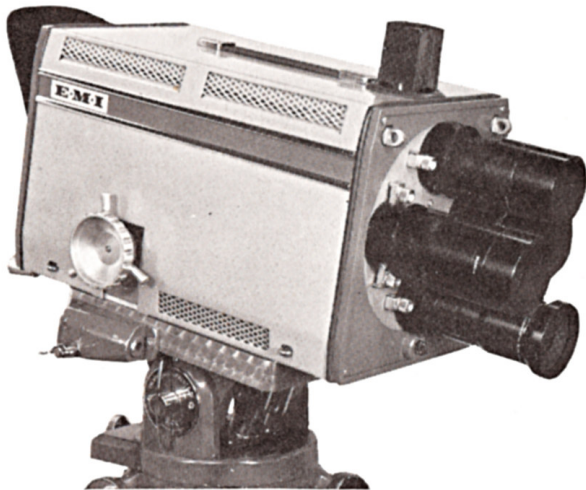




Broadcast and Recording Equipment Division EMI Electronics Limited

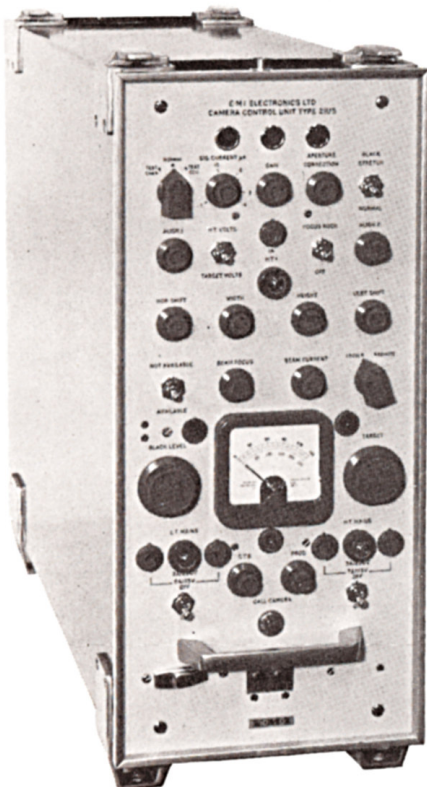
Camera Channel Type 201



The Camera Channel Type 201, using the EMI Separate Mesh Vidicon Camera Tube Type 9677, or RCA Vidicon Type 6326, or equivalent, produces broadcast quality television signals on 405, 525 or 625 line systems. The camera is also used as the film pick-up head in Vidicon Telecine Equipment Type 404.

FEATURES

- * *Compactness and low weight.*
- * *Suitability for operation, by simple change of plug connectors, on any of the following systems:*
 - 625 lines (CCIR/OIR)*
 - 525 lines (IRE/EIA)*
 - 405 lines (UK)*
- * *Extensive use of plug-in printed wiring sub-units provides very good accessibility and ease of maintenance.*
- * *Special quality valves and high stability circuits eliminate need for adjustment over long periods of operation.*
- * *Two isolated composite or non-composite outputs.*
- * *Four-position turret, or zoom lens if required.*
- * *Built-in 7-inch (180 mm) electronic viewfinder.*
- * *Variable aperture correction.*
- * *Quick-release camera cable plug and socket.*
- * *Built-in test signal facilities.*
- * *Switched semi-automatic alignment.*
- * *Calibrated vidicon signal current control.*
- * *Remote control panel (if required).*



Camera Control Unit Type 211/5

CONSTRUCTION

The basic units of the Camera Channel 201 are:

Camera Type 201/5 and Camera Control Unit Type 211/4
(Turret model, 405, 525 & 625 lines)

or

Camera Type 201/6 and Camera Control Unit Type 211/4
(Zoom lens model, 405, 525 & 625 lines)

or

Camera Type 201/7 and Camera Control Unit Type 211/5
(Turret model, 525 & 625 lines only)

or

Camera Type 201/8 and Camera Control Unit Type 211/5
(Zoom lens model, 525 & 625 lines only)

