PHILIPS

Production Camera



Type LDK 14SL

Outstanding broadcast picture quality. Complete range of automatics.

Lightweight, rugged, shockproof. Each camera vibration and temperature cycled.

Compact Remote Control Unit (RCU) and Remote Control Panel (RCP)

Optional Plug in Triax Adaptors.

Full bandwidth chroma key channel.

High resolution 1½ inch and 5 inch viewfinder for handheld and tripod use.

2/3 inch LOC Diode Gun Plumbicons* with Dynamic Beam Control (DBC).

Built in sync lock.

All system standards.

*Registered trade mark for television camera tubes

The LDK14SL is the most recent version of the very successful LDK14 production camera.
In updating this camera significant improvements have been achieved in signal to noise performance, colorimetry and video processing. The improved contour processor is now fitted with an out of band correction circuit enabling a resolution of 100% at 400 TV lines to be obtained.
The LDK14SL is equally suitable for studio or outside broadcast applications and includes a Remote Control Unit and operational Remote Control Panel together with a 5 inch viewfinder which complements the lightweight camera head. For hand held applications an optional 1.5 inch viewfinder may be used.
A wide range of automatic facilities are standard in the design to enable on-air status to be realised in the minimum possible time. These facilities include automatic colour balance, centering, and auto iris, together with corresponding viewfinder indication that the correct settings have been achieved.

The viewfinder also provides an indication of signal level, colour bar on, on air, and camera call. Extensive use has been made of micro-miniature components and integrated circuits to ensure high reliability, stability and minimum down time. These components also result in a lightweight and compact camera head with reduced power consumption.
A significant feature of the new Philips LDK14SL camera system is the use of LOC (low output capacitance) diode gun Plumbicon tubes, together with specially matched FET's. These combine to provide an unusually high signal-to-noise ratio attainment of 55dB (PAL) and 57dB (NTSC). In addition, they give better highlight handling capabilities, a modulation depth of 50% at 400 TV lines and an extremely high limiting resolution of up to 700 lines.
A further aid to picture quality is the provision of a new IR filter, which enhances transmission characteristics and sensitivity.
Dynamic Beam Control has been incorporated in the camera to improve highlight handling which together with switchable Black Stretch for contrast compression, bias light for minimum lag and full two line vertical and horizontal contour correction provides all the features necessary in an advanced colour camera design.
The LDK14SL Production Camera can be used with multicore cables up to 300 metres maximum. For extra long cable lengths triax cable can be used in conjunction with optional adaptors.
Communications and audio are provided between the camera head and RCU and include a chroma key hue selection facility.
The internal sync pulse generator permits multiple camera synchronisation using an external reference.
To provide maximum operational flexibility the camera is designed to be powered from either an A.C. supply or standard 12 volt batteries.

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Pye TVT Limited
The Broadcast Company of Philips

DESIGN DETAILS — GENERAL

The LDK14SL camera body consists of two integral diecast sections in magnesium alloy, combining light weight and strength. The front section contains the camera optical system, video processing, scanning circuits and dynamic beam control. The rear section houses five boards providing remote controls, contour correction, sync and colour bar generators, encoding, monitoring, signalling and automatics and the power supply converter circuits. This rear section hinges upwards to give full access to the camera interior and the preset controls.

The camera optical section comprising the prism block and deflection assemblies is thermally screened from the camera electronics, and is contained in a single magnesium alloy cast block forming an integral part of the camera front to ensure optimum mechanical and thermal stability. Specially developed deflection coil assemblies for the LOC Diode Gun Plumbicons have been designed with the focus coil inside the scanning coils to reduce power consumption and improve thermal stability. Electrical picture rotation is employed for ease and rapidity of picture alignment, and adjustments for horizontal and vertical scans are provided in red and blue only. For low light operation, dual bias light is injected directly into the f1.4 prism block and to stabilise highlights, Dynamic Beam Control is used which is effective up to 4 lens stops above peak white. The rear loading 2/3 inch LOC Diode Gun Plumbicons are accessible after removing the left hand side cover. The printed circuit boards containing scanning and video processing circuits are accommodated in the right hand camera compartment. These can be hinged out for access when the right hand cover is removed. The rear camera section houses the remaining five boards which are:

- Remote control
- Contour correction
- Sync. colour bar and encoding
- Monitoring, signalling, and automatics
- Power supply converter

All printed circuit boards used in the LDK14SL are self locking to prevent accidental release.







