



Mark IV Image Orthicon Camera

Channel Type BD 863

THE experience of many thousands of hours of operation with Mark III 4½-inch cameras has enabled a very high order of stability to be achieved. Considerable simplification of circuits has been found possible, and has resulted in the production of the Mark IV high-reliability camera channel.

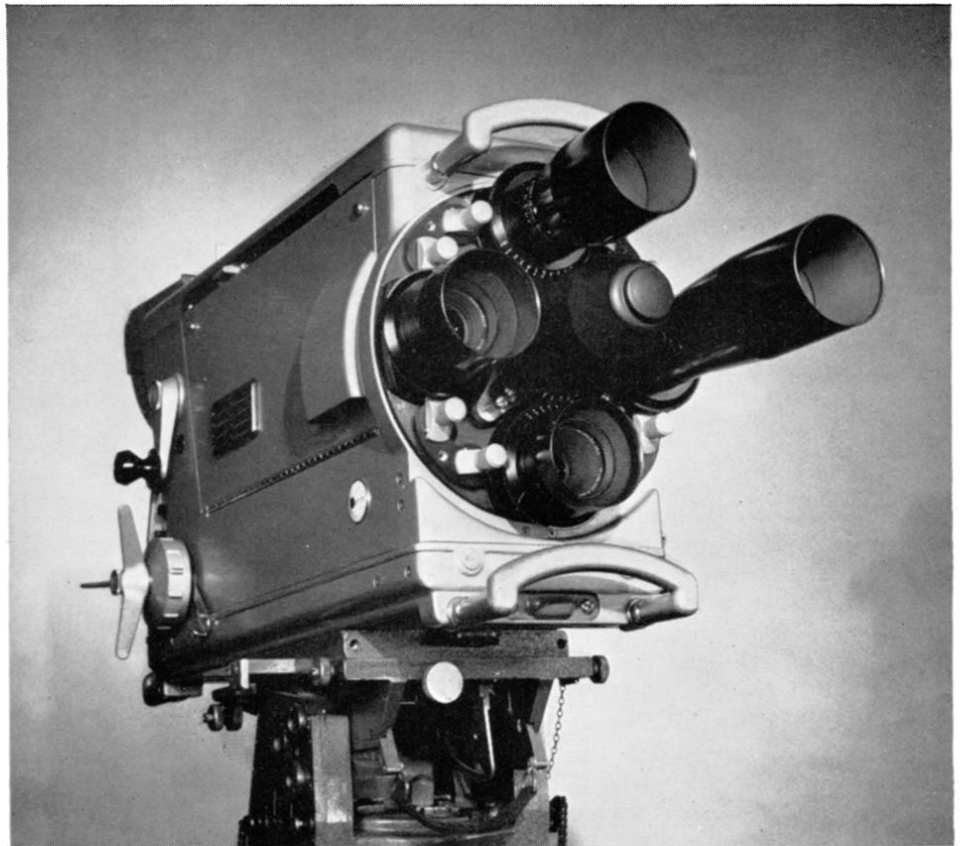
Such highly desirable auxiliary features as image orbiting, remote iris control and provision for fixed filters are all incorporated in the design. Advanced techniques in the power supply regulation have reduced power consumption very materially.

Either 3-inch or 4½-inch image-orthicon tubes may be used by substitution of the yoke. The camera weight has been reduced to a minimum by reducing as far as possible the amount of electronic circuits contained within the camera head.

The camera channel can be set to work on either 405/525/625 lines, or alternatively a switchable version is available enabling changes between the three systems to be made by the operation of a single switch. The performance remains unimpaired on switchable models when the change is made.

