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RADIOCONTACT
LIMITED



**WIRELESS TRANSMISSION
PRODUCTS
INSTALLATION GUIDE**

**X-CRYPT 5.8
5.8GHz WIRELESS TRANSMISSION SYSTEM**

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1 SECTION 1

1.1 General

Prior to any purchase of RF equipment a site survey should take place to determine if the equipment selected is suitable to the job in hand. During this visit particular attention should be paid to the mounting locations of the transmitter and receiver equipment. An estimate of transmission range should be made taking into consideration the height of the Rx/Tx equipment and its location to ensure direct line of site between Rx and Tx antennas.

It is important that before purchasing RF modems or video transmission equipment that the installation, application and specification documentation of the third party equipment to be integrated be carefully studied to ensure compatibility in terms of data rate, data protocol and video levels. Radiocontact Ltd cannot be held responsible for systems failing to operate correctly due to compatibility problems.

Before taking equipment to the customers site for installation ensure sufficient lab testing has been carried out to be familiar with the equipment and to confirm correct operation of all equipment to be installed, including third party equipment.

1.2 Field Trials

Before mounting the RF equipment permanently a Field Trial should be carried out to ensure the equipment will function satisfactorily at the site. This is particularly important in areas where there are steel structures, buildings, moving vehicles such as cars, cranes, trains etc. Checks should be made to ensure the required transmission range can be achieved and that there is no degradation of video picture quality or corruption of transmitted data due to other localised transmission equipment radiating on or near your selected frequency. Should interference be detected then it will be necessary to change transmission channel to avoid the interference. However should this not be possible then alternatives should be considered such as changing the polarisation of the antenna from vertical to horizontal.

1.3 Antenna Mounting

It is essential that all antennas should be mounted as high as possible from the ground. There should be no obstructions such as trees, buildings or cranes that could interfere with the direct line of sight, however the diversity reception features of this Digilink 5.8 ease this problem by working off the best received signal whether it is reflected off buildings or direct.

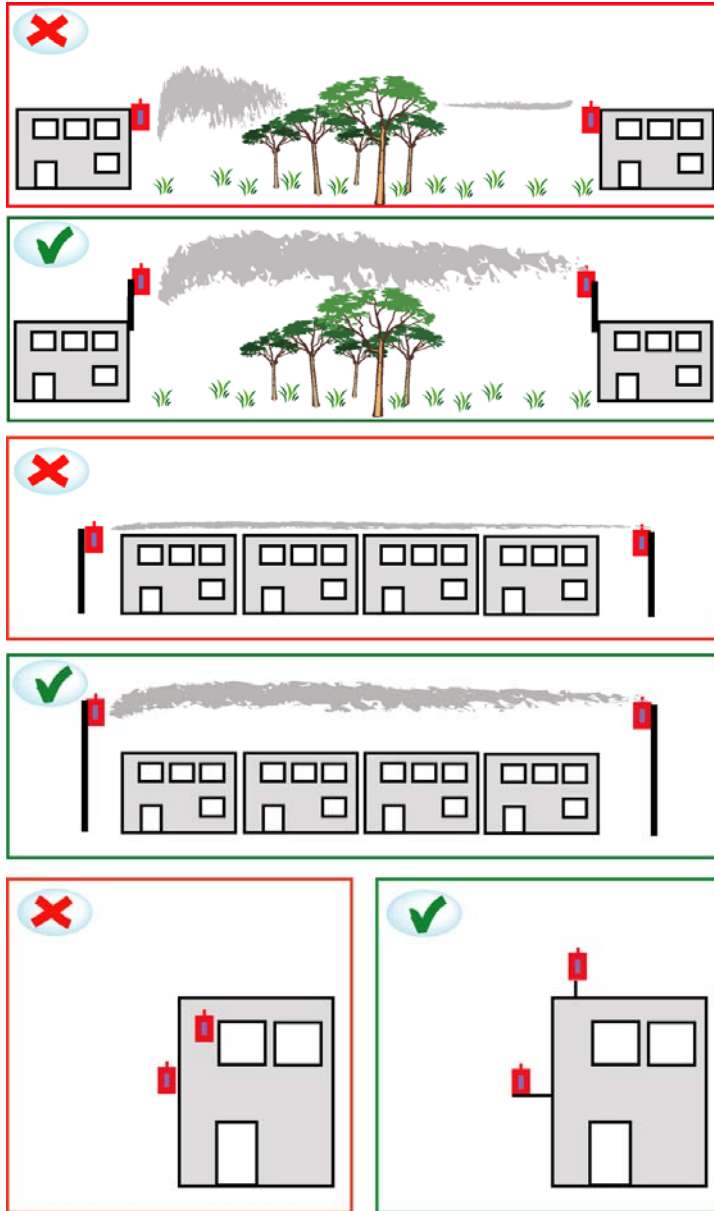
Equipment fitted with built-in stub antennas should be mounted with the antenna vertical. Sufficient space should be left between the antenna and the mounting pole or wall not to distort the RF signal. Normally a clearance space of 20 cm is required. This is to ensure maximum gain from the antenna. Buildings usually absorb some of the radiated energy while metal poles and towers can generate reflections producing “ghosting” on video systems and loss of data on telemetry systems. See Figure 1 for optimum mounting positions.

