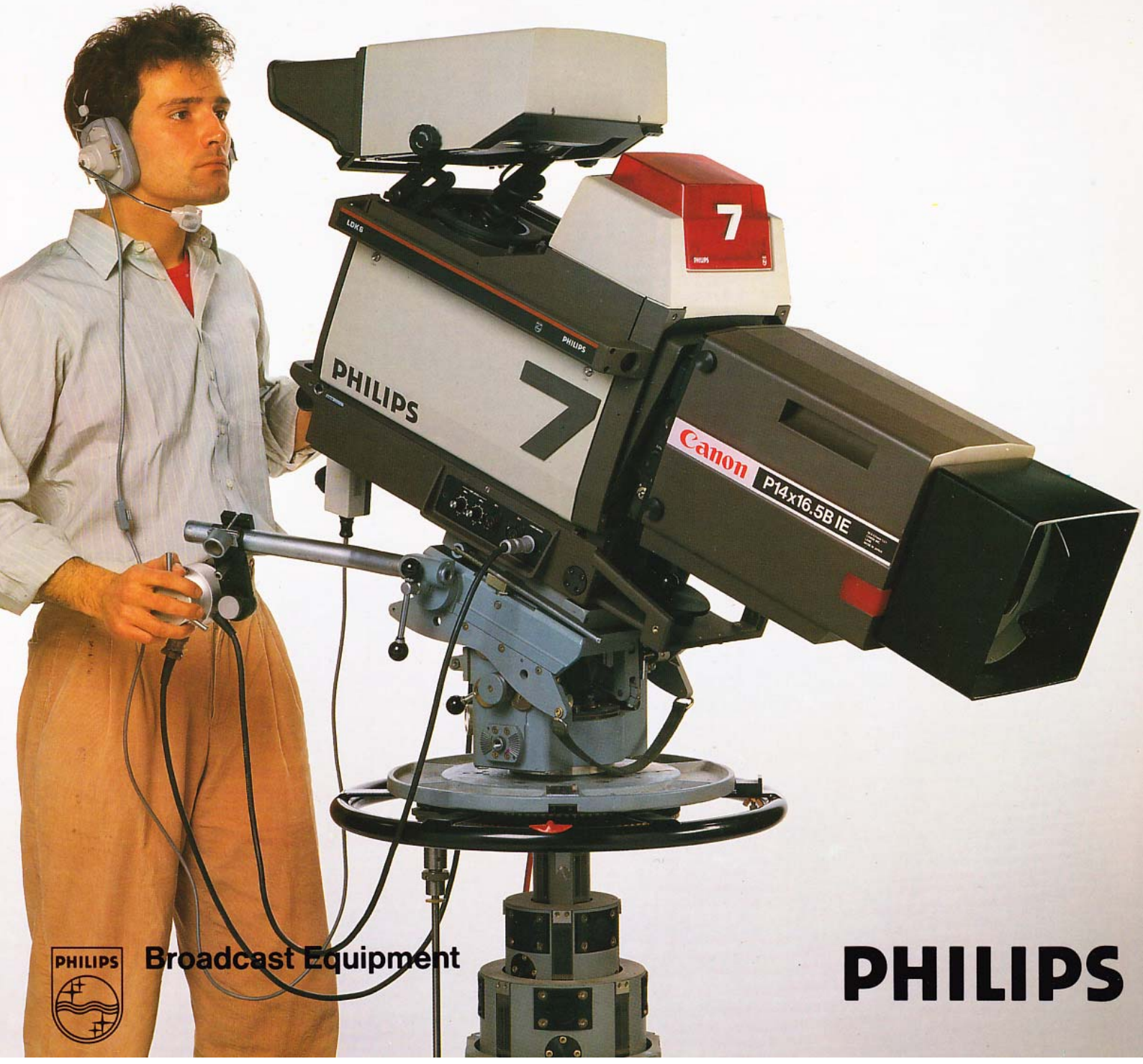
Philips LDK 6A

The intelligent camera system
with 25 mm or 30 mm tubes
and total computer control



PHILIPS Broadcast Equipment

PHILIPS

LDK6A

LDK 6A the television camera system with total computer control and distributed intelligence

The introduction of the Philips LDK 6 top of the line computer-controlled camera with 25 mm or 30 mm tubes heralded a new era for the broadcast industry.

Never before has such modern microprocessor technology been applied to television cameras to give such power for perfection, such wide-ranging capability, so simply, so quickly.

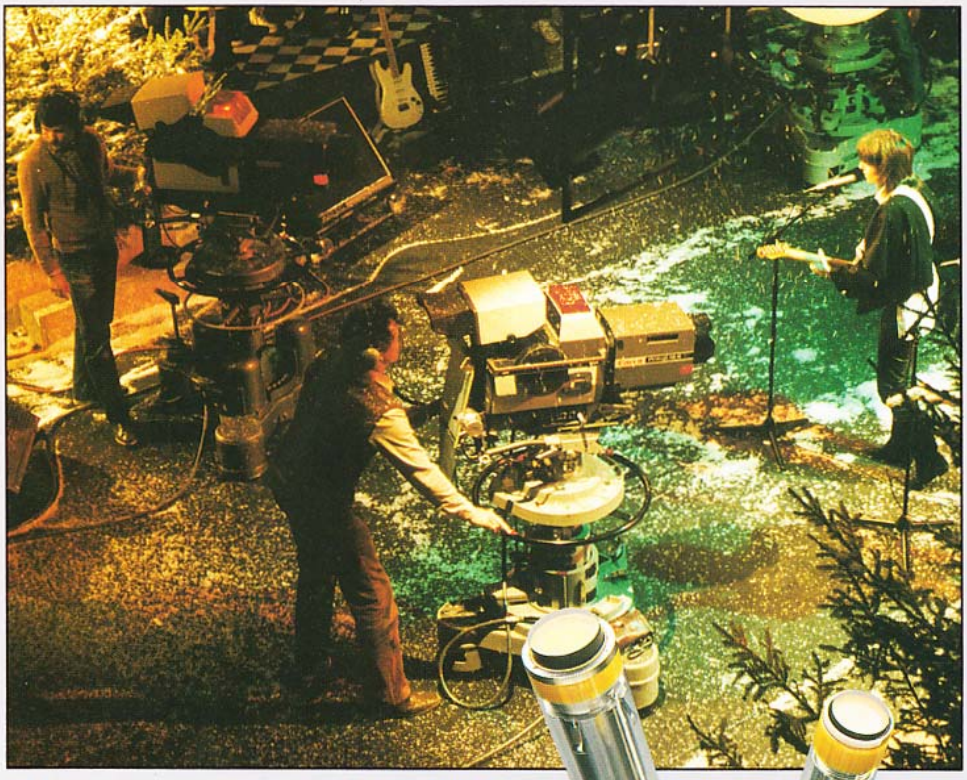
Never before has there been a camera that satisfied so completely the demands of the producer, engineer and cameraman for both studio and field applications.

