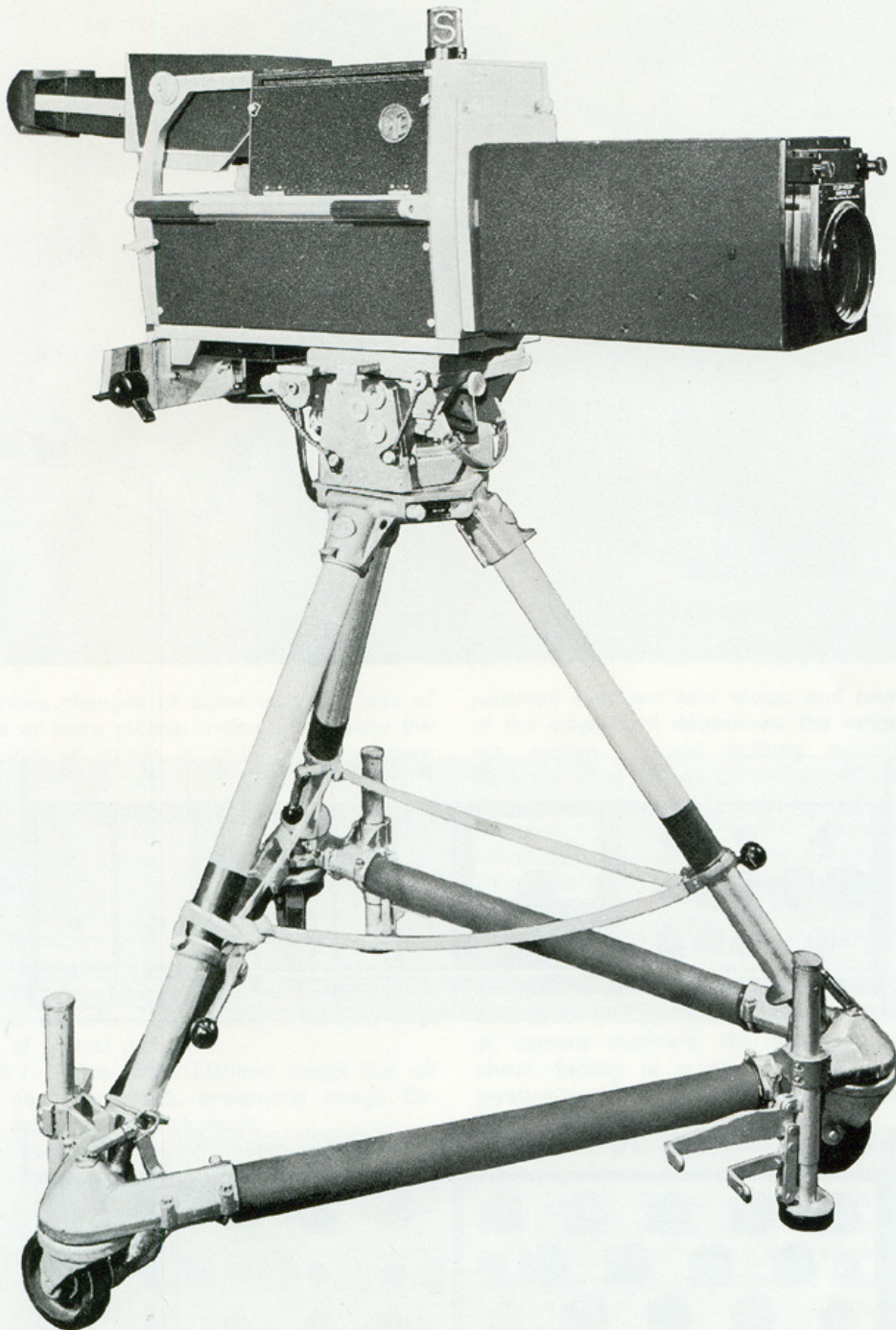


PHILIPS



TELEVISION EQUIPMENT
Manufactured for PHILIPS
by PYE TVT LIMITED

4 $\frac{1}{2}$ -inch Image Orthicon Camera, type 2116



Zoom Image Orthicon Monochrome Camera

All solid state modular construction

Unique analogue pulse-check system

Instant checking and adjustment - local or remote

New, multi-purpose control unit design for a variety of studio cameras

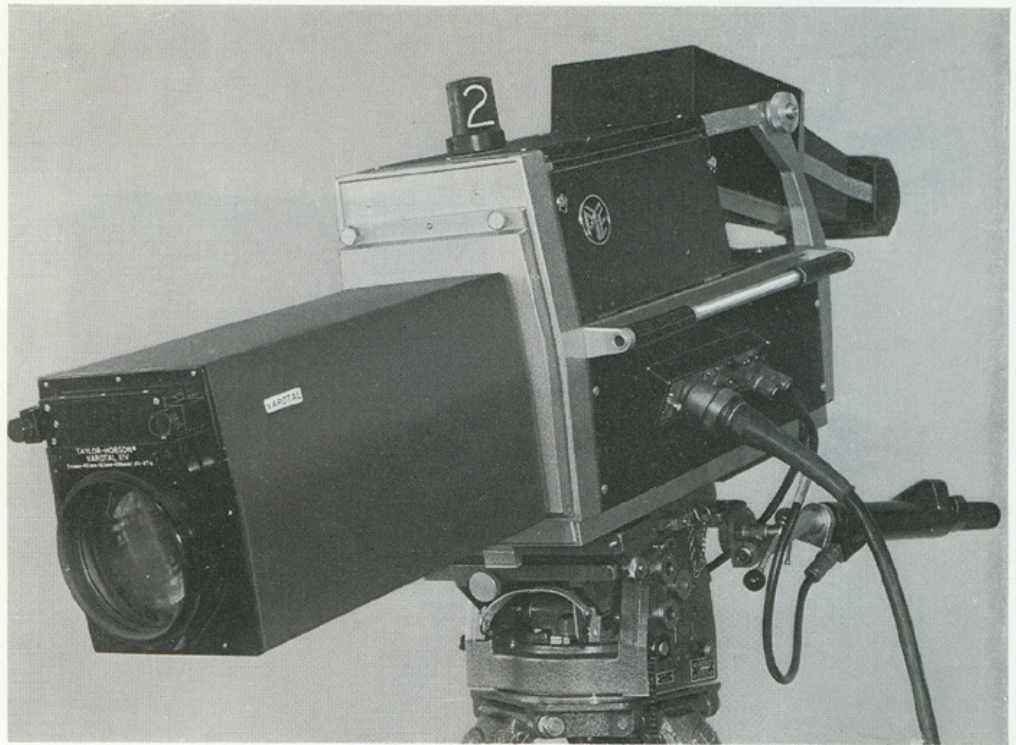
Tilting, detachable 7-inch viewfinder

Suitable for studios and O.B. use

SHORT DESCRIPTION

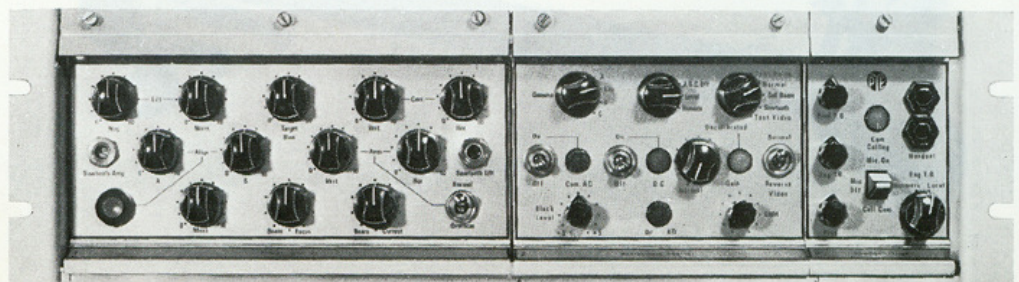
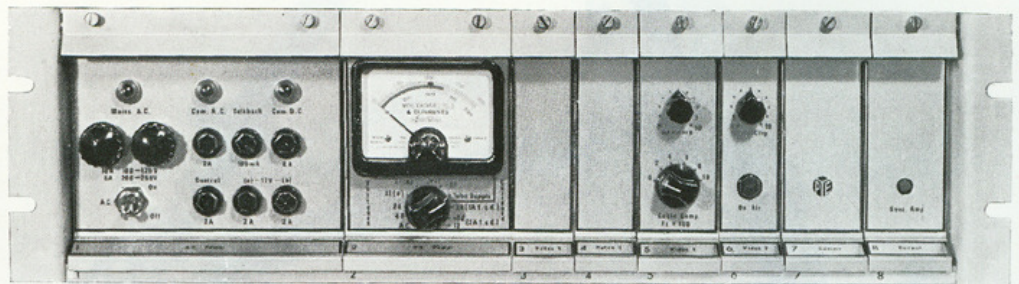
CAMERA

- Designed to take zoom lenses with standard zoom base which can be either servo or manually controlled. Adapter available to take TV 88 lenses.
