PHILIPS

sine/square-wave oscillator

PM 5126

9445 051 26..1

9499 450 05911

731201/2/03/04

PHILIPS

PHILIPS

MA7109

MANUAL

SINE/SQUARE-WAVE OSCILLATOR

PM 5126

9445 051 26..1

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731201/2/03/04

IMPORTANT

In correspondance concerning this apparatus, please quote the type number and serial number as given on the type plate of the apparatus.

CONTENTS

LIST OF FIGURES

1. GENERAL INFORMATION

1.1. INTRODUCTION

The generator produces sine- and square-wave signals in the frequency range 10 Hz to 1 MHz.
The generator frequency may be synchronised by means of an external signal.
The open-circuit voltage is continuously adjustable and is monitored by means of a built-in voltmeter.
There are two signal outputs available, one with an internal resistance of 600 Ω and one with 10 Ω.
Both outputs may be short-circuited.
The maximum open-circuit voltage is 10 V_{rms} for sine-wave and 10 V_{pp} for square-wave signals.

1.2. TECHNICAL DATA

Properties expressed in numerical values with tolerances stated are guaranteed by the manufacturer.
Numerical values without tolerances stated represent the properties of an average instrument and merely serve as a guide.
Unless specified otherwise, relative faults are given in percents of the adjusted values and a.c. voltages are given as r.m.s. values.

Operating modes	- sine wave
	- square wave
Frequency	
Range	10 Hz - 1 MHz
Bands	5 Bands, dial calibration 1-10
Setting error	< 3 % in range 100 Hz to 100 kHz
	< 5 % in range 10 Hz to 1 MHz
Temperature coefficient	$< 150.10^{-6}/^{o}C$ at 5 kHz
Long-term drift	$< 100.10^{-6}$ in 24 hours, at 5 kHz and after a warm-up period of 20 minutes
Short-term drift	$< 50.10^{-6}$ in 15 minutes, at 5 kHz and after a warm-up period of 20 minutes
Frequency variations at mains variations of ± 10 %	$< 50.10^{-6}$
Synchronisation	
Hold range	max. 10 % of set frequency with a negligible effect on the performance
Sensitivity	1 % hold range per 20 mV synchronisation voltage
Input resistance	1 kΩ ± 5 %
Max. permissible input voltage	+ 10 V/- 30 V

Outputs (the outputs can be loaded simultaneously)

1. "600 Ω"

Output resistance	(600 ± 10) Ω
Max. load	protected against short-circuits

2. "LOW Z_o"

Output resistance	10 Ω
Max. resistive load (See Fig. 1)	- protected against short circuits - with load resistors ≥ 300 Ω and at max. voltages all specifications remain valid - with load resistors < 300 Ω the max. permissible voltage decreased to 5 V at 50 Ω and the distortion factor may increase by a factor 1.3.
Max. capacitive load	100 pF

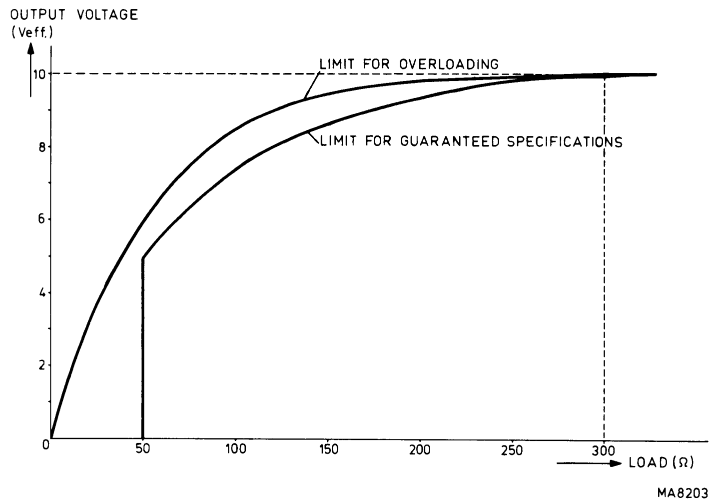


Fig. 1. Overload and specification limits of output voltage at LOW Z_o terminal for sine-wave mode.

Output meter

Indication	open-circuit voltage
Scales	- black scale 0 - 10 V for sine-waves r.m.s. and square-waves peak to peak - blue scale for -5 to +16 dBm 0 dBm ≡ 1 mW into 600 Ω (0.775 V)
Inaccuracy	5 % of full scale deflection
Selecting ∿/⊓	automatically by means of operating-mode switch

Attenuation

Continuous control	> 40 dB for sine-wave > 34 dB for square-wave
Step control (only for output "600 Ω")	3x20 dB (inaccuracy: 0.2 dB/step at 5 kHz)
Frequency response	< 0.05 dB up to -40 dB < 0.20 dB up to -60 dB

Sine-wave mode

Output voltage (both outputs)	10 Vr.m.s. open-circuit voltage
Distortion factor (See Fig.2)	< 0.3 % in range 100 Hz to 100 kHz
	< 1.0 % in range 10 Hz to 1 MHz
Frequency response (See Fig. 3)	< 0.1 dB in range 100 Hz to 100 kHz
(referred to 5 kHz)	< 0.2 dB in range 10 Hz to 1 MHz
Hum and noise	> 60 dB down (max. output)
Max. d.c. offset voltage	50 mV (in signal-voltage range 10 V)
Temperature coefficient output voltage	< 0.3 %/°C, negative

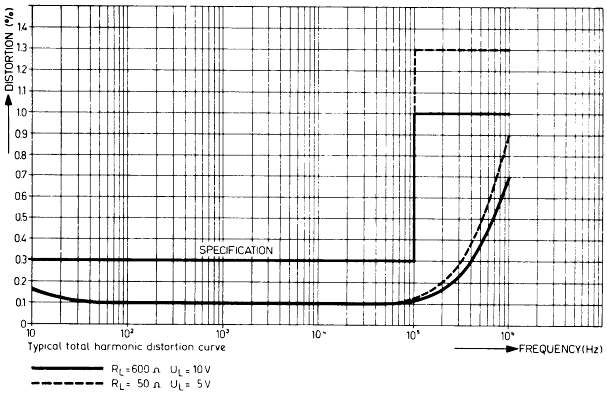


Fig. 2. Typical harmonic distortion curve

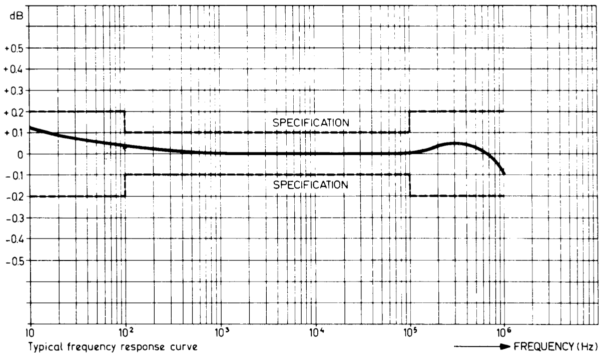


Fig. 3. Typical frequency response curve

Square-wave mode

Output voltage (both outputs)	10 V_{p-p} open-circuit voltage
Duty cycle	0.5 ± 0.025
Rise and fall time	< 80 ns above 5 kHz
Overshoot and ringing	< 3 %
Droop	< 3 %
Frequency response	< 2.0 %
Hum and noise	> 60 dB down (max. output)
Max. d.c. offset voltage	50 mV
Temperatuve coefficient output voltage	< 0.1 %/°C

Power supply

Mains voltage	115 V or 230 V ± 15 %
Mains frequency	50 - 100 Hz
Power consumption	17 W

Environmental conditions

Reference temperature	+23 °C
Nominal operating temp.	+ 5 to + 40 °C
Temperature range for transport and storage	-40 to + 70 °C

This instrument conforms to VDE0411 class I protection standard.

Mechanical data

Dimensions	3-module cabinet (18x21x25 cm)
Weight	5 Kg

1.3. ACCESSORIES

- Mains cable
- Manual
- Fuse with label (for 115 V operation)

1.3.1. Optional accessories

Extension test-board for carrying out measurements on the plug-in printed-wiring boards (order number 5322 263 70035).

1.4. DESCRIPTION OF THE BLOCK DIAGRAM (See Fig. 4)

The generator frequency is determined by two adjustable RC networks in the oscillator amplifier. This arrangement produces a signal with stable frequency and amplitude and very little distortion.

The frequency range 10 Hz to 1 MHz is divided into five steps of one decade which can be selected by the FREQ. Hz range-selector switch 355. The frequency can be continuously varied within the steps by means of adjusting dial 68.

The oscillator frequency may be synchronised with an external signal applied to SYNC. IN socket 856.

∿/⊓ Switch 811 allows switching over from sine-wave to square-wave mode. In the latter mode a squarer is switched into the circuit. It forms a square-wave signal with short rise and fall times out of the sinusoidal output signal of the oscillator-amplifier.

Via AMPLITUDE control 603 which provides continuous control of the signal voltage, the signal is fed to the amplifier where it is amplified to the required value.

The output voltage of the amplifier is fed direct to LOW Z_0 socket 851 and via a calibrated step attenuator (three 20 dB steps) to 600 Ω socket 853.

The open circuit voltage of the generator is measured by means of the meter circuit and meter 821.

The power supply provides the necessary stabilized d.c. voltages for the generator.

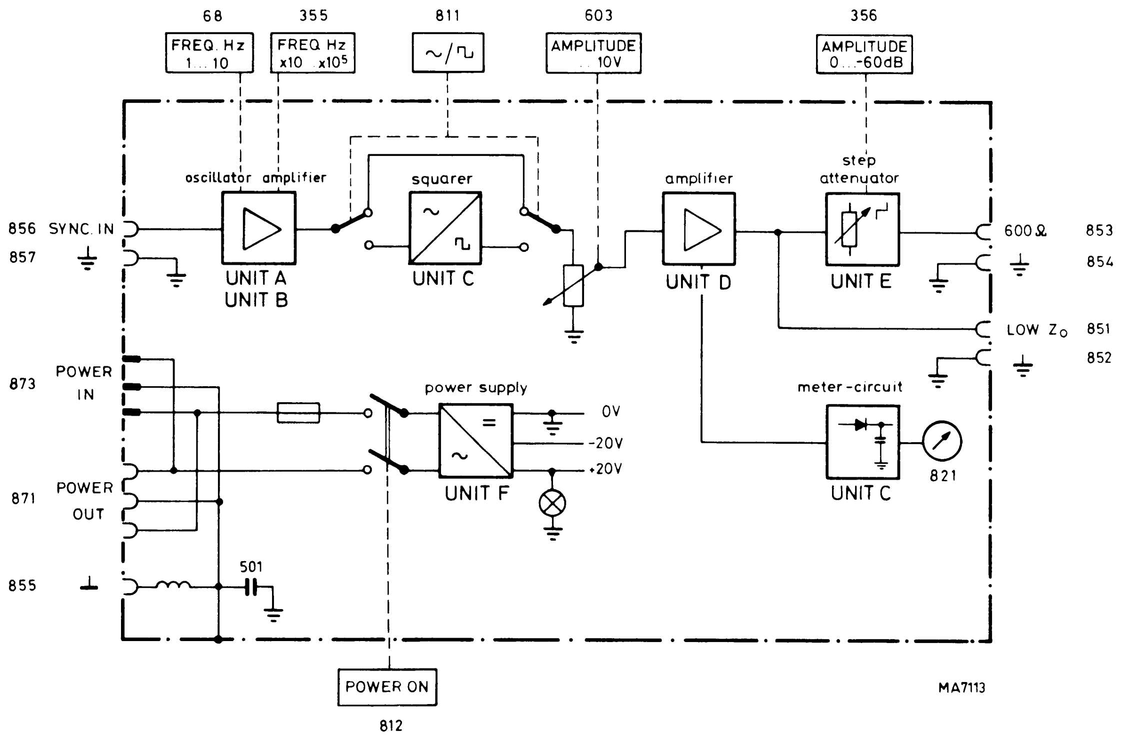


Fig. 4. Block diagram

2. DIRECTIONS FOR USE

2.1. INSTALLATION

2.1.1. Position

The instrument should be used in a horizontal position with a maximum slope in foreward or backward direction of 30°. The instrument can be used in sloping position after the tilting bracket at the bottom of the instrument has been hinged out.

