

# PHILIPS



## ENG/EFP Camera



### Type LDK 14

**Outstanding broadcast picture quality, High Sensitivity.**

**Lightweight, rugged, one piece, fully self contained.**

**Low power consumption and camera Off-Use feature.**

**2/3 inch Plumbicons with dynamic beam control.**

**Fully automatic operation and switchable black stretch.**

**1½ inch and 5 inch viewfinder for hand held and tripod use.**

**Full bandwidth chroma key and triax facilities.**

**Built in sync lock, and suitable for all system standards.**

The LDK14 one piece colour camera has been developed for ENG applications where minimal weight together with rugged shock proof design are of prime consideration. In developing the LDK14, Philips engineers have produced a colour camera with uncompromising picture quality which makes it equally suitable for EFP or studio applications, for which a range of accessories has been provided.

The LDK14 as an ENG camera is designed to provide all the features necessary for instant news reporting in a single unit with the minimum of setting up. To achieve this objective a number of automatic facilities have been incorporated including auto colour balance, auto iris and auto centering. Together with the automatic setting up features, a number of indicators have been designed into the viewfinder to aid the camera operator. These include indication of signal level, colour bar on, spot measurement windows to check the operation of the auto colour balance and auto centering

functions, indication of VTR tape remaining, and indication of battery re-load.

Extensive use has been made of micro miniature components and integrated circuits together with light-weight materials for the camera body to reduce size and weight to a minimum.

The camera uses all magnetic 2/3 inch plumbicons, and a high transmission f1.4 prism system which has been designed to optimise for this tube size.

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 LDK14 having full broadcast picture quality and colorimetry makes it equally suitable for Electronic Field Production (EFP) and Studio use. To meet these requirements a number of options have been designed including a Remote

Control Unit (RCU) and a 5 inch viewfinder for tripod use. With the RCU the LDK14 may be operated as a conventional studio or OB camera with multicore cable lengths up to 300 metres maximum or with triax cable up to 2000 metres using the optional adaptors. Communications and audio are provided between camera and RCU and optional chroma key hue selection facilities can be incorporated. The internal sync pulse generator designed into the LDK14 permits multiple camera synchronization.

In all modes of operation the LDK14 can be powered from either a battery belt when used as an ENG camera or a car or vehicle battery, or from a conventional AC supply.



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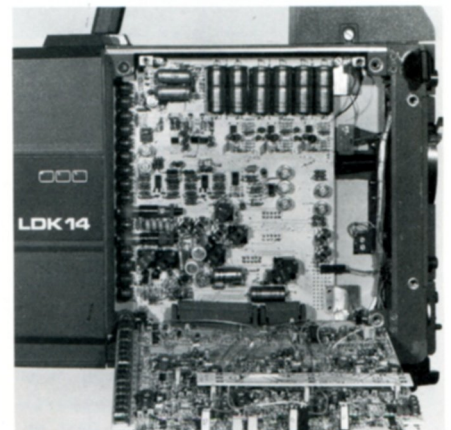


#### DESIGN DETAILS-GENERAL

The LDK14 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 convertor 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 all magnetic 2/3 inch 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.

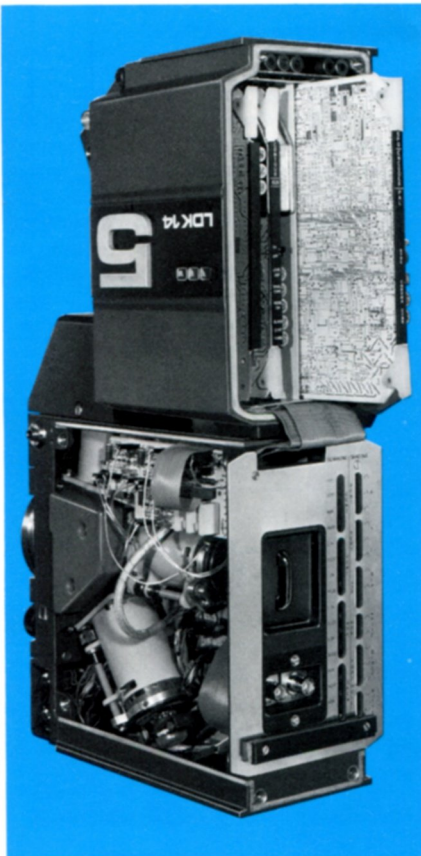
For low light operation, dual bias light is injected directly into the LDK14 f1.4 prism block and to stabilise highlights, Dynamic Beam Control is used which is effective up to 4 lens stops above peak white.



