

PHILIPS



Colour Television Camera

Type LDK 25

Operational flexibility

Low profile camera head

Tiltable, rotatable viewfinder

1 inch Plumbicon * tubes; anti-comet tail; minimum lag

Auto white balance

Auto centering

Auto iris

CLUE facility

Contrast Compression

Uses F & G 753-5 cable

Compatible with Philips LDK 5 and LDK 15 cameras



The LDK 25 is a CCU version of the LDK 5 providing most of the LDK 5's operational features while retaining identical picture quality. This camera is the latest addition to Philips' family of broadcast cameras which includes the LDK 5 and LDK 15.

By replacing the LDK 5's digital and multiplex system required for triax operation, with conventional multicore cable techniques and by simplifying construction, considerable cost savings can be realised without sacrificing technical quality.

As a development within the Philips' family of colour cameras the LDK 25 assures the broadcast station of maximum flexibility of programme coverage.

For example, the LDK 25 camera head has been designed to be compatible with the LDK 15 system. This means that LDK 15 and LDK 25 heads can be interchanged i.e. an LDK 25 head will connect with an LDK 15 portable processing unit whereas an LDK 15 head will connect with an LDK 25 CCU.

With the LDK 25 operating in conjunction with the LDK 15 portable processing unit, triax operation is possible and all LDK 5 type operational configurations can be achieved.

The LDK 25 camera is also designed to accept 41XQ image intensifiers. These locate in front of the plumbicon tubes and enable broadcast quality to be obtained with light levels below 5 ft. candles.

*Registered trade mark for television tubes.



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Camera Head

Camera and viewfinder are contained in light-weight aluminium cast housings. The removable viewfinder can also be rotated and tilted and is supplied with a detachable shade and hood for inside or outside use. Adjacent to the viewfinder are located the following controls: Brightness, Contrast, Peaking ON-OFF, Clue-Single-Overlay Selector, R-G-B-Y-E Selector, Focal Length Scale, Tally Light, and Call Light. Zoom Lenses for the LDK25 are interchangeable with the LDK 5 and can be supplied with Manual controlled focus and zoom, as well as with full Servo control. The lens is fixed into position by means of a bayonet fitting. A key aspect of the mechanical design of the camera is the horizontal spider layout of the pick-up section.

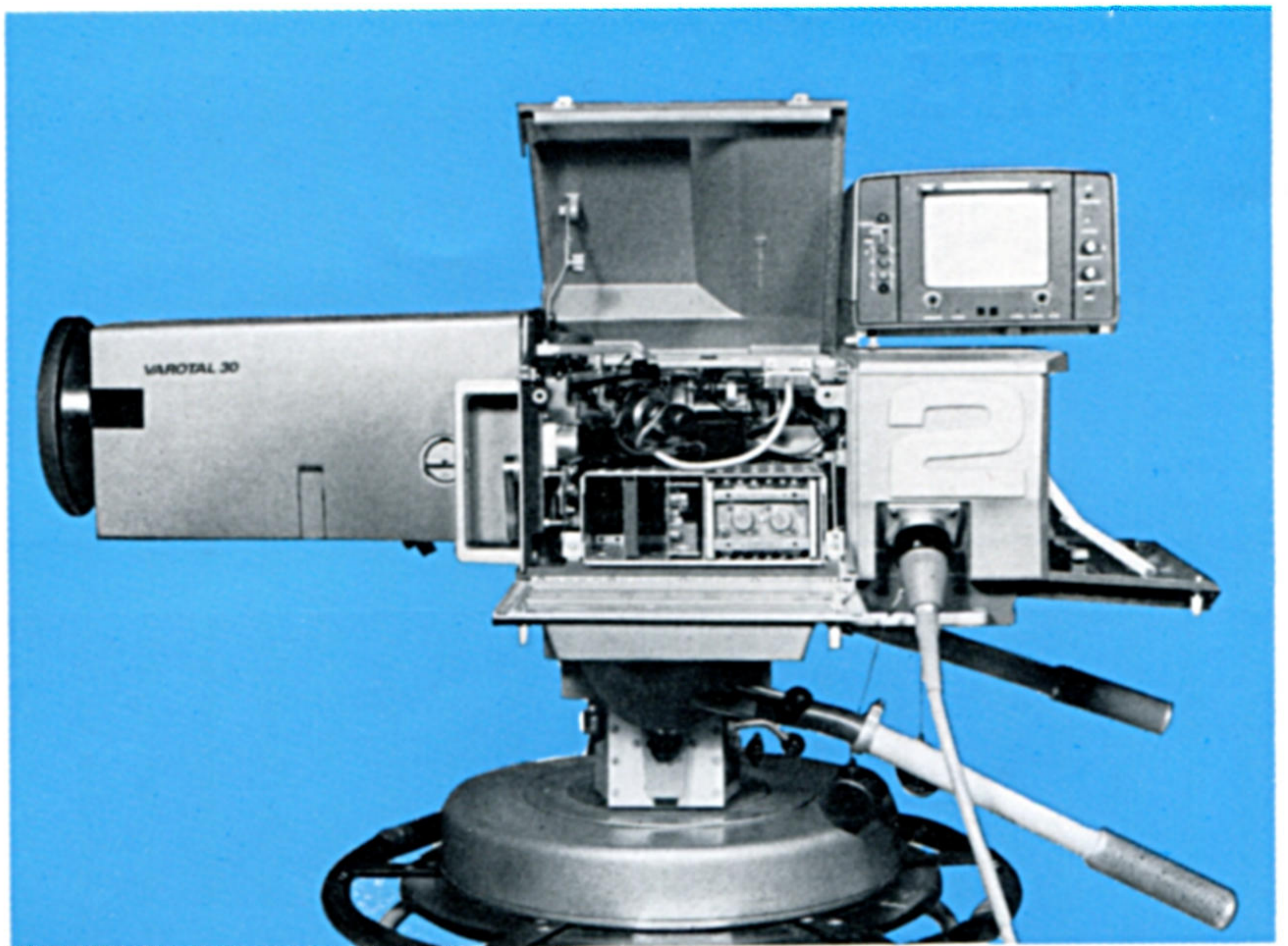
This section, which comprises the colour beamsplitting prism and the deflection units with camera tubes, is incorporated in one machined, magnesium cast block. This block is screwed to the camera front, to which the lens is also clamped. In this way, the whole optical part of the camera forms one rigid structure ensuring maximum alignment precision and registration stability.

