

DISTORSION ANALYSER

CS 27 E

SPECIFICATIONS

DISTORTION ANALYZER

Frequency: 10 Hz to 100 KHz in 4 ranges.

Accuracy : better than $\pm 1\% \pm 1$ digit.

Attenuation: for the fundamental frequency: greater than 80 dB
for the 2nd harmonic: lower than 0.5 dB.

Reading accuracy: within $\pm 3\%$ of f.s.d. for distortions
exceeding 0.5%.

Distortion: less than 0.08%.

Sensitivity: 100% f.s.d. to 0.3% f.s.d. in 6 ranges.

Input level: amplitude of signal to test 0.3 V minimum;
100 V maximum. Stepped and continuously ad-
justable input attenuation facility.

Input impedance: approx 1 MOhm and 50 uuF.

Input insulation: a 400 V max. DC-component of the signal
is allowed.

VOLTMETER

Frequency range: 10 Hz to 1 MHz.

Ranges : 1 mV f.s.d. to 300 V f.s.d. in 12 steps.

Accuracy: better than $\pm 3\%$ of f.s.d. from 10 Hz to 0.1 MHz;
better than $\pm 5\%$ of f.s.d. from 10 Hz to 1 MHz.

Input impedance: 1 MOhm and 50 uuF, all ranges.

Output : approx. 50 mV for f.s.d. on 5000 Ohms.

Power supply: 220 V $\pm 10\%$, 50 Hz, 30 VA.

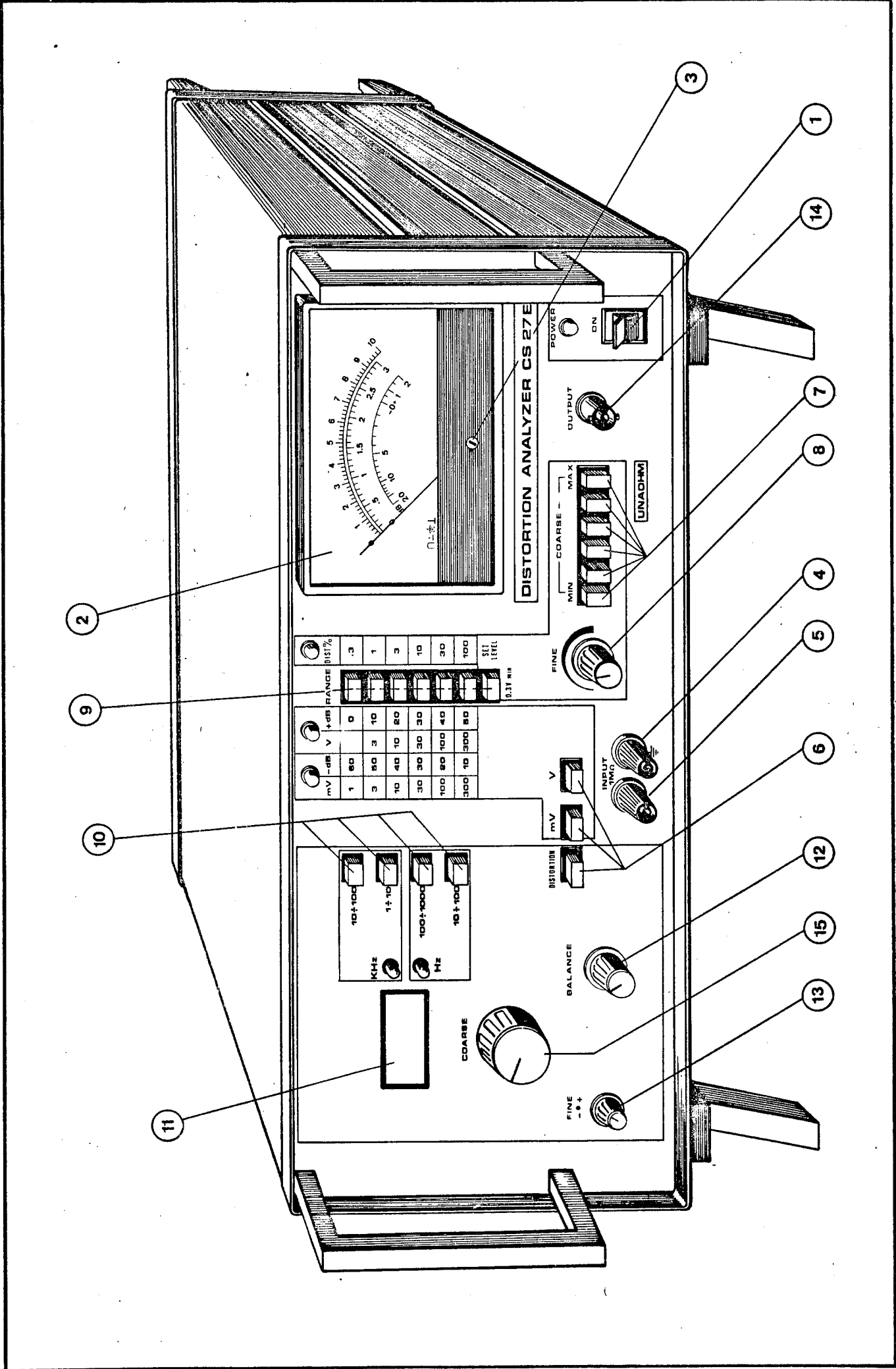
Dimensions : 425 x 180 x 210 mm.