Signal Processing

The first stage FET pre-amplifier for each colour channel is mounted within the deflection coil shielding close to the Plumbicon target pin. This arrangement minimises target capacitance and the pick-up of spurious signals. The remaining elements of the pre-amplifier in each channel, a single integrated circuit, is mounted together with the Dynamic Beam Control circuit in the left hand camera compartment. Each video processing channel employs video operational amplifiers and includes circuits for flare compensation, black and white shading correction, automatic colour balance, linear matrixing (for optimal colourimetry), gamma correction and two line contour processing. The linear matrix circuit is mounted on a single plug in board, and switchable gamma correction is fixed in the green channel, red and blue being adjustable to match green. Two system dependent boards are provided to enable the RGB video signals to be encoded into all PAL, NTSC or SECAM system standards.

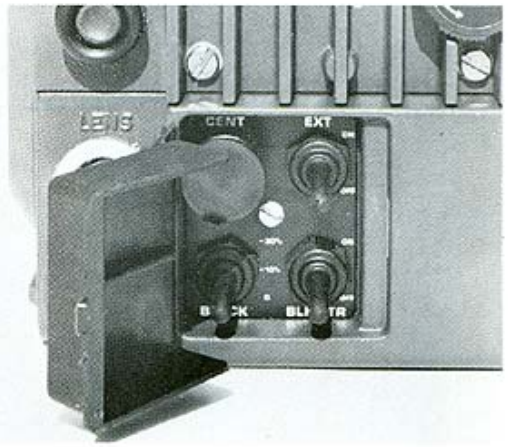
Extensive Automatic Systems

One of the major advantages of the new LDK14SL is the extensive operational freedom provided for the user via the new video processor and built-in monitoring board. This is made possible by a reliable series of built-in, automatic functions which include centering, black balance, white balance, dynamic beam control, and flare compensation. Where scene light level is too low and white balance is incorrect, centering is automatically inhibited. The "intelligence" of the LDK14SL also ensures that the auto-iris control of the lens is automatically switched to remote when the camera is used with a digital remote control system. Switching can alternatively be carried out at the control panel by means of an optional auto/manual switch. A further outstanding feature of the system is its adaptability for a gain option of +9 or +18dB.
In addition, the white balance range has been extended, which minimises the need for adjusting the five-position direct-drive filter wheel, and the accuracy and stability of auto black balance have been increased.

When switching from the auto iris function to the momentary iris button on the lens, a spot measurement window will be displayed on the viewfinder screen. If the camera is then pointed at a scene so that the object to be televised is within the window and the momentary iris button is pressed, the lens iris will be automatically set and the continuous auto iris may be switched back into operation. A new feature is the addition of automatic iris closing when the camera is switched to standby.
The LDK14SL is equipped with memories which will retain Centering and Colour Balance information for several days, depending upon the state of the charge of the battery.

Servicing

To facilitate servicing, the camera is fitted with a large number of labelled test points and the removable side covers and hingeable rear section provide easy access to the camera interior. Printed circuit boards either hinge out or can be placed on extenders, and an external test sawtooth and external video test input signals may be used. A monitoring output is also provided which is accessible when the rear camera compartment is hinged up to allow the camera to be tested with an external larger screen monitor.





