



MODEL BE-322/CS-222/CS-122

WIRELESS VIDEO COMMUNICATION SYSTEM

OPERATION & INSTALLATION MANUAL

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1.0 INTRODUCTION

Thank you for purchasing the Premier wireless video transmission system.

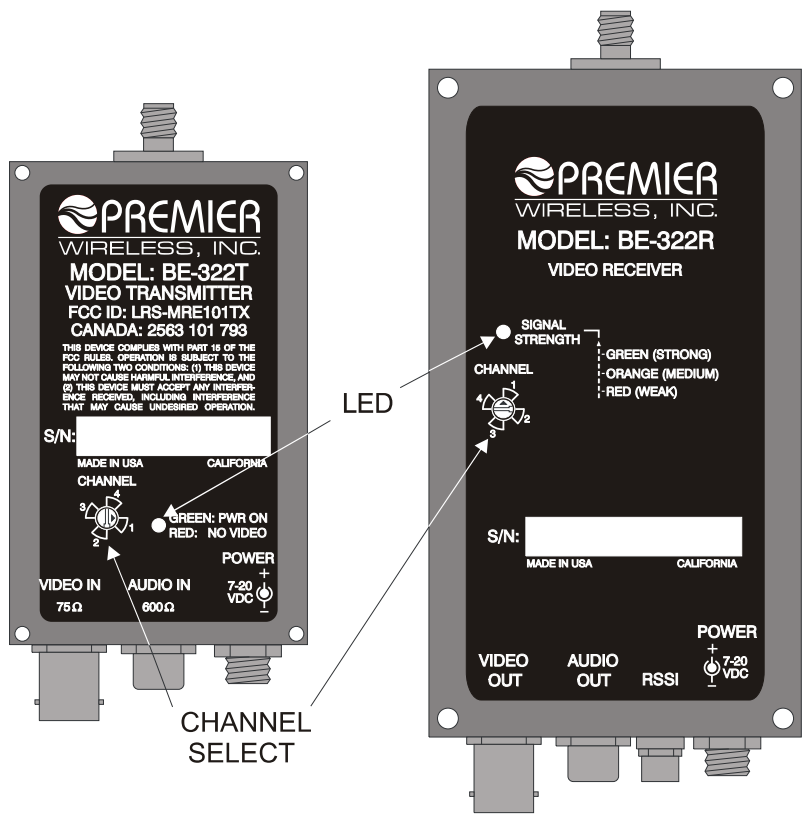
These microwave systems are designed to provide wireless distribution of full-motion standard color NTSC or PAL video signal. The CS-122 system transmits video only while the CS-222 and BE-322 systems transmit video and audio. CS-222 system's audio is compatible with regular VCR or camcorder. BE-322 system's audio is compatible with the line level output of most professional audio equipment. These systems operate in the 2400 to 2483 MHz frequency band and is FCC certified requiring no user license.

2.0 DESCRIPTION

2.1 *WHAT IS INCLUDED:* Enclosed in each package you will find:

	MODEL	Transmitter Module	Receiver Module
1 ea	CS-122	CS-122T	CS-122R
	CS-222	CS-222T	CS-222R
	BE-322	BE-322T	BE-322R
1 ea	AS-10 Transmit and AS-11 Receive Antenna		
2	12 volt AC/DC converters		
1	Operator's Manual		

2.2 LOCATION OF CONTROLS



MODEL BE-322 SHOWN
(CS-222 Modules have BNC audio connector, CS-122 has no audio)

3.0 INSTALLATION

IMPORTANT!

Verify that all other video equipment is operating properly prior to installing the wireless system. A direct interconnection of the camera to the monitor is recommended to insure all components and cables are working properly.

Installation should be in accordance with FCC regulations and all applicable local and national electric codes, utilizing approved materials only. Please thoroughly familiarize yourself with the information in this manual prior to installation and operation.

3.1 ANTENNA POSITIONING AND MOUNTING

IMPORTANT!