Features

- Extremely stable operation, so that a number of cameras can be controlled by one operator.
- Small size, low weight, low power consumption. Short warm-up time.
- Image orbiting device extends image orthicon life.
- Remotely controlled iris mechanism.
- Fully transistorized pre-amplifier.
- Screened yoke assembly, for further stability improvement.
- Transistorized communications circuits built into the camera channel.
- Dual-purpose equipment cases, for rack-mounting or mobile use.
- 4½-inch or 3-inch image orthicon can be used.
- Fixed filter turret behind lens turret.
- Transducer regulated power supply reduces heat dissipation and mains loading.
- Camera can be set up from the remote control position without calling on the cameraman's assistance.



A typical Mark IV television camera.



The body of the camera hinged upwards giving excellent access to the image orthicon tube.

Lenses from 28 mm wide-angle to 40 in. (100 cm), and Zoom lenses readily fitted to the turret by quick-release device.

EQUIPMENT

The camera channel comprises:

- (a) The Camera, Type 3392, incorporating electronic viewfinder, remote iris control, image orbiting and fixed filter disc.
- (b) The Camera Control Unit, Type 5152, supplied with fittings for rack mounting or mobile use.
- (c) The Power Supply Unit, Type 3394, (containing also servo amplifiers for the remote iris control) is mounted alongside the camera control unit in a standard rack or is supplied with fittings for mobile use.
- (d) The Camera Control Panel, Type 3393, a passive unit mounted in either the studio console or in a small case for mobile use.
- (e) The Picture and Waveform Monitor, Type BD 873 (see page 77), having a 14 in. (36 cm) picture and a 5 in. (13 cm) waveform display.
- (f) For the studio channel a Console Type 4785 contains items (d) and (e) and for mobile use, a Mobile Case Type 4302A houses the picture and waveform monitor.

CONSTRUCTION

The camera framework is formed from magnesium alloy castings, with a light-alloy top. Hinged side covers carry the sub-chassis giving access to circuit elements. A standard Vinten pin-and-slot wedge base is used, or alternatively American fixing can be provided. Fore and aft adjustment is provided to balance the camera.

Embodied in the design of the camera case is provision for the attachment and control of a variety of prompting and trick effect devices (see page 105).

Full servo control of the iris from the remote control position is available as an optional extra. This device will handle lenses of both studio and outside-broadcasting ranges. The servo amplifier uses transducer circuits.

A second picture may be superimposed on the viewfinder as an aid during matte and trick effects.

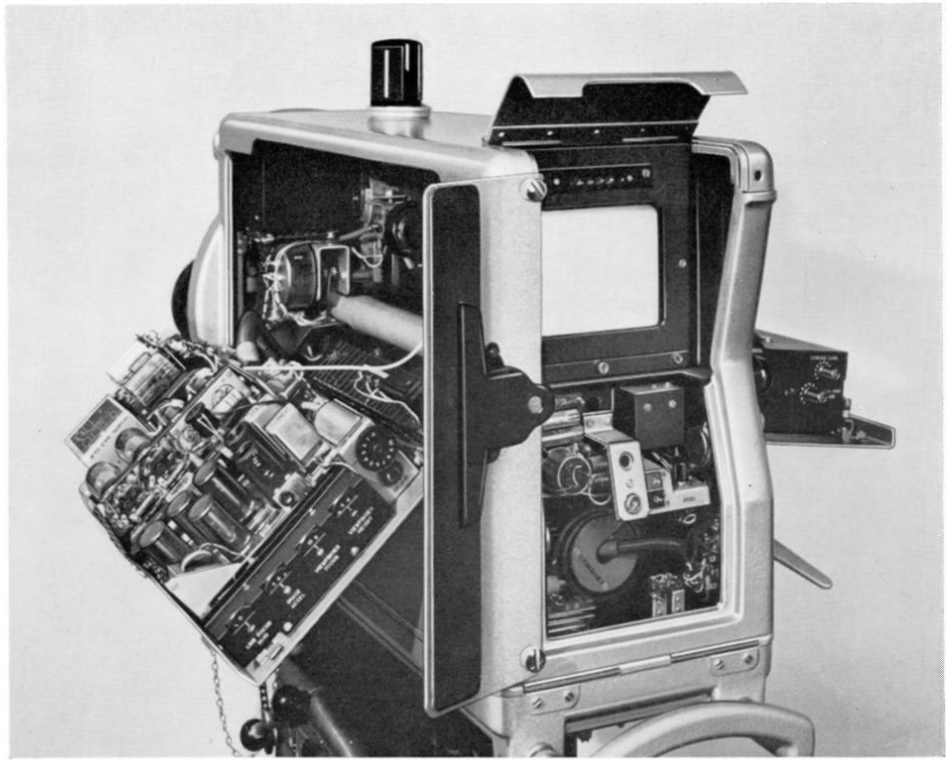
The focus control has two ranges of travel (for studio or O.B use) and the capstan handle requires approximately 2 turns. PTFE bearings are used for the yoke carriage.

