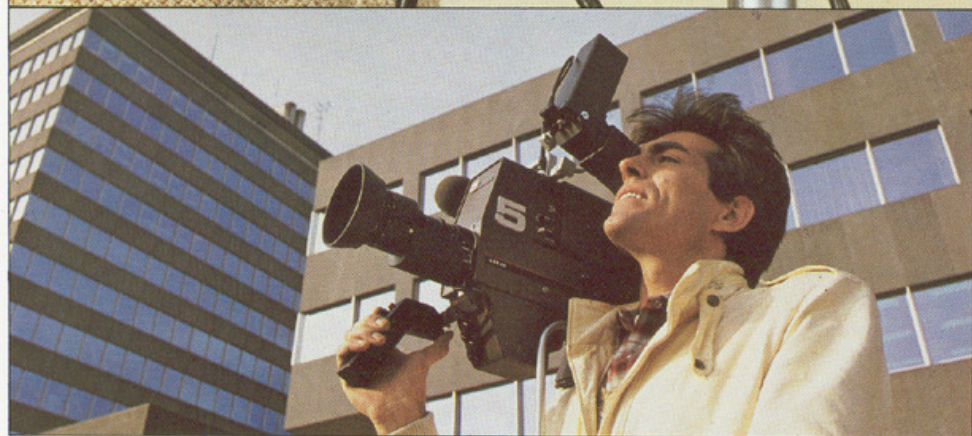# LDK 44 Colour Camera System

- Flexible means of obtaining broadcast quality pictures
- Versatility and economy through modular construction of head and electronic pack
- Three plumbicon tube head, using prismatic light splitting principle
- Universal electronic pack
- Easy installation and automatic setting-up with VLS and CLUE
- Fully integrated standard pulse generator with gen. lock facility

PHILIPS

LDK 44 Colour Camera System

The attractively styled LDK 44 colour camera from Philips, provides a compact, flexible, and economic means of obtaining broadcast quality pictures. Its modular construction enables a variety of configurations to be used to suit most studio (single, dual and triple camera arrangements) and ENG requirements. It also enables quick and easy conversion from one configuration to another. When used in an ENG situation, with battery powered VCR or VTR units, it provides a high performance, independent facility.

The basic LDK 44 camera system comprises a sensitive 3-plumbicon tube head, and a universal electronic pack. To these are added selections from a wide variety of accessories, which greatly extend its capabilities.

For broadcasters, professional production houses, and a wide range of users from education and commerce to medicine, the new LDK 44 camera system provides exceptional flexibility combined with an outstanding price/performance ratio.

LDK 44 camera head

The lightweight LDK 44 camera head is fitted with three plumbicons and operates on the prismatic light splitting principle, enabling professional standards of resolution and colour separation. It also has bias light, yielding minimal lag at low light levels, and shading correction for a flat image field. A dynamic beam control is incorporated, which counteracts "comet-tail" effects at the higher signal levels. The sealed prism construction of the LDK 44 ensures protection against dust and dirt. The prism is retained in a robust, one-piece, precision-cast aluminium block, which ensures optimal mechanical strength, and accurate alignment with the lenses. It also assures stability of registration over a wider ambient temperature range. The mounting of the three FET pre-amplifiers on their respective target electrodes, helps keep noise and interference pick-up to a minimum. Triplets are computer matched. They consist of three screw-on-type deflection yokes which are μ-metal shielded, and vernier adjustable for focus and deflection.
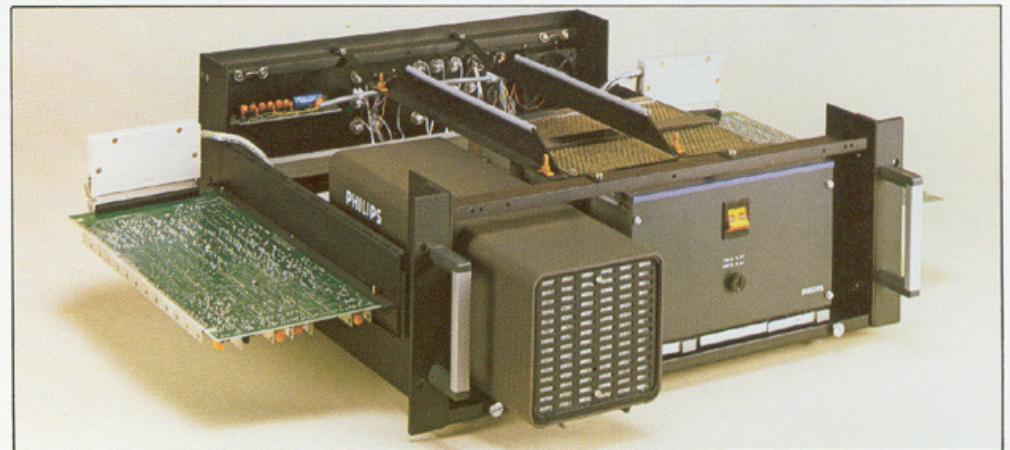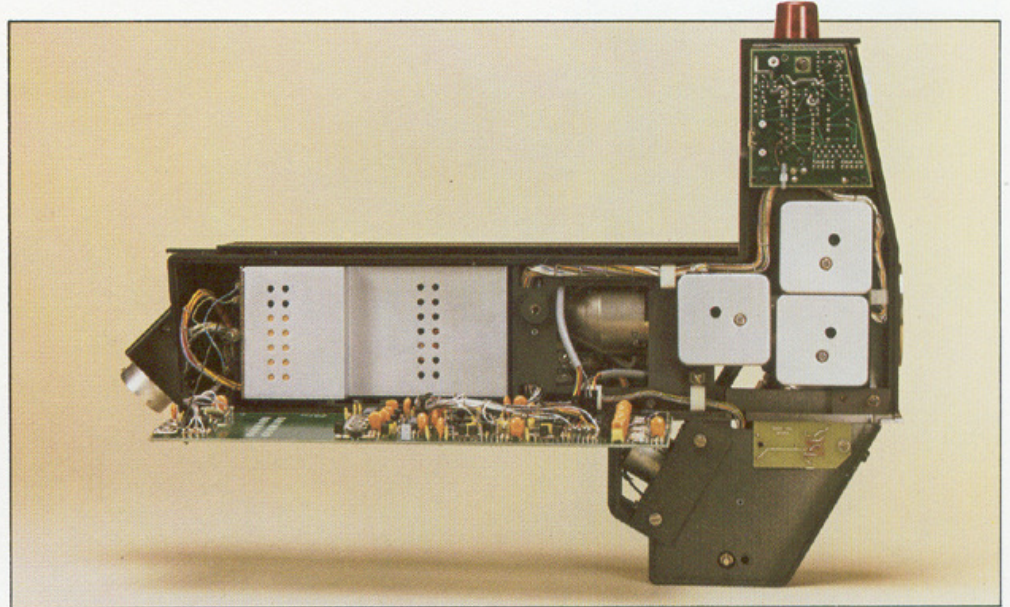
LDK 4400 electronic pack – the heart of the system

