

PHILIPS



BROADCASTING EQUIPMENT

Plumbicon* Colour Camera Chain, Type LDK 33



Fully remote-controlled camera system
with servo-operated lens drive

Suitable for remotely controlled pan and
tilt head mounting

Outstanding picture sharpness due to
'contours-from-green' signal processing

Modular type CCU with integral encoder
and colour-bar generator

Full studio performance

* Registered Trade Mark

This highly versatile colour camera chain has been designed as an economical alternative to the viewfinder camera in televising programmes where a fixed position camera would be sufficient. Such programmes are news presentations, studio interviews, caption scanning, telecine, etc.

While equal in performance to the more complex studio camera chains, it is far simpler to operate and smaller in size. One or more cameras can be remotely controlled by one operator or alternatively by an automatic programme selector.

An important feature of the LDK 33 is that the electronic circuit modules of the camera control unit (CCU) are basically identical to those of the type LDK 3 studio camera chain. Therefore only one set of replacement modules is required for servicing both systems.

THE CAMERA

Excellent resolution and high performance, together with reliability and ease of maintenance are inherent features of the Plumbicon* Colour Camera. Due to an exclusive prismatic colour splitting optical system, maximum colorimetric response is ensured.

Each of the camera's three colour channels employs a separate mesh Plumbicon* tube, resulting in improved overall resolution. Also as each tube exhibits an extended linear transfer characteristic, there is no degeneration in resolution during excessive highlight excursions.

In addition to the three video pre-amplifiers which have to be located close to a Plumbicon* tube assembly, the camera contains the deflection and video output circuitry, a sawtooth generator for setting up purposes and a scanning protection circuit. The solid state circuitry employing silicon transistors throughout remains extremely stable over a wide temperature range. Also as the circuits are powered from regulated DC power supplies, they are free from the influence of mains voltage fluctuations.

The input stage of each video pre-amplifier has been specially designed to ensure an exceptionally high signal to noise ratio. This has been achieved by using selected low noise Field Effect Transistors connected in an improved cascode arrangement. The juxtapositioning of each amplifier with its respective Plumbicon* tube, so as to minimise the video signal path from tube to amplifier, also assists in attaining this very low noise figure.

A calibrated sawtooth generator which can be switched to the input of each video pre-amplifier by the CCU operator, facilitates the setting-up of the entire video processing channels.

In the event of horizontal or vertical scan failure the camera's protection circuit automatically switches the complete camera chain to 'standby'.

* Registered trade mark

The combined deflection/focusing assembly for each tube is housed in an alloy casting which has been precision machined to ensure accurate alignment.

Vernier adjustment is provided to facilitate precise optical focusing. When tube replacement is necessary the complete assembly can be easily removed and rapidly replaced without further mechanical alignment.

Apart from a small number of essential presets the camera does not possess any external setting-up or operating controls, these functions being carried out by the CCU operator.

The camera has been primarily designed for the connection of only one camera cable type 756-1. However, as the cable socket wiring is terminated at a taper pin block, other makes of cable can be used without serious modification. A separate output socket provides mains voltage, video and sync signals for a black and white monitor.

A selection of high quality lenses is offered to suit a variety of applications. Each lens is optically corrected for use with the camera's prismatic colour splitting system and is designed for servo controlled operation. Attachment of the lenses to the camera is by means of two 'quick change' lever devices.

A four position filter wheel for the insertion of neutral density or colour correction filters is a standard fitting.

Housed within a robust aluminium casing, the camera's functional styling and low weight in no way detracts from its ability to withstand the rigours of continuous studio use. Hinged covers at either side of the casing permit easy access to the interior when routine servicing is necessary.

CAMERA CONTROL UNIT

A major feature of the CCU is its high degree of flexibility. This has been achieved by arranging the circuits into three prime units: the Electronics Unit, Local Control Unit and Power Supply Unit.

The Electronics and Power Supply Units are of modular design. The three units can be mounted either in a standard 19 inch rack or in three separate cabinets, whichever is most convenient. When mounted separately the distance between the Electronics Unit and the Power Supply Unit can be up to 10 metres, and that between the Electronics Unit and Local Control Unit up to 100 metres (300 ft).

Electronics Unit

This unit contains the video processing intercommunication, signalling and remote operation circuitry. The latest electronic techniques have been used throughout to ensure outstanding precision and stability of performance. The contour extractor circuit, which operates on the 'contours-from-green' principle is divided over two modules. One of these, the delay module, can be readily interchanged to suit either the CCIR or EIA scanning system.

