



This trainer kit is designed to **explore and analyze analog frequency and phase modulation techniques**, with practical implementation of modulators, demodulators, and associated circuits. It covers **varactor and reactor-based FM, VCO-based modulation**, and multiple demodulation methods, enabling a comprehensive study of FM communication systems. Learners can also investigate the **impact of noise on FM detection**, supported by on-board filters, amplifiers, and visualization tools. Ideal for communication engineering labs, this kit provides both theoretical and practical understanding of FM systems.

### Application

- Study of **frequency and phase modulation** principles
- Demonstration of **varactor, reactor, and VCO-based FM modulators**
- Implementation of **six different FM demodulation techniques**
- Analysis of **noise effects** in FM detection
- Understanding **filtering, limiting, and amplification stages**
- Fault simulation for **hands-on troubleshooting practice**

### Product Features

- Functional block diagram with **self-explanatory waveforms**
- **On-board modulators and demodulators** with mixer, amplifier, amplitude limiter, and filter circuits
- **Audio oscillator** for modulating input signals
- Facility to **observe noise impact on FM reception**
- **LED indicators** for signal flow and selection
- Option for **interactive PC software** for enhanced visualization

*Note: Specifications are subject to change, Photos shown above are Indicative, Actual Product can Vary.*



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**Technical Specifications**

- **Audio Oscillator:** Sine wave, frequency range 200 Hz – 3 kHz (or better)
- **FM Modulators (3 Nos.):**
  - Varactor Modulator – Carrier frequency ~450 kHz
  - Reactor Modulator – Carrier frequency ~450 kHz
  - VCO-based Modulator
- **FM Demodulators (6 Nos.):**
  - Detuned Resonant Detector
  - Quadrature Detector
  - Foster-Seeley Detector
  - Ratio Detector
  - PLL Detector (IC HEF4046 based)
  - PLL Detector (IC LM565 based)
- **Low-Pass Filter:** Cut-off at 3 kHz or better
- **Switched Faults:** 7 or more
- **Test Points:** 35 or more
- **Interconnections:** 2 mm sockets

**Accessories / Spares**

- Microphone
- Coaxial Cables
- Antenna
- RF Load
- Oscilloscope Probes
- Set of Patch Cords

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