



**40708** is versatile trainer which is suitable to conduct both Analog and Digital Communication experiments. This Board consists of Master base unit in which has all sources like Sine generator, Low pass amplifiers, Speaker, MIC, Data, Clock, Selectable Pulse generator, Variable DC supply etc. Various Plug in Modules are provided as per the experiments for studying Analog & Digital communication.

**Specification:**

**1. Fixed Sine Wave Generator**

- Provides fixed Sine waveform Natural & Flat Top output of 250Hz, 500Hz, 1 KHz, and 2 KHz.
- Amplitude adjustments of 0 - 4Vp-p

**2. Variable Sine Wave Generator**

- Provides Sine waveform output from 1Hz to 10KHz
- Provision for Amplitude adjustments provided for 10Vp-p

**3. DC Source**

- One No. of variable (0-5V) DC source.
- Provision for Amplitude adjustments provided

**4. Pulse Generator**

- Switch selectable sampling clock of 2, 4, 8, 16, 32, 64 KHz.
- Crystal Controlled Pulse Generator
- Switch selectable Duty cycle of 10-90% in steps of 10%.

**5. Clock and Data Generator**

- 8 bit variable NRZ-L pattern generated of 8-bit Data Switch provided.
- Clock Frequency is of 250 KHz.
- 8KHz frame frequency

**6. PRBS Generator**

- Fast (240 KHz/Channel approx)
- Slow (1Hz. /channel approx.)

**7. Carrier Sine Wave Generator**

- Provides synchronized Sine output of 500KHz(0 deg.), 500KHz(90 deg.), 500KHz(180 deg.), 500KHz(270 deg.),
- 1MHz(0 deg.) & 1MHz(180 deg.).

**8. On-board features**

- MIC & Speaker interface circuit for Voice Link
- 1 no. of 2nd order Low pass filter with cut off frequency of 3.4 KHz.
- 5 no's of 4th order Butterworth Low pass filter with cut off frequency of 3.4 KHz.
- 26 Pin FRC male Connector provided for interfacing Experimental Module

Note: Specifications are subject to change.

- Block Description Screen printed on glassy epoxy PCB
- All interconnections are made using 2mm banana Patch cords
- Test points are provided to analyze signals at various points.
- Bare board Tested Glass Epoxy SMOBC PCB is used.
- In-Built Power Supply of +5V/1.5A, ±12V/250mA with Power ON indication
- Space provided to place ready to use analog/digital communication module
- Attractive Metal Enclosure for base unit.

### List of Optional Modules

SN	Name	Order Code	Qty.
01.	DSB/SSB AM Modulation & Demodulation	40708-M01	01
02.	FM Modulation & Demodulation Module	40708-M02	01
03.	Fibre Optics Module	40708-M03	01
04.	PAM/PWM/PPM/TDM Module	40708-M04	01
05.	TDM Pulse Code Modulation & Demodulation Module	40708-M05	01
06.	Line Coding & Decoding Module	40708-M06	01
07.	ASK/FSK/PSK/QPSK Module	40708-M07	01
08.	Delta Modulator & Demodulator Module	40708-M08	01

### Order Code - 40708-M01

#### DSB/SSB AM Modulation & Demodulation Module

Need Communication System Trainer Master Unit for performing the Experimental module

#### On-board features

- 2 Nos. of Balanced Modulator with band pass filter (1MHz) & 1 No. of balanced modulator (455KHz)
- Ceramic band pass filter
- Carrier Frequency of 1MHz
- Frequency range of 525 to 1625Khz.
- Receiver CKT consist of RF Amplifier, Mixer, Local Oscillator, BFO, IF amplifier-1, IF amplifier-2.
- Diode detector for DSB & Product detector for SSB.
- Block Description Screen printed on glassy epoxy PCB

### Order Code - 40708-M02

#### FM Modulation & Demodulation Module

Need Communication System Trainer

Master Unit for performing the Experimental module

#### On-board features

- FM Modulation using Reactance Modulator & Varactor Modulator.
- Transmitter Frequency to 455 KHz.
- FM Demodulator using Detuned Resonant detector, Quadrature detector, Foster Seeley detector, Ratio detector & PLL detector
- Block Description Screen printed on glassy epoxy PCB

