

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.

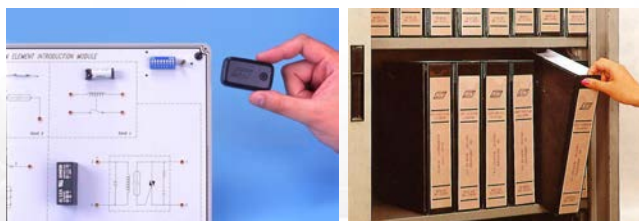
All the necessary equipment for electronic circuit experiments such as power supply, function generator, analog and digital meters are installed on the main unit.

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.

+ **Simulation**

● Features

1. Ideal for electronic circuit experiments and designing exercises.
2. Integrated experimental circuit and trainer with comprehensive experiment curriculum.
3. Supply complete training device easy and effective for experiments.
4. With universal breadboard for circuit designing and prototypes.
5. All modules equipped with an 8-bit DIP switch for fault simulations.
6. Individual keeping case for all modules easy carrying and storage facilities.
7. Including computer - based training



● Specifications

Main Unit (KL-21001)

1. DC Power Supply
 - (1) Fixed DC power supply
 - a. Voltage range : $\pm 5V, \pm 12V$
 - b. With output overload protection
 - (2) Dual DC power supply
 - a. Voltage range : $\pm 3V \sim \pm 18V$, continuously adjustable
 - b. With output overload protection
2. AC power supply
 - (1) Voltage range : $9V \sim 0 \sim 9V$
 - (2) With output overload protection
3. Function Generator
 - (1) Output waveform : Sine, square and triangle
 - (2) Output frequency : $10Hz \sim 100KHz$, 4 settings, continuously adjustable
 - (3) Accuracy : $\pm 5\%$ of full scale value
 - (4) Output impedance : 50Ω
 - (5) Output voltage : $\geq 18V_{pp}$ (open loop)
 $\geq 9V_{pp}$ (with 50Ω load)
4. 3 1/2 digit Digital Voltmeter/Ammeter
 - (1) DC voltage range : $2V, 200V$
 - (2) DC voltage accuracy : $\pm 0.3\%$ of reading + 1 digit
 - (3) DC current range : $200\mu A, 2000mA$
 - (4) DC current accuracy : $\pm 0.5\%$ 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

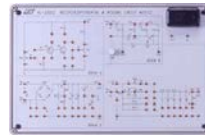
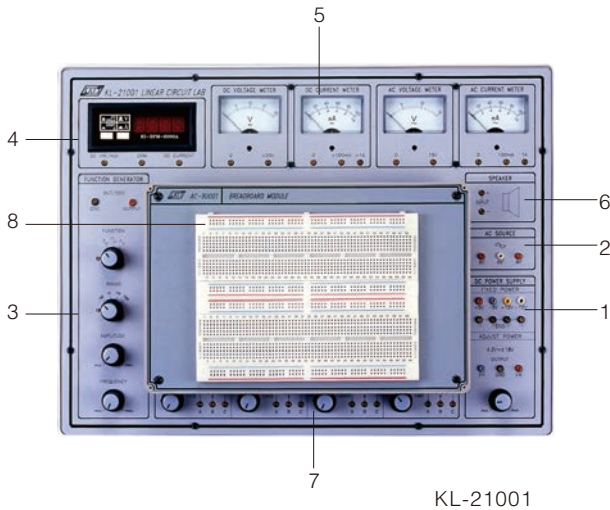
one 8Ω, 0.25W speaker with driver circuit

7. Variable Resistors

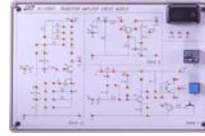
- (1) 1KΩ, 0.25W variable resistor with 3 terminals (A,B,C)
- (2) 10KΩ, 0.25W variable resistor with 3 terminals (A,B,C)
- (3) 100KΩ, 0.25W variable resistor with 3 terminals (A,B,C)
- (4) 1MΩ, 0.25W variable resistor with 3 terminals (A,B,C)

