



Television Equipment Division

EMI Electronics Limited

Camera Channel Type 2004

Camera Channel Type 2004 produces a high quality monochrome television signal on 625 (CCIR) or 525 (EIA) line systems, and is designed essentially for professional type educational television and similar small studio installations.

Camera head Type 2004 uses a 30 mm lead oxide vidicon pick up tube. Camera head Type 2004/1 uses a 25 mm lead oxide vidicon or a standard vidicon pick-up tube.



Features

- * Latest silicon semi-conductor techniques throughout.
- ★ Four-position lens turret accommodates studio 'B' or 'C' mount fixed focus lenses, or a zoom lens.
- Employs 30 mm separate-mesh lead oxide Vidicon (2004) or 25 mm separate-mesh Standard Vidicon/Lead oxide Vidicon (2004/1).
- Plug-in and hinged circuit boards for ease of servicing.
- ★ Operates on standard broadcast 625 line 50 field (CCIR) system or 525 line 60 field (EIA) system.
- Three isolated video outputs any of which can be composite or non-composite.
- ★ 18 cm (7 in) tilting viewfinder.
- * Variable level dependent aperture correction.

- * Switched scan reversal.
- Switched gamma correction.
- * Switched NEG/POS Picture.
- * Built-in Test signal facilities.
- ★ Up to 300 metres (1,000 ft) camera cable can be used.
- Modern styling, low weight and compact camera.
- Incorporates cue circuits.
- Studio talkback can use carbon or modified dynamic microphone headsets.
- ★ Incorporates a four position neutral density filter.
- * Focus Rock (Beam Alignment).

Construction

The basic units of the camera channel are:—
30 mm Lead Oxide Vidicon Camera Type 2004 with

Camera Control Unit Type 2114 (rack mounting)

OR

25 mm Standard Vidicon or Lead Oxide Vidicon Camera Type 2004/1

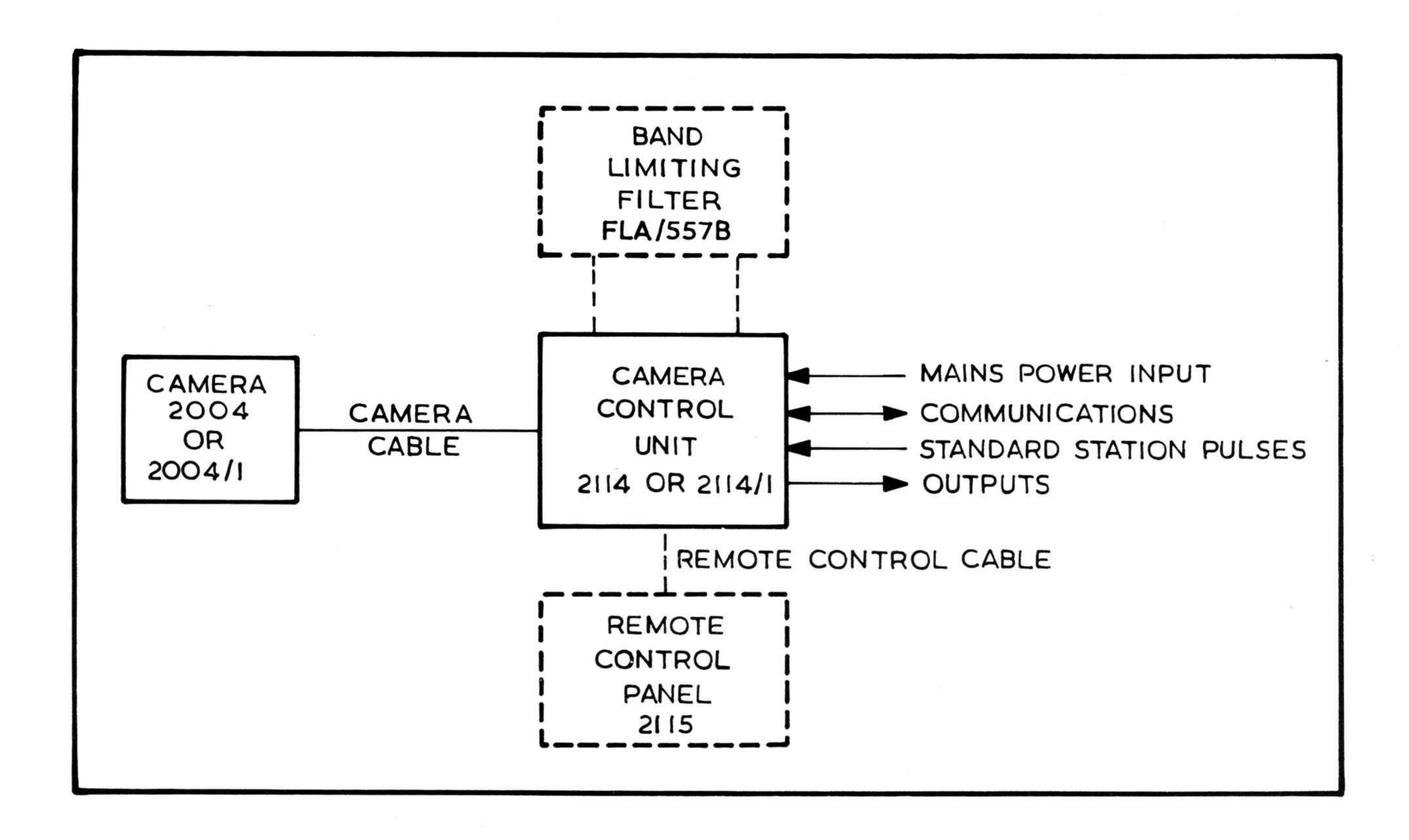
with

Camera Control Unit Type 2114/1 (rack mounting).

