

model: **Satellite-7000**

Satellite Emulation Training System

Overview

Satellite-7000 is a integrated system to simulate satellite telecommunication without a real satellite. This system utilizes worldwide popular top-level satellite modems so that operators(customers) can experience its feature-rich function and performance. The system is also designed to adopt Ku-band, the most common and reliable bandwidth, among available satellite frequency bandwidth and provide IP-based interface to accommodate various applications from customers

Feature

- 1) Simple design & appearance using standard 19" rack
- 2) Low power consumption
- 3) Easy installation and transportation
- 4) Selection among three different bands in receive frequency bandwidth
- 5) Monitoring of uplink & downlink IF carrier characteristic from front monitoring panel
- 6) IP-based various application testing (Video, Data, VoIP)
- 7) Satellite telecommunication standard L-band interface(950~1,450MHz)
- 8) Monitoring and configuring of various satellite parameters from modem's front panel including
 - Tx Level
 - Tx Frequency
 - Eb/No
 - Data Rate
 - FEC
 - Modulation&Demodulation Type

Function

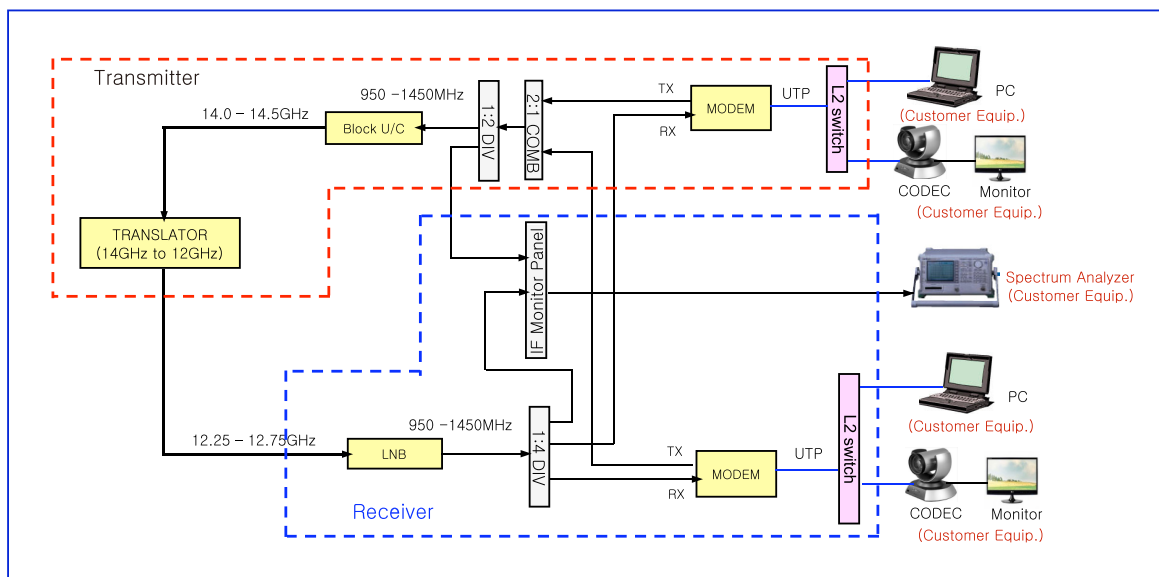
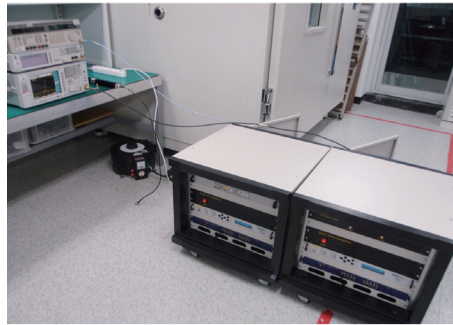
- 1) Satellite modem Tx parameter configuration (Data Rate, Modulation, FEC, IP etc.)
- 2) Satellite modem Rx frequency and level configuration
- 3) Transmitting and monitoring of L-band frequency
- 4) Frequency conversion and amplifying of L-band(950~1450 MHz) to Ku band(14.0~14.5 GHz)
- 5) RF frequency conversion (14.0~14.5 to 12.25~12.75 GHz)
- 6) RF signal level control in Ku-band (20 dB/min)
- 7) Satellite modem Rx parameter configuration (Data Rate, Modulation, FEC, etc.)
- 8) Receiving and monitoring of L-band frequency
- 9) C/N measurement from spectrum analyzer
- 10) Test data transmit and receive