8. Breadboard (AC-90001)

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



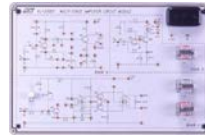
KL-23002
Rectifier, Differential & Integrator Circuits



KL-23003
Transistor Amplification Circuits



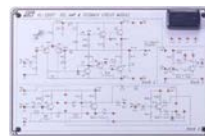
KL-23004
Field Effect Transistor (FET) Circuits



KL-23005
Multistage Amplification Circuits



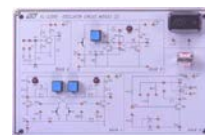
KL-23006
OTL Amplifier Circuit



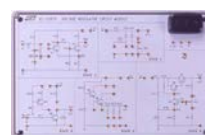
KL-23007
OCL Amplifier & Feedback Circuit



KL-23008
Oscillator Circuits (1)



KL-23009
Oscillator Circuits (2)

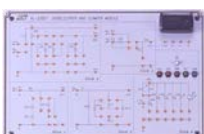


KL-23010
Voltage Regulator Circuits

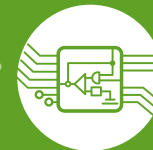
Experiment Modules

- 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 30mm

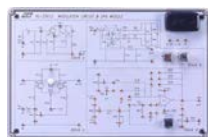
List of Modules



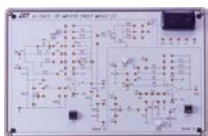
KL-23001
Diode, Clipper and Clamper Module



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



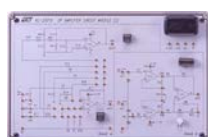
KL-23012
Frequency Modulation (FM) &
OP Amplifier Circuits



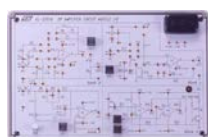
KL-23013
OP Amplifier Circuits (1)



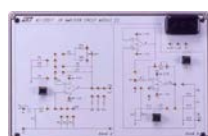
KL-23014
OP Amplifier Circuits (2)



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 diodeKL-23001(A)
- 1-2 Germanium diodeKL-23001(A)
- 1-3 Zener diodeKL-23001(A)
- 1-4 Light emitting diodeKL-23001(E)
- 1-5 Optical diodeKL-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 circuitKL-23002(C)
- 3-2 Full wave rectifier circuitKL-23002(C)
- 3-3 Bridge rectifier circuitKL-23002(C)
- 3-4 Dual power supply rectifier circuitKL-23002(C)
- 3-5 Voltage magnified rectifier circuitKL-23002(B)

4. Differential and Integrator Circuits

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

5. Transistors

- 5-1 PNP transistorKL-23002(A)
- 5-2 NPN transistorKL-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 circuitKL-23003(C)
- 6-5 Darlington's circuitKL-23004(A)

7. Field Effect Transistors (FET)

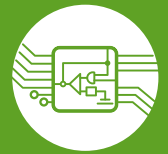
- 7-1 Junction type FET (JFET)KL-23004(B)
- 7-2 Metal-Oxide-Semiconductor FET (MOSFET)
.....KL-23004(B)

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 circuitKL-23005(A)
- 9-2 Direct coupled amplification circuitKL-23005(A)
- 9-3 Transformer coupled amplification circuitKL-23005(B)
- 9-4 Push-pull amplification circuitKL-23005(C)
- 9-5 OTL amplification circuitKL-23006(B)
- 9-6 OCL amplification circuitKL-23007(A)
- 9-7 IC amplification circuitKL-23006(A)



