User's Guide

Digital Wireless Triax camera system v1

For SD cameras

Declaration of Conformity

We, Grass Valley Nederland B.V., Kapittelweg 10, 4827 HG Breda, The Netherlands, declare under our sole responsibility that the LDK 5450, LDK 5451, LDK 4450, LDK 4452, LDK4453 and LDK4454 is in compliance with the following standards:

    EN60950 : Safety
    EN301489-3   : EMC for Radio Devices
    ETS 300 220   : Radio
    ETS 300 440   : Radio

following the provisions of:

    RTT&E Directive 1999/5/CE

We, Grass Valley Nederland B.V., Kapittelweg 10, 4827 HG Breda, The Netherlands, declare under our sole responsibility that the remainder of the equipment used in this product is in compliance with the following standards:

    EN60065 : Safety
    EN55103-1   : EMC (Emission)
    EN55103-2   : EMC (Immunity)

following the provisions of:

    a. the Safety Directives 73/23//EEC and 93/68/EEC
    b. the EMC Directives 89/336/EEC and 93/68/EEC

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User's Guide

Digital Wireless Triax Camera System

Contents

Safety Summary

This informaton is intended as a guide for trained and qualified personnel who are aware of the dangers involved in handling potentially hazardous electrical/electronic equipment. It is not intended to contain a complete list of all safety precautions which should be observed by personnel in using this or other electronic equipment.

The installation, maintenance and service of this equipment involves risks both to personnel and equipment and must be performed only by qualified personnel exercising due care.

Personnel engaged in the installation, operation, maintenance or servicing of this equipment are urged to become familiar with First Aid theory and practises.

During installation and operation of this equipment, local building safety and fire protection standards must be observed.

Before connecting the equipment to the power supply of the installation, the proper functioning of the protective earth lead of the installation needs to be verified.

Whenever it is likely that safe operation is impaired, the apparatus must be made inoperative and secured against any unintended operation. The appropriate servicing authority must then be informed. For example, safety is likely to be impaired if the apparatus fails to perform the intended function or shows visible damage.

This product has been designed and tested according to EN60950.

ATTENTION

The radio frequency channels used by this equipment may be constrained or restricted by law in the country where you are operating this equipment. Check before using this equipment that all applicable licenses or authorizations have been obtained.

Any modifications shall void the warrantee and could make the user liable for any disturbances caused by the modified equipment.

Cautions and Warnings

When performing service, be sure to read and comply with the warning and caution notices appearing in the manuals. Warnings indicate danger that requires correct procedures or practices to prevent death or injury to personnel. Cautions indicate procedures or practices that should be followed to prevent damage or destruction to equipment or property.

WARNINGS

DO NOT MODIFY THIS EQUIPMENT.

DO NOT USE THIS EQUIPMENT IN AREAS WHERE IT MAY ENDANGER SAFETY SUCH AS HOSPITALS OR AIRPORTS.

THIS EQUIPMENT GENERATES ELECTROMAGNETIC RADIO FREQUENCIES. INSTALLATION MUST CONFROM TO THE INSTRUCTIONS GIVEN IN THIS MANUAL.

INSTALLATION OF THIS EQUIPMENT MUST ONLY BE PERFORMED BY QUALIFIED PERSONNEL.

DO NOT USE ANY ACCESSORIES OTHER THAN THOSE RECOMMENDED BY THE MANUFACTURER.

THE CURRENT AND VOLTAGES PRESENT IN THIS EQUIPMENT ARE DANGEROUS. PERSONNEL MUST AT ALL TIMES FOLLOW THE SAFETY REGULATIONS.

ALWAYS DISCONNECT POWER BEFORE REMOVING COVERS OR PANELS.

ALWAYS DISCHARGE HIGH VOLTAGE POINTS BEFORE SERVICING.

NEVER MAKE INTERNAL ADJUSTMENTS, PERFORM MAINTENANCE OR SERVICE WHEN ALONE OR WHEN FATIGUED.

IN CASE OF AN EMERGENCY ENSURE THAT THE POWER IS DISCONNECTED.

MOUNT EQUIPMENT SO THAT POWER LEAD CAN BE ACCESSED TO DISCONNECT POWER.

THE POWER LEAD OF THE WCU MUST ALWAYS BE CONNECTED TO A POWER SOCKET WITH A PROTECTIVE EARTH.

ANY INTERRUPTION OF THE PROTECTION CONDUCTOR INSIDE OR OUTSIDE THE APPARATUS, OR DISCONNECTION OF THE PROTECTIVE EARTH TERMINAL, IS LIKELY TO MAKE THE APPARATUS DANGEROUS. INTENTIONAL INTERRUPTION IS PROHIBITED.

USE ONLY FUSES OF THE TYPE AND RATING SPECIFIED.

USE ONLY THE ANTENNAS SUPPLIED. DO NOT USE THE CAMERA WITHOUT ANTENNAS. SWITCH OFF POWER TO THE UNITS BEFORE DETACHING ANTENNAS.

CAUTIONS

⚠ To prevent risk of overheating, ventilate the product correctly.

⚠ Connect the product only to a power source with the specified voltage rating.

⚠ Never connect an analog triax system to a digital triax system.

⚠ Do not allow system ground currents to exceed 1.5A in the outer shield of the triax cable or 0.2A in other cable shields.

⚠ Do not short circuit the inner and outer shields of the triax cable.

⚠ Always switch off the camera before changing the battery or changing the power supply.

⚠ Any cables connected to the camera must be less than 3m to avoid interference.

Summary of cautions used in this manual:

Caution

⚠ Always disconnect from the power supply before opening the adapter.

⚠ Connection panel position in the rack should ensure that the plug and power cord are within easy reach for switching off purposes.

⚠ Be extremely careful with the connectors between the camera head and the adapter. Do not allow the guide pins to damage the pins of the connector. Follow these steps in the order given. Tightening the screws in the wrong order could result in mechanical damage to the camera. Loosening the screws in the wrong order could result in mechanical damage to the camera.

⚠ Never supply power to an adapter without first ensuring that the antennas are attached.

⚠ Use only the antennas supplied.

⚠ Switch off the power to the units before detaching the antennas.

⚠ The input voltage to the camera must stay between +11Vdc and +17 Vdc.

⚠ Disconnect the power to the WCU before opening the AMU.

Mains Lead Wiring for UK Users

The wires in the mains lead are coloured in accordance with the following code:

GREEN AND YELLOW	-	EARTH
BLUE	-	NEUTRAL
BROWN	-	LIVE

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug proceed as follows:

- The wire coloured GREEN AND YELLOW must be connected to the terminal on the plug marked with the letter E or by the safety earth symbol ⏚ or coloured GREEN or GREEN AND YELLOW.
- The wire coloured BROWN must be connected to the terminal marked with the letter L or coloured RED.
- The wire coloured BLUE must be connected to the terminal marked with the letter N or coloured BLACK.

Ensure that your equipment is connected correctly - if you are in any doubt consult a qualified electrician.

Cathode ray tubes

Components marked ⚠ on the circuit diagram are critical for safety and include those specified to comply with X-ray emission standards for units using cathode ray tubes and those specified for compliance with various regulations regarding spurious radiation emission.

When servicing units that use cathode ray tubes (CRTs), the cathode ray tubes themselves, the high voltage circuits and related circuits are specifically chosen so that they comply with recognized codes pertaining to X-ray emission.

Consequently, when servicing, replace the cathode ray tubes and other parts with specified parts only. Do not attempt to modify these circuits as any unauthorized modification can increase the high voltage value and cause X-ray emission from the cathode ray tube. Handle the cathode ray tube only when wearing shatterproof goggles and after discharging the high voltage completely.

Symbol	Colour	Explanation
↯	Red	High voltage terminal at which a voltage, with respect to an other terminal, exists or may be adjusted to 1000V or more.
⚡	Yellow/Black	Live part.
⚠	Yellow/Black	This marking indicates that the operator must refer to an explanation in the Instruction Manual, or that a specific component must be replaced by the component specified in the documentation for safety reasons.
⏚	White/Black	Protective earth (ground) terminal.

Sicherheit (Zusammenfassung)

TDiese Informationen sind als Leitfaden für qualifiziertes Fachpersonal gedacht, das die Gefahren beim Umgang mit potenziell gefährlicher elektrischer/elektronischer Ausrüstung kennt. Es handelt sich dabei nicht um eine vollständige Zusammenstellung aller Sicherheitsvorkehrungen, die beim Gebrauch dieser oder anderer elektronischer Geräte zu beachten sind.

Die Montage, Wartung und Instandsetzung dieser Ausrüstung ist mit Risiken für Personal und Ausrüstung verbunden und darf nur von qualifiziertem Personal vorgenommen werden, wobei mit der nötigen Sorgfalt vorzugehen ist.

Mit der Montage, Bedienung, Instandhaltung oder Instandsetzung dieser Ausrüstung betrauten Personen wird dringend geraten, sich mit der Theorie und Praxis der Ersten Hilfe vertraut zu machen.

Beim Einbau und Betrieb dieser Ausrüstung müssen die örtlichen Gebäudesicherheits- und Brandschutzvorschriften beachtet werden.

Vor dem Anschluss der Ausrüstung an die Stromversorgung der Anlage muss überprüft werden, ob der Schutzleiter intakt ist.

Wenn eine Beeinträchtigung des sicheren Betriebs wahrscheinlich ist, muss das Gerät außer Betrieb gesetzt und gegen ungewollten Betrieb gesichert werden. Dann muss der zuständige Kundendienst benachrichtigt werden. Eine Beeinträchtigung der Sicherheit ist zum Beispiel dann wahrscheinlich, wenn das Gerät nicht wie vorgesehen funktioniert oder einen sichtbaren Schaden aufweist.

Dieses Produkt wurde nach EN60950 entwickelt und geprüft.

WICHTIG!

Die für diese Ausrüstung verwendeten Funkfrequenzkanäle können in dem Land, in dem diese Ausrüstung betrieben wird, gesetzlichen Beschränkungen unterliegen. Prüfen Sie vor dem Einsatz dieser Ausrüstung nach, ob alle relevanten Zulassungen bzw. Genehmigungen vorliegen.

Änderungen haben zur Folge, dass die Garantie ungültig wird und der Benutzer für etwaige durch die veränderte Ausrüstung verursachte Störungen haftbar gemacht werden könnte.

Warn- und Gefahrenhinweise

Bei der Durchführung von Servicearbeiten sind die mit "Achtung" und "Vorsicht" gekennzeichneten Warnhinweise in den Handbüchern zu lesen und zu beachten. Mit "Vorsicht" wird auf eine Gefahr hingewiesen, die korrekte Arbeits- oder Verfahrensweisen erfordert, um Tod oder Verletzung zu verhindern. Mit "Achtung" werden Arbeitsanweisungen gekennzeichnet, die zu befolgen sind, um eine Beschädigung oder Zerstörung der Ausrüstung bzw. von Eigentum zu verhindern.

VORSICHT!

AN DIESER AUSRÜSTUNG DÜRFEN KEINE ÄNDERUNGEN VORGENOMMEN WERDEN.

DIESE AUSRÜSTUNG DARF NICHT IN BEREICHEN EINGESETZT WERDEN, IN DENEN SIE DIE SICHERHEIT GEFÄHRDEN KÖNNTE (Z.B. KRANKENHÄUSER ODER FLUGHÄFEN).

DIESE AUSRÜSTUNG ERZEUGT ELEKTROMAGNETISCHE FUNKFREQUENZEN. DIE MONTAGE MUSS GEMÄSS DEN ANWEISUNGEN IN DIESEM HANDBUCH ERFOLGEN.

DIESE INFORMATIONEN VOR DER MONTAGE ODER WARTUNG/INSTANDSETZUNG DIESER AUSRÜSTUNG GENAU DURCHLESEN

DIE MONTAGE DIESER AUSRÜSTUNG DARF NUR VON FACHPERSONAL VORGENOMMEN WERDEN.

ES DARF NUR DAS VOM HERSTELLER EMPFOHLENE ZUBEHÖR VERWENDET WERDEN.

DIE STROMSTÄRKE UND SPANNUNGEN IN DIESER AUSRÜSTUNG SIND GEFÄHRLICH. DIE SICHERHEITSVORSCHRIFTEN SIND VOM PERSONAL STETS EINZUHALTEN.

VOR DEM ABNEHMEN VON ABDECKUNGEN ODER VERKLEIDUNGEN IST STETS DIE STROMZUFUHR ABZUSCHALTEN.

VOR DER AUSFÜHRUNG VON WARTUNGS-/ INSTANDSETZUNGSARBEITEN SIND HOCHSPANNUNGSPUNKTE STETS ELEKTRISCH ZU ENTLADEN.

NEHMEN SIE NIE INTERNE EINSTELLUNGEN VOR UND FÜHREN SIE NIE WARTUNGS- ODER INSTANDSETZUNGSARBEITEN AUS, WENN SIE ALLEIN ODER ERMÜDET SIND.

BEI EINTRETEN EINES NOTFALLS UNBEDINGT DIE STROMZUFUHR ABSCHALTEN.

AUSRÜSTUNG SO MONTIEREN, DASS DAS NETZKABEL ZUM ABSCHALTEN DER STROMZUFUHR ZUGÄNGLICH IST.

DAS NETZKABEL DES WCU MUSS IMMER AN EINE NETZDOSE MIT EINER SCHUTZERDUNG ANGESCHLOSSEN WERDEN.

JEDE UNTERBRECHUNG DES SCHUTZLEITERS INNERHALB ODER AUSSERHALB DES GERÄTS ODER TRENNUNG DER SCHUTZLEITER-ANSCHLUSSKLEMME KÖNNTE DAS GERÄT GEFÄHRLICH MACHEN. EINE ABSICHTLICHE UNTERBRECHUNG IST UNTERSAGT.

ES DÜRFEN NUR SICHERUNGEN DES VORGESCHRIEBENEN TYPS UND NENNWERTS VERWENDET WERDEN.

ES DÜFREN NUR DIE MITGELIEFERTEN ANTENNEN VERWENDET WERDEN. DIE KAMERA DARF NICHT OHNE ANTENNEN BETRIEBEN WERDEN. VOR DEM ANTENNEN-ABBAU MUSS DIE STROMZUFUHR ZU DEN GERÄTEN ABGESCHALTET WERDEN.

ACHTUNG!

⚠ Um einer Überhitzungsgefahr vorzubeugen, ist das Produkt korrekt zu belüften.

