PHILIPS

MANUAL

PASSIVE PROBE

PM 9336-PM 9336L

ATTENUATION 10x

9499 440 11211

721201/1/01

CONTENTS

LIST OF FIGURES

I. GENERAL

1.1 INTRODUCTION

The PM 9336 is a 10x attenuator probe, designed for oscilloscopes up to 25 MHz, having a BNC input jack and 10 to 35 pF input capacitance, paralleled by 1 MΩ. The PM 9336L is a similar probe with a cable length of 2.5 m.

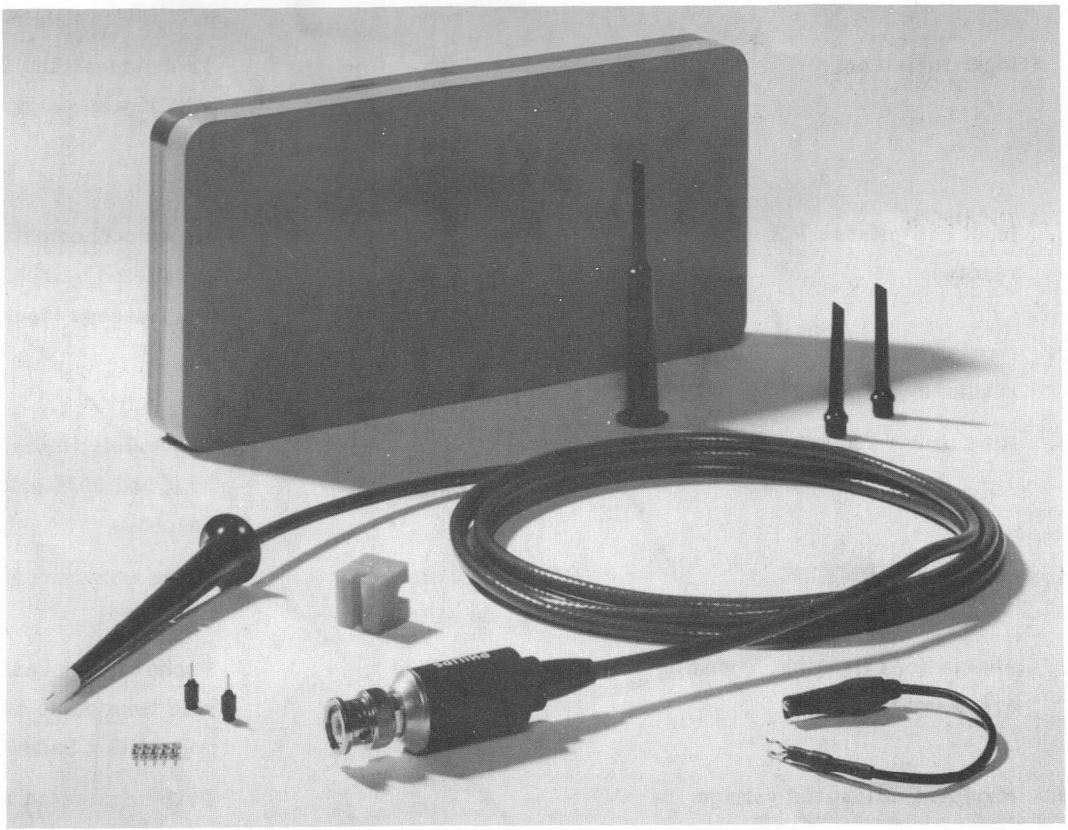

Fig. 1.1.1. Probe set PM 9336 - PM 9336L

1.2 TECHNICAL DATA

Electrical

	Characteristic		Specified performance	Additional information
1.2.1.	Compensation range		≤ 10 pF up to ≥ 35 pF	Input capacitance of oscilloscope, that can be compensated for
1.2.2.	Attenuation		10x (±3 %)	Probe connected to 1 MΩ (±1 %) oscilloscope input
1.2.3.	Input resistance	DC	10 MΩ (±2 %)	Probe connected to 1 MΩ (±5 %) oscilloscope input
		AC	See curve Fig. 1.2.1. for PM 9336 and 1.2.3. for PM 9336L	
1.2.4.	Input capacitance PM 9336 reactance at	DC-LF	11 pF (±1 pF)	Probe connected to 1 MΩ (±5 %), paralleled by 10 pF to 21 pF oscilloscope input
		HF	See curve Fig. 1.2.1.	
	Input capacitance PM 9336L reactance at	DC-LF	14 pF (±1 pF)	
		HF	See curve Fig. 1.2.3.	
1.2.5.	Rise time PM 9336		≤ 6 ns	Probe only; measured between 10 % and 90 % points of step response
	PM 9336L		≤ 7 ns	
1.2.6.	Bandwidth PM 9336		DC - ≥ 60 MHz	Probe only; measured at 70 % (-3 dB)
	PM 9336L		DC - ≥ 50 MHz	
1.2.7.	Aberrations (ringing, rounding, overshoot and tilt)		not exceeding ±3 %	Probe only; measured with 3 ns rise time pulse on an oscilloscope with a bandwidth of 25 MHz
1.2.8.	Maximum allowable voltage DC -7 MHz		±500 V (DC + AC_{peak})	Probe connected to a 1 MΩ oscilloscope input. Maximum voltage applicable between probe tip and earthed part of probe body
	for frequencies over 7 MHz		See derating curve Fig. 1.2.2.	