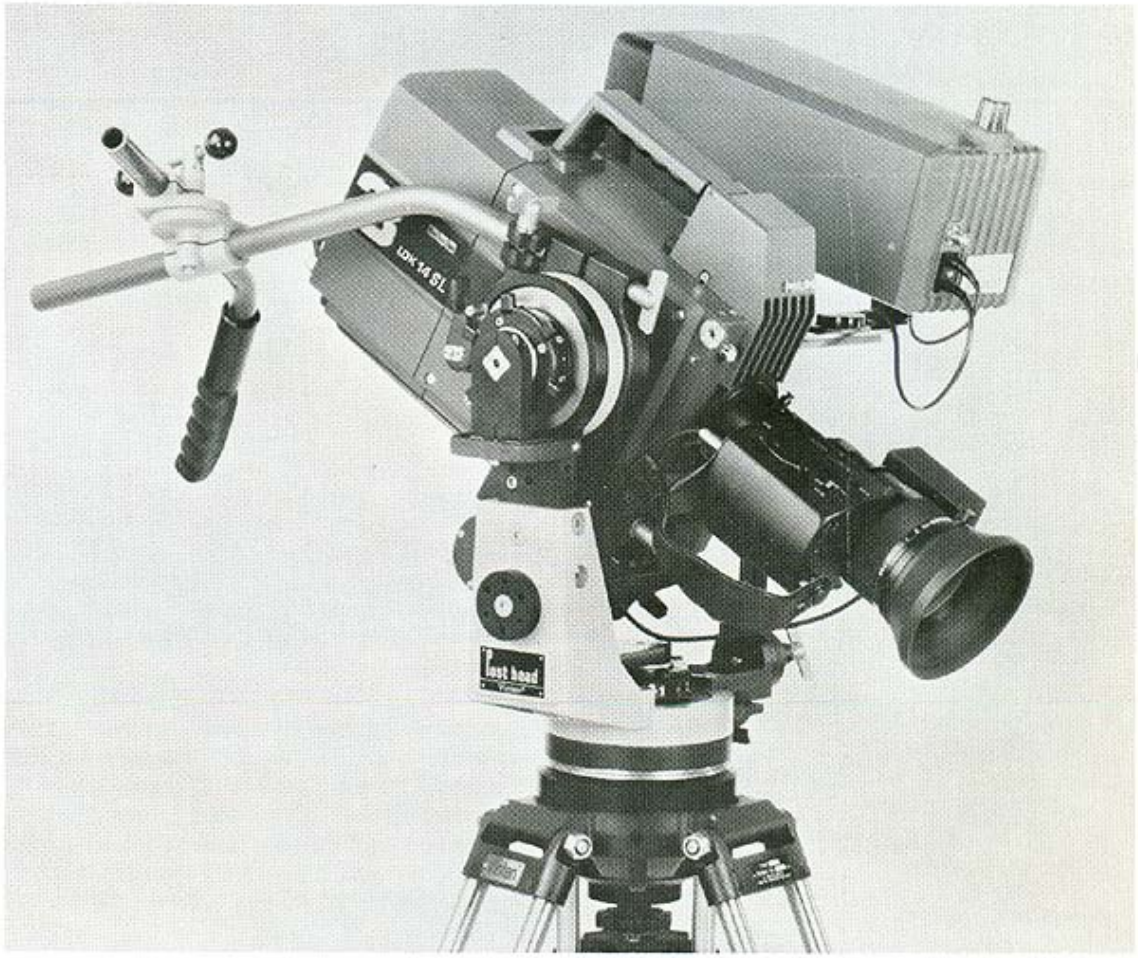
Optics

A wide range of lenses is available for the LDK14SL with both variable and fixed focal lengths. Zoom ranges up to 30 times and lens apertures up to f1.4 can be accommodated and a range of optional close up and wide angle attachments as well as range extenders are available. The LDK14SL optical block is a high transmission f1.4 prism system which together with linear matrixing (optimised for 2/3 inch Plumbicon tubes) provides optimal colourimetry.
The camera lens is attached by a quick release bayonet mount, the lens rings on the camera being made out of a titanium alloy combining great strength with low weight.
The lens iris is servo controlled, and the zoom function may be manually or servo controlled. Focussing is either manually controlled at the lens or remoted by a Bowden cable to a pan bar when the camera is tripod mounted. A manually controlled five position filter wheel inserted between the lens and prism has the following filters fitted as standard.
CAP; CLEAR; 06.ND; 85B; 85B plus 0.9ND.