Remote Control Unit Type 2115 (optional extra).

Band Limiting Filter Unit Type FL4/55B (optional extra).

Free Standing Case Type 2114104 for C.C.U's 2114 or 2114/1 (optional extra).



Camera Type 2004 - 2004/1

The Camera 2004 is built in aluminium alloy with modern styling, is showerproof and has high quality finishes in tones of grey and black. Removable side covers permit easy access to the sub units. The base can be mounted on a lightweight tripod or pedestal pan and tilt head with the standard 0·375 in Whitworth screw fixing. A wedge-plate 9A/C.203938 can be supplied as an optional extra when the camera requires to be mounted onto pedestals having the standard Vinten wedge adaptors. Red cue lamps are mounted at the top, front and rear of the camera.

The camera can be used with either a 30 mm separate-mesh lead oxide Vidicon or a 25 mm separate-mesh high resolution Vidicon or lead oxide Vidicon. The focus and scan coil assembly with the camera pick-up tube moves on slides to obtain optical focus, the rack-and-pinion mechanism is designed to have a minimum of backlash and is coupled to the focus control situated at the bottom right hand side of the camera. Friction of this control can be adjusted. The focus knob provides a positive control, fits easily into the palm of the hand and can be readily operated with gloves; this knob is easily removed for camera head servicing.

The 4-lens turret is rotated from station to station by movement of a handle at rear of the camera. The turret accepts Studio type flange mounts Type 2004320 for "B" or Type 2004321 for "C" mount lenses, such as the R.T.H. Vidital and Dallmeyer Vidiac lenses, and Standard 16 mm "C" mount cine and other various fixed focus lenses suitable for the 25 mm and 30 mm lead oxide Vidicon and Standard Vidicon formats. Zoom lenses of either manual drive type or remote drive type can also be

fitted to the turret, suitable for 25 mm lead oxide Vidicon and 30 mm lead oxide Vidicon formats. The Studio type flanges provide quick, easy and accurate location of the lens units.

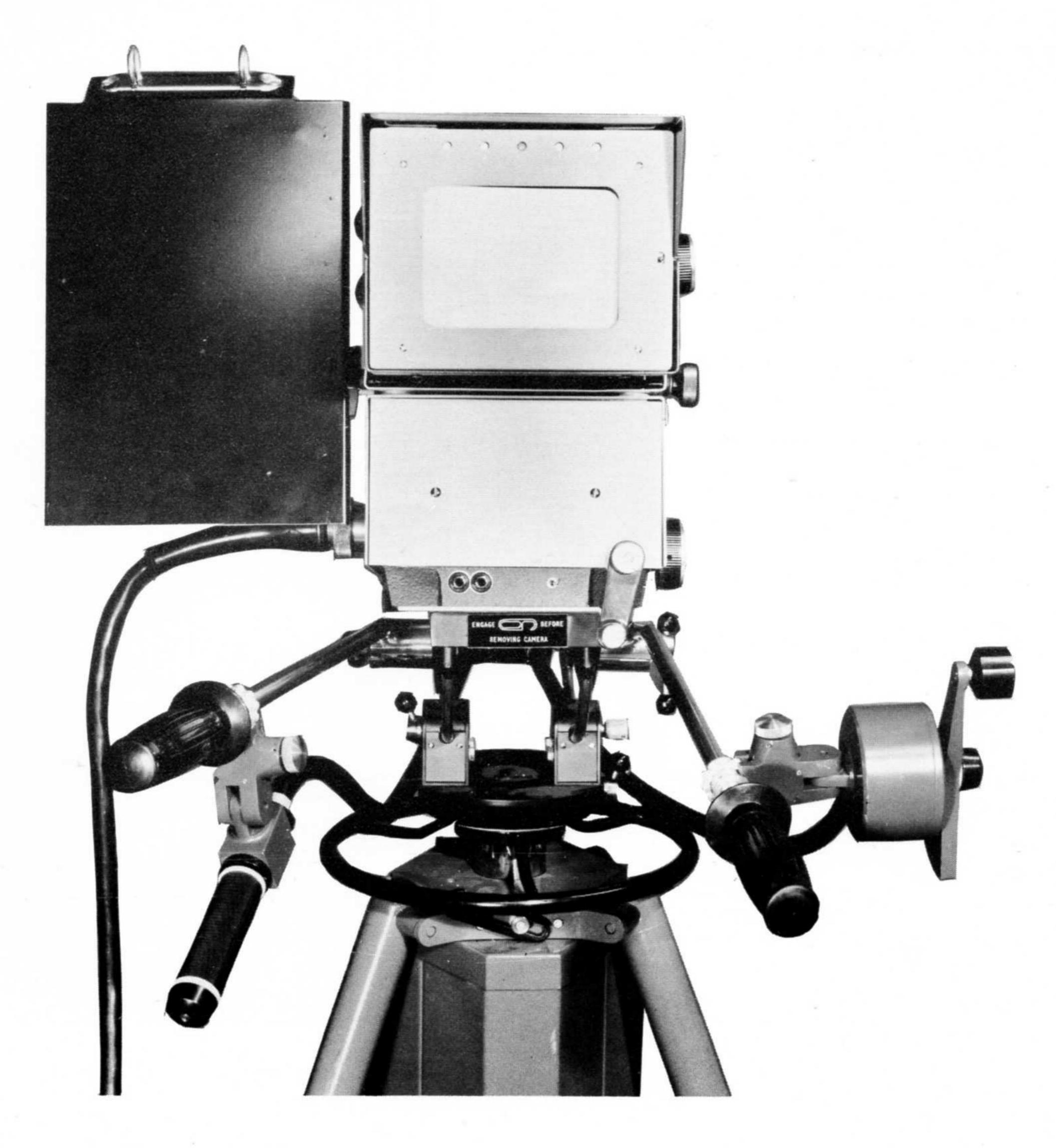
A manually operated Neutral Density Filter Assembly is provided as standard and allows the use of four filters of varying densities, Zero, 0·3, 1·0 and 2·0 being supplied as standard. The Filter Unit operates between camera lens and pick-up tube. Filters can be readily changed or replaced.

