## *TECHNICAL SPECIFICATION*

# T-4180 HF DSP EXCITER HALF-RACK


**The T-4180 is a high performance computer-controlled 1.6 to 30 MHz HF DSP Exciter**

## FEATURES

- *Frequency Range: 1.6 to 30 MHz*
- *Incorporates digital signal processing (DSP) for greater linearity and spectral purity*
- *User-friendly menu-driven display*
- *Exceptional tuning speed, 2 msec typical, 4 msec maximum (10 MHz step)*
- *Operating modes: LSB, USB, ISB, AM, FM, CW, FSK, FMfax, LSBfc, LSBpc, USBfc and USBpc*
- *Integral post selector minimizes harmonic and spurious outputs*
- *250 preprogrammable channels*
- *Rugged construction - three individually shielded modules, in addition to the power supply*
- *Surface mount technology for superior reliability*
- *Outstanding MTBF: 15,000 hours over temperature*
- *Full function remote control: RS-232 or RS-422*
- *BITE and BIT - isolation to the module level*

CUBIC
DEFENSE APPLICATIONS, INC.
A member of the Cubic Corporation family of companies
*An ISO 9001 Certified Company*

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## FREQUENCY

Frequency Range: 1.6 to 30 MHz
Tuning Step Size: adjustable 1 Hz to 10 MHz in decade steps
Synthesizer Tuning Speed: (from receipt of last command byte until within 1 kHz of the final frequency): all modulation modes
Δf<100 kHz <1.0 msec, typical
Δf<1 MHz <1.5 msec, typical
Δf<10 MHz <2.0 msec, typical
Sweep and Scan Speed: 100 channels per second
Tuning Accuracy:
Internal Standard TXCO: ±1 ppm of tuned frequency
External Standard: equal to accuracy of external standard in ppm
Internal/External Frequency Standard: 10 MHz

## MODULATION

Modulation: LSB, USB, ISB, AM, FM, CW, FSK, FMfax, LSBfc, LSBpc, USBfc and USBpc
Bandwidth may be automatically selected by modulation mode and modulation characteristic
LSB, USB, 2-channel ISB and CW per MIL-STD-188-141A, Table I and Paragraph 5.2.7.1 plus Figure 5
AM - 6 kHz default or as selected. Amplitude Modulation up to 95%
FM bandwidth automatically selected for specified modulation characteristics. Deviation up to 5 kHz
Internal Modulation: 50 Hz - 6 kHz sine wave or white noise
Emission Designators supported: A1A/A1B, A2A/A2B, A3E, B8E, F1A/F1B, F1C, F3E, H2A/H2B, H3E, J2A/J2B, J3E, R2A/R2B, & R3C/R3E

## RF SECTION

Exciter Power Output: +27 dBm maximum
Output Impedance: 50 ohms
Output VSWR: 2:1 maximum
RF On/Off Switching Speed: <80 µsec, 60 dB isolation, controlled by external TTL levels
RF Filters: eight suboctave bandpass filters reduce harmonic content
Automatic Level Control (RF): 0 to -60 dB level control from single RS-422 (dedicated from PA microcontroller)
Manual Level Control (MLC): -33 to +27 dBm in 1 dB steps
Phase Noise: Per MIL-STD-188-141A, Paragraph 5.2.5 and Figure 3 fixed site, non-cosited
Phase Stability: Exceeds MIL-STD-188-141A, Paragraph 5.2.4
Absolute Delay: 5 ms maximum
Keying Characteristics:
Attack Time Delay: 3 ms max to 90 percent of full steady state output
Release Time Delay: 3 ms max to 10 percent of full steady state output
Keying Time: Defined as time from "key down" to RF output or "key up" to reduce RF output

## NOISE AND DISTORTION

In-band Noise: -105 dBc/Hz
In-band Intermodulation Distortion (IMD): 50 dB below either tone of two equal signals producing +21 dBm PEP
Spurious Broadband Emissions: per MIL-STD-188-141A, Paragraph 5.3.2.1 and Table II
Harmonic Outputs: -55 dBc. All other discrete spurious are -80 dBc
Carrier Suppression: -60 dBc for a single tone at +27 dBm signal output
Unwanted sideband suppression: -60dB

