PHILIPS

Portable Colour Camera



Type LDK 15

Broadcast quality pictures

Studio operational facilities

Cable or wireless mode of operation

Camera cable length to PPU up to 150 m

Interfaces with LDK 5 base station or LDK 25 CCU

Triaxial cable link to base station

Encoded output, automatically timed and phased

Digital control system

1 inch A.C.T. Plumbicon tubes

41 XQ Image Intensifiers applicable

Circuit modules in common with LDK 5 system

The LDK 15 is basically a portable version of the LDK 5 colour camera employing largely the same circuit modules. It also features the same studio picture quality and operational facilities. The scope of this high-quality portable member of the LDK 5 family will include both studio and outside broadcasting. In studio broadcasting, it will find application in taking the special shots for drama inserts in programme productions. In outside broadcasting, where high picture quality is a requirement, the LDK 15 will be applied in televising actual events, and in making documentaries on location. Also, equipped with 41 XQ Image Intensifier Units, it will be used for taking studio quality pictures in low environmental light levels, eg. in parliaments and sports stadiums.

The LDK 15 equipment consists of a small and light-weight camera head with associated hip-pack and a portable processing unit (PPU), and is normally operated in conjunction with an LDK 5 family type base station (as indicated in the LDK 15 layout diagram). Camera head and hip-pack are interconnected by a thin multicore cable, the length of which may vary between 2 and 15 m. Hip-pack and PPU are linked by a 13 mm diameter multicore cable up to 150 m in length. The PPU in turn can be connected to the base station by a triaxial cable with a length of up to 2000 m.