An encoder with integrated colour bar generator, is also contained within this unit. Like the delay module the encoder is available in two versions, PAL and NTSC, the associated colour bar generator operating in accordance with the CCIR or EIA system respectively.

As well as signals used for monitoring and encoding, the Electronics Unit generates one set of R, G, B, gamma corrected signals and three composite colour signals; two with sync and one without. A non-additive mixed (NAM) signal, derived from the largest amplitude and lowest black level information of the R, G, B, video signals is also provided. This is intended as a reference signal for basic waveform monitoring, automatic exposure control or centralised camera matching systems.

Remote control of up to eighteen operational functions can be selected as required.

Test points for signal monitoring and routine servicing are available at the modules. The unit also has two positions containing module extenders to facilitate service measurements.

Local Control Unit

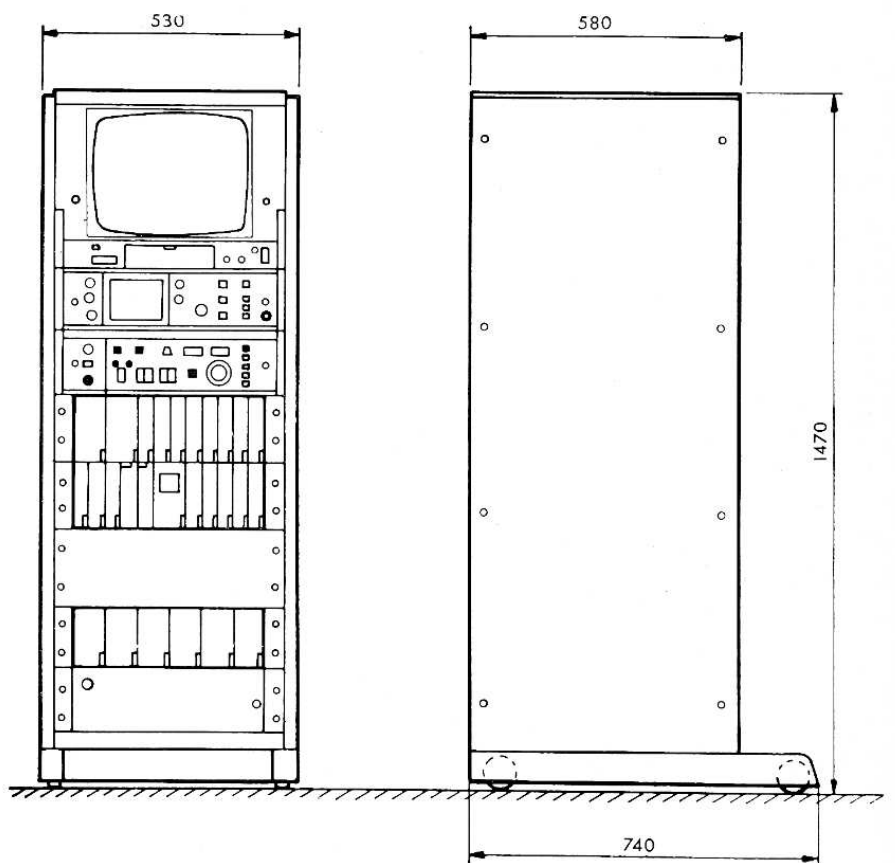
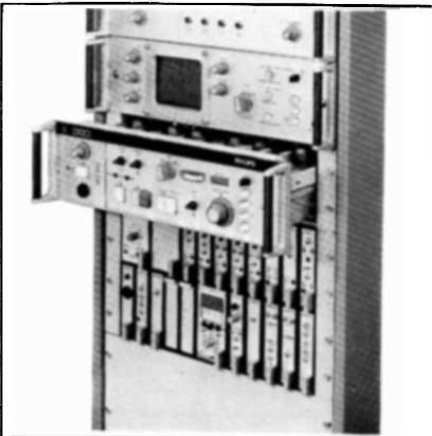
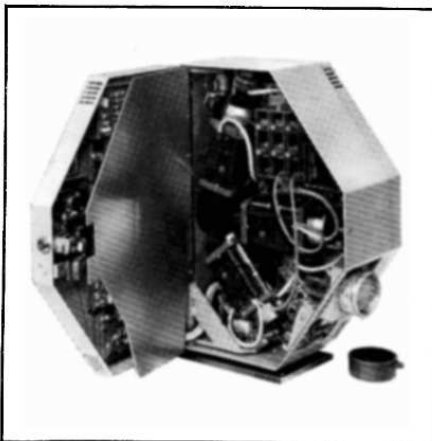
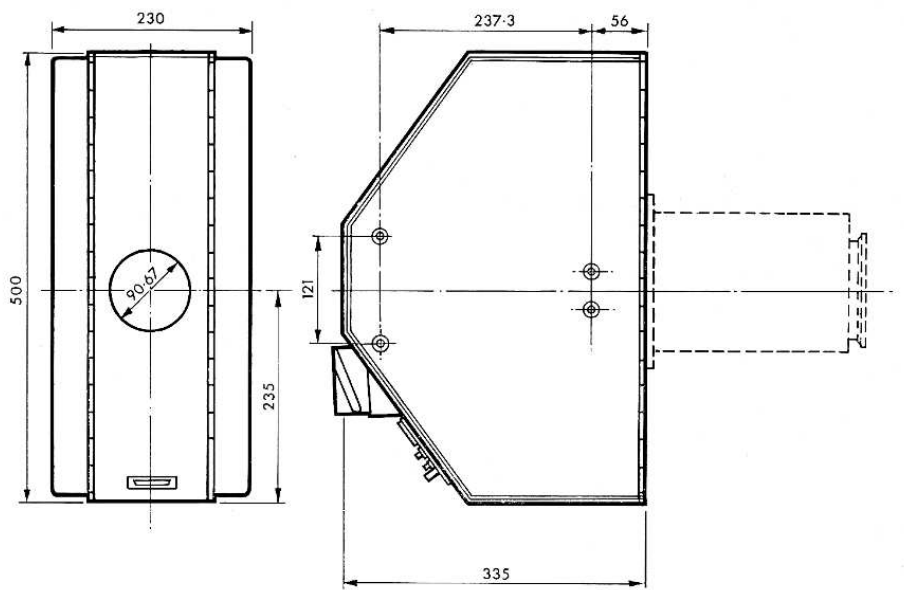
The controls of the Local Control Unit are arranged in two groups: operational controls on the front panel and setting-up and colour registration controls on a hinged recessed panel within the drawer. The recessed panel can be lifted to permit easy access to the interior. A 5 inch colour waveform monitor enables waveforms to be compared separately or together, and in any combination, either line or field sequential. The built-in "X" amplifiers provide an X-Y facility for comparing the gamma characteristics of the colour signals without interfering in any way with the programme production.