In order to fully optimize system performance and range, allow for a vertical movement (up to 4 feet) of either the transmit or receive antenna (preferably receive antenna) when initially positioning antennas (see section 4.5).

Connect the AS-10 antenna to the transmitter and the AS-11 antenna to the receiver. *CAUTION: The antennas are not interchangeable, doing so will damage them and the connector on the transmitter and receiver.* Short extension cables can be used between the antenna and the transmitter or receiver. They are available from Premier Wireless in 6, 12 and 18 inches. If the installer makes their own cables, use only high quality, low loss 50 ohm cables (such as UT-141, RG-142 or RG-223/U). Note: for every four feet of additional cable such as RG-142 the maximum transmission range is reduced by 10%.

The maximum transmission range will be achieved when there is a clear line of sight between the transmit and receive antennas. In addition, both antennas should be elevated a minimum of ten feet above ground level and any obstacles that might be between the antennas such as highway traffic. A "rule of thumb" for determining adequate antenna elevation is to set the product of the two antenna elevations greater than ten percent of the distance between the antennas. Or;

$(\text{Height Transmit Antenna, in feet}) \times (\text{Height Receive Antenna, in feet}) \geq (0.1) \times (\text{Distance Between Antennas, in feet})$

This is an approximation only and the actual elevation required may vary (higher or lower) dependent on the specific user site conditions. For example, if the distance between antennas is 1,400 feet, then $(\text{Height Transmit Antenna}) \times (\text{Height Receive Antenna}) \geq 140$ feet. This can be achieved by elevating each antenna 12 feet or one antenna 10 feet and the other 14 feet. If, however, the distance between antennas is only 250 feet, then by the same calculation the antennas need only be elevated a minimum of 5 feet each (although a minimum elevation of ten feet is strongly recommended). After this initial height calculation, please follow section 4.5 to determine the optimum antenna position. This is a critical step in achieving and maintaining a good quality video signal. It is also best to position the antennas as far as possible from metallic or other reflecting materials.

3.2 TRANSMITTER AND RECEIVER

The transmitter module can be bolted to the mounting surface by using #2-56 screws which are 1 inch long if front mounted or using #4-40 x 1/4 inch long screws if rear mounted. The receiver module uses #4-40 x 1 inch screws if front mounted or #8-32 x 1/4 inch if rear mounted. The transmitter and receiver units are not weather proof. If both ends of the system are installed indoors or out of direct exposure to the elements then no additional protection for the transmitter or receiver is required. If, as is typically the case, the transmitter and receiver are to be installed outdoors and directly exposed to the elements then additional protection must be provided. Under such conditions it is recommended that an enclosure constructed out of fiberglass (transparent to microwaves) be used to house the units (available from Premier).

3.3 ENVIRONMENTAL REQUIREMENTS

At the frequency of operation (2400 MHz), the transmission range is not affected by rain or snow. However, snow and ice build up on or in front of an antenna will attenuate the signal and reduce the range. Both the transmitter and receiver should be housed in a weather proof enclosure (such as NEMA-4X) when directly exposed to the elements.

If the surrounding temperature will exceed the operational specifications (- 20°C to +65°C, - 4°F to +149°F), then the units must

either be heated or cooled. For temperatures over 40° C (104° F) it is recommended that a fan be used to blow air over the surface of the units to assist in heat dissipation.

4.0 OPERATION

4.1 VIDEO, AUDIO & POWER CONNECTIONS

1. The video output of the camera, VCR or other source should be connected to the BNC connector indicated on the label as VIDEO IN of the transmitter. The audio signal from the camera, VCR or other source should be connected to the RCA connector (BE Model) or the BNC connector (CS Model) labeled AUDIO IN of the transmitter (CS-122 has no audio capability).
2. The video input to the monitor or VCR should be connected to the BNC connector indicated on the label as VIDEO OUT of the receiver. The audio input to the monitor or VCR should be connected to the RCA connector (BE Model) or the BNC connector (CS Model) labeled AUDIO OUT of the receiver.
3. Connect the power adapters to the transmitter and receiver first before plugging them into the A.C. wall sockets. Plug the coaxial jack on the A.C. adaptor into the corresponding connector on each unit. The adapters are for indoor use only.