System cinfigation

Transmitter



Receiver



Components

4.1 Transmitter

Equipment Rack	1 ea
L2 switch	1 ea
Satellite Modem with IP Interface	1 ea
BUC(Block Up-Converter)	1 ea
L-Bnad Combiner	1 ea
L-Band Divider	1 ea
Translator(TLT)	1 ea
RF cable Assy	1 ea
User's Manual	1 ea

4.2 Receiver

Equipment Rack	1 ea
L2 switch	1 ea
Satellite Modem with IP Interface	1 ea
LNB(Low Noise Block Down-Converter)	1 ea
IF Monitoring Panel	1 ea
L-Band Divider	1 ea
RF cable Assy	1 ea
User's Manual	1 ea

Specification

1) Transmitter

1.1) Satellite Modem

Frequency Range	950 to 2000MHz, 100Hz resolution
Data Interface	10/100base-T Ethernet
Data Rate Range	2.4 kbps to 5Mbps
Modulation&FEC Type	1/2BPSK, 1/2QPSK/OQPSK, 3/4QPSK/OQPSK 7/8QPSK/OQPSK, 2/3QPSK/OQPSK
M&C Interface	EIA-232, EIA-485(2- or 4-wire)
Input/Output Impedance	50Ω, female Type N Connector
Modulator Output power	0 to -40dBm, 0.1dB steps
Power supply	100 to 240 VAC, 50/60Hz, 37W
Display Size	20/L x 93/H mm

1.2) Block Up Converter

Output Frequency	14.0 to 14.5 GHz
LO Frequency	13.05 GHz
Input Frequency	950 to 1450 MHz
Output Power(P1dB)	34dBm min, 3Watt Linear
Linear gain	51dB min.
Input connector	F-type, Female
Output connector	SMA, Female
Power	DC Power, +24V (over IF coaxial cable)
Power consumption	18W Typ., 23W Max. @ Pout = +34 dBm

1.3) Translator

Frequency Input range	14.0 to 14.5 GHz
Frequency Output range	12.25 to 12.75 GHz at LO 1 Frequency 1750 MHz 11.70 to 12.00 GHz at LO 2 Frequency 2300 MHz 10.95 to 11.45 GHz at LO 3 Frequency 3050 MHz
Maximum Input Power	10Watt, continuous
Insertion Loss	40dB min, 75dB max.
Level Control	25dB min. 1dB steps
LO Selection	3 Bands, Front Panel Selectable Band 1: 1750MHz, Band 2: 2300 MHz, Band 3: 3050MHz
Input/Output connector	SMA, Female
Power	90 to 250VAC, 47-63Hz
Display Size	Frequency : 12/L x 43/H mm Attenuation : 12/L x 20/H mm

1.4) Rack

Size	600(W) x 500(H)x 600(D) mm
Prime Power Socket	90 - 250VAC, 8hole

2) Receiver

2.1)Satellite Modem

Frequency Range	950 to 2000MHz, 100Hz resolution
Input power range	-130 +10 log symbol rate dBm (minimum) -90 +10 log symbol rate dBm (maximum)
Data Interface	10/100base-T Ethernet,
Data Rate Range	2.4 kbps to 5Mbps
Demodulation&FEC Type	1/2BPSK, 1/2QPSK/OQPSK, 3/4QPSK/OQPSK 7/8QPSK/OQPSK, 2/3QPSK/OQPSK
Monitor Fuction	Eb/No, Frequency offset, BER, Rx Signal level
M&C Interface	EIA-232, EIA-485(2- or 4-wire)
Input/Output Impedance	50Ω, female Type N Connector
Power supply	100 to 240 VAC, 50/60Hz, 37W
Display Size	20/L x 93/H mm