1.2.9.	Test voltage		1500 V DC during 1 sec.	Test conditions: probe output terminated with 1 MΩ. Temperature: 15 °C to 25 °C; rel. humidity: ≤ 80 %; at sea level

Environmental

	Characteristic		Specified performance	Additional information
1.2.10.	Temperature			
	Storage		-40 °C to +70 °C	Test procedure IEC 68 tests Ab and Bb; recovery time from -40 °C to room temperature being 1 hour when probe is attached to powered oscilloscope

Environmental

Characteristic	Specified performance	Additional information
Operating	-25 °C to +70 °C	Test procedure IEC 68 tests Ab and Bb. Within electrical specifications after occasional readjustment
1.2.11. Humidity, non-operating	21 cycles of damp heat test; temperature 25 to 40 °C; relative humidity 90 to 100 %; cycle time 24 hours	Test procedure IEC 50 B (CO) 142
1.2.12. Altitude		
Operating	to 5 000 m	Within electrical specifications
Storage	to 15 000 m	
1.2.13. Vibration, operating	45 minutes each axis; frequency varied 10 Hz - 150 Hz - 10 Hz in ten-minute cycles; constant displacement 0.7 mm p-p from 10 Hz to 60 Hz; constant acceleration 5 g from 60 Hz to 150 Hz. Further 10 minutes each axis at any resonance point. Attachment to vibration platform by means of a BNC connector at one end and a mini connector at the other end	Test procedure IEC 68 test F
1.2.14. Shock, non-operating	Probe stands 1 000 bumps each axis of half sine waves with a peak acceleration of 10 g. Attachment to shock platform by means of BNC connector at one end and a mini connector at the other end	Test procedure IEC 50 A (CO) 110
1.2.15. Transport		
Package drop	1 m on each corner and each flat surface, 12 drops in total	
Package toppling	10 minutes each axis at a frequency of 7 Hz and an amplitude of 7 mm.	

Mechanical

Characteristic	Specified quantity			Additional information
1.2.16. Dimensions	L	W		
Probe body	105	20 (max)	mm	
Cable	1500	-	mm	L = 2500 mm for PM 9336L
Correction box	75	20	mm	+BNC connector & collar

