

Watertight Transmitter



- Selectable output power to maximize battery life or operating range
- Machined aluminum, corrosion resistant housing
- Water resistant seals for use in wet environments
- LCD interface with lockout option
- Programmable compatibility modes for use with a wide variety of different receivers
- Servo Bias input circuitry with selectable voltage

Designed for wet or dusty environments, the WM transmitter features O-ring sealed battery compartments and input jack, a compression sealed antenna port and gasket sealed control panel and back cover. Dual AA batteries provide twice the operating time of earlier watertight transmitter designs. Larger membrane switches and control panel and a highly visible, backlit LCD enhance the user interface.

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 exemplary RF performance of the finest analog wireless systems.

This 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.

The process eliminates compandor artifacts, expanding the applications to include test and measurement of acoustic spaces and musical instruments.

To meet the demand for both extended operating range and extended battery life, the transmitter offers selectable output power of 50, 100 and 250 mW. With higher power output, the operating range is improved at the expense of battery life. When range is not an issue, the power can be reduced to extend the battery life.

The transmitter can be controlled by the RM and RM2 remote control units for *hands free* setup and adjustment using audible tones delivered into the microphone from a tiny loudspeaker in the remote control unit. The transmitter can be put to sleep to conserve battery power during setup when it is buried deep inside costuming, then awakened for normal operation when the production begins. Other adjustments include frequency, audio level and control panel lockout.

The DSP-based design works with all Digital Hybrid receivers, and is backward compatible for use with Lectrosonics 200 and 100 Series and IFB receivers and some other brands of analog wireless receivers.

The input section features servo bias circuitry with voltages being selectable from the LCD to match the requirements of a wide variety of lavalier microphones. The bias can also be turned off for use with dynamic microphones. A line level setting is provided for use with signal levels up to 5 volts. The low frequency roll-off can be adjusted from 35 to 150 Hz.

A DSP-controlled analog audio limiter is employed ahead of the first mic preamp to protect the entire audio chain from overload. The limiter has a range of more than 30 dB for excellent overload protection and a dual release envelope that makes the limiter acoustically transparent while maintaining low distortion.

Watertight Connections

The input connector is mounted in a recessed opening which provides a captive seat for the O-ring on the microphone connector. This captures the O-ring allowing it to be tightened firmly.

The antenna is mounted with a compressible strain relief under a flange that presses the strain relief into a tapered opening for a watertight connection.



Input Limiter

A DSP-controlled analog audio limiter is employed before the analog-to-digital converter. The limiter has a range of more than 30 dB for excellent overload protection. A dual release envelope makes the limiter acoustically transparent while maintaining low distortion. The limiter recovers quickly from brief transients, so that its action is hidden from the listener, but recovers slowly from sustained high levels, to keep audio distortion low and preserve short term dynamic changes.

The bicolor LEDs on the control panel indicate limiter activity accurately to assist in setting the input gain for optimal signal to noise ratio and dynamic range.

