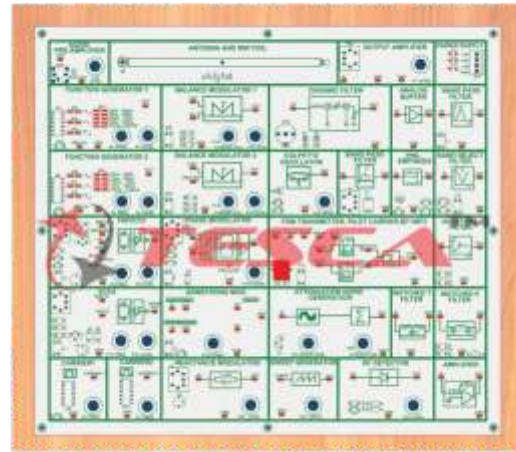




**Transmitter**



**Receiver**

Tesca is pleased to announce the Launch of Analog Communication System which allows the Students to learn the fundamental concepts by building the Analog Communication System experiments at the Block Diagram level. Theory comes to life as they build different Modulators and Receivers.

The System is completely self-contained with all required Modulating Signals, Carriers generated on Board and the students can connect respective functional blocks using patch-chord to build their required Modulation / Receiver Scheme. Waveforms can be displayed on a Digital Storage Oscilloscope which is generally available in the Laboratory.

This System covers the complete Analog Communication Curriculum and serves as a very good practical learning board to teach the fundamentals of Analog Communication.

**Technical Specification - Transmitter**

**GENERATOR BLOCK**

**Function Generator 1**

Waveform : Sine, Square & Triangular  
Frequency : 1Hz to 100 KHz, Variable  
Amplitude : 0 to 2V, Variable

**Fuction Generator 2**

Waveform : Sine, Square & Triangular  
Frequency : 1Hz to 100 KHz, Variable  
Amplitude : 0 to 2V, Variable

**Carrier Generator 1**

Waveform : Square wave  
Frequency : 1 KHz to 20 KHz, Variable  
Amplitude : 2V, Fixed

**Carrier Generator 2**

Waveform : Square wave  
Frequency : 1 KHz to 30 KHz, Variable  
Amplitude : 2V, Fixed

**Voltage Controlled Oscillator (VCO) & FM Modulator**

Frequency : 400 KHz to 1500 KHz, Variable  
Amplitude : 0 to 2V, Variable

**Voltage Controlled Oscillator (VCO2)**

Frequency : 400 KHz to 1500 KHz, Variable

Note: Specifications are subject to change.

Amplitude : 0 to 2V, Variable

**MODULATOR BLOCK**

**Balance Modulator 1**

Modulation : Amplitude modulation, Double sideband, single sideband (USB and LSB)

Carrier Input : 1-1000 KHz  
Modulation Input : 0.1 - 100 KHz  
Carrier Null : Adjustable  
Output Amplitude : Adjustable

**Balance Modulator 2**

Modulation : Amplitude modulation, Double side band, Single side band (USB and LSB).

Carrier Input : 1MHz  
Modulation Input : 400-500KHz  
Carrier Null : Adjustable  
Output Amplitude : Adjustable

**Balance Modulator 2**

Modulation : Amplitude modulation, Double side band, Single side band (USB and LSB).

Carrier Input : 1MHz  
Modulation Input : 400-500KHz  
Carrier Null : Adjustable  
Output Amplitude : Adjustable

**Colpitt's Oscillator:** 1MHz Sine Wave with variable amplitude 0 to 2V

**Ceramic Filter :** Central Frequency 460KHz Bandwidth 10 KHz + / - 3 KHz

**Band Pass Filter :** Central Frequency 1.455MHz Bandwidth 10 KHz + / - 3 KHz

**FDM Transmitter:**

Input 1 Band Pass Filter: 7KHz to 11KHz  $F_c = 9\text{KHz}$

Input 2 Band Pass Filter: 18KHz to 22KHz  $F_c = 20\text{KHz}$ , Pilot Carrier 256KHz

