TRM-1000
SATCOM On-The-Move Terminal

Continuous and reliable access to real time information is a key enabler to keep remote users connected where infrastructure is lacking (e.g. natural disasters, border surveillance and tactical scenarios).

The TRM-1000 is a field-proven, highly efficient, flexible, secure, low cost, SATCOM On-the-Move (SOTM) terminal that provides users the specialized IP SATCOM that is necessary to keep mobile and dispersed troops connected.

The major components of the TRM-1000 are the MPM-1000 Internet Protocol (IP) modem with its embedded Network Centric Waveform (NCW), plus a FSS-4000 series On-the-Move (OTM) antenna.

The TRM-1000 is specifically designed to utilize the full capabilities of the Wideband Global SATCOM (WGS) satellites. The NCW is designed to support the IP user by using native Ethernet encapsulation, which makes it easy to configure military networks that require COMSEC, TCP accelerators, and any other IP net-working devices.

The TRM-1000 features an affordable and flexible Vehicular Mounted Earth Station (VMES) antenna, configurable for most platforms and missions. With their multi-aperture and multi-band capability on a common pedestal, the antennas offer greater deployment flexibility.

Connection and configuration of the TRM-1000 is very simple. An external power connection is all that is required. Once the components are mounted, an intuitive user interface allows for quick configuration and monitoring.

Shown with FSS-4180-LC Antenna

KEY FEATURES:

- **A READYMADE COMMUNICATIONS ARCHITECTURE FOR REMOTE OPERATION IN AN IMMATURE ENVIRONMENT**
- **SUPPORTS THE MAXIMUM NUMBER OF USERS AND HIGHEST DATA RATES BY OPTIMIZING SATELLITE BANDWIDTH AND POWER**
  - HIGHLY EFFICIENT MF-TDMA WAVEFORM WITH A DAMA CONTROLLER
  - AUTOMATIC LINK OPTIMIZATION WITH ADAPTIVE DATA RATE AND POWER CONTROL
  - REAL TIME, LOW LATENCY VOICE AND VIDEO SERVICES WITH 16 LEVELS OF DATA PRIORITY
- **HIGHLY ADAPTABLE HARDWARE DESIGN SUPPORTS MULTIPLE FREQUENCIES AND COMMUNICATIONS BETWEEN HETEROGENEOUS TERMINALS**
  - INTERCHANGEABLE ANTENNA FEEDS ALLOW OPERATION WITH X, KU OR KA-BAND SATELLITES
  - ALLOWS THE USE OF ALL SIZES AND TYPES OF TERMINALS IN A SINGLE MESH, HUB-SPOKE, OR HYBRID NETWORK TOPOLOGY
- **ADVANCED ANTENNA TECHNOLOGY ENABLES RELIABLE MOBILE ACCESS WITH AUTOMATIC LINK ESTABLISHMENT**
  - FULL-MOTION AZIMUTH OVER ELEVATION GIMBAL PERMITS DISH TO SPIN WITHOUT RESTRICTION OF CABLE LOOPS, ALLOWING THE ANTENNA TO MAINTAIN NETWORK ACCESS INDEFINITELY WITHOUT PERIODICALLY BEING FORCED TO GIVE UP ITS NETWORK CONNECTION TO "UNWIND"
  - 100% POINTING ACCURACY TO WITHIN ½ DEGREE WITH ELEVATION COVERAGE UP TO 70 DEGREES
  - QUIETER OPERATION AND HIGHER MAINTENANCE RELIABILITY SINCE THERE ARE NO BELTS, CHAINS, OR GEARS; THUS MINIMIZING THE NUMBER OF MOVING PARTS
- **INHERENT LOW PROBABILITY OF INTERCEPT AND EXPLOITATION**
  - FIPS 140-2 VALIDATED ENCRYPTION OF ALL TRANSMISSIONS USING HIGHEST AVAILABLE CRYPTOGRAPHIC KEY STRENGTH (AES-256)

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TRM-1000 SATCOM-On-The-Move Terminal

Terminal Components

- **L-3 MPM-1000 NCW IP Modem**
- **L-3 FSS-4000 Series On-The-Move Antenna**
- **Ruggedized Terminal Control Laptop & HMI Software**
- **Power Conditioning Module**
- **HAIPE In-line Network Encryptor (optional)**
- **TCP Performance Enhancement Proxy (optional)**
- **Router/Switch (optional)**

