



## T-10000B

### 10 kW High Power Transmitter System

The Sunair T-10000B is the hallmark solution for mission-critical communications applications requiring reliable coverage. The transmitter system combines solid-state radio and RF power amplification and control technology to produce a fail-safe high power solution that operates in a frequency range of 1.5 MHz to 30 MHz. Maximum power output is 10 kW at 100% duty cycle to facilitate long-range hemispheric communications when coupled with the appropriate antenna. Power is reducible in 1 dB steps down to the 1 kW level. Standard operating voltage is three phase 338 – 458 Vac, 47 to 63 Hz with a modest power requirement of  $\leq 35$  kVA.

The Sunair T-10000B is supplied as an integrated system consisting of the Sunair T-9000S Software-Defined Next Generation HF SSB/ISB Transmitter, F-9800 Post-Selector, and the LPA-10000A 10 Kilowatt Power Amplifier. The amplifier architecture consists of eight IPA intermediate power amplifier subsystems that are combined to produce final power output and managed by the Sunair HPAC High Power Amplifier Controller. The HPAC actively monitors system balance and performance, and provides power control and safety shutdown in the event of internal module failure such as power supplies, system failures such as air flow or over temperature or external failures such as high antenna VSWR and short or open circuit.

Advanced built-in-test (BITE) capability reports the status of the T-10000B down to the Lowest Replaceable Unit (LRU) level providing English messages on the HPAC and the T-9000S front panel displays, and then to a remote site when configured. Individual LRU fault indication and the system's intuitive modular design allows for ease of maintenance and upgrade throughout the equipment life cycle at minimal expense. These high-performing niche products are in daily service as integral components of critical strategic communications solutions for leading defense, peacekeeping, and aviation agencies around the world.





Modes of operation are AM, NB-FM, USB, LSB, ISB, CW, and FSK; Data implemented with internal or external modems. When paired with a companion receiver the T-10000B offers 2G and 3G Automatic Link Establishment (ALE) as an internal or external option in accordance with MIL-STD-188-141 A/B/C, FS1045A, and STANAG 4538. Frequency hopping compliant to STANAG 4444 and HF email/data transfer with Automatic Link Maintenance (ALM) compliant to STANAG 5066 are available with optional external controllers.

Designed as a high performance HF system the T-10000B complies with the radio requirements of MIL-STD-188-203-1A and STANAG 5511/5522 (TADIL-A/Link 11 and NILE/Link 22) for tactical data link operation. It also complies with the performance requirements in MIL-STD-188-141C and STANAGs 4203 and 5031.

The T-10000B is compatible with STANAGs 4285, 4529, 4415, 4481, 4539, and 5065 and MIL-STD-188-110B (including Appendix F ISB) HF modem waveforms. These waveforms can be provided with optional internal or external HF data modems. If equipped with the Internal data modem option the architecture of the T-10000B allows for the upgrade of the data modem to MIL-STD-188-110C and other future modem waveforms by a firmware upgrade from the front or rear panel of the T-9000S.

The T-10000B can accommodate Type 1 encryption such as ANDVT, KY-99, KG-84(), and KG-40 as well as commercial privacy devices or optional internal MELPe digital voice F/W with DES 56, AES 128 & AES 256 encryption functions. The audio interface supports front panel microphone and rear panel analog or VoIP connections.

Full function control, programming and system monitoring/BITE can be accomplished from the front panel controls and displays, or remotely via Ethernet or serial port. A serial port connector on the front panel is provided for ease of reprogramming the unit's configuration. Channel, frequency, mode, forward power, reflected power, input audio and other operating information and status are presented in English via a large TFT displays.

- **High Efficiency Solid State Design**
- **Full Power into Load VSWR up to 2:1**
- **Comprehensive BITE to LRU**
- **Full Function Remote Control via Serial or Ethernet**
- **Tactical Data Link - MIL-STD-188-203-1A TADIL A and Link 11/22 (requires external modems and controllers)**
- **HF Data - MIL-STD-188-110A/B and STANAG**
- **ALE - 2G MIL-STD-188-141A/B and 3G STANAG 4538 (with companion transmitter)**
- **STANAG 4444 Frequency Hopping (requires optional external controller)**