PYE TVT



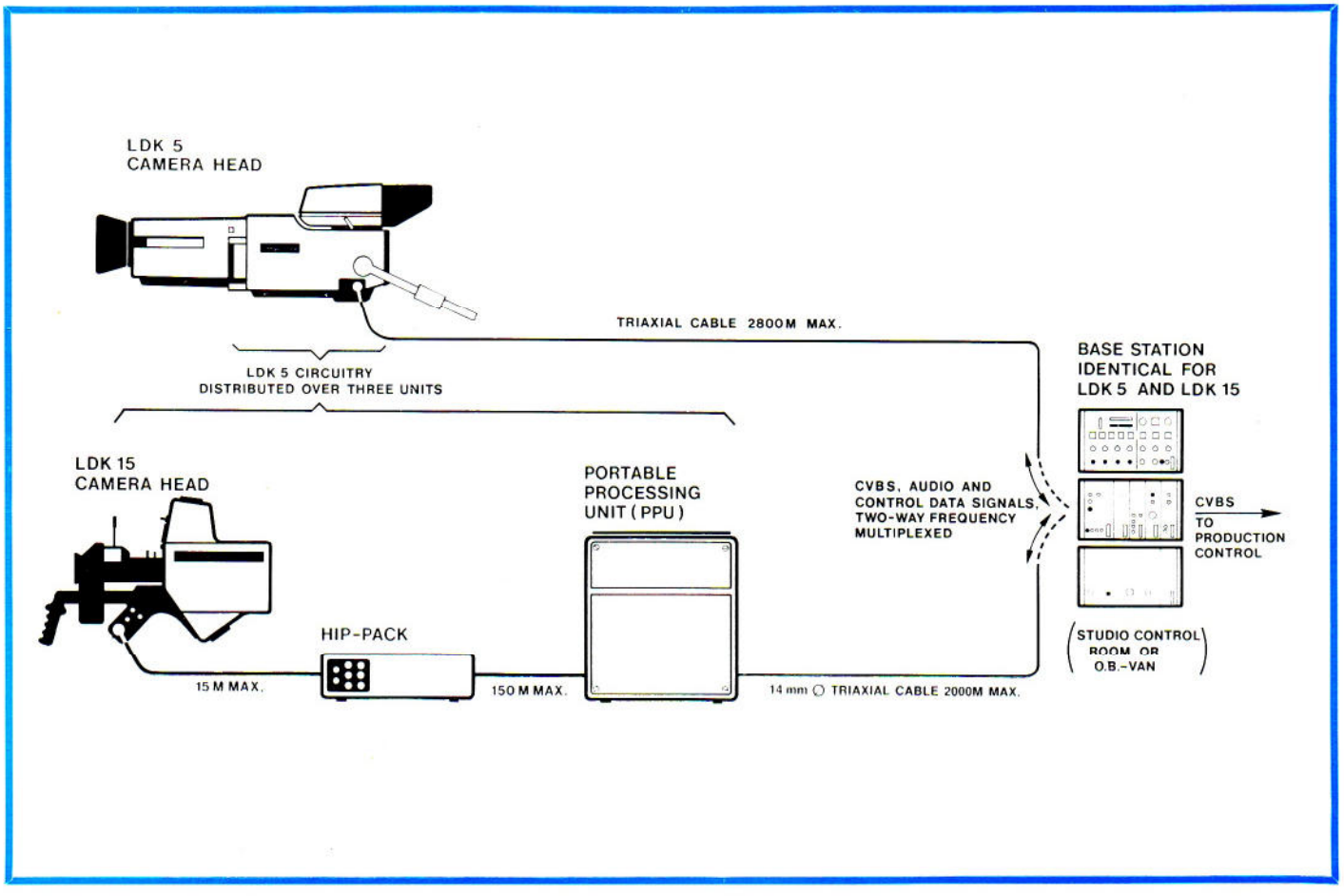
THE CAMERA HEAD

The camera head including viewfinder weighs about 10 kg. It can be carried on the right or left shoulder, a shoulder pad being fitted to the mounting interface at the front of the camera. By means of a standard quick-mounting insert, the camera head can also be mounted on a light-weight tripod, for use as a special mobile camera inside a studio. The camera lens can be selected from a range of three different types, ranging in focal length between 13–78 mm and 16–160 mm, and with apertures down to f/2·0. All lenses have a bayonet fitting for quick and accurate replacement. Between the lens and the beam-splitting prism there are two three-position filter turrets, independently controlled with two knobs on the front of the camera. The three positions are 'cap', 'clear' and 'colour filter' for the front turret, and 'clear', 'N.D. 0·9' and 'N.D. 1·8' for the rear turret. The colour filter (a Tiffen 85 daylight filter) and the two neutral density filters enable the cameraman to adjust the camera instantaneously upon transition from the comparatively low-level artificial lighting inside a building to the high-level daylight outdoors. In addition to the two turrets there is a filter holder in front of the prism in which another filter can be easily inserted if necessary for a particular application.

The camera employs an electronic viewfinder equipped with a 1 inch high-definition CRT For convenience of handling, the viewfinder is positioned vertically and is consequently fitted with a 45 degree mirror between the CRT and the eyepiece. The cameraman has at his disposal a contrast and a brightness control and, beside the mirror, two pilot lamps indicating 'on air' and 'camera call', respectively. Two more 'on air' lamps are located on top of the camera front and rear. They can be operated from either the PPU or the base station, depending on the mode of operation of the camera.

The camera pick-up tubes are three 1 in A.C.T. Plumbicons XQ 1080 which, for low light level applications may be easily replaced by the newly developed 41 XQ Image Intensifier/ Plumbicon Units. These units each consist of a specially adapted yoke assembly in which a small light-intensifier tube is mounted and accurately adjusted. This tube with plane-concave fibre-optics face plates on either side, presses tightly against the fibre-optics face plate of a special type of 1 in Plumbicon tube. The 41 XQ units, which perfectly preserve the high-quality standards obtained with the XQ 1080 Plumbicon tubes, increase the camera sensitivity by a factor five, and permit the LDK 15 camera to take studio-quality pictures at scene light levels as low as 50 lux. The camera will be provided with three protective domes for use with the 41 XQ units. With these units, an EHT generator has to be mounted in the camera, to supply the −12 kV needed for the cathodes of the light-intensifier tubes.

The only external controls on the camera are the two turret knobs, an iris control and a VTR start/stop or call button. The two latter controls are intended for use only in self-supporting camera operation, eg. in the direct taping or in the wireless modes of operation (see operational modes diagram). In the latter case, the start/stop button will switch the intercom transceiver. Inside the camera there are a few presets, which are easily accessible behind the hinged side covers. On the front of the camera there are, in addition to a headphone jack, a socket for connecting an iris servo unit and the power supply to a motorised zoom lens, and another for the electronic viewfinder. The camera is further fitted with elapsed-time meters, three for the Plumbicon tubes and the fourth for the cumulative operating time of the camera.



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THE HIP-PACK

The hip-pack weighs about 5 kg, and can be carried on a belt by the cameraman or an assistant or fixed to a tripod by means of a special mount. It is connected to the camera head by a 7 mm diameter multicore cable of 2 m length, or a 13 mm diameter cable of 15 m length. The hip-pack has volume controls for engineering, production and programme sound, colour balance knobs, which simultaneously control the CLUE circuit, and a 12 position viewfinder display selector. In addition, its control panel contains a microphone on/off switch and a headphone jack.