Weight : approx. 7 kg.

STANDARD ACCESSORIES

1 type C84 Line Cord

1 fuse 0,3A



2

9

10

11

3

1

14

7

8

4

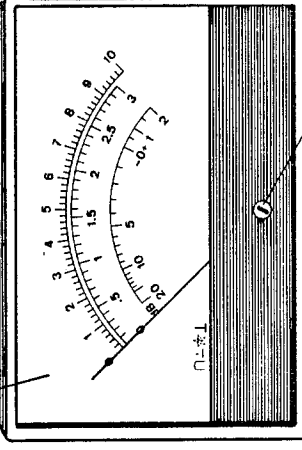
5

6

12

15

13



DISTORTION ANALYZER CS 27E

RANGE	0.3	1	3	10	30	100	SET LEVEL
dB	0	10	20	30	40	50	0.3V MIN
mV	1	3	10	30	100	300	
V	10	30	100	300	1000	3000	

KHz	10 ± 100	1 ± 10	100 ± 1000	10 ± 100
-----	----------	--------	------------	----------

mV	1	3	10	30	100	300
V	10	30	100	300	1000	3000

POWER ON

OUTPUT

MIN COARSE - MAX UNADJUSTED

FINE

INPUT 10MΩ

mV V

DISTORTION

BALANCE

COARSE

FINE

CONTROLS AND CONNECTIONS

- 1) POWER ON-OFF Mains switch.
- 2) Meter for distortion, level and amplitude reading.
- 3) Screw for mechanical zeroing of meter pointer.
- 4) INPUT Ground terminal.
- 5) INPUT Hot input terminal for either voltmeter and distortion analyzer mode.
- 6) DISTORTION-mV-V Function selector. From left to right buttons select:
Distortion: distortion analyzer
mV : electronic millivoltmeter
V : electronic voltmeter
The appropriate light emitting diode on the front panel lights when a function has been selected.
- 7) COARSE Button selector of analyzer input sensitivity, from minimum (MIN) to maximum (MAX) in six 10 dB steps.
- 8) FINE Enables input sensitivity between steps to be continuously adjusted.
- 9) RANGE Range selector. The range to be selected will refer to the specific function the unit has been set for viz, to the button engaged on Function selector (6). Therefore, if the button engaged is "mV" (the one in the middle) the selectable ranges will cover 1 mV f.s.d. to 300 mV f.s.d. If the button engaged is "V" (the one on the right) the selectable ranges will cover 1 V f.s.d. to 300 V f.s.d. Reading is then carried out deducting the dB value indicated by the LED light from the dB reading of the panel meter. If the button engaged on Function selector (6) is "Distortion" (on the left) the selected ranges will cover 0.3% f.s.d. to 100% f.s.d.
The lowest button designated SET LEVEL enables a reference level to be established for distortion measurements.
- 10) KHz-Hz Range selector of rejection frequency of the distortion analyzer (fundamental frequency of the signal under test). Each button is designated with their own frequency range.

- 11) DISPLAY Frequency readout of the input signal.
- 12) BALANCE Coarse adjustment of frequency rejection.
- 13) + - FINE Fine adjustment of frequency rejection.
- 14) OUTPUT Amplifier BNC output.
- 15) COARSE Coarse adjustment of rejecting frequency of the distortion analyzer.

