

WASC 634

Photography in Explosives  
Research

Stanley W. Bowler

The British Journal of  
Photography.

1 November 1968

vehicle, due to be launched from Woomera early next year. The new re-

David Morgan, though not a photographer by profession, has had exten-

**Kodak Price Reductions**  
Reductions in the prices of their Carou-

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# The British Journal of PHOTOGRAPHY

Hanimex (UK) Limited announce their acquisition of the Toshiba agency. They will be handling the entire range of audio equipment: radios, record players, radio-grams, tape recorders, hi-fi amplifiers, television receivers, light domestic appliances and batteries. This equipment will be introduced to the trade at receptions up and down the country.

## Kodak Exhibition

The display of colour photographs by Max Hafler at Kodak House, Kingsway, London WC2, mentioned in the Journal last week, has been extended to 29 November.

## 'The Sunday Times' Lecture

On Friday, 4 October 1968, *The Sunday Times* gave a major lecture to leading Japanese camera manufacturers at photokina, aimed at stimulating interest in a large-scale advertising feature in the Magazine. It was given in Japanese and accompanied by slides which outlined the potential of the British camera market and the value of a co-operative advertising feature involving most leading Japanese camera brands.

We understand that Japanese industrialists who were present at the lecture and subsequent reception showed considerable surprise and satisfaction at the fact that a British newspaper had taken the trouble to put its case to them and expressed the hope that this example would lead the way to greater contact between the British press and Japanese industry.

## The Photographer—Editor

The Institute of Incorporated Photographers has appointed David Morgan MIPR as editor of its monthly journal, *The Photographer*. The former editor, John Blaxland, died last August. Previous occupants of the chair have, for the most part, been professional photographers first and editors second. The new appointment reflects a change in IIP policy in laying an emphasis on professional editing.

## Open Lecture on E4

The Association of Photographic Technicians are holding an open meeting at 6.30 for 7pm on Tuesday 19 November at Kodak House, Kingsway, London. The lecture/discussion on the Ektachrome E4 process is being given, and non-members are invited. Ticket applications should be sent to Peter Newton, 25 Preston Waye, Harrow, Middlesex.

## North of Thames Annual Conference

A late addition to this conference programme is that David Cole FIIP, Hon FRPS, DGPh of Ilford Ltd will talk on the Cibachrome print process.

The conference takes place on 17 November, 09.00 hours at the GECB Lecture Theatre, Newgate House, Nr St. Pauls. The conference is at present sold out, but news of last minute 'returns' may be obtained from John Road, of North Thames Centre at 01-907 2331.

## BKSTS Film '69

The British Kinematograph Sound and Television Society is to hold an international film technology conference and exhibition from 23 to 27 June 1969.

Termed Film '69, the latest techniques in motion-picture-film usage will be presented and discussed, to the benefit of engineers and crews in fields as diverse as advertising, education, industry, research, public relations and medicine. All facets of picture and sound recording and production will be under review, as will the pros and cons of the gauges.

Film '69 is the first of a series of such conferences catering exclusively for the professional user to be held in London. This first event will be at the Royal Lancaster Hotel.

Besides a large equipment exhibition there is planned a series of visits to studios, plant laboratories, theatres, etc. For further particulars contact The Secretary, British Kinematograph Sound and Television Society, 110-112 Victoria House, Vernon Place, London WC2. Telephone: 01-242 8400.

At the same time, Kodak announce the introduction of a new zoom lens for Carousel projectors: the Vario-Projar 70-120mm lens retailing at £18:17:8d.

## Recent Acquisition

The Ayling Industries group of companies of King's Road, Horsham, Sussex, has announced its acquisition of the business of Ross, well-known manufacturers of binoculars, lenses and scientific instruments. Ross optical equipment first appeared in 1830 and will continue to be independently manufactured and marketed at home and abroad by Ross Optical Limited with the full backing and support of the new group's services.

## New Headquarters, New Division

The Photo Products Group of Bell & Howell Limited has moved its international headquarters from Brentford to Wembley. The new address is: Alperton House, Bridgewater Road, Wembley, Middlesex (telephone: 01-902 8812). Already at Alperton House is the headquarters of Bell & Howell A-V Limited, the company through which Bell & Howell Limited market their projectors, cameras and other photographic products in the United Kingdom.

