# DERYTECH

# Shepherd
## User Guide

# Contents

This user guide describes how to setup, install and operate the Shepherd. Please read it carefully before commencing installation of the product.

# Statement

## FCC Interference Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation.

**This 5.8GHz Wireless video system** 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 according to 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 is found 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 antenna.
- Increase the separation between the equipment or device.
- Connect the equipment to an outlet other than the Receiver's.
- Consult a dealer or an experienced radio/TV technician for assistance.

# FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 23cm between the radiator and your body.

# Manufacturer's Disclaimer Statement

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# 1. System Introduction

**The DeryTech Shepherd** represents an all new, high performance, cost effective digital based wireless surveillance camera transmission system. Offering exceptional bandwidth and serial data transmission, the Shepherd brings a wireless capability to all traditional fixed cameras and supplies built-in remote control to PTZ dome cameras, providing a first-rate solution for remote and hard-to-reach camera locations.

The Shepherd uses the latest digital wireless OFDM modulation in the less crowded (and unlicensed) 5GHz radio band, providing transmission rates that significantly reduce signal interference and, being full-duplex, supplying a very stable wireless link, which, combined with our image processing software, delivers hi-definition, full-motion, no-ripple video up to 10 Km line-of-sight. Furthermore, the Shepherd offers considerably improved data security via either AES or RC4 key encryption when used in conjunction with our proprietary MagicLink software, and it's bi-directional, full-duplex digital transmission allows the system to provide full joystick remote control of RS485 based PTZ cameras.

The Shepherd has also been designed for ease-of-use and flexibility. The MagicLink software makes configuring the Shepherd a quick and simple task, allowing for the selection of personalized encryption keys, the setting-up of the PTZ interface and a choice of transmission ranges for improved image quality. Where transmission of over 10 kilometers is required or the signal path needs to change direction, two or more Shepherds can be connected in series using the Repeater Mode. The Shepherd is also set-up to support Power over Ethernet (PoE), eliminating the need for an AC power supply and associated cabling, making installation easier and cheaper.

Overall, the Shepherd provides a versatile, all-in-one wireless transmission solution for CCTV and traffic surveillance needs, offering superb performance in all environments and weather conditions, and providing integrators and installers with a system that is easy to set-up, simple to install and straight-forward to operate, whilst offering time and money saving flexibility.

## 1.1 Features

- Wireless transmission for real time video up to 10 Km

- 5GHz OFDM for reduced interference

- Data Rates of up to 54 Mbps

- Full Duplex provides a stable wireless link

- Digital Image Processing cuts out signal ripple and snow

- Advanced security provided by either AES or RC4 key encryption

- Proprietary serial data transmission mode for PTZ control

- User-selectable transmission power and distance

- MagicLink software for system configuration

- Supports NTSC/PAL (D1 resolution at 30 fps)

- No signal interference between cameras

- Easy installation and mounting

# 1.2 Configuration
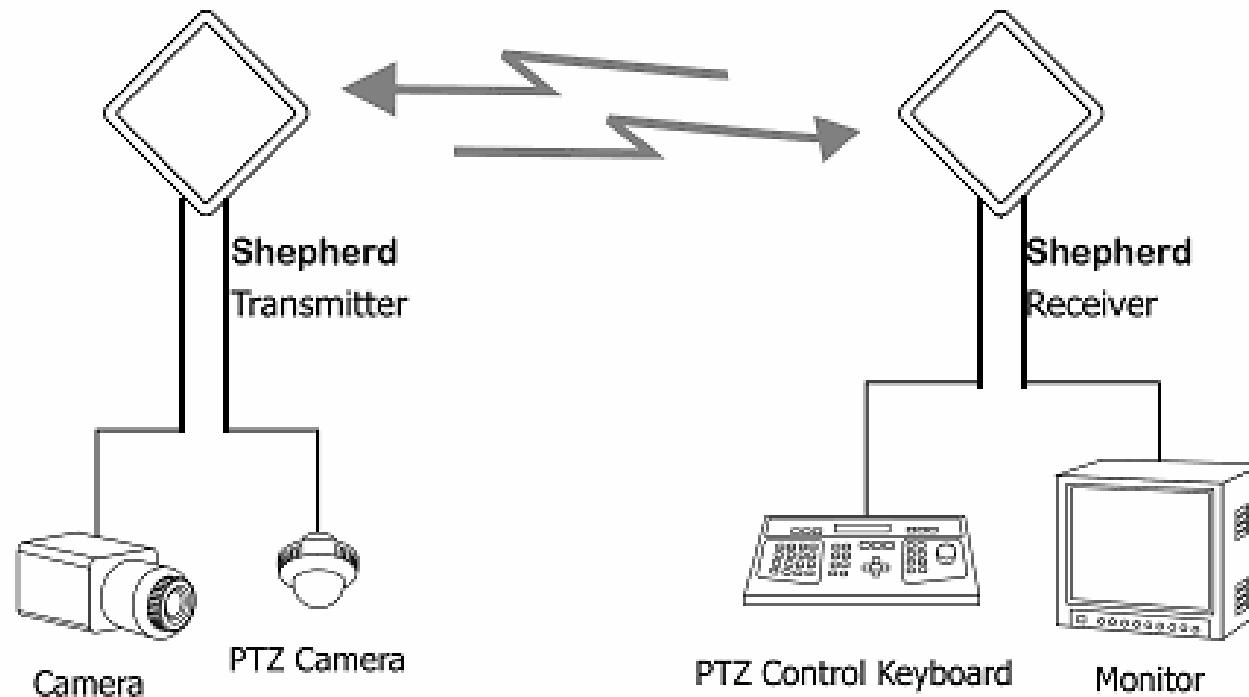


**Figure 1a**   A standard wireless configuration using the Shepherd.

# 2. System Hardware

## 2.1 Package Contents

| | |
|---|---|
| **Shepherd<sup>TM</sup>** | Transmitter x 1, Receiver x 1 |
| **Antenna** | 23dBi panel antenna X 2 |
| **MagicLink** | CD-Rom |
| **Power Adapter** | X 2 |
| **RCA/BNC Line** | Fully Assembled |
| **User Manual** | Soft Copy |
| **Warranty Card** | X 1 |
| **Mounting Brackets** | X 2 sets |

**NOTE:** If any of the above items are damaged or missing, please contact your dealer immediately.

## 2.2 Hardware Connections
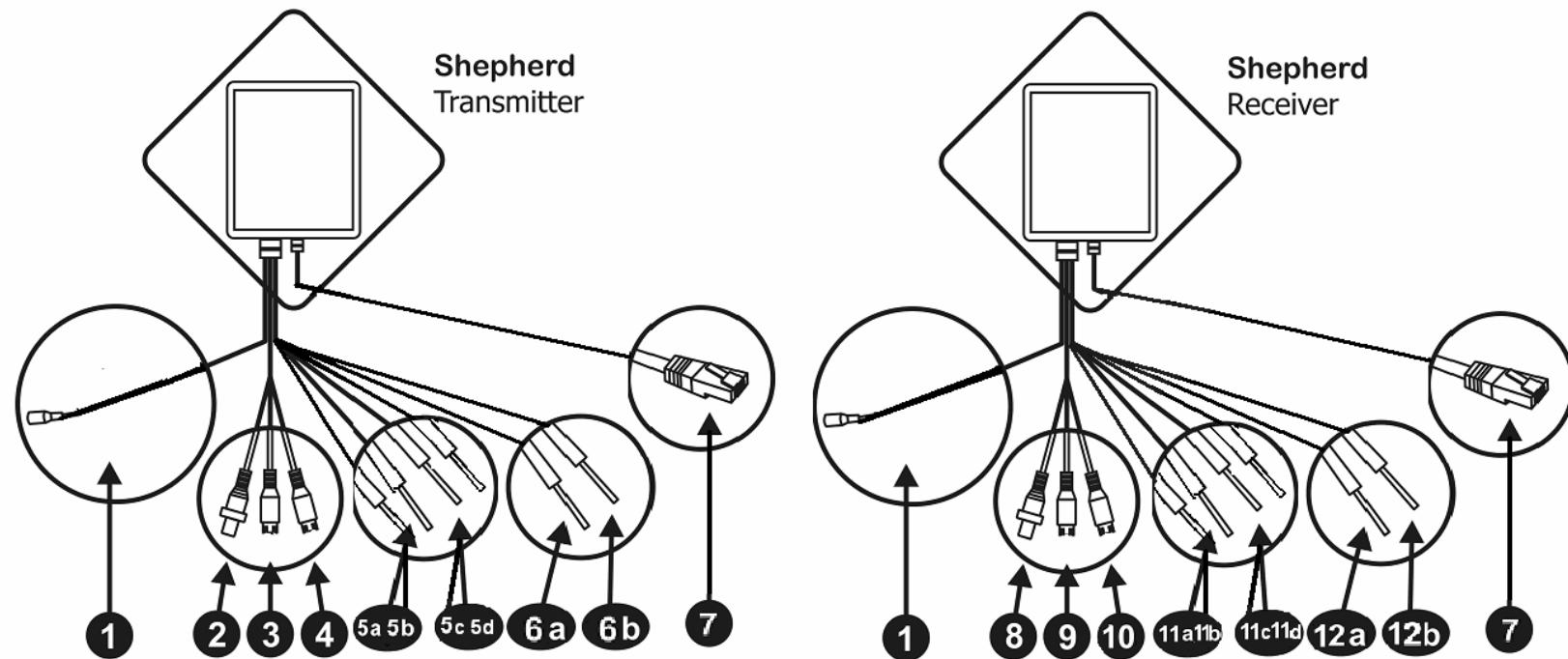


**Figure 2a**

**(1) Power Input**

- Connects to the 12 Vdc / 2A Female power connector

**(2) Video Cable (BNC-Female) (silver)**

- Designed to mate with standard BNC Female camera connector. This input accepts with 75ohm video in both NTSC and PAL formats

**(3) & (4) Audio Cables (Female)- Right (red) & Left (white)**

- Designed to mate with standard RCA Female "lineout" audio source connectors on camera. Each input accepts 1 Vpp audio input and is terminated with 600ohm unbalanced configuration.