A Diascope is available (optional extra), one version for 30 mm lead oxide Vidicon working, and another version for 25 mm lead oxide Vidicon working, to assist setting-up of the camera.

The viewfinder provides a high-resolution bright display on a flat-faced 18 cm (7 in) diagonal rectangular cathode ray tube. The signals fed to the viewfinder can be either from the channel or from an external source, or a mixture of the two selected by a switch on the rear of the viewfinder. The viewfinder with its light shield can be tilted for convenient viewing. External controls enable adjustment of picture brightness and contrast. The electrical circuits in the camera are all remotely controlled so that the cameraman has only to concentrate upon positioning the camera, selecting lenses and focusing.

Talkback circuits include an outlet on the back of the camera for the cameraman's headset, and an outlet on the side of the camera for a floor manager's headphone. Volume controls enable adjustment of sound level.

A power outlet is provided at the camera head for operational and service functions.



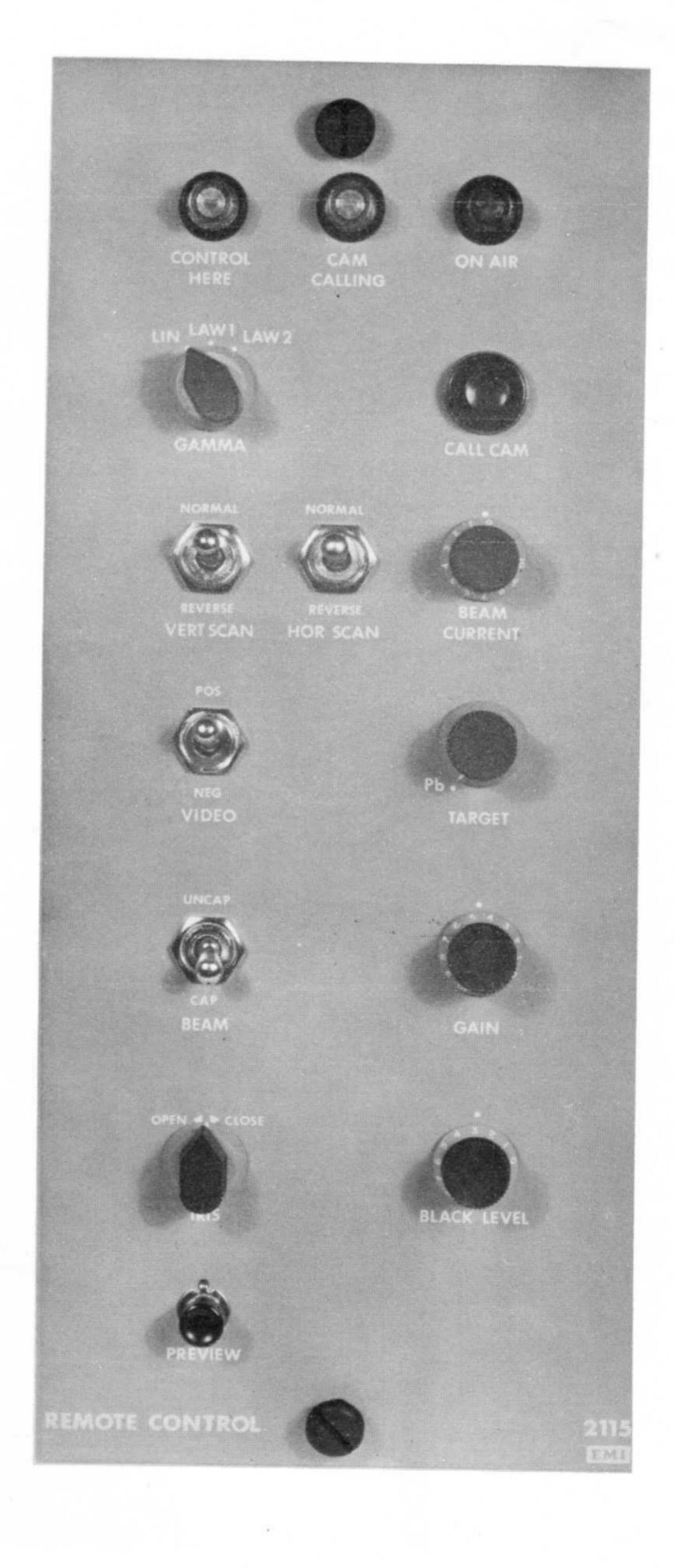
Camera Control Units Type 2114 and 2114/1

The Camera Control Units 2114 and 2114/1 are designed for standard 480 mm (19 in) rack mounting. The Camera Control Units 2114 and 2114/1 can be enclosed in a case type 2114104 (optional extra) for free standing purposes. On the front is a control panel hinged at the left-hand side; this permits easy access to the rear of the panel and to the plug-in circuit boards. The printed boards are mounted vertically, a fan is incorporated to ensure correct temperatures for the wide range of operational configurations and climatic conditions that will be met. Board and cable extenders (optional extras) enable easy servicing of these boards and the unit is designed so that all normal servicing can be done from the front.