4.2 CHANNEL SELECTION

There are four selectable channels for operation. Both the transmitter and receiver have to be set to the same channel in order for the system to work. To change the channel setting, rotate the channel switch with the triangle pointing to the desired channel. There may be more than one stop on the switch pointing to the same channel.

4.3 AUDIO INPUT LEVEL

BE-322: The audio input level to the transmitter is 0 dBm and the impedance is 600 Ohms unbalanced. This is compatible with most line amplifier or mixer output level.

CS-222: The audio input level to the transmitter is 1 Vp-p and the impedance is high (~10K ohms). This is compatible with most VCR and camcorder output level.

CS-122: There is no audio channel.

4.4 LED INDICATOR

Transmitter: The LED is red when there is no video, turns green when video is detected at the input.

Receiver: The LED gives a three level signal strength indication – RED: weak; ORANGE: medium; GREEN: strong.

4.5 ESTABLISH & OPTIMIZE LINK

The system takes several seconds to lock in when the DC power is connected, or when a channel change is made. At that time a picture should be viewable on the monitor. To optimize the picture quality and range for fixed applications, perform the following steps:

1. Connect a DC voltmeter to the RSSI port of the receiver by plugging the positive lead of the voltmeter into the red plug on the receiver and the negative lead of the voltmeter to the receiver case (ground).
2. With the system operational, slowly and carefully adjust the position of either the transmit or receive antenna up to four feet vertically to maximize the DC voltage from the RSSI port. This voltage will vary from 0 to a maximum of 3.0 volts depending on the range. Careful attention should be paid so that the individual adjusting the antenna position does not cause false readings by his body movement and position.
3. When the maximum reading has been achieved, secure the antennas in place and the system is ready for continuous operation.

4.6 TROUBLESHOOTING

It is recommended that the wireless system be first tested with the receiver and transmitter fixed and in close proximity (5 to 10 feet) to ensure proper interconnection of the camera and monitor to the transmitter and receiver, respectively. If all interconnections are made appropriately as described, the antennas have been properly positioned and the steps to optimize the link performed, then there should be a clear picture on the monitor. If there is no picture at all, or a very poor picture, perform the following steps:

1. **Bypass Check:** Check the performance of the system minus the wireless video transmitter and receiver by directly connecting the monitor to the camera with the same cables. This will verify the performance of the camera and monitor, as well as verify that the interconnecting cables are good.
2. **Channel Setting:** If the verification detailed in (1) above is performed and the system is fully reconnected and there is still no picture or a very poor one, check the channel settings for the receiver and transmitter. Both units must be set to the same channel.
3. **Power Supply:** If the verification detailed in (2) above is performed and there is still no picture or a very poor one then check the power supply voltage. If the voltage out of the supply is less than 12.0 volts (and the A.C. voltage is \geq 110 volts) the power supply needs to be replaced. Please contact Premier Wireless for a replacement.
4. **Replacement:** If the system is still not operating after successfully verifying the steps above, the fault must lie within the wireless system. Please contact Premier Wireless immediately for a replacement. It is our policy to provide quality products to our customers.

If the transmitter and receiver are now placed in their required locations and there is poor picture quality, there are several possible reasons that need to be addressed individually.

5. **Exceeding Maximum Range:** Observe the maximum distance achievable with the particular antennas used. Obstruction

between the antennas will reduce the maximum range. The maximum range with obstructions will vary depending on the type and number of obstructions encountered.