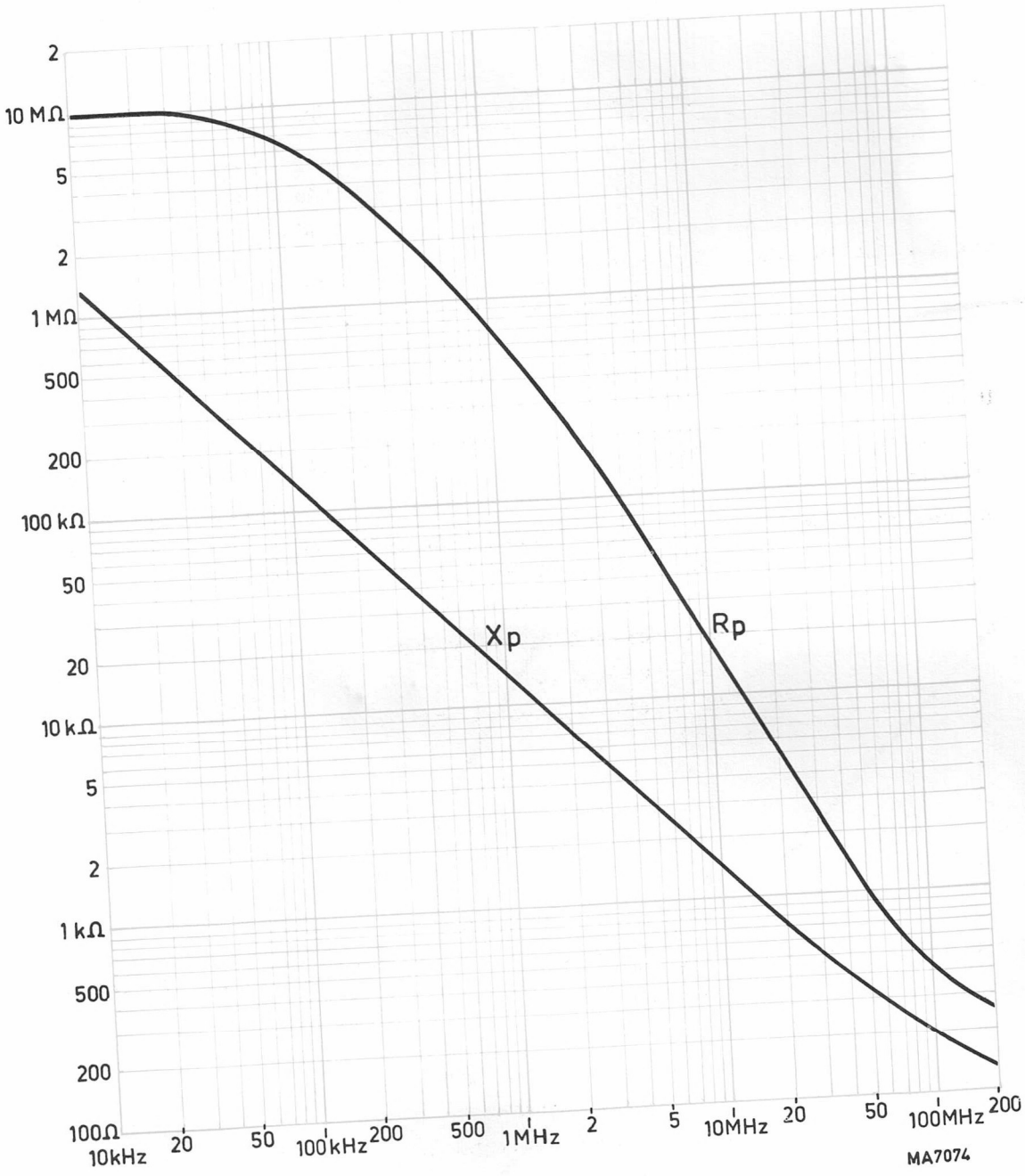

Fig. 1.2.1. Input resistance (R_p) and reactance (X_p) versus frequency (PM 9336)

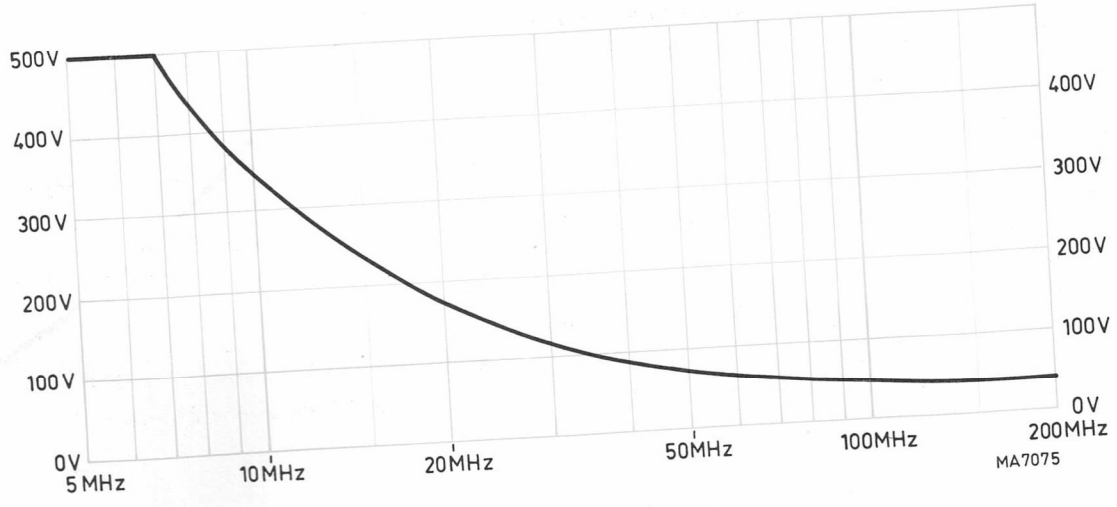

Fig. 1.2.2. Max AC component of input voltage ($\pm V_{peak}$) as a function of frequency