The maximum range of some Radiocontact systems can be increased using high gain directional antennas at the receiver. However it is important to ensure these are mounted as high as possible and aligned towards the transmitter antenna. These antennas can only be used on the Receivers. *It is illegal to fit these high gain antennas to Radiocontact transmitters as this will compromise the requirements of the License Exempt regulations to which the equipment has been Type Approved and could cause serious interference to other users.*

In cases where multiple antennas are required to be mounted on the same mast, then a separation distance of approximately 1m should be maintained between antennas. This is to avoid interference problems between the various receiver or transmitter local oscillator and sub-harmonic frequencies.

It should be noted that accurate antenna alignment cannot be carried out until the equipment is permanently installed. It may be necessary to move either the Tx or Rx antenna to optimise video picture or data quality. Small movements of up to $\frac{1}{4}$ wavelength can mean the difference between poor signal and good signal. A $\frac{1}{4}$ wavelength at 5.8GHz is 13mm.

Figure. 1: Antenna Mounting



1.4 Power Supplies

1.4.1 Only use analogue Power supplies

All Power Supplies used with Radiocontact RF modems and Video Transmission equipment **MUST** be analogue and **NOT** Switch Mode. Switch Mode power supplies generate and radiate a high level of switching noise at a frequency of around 150 – 200KHz. This can cause interference lines on video transmission equipment and corrupt data bits on RF modems.

It should also be noted that Radiocontact RF equipment operates from 12V DC. A normal tolerance on this voltage would be $\pm 0.5V$, therefore regulated power supplies are required. Unregulated 12V power supplies can produce voltages of 18-19V until the full supply current is taken. This can cause the internal surface mount fuse to blow due to the high surge current.

1.4.2 Do not use Power supplies designed for charging batteries

It is NOT permissible to operate this equipment from 12V rechargeable batteries as the output voltage from batteries of this type can be as high as 13.6V, un-filtered and can damage equipment. Should it be necessary to operate equipment from this type of battery then a suitable 12V DC regulator should be employed.

1.4.3 Do not share Power supplies with other equipment

Should it be necessary to power up several RF modems or video transmitters at the same location then separate analogue power supplies must be used. This is to prevent interference and crosstalk between the different systems.

1.4.4 Confirm 12V at the equipment end

All power supplies should be mounted as close as possible to the equipment. In situations where this may not be possible care should be taken to ensure that suitable low resistance cable is used for power connections. This is to minimise voltage drop along the power cable. When installation is complete it is necessary to measure the 12V DC supply AT THE EQUIPMENT END not the power supply to ensure it is within the $\pm 0.5V$ recommended limit, or within the voltage range specified on the equipment datasheet.

1.5 Safety

The installation of RF and CCTV equipment involves the equipment being installed at considerable heights outside buildings or on masts. It is essential that **ALL** Health and Safety Regulations are adhered to regarding the wearing of safety equipment.