6. **Interference:** The systems operate in the 2.4 GHz public band, it is susceptible to outside interference, including cordless phones, wireless computer modems, mobile video transmissions. This condition is evident by the irregular horizontal lines, jumpy picture, or ghost imposed on a fairly sharp picture without "snow". Depending on the type of interference, some can be avoided by simply select another channel. Others that can not be avoided by channel change include leaky microwave oven and some frequency hopping cordless phones or modems. It is sometimes possible to avoid the interference by relocating the receiver away from those sources and use higher gain receive antenna, but more often the only solution is not to use those interfering devices in the vicinity of the receiver and along the signal path of the receive antenna
7. **Antenna Elevation:** Re-examine the elevation of both the transmit and receive antennas to ensure that both are sufficiently elevated above objects to minimize sources of multipath. Make sure there are no reflecting surfaces directly adjacent to the antennas.
8. **Multipath Interference:** Multipath interference is the loss of signal strength at the receive antenna when the primary direct signal from the transmitter is wholly or partially canceled by reflected signals that arrive 180° out of phase. If the instructions for antenna positioning are properly followed, then such interference in a fixed point to point application can be virtually eliminated. Moving objects (such as motor vehicles) near the path of the transmission can cause some amount of multipath interference. In that case, more directional antenna attached to the receiver (available from Premier) can substantially reduce such effects. In a mobile application where one end (such as the transmitter) is continually moving, multipath effects are almost impossible to eliminate completely. Such effects can be minimized in many cases by the use of directional and circular polarized antennas (available from Premier).

Note: Due to the difficulty of predicting the susceptibility of any one

application to the transmission limitations described above, it is generally recommended that site testing occur prior to installation. Consult your dealer to obtain further information.

4.7 *MULTIPLE SYSTEM CONFIGURATIONS*

The system provides four transmission channels which can operate independently using four transmitters and four receivers. Even though each transmitter-receiver pair operates at different frequencies, it is possible to cause interference in an adjacent channel. This will occur, for instance, if a channel 2 transmitter is located much closer to a channel 1 receiver than the corresponding channel 1 transmitter. When this happens, the signal strength at the adjacent frequency is much stronger than the desired signal, which "overloads" the channel 1 receiver. To avoid this possibility, and as a rule of thumb, the system needs to be configured such that no receiver has an adjacent channel transmitter located closer than 1/10 the distance to its own transmitter.

The potential for interference can be further minimized if directional and/or circular polarized antennas are used, such as the AH-51R or AH-52R (for mobile applications). With a directional receive antenna pointing at the corresponding transmitter, and if there is enough angular separation between the transmission paths along the horizontal, then the potential interference from adjacent channels will be greatly diminished. In fixed installation, use of vertical and horizontal antenna polarity will also help to reduce interference.

FCC STATEMENT

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- ! Reorient or relocate the receiving antennas.
- ! Increase the separation between the equipment and receiver.

- ! Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- ! Consult the dealer or an experienced radio/TV technician for help.

The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment as well as invalidate the systems warranty.

TYPE APPROVAL NUMBERS

BE-322T, CS-222T, CS-122T:	USA	LRS-MRE101TX
	CANADA	2563 101 793

5.0 ACCESSORIES

Premier Wireless offers many different kinds of antennas that can be used to extend the system range as well as NEMA enclosures and mounting accessories for system installation. Request our complete set of catalogs and data sheets for more details.

6.0 SYSTEM SPECIFICATIONS

Video Input & Output

Signal Formats	NTSC & PAL
Input Level	1.0 Volt p-p
Output Level	1.0 \pm .2 Volt p-p
Impedance.	75 ohms
Video Bandwidth	5.0 MHz
Pre-Emphasis/ De-emphasis	CCIR
Connector	BNC

Audio Input & Output (BE-322 and CS-222 only)

Channels	1
Input Level	
BE-322	0 dBm
CS-222	1 Vp-p (-7 dB)
Input Impedance	
BE-322	600 ohms
CS-222	10,000 ohms
Output Level	0 dBm
Output Impedance	Low Impedance
Frequency Response	150 Hz to 10 KHz
Pre-Emphasis/De-Emphasis	75 μ Sec
Connector	
BE-322	RCA
CS-222	BNC

Transmitter

Radiated Power	FCC Part 15 (15.249)
Connector Antenna	SMA Jack, Reverse Polarity
Antenna.	Dipole, Detachable

