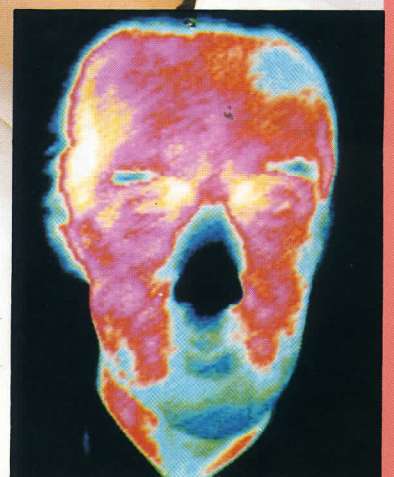
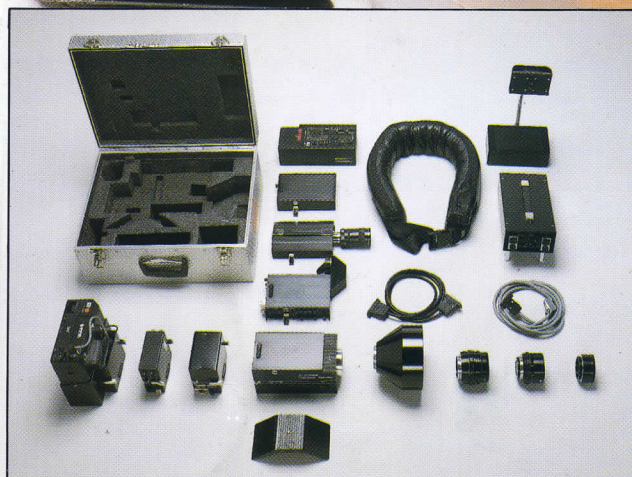
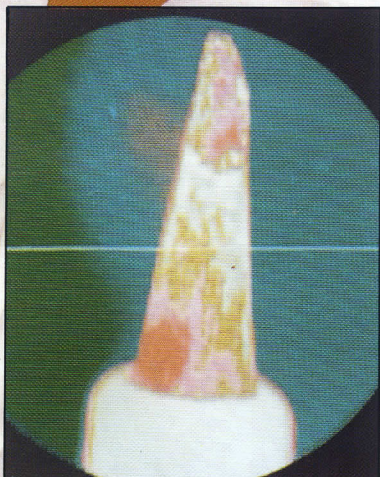
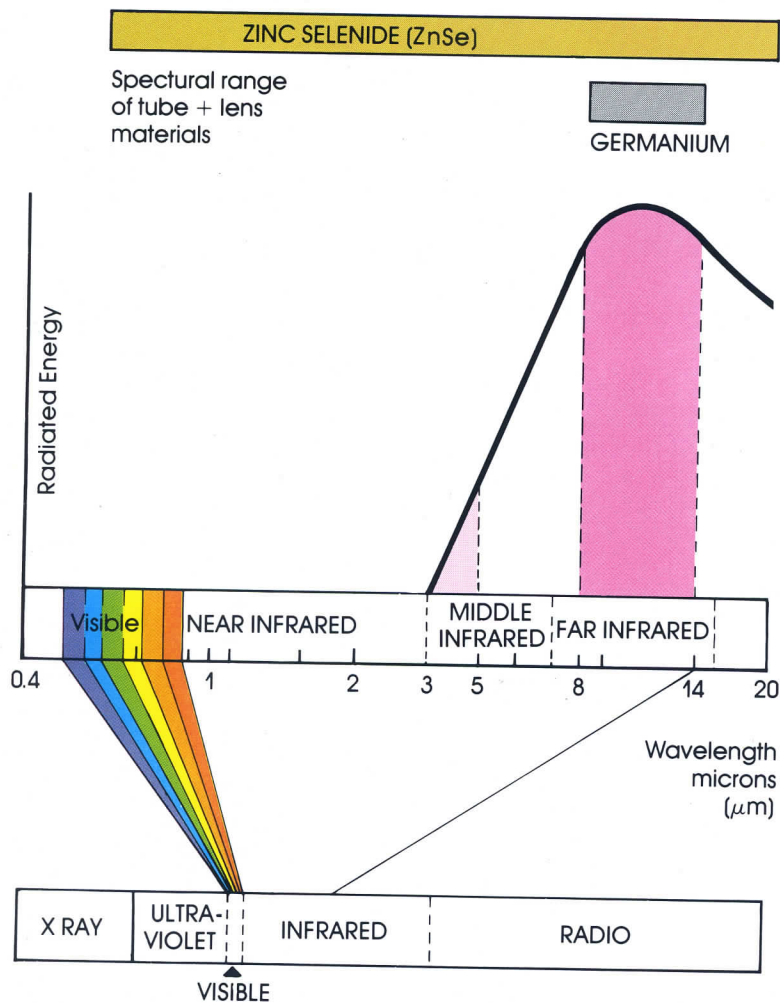