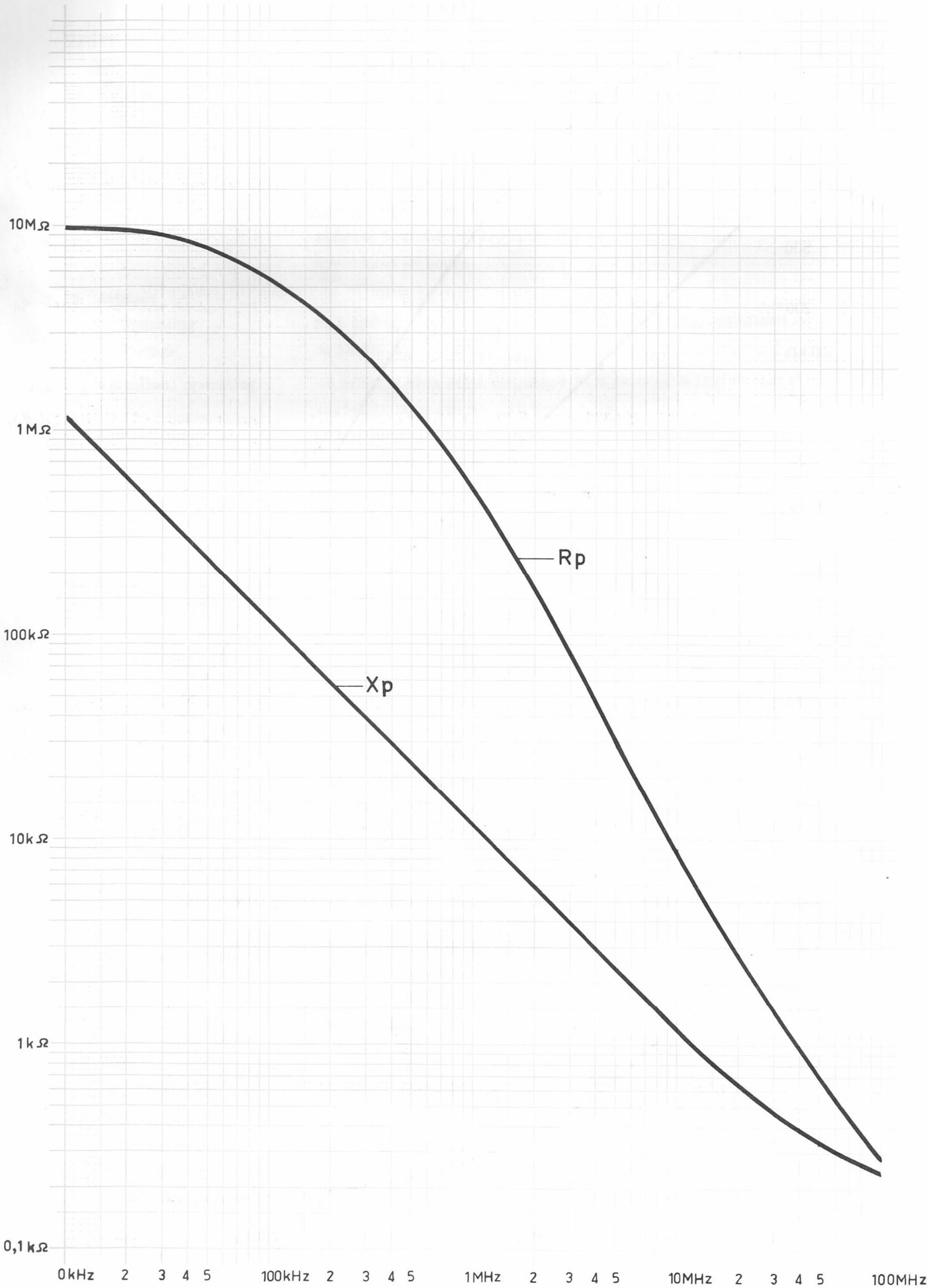

Fig. 1.2.3. Input resistance (R_p) and reactance (X_p) versus frequency (PM 9336L)