From the snows of the winter Olympics to the heat of the Middle East, at international and national events, the LDK 6 has proved the benefits that come with *total* computer control.

- **Superb picture quality**
  Through 25 mm or 30 mm Plumbicon tubes and optimised digital scan, shading and dynamic focus correction.
- **Operational flexibility**
  For a wide range of broadcast applications under varied weather and light conditions. The interactive computer system with operational and set-up memories allows quick set-up and smooth operation for single or multi-camera systems. The RGB triax system allows great cabling flexibility.
- **Reliable ready for operation**
  Assured by digital control components, self-diagnostics and easy interchangeability of main units without the need for further adjustments. Tube change takes about ten minutes. The 'full auto set-up' program aligns the green channel automatically, using the diascope integral to the camera head. Red and blue are then aligned to green.
- **Future-proof**
  State-of-the-art in concept and design, having a transparent computer system with distributed intelligence that can also accommodate future developments. And COACH, the Philips remote control and monitoring system, gives double assurance of perfect performance.
- **Minimum cost of ownership**
  With triax for minimum handling and maintenance costs. With automatic set-up for a quickly obtainable and consistent high quality picture. With instant recall of operational and lens memories for efficient production. With a diascope that is integrated in the camera head to allow the use and exchange of standard lenses. With diagnostics for surveillance and to ensure minimum downtime. With efficient optics and total computer control that can cut lighting costs by up to 50%. With only 27 foot candles, the LDK 6A can remain at 0 dB and f 1.6 and is absolutely quiet at 12 dB.

The qualities that come from total computer control

LDK6A



Superb picture quality

The LDK 6A provides the programme producer with an oustanding array of automatic features and facilities that ensure the highest standards of picture quality.

The design of the camera head allows the selection of the Plumbicon tube to suit your requirements for maximum performance. There is a choice of 25 mm or 30 mm tubes, with either dynamic beam control or anti-comet tail for highlight handling capabilities.

A further aid to picture quality is the provision of digital scan correction. This enables exceptional standards of picture registration. Instead of the usual 100% correction at only 3 points, an optimum 49 points are individually corrected under the control of the automatic set-up facility. The result is a threefold reduction in registration error (see diagrams A and B).

This 49 area automatic correction is also applied for black shading, white shading and focus correction for further enhancement of the picture quality.

Amongst the comprehensive video processing features are black stretch, white compression, highlight handling, gamma correction selection, in-band and edge-of-band contours out of green (red: option) and a full 3×3 linear matrix.

This linear matrix circuit gives spectral curves that are closest to the ideal including the negative lobes required for natural colours. The result is a perfect match between Philips cameras.

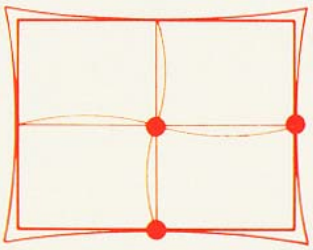
Because all the major elements such as prisms, yokes and tubes are manufactured by Philips, quality performance is guaranteed.

The microcomputer control system

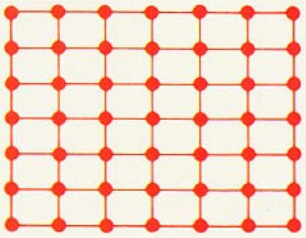
The LDK 6A system has 4 micro-computers – in the Camera Head, the Camera Processing Unit, the Master Control Panel and the Common Control Panel. Each unit can converse with the others in the chain enabling constant check and status of camera performance. Each camera has its own set-up computer. Because of this 'distributed intelligence' system it is possible to set up independently, simultaneously and automatically any number of camera chains. LDK 6A system units can be interchanged, without the need for re-setting, checking or adjusting.

The control system is fully digital, and digital/analogue converters with 'pulse-pot' technology permit manual and automatic adjustment over the whole control range. Because of this system no manual pre-set is required for automatic set-up.

Well over a thousand settings with full range computer control make the LDK 6A a totally automatic camera with perfect, consistent performance.



A. Conventional Scanning
– only 3 points 100% correct.
Corner errors 120 ns



B. Digital Scan Correction
– 49 points 100% correct.
Centre < 25 ns Corner errors < 40 ns

Memories – a major advantage

The LDK 6A camera has 6 operational, 2 set-up and 4 lens memories. All 6 operational memories can be recalled so that there is immediate access to pre-arranged special production effects or lighting conditions.

Each of these operational memories can store:

- Gains RGB
- Blacks RGB
- Filter wheel 1
- Filter wheel 2
- Colour temperature
- Master black
- Gain
- Black stretch
- Gamma
- Contours
- Auto-iris presets

For special creative and technical applications over 700 parameters can be stored in 2 separate selectable set-up memories.

Each LDK 6A camera can also store the complete characteristics of up to 4 lens types and recall their parameters when required. These parameters are:

- Colour temperature
- Registration
- Flare
- Shading
- Back focus

These lens files can also be used to store range extender characteristics and are called up automatically with servo extender selection.

COACH – double assurance

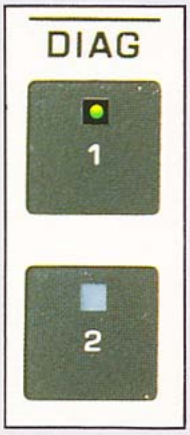
COACH is a tool for centralised maintenance and monitoring of the LDK 6 family of cameras. It consists of 2 components – an interface and an IBM-compatible personal computer. Simple to use, COACH provides:

- Remote control and monitoring of LDK 6 family camera systems
- Flexible retrieval, storage and control of camera data
- In depth diagnostic monitoring
- Remote access via standard modems over telephone lines

It therefore helps make more cost-effective use of engineering staff and allows contact and control at the local Philips Service Centre.

See the COACH brochure for full description.

