentiometer
Unit 1					
606	5322 116 50253	324 k	1	MR30	Metal film
607	5322 100 10088	220 k	20	0.1 W	Potentiometer
608	4822 100 10107	470 k	20	0.1 W	Potentiometer
609	5322 100 10088	220 k	20	0.1 W	Potentiometer
610	5322 116 54328	51 k	2	CR25	Carbon
612	5322 100 10036	4.7 k	20	0.1 W	Potentiometer
614	5322 116 50524	3 k	2	CR25	Carbon
616	5322 116 54328	51 k	2	CR25	Carbon
623	5322 116 54202	7.5 k	2	CR25	Carbon
626	5322 116 50095	510 k	2	CR25	Carbon
628	5322 116 54207	1 k	2	CR25	Carbon
630	5322 116 50752	1.5 k	2	CR25	Carbon
631	5322 100 10036	4.7 k	20	0.1 W	Potentiometer
663	5322 116 54188	1 M	1	MR30	Metal film
665	5322 116 54327	10 k	1	MR25	Metal film
666	5322 116 50726	36.5 k	1	MR25	Metal film
667	5322 116 50897	18.2 k	1	MR25	Metal film
668	5322 116 50666	73.2 k	1	MR25	Metal film
669	5322 116 50446	66.5 k	1	MR25	Metal film
Unit 2					
601	**5322 116 50524**	3 k	2	CR25	Carbon
602	**5322 116 54148**	9.1 k	2	CR25	Carbon
603	**5322 116 50859**	91 k	2	CR25	Carbon
604	**5322 116 54293**	4.7 k	2	CR25	Carbon
605	**5322 116 54147**	3.9 k	2	CR25	Carbon
606	**5322 116 54079**	36 k	2	CR25	Carbon
607	5322 116 50872	62 k	2	CR25	Carbon
611	**5322 116 50747**	1 k	2	CR25	Carbon
612	5322 116 50603	360 k	2	CR25	Carbon
614	5322 116 54405	750 k	2	CR25	Carbon
615	5322 116 54343	5.1 k	2	CR25	Carbon
616	5322 116 50747	1 k	2	CR25	Carbon
617	5322 116 50603	360 k	2	CR25	Carbon
621	5322 116 50309	24 k	2	CR25	Carbon
623	5322 116 54191	30 k	2	CR25	Carbon
624	5322 116 54171	2.2 k	2	CR25	Carbon
625	5322 116 54089	6.2 k	2	CR25	Carbon
629	5322 116 54343	5.1 k	2	CR25	Carbon
632	4822 100 10035	10 k	20	0.1 W	Potentiometer
635	5322 116 54001	15 k	1	MR25	Metal film
636	5322 116 54202	7.5 k	1	MR25	Metal film
638	4822 100 10029	2.2 k	20	0.1 W	Potentiometer

Capacitors

Item	*Ordering number*	*Value*	*%*	*V*	*Description*
581	5322 122 70069	100 pF	10	350	Lead feed-through
582	5322 122 70069	100 pF	10	350	Lead feed-through
583	4822 122 70063	2.2 nF	−20/+50	400	Feed-through
584	4822 122 70063	2.2 nF	−20/+50	400	Feed-through
585	4822 122 70063	2.2 nF	−20/+50	400	Feed-through
586	4822 122 70063	2.2 nF	−20/+50	400	Feed-through
587	4822 122 70063	2.2 nF	−20/+50	400	Feed-through
588	4822 122 70063	2.2 nF	−20/+50	400	Feed-through
589	4822 122 70063	2.2 nF	−20/+50	400	Feed-through
590	4822 122 70063	2.2 nF	−20/+50	400	Feed-through
591	4822 122 70063	2.2 nF	−20/+50	400	Feed-through
592	4822 122 70063	2.2 nF	−20/+50	400	Feed-through
593	4822 122 70063	2.2 nF	−20/+50	400	Feed-through
594	4822 122 70063	2.2 nF	−20/+50	400	Feed-through
595	4822 122 70063	2.2 nF	−20/+50	400	Feed-through
Unit 1					
596	5322 125 14009				Tuning
501	4822 125 50045	2...22 pF		100	Trimmer
503	4822 125 50045	2...22 pF		100	Trimmer
505	4822 125 50045	2...22 pF		100	Trimmer
507	4822 125 50045	2...22 pF		100	Trimmer
508	4822 122 31072	4.7 pF	±0.25 p	100	Ceramic
509	4822 122 31177	470 pF	2	100	Ceramic
510	4822 125 50045	2...22 pF		100	Trimmer
511	4822 122 31061	18 pF	2	100	Ceramic
512	4822 125 50045	2...22 pF		100	Trimmer
514	4822 125 50045	2...22 pF		100	Trimmer
515	4822 122 31061	18 pF	2	100	Ceramic
516	4822 125 50045	2...22 pF		100	Trimmer
518	4822 125 50017	5.5...65 pF		100	Trimmer
519	4822 122 31081	100 pF	2	100	Ceramic
520	4822 122 31056	12 pF	2	100	Ceramic
521	4822 122 31177	470 pF	2	100	Ceramic
522	4822 122 31165	300 pF	2	100	Ceramic
523	5322 122 10107	100 nF	−20/+80	30	Ceramic
524	5322 121 40197	1 µF	20	100	Polyester
525	5322 122 30103	22 nF	−20/+100	40	Ceramic
526	5322 122 30103	22 nF	−20/+100	40	Ceramic
527	4822 122 31211	100 pF	5	400	Ceramic
528	5322 122 10107	100 nF	−20/+80	30	Ceramic
529	5322 122 30103	22 nF	−20/+100	40	Ceramic
530	4822 124 20461	47 µF		10	Electrolytic
531	5322 122 30103	22 nF	−20/+100	40	Ceramic
532	5322 122 30103	22 nF	−20/+100	40	Ceramic
533	5322 122 30103	22 nF	−20/+100	40	Ceramic
534	4822 124 20475	10 µF		25	Electrolytic
535	5322 122 30109	1.5 pF	0.25 p	100	Ceramic
536	5322 122 30103	22 nF	−20/+100	40	Ceramic
537	5322 122 10107	100 nF	−20/+80	30	Ceramic
538	4822 125 50017	5.5...65 pF		100	Trimmer
539	4822 122 31177	470 pF	2	100	Ceramic