The rear loading 2/3 inch 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 LDK14 are self locking to prevent accidental release.





The LDK14 is intended for a number of applications ranging from ENG to Studio use, and hence a wide range of optional items have been designed.

These options include clamping brackets for an on-camera microphone or cine light and quick release shoulder and chest or waist supports. The camera base is equipped for mounting a mini wedge and the housing is rain and dust proof and screened against RF radiation.

For ENG self-contained operation, the LDK14 ENG lenses are equipped with VTR start and stop switches which may be mounted either on the lens or in the hand grip.

Operational comfort and convenience have been considered high priorities in the design, and hence the LDK14 is well balanced on the shoulder and can be used for short periods without a conventional mounting, having a flat base. The optical axis is at virtual eye level giving the operator better control of the picture which is being televised and improving the apparent feel of the camera.

#### Signal Processing

The first stage FET pre-amplifier for each colour channel is mounted within the deflection coil shielding close to the plumbicon target ring. This arrangement minimizes 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 colorimetry), 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.

#### Automatic facilities

The LDK14 incorporates automatic control of colour balance (black and white) centering and iris.

With the filter wheel in the cap position Black Balance (or pulse compensation) is adjusted by the auto black balance circuit on pressing the Colour Balance Button. The auto master black level function when activated, will operate continuously to set the darkest part of the picture to black or a pre-set level.

When a reference white object is televised, and Colour Balance is selected, a small window in the viewfinder picture centre indicates when correct white balance is achieved. This same window will also indicate if the auto colour balance circuit is out of range and whether to add or subtract a colour filter.

For auto centering, adjacent windows to the left and above centre indicate when the horizontal and vertical scans are correctly centered utilising a special registration chart. For this function a momentary acting button is provided.

The iris is adjusted automatically and manual override can be selected by two momentary buttons, for iris increase and decrease over a small range. In the automatic mode of operation, the lens iris will respond to the peak to average value of the video signal level dependent on a servo control signal derived from a non-additive mixed and integrated RGB signal. The auto iris function operates on a picture area of about 40%, and the peak to average level can be pre-set internally.

For ENG work, lenses are available with a momentary iris switch for making spot automatic exposure measurements. When switching from the auto iris function to the momentary auto 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 will retain its position. When the take is completed, the continuous auto iris may be switched back into operation.

The LDK14 is equipped with memories which will retain Centering and Colour Balance information for 24 hours when the memory battery is fully charged. This battery will be fully charged when the camera has been ON or in the OFF USE position for a minimum of one hour.







## Optics

A wide range of lenses is available for the LDK14 with both variable and fixed focal lengths. Zoom ranges up to 25 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 LDK14 optical block is a high transmission f1.4 prism system which together with linear matrixing (optimised for 2/3 inch plumbicon tubes) provides optimal colorimetry. The camera lens is attached by a quick release bayonet mount, the lens ring 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 remotely 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; 0.6ND; 85B; 85B PLUS 0.9ND.

## Viewfinders

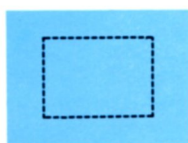
Two viewfinders of 1.5 inch and 5 inch are available for use with the LDK14.

The 1.5 inch viewfinder provided with the basic ENG package is mounted in an aluminium housing. It can be adjusted over a wide range of positions (including storage above the lens) and mounted on either side of the camera. This high brightness viewfinder is equipped with a 2.5x magnifier for monocular viewing. Contour correction is applied to the viewfinder Y signal to ensure a sharp and crisp picture display, standard peaking also being available as an ON-OFF function.

An optional 5 inch high quality viewfinder is available for EFP or studio applications when the LDK14 is tripod mounted. Provision is made to mount the 5 inch viewfinder in a number of positions to suit the requirements of setting up and operating. These include both top and side mounting.

The LDK14 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, whether colour bars have been selected (the edges of the blue bar appear on the screen) and the automatic function patterns described above. Reset peak signal levels are preset between 90% and 110%. Those parts of the signal which exceed the limit will then appear black.

## Viewfinder Automatic Setting-up and Monitoring



### Auto-Iris

40% - working area for Auto-Iris - permanent engraving on viewfinder screen.