The group has also set up a Video Systems Division to handle the home and international distribution of the new Bell & Howell closed-circuit colour television range, which, it is claimed, provides colour and sound of broadcast quality at an exceptionally low cost. It comprises a colour TV camera, a colour video recorder and a 16mm film chain, enabling colour films to be transmitted into a number of classrooms or other viewing locations from a central point.

## Price Reduction

Key Ring Studios of 33 Coronation Street, Blackpool, inform us that, as a result of a Customs and Excise ruling, their Micro-Viewer keyring, which has been subject to approximately 50% purchase tax since the last Budget, will in future be sold tax-free.

# PHOTOGRAPHY IN EXPLOSIVES RESEARCH

by STANLEY W. BOWLER, FRPS

Although its earliest history is a little obscure, it is fairly certain that a gunpowder factory has existed in the Lea Valley in Essex, on a site near Waltham Abbey, since the days of Queen Elizabeth I. Gunpowder was the sole product of the factory for several hundred years, but the first plant for making guncotton was started in 1872 and a second and larger one in 1885. Later, in 1891, nitroglycerine and cordite were made. Other explosives, such as TNT and RDX, have followed since the turn of the century.

Since the end of the war the activities have changed from production to research, mainly on liquid and solid propellants, including plastic propellants for rockets of all kinds. The Explosives Research and Development Establishment is now part of the Ministry of Technology. About 20% of the total effort is devoted to work on high explosives, about 50% to solid propellants and the remaining 30% to the fields of physics, chemistry, the applications of polymers and the design of high strength composite materials.

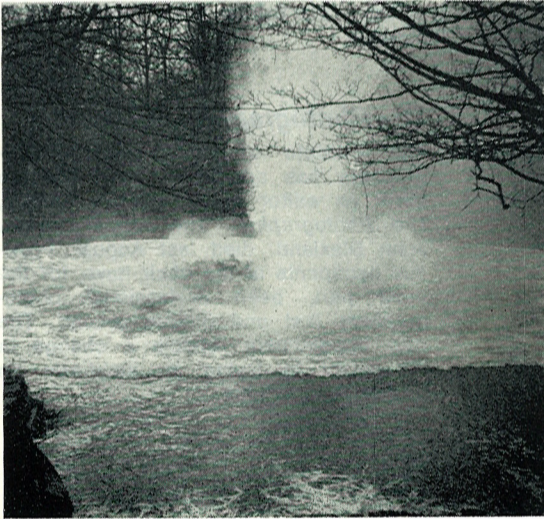
In contradistinction to many other Government research establishments there is no central photographic section and each of the various laboratories handles its own photographic work. This may range from conventional photography of machines and equipment for records, to photomicrographic work, sequence photography and high-speed photography.

Naturally, the photography of explosions is the most spectacular application but the making of interesting pictures

is by no means the prime aim and object. In some instances single pictures are taken for record purposes, as in the case of the underwater explosion in Newton's Pool. Eight ounces of high explosive in a million gallons of water cause quite an upheaval.

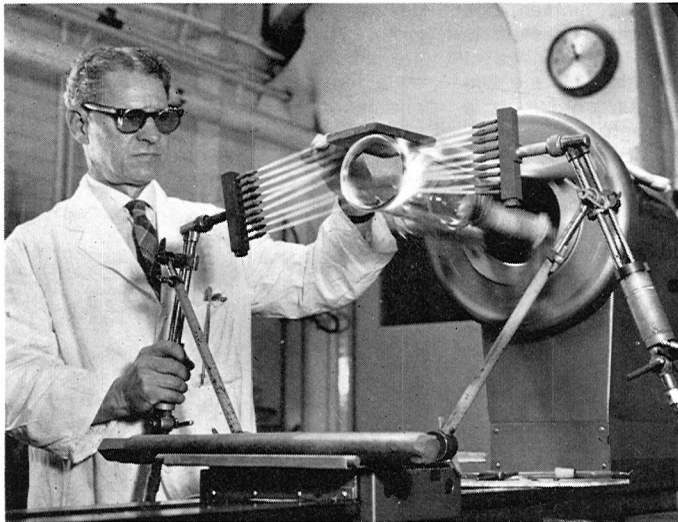
The same subject provides an interesting sequence of pictures, in this instance recorded with a *Robot* camera at a rate of 1 picture every two seconds. Apart from the visual interest in the way in which the explosion displaces the water the set of pictures provides specific information to the scientists. In addition to the pictures themselves other recording devices are used close to the explosive to measure at very high rates the changes in pressure and so on.