Receiver

Connector Antenna	SMA Jack
Antenna	Dipole, Detachable (other options available)

Microwave System

Frequency Of Operation	2400 to 2483 MHz
Channels (User Selectable)	4
Channel Frequencies.	2412.5 MHz
	2432.5 MHz
	2452.5 MHz
	2472.5 MHz
Channel Control.	Rotary Switch
Modulation	FM
Range	1,000 Ft. Clear Line of Sight
	(Consult factory for extended operating range)

Power

Input Voltage.	7 to 20 VDC
Input Current	
Transmitter	< 100 mA @ 12 VDC
Receiver	< 170 mA @ 12 VDC

Input Connector	Coaxial (5.5/2.1 mm)
Reverse Polarity Protection	
Mechanical	
Weight	
Transmitter	< 4 Oz
Receiver	< 6.5 Oz
Dimensions (excluding connectors)	
Transmitter	2.0 x 3.25 x 0.7
Receiver	2.5 x 4.50 x 0.7
Environmental	
Operating Temperature	-20°C to +65°C
Storage Temperature	-50°C to +85°C

7.0 WARRANTY AND RETURNS

WARRANTY

Premier Wireless will repair or replace, without charge, any product proved defective in material or workmanship in normal usage for a period of one year after the date of shipment. Premier Wireless will warranty all replacement parts and repairs for 90 days from the date of shipment. All goods for warranty or out of warranty work shall be sent freight prepaid to our California facility. Repairs made necessary by reason of misuse, alteration, normal wear or accident are not covered under this warranty. In no event is Premier Wireless liable for indirect, incidental or consequential damages incurred by the customer for any reason.

THE FOREGOING WARRANTIES ARE IN LIEU OF ALL WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND OF ANY OTHER OBLIGATION ON THE PART OF PREMIER WIRELESS.

This warranty gives you specific legal rights. You may also have additional rights, which are subject to variation from state to state.

If a warranty repair is required, contact Premier Wireless for a Return Material Authorization number (RMA), and provide the following information.

1. Model and Serial Number
2. Date of Shipment, P.O. number, Premier Sales Order number, or Premier invoice number
3. Details of the defect or problem

If there is a dispute regarding the warranty of a product which does not fall under the warranty conditions stated above, please include a written explanation with the product when returned.

Ship freight prepaid to:

Premier Wireless, Inc.
2284 N. Glassell Street, Unit D
Orange, CA 92865
Attn: RMA _____
Ph: (714) 283-1251

Returned goods should be clearly identified with the assigned RMA number. Method of return shipment shall be via UPS Ground unless otherwise requested and paid for by customer.

OUT OF WARRANTY & CREDIT RETURNS

The same procedure specified above for warranty returns should be followed for out of warranty repairs and credit returns. Below is an outline of our policy.

1. Any products can be returned for full credit towards future purchases as long as it is in new condition and returned within thirty (30) days of the ship date as provided on the original packing slip from Premier Wireless. A twenty percent (20%) restocking fee will apply for any new product returned after 30 days but less than 90 days. No return will be accepted after 90 days.

2. Any returned product that requires repair and/or refurbishment so that it can be resold will bear additional charges which will be deducted

from the credit given.

3. At no time will Premier Wireless accept any product that can not be repaired and/or refurbished for purpose of resale.

4. All freight charges will be the responsibility of the customer.

PACKAGING OF RETURNED GOODS

When returning products to Premier Wireless, please ensure adequate protective packing materials are used to prevent any damage during shipment. Use the original packing boxes if possible. For bulky products such as the NEMA enclosures, a double box packing method is necessary. Do not ship NEMA enclosures using the inner box alone as damage to the enclosure can easily occur during shipment.

CUSTOMER SATISFACTION

Premier Wireless commitment to our customers requires 100% customer satisfaction. Our return policy guarantees 2-day turnaround on all Premier Wireless manufactured products returned for warranty or non-warranty repair.