2.2) Block Down Converter

Input Frequency	12.25 to 12.75GHz
LO Frequency	11.30 GHz
Output Frequency	950 to 1450 MHz
Conversion gain	55dB min
Noise Figure	0.8 Typ., 1.0 dB max
Input connector	SMA, Female
Output connector	F-Type, Female
Power	18VDC (+12 to +24VDC, over IF Coaxial cable)

2.3) Monitoring Panel

Frequency	RX IF : 950 to 1450MHz TX RF : 14.0 - 14.5 GHz
Port Interface	RX IF : F-type/Female, TX RF : SMA/Female
Panel size	1 U

2.4) Rack

Size	600(W) x 500(H)x 600(D) mm
Prime Power socket	90 - 250VAC, 8 hole

Training contents

<Book-1>

Part-1, Satellite Emulation Training System

- Operation Guide
- Chap 1, Satellite Training System Introduction
 - 1.1 Overview
 - 1.2 Function
 - 1.3 Feature
 - 1.4 Components
 - 1.5 System Block diagram
 - 1.6 Specification
 - 1.7 System Rack
- Chap 2, Equipment Function and Characteristics
 - 2.1 Satellite Modem
 - 2.2 Block Up Converter
 - 2.3 Test Loop Translator
 - 2.4 Block Down Converter
 - 2.5 L2 Switch
 - 2.6 IF/RF Monitoring Panel
- Chap 3, Satellite Modem Operation
 - 3.1 Front Panel Operation
 - 3.2 Web Based Operation
- Chap 4, System Performance Test (1)
 - 4.1 Carrier Bandwidth & C/N Test
 - 4.2 Frequency Stability Measurement
 - 4.3 Frequency Level Measurement
 - 4.4 Data Throughput Test
 - 4.5 Data File Transfer Test
 - 4.6 Web Test(Internet)
 - 4.7 Video Transfer Test
 - 4.8 Uplink & Down link level adjustment
- Chap 5, System Performance Test (2)
 - 5.1 Transmitting Gain
 - 5.2 Transmitting Gain Stability
 - 5.3 Receiving Gain
 - 5.4 Receiving Frequency Stability
 - 5.5 Frequency Conversion Accuracy

Part-2, Introduction to Satellite Communication (Theory)

Chap 1, Fundamentals of Satellite System

- 1.1 Basic Characteristics of Satellite
 - 1.1.1 Advantages of Satellite Communication
 - 1.1.2 Use of Microwave Frequencies
 - 1.1.3 Digital Transmission, Compression, and Routing
 - 1.1.4 Improved Space Platforms and Launching Systems
 - 1.1.5 Integration with Terrestrial Wired and Wireless Networks
- 1.2 System Elements
 - 1.2.1 Space Segment
 - 1.2.2 Ground Segment
 - 1.2.3 Overall System
- 1.3 Satellite Orbit Configurations
- 1.4 Frequency Spectrum Allocations
 - 1.4.1 ITU Spectrum Allocations and Regions
 - 1.4.2 VHF and UHF Frequency Ranges
 - 1.4.3 Microwave Bands: L and S
 - 1.4.4 Microwave Bands: C, X, and Ku
 - 1.4.5 Millimeter Wave and Higher: Ka-, Q-, and V-Bands
 - 1.4.6 Guided and Unguided Optical Properties
- Chap 2, Evolution of Satellite Communication
 - 2.1 Source of the Original Idea
 - 2.1.1 SYNCOM
 - 2.1.2 COMSAT
 - 2.2 Evolving Satellite Coverage
 - 2.2.1 Global Service: INTELSAT, PanAmSat, and Orion
 - 2.2.2 Regional Coverage: EUTELSAT and SES
 - 2.2.3 Domestic Systems: Telesat, Westar, and Palapa
 - 2.3 Specialized Systems: DTH and Mobile
 - 2.3.1 DTH Development
 - 2.3.2 MSS Development
 - 2.3.3 Digital Information Broadcasting
 - 2.4 Expansion at Higher Frequency Bands: Ka-Band