The camera cable and other interconnecting cables enter the unit at the rear, and this includes connection to the Remote Control Panel, and Band Limiting Filter Unit (optional extras). The unit includes the camera channel's power supply.

Remote Control Panel Type 2115 (optional extra)

The Remote Control Panel 2115 is a compact unit carrying only those controls necessary for programme operation. A number of these panels can be mounted side-by-side on a vision control desk for control by one operator. These can be situated up to 150 m (500 ft) away from the Camera Control Unit 2114 or 2114/1.





Camera 2004

The electronic sub-units in the camera are:

Voltage Regulator and Talkback

Head Amplifier

Camera Horizontal Scan

Viewfinder Amplifier

Viewfinder Vertical Scan

Viewfinder Horizontal Scan and E.H.T.

These are plug-in units readily accessible for replacement and hinge open for ease of maintenance. Extensive use is made of stageby-stage and overall negative feedback to ensure stability of operation. The precision scanning and focus yoke is designed for good picture geometry and screening ensures freedom from interference by external magnetic fields. Video signals are raised to 0.5V level for feeding down the camera cable which may be up to 300 metres (1,000 ft) in length. The viewfinder provides a bright sharp focused picture on a flat-faced 18 cm (7 in) diagonal rectangular cathode ray tube. The circuits include HF loss correction for long camera cable and picture crispening for ease of camera focusing. The scan drive circuits are very stable and no hold controls are provided.



Camera Control Units Type 2114 and 2114/1

The electronic sub-units in the Camera Control Unit are:

Pulse Processor 1

Pulse Processor 2

Camera Vertical Scan

Video Processor 1

Video Processor 2

Power Supply

Television station pulses at 625 line (CCIR) standard or 525 line (EIA) standard are fed to the unit which has a high impedance so that they can loop in and out of several channels. The C.C.U. video processing circuits include variable camera cable frequency correction positive/negative picture switching, phaseless level dependent aperture correction, and a choice of gamma laws greater or less than unity. In addition three video outputs are provided any of which can be composite or non-composite.

Provision is made within the camera control unit to allow the fitting of an external phase corrected Band Limiting Filter having an upper frequency cut off at 5.5 MHz.

A test sawtooth is provided to enable the channel gain to be correctly set. Focus Rock facility allows correct and easy beam alignment.

Provision is made at the C.C.U. for vertical and horizontal scan reversal switching.

Pulse processing at the C.C.U. removes any discontinuities present on the incoming pulses. In addition horizontal drive is used to provide a pulse of variable timing to correct for camera cable delays.

Extender Board 2114070 and Cable 2114085 are available (optional extras) to enable easy servicing of the sub-units.

An hour meter 9A/A.17089 (optional extra) can be readily fitted into the pick-up tube heater circuit, to record the operational running hours of the pick-up tube. The meter when fitted is located on the front panel of the power unit in the C.C.U.

The front panel controls are as follows:

Power ON-OFF Local/Remote (switch)

D.C. ON-OFF Normal/Test (switch)

Target volts Signal current

Black level Gain

Iris Control (potentiometer) Focus Rock (switch)

Gamma law (switch) Alignment 1

Horizontal scan reverse (switch) Alignment 2

Vertical scan reverse (switch) Beam Current

Horizontal Centering Beam ON-OFF

Vertical Centering Beam Focus

Height Pos/Neg (switch)

Width Volume Controls (talkback)

Call Camera (button)



Lens Data

Lenses for use with 25 mm standard Vidicon and 25 mm lead oxide Vidicon

Fixed Focal length lenses

Lens Type	Lens Mount	Focal Length	Maximum Aperture	Horizontal Angle
R.T.H. Vidital	"B"	20 mm (0·8 in)	f1·7	35°
		30 mm (1·2 in)	f1·4	24°
		50 mm (1·8 in)	f1·4	14°
		80 mm (3·1 in)	f1·4	9°
Dallmeyer Vidiac	"B"	20 mm (0·8 in)	f1·9	34°
		25 mm (1·0 in)	f1·9	28°
		51 mm (2·0 in)	f1·9	14°
		76 mm (3·0 in)	f1·9	9°