The camera employs the new 1-inch Plumbicon tubes, type XQ 1080, in conjunction with deflection units of utmost mechanical and electrical precision. These tubes of separate mesh construction are fitted with a ceramic centering ring, which reduces the tolerances in optical alignment and improves the fixing of the tube target with respect to the optical image. An anti-comet tail (ACT) gun design ensures better highlight handling. An internal bias light conductor gives a uniform bias lighting of the tube target, and the resultant artificial dark current reduces beam discharge lag. The Plumbicon tube is inserted into its deflection unit from the rear, so that the latter need not be removed from the camera for tube exchange. The deflection coil assembly has a mu-metal shielding in one piece, for optimum screening against external magnetic fields.

The first video pre-amplifier stage in each camera channel is mounted inside the mu-metal screen of the deflection coil assembly, as near as possible to the signal electrode, for minimum capacitance and pick-up of spurious signals.

The deflection circuitry operates on the corrections-added principle. Master generators for line and field deflection provide identical scanning waveforms for all three camera channels. Corrections of only a few per cent of the total scanning are added to the waveforms.

With the exception of the horizontal and vertical fine shift controls, which have been automated, all registration and tube setting controls are presets located in the camera.



Video Processing

The LDK 25 is an RGB type of camera employing multicore cable to connect with the CCU. The camera head contains the electronic modules necessary for scanning, Plumbicon supplies and signal pre-amplification. All other circuitry is located in the CCU.

Video processing at the CCU includes cable compensation, contour correction, linear matrixing, gamma correction, contrast compression and automatic iris. Optional facilities include automatic white balance and variable matrixing. A Pal or split field NTSC colour bar is available and R.G.B. outputs are available for chroma keying.

System Timing

All pulses required by the camera head are generated by the camera pulse module located in the head. This module generates horizontal pulses by means of a DC controlled oscillator. These pulses are added to the blue video channel and are sent to the CCU where they are compared in phase with a horizontal reference. Any phase difference causes a proportional DC error voltage to be generated and fed back to the camera pulse module oscillator to eliminate the error. This ensures that the internal system timing remains correct regardless of camera cable lengths. To avoid further timing problems all essential pulses are added to the very last stage of the CCU, making direct use of station pulses after cleaning and reshaping to standard amplitudes, widths and risetimes. Subcarrier timing control over 360 degrees is achieved at the CCU by means of a switch for coarse control and a potentiometer for fine control.

Communications

The intercom provides the electronics to receive, mix and distribute throughout the camera system, intercom signals from three external inputs; Engineering, Production and Programme. In addition, a talkback output is provided to deliver Production and Engineering microphone signals from the camera head to the external intercom network.

The intercom system also enables private communication between CCU operator and cameraman to be selected.