⚠ Das Produkt darf nur an eine Stromquelle mit der vorgeschriebenen Nennspannung angeschlossen werden.

⚠ Niemals ein analoges Triax-System an ein digitales Triax-System anschließen.

⚠ System-Erdströme dürfen 1,5 A in der äußeren Abschirmung des Triax-Kabels bzw. 0,2 A in anderen Kabelschirmen nicht übersteigen.

⚠ Die innere und äußere Abschirmung des Triax-Kabels nicht kurzschließen.

⚠ Die Kamera vor dem Wechsel der Batterie oder dem Wechsel der Stromversorgung immer ausschalten.

⚠ Alle an die Kamera angeschlossenen Kabel müssen weniger als 3 m lang sein, um Störungen zu vermeiden.

Zusammenstellung von in diesem Handbuch verwendeten Warnhinweisen:

Achtung!

Immer von der Netzversorgung trennen, bevor der Adapter geöffnet wird.

Stecker zwischen Kamerakopf und Adapter mit äußerster Vorsicht handhaben. Darauf achten, dass die Steckerstifte nicht durch die Führungsstifte beschädigt werden.

Diese Schritte in der angegebenen Reihenfolge ausführen.

Das Anziehen der Schrauben in der falschen Reihenfolge kann zu mechanischen Schäden an der Kamera führen.

Das Lösen der Schrauben in der falschen Reihenfolge kann zu mechanischen Schäden an der Kamera führen.

Niemals einem Adapter Strom zuführen, ohne sich zuerst zu vergewissern, dass die Antennen angebracht sind.

Es dürfen nur die mitgelieferten Antennen verwendet werden.

Vor dem Abnehmen der Antennen muss die Stromzufuhr zu den Geräten abgeschaltet werden.

Die Eingangsspannung darf nie +17 VDC überschreiten.

Vor dem Öffnen des AMU muss die Stromzufuhr zum WCU abgeschaltet werden

Netzkabel für Betreiber in Großbritannien

Die Leitungen im Netzkabel sind mit den folgenden Kennfarben markiert:
GRÜN UND GELB - ERDE
BLAU - NEUTRAL
BRAUN - STROMFÜHREND
Möglicherweise stimmen die Farben der Leitungen im Netzkabel dieses Geräts nicht mit den Farbmarkierungen der Anschlussklemmen in der Steckdose überein. Dann ist wie folgt zu verfahren:

Die GRÜN-GELB markierte Leitung muss an der Klemme der Steckdose angeschlossen werden, die mit dem Buchstaben E oder dem Erdungszeichen ⏚ gekennzeichnet oder GRÜN oder GRÜN-GELB markiert ist.

Die BRAUN markierte Leitung muss an die Klemme angeschlossen werden, die mit dem Buchstaben L gekennzeichnet oder ROT markiert ist.

Die BLAU markierte Leitung muss an die Klemme angeschlossen werden, die mit dem Buchstaben N gekennzeichnet oder SCHWARZ markiert ist.

Sorgen Sie dafür, dass Ihre Ausrüstung korrekt angeschlossen ist - fragen Sie im Zweifelsfall ⚠ einen Elektrofachmann um Rat.

Elektronenstrahlröhren

Auf dem Schaltplan mit [SYMBOL] gekennzeichnete Komponenten sind sicherheitskritisch und schließen diejenigen Komponenten ein, die so spezifiziert sind, dass Röntgenstrahlenemissionsnormen für Geräte mit Elektronenstrahlröhren erfüllt werden, sowie diejenigen, die so spezifiziert sind, dass verschiedene Vorschriften zu Störstrahlungsemissionen erfüllt werden.

Bei der Wartung/Instandsetzung von Geräten mit Elektronenstrahlröhren ist zu beachten, dass die Elektronenstrahlröhren selbst, die Hochspannungskreise und damit verbundene Stromkreise eigens so ausgewählt werden, dass anerkannte Normen bezüglich Röntgenstrahlenemissionen erfüllt werden. Folglich dürfen bei der Wartung/Instandsetzung die Elektronenstrahlröhren und sonstigen Teile nur durch spezifizierte Teile ersetzt werden. Es darf nicht versucht werden, Änderungen an diesen Stromkreisen vorzunehmen, da jede unbefugte Änderung zu einer Erhöhung des Hochspannungswerts führen und Röntgenstrahlenemissionen aus der Elektronenstrahlröhre hervorrufen kann. Beim Hantieren mit der Elektronenstrahlröhre muss eine splittersichere Schutzbrille getragen werden; vor dem Hantieren mit der Elektronenstrahlröhre muss die Hochspannung vollständig entladen werden.

Technology

This wireless system combines with an LDK camera head to form a Digital Wireless Triax Camera System. The high-performance digital transmission means that the system is omnidirectional with no adverse effects from multi-path reflections.

The Digital Wireless Triax Camera System integrates perfectly into your existing set-up. It is a flexible camera system that is equally at home in the studio or out on location in an OB environment. The bidirectional data transmission lets the wireless camera communicate with LDK camera control systems easily—just like a fixed-position LDK triax camera. The ability to genlock the wireless camera, without a separate frame store unit, ensures that the system can operate alongside other cameras without timing problems.

The system uses a unique digital 4:2:2, 10-bit, end-to-end signal using wavelet compression and DVB-T COFDM transmission technology. This provides high-quality, reliable pictures with very low latency. The extremely low latency means that shots integrate seamlessly into the overall production workflow with imperceptible video-to-audio lag. No digital block effects are visible as with low bit-rate MPEG transmission. Compression is intra-field, so all fields have the same quality and there is no GOP (groups of pictures).

The received signal in a COFDM system can be improved by multi-path reflections. To get the best benefits from reflections the receiving set is equipped with a three antenna diversity system. A set of three RF receivers is used to get the best benefits of receiving COFDM signals via different reflection paths (diversity principle). These down convert the RF signal to VHF bands. The Antenna Management Unit selects automatically between the receiving antennas without any break in the RF link. Both transmitting and receiving antenna are omnidirectional, so there's no need for alignment or tracking.

To extend the receiving area a second receiving set can be attached to the Wireless Control Unit (WCU). The WCU selects automatically between the two receiving sets without a picture break (roaming).

Features

- Digital 10-bit 4:2:2 picture quality; close to wired Triax cameras.
- Integrated Genlock as with wired Triax cameras; no frame store needed.
- Perfectly clean frozen picture in the case of interrupted video connection.
- Full camera control as with wired Triax cameras.
- Low power COFDM transmission.
- Automatic switching of multiple antenna sets.
- Extremely low latency.
- Selectable RF frequency; using several wide band modules to cover ranges like 2.2 to 2.4 GHz, 2.4 to 2.5 GHz and 2.5 to 2.7 GHz.
- Most frequencies* in the ISM [2.4-2.5 GHz] band do not require a licence (in E.U.).
- Easy frequency and channel selection from the viewfinder menu of the camera.
- Full bandwidth audio channel or two channels with reduced bandwidth.
- Excellent reception across 150m with a transmitted power of just 40mW in open field conditions for ISM-[2.4-2.5] GHz band. Increased power up to 75 mW for other bands.
- AMU skate mount protects it from shocks.
- AMU sun cover reduces temperature increase.

A wireless system includes:

- A wireless camera adapter (including RF module and two antennas).
- An antenna management unit (AMU).
- Three RF Receiver units with three matching antennas.
- Data emitter unit with matching antenna.
- An antenna bracket to mount RF and data units and antennas.
- A 10m antenna cable set consisting of three coax cables with BNC connectors and a RS422 screened cable with a 9-pin D connector.
- A wireless connection unit (WCU).

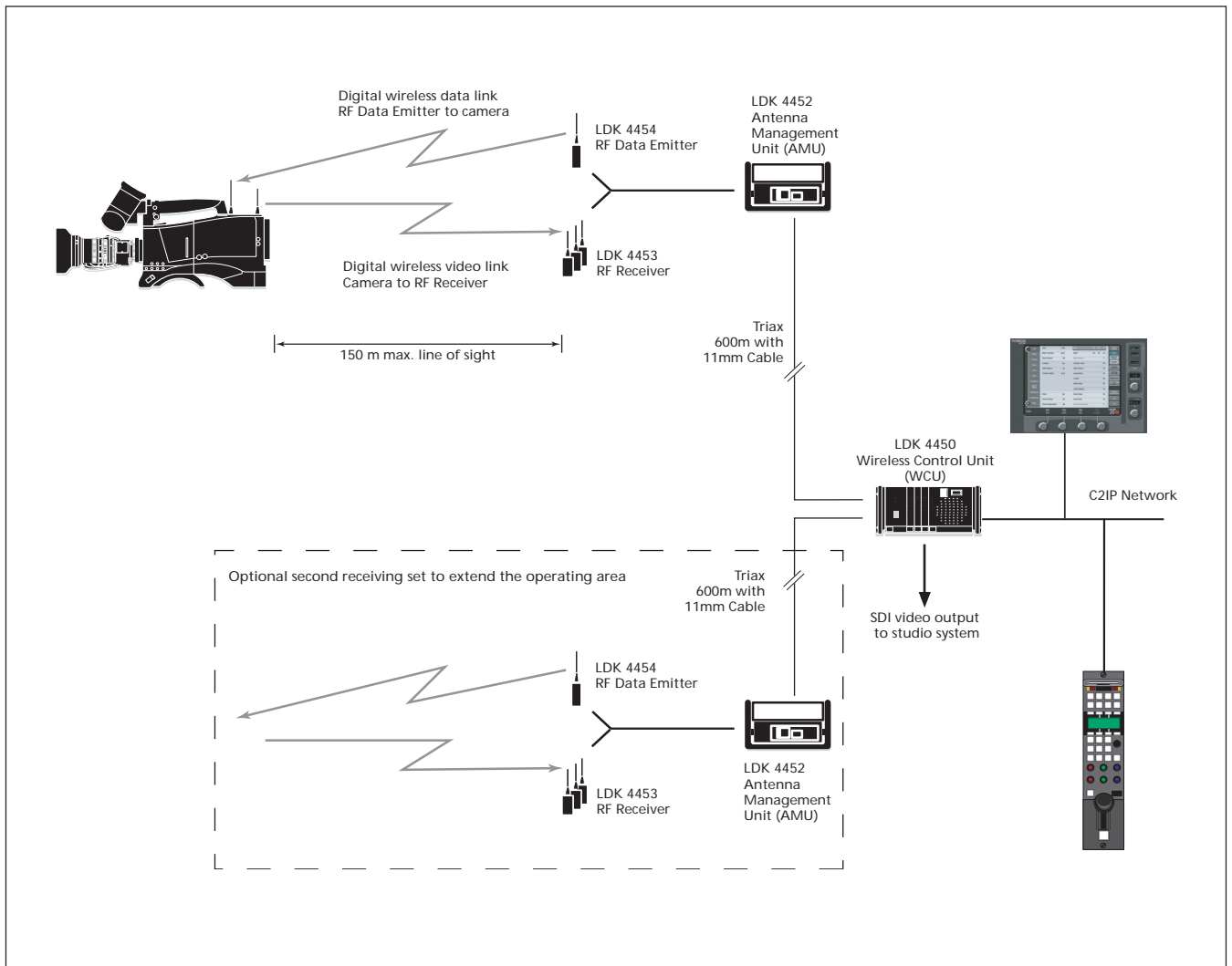For a complete digital wireless triax camera system the following elements must be added:
- An LDK camera head and viewfinder
- A lens
- Triax and control cables

For full remote control:
- An OCP
- An MCP

To expand the operating range of the camera an additional AMU with antenna set can be added to the system.

* some do; refer to the frequency table in the section "Setting up the camera adapter"

Configuration

Digital wireless data link
RF Data Emitter to camera

LDK 4454
RF Data Emitter

LDK 4452
Antenna
Management
Unit (AMU)

Digital wireless video link
Camera to RF Receiver

LDK 4453
RF Receiver

150 m max. line of sight

Triax
600m with
11mm Cable

LDK 4450
Wireless Control Unit
(WCU)

C2IP Network

Optional second receiving set to extend the operating area

Triax
600m with
11mm Cable

LDK 4454
RF Data Emitter

SDI video output
to studio system

LDK 4452
Antenna
Management
Unit (AMU)

LDK 4453
RF Receiver

In this configuration the camera communicates wirelessly with the antenna management unit (AMU). The AMU is connected to the Wireless Control Unit (WCU) via a triax cable. Triax cable between AMU and WCU; maximum length is 700m (14mm), 600m (11mm) or 400m (8mm).

The WCU delivers the video signals for the studio system.

An optional second AMU with an antenna set can be added to the system to extend the range of the camera coverage.

Remote control of the camera is achieved through the C2IP network that can be connected to the WCU. Control panels such as the MCP 400 or OCP 400 can be used to gain full access to the camera. Alternatively, Series 9000 control panels can be used.

Setting up the camera adapter

Wireless camera adapter

The transmission frequencies for the video link and the data link must both be set for the Wireless Camera Adapter (WCA) and then the corresponding selections must be set on the Wireless Connection Unit (WCU).

If you decide to change frequency bands, then refer to the description below on exchanging the frequency module.

Carry out the following steps to prepare the camera for use:
- If required, exchange the frequency module.
- If required, exchange the RF Data Module

Exchanging the Video Frequency Module

In some situations you may choose to use a different frequency band. To use a different band, you need to exchange the entire right side cover (= the frequency module) of the wireless camera adapter. You may also need to change the frequency module selection switch in the AMU as well as the set of RF receivers. Refer to "Setting up the AMU".

