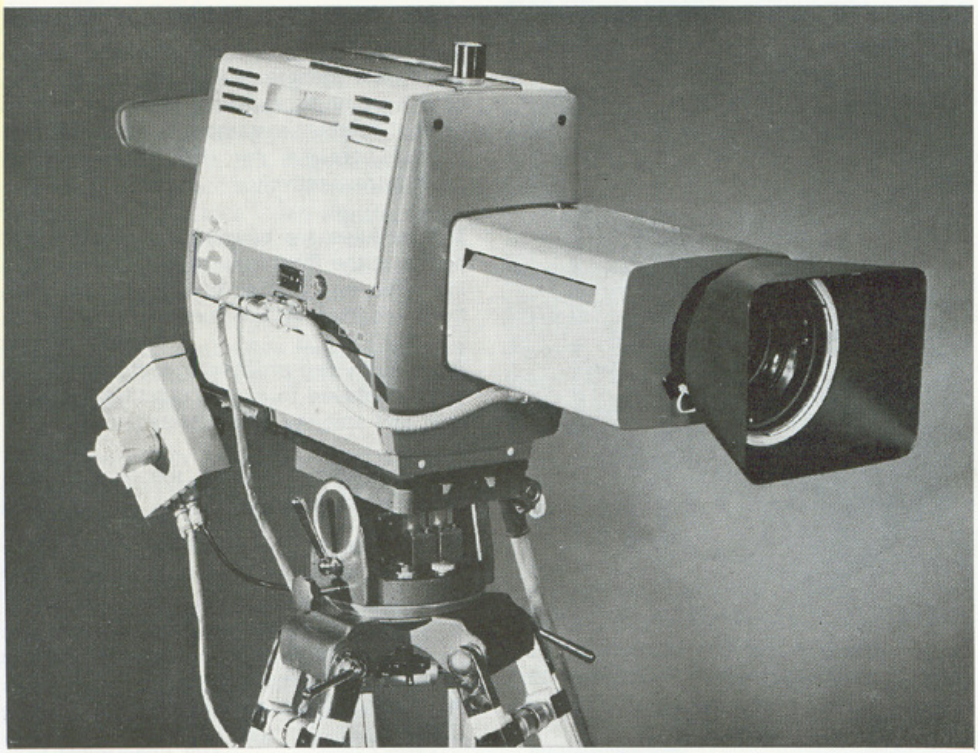
PHILIPS

TELEVISION EQUIPMENT

Plumbicon* Colour Television Camera Chain, Type LDK 3



Three-tube camera with integrated "contours-from-green" principle

XQ 1020 separate mesh Plumbicon tubes for better overall resolution and excellent highlight handling

XQ 1023 R red extended Plumbicon tube, on request

More efficient prismatic colour-splitter and linear matrixing for optimum colorimetric response

Built-in test signal for camera line-up

Single camera cable with a length of up to 1000 metres

Modular type CCU split up into three separate subassemblies for high operational flexibility

Integral contour extractor, encoder and colour bar generator for vectorscope-less encoder adjustment

Solid-state circuitry employing ultra-stable silicon-type transistors

This third-generation Plumbicon Colour Camera for use in studio and outside broadcast applications represents a major advance in overall camera design. The latest colour television techniques and modular system layout have been employed to ensure high stability, reliability and flexibility in operation.

The new design has been based on the experience gained during many years of successful operation with previous versions of three-tube Plumbicon Colour Camera all over the world.

THE CAMERA

Similar to the previous models, the camera is housed in a strong construction of aluminimum alloy castings with hinged covers for easy access to the interior.

Its precision lens-mounting allows the application of optical systems and drive systems of latest techniques. The wide range of high-quality zoom lenses available includes fully servo-controlled lenses as well as lenses with manually controlled focus and zoom and servo-controlled iris. The majority of these lenses is suitable for the use of range extenders.

Two independent, motor-driven filter wheels are provided between lens and colour beam-splitter, one for colour-correcting filters and the other for neutral density filters.

The colour beam-splitter is the well-known prism-block with its two internal reflections per channel. The introduction of linear matrixing enabled the use of a more efficient colour beam-splitting prism.