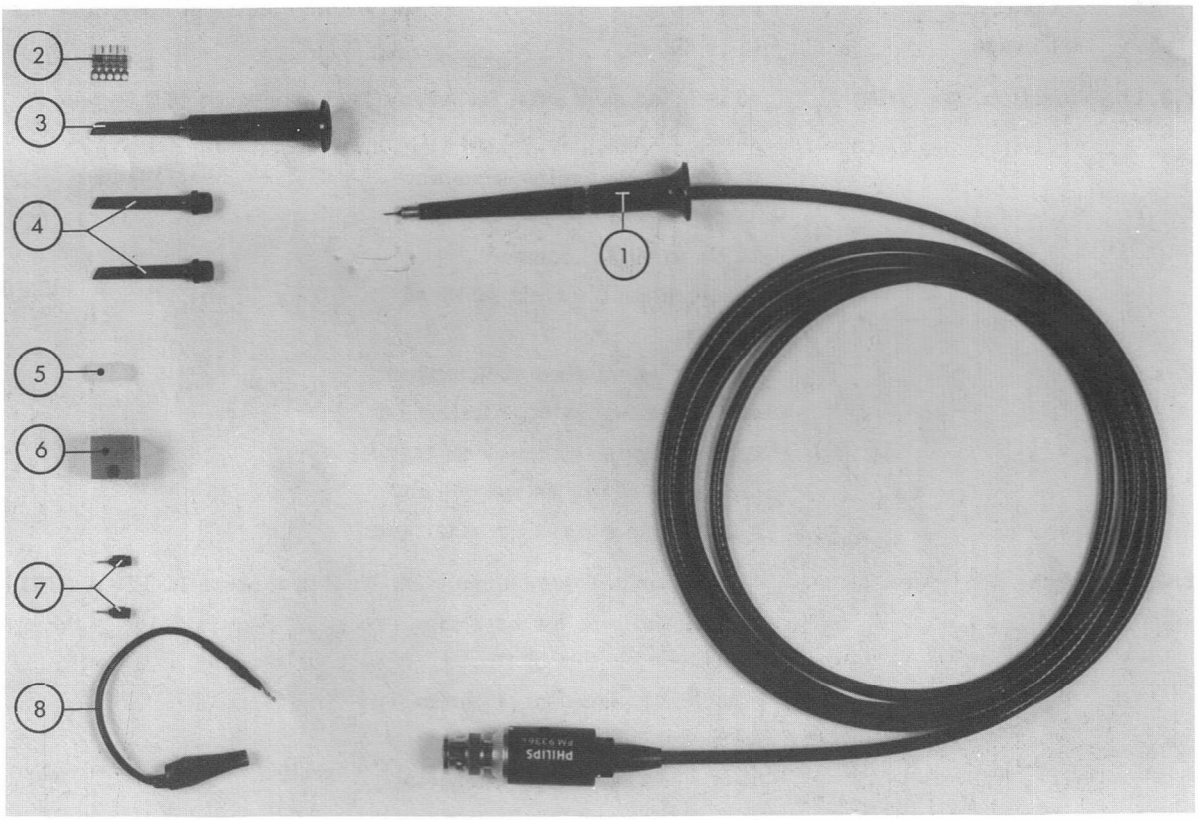

Fig. 1.3.1. Probe with accessories

1.3 ACCESSORIES

Item 1 Probe, cable and compensation box.

Item 2 Five soldering terminals.
In densely wired circuits the soldering terminals may be incorporated as routine-test points.

Item 3 Test hook.
The test hook is slid over the probe tip; by pushing the probe tip deeper in the test hook, the hook will protrude, so that the test point can be gripped.

Item 4 Two spare test hook sleeves.
These test hook sleeves are supplied with the probe, to serve as replacements for damaged parts. The test hook sleeve is screwed on to the test hook holder.
Insert the wire hook so that the opening is formed by its tip and the longer side of the sleeve.

Item 5 One protective cap.
If the probe is not in use, the protective cap should be fitted in order to prevent damage to the probe pin.

Item 6 Probe holder.
The probe holder is pushed over the probe cable, close to the compensation box.
During a break in the measurements, the probe cable (close to the probe body) can be pushed into the vacant slit of the probe holder (Fig. 1.3.2.).
The probe holder can also be used to take the weight of the probe when it is permanently connected to a circuit (Fig. 1.3.3.).

