

Satellite Communication Lab STC24 Features:

- * PLL Uplink & Downlink channels in 2.3 to 2.7 Ghz.
- * 500MHz signal analyzer provided for C/N measurement.
- * Tele-command and telemetry facility
- * Different Baud rates PC-PC link.
- * Emulation of variable signal fading, variable thermal noise
- * Variable propagation delay.
- * Total 4 Variable path loss at uplink and downlink channels
- * LCD display of PLL synthesized frequency in Transmitter, Receiver and Satellite Emulator
- * Gold Plated SMA connectors & Silver Teflon cables
- * Helix, Dish, Patch array for linear & circular polarization.
- * C/N and S/N measurement facility

1. Satellite Uplink Transmitter



Technical specifications:

Frequency range	: 1.9-2.7 GHz PLL controlled
Step size	: 0.125, 0.25, 0.5, 1, 10, 100 MHz
Accuracy	: 0.01%
Display	: 16X2 Backlit LCD
Controls	: Menu, Enter, Escape, Up & Down
Memory/Channel	: 1000 frequency store/recall
Spurious output	: 30 dB typical
RF Output Z	: 50 Ohms Unbalanced SMA
RF output level	: +3 dBm nominal
Path Loss	: 35dB
Audio 1	: Int. 1KHz sine wave / Ext Mic Ext. Function Generator waveform
Audio 2	: Int. 1KHz sine wave / Ext Mic Ext. Function Generator waveform
Video	: Colour Camera
Waveform	: upto 5MHz Function Generator
Digital	: Max bit rate 500KHz typical
RS232	: PC serial port compatible input
Tele-command	: Selectable 4 bit binary input with selectable 4 addresses
Enable	: Telecommand Frame available at digital input
FM deviation	: Variable on audio and video/data

2. Signal Analyser



Frequency: 10-500MHz
Resolution: 100KHz 4 digit
LED display
Range: -100dBm - +10dBm
Noise Figure: 4dB
Input Impedance: 50 Ohms
(SMA)
CRO Output: Linear X, Log Y
out (BNC) 500mV/10dB
Filter: Video

3. Satellite Downlink Receiver



Technical specifications:

Frequency range	: 2.3-2.8 GHz PLL controlled
Step size	: 0.125, 0.25, 0.5, 1, 10, 100 MHz
Accuracy	: 0.01%
Display	: 16X2 Backlit LCD
Controls	: Menu, Enter, Escape, Up & Down
Memory/Channel	: 1000 frequency & level store/recall
RF Input Z	: 50 Ohms Unbalanced SMA
Sensitivity	: -85dBm
Path Loss	: Variable
Measure	: RF power in dBuV, dBm, pW, nW, dB dB relative
Resolution	: 0.1dB
Dynamic range	: 60dB log
Audio 1 out	: Speaker inbuilt/output
Audio 2 out	: Speaker inbuilt/output
Video Out	: 5MHz bandwidth, 1V p/p
Digital	: Max bit rate 500KHz typical TTL
RS232	: PC serial port compatible output
Down-converter	: 400-500MHz output for spectrum analysis
Telemetry	: 4 bit binary LED output with Selectable 4 addresses
Valid/Error Correction	: Tele-command Frame available at digital output
RSSI Out	: Received signal strength output for C/N measurement

4. Satellite link Emulator



Technical Specifications:

Transponder Uplink

Frequency range	: 2.3-2.8 GHz PLL controlled
Step size	: 0.125, 0.25, 0.5, 1, 10, 100 MHz
Display	: 16X2 Backlit LCD
Controls	: Menu, Enter, Escape, Up & Down
Memory/Channel	: 1000 frequency & level store/recall
RF Input Z	: 50 Ohms Unbalanced SMA
Measure	: RF power in dBuV, dBm, pW, nW, dB dB relative
Resolution	: 0.1dB
Dynamic range	: 60dB log
Sensitivity	: -85dBm

Mfd by: Amitec Electronics Ltd.