Data Summary

Inputs:

Mains. 100–125 V or 200–250 V, 50–60 c/s. Consumption 800 VA.

Pulses. Bridging coaxial input for line drive, field drive, mixed blanking and



All parts of the camera are readily accessible. The side cover is here shown dropped down, revealing the line scan unit. The rear cover has been removed, showing the tube base.



The camera control unit, mounted (horizontal) with a picture and waveform monitor in a standard console.

mixed sync. (for composite outputs), at standard levels.

Communications. Programme sound, production talkback and 'on air' cue.

Control. Remote control of lift, gain, lens iris and gamma.

Outputs:

Vision. Two standard-level signals composite or non-composite.

Communications. Camera talkback for mixing to give mixed camera talkback.

Utilities. Mains, 250 V h.t., 6.3 V a.c., 'on air' cue and lens position indicator.

CAMERA

Linearity: Max. error $\pm 1\%$ of picture height or width.

Geometry: Not more than 2% departure from correct raster edge.

Positional hum: Not greater than $\pm 0.1\%$ of picture height or width.

Signal-to-noise (average): Using a 4½ in. image orthicon on 525/625 lines and a 5.1 Mc/s cut-off filter, 37–40 dB. With a 3 in. tube, 31–35 dB. On 405 lines, using a 3.6 Mc/s cut-off filter, 2–3 dB better.

Resolution (average): At 400 lines per picture height, without aperture correction, using a 4½ in. image orthicon, 4–6 dB loss. Using a 3 in. image orthicon, 9–11 dB loss. Corners not more than 3 dB worse than at centre of picture.

Aperture corrector: Variable up to approx. 11 dB; peak frequency on 525/625 lines 6.8 Mc/s, on 405 lines 4.8 Mc/s.

Gamma correction: To suit requirements between 4–8 dB, 6–12 dB and 8–16 dB. Each of the two onsets is variable.

Black level stability: For mains surges of +5% of nominal voltage, maintained for 3 secs, black level variation will not exceed $\pm 0.5\%$ of standard composite signal. For a blanking width variation of 10%, black level will remain constant within 2% of standard composite signal.

Gain stability: For a mains surge of $\pm 5\%$ nominal voltage maintained for 3 secs, change of gain will not exceed $\pm 2\%$.

VIEWFINDER

Linearity: Maximum error of $\pm 1\%$ of picture height or width.

Geometry: Not more than 2% departure from correct raster edge.

Positional hum: Not greater than $\pm 0.1\%$ of picture height or width.