Viewfinders

Two high resolution viewfinders are available for use with the LDK14SL the standard 5 inch viewfinder for studio use and an optional 1.5 inch viewfinder for hand held applications.
The 5 inch viewfinder may be top or side mounted to suit the particular application. Contour correction is applied to the Y signal to ensure a sharp and crisp picture display. Standard peaking is also available as an ON-OFF function.
The optional 1.5 inch viewfinder of high brightness is equipped with an adjustable magnifying lens for monocular viewing.
Both LDK14SL viewfinders are equipped with contrast and brightness controls and a peaking ON-OFF selector. Two LED indicators are provided: red indicating ON-AIR or VTR RECORDING and amber indicating LOW BATTERY or CALL (flashing) or non-operational. Information is also provided by electronic means on the viewfinder to indicate how much tape is remaining on the VTR, (if the VTR has this facility) whether colour



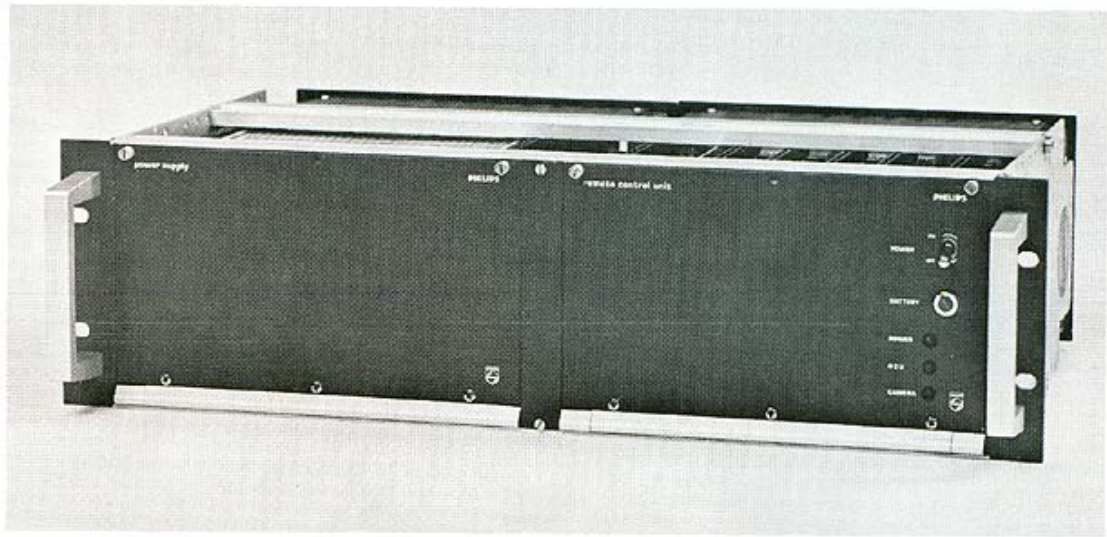




bars have been selected (the edges of the blue bar appear on the screen) and the automatic function patterns described above. Peak signal levels are preset between 90% and 110%. Those parts of the signal which exceed the limit will then appear black.
The viewfinder selector on the camera front when switched to the Internal position enables the viewfinder to display one of the following signals: RGB; B/-G; R/-G; and Y, as preset on the monitoring board. (The viewfinder Y signal consists of one third each of red, green and blue). In position External, the external input signal fed to the camera will be displayed.