DSP-Based Pilot Tone & Compatibility

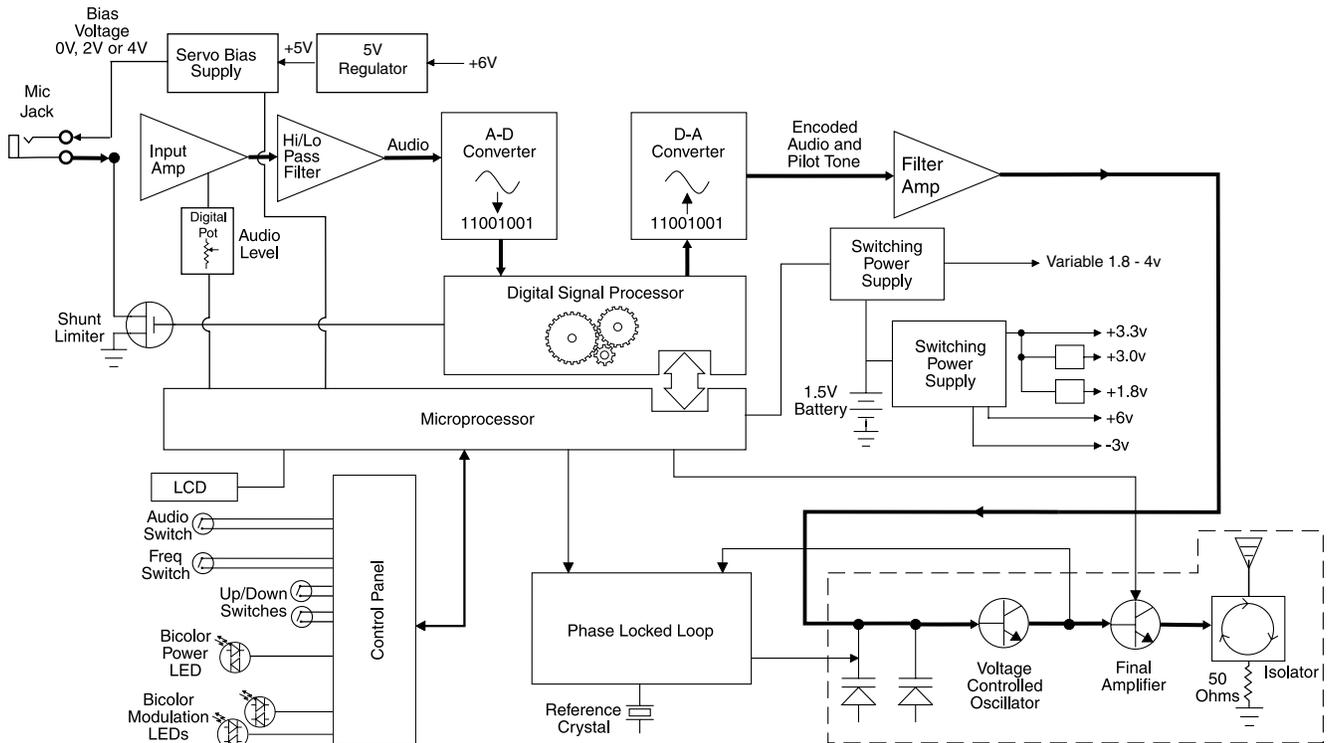
The DSP generated pilot tone eliminates the need for fragile crystals and allows a different pilot tone frequency for each of the 256 carrier frequencies in the tuning range of the wireless system. Individual pilot tones significantly reduce squelch problems in multichannel systems where a pilot tone signal can appear in the wrong receiver via intermodulation products.

The DSP also offers compatibility modes to allow backward compatibility with all Lectrosonics IFB systems, 100/200 Series systems and analog receivers from some other manufacturers in addition to its native Digital Hybrid operating mode.

Output Isolator

The transmitter RF output circuit includes a specialized RF device called an *isolator* using a magnetically polarized ferrite to allow RF signals to pass through to the antenna, but block them from coming backward into the transmitter output section.

The isolator greatly reduces RF intermodulation produced in the transmitter output stages when multiple units are used in close proximity (a few feet apart). The isolator also helps protect the output stage from electrostatic shock delivered to the antenna. Isolators are common in broadcast and commercial applications, but because of their high cost it is unusual to find them in wireless microphone transmitters.



Remote Control

RM Remote Control

The RM gives you remote control of the WM transmitter using an audible tone delivered to the microphone. Operating parameters on the wireless transmitter can be set by holding the speaker on the RM close to the microphone and pressing the pushbutton. A “dweedle” tone will play from the RM speaker into the microphone and the parameter on the transmitter will be set immediately. Adjustments can be made to set:

- Audio input gain
- Frequency
- Lock or Unlock Modes
- Sleep Mode ON/OFF



The flexible, intuitive interface on the RM makes setting these parameters quick and easy. The dweedle tones that control the transmitter are complex and can be detected in the midst of noise, yet they cannot be mistaken for the natural sound entering the microphone.

A single RM is capable of controlling a WM transmitter in any frequency block. Since it can simultaneously control multiple transmitters, the loudness of the tone is adjustable to suit different situations. With the volume turned up, changes can be made at a distance of up to 6 feet from the microphone. The volume can also be turned down so only microphones within a few inches of the speaker will pick up the tone.

The RM eliminates the need to disturb wardrobe or talent other than to make a quick, hands-free pause to send the dweedle tone into the microphone. Since the microphone is always positioned to pick up sound from the talker's voice, it is always accessible for setup changes using the the RM. Even with the microphone concealed under fabric, the tone will still reach the microphone. A remote control system using an IR (infrared) signal would require a line of sight between remote module and transmitter.

Input gain is adjusted by setting the desired value on the LCD on the RM in the same manner as it is adjusted on the transmitter. A single pushbutton press and a brief tone burst then transfers the setting to the transmitter. Frequency is adjusted in the same manner, with the options of setting it directly by hex switch code or adjusting it by block and frequency in MHz.



The RM is supplied with a quick-release lanyard

The **Lock** and **Unlock** functions on the transmitters are used to safeguard the settings and prevent accidental adjustment. When Lock Mode is enabled, the switches on the transmitter control panel will not operate. The RM can be used to unlock or lock the transmitter controls with a brief dweedle tone. The only way to unlock the controls with the transmitter itself is to remove the battery.