Dimensions (approx.):

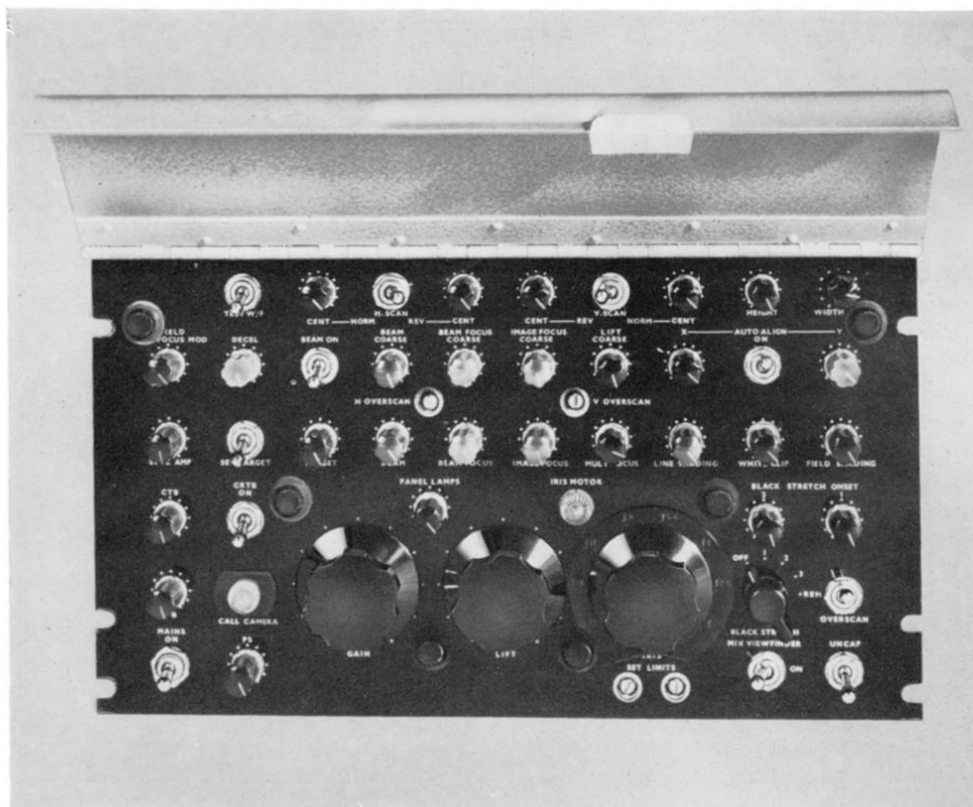
Camera:

Height Wedge base to top of camera case
17 in. (43 cm)

Width Over casework, 9½ in. (24 cm)
over turret 12 in. (30 cm)

Length Front of turret to rear of case
26½ in. (67 cm)

Weight 3 in. version, 95 lb (43 kg) 4½ in.
version, 105 lb (47 kg)



The panel of the camera control unit. The controls are colour-coded for clarity of operation.



Interior of the camera control unit. Individual boards are readily removable, having plug-in connections. A unique bus-bar system at each side provides mechanical rigidity and a means of feeding HT and heater supplies to the circuits at low impedance.

Camera control unit:

(a) Rack-mounted

Height	Width	Depth	Weight
15 $\frac{3}{4}$ in.	8 $\frac{3}{8}$ in.	24 $\frac{1}{2}$ in.	53 lb
(40 cm)	(22 cm)	(62 cm)	(24 kg)
		max.	

(b) Mobile unit

Height 18 $\frac{1}{4}$ in. (46.5 cm). Width and depth as rack-mounted. Weight 58 lb (26 kg)

Power supply unit:

Dimensions as camera control unit.