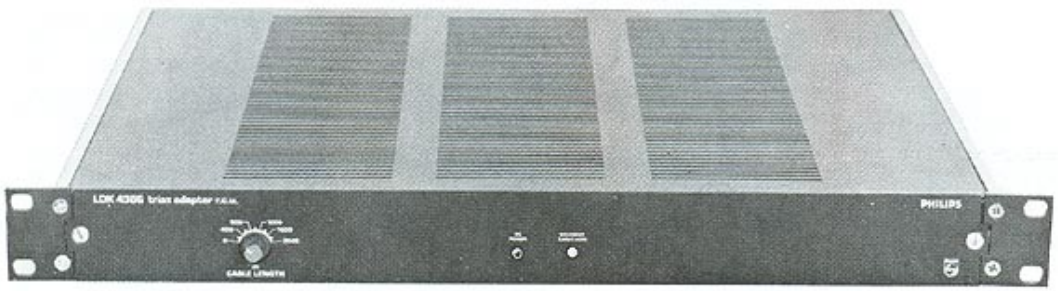
Remote Controls

The LDK14SL Production Camera is provided with a Remote Control Unit (RCU) and an operational Remote Control Panel (RCP).
The RCU provides video and data multiplexing, audio and intercom and power for the camera head. Three CVBS video outputs are available, together with the chroma key hue signal and an external reference input signal for the sync lock system. A multiway connector is used for signalling and intercom circuits and a three pin standard XLR connector for audio from the camera head.
The RCP which can be used up to a distance of 10 metres from the RCU provides all the operational controls for the camera channel. These include Iris and Master Black level, Red and Blue gains and black level control, camera call push button with indicator, intercom, high gain selector, colour bars on-off and a camera standby switch, together with on-air indication and headset connector and switch for intercom.
All control functions are sent to the camera head via a data link multiplexed down the camera cable. The data words are synchronous to the television frame and transmitted every frame. This signal is added to the colour black reference signal and transmitted to the camera head by the video multiplexing system. If a composite colour signal is used for sync reference then the video information will be suppressed and replaced by the data signal.
Video signals are sent to and from the camera using multiplex techniques which provide a simple solution for cable correction and an economic solution for the triax cable option. Two signals are sent in both directions, the CVBS output and chroma key hue signal from the camera to RCU and external viewfinder plus the colour black sync reference with the control data from the RCU to camera head.
The chroma key hue signal which is derived in the camera head may be remotely controlled to obtain the required hue. This control is normally located with the Production Switcher.
Permanent remote monitoring is also possible, by slight modification to the camera remote control units. This enables selection of the wide band overlay signals G minus R and B minus G.
Provision has been made to power the system from either an A.C. supply or for outside broadcast work from a 12 volt battery if required. The rear panel of the RCU has connectors for A.C. input and battery input.





The RCU front panel has a power ON-OFF switch and indicators for power on and camera on.
Behind the RCU front panel are located subcarrier coarse and fine phasing controls and a horizontal phasing control to enable the camera to be phased up to other sources. In addition controls for horizontal and vertical centering of Red and Blue scans are available.
To provide for ease of servicing all the RCU electronics is built on a modular system for easy access.



