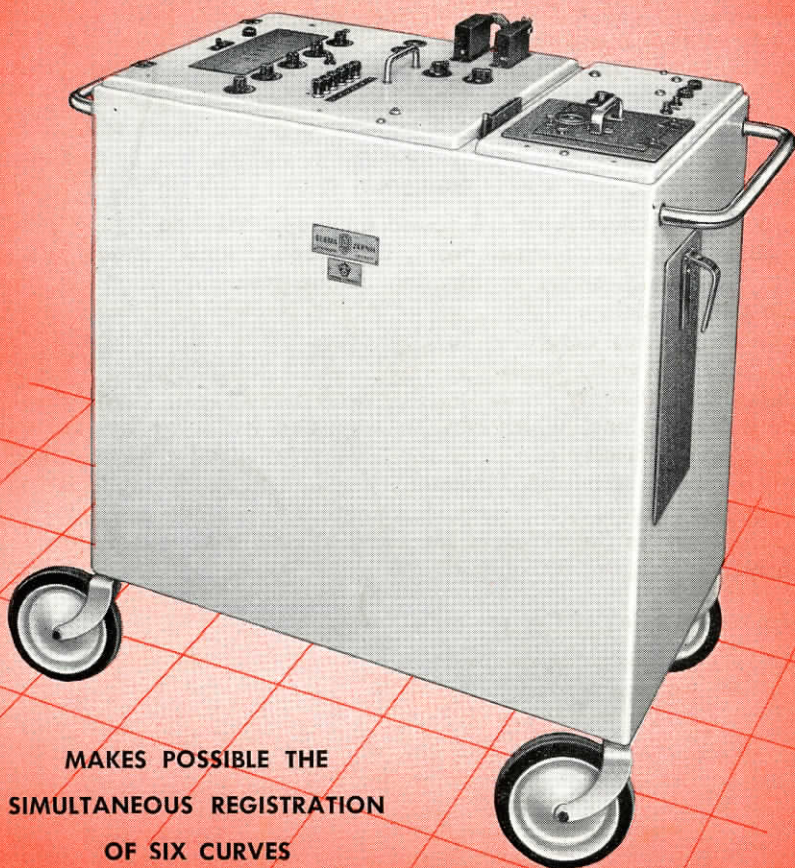


Klinik



UNIVERSAL ELECTROCARDIOGRAPH



MAKES POSSIBLE THE
SIMULTANEOUS REGISTRATION
OF SIX CURVES

AKTIEBOLAGET

ELEMA

STOCKHOLM - SWEDEN

Klinik

UNIVERSAL ELECTROCARDIOGRAPH

Our world-famous, universal electrocardiograph, type "Klinik", offers a wide range of recording possibilities. It proves its worth to heart specialist and hospital clinic alike. Thanks to its construction it records even the highest frequencies, such as heart sounds, with scientific exactitude, yet can at the same time stand up to the strain of daily use in hospitals.

Electrocardiograph type "Klinik" makes possible the simultaneous registration of six curves since it is fitted with 5 amplifiers and 6 galvanometers. The amplifiers are fully independent of each other. By adding easily connectable supplementary units, a series of diagnostically valuable curves can be recorded simultaneously with the electrocardiogram, e. g. the heart sound in different frequencies, the arterial- and venous-pulse curves, the intra-cardiac blood pressure, pneumogram, electrokymogram etc.

