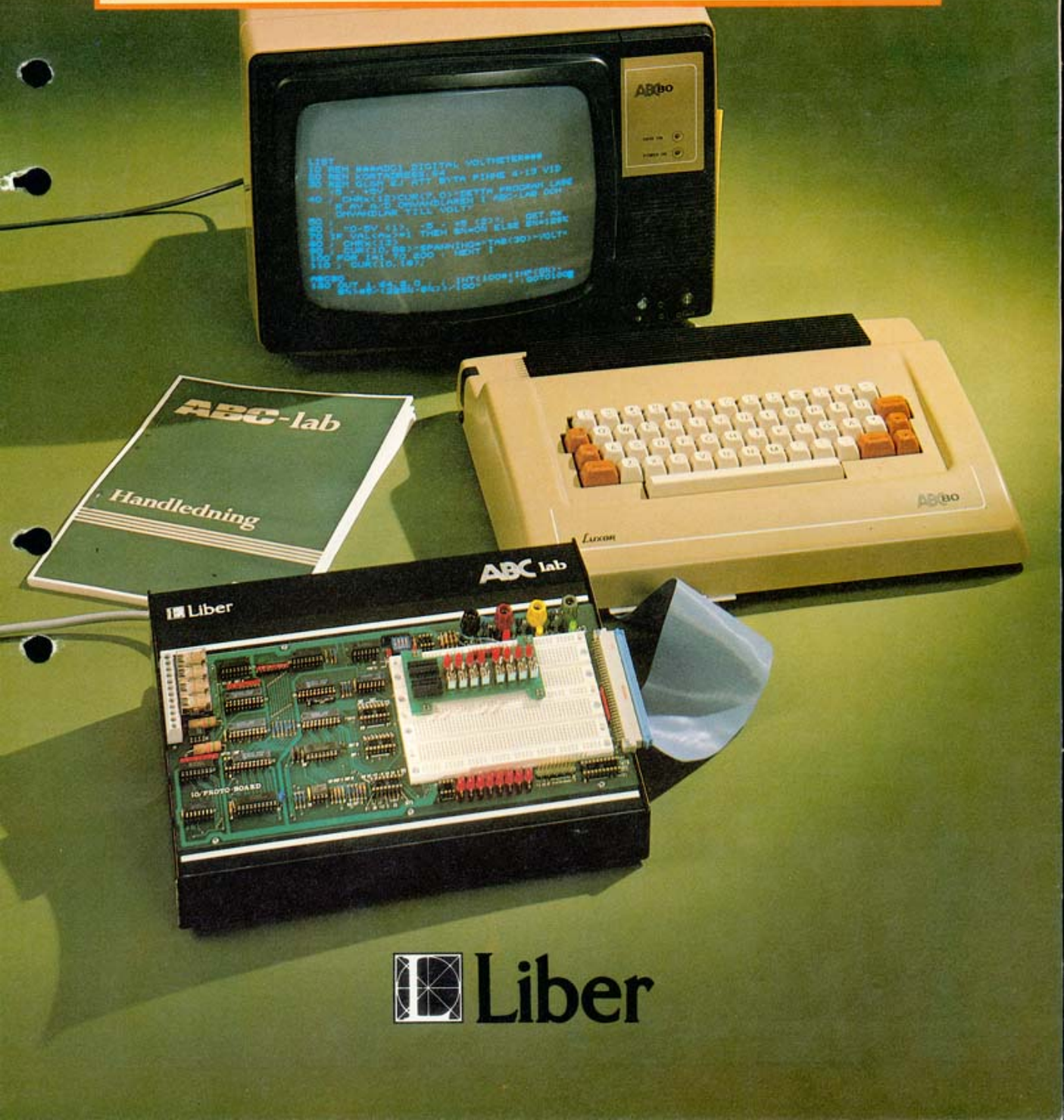
ABC-lab

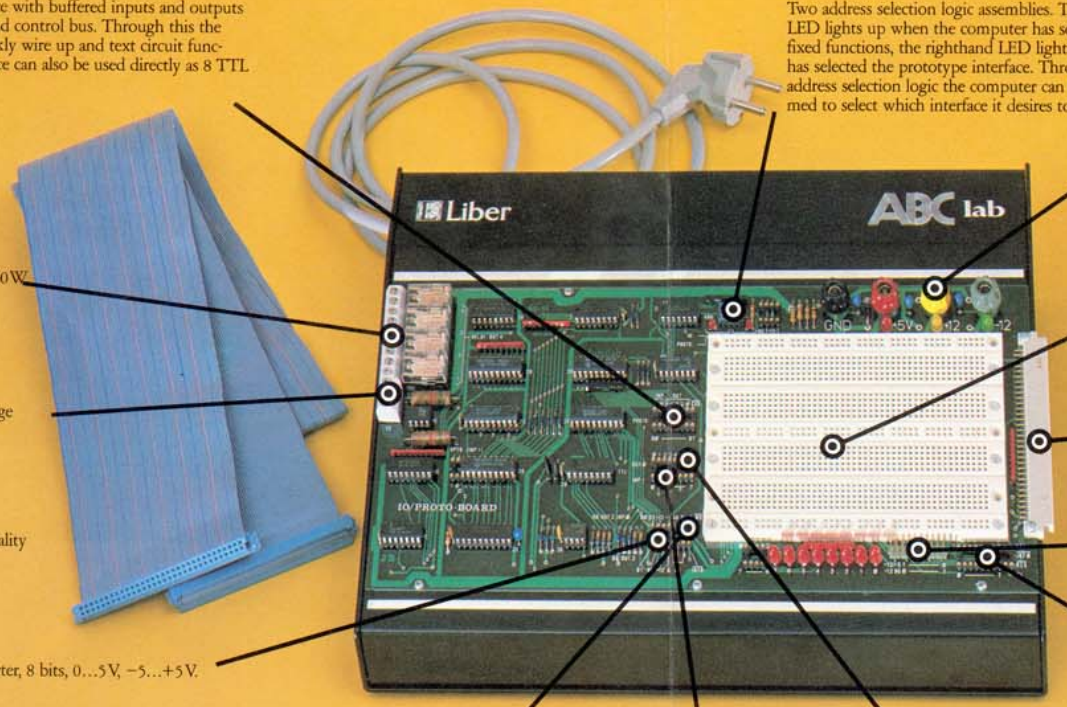
A new, universal aid for education and design engineering in applied computer technology.



ABC-lab for education and design engineering!

- The ABC-lab has been developed to cover the need for proper educational aids for the natural science and technical subjects in the Swedish Upper Secondary School and Labour Market Training.
- The ABC-lab is also a flexible aid for the development of prototypes in electronics.
- The ABC-lab is supplied with documentation and a thoroughly prepared manual of experiments.
- The ABC-lab is an all-Swedish product developed by Liber in cooperation with teachers at the Chalmers Institute of Technology.

Facts about the ABC-lab



Prototype interface with buffered inputs and outputs to the data bus and control bus. Through this the designer can quickly wire up and text circuit functions. The interface can also be used directly as 8 TTL inputs.

Two address selection logic assemblies. The left-hand LED lights up when the computer has selected the fixed functions, the righthand LED lights up when it has selected the prototype interface. Through the address selection logic the computer can be programmed to select which interface it desires to use.

Short-circuit proof and overvoltage-protected mains unit +5V 2A, ±12V 0.4A (variable ±9V...±15V).

Four relay outsputs, 2A, 125V, 60W (125VA).

Connecting board for wiring up own prototypes and/or connection of boards from the ABC-lab series. The board is of generous dimensions so that it will make an effective aid circuit board designers as an alternative or complement to wire-wrap.

