MM-7000
MM-7000 RUGGEDIZED TACAN SYSTEM
FOR HARSH ENVIRONMENTS
Moog Inc. is a worldwide designer, manufacturer and integrator of mission critical products and systems. Over the past 60 years, we have developed a reputation for delivering innovative solutions for the most challenging civil, military and marine applications. Moog’s product heritage in navigation and surveillance systems is based on supplying innovative solutions to civil aviation authorities and military commands worldwide. By the 1980’s, we were supplying comprehensive fixed base, shipboard, mobile and man portable TACAN systems to customers globally.

In 2009, Fernau Avionics became part of Moog, bringing with it a highly talented workforce, 40 years of navigational aids experience and a broad range of navigation and surveillance products. The combined business is now able to offer customers a broader range of options to meet their unique needs, all backed by world-class customer support. Customers value the superb reliability, low cost of ownership and responsive support from the Moog team.

**MM-7000 OVERVIEW**

The MM-7000 is the world’s most technologically advanced, full service TACAN beacon available today. Best suited for ruggedized operations in harsh environments, the MM-7000 is shipboard certified, meeting MIL-STD-901D for shock, MIL-STD-167 for vibration and MIL-STD-810G for temperature. The MM-7000 is available in fixed base, shipboard and mobile configurations, and operates in TACAN, silent, demand and DME-only modes. The system is available in 29", 43" and 60" high racks as single and dual transponder configurations, and can be used independently or with existing navigational aids.

Its modular state-of-the-art design includes surface mount technology components, digital signal processing and soft-fail RF power amplifiers to maximize performance. Large-scale integrated circuitry, back-plane interconnection and miniaturization reduce cost and allow for flexible configuration. Pulse shape and spectrum are controlled by an agile digital feedback control loop to keep the signal in space within permissible limits in all operating conditions. The MM-7000 TACAN/DME is available as US Navy AN/URN-32 kit or installed in AN/URN-25 cabinet and drawer, is fully compliant with STANAG 5034, Mil-Std-291C and ICAO Annex 10, and offers low maintenance, high reliability and ease of use.
REMOTE MAINTENANCE MONITORING (RMM) AND CONTROL SUB-SYSTEM

The integrated monitoring and maintenance system provides capability to remotely monitor, control, troubleshoot and fault-isolate all system parameters. RMM functions can be accessed via a built-in, high resolution touch screen display, a local PC, remote PC and a remote control status unit (RCSU).

Each monitor checks system performance to allow in-depth system analysis and test from local or remote locations. Display screens show operating parameters, overall system status, LRU status, alarm limits, diagnostics and test, amplifier status and transmitter control status.

The RCSU allows full access to all RMM features via a high resolution touch screen display using a two wire twisted cable pair at up to five miles distance.

RMM features include:
- Windows, Mac and Linux compatibility and four level username and password protection
- Alignment and adjustment of all critical parameters including settable adjustment of hard and soft fail alarm limits
- Accommodates flight testing support from a remote location
- Full RMM diagnostics and history logging for each site
- LRU build state look-up
- Dial-up, two wire twisted pair and Ethernet connectivity
- LAN/satellite link/fiber optic connection option

BUILT-IN TEST EQUIPMENT

Independent, built-in interrogators provide automatic, real-time system testing to ensure fault free operation and beacon signal production.

- Fully operational from a local or remote location
- Available for troubleshooting and fault isolation
- Includes on-board status indicators for normal and fault conditions

ANTENNA COMPATIBILITY

Moog’s line of electronically scanned antennae fully comply with relevant international standards to offer improved features, reliability and range. Tall and medium aperture antennas are available for fixed base and mobile applications. Small aperture antennas are available for shipboard and man portable installations.

- Antenna status and control fully integrated into RMM for local and remote operations
- Rapid BIT fault isolation to LRU level
- Antenna control unit LRU integrated into system cabinet
- Low power consumption and high gain provide reduced operating costs

LOGISTICS SUPPORT

Moog is the number one TACAN producer in the market, having sold and fielded more systems than all other TACAN suppliers combined. Our products have been installed and are used by civil and military customers across the globe.