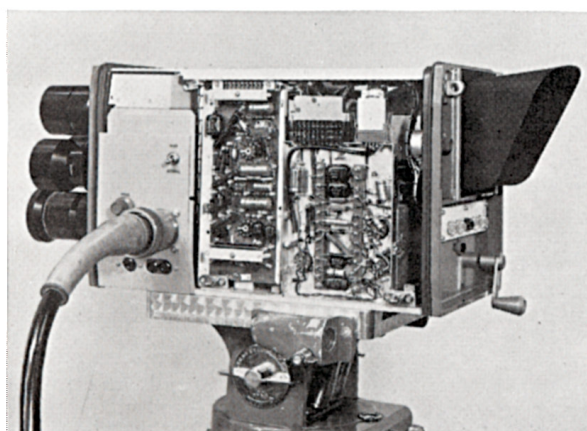
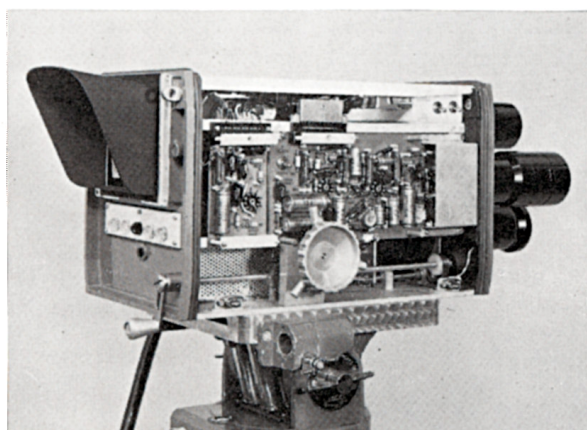
Ancillary units for the Camera Channel Type 201 are:

Picture Monitor Type 301

Waveform Monitor Type 302

Remote Control Panel Type 890 (joystick).

Optional and recommended additional items of equipment are listed in the Schedule of Equipment on page 7.



Camera 201/5

Camera Body and Viewfinder

The Camera 201/5 is constructed of light alloy and has a high-quality enamel finish in two tones of green. The front and rear end castings, which carry the turret and viewfinder respectively, are fixed on a high duty aluminium alloy base-plate; the top and sides are formed as one piece from alloy sheet and contain adequate ventilation louvres.

The camera is supplied with a V slide attachment for mounting on a conventional studio pan and tilt head. The camera can also be mounted on a lightweight tripod through a single-screw fixing hole tapped in the V slide.

The viewfinder uses a 7-inch (180 mm) rectangular cathode ray tube (Mullard AW17-20). It produces a large bright picture requiring no optical magnification. A short, fixed, light shield, Viewfinder Shade Type 857, which guards the tube from extraneous light but leaves the tube face and turret position indicator in view can be provided for the viewfinder; an adjustable viewfinder hood, Viewfinder Hood Type 858/1, which is lightweight and easily detachable, is also available. The viewing aperture of this hood is padded, and its length is designed to give the correct viewing distance. This, combined with the hinged construction of the main body, enables the camera operator to maintain his picture in view at different angles of tilt of the camera. An adjustable friction device and counter-balance spring assist this facility.

The camera cable plug and talk-back outlets are located on the left-hand side of the camera and are mounted on a detachable junction box. The junction box also contains associated supply filter components and scan reversal switches. 'On-air' indicating lamps are fitted.

Lens Turret

The four-station turret is controlled by an operating crank, located at the back of the camera on the right-hand side; one turn of the crank moves the turret one station. Position indicator lamps are situated below the viewfinder and there is a position index at the turret. An iris coupling attachment can be provided to couple together the four iris rings of the lenses. It can be mounted in the centre of the turret and enables all lenses to be set manually to the same aperture by adjustment of one only. The necessary friction is provided to ensure that this setting is not disturbed when the turret is rotated.