Make sure that the ventilation holes in the cabinet are free.

2.1.2. Adjusting to the local mains voltage

The instrument can be set for mains voltages of 230 V $\pm$ 15 % or 115 V $\pm$ 15 % by means of switch 802 on the rear panel. The set mains voltage value is displayed through the opening above switch 802.

Setting for a different mains voltage:
- slacken the screw on switch 802.
- slide the switch upwards for a 230 V setting.
- slide the switch downwards for a 115 V setting.
- check that the correct voltage value is visible through the opening.
- fasten the screw on switch 802.
- select a suitable fuse for 803, viz. 250 mA del'd action for 230 V and 500 mA del'd action for 115 V.
- insert the correct label into the fuse holder.

The instrument is delivered with switch 802 in position 230 V.

2.1.3. Earthing

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

$\perp$ Socket (855) is internally connected to the cabinet via h.f. choke 760 (6 μH max. load 4A); this socket should on no account be used as a connection point for a protective-earth lead!

The circuit earth is connected direct to the signal- earth sockets $\bar{\bar{\perp}}$ (852, 854, 857) and, moreover, to the (earthed) cabinet via 330 nF capacitor 501.
The signal-earth socket $\bar{\bar{\perp}}$ (854) is connected to cabinet socket $\perp$ (855) by means of a shorting link. As a consequence, undesired external interferences at the signal-earth socket $\bar{\bar{\perp}}$ (854) cannot influence the function of the instrument.

After removal of the shorting link, d.c. or l.f. voltages may be applied between circuit earth and the earthed cabinet (floating output).
The insulation of the circuit allows a maximum of 100 V d.c. or 50 V a.c. (up to 1 kHz) between circuit earth and cabinet.

Note that there is a capacitance of 330 nF between circuit earth and cabinet so that h.f. voltages between socket $\perp$ and $\bar{\bar{\perp}}$ are short-circuited to earth.

2.1.4. Controls and sockets (Figs. 5 and 6)

Item	Indication	Function
812	POWER ON	Mains switch
801	POWER ON	Pilot lamp
856	SYNC. IN	Socket for external synchronisation signal
857	⏚	Socket for signal earth
68	–	Frequency dial
355	FREQ. Hz	Frequency-range selector
603	AMPLITUDE	Continuous control of the output voltage
356	AMPLITUDE	Control of output voltage in steps
811	∿/⊓⊔	Mode selector
821	-	Meter indicating the unloaded output voltage
851	LOW Z_o	Socket for output voltage (Ri = 10 Ω)
852	⏚	Socket for signal earth
853	600 Ω	Socket for output voltage (Ri = 600 Ω)
854	⏚	Socket for signal earth
855	⊥	Socket for cabinet earth (via h.f. choke)
873	POWER IN	Mains input with earthing contacts
871	POWER OUT	Mains output with earthing contacts
803	-	Mains fuse
802	-	Mains voltage adapter

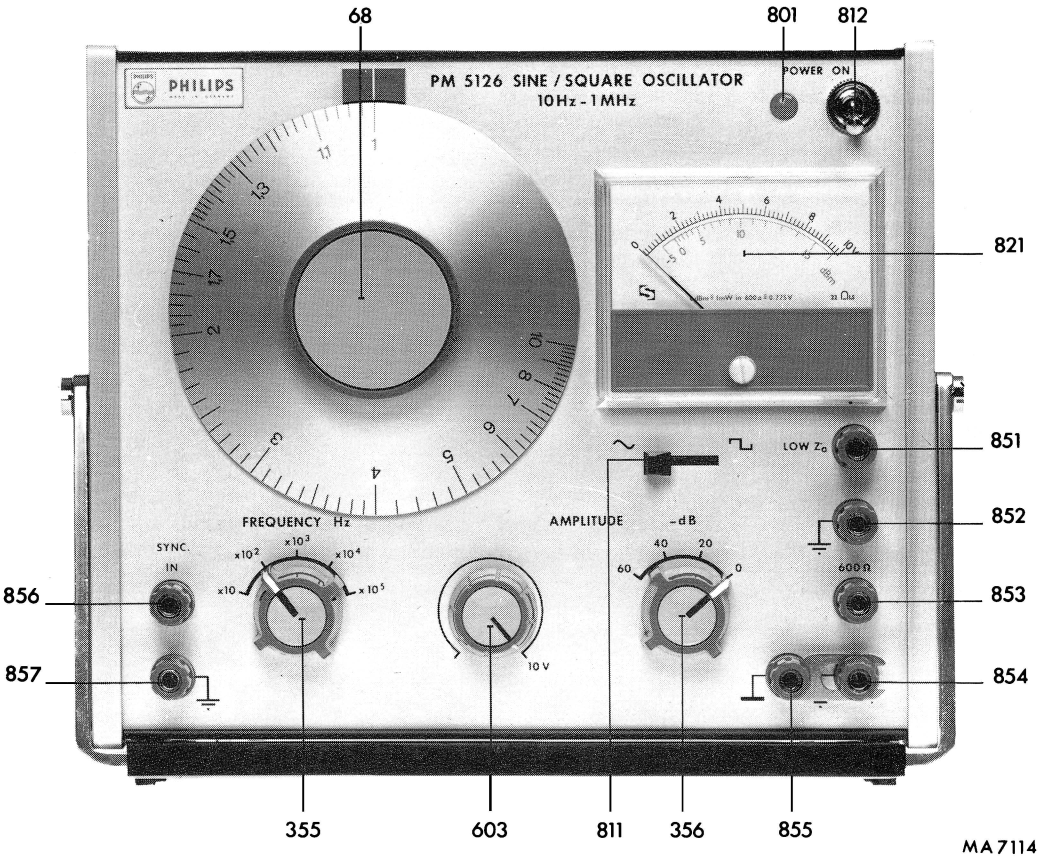


Fig. 5. Front view, controls and sockets

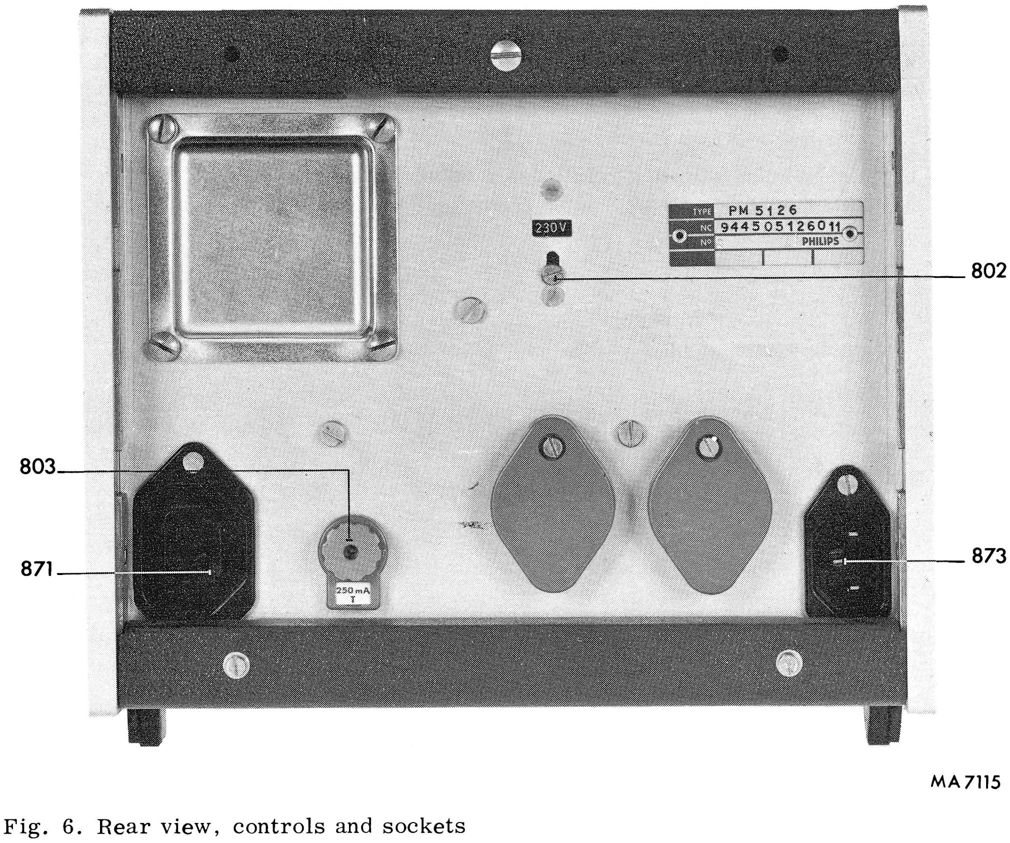


Fig. 6. Rear view, controls and sockets

2.2. OPERATION

2.2.1. Switching on

- Connect the instrument to a mains socket with earthing contacts
- Switch on the instrument by means of POWER ON switch 812; pilot lamp 801 lights up

After a warm-up period of 20 minutes the output signal has attained the frequency stability indicated in the technical data.

2.2.2. Selecting mode and frequency

- Select the operating mode with ∿/⊓ switch 811. The symbols indicate the operating mode.
- Set the frequency range with FREQ. Hz switch 355
- Adjust dial 68 for the desired frequency

2.2.2.1. Synchronisation of the frequency

If the frequency of the generator should be synchronised with the frequency of an external signal, the latter should be applied to the SYNC. IN/⏚ sockets 856/857. With a voltage of 200 $mV_{r.m.s.}$ the maximum hold range of 10 % is attained.

2.2.3. Setting and measuring the output signal

The value of the unloaded output voltage is adjusted with AMPLITUDE control 603 and indicated by meter 821.

R.M.S. values of the sine-wave signals and peak-to-peak values of the square-wave signals can be read on the upper black scale.

The blue scale, calibrated in dBm, can be used for the indication or setting of voltage levels. The 0 dBm index on this scale is referred to a power of 1 mW delivered via the 600 Ω output into a load impedance of 600 Ω, the corresponding terminal voltage being 0.775 V.

The signal of the 600 Ω output can be attenuated in three 20 dB steps by means of AMPLITUDE switch 356. The damping factor a is shown in the table below.

The terminal voltage V_o at the output sockets depends on the load by the input resistance of the circuit under test.

In general there exists the following relationship between unloaded voltage $V_{e.m.f.}$ and terminal voltage V_o:

$$V_o = V_{e.m.f.} \cdot a \cdot \frac{RL}{Ri + RL}$$

$$V_{e.m.f.} = \frac{V_o}{a} \cdot \frac{Ri + RL}{RL}$$

in which:

V_o	= terminal voltage
$V_{e.m.f.}$	= unloaded voltage
Ri	= internal generator resistance
RL	= load resistance
a	= damping factor

AMPLITUDE switch 356	Damping factor a
0 dB	1
-20 dB	0.1
-40 dB	0.01
-60 dB	0.001

Table for the numerical values of the damping factor a in the different positions of AMPLITUDE switch 356

If the load resistance RL equals the internal resistance Ri of the loaded output (so 10 Ω or 600 Ω), the terminal voltage V_o is half the unloaded voltage $V_{e.m.f.}$ as indicated by meter 821, provided that AMPLITUDE switch 365 is set to position 0 dB.