The same electronic pack acts as the video processor for the whole LDK 44 camera system . . . whatever camera configuration is selected. The pack is robust, yet lightweight, and incorporates the most sophisticated integrated circuit techniques to enable broadcast quality signal processing with excellent stability. Circuits are incorporated for cable compensation, for up to 150 metres, gain control, colour balance, linear matrixing and contouring. Automatic control circuits, with mains independent memory store, are provided for white balance, pulse compensation, and centering. Automatic circuits are also provided for iris, and proportional gain control. Frequency-dependent gamma circuitry, set to broadcast standards, enables high resolution of the bright areas and noise reduction in dark areas. A full field colour bar is included, which simplifies setting up the colour monitor and VTR unit, and eliminates the need for external equipment. A built-in colour gen. lock synchr. pulse generator, meeting FCC and EBU specifications, permits phase locking of the camera onto external video signals.

Remote control units

The single (LDK 4402) and triple (LDK 4405) remote control units provide the operational control for single and triple camera systems. They also have the switching facilities for a wide range of functions, with control over setting up procedures. Setting up switches include VLS, CLUE, plus RG and B. Amongst the operational controls are master black, painting, iris control (manual/automatic, peak/average, and gain). The triple remote control unit also offers the facility of camera selection, by permitting switching during vertical blanking.

Remote control of ENG work is possible with the LDK 4409 unit. This is an optional remote control panel which enables the LDK 44 ENG configuration to be controlled from a distance of up to 90 metres. Each type of remote control unit is suitable for either panel mounting, or for use in a 19" rack system.

Viewfinders

In both single and multi-camera configurations, tilting 4½" viewfinders are used, which provide images with excellent resolution and high brightness. A control is provided on the viewfinder which enables accurate, on–the–spot registration. For ENG work a 1½" viewfinder is fitted to the camera head via a viewfinder interface. Both types of viewfinder feature displays for automatic setting-up procedures.

Lenses

The LDK 44 camera head can be fitted with a variety of lenses, such as a 10:1 zoom lens (f 1,8/10-100 mm) which has a bayonet mount, and motor driven zoom and focus control. A selection of alternative lenses, range extenders and filters are available as optional accessories.

Extended capabilities

The multi-purpose design of the LDK 44 camera extends the scope of its usage. In addition to its studio and ENG capabilities, by using special adaptors and interfaces, it can be simply and quickly converted for use in an operating theatre lamp or attached to a microscope or endoscope. The LDK 44, used in combination with 35 mm slide and 8 mm or 16 mm movie projectors, also provides an effective, yet simple-to-operate telecine system.

