AF Millivoltmeter type RV36

Section A. Introduction

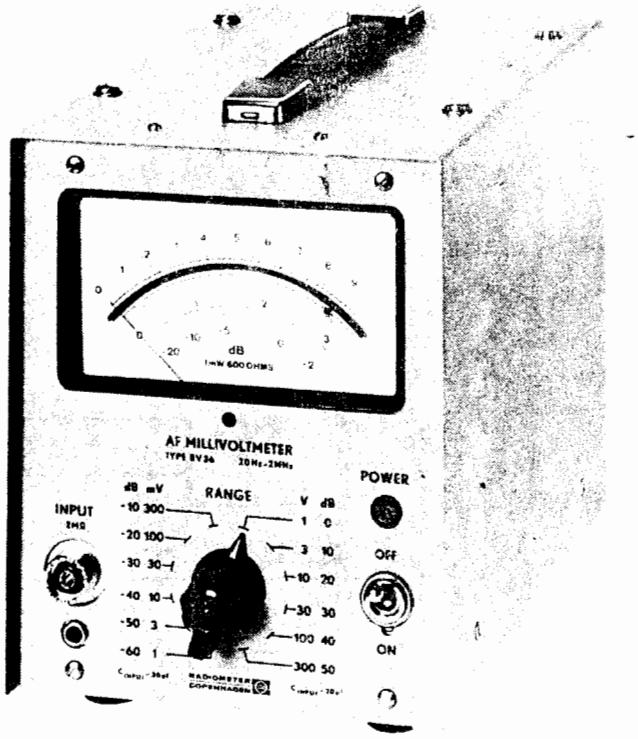


Fig.1. The AF Millivoltmeter, type RV36

The AF Millivoltmeter, type RV36, is a solid-state, line operated, instrument with complete overload protection. Owing to its high measuring-stability, this millivoltmeter is ideal for laboratory and electronic shop work.

Its main features are wide voltage and frequency ranges - from 1 mV to 300 V f.s. and from 20 Hz to 2 MHz, respectively. The input impedance is nominally 2 MΩ at low frequencies in parallel with 30 pF in the millivolt ranges and with 20 pF in the volt ranges.

The AF Millivoltmeter, type RV36, is also suitable for use as an amplifier with an ac output voltage of 50 mV at full scale deflection on all ranges, and a dc output of 500 mV at full scale deflection on all ranges.

The mirror-backed meter with its two voltage scales from 0 to 1 and from 0 to 3, and its dB scale from -20 to +2 dB (0 dB = 1 mW in 600 Ω), has a knife-edge pointer which combines with fine-scale graduation to give accurate reading, free from parallax. The AF Millivoltmeter, type RV36, reads the rms value of a sine wave, but responds to the average value of the applied voltage.

It is provided with two ordinary banana jacks for connection of an external 52-70 V battery.

Section B. Specifications

VOLTAGE RANGES:

1 mV to 300 V f.s.d. in a 1-3-10 sequence.

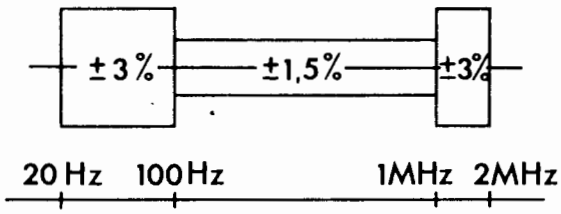
TOTAL dB RANGES:

From -80 to 52 dB in 10 steps. (0 dB = 1 mW in 600Ω)

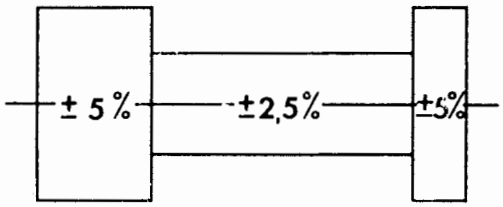
FREQUENCY RANGE:

20 Hz to 2 MHz

ACCURACY
AT 1/1 DEFLECTION
(inclusive of errors due to line voltage variations of ± 10%)



ACCURACY
AT 1/3 DEFLECTION
(inclusive of errors due to line voltage variations of ± 10%)



METER:

The Meter reads the rms value of a sine wave, but responds to the average value of the applied voltage

Two linear mirror-backed voltage scales 0 to 1 and 0 to 3

One dB scale -20 to +2 dB. (0 dB = 1 mW in 600 Ω)

Scale length: 100 mm

INPUT IMPEDANCE:

Capacity: 30 pF in the mV ranges, and 20 pF in the V-ranges.