- Built-in testing by means of pulses inserted at various points providing instant checking of the complete video channel including the image orthicon. When all is correct the brightness of each test pulse displayed on the picture monitor is the same.
- Zoom rate control on panning handle. Focus and zoom shot-box controls may be placed in a variety of positions to suit the cameraman, e.g. low on the camera or high beside the viewfinder.
- Tilting/detachable viewfinder, 18 cm (7 inch) diagonal screen.
- Rear withdrawal of Image Orthicon tube, with quick and easy cleaning of face plate from the front.
- 5-Way filter wheel operated from rear of camera permitting wide range of filters to be used.



CONTROL UNITS

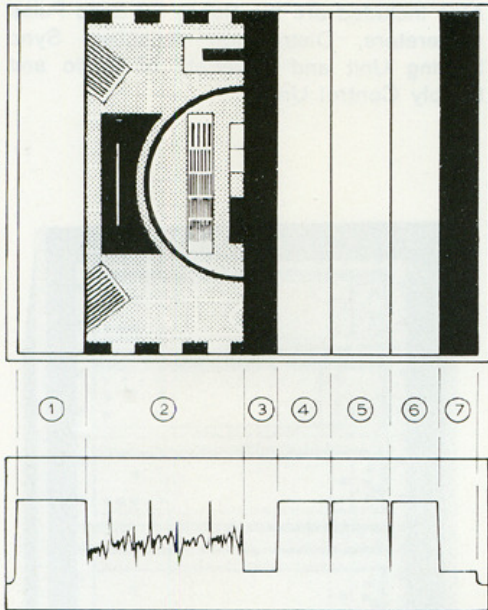
- Remote joy-stick facilities available.
- Standard camera control units and engineering controls units may be rack mounted or re-arranged to suit the layout requirements of the customer.
- Modular construction, small standard size plug-in printed boards used in camera as well as camera control units.
- All control units are designed to drive alternative camera heads (Vidicon, Plumicon* or Teleciné) with suitable changes of some unit modules.
- Separate channels with individual volume controls at both camera and E.C.U. for programme sound, production talk-back and engineering talk-back. These services are brought out from the E.C.U. in a manner allowing flexible adaptation to different talk-back systems.
- Accessory unit available for up to 600 m (2000 ft) of cable.
- Whilst modern "non-stick" Image Orthicons do not require image orbiting, this facility can be fitted if required as an optional extra.
- Small space requirements: front area 48 cm (19 inch) x 12.8 cm (5¼ inch).



* Registered Trade Mark for television camera tubes.