2 SECTION 2

2.1 System Specifications

Table 1 Transmitter Technical Specification

CHANNAL	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
FREQUENCY	5740 MHz	5760 MHz	5780 MHz	5800 MHz	5820 MHz	5840 MHz	5860 MHz	5740 MHz
RF ANT. IMPEDANCE	50 Ω Typical							
POWER	DC12V/1.5A Adaptor							
CURRENT	350mA							
DC OUTPUT	DC12V/750mA							
OUTPUT POWER	10mW							
VIDEO INPUT	1 Vp-p Composite @ 50 Ω							
AUDIO INPUT	2 Vp-p @ 600 Ω Typical							
ALARM INPUT	TTL/CMOS (Level Detection)							
DIMENSIONS	L:85 mm		H:30 mm		D:16 mm			

Table 2 Receiver Technical Specification

CHANNAL	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
FREQUENCY	5740 MHz	5752 MHz	5771 MHz	5790 MHz	5809 MHz	5828 MHz	5847 MHz	5760 MHz
RF ANT. IMPEDANCE	50 Ω Typical							
Minimum Receiver Sensitivity	-84dBm							
POWER	DC12V/500mA Adaptor							
CURRENT	380mA Max.							
VIDE OUTPUT	1 Vp-p Composite @ 75 Ω							
AUDIO OUTPUT	2 Vp-p @ 600 Ω Typical							
ALARM OUTPUT	NC/NO/COM (Dry Contact) Contact Rating: AC 125V / 0.5A ; DC 24V / 1A							
DIMENSIONS	L:85 mm		H:30 mm		D:160 mm			

3 SECTION 3

3.1 X-Crypt 5.8 Connection and Setup Procedure

The X-Crypt 5.8 video transmission system is RF equipment therefore the installation guidelines detailed in Section 1 apply and should be thoroughly read and understood.

This equipment is capable of transmitting mono audio and analogue video over a range of up to 1000m on up to 8 different RF channels, assuming a clear Line Of Sight with no obstructions and proper installation.

Note, to avoid potential interference from other 5.8GHz transmitting devices, such as 802.11 a/b/g routers, a separation distance of 3 – 5 meters should be maintained.

This unit comes in its packaging with the front panel antenna disconnected from the rear panel. This is to avoid potential damage when unpacking. It is important that the SMA connector at the end of the antenna cable is attached to the antenna, and that the antenna is fitted to its housing with the correct polarity, i.e. vertical polarisation.

3.2 X-Crypt 5.8 Tx

3.2.1 Audio/Video/Power Connection

Connect the external camera audio (Phono) and video (BNC) cables as shown in Figure 2 below. Ensure the DC Power cable is fitted to the power socket as shown and also the polarity of the DC Power connector is correct, i.e. centre positive.

3.2.2 Channel Selection and Encryption

Using the blue DIP switch, see Figure 3 below, set the desired transmission channel as detailed in Table 3. If Encryption is required the ID address should be selected using switches 1 to 3 on the red DIP switch as detailed in Table 4. If Encryption is not required switches 1 to 3 should be set to OFF. Note that the same DIP switches should be selected on the X-Crypt Receiver. If this is not the case the red “Power On” LED on the receiver will flash slowly and no comms will be established.