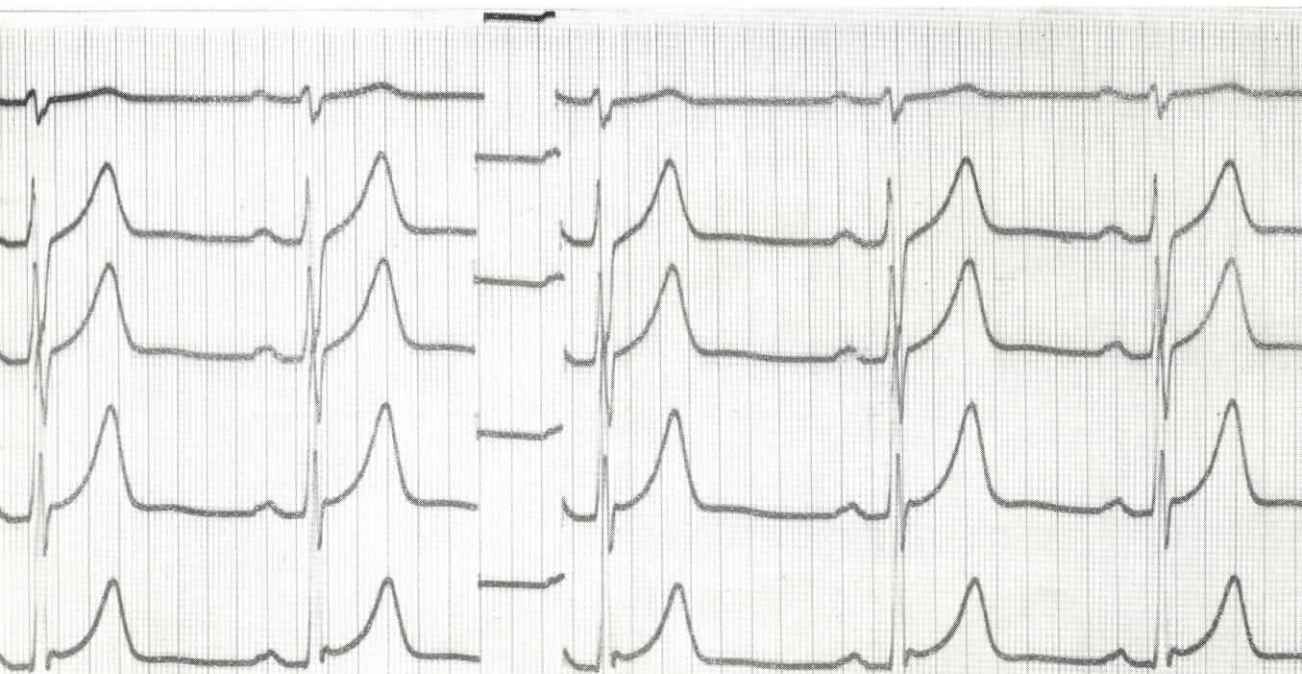
The two lead-selectors A and B found on the panel (see fig. 4) make simple the registering of electrocardiogram, heart sound and venous pulse in combination. The synchronous registration of the following lead combinations is possible without delay:

The extremity leads according to Einthoven.

The unipolar extremity leads.

The Einthoven extremity leads together with one or two chest leads. Three to five chest leads alone, which can be combined (with the help of one of the lead-selectors) with any one of the indifferent electrodes (right arm, left arm, left leg or central terminal). Moreover, if a heart sound amplifier and venous-pulse receptor are used, it is possible to register even one extremity lead, three heart sound curves (in different frequencies) and a venous-pulse curve simultaneously.

Fig. 2 Simultaneous recording of five precordial leads.



A UNIVERSAL INSTRUMENT FOR CARDIOLOGICAL RECORDINGS

Three heart sound curves in different frequency ranges can be recorded when the electrocardiograph is equipped with a special built-in heart sound amplifier. The three frequency ranges have been selected so that the first has a linear frequency response, the second a frequency response corresponding to that of the human ear, while the third registers only the highest frequencies.

This combination of frequency ranges offers very great diagnostic possibilities in view of the fact that the heart sound curves can be registered **simultaneously** with the electrocardiogram and venous-pulse curves.

The synchronous registration of two arterial-pulse curves and one ECG lead can also be carried out in relationship with the venous-pulse.