Completing the camera system

A series of compatible units for use with the LDK 44 camera, together with a comprehensive range of accessories, is available. It includes a video mixer with built-in chroma-keying, and all necessary video monitors and allied equipment to complete a professional broadcast studio.
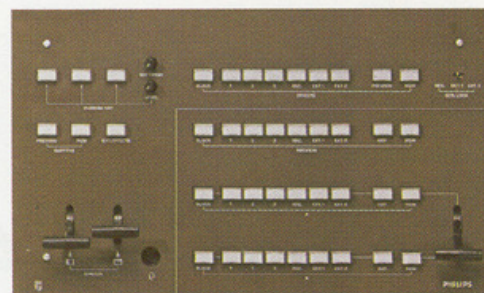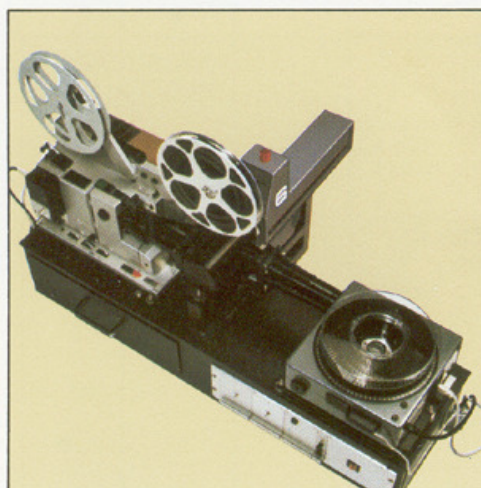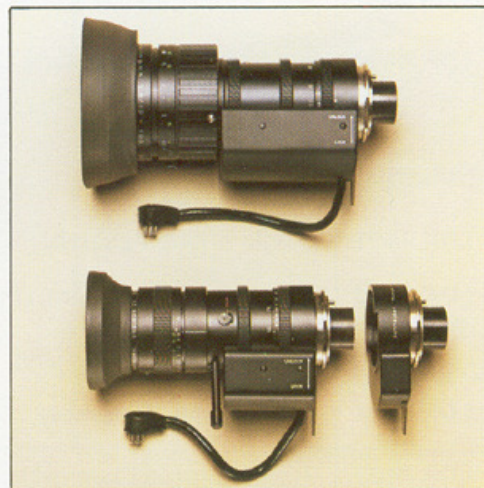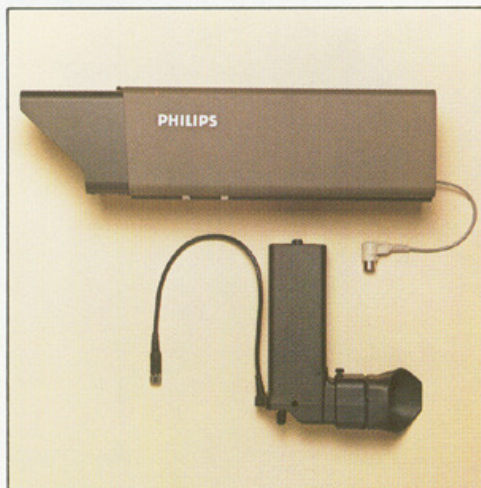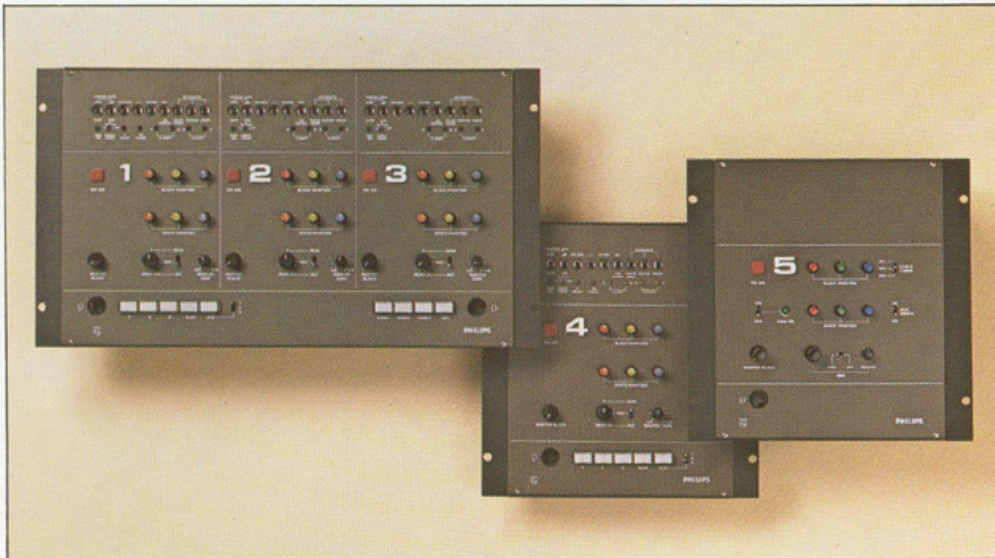
Typical LDK 44 Systems

Typical systems
The following table demonstrates typical systems for single, triple and ENG camera applications. These can be developed further through selections from the wide range of other accessories which are available.
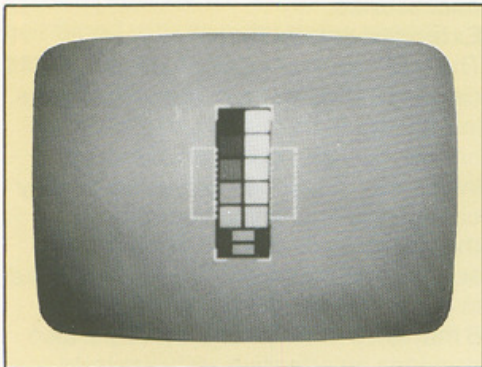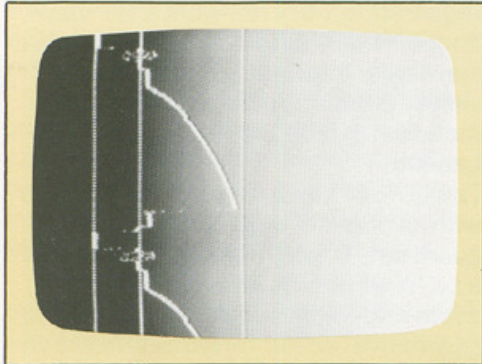
VLS and CLUE
The frame assemblies, single and triple, carry the electronic circuitry for VLS (Video Line Sampling) and CLUE (Colour Line-Up Equipment). These features have been specially built in to simplify setting-up, without the need for specialist measuring equipment.