NOTE: For the 600 Ω output the above mentioned equations only hold good with specified accuracy if the LOW Z_o output is not loaded.
In principle, these equations may also be used for the LOW Z_o output.
However, one should bear in mind that the internal resistance of 10 Ω is not specified with a tolerance.
Thus, the accuracy of the measuring results, especially with low resistances, cannot be defined.

2.3. SERVICE

Switch off the instrument before you start replacing parts. After replacing parts, it might be necessary to re-adjust the instrument according to paragraph 3.4. CHECKING AND ADJUSTING. For accessibility of the individual parts, see paragraph 3.2.

NOTE: In case of breakdowns, the assistance of the PHILIPS Service organisation can always be called upon.
Whenever the instrument is to be forwarded to a PHILIPS Service Center for repair, the following should be observed:

- Provide the instrument with a label bearing full name and address of the sender. Indicate as completely as possible the symptoms of the fault.
- Carefully pack the instrument in the original packing, or, if this is no longer available, in a wooden crate.
- Forward the instrument to the address provided by your local PHILIPS representative.

3. SERVICE DATA

3.1. CIRCUIT DESCRIPTION

Fig. 20 shows the detailed circuit diagram.

Dealing with the circuit diagram, we assume that you studied the description of the block diagram in paragraph 1.4.

3.1.1. Unit A and B Oscillator-amplifier (See Fig. 7)

The sine-wave signal is produced by an RC oscillator consisting mainly of two phase-shift stages with transistors 302 and 305, and an inverter stage with transistor 308.

Two identical frequency determining RC networks have been used. The first one is connected between the collector and the emitter of phase-shift stage 302; it consists of resistors 604 + R1a + 631 and capacitors 501...507.

The second one is connected between the collector and the emitter of phase-shift stage 305; it consists of resistors 609 + R1b + 632 and capacitors 508...514. Each of these networks provide, a phase-shift of 90° at the oscillation frequency f_o. Hence, the phase-shift between the input of the first stage and the output of the second stage is 180°.

The phase-shift due to the third stage, inverter stage 308, is 180°.

The total phase-shift is then 360°. Consequently, the input voltage of the first stage 302 and the output voltage of the third stage 308 are in phase at the oscillation frequency.

The frequency is changed in five steps of one decade by switching the capacitors 501...514 by means of switch 355. Continuous frequency control, ratio 1:10, is effected by means of the double potentiometer R1a/R1b.

By using emitter followers 310/301, 303/304, 306/307 the input impedances of stages 302, 305 and 308 are increased in such a way that the active components barely influence the frequency.

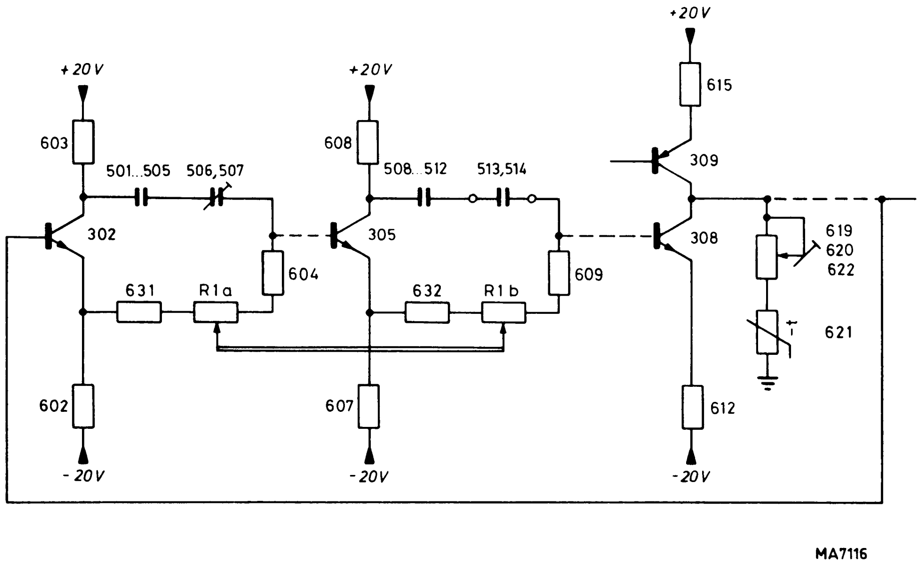


Fig. 7. Simplified diagram of the oscillator

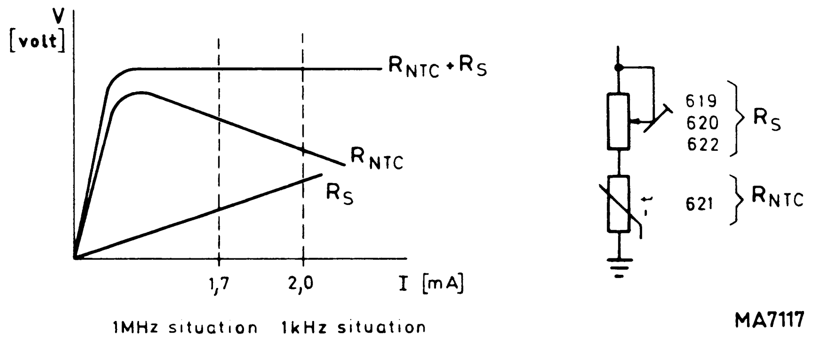


Fig. 8. Thermistor circuit

Thermistor 621 keeps the output amplitude constant. By means of resistor RS (= 619 + 620 + 622) the characteristic of thermistor $R_{N.T.C.}$ (Fig. 8) is adjusted in such a way that R_S becomes complementary to the differential resistance $R_{N.T.C.}$. Hence, between certain limits, the variation of $R_{N.T.C.}$ + RS ($= \frac{\Delta V \text{ total}}{\Delta I}$) becomes zero.

The amplification of inverter stage 308 is determined by the relation between the sum of collector-resistors 619, 620, 621, 622 and the parallel resistance of emitter resistors 612//613; it exceeds a factor 1.

The resistance value of thermistor 621 amounts to 600...700 Ω in stabilised position.

Phase correction at very high frequencies is obtained by means of capacitors 515, 516 in the emitter circuit of inverter stage 308. Diodes 401, 402 introduce a controlled amount of non-linear distortion, which results in a shorter settling time at low frequencies.

Via capacitor 517 and constant-current source 309 the oscillator can be synchronized with an external signal.

Via emitter follower 310 and the voltage divider with zener-diode 411 the signal is fed back to emitter follower 301.

With potentiometer 625 the output amplitude is adjusted. Temperature dependance of the output amplitude is decreased by N.T.C. resistor 630. Via emitter follower 311 and capacitor 519 the output signal of the oscillator is fed to waveform selector 811.

3.1.2. Unit C Squarer

The squarer comprises Schmitt-trigger 302, 303. The Schmitt-trigger is decoupled by means of pre-amplifier 301 at the input and with buffer stage 304 at the output.

The diodes 401, 402 in the emitter circuits of transistors 302, 303 protect against too high base-emitter voltages.

Capacitor 501 prevents a capacitive influence of the sinusoidal input voltage at the output.

Capacitor 502 decreases the overshoot of the Schmitt-trigger, and capacitor 512 shortens the rise- and fall times at low frequencies.

3.1.3. Unit D Amplifier (Fig. 9)

The amplifier consists of an operational power amplifier with feedback via voltage divider 611, 612. This feedback is frequency compensated by means of capacitive voltage divider 502, 503.

The input of the amplifier is coupled by means of isolating capacitor 501.

The open-circuit voltage for the meter circuit is taken off via resistor 627, contact 15.

The required output resistance of 10 Ω is composed of the output resistance of the amplifier (1.8 Ω), and output resistor 621 (8.2 Ω).

To keep the d.c. output voltage at 0 V, the output voltage of the amplifier is fed via low-pass filter 620, 506 to integrator 311. Thus, only the d.c. voltage component is fed to the input of the integrator. At the integrator output there appears a control voltage which is fed back, via resistor 613, to the inverting input of the amplifier.

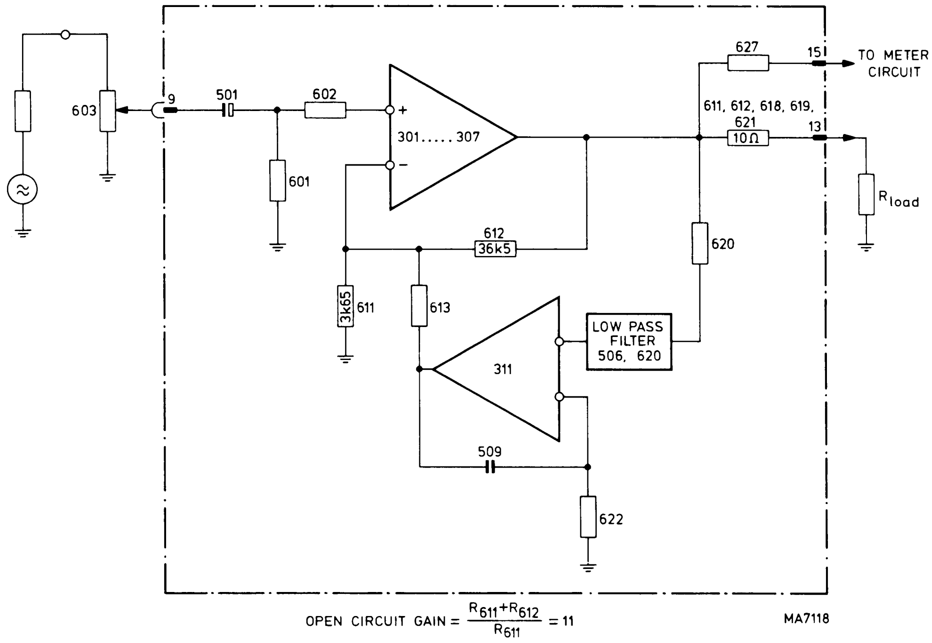


Fig. 9. Simplified diagram of the amplifier

3.1.4. Unit C Meter Circuit

In principle the meter circuit consists of a peak detector.
The measuring ranges for sine-and square-wave mode are separated adjustable with resistors 617 and 621.
Zero-point suppression of the indication, caused by diode 403, is avoided by means of a pre-voltage setting via resistors 615, 619. Therefore, the meter scale is linear.

3.1.5. Unit E, Step Attenuator

The step attenuator consists of a π-section ladder network. The output impedance for each setting is 600 Ω. Capacitor 501 corrects the frequency response in the 60 dB position.

3.1.6. Unit F, Power Supply

The output voltage is stabilised by a control circuit. Zener-diodes 422, 424 form a voltage reference and the differential-amplifier stages with transistors 304, 308 serve as a voltage comparator.
An overload protection with transistors 301, 305 re-adjusts the output-voltage if the output current becomes > 450 mA.

3.2. ACCESS TO PARTS

3.2.1. Removing the cover plate

After unlocking the locking device on the rear, the top cover can be removed.
To refit the top cover, place the groove of the locking device in horizontal position and fit the cover in its initial position.

3.2.2. Removing the side plates

The side plates can be taken off after removing the screw on each side of the instrument.

3.2.3. Removing the bottom plate

The bottom plate can be taken off after removing the appropriate screws on the rear of the instrument.

3.2.4. Removing the support

The support can be detached by sliding both clips "A" in the direction indicated by the arrow in Fig. 10.