The following are mounted on the rear panel:

- mains embedded plug
- spare 300 mA fuse

OPERATING INSTRUCTIONS

Before switching the instrument ON check that the meter pointer is properly zeroed, otherwise adjust it accordingly by means of screw (3).

Apply power to the meter from a 220 V AC line outlet using line cord C84. Note that the line cord is provided with a third wire for grounding purposes to comply with safety norms of underwriting organizations.

However, if grounding is not accomplished, the specifications of the meter are not affected.

Set the mains switch (1) to ON. Power pilot light lights to confirm this status and that the meter is ready to work.

Distortion Analyzer

Set Range Selector (9) to SET LEVEL and Function Selector (6) to DISTORTION.

Reduce the sensitivity to a minimum by engaging the COARSE Selector (7) leftmost button (MIN) and turning FINE control (8) counterclockwise.

Apply the signal to be analyzed to input jacks (4) and (5) following the jack polarity (red for live, black for cold or - side) if the source is not balanced.

Engage the KHz-Hz range button (10) which is appropriate to the frequency of the signal under test. If the frequency is unknown, then engage the 10-100 Hz range button: this will make its light emitting diode light; in addition it will make display (11) read either the frequency of the signal under test or EEE, the latter being a warning for out of range condition, thus suggesting that a higher range button(s) is (are) to be engaged for proper frequency reading.

Gradually increase the sensitivity by engaging, one at a time, the COARSE Selector (7) buttons next to MIN button and tuning FINE control (8) clockwise until the meter (2) pointer reads 10 (100%).

Once the above adjustments are made, the user has set a reference level and made a comparative level measurement, after which care must be taken not to change the setting of controls (7) and (8). Switch Range selector (9) to 100.

Trimming COARSE control (15) makes the pointer of meter (2) clearly tend to reduce the reading; adjust BALANCE (12) and FINE (13) controls until minimum reading is obtained. Should the meterpointer reduce reading down to the first one-third of the dial, it is advisable to switch RANGE selector (9) to a lower range.

Trim then BALANCE (12), COARSE (15) and FINE (13) controls in an attempt to further reduce the indication of meter (2) (Fundamental rejection).

If necessary, switch RANGE selector progressively to a lower and lower distortion percentage. It is worth noting that the lower the RANGE selector is set, the more cautious the adjustments of BALANCE (12) and COARSE (15) controls have to be, this to prevent the meter pointer from dangerously hitting the full scale stopper.

Upon completion of the adjustments, the minimum deviation of the meter indicates the percentage content of the harmonics of the signal under test.

Read the harmonic distortion on one of the upper scales of meter (2) according to the RANGE (9) button engaged.

Once the reading is taken note of, push RANGE (9) SET LEVEL button before the leads are disconnected from input terminals.

When using the CS27 for checking a new project for distortion, it becomes evident the usefulness of evaluating the order of the main harmonics too. This is made possible using OUTPUT (14) which, outputting the signal under test without its fundamental thanks to a Wien bridge, enables the user to evaluate its harmonic content through an oscilloscope.