Lens Data

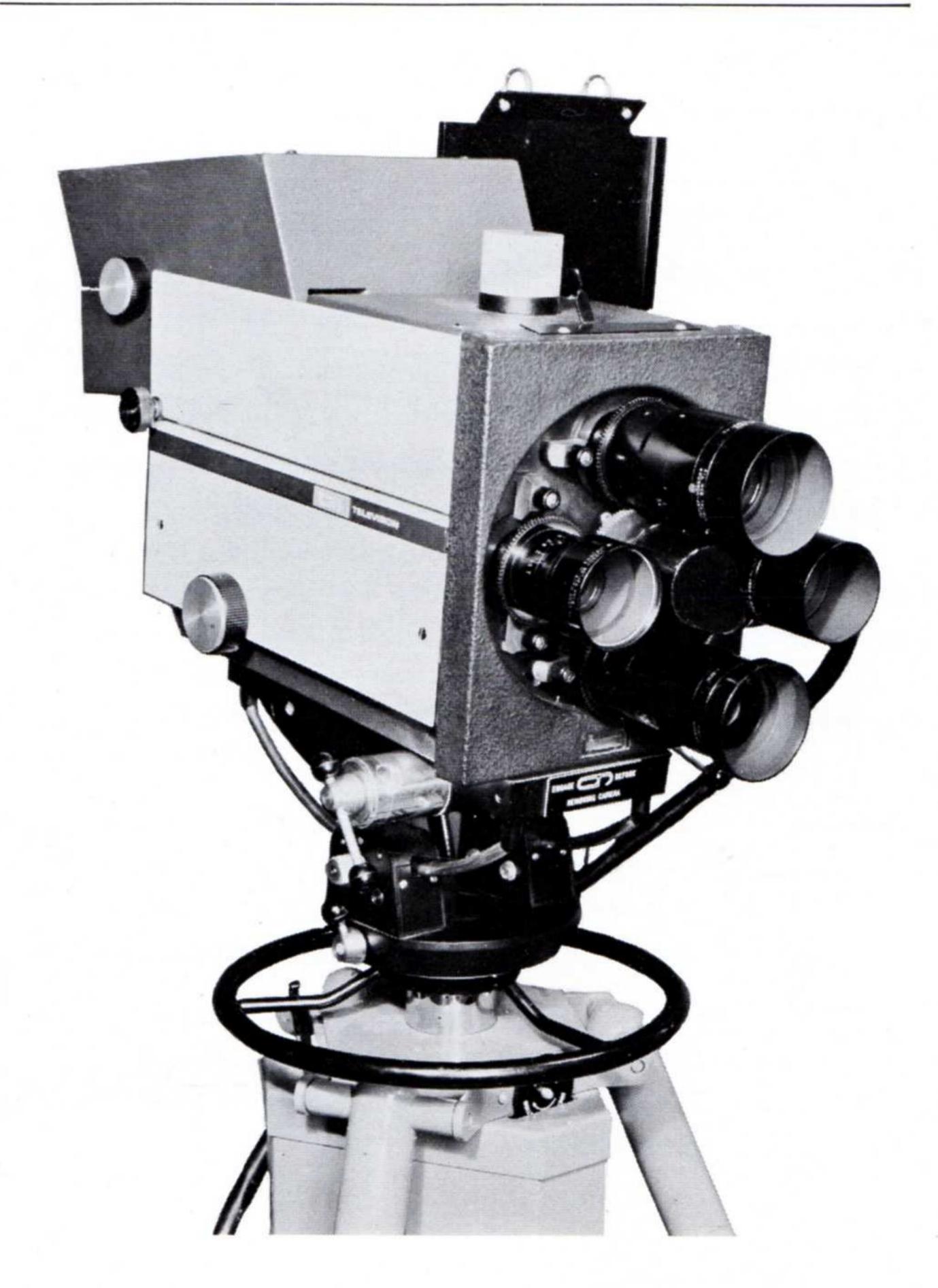
Lenses for use with 25 mm standard Vidicon and 25 mm lead oxide Vidicon

Zoom Lenses Lens Type Lens Mount		Range of Horizontal Viewing Angle	Minimum Focus Distance	Minimum Aperture	
Angenieux 4×20	"B" or "C"	43°-12° ** (20-80 mm) ***	4 ft*	f2·5 Man/Motorised	
Angenieux 10×15	"B" or "C"	54°-6° *** (15–150 mm)	5 ft*	f2·8 Man/Motorised	
Angenieux 20×15	"B" or "C"	55°-3° (15-300 _s mm)	5 ft	f4·5-6 Manual	
R.T.H. Monital		40°-5° (17-130 mm)	2·08 m (6 ft 10 in)*	f2·7 Man/Mot/Servo	
8:1 series	"B" or "C"	32°-4° (24-180 mm)	2·15 m (7 ft 1 in)*	f3·4 Man/Mot/Servo	
R.T.H. Monital		40°-8° (17-85 mm)	1·7 m (5 ft 7 in)*	f1·8 Man/Motorised	
5:1 series	"B" or "C"	35°-7° (20-100 mm)	1·7 m (5 ft 7 in)*	f2·1 Man/Motorised	
		30°-6° (25-125 mm)	1·7 m (5 ft 7 in)*	f2·6 Man/Motorised	
		17°-3·5° (40-200 mm)	1·7 m (5 ft 7 in)*	f4·2 Man/Motorised	
R.T.H. Varotal XXIII 10:1 series—	"B" or "C"	45°-4·5° (16–160 mm)	1·2 m* (4 ft)	f2·2 Man/Mot/Servo	

(VIDICON) DIASCOPE: Type 130/87-C ("C" Mount)

Note:

- * Close-up lens available.
- ** Wide angle attachment available.
- *** Range extender available.



Broadcast "B" Mount

is 1.5 in in diameter having 24 t.p.i. with a 0.569 in register.

Cine 16 mm "C" Mount

is 1.0 in in diameter having 32 t.p.i. with a 0.69 in register. A wide range of 16 mm Cine "C" Mount fixed focus and zoom lenses are available and can be used with the camera channels. Lenses of more than 80 mm focal length used on the turret may obstruct the field of view of the other three lenses on the turret.