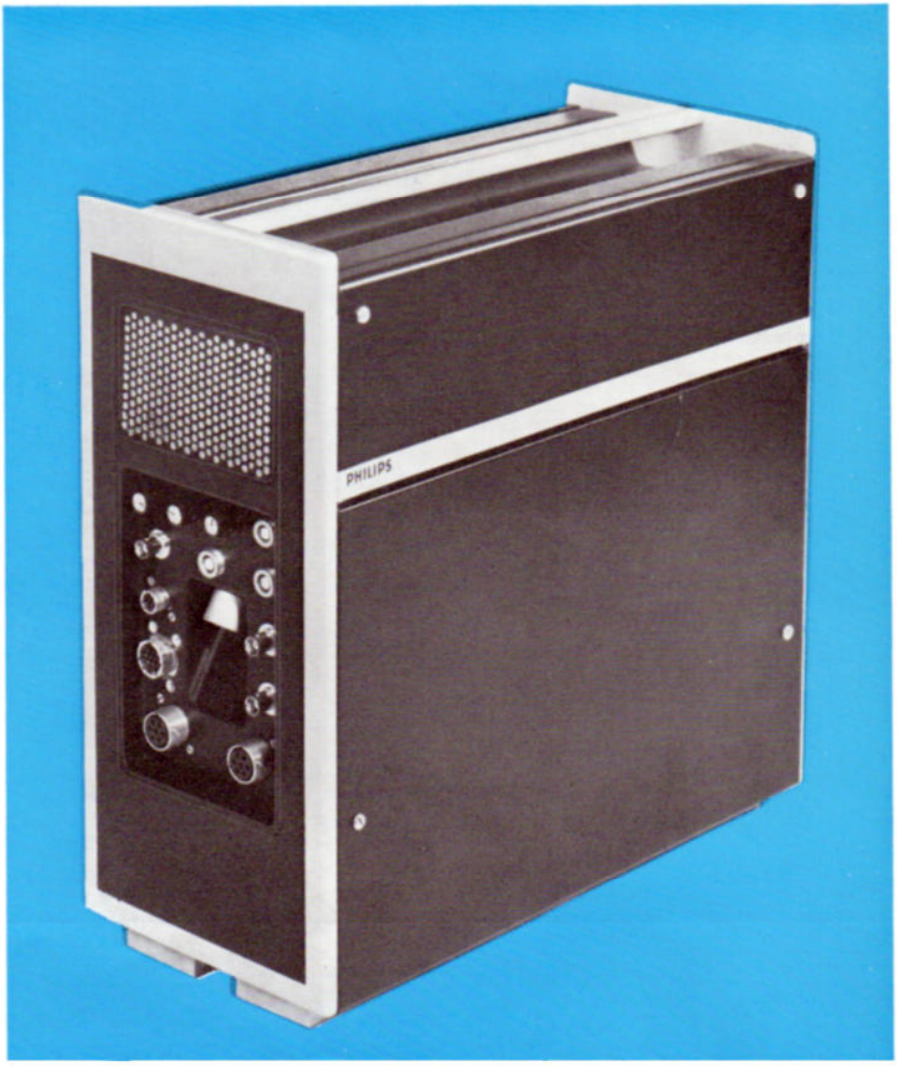
THE PORTABLE PROCESSING UNIT (PPU)

The PPU weighs about 15 kg and contains the main part of the colour camera electronics. This means that it houses the majority of the standard electronic modules forming part of the LDK 5 camera. The unit is connected to the hip-pack by a 13 mm diameter multicore cable up to 150 m in length. Apart from some preset controls on the inside of the modules, the unit has no external camera controls, except talk-back facilities. There are, however, a number of connectors which are needed mainly because of the various operating modes of the camera. In addition to the connectors for the triaxial and multicore cable links to the base station, one headphone connector and two audio input terminals, connectors are provided for the following purposes: in and outputs for an external viewfinder signal; output of a camera CVBS signal (to feed the VTR in the direct-taping mode); start/stop signal output for a VTR or an intercom transceiver (direct-taping or wireless mode); input for a control data signal (connected to the data output of the receiver in the wireless mode); duplicated 100 V (or slightly more, dependent on the cable length) power input, for use with a battery-pack or the standard power supply unit of the LDK 5 in the direct-taping or wireless mode.