Caution

⚠ Exchange of the frequency module must only be performed by qualified personnel.
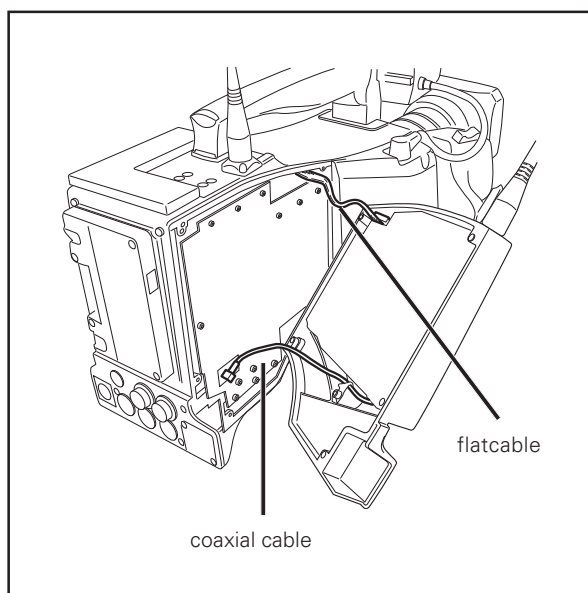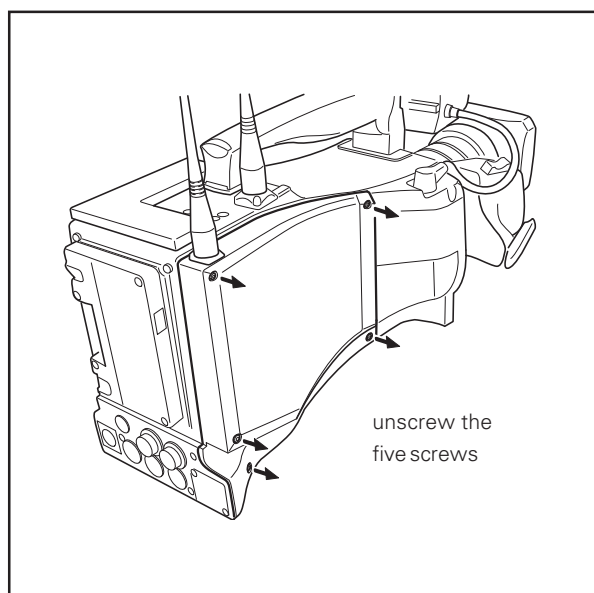
Choose the frequency module for your frequency band:
LDK 5451/22	Camera RF Module 2.2-2.4GHz
LDK 5451/24	Camera RF Module 2.4-2.5GHz
LDK 5451/25	Camera RF Module 2.5-2.7GHz

To install the module you need to exchange the entire right side cover of the wireless camera adapter as follows:

Caution

⚠ Do not immediately remove the panel from the adapter after unscrewing; it is connected by two cables to the adapter.

1. Unscrew the five screws securing the right side cover of the adapter and carefully open.
2. Disconnect both the coaxial cable and the flat cable from the adapter side.
3. Connect the cables from the new frequency module to the adapter.
4. Fold the cable into the space between the printed circuit board and the upper guiding rail to make sure that it will not get stuck.
5. Mount the module on the adapter and secure it with the five screws.

unscrew the five screws

flatcable

coaxial cable

- Attach the adapter to the camera.
- Attach the antennas to the adapter.
- Power the camera via the adapter.
- Select the video frequency via the camera menu.
- Select the data frequency via the camera menu.
- Select the camera number via the camera menu.

Exchanging the RF Data Module

In some situations you may choose to use a different frequency for the data channel. To use a different frequency, you need to exchange the RF Data Module inside the camera wireless adapter. You may also need to change the frequency module selection switch in the AMU as well as the Data Emitter. Refer to the section "Setting up the AMU".
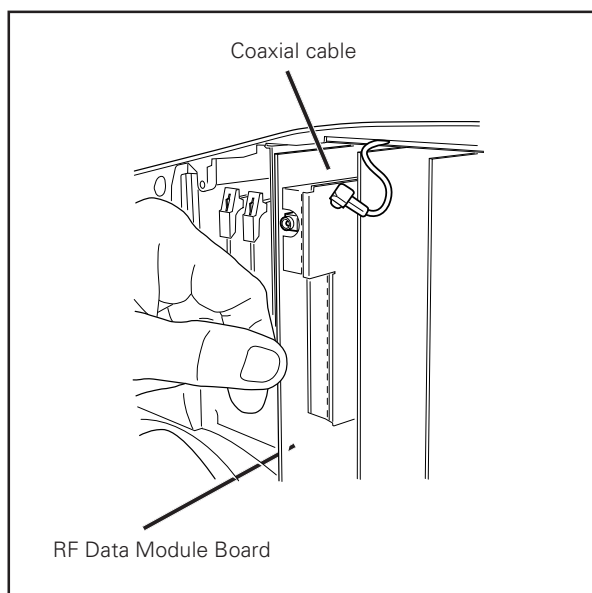
Caution

⚠ Exchange of the RF Data Module must only be performed by qualified personnel.

Choose the RF Data Module for the frequency you want to use:

LDK 4456/10   Camera RF Data Module 433 MHz
LDK 4456/20   Camera RF Data Module 456 MHz

To install the module you need to exchange RF Data Module entire right side cover of the wireless camera adapter as follows:

1. Unscrew the five screws securing the **left** side cover of the adapter and carefully open. Handle the flatcable at the bottom very carefully.
2. Locate the RF Data Module Board (third one from the left) and disconnect the coaxial cable from the board.
3. Pull out the board gently.
4. Insert the new board and push until it firmly locks into its socket.
5. Attach the coaxial cable to the board.
5. Replace the cover on the adapter and secure it with the five screws.

Coaxial cable

RF Data Module Board

Setting up the camera adapter (cont.)

Attaching the adapter to the camera

Caution

⚠ Be extremely careful with the connectors between the camera head and the adapter. Do not allow the guide pins to damage the pins of the connector.

⚠ Follow these steps in the order given. Tightening the screws in the wrong order could result in mechanical damage to the camera.

To attach an adapter to the camera proceed as follow:
a.   Using the rail ❶ on the bottom of the camera head as a guide, fit the guide pins ❷ on either side of the connector and the guide pin ❸ at the top rear of the camera head into the corresponding slots of the adapter.
b.   First, tighten the two horizontal screws ❹ on the top of camera.
c.   Next, tighten the two horizontal screws ❺ at the front of the camera.
d.   Lastly, tighten the vertical screw ❻ in the handle of the camera.

To detach an adapter from the camera head follow the steps for attaching it in the reverse order.
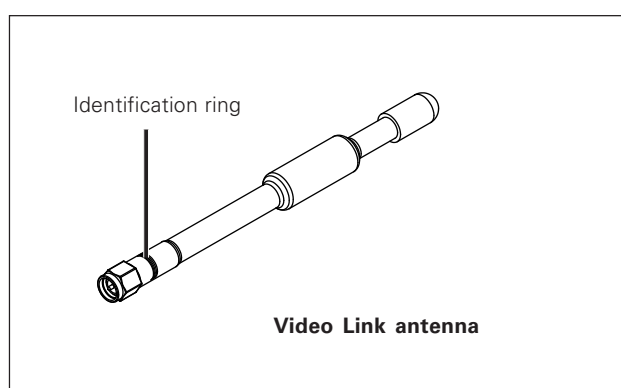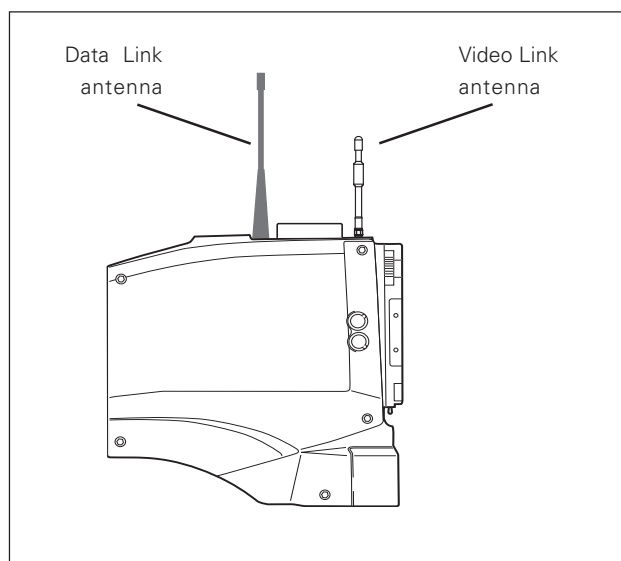
Caution

⚠ Loosening the screws in the wrong order could result in mechanical damage to the camera.
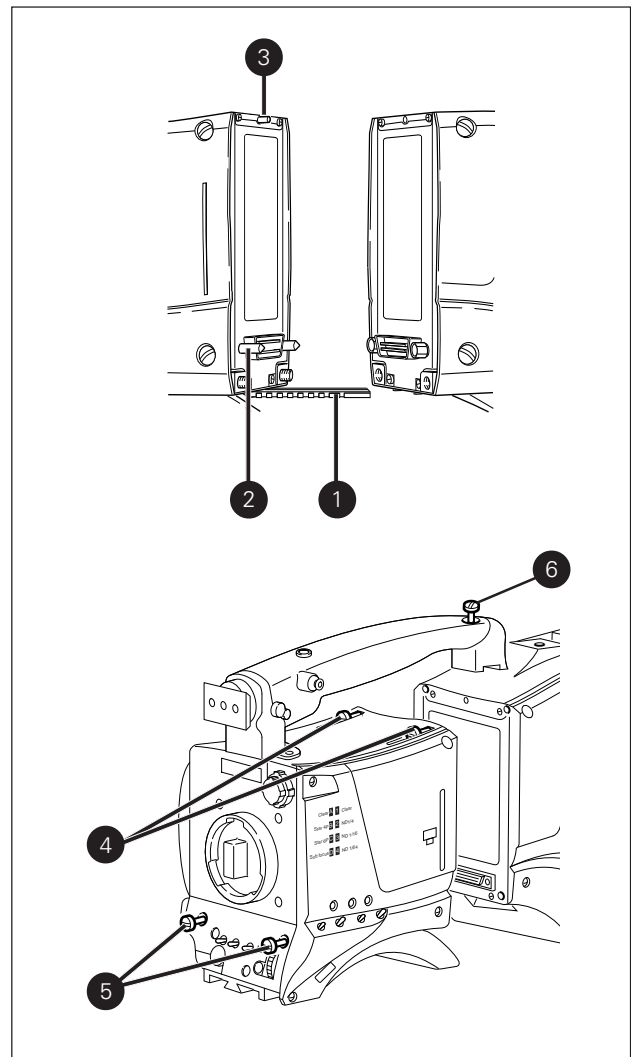
Attaching antennas to the camera adapter

Attaching antennas to the adapter

The wireless camera adapter uses two different antennas: a Data Link antenna and a Video Link antenna:

Data Link antenna

Video Link antenna

Identification ring

Video Link antenna

The following tables show which antenna to use for the chosen frequency ranges:

Video frequency:	Identification ring:
[2.2-2.4] GHz	Red ring + no. '2'
[2.4-2.5] GHz (ISM)	Yellow ring + no. '4'
[2.5-2.7] GHz	Green ring + no. '5'

Data frequency:	Antenna type:
433 MHz	T9006720 (18 cm)
456 MHz	25814730 (17.5 cm)

Attach both antennas securely to the wireless adapter.

Caution

⚠ Never supply power to an adapter without first ensuring that the antennas are attached.

⚠ Always use the antenna that was supplied with the frequency module. Using the wrong antenna will result in poor coverage.

⚠ Switch off the power to the units before detaching the antennas.

Setting up the camera adapter (cont.)

Camera power supply

Attach the battery pack to the camera as shown below or supply a +12 Vdc nominal voltage to the **DC in** connector on the rear of the adapter.

Caution

⚠ The input voltage at the DC in connector must stay between +11 Vdc and +17 Vdc.

⚠ Always switch off the camera before removing the battery.

Battery pack

DC in power
supply socket
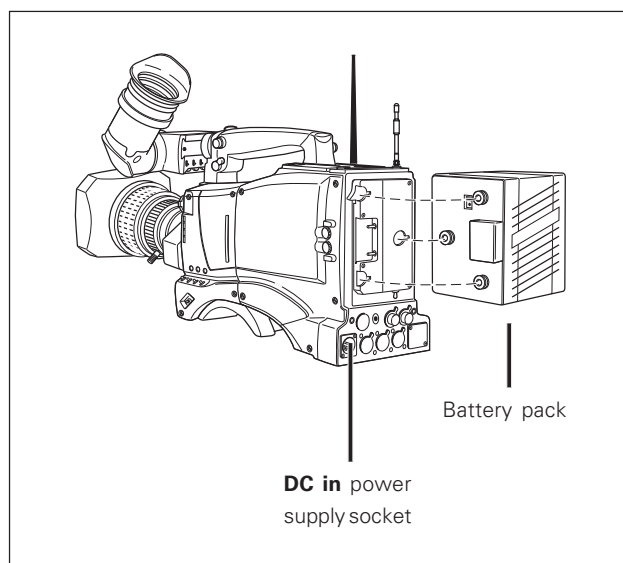
Viewfinder battery indicator

The BATT indicator in the viewfinder flashes when battery voltage is low. It lights continuously when battery voltage is less than 11V.

Viewfinder display

BATTERY indicator

`- + ++ REC TAPE BATT ND/RE`

`3.2 5.6 7.5 FL AW1 AW2 !`
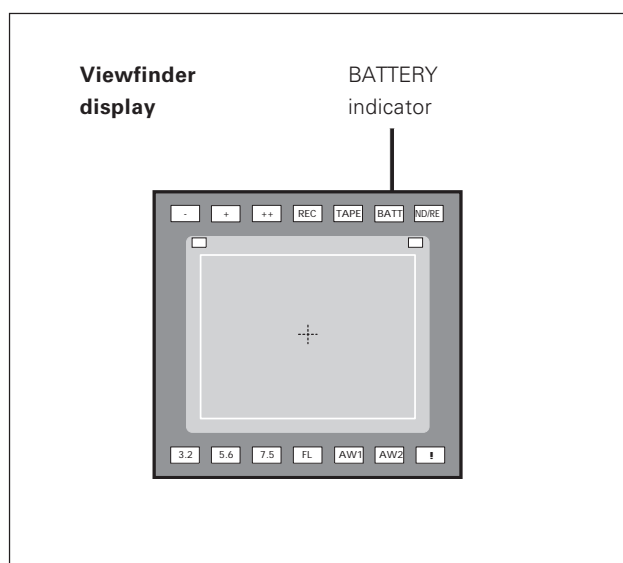
Menu setup

The tranmission frequencies and camera number are selected in the viewfinder menu of the camera head. Refer to section 3 of the camera User's Guide to learn more about using the camera menu system. The full Install menu for the wireless adapter is shown on the next pages.

In the menu, you can either select the channel or the frequency for both the data link and the video channel. The values displayed depend on the frequency module that is installed (refer to the table below).

Note 1

If two cameras are used at the same time, ensure that there is a minimum spacing of two channels between the cameras.