In the workshops and laboratories of this establishment there is a great variety of research carried out and by no means all of it is concerned with explosives. As is usual, a good deal of the more specialised equipment is made in these workshops and a typical example of glass working is illustrated. In an entirely different field, that of the reinforcement of metals and plastics with 'whiskers' (needle crystals) or with extremely fine fibres to produce composite materials with enhanced strength and other attributes, photomicrography is used as a routine recording medium. A typical example of one of these records is shown, which gives some idea of length and diameter of the fibres employed. The width of the record is about 1.6mm. The search for inexpensive fibres with optimum properties is continuing — at the present time specially selected and sorted asbestos fibres



appear to offer promising results. Other materials include silicone carbide and silicon nitride whiskers produced by vapour-phase chemical reactions.

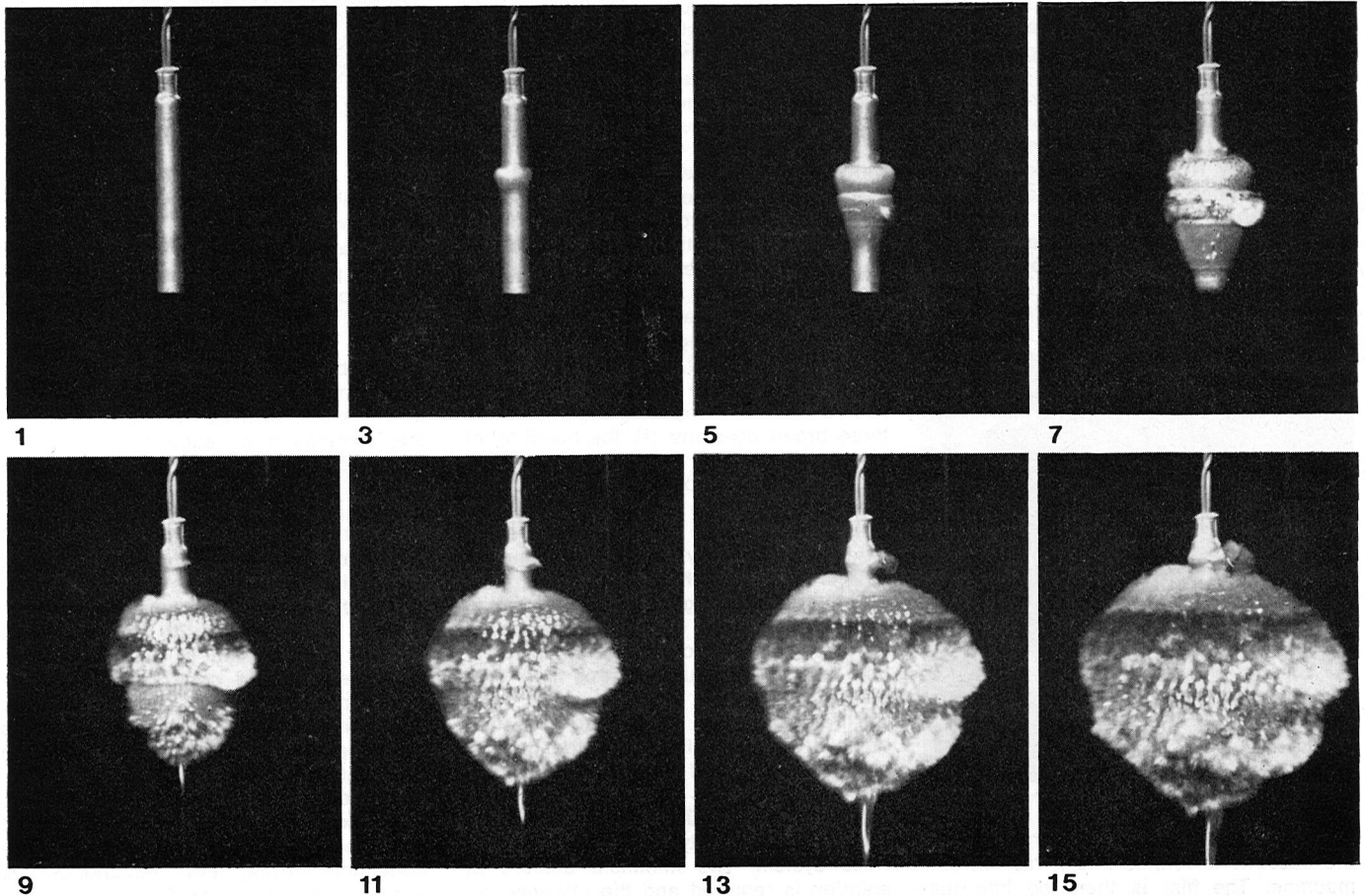
Returning to the use of photography and high-speed photography in the Explosives Section, a variety of equipment is used here, including 4 x 5in., 6 x 6cm and 35mm still cameras. *Eastman-Kodak* and *Hycam* 6mm high-speed motion-picture cameras (the latter running up to 9,000 full-frame pictures per second and double that number in the half-frame mode of operation) as well as two *Beckham and Whitley* ultra-high-speed cameras. One of these is a *Model 189* with framing rates up to 1,250,000 pictures per second by using the 17,000 rpm helium gas turbine, 4,000,000 pictures per second, while the other is a *Model 339B* streak camera with a writing speed of 8.5mm per  $\mu$  second. The