INSIGHT

80 SERIES

THERMAL IMAGING
CAMERA





ADVANTAGES OF USING THE INSIGHT THERMAL IMAGER

- Low cost
- No coolant required.
- Modular approach allowing full flexibility in system configuration.
- Both high quality chopped and pan mode operation.
- Boresighted vidicon camera option for visible image overlay.
- 12 volt operation – Lower power consumption.
- True temperature measurement via dual temperature reference.
- Automatic poling – Can drive soft and hard PEV's including reticulated tubes.
- Full genlocking facilities.
- Low cost compatible computer system
- Filter slide.
- Built-in profiler
- Remote operation option – up to 250m.
- Fully T.V. compatible both in EIA and CCIR standard.
- Digital flicker cancellation via integral field store
- Plug-in colour isotherm option

WHAT IS THERMAL IMAGING ?

All objects above zero degrees absolute (-273°C) give off electromagnetic radiation, the frequency and amplitude of which increase with temperature. Above 750°C the frequency is within the range of the human eye and objects are seen to glow red. The colour and brightness are proportional to the temperature and hence visual pyrometry is possible.

BLACK BODY CURVES

Ever since Sir William Herschel discovered infrared radiation in 1800, man has wanted to image the wavelengths that correspond to the lower ambient temperatures. The black body curve (see diagram) illustrates the emission from an object at 30°C . Atmospheric absorption dictates working in the windows at either $3\text{--}5\text{ }\mu\text{m}$ or $8\text{--}14\text{ }\mu\text{m}$. Within these wavebands energy radiated is proportional to the body's temperature.

EARLY IMAGERS

All thermal imagers gather and focus this radiation from a defined field of view. It is then detected and converted to an effect suitable for displaying to the human eye. From early this century these techniques have been researched and developed, sometimes using principles borrowed from visual television.

The first successful thermal imaging was pioneered in Germany during World War 2 using cooled photon detectors with a narrow field of view scanned through the scene by rotating mirrors. This is the basis of current military and commercial cooled imagers. Whilst producing good results they are handicapped by cryogenics and the cost of high speed precision mechanical scanning.

INSIGHT'S APPROACH

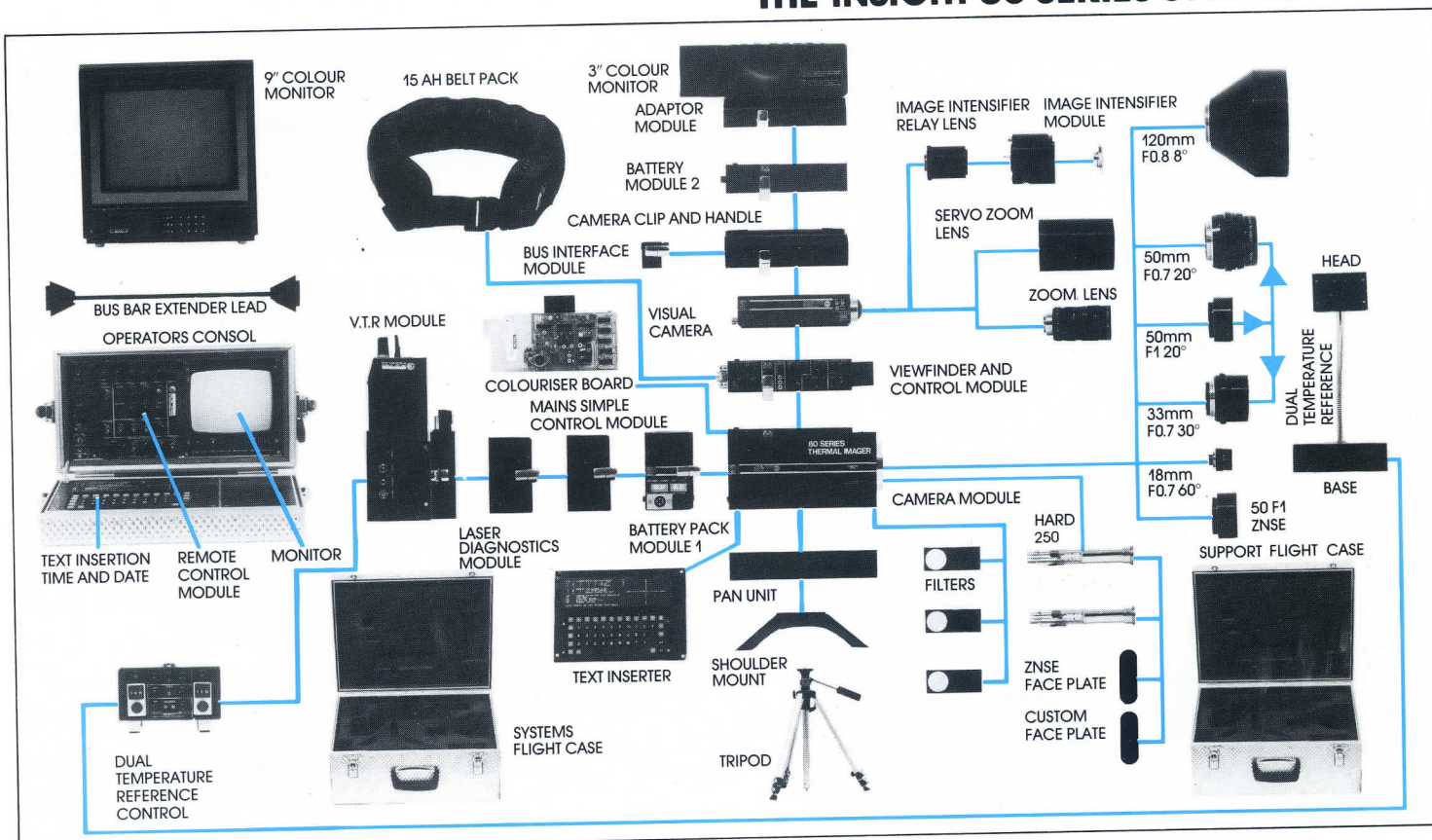
This approach is not pursued in the INSIGHT 80 SERIES. Instead, low cost, modern electronic television techniques utilising a staring array of pyroelectric detectors accessed by an electron beam remove the need for mechanical scanning and expensive cooled photon detectors. Proposed in the 1960's, researched in the 70's and refined in the 80's, the device making this possible is the *Pyroelectric Vidicon* (PEV).