Focus Mechanism

The scanning and focusing assembly is mounted on the centre-line at the bottom of the camera; for focusing it is moved along its own axis by means of a geared quadrant and link mechanism. The drive mechanism is operated by means of a capstan type handle located on the right-hand side of the camera. 1.25 turns of the handle cover the full focusing range with a cosine law movement.

Camera 201/6

The Camera 201/6 differs from the Camera 201/5 in the following particulars. In place of the four-station turret the camera is fitted with a lens mounting plate specifically designed to accommodate a manually controlled zoom lens.

The focus and zoom controls are brought out to a combined control handle. This control handle is mounted on a short shaft fitted into the pan and tilt head on the opposite side to the pan and tilt handle. A pre-set adjustment of the position of the yoke by means of the normal focus handle is retained for setting-up purposes. Iris control can be achieved by operation of the iris ring.

Camera 201/7

The Camera 201/7 is similar in construction to the Camera 201/5 differing only in the amplifier circuit. It is specifically designed for operation on the 525 lines and 625 lines systems, and provides a higher limiting resolution than the Camera 201/5 in which a compromise band width is accepted for operation on 405, 525 and 625 lines systems.

Camera 201/8

The Camera 201/8 is similar in construction to the Camera 201/6, differing only in the amplifier circuit. Like the Camera 201/7, it provides a higher limiting resolution on 525 and 625 lines.

Camera Control Unit 211/4 and 211/5

The Camera Control Unit 211/4 and 211/5 are similar in construction; each is housed in a Standard Equipment Case Type 197. The chassis is fitted on telescopic runners and is connected to the rear panel by means of 'swan-neck' cable-forms; it can easily be withdrawn from the case for servicing. Frames are available to enable two control units to be mounted side by side in a 19-inch (480 mm) rack.

The rear panel of the camera control unit carries the cable connectors. The following controls are on the front panel:

- L.T./H.T. mains switches
- Target Voltage
- Black Level
- Available/Not Available
- Local/Remote switch
- Cueing lamps
- Talk-back outlets
- H.T. Volts/Target Volts meter
- Normal/Test switch
- Signal Current
- Gain
- Vidicon Scanning
- Semi-automatic Alignment
- Beam Focus
- Beam Current

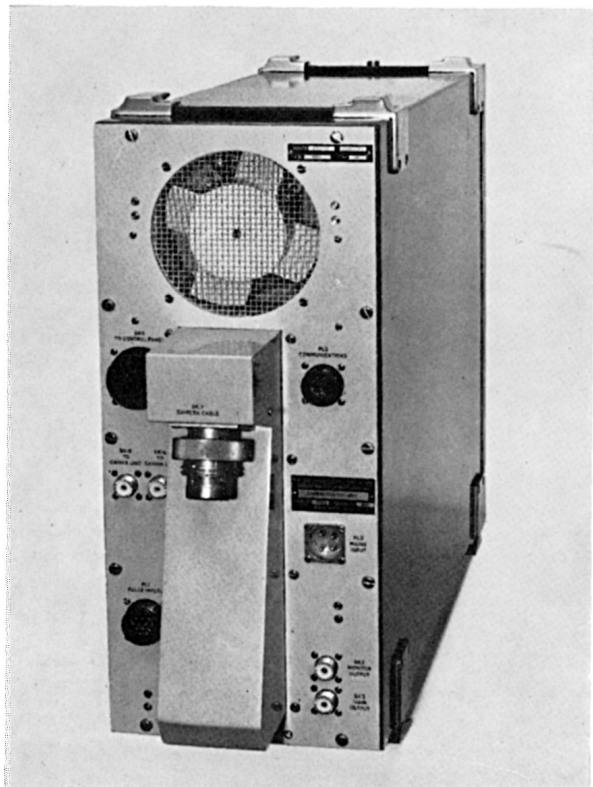
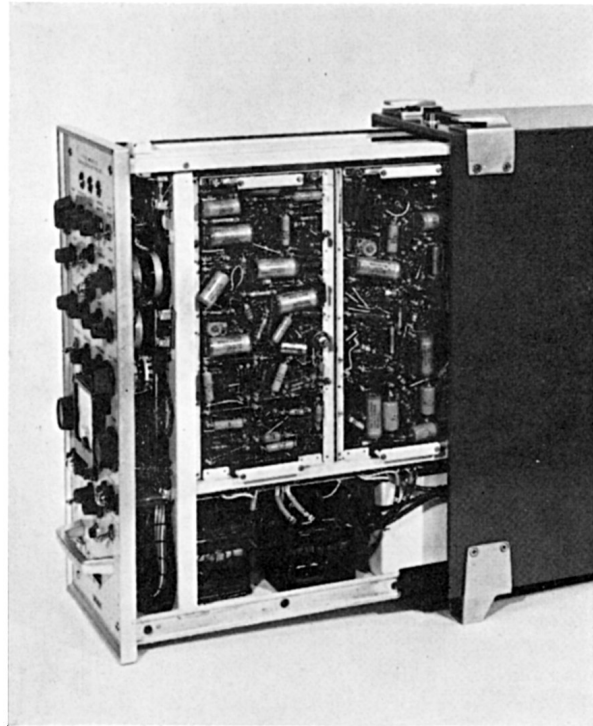
The control unit contains the stabilised power supplies, using semi-conductor rectifiers, for the complete channel, and has external sockets to enable a gamma control unit to be incorporated when the camera is used as the film pick-up head in Vidicon Telecine Equipment Type 404.