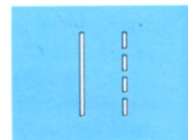
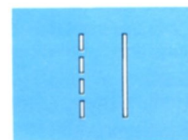
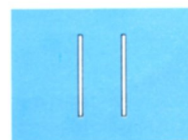
### Momentary Iris

Select momentary iris. V.F. displays window of 1 1/2 % of picture. Point camera at scene to be televised. Selected reference object must be within window. Press momentary iris button. Iris now automatically set, and will retain position.



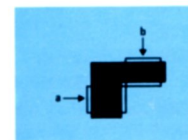
### Auto-Black

Select cap position on filter wheel. Press auto-colour balance button on camera front. V.F. then displays parallel vertical white lines. When black balance is achieved vertical lines change to broken.



### Auto-White Balance

1. Select auto-white balance and display parallel vertical white lines. Televisé reference white object between lines. Press auto-colour balance button.
2. If white balance is achieved, vertical lines become broken.
3. If left-hand line only becomes broken, add colour filter.
4. If right-hand line only becomes broken, remove colour filter.



### Auto-Centring

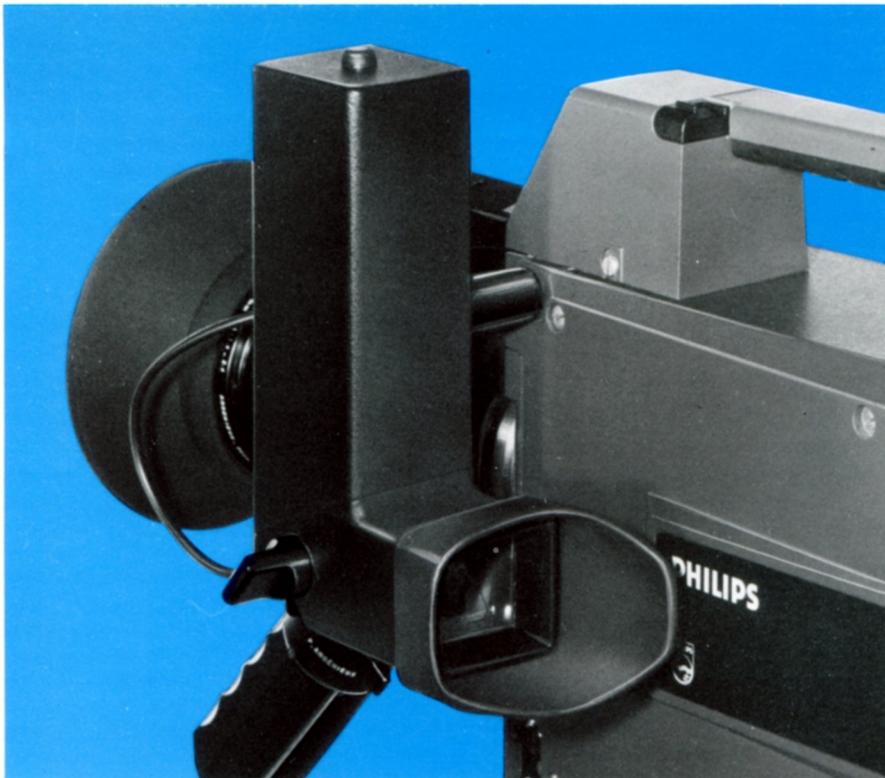
1. Televisé special registration chart and align with indications on viewfinder screen.
2. Press momentary auto-centring button to display two centring windows. Left and above the centre area.
3. When inverted 'L' is aligned with windows as shown, auto-centring takes place with 'a' aligning vertically and 'b' aligning horizontally. N.B. Black to white transitions shown by 'L' are used by the camera circuits to determine camera centring.

### Signal Level Indication

1. Peak white may be pre-set to a level between 90% - 110%.
2. The parts of the viewfinder image which exceed the pre-set signal level will then appear black.

If colour bars are selected this is indicated in the viewfinder by the presence of vertical edged transients.