Resistance: nominally 2 MΩ at low frequencies

NOISE:

Approx. 50 μV at a source impedance of zero. Less than 200 μV at a source impedance of 100 kΩ. Both noise voltages are referred to the input.

OVERLOAD PROTECTION:

Protected for inputs up to 500 V rms on all V-ranges, and up to 100 V rms on all mV-ranges.

The dc voltage plus the ac peak voltage must not exceed 700 V on all V ranges, and 250 V on all mV ranges.

AMPLIFIER OUTPUT:

Output voltage:	50 mV ± 4% at full scale deflection on all ranges.
Frequency response:	within ± 3% from 20 Hz to 2 MHz.
Output impedance:	600 Ω.

DC OUTPUT:

Output voltage:	500 mV ± 4% at full scale deflection on all ranges.
Output impedance:	100 kΩ.

POWER SUPPLY:

Voltages:	110, 115, 127, 200, 220, and 240 V.
Line frequency:	50 to 60 Hz.
Consumption:	3.5 VA.
	External battery can be connected through two 4 mm banana jacks.
Battery voltage:	52 to 70 V.
Current consumption:	approx. 26 mA.

TERMINALS:

The voltage INPUT and amplifier AC OUTPUT are UHF coaxial sockets, type SO-239, which also accommodate ordinary 4 mm plugs.

DC OUTPUT and BATTERY input terminals are ordinary 4 mm banana jacks.

DIMENSIONS AND WEIGHT:

Height	Width	Depth	Weight
194	143	266 mm	3.5 kilos
7.7	5.7	10.6 inches	8 lbs

Section C. General Description

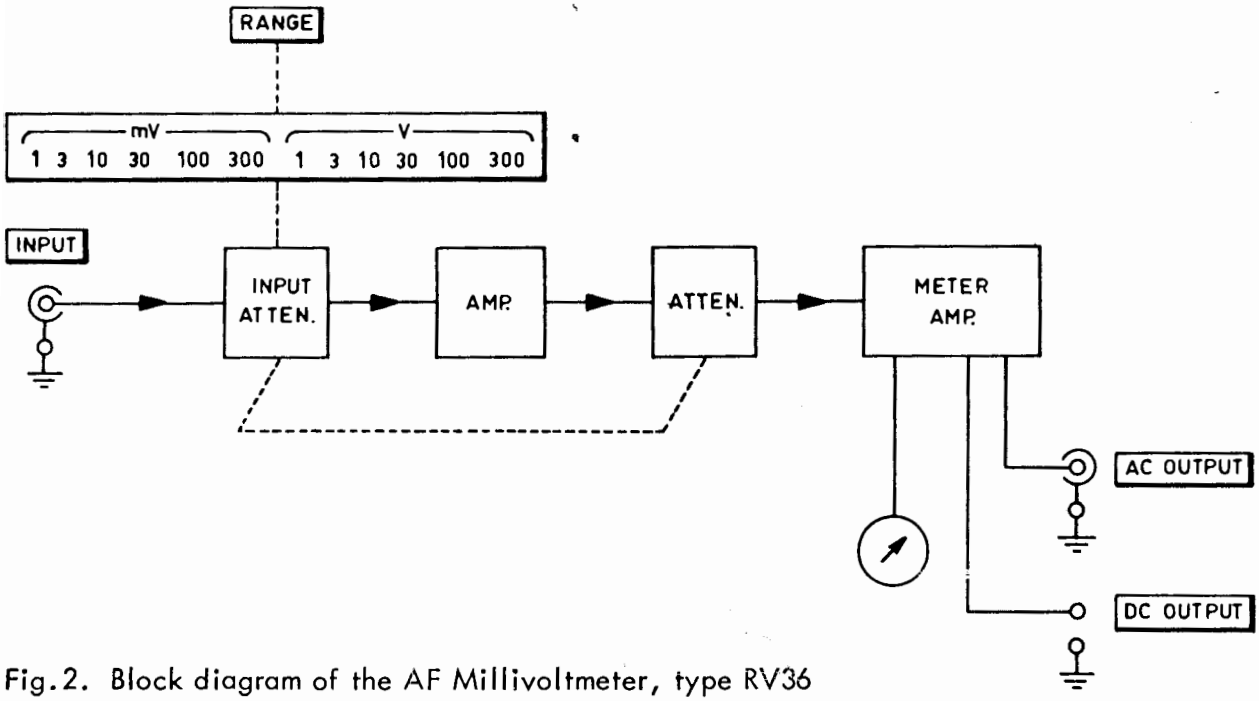


Fig.2. Block diagram of the AF Millivoltmeter, type RV36

The principle of operation is indicated in the block diagram shown in Fig.2.

The AF Millivoltmeter, type RV36, consists of an input attenuator-stage with 0 dB attenuation in the millivolt ranges, 40 dB and 60 dB attenuation in the 1, 10 V and 30, 300 V ranges, respectively, followed by a final 4-stage meter amplifier providing for ac and dc outputs.

CONTROLS, TERMINALS AND METER

As shown in Fig.3, the AF Millivoltmeter, type RV36, is equipped with the following controls, terminals and meter:

Power Switch ON/OFF (1) and Pilot Lamp (POWER) (2)

Power switch and pilot lamp are located on the front panel.

Voltage Range Selector (3)

The voltage RANGE selector switches from 1 mV to 300 V full scale deflection in a 1-3-10 sequence, or from -60 dB (0 dB = 1 mW

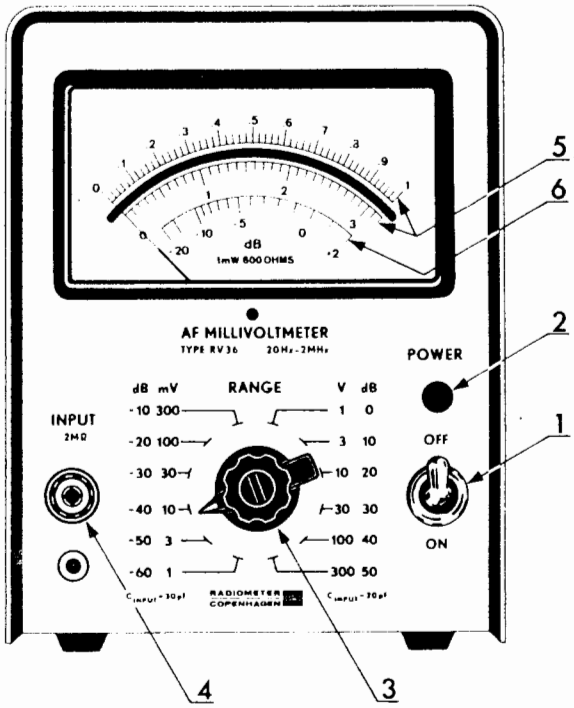


Fig.3. Front plate of the AF Millivoltmeter, type RV36

in 600 Ω) to 50 dB full scale deflection in 10 dB steps.

Terminals

Both the voltage INPUT (4) and the amplifier AC OUTPUT (see Fig.4) terminals are UHF coaxial sockets, and accept regular 4 mm banana plugs. The DC OUTPUT (see Fig.4) and the battery input are 4 mm banana jacks.

Power Cord, Fuse and Voltage Indicator

As seen in Fig.4, the power cord, fuse and voltage indicator are all located on the rear of the instrument.

Battery

The AF Millivoltmeter, type RV36, can be battery-operated, and two input BATTERY jacks for a 52 - 70 V battery are provided on the rear of the instrument.

Meter

The meter is equipped with a mirror-backed scale and a knife-edge pointer providing for accurate reading, free from parallax. It has three scales, the two upper (5), graduated from 0 to 1 and 0 to 3, being used for voltage measurements, the indication being rms millivolts or volts. The lower scale (6) is used for dB-measurements and is graduated in decibels from -20 to +2.