Lens Data

Lenses for use with 30 mm lead oxide Vidicon

Fixed focal length lenses

Lens Type	Lens Mount	Focal Length	Maximum Aperture	Horizontal Angle
Angenieux R62-B	"C"	14·5 mm	f3·5	74°
Angenieux R2-B	"C"	18·5 mm	f2·2	61°
Angenieux S1-B	"C"	50 mm	f1·8	25°
Angenieux S3-B	"C"	75 mm	f1·8	16° 30′
Angenieux S3-B	"C"	100 mm	f2	12° 30′

Zoom Lenses

		2,	
Lens Mount	Range of Horizontal Viewing Angles	Minimum Focus Distance	Minimum Aperture
"B" or "C"	62°-7° (18–180 mm)	0·75 m (2·5 ft)	f2·8 Man/Mot/Servo
"B" or "C"	48°-5° (25-250 mm)	1·40 m (4·5 ft)*	f3·2 Man/Mot/Servo
"c"	40°-6° (25-250 mm)	1·7 m (5·5 ft)*	f2·6 Man/Mot
	25°-5° (40-200 mm)	1·7 m (5·5 ft)*	f4·2 Man/Mot
	20°-4° (50-250 mm)	1·7 m (5·5 ft)*	f5·2 Man/Mot
"C"	40°-5° (24-180 mm)	2·15 m (7·1 ft)*	f3·4 Man/Mot/Servo
"B"	45°-4·5° (21-210 mm)	1·2 m (4 ft)*	f2·8 Man/Mot/Servo
	"B" or "C" "C"	"B" or "C" 62°-7° (18-180 mm) "B" or "C" 48°-5° (25-250 mm) "C" 40°-6° (25-250 mm) 25°-5° (40-200 mm) 20°-4° (50-250 mm) "C" 40°-5° (24-180 mm)	### Company **Normal Scripts** #### Company **Normal Scripts** ### Company **Normal Scripts** #### Company **Normal Scripts** #### Company **Normal Scripts** ##################################

(Lead Oxide Vidicon) DIASCOPE: R.T.H. Type 130/146-C ("C" Mount)

Note: * Close-up lens available.

All of the 25 mm Pick-up Tube format fixed focus lenses, less the 20 mm unit, can be used successfully with the 30 mm Pick-up Tube after the necessary camera channel setting up for the 25 mm tube format.

Data Summary

Systems

625 lines, 50 field/second (CCIR/OIRT). 525 lines, 60 field/second (IRE/EIA).

Power Input

100V to 125V r.m.s. 50 Hz to 60 Hz single phase 200V to 250V r.m.s.

Permitted variation: ±6% Voltage. Consumption: 175VA approx.

Voltage selection by plug on rear of power unit.

Channel Outputs

Three composite video outputs can be either at standard level (0.7 Volt picture 0.3 Volt sync, or 1.0 Volt picture 0.4 Volt sync) or non-composite at the same picture level, into 75 ohm loads. Isolation between outputs: better than -45 dB at 1.0 MHz

> better than -35 dB at 3.5 MHz better than -30 dB at 5.0 MHz

Pulse Inputs

Mixed syncs, mixed blanking, horizontal and vertical drive at -1.5V to -6V.

All pulse inputs are high impedance and can loop in and out. Up to 1.5V hum on 2V pulses causes no deterioration of performance.

External Signal Input

Accepts standard level composite video signal for feeding to the viewfinder.

Communications

2V into greater than Producer (input) bal./unbal.:

2000 ohms

Programme Sound (input) bal./unbal.: 2V into greater than

2000 ohms

Camera talkback (output) unbal.:

2V into greater than

2000 ohms

Camera Control talkback (output)

unbal.:

2V into greater than 2000 ohms

The camera talkback system is designed for use with existing carbon microphone headsets.

Dynamic microphone headsets can be employed with the 2004 Camera Channel by the use of a Jack and Amplifier assembly 9A/B.2004240 which comprises a small amplifier located inside a Post Office Type Jack No. 610W (STC 4052A). The amplifier card is powered from the carbon microphone supply which is available at the Jack Sockets.

Sensitivity

The figures for sensitivity published by the Vidicon and Lead Oxide Vidicon tube manufacturers are the only factor governing camera sensitivity at the maximum aperture of the lens in use. A 100 nA signal current will produce a 1.0V non-composite video output.

Resolution - 30 mm/25 mm Lead Oxide Vidicon Tubes

With aperture correction adjusted for optimum performance the following resolution can be expected with typical tubes using a square wave optical pattern. The depth of modulation at 5 MHz is -3 dB at the centre of the picture within a circle of diameter equal to 0.8 times picture height and -8 dB outside this circle.

Using RETMA Resolution Chart (1956) a limiting resolution equivalent to 600 lines per picture height is normally achieved.

Resolution – 25 mm Vidicon Tubes

This is as for Lead Oxide Vidicon Tubes, but for a limiting resolution equivalent to 800 lines per picture height is normally achieved when operated without a Band Limiting Filter.

Signal to Noise Ratio

With no gamma or aperture correction, the ratio of 1V peak to peak signal to r.m.s. noise, at a beam current of 300 nA, will be approximately 45 dB with a 5.5 MHz filter at the C.C.U. input.

Sine Squared Pulse and Bar Response

The response of the entire channel for 625 line 5 MHz pulse and bar waveform (with no band limiting filter) is as follows:

Pulse/Bar Ratio K Rating 0.98 to 1.02 625-2T 0.5% 0.85 to 1.0 625-1T 4%

Amplitude – Frequency Response

With zero aperture correction:

For 30 m (100 ft)

camera cable:

Flat within ±0.25 dB to 6 MHz

better than -2 dB at 8 MHz

-6 dB at 10 MHz

For 300 m (1000 ft)

camera cable:

Flat within ± 0.5 dB to 6 MHz better than -3 dB at 8 MHz

-8 dB at 10 MHz

Variable phaseless level dependent aperture correction is adjustable for 0 dB to 10 dB at 5 MHz.