**Pre-emphasis:** Time Period with 50us

**Armstrong Modulator:** 450 KHz Carrier Generator with 90° Phase Shifter

**Phase Modulator:** Adjustable to 400KHz to 500KHz

**Reactance Modulator:** Reactance modulator with variable amplitude

**NOISE GENERATOR & FILTER BLOCK**

**Noise Generator & Adder:** Adjustable from 0V to maximum input value signal + Noise Adder stage 0 to 4V white noise

**Sweep Generator:** Sweep frequency-10Hz, Sweep depth -Adjustable Output for oscilloscope -X axis

**RF/Spectrum Detector:** Minimum. Input - 100mVpp, Adjustable

**Band Pass Filter:** Frequency Range 7KHz to 13KHz

**High Pass Filter:** Cut off Frequency 3.4 KHz

**Band Reject Filter:** Frequency Range 7KHz to 13KHz

**Matched T Filter:** Cut off Frequency 20 KHz

**Matched II Filter:** Cut off Frequency 20 KHz

**TRANSMISSION VIA ANTENNA AND APPLICATION BLOCK**

**Antenna:** Ferrite Rod & MW coil

**Output Amplifier:** 600 KHz to 1650 KHz with adjustable gain

**Audio Pre-amplifier:** Audio pre-amplifier with Microphone and adjustable gain

Note: Specifications are subject to change.

**Technical Specification - Receiver  
RF AMPLIFIER BLOCK**

Rf amplifier: 600 KHz to 1650 KHz With adjustable gain

**LOCAL OSCILLATOR BLOCK**

Output signal: Sine wave for local oscillator input

Frequency: 900 KHz to 2.1MHz variable

Amplitude: Adjustable from 0 ~ 2Vp-p

Output impedance: 50 Ohms

**MIXER BLOCK**

Dual gate MOSFET IN

Inputs: Local oscillator and RF Signal

Output Frequency: 455KHz adjustable

**Filter:** Dual tune LC

**IF AMPLIFIER & FILTER BLOCK**

1st IF and 2nd IF amplifier

Central frequency: 455KHz

Load impedance: Variable R-L-C

Gain: 32dB with automatic gain control

Filter 1 & Filter 2: Cut off Frequency of 3.4KHz

**DEMODULATOR BLOCK**

**Beat Frequency Oscillator**

Central Frequency: Adjustable to 457KHz

Amplitude: 0 to 2V variable

**Diode Envelope Detector**

Detection of Positive & Negative envelope with variable RC filter DSB

**Limiter:**

455KHz central Frequency 1.5V output amplitude

**Quadrature / Product Detector**

Operating frequency : Adjustable from 400KHz ~ 500KHz SSB

Input amplitude : 1Vp-p

**Foster Seeley / Ratio Detector**

Operating frequency: Adjustable from 400KHz ~ 500KHz SSB

Input amplitude: 1Vp-p

**PLL Detector**

Operating frequency : Adjustable from 400KHz ~ 500KHz SSB

Input amplitude : 1Vp-p

**Detuned Resonance Detector**

Operating frequency: Adjustable from

Input amplitude: 1Vp-p

**De-emphasis**

Time Period with 50us

### FDM Receiver

Band Pass Filter: 7 KHz to 11 KHz,  $F_c = 9$  KHz,  
Band Pass Filter: 18 KHz to 22 KHz,  $F_c = 20$  KHz

### Power Meter with Integrator and Dump Circuit:

2 Digit Seven Segment Display with 1 - 15 sec Timer.

Input signal Amplitude 0 to 2V

### RECEPTION VIA ANTENNA AND APPLICATION BLOCK

Antenna: Ferrite Rod & MW coil

Audio Amplifier: Audio Amplifier with headphone and adjustable gain.

Switch Fault: Switch Faults are provided to simulate fault condition in various parts of the Circuit.