Note 2

Some ISM frequencies [2.4-2.5 GHz] are licence free but others may need a licence. Please check your local directives.

Selecting the video frequency channel

- Decide which frequencies you wish to use from the table below.
- The video tranmission frequency is selected in the system menu of the camera head. In the **INSTALL** menu go to the **WIRELESS** submenu where you can select either the available channels or frequencies. These two values are linked so changing one value will change the other.
  Menu path:
  ```
  Install / Wireless / Video Freq. GHz. or
  Install / Wireless / Video Channel
  ```

Selecting the data frequency channel

- Decide which frequencies you wish to use from the table below.
- The data transmission frequency is selected in the system menu of the camera head. In the **INSTALL** menu go to the **WIRELESS** submenu where you can select one of the available channels.
  Menu path:
  ```
  Install / Wireless / Data Channel
  ```

Selecting the camera number

- The camera number is selected in the system menu of the camera head. In the **INSTALL** menu go to the **WIRELESS** submenu where you can select either the number.
  Menu path:
  ```
  Install / Wireless / Camera Number
  ```

Setting up the camera adapter (cont.)

Frequency table for Video Modules:

WCA Channel	WCU Channel	Module [2.2-2.4 GHz]	Module ISM-[2.4-2.5 GHz]	Module [2.5 - 2.7 GHz]
0	0	2200.0 MHz	2394.0 MHz [1] [2] [3]	2500.0 MHz [1]
1	1	2212.0 MHz	2404.0 MHz [2] [3]	2512.0 MHz [1]
2	2	2225.0 MHz	2411.0 MHz [3]	2525.0 MHz
3	3	2237.0 MHz	2418.0 MHz [3]	2537.0 MHz
4	4	2250.0 MHz	2425.0 MHz [3]	2550.0 MHz
5	5	2262.0 MHz	2432.0 MHz [3]	2562.0 MHz
6	6	2275.0 MHz	2439.0 MHz [3]	2575.0 MHz
7	7	2287.0 MHz	2446.0 MHz [3]	2587.0 MHz
8	8	2300.0 MHz	2453.0 MHz [3]	2600.0 MHz
9	9	2312.0 MHz	2460.0 MHz	2612.0 MHz
10	A	2325.0 MHz	2467.0 MHz	2625.0 MHz
11	B	2337.0 MHz	2474.0 MHz [2]	2637.0 MHz
12	C	2350.0 MHz	2483.0 MHz [2] [3]	2650.0 MHz
13	D	2362.0 MHz	2490.0 MHz [2] [3]	2662.0 MHz
14	E	2375.0 MHz	2497.0 MHz [2] [3]	2675.0 MHz
15	F	2387.0 MHz [1]	2504.0 MHz [1] [2] [3]	2687.0 MHz

Frequency table for Data Modules:

WCA Channel	WCU Channel	Data Emitter (433 MHz)	Data Emitter (456 MHz)
0	0	433.10 MHz	455.00 MHz
1	1	433.20 MHz	455.10 MHz
2	2	433.30 MHz	455.20 MHz
3	3	433.40 MHz	455.30 MHz
4	4	433.50 MHz	455.40 MHz
5	5	433.60 MHz	455.50 MHz
6	6	433.70 MHz	455.60 MHz
7	7	433.80 MHz	455.70 MHz
8	8	433.90 MHz	455.80 MHz [3]
9	9	434.00 MHz	455.90 MHz [3]
10	A	434.10 MHz	456.00 MHz [3]
11	B	434.20 MHz	456.15 MHz [3]
12	C	434.30 MHz	456.25 MHz [3]
13	D	434.40 MHz	456.40 MHz [3]
14	E	434.50 MHz	456.55 MHz [3]
15	F	434.60 MHz	456.70 MHz [3]

Notes

[1] As the highest channels of some modules may interfere with the lowest channels of other modules it is not recommended to use these settings simultaneously for systems in the same operating space. The minimum frequency distance is 12 MHz.

[2] The use of some frequencies may require a radio licence.

[3] Frequency is not available for the US market.

Install Menu (LDK5450)				
Menu text	**User**	**Values**	**Hide when**	**File**
Disable Camera	0	Off, On	-	-
IR receiver	0	Off, On	-	oper
OnAir Lamp	0	Off, On	VF <> 7"	oper
OnAir Handgrip	0	On, Switch	<> ENG	oper
Intercom >>				
Side tone	1	0…99	-	oper
Cam. Mic Gain	1	0dB,40dB	-	oper
Cam. Mic Power	1	On,Off	-	oper
Prod Volume	1	Front, Rear	-	oper
Audio >>				
Audio Mode	0	Ch1, Ch1&2		oper
Audio Gain Mode	0	Ext, Loc	-	oper
Audio 1 Source	0	Line,Mic,Mic48, Front	-	oper
Audio 1 Gain	1	-22,-28,-34,-40,-46,-52,-58,-64dB	Audio 1 Source = Line	oper
Audio 1 HPF	1	On, Off	-	oper
Audio 2 Source	0	Line,Mic,Mic48	Audio Mode = Ch1	oper
Audio 2 Gain	1	-22,-28,-34,-40,-46,-52,-58,-64dB	Audio 2 Source = Line	oper
Audio 1 Limiter	S1	On, Off	-	oper
Audio 2 Limiter	S1	On, Off	-	oper
Audio 2 HPF	1	On, Off	-	oper
Source	0	Line,Mic,Mic48, Top M	-	oper
Gain dB	1	-22,-28,-34,-40,-46,-52,-58,-64dB	-	oper
HP filter	1	Off, On	-	oper
Limiter	S1	Off, On	-	oper
Notch	3	Off, On		install
Chroma	3	Off, On		install
Aspect Ratio >>				
select	1	4:3, 16:9	-	scene
loc/ext	1	Loc,Ext	-	scene
Letterbox	0	Off, 16:11, 16:10, 16:9	-	-

Setting up the camera adapter (cont.)

Menu text		User	Values	Hide when	File
Exposure	>>				
Lighting		1	-10..+10	Exp.<> 50,60Hz	scene
Clean Scan	>>	0			
Cl.Scan Mode		0	Normal,Extended	-	scene
Value		0	54.7-121.5Hz / 8.2-18.2 mSec	-	scene
Units		0	Hz, mSec	-	scene
Variable (Hz)		1	Pal 50..103, NTSC 60..150		
Gain preset	>>				
Gain -		2	-6, -3 (dB)	-	oper
Gain +		2	3,6,9,12,15	-	oper
Gain ++		2	6,9,12,15,18	-	oper
Gain +++		2	30,36, 42 (IT sensor only)	-	oper
Autowhite	>>			Coltemp<>AW	
Awb speed		S	0..99	-	oper
Awb gain		S	0..99	-	oper
Quick Smart Touch		1	On, Off		
Classic Mode		3	On, Off		
Wireless	>>				
Camera Number		1	1..254 (limited by adaptor)		
Data Chan. No.		1	0..255 (limited by adaptor)		
Data Freq. MHz		1	000.0 - 999.9 MHz (limited by adaptor)		
Video Chan. No.		1	0..255 (limited by adaptor)		
Video Freq. Ghz		1	000.0 - 999.9 MHz (limited by adaptor)		
Buttons	>>				
SW1 (VTR Save)		0	VTRsv, RET1, RET2		install
SW1 Control		0	Mom, Alt		install
SW2 (Ext. IRIS)		0	Extlr, RET1, RET2		install
SW2 Control		0	Mom, Alt		install
SW3 (VTR Start)		0	VTRst, RET1, RET2		install
SW3 Control		0	Mom, Alt		install
SW4 (Option)		0	None, Disab		install

Table title: **Install Menu (LDK5450)**

AMU indicators
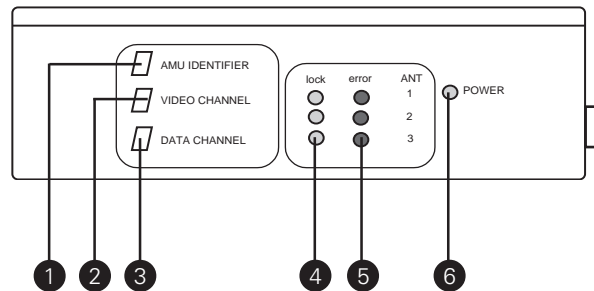
1 AMU IDENTIFIER

The display shows the number of the AMU (to identify AMUs when there are two AMUs in a system). This number also appears in the viewfinder at the bottom right.

When the AMU automatically switches to long distance triax mode the decimal dot in the display lights.

2 VIDEO CHANNEL

The display shows the channel number on which the wireless video signal from the camera is transmitted (set on WCU).

3 DATA CHANNEL

The display shows the channel number on which the wireless control signal to the camera is transmitted (set on WCU). A dash (-) indicates that no data emitter is connected.

When the AMU detects that a 456 MHz Data Emitter is connected, the decimal dot in the display lights.

4 LOCK

These three green indicators, whose numbers correspond to the three transmission antennas, light to indicate that there is a connection between camera and the specific AMU antenna. At least one of these indicators must be lit to have a connection. If all three are lit, then the RF link is at its strongest.

5 ERROR

A red indicator lights to indicate a problem (uncorrectable errors) in the connection between the camera and a specific AMU antenna. The connection remains reliable as long as all three indicators do not light at the same time.

6 POWER

This indicator lights when power from the WCU is supplied to the AMU via the triax cable.

AMU and antenna positioning

Position the AMU at the centre of the area you wish to cover. Mount the antenna assembly on a mast or attach it to a raised structure. If required a second AMU can be used to extend the covered area.

Hint

> To cover a typical stage area, it might be a good idea to place the antenna assembly upside-down at a high point on either side of the stage.

Antenna unit

Set up the antenna support assembly close to the AMU as follows:

1. Unfold the antenna support assembly.
2. Attach the three antenna receiver units to the ends of the arms.
3. Attach the data receiver unit to the centre of the assembly.
4. Screw the three antennas with SMA connector onto the antenna receiver units.
5. Connect the data antenna with BNC connector to the data transmission unit. There are two types of antenna available:

LDK 4454/10 (433 MHz) uses T9006720 antenna
LDK 4454/20 (456 MHz) uses 25814730 antenna

6. Connect the three BNC coaxial connectors of the supplied cable to the antenna receiver units.
7a. Connect the 9-pin sub-D connector to the data transmission unit.
7b. If your antenna support assembly has a Data Booster connect the 2 pin LEMO connector to the Data Booster unit.

Caution.

⚠ Always use the antennas that were supplied with the modules. Using the wrong antennas will result in poor coverage.

AMU connectors

8. Connect the three coaxial cables from the antennas to the upper row of BNC video connectors on the AMU.
9. Connect the cable from the data antenna to the 9-pin, sub-D connector on the AMU.
10. Connect the triax cable (<600m of 11mm triax cable) to the Triax output of the AMU (TRIAX output).

Mount the antenna support on a tripod or other support.

Data connector

Video antenna connectors (BNC)

TRIAX OUTPUT

DATA CAM TRANSMITTER

IF1 IF2 IF3
IN IN
OUT OUT

Triax cable
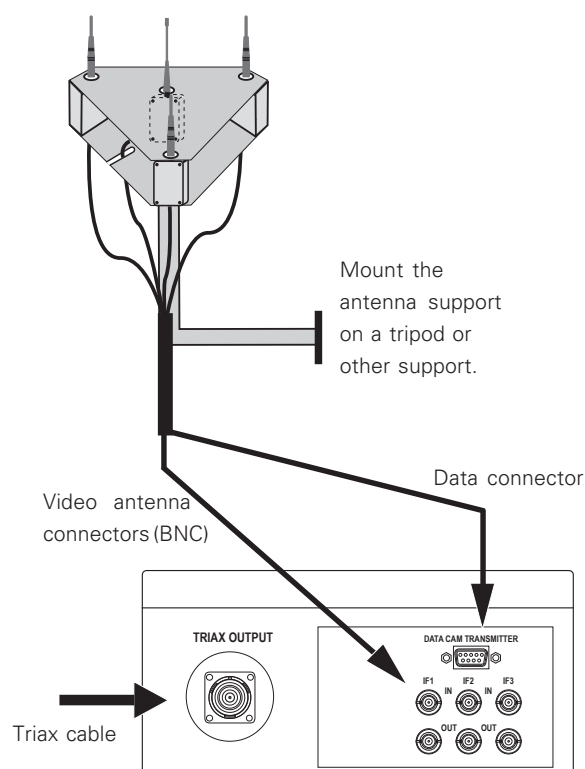
AMU identification number

If more than one AMU is used, each AMU must be given a unique identification number. The AMU identification number is shown on the upper display on the side of the AMU. You may choose any possible identification number as long as you choose a different one for each AMU in the system.

Caution

⚠ Disconnect the power to the WCU before opening the AMU.

To change the AMU identification number proceed as follows:
1. Ensure power is disconnected.
2. Open the AMU by removing the four screws underneath the sun cover and tilt open the lid of the case.
3. Find the row of three rotary switches on the main print panel (refer to the drawing).
4. Set the rotary switch (RC1) on the far right to the number you want for the AMU.
5. Close the cover and tighten the screws carefully.

AMU identification number display
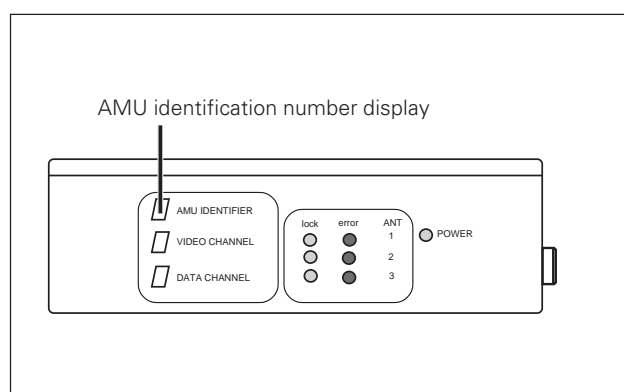
Video frequency selection

If you change the frequency module on the wireless camera adapter, it may be necessary to change the setting of the AMU.

To change the AMU frequency module setting proceed as follows:
1. Ensure power is disconnected.
2. Open the AMU by removing the four screws underneath the sun cover and tilt open the cover of the case.
3. Find the row of three microswitches on the main print panel.
4. Use a thin screw driver to access the microswitch SW3.1.
5. If an ISM [2.4-2.5] GHz module is used, set this switch to the RIGHT position. For other modules set this switch to LEFT position.
6. Close the cover. Tighten the screws bit by bit counterclockwise and one after the other to ensure steady pressure on the waterproof gasket.