*Beckman and Whitley Model 189* is used for such work as, for example, the recording of exploding detonators. A sequence from such a recording is illustrated here.

Alternate frames from the recording, serially numbered 1, 3, 5, etc., represent twice the actual time interval of 0.8  $\mu$  second which is 1.6  $\mu$  second; the exposure time for each picture is 0.3  $\mu$  second. Once again, a serious application of an advanced type of photography provides not only information about the detailed behaviour of a rapid event but also an interesting pictorial sequence of pictures.

I am indebted to Dr L. J. Bellamay, the Director of The Explosives Research and Development Establishment at Waltham Abbey, Essex, for permission to visit the laboratories and workshops and to his staff for dealing with a number of queries and for supplying the photographs which illustrate this contribution. All of them are *Crown Copyright Reserved*.



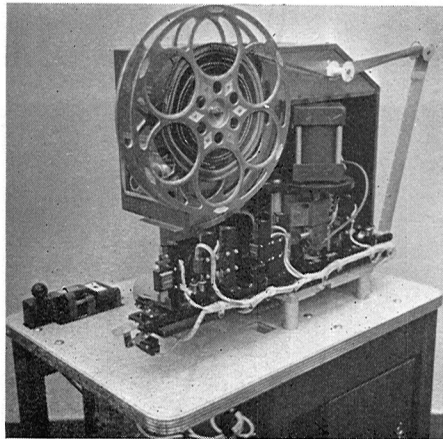


# COMMERCIAL PROCESSING EQUIPMENT AT PHOTOKINA

It would now seem that commercial processing equipment for the bulk handling of multi-strand operations on both black-and-white and colour films and paper has reached a peak of development and production. The latest machines will deal with greater quantities of material at higher speeds. These developments, however, bring in their train demands for more precise control equipment and accessories, as well as the need to feed and to take away from them the increasing output of negatives, transparencies and prints or enlargements. To off-set the capital cost of such equipment the labour charges in any modern laboratory must be reduced if the full benefit of automation is to be realised and the cost to the customer kept at a reasonable level.

As an example of the kind of problem which arises, the extraction and joining together of lengths of film from 126 and 35mm cassettes is a time-consuming task. Therefore, if advantage is to be taken of the greater input to processing machines which is now available some mechanisation at the beginning stage is essential.