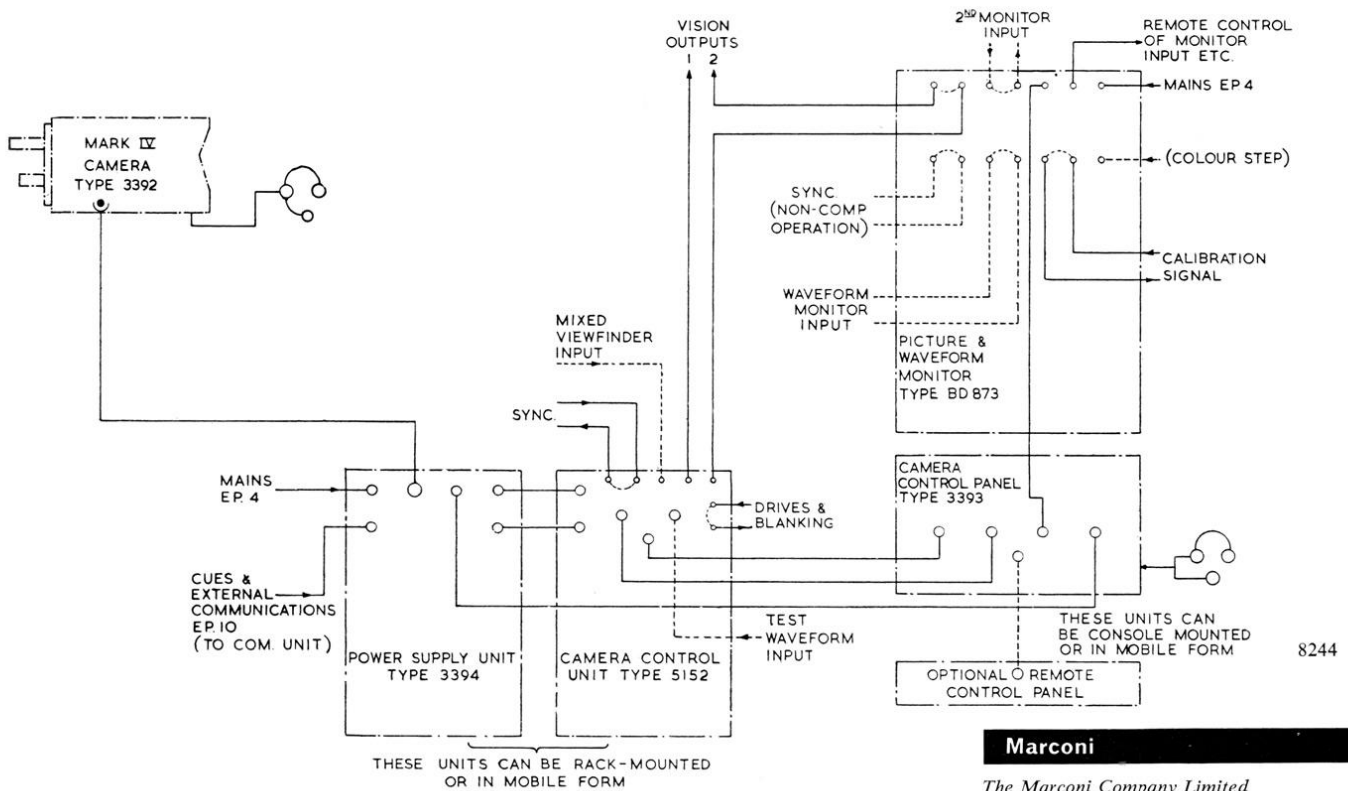
Weight 83 lb (38 kg) rack-mounted and 88 lb (48 kg) mobile.

Camera control panel:

Height	Width	Depth	Weight
8 in.	14 in.	6 in.	11 $\frac{3}{4}$ lb
(18 cm)	(31 cm)	(13 cm)	(4.8 kg)