Data frequency selection

If you change the Data module on the wireless camera adapter, it may be necessary to change the setting of the AMU.

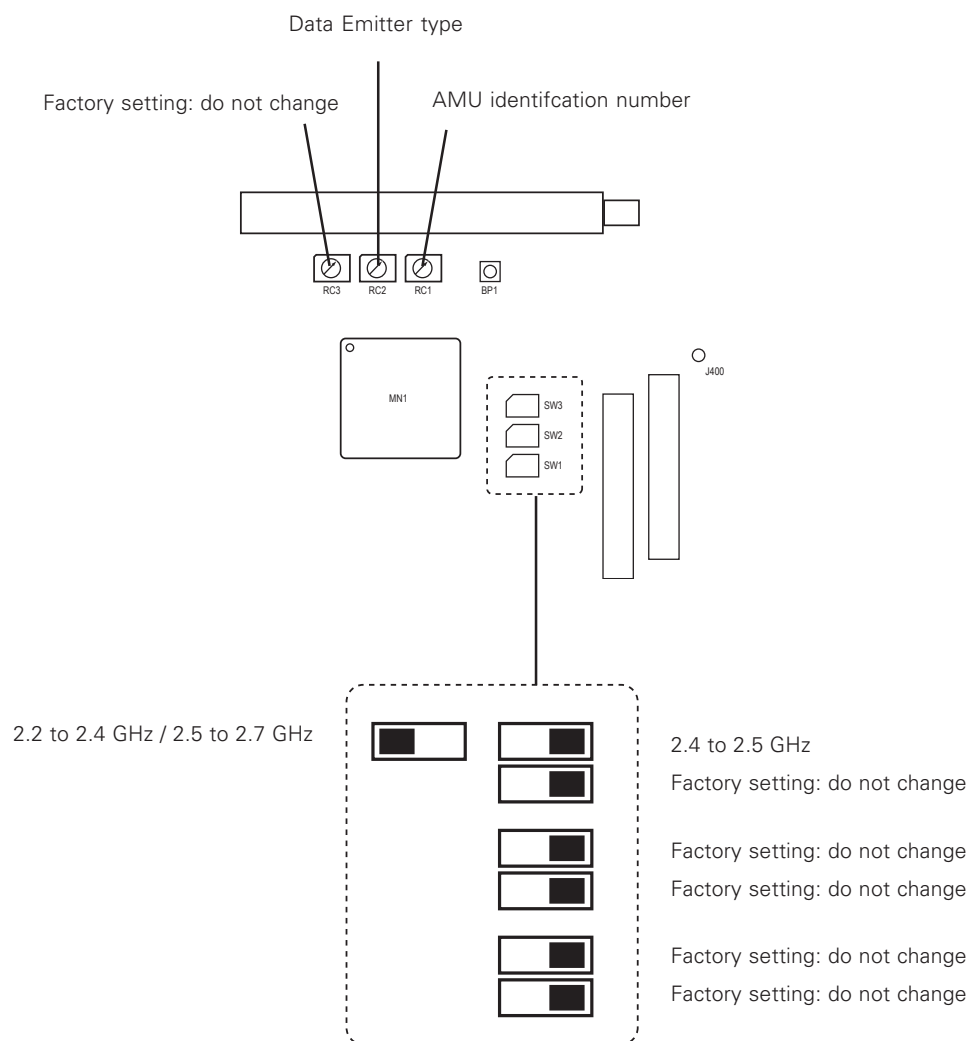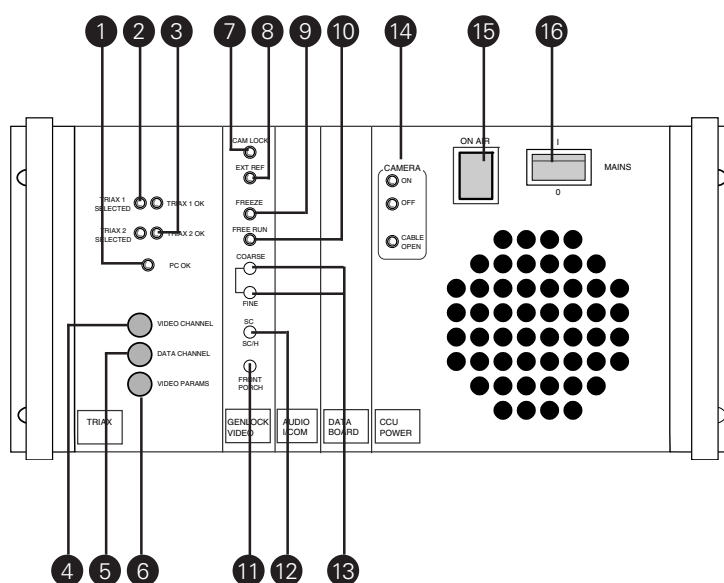To change the AMU Data module setting proceed as follows:
1. Ensure power is disconnected.
2. Open the AMU by removing the four screws underneath the sun cover and tilt open the cover of the case.
3. Find the row of three rotary switches on the main print panel (refer to the drawing).
4. Use a thin screw driver to access the rotary switch RC2.
5. If an 433 MHz module is used, set the switch to position **F**. For other modules (e.g. 456 MHz) set the switch to position **E**.
6. Close the cover. Tighten the screws bit by bit counterclockwise and one after the other to ensure steady pressure on the waterproof gasket.

Note

⚠ Switches SW1, SW2 and RC3 and BP1 are standard factory settings for the board's logic circuits. Do not change these switches.

Setup switches

Data Emitter type

Factory setting: do not change

AMU identifcation number

RC3 RC2 RC1 BP1

MN1

J400

SW3
SW2
SW1

2.2 to 2.4 GHz / 2.5 to 2.7 GHz

2.4 to 2.5 GHz

Factory setting: do not change

Factory setting: do not change
Factory setting: do not change

Factory setting: do not change
Factory setting: do not change
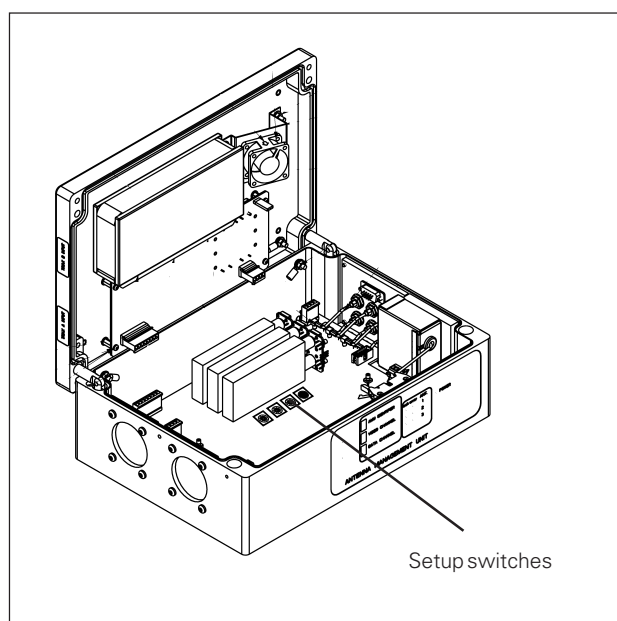
1 PC OK

Only used when a remote PC is connected to the front plug of the WCU Audio Board. In this case the light indicates the status of the PC to WCU dialog:

PC OK (Green)	PC connected	Message:
Off	No	Internal switch configuration of Digital Triax is OK.
Flashing	No	Internal switch configuration of Digital Triax is not OK.
Toggling	Yes	Dialog busy. Toggling indicates transfer speed.

2 TRIAX 1 OK / SELECTED

Normally lit, these lights indicates that the signal from the AMU is present and selected. Flashing indicates no camera; Off indicates no AMU.

Triax Sel. (Green)	Triax OK (Orange)	Message:
On	On	Triax input is selected. Video transmission in Triax is OK.
Off	On	Triax input is not selected. Video transmission in Triax is OK.
On	Off	Video transmission in Triax is not OK.
Flashing	-	AMU is not acknowledging control data sent by WCU.

3 TRIAX 2 OK / SELECTED

These lights indicate that a signal from a second AMU is present and selected.

4 VIDEO CHANNEL

This rotary switch selects the video transmission channel.

5 DATA CHANNEL

This rotary switch selects the data transmission channel.

6 VIDEO PARAMS

No function, not used.

7 CAM LOCK

When ON the WCU is receiving a live video signal from the camera. Flashes during Freeze or Power Up sequence of the WCU.

8 EXT REF.

When ON this light indicates the presence of a correct external sync signal on the GEN LOCK connector of the WCU. Otherwise is is off or flashing.

9 FREEZE

When ON, this light indicates that Freeze Mode is activated due to an interrupted video connection.

WCU Controls..

⑩ FREE RUN

Always Off. Not used.

⑪ FRONT PORCH

Adjustment of the front porch for encoded video signal.

⑫ SUBCARRIER (SC)

Subcarrier phase adjustment for encoded video signal.

⑬ HORIZONTAL PHASE

Use COARSE and FINE adjustment for encoded video signal.

⑭ CAMERA

ON

Normally and permanently ON, this light indicates that the WCU is powered. This indicator flashes to indicate excessive consumption at the WCU.

OFF

This indicator lights when the AMU is not drawing power. This indicator flashes to indicate that the AMU consumption is excessively low (<26 W).

CABLE OPEN

This normally OFF indicator lights if there is no Digital Triax Rack in the WCU.

⑮ ON AIR

When ON, this light indicates that the camera signal is on air (ON AIR1).

⑯ MAINS

The equipment master on/off switch:
«I»: The equipment is operating.
«O»: The equipment is not operating.

Setting up the WCU

WCU connections

1. Connect the triax cable from the **AMU** to the Triax input 1 of the **WCU**. (If you use a second AMU, connect it to Triax input 2 of the **WCU**.)
2. Connect the **OCP** to the C2IP network.
3. Connect the SDI outputs of the **WCU** to the studio system.
4. If required provide a reference signal (H/V) to the Genlock input of the **WCU**.
5. Connect the **WCU** to the mains power.

After you have made the connections to the **WCU**, you can set up the following items:

- Video frequency
- Data frequency
- Camera number (set in the **WCU** menu)
- Signalling (set in the **WCU** menu)

Set the video frequency channel

- Turn the VIDEO CHANNEL rotary switch on the front of the **WCU** to the same number that you set for the video transmission frequency in the **WCA**.

Set the data frequency channel

- Turn the DATA CHANNEL rotary switch on the front of the **WCU** to the same number that you set for the data transmission frequency in the **WCA**.

Set the camera number

- Refer to the description of how to select a **WCU** menu setting to set the camera number to the same number you selected in the camera menu.

Video channel

Data channel   Data Board

Camera number / menu display

RS-232 connector

Rotary/push button
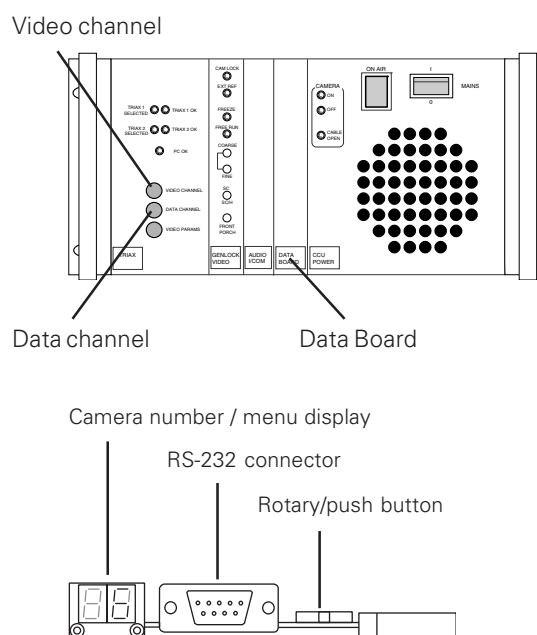
Setting up the WCU (cont.)

WCU menu settings

Some WCU settings are changed in a menu which is accessed via the Data board. When you enter the menu system, the Data board display shows a two-letter abbreviation which must be read from top to bottom. The code corresponds to a particular menu, submenu or parameter. To change a WCU menu setting proceed as follows:

1. Remove the front panel marked DATA BOARD from the WCU.
2. Reach into the opening, push the Rotary/push button at the front of the Data board and then rotate it.
3. Scroll through the different settings until the display shows the abbreviated name you want.
4. Push the Rotary/push button to select the submenu, scroll to the desired setting and push the Rotary/push button again to select it.
5. Push the Rotary/push button again to leave the menu.

The following menus are available:

CA - Camera number
Each camera in the system can be given a unique camera number. This number must be set in the camera, the WCU and a connected OCP if present.
To set the camera number in the WCU push the rotary/push button and use the rotary button to select a camera number from 1 to 99. Push again to select the number.

IP - Ethernet address mode
The WCU is set to Auto (AU) mode by default. Normally you need not change this setting. If you wish to set the IP address to a particular value push the rotary switch once so the indication (NN) is displayed. You must use the NetConfig application to set the IP address (future option).

RY - On-air red/yellow mode
Standard (ST) or Independent (ID).

OR - On-air red mode
Open/High (OH); High/Open (HO); Low/High (LH) or High/Low (HL).

OY - On-air yellow mode
Open/High (OH); High/Open (HO); Low/High (LH) or High/Low (HL).

CL - Call input mode
Open/High (OH); High/Open (HO); Low/High (LH) or High/Low (HL).

OF - 7-segment display off
When selected, the menu display automatically switches off after a few seconds.

Signalling inputs

There are four connection methods for the Call, On-air and Iso (On-air yellow) signalling functions:

a. Dry contact
b. Common ground
c. Voltage level Send lead
d. Open / voltage level Send lead

A selection in the menu allows you to make the state of the function (on or off) correspond to a particular input signal. There are two leads for each connection - Send and Return.

Function	Send pin	Return pin
Call	2	10
Iso	3	11
On-air	4	12

The following tables show the selectable states for each of the four connection methods.

Menu setting	Input shorted	Input open
LH	Function ON	Function OFF
HL	Function OFF	Function ON

* a common return (not ground!) can be used for the three functions.