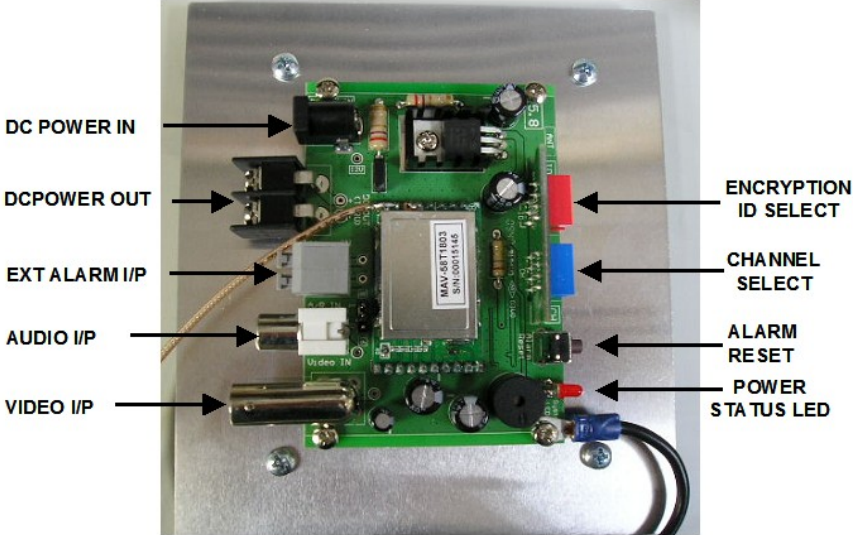


Figure 2 X-Crypt 5.8 Transmitter Connections

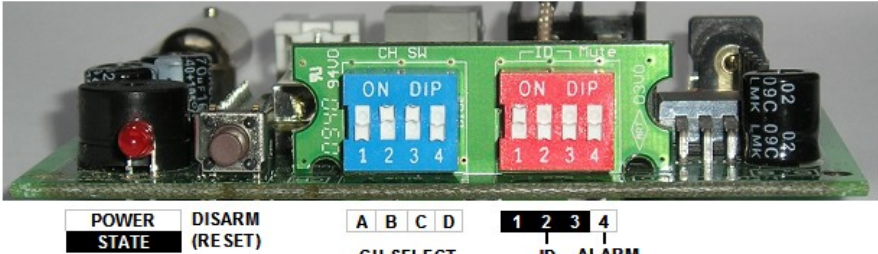


Figure 3 Tx Channel and Encryption DIP Switches

3.2.3 External Alarm Connection

Should connection to an external alarm sensor be required, e.g. PIR, then the normally open relay contacts of the device should be connected to the grey PCB connector as shown in Figure 4 below. Note that cables are connected by pushing the grey buttons in and sliding the bared end of the cable into the hole. Releasing the button causes the cable to be firmly gripped by the connector.

If indication of an alarm event is required then “Alarm Mute” switch (4) on the red DIP switch should be set OFF, enabling the on-board buzzer. Setting this switch to ON will disable the on-board buzzer, however alarm function will continue to operate and the red “Power On” LED will continue to flash. The alarm will sound for 20 seconds and then automatically reset. If an earlier reset is required then the reset pushbutton shown in Figure 4 below should be pressed, assuming easy access.

If +12V DC power is required for the associated camera this can be supplied via the black screw terminal connectors shown in Figure 4 below. Note that the maximum current available is 750mA, when a 1A power supply is used.

Red “Power LED” – note that when the transmitter is powered up the red LED will illuminate continuously. When the alarm input is triggered the red LED will flash for the duration of the alarm period. Transmitter Unit Power LED functions are summarised as follows:-

Indications	Power/State LED
Power On	Lit Continuously
ARM	High Speed Flashing

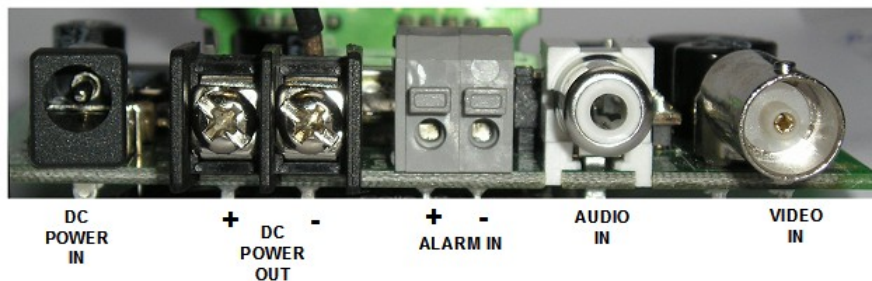


Figure 4 X-Crypt Tx Connections

3.3 X-Crypt 5.8 Rx

3.3.1 Audio/Video/Power Connection

Connect the external camera audio (Phono) and video (BNC) cables as shown in Figure 5 below. Ensure the DC Power cable is fitted to the power socket as shown and also the polarity of the DC Power connector is correct, i.e. centre positive.