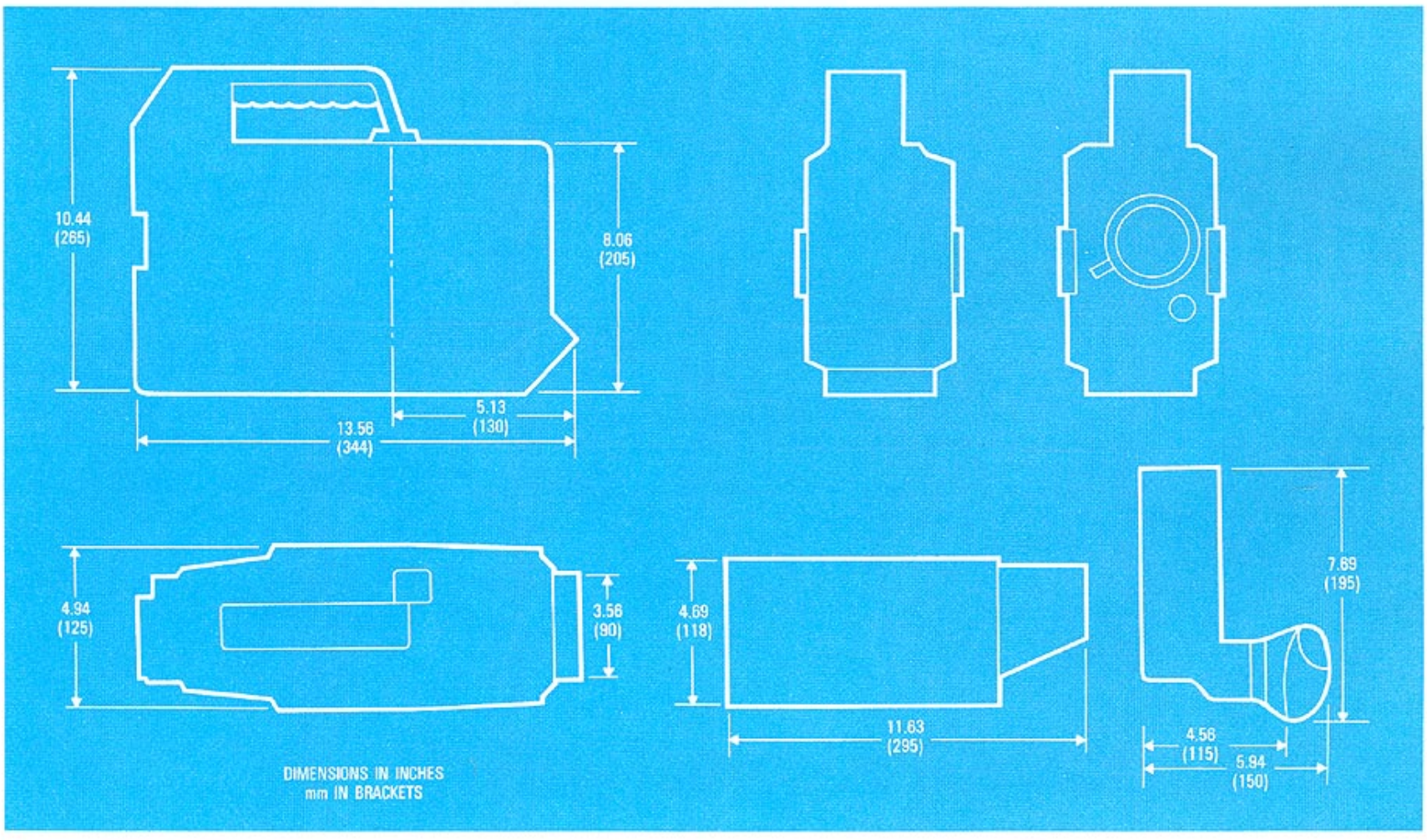


Optional Triax Adaptors

The LDK14SL has provision for mounting an on camera triax adaptor for cable runs of up to 1500 metres (local camera powering). At the camera head, the triax adaptor is attached to the rear of the camera by a quick release snap lock mounting plate which as an alternative can also mount an on-camera battery for hand held use.

At the Remote Control Unit a 19 inch one rack unit high triax adaptor is used in conjunction with the RCU.

It is unnecessary to modify either the camera or the RCU for triax use, only simple cable connections are required.



Modes of Operation

The LDK14SL production camera has been designed to provide for very flexible operation. It is equally suitable for studio, outside broadcast and location work being light weight and quickly adaptable to the desired format.

As a conventional studio camera pedestal or tripod mounted and with the 5 inch viewfinder, it may be connected to the Remote Control Unit by up to 300 metres of multicore cable or 1200 metres of 14mm triax. The RCU provides up to 3, CVBS outputs and a chroma key signal, the hue of which may be controlled remotely. Using an external reference of colour black, or CVBS, the LDK14SL will operate synchronously with external sources such as other cameras or station timing and subcarrier and horizontal phase controls are provided at the RCU.

The operational Remote Control Panel may be desk or rack mounted together with other RCP's and used to control the normal operational facilities for production purposes. Communications provided between the RCP and Camera head are equally suitable for 2 wire or 4 wire systems and a programme audio circuit with limiter has an output at the RCU from a microphone input at the camera.

For outside broadcast use very long cable runs in triax may be used.

Being extremely lightweight the LDK14SL may be hand held with very fast conversion from the studio or OB camera mount to a shoulder support. When hand held battery can be used for local powering and direct connection made to a portable VTR.

If an A.C. supply is not available then the complete channel can be powered from a 12 volt battery supply which could be a car or OB vehicle battery. In this case the battery supply is connected into the RCU and power fed to the camera head down the multicore or triax cable.