Remote Control Panel Type 890

The Remote Control Panel Type 890 is a small unit which combines the control of TARGET (which controls signal level) and BLACK LEVEL in one joystick knob. With this compact and simple-to-operate arrangement, several panels connected to several camera channels can be controlled by

one operator. The knob when depressed operates a micro-switch to select the Picture Monitor 301 and Waveform Monitor 302 to the channel under control.

BEAM CURRENT and BEAM FOCUS control and cueing facilities are provided. Talk-back facilities are brought to the Control panel, and can be connected through a selector switch on the control desk to the operator's headset.



Camera Control Unit Type 211/5

CIRCUITS

Camera 201/5

The circuits described under this heading are common to all four versions of the camera.

Detachable printed wiring sub-units are used for most of the camera circuits. Consequently economy of space and weight is achieved, and inspection and servicing are facilitated.

A pre-amplifier with a cascode input stage accepts the signal from the camera tube and amplifies it to a level of up to 0.27V for transmission down the camera cable, simultaneously applying frequency correction for losses in the input circuit (but not for tube resolution loss). Positive or negative picture output is available. An additional amplifying valve, also carried on a small printed wiring sub-unit, is used for applying black-out signals to the camera tube. A stabilizing circuit controls the current for the camera focus coil.

The viewfinder is fed, via the camera cable, with the composite signal output of the channel so that full output viewing is obtained. The viewfinder circuits are on two removable units, one of which carries the signal amplifier, and the other the line scan and e.h.t. components. The field scan is fed from the camera control unit.

Camera 201/6

The circuits of the Camera 201/6 are similar to those of the Camera 201/5.

Camera 201/7 and 201/8

The Camera 201/7 and the Camera 201/8 differ from the Camera 201/5 and Camera 201/6 respectively in that they are equipped with a wide bandwidth (8 Mc/s) camera amplifier circuit.