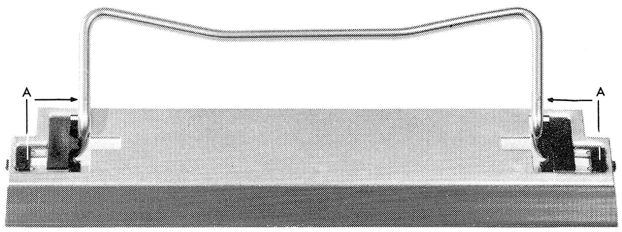


Fig. 10. Stand assembly

3.2.5. Removing the plug-in printed-wiring boards

After unlocking the locking device "B" (Fig. 15), the security bracket can be removed in order to pull out the printed-wiring boards.
Moreover, the four wires of potentiometer 68 should be unsoldered before removing the oscillator board UNIT A. When mounting the oscillator board, make sure that the four wires are connected to this board in accordance with Fig. 16b.

Note: For all units of this instrument, extension test boards may be used for fault finding.

3.3. LIST OF ADJUSTING ELEMENTS

Adjustment	Adjusting element	Measuring equipment	Recommended PHILIPS equipment	Section	Fig.
Current consumption	-	Ammeter	PM 2411	3.4.1.	-
Supply voltage -20 V	Resistor 620/unit F	Digital voltmeter	PM 2421	3.4.2.	19
Supply voltage +20 V	Resistor 609/unit F	Digital voltmeter	PM 2421	3.4.2.	19
Ripple	-	Oscilloscope	PM 3231	3.4.2.	-
Frequency in range $x10^3$	Resistor 631/unit A Resistor 632/unit A	Frequency counter	PM 6630	3.4.3.	16a
Frequency in range $x10^4$	Trimmer 506/unit A Capacitor 513/unit A	Frequency counter	PM 6630	3.4.3.	11, 16a
Frequency in range $x10^5$	Trimmer 507/unit A Capacitor 514/unit A Trimmer 516/unit A	Frequency counter	PM 6630	3.4.3.	11, 16a
Sine-wave output voltage	Potentiometer 620/unit A Potentiometer 625/unit A	Digital voltmeter	PM 2421	3.4.4.	11, 16a
Square-wave output voltage	Resistor 605/unit D Trimmer 502/unit D	Sampling oscilloscope	PM 3400	3.4.5.	18
Voltage indication	Resistor 621/unit C	Oscilloscope	PM 3231	3.4.6.	17
	Resistor 617/unit C	Digital voltmeter	PM 2421	3.4.6.	17
Distortion	Potentiometer 622/unit A	Distortion meter	-	3.4.7.	11, 16a
Frequency response and attenuator	-	Digital voltmeter	PM 2421	3.4.8.	-
		A.C. millivoltmeter	PM 2454	3.4.8.	-
Interference voltages	-	Oscilloscope	PM 3250	3.4.9.	-
Synchronisation	-	Frequency counter	PM 6630	3.4.10	-

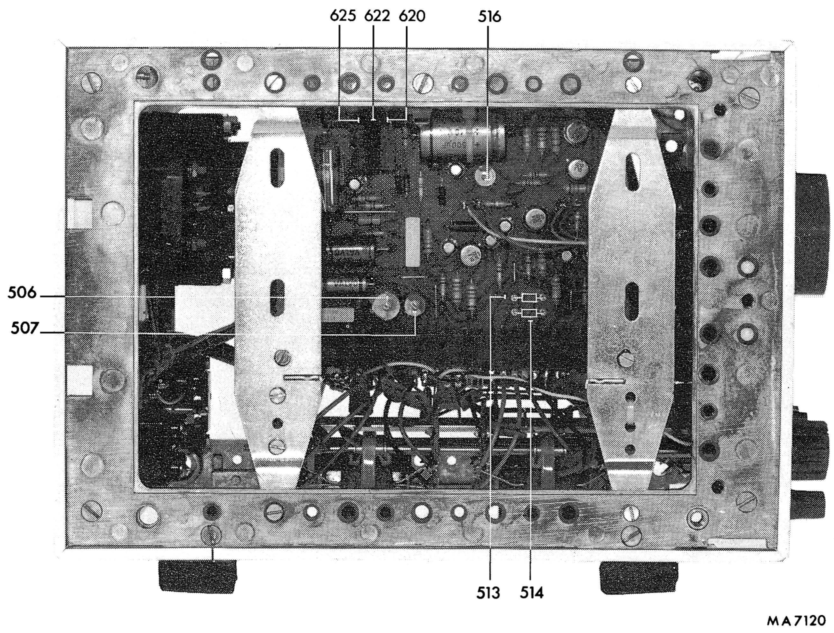


Fig. 11. Left-hand view

3.4. CHECKING AND ADJUSTING

The tolerances mentioned in this chapter apply only to newly adjusted instruments. The values may differ from those given in chapter 1.2. TECHNICAL DATA.
The adjusting elements and the auxiliary equipment for the adjusting procedure are indicated in chapter 3.3.
The instrument may be adjusted only after a warming-up period of 30 minutes at an ambient temperature of $(23 \pm 3)^{o}$C.

3.4.1. Mains current

- Connect the instrument to the mains via an ammeter.
- Check that the current consumption is 107 mA at 220 V mains, 50 Hz.

3.4.2. Supply voltages

- Check that the voltage between contact 1/UNIT F and ⏚ is $-(20 \pm 0.2)$ V
  Adjusting element: resistor 620/UNIT F
- Check that the voltage between contact 21/UNIT F and ⏚ is $+(20 \pm 0.2)$ V
  Adjusting element: resistor 609/UNIT F
- Check that the ripple does not exceed 5 mV_{pp}.

3.4.3. Frequencies

- Set switch ∿/⊓⊔ (811) to position ∿
- Set switch AMPLITUDE (356) to position 0 dB.
- Turn control AMPLITUDE (603) fully clockwise (10 V)
- Set switch FREQUENCY Hz (355) to position $x10^3$
- Set the frequency dial to 10, and check that the frequency of the output signal is 10 kHz.
  Tolerance: < 0.2 %. If necessary, readjust the frequency dial on the spindle of the potentiometer.
- Set the frequency dial to 1 and check that the frequency is 1 kHz.
  Tolerance: $\pm$ 0.2 %. If necessary, change the values of resistors 631 and 632/UNIT A, but take into account that the values of the two resistors do not differ more than 10 %
- Set switch FREQUENCY hz (355) to position $x10^4$
- Set the frequency dial to 1, and check that the frequency is 10 kHz $\pm$ 0.2 %.
  Adjusting element: trimmer 506/UNIT A. If necessary, change the value of capacitor 513/UNIT A.
- Set switch FREQUENCY Hz (355) to position $x10^5$
- Set the frequency dial to 1, and check that the frequency is 100 kHz $\pm$ 0.2 %.
  Adjusting element: trimmer 507/UNIT A. If necessary, change the value of capacitor 514/UNIT A.
- Set the frequency dial to 10, and check that the frequency is 1 MHz $\pm$ 0.2 %.
  Adjusting element: trimmer 516 UNIT A.
- If necessary, repeat adjustments at 100 kHz and 1 MHz.
- Check the frequencies in accordance with table I

TABLE I

Switch 355 FREQUENCY Hz in position:	Frequency dial 68 to:						
	1	1.5	2	3	5	7	10
x10	9.6- 10.4 Hz	-	-	28.8- 31.2 Hz	-	-	96- 104 Hz
$x10^2$	97.5- 102.5 Hz	-	-	292.5 307.5 Hz	-	-	975- 1025 Hz
$x10^3$	-	1470- 1530 Hz	1960- 2040 Hz	2940- 3060 Hz	4900- 5100 Hz	6860- 7140 Hz	-
$x10^4$	-	-	-	29.25- 30.75 kHz	-	-	97.5- 102.5 kHz
$x10^5$	-	-	-	288- 312 kHz	-	-	-

3.4.4. Sine-wave output voltage

- Set switch ∿/⊓⊔ (811) in position ∿
- Set switch AMPLITUDE (356) to position 0 dB
- Turn control AMPLITUDE (603) fully clockwise (10 V)
- Connect a load of 600 Ω to output LOW Z_o/⏚ (851/852)
- Set the frequency dial to 10
- Set switch FREQUENCY Hz (355) to position $x10^3$ (approx. 10 kHz)
- Measure the voltage at output LOW Z_o/⏚ and note the value
- Set switch FREQUENCY Hz (355) to position $x10^5$ (approx, 1 MHz)
- Measure the voltage at output LOW Z_o/⏚ and compare it with the value noted.
  Check that the voltage value at 1 MHz oversteps the noted value at 10 kHz with (0.7 ± 0.2) %
  Adjusting element: potentiometer 620/UNIT A.
- Remove 600 Ω - load from output LOW Z_o/⏚
- Set the frequency dial to 5
- Set switch FREQUENCY Hz (355) to position $x10^3$ (approx. 5 kHz)
- Check that the open-circuit voltage at output LOW Z_o/⏚ is (10.1 ± 0.1) V
  Adjusting element: potentiometer 625/UNIT A

3.4.5. Square-wave output voltage

- Set switch ∿/⊓⊔ (811) to position ⊓⊔
- Set switch AMPLITUDE (356) to position 0 dB
- Turn control AMPLITUDE (603) fully clockwise (10 V)
- Set the frequency dial to 10
- Set switch FREQUENCY Hz (355) to position $x10^5$ (approx. 1 MHz)
  Connect a load of 600 Ω to output LOW Z_o/⏚ (851/852)
- Check by means of a sampling oscilloscope that the ringing of the signal at output LOW Z_o is < 2.5 %.
  If necessary change the value of select-in-test resistor 605/UNIT D.
- Check by means of a sampling oscilloscope that the preshoot of the signal at output LOW Z_o is <2.5 %.
  Adjusting element: trimmer 502/UNIT D.

- Connect a load of 50 Ω to output LOW Z_o
- Set output voltage to 5 V_{pp}
- Check that the ringing and overshoot between 100 kHz and 1 MHz is < 2.5 %
  If necessary change the value of resistor 605/UNIT D or re-adjust with trimmer 502/UNIT D.
  Repeat the checking procedure at max. output with a load of 600 Ω.
- Connect a load of 600 Ω to output LOW Z_o
- Turn control AMPLITUDE (603) fully clockwise (10 V)
- Set the frequency dial to 1
- Set switch FREQUENCY Hz (355) to position x10 Hz (approx. 10 Hz)
- Check that the droop of the square wave at output LOW Z_o/⏚ is < 2.5 %
- Connect a load of 50 Ω to output LOW Z_o
- Set switch FREQUENCY Hz (355) to position x10^4 (approx. 10 kHz)
- Set output voltage to 5 V_{pp}
- Check that the rise and fall time are < 75 ns
- Remove 50 Ω load from output LOW Z_o/⏚
- Turn control AMPLITUDE (603) anti-clockwise
- Check that the d.c.-component is < 10 mV. If necessary change value of capacitor 506/UNIT D.
- Turn control AMPLITUDE (603) fully clockwise (10 V)
- Set switch FREQUENCY Hz (355) to position x10^3 (approx. 1 kHz)
- Check that the open circuit voltage is (10.3 ± 0.3 V_{pp}

3.4.6. Voltage indication

- Switch off the instrument
- Adjust the mechanical zero point of instrument 821
- Switch on the instrument
- Set switch AMPLITUDE (356) to position 0 dB
- Set the frequency dial to 1
- Set FREQUENCY Hz (355) to position x10^3 (approx. 1 kHz)
- Set switch ∼/⊓⊔ (811) to ⊓⊔
- Measure the open circuit voltage at output LOW Z_o/⏚ (851/852) and adjust to 5 V_{pp} with control AMPLITUDE (603)
- Check the voltage indication of instrument 821, if necessary change the value of resistor 621/UNIT C.
- Set switch ∼/⊓⊔ (811) in position ∼
- Measure the open circuit voltage at output LOW Z_o/⏚ and adjust to 5 $V_{r.m.s.}$ with control AMPLITUDE (603)
- Check the voltage indication of instrument 821, if necessary change the value of resistor 617/UNIT C.
- Adjust the open circuit voltage to 0.4 V; 2.0 V; 3.0 V; 8.0 V; 10.0 V, and check that the voltage indication of instrument 821 do not deviate more than 3 %, referred to full scale deflection