Power Supply: GND, +5V, +12V, -12V

## OPTIONAL MODULES

### Module 1: Linear Modulation

- Amplitude Modulation
- Frequency Spectrum of AM
- Power in AM wave
- Generation of AM signal
- Modulation Index of AM
- Observed Linearity Curve of AM Modulator
- SSB-SC
- DSB-SC
- AM Demodulation - Envelope and Square
- Law Demodulation
- Phase Discriminator Method
- Armstrong Modulation

### Module 2 : Frequency Division Multiplexing

- FDM

### Module 3: Angle Modulation

- Principle of frequency and phase modulation- Relation between FM and PM waves
- Frequency deviation & Modulation Index of FM
- Bandwidth of FM
- Spectrum of FM
- Armstrong Modulation

### Module 4: Demodulation of Angle

- Modulated Signals
- FM detectors – slope detectors

- Ratio detectors
- The Phase Locked Loop
- Pre-emphasis and de-emphasis.

### Module 5: Receivers and Noise in

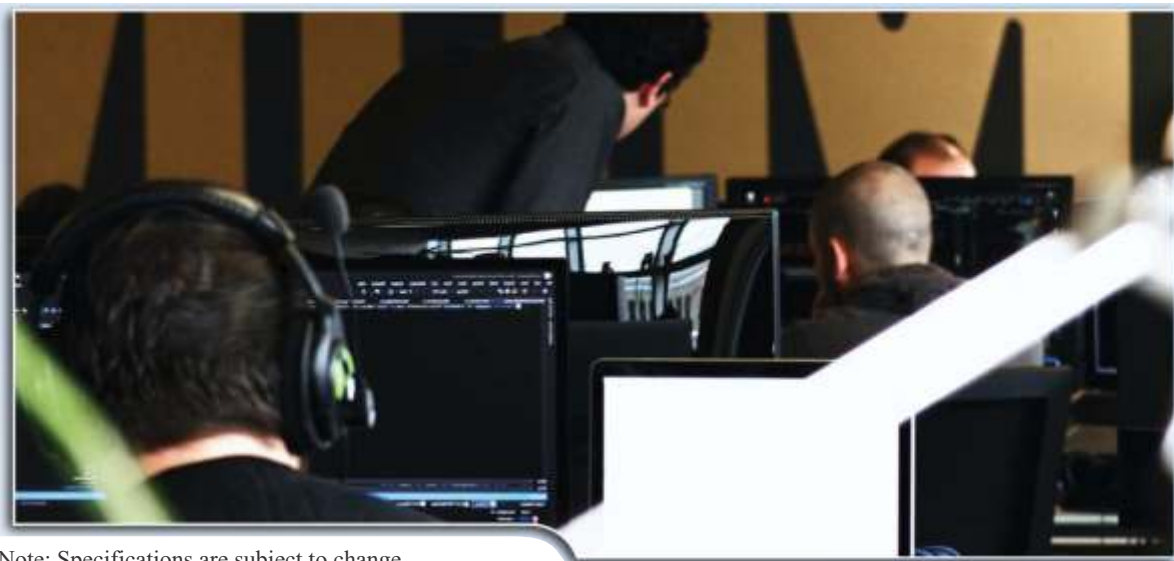
- Analog Communication
- Super-heterodyne receiver (AM and FM)
- Observed Frequency Response
- of Ceramic Filter
- Study of Selectivity & Sensitivity of AM Receiver
- Effect of Noise on Analog Systems
- Noise Power Spectral Density Measurement
- SNR and Noise Figure measurement

### Module 6: Filter

- Study of Band Pass Filter
- Study of Band Reject Filter
- Study of High Pass Filter
- Study of Low Pass Filter
- Study of Matched T Filter
- Study of Matched II Filter

### Module 7: Applications

- Transmit AM Signal Via Antenna
- Study of Amplifier Circuit
- Study of Voice communication
- Study of Switch Fault



Note: Specifications are subject to change.

19.01.2022 **Tesca Technologies Pvt. Ltd.**

IT-2013, Ramchandrapura Industrial Area, Sitapura Extension,  
Near Bombay Hospital, Vidhani Circle, Jaipur-302022, Rajasthan, India,  
Tel: +91-9829132777; Email: info@tesca.in, tesca.technologies@gmail.com  
Website: www.tescaglobal.com