The mechanical zero-setting screw is located right below the meter.

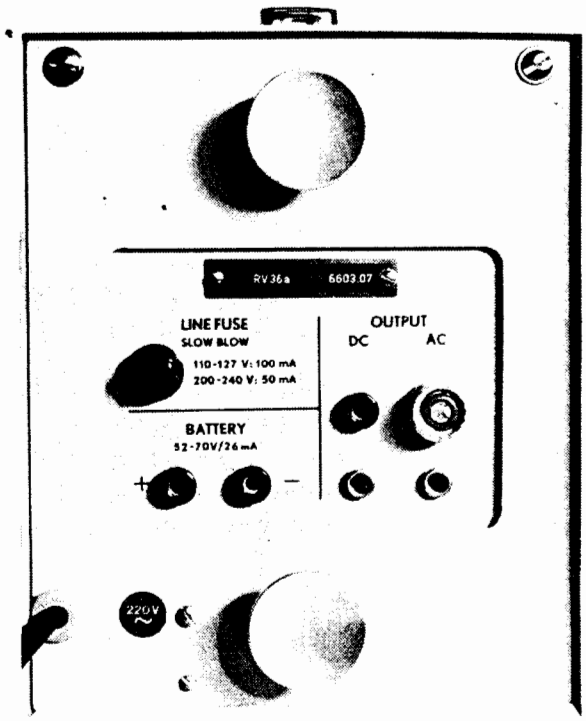


Fig.4. Rear view of the AF Millivoltmeter, type RV36

Section D. Operating Instructions

ZERO ADJUSTMENT

Zero adjustment is seldom required, but may be necessary after long usage, or following transportation. Before making this adjustment, the power switch should be thrown to OFF and the instrument placed in its normal operating position.

PREPARING THE AF MILLIVOLTMETER, TYPE RV36

Check that the instrument is correctly switched to the line voltage as indicated by the plate on the rear of the cabinet.

The AF Millivoltmeter, type RV36, is set at 220 V (unless otherwise specified) when leaving the factory and is furnished with 2 fuses. Change the fuse when switching from 200 - 240 V to 110 - 127 V operation and conversely. Slow-blow fuses, 0.05 A for 200 - 240 V operation, and 0.1 A for 110 - 127 V operation, must be inserted.

Reading of another line voltage on the Voltage Indicator is made possible by loosening the screw located on the right-hand side of it, unscrewing completely the lower screw and rotating the disc.

Connect the supply transformer to other lugs, as follows, when switching to another line voltage:

1. Remove the cabinet.

2. Remove the cable from tap No. 6 (220 V) on the power transformer.

3. Resolder the cable to the appropriate solder lug of the transformer, according to the table below:

Lug No.	Line Voltage
2	110 V
3	115 V
4	127 V
5	200 V
6	220 V
7	240 V

After having checked the fuse and the supply transformer, connect the instrument to the line and switch on.

USING THE RV36 AS A MILLIVOLTMETER

1) Connect the object under test to the input terminals of the AF Millivoltmeter.

2) Select the desired measuring range.

3) Read the value of the unknown voltage directly on the meter. The voltage range selected determines the full scale deflection value of the meter. When measuring dB, the selected range indicates the full-scale deflection value, 0 dB being the reference point.

USING THE RV36 AS AN AMPLIFIER

1) Connect the voltage source to the input terminals of the AF Millivoltmeter.