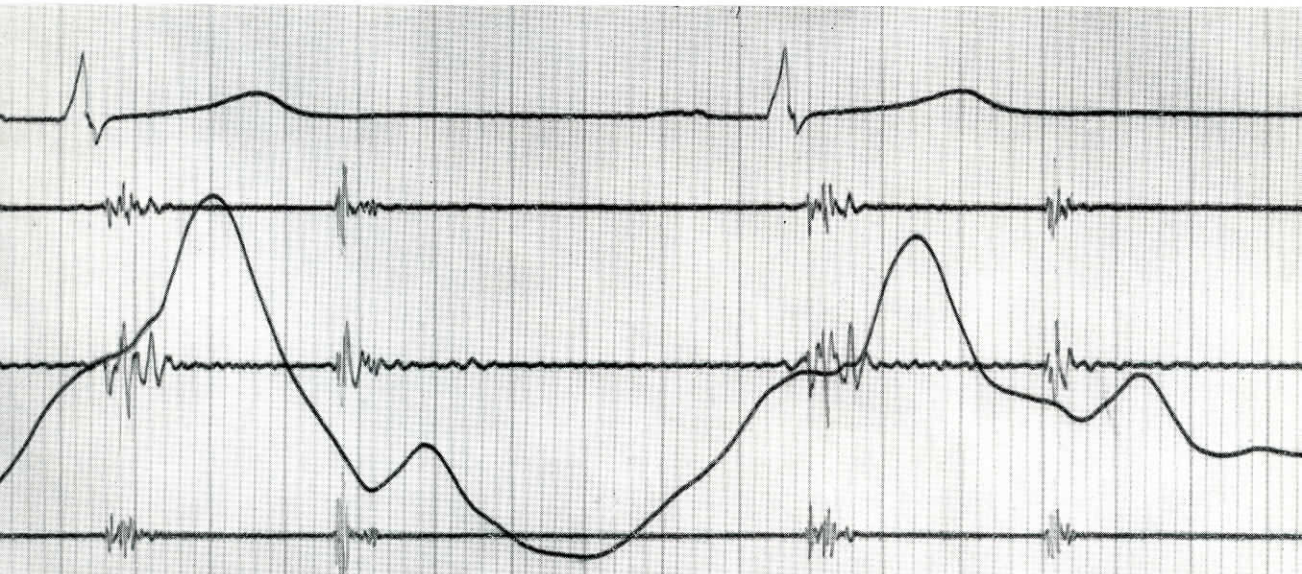
Recording with "free choice"

In addition to the above recordings, made possible by the lead selectors' "fixed" combinations, a series of other recordings can be made at "free choice". In this connection all the amplifiers with galvanometers can be used, or only the latter, depending upon the size of the impulses.

By using special supplementary units **the heart sound in six different frequency ranges** (Phonocardiograph RC 5) intracardiac bloodpressure, breathing curve, electrokymogram etc., can likewise be recorded.

Simultaneous recording of ECG lead I, jugular pulse and three phonocardiograms in different frequency bands.

