The TSN101/X is a Naval Satellite Terminal, providing voice and data communications through a FDMA PAMA channel at 16 ÷ 256 kbps.

The Terminal consists of above deck equipment and below deck equipment.

The above deck equipment is basically constituted of antenna, RF Front end, pedestal and pedestal control unit; while the below deck equipment is constituted of the base band equipment, including satellite modem, access and switching equipment, antenna control unit.

The Terminal is available in two versions: Single Antenna version and Dual Antenna version.

The Single Antenna version is equipped with one antenna and one RF Front-end. This version is suitable for installation wherein the satellite line-of-sight is not obstructed by the ship frame in quite all conditions.

The Dual Antenna version is equipped with two antennas and two RF Front-ends. It is suitable for installations whereas the above conditions cannot be met.

The Antenna is a 1 m diameter, offset, prime focus type one, protected by means of a radome and installed on a motorized and stabilized pedestal.

The RF Front-end furnishes complete transmitter and receiver functions between the IF 70 MHz modem interface and the X Band antenna subsystem interface and is installed on antenna pedestal.

The below deck Base Band Section consists of the MSN 100 equipment.

It contains the Satellite Modem integrated with a Unit Level Circuit and Packet Switch, and provides, in a standard configuration, 5 off Analogue Voice interfaces, 2 off Asynchronous/Synchronous Data interfaces, 2 off Asynchronous Data interfaces, 2 off Ethernet 10 Mbps bridge interfaces and 1 trunk interface up to 2 Mbps, selectable in Eurocom, Transparent or ITU PCM/ISDN mode.

Optionally, the user interfaces can be expanded, in a modular fashion, by the addition of User Interface boards.

The integrated satellite modem unit provides a FDMA PAMA Traffic channel up to 256 kbps, in a 4 kbps step. A Viterbi and Reed Solomon code improves BER performances and optimises the Satellite Bandwidth.

The TSN101/X is fully interoperable with tactical switches belonging to the CD1xx family.

Eurocom, NATO STANAG, ITU-T and ETSI standards are supported. The local M&C function allows all the main Terminal operating parameters to be configured and controlled.
It is performed by a devoted processor for the RF Front End and by the Central Unit for the MSN100 equipment. In the Single Antenna version the M&C function is allowed through the furnished AS107 hand held terminal. In the Dual Antenna version the M&C function is allowed through software applications with graphical interface, hosted on a dedicated PC. The M&C software interface and the hosting PC can be provided also in the Single Antenna version as an option.

A remote M&C function from a Network Control Centre can be provided optionally for both the versions. Powerful self-diagnostics greatly ease the field maintenance task. The Terminal is powered by an AC power source at 90 ÷ 240 Vac, 47 ÷ 63 Hz.

KEY FEATURES

Flexibility
- Easy tailor able on the base of ship characteristics
- Single or dual antenna configuration
- Comprehensive User and Network interfaces

Compactness and High Integration
- A single equipment providing User Interfaces, Switching Capabilities, Satellite Access
- A single board contains the Main Controller, the Switch and the User/Network Interfaces
- A single board contains the Satellite Modem

High Efficiency
- Three-axis stabilized antenna platform to compensate ship’s motion
- Powerful Reed Solomon codec for Satellite/Terminal power optimisation
- Bandwidth optimisation thanks to high granularity of Satellite Channel Frame (down to 4 kbps step)
- High efficiency Voice coding scheme: down to 8 kbps CELP

Modularity
- User interfaces and Satellite Channel Access (modems) may be expanded by adding modules

MAIN FEATURES

- Transmit Band: 7.9 ÷ 8.4 GHz
- Receive Band: 7.25 ÷ 7.75 GHz
- EIRP saturation: 41 dBW at midband
- G/T: 12 dB/K at midband, 23°C, clear sky
- IF frequencies interface:
  - 70 ± 20 MHz, 100 Hz step size
  - 125 kHz RF step size
- 1 off FDMA/PAMA Traffic Channel:
  - 16 ÷ 256 kbps user rate, in 4 kbps steps
  - Modulation: QPSK
  - FEC Viterbi K=7, rate 1/2, 3/4
  - Reed Solomon 126/112/7
- Local subscribers (voice, data, LAN)
- 1 off trunk interface configurable as:
  - Transparent with HDB3/AM/V.11/V.28/V.35
  - Eurocom trunk to CD1xx family
  - Eurocom Gateway/EES Gateway
  - STANAG 4206
  - ITU-T E1 with selectable Euro ISDN/Qsig/R2/CAS protocol
- User interfaces in accordance with Eurocom, NATO and ITU/ETSI standards
- Local and Remote Monitor and Control
- Tolerated ship’s motion:
  - Roll +/- 25° with 6 -12 s periods
  - Pitch +/- 15° with 6 -12 s periods
  - Yaw +/- 8° with 15 - 20 s periods
- Powered by AC source (90 ÷ 240 Vac, 47 ÷ 63 Hz)
- Designed for operation in marine ambient environments

