

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

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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
 $\Delta f < 100 \text{ kHz}$ <1.0 msec, typical
 $\Delta f < 1 \text{ MHz}$ <1.5 msec, typical
 $\Delta f < 10 \text{ MHz}$ <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 $\pm 10\%$ 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-HKKB-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 (ambi-
ent 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

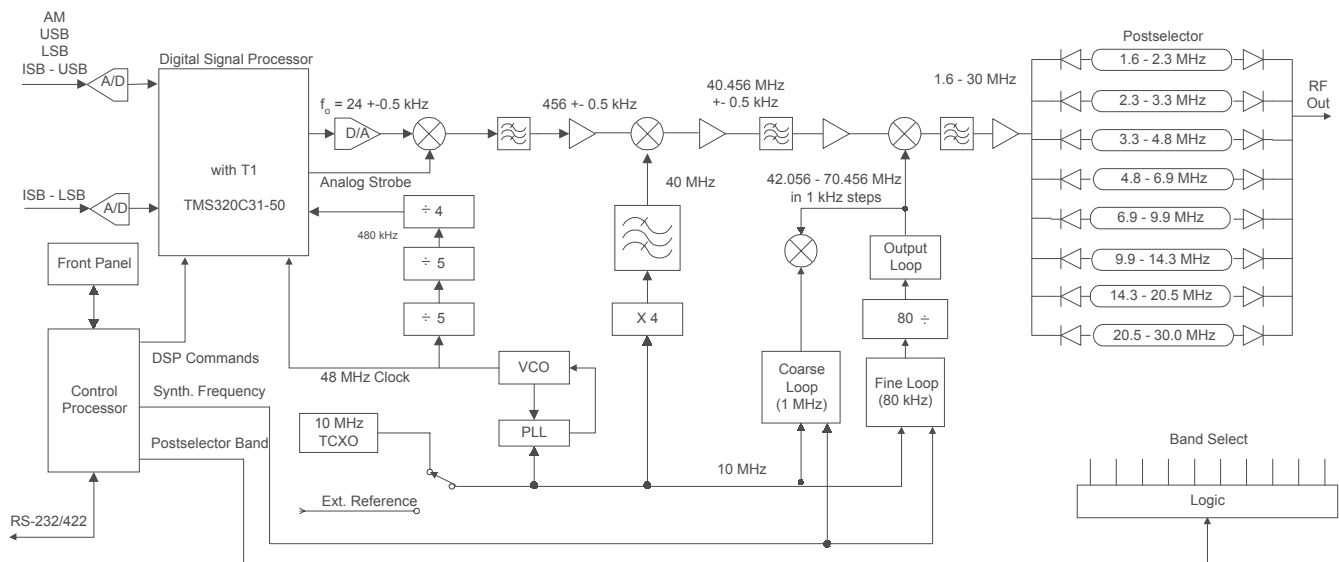
Size: half 19-inch rack size:
8.45 inches (21.5 cm) wide
3.5 inches (8.9 cm) high
22.25 inches (56.5 cm) deep
Weight: 16 lb. (7.3 kg)

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).



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COM-1000 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.



COM-4000/5000 Power Amplifier

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

Specifications subject to change without prior notice

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