**(5a) RS485 Full Deplex Twisted-pair cable (TO+) (Red cable)**

- Connects TO+ shielded twisted-pair cable to PTZ Full deplex system camera

**(5b) RS485 Full Deplex Twisted-pair cable (TO-) (Orange cable)**

- Connects TO- shielded twisted-pair cable to PTZ Full deplex system camera

**(5c) RS485 Full Deplex Twisted-pair cable (RI+) (Yellow cable)**

- Connects RI+ shielded twisted-pair cable to PTZ Full deplex system camera

**(5d) RS485 Full Deplex Twisted-pair cable (RI-) (Green cable)**

- Connects RI- shielded twisted-pair cable to PTZ Full deplex system camera

**(6a) RS485 Half Deplex Twisted-pair cable (T+) (Black cable)**

- Connects T+ shielded twisted-pair cable to PTZ Half deplex system camera

**(6b) RS485 Half Duplex Twisted-pair cable (T-) (Brown cable)**

- Connects T- shielded twisted-pair cable to PTZ Half deplex system camera

**(7) Ethernet Cable**

- No use in Normal link status

- For configuration only, Connects to PC for configuring the Transmitter and Receiver using MagicLink software

**(8) Video Cable (BNC-Female) (silver)**

- Designed to mate with standard BNC Female TV connector. This input accepts with 75ohm video in both NTSC and PAL formats

**(9) & (10) Audio Cables(Female) - Right (red) & Left (white)**

- Designed to mate with standard RCA Female "lineout" audio source connectors on TV. Each input accepts 1 Vpp audio input and is terminated with 600ohm unbalanced configuration.

**(11a) RS485 Full Deplex Twisted-pair cable (TO+) (Red cable)**

- Connects TO+ shielded twisted-pair cable to PTZ Full deplex system controller

## (11b) RS485 Full Deplex Twisted-pair cable (TO-) (Orange cable)

- Connects TO- shielded twisted-pair cable to PTZ Full deplex system controller

## (11c) RS485 Full Deplex Twisted-pair cable (RI+) (Yellow cable)

- Connects RI+ shielded twisted-pair cable to PTZ Full deplex system controller

## (11d) RS485 Full Deplex Twisted-pair cable (RI-) (Green cable)

- Connects RI- shielded twisted-pair cable to PTZ Full deplex system controller

## (12a) RS485 Half Deplex Twisted-pair cable (T+) (Black cable)

- Connects T+ shielded twisted-pair cable to PTZ Half deplex system controller

## (12b) RS485 Half Duplex Twisted-pair cable (T-) (Brown cable)

- Connects T- shielded twisted-pair cable to PTZ Half deplex system controller

# 3. System Setup and Configuration

The Shepherd operates as a totally independent system and does not need to cooperate with other network systems. Therefore, if all the Transmitter and Receiver default settings are to be used (for default settings, see Configuration Settings on page 30), the system can be installed as a simple plug-and-play solution. However, we recommend that, for security reasons, every Shepherd system is configured with its own unique security settings (using the MagicLink software), and, if 2 or more Shepherd systems are used in a single area, it is vital that each be configured with its own Data Encrypt Key and Connection ID.

To re-configure any of the default settings on the Shepherd, the MagicLink software should first be installed onto a Windows-based PC or Notebook and then the system settings of the Transmitter and Receiver changed.

## 3.1 Installing MagicLink

MagicLink software allows users to re-configure the Shepherd via any Windows-based PC or Notebook. This section describes how to install MagicLink to your PC.

1.  Insert the MagicLink Installation CD-ROM into your computer's CD-ROM drive. Run the **SETUP.EXE** program from the CD-ROM. The following window will appear:
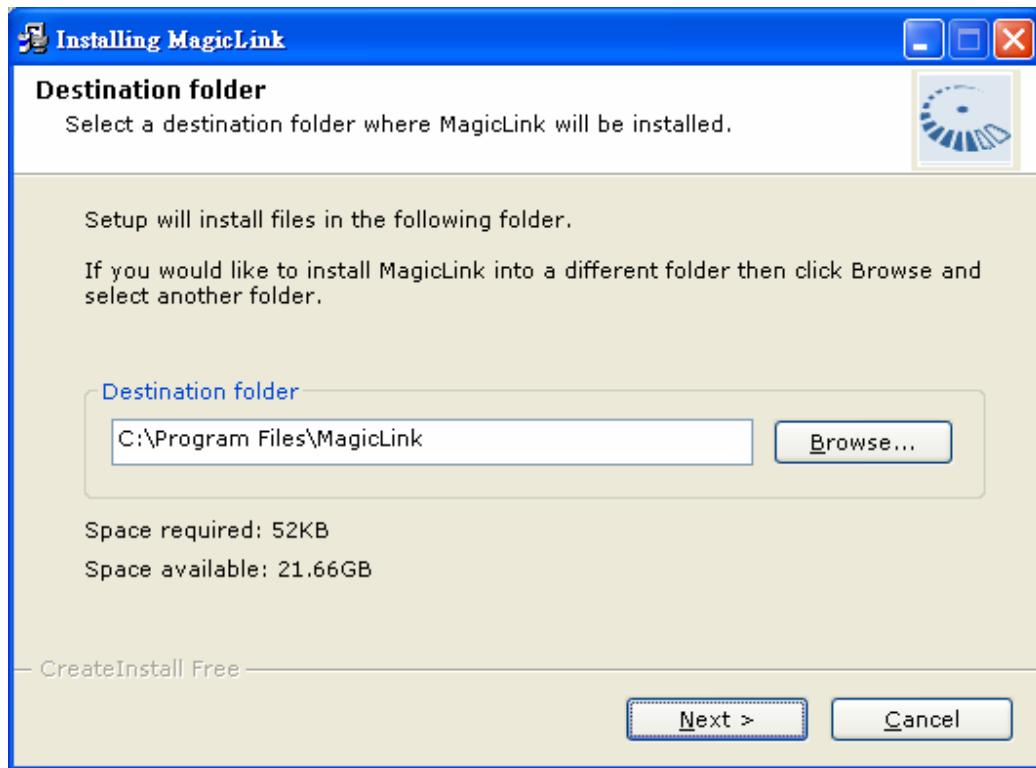
- The screen will show the default destination for the MagicLink software chosen by your computer's utility. If you want to install MagicLink to another location, click the **Browse** button and select an alternative destination.
- Click **Next** when you are ready to continue. The setup program will begin to install the programs into the destination folder.

2. When MagicLink has been successfully installed, the following window will appear:
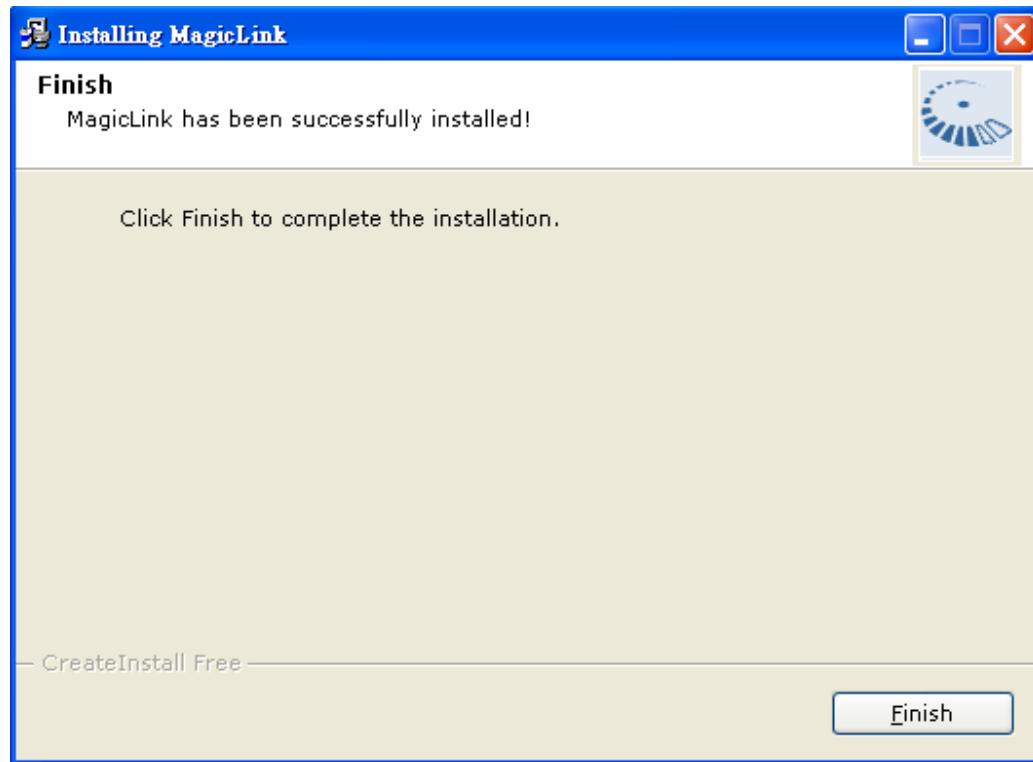


**Figure 3b**

● Click **Finish** to complete the installation.

