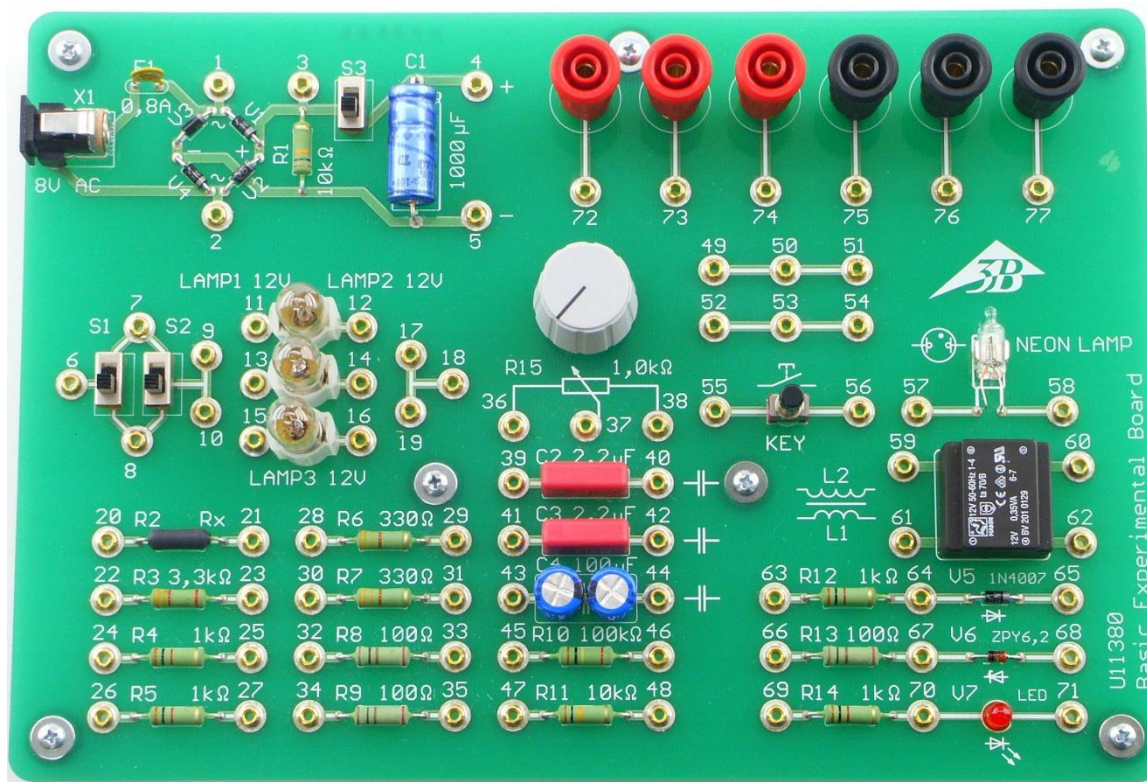


Basic experiment board

1000573

Instruction manual

10/15 CB



1. Safety instructions

- Only use the supplied power supply unit (8 V / 500 mA AC) to provide power. Never plug directly into the mains.
- In order to avoid damage to the components, adhere to the limiting values for current and power as stated below.
- Before plugging in the mains, check the assembled circuit.

Components can get hot during operation.