Item	Ordering number	Value	%	V	Description
540	5322 122 10107	100 nF	−20/+80	30	Ceramic
541	5322 122 30103	22 nF	−20/+100	40	Ceramic
542	4822 125 50045	2...22 pF		100	Trimmer
543	4822 122 31063	22 pF	2	100	Ceramic
544	4822 122 31175	1 nF	10	100	Ceramic
545	4822 122 31081	100 pF	2	63	Ceramic
546	5322 122 10107	100 nF	−20/+80	30	Ceramic
547	4822 122 31207	68 pF	10	400	Ceramic
548	4822 122 31207	68 pF	10	400	Ceramic
549	5322 122 10107	100 nF	−20/+80	30	Ceramic
550	4822 122 31207	68 pF	10	400	Ceramic
551	4822 122 31165	300 pF	2	100	Ceramic
552	5322 121 40323	100 nF	10	100	Polyester
553	5322 124 24063	1 µF		63	Electrolytic
554	5322 122 10107	100 nF	−20/+80	30	Ceramic
555	4822 124 20476	22 µF		25	Electrolytic
556	4822 124 20461	47 µF		10	Electrolytic
557	5322 122 30103	22 nF	−20/+100	40	Ceramic
558	4822 124 20476	22 µF		25	Ceramic
559	4822 121 40045	22 nF	10	250	Polyester
560	5322 122 10107	100 nF	−20/+80	30	Ceramic
561	4822 121 40232	220 nF	20	100	Polyester
562	5322 122 10107	100 nF	−20/+80	30	Ceramic
563	4822 122 31211	100 pF	5	400	Ceramic
564	5322 122 30103	22 nF	−20/+100	40	Ceramic
565	4822 124 20461	47 µF		10	Electrolytic
566	4822 122 31072	47 pF	2	100	Ceramic
567	4822 124 20463	100 µF		10	Electrolytic
568	5322 122 30103	22 nF	−20/+100	40	Ceramic
Unit 2					
501	5322 121 40283	3.3 µF	10	100	Polyester
502	4822 124 20461	47 µF		10	Electrolytic
503	4822 124 20514	1000 µF		6.3	Electrolytic
504	4822 124 20461	47 µF		10	Electrolytic
505	5322 124 24063	1 µF		63	Electrolytic
506	5322 121 40323	100 nF	10	100	Polyester
507	5322 121 40323	100 nF	10	100	Polyester
508	5322 124 24063	1 µF		63	Electrolytic
509	4822 124 20461	47 µF		10	Electrolytic
510	5322 124 24063	1 µF		63	Electrolytic
511	4822 124 20529	1000 µF		25	Electrolytic
512	4822 124 20529	1000 µF		25	Electrolytic
513	4822 121 50414	3 nF	5	63	Polyester
514	4822 124 20476	22 µF		25	Electrolytic
515	4822 122 31175	1 nF	10	100	Ceramic
516	4822 122 31175	1 nF	10	100	Ceramic