These very flexible powering facilities allow for local power supplies at the camera end and RCU end for independent operation.

Triax or Coax Mode

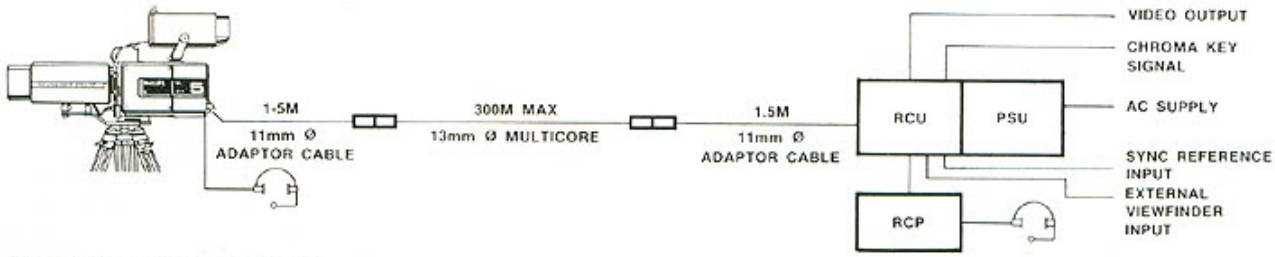
In this mode an adaptor is fitted to the LDK14SL camera and a new interconnection unit and module is fitted to the RCU. With this adaption the LDK14SL can be used with Triax or coax cable providing much longer cable runs that is possible in the multicore mode.

Provision has been made to power the camera from the RCU when the maximum cable run will be 1200 metres of 14mm triax.

LDK 14 Multicore Mode (100m)



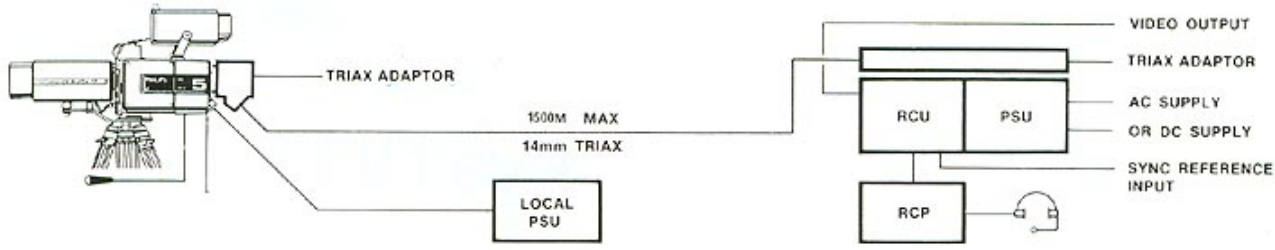
LDK 14 Mulitcore Mode (300m)



LDK 14 Triax Mode (1200m)



LDK 14 Triax Mode (1500m)



TECHNICAL DATA

Systems
PAL 625 lines, 50 fields/sec
PAL M 525 lines, 60 fields/sec
NTSC 525 lines, 60 fields/sec
SECAM 625 lines, 50 fields/sec
using system dependent p.c. boards.

Power Supplies
Input Voltage:
99-128V a.c.
198-257V a.c.
47Hz to 63Hz
or 10.5-15V d.c. (with limited cable lengths)
Consumption:
approx 65VA including RCU, camera head and 5 inch viewfinder.

Input Signals
a. Colour black or CVBS external reference loop through 75 ohm with a sync component of 0.15 to 0.6V p-p. For correct sync lock operation these signals must have the correct sync to subcarrier relationship.
b. External viewfinder signal loop through 75 ohm, 1V p-p composite.

Output Signals
3 x Coded composite colour signals 1V p-p 75ohm
2 x Chroma key hue signals 1V p-p 75 ohm
1 x Programme audio channel includes limiter circuit. 0dBm 600 ohm output impedance balanced.

Scene Illumination
1000 lux for a signal to noise ratio better than 55 dB PAL (57dB NTSC) unweighted; lens iris f3.0 and reflection factor 89.9% with gamma linear, matrix in and contours off.