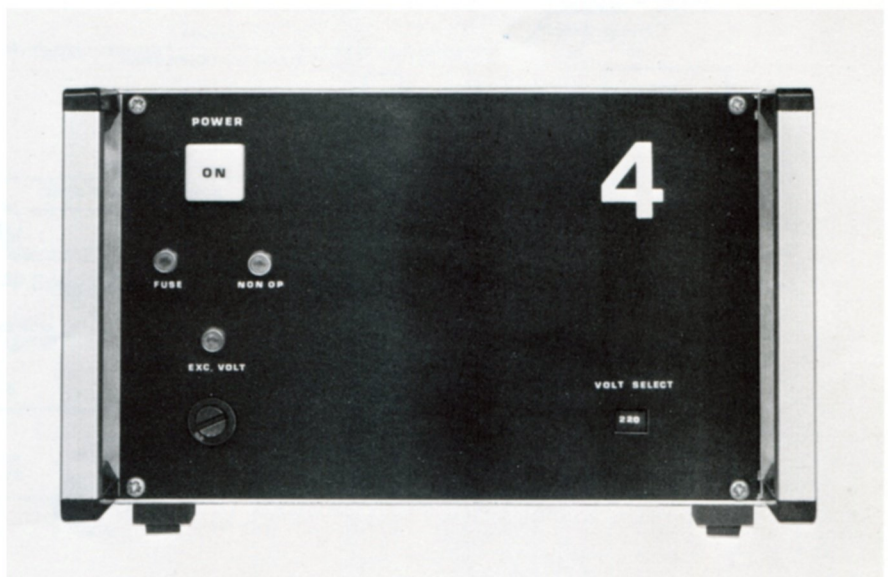
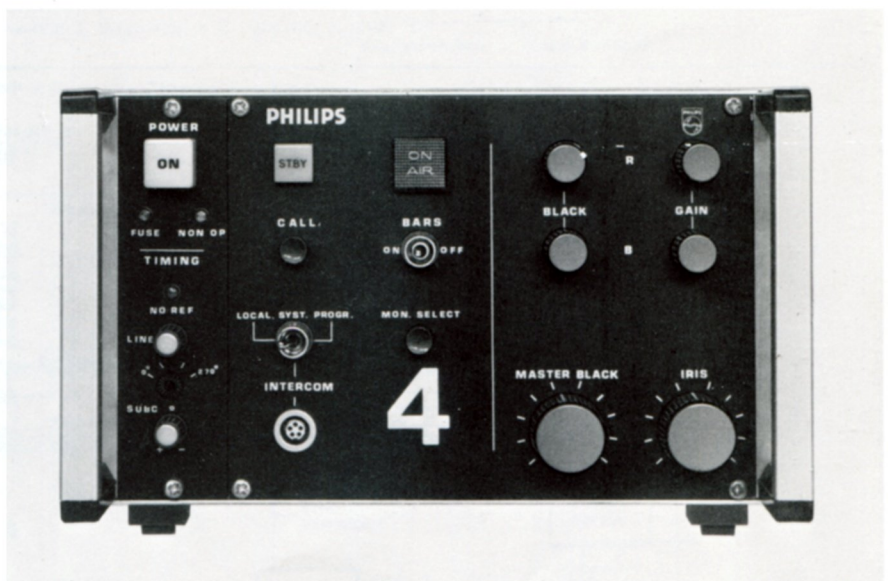


The viewfinder selector on the camera front when switched to the Internal position enables the viewfinder to display one of the following signals: R.G.B; B/-G; R/-G; and Y, as preset on the monitoring board. (The viewfinder Y signal consists of one third each of red, green and blue.) In position External, the external input signal fed to the camera will be displayed.

#### Remote Control Unit (RCU)

The optional RCU enables the LDK14 to be operated as a conventional camera for EFP or studio applications. This unit may be connected to the camera by means of a 19 way, 11mm diameter cable up to 100 metres in length or by means of cable adaptors up to 300 metres using a 39 way 13mm diameter cable. For extreme distances between camera and RCU, optional triax adaptors are available for cable lengths up to 2000 metres 14mm diameter or alternatively 1000 metres of coaxial cable 7mm diameter when the camera head is powered locally.

The RCU is half 19 inch rack width and in addition to the normal remote controls for iris, colour balance, and master black, the unit contains audio, communications, signalling and colour bar ON/OFF, as well as the timing circuits. The system may be AC powered or, if equipped with an optional battery converter, it may be battery powered from a car battery or alternative. Automatic sensing is incorporated to compensate for varying lengths of camera cable.



### Battery Belt

For ENG applications the LDK14 is normally powered from a battery belt using a 1.5 metre retractable lead. The very low power consumption of the LDK14 of only 27 watts permits a camera running time of 1.5 to 2.0 hours on this supply. Between takes with the camera switched to the OFF USE position, the power consumption is reduced to only 6 watts, thus conserving battery power.

