



# XL-2000/M 8 CHANNELS MICROWAVE LINK FOR 2.4 GHz

**EXCELLENT MICROWAVE LINK 2.4 GHz WITH 8 FREQUENCY AGILE CHANNELS**



XL 2000/M is a portable microwave link. It is frequency agile in 2.4 GHz band. XL 2000/H is excellent solution for mobile applications and TV broadcast transmission up to 6 km line-of-sight.

## Installation and Operating Instructions

- 1• Verify proper operation of camera and monitor/event recorder using coaxial cable prior to installing wireless link.
- 2• Install transmitter and receiver units in secure and dry place.
- 3• Install antennas

**USE EXTREME CARE WHEN INSTALLING ANTENNAS NEAR POWER LINES.**

- 4• Tighten antenna cable to receiver and transmitter. Apply a small amount of silicone to flange to make a leak proof connection.
- 5• Connect video, audio, power, cables to units through flanges. Tighten flanges to allow small air gap at bottom of enclosure.

### **IMPORTANT NOTE:**

Power adapter must be kept dry.

- 6• Verify that LEDs are lit up and transmitter and receiver are on same channel.

**DO NOT APPLY POWER TO THE TRANSMITTER UNLESS THE ANTENNA IS CONNECTED. PERMANENT DAMAGE MAY RESULT.**

To obtain the best picture quality and transmission distance, the following rules of thumb should be followed:

1) Mount the transmitter and receiver antennas above human and mechanical traffic, the higher the better. A 10 foot (or more) steel mast on top of a building is typical. Make sure that the mast is well grounded to earth ground with an 8 AWG or larger wire. For maximum range, the transmit and receive antennas must be 15 to 30 feet above all obstacles in the line of sight.

2) Keep the transmission path as open as possible. **Objects such as walls and metallic objects near the transmission path may reduce the transmission distance.**

3) **Do not add additional lengths of cable to connect the receiver to the antenna as significant losses in signal, and reduced transmission range will occur.**

4) Keep the cable connecting the antenna to the receiver as short as possible.

5) If needed you may run over 100 ft coax audio/video cable feed to the A/V source

### **IMPORTANT NOTE:**

The Transmitter and Receiver units may get warm to the touch. This is normal and does not affect operation in any way. Units are covered by one-year warranty.

**WARRANTY VOID IF UNITS MODIFIED!**

Figure 2 shows the front panel of the XL 2000/M transmitter and the functions of each control and input/output. Each control is described in greater detail below.

***IMPORTANT NOTE: The transmitter uses a non-standard (SMA) jack to connect to***

**the transmitter to antenna. Any modification to this jack may void the user's authority to operate the equipment and will void the manufacturer's warranty.**

**AGAIN: DO NOT APPLY POWER TO THE TRANSMITTER WITHOUT THE ANTENNA SECURELY ATTACHED-DAMAGE TO THE UNIT MAY RESULT.**

### ***VIDEO INPUT***

Designed to mate to a standard RCA male connector, this input accepts 1 Volt peak-to-peak video in both NTSC and PAL formats. This input is terminated with 75  $\Omega$ .

RCA to BNC adapters are available for use with some cameras and VCRs.

### ***AUDIO INPUTS***

There are two separate audio inputs/outputs for stereo audio broadcast.

Designed to mate to a standard RCA male connector, this input accepts 300 millivolt peak-to-peak audio input and is terminated with 600  $\Omega$  unbalanced configuration.

It is designed to be interfaced to "lineout" audio sources. A preamplifier must be used to connect a microphone to this input. RCA to BNC adapters are available for use with some cameras and VCRs.

### **IMPORTANT NOTE:**

**With no video signal input, the transmit power level will be reduced in compliance with FCC regulations, shortening the transmission range for audio significantly. A video signal must be present on the video input to allow transmission at full power.**

### ***POWER INPUT***

Accepts a 12 Vdc power source such as the standard 12 Vdc adapters or an optional battery. The nominal current draw is 280 milliamperes for the receiver part and 1.2 A max. for the transmitter part. If using an adapter from a third party, use a well-regulated 12Vdc/500mA output supply for the receiver and 1.6 A/12 V well regulated for the transmitter unit.

#### **Changing Channels:**

To change channels, simply depress the Toggle/Standby switch momentarily until the LED for the desired channel pattern is lit up. Remember to change the receiver channel as well, since it is not automatically changed when the transmitter channel is changed. In order to change the channel please read the text below.

**THE RECEIVE PART HAS A SWITCH WITH 8 CHANNELS- PLACE DESIRED CHANNEL TO ON POSITION.**

### ***VIDEO OUTPUT***

Designed to mate to a standard BNC male connector, this provides a 1 Volt peak-to-peak video signal output. This must be terminated with 75  $\Omega$ . RCA to BNC adapters are available for use with some monitors and VCR inputs.