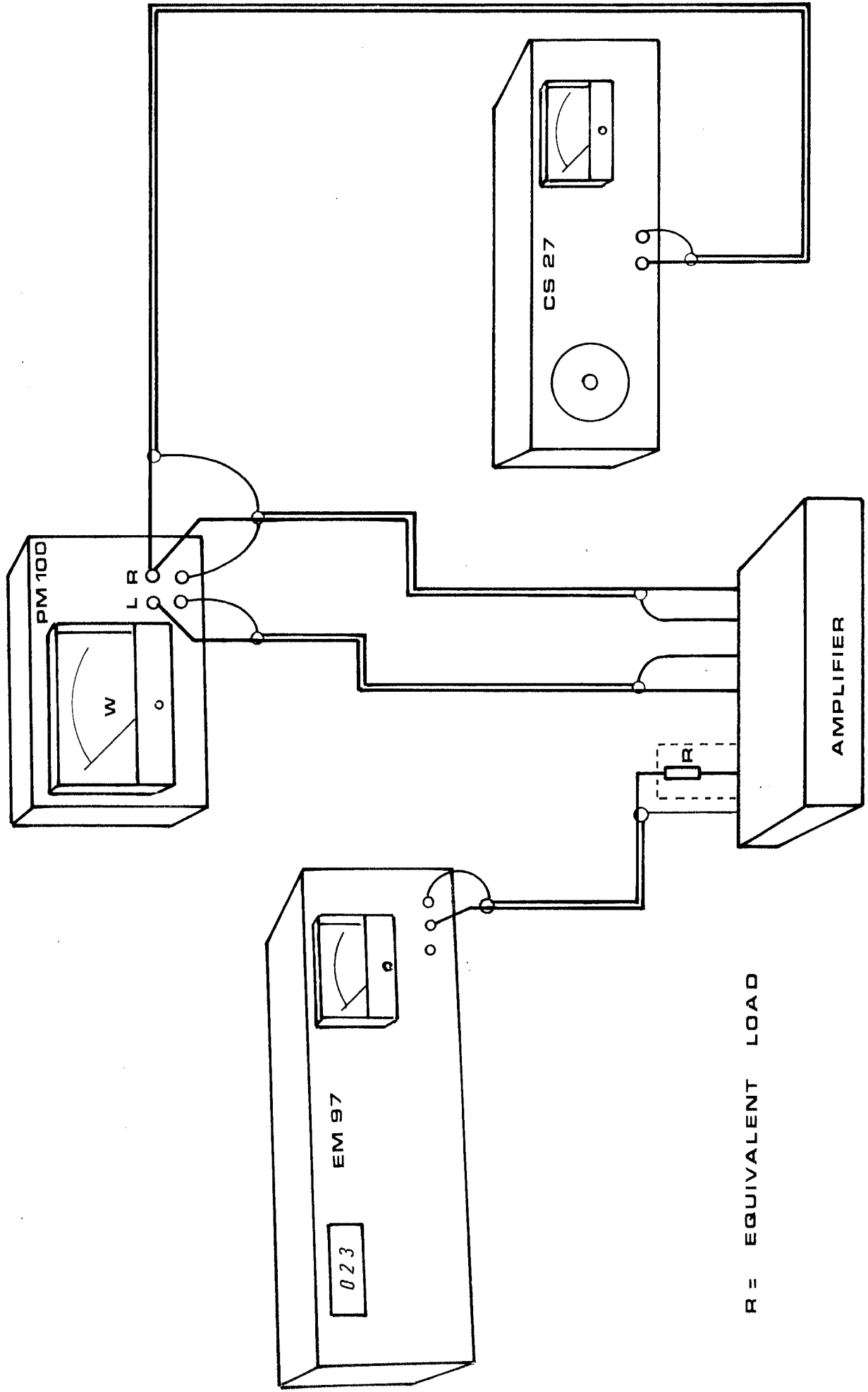
SIGNAL-to Noise RATIO

One of the most typical applications of a distortion meter is the measurement of the signal to noise ratio of audio amplifiers.

Connect the amplifier output to a load of adequate power dissipation and having an ohmic value as close to the amplifier's rated load as possible.

Adjust the amplifier volume control fully clockwise and the tone controls (bass and treble, if any) to full boost.

Apply a signal to the amplifier input which is appropriate for the amplifier to achieve full output.



R = EQUIVALENT LOAD

With the amplifier controls set as described, switch the distortion meter function selector (6) to V, then connect the distortion meter INPUT terminals (4) and (5) across the load of the amplifier.

Engage the RANGE selector (9) button which is appropriate for the pointer of the meter (2) to deviate within the first 1/3 of the scale.

Read the dB level adding the meter indication to the value of the RANGE (9) button engaged.

The above reading represents the reference level of the input signal.

Disconnect the input signal from the amplifier and connect its inputs to a resistor equalling the amplifier rated input impedance.

Shield this resistor to prevent induced signals or external noise from taking place.

Switch RANGE selector (9) to a lower range and, if necessary, engage function selector (6) mV button for the pointer (2) to achieve a resolving deviation.

Make a new dB reading algebraically adding the pointer (2) indication to the RANGE (9) button indication.

The difference in level between the reference level and this last reading represents the signal-to noise ratio.

Voltmeter

The CS27 provides also an excellent performance as an electronic voltmeter in the 10 Hz to 1 MHz frequency range.

Engage the FUNCTION selector (6) button which is appropriate to the voltage to be measured.

This makes the distortion analyzer controls 7-8-10-12-13 and 15 entirely inactive; the frequency digital counter will read up to 99.9 KHz or EEE for out of range values.