ANALOGUE PULSE CHECK

When the channel is correctly set up all peak white pulses should be of the same brightness on Picture Monitor or of the same amplitude on Waveform Monitor. The peak white and black areas of the optical strip can be compared with the white and black pulse strips as an indication of exposure and contrast range of the Image Orthicon.



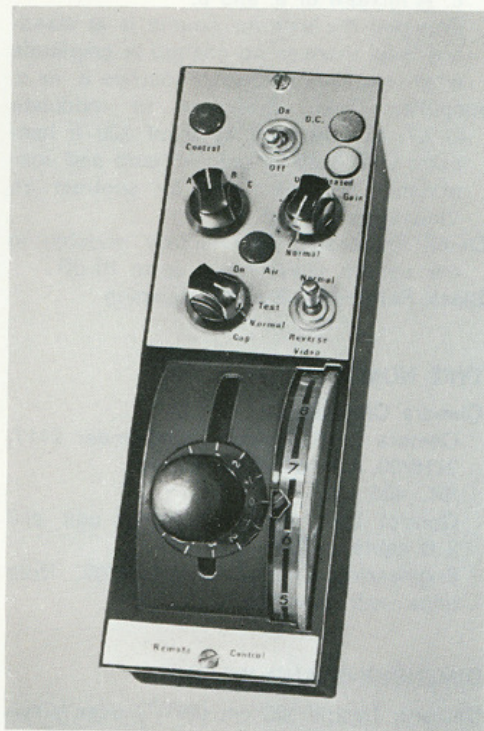
Serious changes of pulse level, or loss of one or more pulses, indicates instantly the section of circuit in which misadjustment or failure has occurred.

When Test Pulses are selected a series of pulses appear across the screen as follows:

1. Peak white pulse injected at input of Head Amplifier (Image Orthicon output).
2. Portion of target near centre of picture is unblanked presenting a vertical strip of optical picture.
3. & 7. Signal from blanked target (i.e. all beam returned), presenting Image Orthicon tube black level.
4. Peak white pulse injected at input of the camera control unit processing amplifier (i.e. at camera control unit end of camera cable).
5. Peak white pulse injected after blanking mixer and before the gamma correction stage.
6. Peak white pulse injected on output line from the camera control unit (on monitoring output only).

JOYSTICK CONTROL

Joystick controls have been in use for some time. Pye have applied new thinking to this very important item and unique results are obtained with the unit illustrated. A novel arrangement allows full range of lens iris control with vernier or "band-spread" adjustment. End to end movement of the joystick within its slot provides ad-



justment over two lens stops, and rotation of the edgewise determines the range of iris setting. Should lighting conditions dictate a wide change of iris setting, simultaneous movement of joystick and edgewise is not apparent in the picture, thus completely smooth operation is obtained. This type of operation has not previously been available.

Rotation of the joystick knob adjusts the picture black level.

Because it is common practice in modern studios for one operator to control a number of camera channels, the analogue pulse check facility is made available on the joystick unit. Thus all the facilities for checking misadjustments are available.

The gain control is provided for emergency operation in unusually poor light conditions, e.g. Outside Broadcast programmes. A warning light shows when this additional 6 dB gain control is operated since black level tracking will no longer be correct.

Controls:

- ON/OFF Switch
- Gamma Correction

- Coarse and Fine Iris Control
- Test Facilities Switch
- Video Reversal
- Emergency Gain
- Black Level

TECHNICAL DATA

Systems: 625 lines 50 fields per second, 525 lines 60 fields, 405 lines 50 fields

Output Signal: Two outputs composite video, or two outputs non-composite video, or one output composite video with one output non-composite, selected by internal link. Synchronising pulses negative

Output Signal Amplitude: 1 V_{pp} composite or 0.7 V_{pp} non-composite into 75 Ω

Isolation Between Video Outputs: Greater than 50 dB at 10 kHz, 38 dB at 3 MHz, 30 dB up to 5.5 MHz

Camera Cable: B.I.C.C. Mk. IV with quick release couplers, maximum length 300 m (1000 ft). Accessory unit to allow for a further 300 m to be used

Power: 450 VA approximately, at 100 - 125 V, or 200 - 250 V a.c. 47 - 65 Hz

System Waveform: Standard complete sync and complete blanking. Pulses negative going and between 1.5 and 5 V amplitude into 75 Ω, with bridging-out connectors (Camera Horizontal and Vertical Drive pulses are internally generated from complete sync).