Camera Control Unit 211/4

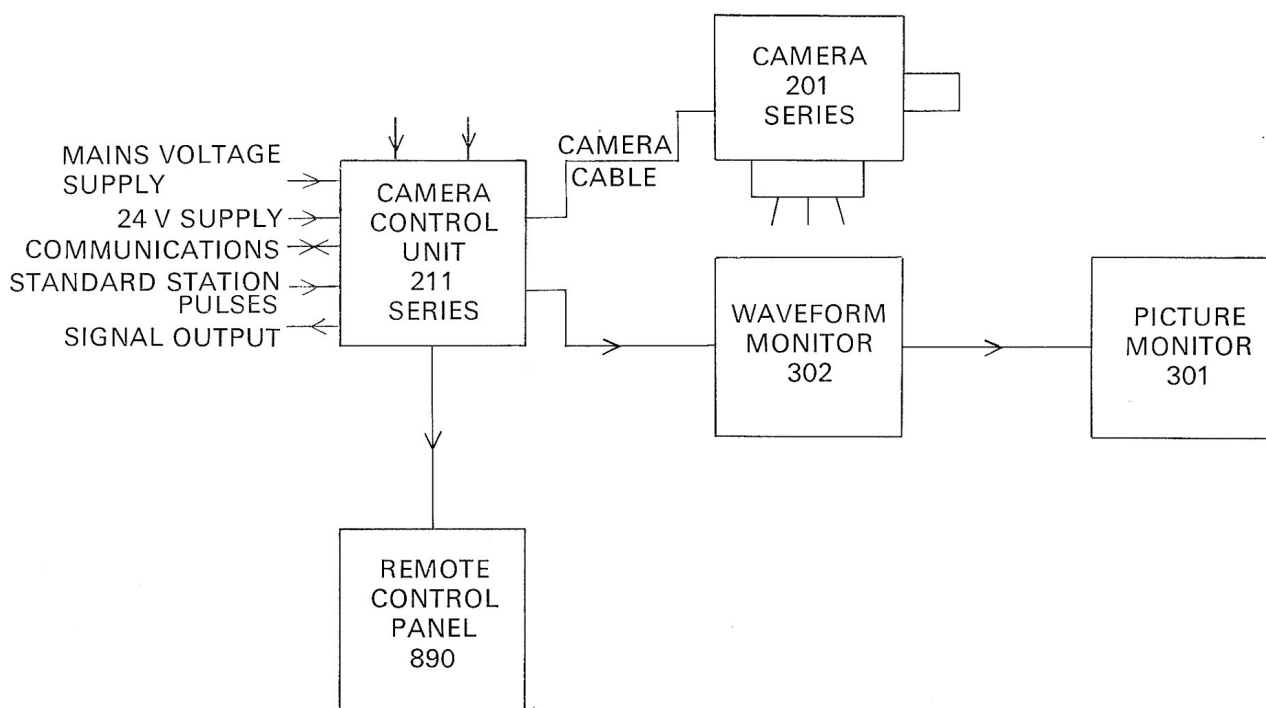
From the line and field driving pulses, line and field scan generators develop signals suitable for transmission down the camera cable to the scanning coils. The amplitude and positional controls for the scanned raster are on the front panel of the control unit and scan reversal switches are fitted in the camera.

The amplifier chain includes a variable boost stage (internal pre-set) for compensating in the line direction for loss of resolution in the camera tube, a black level clamp, and a switched black stretch circuit. The signal is limited at black and white ends to prevent overloading of subsequent equipment, and pedestal and blanking signals are added. Synchronising signals are added if composite outputs are required.

The output stage supplies either two composite or two non-composite outputs at standard level in 75 ohms impedance. One output passes through a censor relay which is operated by the AVAILABLE/NOT AVAILABLE switch on the front panel.

Camera Control Unit 211/5

The Camera Control Unit 211/5 is similar to the Camera Control Unit 211/4 except that it is equipped with a wide bandwidth (8 Mc/s) amplifier, and the frequency of maximum boost of the aperture correction stage is suitably increased. When the unit is used with Camera 201/7 or Camera 201/8 to provide optimum definition on 525 lines or 625 lines for some closed circuit applications the full bandwidth of 8 Mc/s is employed; the channel can be used on 405 lines but optimum definition and signal-to-noise ratio cannot be expected.



