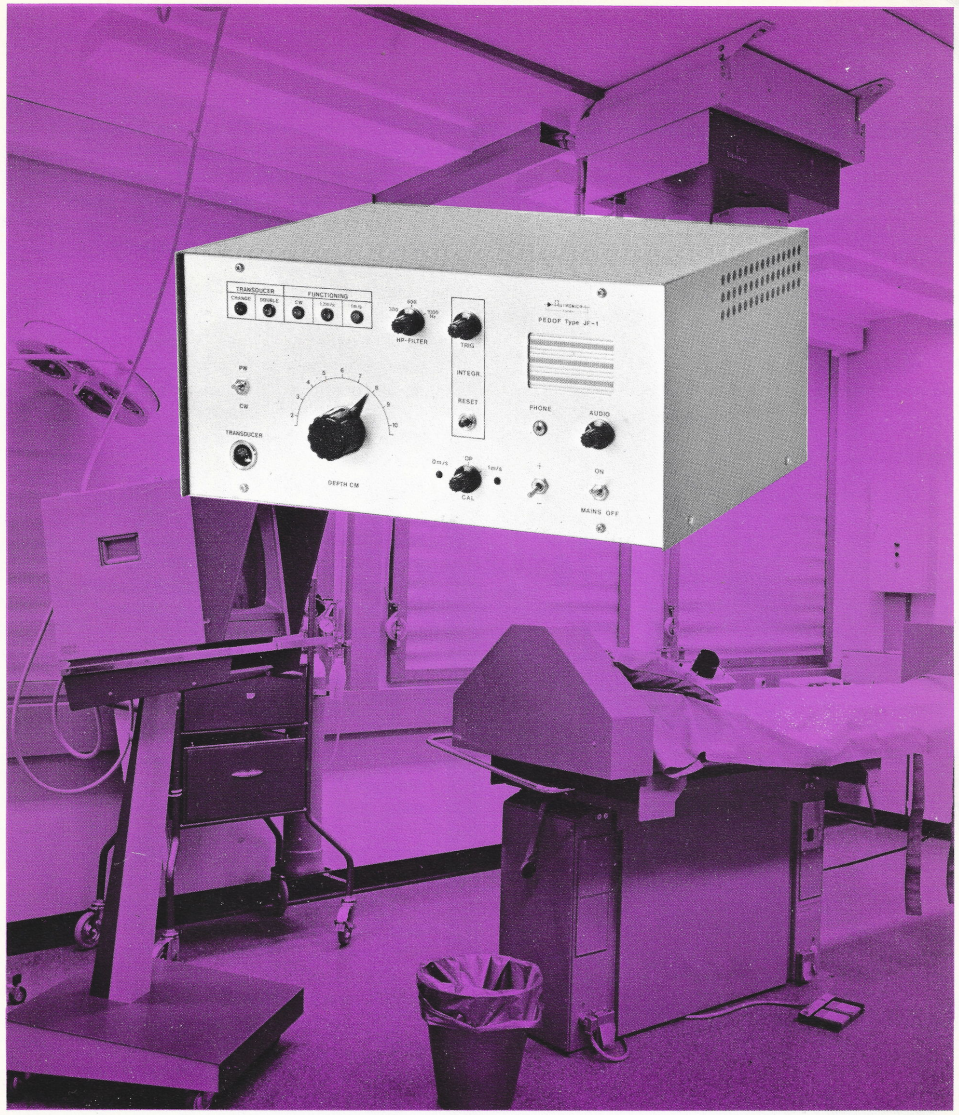


PEDOF

JF-1, An instrument for non invasive measurement of blood flow velocity in the aorta.

AUTRONICA

240475 DK.

TECHNICAL DATA:

Mains: 220V +10/–15% 50–60 Hz.
Ultrasonic frequency: ca. 2 MHz.
Pulse repetition frequency: 9,8, 6,5 kHz or continous.

MAX. MEASUREABLE VELOCITY

Pulsed mode: (PW): Up to ca. 7 cm depth – 1,7 m/s (9,8 kHz).
Above ca. 7 cm depth – 1,1 m/s (6,5 kHz).
Continous mode: (CW): 5 m/s

PLUG ON REAR PANEL

Outputs: Mean velocity and the integral of the same.
Doppler signal channel 1 and 2.
Video signal channel 1 and 2.
Sample pulse.

Inputs: ECG signal, if available.

DISPLAY

Any convenient storage oscilloscope or recorder. Special adaptors to the commonly used Siemens Mingograf are available. The ECG output from the Mingograf may be used to reset the integrator.

TRANSDUCER

Single or double. Mountable lenses.

VELOCITY CALCULATOR

Quadrature correlation mean velocity calculator.

Optional: Maximum velocity calculator.

DIMENSIONS:

Width: 304 mm
Height: 146 mm
Depth: 250 mm

AUTRONICA A/S
TRONDHEIM
NORWAY
P. O. box: 3010 – Telephone: (075) – 18080 – Telex: 55334

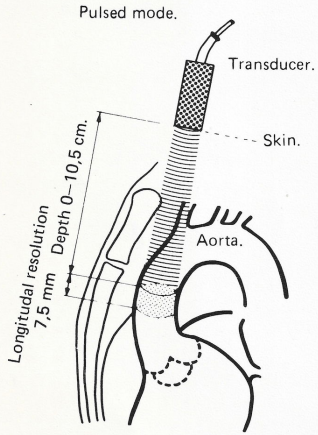
JF-1, PEDOF

An instrument for non invasive measurement of blood flow velocity in the aorta.

PEDOF (Pulsed Echo Doppler Flow velocity meter) is an ultrasonic instrument for measuring blood velocity in deep vessels such as aorta. A transducer emits ultrasound towards the vessel, and the Doppler principle is used to detect the blood velocity.