Limiting Sensitivity
Better than 55 lux (5 foot candles) at f1.4 and gain at +12dB (27 lux at optional +18dB).

Resolution
Limiting resolution equal to or greater than 700 TV lines. Typical resolution depth 50% at 400 TV lines, depending on performance of XQ3427 Series Low Output Capacitance Plumbicon® tubes.

Colour Registration
Horizontal and vertical deviations of Red and Blue with respect to Green:
Zone 1 (circle 80% of picture height) 40n. sec.
Zone 2 (circle of picture width) 80n. sec
Zone 3 (rest of picture area) 160n. sec

Geometric Distortion
Excluding lens errors less than 1.5% at any point in the picture area.

Gain Control
Master selector for 0dB, +6dB and +12dB; individual controls for plus or minus 3dB in RED and BLUE.
Optional: 0dB; +9dB and +18dB.

Filter Wheel
5 positions: CAP; CLEAR; 0.6ND; 85B; 85B plus 0.9ND

Gamma Correction
Gamma: 0.5
Gamma Tracking: better than 0.5%
Optional gamma: 0.45

Black Level Adjustment
Master black level: +20% and −50% of the nominal white level.
Individual RED and BLUE: ±15% of the nominal white level.

Contour Correction
Contour correction is applied in band with level dependency, comb filter, noise slicer (coring). Out of band contour correction can be added to enable the modulation depth at 400 TV lines to be adjusted to 100%.

Test Signals
Sawtooth to check Video channels.
Colour Bar: EBU and split field.

Intercom
Standard European four-wire system and provision for USA standard two-wire system.

Warm-Up Time
Acceptable picture quality will be obtained from Standby in two seconds.

Genlock Timing
Horizontal ±3 μ sec.
Subcarrier more than 360 degrees.

Permissible Ambient Temperature Range
(excluding batteries) −20°C to +45°C

Weights

Camera Head	5.4 Kg
VF 1½ inch	0.5 Kg
VF 5 inch	3.0 Kg
RCU	11.0 Kg
RCP	0.5 Kg
Triax Adaptor—RCU	4.3 Kg
Triax Adaptor—Cam	1.5 Kg

ORDERING INFORMATION

Camera for PAL system	LDK0014/01
Camera for NTSC system	LDK0014/51
Camera for PAL-M system	LDK0014/61
Camera for SECAM system	LDK0014/71
Camera remote control module	LDK4371/10
Remote Control Unit (RCU)	LDK4370/10
Camera power supply	LDK4373/00
Remote Control Panel	LDK4617/00
19 inch rack mounting for two Remote Control Panels	LDK8115/10
Battery Convertor	LDK4374/00
Battery Belt	LDK4375/00
Power Supply	LDK4377/00
*Triple Slow Charge Adaptor	LDK4376/10
1½ inch viewfinder	LDH2101/01
5 inch viewfinder	LDK4308/01
Set of spare camera modules	LDK8614/01
Module extender for LDK14 Camera	LDK4830/00
Set of spare system modules:	
PAL	LDK8615/01
NTSC	LDK8615/51
PAL-M	LDK8615/61
SECAM	LDK8616/71
Set of spare modules for RCU	LDK8616/01
Module extender for Remote Control Unit	LDK4380/01
Spare component kit for LDK14	LDK8604/00
Empty filter wheel	LDK6205/00
ENG shoulder pad	LDK6990/17
Mounting for handgrip	LDK6505/03
Headset with two earphones	LDK8111/13
Headset with one earphone	LDK8111/14
Set of camera designation numbers	LDK6400/01
Set of RCU designation numbers	LDK6400/02
Viewfinder side mounting for Sachtler tripod	LDK6506/01
Carrying case for LDK14 camera head	LDK6995/00
Spare component kit for LDK14S EFP parts	LDK8604/20
Triax adaptor—camera	LDK4385/00
—RCU	LDK4386/00
Set of spare modules for triax adaptor	LDK8617/00
EFP Shoulder brace	LDK6990/16

For use with LDK4377/00

These typical specification details are subject to change without notice.

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