- Chap 3, Satellite Network Architectures
 - 3.1 General Features of Satellite Networks
 - 3.1.1 Dedicated Bandwidth Services
 - 3.1.2 Circuit-Switched Services
 - 3.1.3 Packet-Switched Services
 - 3.1.4 Flexibility Features
 - 3.1.5 Reliability of Satellites and Links
 - 3.1.6 Quality Features and Issues
 - 3.2 Point-to-Multipoint (Broadcast) Networks
 - 3.2.1 Video Distribution
 - 3.2.2 Direct-to-Home Television
 - 3.2.3 Content Distribution Networks
 - 3.2.4 Mobile Satellite Communications
 - 3.3 Point-to-Point Networks
 - 3.4 VSAT Networks
- Chap 4, Microwave Link Engineering
 - 4.1 The Decibel
 - 4.2 Propagation on the Earth-Space Link
 - 4.2.1 Basic Microwave Propagation
 - 4.2.2 Isotropic Radiator
 - 4.2.3 Directional Properties of Antennas
 - 4.2.4 Polarization (Linear and Circular)
 - 4.2.5 Propagation Losses
 - 4.3 Microwave Transmitters and Receivers
 - 4.3.1 Transmitting Station
 - 4.3.2 Receiving Station
 - 4.3.3 Definition of a Transponder
 - 4.4 Overall Link Quality
 - 4.4.1 How Noise and Interference Affect a Microwave Link
 - 4.4.2 Carrier-to-Noise Ratio
 - 4.4.3 Link Budget Analysis
 - 4.4.4 Link Margin
- Chap 5, Modulation, Multiple Access, and Impairments
 - 5.1 Digital Baseband Signals and Hierarchies
 - 5.1.1 Digital Information Sources and Bandwidth Requirements
 - 5.1.2 Analog-to-Digital Conversion
 - 5.1.3 Compression
 - 5.1.4 Error Detection and Correction
 - 5.1.5 Scrambling and Encryption
 - 5.2 Digital Modulation
 - 5.2.1 Frequency Shift Keying
 - 5.2.2 Phase Shift Keying
 - 5.2.3 Amplitude and Phase Shift Keying
 - 5.3 Multiple Access Methods
 - 5.3.1 Frequency Division Multiple Access
 - 5.3.2 Time Division Multiple Access
 - 5.3.3 ALOHA Packet Multiple Access
 - 5.3.4 Code Division Multiple Access
 - 5.3.5 RF Bandwidth Utilization in Multiple Access
 - 5.4 Distortion and Impairments
 - 5.4.1 Digital Signal Impairments
 - 5.4.2 Transponder Intermodulation Impairment
 - 5.4.3 Uplink and Downlink RF Interference
- Chap 6, Earth Stations and Network Technology
 - 6.1 Basic Earth Station Configuration
 - 6.2 Performance Requirements
 - 6.2.1 Transmit EIRP
 - 6.2.2 Receive G/T
 - 6.2.3 Location and Platform Requirements
 - 6.3 Radio Frequency Equipment
 - 6.3.1 Antennas for Earth Stations
 - 6.3.2 Antenna Beam Pointing
 - 6.3.3 High-Power Amplifiers
 - 6.3.4 Upconverters and Downconverters
 - 6.3.5 RF Combining
 - 6.3.6 Uplink Power Control
 - 6.4 Intermediate Frequency and Baseband Equipment
 - 6.4.1 Modulators, Demodulators, and Modems
 - 6.4.2 Multiplexing and Packet Processing
 - 6.5 Tail Links and Terrestrial Interface
 - 6.5.1 Terrestrial Tail Options
 - 6.5.2 Terrestrial Network Interfaces
 - 6.6 Earth Station Facility Design
 - 6.7 Major Classes of Earth Stations
 - 6.7.1 TT&C Ground Facilities
 - 6.7.2 TV Uplinks and Broadcast Centers
 - 6.7.3 FDMA Digital Communications Service
 - 6.7.4 Full-Mesh TDMA Earth Station
 - 6.7.5 VSAT Star Network Terminal
 - 6.7.6 TV Receive-Only Design
 - 6.7.7 MSS User Terminals