3.3.2 Channel Selection and Encryption

Using the blue DIP switch, see Figure 6 below, set the desired transmission channel as detailed in Table 3. If Encryption is required the ID address should be selected using switches 1 to 3 on the red DIP switch. If Encryption is not required switches 1 to 3 should be set to OFF. Note that the same DIP switches should be selected on the X-Crypt Transmitter. If this is not the case the red “Power On” LED on the receiver will flash slowly and no comms will be established.

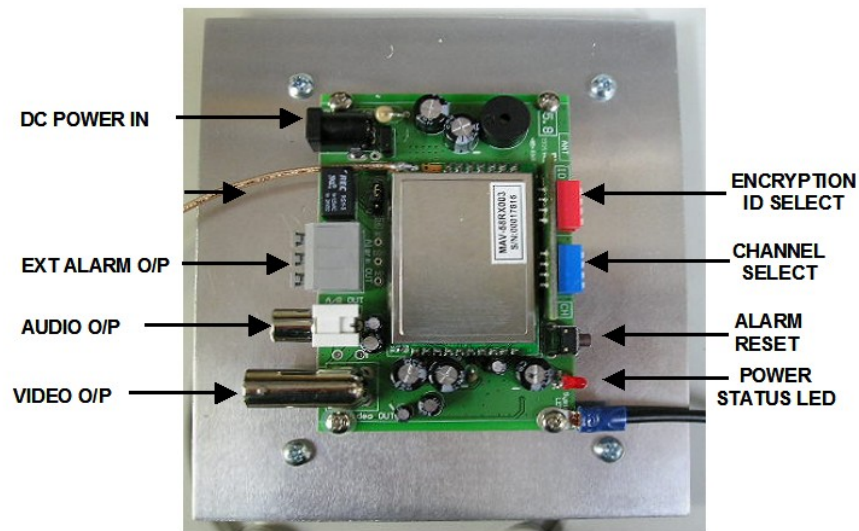


Figure 5 RX-Crypt 5.8 Receiver Connections

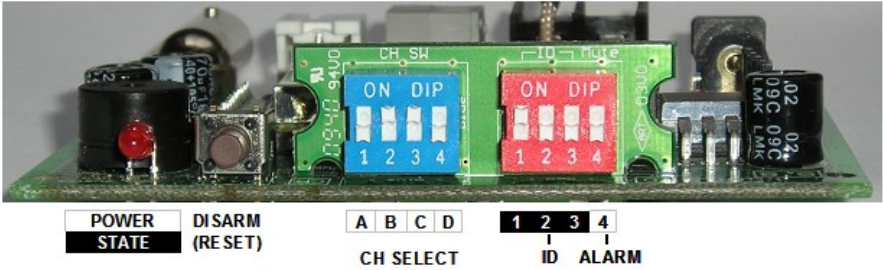


Figure 6 Rx Channel and Encryption DIP Switches

3.3.3 External Alarm Connection

Should connection to an external alarm indicator be required, e.g. siren or lights, the device should be connected to the grey PCB connector as shown in Figure 7 below. Note that cables are connected by pushing the grey buttons in and sliding the bared end of the cable into the hole. Releasing the button causes the cable to be firmly gripped by the connector.

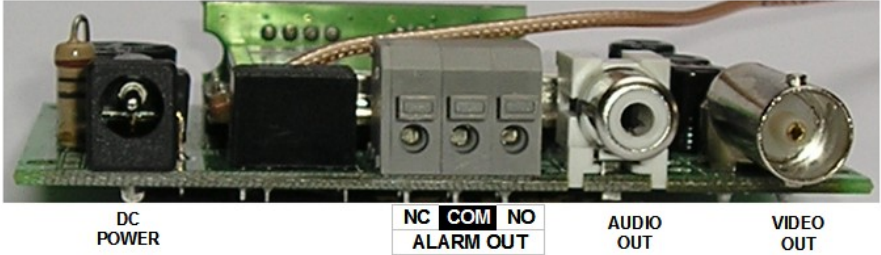


Figure 7 X-Crypt Rx Connections

If indication of an alarm event is required then “Alarm Mute” switch (4) on the red DIP switch should be set OFF, enabling the on-board buzzer. Setting this switch to ON will disable the on-board buzzer and the alarm output functionality, however the red “Power On” LED will continue to flash. The alarm will normally operate for 20 seconds and then automatically reset. If an earlier reset is required then the reset pushbutton shown in Figure 4 below should be pressed, assuming easy access.