Menu setting	Input grounded	Input open
LH	Function ON	Function OFF
HL	Function OFF	Function ON

* use either Send or Return only, do not mix.

Menu setting	Input 0 to 2.5V	Input 4 to 24V
LH	Function ON	Function OFF
HL	Function OFF	Function ON

* isolated from ground.

Menu setting	Input open	Input 4 to 24V
OH	Function ON	Function OFF
HO	Function OFF	Function ON

* isolated from ground.

Audio

Audio settings

The following are the settings for the audio signals applied to the rear of the wireless adapter and the side of the camera head. They can be made in the camera head menu and on the Audio/Intercom board of the **WCU**:

Select 1 or 2 audio channels

- The number of audio channels is selected in the systems menu of the camera head. In the **INSTALL** menu go to the **Audio** submenu where you can select either 1 or 2.
  Menu path:

  `Install / Audio / Audio Mode`

Select audio gain mode

- The audio gain mode is selected in the systems menu of the camera head. In the **INSTALL** menu go to the **Audio** submenu where you can select whether Gain Control is LOCAL (under VF menu control) or EXTERNAL (under MCP control or resistor chain control in the WCU)
  Menu path:

  `Install / Audio / Audio Gain Mode`

Select audio source

- The audio source is selected in the systems menu of the camera head. In the **INSTALL** menu go to the **Audio** submenu where you can select the source.
  Menu path:

  `Install / Audio / Audio Source`

Select audio gain

- The audio gain is set in the system menu of the camera head. In the **INSTALL** menu go to the **Audio** submenu where you can set the gain for both channels.
  Menu path:

  `Install / Audio / Audio 1(2) Gain`

Select audio output level and delay

- Ensure power is disconnected.
- Remove the board marked Audio/Intercom from the **WCU**.
- Locate the AUD 6dB DIP-switch on the board.
- Use the table below to set the audio output level to enable (+6dB) or disable (0dB).
- Locate the DELAY DIP-switch on the board.
- Use the table below to enable the Delay function. (The audio delay function delays the audio signal so that it is synchronised with the video signal.)
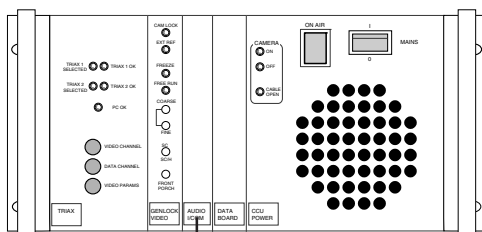
Audio/Intercom Board
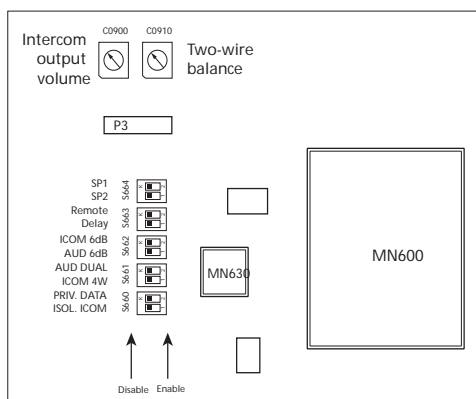
Follow the Disable and Enable positions shown in this drawing. Ignore the screening on the board itself.

Audio/Intercom DIP switch settings (S660-S664):

Switch	Setting
SP1	keep always disabled; factory setting
SP2	normally disabled. When enabled, a 1kHz intercom tone from WCU to WCA is digitally synthesized for test purposes.
REMOTE	not connected; no function
DELAY	enable to activate audio/video delay compensation
ICOM 6dB	enabled: nominal i/com input is +6dBu disabled: nominal i/com input is 0dBu (recommend position is enabled).
AUD 6dB	enabled: nominal audio output is +6dBu disabled: nominal audio output is 0dBu
AUD DUAL	normally disabled. When enabled linear intercom is achieved. Only use this setting when a compressor is available! When disabled, a digital intercom compressor is activated.
ICOM 4W	enabled: 4-wire mode intercom is selected disabled: 2-wire mode intercom is selected
PRIV.DATA	always keep disabled; factory setting.
ISOLATE ICOM	when enabled all intercom input and output signals are isolated

Intercom

Three intercom channels – production (Prod), program sound (Prog) and engineering (Eng) – are mixed and sent from the WCU to the camera operator's headset. The camera operator's intercom microphone signal is sent to the WCU.

Camera menu setup

The **Intercom** section of the **Install** menu of the camera contains various settings for all these channels. Signals for left and right headset muffs and sidetone levels can be selected. Intercom microphone amplification levels, phantom power supply and microphone on/off switches are also available in this menu.

The **Prod volume** menu item selects either the control at the front of the camera or at the left side of the adapter to control the volume of the production signal.

Select Prod control

• The location of the Prod volume control is set in the system menu of the camera head. In the INSTALL menu go to the Intercom submenu where you can select either Front or Rear.
  Menu path:
  ```
  Install / Intercom / Prod. Volume
  ```

Rear controls

Intercom microphone routing switch

This 3-position switch (1) routes the camera operator's intercom microphone signal to engineering (Eng) or production (Prod), or turns off the intercom. Prod position operation is momentary.

Use the VTR Start button at the front of the camera, or the VTR button on the lens, to send the camera operator's intercom microphone signal to production, regardless of the position of this switch.

Intercom headset volume controls

Prod (2) - adjusts the volume of the production signal to the camera operator's headset when **Prod volume** menu item is set to REAR.
Prog (3) - adjusts the volume of the programme signal to the camera operator's headset.
Eng (4) - adjusts the volume of the engineering intercom signal to the camera operator's headset.

Intercom settings on WCU

The Audio/Intercom board of the **WCU** contains some controls for setting up the intercom interface with the studio. Refer to the drawing on the previous page to locate these controls. To access these adjustments:

• Ensure power is disconnected.
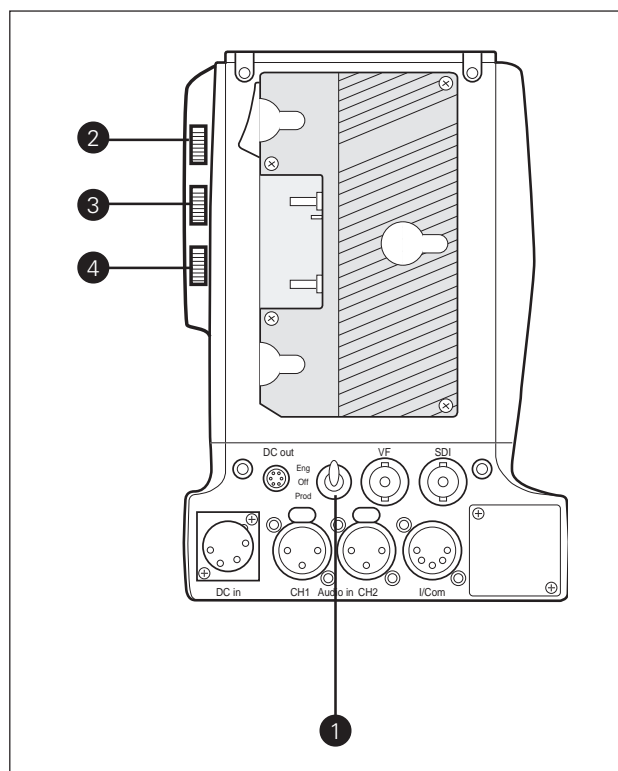
• Remove the board marked Audio/Intercom from the WCU.

Select a 2-wire or a 4-wire system

• Locate the ICOM4W DIP-switch on the board.
• Use the table below to enable (4-wire) or disable (2-wire) the ICOM4W function.

Select input level WCU

• Locate the ICOM 6dB DIP-switch on the board.
• Use the table below to set the ICOM 6dB function to enable (+6dB) or disable (0dB).

Select intercom output level

• Locate the Intercom volume potentiometer (C0900) on the board.
• Adjust the output level as required. Nominal is + 6dBu (position 8) +/- 12 dB per 1.5 dB step.

Select 2-wire balance

• Locate the Intercom 2-wire balance potentiometer (C0910) on the board.
• Adjust the output level as required according to the number of systems connected to the 2-wire bus.

Wireless Camera Adaptor connectors

Back panel view

DC out
VF
SDI
7

Eng
Off
Prod

6

DC in   CH1   Audio in   CH2   I/Com

1   2   3   4   5

(1) DC power output
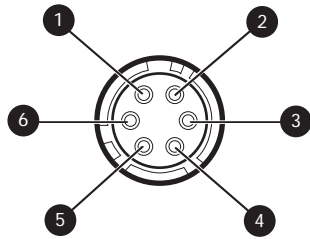
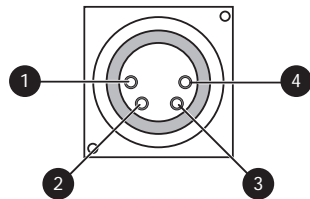**Hirose 6-pin female; panel view**
1. Ground (Video)
2. Video Input (1Vpp CVBS)
3. DC Out (+11Vdc to +17 Vdc), 1.5A max.
4. Ground (DC out)
5. not connected
6. Tally signal (limited current = 10 mA)

Shield of cable directly to the connector housing.

- chassis part (female): Hirose HR10A-7R-6S (3922 200 00038)
- cable part (male): Hirose HR10A-7P-6P

(2) DC power input

XLR 4-pin male; panel view
1. Ground
2. No connection
3. No connection
4. +11 Vdc . . . +17 Vdc

This socket accepts a DC voltage of 12V nominal. Maximum nominal power consumption 38W (excluding power out socket).

CAUTION

⚠ The input voltage must not exceed +17 Vdc.

(3) Audio IN (Channel #1) microphone connector
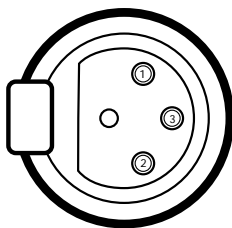
XLR 3-pin female
1. Audio Screen
2. Audio In
3. Audio Return

Input impedance > 10 KOhm

Sensitivity range: -64 to -22 dBu or line (0dBu)
Signal at pin 2 of audio input is in phase with signal at pin 2 of audio output. Switchable phantom power: +48 V

(4) Audio IN (Channel #2) microphone connector
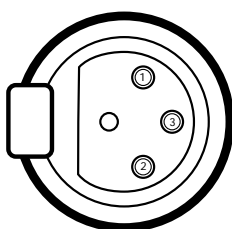
XLR 3-pin female
1. Audio Screen
2. Audio In
3. Audio Return

Input impedance > 10 KOhm

Sensitivity range: -64 to -22 dBu or line (0dBu)
Signal at pin 2 of audio input is in phase with signal at pin 2 of audio output. Switchable phantom power: +48 V

WCA connectors (cont.)

(5) Intercom headset connector
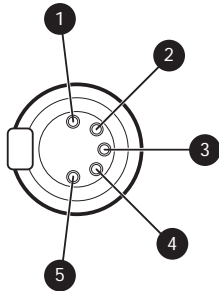
XLR 5-pole female; panel view
1. Microphone return
2. Microphone
3. Telephone return
4. Telephone left
5. Telephone right

Microphone level -44 dBu / -24 dBu switchable
Input impedance > 10 KOhm.
Switchable phantom power: +12 V

Telephone level +12 dBu nominal
Telephone output impedance <50 Ohm

(6) Camera SDI output connector
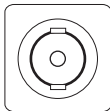
BNC connector
This socket provides a 0.8Vpp SDI output video signal for monitoring purposes only.

(7) VF output connector
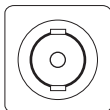
BNC connector
This socket provides a 1.0Vpp VBS output of the viewfinder signal.

AMU Connectors

Back panel view

TRIAX OUTPUT

DATA CAM TRANSMITTER

IN 1   IN 2   IN 3

OUT   OUT
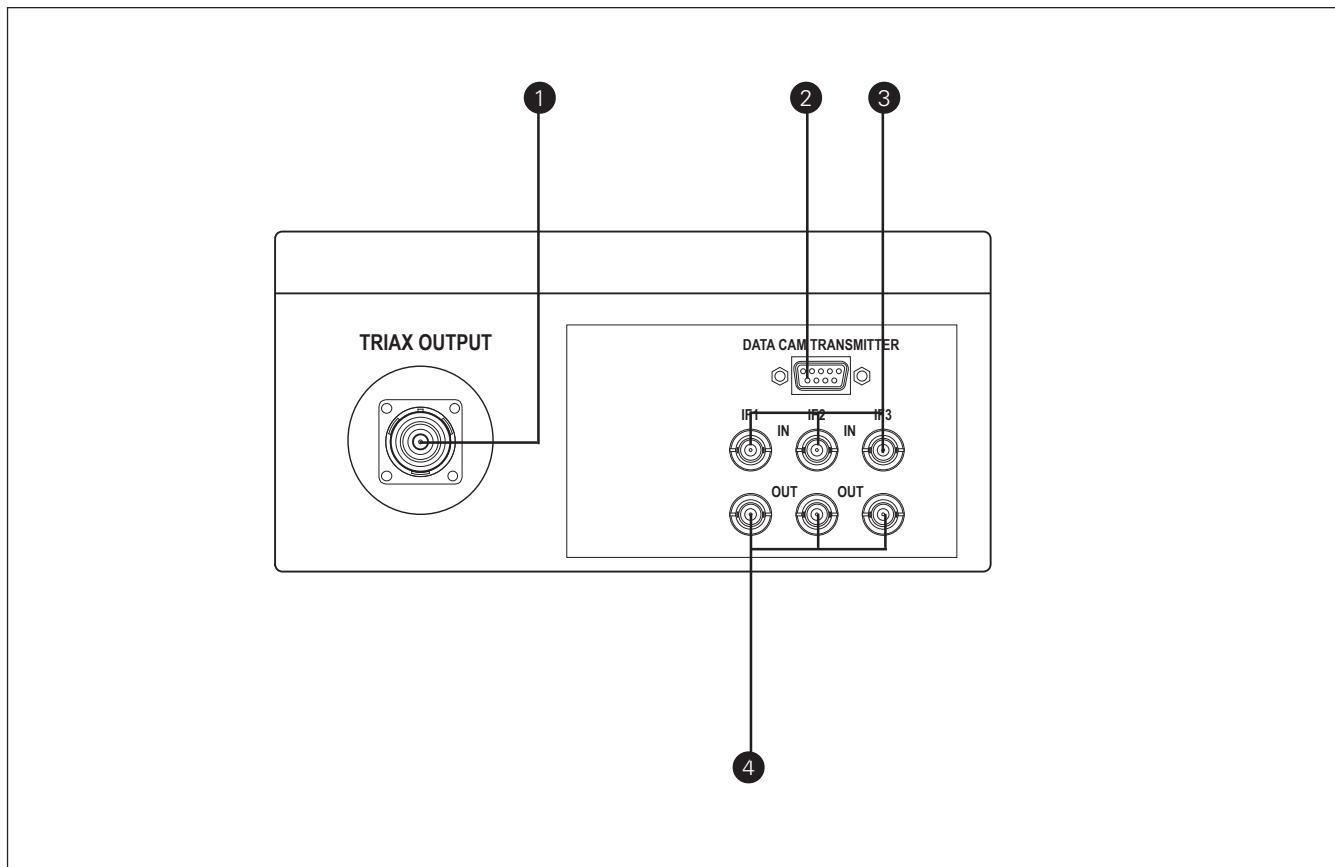
AMU Connectors (cont.)

