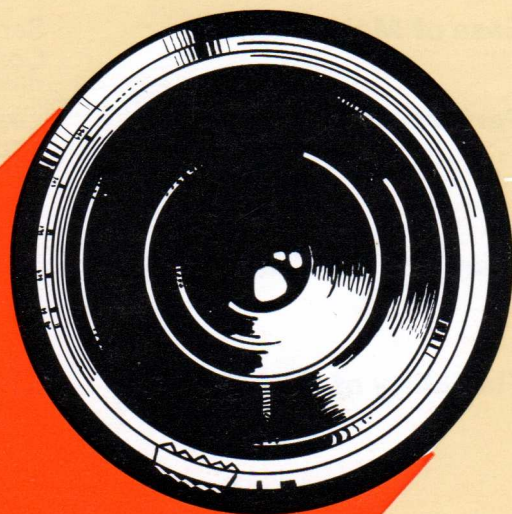


MARCONI ELLIOTT AVIONICS

**Electro-Optical
Systems Division**



**Marconi
V327
Camera
Channel**

Features

High Stability and High Reliability

Low heat dissipation
Wide range auto-sensitivity and auto-black level control
Extensive use of feedback compensation techniques
Silicon transistors and integrated circuits used throughout
Conservatively rated components and stabilized rail voltages

Ease of Maintenance

Servicing by replacement of plug-in printed-circuit boards
Comprehensive test points incorporated on every circuit board

Performance

High resolution
2 to 1 interlace
625 line/50 field *or* 525 line/60 field operation
High signal/noise ratio from use of FET head amplifier

Standard Facilities

Two isolated video outputs with peak white limiter
C or B type lens mounting
Scan failure protection and power unit overload/overheat cutout

Flexibility of Use

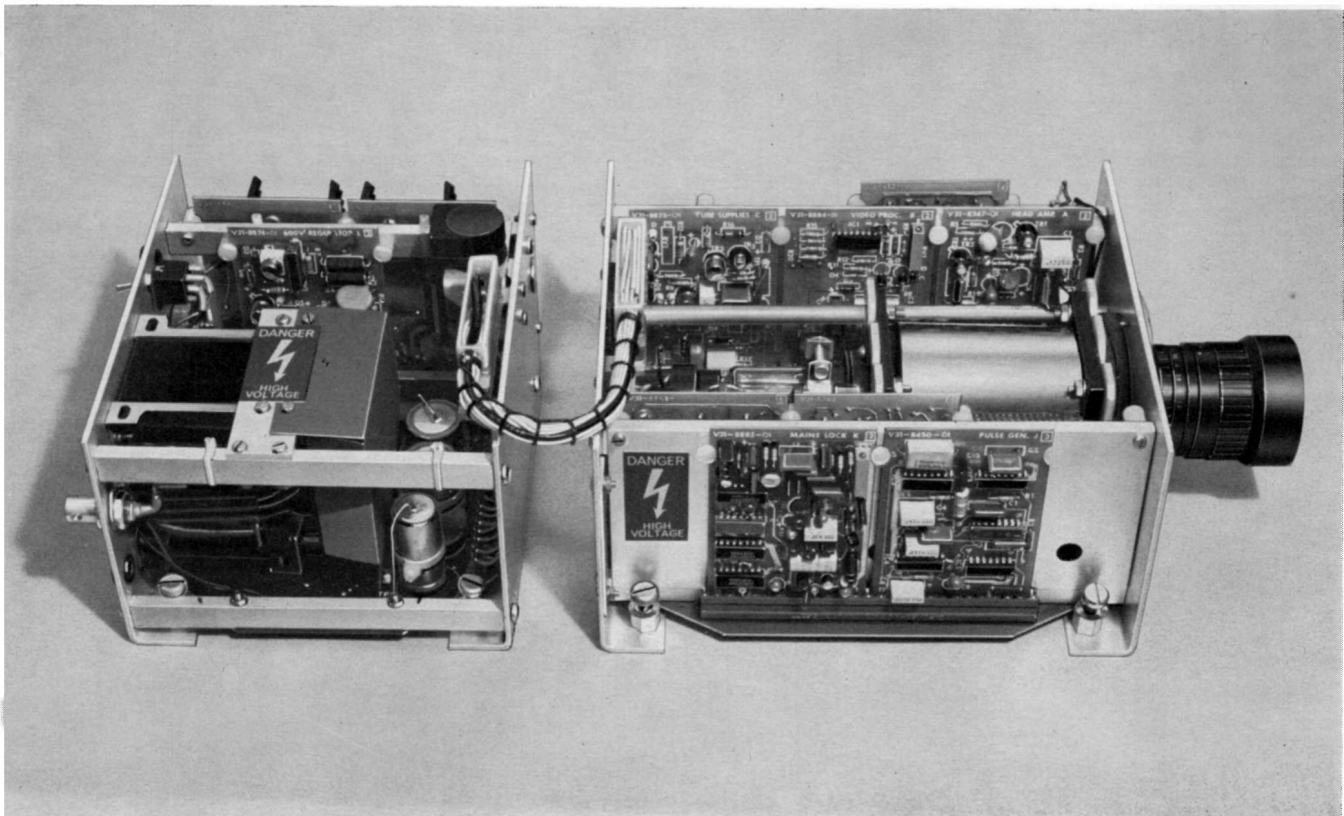
Single or dual unit channel available.
(May be used as a single unit camera for simple installations or with a separate power supply/control unit where the camera is inaccessibly mounted or is required to be of minimum size)