DATA SUMMARY

Systems

405 lines (U.K.)	50 fields/second
525 lines (I.R.E./E.I.A.)	60 fields/second
625 lines (C.C.I.R./O.I.R.)	50 fields/second
Interlace ratio:	2:1
Aspect ratio:	4:3

The required system can be selected by means of a simple plug and socket change.

Power Inputs

- 90V to 140V, r.m.s., 50 c/s to 60 c/s, single phase or
205V to 255V, r.m.s., 50 c/s to 60 c/s, single phase
Consumption: 490 VA

Note: Channel is normally operated from a constant voltage supply. A mains voltage surge equivalent to a pulse of $\pm 5\%$ of the normal voltage and not exceeding one second in duration does not significantly effect performance.

- 24V d.c., 0.8A.

Channel Outputs

Two composite outputs at standard level (0.7 volt picture 0.3 volt sync, or 1.0 volt picture 0.4 volt sync), or two non-composite outputs at the same picture levels.

Pulse Inputs

Mixed sync, mixed blanking, line and field drive at $-2V$ to $-4V$. All pulse inputs are high impedance.

Sensitivity

Normal working sensitivity under reasonably lag-free conditions is obtained with a high-light brightness of 100 foot-lamberts and camera lens iris at $f/1.9$.

In applications where lag can be tolerated the high-light brightness at a lens aperture of $f/1.9$ can be reduced to 20 foot-lamberts or less.

Contrast Range

The channel, including the pick-up tube, is capable of good results from scenes having a contrast range of at least 50:1. The EMI Separate Mesh Vidicon Camera Tube 9677 has an inherent gamma of about 0.6 so that for normal working conditions gamma correction is not necessary.

When vidicon tubes of higher natural gamma are used, or for scenes with very high contrast, an electronic black stretch may be switched into circuit to give an additional correction equivalent to a gamma of 0.7, with gain compensation to keep the signal amplitude unaltered.

Resolution

Variable aperture correction is incorporated to accommodate variations in pick-up tubes. With this adjusted for optimum performance the following resolution can be expected with typical tubes, from a square wave optical test pattern at centre (A), and in all parts of a central region covered by a circle of diameter equal to 0.8 of picture height (B).

Camera 201/5 and 201/6

	A	B
405 lines (pattern equivalent to 2.8 Mc/s)	-1 dB	-6 dB
525 & 625 lines (pattern equivalent to 5.0 Mc/s)	-3 dB	-8 dB

When the RETMA RESOLUTION CHART (1956) is used, a limiting resolution of 500 lines per picture height is normally achieved.

Camera 201/7 and 201/8

	A	B
525 & 625 lines (pattern equivalent to 5.0 Mc/s)	-3 dB	-8 dB

When the RETMA RESOLUTION CHART (1956) is used, a limiting resolution of 600 lines per picture height is normally achieved.

Signal to Noise Ratio

When the channel is working in the conditions quoted above for resolution, the ratio of peak-to-peak signal to r.m.s. noise (including a 6 dB weighting factor for triangular noise spectrum) is as follows:

Camera 201/5 and 201/6:	39 dB for 405 lines (with 3.6 Mc/s filter) 37 dB for 525 and 625 lines
Camera 201/7 and 201/8:	36 dB for 525 and 625 lines.

Geometric Distortion

The displacement of any point on the scan raster from its true position is less than 2% of picture height.

Any distortion occurs gradually and does not introduce visible discontinuities.

Unwanted Signals

Interference from mains power supply, both as amplitude and positional hum, is imperceptible. Interference from other sources is negligible. The photo-conductive type pick-up tube is free from optical burn-in, halo effect due to electron re-distribution, shading or other spurious signal effects.