The standard battery belt which has a weight of 2.7 Kg has a built-in overnight (14 hour) charger. It can, however, be re-charged in only one hour with the aid of a separate fast charger.

### 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 internal test sawtooth and external video test input signals may be used to facilitate servicing. 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 for servicing purposes.

### BASIC ENG MODES— BATTERY POWER

**ENG Mode.** In this mode the VTR can be located with the camera or in a small vehicle when the communications facilities of the LDK14 may be used to control the production. In this mode the maximum cable length is 30 metres. As well as providing a clamp for an 'on-camera' microphone a further clamp may be provided to fit a cine light for those occasions when the ambient lighting is unsuitable. The camera and VTR are powered independently and a separate battery belt is required for use with the cine light.

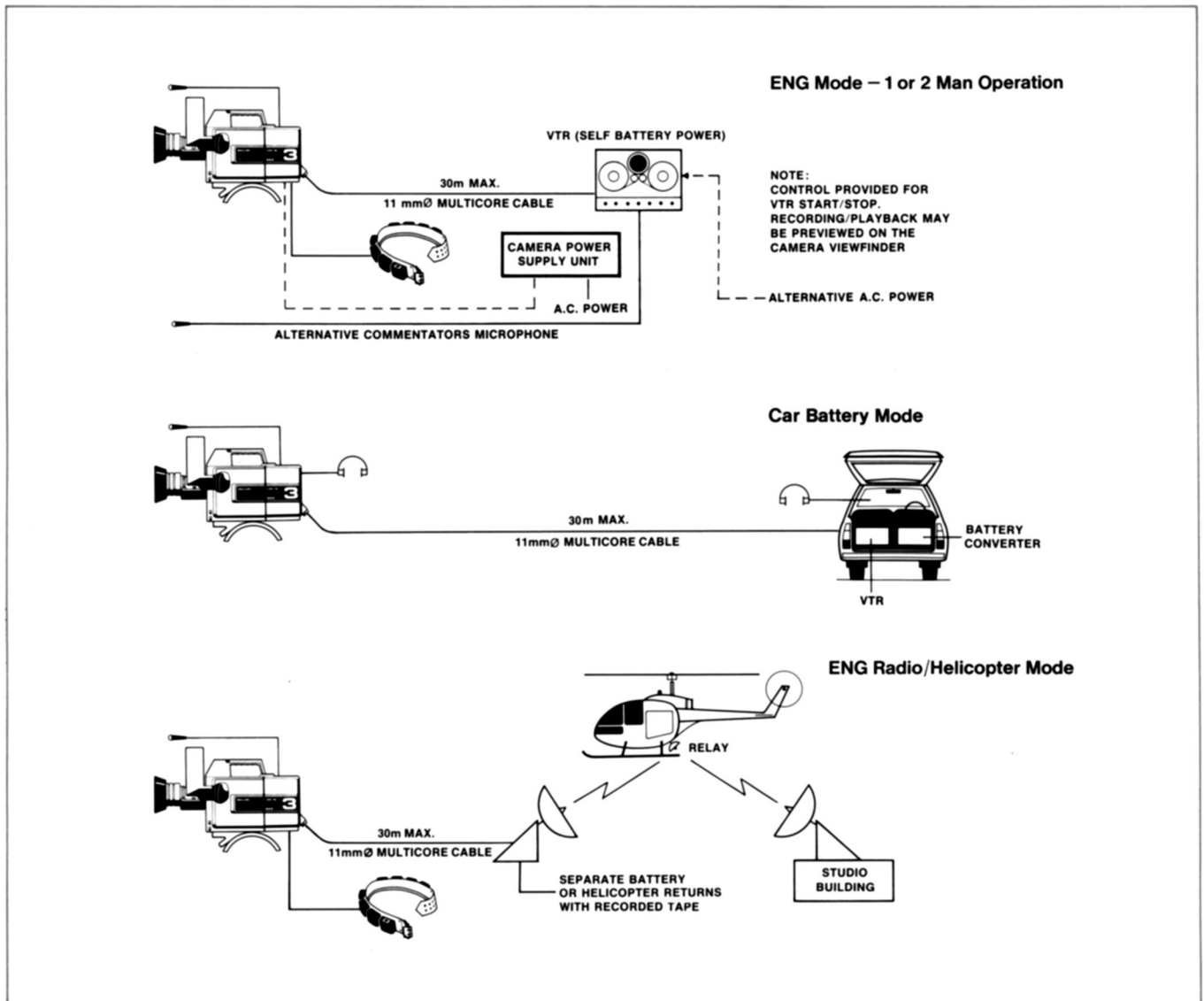
**Car Battery Mode.** In this mode the camera is battery powered and may well use the vehicle's own battery and a battery converter as shown in Figure 2. The method of operation is similar to the mode described above. The VTR will be powered from its own battery.