Miscellaneous

Item	*Ordering number*	*Description*
391	5322 216 64112	Unit 1; printed wiring board
392	5322 216 64113	Unit 2; printed wiring board
393	5322 216 64114	Unit 3; printed wiring board
751	5322 146 24059	Mains transformer
752	5322 242 74036	Quartz crystal 10 MHz
761	5322 156 14019	L1, Coil 3.56 mH
762	5322 156 14021	L2, Coil 366 μH
763	5322 156 14022	L3, Coil 35.6 μH
764	5322 156 14023	L4, Coil 3.66 μH
765	5322 156 14024	L5, Coil 0.3 μH
766	5322 157 44001	L6, Coil
767	5322 157 44002	L7, Coil
768	5322 156 14025	L8, Coil 1.58 mH
769	5322 156 14026	L9, Coil 0.94 μH
770	5322 158 14044	Coil 1.5 mH
771	5322 158 10278	Coil 1 mH
772	5322 158 14065	Coil 47 mH
811	5322 134 44072	Lamp, 40 mA
812	5322 134 44072	Lamp, 40 mA
813	5322 134 44072	Lamp, 40 mA
815	5322 344 64041	Indicator 120 μA, Ri = 1500 Ω

Semi-conductors

Diodes

Type	*Ordering number*	*Qty*	*Location*
BB106	5322 130 30769	5	Unit 1: 401, 402, 403, 411, 412
BAX13	5322 130 40182	6	Unit 1: 404, 405, 406, 407, 408, 410
AA119	5322 130 40229	1	Unit 1: 409
BA217	4822 130 30703	4	Unit 1: 413, 414, 415
			Unit 2: 402
BA216	5322 130 30702	1	Unit 2: 401
BZX79-C5V1	5322 130 30767	1	Unit 2: 404
BY164	5322 130 30414	1	Unit 2: 405
MV50	5322 130 34259	6	Unit 3: 491, 492, 493, 494, 495, 496

Transistors

Type	*Ordering number*	*Qty*	*Location*
BD135	5322 130 40645	1	311
BD136	5322 130 40712	1	314
BFX89	5322 130 40542	8	Unit 1: 301, 302, 304, 308, 309, 310, 311, 312
BFW10	5322 130 40443	1	Unit 1: 303
BF254	5322 130 44117	2	Unit 1: 305, 306
BC238C	5322 130 44198	5	Unit 1: 307, 314, 315
			Unit 2: 304, 306
BC238	5322 130 40758	4	Unit 1: 313
			Unit 2: 305, 307, 312
BC308	5322 130 44119	3	Unit 2: 301, 302, 313

Integrated circuits

Type	*Ordering number*	*Qty*	*Location*
FJH131/7400	5322 209 84143	1	Unit 1: 321
SN7490N	5322 209 84114	2	Unit 1: 322, 323
TAA310A	5322 209 84361	1	Unit 1: 324
CA3086	5322 209 84111	1	Unit 2: 321
SN72741P	5322 209 84163	2	Unit 2: 322, 323

QUALITY REPORTING

CODING SYSTEM FOR FAILURE DESCRIPTION

The following information is meant for Philips service workshops only and serves as a guide for exact reporting of service repairs and maintenance routines on the workshop charts.
For full details reference is made to Information G1 (Introduction) and Information Cd 689 (Specific information for Test and Measuring Instruments).

LOCATION

□□□
Unit number
e.g. 000A or 0001 (for unit A or 1; not 00UA or 00U1)

or: Type number of an accessory (only if delivered with the equipment)
e.g. 9051 or 9532 (for PM 9051 or PM 9532)

or: Unknown/Not applicable
0000

CATEGORY

□

0 Unknown, not applicable (fault not present, intermittent or disappeared)
1 Software error
2 Readjustment
3 Electrical repair (wiring, solder joint, etc.)
4 Mechanical repair (polishing, filing, remachining, etc.)
5 Replacement
6 Cleaning and/or lubrication
7 Operator error
8 Missing items (on pre-sale test)
9 Environmental requirements are not met

COMPONENT/SEQUENCE NUMBER

□□□□
Enter the identification as used in the circuit diagram, e.g.:

GR1003	Diode GR1003
TS0023	Transistor TS23
IC0101	Integrated circuit IC101
R0....	Resistor, potentiometer
C0....	Capacitor, variable capacitor
B0....	Tube, valve
LA....	Lamp
VL...	Fuse
SK....	Switch
BU....	Connector, socket, terminal
T0....	Transformer
L0....	Coil
X0....	Crystal
CB....	Circuit block
RE....	Relay
ME....	Meter, indicator
BA....	Battery
TR....	Chopper

Parts not identified in the circuit diagram:

990000	Unknown/Not applicable
990001	Cabinet or rack (text plate, emblem, grip, rail, graticule, etc.)
990002	Knob (incl. dial knob, cap, etc.)
990003	Probe (only if attached to instrument)
990004	Leads and associated plugs
990005	Holder (valve, transistor, fuse, board, etc.)
990006	Complete unit (p.w. board, h.t. unit, etc.)
990007	Accessory (only those without type number)
990008	Documentation (manual, supplement, etc.)
990009	Foreign object
990099	Miscellaneous