The built-in VLS permits waveform monitoring in the system to be displayed on one of the preview monitors. CLUE is provided for colour balancing, and because of its precision, simplifies the exact colour matching of the cameras. In a single camera system it also accepts an external reference signal (Green) for multi-camera matching.

Type number	Item	Single Camera Application	Triple Camera Application	ENG Camera Application
LDK 44	Colour Camera Head	●	●	●
XQ 1427	Broadcast Quality Plumbicons® (3x)	●	●	●
LDH 6010	Zoom lens f 1,8/10-100 mm	●	●	●
LDH 6301	Lens controls	●	●	
LDH 6316	Camera handgrip with zoom and VTR start/stop control			●
LDH 2100	4½" Viewfinder	●	●	
LDH 2101	1½" Viewfinder			●
LDK 4408	1½" Viewfinder Interface Unit			●
LDK 4400	Electronic Pack	●	●	●
LDK 4407	ENG adaptor unit			●
LDK 4401	Single Frame Assembly	●		
LDK 4402	Single Remote Control Unit	●		
LDK 4403	Single Power Supply Unit	●		
LDK 4404	Triple Frame Assembly		●	
LDK 4405	Triple Remote Control Unit		●	
LDK 4406	Triple Power Supply Unit		●	
LDH 4435	Power Belt			●
LDH 8112	Coiled power cord			●
LDH 6319	Snap-on Camera mount	●	●	
LDH 6317	Shoulder Bracket with snap-on Camera mount			●
LDH 8110	Camera cable up to 150 m.	●	●	
LDH 8111	ENG/Recorder connecting cable length 10 m.			●