Two opto-inputs for the voltage range 12...30V.

Card connector and 1 m flat cable for connection to the ABC 80/4680 bus.

IC bases of highest industrial quality with turned pins.

Pin strip with supply voltage for simple flat cable connection of object-related transmitters, relays, etc.

Digital/analogue converter, 8 bits, 0...5V, −5...+5V.

Base which among other things provides facilities for interrupt generation. Also here are a clock, RESET, etc.

Eight light emitting diodes for optional use.

Analogue/digital converter, 8 bits, approx 100 µs conversion, 0...5V, −5...+5V.

Eight TTL inputs.

Eight TTL outputs.

The computer is nowadays widely used as a control and measuring instrument in industry and for research. Education in computer technology in these fields is therefore of steadily increasing importance.

The ABC-lab provides facilities for practical exercises in technological and natural science applications where computers are used for controlling and regulating processes or collecting measurement data.

The ABC-lab can be used with an interface card in combination with the majority of microcomputers available on the market.

Spheres of application for the ABC-lab include the following:

- **Electronics.** Practical exercises in analogue and digital circuit design.
- **Control engineering.** Control of various processes.
- **Power electronics.** Control of electric machines.
- **Mechanical engineering.** Measurement of elongation, temperature, power, vibration, etc.
- **Heating ventilation and plumbling.** Measurement and control of temperature and ventilation in a building.
- **Physics and chemistry.** Automatic system for collecting measurement data in experiments.

