



P4221

THERMAL IMAGING CAMERA

INTRODUCTION

The P4221 is a thermal imaging camera using the P8092 pyroelectric vidicon. It is a self-contained battery-operated unit incorporating a miniature display monitor, and is primarily intended for use as a fire-fighting aid, giving good quality thermal pictures through dense smoke where normal vision is impossible.

ADVANTAGES IN USE

- Provides clear vision through smoke.
- Instantly shows location of fire source.
- Substantially increases fire-fighter mobility in smoke-filled areas.
- Improves fire-fighter safety by making obstacles and hazards visible.

SPECIAL FEATURES

- Suitable for use in flammable atmospheres.
- Wide angle germanium lens.
- Light weight (4 kg)
- TV signal is CCIR compatible.
- Additional remote surveillance and recording possible (fitted with output socket).
- Operates continuously for one hour with one set of batteries.
- Integral viewfinder/monitor gives operator a clear, TV-quality image.
- Self-contained, compact and portable for hand-held use.
- Rugged for tough conditions.
- Constructed to conform with BASEEFA Certificate Standard SFA3009: 1972 (special protection) as applied to sealed equipment.

DESCRIPTION

The camera container is constructed of double walled polycarbonate plastic, which provides thermal insulation, and a high degree of protection against shock and mechanical damage. The container is waterproof and hermetically sealed, and is designed to conform to the special protection requirements of equipment for use in flammable atmospheres.

The display is presented on a cathode ray tube with a diagonal screen dimension of 40 mm, and is viewed through a transparent window in the camera container. A magnifying and collimating lens is provided for the display, giving adequate eye relief and bi-ocular viewing for an operator wearing breathing apparatus.

The camera may be operated from rechargeable or disposable batteries or, for example for training purposes, from a battery substitution unit powered from a mains supply. A battery state indicator is provided, which is visible in the field of view while the camera is in use. The camera container is supported in a webbing sling to which are attached the carrying handles and neck strap.

GENERAL DATA

Dimensions

Overall dimensions	320 x 230 x 250 mm approx 12.6 x 9.0 x 9.8 inches approx
Net weight (including batteries)	4.0 kg (8.8 pounds) approx

Power Consumption

The power consumption is 4.5 W approximately.

Lens

A germanium lens of 18 mm focal length at $f/0.75$ is normally fitted, giving a field of view of 55° approximately. The lens has a hard anti-reflection coating on the exposed surface, and can be cleaned as necessary with an appropriate cloth. The lens is fitted with an automatic servo-driven iris to prevent overload and blooming of the picture when very hot scenes are viewed.

Spectral Response

The response is determined principally by the lens material, and covers the band 8 to 14 μm approximately.

Duration of Operation

The camera requires an input voltage between 9.5 V and 15 V which may be obtained from 10 disposable batteries. 'Duracell' AA or a similar high capacity type will give an operating duration of approximately 2 hours.

Rechargeable cells, for example 8 nickel-cadmium type AA, may be used, giving an operating duration of approximately 1 hour.

An appropriate battery charger is available as an optional extra.

Mains Supply

A battery substitution unit powered by the mains supply is offered as an optional extra.

Operating Modes

The camera may be operated in two modes, 'panned' or 'chopped'. In the panned mode the image on the monitor represents changes in the temperature differences in the field of view, and the picture will disappear if the camera steadily views a constant temperature distribution in the scene. In this mode the camera must be oscillated slightly by the user in order to maintain the image.

In the 'chopped' mode a rotating shutter in the camera chops the incoming radiation, and the image effectively represents the scene temperature distribution when the viewer is stationary.

The temperature discrimination in the chopped mode is approximately half that in the panned mode, but the need to move the camera in the panned mode is often an unacceptable inconvenience. The resolution of the camera is 200 lines per picture height for a temperature difference in the resolution element of 2°C approximately in the chopped mode, and 1°C approximately in the panned mode.

A selector switch on the back of the camera provides chopped or panned operation as required.

External Controls and Connections

The camera is provided with an external switch for on-off and for chopped and panned modes, and with a BNC connector to allow the video output, which is 625 line 50 Hz CCIR compatible, or 525 line 60 Hz at 1 V level in 75 ohms, to be passed to a further monitor or video tape recorder.

ENVIRONMENTAL PERFORMANCE

Thermal Environment

The camera container is double-walled, with the space between the walls filled with plastic foam, and has good thermal insulating properties. It is designed to operate at 60°C general ambient temperature with 10 minutes at 80°C during a run of one hour, representing a typical maximum tolerance for an operator in a fire-fighting situation.

The maximum operating temperature of the tube target is 50°C . The 4 watts dissipated in the working camera gives an increase of internal temperature of

approximately 5 °C per hour. Operation of the camera for one hour as above produces an internal temperature rise of approximately 20 °C. The resultant total temperature rise of 25 °C in one hour therefore sets a maximum starting temperature of 25 °C (77 °F). One hour of operation with less rigorous ambient conditions may be obtained, however, even when the camera (for example in extreme tropical conditions) has been exposed to an ambient temperature of 38 °C (100 °F) for several hours.

Mechanical Environment

Vibration The camera will withstand, in consideration of carriage on vehicles, 2 g vibration from 1 to 3 Hz and 0.5 g vibration from 15 to 40 Hz.

Bump and Shock The camera will withstand 500 bumps of 10 g, 6 ms duration, at the rate of 1 bump per second.

The camera will withstand 10 shocks of 30 g, 11 ms duration.

Dropping the complete unit from a height of 2 metres on to concrete will not destroy the hermetic seal of the container.

Immersion The camera will withstand driving spray and total immersion in water.

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