Item 7 Two probe tips.
These tips are supplied with the probe to serve as replacements for damaged parts (see also section 3.2.4.).

Item 8 Earthing cord.
The fork of the earthing cord is pushed into the slot in the middle of the probe body.
The crocodile clip is connected to the earthing point of the circuit under test.

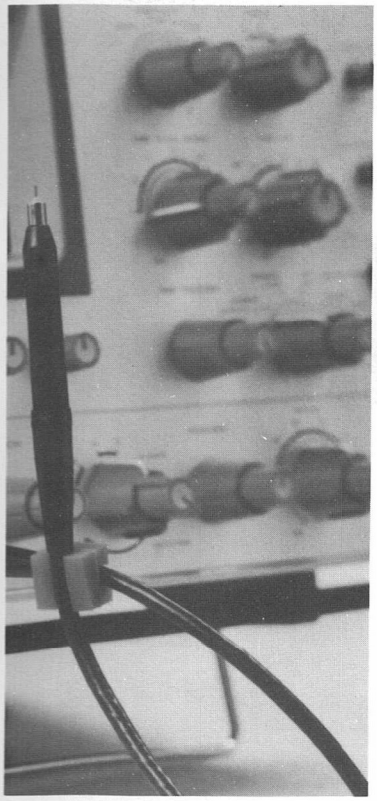

Fig. 1.3.2. Use of probe holder

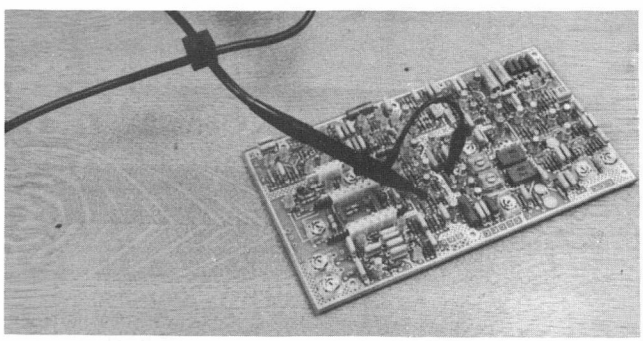

Fig. 1.3.3. Use of probe holder

II. OPERATION

The measuring probe has been adjusted and checked by the factory. However, to match the probe to your oscilloscope, the following manipulation is necessary.
Connect the measuring pin to socket CAL of the oscilloscope.
A trimmer (C2) can be adjusted through a hole in the compensation box to obtain optimum square-wave response.

See the following examples Fig. 2.1.1, 2.1.2, 2.1.3.