TECHNICAL SPECIFICATIONS

SYSTEM PERFORMANCES

<table>
<thead>
<tr>
<th>Unit Level Circuit and Packet Switch</th>
<th>4/8/16/32 kbps SW selectable</th>
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<tbody>
<tr>
<td>Channel sampling rate:</td>
<td>4/8/16/32 kbps SW selectable</td>
</tr>
<tr>
<td>Multichannel (loop/trunk/gateway)</td>
<td>Eurocom/Transparent V.28/V.11/V.35/HDB3/AM (up to 64 slots) trunk</td>
</tr>
<tr>
<td>A/D Conversion:</td>
<td>CVSD, 16/32 kbps (Eurocom D/1 IA8)</td>
</tr>
<tr>
<td></td>
<td>ADPCM, 16/32 kbps (ITU-T G.726)</td>
</tr>
<tr>
<td></td>
<td>CEP, 8 kbps (ITU-T G.729)</td>
</tr>
<tr>
<td>Data processing:</td>
<td>Eurocom data classes 1, 2, 3, 4 (Eurocom D/1 IA9)</td>
</tr>
<tr>
<td>Local user Voice traffic:</td>
<td>4 off ACB analogue telephone</td>
</tr>
<tr>
<td></td>
<td>1 off CACB analogue line for external PABX</td>
</tr>
<tr>
<td>Data traffic:</td>
<td>2 off data interfaces, V.11/V.28/V.35 Synchronous (up to 256 kbps) Asynchronous (up to 115.2 kbps)</td>
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<tr>
<td></td>
<td>2 off data interfaces, V.28 Asynchronous (up to 115.2 kbps)</td>
</tr>
<tr>
<td></td>
<td>2 Ethernet, 10 Mbps</td>
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</tbody>
</table>
RF Module, Antenna and FDMA modem

Transmit band: 7.9 ÷ 8.4 GHz
Receive band: 7.25 ÷ 7.75 GHz
EIRP: 41 dB W at midband
G/T: 12 dB/K at midband, 23°C, clear sky
Antenna type: Offset Prime Focus
Reflector size: 1 m
Antenna steerability: Azimuth: 0 ÷ 360 degrees, unlimited
Elevation: -15 to +120 degrees
Cross level: + / - 28 degrees
Antenna Platform Type: Three Axes (elevation, cross-level, azimuth train)
Antenna polarisation: RHCP (Tx)  
LHCP (Rx)
Number of Traffic Channels: 1 off (FDMA PAMA 16 ÷ 256 kbps)
Modulation type: QPSK
FEC: Viterbi K=7: rate 1/2, 3/4
Reed Solomon: 126,112,7
IBS Overhead: IESS 309 compliant
Operating Mode: Continuous Mode

BER Performance
Continuous Mode VITERBI BER 1/2 3/4 7/8
10-3 4.2 5.4 6.5
10-4 4.8 6.0 7.2
10-5 5.5 6.7 7.9
10-6 6.2 7.5 8.6
10-7 6.7 8.2 9.2
10-8 7.3 8.8 10.0
Continuous Mode RS + VITERBI BER 1/2 3/4
10-6 4.2 5.6
10-7 4.3 5.8
10-8 4.5 6.0
10-10 5.0 6.3

MANAGEMENT
Local Control ITU T.V.28: asynchronous serial line, ASCII XON/XOFF protocol, up to 19.2 kbps
AS107 handheld control terminal
Network management interface: ITU-T V.28: asynchronous serial line, binary protocol, 9.6 kbps
Remote Control facility: via data switched connection
Self-diagnostics: power-on self-test/on-line BITE
General Alarm: floating relay contact pair

ENVIRONMENTAL CONDITIONS
Operating Temperature:
Above Deck Equipment: - 30 to + 55 °C
Below Deck Equipment: 0 to + 40 °C
Storage Temperature:
Above Deck Equipment: - 40 to + 70 °C
Below Deck Equipment: - 20 to + 60 °C
Relative Humidity:
Above Deck Equipment: up to 100%
Below Deck Equipment: up to 95% (not condensing)
Wind (operating): 160 km/h

PRIMARY POWER
AC Power Source
Voltage: 90 ÷ 240 Vac
Frequency: 47 ÷ 63 Hz
Power Consumption: 2000 W maximum

PHYSICAL (SINGLE ANTENNA CONFIGURATION)
Overall dimensions
Below Deck Equipment: 19" x 23 RU maximum
Above Deck Equipment
(Antenna Radome): Height: 66" maximum
Diameter: 61" maximum
Overall weight
Below Deck Equipment: 75 kg
Above Deck Equipment: 300 kg