Test Video and Viewfinder Effects Signal:

1 V_{pp} composite or 0.7 V_{pp} non-composite into 75 Ω, with bridging out connector

OPTICAL SPECIFICATION

Lenses: Standard range of zoom lenses, adaptor for lens on TV 88 mounting

Filters: Five filter positions are provided on a filter turret between the lens and the image plane. One or two filters can be accommodated together at each position. Filter diameter 5.7 cm (2¼ inches), total thickness (double filter) 3 mm (⅜ inch). Filter turret operation by rear knob control

Image Size: 40.6 mm (1.6 inch) diagonal at photo cathode

PICTURE GEOMETRY SCANNING

Camera Picture Geometry and Scanning

Linearity: Within ± 1% within a central circular portion of the raster having a diameter equal to picture height. Within ± 2% in remaining areas

Differential velocity error not greater than 2% in central circular area

Aspect Ratio: 4 : 3

Overscan Amplitude:

Horizontal and vertical, set at 5%

Scan Amplitude Range (Camera and Viewfinder): Horizontal and vertical: minimum range $\pm 10\%$ of normal amplitude

Scan Centring Range: Horizontal and vertical: $\pm 10\%$ of width and height from mid-range position

Camera and Viewfinder Scan Stability:

Within $\pm 1\%$ of picture width and height for 5% a.c. power supply voltage change after a 30 minute stabilising period

Scan Direction: Horizontal and vertical independently reversible from camera position

Viewfinder Geometry and Scanning Linearity:

Within $\pm 1\%$ within central circular portion of the raster having a diameter equal to picture height

Within $\pm 2\%$ in remaining areas. Differential Velocity error not greater than 2% in central circular area

Viewfinder Scan Centring Range: Horizontal and vertical: $\pm 10\%$ of width and height from mid-range position

Viewfinder Display Size:

12 by 9 cm (4 $\frac{1}{2}$ by 3 $\frac{5}{8}$ inches)

Viewfinder Brightness:

200 foot Lamberts, peak white

VIDEO AMPLIFIER CHANNEL

Channel Gain: Sufficient to give standard output level for an Image Orthicon signal current of 4 micro-amperes with 6 dB of gain in hand

Channel Linearity: Amplitude non-linearity less than 2%. Differential Gain distortion less than 5% for any duty cycle

Channel Frequency Response:

K rating 0.5% pulse/bar ratio between 0.98 - 1.02

K_T rating 4% pulse/bar ratio between 0.85 - 1.0

Overall with 0 - 1000 ft cable but less cable tolerance

Square Wave Tilt: L.F. response tilt less than 0.25% per ms

Stability: Black level within $\pm 1\%$, white level clipper within $\pm 2\%$, overall video gain ± 1 dB for extended periods after 30 minute warm up and including mains change of up to 5%

Signal to Noise Ratio: Better than 50 dB for 5 MHz band-width (with Image Orthicon beam cut). Channel does not worsen by more than 1 dB the signal to noise ratio of the Image Orthicon pickup tube

Aperture Correction: Continually adjustable cosine law corrector. Cross-over frequencies matched against roll-off characteristics of average Image Orthicon tube in camera yoke

Gamma Correction: 4 preset transfer characteristics available, switch selected from the E.C.U. The laws normally fitted are a. Black crush, b. Linear, c. and d. Black stretch

White Clipper: Adjustable between 90% and 120% peak white

Black Level Control: By adjustment of gain referred to a peak white clamp giving a range which moves picture black from 40% peak white down to 40% below system black level while maintaining picture white constant

Output Polarity: Positive or negative video switchable from control panel. Separate preset adjustment of negative video lift

Shading Correction: Horizontal and Vertical shading sawtooth signal adjustable in amplitude through zero to full video amplitude from the control panel. Shading injection is before the Black level control and its polarity remains correct for negative picture. Shading adjustment does not affect lift level.