<Book-2>

Part-3, Satellite Modem with Optional High Performance, Packet Processor and Installation and Operation Manual

Chap 1, INTRODUCTION

- 1.1 Overview
 - 1.1.1 Modem Features Overview
 - 1.1.2 Functional Description
- 1.2 Features
 - 1.2.1 Physical Description
 - 1.2.2 Dimensional Envelope
 - 1.2.3 Physical Features
 - 1.2.4 Standard Data Interfaces
 - 1.2.5 Verification
 - 1.2.6 AUPC
 - 1.2.7 EDMAC
 - 1.2.8 Updating Modem Firmware
 - 1.2.9 Fully Accessible System Topology (FAST)
 - 1.2.10 Supporting Hardware and Software
- 1.3 Summary of Specifications
 - 1.3.1 Modulator
 - 1.3.2 Demodulator
 - 1.3.3 Standard AUPC (Automatic Uplink Power Control)
 - 1.3.4 DoubleTalk[®] Carrier-in-Carrier[®] (CnC)
 - 1.3.5 Data and Miscellaneous Interfaces
 - 1.3.6 Data Rate Ranges
 - 1.3.7 VersaFEC Adaptive Coding and Modulation (ACM)
 - 1.3.8 Power
 - 1.3.9 Physical Properties
 - 1.3.10 Miscellaneous
 - 1.3.11 Approvals

Chap 2, INSTALLATION AND STARTUP (Satellite Modem with Optional Packet Processor)

- 2.1 Unpack and Inspect the Shipment
- 2.2 Install the Modem into a Rack Enclosure
 - 2.2.1 Install the Optional Rear Support Brackets Kit
- 2.3 Configure the Modem
- 2.4 Verify Operation (IF Loopback Test)
- 2.5 Connect the External Cables

Chap 3, REAR PANEL CONNECTORS AND PINOUTS

- 3.1 Overview-Cabling Connection Types
 - 3.1.1 Coaxial Cable Connections
 - 3.1.2 D-Subminiature Cable Connections
 - 3.1.3 RJ-XX Cable Connections
- 3.2 Modem Cabling Connections
 - 3.2.1 IF Connections Group
 - 3.2.2 Terrestrial Data Connections Group
 - 3.2.3 Utility Connections Group
- 3.3 Modem Ground, Power, and Fuse Connections
 - 3.3.1 Chassis Ground Interface
 - 3.3.2 Standard Alternating Current (AC) Power and Fusing Interfaces
 - 3.3.3 Modem Optional -24V or -48V DC Power Interfaces

Chap 4, UPDATING FIRMWARE

- 4.1 Overview
 - 4.1.1 About Firmware Files, Naming, Versions, and Archive Formats
- 4.2 Ethernet FTP Upload Procedure
 - 4.2.1 Getting Started: Prepare for the Firmware Download
 - 4.2.2 Download and Extract the Firmware Update
 - 4.2.3 Perform the Ethernet FTP Upload Procedure

Chap 5, FAST ACTIVATION PROCEDURE

- 5.1 Overview
- 5.2 FAST Activation Procedure
 - 5.2.1 FAST Activation via the Modem Front Panel
 - 5.2.2 FAST Activation via the CDM-570A HTTP Interface