(1) Triax connector
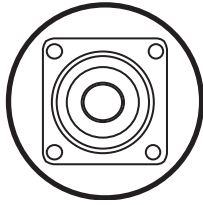
Triax connector
This socket is used to connect the triax cable (maximum 400m of 8mm triax cable) to the triax input of the WCU.

Receptacle types: Fischer, Tri-lock, ARD, Lemo 4, Lemo BBC, Lemo 3.

(2) Data emitter connector (DATA)
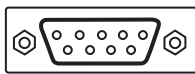
9-pin sub-D connector
This socket is used to connect the AMU to the data emitter unit of the antenna assembly.

(3) BNC RF receiver connectors (UHF IN)
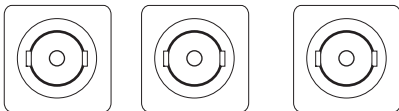
BNC connectors
These sockets are used to connect the AMU to the antenna receiver units of the antenna assembly.

Always use 75 Ohm cables. Phantom power of +9 V is always switchedON.

(4) BNC RF receiver connectors (UHF OUT)
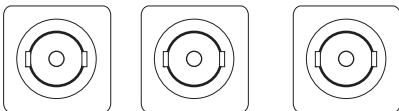
BNC connectors
These sockets are for measurement purposes only. Use short 75 Ohm cables only for measuring equipment.

WCU Connectors

Back panel view
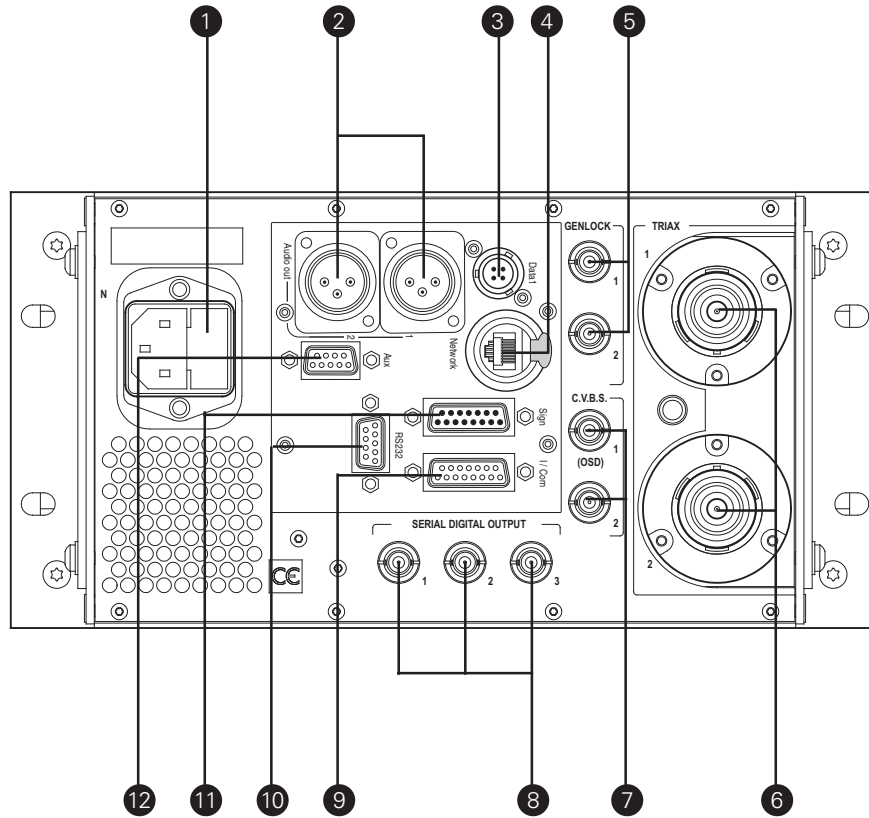
WCU Connectors (cont.)

(1) Power socket and fuse
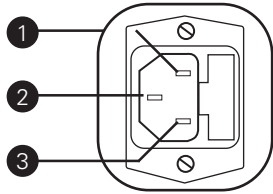
Connect a 100-125 Vac 60Hz or a 200-240 Vac 50Hz power supply to this connector (internal automatic switching).

1. Neutral
2. Ground (connected to chassis ground)
3. Phase

Fuse type: T6.3 AH250V (remove power supply plug to access the fuse and the spare fuse.)

(2) Audio OUT 1 & 2
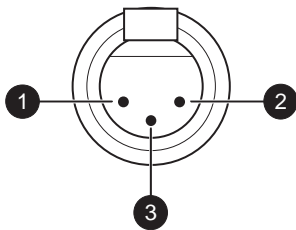
1. shield
2. Audio +
3. Audio -

Nominal level 0dBu (+6dBu selectable)

Shield of cable directly to the connector housing.

Panel part number   2422 026 02985
Cable part number   2432 026 00185

(3) Data connector
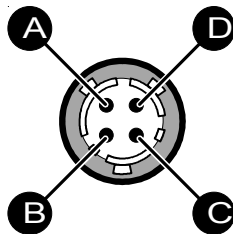
Souriau 4-pin male; panel view

A. Data
B. Data not
C. Not Connected
D. Not Connected

Shield of cable directly to the connector housing.
Connect a unit of the Series 9000 remote control family (OCP, MCP) to the WCU connector via a standard 4-pole Souriau cable.

Panel part number: 2411 020 11367
Cable part number: 2411 020 12025

(4) Ethernet Connector - Panel View
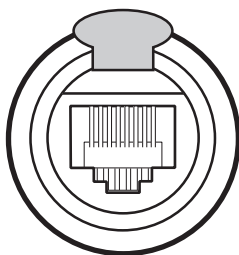
8-pin Standard Ethernet RJ-45 connector

Neutrik RJ-45

WCU Connectors (cont.)

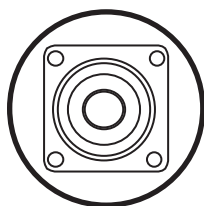## (5) Reference input connectors
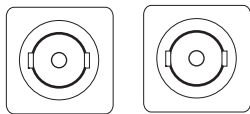
BNC connectors

This BNC connector accepts a 1Vpp composite reference* signal to the camera for genlocking. (The second connector should be terminated with 75 Ohm if the signal is not looped through.)

* must have H and V sync. signals
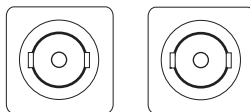
(6) Triax connector for AMU 1 & 2

Triax connector

This socket is used to connect the triax cable (<400m of 8mm triax cable) from the triax output of the AMU.

Receptacle types: Fischer, Tri-lock, ARD, Lemo 4, Lemo BBC, Lemo 3.

(7) CVBS output connector

BNC connector

This socket provides a 1Vpp CVBS output signal for monitoring purposes.
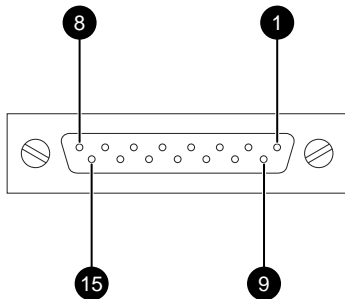
(8) WCU SDI output connectors
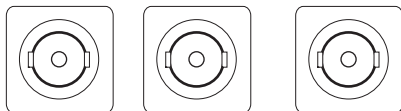
BNC connectors

These three BNC connectors provide a 0.8Vpp SDI output video signal according to SMPTE 259M.

(9) Intercom Connector - Panel View

15-pin female

Panel part number   2411 022 06239
Cable part number   2411 022 05168

15-pin female, shielded cable

1. Prod. out (4-wire out, 2-wire in/out)
2. Prod. in (4-wire only)
3. Prod. in shield (4-wire only)
4. ENG in (4-wire only)
5. ENG out (4-wire out, 2-wire in/out)
6. Progr. in (4-wire only)
7. Progr. in shield (4-wire only)
8. Housing
9. prod. out return (4-wire out, 2-wire in/out)
10. prod. in return (4-wire only)
11. ENG in shield (4-wire only)
12. ENG in return (4-wire only)
13. ENG out return (4-wire out, 2-wire in/out)
14. Progr. in return (4-wire only)
15. Housing

Shield of cable to the pin marked housing.

2-wire:

Nominal level 0dBu
Minimum load impedance: 200 ohm
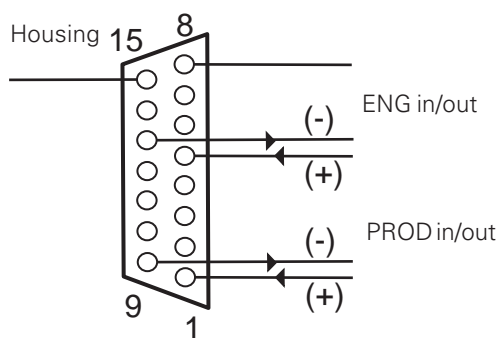Maximum DC level = 40 V

4-wire:

Output signals:

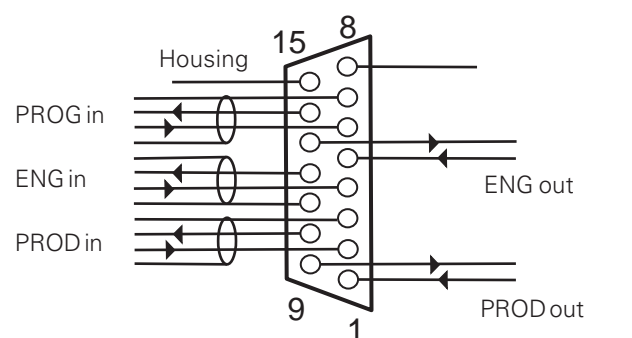nominal level 0dBu; impedance 600 ohm, symmetrical

Input signals:

level +6dBu or 0dBu selectable;
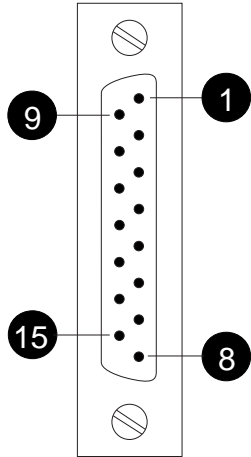impedance 10 Kohm (min), symmetrical

0dBu
Z => 200 ohm
Max 40V DC

+6 dBu or 0dBu
Zin > 10 k ohms

0dB
Zout < 600 ohms

(11) Signalling Connector

15-pin male; panel view

|	
Panel part number	2411 022 05292
Cable part number	2411 022 06157

15-pin male, shielded cable
1. Prev. out ext. (relay contact < 10 ohm)
2. Call out ext. (relay contact < 10 ohm)
3. Iso in ext. (dry contact)
4. On-Air in ext (dry contact)
5. Call in ext. (dry contact)
6. Audio 1 Input level *) Analogue input voltage 0V to +5V, see figure below.
   - 64 dBu ------ 0V
   - 58 dBu ------ +0.7V
   - 52 dBu ------ +1.3V
   - 46 dBu ------ +1.9V
   - 40 dBu ------ +2.5V
   - 34 dBu ------ +3.1V
   - 28 dBu ------ +3.7V
   - 22 dBu ------ +4.3V
7. +5 Vdc; OCP
8. Housing
9. Prev. out ext. return
10. Call out ext. return
11. Iso in ext. return
12. On-Air in ext. return
13. Call in ext. return
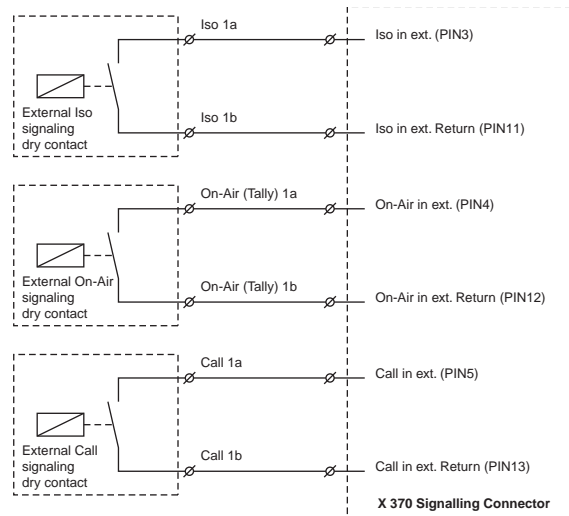14. Audio 2 Input level *) see pin 6
15. GND
*) Only when the External Gain Mode is set in the Viewfinder Menu
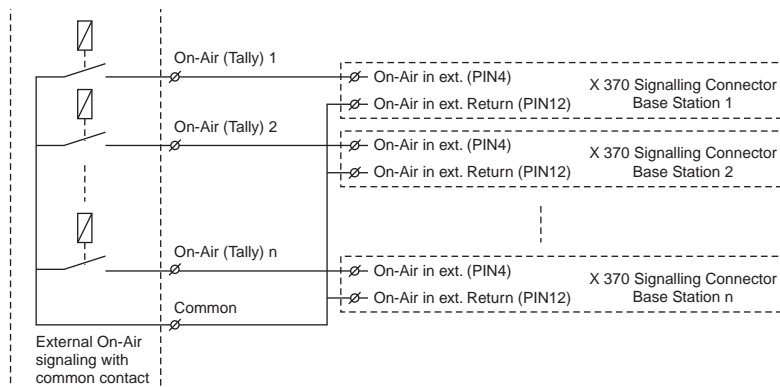**) Shield of cable to the pin marked housing.
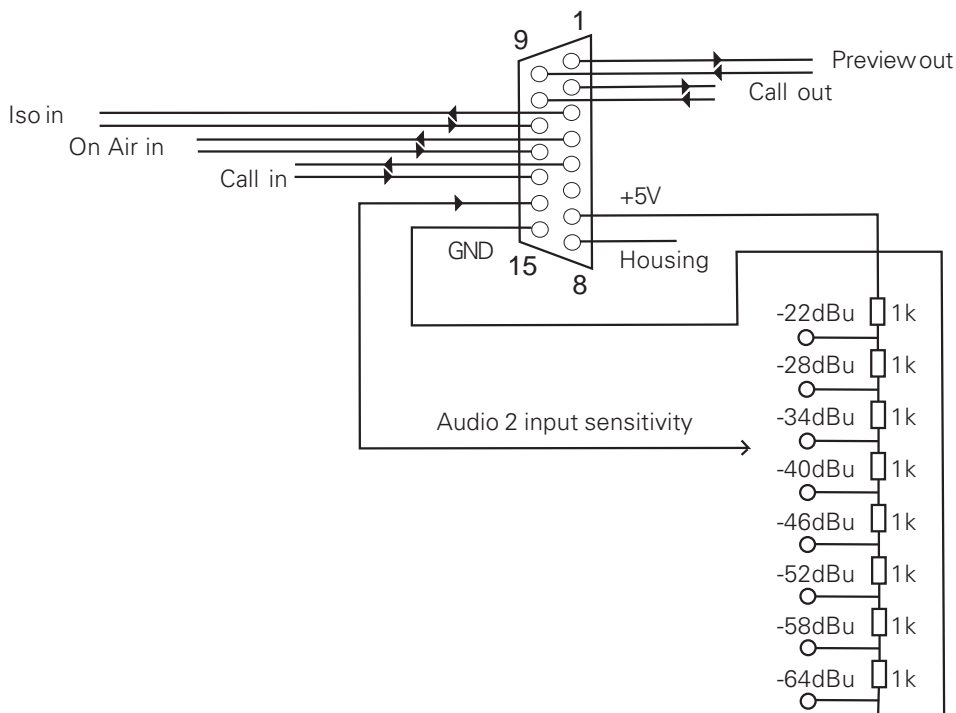
When the Iso, On-Air or Call signal is provided by a dry contact, connect the outputs to the signalling connector as shown in this figure.