INSIGHT now provide the camera and system technology that brings this device to a level of performance that covers a majority of thermal imaging applications.

Based on 15 years of research into PEV thermal imaging, the 80 Series incorporates the optimum mix of flexibility, performance and features required by today's rapidly maturing thermographic demands.



THE INSIGHT 80 SERIES SYSTEM



The 80 Series is made up of modules using a 25 way bus bar. This allows them to be clipped together in a wide variety of combinations. The benefit of the modular approach is to give complete flexibility when configuring systems.

This caters for tight budgets as well as satisfying most technical requirements. The bus system has capacity for future planned items to be added at a later date without fear of incompatibility or redundancy.

DECIDING ON A SYSTEM MOST SUITABLE FOR YOUR APPLICATION

The one unit common to all configurations is the camera module. It is necessary to decide on the type of tube and lens required for a particular application, how to power the unit and type of controller needed. Further options to consider, include visible overlay camera, (with or without

intensifier) colouriser, dual temperature reference, monitor, VTR, filters, bus bar cable lengths, etc.

Apart from the larger colour monitor these items fit into the system or support flight case.

BASIC TRIPOD OR BENCH MOUNTED

Basic system consists of the camera, tube, lens and mains simple controller. This will allow straight-forward images to be obtained and allow the more important camera functions to be exercised such as gain, black level, focus, etc.

REMOTE CONTROL WITH VISIBLE OVERLAY

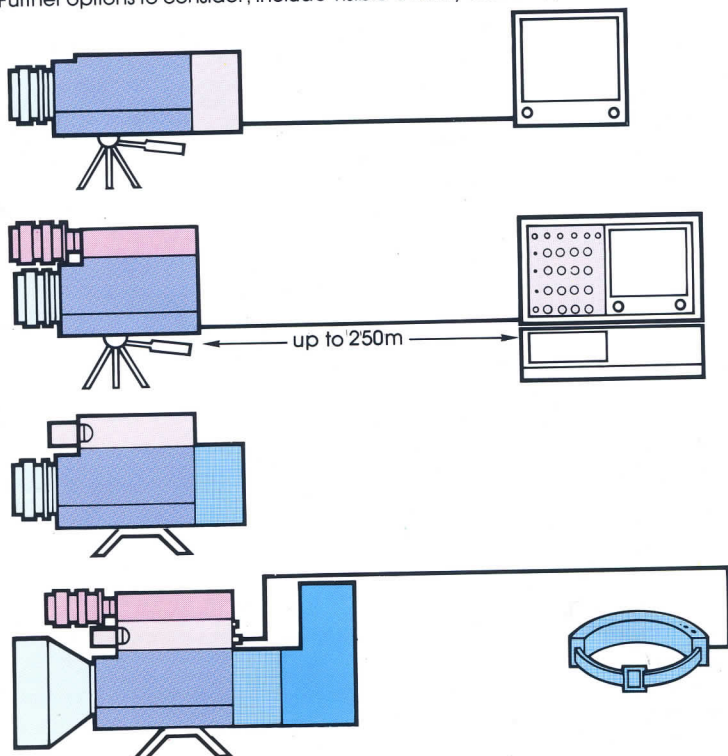
Here the camera is being remotely controlled from the operators rack. Text and date and time can be inserted at the console. The visible camera permits the mixing of the thermal and visible images to aid interpretation.