Camera Cables

The camera design is based on the use of a multiconductor camera cable, F & G type 753-5 (diam. = 13 mm.)

Cable lengths of up to 600 metres can be used.

CCU Equipment

The CCU Equipment consists of three main assemblies: the electronics unit, power supply and control panel.

- Electronics Unit:** This unit is designed for 480 mm (19 in) rack mounting and contains the circuiting necessary for processing the camera output signals and occupies 4 units of rack space.
- Power Supply:** This unit supplies power to the camera head and electronics unit. Designed for 480 mm (19 in) rack mounting, it occupies 3 units of rack space.
- Control Panel:** Required for operational control, this panel is designed to locate in a mounting frame accommodating two such panels in standard 480 mm (19 in) rack width.

Waveform Monitoring

The CCU electronics unit contains circuits to provide full video signal monitoring interface to an external waveform monitor. As well as the video output, WFM ramp voltage and relay keying signals are provided.

The following waveform monitor displays are available:

- Sequential display of red, green, blue and encoded video.
- Sequential display of red, green and blue video.
- Encoded video with sync.
- Superimposed display of red, green and blue video.
- Red, green, blue or luminance video as determined by the picture monitor selector switches.

The order of display can readily be changed to red, blue and green.

Tubes

The LDK 25 is normally equipped with XQ1080 ACT tubes. However, where the ACT and bias light facilities are not required standard XQ1070 tubes can be used instead.

Auto Iris (option)

The Auto Iris facility enables the camera exposure to be automatically adjusted. A non-additive mix of red, green and blue video provides the reference information for this circuit.

In the Auto Iris mode, peak or average exposure can be continuously selected using the Iris control.

An internal adjustment is provided to determine the speed of iris response.

Auto White Balance (option)

This automatic facility enables an accurate colour balance to be quickly achieved. The cameraman fills an engraved viewfinder graticule (approx. 15% of picture height and width) with a white reference. This allows the CCU operator to initiate the auto white balance circuit.

With the auto white switch in the OFF position, the auto white circuit is inhibited and the colour balance circuits are set to mid range – determined by the setting of the manual gain controls. To achieve balance, the operator places the auto white switch in the BAL position until the lamp goes out. This indicates that balance is complete. Before the camera is panned away from the white reference, the auto white switch should be placed in the HOLD position. This ensures that the auto white circuits memorise the settings made during balance.

To ensure that the camera video circuits operate within the limits of their nominal signal levels, the amplitude of the green signal is checked to be within 80% and 120% of the uncorrected red and blue signals. This condition is necessary before automatic white balance can take place. When the auto white switch is initially placed in the BAL position the auto white lamp will light when this condition exists.

Auto Centering (option)

The auto centering circuit requires the cameraman to fill an engraved viewfinder graticule (60% of picture height and width) with a suitable registration pattern.

To achieve registration, the CCU operator places the auto centering switch in the OP position until registration is complete. The switch is then returned to the HOLD position which ensures that the settings are memorised. With the switch in the OFF position the centering circuits revert to manual control.