## IF SECTION

1st IF: 24 kHz, DSP generated, lowpass filter @ 80 kHz
2nd IF: 456 kHz, Standard Filter BW is 18 kHz
3rd IF: 40.456 MHz, Standard Filter BW = 22.5 kHz
IF Filters: 51 DSP derived FIR filters provide bandwidths from 100 Hz to 16 kHz automatically chosen by modulation mode and modulation characteristics

## INPUT CHARACTERISTICS

Unbalanced Audio Input
Impedance: 150 ohms ±10% over 100 to 7000 Hz passband
Audio Input Level: -45 to -15 dBm ref. 150 ohms
Balanced Audio Input Impedance: 600 ohms, 0 dBm -20 dB to +10 dB
Audio Level Control: automatic audio level control holds PEP audio at standard level ±1 dB over the 30 dB input range

## REMOTE CONTROL

RS-232 and RS-422 available. All exciter operational parameters including SELCAL are remotely controllable

## BITE

Fault isolation to the module level

## RELIABILITY

MTBF: 15,000 hours. Calculated based on "Naval Sheltered" (NS) as defined in MIL-HKBK-217F

## MAINTAINABILITY

Mean-Time-to-Repair (MTTR) of not more than 30 minutes at the module replacement level

## POWER REQUIREMENTS

90 - 260 VAC, 47 - 440 Hz, 60 watts max., switching mode power supply

## CONTROLS AND CONNECTORS

Front Panel:
Full alphanumeric display with full function keypad for entry of all parameters
Control knob for selection of all numeric parameters
Power Switch: toggle-type:
Phone jack: 1/4 inch for microphone and/or key line input
Rear Panel:
Power Connector: IEC
RF Output: BNC
External Frequency Standard Input: BNC
Audio Input: 15-pin Sub D
PA Control: 15-pin Sub D
Bus Control: 25-pin Sub D for RS-232 and RS-422

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## ENVIRONMENTAL DATA

Operating High Temperature: MIL-STD-810E, Method 501.3, Procedure II, Table 501.3-I (ambient air conditions), maximum test temperature 50°C, one cycle

Operating Low Temperature: MIL-STD-810E, Method 502.3, Procedure II, Temperature 0°C

Storage High Temperature: MIL-STD-810E, Method 501.3, Procedure I, 85°C, one cycle

Storage Low Temperature: MIL-STD-810E, Method 502.3, Procedure I, Temperature -40°C for 12 hours

Humidity: MIL-STD-810E, Method 507.3, Procedure I-Natural, Table 507.3-I, five cycles total

Shock: MIL-STD-810E, Method 514.4, Procedure I, Category 9, Figure 514.4-15

## EMI/EMC

Equipment designed to intent of the applicable requirements of MIL-STD 461/462 as a guide

## DESIGN AND CONSTRUCTION

Design and Construction: MIL-STD-2036, Paragraph 5.1.4 as a guideline

Workmanship: MIL-HDBK-454, Guideline 9

Interchangeability: all identical units, assemblies and replacement parts are physically, electrically and functionally interchangeable

## DIMENSIONS AND WEIGHT

Size: half 19-inch rack size:
8.45 inches (21.5 cm) wide
3.5 inches (8.9 cm) high
22.25 inches (56.5 cm) deep

Weight: 16 lb. (7.3 kg)

## FINISH

Front Panel: FED-STD-595 chip 26307, semigloss grey enamel

Chassis: corrosion protected following guidelines established in MIL-HBK-454, Requirement 15