**NOTE:** To remove MagicLink from your computer, find and open the MagicLink folder in your desktop, select **Uninstall**, and follow the on-screen instructions.

## 3.2 Configuring the WTX5800 Transmitter and WRX5800 Receiver

Having installed MagicLink to your computer, follow the procedures below to re-configure the settings in **both** your WTX5800 Transmitter and WRX5800 Receiver.

### Re-configuring the WTX5800 Transmitter

1. Connect your computer to the Ethernet cable of the WTX5800 Transmitter.
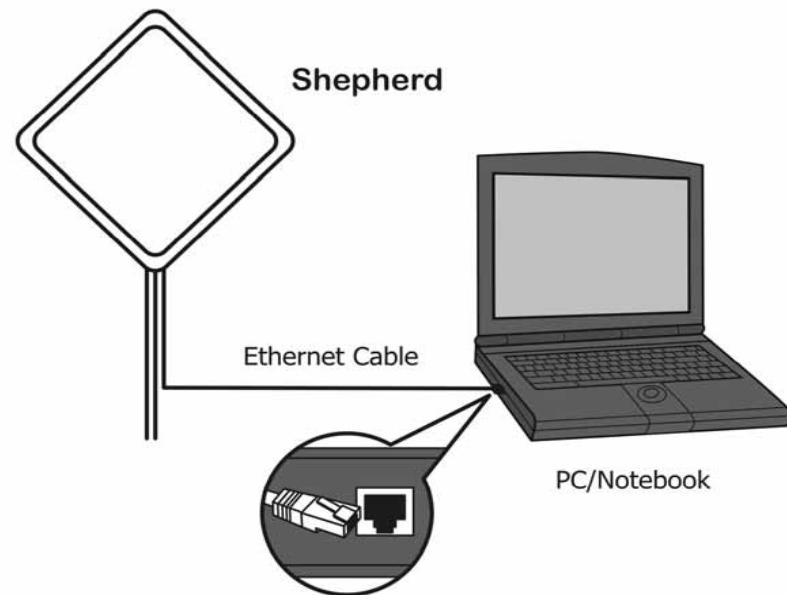


**Figure 3c**

2.  Connect the WTX5800 Transmitter to the power supply using either the power input or via the Ethernet cable and a PoE PSE unit, and power on.
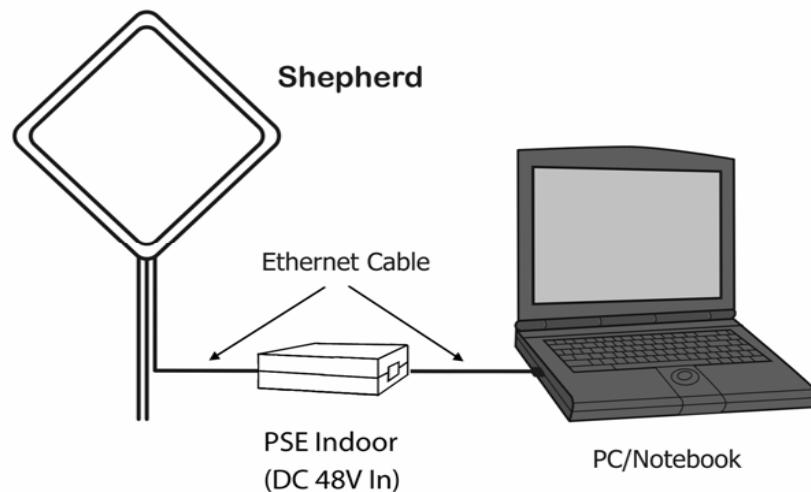


**Figure 3d**

3. Check the status of the **Local Network** icon on the of Windows toolbar.

- The Windows OS is making the necessary connections when the icon is showing:



**Figure 3e**

- Do not yet open MagicLink.

- When the Windows OS has successfully connected, the icon will show:
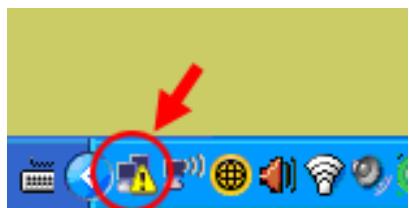


**Figure 3f**

- Open MagicLink on your computer.

4. The following MagicLink configuration window will appear:
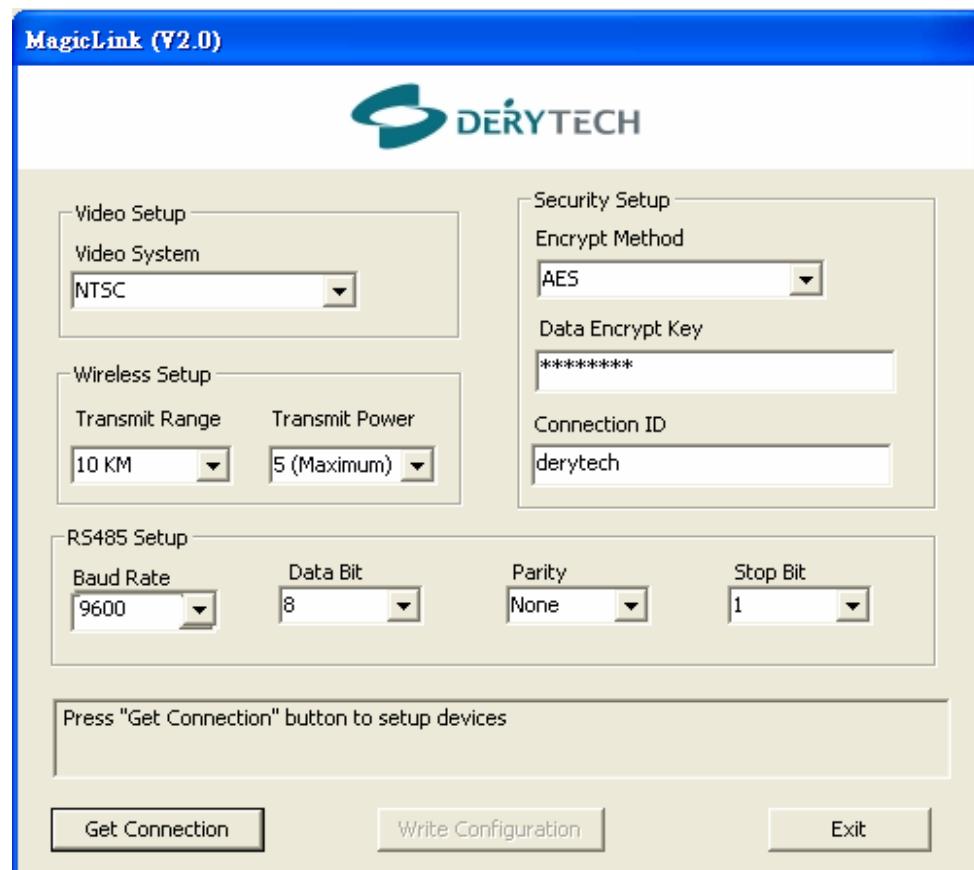


**Figure 3g**

● Click **Get Connection**.

5.   **Connecting to Device** will appear in the dialog section.



**MagicLink (V2.0)**

DERYTECH

Video Setup
Video System
NTSC

Wireless Setup
Transmit Range          Transmit Power
10 KM                   5 (Maximum)

RS485 Setup
Baud Rate       Data Bit        Parity          Stop Bit
9600            8               None            1

Connecting to Device...

Security Setup
Encrypt Method
AES

Data Encrypt Key
********

Connection ID
derytech

Get Connection     Write Configuration     Exit
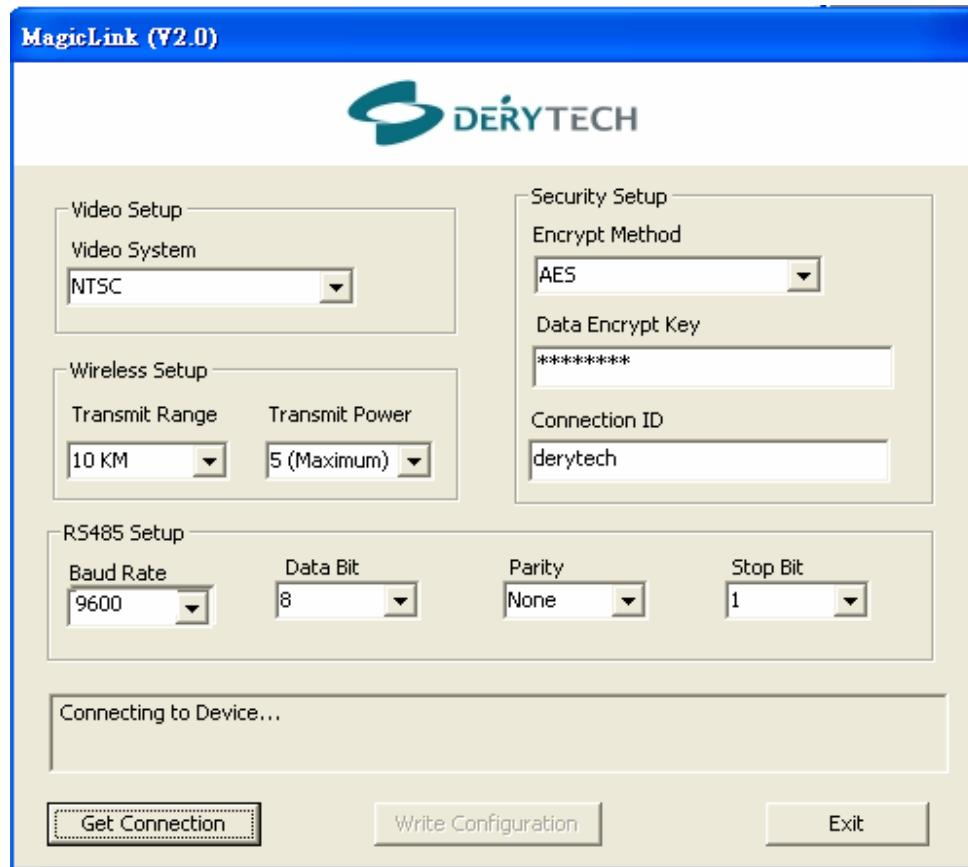
<p style="text-align:right"><strong style="color:teal">Figure 3h</strong></p>