Pedestal: By internal link pedestal may be added to the main video output. Set at 5% peak white

Hum and Spurious Signals: 60 dB down on peak to peak video

VIEWFINDER VIDEO AMPLIFIER

Picture Source: Switchable by key on viewfinder to originate from:

- Its own camera
- An external source
- A mixture of a. and b.

Provided the external source is at standard level there is no change in amplitude when switching between sources a. or c.

Amplifier Gain: Sufficient to modulate C.R.T. to give high lights of 200 ft lamberts with 6 dB of gain in hand and controllable down to zero by contrast on Viewfinder control

Detail Emphasis: Continuously variable in the camera. Gives boost up to 10 dB

Black Reference: By line clamping

TYPE NUMBERS

Camera Channel:

Camera 2116, including viewfinder 2117, 2116/00, 525, 625 line only or /01, 405 only

Control Unit, including power unit and 2 ft cable to ECU, 6370/00

Engineering Control Unit 4431/00. Both units rack mounted

DIMENSIONS AND WEIGHT

Camera: Length: 68 cm (26 $\frac{3}{4}$ ") over Viewfinder. Height: 44 cm (17 $\frac{5}{16}$ "), + 8.4 cm (3 $\frac{5}{16}$ ") cue lamp. Width: 36.2 cm (14 $\frac{1}{4}$ ") over handles. Weight: Camera only 45 kg (99 lb); Viewfinder 5.9 kg (13 lb) (Less lens)

Camera Control Unit: Length: 48 cm (19"). Height: 13.6 cm (5 $\frac{1}{4}$ "). Width: 43 cm (17") over connectors. Weight: 27.6 kg (60 lb)

Engineering Control Unit: Length: 48 cm (19"). Height: 13.6 cm (5 $\frac{1}{4}$ "). Width: 23 cm (9") over connectors. Weight: 7.7 kg (17 lb)

Joystick Control Panel: Length: 7 cm (2 $\frac{3}{4}$ "). Height: 22.2 cm (8 $\frac{3}{4}$ "). Width: 8.9 cm (3 $\frac{1}{2}$ "), + 7.6 cm (3") Joystick Housing and Control. Weight: 0.91 kg (2 lb)

ASSOCIATED ITEMS (to customer's order):

Lenses: Varotal XIV SP, V SP, TV88, Evershed 10 x 35B, or any zoom designed for pulley wheel mounting

Camera Cable 750586, length to requirements

Plug-in boards for alternative line systems
Cable, C.C.U. to E.C.U. AG26312, length as required

Cable, E.C.U. to Joystick R.C.P. AG26313, lengths as required

Joystick Remote Control Panel 4697/00

Extension Box for 2000 ft cable AG27894

Headset for camera or control positions

Visor Face-piece Moulding BG21000

Viewfinder Visor Assembly AG27698

Viewfinder Hood AG27699

Waterproof Cover EA19513

Shot Card Holder AG27477. Illuminator AG27906

Cue Lamp with Numeral Identity AG2756/1-7

SYSTEMS

The advantages of the new Range 70 presentation are fully realised when all the associated items are also provided in this new design. A Range 70 rack is illustrated which shows the neat, compact, modular construction effected by the I.S.E.P. design. The rack shows the type of Camera Control Unit and Engineering Control Unit for Image Orthicon, Vidicon or Plumbicon Camera Chains.

Also included are the Range 70 Sync Pulse Generators, Distribution Amplifier, Sync Slaving Unit and a variety of Audio and Supply Control Units.