The XQ 1020 separate mesh Plumbicon tube, of which the gun design is based on a 2-watt cathode, allows for an increased beam-current. This results in an improved overall resolution and a considerably extended linear transfer characteristic, so that excessive highlights can be handled without severe loss in resolution. The camera employs dynamic focusing to improve the sharpness in the picture corners. The input stages of the camera amplifiers employ field effect transistors in a special cascode circuit to ensure an excellent signal-to-noise ratio.

The deflection and focusing assemblies, which are efficiently screened by mu-metal cans to eliminate the influences of external magnetic fields on the registration accuracy, are framed in precisely machined castings with vernier adjustments for optical focusing and picture rotation.

The complete deflection units are fixed into position on factory-aligned base plates by means of dovetail arrangements, and can be easily removed from the camera for replacement of the tube. After tube replace-

* Registered Trade Mark for television camera tubes

ment, only the normal line-up procedure is required.

Great care has been given to the stability of the electronic circuitry, so that mains voltage and ambient temperature variations can be coped with and the effects due to temperature variations of long camera cable connections do not influence camera performance.

Apart from some presets, the camera does not contain any setting-up controls, so that the complete lining-up of the camera chain can be carried out by the CCU-operator.

A calibrated sawtooth from the test signal generator in the camera can be switched by the CCU-operator to the input of each camera amplifier to facilitate the setting of the complete video processing channels. A protection circuit in the camera switches the chain to stand-by position in the event of any horizontal or vertical scan failure.

The electronic viewfinder, a self-contained black-and-white picture monitor with 7-inch rectangular picture tube and 16 kV HT supply, can be hinged out of the camera housing for easy access. It provides brilliant, sharply-focused pictures, and any combination of either R, G, B or Y, G, EXT video signals can be selected for display.

The "on-air" cueing system consists of an illuminated ring surrounding the lens inside the ray-shade, and the usual tally lights on the camera and the CCU.

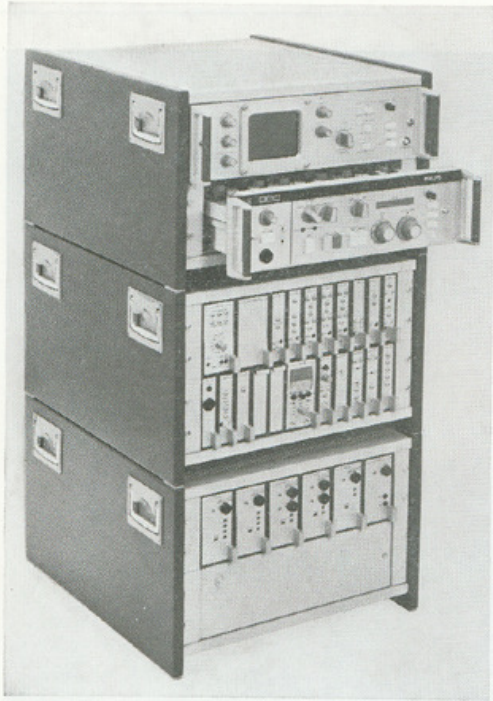
Talkback facilities are provided on the equipment for communication between camera, CCU and production room. Two separate sockets are provided at the camera and the CCU for special audio channel linking.

An elapsed time meter at the camera indicates the operational hours of the camera tubes.

The camera chain has been standardized on a single camera cable, Felten & Guilleaume type 756-1, to a maximum length of 1000 metres. Other types of camera cable may also be applied, however, the maximum length then being dependent on the particular make.

THE CAMERA CONTROL UNIT

The main design target has been a CCU featuring a high degree of operational flexibility. For this end, the CCU has been split up into three separate subassemblies: the Electronics Unit, Local Control Unit and Power Supply Unit, which are linked by cables at the rear. These subassemblies can be accommodated either in a standard 19-inch rack or in three separate 19-inch cabinets. In the latter case, the maximum cable length between the Electronics Unit and the Power Supply Unit is 10 metres, and that between the Electronics Unit and the Local Control Unit is 100 metres.



Camera Control Unit comprising the Local Control Unit (top), the Electronics Unit (middle) and the Power Supply Unit (bottom).

The Electronics Unit

The circuitry of this unit has been divided into functional sections and arranged in small modules, which contain the circuitry for: video processing including contour enhancement, pulse generation and timing, vertical scanning, focusing and beam alignment, picture switching, test signal generation, communication, signalling and remote control.