### Order Code - 40708-M03

#### Fibre Optics Module

Need Communication System Trainer

Master Unit for performing the Experimental module

#### On-board features

- Transmitter One Fiber Optics LED having peak wavelength of emission 660 nm. & One Fiber Optics LED having peak wavelength of emission 850 nm
- Receiver one Analog & One Digital Fiber Optic photo detector
- Drivers Analog & Digital
- Analog Band Width 100Mbd. & Digital Band Width 5mbit/sec
- Block Description Screen printed on glassy epoxy PCB
- On board Analog & Digital Buffer with Filter Amplifier

#### Fibre Cable

- Cable Type Step indexed multimode PMMA plastic cable
- Core Refractive Index 1.492 & Clad Refractive Index 1.406
- Numerical aperture Better than 0.5

Note: Specifications are subject to change.

- Acceptance Angle Better than 60o
- Fiber Diameter 1000 microns
- Outer Diameter 2.2mm
- Fiber Length 1Meter & 1/2Meter

**Order Code - 40708-M04**

**PAM/PWM/PPM/TDM Module**

Need Universal Communication System Trainer Master Unit for performing the Experimental module

**On-board features**

- Analog Sample Circuit Out put
- Sample & Hold Circuit Out put
- Sampling rate of 32 KHz/channel for TDM PAM
- 8KHz. Channel Identification Signal for TDM PAM
- Four Analog Input Channels for TDM PAM Multiplexing/De-multiplexing
- Block Description Screen printed on glassy epoxy PCB
- Modulation Techniques
- PAM modulation & demodulation
- PWM modulation & demodulation
- PPM modulation & demodulation
- TDM-PAM modulation & demodulation

**Order Code - 40708-M05**

**TDM Pulse Code Modulation And De-modulation Module**

Need Universal Communication System Trainer Master Unit for performing the Experimental module

**On-board features**

- Two Nos. of Input Channels.
- 2 Channel Time Division Multiplexed Pulse Code Modulation Receiver.
- Error Detection of None, Even, Odd, Hamming
- Error Correction using Hamming Code technique
- None, Even, Odd, Hamming Parity selections
- Four Switched Faults for Fault Selection
- Block Description Screen printed on glassy epoxy PCB

**Modulation Techniques**

- TDM Pulse Code modulation
- TDM Pulse Code demodulation

**Order Code - 40708-M06**

**Line Coding & Decoding Module**

Need Universal Communication

System Trainer Master Unit for performing the Experimental module

**Data Format (Coding & decoding)**

- NRZ (Level), NRZ (Mark), NRZ (Space), Bi-phase (Manchester), Biphas (Mark), Bi-phase (Space), URZ, AMI.

**On board features**

- Uni-polar to Bipolar conversion
- Bipolar to Uni-polar conversion.
- Block Description Screen printed on glassy epoxy PCB

**Order Code - 40708-M07**

**ASK/FSK/PSK/QPSK Module**

Need Universal Communication System Trainer Master Unit for performing the Experimental module

**Carrier Modulation Techniques**

- ASK modulation
- FSK modulation
- PSK modulation
- QPSK Modulation

**Data Format (Coding)**

- Dibit Pair I & Q Bits.
- Carrier Demodulation Techniques
- ASK Demodulation

Note: Specifications are subject to change.



- FSK Demodulation
- PSK Demodulation
- QPSK Demodulation

**On board features**

- Phase Reset Switch is provided for QPSK Demodulation.
- Block Description Screen printed on glassy epoxy PCB

**Order Code - 40708-M08**

**Delta Modulator & Demodulator Module**

Need Universal Communication System Trainer Master Unit for performing the Experimental module

**Modulation Techniques**

- Delta modulation
- CVSD modulation

**Demodulation Techniques**

- Delta Demodulation
- CVSD Demodulation

**On board features**

- m-law Compander and Expander
- Block Description Screen printed on glassy epoxy PCB

Note: Specifications are subject to change.