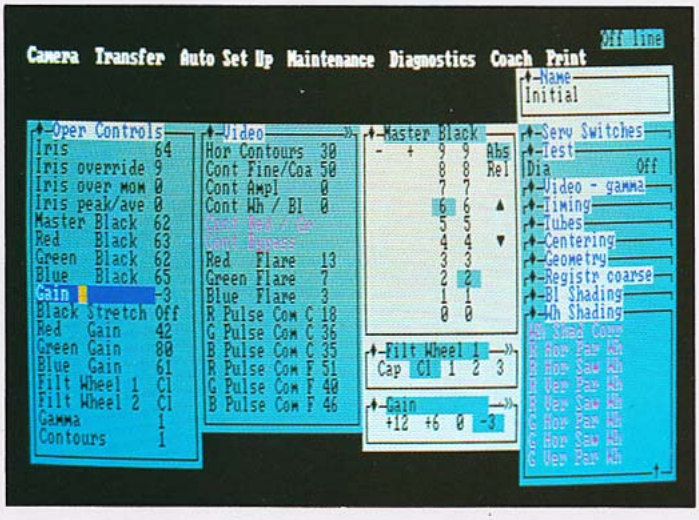
Diagnostics



There are two comprehensive diagnostics systems in the LDK 6A. The first is an advance warning system for fault detection to avoid costly downtime. The second is able to pinpoint the location of a fault to a specific board.

Diagnostics –1 operates on-line, and is active whenever a camera is 'on'. It makes no decisions which will interfere with normal 'on-air' operation. However, where important characteristics deviate from normal, it warns the operator a decision is needed, and provides a character display readout on the engineering monitor.

Diagnostics –2 operates off-line, and on demand, by using signal injection techniques throughout the camera system. Messages are displayed on the picture monitor indicating probable fault location.



Selectable automatic programs

Selectable automatic programs in the LDK 6A include:

- Full auto set-up
- Auto daily check
- Auto white
- Auto black
- Auto shading white
- Auto shading black
- Auto video levels
- Auto lens registration calibration
- Auto lens shading calibration
- Auto tube adjustment
- Auto centring
- Auto registration – full range

These automatic programs provide for ease-of-use and produce the best possible results in the shortest possible time.

Because of the computer-controllable back focus and the full range computer control of the tube parameters, it is even possible to set up the camera fully automatically after tube replacement without any manual pre-setting. The green channel is automatically aligned to a digital electronic test pattern, with red and blue, subsequently aligned to green.

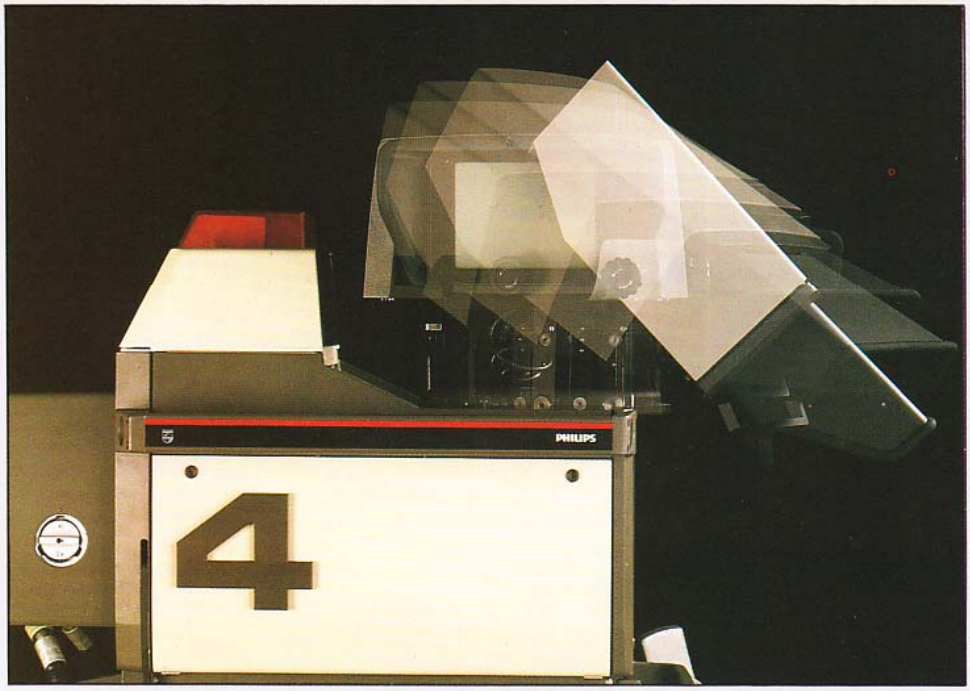
Status feedback

The unique status feedback system is another important advantage of the LDK 6A.

The data transparency of the design enables access to, and retrieval from, any unit on the bus. While all operational settings are displayed on the Common Control panel, virtually all setting-up and operational control parameters are available for display on the Master Control Panel. All settings generated by digi-pots are fed back to the alpha-numeric displays and are shown by an exact percentage readout. This permits settings to be checked at a glance, without physically measuring them.

Ahead of its time

LDK6A



Anticipating the future

The Philips LDK 6A is the most advanced computer controlled camera system available today. But it is also designed to meet tomorrow's changing programming needs, and to anticipate new technical developments.

Easy adaptation and extension are simplified by the digital transparency of the system. The camera head has been designed to foresee future developments in tube technology. And the interchangeablity of the system units, together with their interface specifications, helps to simplify later extension.

The introduction of COACH, the most sophisticated maintenance system available, amply demonstrates how Philips constantly supports its camera range and with on-going laboratory research, we continue to meet the expressed needs of customers throughout the world.

Minimum cost of ownership

Although all modern television cameras can hardly be called inexpensive, the LDK 6A system has been specifically designed to minimize cost of ownership.

The LDK 6A camera head has a built-in diascope, so the cost of specialised lenses is avoided. The compatibility of the lens interface also contributes to minimizing lens investment, as you can use LDK 5 and LDK 25 standard lenses without modification.

The diagnostic system reduces the time involved in fault-finding (in the unlikely event of faults occurring).

The use of triax cables, with their low investment, also means reductions in handling, labour and repair costs.

The 'distributed intelligence' system with its operational, set-up and lens memories heips to minimize operation and maintenance costs, by the considerable reduction in set-up and production times.