BASIC SHOULDER MOUNTED

This configuration is for basic shoulder mounted imaging utilising the viewfinder controller shoulder mount and one of the battery modules. In this form it can be used in such applications as monitoring heat losses from buildings and basic surveillance.

LONG RANGE COMPREHENSIVE SHOULDER MOUNTED UNIT

The camera when used with 120mm Lens can detect a man at 600 metres. Additional information is obtained from the image intensifier on the visible camera. Recording and 24 hour duration are possible with the inclusion of the recorder module and battery belt respectively.



THE INSIGHT 80 SERIES COMPUTER SYSTEM



This low cost computer system is fully compatible with the camera and its other accessories and forms a natural addition for those wishing to analyse the thermal images produced by the camera.

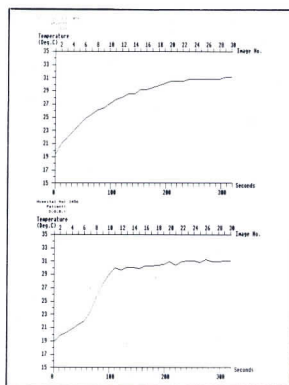
- Features**
- Colour monitor.
 - Basic language with some machine code routines.
 - Compact, self contained portable unit in a flight case.
 - Colour printer for hard copy results.
 - Built-in dual temperature reference.
 - Multi-standard input.

COMPUTER IMAGE ANALYSIS

By taking data from the 6 bit digital port a low cost computer system can be employed for analysis of such parameters as temperature gradients, change of temperature with time and average temperatures of any areas of particular interest. Images can be stored on disc if required for analysis at a later date.

These pictures show the hard copy as produced by an ink jet colour printer and the graphical results obtained by analysing two different areas of a healthy person's hand after a cold stress. Whilst the readings from the palm show an exponential like rise, the finger tip shows a delay before the capillaries open.

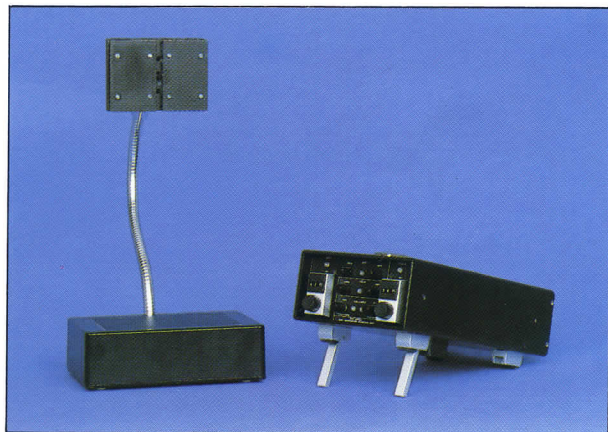
The computer system which comprises a personal computer, a colour printer, dual disc drives, dual temperature reference controller and a colour monitor is housed in a specially designed flight case to minimise trailing cables.



THE 80 SERIES DUAL TEMPERATURE REFERENCE

For the user who needs to know the true temperature of an object the DTR is available as a stand alone unit or can be incorporated into the Computer Package.

- Features**
- Dual References that range from -15°C to $+30^{\circ}\text{C}$ about ambient.
 - Accuracy of $\pm 0.25^{\circ}\text{C}$.
 - Controls black level and gain of 80 Series camera either manually or automatically.
 - Includes camera controls of focus colouriser, profiler, visible overlay, pan, piling, edge enhancement and on/off.
 - Used to calibrate and long term stabilise thermal camera.
 - Optional version available without camera controls and can therefore be used with any thermal imager.



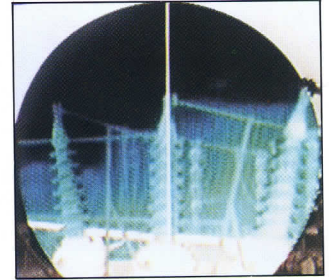
HOW THE INSIGHT 80 SERIES CAN HELP YOU

DETECTION OF 'HOT SPOTS' IN ELECTRICAL CONDUCTORS

Corrosion of cables and switchgear in power transmission systems causes local heating of the area affected. This enables planned maintenance to be carried out before the system fails whilst under load.

Good use of the technique can be found in the shoulder mounted version of the camera as the illustration shows. However to improve the speed of survey work the camera may be mounted in a light aircraft or helicopter thus allowing many kilometres of transmission line to be viewed per day.