**ENG Radio Mode.** In many ENG situations, the programme material is required very quickly or live, necessitating a direct link back to the studio or OB van. The LDK14 is ideal for this method of operation and when powered locally from the battery belt it provides a compact and lightweight package which can feed directly into a portable microwave link.

There are many alternative means of linking the picture information back to the studio centre or OB van. In Diagram 3 a helicopter is shown

being used as a 'mid-point'; a method of operation which is frequently used over a difficult terrain or across barriers such as waterways, etc. The LDK14 may be used on water borne transport, and if local recording is not convenient then microwave can once again be used to get the programme materials back to the studio centre or OB van.

**LDK14 EFP MODES.** The LDK14, providing full broadcast quality pictures, is ideal for field productions such as drama, documentaries, commercials etc. This type of location production requires a more sophisticated method of approach than ENG and hence a number of options such as the 5 inch viewfinder, remote control facilities, sync lock, and alternative cables are provided within the LDK14 system.



**EFP Battery or A.C. Power Mode.** This is the simplest EFP mode using 11mm multicore cable up to 100 metres in length with the LDK14 remotely controlled and remotely A.C. or battery powered. When the system is battery powered it is necessary to use the battery converter unit plugged into the RCU. This mode may be suitable for drama insert work on location, where it is desirable to take the minimum amount of equipment out of the studio centre.

**EFP A.C. Power (Chroma Key) Mode.** In more complex field productions, the LDK14 can be extended to provide the normal facilities of larger studio cameras, such as the Philips LDK5 or LDK25. These extra facilities include a full band width chroma key option with hue selector. The RCU and camera power unit will probably be located either in a small OB van or form part of a multiple camera operation. In either case, the operational controls can be

remoted up to 15 metres from the RCU, and a local sync reference fed to the LDK14 in the case of multiple camera operation. Normal communications facilities between the camera and its remote control unit are provided and the camera (which will probably be used on a tripod), will be fitted with the larger 5 inch viewfinder. In any of these modes the microphone input at the camera head can be utilised.

