KL-200

Linear Circuit Lab (2) - Electronic Circuits Lab

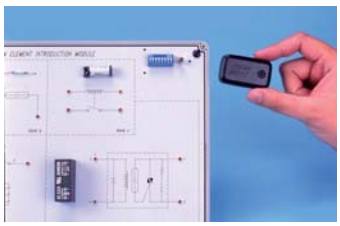
The KL-200 Linear Circuit Lab(2) - Electronic Circuits Lab is a comprehensive and self-contained system suitable for anyone engaged in electronic circuit experiments.

All the necessary equipment for electronic circuit experiments such as power supply, function generator, analog and digital meters are installed on the main unit.

The 17 modules cover a wide range of essential topics for electronics circuit. It is a time and cost saver for both students and engineers interested in developing and testing prototype circuits.

▶ Features

- Ideal for electronic circuit experiments and designing exercises
- Integrated experimental circuit and trainer with comprehensive experiment curriculum
- Supply complete training device easy and effective for experiments
- With universal breadboard for circuit designing and prototypes
- All modules equipped with an 8-bit DIP switch for fault simulations
- Individual keeping case for all modules easy carrying and storage facilities



▶ Specifications

▸ Main Unit (KL-21001)

1. DC Power Supply

(1) Fixed DC power supply
  a. Voltage range : ±5V, ±12V
  b. With output overload protection

(2) Dual DC power supply
  a. Voltage range : ±3V~±18V, continuously adjustable
  b. With output overload protection

2. AC power supply

(1) Voltage range : 9V~0V~9V
(2) With output overload protection

3. Function Generator

(1) Output waveform : Sine, square and triangle
(2) Output frequency : 10 Hz~100 KHz, 4 settings, continuously adjustable
(3) Accuracy : ±5% of full scale value
(4) Output impedance : 50Ω
(5) Output voltage : ⩾18Vp-p (open loop)
  ⩾9Vp-p (with 50Ω load)

4. 3 1/2-Digit Digital Voltmeter/Ammeter

(1) DC voltage range : 2V, 200V
(2) DC voltage accuracy : ±0.3% of reading + 1 digit
(3) DC current range : 200μA, 2000mA
(4) DC current accuracy : ±0.5% of reading + 1 digit

5. Analog Meters

(1) AC current : 0 ~ 100mA ~ 1A
(2) AC voltage : 0 ~ 15V
(3) DC current : 0 ~ 100mA ~ 1A
(4) DC voltage : 0 ~ 20V

6. Speaker

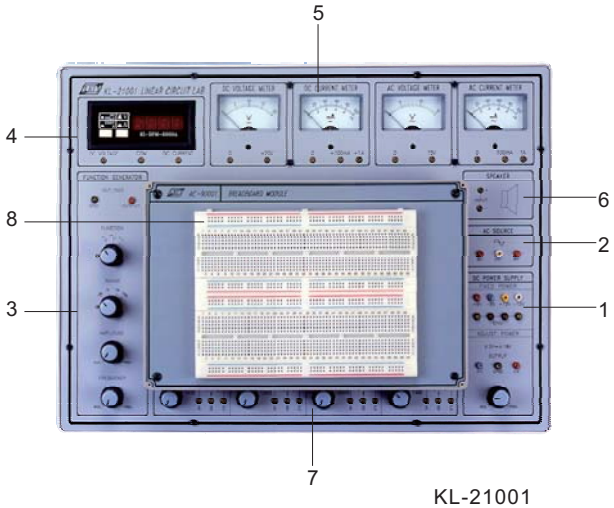
one 8Ω, 0.25W speaker with driver circuit

7. Variable Resistors

(1) 1KΩ, 0.25W variable resistor with 3 terminals (A,B,C)
(2) 10KΩ, 0.25W variable resistor with 3 terminals (A,B,C)
(3) 100KΩ, 0.25W variable resistor with 3 terminals (A,B,C)
(4) 1MΩ, 0.25W variable resistor with 3 terminals (A,B,C)

8. Breadboard (AC-90001)

1680 tie-point breadboard on top panel can be easily put into and taken off.