Valve List

Type	Maker	U.S.A. Equivalents	CV No.	Quantities
E88CC	Mullard	6922	2492	24
EL821	Mullard	6CH6	4055	1
6080	Mullard	6080	2984	2
EL81	Mullard	6CJ6	2721	1
EY51	Mullard	6X2	426	1
EY81	Mullard	6R3	—	1
85A2	Mullard	0G3	449	2
150B2	Mullard	6354	2225	1
EB91	Mullard	6058	140	3
ECL83	Mullard	—	—	3
EL34	Mullard	6CA7	1741	1
AW17-20 (c.r.t.)	Mullard	—	—	1

Overall Dimensions and Weight

	Height	Width	Depth	Weight
Camera 201 series**	10 in.	12 in.	19 in.	42 lb
	254 mm	304 mm	482 mm	18.9 Kg
Control Unit 211/4 and 211/5	20 in.	8.75 in.	30 in.	103 lb
	534 mm	222 mm	760 mm	47 Kg
Remote Control Panel 890	12.4 in.	5.2 in.	6.5 in.	6 lb
	315 mm	132 mm	165 mm	2.7 Kg

** Without Lenses.

Connectors

	Fixed	Mating
Camera Control Unit 2114 and 211/5		
Mains Input	EP4-14S	EP4-15-IC
Talkback and Cueing Circuit	AN3102-18-1P	AN3 108B-18-1S
Remote Control Panel	AN3102A-28-12S	AN3108B-28-12P
Pulse Inputs	AN3102-20-27P	AN3108B-20-27S
Signal Outputs	SO 239(two)	PL259F(two)

Remote Control Panel 216

Control Unit AN3102A-28-12P AN3102A-28-12S

Note: Up to 500 feet (150 mm) of camera cable can be used.

Lens Data

Lenses for Camera 201/5 and Camera 201/7 are supplied to order as required, and are normally provided from the range of extra-high quality lenses especially computed for vidicon cameras shown in Table A.

Lenses listed in Table B are also available.

Focal Length	Maximum Aperture	Horizontal Taking Angle	Make
in	cm	(f)	degrees
TABLE A			
0.8	2.0	1.7	35
1.2	3.0	1.4	24
1.8	5.0	1.4	14
3.1	8.0	1.4	9
			R.T.H. Vidital

TABLE B			
0.8	2.0	1.9	34
1.0	2.5	1.9	28
2.0	5.1	1.9	14
3.0	7.6	1.9	9
			Dallmeyer Vidiac

Note: Lenses in TABLE B must be fitted with lens mounts.

SCHEDULE OF EQUIPMENT

Item	Description	Quantity
1	Basic Camera Channel Type 201 comprising:	
	(a) Camera Type 201/5	1
	Camera Control Unit Type 211/4	1
	or	
	Camera Type 201/6	1
	Camera Control Unit Type 211/4	1
	or	
	Camera Type 201/7	1
	Camera Control Unit Type 211/5	1
	or	
	Camera Type 201/8	1
	Camera Control Unit Type 211/5	1
	(b) Camera Lamp Cover (unnumbered)	1
	or	
	Camera Lamp Cover (numbered – 1 to 9)	1
	(c) Camera Cable B.I.C.C. Mk. IVB	50 feet
	(quick release and right-angle socket)	(15 m)
2	Ancillary equipment:	
	(a) Viewfinder Shade Type 857	1
	or	
	Viewfinder Hood Type 858/1	1
	(b) Vidicon Camera Tube Type 9677	1
	(c) Lenses	one set as required
	(d) Lens box	1
	(e) Picture Monitor Type 301	1
	(f) Waveform Monitor Type 302	1
	(g) Headset	as required
	(h) Headphones	as required
	(i) Remote Control Panel Type 890	1
	(j) Inter-unit cable (R.C.P./C.C.U.)	25 feet (7.5 m)
	or	
		as required
3	Recommended additional equipment:	
	(a) Vinten Lightweight Pan and Tilt Head complete with Wedge Adaptor Plate	1
	(b) Vinten Lightweight Tripod and Skid	1
	(c) Vinten Lightweight Skid	1
	(d) Iris Coupling Attachment	1
4	Optional Extra Equipment:	
	(a) Vidicon Simulator (for checking high frequency response)	1
	(b) Remotely Control Servo Camera Mounting	1

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