® Registered trademark for television camera tubes

Typical configurations

Single-camera applications (Fig. 1)
The electronic pack is used in conjunction with a power supply unit. These are mounted into a single frame assembly, suitable for 19" rack mounting, and linked to the single remote control unit.
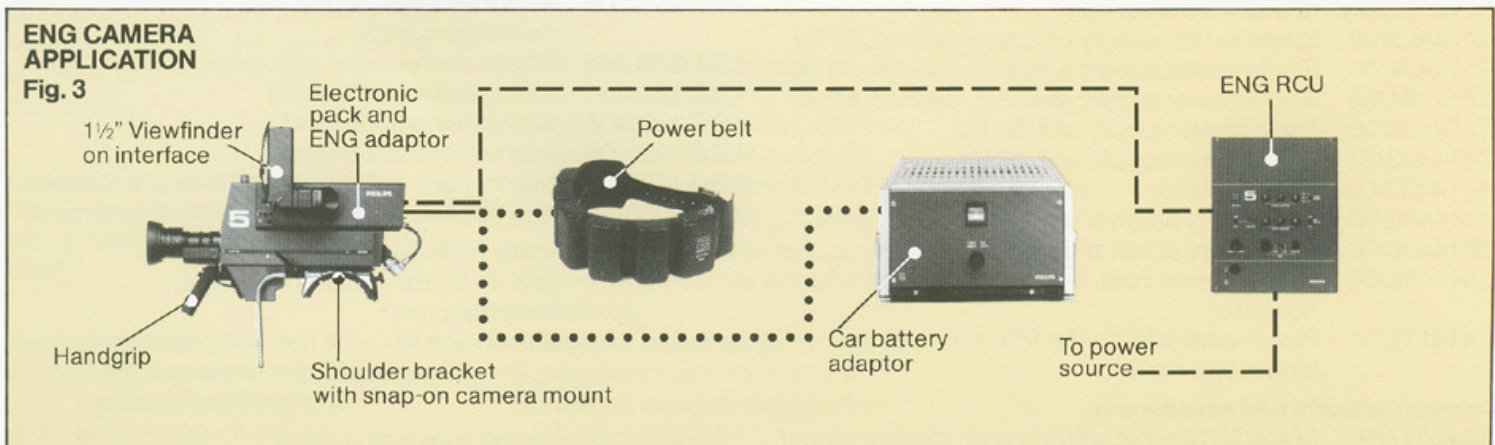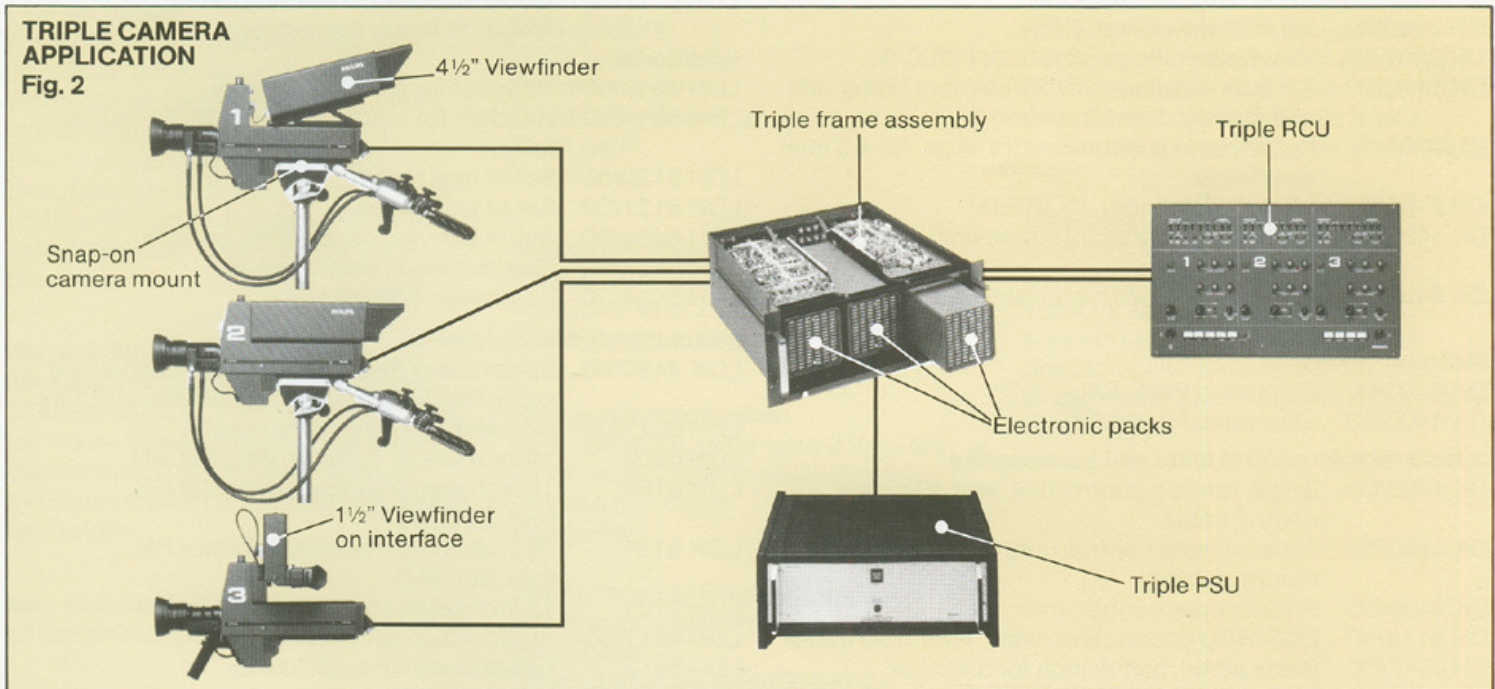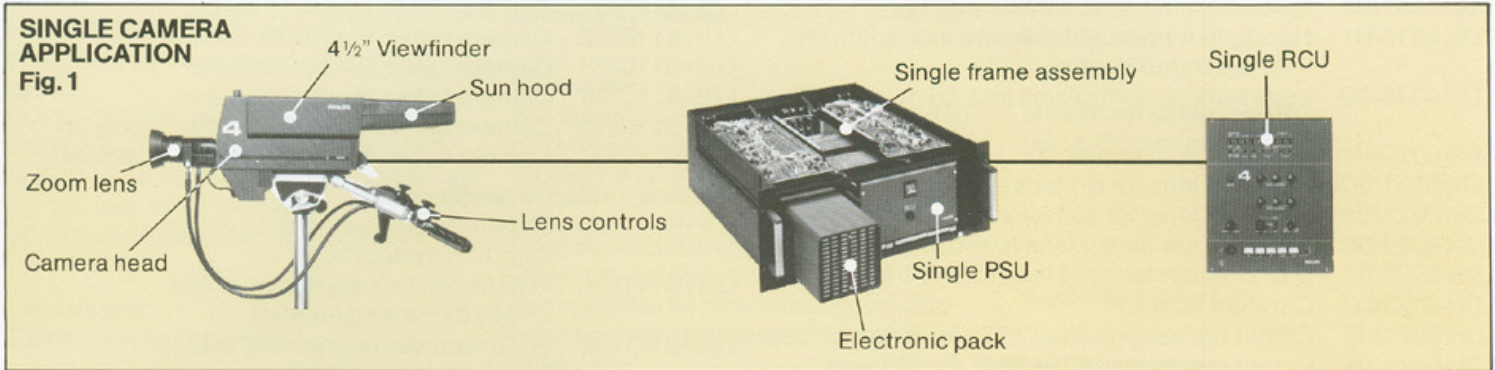
Three-camera applications (Fig. 2)
The triple frame assembly is fitted with three packs. It is linked to a separate power supply unit. As with the single frame assembly, the triple version can be mounted in standard 19" racks, and connected to the triple remote control unit. In the triple camera system all output signals are precisely timed and phased, with the camera 1 electronic pack serving as master.

ENG applications (Fig. 3)
The electronics pack is fitted, together with a small adaptor, and an interface which accommodates a 1½" viewfinder, onto the camera head. Power is derived from a belt worn by the cameraman, or through a special adaptor, from a car battery. The camera can also be remotely controlled by an ENG remote control unit. This must be connected to a separate power source, which replaces the power supply unit to the camera.

SINGLE CAMERA APPLICATION Fig. 1

4½" Viewfinder — Sun hood — Single frame assembly — Single RCU — Zoom lens — Lens controls — Camera head — Single PSU — Electronic pack

TRIPLE CAMERA APPLICATION Fig. 2

4½" Viewfinder — Triple frame assembly — Triple RCU — Snap-on camera mount — 1½" Viewfinder on interface — Electronic packs — Triple PSU

ENG CAMERA APPLICATION Fig. 3

1½" Viewfinder on interface — Electronic pack and ENG adaptor — Power belt — ENG RCU — Handgrip — Shoulder bracket with snap-on camera mount — Car battery adaptor — To power source

