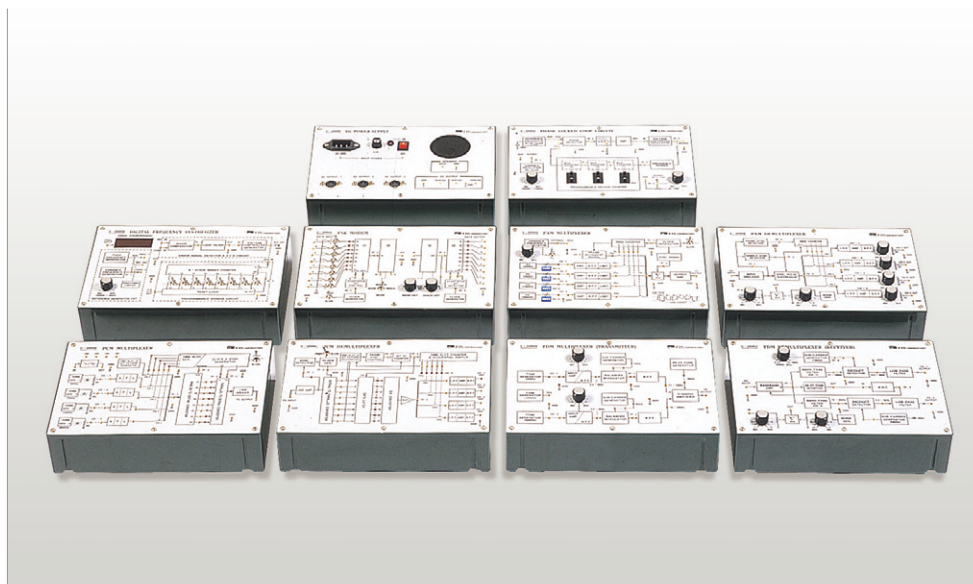


• Communication

MULTIPLEXED COMMUNICATION TRAINER

ED-2990

- PLL and Digital Synthesizer
- PAM, PCM, FDM and FSK Modem
- 10types of module including DC Power Supply



> EXPERIMENTS

- **PHASE LOCKED LOOP CIRCUIT**
 - » Voltage Controlled Oscillator
 - » Study of Phase Locked Condition
 - » Phase Detector & Low Pass Filter
- **DIGITAL SYNTHESIZER**
 - » Error Signal Detector
 - » Study of Phase Comparator
 - » Programmable Division Circuit
 - » Transitory Response of Synthesizer
- **PAM(TDM) TRANSMITTER / RECEIVER**
 - » Input Amp. Characteristics
 - » Transmission Timing
 - » Study of the PAM Multiplexer
 - » Study of the PAM Demultiplexer
 - » Characteristics of the PAM System Noise
- **PCM TRANSMITTER / RECEIVER**
 - » Channel Circuit of the Transmitter
 - » Reception Synchronization & Alignment
 - » A/D Converter & Quantization Characteristics
 - » D/A Converter & Demultiplexer
 - » Characteristics of the PCM System Noise
- **FDM MULTIPLEXER / DEMULTIPLEXER**
 - » Input Amp. & Balanced Modulator
 - » Study of the SSB Demodulator
 - » Study of the System Global Response
 - » Crosstalk Response

> EXPERIMENTAL MODULES (15EA)

MODULE	DESCRIPTION
U-2990A	Phase Locked Loop Circuit
U-2990B	Digital Synthesizer Circuit
U-2990C	MODEM Circuit(FSK, PSK)
U-2990D	PAM Multiplexer
U-2990E	PAM Demultiplexer
U-2990F	PCM Multiplexer
U-2990G	PCM Demultiplexer
U-2990H	FDM Multiplexer
U-2990J	FDM Demultiplexer
U-2990P	DC Power Supply

MULTIPLEXED COMMUNICATION TRAINER

ED-2990

> SPECIFICATIONS

GENERAL CHARACTERISTICS

- Input Voltage : AC 220V, 50/60Hz(U-2990P)
- Module Dimension : 250(W) x 65(H) x 166(D)mm
- System Dimension : 715(W) x 565(H) x 230(D)mm
- System Weight : 27kg (including a case)

ACCESSORIES

- Patch Cord(ø2 Plug) : 1set
- DC Cord(Special) : 3ea
- AC Power Cord : 1ea
- Experimental Manual : 1ea