Fig. 3



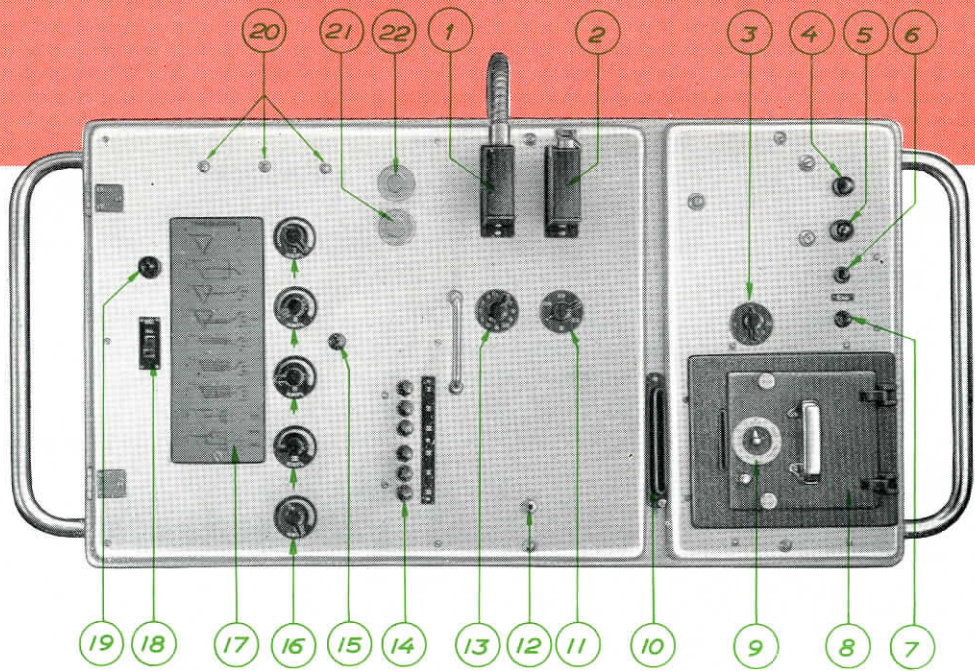
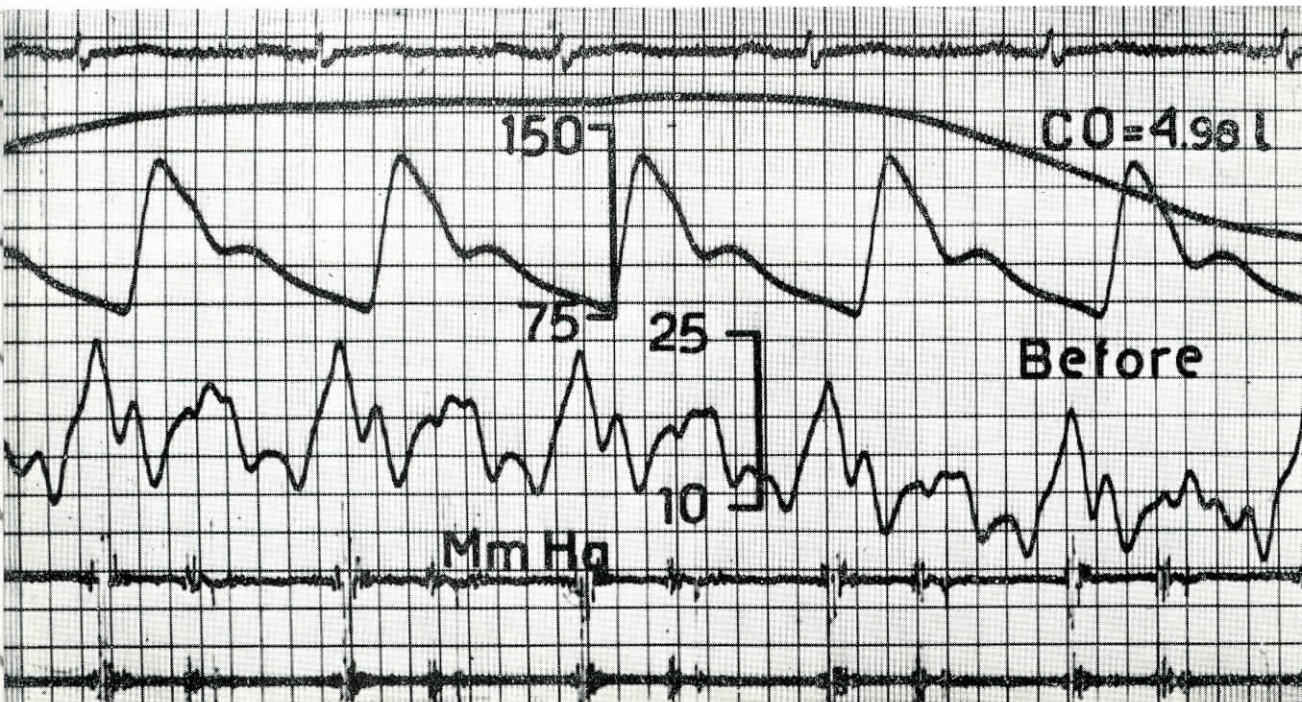


Fig. 4

THE CONTROL PANEL

- | | |
|---|---|
| 1. Patient cable | 12. Standardization voltage 1 mV. |
| 2. Contact for amplifier entrance | 13. Lead selector A |
| 3. Speed selector: 10, 40 and 100 mm/sec. | 14. Light spot adjustment |
| 4. Name marker adjustment | 15. Quick start |
| 5. Pilot lamp for name marker | 16. Sensitivity regulator |
| 6. Push button for name marker | 17. Chart for lead selectors |
| 7. Push button for camera motor | 18. Main switch |
| 8. Storage cassette | 19. Pilot lamp for main switch |
| 9. Indicator for paper transport | 20. For connecting heart sound amplifier |
| 10. Ground glass with oscillating mirror | 21. For connecting venous pulse receptor |
| 11. Lead selector B | 22. For connecting heart sound microphone |