The unit includes an encoder in accordance with the PAL or NTSC standard, and a colour bar generator for either the CCIR or EIA scanning system. The delay module of the contour extractor is also available in two versions, for the CCIR and EIA system, respectively.

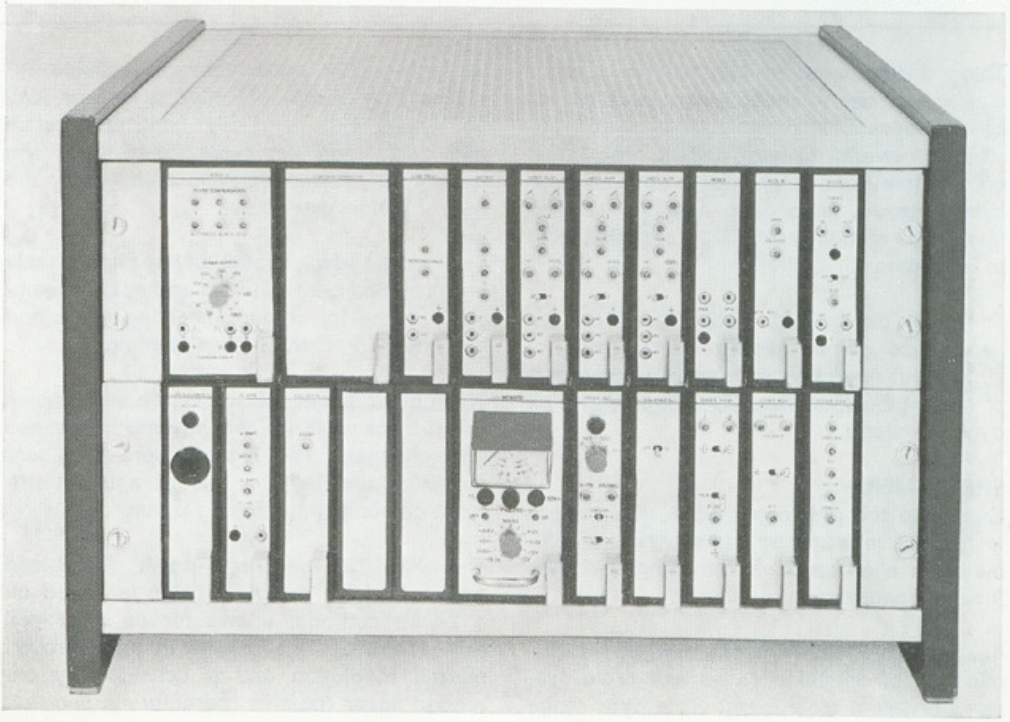
The modules are equipped with ample test points at the front panel for signal monitoring. The unit further has two spare locations lodging module extenders.

Advanced video processing techniques have been employed to ensure outstanding precision and stability of performance.

The processing channels therefore include the following stages:

- cable length compensation (for a camera cable length up to 1000 metres)
- spurious pulse cancellation
- green tilt correction (green camera channel only)
- master gain switching
- colour balance switching (or painting)

The Electronics Unit



- white clipping
- automatic black level control
- horizontal and vertical contour enhancement
- linear matrixing for negative lobe compensation
- horizontal aperture correction
- white limiting (adjustable to "sharp" and "soft" operation)
- adjustable gamma correction

Apart from the signals required for monitoring and encoding, one set of R, G, B signals and composite colour signals with and without sync are available. The unit moreover provides a NAM (non-additive mixed) signal, built-up from the largest amplitude and the lowest black-level information from the red, green and blue video signals, which can be used for "simple" waveform control systems, automatic exposure control circuits or "centralized camera matching".

Remote control is possible for all important operational functions, and it can be adapted to suit local requirements.

The camera chain is provided with a standard intercom system, but other systems can be employed, if required.

The Local Control Unit

This unit consists of a pull-out drawer with a surveyable layout of the usual operational controls at the front panel and setting-up and colour registration controls at the top panel. To facilitate an accurate colour registration setting, the negative green signal can be displayed on the picture monitor. The top panel can be tipped for easy access to the interior of the drawer.