TRM-1000 Terminal General Specifications	
Frequency Ku Ka X	 Rx: 10.95 to 12.75 GHz; Tx: 13.75 to 14.50 GHz Rx: 20.20 to 21.20 GHz; Tx: 30.00 to 31.00 GHz Rx: 7.25 to 7.75 GHz; Tx: 7.90 to 8.40 GHz
EIRP G/T	43.8 dBW (18˝ FS-4000-2, Ku-Band) 12.4 dB/K (18˝ FS-4000-2, Ku-Band)
Receive Pointing Loss	< 1 dB up to 70 deg El (FSS-4000-LC/2) < 1 dB up to 90 deg El (FSS-4000-3)
Max Vehicle Speed	60 mph (100 km/hr)
Power Consumption Terminal Equipment Antenna	 28VDC or 90VAC-264VAC/47-63 Hz, 320 Watts[2] 28VDC, 420 Watts (continuous)

Antenna/RF Parameters	FSS-4000-LC	FSS-4000-2	FSS-4000-3
Pedestal	2-Axis	2-Axis	3-Axis
Available Frequency Bands	Ku and Ka	Ku, Ka, and X	Ku, Ka, and X
Available Aperture Sizes	16˝ (41 cm), 18˝ (46 cm)	16˝ (41 cm), 18˝ (46 cm), 20˝ (51 cm)	18˝ (46 cm), 20˝ (51 cm)
Coverage	Az: 360 deg Continuous El: 0 to 90 deg	Az: 360 deg Continuous El: 0 to 90 deg	Az: 360 deg Continuous X-level: +/-30 deg El: -5 to 105 deg
Tracking	Hybrid Closed or Open-Loop	Open-Loop	Open-Loop
Antenna Controller	Embedded	2U 19˝ rack-mount or ½ ATR form-factor	2U 19˝ rack-mount or ½ ATR form-factor
Beacon Receiver	Embedded	N/A	N/A
Inertial Navigation Unit (INU)	Embedded	Honeywell Talon or GE Aviation NFM	Honeywell Talon or GE Aviation NFM 7000 hrs
MTBF	5000 hrs	7000 hrs	

Deployment Configurations

- **Vehicle Mounted SATCOM On-The-Move (SOTM)**
- **Terminal Equipment Dismounted from Vehicle**
  - Permits use of larger (fly away) antenna and increased network bandwidth

NCW MF-TDMA Mode	
Data Rate (kbps)	32, 48, 64, 96, 128, 192, 256, 384, 512, 768, 1024, 1536, 2048 and 3072[1]
Modulation	BPSK (Rate ½ Coding) OQPSK (Rate ½, ⅔ and ¾ Coding) 8 PSK (Rate ⅔ Coding)
FEC	Serial Concatenated Convolutional Coding (SCCC Turbo Coder)
Direct Sequence Spread Factors	1, 2, 4, 6, 8, 12, 16
Number of Carriers	Two Transmit MF-TDMA Four Receive MF-TDMA
Modem Encryption	FIPS 140-2 Validated AES-256 (CBC)
SATCOM Network Bandwidth	500 MHz
SATCOM Network Capabilities	Up to 255 Nodes Addressable Full Mesh, Star, and Hybrid Topologies Burst-to-Burst Link Power Control, Spread Factor, Data Rate, Code Rate, and Modulation Assignment
Baseband Data Interface	10/100/1000 Base-T Ethernet

FDMA Mode	
MIL-STD-188-165A	Type I Modem
Modulation and Data Rate	BPSK – 65kbps to 6300 kbps QPSK/OQPSK – 64 kbps to 8472 kbps
FEC and Scrambling	Convolutional Coding, RS Coding and Data Scrambling IAW IESS-308, 309, 310, and OM-73
Baseband Data Interface	MIL-STD-188-114/RS-422/RS-423

Control & Monitoring	
Main Terminal Control	10/100/1000 Base-T Ethernet; SNMP/Linkabit terminal control software
MIL-STD-188-165A Modem Control	RS-485 (FDMA mode only)

Mechanical/Environmental	
Size Terminal Equipment Antenna	 19-inch rack, 6U height[2] 26L˝ x 25W˝ x 17H˝ (FS-4000-LC)
Weight Terminal Equipment Antenna	 ~ 150 lbs[2] (configuration dependent) 120 lbs (FS-4000-LC)
Operating Temperature Terminal Equipment Antenna	 0°C to 50°C -40°C to +71°C
Environmental	MIL-STD-810F

1. Maximum data rate depends on link and satellite characteristics
2. Includes options

Note: All specifications subject to change without notice

L-3 Ruggedized MPM-1000 NCW IP Modem

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