Fig. 5



RECORDING POSSIBILITIES

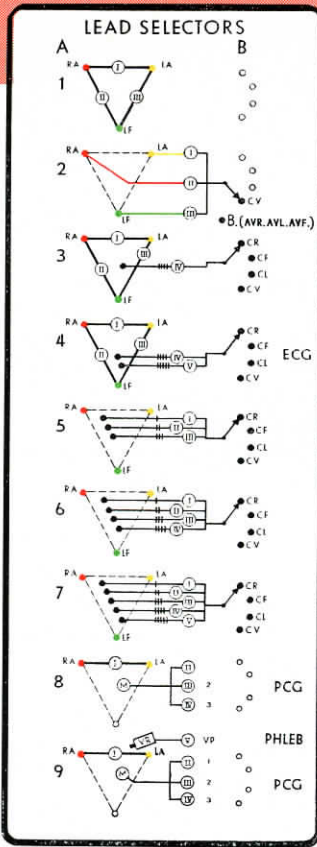
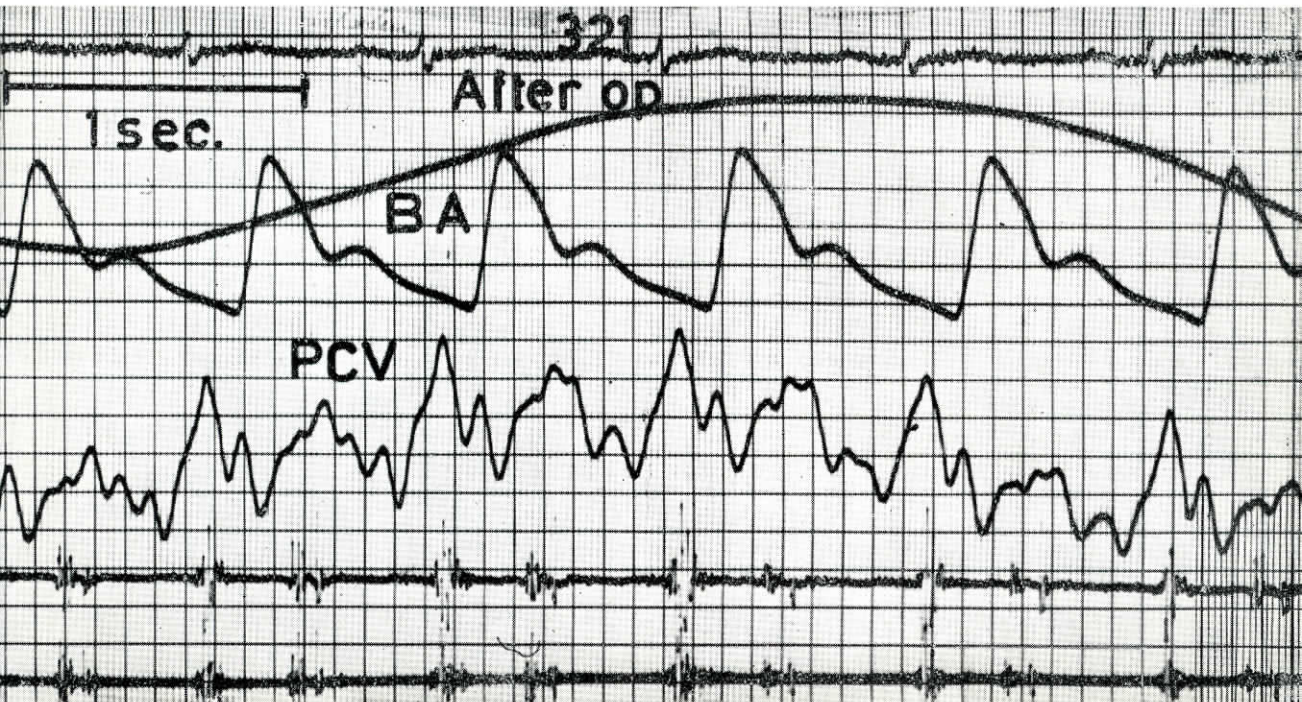