The unit further accommodates a self-contained colour waveform monitor with 5-inch rectangular picture tube. Waveforms can be displayed side by side or superimposed, separately or in any combination, and line or field sequential. For special checks, the oscillograms can be spread over the entire width of the screen. The waveform monitor is further equipped with a service probe input for monitoring the various signals of the module test points.

The Power Supply Unit

The regulated power supply circuitry is divided over six modules in the upper part of this unit, the lower part of which can accommodate the optional ventilator section, type EL 8601/51.

The voltage supplies for video and scanning circuits have been separated to minimize interference. All power supplies for the camera are automatically adapted to the various lengths of camera cable used.

The mains voltage for the camera viewfinder and the lens drive system is stabilized against fluctuations by means of a regulating circuit with motor-driven variable transformer.

TECHNICAL DATA

Systems

CCIR 625-lines, 50 fields/s
or
EIA 525-lines, 60 fields/s

Power supply

110, 117, 220 and 234 V ± 5%, commutable by voltage selectors, 50 - 60 Hz

Power consumption

Camera chain without lens servo system 350 VA

Input signals

composite blanking signal (B), composite sync. signal (S) } 0.75 to 4 V_{pp}, negative going
subcarrier signal, 0.5 to 4 V_{pp}
external burstgate pulses, 0.5 to 4 V_{pp}, negative going (internal burstgate pulses are provided as well)
"Kenn Impuls" signal, 1 to 4 V_{pp} (for PAL encoding system only)
All amplitudes across 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_{pp}, positive going, across 75 Ω

Output signals

1 x R, G, B gamma-corrected (VB) signals, 0.7 V_{pp}, positive going
1 x composite colour signal (CVB)
1 V_{pp}, positive going
2 x composite colour signal (CVBS)
1 V_{pp}, positive going
2 x composite sync. signal (S)
4 V_{pp}, negative going
All signals across 75 Ω

Scene illumination

1500 lux (150 ft. cd.) for a signal-to-noise ratio of 40 dB in the Y-channel; lens iris f/4; aperture correction 6 dB at 5 MHz; gamma correction 0.6; contour enhancement operating at 60% of maximum boost; 250 lux (25 ft. cd.) for just acceptable pictures; lens iris f/2.2

Resolution

With aperture correction, 100% modulation depth can be obtained at 5 MHz in each video channel

Registration accuracy

Mutual deviations in any direction

In an ellipse in the centre of the scanned picture with axes 0.9 of picture height and width, deviations will be no more 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 be no more than 80 nanoseconds.
Outside this circle, deviations will be no more than 120 nanoseconds.

Picture geometry

Maximum 0.5% of the picture height within the ellipse (see "Registration accuracy")
In the remaining picture area, max. 1%
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 bandwidth of 5 MHz; at 40% of peak white

Gain control

Master selector for —6 dB, 0 dB, and + 6 dB, individual control for ± 3 dB in each channel

Painting control

± 2 dB in Red and Blue (before gamma correction)

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
$\leqslant$ 0.5%

Black-level adjustment

Master control for adjustment between —40% and + 50% of the nominal white level
Individual control for adjustment between —15% and + 15% of the nominal white level

Lenses
Standard lens, Angénieux 10 x 18J1, f/2.2; 18 - 180 mm, type EL 8682/01, with 3-function servo control
For other types of lens, see special leaflet

Camera cable
Standard camera cable: Felten & Guilleaume type 756-1, length 50 metres; maximum permissible length 1000 metres

Encoder with Colour Bar Generator
consisting of 5 modules and
in versions for PAL or NTSC system

Contour Extractor
consisting of 2 modules and
in versions for CCIR or EIA standard

Colour Waveform Monitor
type LDK 4910

Warming-up period
For the performance data specified, a warming-up period of 30 minutes should be taken into account
After a warming-up period of 2 minutes, excellent colour registration will be obtained.

Permissible ambient temperature
— 10 to + 45 °C

Dimensions
See dimensioned sketches
All dimensions in mm

Weight

Camera without lens, servo amplifier or power supply unit:	42 kg
Camera with standard lens EL 8682/01, and complete servo control equipment:	75 kg
Electronics Unit:	34 kg
Local Control Unit:	36 kg
Power Supply Unit:	29 kg