- 10. Transistor Negative Feedback Circuits
 - 10-1 Serial voltage negative feedback circuitKL-23007(B)
 - 10-2 Parallel voltage negative feedback circuit...KL-23007(C)
 - 10-3 Serial current negative feedback circuitKL-23007(B)
 - 10-4 Parallel current negative feedback circuit ...KL-23007(B)
- 11. Transistor Positive Feedback Circuits
 - 11-1 Low-frequency sine wave oscillating circuit
 - a. RC phase-shifting oscillating circuitKL-23008(A)
 - b. Wien bridge oscillating circuitKL-23008(B)
 - 11-2 High-frequency sine wave oscillating circuit
 - a. Hartley's oscillating circuit.....KL-23008(C)
 - b. Colpitts oscillating circuitKL-23009(A)
 - 11-3 Crystal oscillating circuitKL-23009(A)
 - 11-4 Astable oscillating circuitKL-23008(D)
 - 11-5 Monostable oscillating circuitKL-23009(B)
 - 11-6 Bistable oscillating circuitKL-23009(C)
 - 11-7 Intermittent oscillating circuit.....KL-23009(D)
 - 11-8 Schmitt's oscillating circuitKL-23010(A)
 - 11-9 Sawtooth oscillating circuitKL-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 circuitKL-23010(E)
 - 12-4 Current-limiting regulated voltage circuitKL-23011(A)
 - 12-5 Regulated voltage circuit with ICKL-23011(B)
 - 12-6 Constant current circuitKL-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 circuitKL-23011(E)
 - 13-4 Frequency demodulation circuit.....KL-23012(B)
- 14. OP Amplifiers
 - 14-1 Transistor differential amplification circuitKL-23012(C)
 - 14-2 Characteristics of OP amplifiers
 - a. Input impedance measurementKL-23012(D)
 - b. Output impedance measurementKL-23012(D)
 - c. Bandwidth measurementKL-23012(D)
 - d. Slew rate measurementKL-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 amplificationKL-23013(B)
 - 15-2 Non-Inverse amplificationKL-23013(B)
 - 15-3 Voltage-follower circuitKL-23013(B)
 - 15-4 Difference amplificationKL-23013(B)
 - 15-5 Sum amplification (Adder).....KL-23013(B)
 - 15-6 Clipping circuitKL-23013(A)
 - 15-7 Constant voltage circuitKL-23013(A)
 - 15-8 Constant current circuit.....KL-23013(A)
 - 15-9 Differentiator circuitKL-23013(A)
 - 15-10 Integrator circuitKL-23013(A)

- 16. Basic Characteristics of OP Amplifier(1)-Negative Feedback
 - 16-1 Logarithm amplification circuitKL-23014(A)
 - 16-2 Exponential amplification circuitKL-23014(A)
 - 16-3 Peak value detection circuitKL-23014(A)
 - 16-4 Precision clipping circuitKL-23014(A)
 - 16-5 Voltage adjustment circuitKL-23014(B)
 - 16-6 Sampling/hold circuitKL-23014(C)
 - 16-7 Instrument amplification circuitKL-23015(B)
- 17. Basic Characteristics of OP Amplifier(2)-Negative Feedback
 - 17-1 High pass amplification circuitKL-23015(A)
 - 17-2 Low pass amplification circuitKL-23015(A)
 - 17-3 Band pass amplification circuitKL-23015(A)
 - 17-4 RIAA amplification circuitKL-23016(A)
 - 17-5 Tone controller circuitKL-23016(B)
 - 17-6 Single power supply inverse amplification circuit
 -KL-23016(A)
- 18. Basic Characteristics of OP Amplifier - Positive Feedback
 - 18-1 ComparatorKL-23016(C)
 - 18-2 Schmitt triggerKL-23016(C)
 - 18-3 Window-type comparatorKL-23016(D)
 - 18-4 Monostable multivibratorKL-23017(A)
 - 18-5 Astable multivibratorKL-23017(A)
 - 18-6 Sine wave oscillation circuit
 - a. RC oscillatorKL-23017(B)
 - b. Wien oscillatorKL-23017(B)

● Accessories(KL-28002)

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

● Computer-Based Training

1. Built-in circuit simulation of experiment modules.
2. Fault simulation is allowed.
3. Users can flexibly compare the simulation analysis result with hardware signal output.
4. Support virtual instrument.