Fully Automatic

An ON/OFF switch is the only control

Optional Features

Remote focus
Sun shutter
Optical filter
Vidicon face-plate cooling
Vidicon, lead-oxide or silicon diode tubes may be used
Gamma correction
Aperture correction
Auto gain
Camera identification in multi-channel installation by alpha-numeric character generator board



Camera Control Unit (CCU)
Type No. V3275

Camera, Type No. V3271

Description

The V327 Series Camera has been produced to meet the requirement for a high quality, high reliability automatic television system for use in traffic control (road, rail, sea or air), security systems and heavy industrial applications. It is also eminently suitable for use in education, training, telecine, document transmission and similar systems. The main emphasis in design has been on simplicity coupled with reliability, with the mechanical construction of the equipment such that the camera performance can be optimized for special requirements by using alternative circuit boards and yokes which are available. More details of these are given later in this brochure.

The V327 is fully automatic in operation after the initial adjustment of lens iris and focus. The auto target range of 2000:1, together with auto black-level control and stabilized beam current, give a picture of constant brightness and contrast over a wide range of light and temperature levels. Careful circuit design has resulted in high resolution and geometry to give an outstanding picture quality.

The system consists of two units which may be installed separately or joined together. The units are:

Camera, including the scanning yoke and associated circuitry.

Camera Control Unit (CCU) which incorporates the power supply module, and the major preset controls.

In the dual unit form, which is likely to be that normally used for surveillance, the camera will be housed in a small double-skinned weather-proof case, for external use, which can be equipped with screen wipers, washers and heaters, if required. The camera control unit may then be mounted remotely and can be up to 200m from the camera. For internal use in industrial control, education, etc., the housing will vary according to the role of the system. In a single unit form the two units are mounted together in a common housing or case.

Design

In introducing the V327 series Marconi are able to offer a unique range of fully integrated camera equipment and accessories designed by the same team to achieve maximum interchangeability, commonality of parts and uniformity of style. Recognizing the illogicality of placing a camera with its own cover inside a second cover or housing and hence restricting ventilation and increasing cost, the camera is constructed on a simple but strong open chassis which also affords maximum accessibility for servicing. The camera control unit is similarly constructed and may be mounted behind the camera, as shown in the photograph on page 2, or in a separate housing up to 200 metres distant. A range of motorized lens packages using this open chassis principal is available and all chassis have the same cross section, the length varying in 20mm increments.

