ADVANCE ANALOG COMMUNICATION TRAINING SYSTEM

Advance Analog Communication Training System, is a complete range of Analog Communication kits in a modular fashion. Every stage and phase achieved in the process of modulation and demodulation is demonstrated. One of the most salient features of the kit is the capability to observe & analyze DSB-USB-LSB and FM signal spectrum on a Dual Trace Oscilloscope. One look at the list of experiments at the end of this section is sufficient to understand the depth at which these kits will take the students, to understand the principles of Analog Communication and its operating characteristics. An interactive user-friendly e-Manual software is provided optionally with this training system on CD.

ACT - 01 SIGNAL GENERATOR AND FREQUENCY MODULATION KIT

ACT-01 forms the heart of the system, generating all necessary signals for performing various experiments in Analog Communication, which includes all modulating and carrier signals.

FEATURES:

- On-board Function Generator.
- Voltage Controlled Oscillator.
- Frequency Modulator
- Audio Pre-amplifier.
- Sweep Generator.
- RF detector.
- Switch Faults.

TECHNICAL SPECIFICATIONS:

ON-BOARD FUNCTION GENERATOR:

Waveforms	: Sine, Triangular, Square.
Amplitude	: 0 to 2 Vp-p.
Frequency Range	: 100Hz to 10KHz.
Synchronous Square Wave	: Frequency X4 & 1/4 of the main output signal, Adjustable Amplitude.

VOLTAGE CONTROL OSCILLATOR:

Carrier Frequency Generator Frequency Modulator:

A. VCO1:

Frequency Range	: 400KHz to 1500KHz. 400KHz to 500KHz.
Amplitude	: Variable 0 to 2 Vp-p.
Inputs to VCO1	: Modulating signal, Marker, AFC (Automatic Frequency Control).

B. VCO2 :

Frequency Range	: 400KHz to 1500KHz.
Amplitude	: Variable 0 to 2 Vp-p.
Input to VCO2	: Modulating signal.

AUDIO PRE-AMPLIFIER:

Audio Input	: Microphone.
Input Impedance	: 600 Ohms.
Voltage Gain	: 1 to 100.
RC Filter	: 3.4 KHz cut-off.

SWEEP GENERATOR:

Sweep Frequency	: 10Hz.
Sweep Depth	: Adjustable.
Output for Oscilloscope	: X- axis.

SPECTRUM DETECTOR:

Minimum Input	: 100mVp-p
Input level	: Adjustable

SWITCH FAULTS: 4 Switch Faults are provided on-board to study different effects on circuit.

INTERCONNECTION: 2mm banana socket.

TEST POINTS: Several test points are provided on-board to observe intermediate signals.

POWER SUPPLY: GND, +5V, +12V, -12V.

ACCESSORIES FOR ACT-01 TO ACT-05:

Red Short Links	: 26 Nos.
Red Long Links	: 12 Nos.
Crocodile Links	: 10 Nos.
Microphone	: 01 No.
Speaker	: 01 No.
Tunning Tool	: 01 No.
Jumper Caps	: 11 Nos.
Experimental Manual	: 01 No.
Circuit Description Manual	: 01 No.
Power Card	: 01 No.
Power Chords	: 05 Nos.
Power Supply	: 01 No.

OPTIONAL:

e-Manual Interactive Multimedia Software & Manual

LIST OF EXPERIMENTS USING ACT-01 TO ACT-05:

- **AMPLITUDE MODULATION:**

a. Study the operation of an Amplitude Modulator.
b. Calculate modulation index of an Amplitude Modulated wave.
c. Observe linearity curve of the Modulator.
d. Observe spectrum of the AM Signal.

- **AMPLITUDE DEMODULATION:**

a. Study and observe the operation of Envelope Detector.
b. Study and observe the effect of time constant RC.
c. Study and observe the operation of synchronous AM Detector.

- **SINGLE SIDE BAND MODULATION (SSB):**

a. i) Observe frequency response of ceramic filter.
ii) Plot the frequency response curve of ceramic filter.
b. Study the operation of Amplitude Modulator with suppressed carrier.
c. Study Single Side Band Generation.
d. Study and observe spectrum of the signal generated by the Balance

Modulator.
e. Study demodulation of the SSB Signal.
f. Study demodulation of the Ring Modulator.

- **FREQUENCY MODULATION:**

a. Plot modulation characteristics of Frequency Modulator.
Calculate modulation sensitivity of Frequency Modulator.
Calculate Non-linearity of Frequency Modulator.
b. Observe and measure frequency deviation and modulation index of Frequency Modulator.
c. Study marker insertion to evaluate the Frequency Deviation.
d. Observe spectrum of the FM signal.

- **FREQUENCY DEMODULATION:**

a. Plot demodulation characteristics of the frequency demodulator (Foster Seeley Demodulator).
   i) Calculate demodulation sensitivity and non-linearity of Frequency Demodulator.
   ii) Observe demodulation characteristics curve
   iii) Observe waveforms of the demodulated Signal.
b. Study of Ratio Demodulator.
c. Study of Quadrature Detector.
d. Study of Limiter Circuit.

- **PHASE MODULATION:**

a. Study & observe the waveforms of the Phase Modulated Signal.
b. Study & observe the waveforms of Phase Demodulated Signal.
c. Study Frequency Demodulation via Phase Modulator.

- **FREQUENCY CONVERSION:**

a. Study frequency relations with the Mixer Study effect of Image Frequency.
b. Observe the frequency response of IF Filter Plot frequency response of the IF Filter.

- **SELECTIVE AMPLIFIER:**

a. i) Find the central frequency and bandwidth of an amplifier.
   ii) Impedance transformation with transformer.
   iii) Impedance transformation with auto transformer.
b. Calibration of gain of a 2 Stage IF Amplifier.
c. Automatic Gain Control.
d. AM Detector.

- **AM SUPERHETERODYNE RECEIVER WITH AGC.**
- **FM SUPERHETERODYNE RECEIVER WITH AFC.**
- **CHANNEL AND NOISE:**

a. Examine the operation of a Noise Generator.
b. Examine the operation of a signal attenuation network.
c. Measurement of S/N Ratio.
d. Measurement of Noise Figure.

- **AUDIO AMPLIFIER:**

a. Measurement of Frequency Response and Power Output.

- **STUDY OF FILTERS.**

a. High Pass Filter
b. Band Pass Filter
c. Band Reject Filter
d. Matched Filter (PI & T Section)

- **EFFECT OF SWITCH FAULTS.**

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