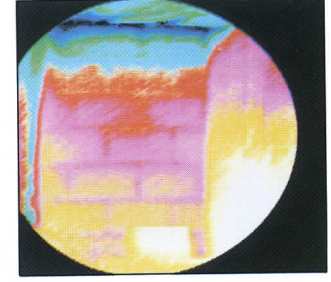
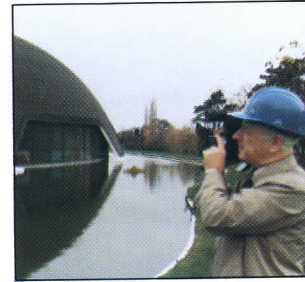
The insertion of the thermal image into the visible image can be put to good effect in this application as it permits the easily located visible image of the conductor to determine camera tracking along its length.



ENERGY CONSERVATION AND STRUCTURAL INSPECTION IN BUILDING AND CIVIL ENGINEERING WORKS

The ability to discern where heat is being lost through poorly insulated buildings (as illustrated) enables architects, engineers, and maintenance personnel to plan effective action to reduce this wasted energy. Similar principles of course apply to the inspection of cold stores and air conditioned buildings in hot climates where heat is entering due to poor insulation.

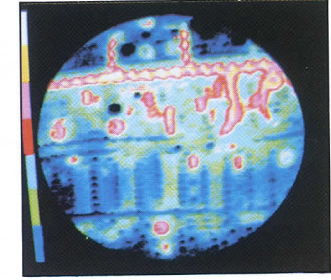
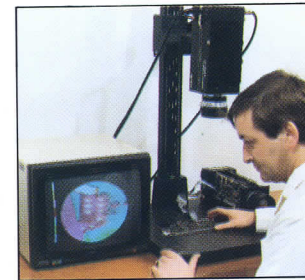
Another useful function the thermal imager can perform is the detection of exfoliation of concrete from the underlying steel reinforcement in bridge decks. Salt spraying can cause corrosion of the steel which in turn lifts off the upper surface of concrete. As the thermal continuity of the structure has now been altered differential warming or cooling of the surface in the morning and evening respectively can be detected using the thermal camera. Similarly, water underlying the cladding on flat roofs can also be found.



THERMAL IMAGING IN PROCESS CONTROL, R. & D. AND OTHER SCIENTIFIC APPLICATIONS

Vertical overhead mounting of the INSIGHT thermal imaging camera facilitates inspection of items on a bench or conveyor as part of test or quality control procedures. In the illustration one of the printed circuit boards in the thermal imaging camera is being run remotely from the camera by the use of an extender lead. Once a thermal 'signature' has been established for a correctly functioning board, faulty elements of circuit may be quickly located by analysing temperature differences.

Scientific uses include gas detection (via the filter slide), pulse thermography, plume analysis and thermography of rotating objects using an optical derotator.



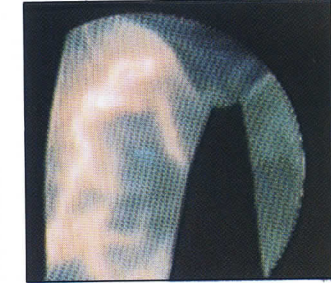
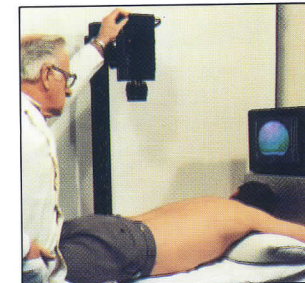
MEDICAL THERMOLOGY

Thermology is the term that has been adopted by the medical profession when thermal imaging is used to view temperature distribution on the human body.

A disease or malady which involves temperature changes on the surface of the body can be studied and in particular their response to treatment.

Typical examples are burns, ulcers, cancer, heat and circulatory diseases such as Raynauds Disease and varicose veins (as shown). Limb viability (prior to amputation); Bedsore detection; Assessment of soft tissue damage (after an accident) are other increasing uses of thermology.

The analysis of the images obtained is generally an important adjunct as this allows temperature averaging, variation of temperature with time and a variety of other valuable parameters to be examined.



SURVEILLANCE

Thermal imaging uses the passive radiation being emitted from objects. It is therefore a valuable aid in night vision to detect human beings and other warm or hot objects such as vehicles. Negative picture can be selected to aid interpretation of the scene as the Landrover shows.

The INSIGHT system shown in use employs a 120mm lightweight lens for imaging at long range. This configuration will allow vehicles to be recognised at ranges of up to 1km. An image intensifier attached to the visible overlay camera on top enables the operator to crossfade to intensified night vision for additional 'visible' information.

The system is ideal for being flown in either light aircraft or remotely piloted vehicles (RPV's) as it is lightweight, compact, low power and does not require cooling. The standard TV. output lends itself to video transmission of the picture back to a ground station.