**NOTE:** If **Connection Fail** appears in the dialog section, check all cables are properly connected and try again.

6.  If the connection is successful, **Connected** will appear in the dialog section.
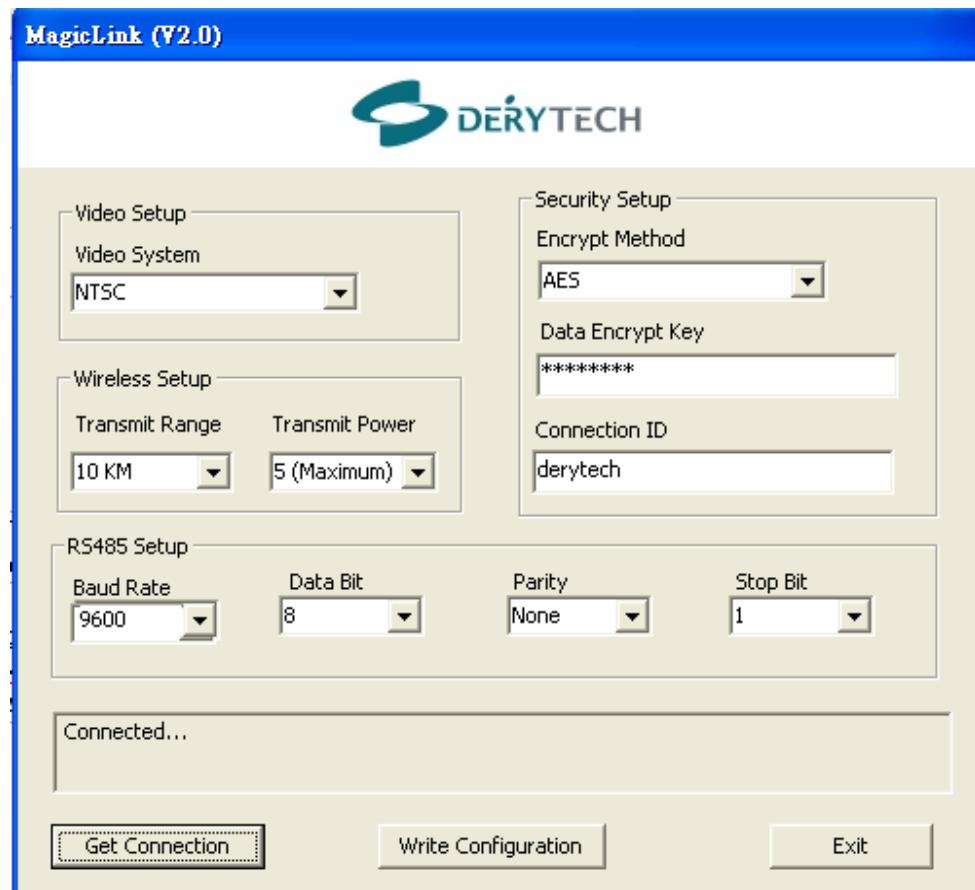
● Enter your required **Configuration Settings** (see below for Default Settings).

**NOTE:** All configuration settings must be the same for both the WTX5800 Transmitter and the WRX5800 Receiver, otherwise communication will fail.

**NOTE:** If the dialog section continues to show **Connecting to Device** and does not change to **Connected,** check your Antivirus software, which might view MagicLink as a virus. In your Antivirus Program Control Notice dialog, select **Permit Always**.



**Figure 3j**

# Configuration Default Settings

| Video Setup | | Default Settings |
|---|---|---|
| **Video System** | To select NTSC or PAL video format. | NTSC |
| **Security Setup** | | |
| (Note: If two or more Shepherd sets are used in the same area, each set must be configured with its own Encrypt Key and Connection ID settings to ensure the security of the connection.) | | |
| **Encrypt method** | Select Encrypt method AES or RC4<br><br>AES: The most secure wireless encryption available. The system generates and exchanges keys dynamically, so each data packet has its own key.<br>RC4: An encryption method that can be used with virtually all wireless Lan clients. | AES |
| **Data Encrypt key** | On the Shepherd, both AES and RC4 use the same 128-bit encryption Key. Input a key of 6~26 hexadecimal characters (letters of the alphabet (case sensitive) or numbers). The Data Encrypt Key cannot be left blank. | derytech |

| Connection ID | Input an ID of 1~ 8 hexadecimal characters [letters of the alphabet (case sensitive) or numbers]. The Connection ID cannot be left blank. | derytech |
|---|---|---|
| **Wireless Setup** | | |
| Transmit Range (Km) | To select the approximate distance between the transmitter and receiver for an improved transmission link [Options: 1~10 kilometers]. | 10 Kilometers |
| Transmit Power | To select the transmit power level. [Options: 1, 2, 3, 4, 5]. (In normal use, set to 5. When testing, if the TX and RX units are very close (10m), reduce TX Power to avoid signal saturation). | 5 (maximum) |
| **PTZ RS485 Setup (refer to the settings on your PTZ controller) \*No matter RS485 Full or Half duplex system you have, Just connect your system to proper lines(refer page 11~14) and you only need one set setting here in MagicLink** | | |
| Baud Rate | Options: 9600, 11.4K, 19.2K, 38.4K | 9600 |
| Data Bit | Options: 7, 8 | 8 |

| | | |
|---|---|---|
| **Parity** | Options: None, Even, Odd | None |
| **Stop Bit** | Options: 1, 1.5, 2 | 1 |

7. After inputting the desired configuration settings, click **Write Configuration**. The following window will appear:
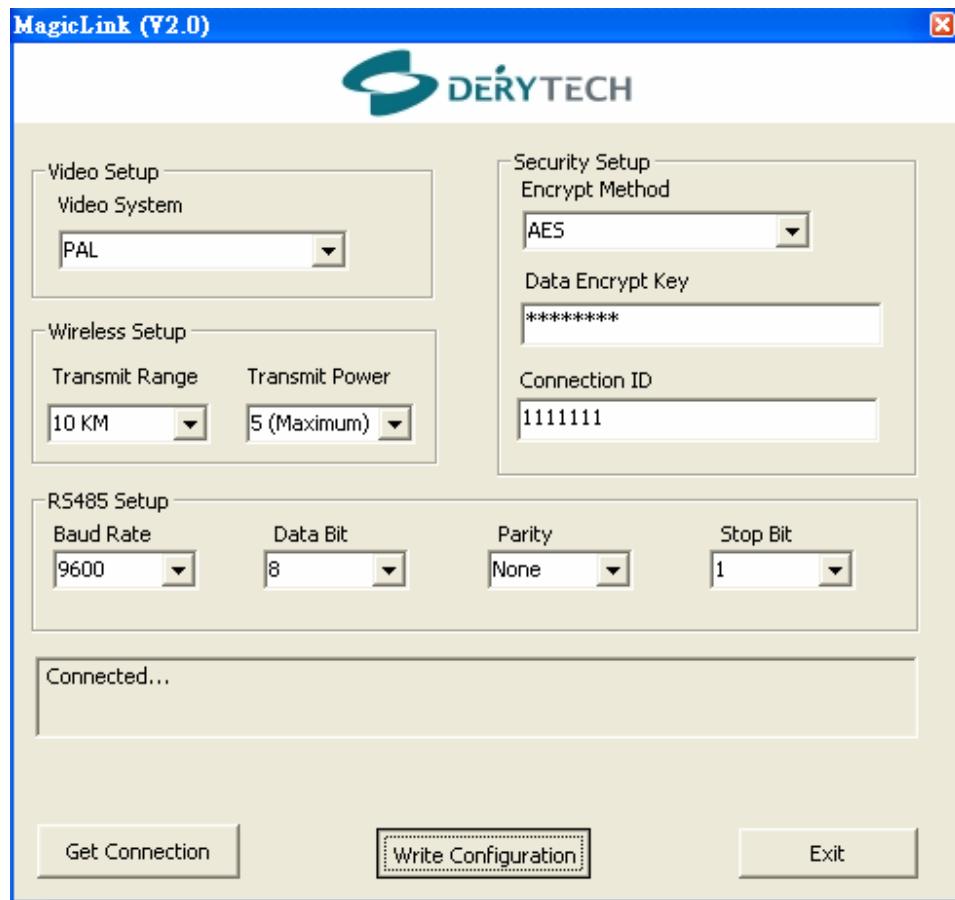


**Figure 3k**

● Wait for up to 1 minute for the settings to be written to the device.