The equipment provided for handling 126 cassettes by Standard Photo Service Incorporated (represented in the UK and in Europe by Refrema of Roskilde, Denmark, on whose stand it was examined) is itself quite complex but is simple in operation. Identification of the cassette is provided by one of a pair of similarly numbered self-adhesive labels, the other being stuck on the customer's docket. The



cassette is then broken open mechanically, the film held by the operator while the cassette is loaded into a rack in the machine. The film is then fed into the

in-take track where it is picked up and drawn forward by edge rollers until it comes to a stop. At this moment the number stuck on the empty cassette is photographed on to the leading edge of the blank leader of the film . . . the film then moves forward again until it butts against the previous length of material. Sensing devices then bring the splicer into operation.

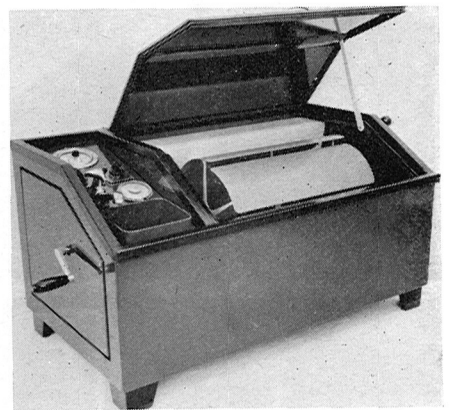
This part of the mechanism cuts off the required length of heat-sealing tape, lays it across the junction and an air-operated ram, with a heated platen, descends and bonds together the two lengths of material. On the withdrawal of the ram the film is wound on to a take-up spool just far enough to leave the trailing end of it in the splicing gate. The machine is then ready to repeat the sequence of operations. At each stage of the passage, cutting, splicing and so on of the film there are electro-mechanical sensing devices which control the operation of the machine — as an example, the machine will differentiate between 12- and 20-exposure films so that presorting is unnecessary. Under factory production conditions this equipment has made up to 300 splices per hour; a rate of one film handled every 12 seconds, which is within most operators' capabilities.

Agfa-Gevaert also have similar equipment for this pre-processing stage, which in the 35mm cassette version will handle up to 600 films per hour. In this case, though the method of identification is by the application of a numbered label and not by direct photography of the number on to the film itself.

For the general processing of sensitized materials there would appear to be three broad divisions (i) the handling of single pieces of film or paper with manual control throughout the sequence of operations, (ii) the automatic processing of single or small quantities using 'one-shot' chemistry, and (iii) continuous bulk processing with one or more strands of material passing through the equipment. But whatever the method employed far greater attention is being paid to time and temperature control than ever before.

Three examples of typical 'one-shot' chemistry units will indicate the general trend in design of this class of equipment. The first is the *Colenta 40* by Johannes Bockemühl (5285 Derschlag) which is a drum-type machine on the Huss system. The minimum amount of solution is required and the intermediate

rinsing water follows the same path as the processing solutions so that there is no carry-over. Agitation is by electric-motor drive; temperature control within the processing compartment is effected by a thermostatically-controlled warm-air circulation system. A variety of drums of varying width and capacity can be supplied to cater for flat- and roll-films as well as for paper.



Merz & Company of 7911 Oberelchingen showed a new *Unitub* apparatus, the Type Merz S 4R, which they classify as a semi-automatic equipment. As its name implies processing is carried out in long cylindrical tubes for which high standards of agitation and uniformity in processing are claimed. The tubes not only rotate backwards and forwards about their longitudinal axes but also tip gently in a see-saw fashion from end-to-end. At the completion of each stage or after intermediate rinsing the tubes are tipped up far enough to empty the contents quickly and cleanly of solution or water.

The third example is the *Metorette 110* (Apparatebau Paul Schmeck GmbH of 5900 Siegen) which is comparable in size with others of this type, being about 5ft 6in in length by 2ft 2in from front to back and 3ft 4in in height. Thermostatic temperature control is again featured up to 40°C with a tolerance of  $\pm 0.2^\circ$ . The kind of saving in solutions which can be effected is illustrated by the fact that the smallest material holder requires only 300cc. Associated with this processor is a temperature-controlled stock-solution system with seven 15 litre containers having level indicators. It is known as the *Metotemp 1*.