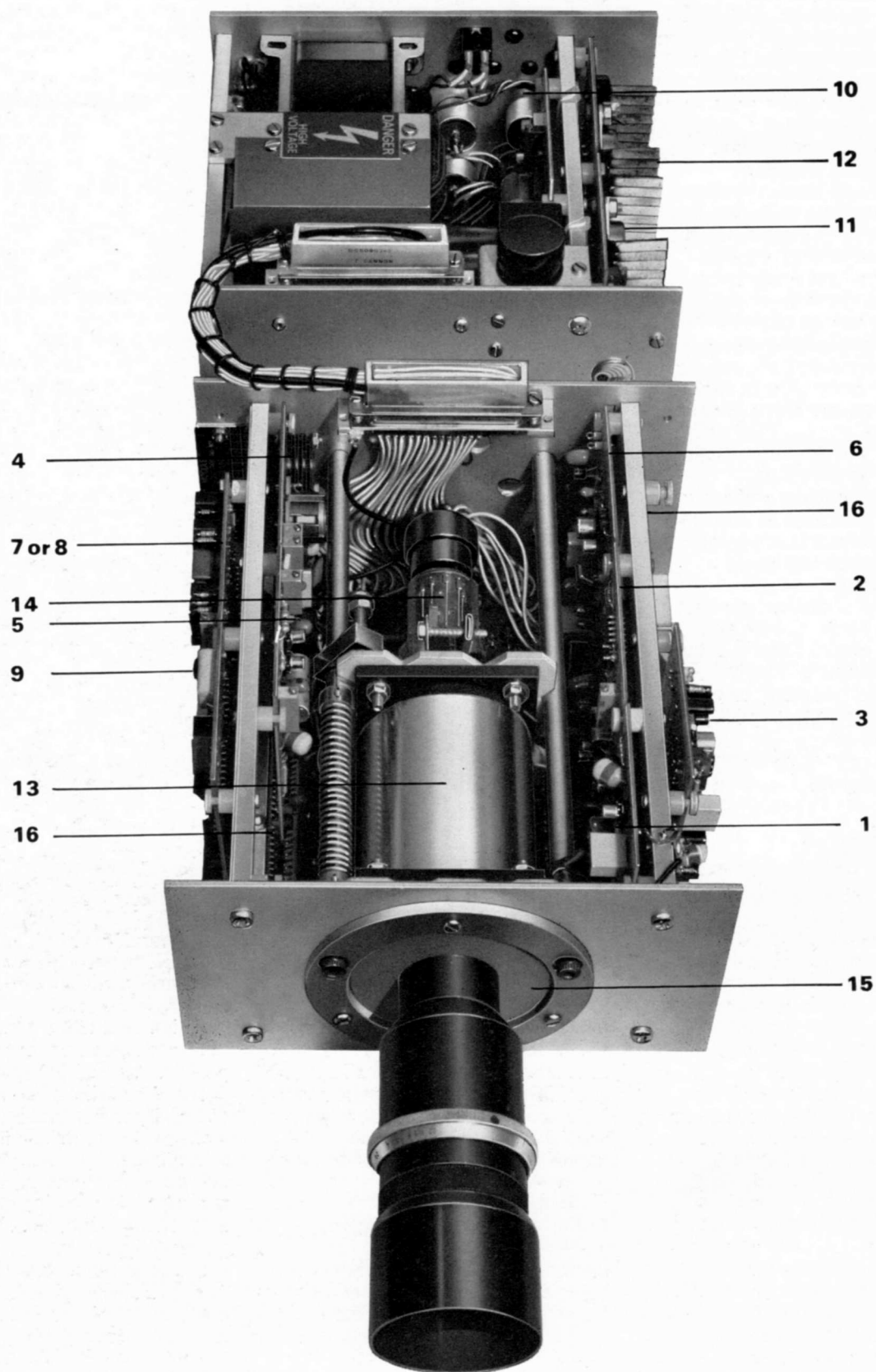
The camera housings, examples of which are illustrated at the foot of page 6, are provided with unit fixing holes on a 20mm pitch, thus

enabling any combination of camera and accessories to be installed at the optimum position. The equipment is constructed to metric standards. The requirements of the Department of the Environment specifications TCD 300 and TCD 330 for television cameras have been included in the design specification and initial type approval of the equipment has been received.

Electrically the circuits are carried on a number of plug-in printed circuit cards, the interconnection between them being made by a printed circuit carrier or "mother" board. Each card carries a complete functional circuit, (e.g. head amplifier, processing amplifier, video output stage, pulse generator), so that the precise characteristics of the camera channel can be adjusted to suit a particular requirement by simply replacing one or more of the cards. Fault-finding time is also reduced to a minimum by employing the substitution method. Two extra card positions are provided in the camera unit to

accommodate a choice of optional features. Of particular use in multi-camera systems is a camera identification circuit which superimposes alpha numeric information on one corner of the picture.

The circuits have been designed so that the major heat producing elements are contained in the CCU thus minimizing the degradation of tube performance which can result from the heating effect of adjacent components. This is particularly true where the camera and CCU are in separate housings. The CCU also carries the major pre-set controls for beam, target, focus and black level together with the only operational control, the ON/OFF switch. Controls for optional remote focus sun shutter and lens filter operation and establishing a stand-by condition can also be accommodated within the CCU if required or alternatively on a separate control panel.



1 Head Amplifier Board

Provides initial amplification of the camera tube signal current. An FET low-noise wideband amplifier is used to give a high signal-to-noise ratio and good resolution. The need for any adjustments to produce the required flat response has been eliminated.

2 Video Processing Board

This board provides automatic black-level control. The video signal from the darkest part of the viewed scene is maintained at a predetermined level despite variations in tube sensitivity and dark current caused by changes in temperature and scene brightness.