Handles and Silkscreen Markings: matte black

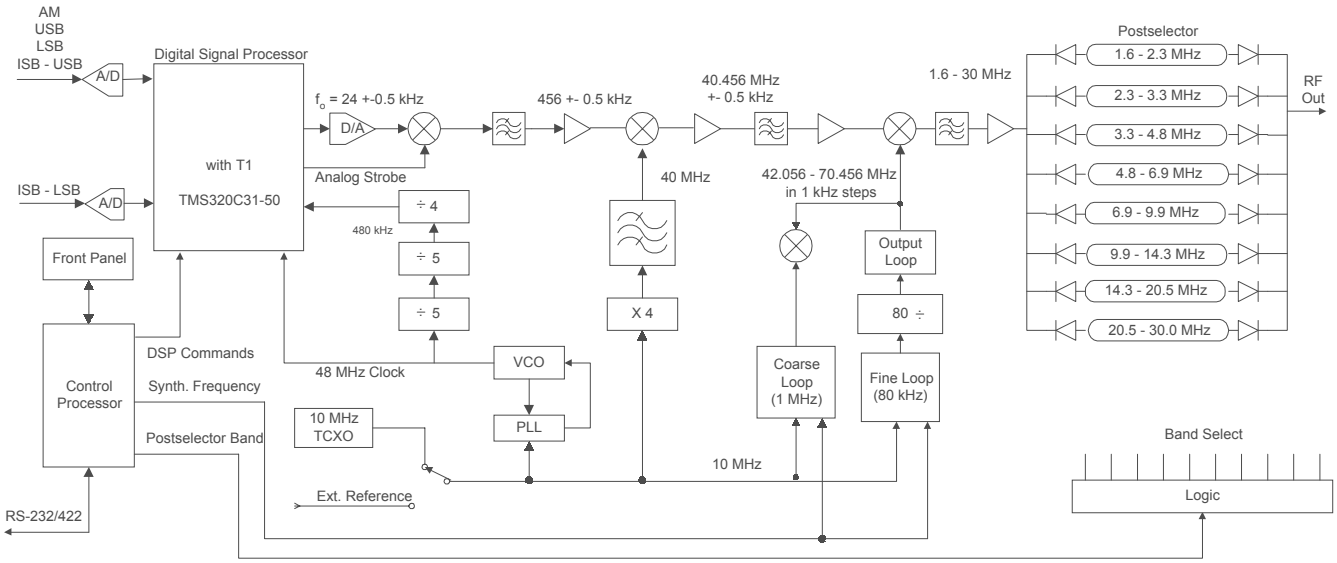
## OPTIONS

High Performance Ref Oscillator: OCXO, 0.1 ppm of tuned frequency

Parallel Data Bus: IEEE-488 (Not available with RS-232/RS422 Serial Data Bus

Dual Rack Mount Kit: Hardware and slides to fasten two T-4180 exciters together for installation in standard 19” rack.

Available as a single 19” rack mount Chassis (T-4150).



# T-4180 HF DSP EXCITER HALF-RACK SPECIFICATION

COM-1000 Power Amplifier

COM-4000/5000 Power Amplifier

## OPTIONAL POWER AMPLIFIERS

Cubic's COM Series Power Amplifiers are designed to operate with the T-4180 HF DSP Exciter.

The COM-1000 is a solid state linear MOD FET amplifier capable of delivering a power output of 1000 Watts in the frequency range of 1.6 to 30 MHz. The COM-1000 is modularized for ease of maintenance. Adjustments are easily accessible and LED's indicated performance of critical circuitry.

The COM-4000 is a 4000 Watt power amplifier working in the frequency range of 1.6 to 30 MHz. It is comprised of four 1KW PA modules, a 3 phase power supply, a 4-Way Combiner module, and a System Controller module.

The COM-5000 is a 5000 Watt power amplifier working in the frequency range of 1.6 to 30 MHz. It is comprised of four 1.25KW PA modules, a 3 phase power supply, a 4-Way Combiner module, and a System Controller module.

**Ordering Information**

| Model Number | Part Number | Description |
|---|---|---|
| T-4180 | 2607-1000-1 | LH-HF DSP Half-rack Exciter, 1.6 - 30 MHz |
| CHAS-KIT-01 | 2600-1000-1 | Full Rack Chassis Kit Without Rack Slides |
| RKSLD-KIT-02 | 222-024/222-087 | Rack Slides Kit (2RU) |
| MNT-KIT-01 | 2600-1009-1 | Dual Rack-mount Kit, Side-by-side |



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