LDK 44 System Accessories and Options

Type number	Item
Tubes	
XQ 1427	R/G/B ⅔ inch Plumbicon® tube, Broadcast Quality
XQ 1428	R/G/B ⅔ inch Plumbicon® tube, Industrial Quality
Lenses and accessories	
LDH 6010/00	Motorized Zoom lens f 1,8/12,5-75 mm.
LDH 6010/02	Manual Zoom lens f 1,8/10-100 mm.
LDH 6010/03	Motorized Zoom lens f 1,8/10-100 mm.
LDH 6104/00	Manual lens controls
LDH 6301/01	Electrical lens controls with pan-bars "Quickset".
LDH 6301/03	Electrical lens controls less pan-bars.
LDH 6316/01	Handgrip for portable camera incl. zoom and VTR start/stop control.
LDH 4346/00	Lens remote control unit incl. 25 m. control cable.
LDH 6020/01	Lens range extender, 2x.
LDH 6021/00	Close-up lens for 6:1 lens (1 dioptre)
LDH 6021/01	Close-up lens, for 10:1 lens (1 dioptre)
LDH 6022/00	N.D. filter set for 6:1 lens (0,6/0,9/1,5).
LDH 6022/01	N.D. filter set for 10 : 1 lens (0,6/0,9/1,5).
LDH 6023/00	C-mount adaptor
LDH 6024/00	Colour conversion filter, 85B, for 6:1 lens
LDH 6024/01	Colour conversion filter, 85B, for 10:1 lens
Electronic viewfinder and accessories	
LDH 2100/80	4,5 inch viewfinder, CCIR
LDH 2097/00	Viewfinder tilting unit for LDH 2100/80
LDK 4410/00	4,5 inch viewfinder, CCIR/EIA, incl. tilting unit and standard metal sunhood
LDH 2098/01	Polystyrene sunhood, extra large, for 4,5 inch viewfinder
LDH 2101/01	1,5 inch viewfinder, CCIR/EIA
LDK 4408/00	1,5 inch viewfinder interface unit, with camera controls
LDK 4408/01	1,5 inch viewfinder interface unit, less camera controls
Electronic packs	
LDK 4400/00	Electronic Pack, PAL
LDK 4400/50	Electronic Pack, NTSC
Camera remote control units and accessories	
LDK 4402/00	Single remote control unit, incl. 10 meter control cable
LDK 4405/00	Triple remote control unit, incl. 2 x 10 meter control cables
LDK 4409/00	ENG remote control unit
LDH 8114/00	ENG/RCU connecting cable, length 30 meter
LDH 4347/00	Blank panel, half 19 inch for SRCU or ENG-RCU
Power supply units and accessories	
LDK 4403/00	Single power supply unit, less cabinet, 50 Hz
LDH 4434/00	Single power supply unit, incl. cabinet, 50 Hz
LDH 4434/60	Single power supply unit, incl. cabinet, 60 Hz
LDK 4406/00	Triple power supply unit, 50 Hz
LDH 4433/61	Triple power supply unit, 60 Hz
LDH 4435/01	Power belt
LDH 4436/00	Car battery adaptor unit, 50 Hz
LDH 4436/60	Car battery adaptor unit, 60 Hz
LDH 8112/00	Coiled power cord, operational length 1,5 meter
LDH 8112/01	Power cord adaptor for PSU connection, length 0,15 meter
Camera supports and accessories	
LDH 6317/00	Shoulder bracket with snap-on camera mount
LDH 6317/01	Lightweight shoulder bracket with snap-on camera mount
LDH 6319/00	Snap-on camera mount
LDH 6353/00	Tripod, dolly and head, "Quickset"
LDH 6354/00	Tripod, dolly and fluid head, "ITE"
LDH 6301/04	Pan-bars, "Quickset"
LDH 6301/05	Pan-bars, "ITE"
Camera cables with mounted connectors	
LDH 8110/00	Camera cable, length 1,5 meter
LDH 8110/10	Camera cable, length 10 meter
LDH 8110/01	Camera cable, length 15 meter
LDH 8110/02	Camera cable, length 30 meter
LDH 8110/03	Camera cable, length 50 meter
LDH 8110/05	Camera cable, length 100 meter
LDH 8110/06	Camera cable, length 125 meter } only on
LDH 8110/07	Camera cable, length 150 meter } request
Camera – video recorder cables	
LDH 8111/00	ENG/recorder connecting cable, length 10 meter (VCR)
LDH 8111/01	ENG/recorder connecting cable, length 10 meter (U-matic)
LDH 8111/02	ENG/recorder connecting cable, length 10 meter (BCN)
LDH 8111/03	ENG/recorder connecting cable, length 10 meter (undefined)
Additional	
LDH 8010/00	Headset for portable camera
LDH 8011/00	Headset for studio camera, CRCU and vision mixer
LDH 6120/00	Set of test charts
LDH 6121/00	Set of test slides
LDH 6404/00	Set of carrying cases, ENG camera
LDH 6408/00	Carrying case, studio camera
LDH 6414/00	Raincover, ENG camera
Matching studio equipment	
LDK 4450/00	Vision mixer PAL, incl. 10 meter connecting cable for TRCU, and titling camera set CCIR.
LDH 8013/00	Headset for titling camera set
LDH 6200	14 inch colour monitor, PAL/SECAM
LDH 6150	16 inch colour receiver/monitor PAL (opt. SECAM)
LDH 6151	26 inch colour receiver/monitor PAL (opt. SECAM)
LDH 2121	12 inch black and white monitor
LDH 4511/60	Audio mixer, with XLR sockets
LDH 8012	Headphone for audio mixer
LBB 9003/05	Lavalier microphone
LBB 9031/05	Reporter microphone, incl. 3 meter connecting cable
LBB 9020/45	Studio microphone with music/speech switch
LBC 1220/01	Microphone boomstand
LBC 1221/00	Microphone floorstand
LBC 1222/00	Microphone floorstand
LBC 1208/05	Microphone extension cable, length 5 meter
LBC 1208/10	Microphone extension cable, length 10 meter
Telecine island (only on request)	
	LDK 44 telecine island with max. two projectors:
	with choice of – 8 mm film projector
	– 16 mm film projector
	– 35 mm slide projector

® Plumbicon is a Registered Trade Mark of Philips

Technical data

International colour television standards:
CCIR standard, 625 lines 50 fields/second 2:1 interlaced
EIA standard, 525 lines 60 fields/second 2:1 interlaced
Colour coding: PAL or NTSC.