Regd. Off: 504, Nilgiri, Barakhamba Road, New Delhi-110001, India

Works: 4/32, Site-4, Industrial Estate Sahibabad, UP-201010, India

amitec@amitecltd.com, www.amitecltd.com

+91-120-4371276, +91-98118-39949, +91-98101-93153

Technical specifications: Transponder Continued

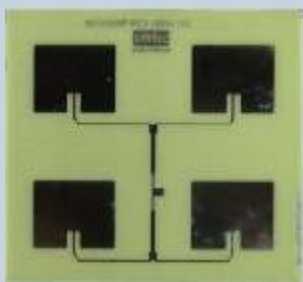
Telemetry	: 4 bit binary LED output with Selectable 4 addresses
Valid/Error Correction	: Telemetry Frame available at digital output
Transponder Downlink	
Frequency range	: 1.9-2.7 GHz PLL controlled
Step size	: 0.125, 0.25, 0.5, 1, 10, 100 MHz
Display	: 16X2 Backlit LCD
Controls	: Menu, Enter, Escape, Up & Down
Memory/ Channel	: 1000 frequency store/recall
Spurious output	: - 30 dB typical
RF Output Z	: 50 Ohms Unbalanced SMA
RF output level	: +3 dBm nominal
Path Loss	: 35dB
Tele-command	: Selectable 4 bit binary input with selectable 4 addresses
Enable	: Telecommand Frame available at digital input
Test Output	: Audio 1, Audio2, Video, Digital
Down-converter	: To spectrum analyzer 400-500 MHz
RSSI Out	: Received signal strength output for C/N measurement
Band limiting	: 18MHz fixed typical
Noise addition	: Variable
Signal delay	: upto 0.6s on Audio1 channel

5. Microstrip Circular Patch Array 2 X 2 - 2 Nos.



F_c : 2.4 ± 0.1 GHz
 S_{11} : 10 ± 2dB
 Polarisation : Circular
 Gain : 7dBi
 Impedance : 50 Ohms
 Connector : SMA

6. Microstrip Rectangular Patch Array 2 X 2 - 2 Nos.



F_c : 2.4 ± 0.1 GHz
 S_{11} : 10 ± 2dB
 Polarisation : Linear
 Gain : 9dBi
 Impedance : 50 Ohms
 Connector : SMA

7. Parabolic Dish - 2 Nos.



S_{11} : >10dB
 Bandwidth: 2.4 ± 0.1GHz
 Gain: 6dBi
 Beamwidth : E plane 40°
 Beamwidth : H Plane 60°
 Polarisation : Linear
 Front to Back Ratio: 10dB
 Connector : SMA

8. Axial Mode Helix RHCP, LHCP - 4 Nos.



S_{11} : >10dB
 Bandwidth: 2.4 ± 0.2GHz
 Gain: 4dBi
 Beamwidth : E plane 60°
 Beamwidth : H Plane 120°
 Polarisation : Circular Right Handed, Left Handed
 Front to Back Ratio: 6dB
 Connector : SMA

9. Serial Communication Software



Serial communication software
 Baud rate: 1200 bps-38,600bps
 Comport: User Selectable

10. Accessories

- 1) Transmitter antenna mounting stand.
- 3) All necessary connectors & Teflon RF cables.
- 4) Experimental Manual
- 5) Software CD
- 6) BNC-BNC Cables - 6 Nos.
- 7) RS232 Lead - 2 Nos.
- 8) SMA-SMA lead 1.5m- 2 Nos.
- 8) Camera
- 9) Monitor 7" LCD
- 10) BNC Tee - 2 Nos.
- 11) RS 232 adapter

E-Manual: Installation Video for ease of Learning

Dimensions: 58X52X44cms Weight: 22Kgs
Warranty: 3 yrs.

Areas of Experimentation and scope of study

- * To set up an active & passive satellite communication link and study their difference.
- * To measure baseband analog signal parameters.
- * To measure the signal parameters like fm deviation in an analog FM/FDMTV Satellite link on spectrum analyser.
- * To study the functionality of a satellite MODEM.
- * To measure Linear and Circular polarization of antennas on spectrum analyser.
- * To measure the C/N ratio, threshold on spectrum analyser.
- * To measure the S/N ratio.
- * To study the effect of fading and measure the fading margin of a received signal on spectrum analyser.
- * To measure the Propagation Delay of signal.
- * To measure pathloss using spectrum analyser.
- * To study noise on spectrum analyser.
- * To measure the digital baseband signal parameters in a satcom link. To measure the range of baud rates that the system can support.
- * To send telecommand and receive the telemetry Data and study the operation of a codec.
- * To setup a RS-232 satellite communication link using computers of PC.
- * To calculate Bit Error Rate in a satcom link.

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