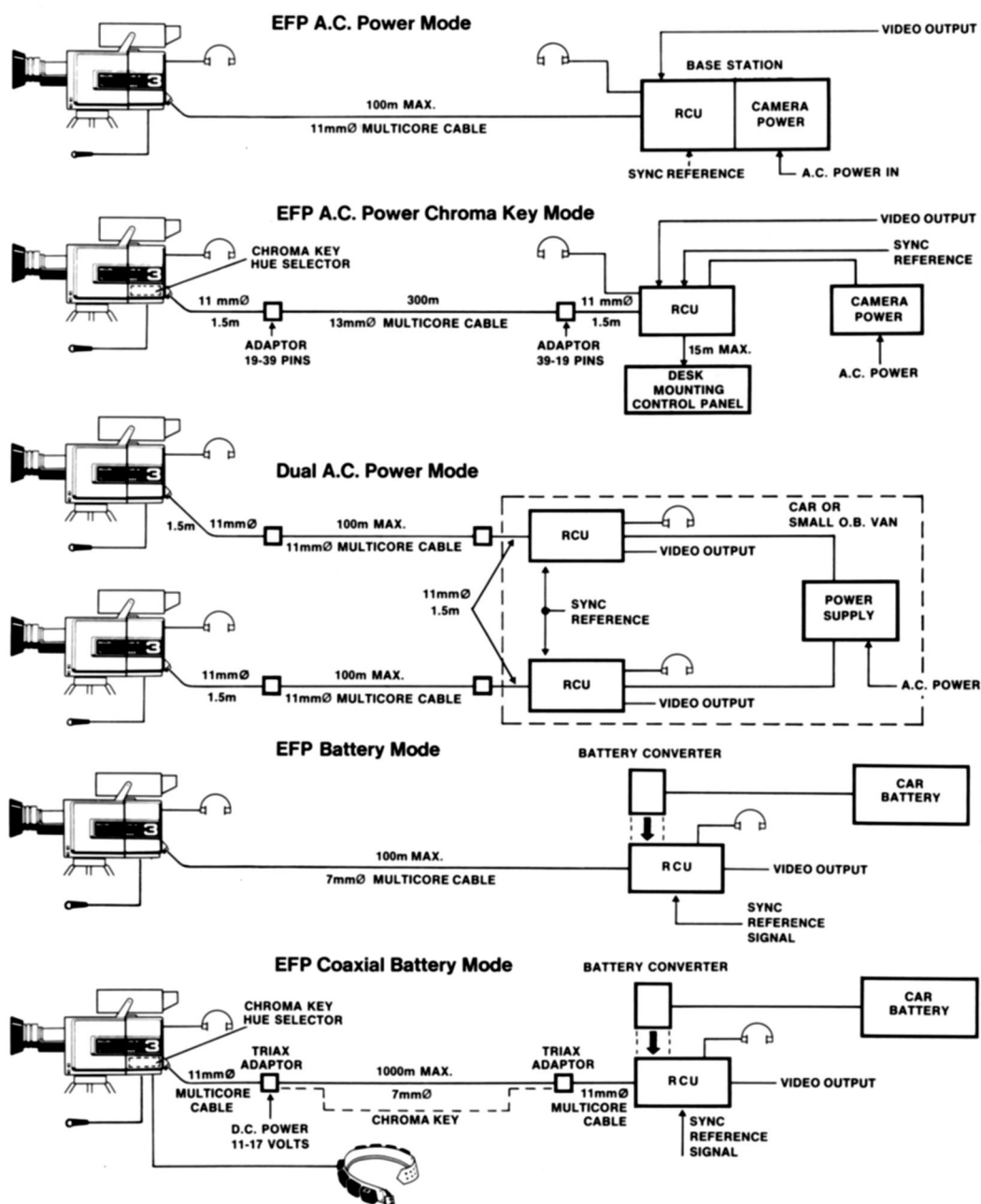
**Dual A.C. Power Mode.** For larger field productions two LDK14s can be used together and fed from a single A.C. power unit. In this mode of operation the LDK14 is ideally suited for complete drama productions where a small two camera OB vehicle, providing all the usual production facilities, would be used. One of the cameras may well be hand-held for specific production shots and provision has been made to change quickly from tripod to shoulder mounting.

**EFP Coax Battery Mode.** In this mode, as the camera cable does not carry any power, it is unnecessary to use triax cable.

Provision has been made to power the camera and its remote control unit from batteries for those occasions when no source of A.C. power is available. The RCU is fitted with a plug-in 'battery converter' which can then be fed from a car battery. If the camera is powered locally it may be connected to the RCU by up to 1000 metres of 7mm diameter coaxial cable using the triax adaptors.

All the facilities mentioned above are still available, together with the camera microphone circuit.

It is unlikely that the maximum lengths of triax or coax cable would be used when the chroma key accessory is fitted. However the light weight and flexibility of these cables can be a distinct advantage for studios and outside broadcasts.



## 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

11 to 17v; d.c.; 27 watts  
OFF USE 6 watts

### Input Signals

Reference Signal 1V p-p comp  
Ext. VF Signal 1V p-p comp  
Test Input Signal 1V p-p comp  
Microphone input  
ON-AIR/VTR Recording

Tape Remaining

### Output Signals

Video 1V p-p comp  
Switchable video monitor channel 1V p-p  
VTR Start/Stop  
Microphone audio output

### Scene Illumination

500 Lux for a signal to noise ratio of 46dB PAL or 48dB NTSC unweighted, lens iris f2.0, reflection factor 60% with Gamma linear, matrix in and contours off at 150nA signal current in the green channel.

### Limiting Sensitivity

60 Lux at f1.4, gain +12dB and a signal to noise ratio of 37dB PAL, 38dB NTSC.

### Resolution

Limiting resolution equal to or greater than 600 TV lines.

### 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) 150n. 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.

### Filter Wheel

5 positions: Clear; NDO.6; 85B; 85B plus NDO.9 and Cap.

### Gamma Correction

Gamma: 0.45 and black stretch on/off.

Gamma Tracking: better than 0.5%.

### Black Level Adjustment

Master black level: +20% and -50% of the nominal white level.

Individual RED and BLUE:  $\pm 15\%$  of the nominal white level.

### Contour Correction

Positive contours before gamma and negative contours after gamma, level dependency and comb filter; noise slicer.

### Test Signals

Sawtooth to check Video channels.