Moog provides global logistics support and technical assistance, including:

- Support packages for 15-20 years
- System installation and training
- Site survey and system commissioning
- Safety cases, spares and repairs
## MM-7000 TACAN TECHNICAL SPECIFICATIONS

### System Configuration
- Fixed, mobile/deployable or shipboard
- Single or dual transponder, monitors, and power supplies
- Up to six (6) “fail-soft” power amplifiers
- Automatic transfer to standby beacon, subsequent automatic shutdown

### Transmitter Performance

<table>
<thead>
<tr>
<th>Frequency Stability</th>
<th>± 0.001%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channels</td>
<td>252 (X and Y mode)</td>
</tr>
<tr>
<td>RF Pulse Spectrum, Spurious Outputs and Harmonics</td>
<td>To relevant international standards (STANAG 5034 Ed 3, MIL-STD 291C and ICAO Annex 10)</td>
</tr>
<tr>
<td>Pulse Rise Time, Pulse Fall Time and Pulse Duration</td>
<td>To relevant international standards (STANAG 5034 Ed 3, MIL-STD 291C and ICAO Annex 10)</td>
</tr>
<tr>
<td>Ident Rate</td>
<td>To relevant international standards (STANAG 5034 Ed 3, MIL-STD 291C and ICAO Annex 10)</td>
</tr>
</tbody>
</table>
| Pulse Pair Spacing | X channel - 1.2 µs ± 0.1 µs  
Y channel - 30 µs ± 0.1 µs |
| Main Reference | X channel - 12 pairs of pulses at 30 µs ± 0.1 µs  
Y channel - 13 single pulses at 30 µs ± 0.1 µs |
| Auxiliary Reference Pulse Group | X channel - 6 pairs of pulses at 24 µs ± 0.1 µs  
Y channel - 13 single pulses at 15 µs ± 0.1 µs |
| Pulse Repetition Rate | Up to 6750 pulse pairs per second |
| Equalizing Pair | Transmitted 100 µs ± 10 µs after each identity pulse |
| Pulse Coding Precedence | 1) Main reference group  
2) Auxiliary reference group  
3) Identity signal  
4) Distance replies  
5) Random pulse pairs |
| Distance Reply Signal | X Mode 50 µs ± 0.1 µs  
Y Mode 56 µs ± 0.1 µs |
| Distance Accuracy | ±50 feet (± 15 meters) |
| Reply Delay Time Stability | ±0.1 µs |
| Transmitter Power | up to 5,000 Watts |
| Peak Output Power | 400 – 5,000 Watts programmable in 1 Watt increments |

### Receiver Performance

| Frequency | 1025 MHZ to 1150 MHz  
(1 MHz channels MIL-STD 291C) |
| Sensitivity | -92 dBm for 70% reply efficiency typical |

### General

- **Aircraft Handling**: Bearing/Azimuth:
  - Unlimited number of aircraft
  - Distance:
    - 100/250 aircraft (selectable)

- **Status Indication**: Full local and remote indication

- **System Monitoring (BITE)**: Complete dual system monitoring by microprocessors

- **Remote/Local Control**: Fully Windows, Linux, or Mac compatible RMM system  
  - Optional Remote Control Status via two wire twisted pair  
  - Local or Remote PC via Ethernet

### Antenna

### Range/Coverage Area
- > 300 nautical miles line-of-site (typical)

### Input Power
- < 1,500 VA, 1000 VA typical

### Power Supply
- 85 to 265 VAC, 47 to 440Hz, single phase  
- Optional 48VDC Battery Backup

### Dimensions/Weight

<table>
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<tr>
<th>Dimensions</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 inch cabinet:</td>
<td>22 in (57 cm) x 28 in (72 cm) x 60 in (152 cm)</td>
</tr>
<tr>
<td>43 inch cabinet:</td>
<td>22 in (57 cm) x 28 in (72 cm) x 43 in (109 cm)</td>
</tr>
<tr>
<td>29 inch cabinet:</td>
<td>20 in (51 cm) x 25 in (64 cm) x 29 in (74 cm)</td>
</tr>
<tr>
<td>AN/URN-32 cabinet:</td>
<td>26 in (66 cm) x 24 in (61 cm) x 68 in (173 cm)</td>
</tr>
<tr>
<td>RCSU Cabinet (Optional)</td>
<td>10 in (25 cm) x 20 in (51 cm) x 18 in (45 cm), 54 lbs (25 kg)</td>
</tr>
<tr>
<td>Weight</td>
<td>&lt; 551 lbs (250 kg) for max configuration</td>
</tr>
</tbody>
</table>

### Environmental

| Temperature | Operating: -40°C to +71°C  
Storage: +40°C to +71°C |
| Humidity | 0% to 97% relative humidity |
| Altitude | 0 - 3,000 meters above MSL |

### Reliability

| MTBO | > 60,500 hrs. (cal. MIL-HDBK-217) |
| MTBF | > 13,860 hrs. (cal. MIL-HDBK-217) |
| MTTR | < 14 minutes |

### Applicable Standards

| ICAO Annex 10 | MIL-STD-901 |
| MIL-STD-167 | MIL-STD-291C |
| MIL-STD-810G | STANAG 5034 |
| MIL-STD-461-F | |