3.3.4 Red “Power LED”

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Note that when the receiver is powered up the red LED will illuminate continuously. When the alarm input is triggered the red LED will flash for the duration of the alarm period. This red LED will also flash if the RF channel or Encryption ID do not match that of the transmitter. Receiver Unit Power LED functions are summarised as follows:-

Indications	Power/State LED
Power On	On Continuously
ARM	High Speed Flashing
RF Loss/Waiting For Tx Link	Low Speed Flashing

CHANNEL	CH SELECT	FREQUENCY (MHz)	CHANNEL	CH SELECT	FREQUENCY (MHz)
CH1	ON ↑ A B C D [][][][]	5740	CH5	ON ↑ A B C D [][][][]	5809
CH2	ON ↑ A B C D [][][][]	5752	CH6	ON ↑ A B C D [][][][]	5828
CH3	ON ↑ A B C D [][][][]	5771	CH7	ON ↑ A B C D [][][][]	5847
CH4	ON ↑ A B C D [][][][]	5790	CH8	ON ↑ A B C D [][][][]	5860

Table 3 Channel Selection

Bit 1	Bit 2	Bit 3	ID Address (Pairing with RX)	Bit 4	Alarm Mute
0	0	0	0	0	ON
0	0	1	1	1	OFF
0	1	0	2		
0	1	1	3		
1	0	0	4		
1	0	1	5		
1	1	0	6		
1	1	1	7		
(1 = SW ON, 0 = SW OFF)					

Table 4 Encryption ID Selection

3.4 X-Crypt 5.8 Final Assembly

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Ensure both transmitter and receiver are connected as detailed previously. Check that both Rx and Tx are set to the same RF channel and have the same Encryption ID settings.

Connect the flying SMA connector to the antenna front panel and fit the front panel to the rear enclosure using the four corner screws as supplied. Ensure both Rx and Tx front panel antennae are fitted in the correct orientation, i.e. arrows vertical for vertical polarisation. Failure to do this will significantly affect transmission range.

Fit the pole mounting kit to the rear enclosure and secure to the fixing pole as required. Note that the Transmitter and Receiver units must face each other otherwise transmission range will be reduced.

This unit comes in its packaging with the antenna front panel disconnected from the PCB antenna cable. This is to avoid potential damage when unpacking. It is important that the SMA connector at the end of the antenna cable is attached to the antenna, and that the antenna is fitted to its housing with the correct polarity, i.e. vertical polarisation.

4 SECTION 4

4.1 General Troubleshooting Guidelines

The following section describes some of the most common problems encountered during installations of both video and telemetry equipment, and possible solutions. Frequency and data selection links should be installed after this installation manual has been thoroughly read and understood and before the equipment is installed in its final location. In the event of the system not working the first things to check are the following:

4.1.1 No reception of any kind

- a) Check power supply is ON, and power is being delivered to the equipment, i.e. +12V at the connector and that the red “Power On” indicator is illuminated continuously.
- b) Ensure correct polarity is used at the power connector, i.e. centre pin +ve.
- c) Ensure the power supply is of the adequate rating for the equipment, i.e. 12V Reg. 1A
- d) Ensure sure the correct channel on both Rx and Tx has been selected. If this is incorrect the red “Power On2 LED on the receiver unit will flash slowly.
- e) Ensure the correct Encryption ID on both Rx and Tx has been selected. If this is incorrect the red “Power On2 LED on the receiver unit will flash slowly.