3.4.7. Distortion

- Set switch ∼/⊓⊔ to position ∼
- Set switch AMPLITUDE (356) to position 0 dB
- Turn control AMPLITUDE (603) fully clockwise (10 V)
- Set the frequency dial to 1
- Set switch FREQUENCY Hz (355) to position x10^3 (approx. 1 kHz)
- Connect a load of 600 Ω to output LOW Z_o/⏚ (851/852)

- Measure the distortion factor at output LOW Z_o/⏚ and adjust it to a minimum + 0.01 % by means of potentiometer 622/UNIT A.
- Connect a load of 300 Ω to output LOW Z_o/⏚ .
- Check the distortion factor according TABLE II

TABLE II

FREQUENCY Hz (355) in position:	frequency dial in position: 1	10
x10	< 0.25 %	-
$x10^2$	< 0.25 %	-
$x10^3$	< 0.25 %	-
$x10^4$	-	< 0.25 %
$x10^5$	-	< 0.9 %

3.4.8. Frequency response and attenuator

- Set switch ∿/⊓ (811) to position ∿
- Connect a load of 50 Ω to output LOW Z_o/⏚ (851/852)
- Check the frequency response at an output voltage of 5 $V_{r.m.s.}$:
  frequency range $x10^2$ to $x10^4$: ± 1 % } referred to 5 kHz
  frequency range $x10^5$: ± 2 % }
  For adjustment see 3.4.4.
- Remove 50 Ω-load from output LOW Z_o/⏚
- Connect a load of 600 Ω to output 600 Ω/⏚ (853/854)
- Turn control AMPLITUDE (603) fully clockwise (10 V)
- Set the frequency of the output voltage to 5 kHz
- Check that the diviation of step attenuator AMPLITUDE (356), does not overstep $\pm$ 0.15 dB per 20 dB step.
- Set the frequency of the output voltage to 1 MHz
- Check that the maximum obtainable attenuation of control AMPLITUDE (603) is $\geq$ 43 dB.

3.4.9. Interference voltages

- Check by means of an oscilloscope (B $\geq$ 10 MHz) that in both signal modes the hum and noise level at the output is at least 66 dB lower than the signal level.
- Check the lower amplitude deviations of the sine wave at 50 Hz; 100 Hz and 150 Hz.
  Tolerance: $\leq$ 0.6 %
- Connect a capacitive load of 200 pF to output LOW Z_o/⏚ (851/852)
- Check the waveform of the output signal in the whole frequency range. No ringing or other disturbances of the waveform may occur.

3.4.10. Synchronisation

- Set switch ∿/⊓ (811) to position ∿
- Set by means of a frequency counter and an oscilloscope the output frequency exactly to 5000 Hz.
- Apply a sine-wave voltage of 100 $mV_{r.m.s.}$, 5000 Hz to input SYNC.IN (856/857)
- Increase the frequency of the sync. signal to such a value that zero beats just become visible on the oscilloscope.
- Measure the frequency of the sync. signal; the upper crossover frequency of the hold range must be $\geq$ 5100 Hz.

- Decrease the frequency of the sync. signal to such a value that zero beats just become visible on the oscilloscope
- Measure the frequency of the sync. signal; the lower crossover frequency of the hold range must be $\leq$ 4900 Hz.

3.5. FAULT FINDING

To facilitate fault finding some d.c. voltages present at various places in the circuit have been indicated in the circuit diagram (Fig. 20). This voltages are measured under the following conditions:

- Mode switch ∿/⊓⊔ (811) in position ∿
- Control AMPLITUDE (603) anti-clockwise

Note: The indicated voltage levels serve only as a guide. If necessary, for each printed-wiring board an extension test board can be used.

To replace parts the instrument should be switched off.
After replacing parts, it may be necessary to re-adjust the instrument according to chapter 3.4. "Checking and adjusting"

3.6. PARTS LIST

3.6.1. Mechanical parts

Item	Number	Fig.	Order number	Description
1	1	12	5322 455 74007	Text plate
2	1	12	5322 450 80212	Cursor
3	1	12	5322 413 50397	Knob 45 ø
4	1	12	5322 413 70062	Cap
5	1	12	5322 381 10116	Lens
6	1	12	5322 277 10178	Switch 812
7	1	12	5322 277 14037	Switch 811
8	7	12	5322 290 40011	Terminal 851...857
9	1	12	5322 290 30001	Link
10	1	12	5322 273 64005	Switch 356
11	2	12	5322 413 40112	Knob 23 ø
12	2	12	5322 413 40037	Cap
13	1	12	5322 413 40211	Knob 23 ø
14	1	12	5322 413 70037	Cap
15	1	12	5322 273 64004	Switch 355
16	2	12	5322 310 10044	Screw for handle bar
17	2	12		Handle bracket
18	2	12		Handle bracket screw
19	2	12		Washer for handle-bracket screw
20	2	12	5322 460 60014	Ornamental surround
21	1	13	5322 277 20014	Slide switch 802
22	1	13	5322 265 30066	Mains input terminal 871
23	4	13	5322 462 50101	Foot for screw
24	4	13	5322 462 40157	Foot cap
25	2	13	5322 255 40091	Transistor cover
26	4	13	5322 255 40072	Bush
27	2	13	5322 255 30072	Mica washer
28	1	13	5322 256 40026	Fuse holder
29	1	13	5322 267 40106	Mains output terminal 873
30	2	14	5322 462 70366	Sliding clip
31	2	14	5322 520 10182	Bracket ratchet
32	2	14	5322 460 60017	Ornamental strip (width of 6 modules)
33	4	15	5322 466 60484	Coding clip
34	4	15	5322 255 44037	Heat sink
35	20	15	5322 255 40073	Transistor spacer T018
36	1	15	5322 255 10007	Lamp holder E10
37	8	15	5322 462 30117	Guide part
38	8	15	5322 255 40006	Transistor spacer T05
39	4	15	5322 267 60023	Plug-in connector