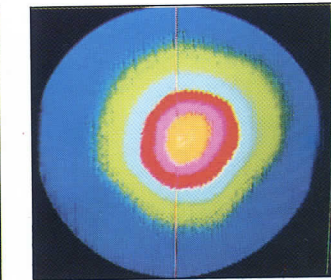
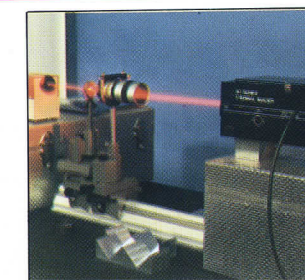


LASER ANALYSIS

The INSIGHT thermal imager is well suited for monitoring and analysing laser beams. The beam is imaged in two dimensions due to the tube being a full area array. The built-in profiler gives an initial indication of beam profile. A false 3D effect to obtain intensity is available when the laser diagnostic module is used in conjunction with an oscilloscope. The colouriser option also gives intensity analysis of a beam.

The standard germanium pyroelectric vidicon tube is ideal for CO₂ lasers or any laser between 8 and 14 micron. For other wavelengths, a zinc selenide faceplate is recommended. For pulse lasers pan mode is selected.

Where a greater degree of measurement accuracy is required a full suite of software is available to run on an IBM AT or HP 6080 (subject of separate literature).



INSIGHT 80 SERIES THERMAL IMAGING CAMERA SYSTEM

BRIEF TECHNICAL SPECIFICATION

THERMAL IMAGING CAMERA MODULE 80/200C

Operation	Chopped mode with digital flicker reduction or pan mode (switchable)
Output signal	1 volt into 75 Ω 625/50 Hz or 525/60 Hz
Weight	1.9 Kg (Incl. tube: excl. lens and colouriser)
Power consumption	<6 watts
Size	203mm x 110mm x 110mm

TUBE 80/25/THS

STANDARD HIGH SENSITIVITY TUBE (HARD VACUUM)

Faceplate	8-14 μ m Germanium (Zinc Selenide 0.6-22 μ m option available) 80/250 THSZ
Resolution	250 TV lines per picture height
Sensitivity	Typically 0.2°C (f0.7 lens)
Life	Better than 5,000 hours

LENSES

GERMANIUM (HIGH RESOLUTION)

18mm f0.7 (60° angle of view)	wt 0.1 Kg	80/221 IRL
35mm f0.7 with Iris (32° angle of view)	wt 0.8 Kg	80/222 IRL
50mm f0.7 with Iris (18° angle of view)	wt 0.6 Kg	80/223 IRL
50mm f1.0 singlet (18° angle of view)	wt 0.2 Kg	80/224 IRL
120mm f0.8 (8° angle of view)	wt 1.25 Kg	80/226 IRL

ZINC SELENIDE (LOW RESOLUTION 0.6 - 22 μ m)

50mm f1.0 singlet (18° angle of view)	80/225 IRL
---------------------------------------	------------

Note: All lenses have Wreathall mount as standard. Special lenses supplied to order.

COLOURISER BOARD 80/203CB

Operation	Eight colours PAL or NTSC encoded O/P & RGB O/P
Power Consumption	<2 watt
Weight	0.1 Kg

VIEWFINDER AND CONTROLS MODULE 80/241 MVC

Tube	2" diagonal
Size (overall)	100mm x 170mm x 44mm
Weight	0.7 Kg
Power Consumption	<1.0 watt
Controls: Display mode	Insert/Mix Select Mix Colour/Black and White Profile
IR Controls	Gain Poling Black level Pan Focus Edge enhance defeat Set $\propto$ focus Negative Iris
Visible Controls	Zoom Focus } When lens is Iris } motorised Horizontal Shift Vertical Shift Visual racking Source selector
Power	Pan Manual/ Automatic } Used with Left limit } Pan and Tilt Right limit } option Rate Tilt
Direction controls	

MINIATURE CCTV CAMERA 75/029CM4

Resolution	600 TV lines per picture height with Vidicon Tube
Tube	2/3" Vidicon, Newvicon or Silicon Vidicon
Lens	12.5 - 75mm f1.8 Zoom
Weight	1.1 Kg incl. tube, lens, clip and bus interface module
Power Consumption	<2 watts