A service probe input for monitoring at various module test points is an additional feature.

Power Supply Unit

The regulated power supply provides the entire camera chain with all the necessary AC and DC voltages. Like the Electronics Unit, the circuitry is of modular design, the modules being contained in the upper part of the unit. The lower part has provision for the fitting of an optional ventilation unit.

Video and scanning supplies are generated separately to minimise the possibility of interaction. The camera supplies are stabilised to allow for voltage drop in the camera cable. A regulating AC circuit with motor driven transformer protects the lens drive system against mains voltage fluctuations.



SPECIFICATION

Systems:

CCIR 625 lines, 50 fields per sec, or
EIA 525 lines, 60 fields per sec

Power Supply:

110, 117, 220 and 234 V $\pm 5\%$, 50–60 Hz

Power Consumption:

Camera chain without lens servo system :
260 VA

Input Signals:

Composite blanking signal (B) :
0.75 to 4 V p-p negative going
Composite sync signal (S) :
0.75 to 4 V p-p negative going
Subcarrier signal : 0.5 to 4 V p-p
External burstgate pulses :
0.5 to 4 V p-p negative going (internal
burstgate pulses are also provided)
"K" pulse signal :
1 to 4 V p-p (for PAL encoding
system only)
All signals into 75 Ω (loop-through sockets
supplementary)
Encoder test signal or VIT signal
Line-up test signal
Overlay picture signal
Overrule picture signal
All signals VB monochrome, 0.7 V p-p
positive going into 75 Ω

Output Signals:

1 x R, G, B gamma corrected signals (VB),
0.7 V p-p positive going
1 x composite colour signal (CVB)
1 V p-p positive going
2 x composite colour signal (CVBS)
1 V p-p positive going
2 x composite sync signal (S)
4 V p-p negative going
All signals into 75 Ω