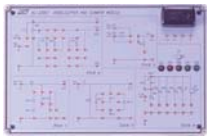


KL-21001

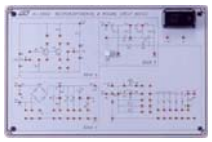
Experiment Modules

1. Each of 17 modules is secured in a solid-body plastic housing
2. Each module is equipped with an 8-bit DIP switch for fault simulations. Students can practice trouble shooting by setting the DIP switch to different positions
3. Detailed solutions for the fault simulation are included in the instructor's manual
4. All sockets on the modules accept 2 mm plugs
5. Comprehensive experiment manual and instructor's manual
6. Module dimension : 255 x 165 x 30 mm

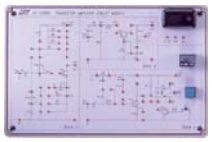
List of Modules



KL-23001
Diode, Clipper and Clamper Module

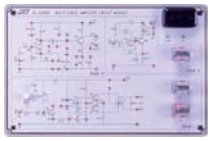


KL-23002
Rectifier, Differential & Integrator Circuits

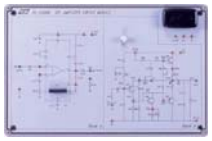


KL-23003
Transistor Amplification Circuits

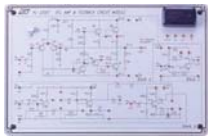
KL-23004
Field Effect Transistor (FET) Circuits



KL-23005
Multistage Amplification Circuits

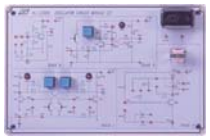


KL-23006
OTL Amplifier Circuit

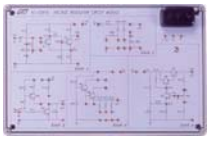


KL-23007
OCL Amplifier & Feedback Circuit

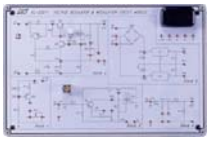
KL-23008
Oscillator Circuits (1)



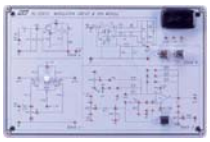
KL-23009
Oscillator Circuits (2)



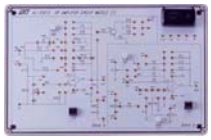
KL-23010
Voltage Regulator Circuits



KL-23011
Voltage Regulator & Amplitude Modulation (AM) Circuits



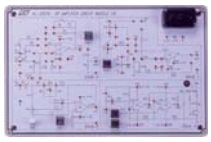
KL-23012
Frequency Modulation (FM) & OP Amplifier Circuits



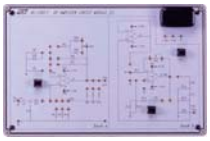
KL-23013
OP Amplifier Circuits (1)

KL-23014
OP Amplifier Circuits (2)

KL-23015
OP Amplifier Circuits (3)



KL-23016
OP Amplifier Circuits (4)



KL-23017
OP Amplifier Circuits (5)

List of Experiments

1. Characteristics of Diodes
- 1-1 Silicon diode ..... KL-23001(A)
- 1-2 Germanium diode ..... KL-23001(A)
- 1-3 Zener diode ..... KL-23001(A)
- 1-4 Light emitting diode ..... KL-23001(E)
- 1-5 Optical diode ..... KL-23001(E)

2. Clipping and Clamping Circuits with Diodes
- 2-1 Clipping circuit (1) ..... KL-23001(B)
- 2-2 Clipping circuit (2) ..... KL-23001(C)
- 2-3 Clamping circuit (1) ..... KL-23001(D)
- 2-4 Clamping circuit (2) ..... KL-23001(D)