4.1.2 Poor reception/Poor Quality Picture or Data

Causes of this problem can be varied but generally fall into 3 categories:-

- a) Weak received signal – poor system sensitivity
- b) Same channel interference
- c) Adjacent channel interference

4.1.2.1 Weak received signal – poor system sensitivity

If the video picture quality or data quality is poor check the following:

- a) Transmission range is within the capabilities of the equipment used.
- b) Make sure the units are not installed near metallic surfaces.
- c) Antennas should be the correctly aligned and the same polarity for each unit.
- d) Rx/Tx equipment should be mounted as high as possible with direct line of sight.
- e) Ensure equipment is mounted off the support structure as described in Section 1 as antennas mounted close to metal structures can cause signal reflections and multi-path effects which reduce the strength of the signal appearing at the receiver.
- f) Due to the nature of RF signal transmission, increases in sensitivity can be achieved by moving the position of equipment by a few centimetres. This may increase the signal strength enough to resolve the problem.
- g) Switch off the transmitter and observe output of the receiver on a suitable monitor. For analogue video systems “snow” should be seen on the monitor. If another picture or distorted image is present then the problem is due to external interference and a different channel should be selected.

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- h) Reduced sensitivity can also be caused by strong signals in the same frequency band but not on the operating frequency. This has the effect of swamping the front end of the receiver causing it to partially or fully shut down due to the operation of its internal Automatic Gain Control (AGC) circuits. This leads to a loss in sensitivity and a reduction in the strength of the signals at the receiver. This type of problem should be identified during the initial site survey. The solution is to change transmission channel on both Rx and Tx modules until the problem disappears. Should it not be possible to find a “good” channel then the source of the interfering signal must be found and agreement reached on either changing frequency or time sharing.

4.1.2.2 Adjacent Channel interference

- a) Adjacent channel interference is where another transmission system is broadcasting on one of the other channels within the band you are using. Problems of this nature normally only exist if the other transmission source is mounted too close to your receiver. The normal solution to this problem is to increase the separation distance between the two equipments concerned or to select another channel.
- b) If interference from an external source persists the polarisation of the antenna may be changed from vertical to horizontal. This involves removing the four fixing screws to the back panel and removing the front panel antenna, rotating through 90 degrees and securing again with the four fixing screws.
- c) Care should be taken when removing the antennas front panel so as not to break the antenna cable. There is sufficient length to allow for rotation of the antenna.

4.2 Summary

The following is a list of the most common video transmission problems and troubleshooting information:-

4.2.1 Black picture on the monitor

- Make sure both Tx/Rx are powered and on the same channel.
- Check that a video source is connected to the input of the Tx and the output of the Rx is connected to the monitor/matrix/mux.
- Check video cables for correct connection and if necessary continuity.

4.2.2 Noise (Snow) on the monitor

- Make sure Tx is powered.
- Check that the Tx channel matches that of the Rx.
- Make sure the correct antennas are used and are connected properly.

4.2.3 Scrolling picture

- Make sure the V-Hold of the monitor is not responsible.
- If the scrolling picture is also of poor quality or dark the video level might be too low causing loss of sync pulse.
- Check termination's at both the Transmitter end (if the signal is coming from a source other than a camera) and Receiving end (check for any double terminations).
- Check the level of the video source connected to the Tx.

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- Radiocontact Transmitters have an internal termination so for the correct level of 1V p-p to be transmitted the video source must be 2V p-p.

4.2.4 B&W instead of colour picture on the monitor

- Make sure the chroma control of the monitor is not responsible.
- Make sure the camera used is not B&W
- If the picture is also of poor quality the video level might be too low.
- Check termination's at both the Transmitter end (if the signal is coming from a source other than a camera) and Receiving end (check for any double terminations).
- Check the level of the video source connected to the Tx.
- Move the links up - down - left - right and watch the monitor for improved quality.
- Should the problem persist then equipment should be substituted one unit at a time until the defective item is identified.

4.3 Disposal Instructions



This symbol on products means that the product concerned should not be mixed with general household waste.

WEEE Compliance B2B Terms & Conditions

The B2B end user is responsible for all liabilities regarding the environmentally sound disposal of this EEE when it is discarded as WEEE.

The producer may, for commercial reasons only, offer a take back option when a B2B end user is purchasing a new product, however, this will be decided on a case by case basis and may incur a charge.

For local environmental sound disposal please contact 0845 257 7024 or info@weelight.co.uk for a free no obligation quote for the removal of WEEE items from a B2B end user.

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