Scene Illumination:

1500 Lux (1500 ft candles) for a signal-
to-noise ratio better than 40 dB in the
Y-channel; at $f/4$; aperture correction
6 dB at 5 MHz; gamma correction 6 dB at
5 MHz; gamma correction 0.6; contour
enhancement operating at 60% of maximum
boost 250 Lux (25 ft candles) for just
acceptable pictures with lens iris $f/2.2$

Resolution:

With aperture correction, 100% modulation
depth at 5 MHz can be obtained in each
channel without contour enhancement

Registration Accuracy:

Deviations of Red or Blue in any direction
with respect to Green
In an ellipse in the centre of the scanned
picture with axes 0.9 of picture height and
width, deviations will not be greater than

the distance equal to a horizontal scanning
time of 40 nanoseconds. Within a circle
having a diameter equal to the picture
width, deviations will not be greater than
80 nanoseconds
Outside this circle deviations will not be
greater than 120 nanoseconds

Registration Drift:

Deviations of Red or Blue in any direction
with respect to Green:
Variations of the ambient temperature
of the camera of no more than $\pm 10^\circ\text{C}$
from the temperature during registra-
tion setting (within the range of
 -10°C to $+45^\circ\text{C}$) will not cause
mutual picture shifts larger than 50
nanoseconds

Picture Geometry:

Maximum deviation 0.5% of the picture
height within the ellipse (see "Registration
Accuracy")
Maximum deviation 1% in the remaining
picture area
Lens errors are not taken into account

Signal-to-Noise Ratio:

45 dB in each channel at a signal current
of 300 nanoAmp; without aperture, contour
and gamma corrections; within a band-
width of 5 MHz; black level at 40% of peak
white

Gain Control:

Master selector for :
-6 dB (preset position for line-up)
0 dB
+6 dB
Individual input gain adjustable of
 ± 3 dB in each channel

Frequency Response:

Without aperture correction:
+0.5 dB up to 5 MHz
-3 dB at 7 MHz

Aperture Correction:

Preset for amplitude boosting of maximum
+10 dB at 5 MHz
Preset for amplitude threshold between
0 and 100% of white level

Gamma Correction:

3 step selector for:
linear operation;
gamma = 0.35 to 0.6 (adjustable);
gamma = 0.6 to 1 (adjustable);
Gamma tracking at peak white level
not greater than 0.5%

Black Level Adjustment:

Master control for adjustment between
-40% and +50% of nominal white level;
individual control for adjustment between
-15% and +15% of nominal white level

Contour Enhancement:

Amount of enhancement:
Variable up to 0.7 V p-p for a pulse
with a rise-time of 100 nanoseconds
Frequency Boost :
Horizontal } Maximum 6 dB at
Vertical } 3.5 MHz
Noise Figure :
Better than 55 dB, for 5 MHz band-
pass filter

Lenses:

Recommended types of zoom lens:
Angenieux 6x22; $f/2.8$, 22–132 mm
Angenieux 10x10j1; $f/2.0$, 18–180 mm
Angenieux 10x25; $f/4.5$, 25–250 mm
Recommended types of fixed focus lens :
Schneider TV Procolor; $f/2.0$, 75 mm
Schneider TV Procolor; $f/2.4$, 110 mm
Schneider TV Procolor; $f/2.8$, 150 mm
Note: In principle any type of lens corrected
for use with the prismatic colour
splitter and the Plumbicon camera
tube can be applied

Camera Cable:

Standard Camera Cable :
Felden & Guilleaume, type 756-1
Selectable corrections are provided
for a maximum cable length of
1000 metres (3000 ft)

Warming Up Period:

For the performance data specified, a
warming up period of 30 minutes should
be taken into account. Two minutes after
switching on, fully acceptable colour
pictures will be obtained

Permissible Ambient Temperature:

From -10°C to $+45^\circ\text{C}$

Dimensions:

See dimensioned sketches. All dimensions
are in mm

Weights:

Camera without lens : 25 kg (55 lb)
Electronics Unit : 34 kg (74 lb)
Local Control Unit : 36 kg (79 lb)
Power Supply Unit : 29 kg (64 lb)

*Specification details subject to change
without notice*



PYE TVT LIMITED

CAMBRIDGE CB1 3JU ENGLAND TELEPHONE CAMBRIDGE 45115 TELEX 81103

www.tvcameramuseum.org

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