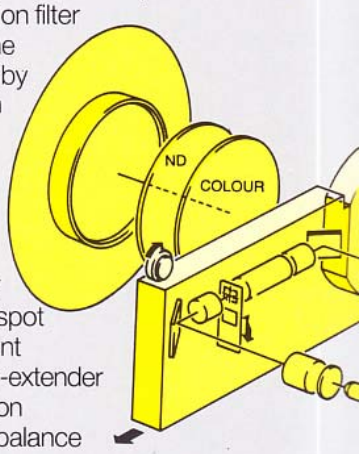
Savings are also made because the system units are independent and easily adaptable to different configurations. So investments in multi-studio configurations can be reduced.

The camera head

The LDK 6A camera head has been developed not only from Philips extensive experience in the broadcast industry, but also in close collaboration with the users – cameramen and the video production team.

It is probably the smallest in its class, yet it incorporates a host of outstanding features.

- Rainproof housing and RFI shielded
- Quick lens change
- Standard lens mount
- 4 different lens memories
- Built-in diascope
- Optical axis of the lens and viewfinder in one vertical plane
- Two 5 position filter wheels – one controllable by cameraman
- Extensive viewfinder signal selection
- Auto iris
- Momentary auto-iris by spot measurement
- Digital range-extender compensation
- Auto-white balance control
- Extensive intercom facilities
- Rotatable, tiltable and removable 7 inch high resolution viewfinder with extreme tilt range (± 60°)
- Extensive indicators and markers in the viewfinder
- Handgrips on all sides
- Provision for remote facility for intercom and external viewfinder switches (e.g. on pan bars)
- Two audio channels
- Utility power
- Integrated lens support
- Large switchable tally light visible from every direction
- Contours from red (option)

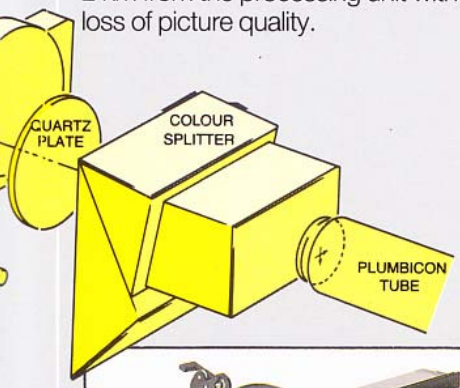


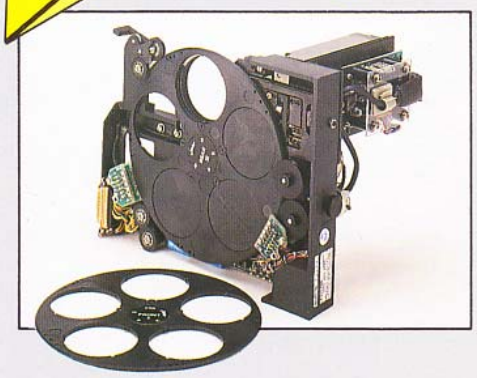
And it is in the camera head, not in the lens, that the diascope is located, making a wider selection of lenses available for different production situations. Full range extender facilities are maintained.

Triax – reliable, flexible

The name of Philips and the reliability of triax operation in broadcast cameras are synonymous. The triax system is used because of its great reliability, its flexibility – and above all because of the extremely positive reaction from the many Philips users of triax cameras in studio and field locations all over the world.

The triax system is an integral part of the camera chain – not an accessory. With the appropriate cable, the camera head can be sited up to 2 km from the processing unit without loss of picture quality.





Compatible companion

The LDK 6A has a plug compatible portable companion – the LDK 54A. Designed to give matching colorimetry, the LDK 54A is the ideal portable – either in the studio or on location. This multi-role lightweight triax camera can operate independently or via the standard LDK 6A control system.

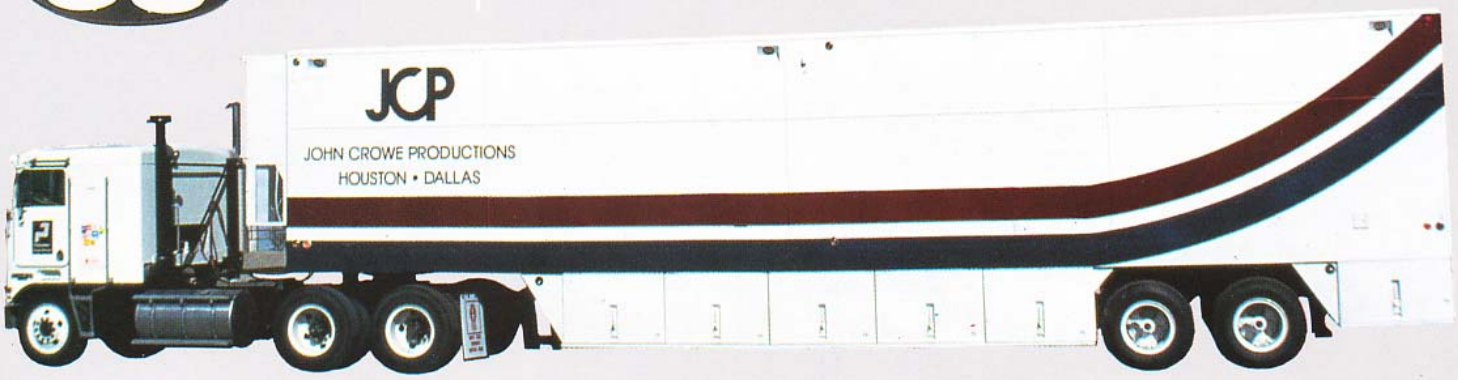
Equally at home on location

Rugged, reliable, rainproof and able to work over a wide range of temperature, the LDK 6A performs to perfection on location. The compact size and modular design of the control panels (the MCP and CPU being only half 19″ rack size) make them easier to locate in the confined space of a mobile unit.

In addition, full bandwidth RGB outputs for Chroma Key over long cable lengths are available, thanks to the quadrature modulation of the Red and Blue signals, and separate modulation of the Green.