BATTERIES

BATTERY MODULE 80/232MB1

Capacity	2.5 Ampere hours 12v
Size	110mm x 110mm x 70mm
Weight	1.4 Kg

BATTERY BELT 80/199BBP

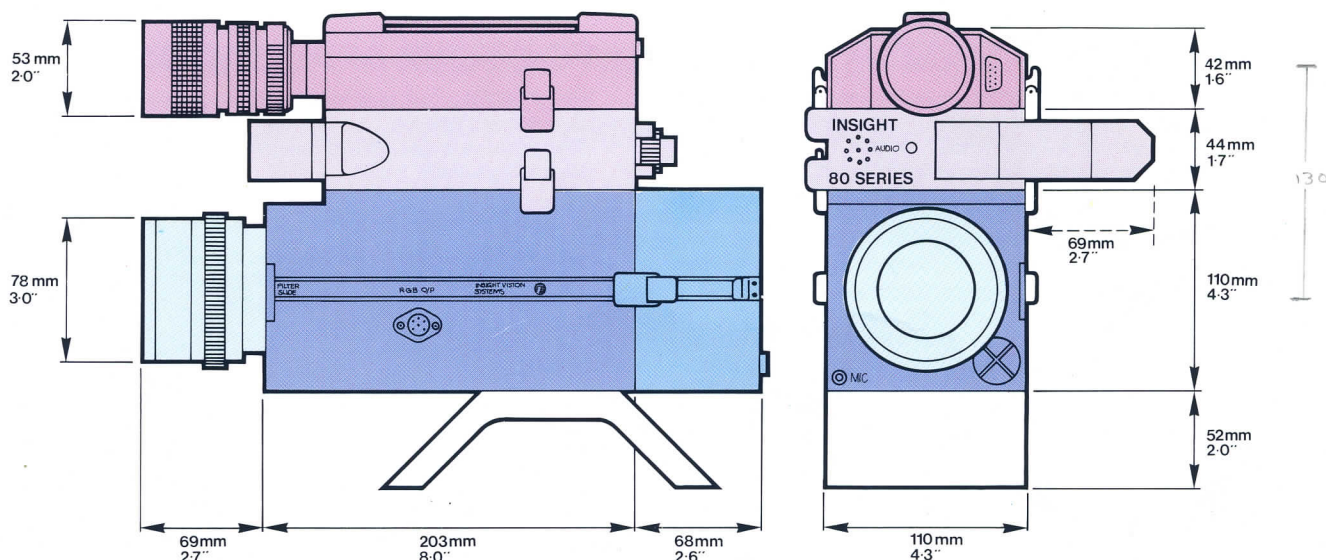
Capacity	15 Ampere hours 12v
Weight	6.5 kg

MAINS SIMPLE CONTROL MODULE 80/239MPC

Output	14v at up to 2A; powers camera and recharges battery
Size	110mm x 110mm x 50mm
Weight	1.5 Kg
Controls	Operates main camera functions when viewfinder or dual temperature reference not in use.

WARNING

The radiation seen by an instrument viewing an area on an object is proportional to the objects temperature times its emissivity plus the objects reflectivity times the radiation falling on the object. It should also be borne in mind that the radiative and reflective properties of a surface can vary with the angle of view. Further, the net radiation is filtered by the spectral absorption of any medium between the instrument and object. Thus temperature measurement by radiometry must be exercised with care under known conditions. Fortunately, this is generally possible.



We reserve the right to change the specification of this equipment without notice to accommodate continuing developments.



INSIGHT VISION SYSTEMS

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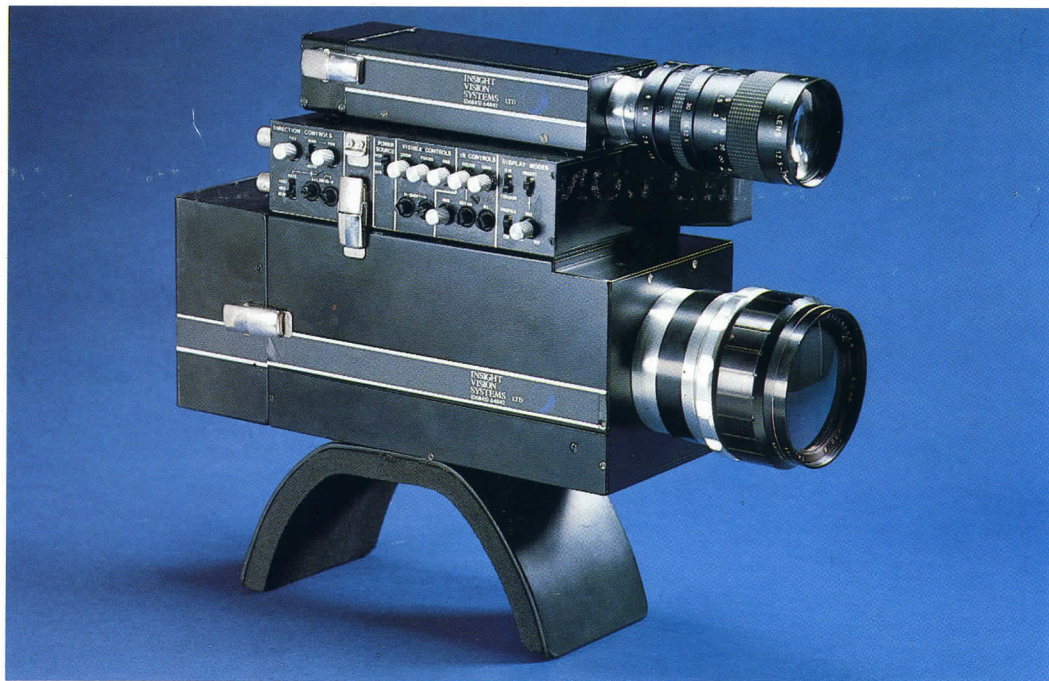
INSIGHT VISION SYSTEMS INC.