When the Iso, On-Air or Call signal is provided by a dry contact with a common return connector connect the outputs to the signalling connector as shown in this figure.


When the Iso, On-Air or Call signal is provided by a DC output voltage connect the outputs to the signalling connector as shown in this figure.

Notes: The Iso, On-Air and Call signal is off if the input voltage is 5..24 VDC. The Iso, On-Air and Call signal is on if the input voltage is 0VDC. The X370 Signalling inputs are not galvanically separated. We recommend using dry contacts and when these are not available using galvanically separated DC voltage outputs.
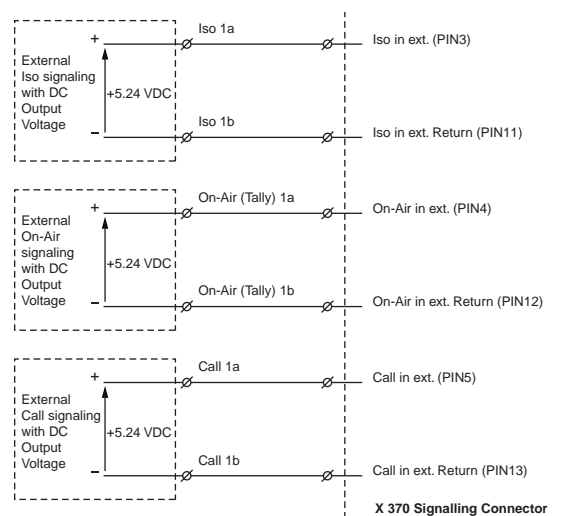
WCU Connectors (cont.)
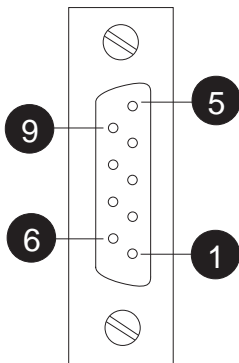
(12) RS232 Connector (NOT USED)
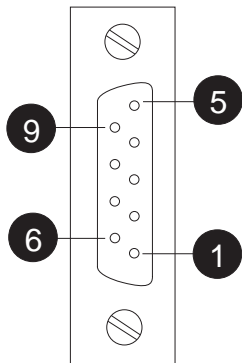
1. SPARE
2. RS-RXD - Receive Data
3. RS-TXD - Transmit Data
4. RS-DTR - Data Terminal Ready
5. RS-DGND - Signal Ground
6. RS-DSR - Data bSet Ready
7. RS-RTS - Request To Send
8. RS-CTS - Clear To Send
9. +12V

Panel part number   2422 025 12962
Serial Interface Cable   4822 872 03413

(13) Auxiliary Connector

9-pin female SUB-D connector
1. +5 V
2. AN 0 (not used)
3. Not connected
4. Not connected
5. Housing (shield of cable to this pin)
6. GND
7. AN 1

Low input signal (0V +/- 0.5V) switches aspect ratio to 4:3 *)
High input signal (5V +/- 0.5V) switches aspect ratio to 16:9 *)

   *) Only when the 'External Aspect Ratio' is being set in the viewfinder menu

8. Not connected
9. Not connected

Shield of cable directly to the connector housing

Panel part number 2411 022 06238
Cable part number 2411 022 05284

Specifications

Wireless adapter unit

Dimensions	Adapter: 191mm x 120mm x 180mm (L x W x H) Camera head with adapter (without viewfinder): 330mm x 120mm x 205mm (L x W x H)
Weight	2.2 kg (4.8 Kg incl. camera head and 1.5-inch viewfinder)
Operating temperature	-20°C to +45°C
Storage temperature	-20°C to +60°C
Power	12V DC, 42W including LDK 300 head and 1.5-inch VF
Battery plate	Anton Bauer type
DC In	12V (11 to 17V); 3.5A (excluding DC Out); XLR 4
DC Out	11 to 17V (battery voltage) 1.5A; 6-pin Hirose
Video	SDI monitoring quality output
VF signal	B&W video 1.0 Vp-p, 75 Ohm output
Antennas	RX antenna; BNC connector, RF signal input TX antenna; SMA connector, RF signal output
RF module	COFDM DVB-T modulation in 2k mode
Frequency ranges	2.2 - 2.4 GHz, 2.4 - 2.5 Ghz or 2.5 - 2.7 Ghz depending on module
Number of channels	16 per band (3 per band for US market)
Emitted Power	15 dBm ± 1.5 dBm (conducted) for 2.4 - 2.5 Ghz band 18 dBm ± 1.5 dBm (conducted) for all other bands measured at 20°C ambient temperature
Bandwidth	7.8 MHz per channel (-3dB)
Bitrate	22 Mbit/s (wavelet compression)
Range	150m line-of-sight in open field conditions
Latency	1.5 Frame, NTSC 50mSec, Pal 60 mSec
Intercom	Speech quality; latency to camera 250mS Microphone level -44 to -24 dBu switchable Input impedance > 10 KOhm Telephone level +12 dBu nominal Telephone output impedance < 50 Ohm
Audio	1 channel full bandwidth (22 kHz, S/N 63dB typical) or 2 channels reduced bandwidth (15 kHz, S/N 60dB typical) Input impedance > 10KOhm Sensitivity range: -64 to -22 dBu or line (0dBu)
Tally out	On: +5 Vdc CMOS level
External video	1 Vpp (C)VBS input

Specifications (cont.)

RF receiver units

Dimensions	98mm x 64mm x 34mm (L x H x W)
Weight	300g / box
Operating temperature	-20°C to +45°C
Storage temperature	-20°C to +60°C
Environment	IP54 compliant
Frequency range	2.2 - 2.4 GHz, 2.4 - 2.5 Ghz or 2.5 - 2.7 Ghz depending on module
RF antenna	SMA connector
VHF output	BNC connector

RF data emitter unit

Dimensions	98mm x 64mm x 34mm (L x H x W)
Weight	300g
Operating temperature	-20°C to +45°C
Storage temperature	-20°C to +60°C
Environment	IP54 compliant
Modulation	FSK modulation
Return channel	sensitivity < -95dBm
Frequency range	433.100 – 434.600 MHz; 455.000 - 456.700 MHz (455.000 - 455.700 MHz for US market)
Number of channels	16
Bandwidth	25 KHz (max.)
Baud rate	14400 baud
Emitted power	8 dBm ± 2 dBm (conducted in 433 MHz range) 14 dBm ± 2 dBm (conducted in 456 MHz range)
Range	150m line-of-sight in open field conditions
RF antenna	BNC connector
Data input	9-pin, D connector female

Antenna management unit (AMU)

Dimensions	480mm x 250mm x 200mm (L x H x W)
Weight	8,5 Kg
Operating temperature	-20°C to +45°C
Storage temperature	-20°C to +60°C
Environment	IP54 compliant
Data output	9-pin, D connector female
UHF inputs	3 x BNC connectors with active loop-through
TRIAX output	Triax plug, towards WCU

Wireless control unit (WCU)

Dimensions	½ 19-inch rack; 3U height
Weight	7 kg
Operating temperature	0°C to +45°C
Storage temperature	-20°C to +60°C
Power	100-125 Vac 60Hz (3A) or 200-240 Vac 50Hz (1.5A) max. 150W depending on system configuration
Triax cable length	400m maximum with 8mm cable or 600m maximum with 11mm cable
Video (x3)	SDI x 3 SMPTE 259M; BNC
CVBS	CVBS output monitoring quality; BNC
Genlock in	B&B input with loop through; BNC
POWER in	IEC type, 3 pin male
Intercom	Speech quality Input level 0 or +6 dBu selectable Output level +6 dBu nominal (adjustable +/- 12dB per 1.5 dB step
Audio	Output level 0 or +6 dBu selectable
Applicable Standards	EMC : EN 301489-3 Radio: ETS 300 220; ETS 300 440 Safety : EN60950

These typical specifications are subject to change without notice.

Type numbers

Main type numbers

LDK 5450/02	Wireless Camera Adapter
LDK 4450/x1 *)	Wireless Control Unit
LDK 4452/x2 *)	Antenna Management Unit **)

*) x=1: Fischer; x=2: Trilock; x=3: ARD; x=4: Lemo4; x=5: BBC Lemo; x=6: Lemo3

**) includes: antenna bracket and 10m connecting cable set for connecting the AMU to the antenna set.

RF Video modules

LDK 5451/22	Camera RF Module 2.2-2.4GHz (incl. anternna)
LDK 4453/22	Set (3 pcs.) RF Receiver Modules 2.2 - 2.4 GHz
LDK 5451/24	Camera RF Module 2.4-2.5GHz (incl. anternna)
LDK 4453/24	Set (3 pcs.) RF Receiver Modules 2.4 - 2.5 GHz
LDK 5451/25	Camera RF Module 2.5-2.7GHz (incl. anternna)
LDK 4453/25	Set (3 pcs.) RF Receiver Modules 2.5- 2.7 GHz

RF Data modules

LDK 4456/10	Camera RF Data Module 433 MHz
LDK 4454/10	RF Data Emitter 433 MHz
LDK 4456/20	Camera RF Data Module 456 MHz
LDK 4454/20	RF Data Emitter 456 MHz

Accessories

The lens, camera head, viewfinder, OCP, MCP, Triax cables and control cables are optional.

Mounting kits:

|	
BDT05701AA	Rack mount for one WCU
BDT05700AA	Coupling kit for two WCUs

Booster units:

LDK 5455/10	RF Video (COFDM) Booster for use with Anton Bauer battery plate
LDK 5455/20	RF Video (COFDM) Booster for use with IDX battery plate
LDK 5456/22	Antenna with N-type connector (2.2 - 2.4 GHz) for use with RF Video (COFDM) Booster
LDK 5456/25	Antenna with N-type connector (2.5 - 2.7 GHz) for use with RF Video (COFDM) Booster
LDK 4455/00	RF DataBooster

Type numbers

LDK 5451/22 Camera RF Module 2.2 - 2.4 GHz

LDK 5451/24 Camera RF Module 2.4 - 2.5 GHz

LDK 5451/25 Camera RF Module 2.5 - 2.7 GHz
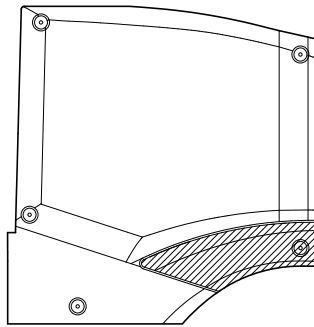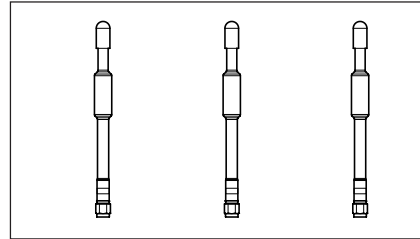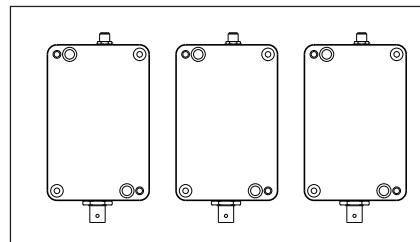
Up Convertor Module   Antenna

LDK 4453/22 Set RF Receiver Modules 2.2 - 2.4 GHz

LDK 4453/24 Set RF Receiver Modules 2.4 - 2.5 GHz

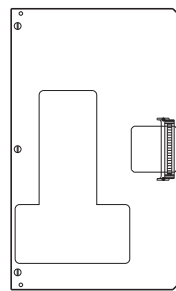LDK 4453/25 Set RF Receiver Modules 2.5 - 2.7 GHz

Antenna (3x)

Down Convertor (3x)

LDK 4456/10 Camera RF Data Module 433 MHz
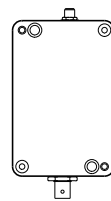
LDK 4456/20 Camera RF Data Module 456 MHz

RxData Board V1

Antenna

LDK 4454/10 RF Data Emitter 433 MHz

LDK 4454/20 RF Data Emitter 456 MHz

Return Channel Transmitter board

Antenna

User's Guide - Digital Wireless System