Low Frequency Response

The tilt on a 50 Hz square wave is less than 0.25% of the square wave amplitude per millisecond.

Gamma Correction

A switch enables two ranges of continuously variable gamma correction:

Position 1 linear

Position 2 gamma 0.3 to 1.0 Position 3 gamma 1.0 to 2.0

Geometric Distortion

The displacement of any part of the scan raster from its true position is less than 1% of picture width.

Any distortions occur gradually and produce no visible discontinuities.

Viewfinder

At highlight brightness of 700 NITS (200 ft lamberts), fine picture detail and scan raster lines are clearly visible over the whole picture.

Regulation of the 15 Kv final anode supply is such that there is negligible change of picture and scanning spot size over the full range of modulation. Geometry errors are no greater than 1.5% within the circle of diameter equal to picture width, and no greater than 2% outside that circle.

Stability

Camera complies with operational specification (less gamma) within 5 minutes of switching on.

Over a period of six hours, gain stability is better than ± 1 dB and black level stability (relative to blanking level) is better than ±1.0% for camera ambient temperature changes of 20°C within the operating temperature range, and for mains supply variations of $\pm 6\%$.

Unwanted Signals

Interference from mains power supply, both as amplitude and positional hum is imperceptible. Interference from other sources is negligible.

Operating Temperature Range

Camera Equipment:

-10°C to +50°C

Photo Conductive Tubes: To manufacturer's operational

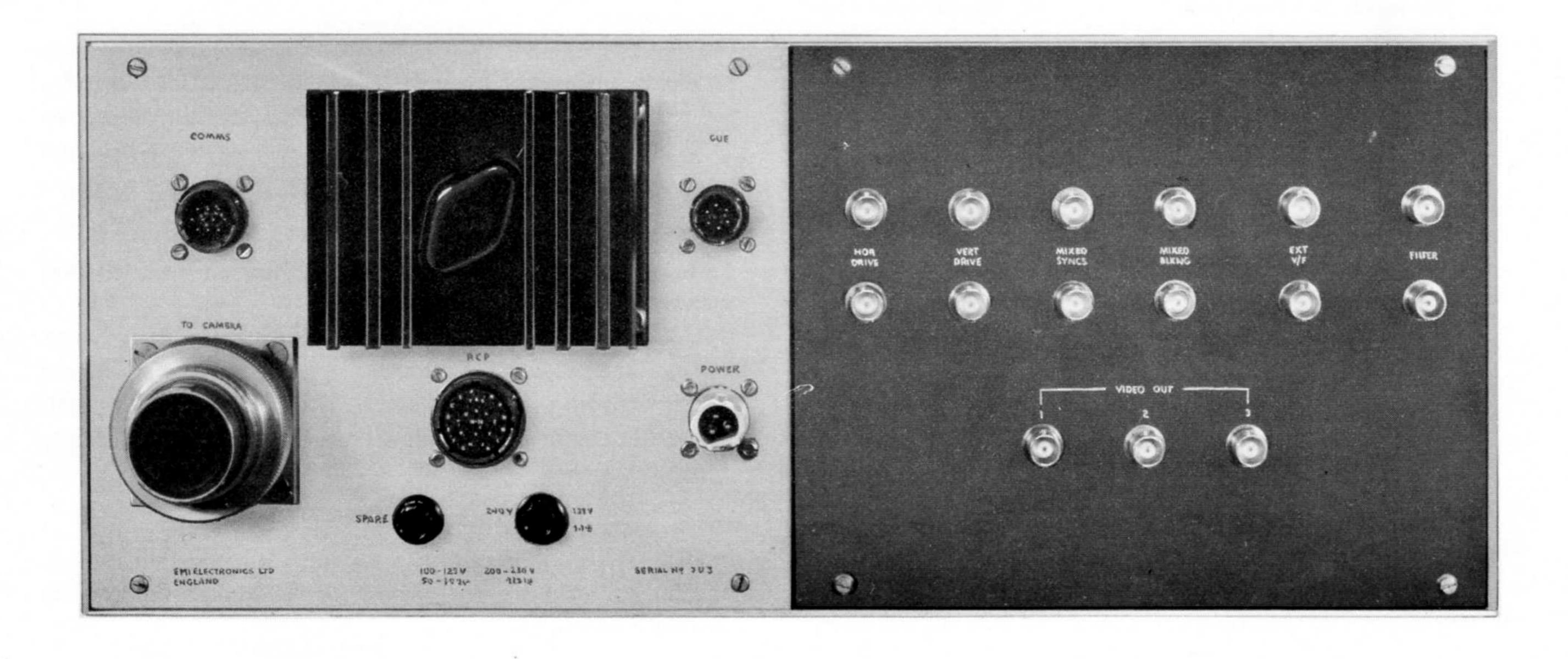
recommendations.