3. Rectifier Circuits
- 3-1 Half wave rectifier circuit ..... KL-23002(C)
- 3-2 Full wave rectifier circuit ..... KL-23002(C)
- 3-3 Bridge rectifier circuit ..... KL-23002(C)
- 3-4 Dual power supply rectifier circuit ..... KL-23002(C)
- 3-5 Voltage magnified rectifier circuit ..... KL-23002(B)

4. Differential and Integrator Circuits
- 4-1 RC direct current charge/discharge circuit ..... KL-23002(D)
- 4-2 Differential circuit : Square wave input ..... KL-23002(D)
- 4-3 Differential circuit : Sine wave input ..... KL-23002(D)
- 4-4 Integrator circuit : Square wave input ..... KL-23002(D)
- 4-5 Integrator circuit : Sine wave input ..... KL-23002(D)
- 4-6 RL circuit ..... KL-23002(D)

5. Transistors
- 5-1 PNP transistor ..... KL-23002(A)
- 5-2 NPN transistor ..... KL-23002(A)

6. Transistor Amplification Circuits
- 6-1 Common emitter transistor amplification circuit ..... KL-23003(A)
- 6-2 Common base transistor amplification circuit ..... KL-23003(B)
- 6-3 Common collector transistor amplification circuit ..... KL-23003(C)
- 6-4 Switching type transistor circuit ..... KL-23003(C)
- 6-5 Darlington's circuit ..... KL-23004(A)

7. Field Effect Transistors (FET)
- 7-1 Junction type FET (JFET) ..... KL-23004(B)
- 7-2 Metal-Oxide-Semiconductor FET (MOSFET) ..... KL-23004(B)

8. FET Amplification Circuits
- 8-1 JFET common source amplification circuit : Self-bias ..... KL-23004(C)
- 8-2 JFET common source amplification circuit : Divide-bias ..... KL-23004(C)
- 8-3 JFET common drain amplification circuit : Self-bias ..... KL-23004(C)
- 8-4 JFET common drain amplification circuit : Divide-bias ..... KL-23004(C)
- 8-5 MOSFET amplification circuit : Biased (1) ..... KL-23004(D)
- 8-6 MOSFET amplification circuit : Biased (2) ..... KL-23004(D)

9. Multi - Stage Amplification Circuits
- 9-1 RC coupled amplification circuit ..... KL-23005(A)
- 9-2 Direct coupled amplification circuit ..... KL-23005(A)
- 9-3 Transformer coupled amplification circuit ..... KL-23005(B)
- 9-4 Push-pull amplification circuit ..... KL-23005(C)
- 9-5 OTL amplification circuit ..... KL-23006(B)
- 9-6 OCL amplification circuit ..... KL-23007(A)
- 9-7 IC amplification circuit ..... KL-23006(A)

10. Transistor Negative Feedback Circuits
- 10-1 Serial voltage negative feedback circuit.....KL-23007(B)
- 10-2 Parallel voltage negative feedback circuit.....KL-23007(C)
- 10-3 Serial current negative feedback circuit .....KL-23007(B)
- 10-4 Parallel current negative feedback circuit.....KL-23007(C)

11. Transistor Positive Feedback Circuits
- 11-1 Low-frequency sine wave oscillating circuit
  - a. RC phase-shifting oscillating circuit .....KL-23008(A)
  - b. Wien bridge oscillating circuit .....KL-23008(B)
- 11-2 High-frequency sine wave oscillating circuit
  - a. Hartley's oscillating circuit.....KL-23008(C)
  - b. Colpitts oscillating circuit .....KL-23009(A)
- 11-3 Crystal oscillating circuit .....KL-23009(A)
- 11-4 Astable oscillating circuit .....KL-23008(D)
- 11-5 Monostable oscillating circuit .....KL-23009(B)
- 11-6 Bistable oscillating circuit .....KL-23009(C)
- 11-7 Intermittent oscillating circuit.....KL-23009(D)
- 11-8 Schmitt's oscillating circuit .....KL-23010(A)
- 11-9 Sawtooth oscillating circuit .....KL-23010(B)