Optical system
Prismatic optical beam splitter relative aperture f 1,8 with bias light assembly.

Lenses
f 1.8/12.5-75 mm with manual focus, motorized zoom, servo iris and macro facility
f 1.8/10-100 mm with motorized zoom and focus, servo iris and macro facility
f 1.8/10-100 mm manual zoom and focus control with macro facility
other lenses available upon request

Lens mount
Quick-release bayonet

Pick-up tubes:
Three 18 mm plumbicons – XQ 1427 broadcast grade or
Three 18 mm plumbicons – XQ 1428 industrial grade or
One 18 mm plumbicon XQ 1427 broadcast grade in the green channel and two 18 mm plumbicons XQ 1428 industrial grade in the red and blue channels.

Illumination leveland S/N ratio
Scene illumination at 60% reflection 1200 lux, 3200°K, lens iris position f 2,8 for 180 nA signal current in the green channel and a S/N ratio of 50 dB at 5 MHz bandwidth and 52 dB at 4,2 MHz bandwidth

Min. illumination level:
50 lux for acceptable pictures

Resolution:
Modulation depth 40% at 5 MHz (400 TV lines) in the green channel at the centre of the picture (no contours, $\gamma = 1$, matrix off.)

Operational resolution:
600 TV lines in the centre of the picture with a Retma standard resolution test chart.

Geometric error:
$\leq 1\%$ within a circle with diameter equal to the picture height.
$\leq 2\%$ outside this circle

Registration error:
Horizontal and vertical deviations of red and blue with respect to green
60 nS in zone I
80 nS in zone II
150 nS in zone III
Zone I : circle of 0,8 of picture height diameter
Zone II : circle of picture height diameter
Zone III: outside circle I and II

Gamma-correction:
Gamma-correction preset for $\gamma = 0,45$

Colour bar:
Full field ($100 - 0 - 75 - 0$) according to EBU for PAL. According to FCC § 73,699 for NTSC.

Contour correction:
Contours out of green
Symmetrical horizontal contours and two line delay processed vertical contours.

SPG outputs
Black burst
Composite sync
Composite blanking
Burst gate
Subcarrier

Subcarrier characteristics
4,43361875 MHz $\pm$ 5 Hz for PAL
3,579545 MHz $\pm$ 5 Hz for NTSC
within the specified temp range

SPG pulse amplitudes:
Sync, blanking, burst gate 2 V_{p-p} (4V_{p-p} by internal jumper) negative going (related to 0 V_{DC})
Subcarrier:
IV_{tt}
2V_{tt} by internal jumper
average DC level 0 V
Black burst:
Sync.: 300 mV_{tt}, burst 300 mV_{tt}
Black level at 0 V_{DC}

Gen. lock characteristics
Reference signal:
(C) VBS signal conform CCIR/PAL signal amplitude: 1 V_{pp} $\pm$ 6 dB
(C) VBS signal conform EIA/NTSC signal amplitude: 1 V_{pp} $\pm$ 6 dB
With VBS signal sync/subcarrier lock is broken as subcarrier remains internally generated.
Subcarrier pull-in range: $\pm$ 150 Hz
Subcarrier phase control: 360°
Horizontal delay compensation:
$- 0,5$ nS $- + 3,5$ nS

"On Air" Signalling

Free standing mode
Camera selection on the triple remote control unit is indicated by the camera on air lamps.

Video mixer signalling
Camera selection on a video mixer connected to a LDK 44 camera chain is indicated by the camera on air lamps. "On air" inputs are provided enabling signalling by "make contact" or voltage supply.