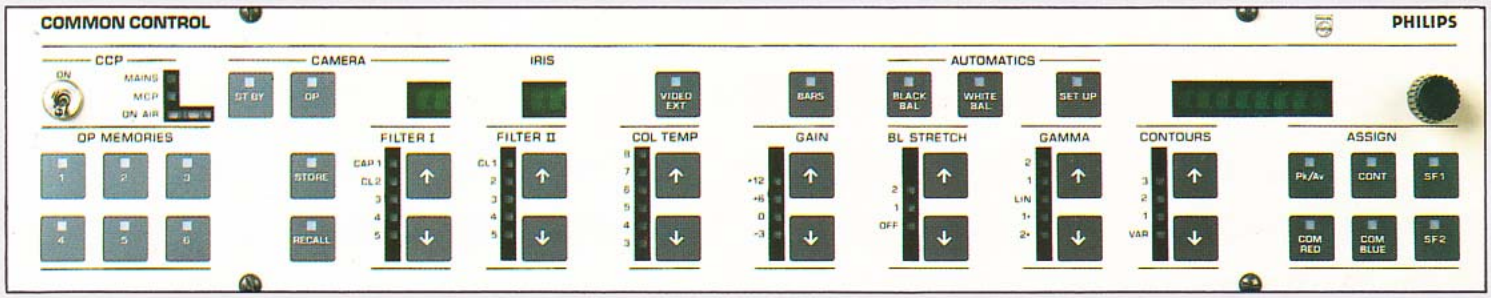
Both in the studio and on location the highest quality performance is maintaned for up to 2 km.

And simply everyone appreciates how light and easy triax cable is to handle.



Automatic control, easy surveillance

LDK6A



Common Control Panel

The Common Control Panel (CCP) is designed for the video operator. It provides secondary (between 'on-air') operational controls. It enables centralised access for multiple camera systems, with assignment being made by the MATCH buttons on the Remote Control Panels. The following functions are available with LEDs indicating the status of the functions at the selected camera:

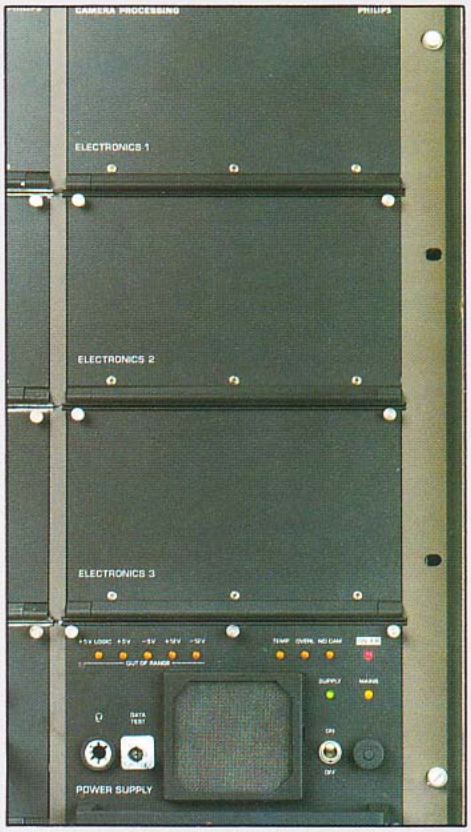
- Stand-by
- Operation
- External video signal to match monitors
- Colour bar
- Auto black balance
- Auto white balance
- Daily set-up
- Filter wheel 1
- Filter wheel 2
- Colour temperature
- Gain
- Black stretch
- Gamma and white compression selector
- Contour selector (optional out of red)

Moreover it is possible to adjust simultaneously, without visual readout confirmation, contour amplitude, auto-iris peak/average, and ± 2 dB range of common blue or red gains of all the cameras in a system. Other readout facilities include camera indication number and the lens f-stop value.

The 6 operational memories of each camera can be stored and recalled from the CCP. This means that 36 operational memories are available in a 6 camera configuration. In each memory all the operational settings can be stored.

Remote Control Panels

Primary operational controls are located on the Remote Control Panels (RCP). Separate or combined iris and black plus painting control panels are available. Included are controls for the iris, master black, iris range control, preview, call, match, auto-iris and red, green and blue individual gain and black level. The design of the RCPs uses only passive components which permits the panels to be co-sited or used in separate locations, depending on the station's operational procedures.



Camera Processing Unit

The Camera Processing Unit, with its incorporated triax circuitry, is the 'black box' of the system. Its compact size (just half the width of a 19" rack), enables a logical left to right system layout, making it ideal for situations such as OB vans, where space is at a premium.

There is a connector to the control data system for maintenance and diagnostics.

Comprehensive LED indicator arrays give warning of operational status of computer systems and power supply.

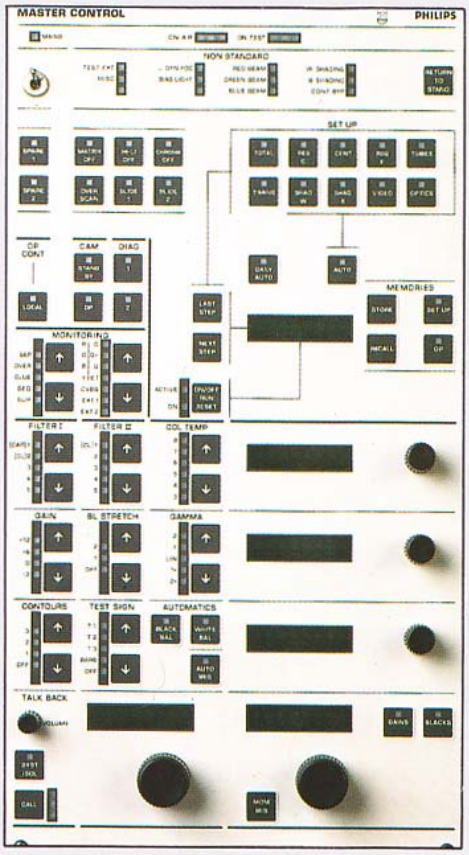
Master Control Panels

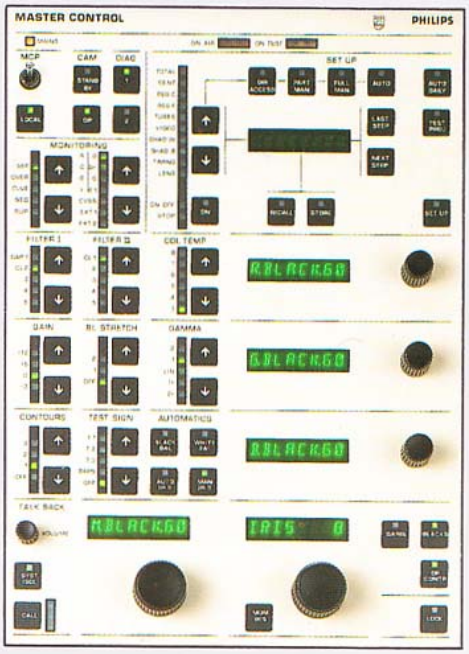
The Master Control Panel (MCP) is operated by the engineer and acts as the 'surveillance centre' of the camera system. It can be linked to any camera chain. Once a specific link is selected, the MCP immediately has access to all operational setting-up and monitoring facilities of that chain. An electronic LOCK freezes all panel settings to avoid accidental disturbance. A button which enables local control is provided. This overrides other operational controls at the RCP and CCP within a selected camera chain.