12. Regulated Voltage / Constant Current Circuits
- 12-1 Regulated voltage circuit with Zener diode .....KL-23010(C)
- 12-2 Regulated voltage circuit with Zener diode / transistor .....KL-23010(D)
- 12-3 Regulated adjustable voltage circuit.....KL-23010(E)
- 12-4 Current-limiting regulated voltage circuit.....KL-23011(A)
- 12-5 Regulated voltage circuit with IC.....KL-23011(B)
- 12-6 Constant current circuit.....KL-23011(C)

13. Modulation and Demodulation
- 13-1 Amplitude Modulation circuit (AM).....KL-23011(D)
- 13-2 Frequency Modulation circuit (FM).....KL-23012(A)
- 13-3 Amplitude modulation detecting circuit.....KL-23011(E)
- 13-4 Amplitude demodulation circuit .....KL-23012(B)

14. OP Amplifiers
- 14-1 Transistor differential amplification circuit .....KL-23012(C)
- 14-2 Characteristics of OP amplifiers
  - a. Input impedance measurement .....KL-23012(D)
  - b. Output impedance measurement .....KL-23012(D)
  - c. Bandwidth measurement.....KL-23012(D)
  - d. Slew rate measurement .....KL-23012(D)
  - e. Offset voltage measurement (1) .....KL-23012(D)
  - f. Offset voltage measurement (2) .....KL-23012(D)

15. Basic Characteristics of OP Amplifier
- 15-1 Inverse amplification .....KL-23013(B)
- 15-2 Non-Inverse amplification .....KL-23013(B)
- 15-3 Voltage-follower circuit .....KL-23013(B)
- 15-4 Difference amplification.....KL-23013(B)
- 15-5 Sum amplification (Adder) .....KL-23013(B)
- 15-6 Clipping circuit .....KL-23013(A)
- 15-7 Constant voltage circuit .....KL-23013(A)
- 15-8 Constant current circuit .....KL-23013(A)
- 15-9 Differentiator circuit.....KL-23013(A)
- 15-10 Integrator circuit .....KL-23013(A)

16. Basic Characteristics of OP Amplifier(1)-Negative Feedback
- 16-1 Logarithm amplification circuit .....KL-23014(A)
- 16-2 Exponential amplification circuit .....KL-23014(A)
- 16-3 Peak value detection circuit .....KL-23014(A)
- 16-4 Precision clipping circuit .....KL-23014(A)
- 16-5 Voltage adjustment circuit .....KL-23014(B)
- 16-6 Sampling/hold circuit .....KL-23014(C)
- 16-7 Instrument amplification circuit .....KL-23015(B)

17. Basic Characteristics of OP Amplifier(2)-Negative Feedback
- 17-1 High pass amplification circuit .....KL-23015(A)
- 17-2 Low pass amplification circuit .....KL-23015(A)
- 17-3 Band pass amplification circuit.....KL-23015(A)
- 17-4 RIAA amplification circuit .....KL-23016(A)
- 17-5 Tone controller circuit.....KL-23016(A)
- 17-6 Single power supply inverse amplification circuit .....KL-23016(B)

18. Basic Characteristics of OP Amplifier - Positive Feedback
- 18-1 Comparator.....KL-23016(C)
- 18-2 Schmitt trigger .....KL-23016(C)
- 18-3 Window-type comparator.....KL-23016(D)
- 18-4 Monostable multivibrator.....KL-23017(A)
- 18-5 Astable multivibrator.....KL-23017(A)
- 18-6 Sine wave oscillation circuit
  - a. RC oscillator .....KL-23017(B)
  - b. Wien oscillator .....KL-23017(B)

▶ *Accessories (KL-28002)*

1. Experiment manual and instructor's manual
2. Connection leads and plugs : 1 set
3. Key : 1 pce