Maximum cable length
Up to 150 metres

Audio and Intercom

Program audio
Microphone input on camera head to pre-amplifier for 0,17 mV_{rms}/ u bar
Dynamic microphone. Output voltage 90 mV available on ENG adaptor, ENG remote control unit, single frame assembly and triple frame assembly.
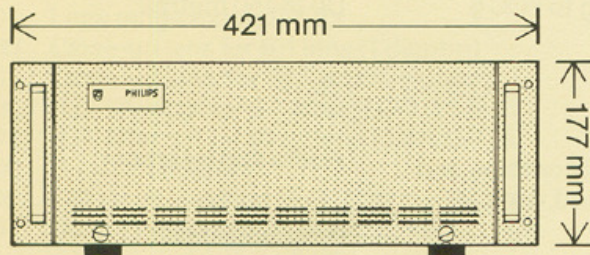
Intercom
Intercom facilities:
camerahead to control unit
input for external intercom and program sound provided on ENG adaptor, ENG remote control unit, single frame assembly and triple frame assembly
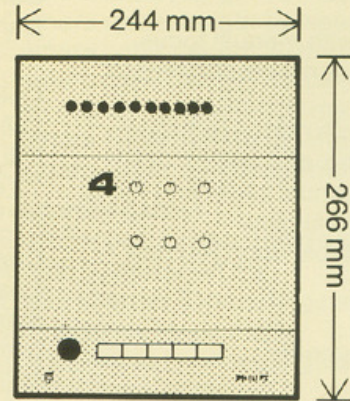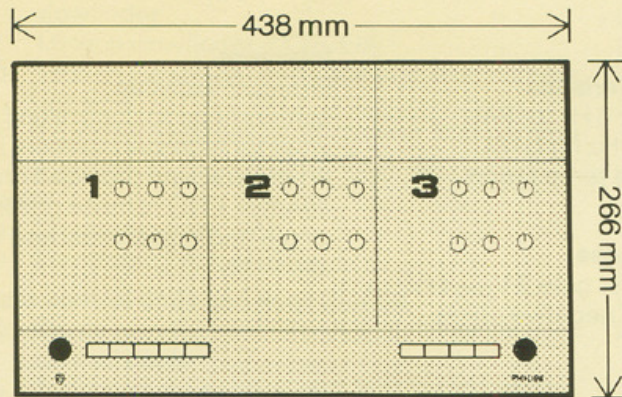
90 mm

430 mm

318 mm

LDK 44 Camera head. 4.8 kg.

115 mm

320 mm

117 mm

PHILIPS
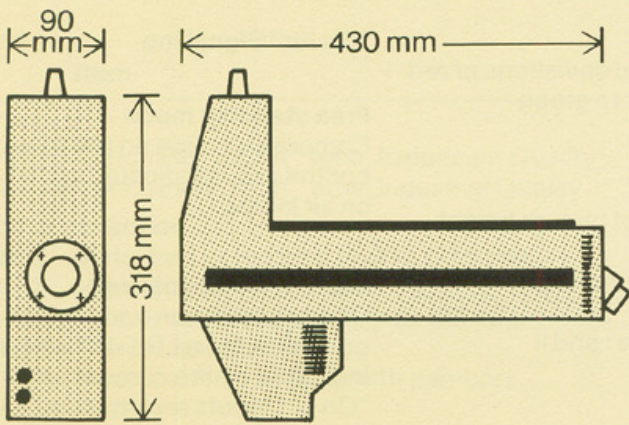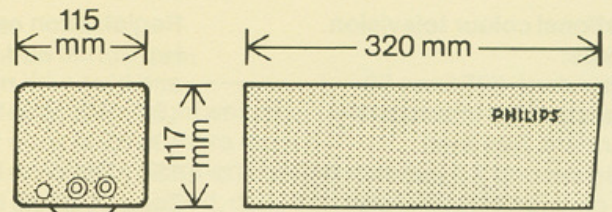
LDK 4400 Electronic pack. 3 kg.
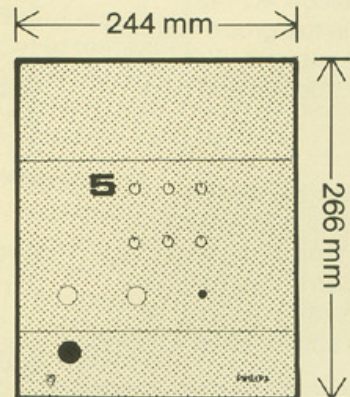
421 mm

177 mm

PHILIPS

**LDK 4401 Single/LDK 4404 Triple frame
assembly unit. 13 kg.
(460 mm deep)**

244 mm

266 mm

4

**LDK 4402 Single remote control unit. 1.7 kg.
(51 mm deep; excl.
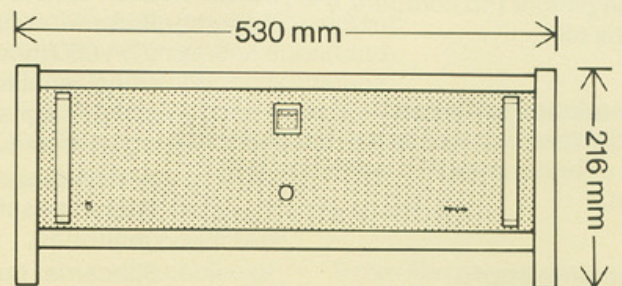remote control cable)**

438 mm

266 mm

1   2   3

**LDK 4405 Triple remote control unit. 3 kg.
(51 mm deep; excl. remote control cable)**

244 mm

266 mm

5

**LDK 4409 ENG remote
control unit. 1.6 kg.
(51 mm deep; incl. hinges)**

233 mm

143 mm

PHILIPS
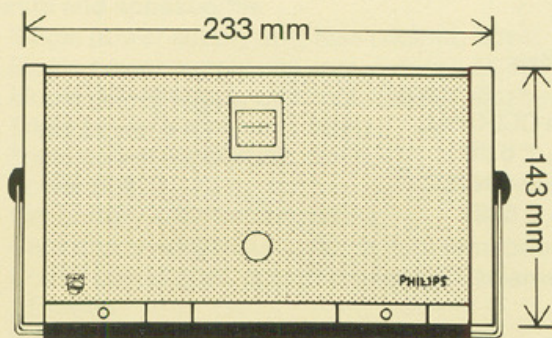
**LDH 4436 Car battery adaptor. 6.5 kg.
(270 mm deep)**

530 mm

216 mm

**LDK 4406 Triple power supply unit. 18 kg.
(340 mm deep)**