8.  When the dialog section shows **Successfully**, configuration has been completed.
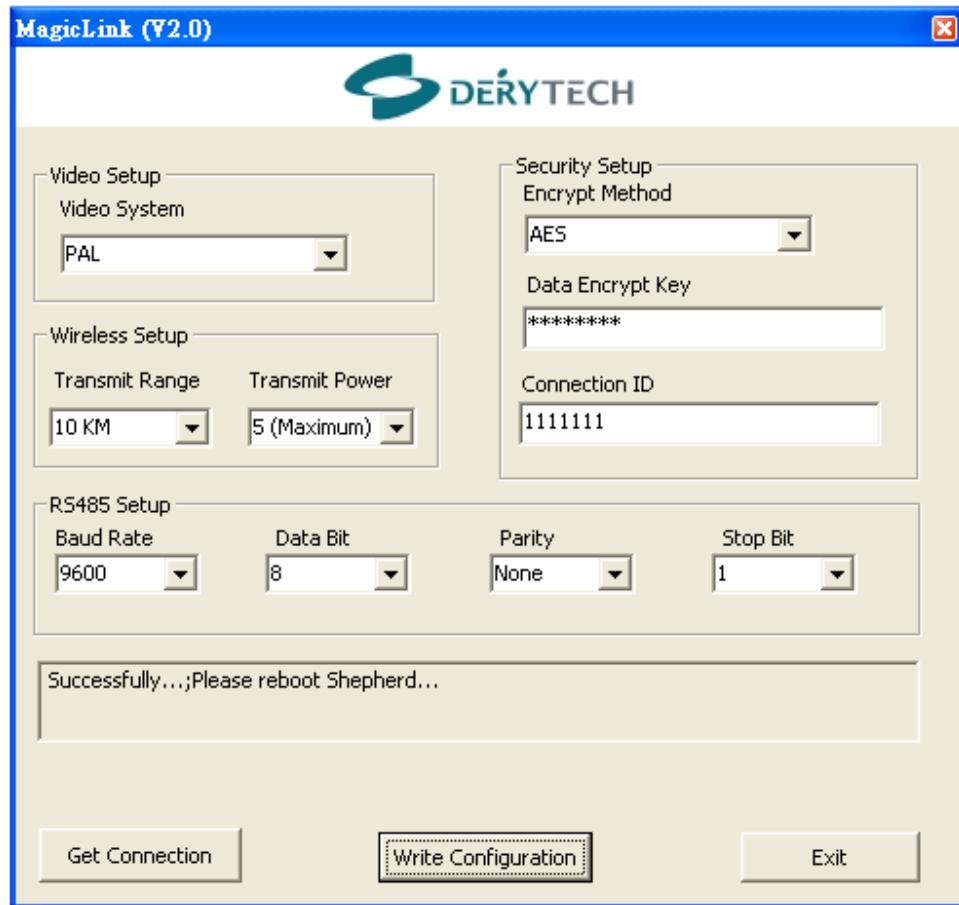


**Figure 3I**

●   Click **Exit**

● Power off the Shepherd then power on again to complete the re-configuration.

**NOTE:** If the dialog section shows **Timeout; Please check**, the configuration settings have failed to write to the device. Check all connections and follow procedures 1~8 again.
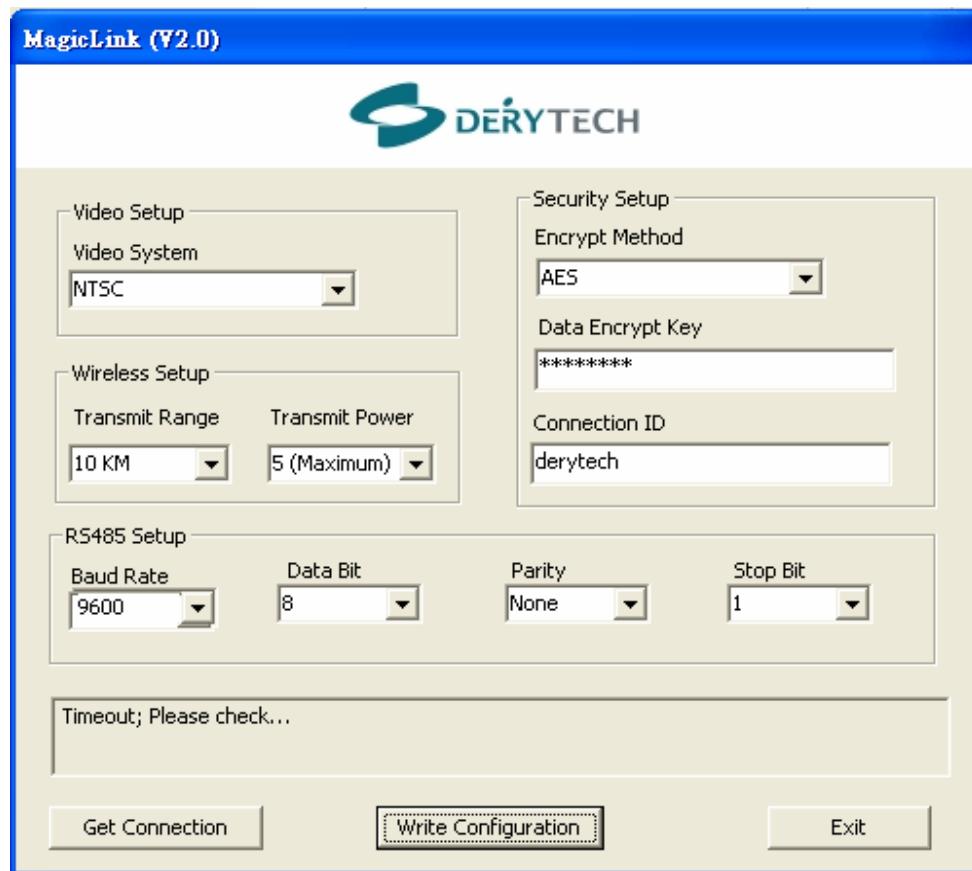
**Figure 3m**

9.  After Re-booting the Shepherd, open MagicLink again, click **Get connection** and check the configuration settings have been updated.



10.
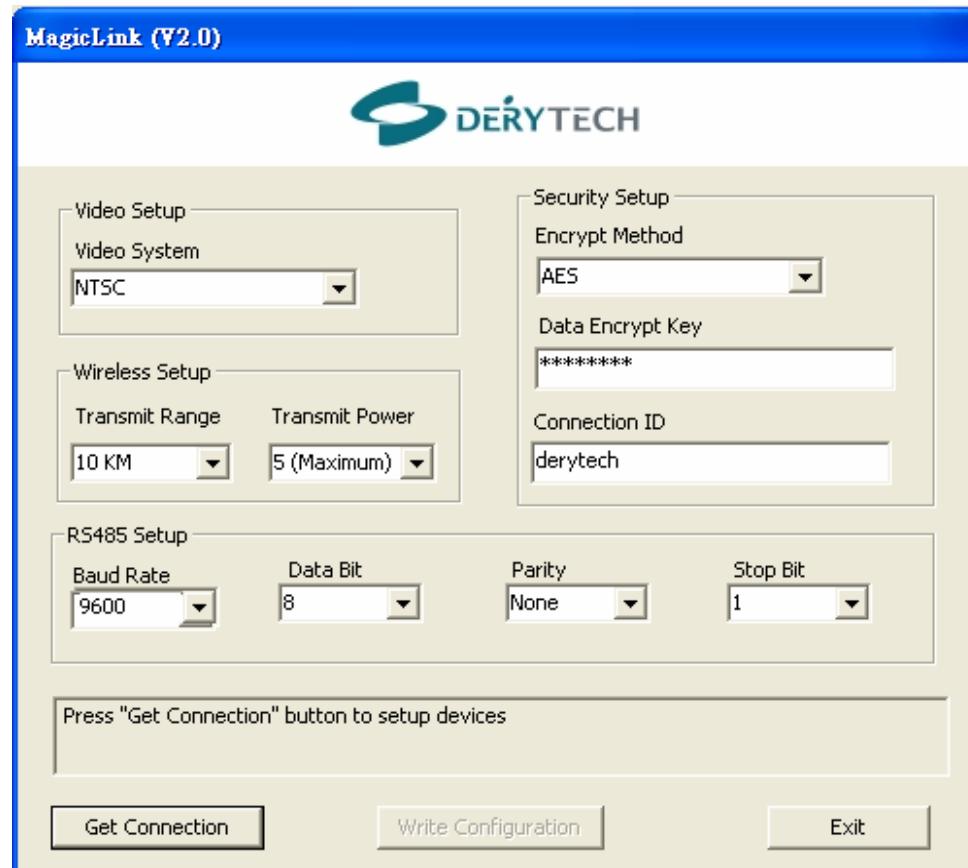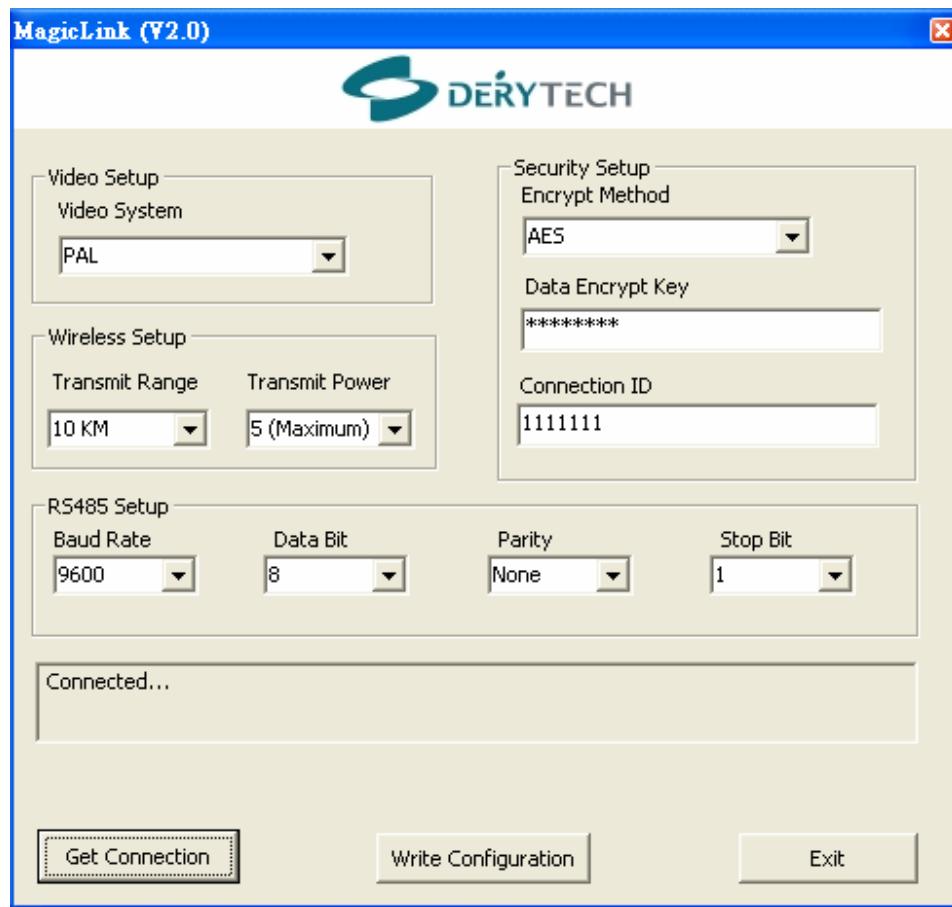
**Figure 3n**

- Click **Exit**.
11. Remove the Ethernet cable from your PC.