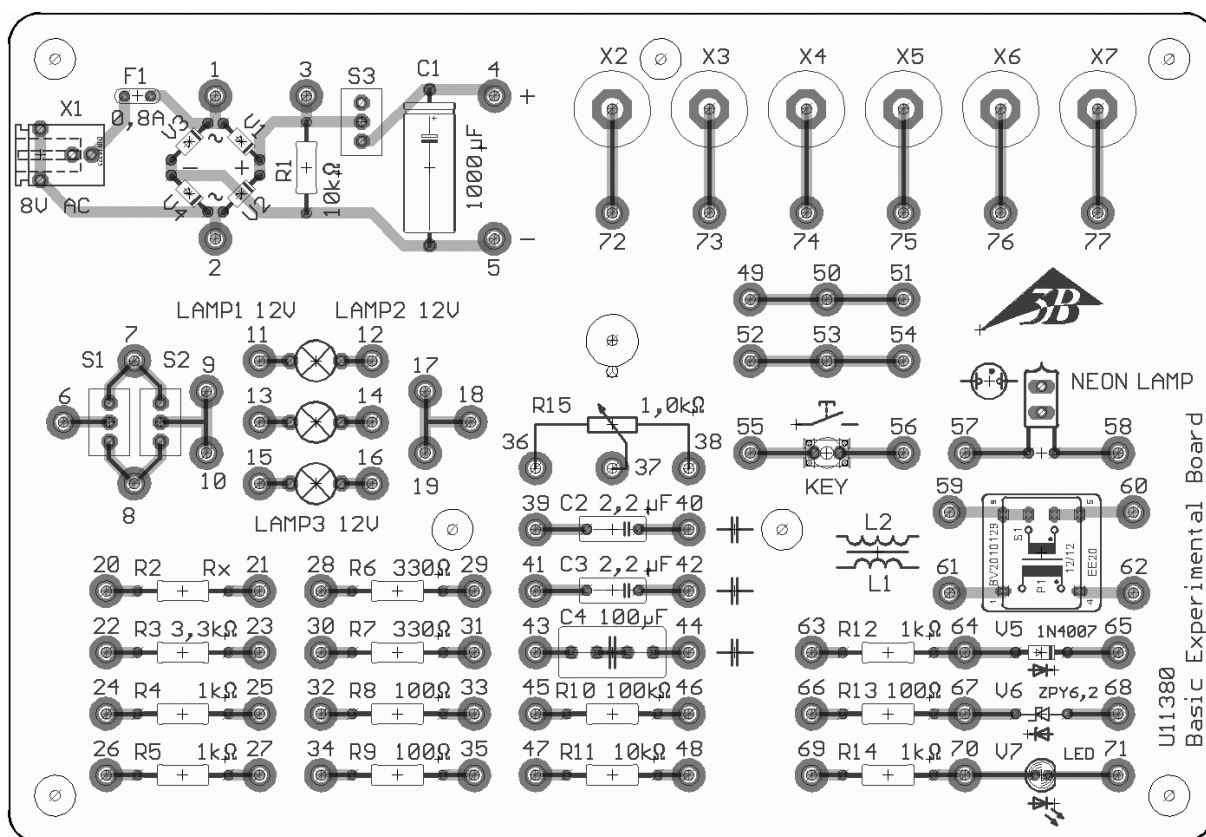
- Hence, avoid touching them.

2. Contents

- 1 Experiment board
- 3 Incandescent lamps (12 V / 0.1 A)
- 10 Experiment cables (10 cm, 2-mm banana plugs)
- 10 Jumpers (2-mm banana plugs)
- 1 Mains transformer (input: 115 V AC (1000572) or 230 V AC (1000573), output: 8 V / 0.5 A AC)

3. Description

The experiment board is equipped with the following components:



Symbol	Terminals	Item	Technical data
X1	1-5	Connection for mains power supply	8 V AC / 0.5 A
F1		Fuse (Multifuse)	0.8 A
V1-V4	1-5	Rectifier (half-wave/full-wave)	
R1	1-5	Basic load resistor	10 kΩ
S3	3-5	Switch for starting smoothing capacitor C1	
C1	4,5	Smoothing capacitor	1000 μF (electrolyte)
S1,S2	6-10	Switch	
LAMP 1-3	11-16	Incandescent lamps	12 V / 0.1 A / 1.2 W
	17-19, 49-54	Junctions	
R2	20, 21	Resistor (colour code concealed)	6.8 KΩ
R3	22, 23	Resistor	3.3 KΩ
R4,R5	24-27	Resistors	1 KΩ
R6,R7	28-31	Resistors	330 Ω
R8,R9	32-35	Resistors	100 Ω
R10	45, 46	Resistor	10 KΩ