Fig. 6

- 1 3 extremity leads (I, II, III)
- 2 3 unipolar extremity leads (lead selector B in position CV) or 3 augmented unipolar extr. leads (lead selector B in position B).
- 3 3 extremity leads and 1 chest lead with either right arm, left arm, left leg or "central terminal" as the indifferent electrode according to the adjustment of lead selector B.
- 4 3 extremity leads with two chest leads and indifferent electrode as in position 3.
- 5 3 chest leads with indifferent electrode as in pos. 3.
- 6 4 chest leads with indifferent electrode as in pos. 3.
- 7 5 chest leads with indifferent electrode as in pos. 3.
- 8 1 extremity lead and 3 heart sound curves.
- 9 1 extremity lead, 3 heart sound curves and 1 venous-pulse curve.
- 10 When lead selector A is set on position 10 the entrance-grids of all the amplifiers are connected with contact 2 (see fig. 4). It is now possible to record at "free choice" without using the combinations given by the patient cables and lead selectors.

When lead selector A is set on position 0, all amplifier entrances are short-circuited and earthed.

Simultaneous recording of the brachial arterial (BA) and pulmonary capillary venous (PCV) pressures together with electrocardiogram (Lead II), two phonocardiograms and pneumogram in case of mitral stenosis. (Werkö and fellow-workers 1951)



PHONOCARDIOGRAPHY

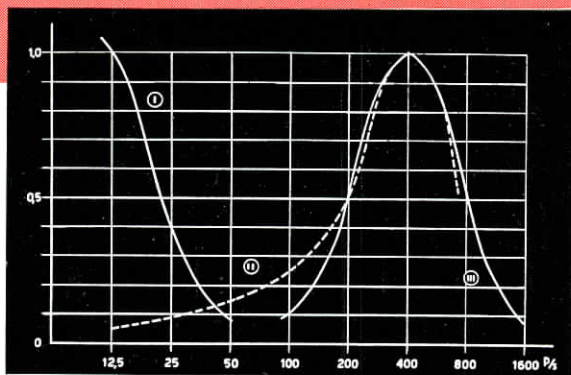


Fig. 7

The heart sound amplifier (Cat. No. EMT 409) is mounted in a special position inside the apparatus, and connected with the entrance of the ECG amplifiers. The first amplifier now records the electrocardiogram, the second, third and fourth the heart sounds. The latter are registered in three different frequency ranges. (See fig. 7).