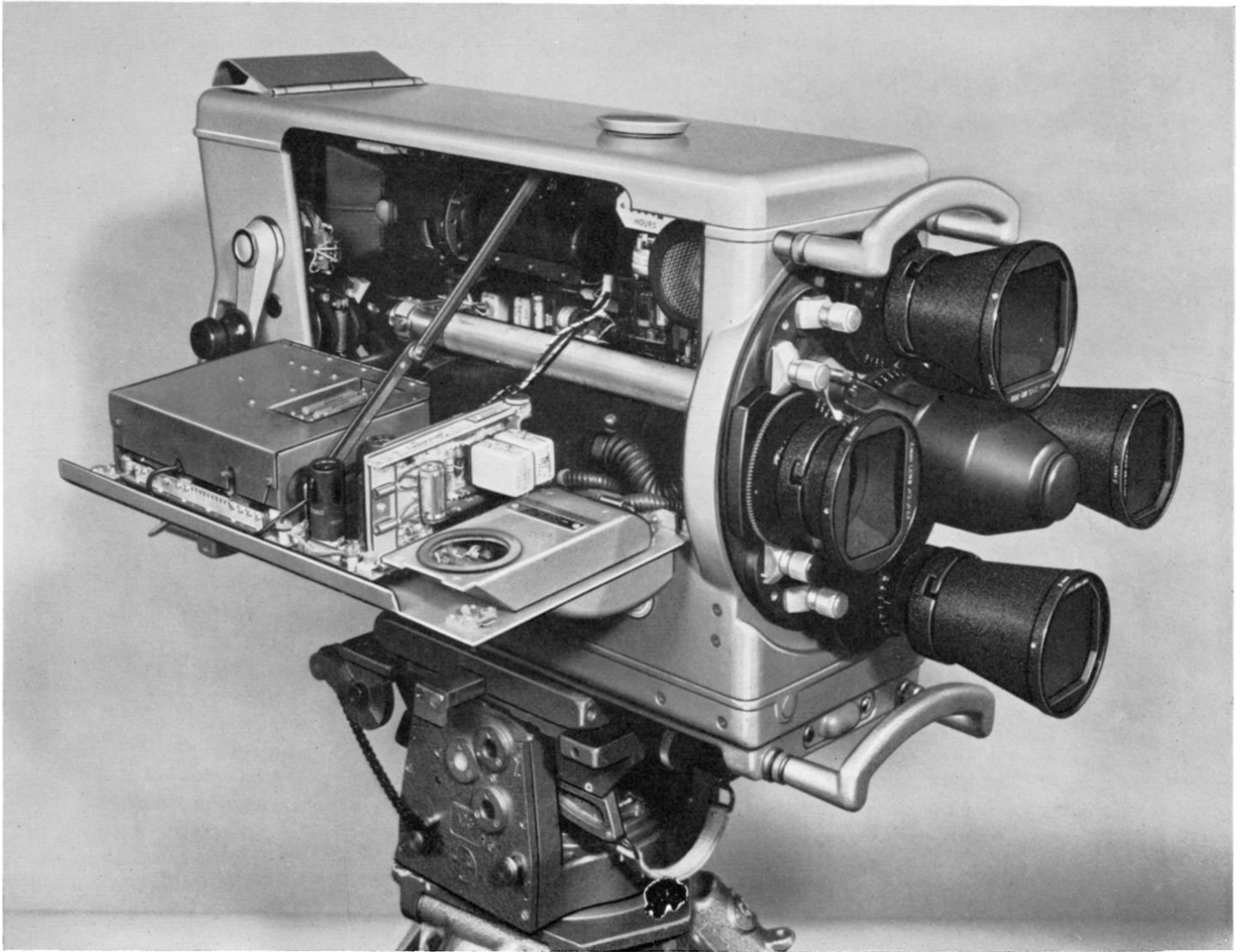
In their mobile form, the camera control and power units are easily handled and are not vulnerable during transit. Adequate handles and a heavy tubular base are fitted.



Block diagram.

Marconi

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Mark IV improvements

As a result of continuous development and improvement, a number of further changes have been made to the Mark IV Image-orthicon Camera Channel. These include, in addition to the new line-scan chassis and moulded slip-ring announced earlier, a transistorized pre-amplifier (shown above, at the rear of the hinged chassis) and a fully screened yoke assembly. This latter unit further enhances the stability of the camera by completely removing the effects of the Earth's magnetic field. Additionally it does permit the camera to operate in areas where a high magnetic field exists. The transistorized pre-amplifier improves the reliability of the equipment and, additionally, reduces the power dissipation.