Overall Dimensions and Weight

	Height	Width	Depth	Weight
Camera 2004–2004/1	343 mm	222 mm	484 mm	17·0 kg
(excluding lenses)	13·5 in	8·75 in	19·0 in	37·5 lb
C.C.U. 2114 and	178 mm	484 mm	336 mm	13·8 kg
C.C.U. 2114/1	7·0 in	19·0 in	13·25 in	30·5 lb
Remote Control Panel 2115	318 mm	133 mm	102 mm	0·8 kg
	12·5 in	5·25 in	4·0 in	1·75 lb
C.C.U. 2114-2114/1	236 mm	499 mm	437 mm	21 kg
fitted into Case 2114104	9·3 in	19·6 in	17·2 in	46.5 lb

Connectors

	Fixing	Mating
Camera		
Camera Cable Plug	BICC Mk. IVB	
Comms Headset/Headphone	GPO Socket	GPO JACK 610W (ST4052A)
Power Outlet	McMurdo DE-9S	McMurdo DE-9P
Camera Control Unit		
Camera Cable Socket	BICC Mk. IVB	
Mains Power Input	FRB-D03/EC/32/MTG	FRB-D03/P/32/FTG
Coaxial Connectors	BNC/Amphenol 31-221	BNC/Amphenol 31-322
Communications	Amphenol 62GB-12E-12-10P	62GB-16F-12-10S
Comms Headset	GPO Socket	GPO JACK 610W (STC4052A)
Remote Control Panel	Amphenol 62GB-12E-16-26S	62GB-16F-16-29P
Cue Lamp	Amphenol 62GB-12E-10-6P	62GB-16F-10-6S
Remote Control Panel		
Camera Control Unit	Amphenol 62GB-12E-16-26P	62GB-16F-16-26S



Schedule of Equipment

Bas	ic Camera Channel comprising:	
(a)	Camera Type 2004 (30 mm Lead Oxide Vidicon	
. ,	version)	1
	or Camera Type 2004/1 (25 mm Vidicon or Lead	
	Oxide Vidicon version)	1
(h)	Camera Control Unit Type 2114 (rack mounting)	
(b)	30 mm Lead Oxide Vidicon version	1
	or	
	Camera Control Unit Type 2114/1 (rack mounting)	
	25 mm Vidicon or Lead Oxide version	1 -
N.B.	Camera channels are supplied complete with:	
	(a) all mating connectors other than for camera ca	ble
	and R.C.P. cable.	
	(b) Operating Instructions TL.1784 Vol. 1.	
Anc	illary Equipment:	
(a)	Camera Cable B.I.C.C. Type Mk. IVB As required or	red
	B.I.W. Type TV.33N	
(b)	30 mm Lead Oxide Vidicon Type Mullard Plumbicon	
` '	XQ.1020 series or equivalent	1
	or	
	25 mm Vidicon Type EMI.9677 series or equivalent	1
	or	
	25 mm Lead Oxide Vidicon Type Mullard Plumbicon	
(0)	XQ.1070 series or equivalent	rad
(q) (c)	Lenses Lens Mount Flanges 'B' (9A/A.2004320) or	rea
(u)	'C' (9A/A.2004321) type	1_4
	or	•
	Lens Blanking Plate 9A/A.2004219	
(e)	Lens Clamp Assembly 9A/A.2004282	
` '	(when Varatol XX Series Zoom Lens is fitted)	1
(f)	Headsets Carbon 9A/A.16823	2
	or	
	Headsets Dynamic with Jack and Amplifier assembly	
	Type 9A/B.2004240	2
(g)	Headphones 9A/A.16851	1
Opt	ional Extra Items:	
(a)	Remote Control Panel 2115	1
(b)	C.C.UR.C.P. Interconnecting Cable Type 9A/B.1677	2 1
(c)	DC Motorised Iris Kit for Turret Type 9A/A.2004312	
	or Zoom Type 104/2014V-104/20—M	1
(d)	Vinten Wedge Plate 9A/C.203938	1
(e)	Band Limiting Filter Type FL.4/557B	1
(f)	Script Card Holder Type 9A/D.2004172	1
(g)	Hour Meter 9A/A.17089A (50 Hz) or	
	9A/A.17089B (60 Hz)	1
(h)	Service Extender Board 9A/C.2114070	1
(i)	Power Supply Extender Cable 9A/B.2114085	1
(j)	Waterproof Cover for Camera Head 2004 or 2004/1	1
(k)	Viewfinder Hood Eroo Standing Cose for C.C.I. 2114 2114 /1	1
(1)	Free Standing Case for C.C.U. 2114-2114/1	4
(m)	Type 2114104 Neutral Density Filter 9A/A.2004299/D N.D. 3·0,	ı
(111)	or 9A/A.2004299/E N.D. 4·0	1
(n)	Diascope 130/146C or 130/87C	1
(II) (O)	Service Manual TL.1784 Vol. 2	1
(p)	Special Spanner 9A/A.2004244 (For adjustment of	•
/	Turret End Float)	2

Recommended Additional Items:

- (a) Video Monitors
- (b) Video Switching and Mixing Equipment
- (c) Special Effects Generator
- (d) Vidicon and Pulse Distribution Amplifiers
- (e) Stabilising Amplifier
- (f) Transicom (intercommunication)
- (g) Audio Switching and Mixing Equipment
- (h) Camera Mountings
- (i) Studio Lighting
- (j) Test Equipment (electronic and optical)
- (k) Synchronising Pulse Generator

Ordering Information

When ordering please state:

- Your equipment requirements by quoting from the Schedule of Equipment.
- 2. The supply voltage and frequency from which the equipment will be used.
- The television line standard system the equipment will be used on.
- Camera cable requirements.
- The distance between Camera Control Unit and Remote Control Panel if cable is required.
- 6. Lens mount requirements, 'B' type (T.V. Broadcast) or 'C' type (cine version) or Lens blanking plates.
- Optional extras required to allow ease of operation and servicing.

The company reserves the right to modify the design or specification without notice.