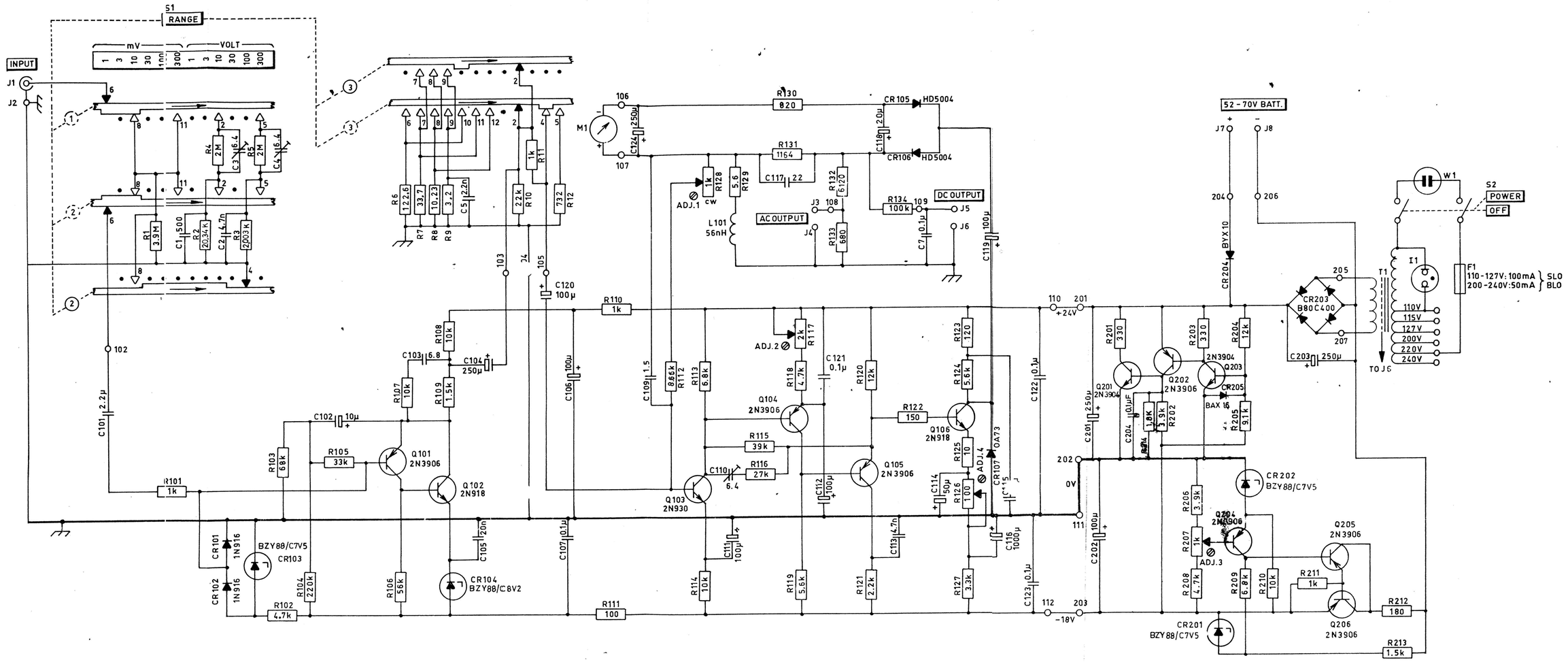
2) Select the desired measuring range.

3) The output voltage is proportional to the input voltage, but of max. 50 mV ac or 500 mV dc for full scale deflection on all ranges.

Section E. Circuit Description

The input signal is fed via the input attenuator S1, giving no attenuation in the millivolt ranges and 40 dB and 60 dB in the 1-10 V and 30-300 V ranges, respectively. The input attenuator is followed by a two-stage, bootstrapped amplifier Q101 and Q102. This stage provides for impedance conversion. The system Q101 -Q102 is protected against overload by CR101 and CR102. From the collector of Q102, the signal is fed to a current divider and then to the final four-stage output amplifier Q103 - Q104 - Q105 - Q106, with negative overall feedback, thus providing for high stability. The rectifying elements and the meter are in the feedback loop. The meter amplifier is provided with ac and dc outputs.

The power supply is a regulated power supply; with provision for battery operation from a 52-70 V battery having a current consumption of about 26 mA.



VALUES IN pF OR Ω IF NOT OTHERWISE SPECIFIED
cw: CLOCKWISE POSITION
101 : PRINT TERMINAL

2	149550	13-2-69	Je.		DU	
1	127421	16-4-68	SHM			
Rev.	Erstatter	Dato	Tegn.	Kont.	Norm.	

RADIOMETER COPENHAGEN
72 EMDRUPVEJ NV

Målestok /
Tegn. PG 2/11-6
Kont. PK 2/11-6
Norm.

AF-MILLIVOLTMETER
TYPE RV 36c
From no. 123893 to no.

Erstatter
1179-A1
Erstatters af