# Re-configuring the WRX5800 Receiver

To re-configure the WRX5800 Receiver, follow procedures 1-10 for configuring the WTX5800 Transmitter above.

**NOTE:** Be sure to use the same settings for the WRX5800 Receiver as have been used for the WTX5800 Transmitter. Take particular care when choosing and entering the **Data Encrypt Key** and **Connection ID**.

# 4. System Hardware Assembly and Installation

The Shepherd is a versatile and easy to use system, however, time and care should be taken when choosing suitable camera, transmitter and receiver locations and during installation.

## 4.1 System Location

To obtain the best possible picture quality and transmission distance, follow these general rules of thumb:

1.  Mount the transmitter and receiver as high as possible to avoid human and mechanical traffic and to reduce signal interference caused by the ground plane.

2.  Keep the transmission path as open as possible. Objects such as walls, roofs and anything metallic near the transmission path may cause interference to the signal.

3.  Ensure the transmitter and receiver antennas are angled as close to perfect face-to-face alignment as possible.

See the diagrams below.

**Mount the Transmitter and Receiver on poles to raise them above obstructions (as in B).**
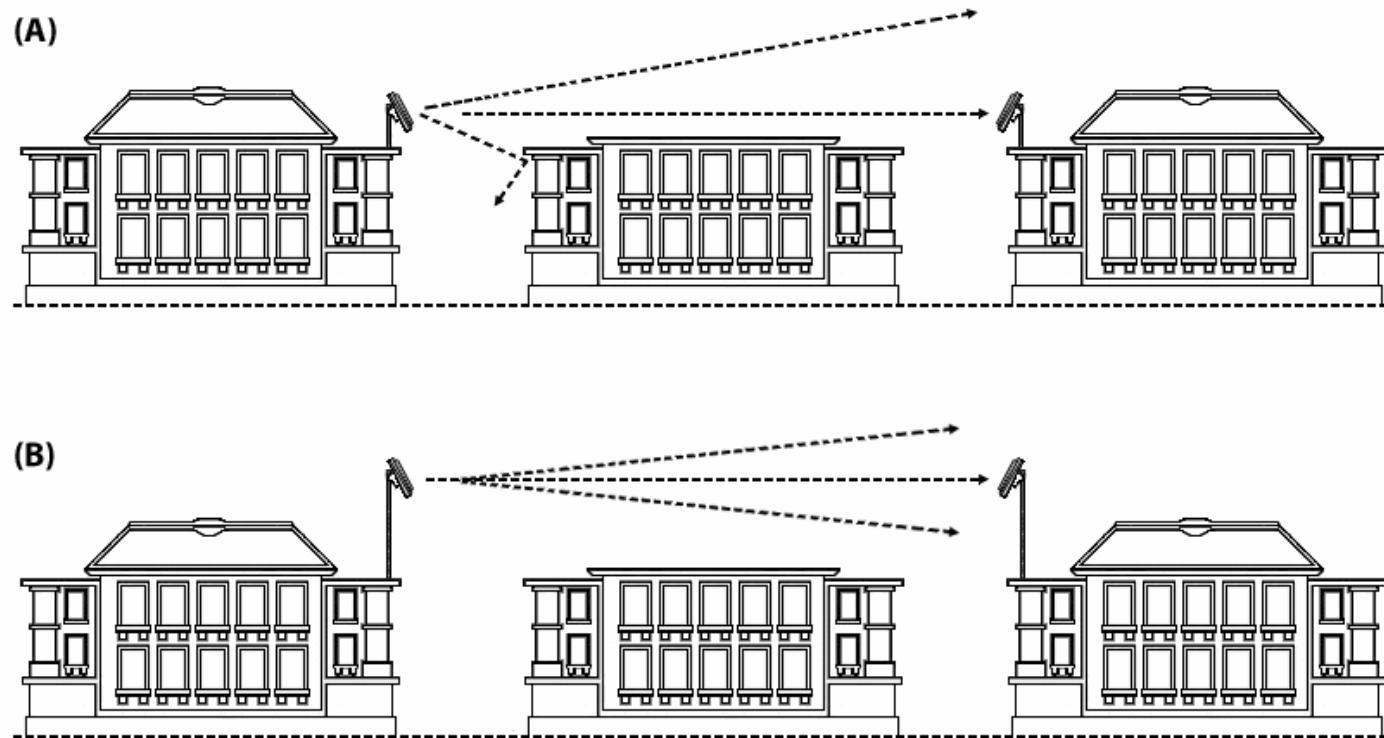


Figure 4a

**When locating Transmitters (and/or Receivers) on roof-tops, provide a clear line-of-sight and avoid the possibility of signal multi-pathing by raising them on poles or locating them on the edge of the roofs (as in B).**
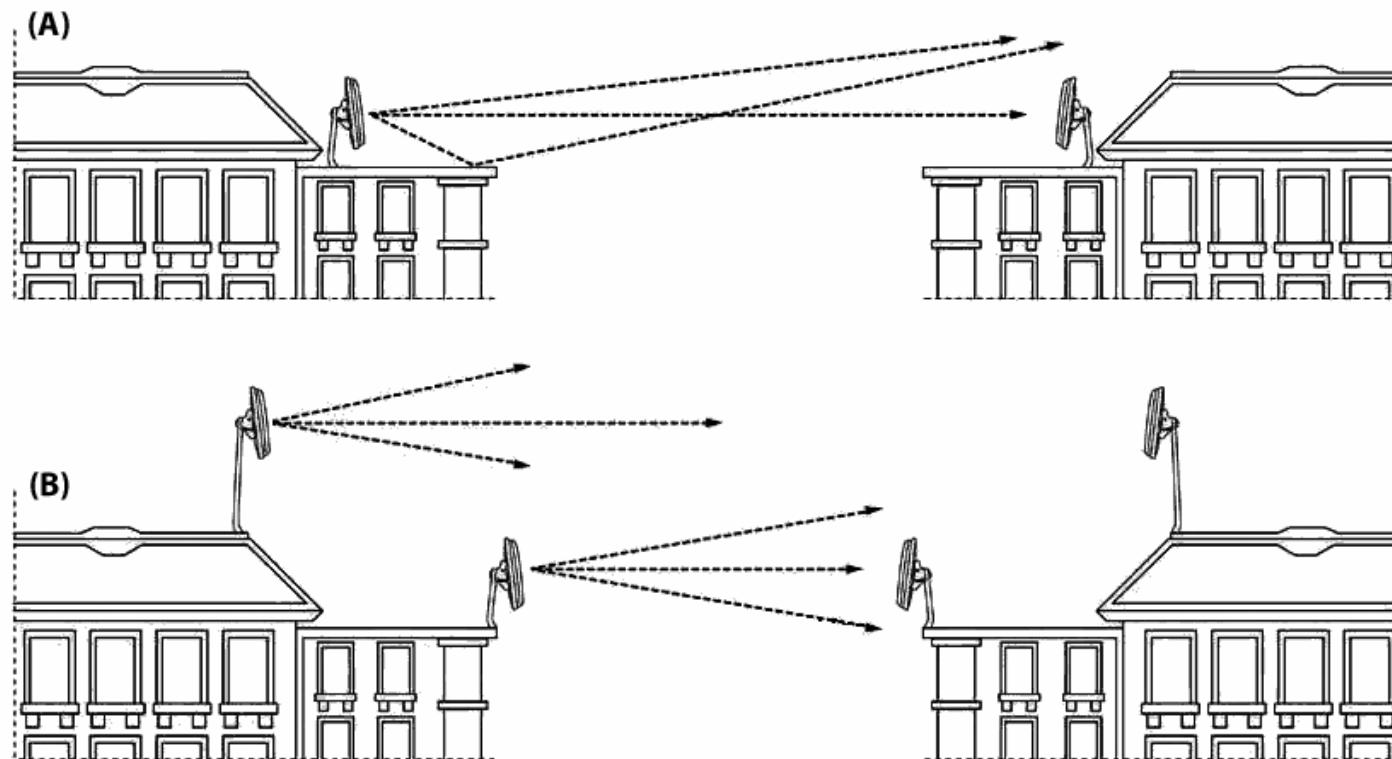