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Telex: 898111
Fax: (301) 628 0004

*The Pyroelectric Vidicon Camera Tube has been available for
OVER 10 years this is the Camera System it deserves*

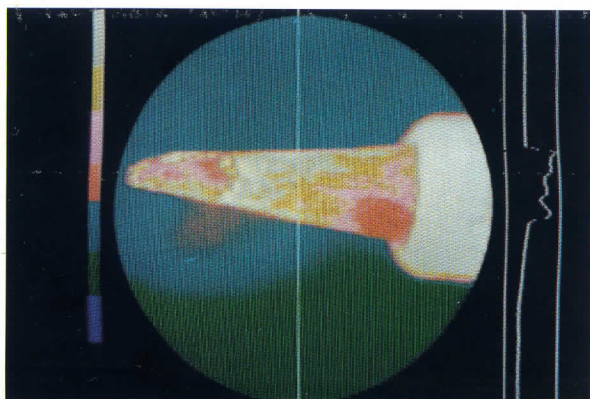
THE INSIGHT 80 SERIES THERMAL IMAGING CAMERA SYSTEM



Compare these features with other systems

- Modular system with true flexibility of configuration via interconnecting bus bar.
- Chopped mode operation with digital flicker reduction giving real TV quality.
- Low power consumption in a compact lightweight design.
- Removable display, including all operator controls, by up to 250 metres.
- Automatic Poling. Drives both soft and hard vacuum tubes including reticulated tubes.
- Clip on 12v battery module, mains/charger module, laser diagnostic module.
- Built-in profiler—plug in colouriser option.
- Clip on miniature boresighted TV Camera allowing full overlay.
- Operation from tripod or shoulder mount.
- Built-in pan table option—Servo operation with autopan facilities.
- Can be used with all known PEV Lenses.
- Simple operation with cassette VTRs.
- Full synchronisation to external composite video (including colouriser).
- Filter slide.
- Future safe design to allow further modules and accessories pending tube and electronics development.

PLUS a host of other features for improved picture quality and ease of use.



SOLDERING IRON TIP SHOWING TEMPERATURE VARIATION ALONG ITS LENGTH
(COLOURISER AND PROFILER IN OPERATION)

Applications include

- Industrial process monitoring.
- Night surveillance.
- Medical thermography.
- Fire detection and fighting.
- Scientific research.
- Energy conservation.
- Laser beam analysis.
- Spectral analysis.
- Nuclear monitoring.



INSIGHT 80 SERIES THERMAL IMAGING CAMERA SYSTEM / BRIEF TECHNICAL SPECIFICATION

THERMAL IMAGING CAMERA MODULE (80S/CAM)

Tube Operation	Soft or Hard vacuum PEV
Minimum resolvable temperature (f0.7 lens)	Chopped mode with digital flicker reduction or pan mode (switchable)
Output signal	50 TV Lines 0.2°C
Weight	150 TV Lines 1.0°C
Size	1 volt into 75 ohms 625/50 Hz or 525/60 Hz
Power consumption	<2 Kg
Uniformity of response with FOV	110mm x 110mm x 190mm
	<7 watts
	<±10% of camera to object temperature difference

VIEWFINDER AND CONTROLS MODULE (80S/VFM)

Tube	2" diagonal
Size (Overall)	100mm x 170mm x 44mm
Weight	<0.7 Kg
Power Consumption	<1.0 watt
CONTROLS - Display mode	Insert/Mix Select
	Mix
	Colour/Black and White
	Profile
- IR Controls	Gain
	Black level
	Focus
	Set ∞ focus
	Iris
- Visible Controls	Zoom
	Focus
	Iris
	Horizontal Shift
	Vertical Shift
- Power	Source selector
- Direction Controls	Pan
	Manual/Automatic
	Left limit
	Right limit
	Rate
	Tilt
	Poling
	Pan
	Edge enhance defeat
	When lens is motorised
	Used with Pan and Tilt options

MINIATURE CCTV CAMERA (75S/CAM)

Resolution	600 TV Lines picture height with Vidicon Tube
Tube	2/3" Vidicon, Newvicon or Silicon Vidicon
Lens	12.5-75mm f1.8 Zoom
Weight	<0.8 Kg
Power Consumption	<2 watts

BATTERY MODULE (80S/BM1)

Capacity	2.5 Ampere hours 12v
Size	110m x 110mm x 70mm
Weight	1.4 Kg

COLOURISER BOARD (80S/CB)

Operation	Eight colours PAL or NTSC encoded O/P & R.G.B. O/P
Power Consumption	<2 watt

MAINS SIMPLE CONTROL MODULE (80S/MPCM)

Output	14v at up to 2A Powers camera and recharges battery
Size	110m x 110mm x 50mm
Weight	1.5 Kg
Controls	Operates main camera functions when viewfinder not in use.



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