### ***AUDIO OUTPUT***

Designed to mate to a standard RCA male connector, this provides a 1 Volt peak-to-peak audio output and should be terminated in a 600  $\Omega$  load, as is found in most "line in" audio inputs. RCA to BNC adapters are available for use with some monitors and VCR inputs.

#### **Changing Channels:**

To change channels, simply depress the Toggle/Standby switch momentarily until the LED for the desired channel pattern is lit up. Remember to change the receiver channel as well, since it is not automatically changed when the transmitter channel is changed.

### ***INTERFERENCE***

If interference such as lines in the pictures is observed, changing the transmission channel may cure the problem. In some cases strong signals from wireless network could cause the problem Also, AC generators in close proximity to the transmitter or receiver may cause lines in the picture. Move the unit away from the source of the interference.

### ***NO PICTURE***

Check that the transmit and receive channels are set the same. Verify all connectors are tight.

### ***POOR PICTURE QUALITY***

Raise transmitter and receiver antennas above ground and away from obstacles and traffic, including foot traffic. Change the channel or check with a spectrum analyzer if any other source transmitting. Use only clear channel, not disturbed by other transmitting source.

**Use an optional high-gain dish antenna on the receiver.** Verify all connectors are tight. Shorten the receiver antenna feed cable.

**RADIO SECTION:***Frequencies:***Channel 1: 2300 MHz****Channel 2: 2325 MHz****Channel 3: 2350 MHz****Channel 4: 2375 MHz****Channel 5: 2410 MHz****Channel 6: 2433 MHz****Channel 7: 2452 MHz****Channel 8: 2481 MHz***RF Output Power:* Nominal: **+35dBm**  $\pm$  3 dB conducted into 50  $\Omega$  unmodulated carrier with final PA on.*Frequency Stability:* 0.005% PLL Stabilized (50 ppm) over temperature range*Frequency Plan:* Single upconversion with SAW IF filter for bandlimiting, Low

Side LO injection, 479.5 MHz IF

*Modulated Bandwidth:* 16 MHz (3 dB); 30 MHz (40 dB)*Harmonic Attenuation:* > 20 dBc (2nd harmonic)*Spurious Attenuation:* > 50 dBc**VIDEO SECTION:***Input Level:* 1Vpp per NTSC/PAL standard*Input Impedance:* 75 $\Omega$  unbalanced*Modulation:* Narrowband direct FM (for composite signal)*Modulation Index:* 1.0 at 6.5 MHz for composite A/V signal ( $\pm$ 6.5 MHz deviation)*Pre-emphasis:* CCIR Rec 405-1**AUDIO SECTION:***Input Level:* 1 Vpp Nominal*Input Impedance:* 600  $\Omega$ *Bandwidth:* 50 Hz – 10 kHz (3 dB)*Modulation:* Wideband FM*Subcarriers:* 6.0 MHz and 6.5 MHz*Modulation Index:* 1.0 at 11 kHz for audio ( $\pm$ 11 kHz deviation)*Pre-emphasis:* yes**GENERAL:***Size:* 3.4"W x 4.3"L x 1.2"D (8.64cm x 10.9cm x 3.05cm)*Weight:* 1.5 lb (0.68 kg)**CONNECTORS & INDICATORS:***RF Output:* SMA connector epoxied to straight feed point antenna in compliance with FCC rules part 15C, 15.203.

Specifications

*Video:* BNC female bulkhead mount*Audio1/2:* RCA female bulkhead mount*Controls:* Channel switch – momentary, toggles through modes/channels*Indicators:* 8 channel LEDs that blink slowly in Standby mode**ENVIRONMENTAL:***Operating Temp.:* -20 to 70  $^{\circ}$ C*Storage:* -30 to 85  $^{\circ}$ C*Humidity:* 95% noncondensing

## Powerup

At powerup, the unit will retrieve the last used channel, program the PLL with this channel, and display the channel by blinking the LED the same number as the channel number.

## Displaying Current Channel

To display the current channel, press the pushbutton once and release. The current channel will blink. After approx. 5 seconds, the current channel will again blink.

## Changing to a New Channel

To change to a new channel, press the pushbutton once and release. The current channel will blink. Press and release the pushbutton again **before** 5 seconds has elapsed and the channel will increment by 1 and the LED will blink the new channel. Repeat this step until the desired channel is reached, waiting for the blinking to stop each time before pressing the button again.

Once your desired channel is reached, wait 5 seconds until the LED again blinks your desired channel. Your new channel is now saved in memory.

**8 CHANNELS ARE AVAILABLE IN 2.4 GHz RANGE.**

### Warning

**Our microwave links are built in weatherproof boxes, but they are not waterproof. Please make sure to protect transmitter/receiver boxes from the rain and moisture.**