3 Video Output Board

Incorporated on this board are the signal voltage limiter, the peak white limiter and the automatic sensitivity control circuit which maintains the brightness of white picture information at a predetermined level. This circuit, together with the black reference control circuit, maintains the contrast range and grey scale of the picture as initially set up despite variations of operating conditions.

4 Line-Scan Board

The line-scan waveform is developed from line drive by an integrated circuit and fed to the line output stage. Feed-back signals derived from the scan coils are used to eliminate any need for linearity controls.

5 Field-Scan Board

This board also employs integrated circuits and uses sampling of the scan current to ensure correct stability and linearity over the temperature range. The only preset controls required, therefore, are for height and shift alignment.

6 Tube Supplies Board

Stabilization of the vidicon cathode current is achieved in this circuit and blanking at both line and field frequencies is added. Protection against tube damage resulting from scan failure is provided by sensing the absence of line and field deflection currents.

7 Mains Lock Board

Eliminates possibility of asynchronous hum interference by synchronization of the camera field frequency oscillator to the mains supply.

8 Oscillator and Counter Board

This optional board may be used in place of the mains lock circuit. It employs a high stability crystal-controlled oscillator to control the pulse timings and is essential when mains and field frequencies are different.

9 Pulse Generator Board

Produces highly stable synchronizing and blanking pulses. The stability is such that adjustment controls are not required.

10 600-Volt Regulator Board

Regulates the high voltage supply to the tube mesh and focus electrode to ensure optimum tube performance. In conjunction with the stabilized focus current, this circuit ensures that refocusing is not necessary between maintenance periods.

11 Focus Current Board

An integrated circuit and control transistor is used to ensure stability of the focus current. This board also provides a stable supply, by means of a short-circuit and thermally protected integrated circuit, to power the logic and other circuits within the camera.

12 Low-voltage Regulator Board

Uses short circuit protected and thermally protected integrated circuits to provide highly stable positive and negative 15V and negative 5V supplies.

13 Yoke

The camera design is such that a wide variety of yokes can be fitted. A standard yoke is normally installed but can be easily changed to customer requirement or operational need.

14 Camera Tube

The performance figures quoted on page 7 are for vidicon operation but the camera is also designed to accept lead-oxide and silicon-diode tubes.

15 Lens Mount

A 'C'-type lens mounting is supplied on the basic camera but alternative lens types are also catered for in the unit design.

16 Spare Board Positions

Two spare board positions are provided for special options and can be used for such features as gamma correction, camera identification, aperture correction, auto-gain, etc.

Reliability

The V327 is a high-performance television camera designed to produce consistent results during extended periods of continuous operation without attention. With this objective, feedback techniques have been employed to ensure stability of performance over wide temperature variations and ageing of components. In order to ensure that reliability is not affected by incorrect preset control adjustment the scan linearity, video amplifier response and d.c. controls normally fitted have all been eliminated by the use of feedback techniques based on the maximum use of proven, readily available, integrated circuits. Controls which are fitted are those normally specified by users or those which are necessary to compensate for initial variations between sensor tubes. After the controls have

been set tube voltages are automatically stabilized and the tube cathode current maintained at the set level during the life of the tube. The low voltage rails are supplied by fixed voltage integrated circuits incorporating overload and thermal protection.

The choice of components has been influenced by the reliability experience obtained on previous television cameras; for example, printed-board components include cermet potentiometers, tantalum capacitors and metal film fixed resistors.

Reliability of electronic equipment is significantly affected by high temperature and care has been taken to reduce power dissipation within the camera housing. It is also possible to separate the power supply and control unit from the camera

itself, thus removing the components generating the greatest heat from the camera.

From initial stages of development to final production, component failures have been carefully examined to ensure that failure modes have been eliminated, and that components are conservatively rated. Each unit is soak tested for forty hours before despatch in order to remove any incipient failures during the early life of the equipment.

The results of extended temperature runs and testing during development and production predict a failure rate better than the calculated mean-time-between-failure of 8000 hours. Camera tube life, which is variable, is not included in the calculated MTBF figure.

Protective Covers

Protective covers for the camera and the camera control unit have been designed for a variety of applications and environmental conditions. A selection of these is shown below but other versions can be produced to customer requirements. The four covers

illustrated are all available in various lengths to accommodate the single or dual unit configuration of the camera channel and a variety of lenses. Weatherproof and rack mounting housings are available for the CCU.