Colour Bar: EBU and split field.

### Intercom

Standard European four-wire system and with optional adapter USA standard two-wire system.

### Warm-up and Stability

Acceptable picture quality will be obtained from stand by in two seconds.

### Gen Lock Timing

Horizontal  $\pm 3$   $\mu$ sec. remote d.c. controlled.

Subcarrier more than 360 degrees.

### Operational Ambient

#### Temperature Range

(excluding batteries) -20°C to +45°C.

### Weights

Camera head 5.0 Kg

VF 0.5 Kg

Typical ENG Lens 1.5 Kg

7.0 Kg

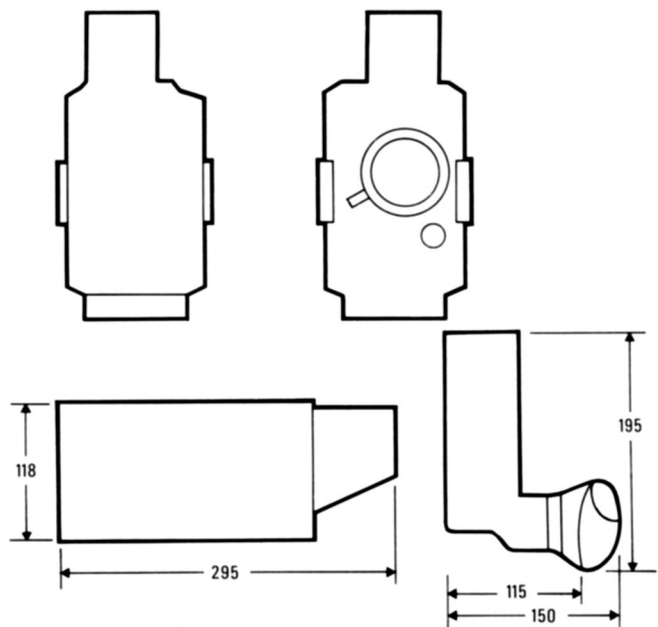
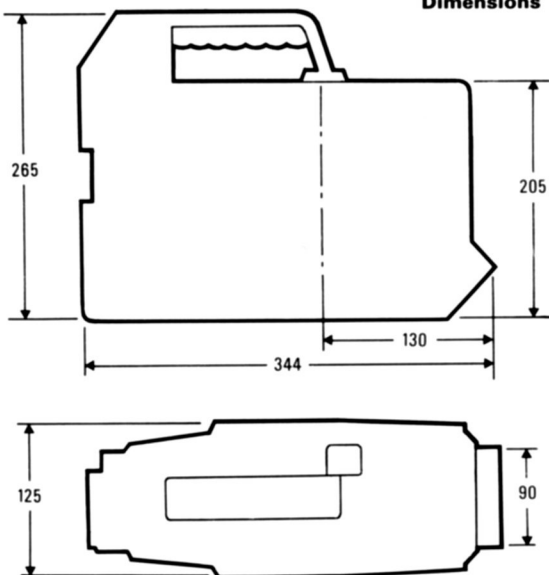
Battery Belt 2.7 Kg

(Cine 60)

## ORDERING INFORMATION

|                                |             |
|--------------------------------|-------------|
| Camera for PAL system          | LDK 0014/00 |
| Camera for NTSC system         | LDK 0014/50 |
| Camera for PAL-M system        | LDK 0014/60 |
| Camera for SECAM system        | LDK 0014/70 |
| Camera remote control module   | LDK 4371/00 |
| Remote Control Unit (RCU)      | LDK 4370/00 |
| A.C. supply unit               | LDK 4373/00 |
| Battery converter              | LDK 4374/00 |
| Battery Belt                   | LDK 4375/00 |
| 1½ inch Viewfinder             | LDH 2101/00 |
| 5 inch Viewfinder              | LDK 4308/01 |
| Set of spare camera modules    | LDK 8614/00 |
| Set of spare system modules:   |             |
| PAL                            | LDK 8615/00 |
| NTSC                           | LDK 8615/50 |
| PAL-M                          | LDK 8615/60 |
| SECAM                          | LDK 8615/70 |
| Set of spare modules for RCU   | LDK 8616/00 |
| Spare component kit for LDK14  | LDK 8604/00 |
| ENG shoulder brace             | LDK 6990/15 |
| Shoulder brace/stomach support | LDK 6990/16 |

### Dimensions



## Pye TVT Limited

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