R11	47, 48	Resistor	100 K Ω
R12	63, 64	Series resistor for diode V5	1 K Ω
R13	66, 67	Series resistor for zener diode V6	100 Ω
R14	69, 70	Series resistor for LED V7	1 K Ω
R15	36-38	Potentiometer	1 K Ω
C2,C3	39-42	Capacitors	2.2 μ F
C4	43-44	Capacitor	100 μ F (2x 220 μ F electrolytic, in series +pole to -pole)
KEY	55, 56	Push-buttons	
NEON LAMP	57, 58	Fluorescent lamp (neon)	Trigger voltage: $\leq$ 90 V Current: 1.7 mA
L1, L2	59-62	Transformer	Primary: L1 (50, 51) / 12 V Secondary: L2 (52, 53) / 12 V at 29 mA / 20.3 V no load Max. power: 350 mW
V5	64, 65	Diode	Max. reverse voltage: 1000 V Max. forward current: 1 A Forward bias: 56 $\rightarrow$ 57
V6	67, 68	Zener diodes	Zener voltage: 6.2 V at 35 mA Reverse bias: 67 $\rightarrow$ 68
V7	70, 71	Light-emitting diode	2.25 V / 20 mA Forward direction: 58 $\rightarrow$ 59
X2-X7	72-77	4-mm adapter to 2-mm banana plug	

1% tolerance and max. 1 W power dissipation applies to all resistors.

For connecting the components, experiment cables or jumpers with 2-mm banana plugs are used.

6 adapters are available for connecting cables with 4-mm banana plugs.

4. Operation

Basic experiments on electricity can be conducted by using the basic experiment board (see section 5).

At terminals 1 to 5, different types of voltage can be read off:

1. Direct current voltage between 4(+) and 5(-) (S3 in up position)
2. Alternating voltage between 1 and 2
3. Half-wave rectifier, AC voltage, between 3 and 2
4. Full-wave rectifier, AC voltage, between 3 and 5 (S3 in down position)

For most experiments, at least 2 multimeters are required (voltage/current, AC/DC, recommended: 1003073 / 1002784 / 1002785). With a storage/digital oscilloscope and/or function generator, further experiments can also be conducted. The 3B NET/og™ computer interface

combines the functions of these measuring instruments in one and is therefore ideally suited for operations on the experiment board.

5. Experiment examples

5.1 Resistance and Ohm's law

By measuring current and voltage, the value of unknown resistor R2 can be determined. Alternatively, a Wheatstone bridge circuit can also be used. (Required equipment: 3B NET/og™ or 2 multimeters)

5.2 Rectifiers

The output voltage of the half-wave and full-wave rectifiers can be observed on an oscilloscope. Smoothing capacitor C1 can also be connected and the behaviour of the resulting DC voltage source under load can be investigated. (Required equipment: 3B NET/og™ or oscilloscope)

5.3 Charging and discharging of capacitors

Depending on the choice of the time constant RC , the charging and discharging characteristics of the capacitors can be recorded with a multimeter or an oscilloscope. (Required equipment: multimeter/storage or digital oscilloscope or 3B NET/og™)

5.4 Resonant circuits

Damped electrical oscillation can be displayed with the help of an oscilloscope. Depending on the cycle period, the inductance of the circuit can be calculated if the capacitance and resistance are known. (Required equipment: oscilloscope or 3B NET/og™)

5.5 Potentiometer

The effects of a load on voltage regulation by a potentiometer circuit can be qualitatively investigated. (Required equipment: 3B NET/og™ or 2 multimeter)

5.6 Turn-on delay due to inductor

The delaying effect of an inductor on the turn-on transient of a circuit can be demonstrated. In the process, the inductance can be calculated. (Required equipment: storage oscilloscope or 3B NET/og™)

5.7 Transformer

The transfer characteristics of the transformer can be observed and measured for all loads from open-circuit to short circuit. (Required equipment: wattmeter, multimeter or 3B NET/og™ with extension)

5.8 Further experiments

Diode characteristics, AC impedances, voltage converters, phase shifting, voltage stabilisation with zener diode, etc.