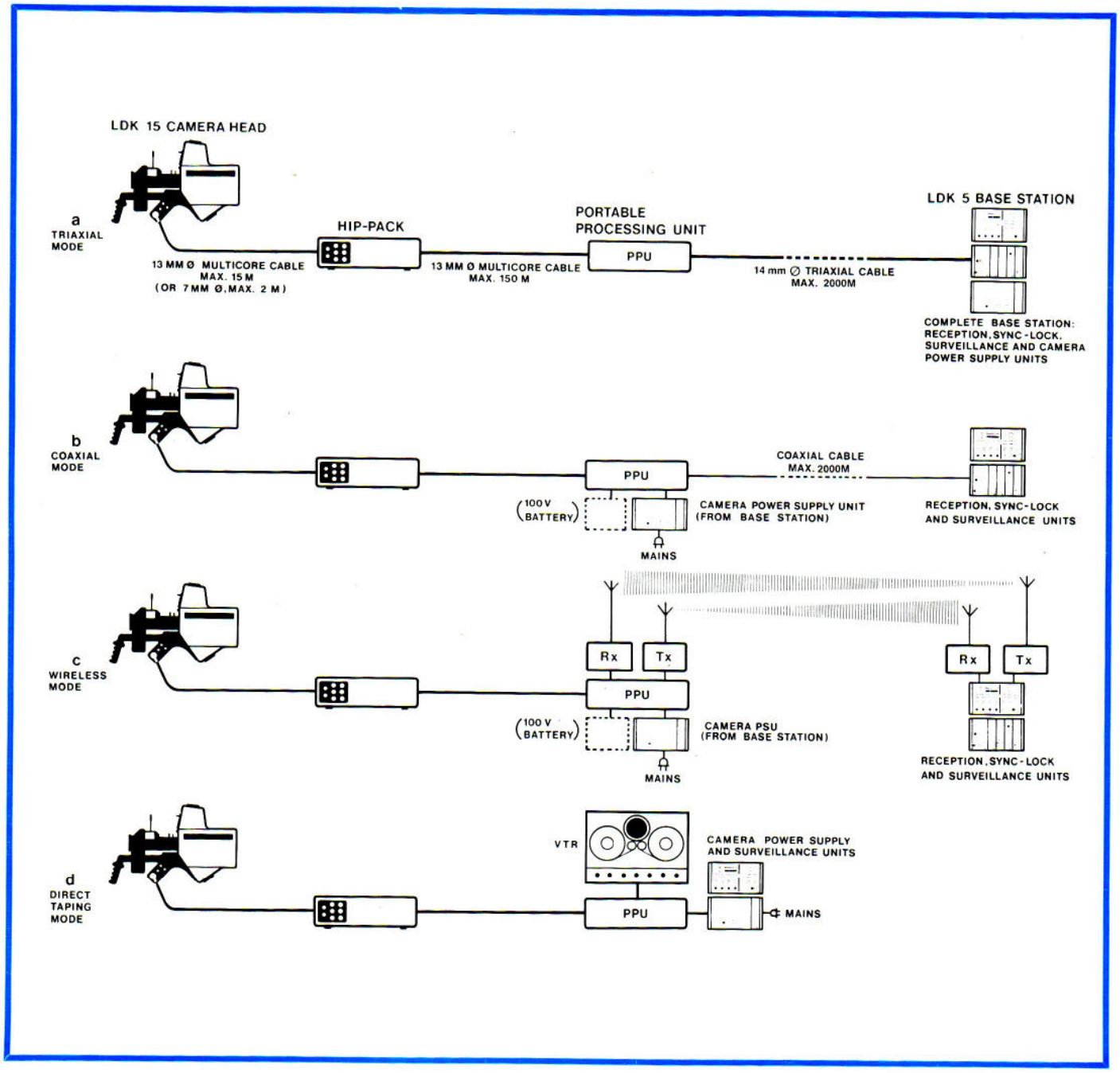
Like the LDK 5 camera head, the PPU of the LDK 15 is designed to be fitted with a set of system-dependent modules on occasions when the camera has to operate to different CTV system standards. The unit may be left unattended. A 100 V battery pack can be clipped on at the bottom, while on top of the unit there is a quick-locking device for a suitable transceiver. When this additional equipment is used, there are no cable connections to the base station or an external power source and the LDK 15 camera can literally be operated anywhere on land, on water or in the air.