Engage the Range (9) button which is appropriate to the voltage to be measured.

Apply the signal to be measured to INPUT terminals (4) and (5) taking care to match the polarity colour coding.

Read the value on one of the two upper scales, this being dependent on the range selected.

GUARANTEE

Our instruments are guaranteed for one year time against breakdown or malfunction due to faulty components manufacture.

Any kind of check-over will be performed at our works or at our representative laboratory, or skilled engineer, where the instruments are to be delivered packed into adequate protecting packing.

The guarantee shall expire in case of mishandling, incorrect repair or modification, performed without our approval or instructions.

We reject any responsibility of damage to people or things, deriving from the use of our instruments.

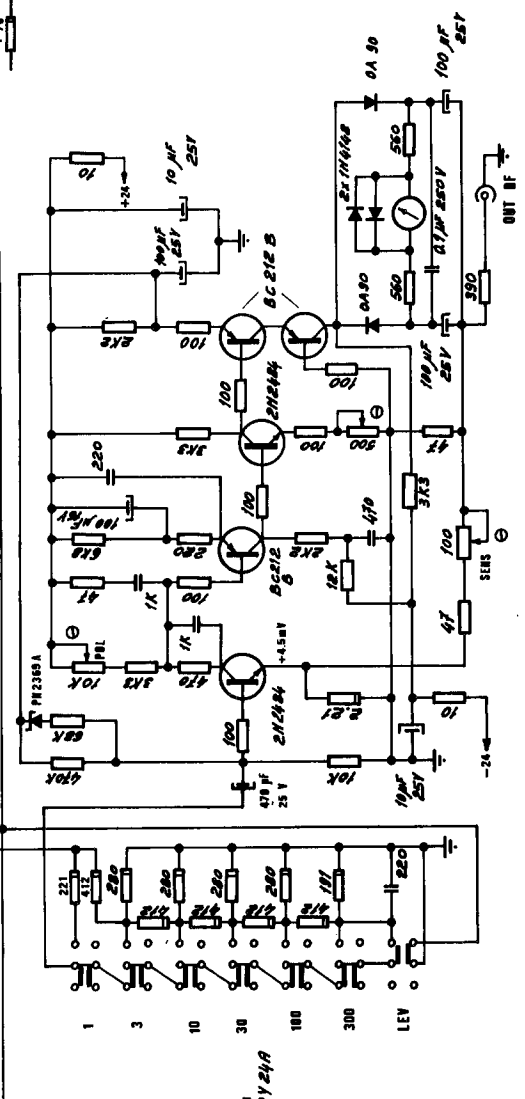
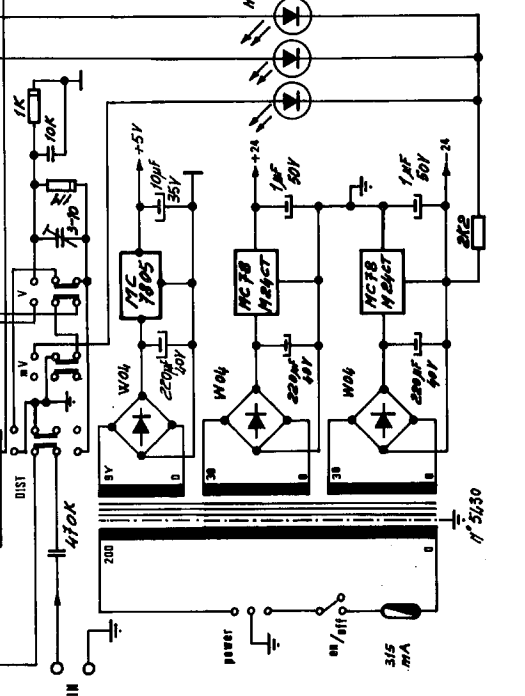
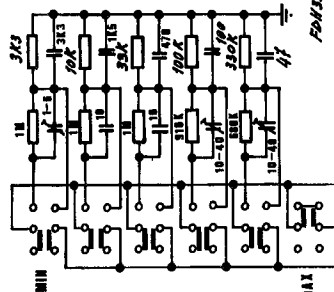
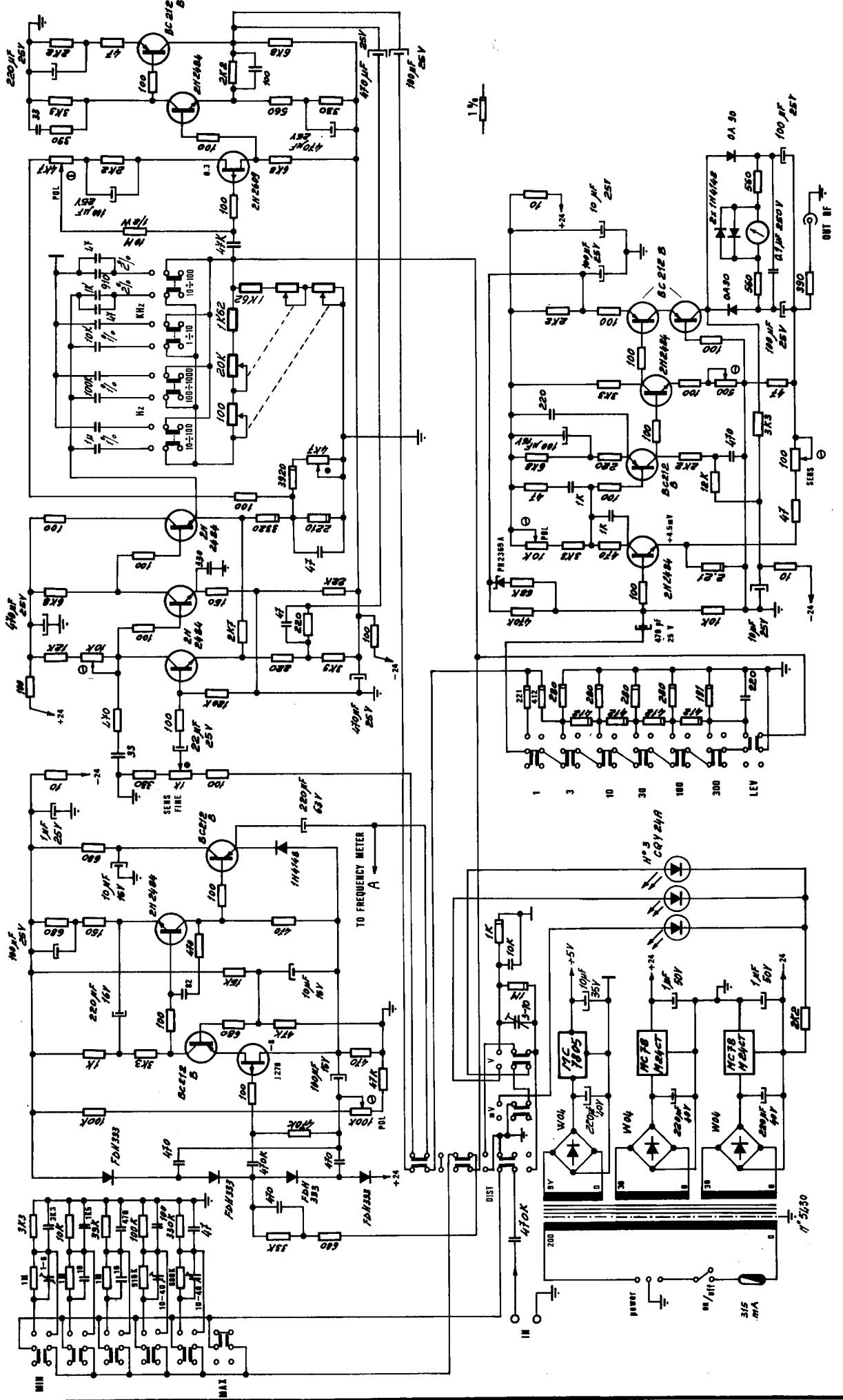
The electric diagram and other drawings of this manual are given as literature and we claim the right to make any necessary change to the instrument without updating the instruction manual.

IMPORTANT NOTICE



ANY RETURN OR REJECT OF OUR PRODUCTS, WHICHEVERS MAY
BE THE REASON, MUST HAVE OUR PREVIOUS APPROVAL ALSO
AS REGARDS TO TRANSPORTATION MEANS.
THE SHIPMENT SHALL BE MADE IN ANY CASE CIF MILAN.
CUSTOMS AND CLARING AGENT WILL BE STATED IN OUR AP-
PROVAL.

DISTORTION ANALYZER CS 27E



CS 27E DISTORTION METER

DIGITAL FREQ DPM 10/B