Chap 6, FRONT PANEL OPERATION

- 6.1 Overview
 - 6.1.1 LED Indicators
 - 6.1.2 Keypad
 - 6.1.3 Vacuum Fluorescent Display (VFD)
- 6.2 Compatible Mode Operation
(CDM-570A/570AL vs. CDM-570/570L)
- 6.3 Front Panel Operation
 - 6.3.1 SELECT: (Main) Menu
 - 6.3.2 (SELECT:) Config (Configuration) Menus
 - 6.3.3 SELECT: Monitor
 - 6.3.4 SELECT: TEST
 - 6.3.5 SELECT: Info
 - 6.3.6 SELECT: Save/Load
 - 6.3.7 SELECT: Util (Utility)
 - 6.3.8 SELECT: ODU

Chap 7, ETHERNET-BASED REMOTE PRODUCT MANAGEMENT

- 7.1 Overview
 - 7.1.1 Ethernet Management Interface Protocols
- 7.2 SNMP Interface
 - 7.2.1 Management Information Base (MIB) Files
 - 7.2.2 SNMP Community Strings
 - 7.2.3 SNMP Traps
 - 7.2.4 MIB-II
 - 7.2.5 Private MIB
- 7.3 Telnet Operation via HyperTerminal
- 7.4 CDM-570A HTTP (Web Server) Interface

7.4.1 Operational Features

7.4.2 CDM-570A HTTP Interface ; ' Menu Tree

7.4.3 CDM-570A HTTP Interface Page

Descriptions

Chap 8, SERIAL-BASED REMOTE PRODUCT MANAGEMENT

- 8.1 Overview
- 8.2 EIA-485
- 8.3 EIA-232
- 8.4 Basic Protocol
 - 8.4.1 Packet Structure
- 8.5 Remote Commands and Queries
 - 8.5.1 Table Indexes
 - 8.5.2 Transmit (Tx) Parameter Commands and Queries
 - 8.5.3 Receive (Rx) Parameter Commands and Queries
 - 8.5.4 Unit Parameter Commands and Queries
 - 8.5.5 Bulk Configuration Commands and Queries
 - 8.5.6 Modem Information Commands and Queries
 - 8.5.7 Modem Performance Information
 - 8.5.8 BUC (L-Band Block Up Converter) Commands and Queries
 - 8.5.9 LNB (L-Band Low-noise Block Down Converter) Commands and Queries

Chap 9, OPTIONAL PACKET PROCESSOR ; ' SERIAL/TELNET CLI OPERATION

- 9.1 Overview
 - 9.1.1 Access to the CLI
- 9.2 Command Line Interface (CLI)
 - 9.2.1 CLI Menus ; ' Common Navigation and Operation Features
- 9.3 CLI Operations
 - 9.3.1 CLI Main Menu
 - 9.3.2 Administration
 - 9.3.3 Interface Configuration
 - 9.3.4 QoS (Quality of Service) Configuration
 - 9.3.5 Route Table Configuration
 - 9.3.6 Protocol Configuration
 - 9.3.7 Vipersat Configuration
 - 9.3.8 Satellite Modem
 - 9.3.9 Operations and Maintenance > Statistics Menu> IP Statistics>Diagnostics

Chap 10, ODU (TRANSCEIVER, BUC, LNB) M&C OPERATIONS

- 10.1 Overview
 - 10.1.1 CDM-570A/570AL Front Panel Operation-Overview
 - 10.1.2 CDM-570A HTTP Interface-Overview
 - 10.1.3 CDM-570A/570AL Serial Remote Control-Overview
- 10.2 Transceiver M&C via the CDM-570A (70/140 MHz) Satellite Modem
 - 10.2.1 Transceiver M&C via the CDM-570A Front Panel
 - 10.2.2 Transceiver M&C via the CDM-570A 's HTTP Interface
 - 10.2.3 Transceiver M&C via CDM-570A Serial Remote Control
- 10.3 BUC and LNB M&C via the CDM/R-570AL (L-Band) Satellite Modem
 - 10.3.1 BUC and LNB M&C via the CDM/R-570AL Front Panel
 - 10.3.2 BUC and LNB M&C via the CDM-570A HTTP Interface