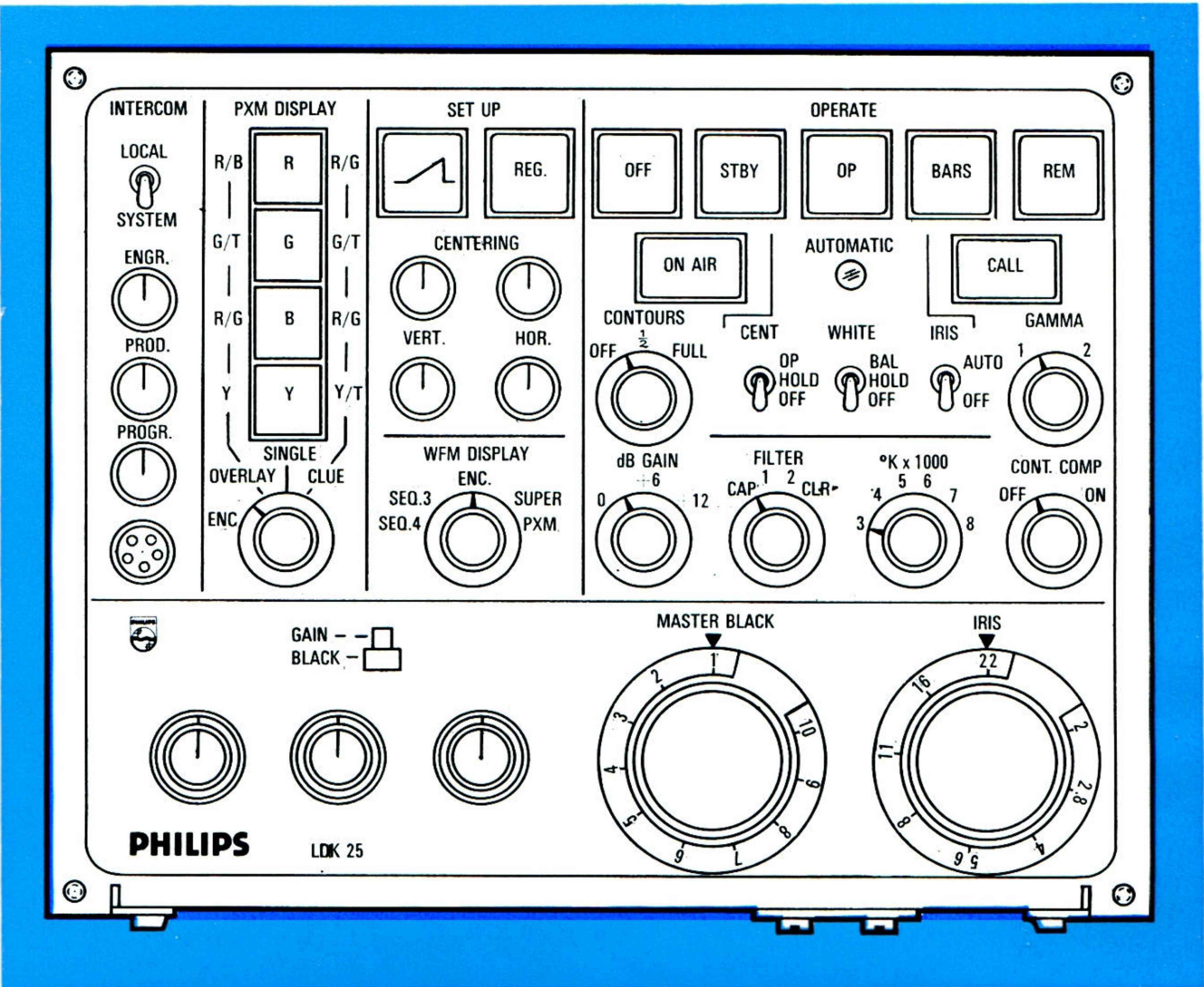
Contrast Compression

This feature enables the shadow detail of a high contrast scene to be resolved without over-exposing highlights. This is achieved by means of a contrast compression circuit in the luminance video channel only. By stretching the black areas and compressing the white areas of luminance video, scenes of extreme contrast can be viewed without changing the iris setting.

To eliminate excessive noise which could result from the increased amplification of the dark areas, a high frequency noise-stripping circuit is included. This is automatically switched on when contrast compression is selected.

Variable Matrix (option)

To allow the LDK 25 to match with other colour cameras or as a production aid where the enhancement or emphasis of a particular range of colour is desired, a variable matrix is available. This facility allows the hue and saturation of the primary and complementary colours or red, blue, green, magenta, yellow and cyan to be varied without affecting the black and white response.



CONTROL IDENTIFICATION FUNCTION		CONTROL IDENTIFICATION FUNCTION	
INTERCOM SYSTEM/LOCAL		On-Air	Illuminates when tally circuit is enabled.
Switch permits private discussion between CCU operator		Call	Illuminated by operating call switch on camera head.
ENGR., PROD., PROG.		Contours	3 position ; OFF, 1/2, FULL. Related to continuously variable amplitude available at the electronics unit.
PXM DISPLAY		AUTOMATIC	
Enc	Encoded output	Cent	Used for automatic centering.
Overlay	Mixed R-G, B-G, T-G, Y	White	Initiates auto-white balance circuit. Lamp indicates that video signal is between amplitude limits. It extinguishes after the short delay needed to complete balance.
Single	Individual R, B, G, Y	Iris	Selects automatic or manual iris. In the automatic mode the IRIS control can be varied to obtain average or peak exposure.
Clue	R/G, B/G, T/G, T/Y	Gamma	2 position : Linear & pre set gamma.
SET UP		Db Gain	3 position : 0 dB, +6 dB and +12 dB.
Reg	Applies calibration sawtooth to pre-amplifier.	Filter	Filter Wheel. 4 position including cap and clear
CENTERING		°K × 1000	Colour Temperature. 6 position ; calibration in degrees Kelvin.
Hor & Vert	Registration set-up. Switches gamma and contours off for registration adjustments.	Contr Comp	Contrast compression. 2 position : off/on.
WFM DISPLAY		Gain & Black	Red, green and blue : black level & gain.
4 position : SEQ 4-RGBY ; SEQ3-RGB ; ENC – encoded output ; SUPER-RGB superimposed ; PXM – follows PXM single display.		Master Black	Control setting illuminated from rear.
OPERATE		Iris	Control setting illuminated from rear.
Off	Switches power supply off.		
STBY	Switches system to standby position ; CCU and camera power on, tube high voltage off.		
OP	Operate – system ready for operation.		
BARS	Colour bar selector.		
REM	Switches master black, iris paint functions and master switched gain colour temperature and filter to remote panel : eg. joystick control.		