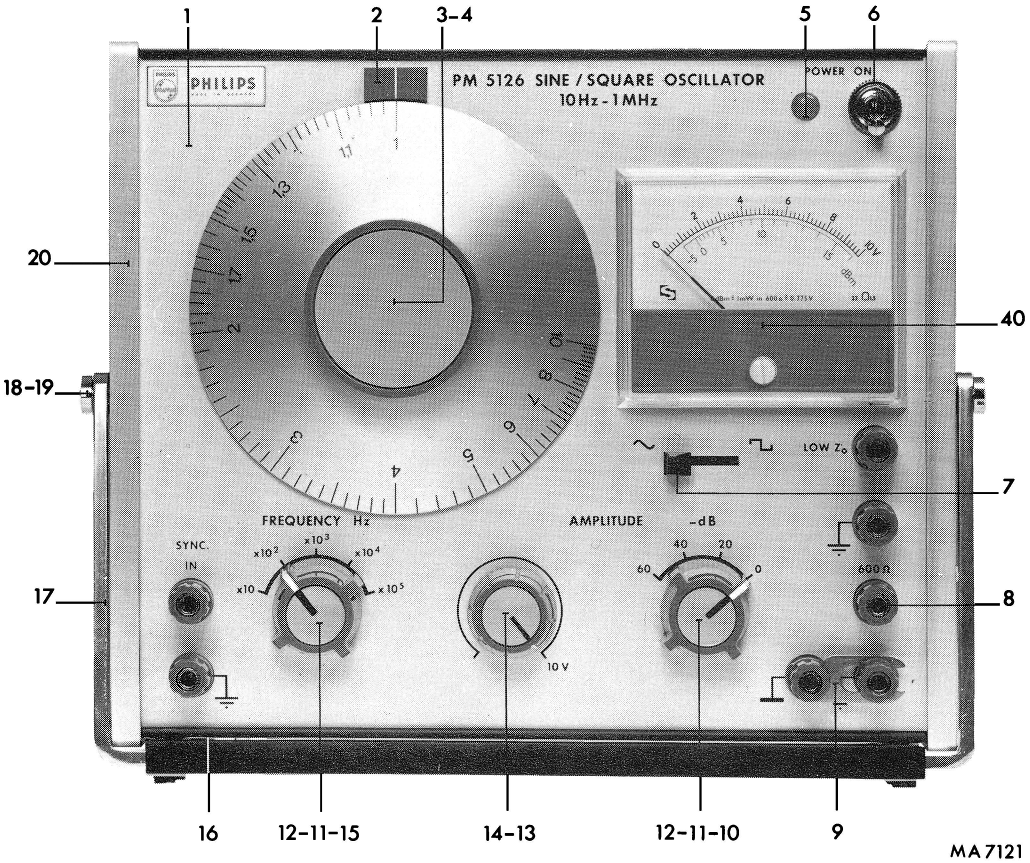


Fig. 12. Front view, mechanical parts

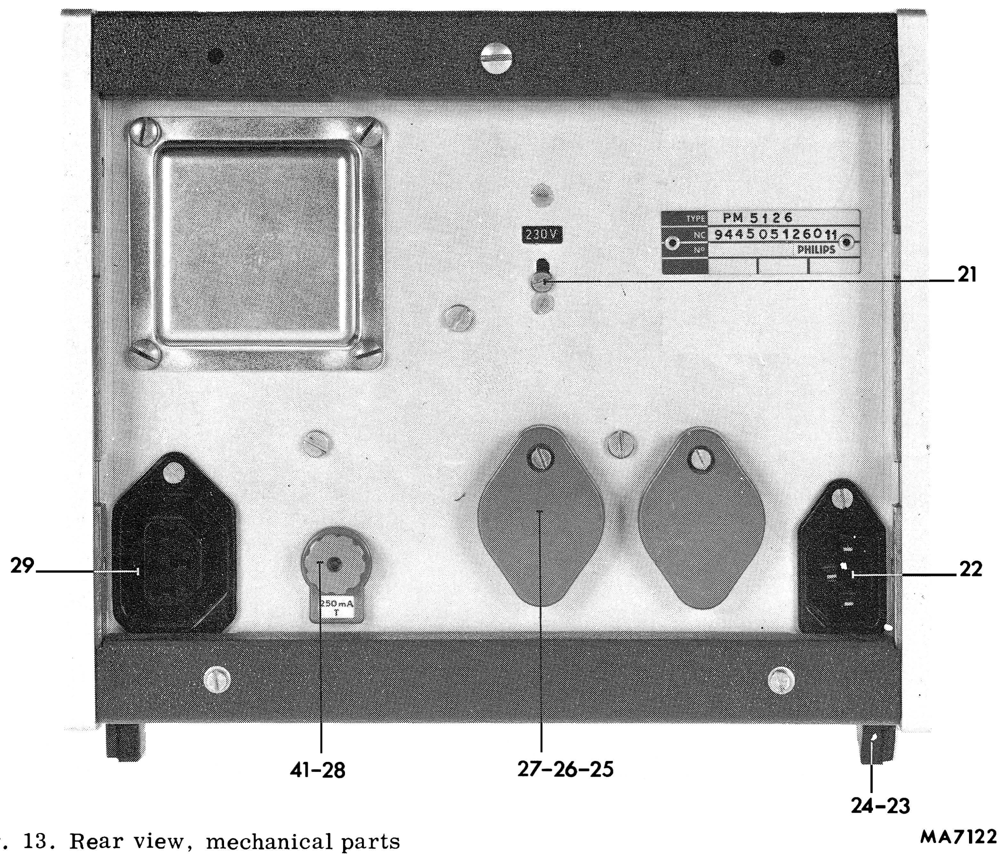


Fig. 13. Rear view, mechanical parts

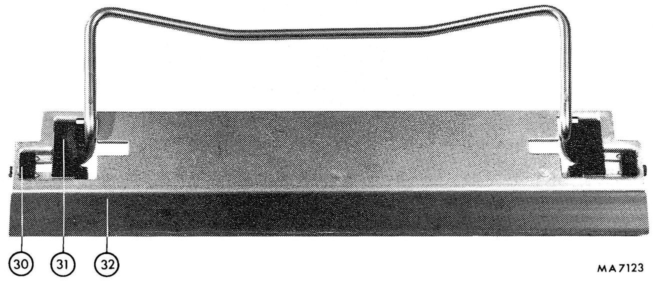


Fig. 14. Stand assembly, mechanical parts

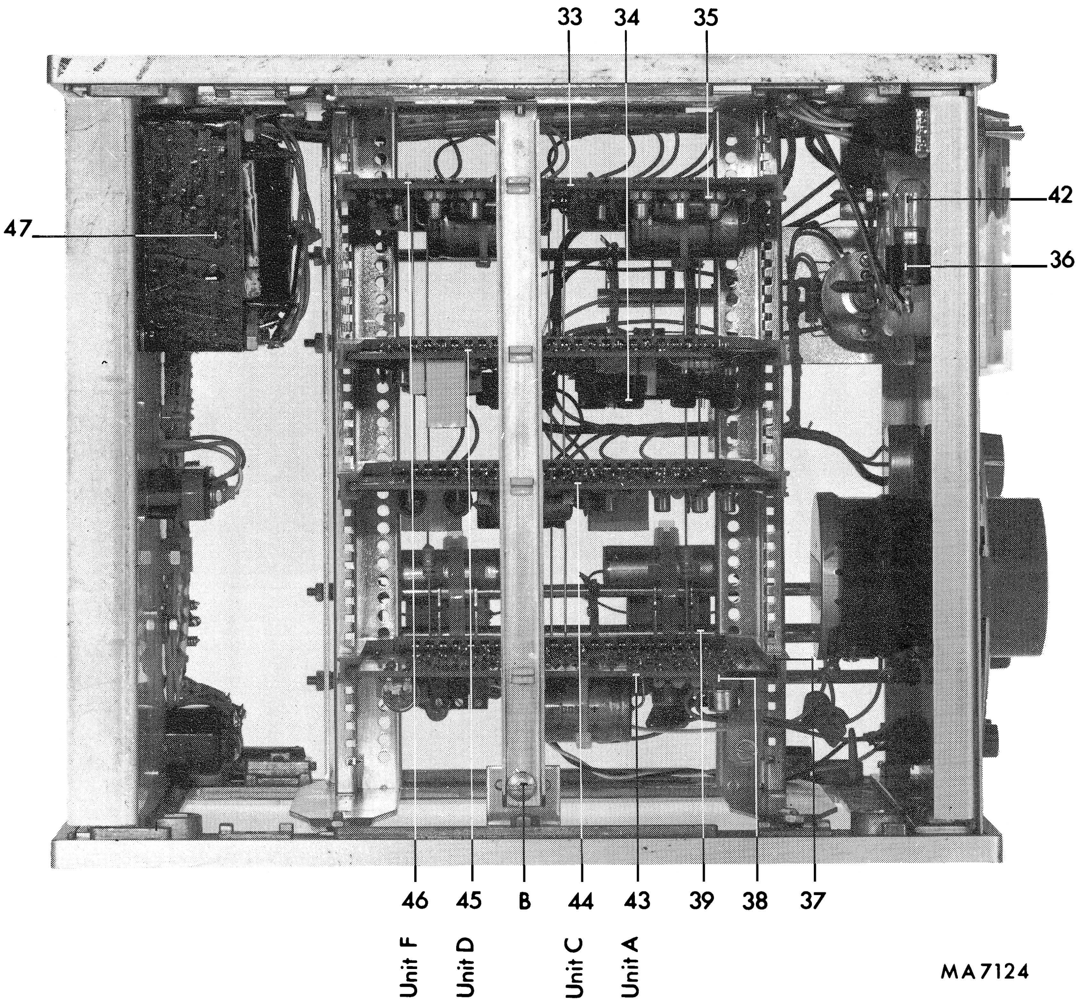


Fig. 15. Top view, mechanical parts

3.6.2. Electrical parts

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	1 W $\leq$ 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	0,25 W $\leq$ 1 MΩ, 5% $>$ 1 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%
Carbon resistor E24 series Kohleschichtwiderstand, Reihe E24 Koolweerstand E24 reeks Résistance au carbone, série E24 Resistencia de carbón, serie E24	0,5 W $\leq$ 5 MΩ, 1% $>$ 5 $\leq$ 10 MΩ, 2% $>$ 10 MΩ, 5%
Wire-wound resistor Drahtwiderstand Draadgewonden weerstand Résistance bobinée Resistencia bobinada	0,4 – 1,8 W 0,5%
Carbon resistor E12 series Kohleschichtwiderstand, Reihe E12 Koolweerstand E12 reeks Résistance au carbone, série E12 Resistencia de carbón, serie E12	0,5 W $\leq$ 1,5MΩ, 5% $>$ 1,5MΩ, 10%
Wire-wound resistor Drahtwiderstand Draadgewonden weerstand Résistance bobinée Resistencia bobinada	5,5 W $\leq$ 200 Ω, 10% $>$ 200 Ω, 5%
Wire-wound resistor Drahtwiderstand Draadgewonden weerstand Résistance bobinée Resistencia bobinada	10 W 5%

Tubular ceramic capacitor Rohrkondensator Keramische kondensator, buistype Condensateur céramique tubulaire Condensador cerámico tubular	500 V
Polyester capacitor Polyesterkondensator Polyesterkondensator Condensateur au polyester Condensador polyester	400 V
Tubular ceramic capacitor Rohrkondensator Keramische kondensator, buistype Condensateur céramique tubulaire Condensador cerámico tubular	700 V
Flat-foil polyester capacitor Miniatur-Polyesterkondensator (flach) Platte miniatuur polyesterkondensator Condensateur au polyester, type plat Condensador polyester, tipo de placas planas	250 V
Ceramic capacitor, "pin-up" Keramikkondensator "Pin-up" (Perltyp) Keramische kondensator "Pin-up" type Condensateur céramique, type perle Condensador cerámico, versión "colgable"	500 V
Paper capacitor Papierkondensator Papierkondensator Condensateur au papier Condensador de papel	1000 V
"Microplate" ceramic capacitor Miniatur-Scheibenkondensator "Microplate" keramische kondensator Condensateur céramique "microplate" Condensador cerámico "microplaca"	30 V
Wire-wound trimmer Drahttrimmer Draadgewonden trimmer Trimmer à fil Trimmer bobinado	
Mica capacitor Glimmerkondensator Micakondensator Condensateur au mica Condensador de mica	500 V
Tubular ceramic trimmer Rohrtrimmer Buisvormige keramische trimmer Trimmer céramique tubulaire Trimmer cerámico tubular	

SERVICE

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.

3.6.2.1. Resistors

Item	Order number	Ω		W	%	Description
68	5322 310 24001	-		-	-	Dial + R1a. R1b
603	5322 101 20374	2.2	k	-	-	- Potentiometer lin. AMPLITUDE
UNIT A						
602, 603	5322 116 50099	1.2	k	0.5	1	Carbon
604, 609	5322 116 50099	1.2	k	0.65	0.25	Metal-film
607, 608, 612, 615	5322 116 50099	1.2	k	0.5	1	Carbon
616	5322 116 50878	1.3	k	0.5	1	Carbon
617	5322 111 20022	3.9	k	0.5	1	Carbon
620	5322 103 10118	200		-	-	Potentiometer lin.
621	5322 116 44001	-		-	-	Thermistor
622	5322 103 10047	100		-	-	Potentiometer lin.
624	5322 116 50008	4.3	k	0.5	1	Carbon
625	5322 103 10048	2.0	k	-	-	Potentiometer lin.
628	5322 116 50117	4.7	k	0.5	1	Carbon
630	5322 116 34002	220		0.5	20	NTC
UNIT C						
602	5322 116 54005	3.32	k	0.5	5	Carbon
603	5322 116 50155	910		0.5	1	Carbon
604, 605	5322 116 50007	2.7	k	0.5	1	Carbon
606	5322 111 20007	430		0.5	1	Carbon
607	5322 116 54562	1.40	k	0.5	1	Carbon
608	5322 116 50791	3.83	k	0.5	1	Carbon
609	5322 116 50906	169		0.5	1	Carbon
610	5322 116 50586	1.54	k	0.5	1	Carbon
611	5322 116 54051	1.05	k	0.5	1	Carbon
620	5322 116 50852	40.2	k	0.4	1	Carbon
UNIT D						
601	5322 116 50524	3.01	k	0.4	1	Metal-film
615	5322 116 50293	1.5	k	0.5	1	Carbon
617	5322 116 50099	1.2	k	0.5	1	Carbon
618, 619	5322 114 44157	16		0.5	1	Carbon
621	4822 110 23052	8.2		1.15	5	Carbon
625	5322 116 50904	30		0.5	1	Carbon
626, 629	4822 110 23063	22		1.15	1	Carbon
628	5322 116 50931	24		0.5	1	Carbon

UNIT E

Item	Order number	Ω	W	%	Description
601	5322 116 50225	590	0.5	1	Metal-film
602, 604, 606	5322 116 50239	5.97 k	0.5	0.5	Metal-film
603	5322 116 50534	741	0.5	0.5	Metal-film
605	5322 116 50535	732	0.5	0.5	Metal-film
607	5322 116 54041	657	0.5	0.5	Metal-film

UNIT F

610, 621	5322 116 51041	6.81 k	0.4	1	Metal-film
611, 622	5322 116 50524	3.01 k	0.4	1	Metal-film

3.6.2.2. Capacitors

Item	Order number	F	V	%	Description
501	5322 121 40216	330 n	100	10	Plastic

UNIT A

506	5322 125 50017	65-5.5 p	100	-	Trimmer
507, 516	5322 125 50045	2-22 p	100	-	Trimmer
515	5322 122 44003	47 p	100	-	Ceramic
517	4822 124 20372	47 μ	63	-	Electrolytic
518	4822 124 20423	1500 μ	16	-	Electrolytic
519	4822 124 20395	220 μ	10	-	Electrolytic
520, 521	4822 124 20475	10 μ			Electrolytic
531	4822 122 40006	18 p	400	5	Ceramic
533	4822 122 40004	27 p	400	5	Ceramic
535	5322 122 40083	39 p	400	5	Ceramic
538	5322 122 40086	68 p	400	10	Ceramic
541	4822 122 40011	10 p	400	5	Ceramic
543	4822 122 40018	15 p	400	5	Ceramic
545	4822 122 40007	22 p	400	5	Ceramic
547	4822 122 40005	33 p	400	5	Ceramic

UNIT B

501, 508	5322 121 50337	1.1 μ	63	1	Plastic
502, 509	5322 121 50425	100 n	63	1	Plastic
503, 510	5322 123 34002	10 n	300	0.5	Mica
504, 511	5322 123 34003	950 p	500	1	Mica
505, 512	5322 120 64076	68 p	500	1	Mica

UNIT C

501, 502	4822 122 40018	15 p	400	5	Ceramic
503	4822 124 20418	1000 μ	6.3	-	Electrolytic
506, 507	5322 121 40257	330 n	100	10	Plastic
508	5322 124 10008	22 μ	25	-	Electrolytic