Weatherproof housing Type V4228-01



Dustproof housing Type V4228-02



Case Type V4236

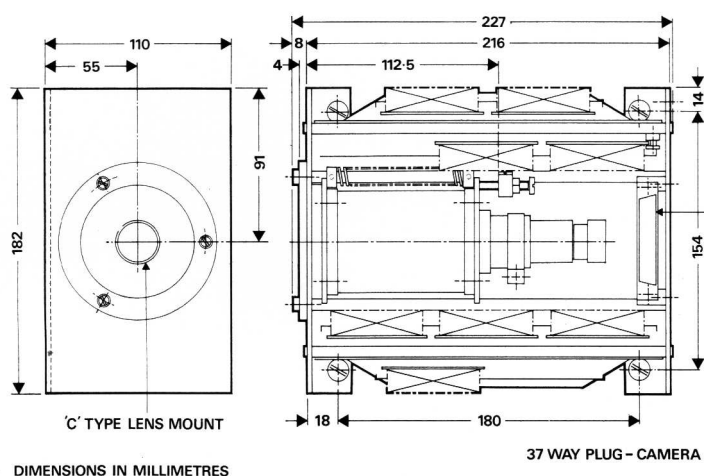


Cover Type V4237

Technical Specifications

Camera Type V3271

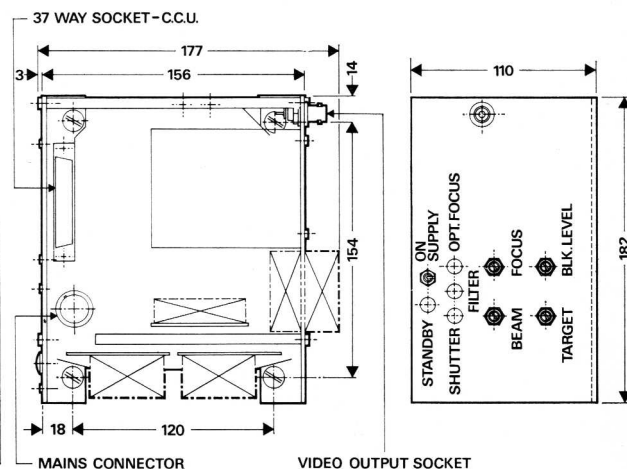
Weight 2.5kg (5.5lb)



DIMENSIONS IN MILLIMETRES

Camera Control Unit Type V3275

Weight 2.7kg (5.94lb)



Environmental

Ambient temperature :

To BS2011 Tests Ab and Bb

–15°C to +40°C for continuous operation (with weatherproof housing)
Up to +55°C under good lighting conditions but performance will be tube limited

Humidity :

Up to 95% at +35°C (in weatherproof housing). BS2011 Test D

Vibration :

To BS2011 Test F (5–35Hz for operation, 5–150Hz transit)

Electrical Inputs

Power supply :

100–125V or 200–250V

48–62Hz or 380–420Hz

Power consumption :

Up to 10VA in the camera module

Not greater than 25VA total

Sync pulses :

Standard form – internally generated 2:1 interlace, either mains or crystal lock. Facilities can be provided for external synchronization by two standard pulses or by mixed sync only

Standby facility :

Facilities are provided for the establishment of a standby condition in the camera (reduced target potentials)

Electrical Outputs

Vision :

Single 1.0V composite or 0.7V non-composite into 75 Ω. Alternatively 1.5V composite or 1.0V non-composite by adjustment of preset controls. Dual output version also available.

Scanning standards :

625/50 or 525/60. Other standards can be provided to special order.

Resolution :

Horizontal resolution better than 600 lines per picture height centre and 500 lines in the corners (800 and 667 lines per picture width respectively)

Positional scanning errors :

Not more than 2% of picture height or width

Signal-to-noise ratio :

When viewing a resolution chart with a highlight brightness of 35cd/m² (10ft. lambert) the signal/noise ratio is greater than 35dB with an aperture of f/2.8 (2.7Lux (0.25ft.C) on faceplate)

With a highlight of 170cd/m² (50ft. lambert) the ratio is greater than 41dB with an aperture of f/2.8 (peak to peak signal : r.m.s. noise)

Auto sensitivity :

2000:1 above 2.7Lux (0.25ft.C) on faceplate

Auto black :

Stable black level set up for vidicon dark current change from 0 to 0.3 μA

Video bandwidth :

H.F. response :

±1dB at 7MHz, capable of adjustment to ±0.5dB

L.F. response :

Less than 10% tilt on 50Hz square wave

The policy of Marconi-Elliott Avionic Systems Limited is one of continuous development and improvement of its products and, therefore, the right is reserved to change without notice the specifications given in this publication

**Marconi-Elliott
Avionic Systems Limited**

A GEC-Marconi Electronics Company

Electro-Optical Systems Division

Christopher Martin Road, Basildon, Essex, England SS 14 3EL

Telephone: Basildon 22822

Telex: 99451

Telegrams: Mareos Basildon Telex