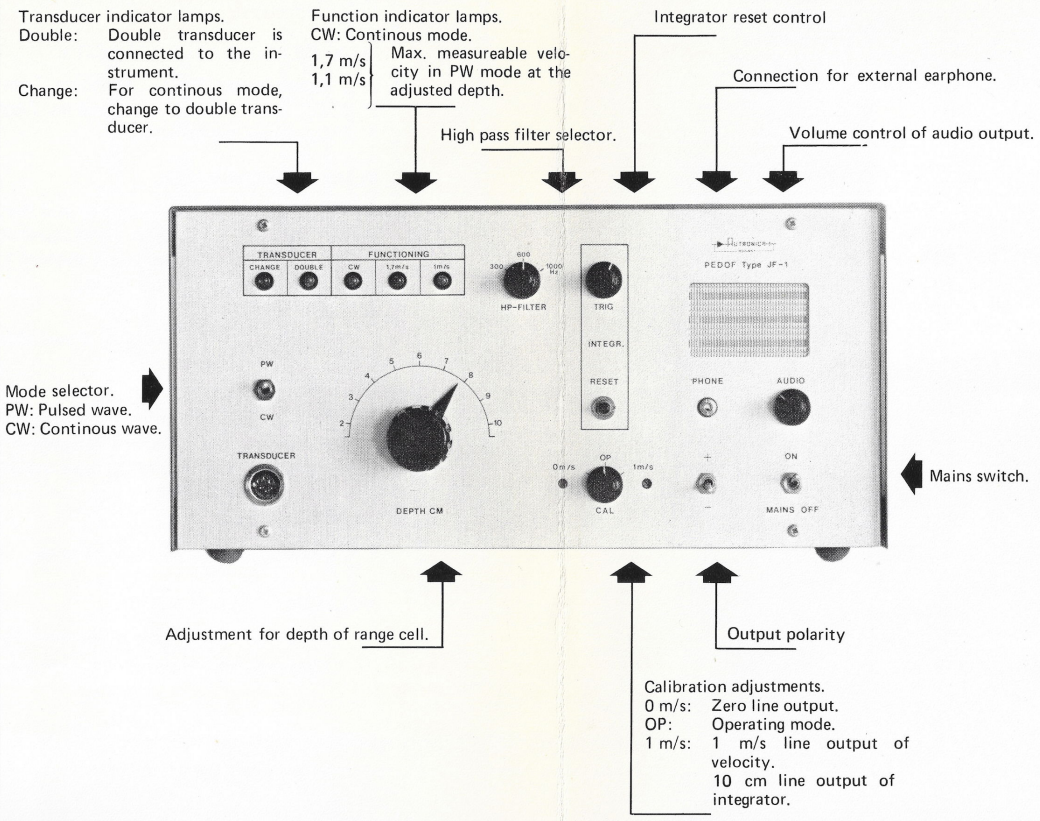
The instrument may be operated in both pulsed and continous mode:

The pulsed mode is used when range resolution is wanted. This gives a resolution along the beam of approximately 7,5 mm The longitudal resolution is determined by the width of the beam The width of the unfocused beam is ca. 20 mm By means of lenses, the beam may be focused to 5 mm (8,5 mm) at a depth of 6 cm (10 cm).



Two pulse repetition frequencies are used, 9,8 kHz and 6,5 kHz. With the high repetition frequency, velocities up to 1,7 m/s can be studied at a maximum depth of ca. 7 cm. Using the lower repetition frequency the maximum values are 1,1 m/s and 10,5 cm respectively.

In the continous mode, range resolution is lost, but this mode is useful for measuring high velocities. Three high pass filters remove the signal from slowly moving tissues, and enables measurement even during physical work.



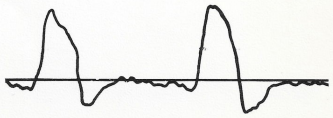


Fig. 1: Flow velocity in the ascending aorta in a normal person.

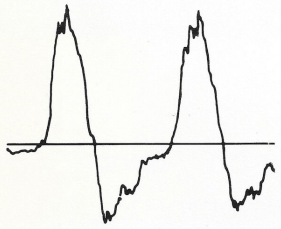


Fig. 2: Flow velocity in the ascending aorta with an aortic incompetence.

For measuring the flow velocity in the ascending aorta and the aortic arch, the transducer is placed in the suprasternal notch. Fig. 1 shows a typical curve in a healthy subject. The direction of flow can be noted and the area under the curve is proportional to the stroke volume.

Due to the fact that the angle between the ultrasonic beam and the flow direction is not known, only relative values can be calculated. Even so, the possibility of measuring changes in flow and flow velocity in the aorta offers several interesting aspects.

HEMODYNAMIC EVALUATION

Gross changes in flow can occur without significant changes in pressure. In patients with failing hearts this is of particular importance, and by using PEDOF the changes in flow can easily be monitored.

DRUG EFFECTS

The effects to drugs on the aortic flow can be recorded noninvasively. If the arterial pressure is measured, changes in peripheral resistance can be calculated.

"CONTRACTILITY" EVALUATION

The "contractility" of the heart is reflected in the peak velocity and the maximum acceleration of flow, both of which can be measured by PEDOF.

VALVULAR DISEASE

The severity of aortic incompetence can be estimated from the area under the negative flow curve. See fig. 2. Using PEDOF in the continous mode, the high velocities in aortic stenosis can be measured. Aiming the transducer from the precordium, the flow velocities in the mitral valve can be measured.

The above mentioned uses of PEDOF is based on limited experience and litterature studies. Much work needs to be done to evaluate this method, but the ability to measure aortic flow velocity may offer new insight into the hemodynamics in intact man.