The MCP can also be used as a fault-finding and setting-up aid. It can be divided into several discrete areas providing the engineer with overall and selective control of the system.

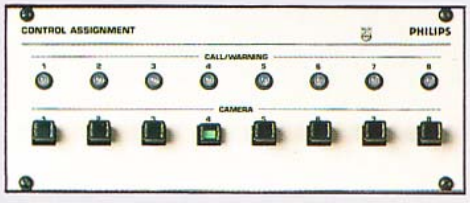
The MCP can be taken to, and directly connected to, either the camera head or CPU for localised maintenance and diagnostics.

There are two MCPs, the Standard and Extended. The Extended does all that the Standard does, but can help save time by allowing immediate, non-sequential access to individual function groups such as registration, centring, shading, video, timing and optics.



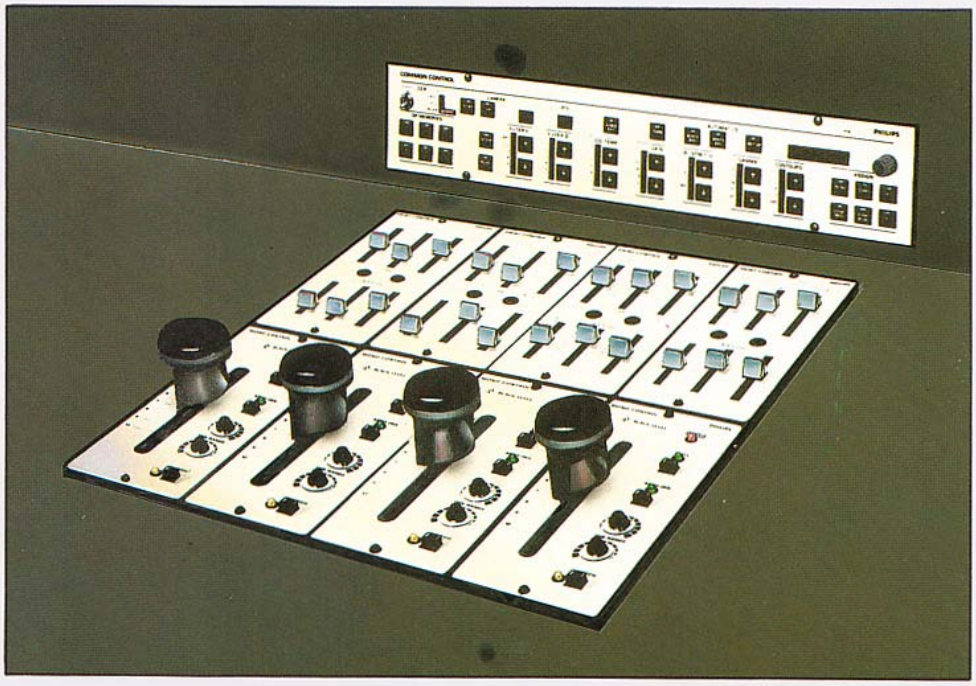


In addition, manual modifications of set-up data (e.g. bias light, RGB beams, shading, etc.) are indicated by an extensive LED display.