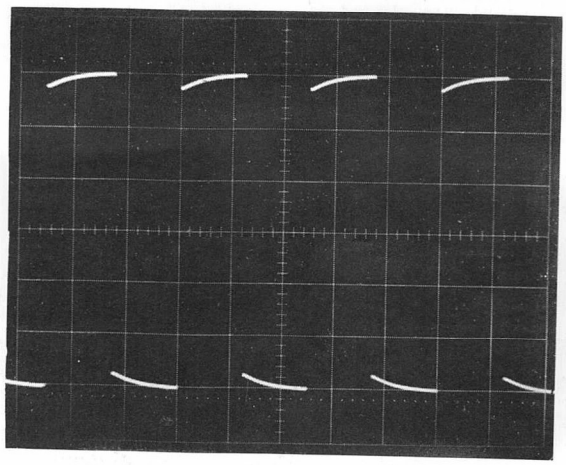

Fig. 2.1.1. C2 overadjusted

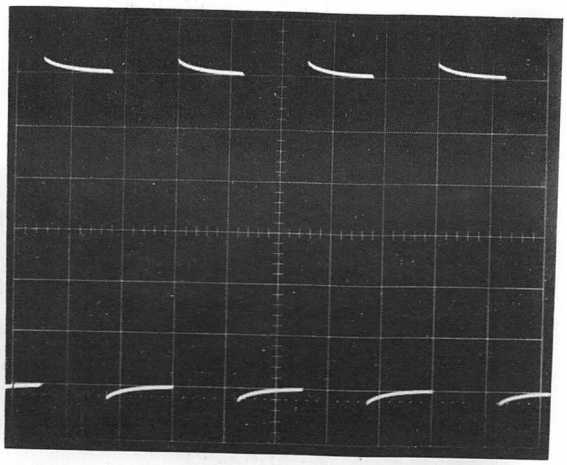

Fig. 2.1.3. C2 underadjusted

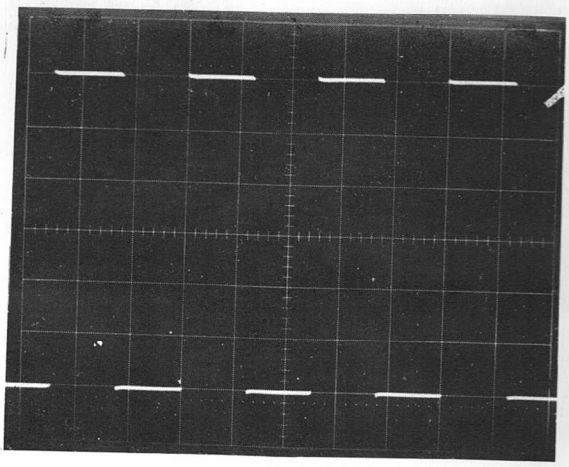

Fig. 2.1.2. C2 correctly adjusted

III. SERVICE DATA

3.1 DISMANTLING

3.1.1. Dismantling the probe

The forward part (9) of the measuring probe can be screwed from the rear part (12), (9) and (10) can then be slid from (11) and (12).
The RC combination (11) is soldered to (12).
For replacement of (11) refer to section 3.2.1.

3.1.2. Dismantling the compensation box

Unscrew the ribbed collar of the compensation box and slide it back over the cable.
The casing (14) can then also be slid back over the cable.

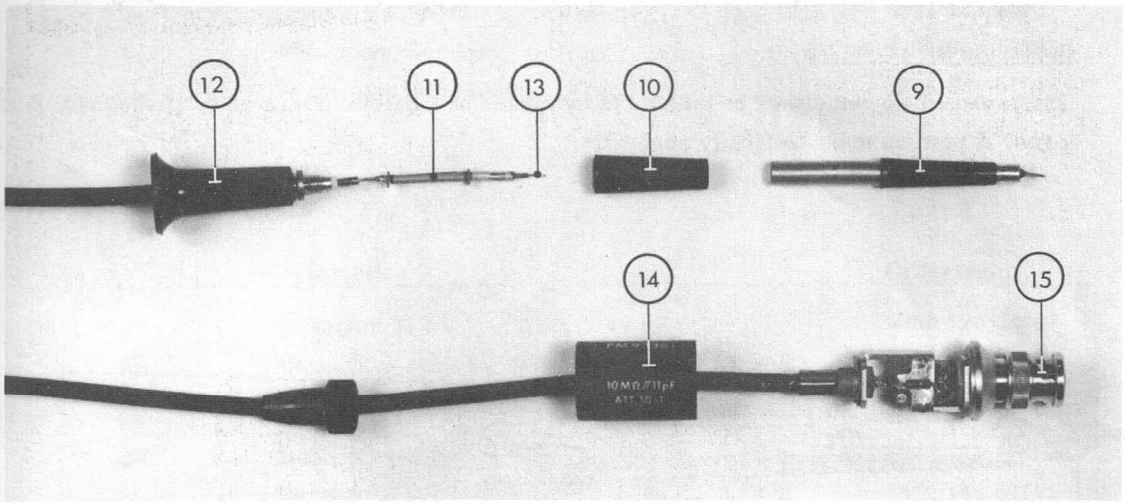

Fig. 3.1.1. Assembly of the probe PM 9336 - PM 9336L

3.2 REPLACING PARTS

3.2.1. Assembling the measuring probe

When assembling the measuring probe, the RC assembly must be at dead centre in the probe tip (Fig. 3.2.1.).

Ensure that the correct distance between the top of plug (A) and the frontside of the earthing ring (B) is maintained. The distance AB must be $62^{-0.5}$ mm (see Fig. 3.2.1.).

3.2.2. Replacing the cable assembly

Dismantle the compensation box in accordance with section 3.1.2.

Unsolder the connection between inner conductor and resistor.

Keep the lining of the compensation box steady and loosen the nut with a 8 mm spanner.

Replace the cable and fit it, working in the reverse order.

3.2.3. Replacing the BNC connector

Dismantle the compensation box in accordance with section 3.1.2.

Unsolder the connection to the components.

Keep the lining of the compensation box steady and loosen the BNC connector with a 3/8 in spanner.