MODES OF OPERATION

Four typical modes of camera operation are illustrated in the operational modes diagram given. Modes (a) and (b) are the ones which will probably be used most in practice. In both cases, the base station may be located either in an OB van (for indoor or outdoor outside broadcasts) or in a studio control room together with other camera control units (when the LDK 15 is used as an additional portable studio camera). The obvious difference between diagrams (a) and (b) is the connection from the PPU to the base station, namely a triaxial and a coaxial cable, respectively. The basic difference between the two modes, however, is in the power supply to the camera itself. In many cases it may be an advantage to power the camera conventionally, via the base station (mode a). This means that a triaxial cable has to be used. In other cases, however, it may be preferable to power the camera from the point where the PPU is located, either with the standard camera power supply unit taken from the base station or, if there is no mains connection available, from a 100 V battery pack (mode b). In the last two cases, a coaxial cable connection to the base station is sufficient, because there is no power to be transported via the cable. Mode (b) will be frequently employed for camera operation on studio premises or inside other buildings where a coaxial cable network is permanently installed and mains connections are everywhere available. The fully self-supporting mode of operation (c) may be used for outside broadcasts originating in, for example, car,



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boat or helicopter in motion. A small microwave transceiver together with its aerials can be fitted on top of the PPU, and used for the two-way transmission of all video, audio and control data signals to and from the base station. The base station will be normally located in an OB van, which will also be fitted with suitable receivers, transmitters and aerials for the RF link to the camera vehicle on the one hand and the television centre on the other. A unit for converting 12/24 V d.c. to 100 V d.c. will be made available, to enable the d.c. supply of the car, boat or aircraft to be used instead of the battery pack.

In the modes (a), (b) and (c), it is assumed that the camera will operate in conjunction with the control desk and production room of a distant studio and that it will therefore be locked to the master sync and burst signal from this studio. Mode (d) on the other hand, illustrates the direct-taping application of the camera, in which the camera CVBS signal is recorded immediately by a VTR at the site of the outside broadcast. Apart from a mains connection and a suitable VTR, the only items needed are the surveillance and power supply units of the standard base station. The sync-lock unit is superfluous, because the accuracy of the sync pulse and burst generator built into the camera is sufficient to ensure the perfect sync-locked playback of the tape on any professional VTR. The cameraman himself can start and stop the VTR by means of a button on the camera and, if the VTR has a write-read facility, he can watch the picture in the viewfinder as it is being taken.

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TECHNICAL DATA

Systems:
PAL (B, G, H, I) 625 lines, 50 fields/s,
or
PAL (M) 525 lines, 60 fields/s,
or
NTSC 525 lines, 60 fields/s
or
SECAM 625 lines, 50 fields/s

Power supply:
110, 117, 220 and 234 V ± 10%;
50 or 60 Hz.

Power consumption:
Approx. 500 W.

Input signals:
a) 'Colour black' or CVBS loop through 75Ω with sync component of 0·15 to 0·6 Vpp.
b) Composite sync loop through 75 Ω, 1–8 Vpp negative; plus subcarrier loop through 75 Ω, 0·5–2 Vpp; plus PAL identification loop through 75 Ω, 1–8 Vpp, waveform of any duty cycle. Line following positive going transient has + (R–Y).
c) The camera's own CVBS signal, 75 Ω non loop-through.
d) External viewfinder input, 75 Ω, standard level.

The input signals must have the correct ratio between subcarrier frequency and line frequency. The camera signals are correctly timed with respect to the sync-lock input terminals with input combinations 'a' and 'c' or 'b' and 'c'.

Output signals:
4 × coded composite colour signal (CVBS), 1 × CVBS + VIT signal 1 × B–Y signal (in multicore mode).
All signals positive going, 1 Vpp into 75 Ω.

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 1¼ in 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, maximum 1%;
Lens errors not taken into account.

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

Colour temperature control:
5-step selector for: +1000, +2000, +3000, +4000 and +5000°K, above the nominal colour temperature of 3200°K.
Two 3-position filter turrets for the optical filters: cap; clear; colour no. 85; and clear, N.D. 0·9 and N.D. 1·8. Slide for insertion of additional filter.

Gamma correction:
Selector for linear operations and gamma = 4·45 and 0·35;
Gamma tracking: in the white region better than 0·5%,
in the black region better than 0·25%.

Black level adjustment:
Master control for adjustment between −65% and +35% of the nominal white level;
Individual control in Red and Blue for adjustment between −20% and +20% of the nominal white level.