**Figure 4b**

**The ground plane causes multi-pathing and can significantly affect distance.**



**SIDE VIEW WALL**

20 FEET — PROBABLE RANGE 100% OF POTENTIAL

10 FEET — PROBABLE RANGE 50-75% OF POTENTIAL

5 FEET

PROBABLE RANGE 25-50% OF POTENTIAL

0 FEET
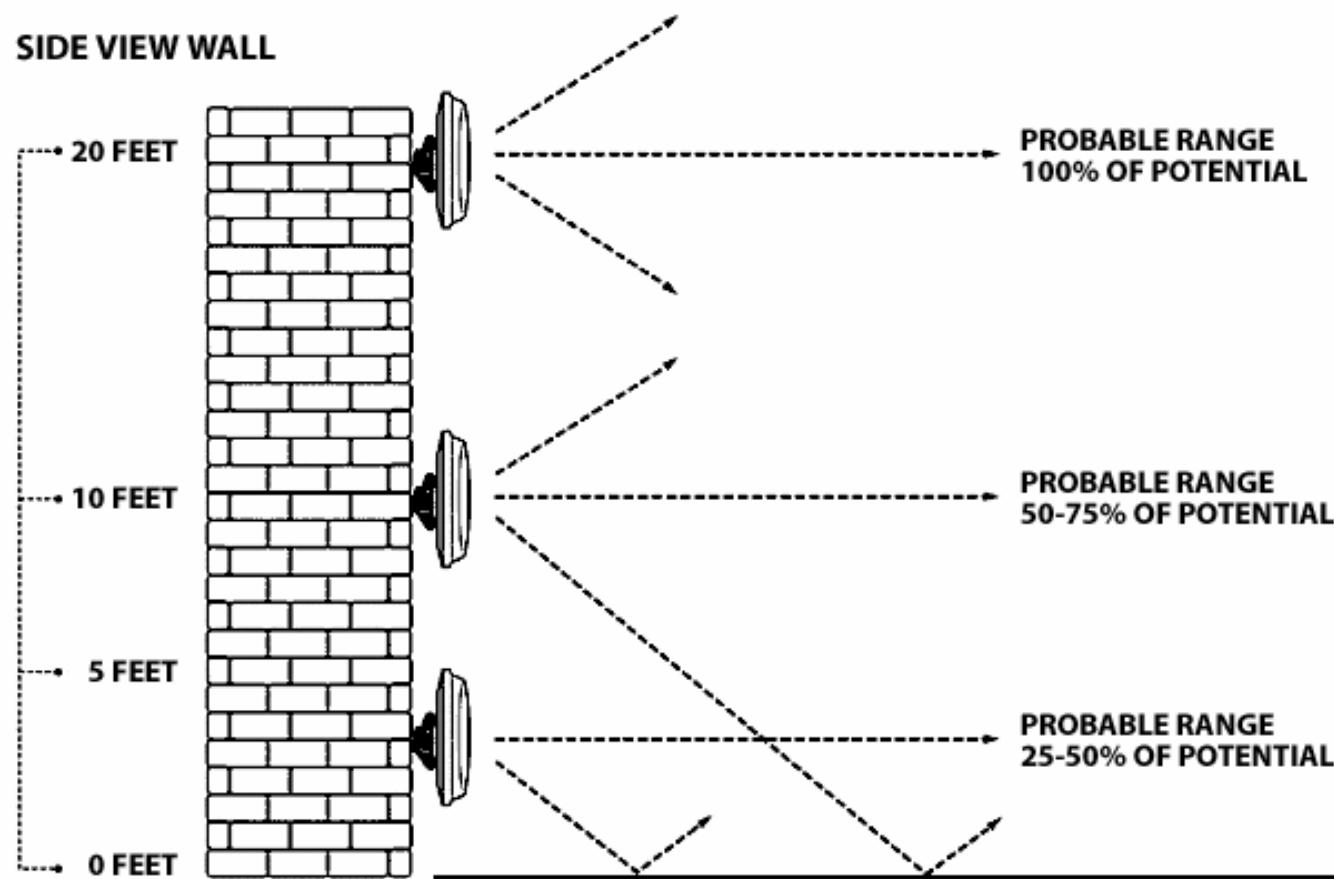
**Figure 4c**

## 4.2 System Assembly

The Shepherd transmitter and receiver units are easy to install on both poles and walls using our universal pole/wall mounting brackets.