Replace the BNC connector and fit it, working in the reverse order.

3.2.4. Replacing the probe tip

The damaged tip can either be pulled out by means of a pair of pliers or be pushed out by means of a rod. A new tip must be firmly pushed in.

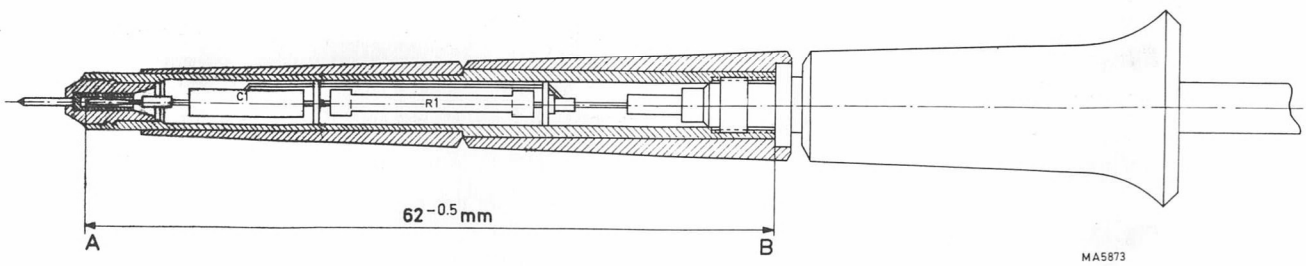

Fig. 3.2.1. Fitting of the RC-combination

3.3 LIST OF MECHANICAL PARTS

Item	Fig.	Description	Ordering code
2	1.3.1	Measuring terminal	5322 255 44026
3	1.3.1	Test hook	5322 264 20024
4	1.3.1	Test hook sleeve	5322 264 20028
5	1.3.1	Protective cap	5322 532 60535
6	1.3.1	Probe holder	5322 256 94034
7	1.3.1	Probe tip	5322 268 14017
8	1.3.1	Earthing cord	5322 321 20223
9	3.1.1	Probe shell	5322 264 20025
10	3.1.1	Sleeve	5322 532 70126
11	3.1.1	RC Assy PM 9336	5322 219 80181
		RC Assy PM 9336L	5322 219 84019
12	3.1.1	Cable assy PM 9336	5322 320 14004
		Cable assy PM 9336L	5322 320 14013
13	3.1.1	Plug	5322 268 10023
14	3.1.1	Casing PM 9336	5322 447 64008
		Casing PM 9336L	5322 447 64007
15	3.1.1	BNC connector	5322 264 10025
16	-	Probe box with insert	5322 600 34002

3.4 LIST OF ELECTRICAL PARTS

Item		Description			Ordering code
PM 9336	C2	Trimmer 350 V	40 pF		5322 125 54007
	R2	Metal film resistor MR25	1 %	158 Ω	5322 116 50836
PM 9336L	C2	Trimmer 350 V	40 pF		5322 125 54007
	R2	Metal film resistor MR25	1 %	75 Ω	5322 116 50001
	R3	Metal film resistor MR25	1 %	178 Ω	5322 116 54179

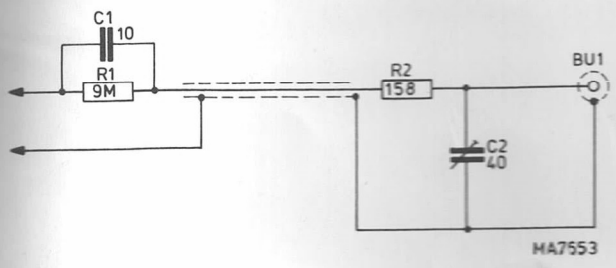

Fig. 3.4.1. Circuit diagram PM 9336

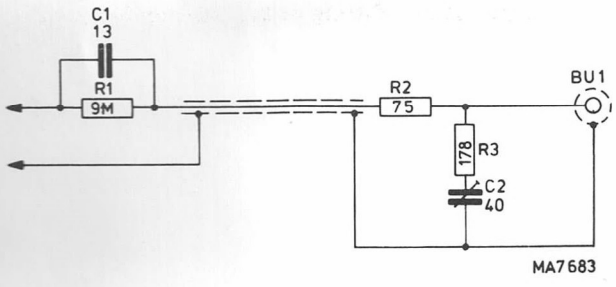

Fig. 3.4.2. Circuit diagram PM 9336L