

# VLF/LF Modulator Equipment



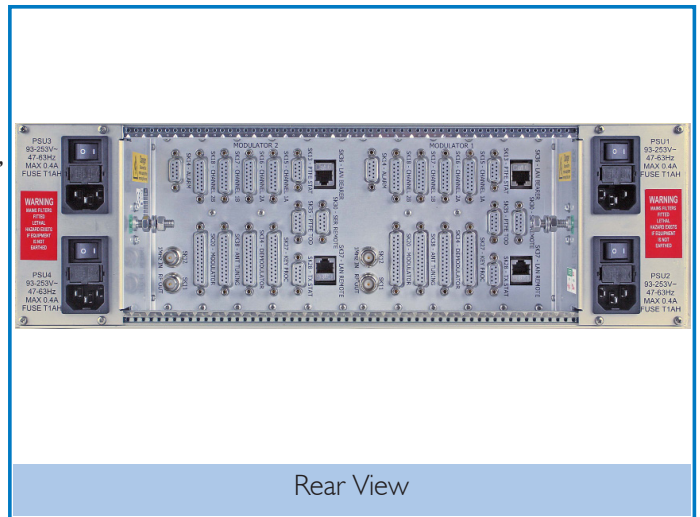
Drumgrange has been actively involved in the Strategic VLF Submarine Broadcast Communications program since the 1980s having developed bespoke items of equipment that span the entire VLF communications chain from headquarters, transmitter sites, to submarine platforms. We continue to support, refine and refresh those systems via long term contracts with National Governments, NATO and Prime Contractors.

## Key Features

- Modulation Modes: OOK, FSK, MSK1, MSK2 or MSK4
  - Baud Rate: 50/100/200 baud - 75/150/300 baud (upgrade)
  - Keystream Input Channels: 4 Synchronous, Asynchronous or LAN
  - Keystream Data Control: 4 Status lines, Strobe and Flow Control
  - Data formatting: NATO STANAG 4724\* / 5030 / 5065 (upgrade)
  - Frequency Range: 10KHz – 160KHz in 10Hz Steps
  - Time of Day: PTFE (Station Standard), or NTP
  - 1MHz & IPPS: PTFE (Station Standard)
  - Clock Output: Key Stream Source Synchronization
  - Internal Clock: Stability 3x10<sup>-9</sup> Per Day
  - Emergency Key Input: Synchronous or Asynchronous
  - Local or Remote Control: LAN or Serial Connection
  - RF Output level adjustment
  - RF Output Curbing: Selectable from a Number of Shapes
  - Dual Modulator Configuration: 2 independent Modulators in a 19" Sub-Rack
  - Dual Redundant Current Sharing Power Supplies
  - Expansion capability to include Demodulator (OTAM), Keystream interface and Aerial Tuning Unit
  - Audible Alarm with Mute Facility and volume control
  - Alarm relay contact outputs for external system
  - Extensive Built in Test Facilities including a variety of test messages
- \*Currently Pass through mode (ALT LEF), future Black side hardware and interface compliant



Front View



Rear View

## Technical Specification

### RF Output:

Characteristic	Description
Power Output:	1V <sub>pp</sub> – 10V <sub>pp</sub> , Adjustable via front or remote control (Maximum 250mW into a 50Ω load)
Phase Jitter:	Less than ± 0.5° in a 50Hz bandwidth
Amplitude:	Symmetrical about the centre frequency within ± 0.5dB
In Band Noise:	Better than -42dB relative to un-modulated carrier in a 240Hz bandwidth centred on carrier
Out of Band Noise:	Better than -72dB relative to un-modulated carrier in 100Hz bandwidth outside the range $f_c \pm 500\text{Hz}$
Hum:	The individual, discrete hum sidebands is at least 48dB below the un-modulated carrier
Harmonics:	Better than -55dB down relative to the carrier at any carrier frequency setting.

### Data Management Unit Interface:

Characteristic	Description
Channels:	4 Data and 4 Status lines V.24 Synchronous, 4 serial asynchronous with flow control or LAN
Data Rate:	50/100/200 baud - 75/150/300 baud (upgrade)
Strobe Input:	75 Hz (upgrade)
Fault Output	Relay changeover contact (volt free)

### EMC:

Characteristic	Description
Radiated	CE, EN 60945, MIL-STD-188-140A, ITU-R SM.329-12
Conducted	CE, EN 60945, MIL-STD-461

### Power:

Characteristic	Description
Rack Mount:	Voltage: 93 - 253 VAC Frequency: 47 – 63 Hz Power Factor: > 0.6

### Physical:

Characteristic	Description
Size (HxWxD):	3U x 28HP x 226mm
Cooling:	Natural convection
Climatic:	Operational 0°C – +55°C, Storage -10°C - + 70°C Relative Humidity 95% non condensing

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