

UM400a

TECHNICAL DATA

Digital Hybrid UHF Belt Pack Transmitter



- Digital Hybrid Wireless™ Technology
- 256 synthesized UHF frequencies
- 100 mW output power
- DSP controlled dual envelope input limiter
- DSP emulations for analog compatibility
- Servo bias input preamp
- DSP based pilot-tone signal
- Circulator/Isolator output stage
- Adjustable low frequency roll-off

The latest digital/analog hybrid technique is presented in a classic Lectrosonics wireless belt-pack transmitter. 24-bit digital audio is combined with optimized FM to create unprecedented audio quality and RF performance. The RF transmission is an aggressively optimized FM system with +/-75kHz wide deviation for a high signal to noise ratio. The overall system delivers full bandwidth audio frequency response up to 20kHz and the operating range of the finest analog wireless systems.

The innovative servo bias input on the standard 5-pin connector provides a programmable, regulated voltage to accommodate a wide variety of electret microphones. It is no longer necessary to install resistive pads for some mics to prevent overload of the input stage, divide the bias voltage down for some low voltage mics, or reduce the limiter range at minimum gain settings. To simplify wiring connectors, a single configuration for all microphones is now available for the UM400a transmitter input, and an alternate wiring configuration works well with all 5-pin inputs on Lectrosonics transmitters.

Compatibility with earlier analog Lectrosonics receivers and even some receiver models from other manufacturers is provided by custom firmware emulations built into the DSP code. A simple procedure using the frequency and power switches selects the desired operating mode.

Digital Hybrid Wireless™ U.S. Patent 7,225,235, a revolutionary design that combines digital audio with an analog FM radio link to provide outstanding audio quality and the extended operating range of the finest analog wireless systems. The process eliminates a compandor and its artifacts. The design overcomes channel noise in a dramatically new way, digitally encoding the audio in the transmitter and decoding it in the receiver, yet still sending the encoded information via an analog FM wireless link. This proprietary algorithm is not a digital implementation of an analog compandor. Instead, it is a technique which can be accomplished only in the digital domain, even though the audio inputs and outputs are analog signals.

The UM400a is powered by a single 9V battery and provides a full 100mW output for extended operating range. The housing and belt-clip are machined aluminum, powder coated and laser engraved for ruggedness and legibility.

Two 16-position rotary switches adjust the operating frequency of the transmitter over a 25.6 MHz bandwidth in 100 kHz steps.



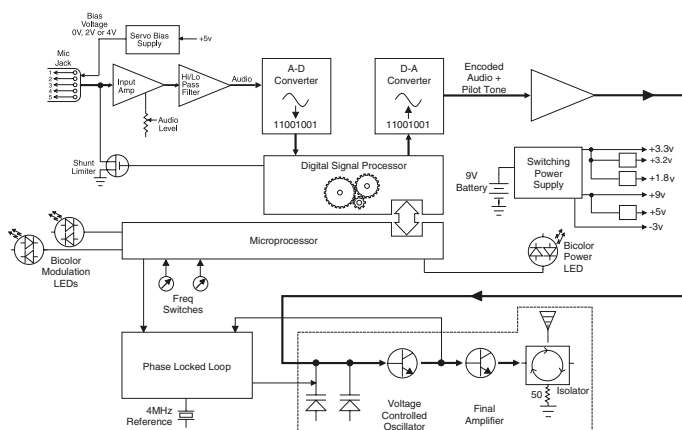
The low frequency roll-off is adjustable from 35 Hz to 150 Hz to control the presence of extremely low frequency audio in the program material.



UM400a Block Diagram

The input includes a wide range limiter, a 24-bit A/D converter sampling at 88.2 kHz, followed by DSP filters to remove supersonic audio above 21 kHz. The resulting signal is then encoded with a proprietary DSP algorithm to produce an encoded data signal for RF transmission. The encoded data signal is mixed with a DSP derived pilot tone signal and sent to the VCO. The modulated output of the VCO is then delivered to the output stage.

The RF output stage includes a circulator/isolator to prevent IM products from occurring in the output amplifier. It allows the RF signal to be transmitted, but suppresses external RF signals from entering back into the output amplifier.



Specifications

Frequency selection: 256 frequencies in 100kHz steps
 RF Power output: 100 mW (nominal)
 Pilot tone: 25 to 32 kHz; 5kHz deviation
 Frequency stability: $\pm 0.002\%$
 Deviation: ± 75 kHz (max)
 Spurious radiation: 90 dB below carrier
 Equivalent input noise: -120 dBV (A-weighted)
 Input level: Nominal 2 mV to 300 mV, before limiting. Greater than 1V maximum, with limiting.

Input impedance:
 Dynamic mic: 300 Ohms
 Electret lavalier: Input is virtual ground with servo adjusted constant current bias
 Line level: 2.7 k Ohms
 Input limiter: Dual envelope "soft" limiter; greater than 30 dB range
 Gain control range: 43 dB; semi-log rotary control
 Modulation indicators: Dual bicolour LEDs indicate modulation of -20, -10, 0 and +10 dB referenced to full modulation

Audio Performance (overall system)
 Frequency Response: 32 Hz to 20 kHz (+/-1dB)
 THD: 0.2% (typical)

SNR at receiver output:	SmartNR	No Limiting	w/Limiting
	OFF	103.5	108.0
	NORMAL	107.0	111.5
	FULL	108.5	113.0

(Note: the dual envelope "soft" limiter provides exceptionally good handling of transients using variable attack and release time constants. Gradual onset of limiting in the design begins below full modulation, which reduces the measured figure for SNR without limiting by 4.5 dB)

Input Dynamic Range: 125 dB (with full Tx limiting) Low frequency roll-off Adjustment: -18 dB/octave; adjustable from 35Hz to 150Hz

Controls:

- Two position "ON-OFF" power switch
- Audio input gain knob
- Low frequency roll-off pot on side panel
- Two 16-position rotary switches adjust frequency

Audio Input Jack:

Switchcraft 5 pin locking (TA5F)

Antenna:

Detachable, flexible wire supplied

Battery:

50 Ohm port allows connection to test equipment
 Precision compartment auto-adjusts to accept any known 9 Volt battery

Battery Life:

5 hours (alkaline); 10 hours (lithium)

Weight:

6.98 ozs. - 198 grams (including battery & antenna)

Dimensions:

3.17 x 2.48 x .84 inches

Emission Designator:

180KF3E

Operating Frequencies (MHz):

Block 470:	470.100 - 495.600	Block 24:	614.400 - 639.900
Block 19:	486.400 - 511.900	Block 25:	640.000 - 665.500
Block 20:	512.000 - 537.500	Block 26:	665.600 - 691.100
Block 21:	537.600 - 563.100	Block 27:	691.200 - 716.700 (export only)
Block 22:	563.200 - 588.700	Block 28:	716.800 - 742.300 (export only)
Block 23 lower:	588.800 - 607.900	Block 29:	742.400 - 767.900 (export only)
Block 23 upper:	614.100 - 614.300	Block 944:	944.100 - 951.900

The machined aluminum battery door is hinged to the housing. Battery contacts automatically adjust to a wide variety of 9 V batteries.



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