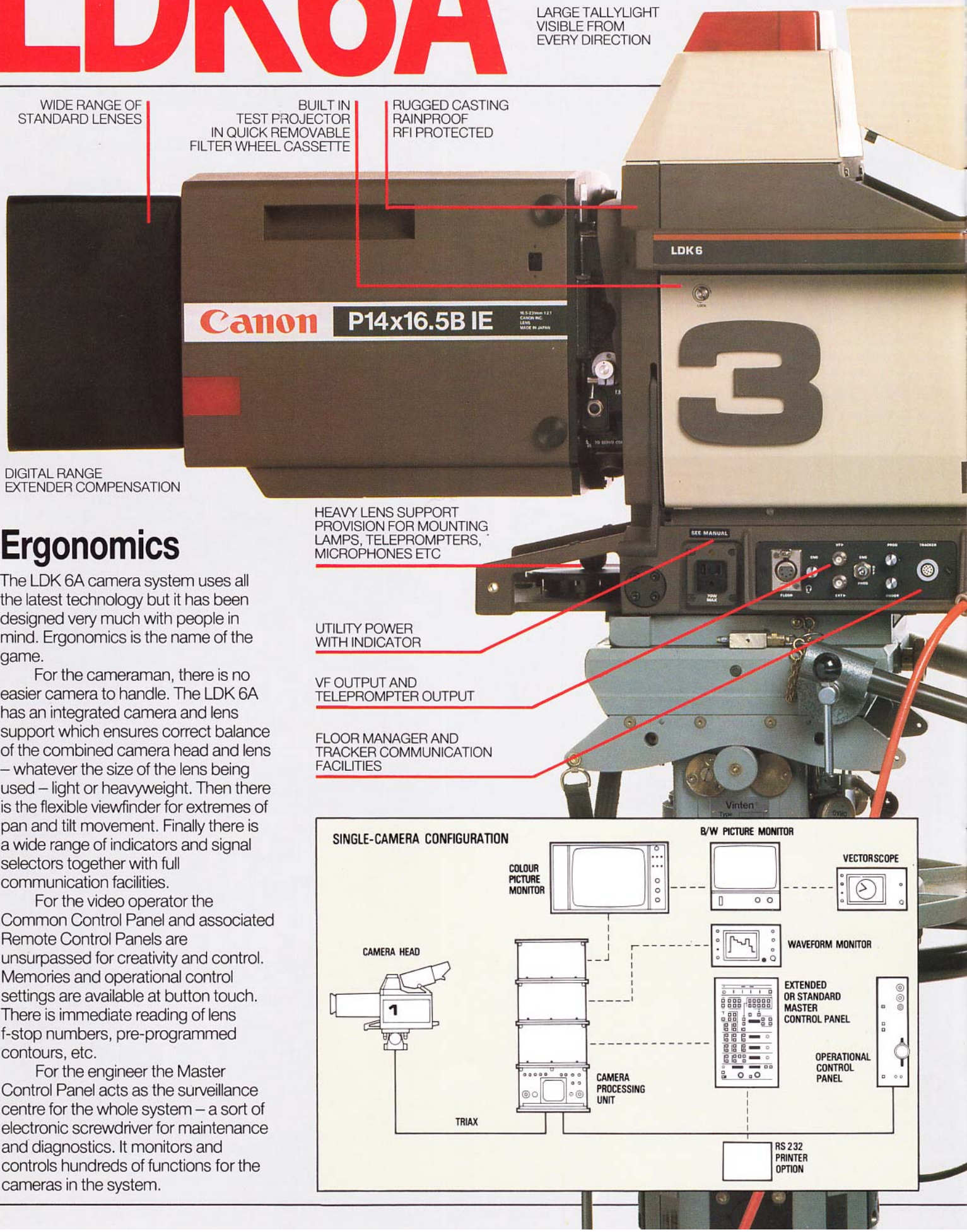
Control Assignment Panel

The Control Assignment Panel (CAP) is used to delegate the Master Control Panel to any selected camera in a multi-camera configuration. Two standard versions of this panel are available allowing camera selections to be made from 1–6, or 1–8 cameras. If a non-selected camera wishes to communicate with the MCP, this will be indicated by the related call lamp on this CAP.



Flexibility with creativity

LDK6A



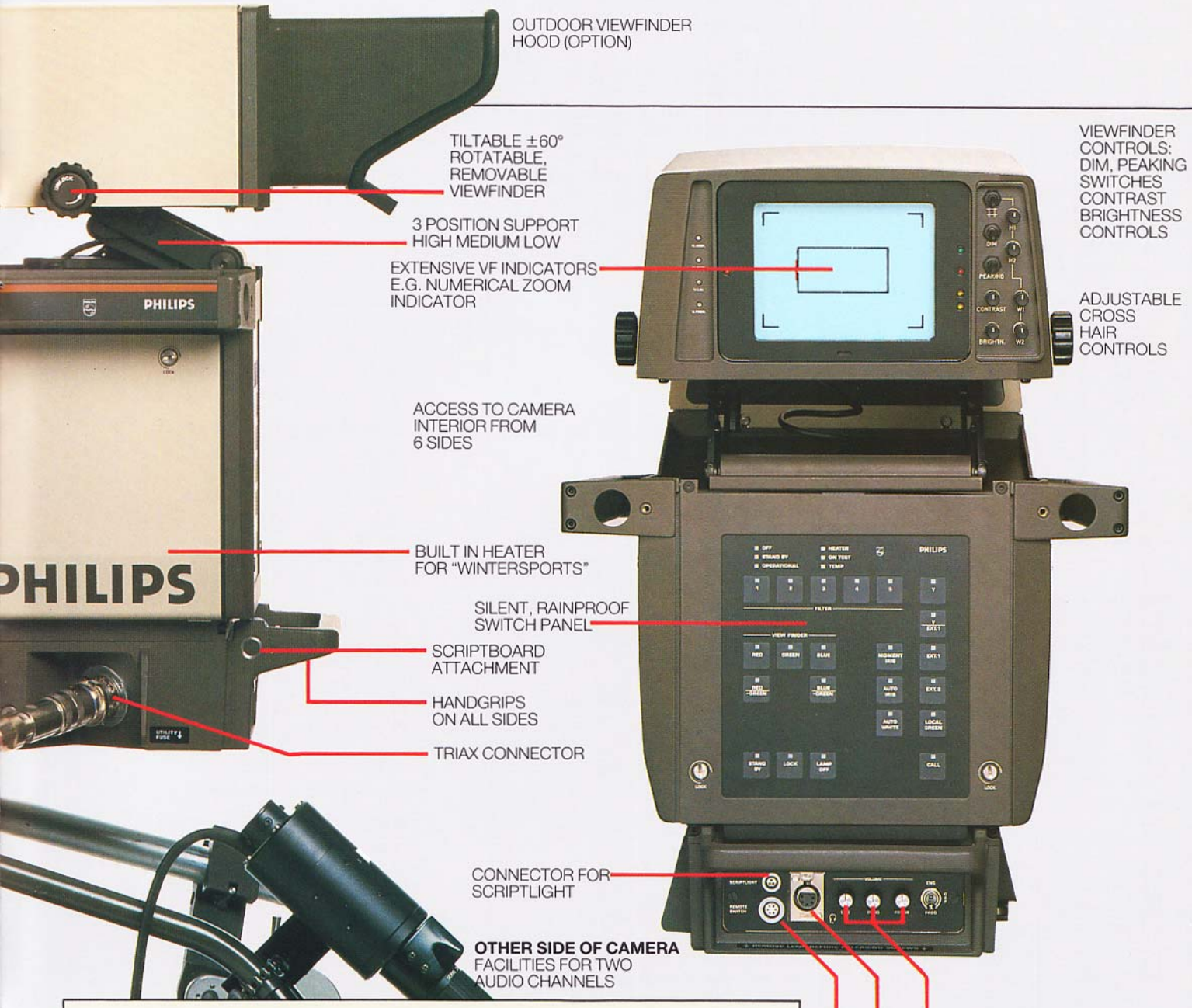
Ergonomics

The LDK 6A camera system uses all the latest technology but it has been designed very much with people in mind. Ergonomics is the name of the game.

For the cameraman, there is no easier camera to handle. The LDK 6A has an integrated camera and lens support which ensures correct balance of the combined camera head and lens – whatever the size of the lens being used – light or heavyweight. Then there is the flexible viewfinder for extremes of pan and tilt movement. Finally there is a wide range of indicators and signal selectors together with full communication facilities.

For the video operator the Common Control Panel and associated Remote Control Panels are unsurpassed for creativity and control. Memories and operational control settings are available at button touch. There is immediate reading of lens f-stop numbers, pre-programmed contours, etc.

For the engineer the Master Control Panel acts as the surveillance centre for the whole system – a sort of electronic screwdriver for maintenance and diagnostics. It monitors and controls hundreds of functions for the cameras in the system.