Contour correction:
Negative contour modulation; level-dependency and comb filter; noise slicer.

Lenses:
A range of 3 zoom lenses is available, ranging from 13/78 mm to 16/160 mm.

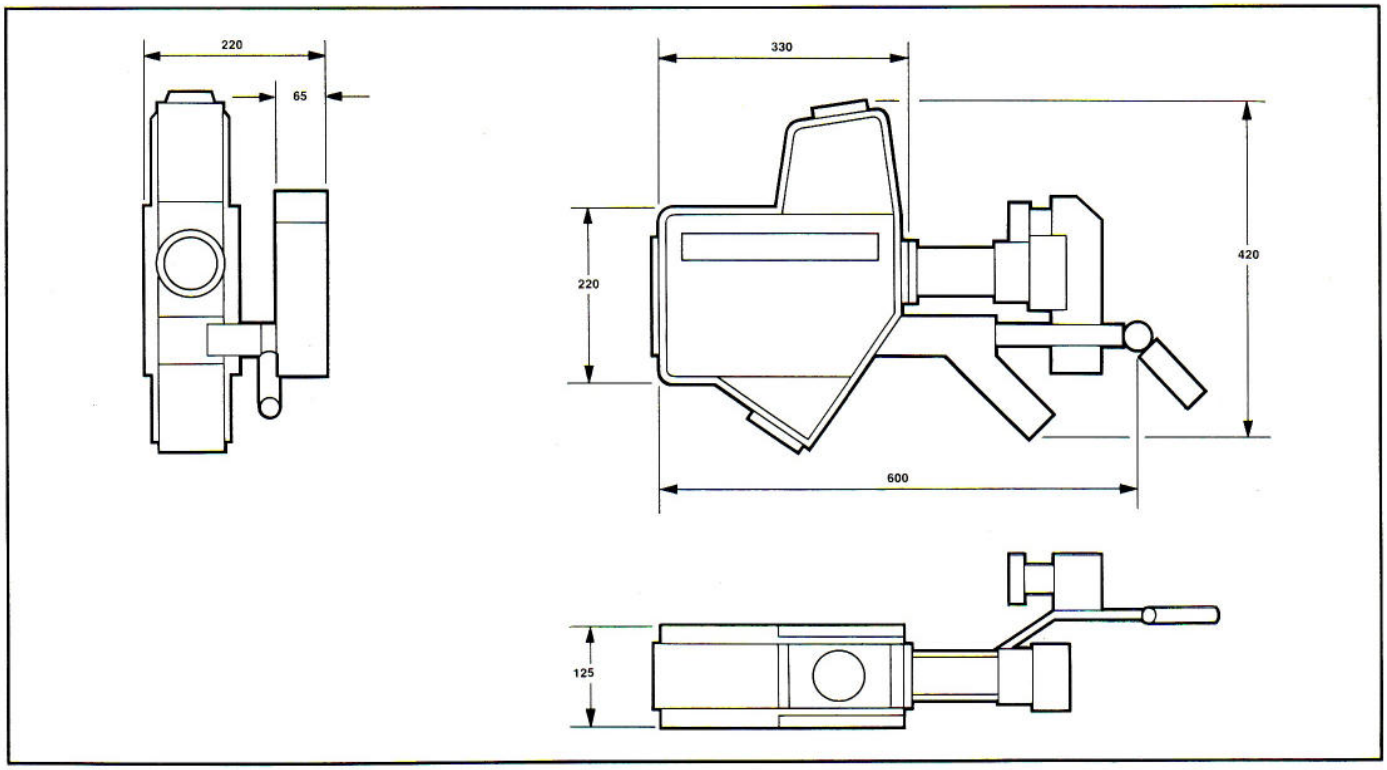
Permissible ambient temperature range:
−15 to +45°C.

Viewfinder
Electronic viewfinder with 1 in. high-definition CRT.

Weights:
Camera head including lens and viewfinder approx. 10 kg;
Hip-pack approx. 5 kg;
PPU approx. 15 kg.

Dimensions:
Camera head (see dimensioned sketch)
Hip-pack (h × w × d) 180 × 103 × 385 mm
PPU (h × w × d) 400 × 385 × 180 mm

Specification subject to change without notice



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Pye TVT Limited
PO Box 41 Coldhams Lane Cambridge England CB1 3JU
Tel: Cambridge (0223) 45115. Telex: 81103

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