Examples of applications:

- **Multimeter** for measuring current, voltage, resistance, capacitance power, elongation and temperature.
- **Data collection** with the ABC-lab multiplexor card, eight analogue inputs.
- **Transient recorder,** 10 kHz.
- **Spectral analysis** of vibration, etc.
- **Function generator** for sine waves, sawtooth waves and square waves as well as exponential functions and complex functions.
- **Memory oscilloscope.**
- **Fault tracing in digital systems.** Automatic function testing.
- **Integration and derivation** of physical quantities.
- **Simulation** of digital circuits and logic functions.
- **Studies in Boolean algebra.**
- **Robot control.**
- **Analoque and digital filter techniques.**

Technical specifications

ABC 80/800 and BASIC

The ABC-lab is controlled from an ABC 80, ABC 800 or other microcomputer in BASIC.

It is connected directly, or via an expansion box – with or without floppy disk unit.

AIM 65 – machine language

For programming in machine language an interface is available for AIM 65.

Expansion facilities

The ABC-lab contains all the usual inputs and outputs occurring in computerized measurement and control systems.

More inputs and outputs of some type may be needed for more advanced applications. This need is satisfied through the ABC-lab series with a digital board, eight relay outputs/eight optoinputs or a multiplexor with adjustable amplification.

The ABC-lab has a connecting board of generous dimensions for your own circuits or for connecting cards from the ABC-lab series.

Together with the prototype interface this provides unique facilities for developing and testing your own designs.

From the simple to the complex

The ABC-lab can be used without an extensive knowledge of computers, both for simple control systems and more professional systems.

Reliability and safety for educational environments

The ABC-lab is equipped with protection against overvoltage and short-circuits.

It is all contained in a compact unit mounted in a robust metal case.

Technical data

Dimensions (H×W×L)	85×230×300 mm
Supply voltage	220 V ±10%
Weight	approx 2,7 kg

Application example: Digital voltmeter

Connect the input voltage to base 4E, pin 12 (AD) and pin 5 (AG). Enter the program and test run.

```
10 REM ### ADC1 DIGITAL VOLTMETER ###
20 REM KORTADRESS:64
30 REM GLÖM EJ ATT BYGLA PINNE 4-13 VID -5-+5V
40 ; CHR$(12)CUR(7,0)"DETTA PROGRAM LASER AV A/D OMVANDLAREN  I MULTILAB OCH OMVANDLAR TILL VOLT"
50 ;
60 ; "0-5V (1),-5-+5V (2)"; : GET A$
70 IF VAL(A$)=1 THEN B%=0% ELSE B%=128%
80 ; CHR$(12)
90 ; CUR(10,8)"SPANNING="TAB(30)"Volt"
100 FOR I=1 TO 200 : NEXT I
110 ; CUR(10,18);
120 OUT 1,64,2,0 : ; INT(100*(INP(0%)-B%)*5/(255%-B%))/100"   " : GOTO 100
```

Since the program is not calibrated corrections may be necessary for maximum accuracy. On line 70 B% = 128% can be corrected if 0 V input is not exactly 128%. If this change is made the denominator in the expression on line 120 should be corrected so that the measurement is correct across the entire input voltage range. For example, you can change the denominator to (225% – B%.K) where K is a correction constant near 1. Calibration can be carried out either by calculating K or by arrive at a good value by trial and error.

Order facts

Prices in separate appendix.
The ABC-lab is supplied with extensive documentation.
The system can be further expanded with the ABC-lab card series.

Hardware	Article No.
ABC-lab	10150

Accessories	Article No.
Analoque multiplexer, eight channels with adjustable amplification	10151
Binary board with eight switches and eight light emitting diodes	10152
Eight heavy-current relays and eight optoswitches with flat cable to ABC-lab	10153
Real time analyzor with software on diskette for graphic plotting of frequency spectra and printer plotting from display on Epson MX80, for example	10154
Extension card for expansion box or floppy disk unit	10158
3-metre flat cable connection for applications where it is not possible to have computer and ABC-lab at the same place	10157
Interface card ABC-lab – AIM 65 (Interface card for certain other microcomputers under development)	10159

Literature and software	Article No.
ABC-lab. Manual	10155
Software for manual/cassette	10156
Software for manual/floppy disk	10156

Orders

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733 00 SALA 0224-180 50