## GENERAL

General Performance:	Complies with the performance requirements in MIL-STD-188-141C, MIL-STD-203-1A and STANAGs 4203, 5031, 5511 and 5522
Frequency Range:	1.5 MHz – 30 MHz
Frequency Accuracy and Stability:	Frequency accuracy better than $\pm 3$ Hz The stability of any selected carrier frequency is within $\pm 1$ parts in $10^7$ after a warm up period of 30 minutes and does not vary more than $\pm 1$ parts in $10^9$ after a warm up period of 2 hours. The stability does not degrade by more than $\pm 5$ parts in $10^9$ for each 30 days.
Power Output and VSWR Performance:	<ul style="list-style-type: none"><li>• 10 kW PEP and average <math>\pm 1</math> dB for VSWR <math>\leq 2:1</math>; selectable in 1 dB steps down to 1 kW (10 dB)</li><li>• Reduced power for VSWR <math>\leq 3:1</math>; self-protected from open / short circuits</li><li>• Custom: <math>\pm 0.5</math> dB</li></ul>
Duty Cycle:	Continuous 100%
Tuning Steps:	1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, or 1 MHz
Transmit Activation and Frequency Settling Time:	7 ms maximum for 90% output power
Modes of Operation:	AM, NB-FM, USB, LSB, ISB, CW, and FSK; Data with optional internal or external modems to STANAGs 4285, 4529, 4415, 4481, 4539, and 5065 and MIL-STD-188-110 A / B (upgradeable to C) including Appendix F ISB  Automatic Link Establishment (ALE) with optional internal or external controller compliant to MIL-STD-188-141A/B/C, FS1045A, and STANAG 4538. Requires companion R-9000S Receiver.  Frequency hopping compliant to STANAG 4444 and HF email/data transfer with Automatic Link Maintenance (ALM) compliant to STANAG 5066 with optional external controllers  MIL-STD-188-203-1A and STANAG 5511/5522 (TADIL-A/Link 11 and NILE/Link 22) with external modems and controllers
Keying:	Local or Remote; local keying method compliant to STANAG 4203 and MIL-STD-203-1A; VOX - Voice Operated Keying
Programmable Channels:	1000; nonvolatile memory; channel/frequency, mode, power level
Remote Control:	Through T-9000S; designed for unattended continuous operation
Remote Interface:	Ethernet, RS-232, RS-422 direct and bus, RS-485 and FSK Tone Internal Modem
Post-Selector Operation:	Automatic with F-9800; F-9800 bypasses between 1.5 MHz and 1.6 MHz
Output Impedance:	50 ohms, nominal, unbalanced
Output Connector:	7/8 in EIA flange (1 5/8 in with adaptor)
Tuning Control:	Initiated by T-9000S and digitally controlled; no operator intervention required
Input Voltage:	338 Vac–458 Vac, 3-phase, 47 Hz–63 Hz
Energy Consumption:	$\leq 35$ kVA
Metering:	TFT display on HPAC and T-9000S; analog metering on IPA-1500; via remote control
BITE:	Power up, surveillance, and operator-initiated; fault isolation to the LRU; front panel and LRU indication; reporting and resetting through T-9000S and remote control
MTBF:	10000 hours
MTTR:	60 Minutes
Dimensions:	Height: 100.5 in (255.3 cm) Width: 42.0 in (106.7 cm) Length: 31.5 in (80.0 cm)
Weight:	2367 lbs (1075.9 kg) estimated, unpacked
Construction:	Modular plug-in assemblies, field serviceable
Origin:	Designed and manufactured in the U.S.A.

## TRANSMITTER

Differential Delay:	Less than 0.5 ms; two audio tones
Absolute Delay:	3.5 ms maximum
Harmonic Suppression:	At least 60 dB below carrier; No more than +10 dBm
Intermodulation Distortion:	At least 36 dB below PEP
Muting:	Better than 60 dB rated power
Carrier Suppression:	Better than 70 dB below PEP
Undesired Sideband:	Better than 70 dB below PEP
In Band Hum and Noise:	Better than 50 dB below PEP
Wideband Noise:	The output noise measured in any 3 kHz bandwidth (excluding any harmonic of the fundamental signal) and separated by more than 10% from the suppressed carrier frequency, is at least 70 dB below the PEP level when the transmitter is driven with a single tone of amplitude -10 dBm and delivered full mean output power into 50-ohm resistive termination, at any frequency in the frequency range.
Spurious:	The mean power of any spurious emission other than inter-modulation products will not exceed -53 dB relative to the output power when the transmitter is driven with a single test tone and delivered full mean output power into 50-ohm resistive termination at any frequency in the frequency range.
Audio Input Front Panel:	Microphone; handset
Audio Input Rear Panel:	Two selectable; 600 ohms, balanced
Audio Response:	$\pm 1$ dB from 300 Hz to 3050 Hz; shapes per S4203, MIL-STD-188-141B, MIL-STD-203-1A, and S5511
Audio Input Level:	0 dB nominal; adjustable to $\pm 20$ dB; manual and automatic adjustment

## EQUIPMENT OPTIONS

Spares Kits:	Running spares, field modules, final tested sub-units
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## ENVIRONMENTAL

EMI:	MIL-STD-461F
Shock:	MIL-STD-810G
Vibration:	MIL-STD-810G
Safety:	IEC/EN 60950
Temperature:	<ul style="list-style-type: none"><li>• Operating: -20 °C to 50 °C (-4 °F to 122 °F)</li><li>• Reduced duty cycle: 50 °C to 55 °C (122 °F to 131 °F)</li><li>• Storage: -40 °C to 85 °C (-40 °F to 185 °F)</li></ul>
Humidity:	95% @ +55 °C, non-condensing
Altitude:	<ul style="list-style-type: none"><li>• Operating: up to 10,000 feet</li><li>• Storage: up to 40,000 feet</li></ul>
Cooling:	Forced air; fan-cooled
Air Source and Volume:	Clean filtered air through front panel of T-10000B subcomponents; 8000 cubic-feet/minute (CFM) or 224 cubic meters/minute (CMM) when keyed
Exhaust Air:	Through top of cabinet; external exhaust recommended

# T-10000B

## 10 kW High Power Transmitter System

### LOCAL CONTROL

The following transmitter functions are locally controlled from the T-10000B front panel:

- On/off/stand-by
- BITE initiation and status reports
- Mute on/off
- Push to talk
- Regain Local Control or return to Remote Control
- Operation mode selection
- Channel selection and programming
- Operating frequency selection
- VOX on/off
- Audio input selection
- Power level selection in 1 dB steps
- Alarms and shutdown causes (excessive cabinet temperature, power, etc.)
- Overall and individual VSWR monitoring
- Overall and individual power output power in kW

### REMOTE CONTROL

The following transmitter functions can be remotely controlled or monitored from the RCU or Pathfinder II:

- On/off/stand-by
- BITE initiation and status reports
- Mute on/off
- Push to talk
- Set Local Control or Remote Control
- Operation mode selection
- Channel selection and programming
- Operating frequency selection
- VOX on/off
- Audio input selection
- Power level selection in 1 dB steps
- Alarms and shutdown causes (excessive cabinet temperature, power, etc.)
- Overall VSWR monitoring
- Overall power output power in kW



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