The **Sleep** and **Unsleep** functions are used to extend battery life during idle conditions. This is very useful when lengthy preparations are necessary or with extensive costuming. The transmitter and microphone can be placed and concealed early in the process and the transmitter then put to sleep with the RM, which reduces power consumption by a factor of 5. When the production is ready to start, a quick dweedle tone wakes up the transmitter and operation resumes.

The life of the single AA battery that powers the RM itself is extremely long. A lithium AA battery may run the unit for several years depending upon how often the unit is used, how loud the tone is played and storage conditions.

The machined aluminum housing and corrosion-resistant finish protect against damage from rough handling and moisture. A membrane switch panel helps protect the LCD and internal circuits from moisture and dust.

RM2 Remote Control

The RM2 is a lower cost alternative remote control with a simple push button interface. Adjustments can be made to:

- Turn the transmitter Sleep Mode On and Off
- Lock or Unlock transmitter controls
- Adjust transmitter Audio Input Gain



Specifications

Operating frequencies:

Block 470	470.100 - 495.600	Block 23	588.800 - 607.900
Block 19	486.400 - 511.900	Block 24	614.100 - 614.300
Block 20	512.000 - 537.500	Block 25	640.000 - 665.500
Block 21	537.600 - 563.100	Block 26	665.600 - 691.100
Block 22	563.200 - 588.700		

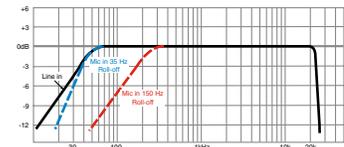
Channel Spacing:	100 kHz
Frequency selection:	Control panel mounted membrane switches
RF Power output:	Switchable; 50, 100 or 250 mW
Compatibility Modes (6)	Digital Hybrid Wireless® (400 Series), 200 Series, 100 Series, Mode 3, Mode 6, IFB
Pilot tone:	25 to 32 kHz; 5 kHz deviation (in 400 Series Hybrid Mode)
Frequency stability:	± 0.002%
Deviation:	± 75 kHz max. (in 400 Series Mode)
Spurious radiation:	60 dB below carrier
Equivalent input noise:	-125 dBV, A-weighted
Input level:	
Dynamic mic:	0.5 mV to 50 mV before limiting. Greater than 1 V with limiting.
Electret lavaliere mic:	1.7 uA to 170 uA before limiting. Greater than 5000 uA (5 mA) with limiting.
Line level input:	17 mV to 1.7 V before limiting. Greater than 5 V with limiting.
Input impedance:	
Dynamic mic:	300 Ohms
Electret lavaliere:	Input is virtual ground with servo adjusted constant current bias > 2.7 k Ohms
Line level:	
Input limiter:	Soft limiter, 30 dB range
Bias voltages:	Selectable; 2V, 4V and Off
Gain control range:	44 dB; panel mounted membrane switches
Modulation indicators:	Dual bicolor LEDs indicate modulation of -20, -10, 0, +10 dB referenced to full modulation
Controls:	Control panel with LCD and four membrane switches



AA battery compartments are O-ring sealed

Low frequency roll-off:

Adjustable from 35 to 150 Hz



Audio Frequency Response:

35 Hz to 20 kHz, +/-1 dB (The low frequency roll-off is adjustable - see graph above)

Signal to Noise Ratio (dB): (overall system, 400 Series mode)

	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. 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)

Total Harmonic Distortion:

0.2% typical (400 Series mode)

Audio Input Jack:

2.5 mm locking micro; threaded for stainless sleeve on WP connector

Antenna:

Flexible, unbreakable steel cable.

Batteries:

1.5 Volt AA lithium or rechargeable

NiMH recommended

Battery Life:	Alkaline	Lithium	2500mA NiMH
50 mW (2 AA):	6 hrs	14.5 hrs	8.5 hrs
100 mW (2 AA):	5.5 hrs	14 hrs	8.5 hrs
250 mW (2 AA):	1.75 hrs	7.5 hrs	5 hrs

*Alkaline is not recommended at the 250 mW level

Weight:

5.33 oz.. (151 grams) with lithium batteries

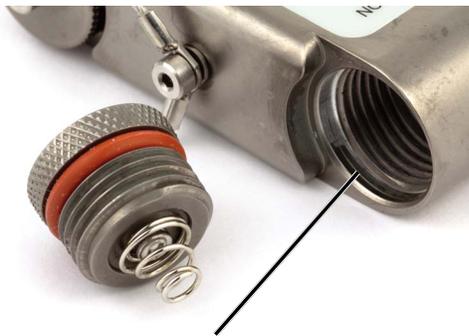
Housing Dimensions:

2.98 x 2.55 x 0.77 inches
75.7 x 64.8 x 19.6 mm
(including battery caps)

Emission Designator:

180KF3E

Specifications subject to change without notice.



The recess in the battery compartment traps the O-ring for a tight seal.