Item	Order number	F		V	%	Description
509	5322 124 10056	180	μ	4	-	Electrolytic
510	5322 122 40082	1.0	n	400	-20/+50	Ceramic
511	5322 124 10062	33	μ	16	-	Electrolytic
512	4822 122 31207	68	p	400	5	Ceramic
522, 523	5322 121 54054	22	n	40	-20/+50	Ceramic plate
UNIT D						
501	4822 124 20418	1000	μ	6.3	-	Electrolytic
502	5322 125 54009	4.5-26	p	50	-	Trimmer
503	5322 122 44002	1.8	p	400	± 0.5 pF	Ceramic
506	5322 124 10012	100	μ	10	-	Electrolytic
507, 508	5322 121 40323	100	n	100	10	Plastic
509	5322 121 40224	4.7	μ	100	20	Plastic
510	5322 122 40077	220	p	400	20	Ceramic
511	5322 122 40081	4.7	n	250	-20/+50	Ceramic
512, 513	5322 121 40231	150	n	100	10	Plastic
UNIT E						
501	4822 122 40005	33	p	400	10	Ceramic
UNIT F						
501, 502 508, 509	4822 124 20413	680	μ	40	-	Electrolytic
503, 510	4822 124 20374	47	μ	40	-	Electrolytic
504, 511	4822 122 40040	27	p	400	10	Ceramic
505, 512	5322 122 44001	2.2	n	400	-20/+50	Ceramic
506, 513	5322 124 20596	39	μ	25	-	Electrolytic
507, 514	5322 121 40323	100	n	100	10	Plastic
517, 518	5322 122 40085	6.8	n	250	-20/+50	Ceramic

3.6.2.3. Semi-conductors

Item	Order number	Type	Description
301, 302	5322 130 40449	BDY20	Transistor
UNIT A			
301, 303, 304, 306, 307, 310, 311	5322 130 40325	BCY56	Transistor
302, 305, 308	5322 130 40016	2N2218	Transistor
309	5322 130 40388	2N2904	Transistor
401, 402	5322 130 30229	AAZ15	Diode
411	5322 130 30766	BZY79-C6V2	Diode

UNIT C

Item	Order number	Type	Description
301, 302, 303, 304	5322 130 40324	BCY70	Transistor
401, 402, 403	5322 130 40182	BAX13	Diode

UNIT D

301, 302	5322 130 40373	BCY71	Transistor
303	5322 130 40324	BCY70	Transistor
304	5322 130 44036	BFW17A	Transistor
305, 306	5322 130 40016	2N2218	Transistor
307	5322 130 40388	2N2904	Transistor
311	5322 209 80068	TAA521	I.C.
401, 402, 403, 404	5322 130 40182	BAX13	Diode
411, 412	5322 130 30767	BZX79-C5V1	Diode
413	5322 130 30759	BZX79-C5V6	Diode

UNIT F

301, 303, 305, 307	5322 130 40325	BCY56	Transistor
302, 306	5322 130 40324	BCY70	Transistor
304, 308	5322 130 30188	BCY89	Transistor
401, 402	5322 130 30414	BY164	Rectifier
421, 423	5322 130 34048	BZX75-C2V8	Diode
422, 424	5322 130 30759	BZX79-C5V6	Diode

3.6.3. Miscellaneous

Item	Fig.	Order number	Description
40	12	5322 344 64004	Meter
41	13	5322 253 30013	Fuse 250 mA delayed, 250 V
-	-	5322 253 30017	Fuse 500 mA delayed, 250 V
42	15	5322 134 40065	Lamp E10, 24 V, 50 mA
43	15	5322 216 64015	Oscillator, UNIT A
44	15	5322 216 64013	Squarer and meter circuit, UNIT C
45	15	5322 216 64014	Amplifier, UNIT D
46	15	5322 216 64006	Power supply, UNIT F
47	15	5322 146 20411	Mains transformer
751/UNIT D	20	5322 158 10276	Coil, 4.7 μH
760	20	5322 158 14019	Coil, 6 μH
761	20	5322 158 14018	Coil, 33 μH
762, 763		5322 158 10308	Coil 68 μH
-	-	5322 263 70035	Extension test board
-	-	5322 390 20019	Silicon paste DC340