Experiments Module



U-2990A PHASE LOCKED LOOP UNIT

- VCO Frequency Range
 - » 700kHz~1.4MHz
- PLL Output Frequency
 - » 800kHz~1.3MHz
- Output Level : 3Vp-p Approx.
- Reference Frequency
 - » 1kHz(with 1MHz X-TAL)
- Variable Oscillator
 - » 500Hz~1.5kHz
- DC Output : 0~+15V



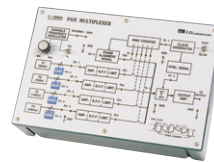
U-2990B DIGITAL SYNTHESIZER UNIT

- VCG Frequency Range
 - » 1Hz~320kHz
- Synthesizer Output Frequency
 - » 1kHz~25.5kHz
- Output Level : 15Vp-p
- Programmable Division
 - » 8-stage Binary Counter
- Phase Detection Circuit
 - » Logic Comparator
- Reference Frequency : 1kHz
- Variable Frequency Generator
 - » 300Hz~3kHz
- Frequency Counter
 - » 10Hz~10kHz



U-2990C MODEM UNIT

- Keying Mode : FSK
- Transmission Freq. : Space : 1200Hz
Mark : 2400Hz
- Operating Speed : 0~300 bits
- Operating Mode : Synchronous
- Data (Input/Output) : 8 bits

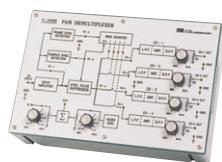


U-2990D PAM MULTIPLEXER

- Multiplexing Mode
 - » Time Division Multiplexer
- Transmission Channel
 - » 4-Channel
- Input Frequency
 - » 350/700/1400/2800Hz
- Amplitude Range
 - » 2.5V~12.5Vp-p
- Timing Generator(Speed)
 - » Fast/Slow selectable
- Variable Frequency Generator
 - » 300Hz~3kHz(Sine/Square)

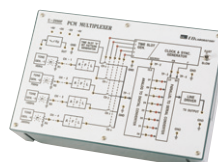
MULTIPLEXED COMMUNICATION TRAINER

ED-2990



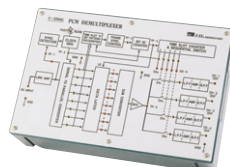
U-2990E PAM MULTIPLEXER

- Demultiplexing Mode : TDM
- Receiving Channel : 4-Channel
- Output Frequency Range
 - » 350~2800Hz
- Sample Sync. Level : 12.5Vp-p
- Frame Sync. Level : 2.5Vp-p
- Noise Generator
 - » DC 7V + AC 0~5Vp-p



U-2990F PCM MULTIPLEXER

- Multiplexing Mode
 - » Time Division Multiplexer
- Transmission Channel : 4-channel
- Input Frequency
 - » 350/700/1400/2800Hz
- Input Dynamic Range : 43~55dBm
- A/D Converter : 8bitsx4ch
- Clock Generator
 - » Fast : 320kHz, Slow : 8Hz
- Sampling Speed : 8000/sec



U-2990G PCM DEMULTIPLEXER

- Demultiplexing Mode
 - » Time Division Multiplexer
- Capacity of Channel : 4-channel
- Output Frequency Range
 - » 350~2800Hz
- D/A Converter : 8 bits
- Synchronizing Clock
 - » Fast/Slow selectable



U-2990H FDM MULTIPLEXER

- Multiplexing Channel
 - » 2-Voice Channel
- Input : 0.3~4kHz, 1Vp-p Max.
- Sub Carrier
 - » Ch-1: 15kHz, Ch-2: 20kHz
- Pilot Frequency : 56kHz
- Test Tone Generator
 - » 500/1000/2000Hz
- Transmission Bandwidth
 - » about 11~56kHz
- Output (Level) : 5Vp-p



U-2990J FDM DEMULTIPLEXER

- Capacity of Channel
 - » 2-Voice channel
- Base Bandwidth : about 80kHz
- Band Pass Filter
 - » Ch-1 : 11~15kHz, Ch-2 : 16~20kHz
- Voice Output
 - » 0.3~3kHz, 1Vp-p Max.
- Noise Generator
 - » 10Vp-p Max.



U-2990P POWER MODULE

- Input Voltage : AC220V, 50/60Hz
- Output Voltage
 - » DC5V(0.5A), DC $\pm$ 15V(0.5A)
- Speaker : 0.6W
- Output Connector
 - » 3ea(for 3 modules)
- Dimension
 - » 250(W) x 65(H) x 166(D)mm
- Weight : 1.4kg