

UM400

TECHNICAL DATA

Digital Hybrid UHF Belt Pack Transmitter



Feature Highlights

- Digital Hybrid Wireless™ Technology*
- 256 synthesized UHF frequencies
- 100 mW output power
- Dual envelope input limiter
- Dual bicolor LEDs indicate four different levels for accurate gain adjustment
- DSP based pilot-tone signal
- Circulator/Isolator output stage
- Adjustable low frequency roll-off

*US Patent Pending

Digital Hybrid Wireless™ is a revolutionary new 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 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 process eliminates a compandor and its artifacts.

The UM400 belt-pack transmitter implements the latest digital/analog hybrid technique in a classic Lectro belt-pack transmitter. A 5-pin input jack provides taps for low impedance dynamic mics, electret lavalier mics with positive or negative bias and line level inputs. Input gain is adjustable over a 43 dB range to perfectly match the audio input level for optimum modulation, minimum distortion and maximum signal to noise ratio. Input levels are accurately indicated by two LEDs on the control panel.

The input amplifier uses an ultra low noise op-amp for quiet operation. It is gain controlled with a wide range dual envelope input limiter which cleanly limits input signal peaks over 30dB above full modulation. A 24-bit A-D converter in the input section digitizes the audio, followed by filters to remove supersonic audio above 21kHz. The resulting signal is then encoded with a proprietary algorithm to produce an analog data signal for RF transmission. 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 operating range better than the finest analog wireless systems.

The UM400 is powered by a single 9 V 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.

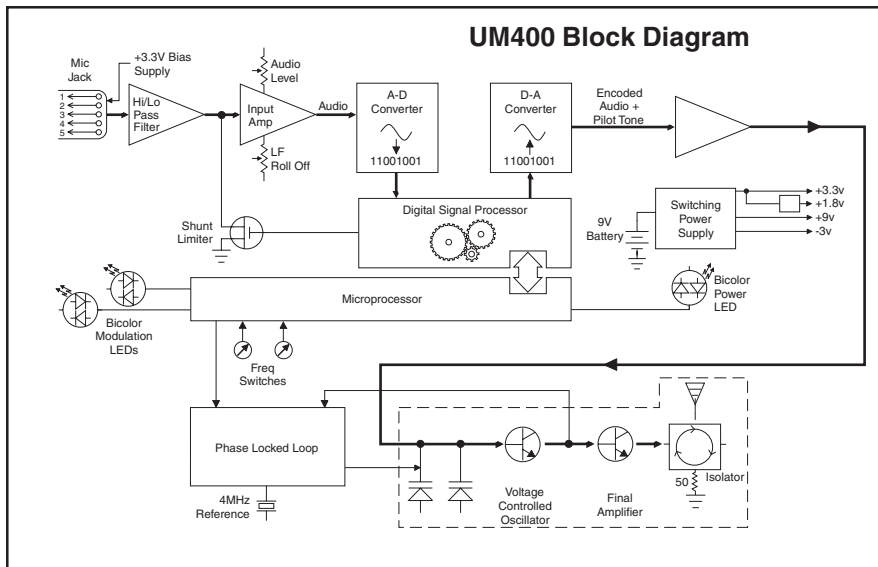


Two 16-position rotary switches adjust the operating frequency of the transmitter over a 25.6 MHz bandwidth in 100 kHz steps.



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.

LECTRO™

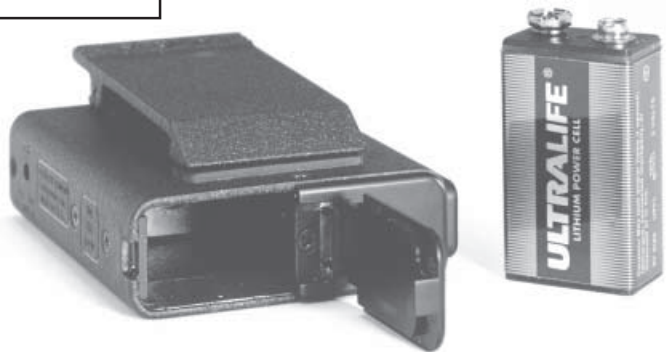


Operating Frequencies (MHz):

Block 21	537.600 - 563.100
Block 22	563.200 - 588.700
Block 23	588.800 - 607.900;
	614.100 - 614.300
Block 24	614.400 - 639.900
Block 25	640.000 - 665.500
Block 26	665.600 - 691.100
Block 27	691.200 - 716.700
Block 28	716.800 - 742.300
Block 29	742.400 - 767.900
Block 30	768.000 - 793.500 (export)
Block 31	793.600 - 805.600 (export)

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 will not let external RF signals back into the output amplifier.



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

- Frequency selection:** 256 frequencies in 100kHz steps
- RF Power output:** 100 mW (nominal)
- Pilot tone:** 25 to 32 kHz; 5kHz deviation
- Frequency stability:** ± 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:** Taps provided for 200, 4k, 40k Ohm
- Input limiter:** Dual envelope "soft" limiter; greater than 30 dB range
- Gain control range:** 43 dB; semi-log rotary control
- Modulation indicators:** Dual bicolor LEDs indicate 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

- 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 rolloff pot on side panel
 - Two 16-position rotary switches adjust transmitter frequency
- Audio Input Jack:** Switchcraft 5 pin locking (TA5F)
- Antenna:** Detachable, flexible wire supplied; 50 Ohm port allows connection to test equipment
- Battery:** Precision compartment auto-adjusts to accept any known alkaline 9 Volt battery. (We've tried 243 different ones.)
- Battery Life:** 5 hours (alkaline); 16 hours (lithium)
- Weight:** 6.98 ozs. - 198 grams (including lithium 9V battery & antenna)
- Dimensions:** 3.17 x 2.48 x .84 inches

Emission Designator: 180KF3E

UM400-TD-11/02

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



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