



TECHNOLOGY NOTE

P11 MINIATURE RADIATION-RESISTANT TELEVISION CAMERA

Development criteria

This camera was developed to suit the special operating conditions in an accelerator. It must be radiation-resistant and insensitive to magnetic fields of about 100 Gauss. It must be as small and light as possible and must have remote-control facilities for the optical focusing system. Moreover, it must be insensitive to fluctuations in the mains voltage and the concomitant parasitic effects, highly reliable and easy to maintain.

Design principles

Only nuvistorised circuits can withstand high radiation doses (greater than 10^6 rem). Transistorised circuits cannot withstand doses higher than about 10^5 rem, but they are much more reliable. Accordingly, we have divided the camera into two parts :

- a) the camera head, which comprises a nuvistor preamplifier, the camera tube (vidicon) and the deflection unit;
- b) the control equipment, including the power supply unit, pulse generator, scanning circuits and video amplifier, which are fitted in a cubicle or a rack.

The deflection unit is particularly sensitive to external magnetic fields. It can be very effectively protected, while reducing its bulk and weight as compared to the conventional type of construction, by surrounding it with shielding and by making the camera casing of mu-metal.

The entire deflection unit is mounted on slides, thus allowing the image to be easily focused either manually or with the aid of a motor, even when the objects to be photographed is very close to the lens.

Construction

In practice, the camera may take two forms :

Two-part type : only the camera head with its nuvistorised preamplifier is fitted in the radiation zone. The control racks are arranged, eight on each chassis, in an equipment room.

Monobloc type : the head, fitted with a transistorised pre-amplifier, is arranged in the same casing as the control box. The video signal then comes from the box.

In order to facilitate operation, the direction of horizontal and vertical scanning can easily be reversed by means of changeover switches, and the video signal can be sent back to the camera head for purposes of regulation.

The camera was designed at CERN and it is being produced by CEMEL of Gex (France).

Technical data

Scanning standard : 625 lines, interlaced scanning
Video output : level 1 Vpp, impedance 75 Ohm
Definition at the centre : 700 points (RETMA grid)
Power supply : 220 V \pm 10%, 50 Hz, 18 VA
Dimensions :
 camera head : 82 x 92 x 237 mm
 monobloc camera : 82 x 184 x 234 mm
Weight :
 camera head : 2.6 kg
 monobloc camera : 4.6 kg.

References

For further information, please consult MPS/PO Note 72-31 or contact P. Monnet or J. Robert, MPS Division.