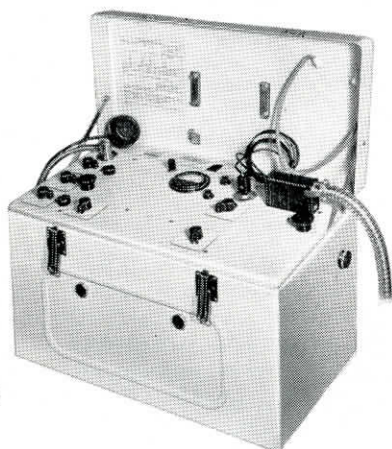


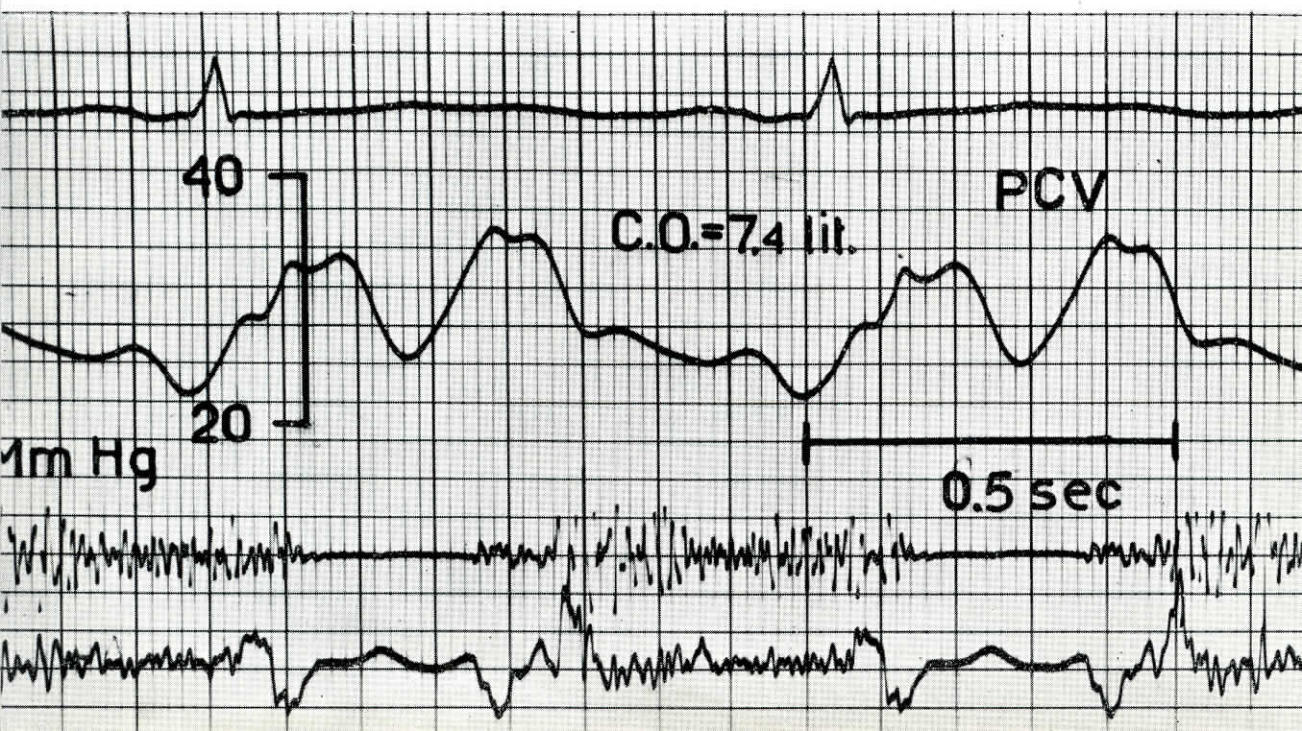
Fig. 8

With the help of **Phonocardiograph type RC 5** (Cat. No. EMT 417 K) which is connected to the second, third and fourth galvanometers, six different heart sound curves in different frequency ranges can be recorded simultaneously with the electrocardiogram. The phonocardiograph registers the six curves in two sets of three, each set simultaneously recorded with one electrocardiogram. The microphone-amplifier-galvanometer system can be calibrated by means of a built-in sound-generator.

(See our special brochure for further details.)

Simultaneous recording of the pulmonary capillary venous (PCV) pressure together with electrocardiogram (lead II) and two phonocardiograms in case of mitral stenosis. (Eliasch 1952.)

Fig. 9



SPHYGMOGRAPHY

By using the supplementary unit for recording the arterial pulse (Cat. No. EMT 435) two arterial pulse curves can be registered simultaneously with ECG. The unit consists of a piezo-electric receptor, holder and coupling-box and is connected to the main apparatus with a special flatpin contact (see fig. 10).

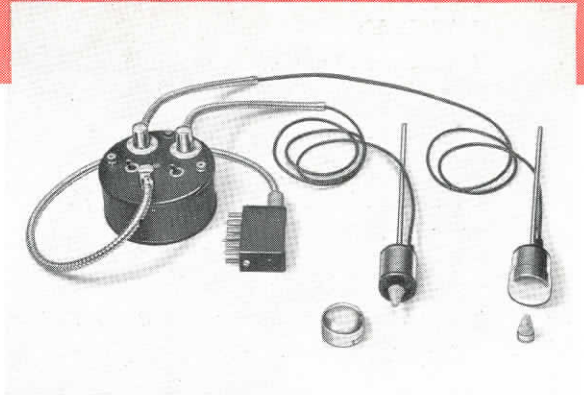


Fig. 10

PHLEBOGRAPHY

The venous-pulse can be recorded with a special supplementary device (Cat. No. EMT 424) which is connected to ECG Klinik by a contact on the instrument panel (see fig. 11). It consists of a piezo-electric receptor, holder and stand. The venous-pulse can be recorded simultaneously with one ECG lead and three heart sound curves.