TECHNICAL DATA

Systems

PAL (B, G, H, I) 625 lines, 50 fields/sec.
or
PAL (M) 525 lines, 60 fields/sec.
or
NTSC 525 lines, 60 fields/sec.

Power Supply

100 to 120 V.
220 to 240 V.
+10% – 15%.
47 to 63 Hz.

Input signals

Sync. Blanking, Burst gate, PAL ident.
(optional)
Each –0.75 V to –4.0 V_{pp}.
Subcarrier 0.5 V to 2.0 V_{pp}.
Test. Composite video 1 V_{pp}.
All inputs are provided with loop through con-
nections. Return loss when terminated in an
external 75 Ω load = 40 dB @ 4.43 MHz.

Output signals

R, G, B (one output of each) 0.7 V_{pp} non comp.
Monitor VBS (one output) 1.0 V_{pp} compo-
site.
CVBS (three outputs) 1.0 V_{pp} composite.
Sending impedance 75 Ω, return loss –46 dB
@ 1 MHz, –35 dB @ 5 MHz.

Scene illumination

1000 lux (100 ft. cd.) for a signal-to-noise
ratio of 45 dB in the Y-channel; lens iris f/2.8
(f/2.8 is about equivalent to f/4 with 1 ¼ inch
Plumbicon tubes); reflection factor 60% with
linear matrixing; without contour correction;
with 5 MHz bandpass filter; at 40% of peak
white.

Resolution

In the Y-channel, without contour correction;
40% modulation depth at 5 MHz in the picture
centre.

Colour registration

Deviations of Red or Blue in any direction
with respect to Green:
In an ellipse with axes 0.9 of the picture height
and width deviations will be no more than the
distance equal to a horizontal scanning time of
25 nanoseconds. Within a circle of a diameter
equal to the picture width deviations will be
no more than 50 nanoseconds.
Outside this circle, deviations will be no more
than 100 nanoseconds.

Geometry error

Maximum 0.5% of the picture height within an
ellipse with axes 0.9 of picture height and
width; In the remaining picture area, maxi-
mum 1%; Lens error not taken into account.

Gain control

Master selector for: 0 dB, +6 dB and +12 dB
Individual controls for plus or minus 3 dB in
Red and Blue.

Colour temperature control

6 step selector for 3000, 4000, 5000, 6000,
7000 and 8000°K 4 position wheel for the
optical filters; clear, colour no. 85; combined
colour no. 85 and N.D. 0.9 and Cap. Slide for
insertion of additional filter.

Gamma correction

Selector for linear operation and gamma = 0.5
or may be adjusted for 0.5 and 0.35.
Gamma tracking at Gamma = 0.5 better than
0.3%
at Gamma = 0.35 better than
0.5%

Black level adjustment

Master control for adjustment between –65%
and +35% of the nominal white level.
Individual control in Red and Blue for adjust-
ment between –20% and +20% of the
nominal white level.

Contour correction

Negative contour modulation: level-depen-
dency and comb filter; noise coring.

Lenses

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

Permissible ambient temperature range

–10 to +45°C.

Viewfinder

Picture tube, type M17–141W; screen dia-
gonal 17 cm; high brightness 250 ft. lamberts
X-ray radiation conforming to DHEW Rules
21 CFR 278 (USA performances standard).

Weights & dimensions

Camera (incl. VF):			
length	approx.	557 mm	
width	approx.	441 mm	
height	approx.	429 mm	
weight	approx.	47.5 kg	
Camera Control Unit:			
width	approx.	483 mm	
depth	approx.	276 mm	
height	approx.	178 mm	
weight	approx.	15.5 kg	
Power Supply:			
width	approx.	483 mm	
depth	approx.	407 mm	
height	approx.	133 mm	
weight	approx.	22.5 kg	
Control Panel:			
width	approx.	217 mm	
depth	approx.	113 mm	
height	approx.	173 mm	
weight	approx.	2.3 kg	

Specification details are subject to change
without notice.



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