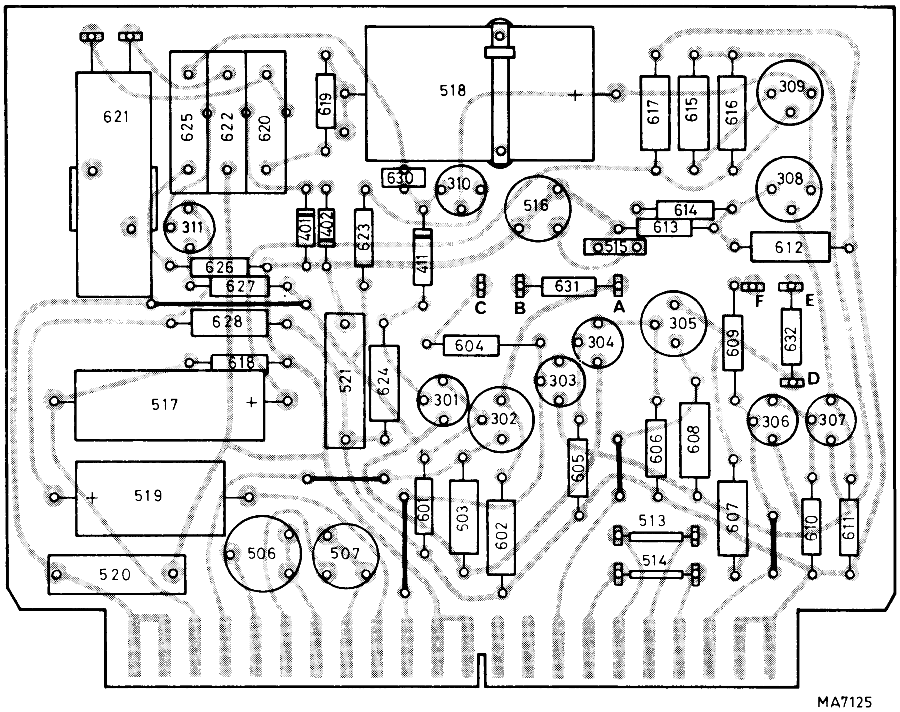


Fig. 16a. Printed wiring board of the oscillator

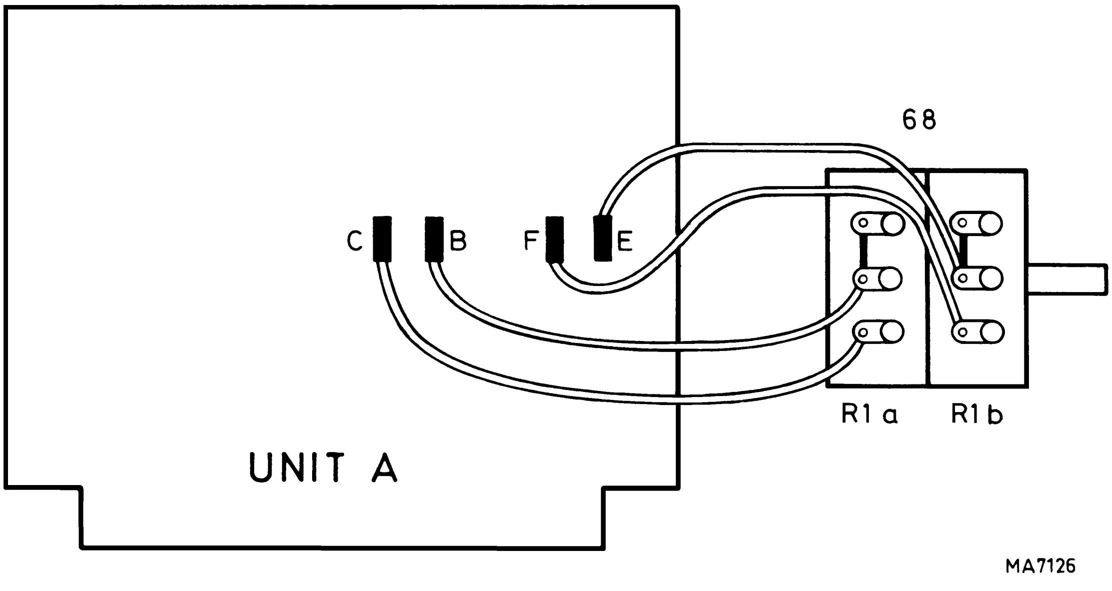


Fig. 16b. Detailed diagram with interconnections

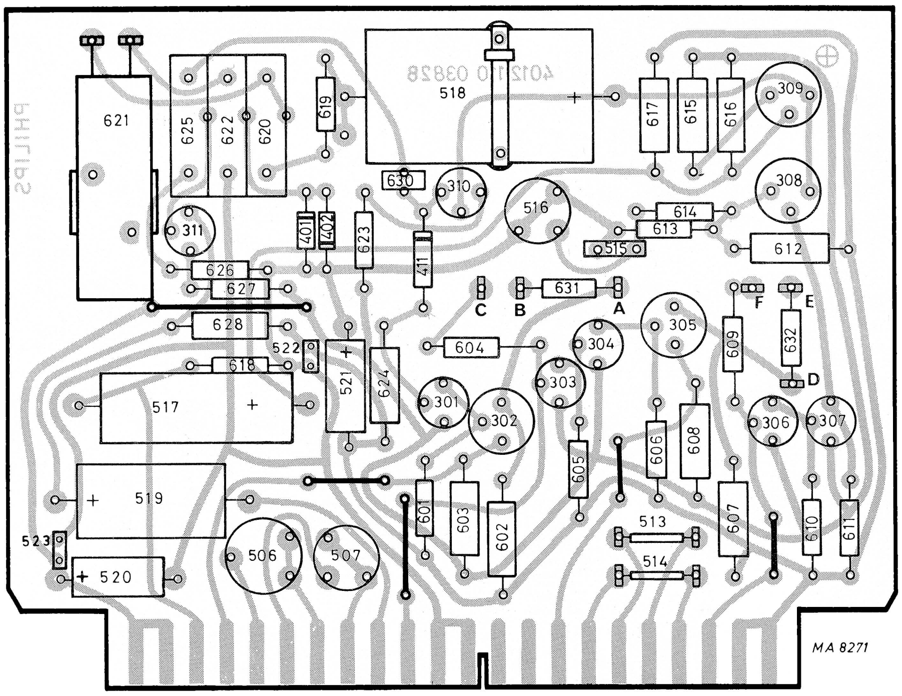


Fig. 17. Printed wiring board of squarer and meter circuit

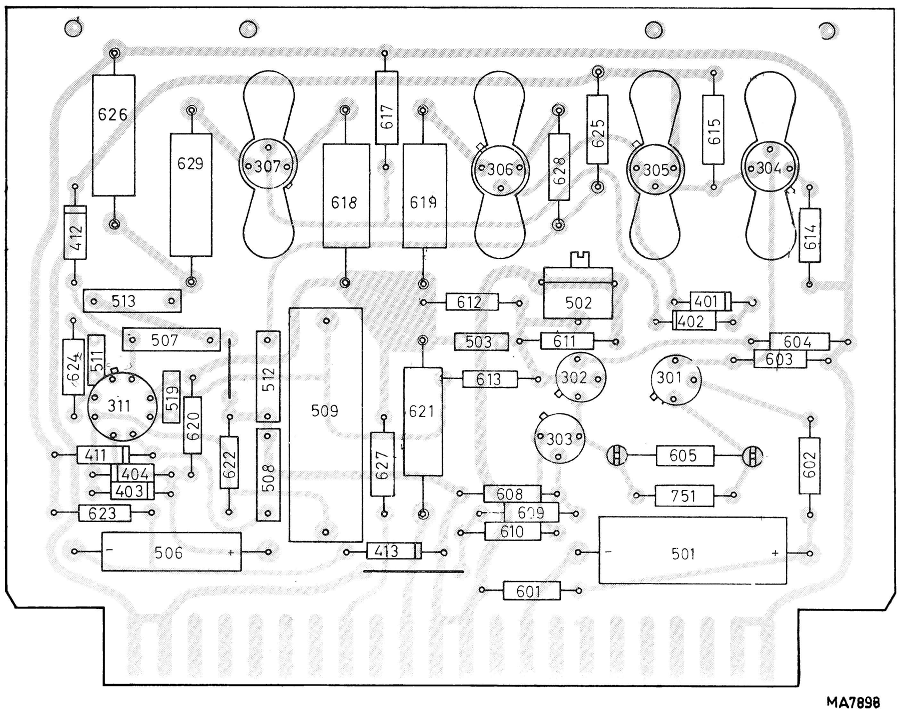


Fig. 18. Printed wiring board of amplifier

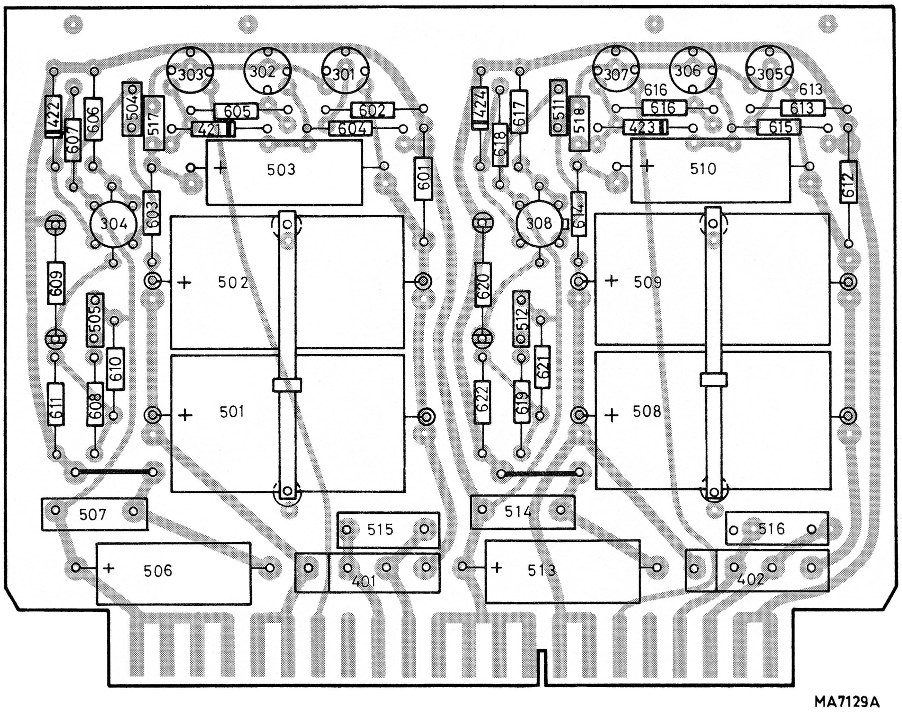
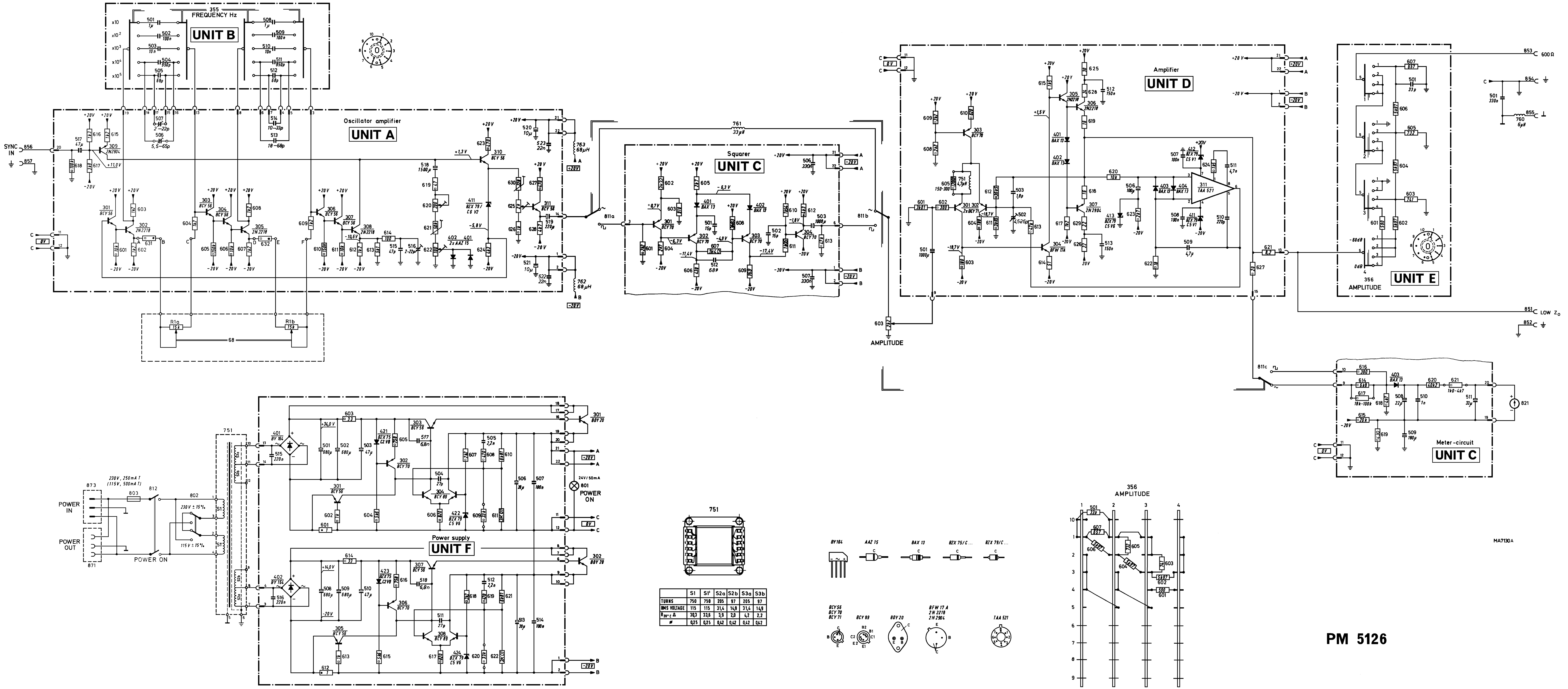


Fig. 19. Printed wiring board of power supply



	S1	S1'	S2a	S2b	S3a	S3b
TURNS	750	750	205	97	205	97
RMS VOLTAGE	115	115	31,4	14,9	31,4	14,9
$R_{20°C}$ Ω	30,3	33,6	3,9	2,0	4,2	2,2
⌀	0,25	0,25	0,42	0,42	0,42	0,42

Overall circuit diagram

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

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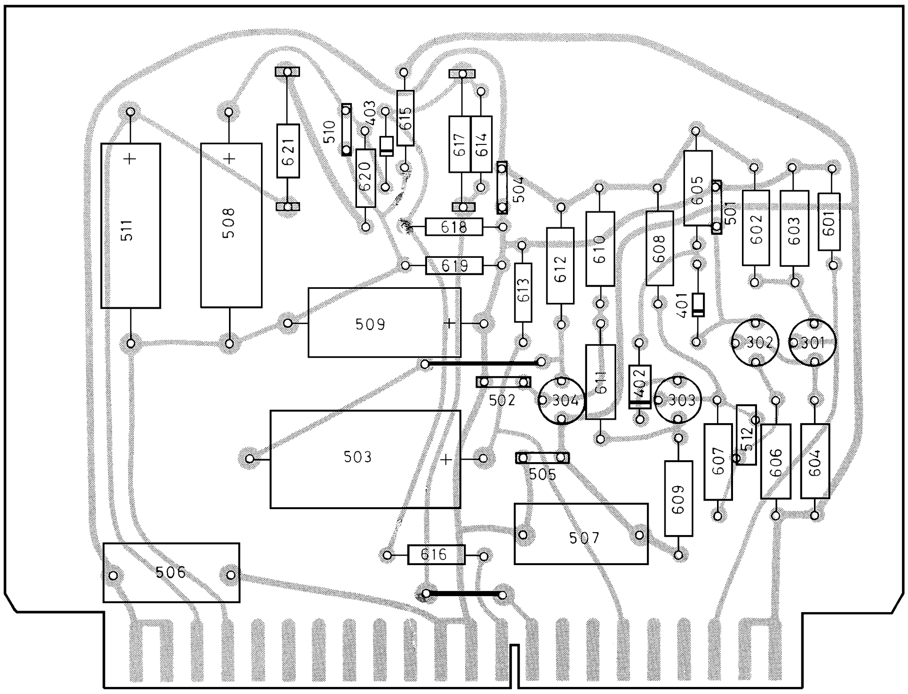
740601 | PM 5126 | Cd 825

TEST AND MEASURING INSTRUMENTS

Already published:

Re : Modifications to manual for PM 5126/03/04 (codenumber 9499 450 05911)

The lay-out of printed-wiring board given in fig. 17 of this manual is not the board of the squarer und meter circuit, but the modified printed-wiring board of the oscillator which belongs to fig. 16a.
The printed-wiring board given in fig. 16a of the manual is wrong.
The lay-out of printed-wiring board of the squarer and meter circuit, belonging to fig. 17 in the above mentioned manual, is not given and therefore printed in this information.



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740815 PM 5126 Cd 833

TEST AND MEASURING INSTRUMENTS

Already published: Cd 793, Cd 794 and Cd 825
Re : Version -/05

Version -/05 is identical to versions -/03 and -/04, except the following:
The specifications of the potentiometer, serving for continuous control of the frequency within a range, have been changed. This potentiometer determines, together with the dial, the frequency setting error.
Therefore the specifications for the PM 5126/05 have been slightly changed too, with respect to the frequency setting error.

The new specification is; ±4 % in range 100 Hz to 100 kHz
±6 % in range 10 Hz to 1 MHz

Bereits veröffentlicht: Cd 793, Cd 794 und Cd 825
Betrifft : Ausführung -/05

Ausführung -/05 ist gleich an Ausführungen -/03 und -/04 mit folgender Ausnahme:
Die Spezifikationen des Potentiometers, der der Frequenzregelung innerhalb eines Bereichs dient, wurden geändert.
Dieses Potentiometer, zusammen mit der Skalenscheibe, bestimmt den Frequenzeinstellfehler.
Aus diesem Grunde wurden die Spezifikationen des PM 5126/05 in Bezug auf den Frequenzeinstellfehler ebenfalls etwas geändert.

Die neuen Spezifikationen sind; ±4 % im Bereich 100 Hz bis 100 kHz
±6 % im Bereich 10 Hz bis 1 MHz

Déjà publié: Cd 793, Cd 794 et Cd 825
Concerne : Version -/05

La version -/05 est identique aux versions -/03 et -/04, à l'exception des points suivants:
Les spécifications du potentiomètre pour la commande continue de la fréquence dans une gamme, sont modifiées.
Ce potentiomètre avec cadran détermine l'erreur de réglage de fréquence.
Les spécifications pour PM 5126/05 sont dès lors légèrement modifiées.
Nouvelle spécification: ±4 % dans la gamme 100 Hz - 100 kHz
±6 % dans la gamme 10 Hz - 1 MHz

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