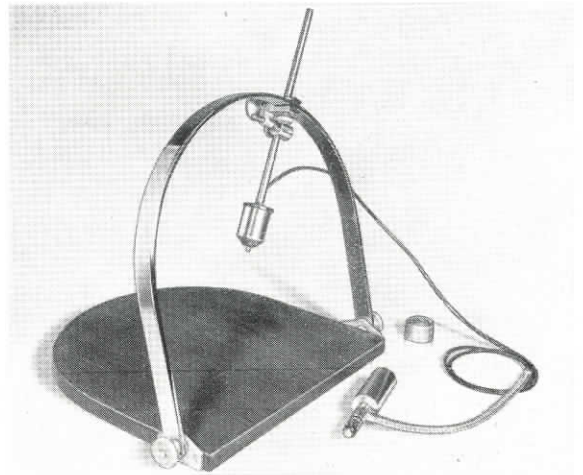


Fig. 11

THE RECORDING OF THE INTRA-CARDIAC BLOOD PRESSURE

is made possible by means of a separate supplementary device (Cat. No. EMT 446) which is connected directly to the sixth galvanometer. With this, a series of extremely significant curves can be obtained simultaneously, e. g. electrocardiogram, blood pressure, heart sound and venous-pulse. The unit consists of manometer, amplifier, holder etc.

(See our special brochure for further details.)

SPECIFICATIONS

AMPLIFIERS:

5 differential amplifiers with a time-constant of ca. 2 sec. AC interference is eliminated by special coupling. The valve's filaments are fed with filtered direct current.

Continuous sensitivity adjustment.
Calibration by means of built-in standard cells.

6 Galvanometers:

Linear frequency response up to ca. 600 c/s.

6th galvanometer is without amplifier for use for supplementary recordings.
Directly accessible, with separate contacts.

Time-marker

with special synchronous motor:
Time between thin lines 1/50 sec.,
between thick lines 1/10 second.

Power supply — entirely mains operated on 110, 130, 150, 220, 240 V, 50 c/s.

Stabilisation for line voltage variations.

Power consumption

Ca. 200 W.

CAMERA:

Storage cassette of light metal.

Capacity: 50 m paper 100 mm in breadth.

Indicator for paper consumption.

Punch for marking paper with hole after each examination.

Identifying of curve by photographic method.

Receiving cassette with automatic cutting of paper.

Paper transport with synchronous motor geared for different speeds:
10, 40 and 100 mm/second.

Dimensions: 100 × 50 × 90 cms.

Weight: (complete with accessories)
92 kg.

Finish: white laquer: all visible parts chromium-plated.

Standard accessories:

	Cat. No.
1 9-pole patient cable	EMT 137
5 plate-electrodes	EMT 161
5 suction-electrodes	EMT 162a
4 short rubber straps	EMT 191
1 long rubber strap	EMT 192
1 set name marking plates	EMT 128

SUPPLEMENTARY UNITS

I. For registering of phonocardiogram

A) Amplifier with filter circuits for 3 different heart sound curves, to be built into the electrocardiograph.
Complete with microphone and connecting details EMT 409

B) **Phonocardiograph** for recording 6 heart sound curves in two groups of three, each with one ECG lead: built-in calibrating device.
Complete with microphone and connecting cable EMT 417 K

II. For registering of venous-pulse curve

Venous-pulse receptor with holder and stand EMT 424

III. For registering of two arterial-pulse curves

Two arterial-pulse receptors complete with holding stave, cork pilotes and coupling-box EMT 435

Divergences from illustrations and descriptions are reserved.

Printed in
Sweden 1952
Solna Tryckeri
Stockholm-Hagalund.