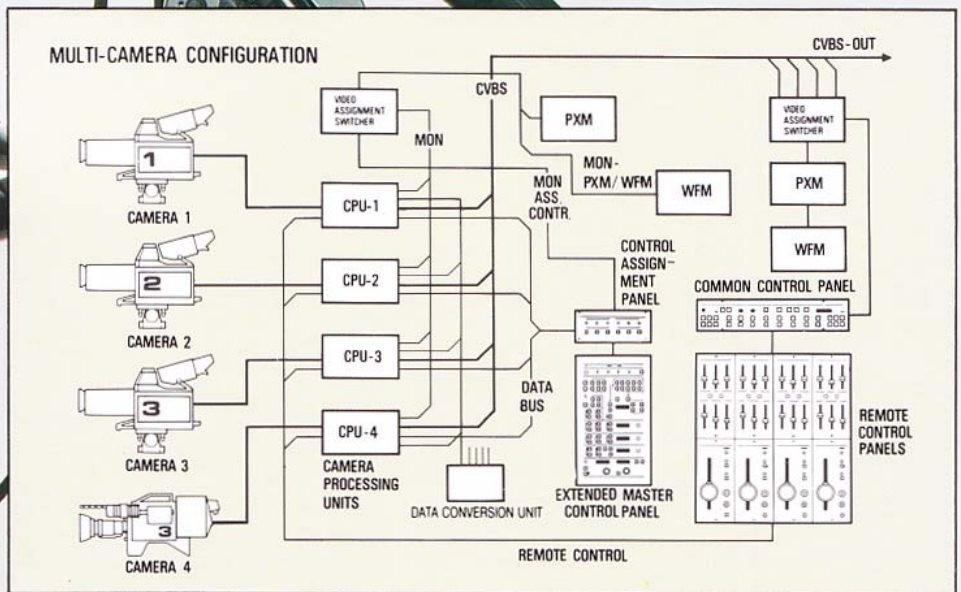


OTHER SIDE OF CAMERA
FACILITIES FOR TWO AUDIO CHANNELS

VOLUME CONTROLS FOR INTERCOM: ENGINEERING, PRODUCTION, PROGRAM

INTERCOM SOCKETS

CONNECTOR FOR EXTERNAL SWITCHES



Technical Data

Transmission system
PAL, PAL-M, NTSC and SECAM.

Power supply
AC 47–63Hz, 90–132V and 189–264V.

Power consumption
375W without utility power

Input signals
CVBS or Blackburst
Ext. 1 (C) VBS
Ext. 2 (teleprompter) (C) VBS
(Above inputs are looped-through:
Return loss: ≥ 46dB at 1MHz)
Green reference: VB

Output signals

1 × Red 2 × Green 1 × Blue	(with contours, colour matrixed, no sync, narrow blanking and gamma corrected) 0.7V p–p across 75 Ohm
2 × WFM 2 × PXM 3 × CVBS	1V p–p across 75 Ohm

Separation between outputs ≥ 50 dB at 1MHz.

Scene illumination
750 lux (70 ft.cd) for a typical signal-to-noise ratio of 56dB (PAL) or 58dB (NTSC) in the Y-channel; lens iris f/2.8 when camera head equipped with 1" Plumbicon tubes; reflection factor 60%, without linear matrix; without contour correction; encoder notch filter on colour temp. 3000K.

Measurements performed at 35% of peak white.

Contour correction
The contours out of green principle is applied (out of red: optional). Horizontal contour correction is both in-band as well as edge-of-band. The amplitudes of the negative and positive combined horizontal and vertical contours can be independently controlled.

The response can be adjusted to provide a modulation depth of 100% at 400 TV lines. Level dependency of horizontal contours, noise coring and comb filtering are incorporated in the contour processing circuitry.

Colour registration
Deviations of Red or Blue in any direction with respect to Green. In a circle of 0.8 of picture height, deviations will be no more than the distance equal to a horizontal scanning time of 25 nanoseconds in horizontal as well as in vertical direction. Outside this area deviations will be no more than 40 ns.

Geometry error
Maximum 0.5% of the picture height.
Skew 0.3% of the picture height (excluding lens distortions).

Gain control
Master selector for: −3dB, 0dB, +6dB and +12dB.
Individual controls for +3dB to −3dB in Red and Blue video amplifiers.

Colour temperature control
The colour temperature can be set with a six-step selector covering a range from about 3000K to 8000K.

Optical filter wheels
Two five-position filter wheels are incorporated.
Turret I contains: Clear, ND 0.6 and ND 1.2.
Turret II contains: Clear and 85B.
(Note: Unspecified positions available for special effects and optional filters.)

Gamma correction
Selector for linear, gamma I and gamma II.
Gamma I and II can be preset between gamma = 0.4 to gamma = 0.5.

Black level adjustment
Master control for adjustment between −65% and +35% of the nominal white level.

Individual control for adjustment between −20% and +20% of the nominal white level.

Lenses
A wide range of manually and servo controlled lenses is available.

Amplification characteristics
Green/CVBS to 5MHz ± 0.5 dB, and at 7MHz + 0dB/−3dB.
Red/Blue at 5 MHz + 0dB/−3dB.

Viewfinder
Picture tube, type M17-141W.
Screen diagonal 17cm.
High brightness 250 ft Lamberts.
X-ray radiation conforming to DHEW Rules 21 CFR278 (USA performance Standard).

Permissible ambient operating temperature range
Camera Head and Viewfinder – 20°C to +45°C.
Camera Processing Unit and Control Panels 0°C to +45°C.

Cable lengths
with ⌀ 8 mm triax cable 675 m (2215')
with ⌀11 mm triax cable 1200 m (3940')
with ⌀14 mm triax cable 2000 m (6560')

Dimensions

Camera (incl. VF and handgrips)

length	661 mm (26.0")
width	402 mm (16.5")
height	521 mm (20.5")
weight	43 kg (94.6 lb approx.)

Camera Processing Unit (CPU)

width	213 mm (8.4")
depth	460 mm (18.0")
height	533 mm (21.0")
weight	35 kg (77 lb approx.)

Master Control Panel (standard)

width	213 mm (8.4")
depth	128 mm (5.0")
height	320 mm (12.6") (blind panel incl.)
weight	6 kg (13.2 lb approx.)

Master Control Panel (extended)

width	213 mm (8.4")
depth	128 mm (5.0")
height	399 mm (15.7")
weight	7.6 kg (16.7 lbs approx.)

Control Assignment Panel

width	213 mm (8.4")
depth	70 mm (2.8")
height	87.5 mm (3.4")
weight	0.8 kg (1.8 lb approx.)

Common Control panel

width	426 mm (16.8")
depth	190 mm (7.5")
height	87.5 mm (3.4")
weight	5 kg (11 lb approx.)

Intercom
From camera head to CPU: 2 channels
From CPU to camera head: 3 channels

Audio
Two channels from camera head to CPU.

These typical specification details are subject to change without notice.

Separate colour brochures are available for the LDK 26A and LDK 54A cameras and COACH.

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