## Before Commencing Installation

1. Verify proper operation of the camera and monitor/DVR using cable before attempting to install the wireless link.

2. Verify proper operation of the Shepherd wireless link in a convenient location.

3. Confirm that mounting poles and walls are strong enough to take the weight of the Shepherd units.

## Pole Mounting
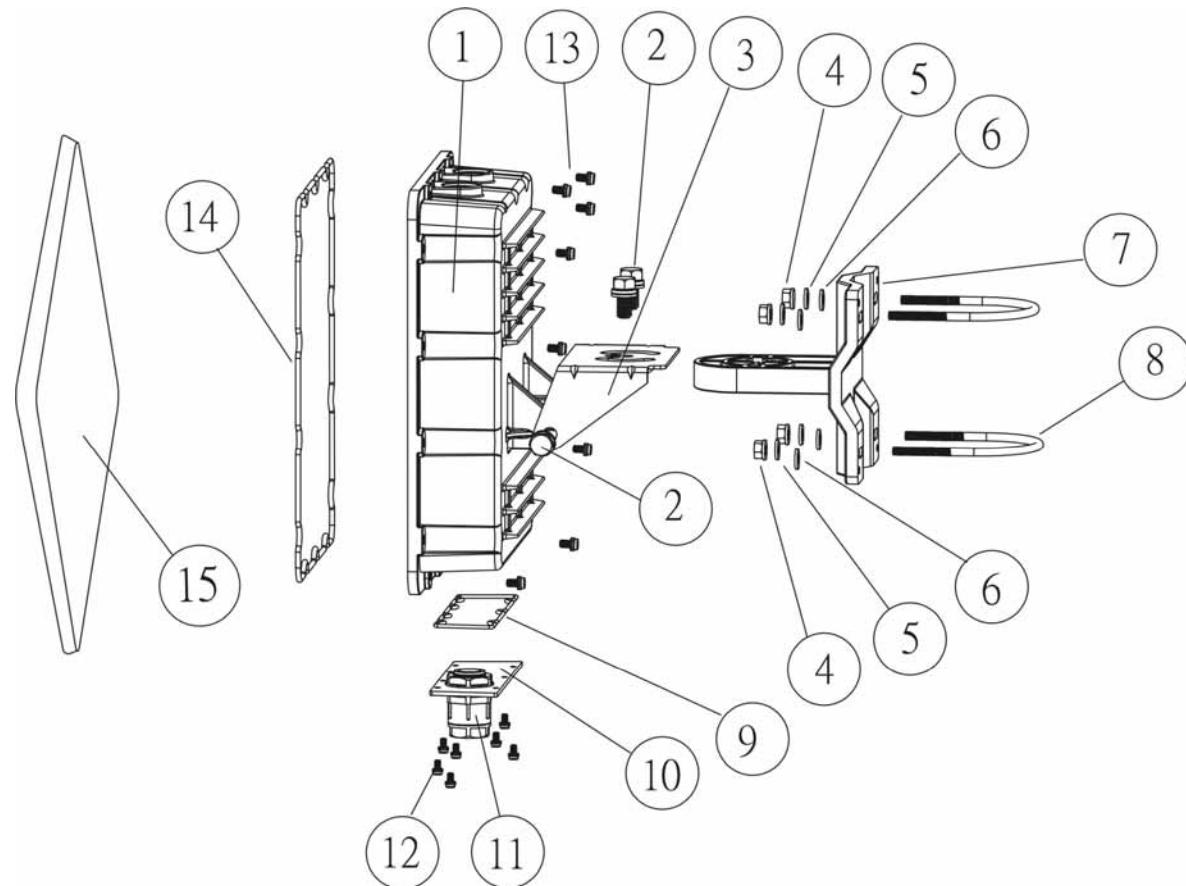


Figure 4d

## Wall Mounting
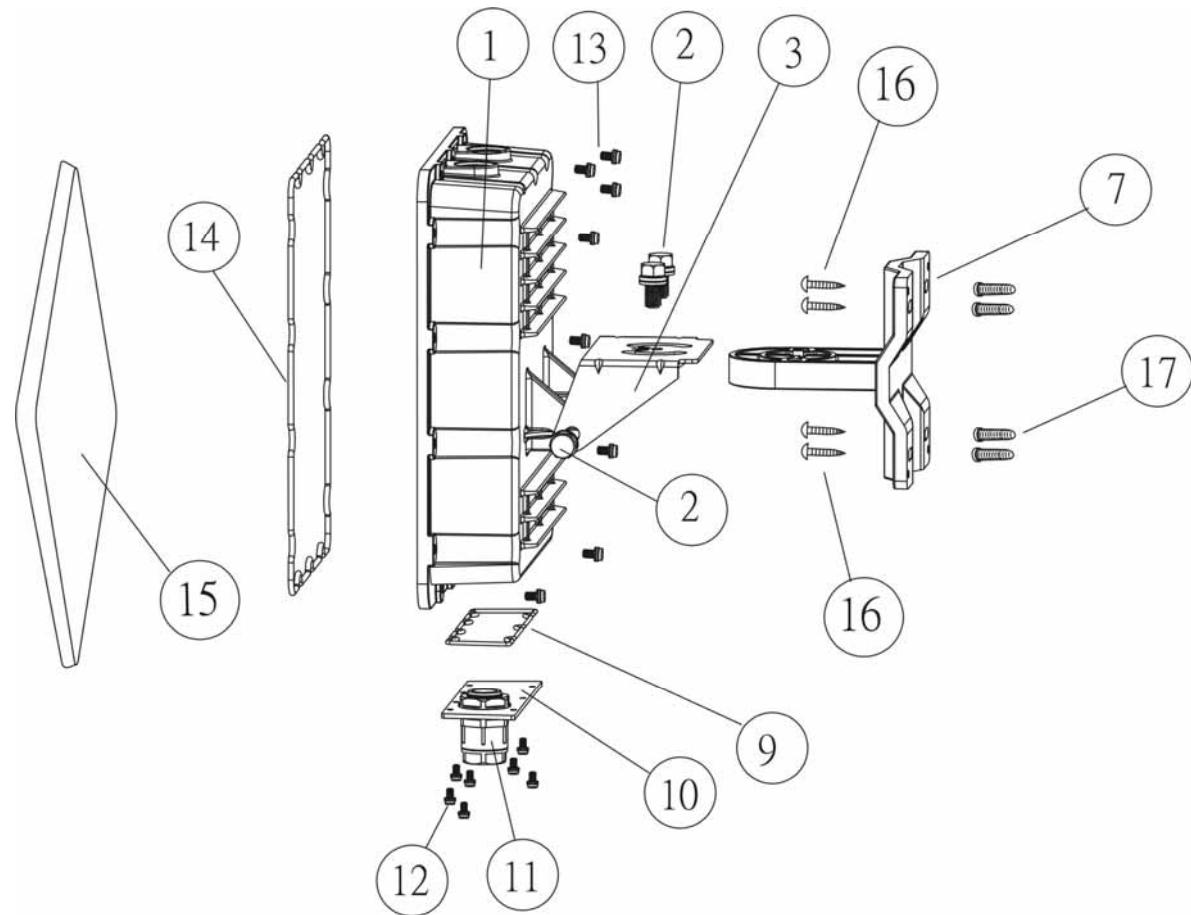


**Figure 4e**

| | | |
|---|---|---|
| 1 | ENCLOSURE | 1pcs |
| 2 | BOLTS M8*18mm | 4pcs |
| 3 | ROTATING BRACKET | 1pcs |
| 4 | NUTS 1/4" | 4pcs |
| 5 | SPRING WASHERS M6 | 4pcs |
| 6 | WASHERS | 4pcs |
| 7 | MOUNTING BRACKET | 1pcs |
| 8 | U-BOLTS 2 1/2" | 2pcs |
| 9 | BASE COVER RUBBER SEAL | 1pcs |
| 10 | BASE COVER | 1pcs |
| 11 | CABLE GLAND | 1pcs |
| 12 | BASE COVER SCREWS M3*8mm | 7pcs |
| 13 | ANTENNA SCREWS M4*10mm | 14pcs |
| 14 | ANTENNA RUBBER SEAL | 1pcs |
| 15 | ANTENNA | 1pcs |
| 16 | WALL SCREWS | 4pcs |
| 17 | WALL ANCHORS | 4pcs |

## 4.3 Aligning the Transmitter and Receiver

Correct alignment of the antennas is critical for achieving optimum performance and transmission distance. The longer the wireless video transmission range, the more important the alignment of the antennas becomes. For ranges of over one kilometer, correct alignment is measured in only a few degrees, both up and down, and left to right. Consider using a Global Positioning Satellite (GPS) handset to determine the Transmitter and Receiver angles accurately (using a GPS system allows a 10 Kilometer range to be aligned faster and more accurately than a 1 Kilometer range aligned "by eye").

**NOTE:** When aligning the Transmitter and Receiver, hold the units in each adjusted position for at least 3 seconds before checking the resulting signal / picture, as the system requires a short time for the processing and transmission of the digital signal.

**NOTE:** After alignment has been completed, tighten the bolts so that the units are secure and will not move in a strong wind.

1. To align antennas on the horizontal plane, carefully slacken the 2 bolts 2(a) attaching the Rotating Bracket to the Mounting Bracket to allow horizontal movement. When correctly aligned, tighten the bolts.
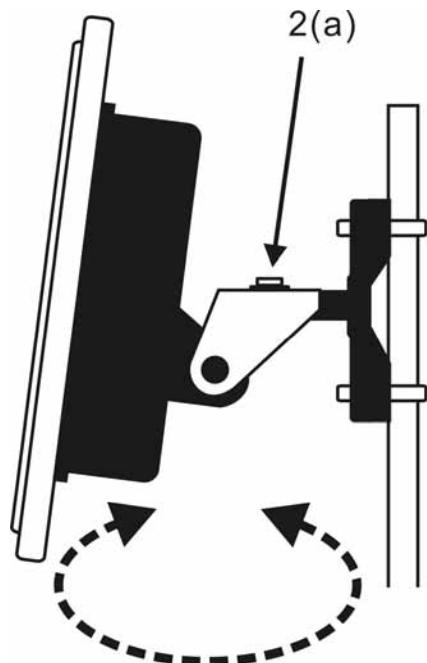


**Figure 4f**

2.  To align antennas on the vertical plane, carefully slacken the 2 bolts 2(b) attaching the Rotating Bracket to the Enclosure and tilt the antenna up or down. When correctly aligned, tighten the bolts.
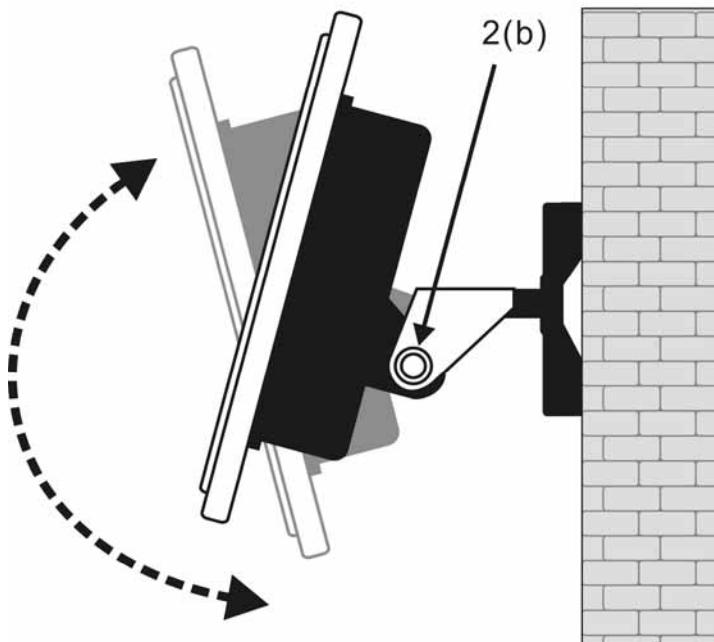


**Figure 4g**

# 5. Trouble Shooting

1. **NO PICTURE**

   - Check power is switched on for all units.
   - Check all connections are tight and secure.
   - Check the LED panel for signal strength.
   - Check alignment of the Transmitter and Receiver.
   - Verify proper operation of the camera and monitor using cable.
   - Verify proper operation of the Shepherd wireless link in a convenient location.
   - Confirm the configuration settings for both the Transmitter and Receiver are the same and that no fields have been left blank. Confirm Transmit Power is set at 5 (maximum).

2. **PICTURE NOT CLEAR (This indicates the signal is weak)**

   - When testing for proper operation of the Shepherd wireless link, if the Transmitter and Receiver are very close together (10m or less), the system might suffer from signal saturation. Reduce the Signal Power in both the TX and RX using MagicLink software. In normal operation, set to 5 (maximum)
   - Check the LED panel for signal strength. Confirm Transmit Power is set to 5 (maximum)
   - Verify all connections are tight and secure.
   - Confirm there are no obstructions between the Transmitter and Receiver (see below).
   - Confirm there are no other possible causes of interference (see below).
   - Check the Transmitter and Receiver units are mounted at similar heights. There should be no more than a 10

foot (3 metre) variance in height.

- Check the alignment of the Transmitter and Receiver. (Note that if the bolts used for fixing the alignment are not properly tightened, the units may blow out of alignment in strong winds).
- Raise the height of the Transmitter and Receiver units.
- Use MagicLink to increase the Range in both the Transmitter and Receiver units.
- Move the Transmitter and Receiver closer together.

**Possible obstructions and other causes of interference.**

- Water or anything with water in it, including people and other living things, snow, rain etc. can all reduce the transmission distance.
- Metals and anything containing metal—steel-reinforced concrete (rebar), metal window screens and tool-room cages, aluminum siding and wall insulation foil, even metallic paints, metallic wallpapers and mirrors will affect the quality of the signal.
- Lead windows kill radio transmission, as do windows with a UV protective coating or metallic energy-saving film.
- Other materials such as brick, drywall or wood, also cut down on the signal, depending on their water content.
- High Voltage transmission lines may cause interference to the signal.
- AC generators in close proximity to the Transmitter or Receiver may cause interference lines in the picture.

### 3. PICTURE TOO DARK

- Make sure that monitors and other peripheral equipment connected to the video source are set to high impedance termination since the Transmitter has a built-in 75ohm termination.

### 4. PICTURE TOO BRIGHT

- Make sure the Receiver video output line is terminated with 75ohm.

### 5. CANNOT CONTROL PTZ

- Check the twisted cable + and – are connected correctly.
- Check the RS485 PTZ settings in the Transmitter and Receiver are the same as on the PTZ Controller.

### 6. PTZ CONTROL IS NOT SMOOTH

- Check the RS485 twisted cables' connections are good.
- If the connection distance between the PTZ Controller and the Receiver is too long, reduce the baud rate on both the PTZ Controller and on the Shepherd Transmitter and Receiver.

**7.** The product is intended only for fixed point-to-point operation. The product is exclusively for fixed point-to-point operation and that operation in point-to-multipoint systems, omni-directional applications, or in applications with multiple co-located intentional radiators transmitting the same information is strictly prohibited.