Mr. T. Barkley

WATS ON

JANUARY, 1965

J52/165

C

CUSTOMERS SPECIFICATIONS

Everyone engaged in the job of selling will appreciate the importance of obtaining an exact specification of requirements from any particular customer. It is not sufficient to try and persuade a customer that any instrument will meet the demands of the work involved and a salesman should always try and demonstrate how a certain instrument will do the work but this can only be done once the specification is known.

We have lost orders recently as a competitor has beaten us to it on the question of the right instrument for the job. In one case in particular, no fault could be attributed to the salesman concerned as the customer, after at first insisting on a quartz iodine bulb as a source for each of the number of instruments involved, was then gullible enough to accept a less efficient microscope without this lamp. This demonstrates two things, (1) that the customer can change requirements in mid-stream and this may at times be due to the amount of money available and (2) an order is never obtained until you actually hold the piece of paper on which it is written. There is certainly one thing we can learn from this particular instance - that we should never fail to follow up our demonstrations and quotations in the shortest possible time. There can be no objection from the customers point of view for a representative to call and ask to be assured that they have in fact received a quotation from Barnet and ask whether or not it was satisfactory. Each representative must use his judgment on such occasions as time is too valuable to follow up every single quotation, when the time could be profitably used calling elsewhere.

To return to the main theme however, which can bear being repeated,

a) It is vital to understand your customers requirements and the specification of the instrument to the job.

b) As a result of one, a suitable instrument can be offered and no opportunity should be lost to demonstrate the particular features of the instrument itself.

WATS ON

J53/165

C

PRODUCT NEWS

PROJECTION BASE

These bases which incorporate the 100w quartz iodine bulb, will become available from production in June this year and where demonstrations of the prototypes have already been given, it appears to be well received. An interesting feature of this bulb is its life which is 40 hours at the full 12v. rating. Only in exceptional circumstances such as oil immersion projection over long throes would it have to be used at 12v. and in most cases 9v. would be adequate. The life at 9v. is many thousands of hours.

The Service 3 microscope with projection base will be very competitive with the G. & S. Conference microscope and full price details will be sent to you shortly.

RESEARCH STEREO MICROSCOPES

These instruments will, in the near future, have certain parts finished in hammer grey similar to the Eight Fifty range. The parts are confined to what is known as the body slide but some of you may know it as the standard lamp. The other part that will appear in the hammer finish is the horseshoe foot. This rationalisation of finishes for the Stereo range will will enable us to present a more complete picture of the complete range of Watson Stereos in the new catalogue which is in the course of preparation. It may also enable us to use works drawing numbers instead of the usual code numbers. This latter move will considerably simplify production methods and avoid any possible confusion when transmitting code numbers into drawing numbers. Alternative hammer finishes are being investigated so as to provide a greater contrast with the grey enamel and should a suitable one be found, the complete range will be finished in this way.

DUST COVERS

All microscopes are now being supplied with a dust cover free of charge and replacements will still be obtainable under codes 618 and 619. The price of these covers will be as follows:-

Code No. 618 - Size 16" x 9" 5/6d. each.

Code No. 619 - Size 17" x 11" 6/-d. each.

WATS ON

J54/165
C

SERVICE 3 CASES

As many of you will have noticed, in line with other manufacturers we are separating the case from the instrument itself in the new Service 3 catalogue. There seems to be a trend towards the use of plastic dust covers for student microscopes, but it should be remembered that any opportunity to sell a case with the instrument should not be lost.

Following a number of complaints regarding the securing holes of Service 3 cases, an investigation has been carried out and a discrepancy between the positioning of the holes relative to the holes in the microscope base has been established. This has now been corrected and the complaint should not arise in the future. A further possible cause of complaint, namely the length of screws, has also been rectified by the use of a longer screw which will give adequate engagement.

PRODUCT OF THE MONTH

Every effort should be made to sell the rather large stock of Zoom Stereo arm rests and there seems no reason why these cannot be offered with the conventional range of Stereos both to new and existing users. If, of course, you prefer to sell a Zoom Stereo with each pair of arm rests, we shall have no objection.

WATS ON

J55/165
C

UNIVERSITY NEWS

Dr. Ian C. Roddie, Reader in Physiology, Queens University of Belfast has been appointed to the Chair of Physiology in the same University. The following Lectureships have been announced at Keele University:- V.H. Dundas-Grant to Department of Education and Dr. D.O. Hughes to Department of Chemistry. Professor J.F. Sutcliffe has been appointed to the Chair of Plant Physiology, University of Sussex. He comes from Kings College, University of London where he was Professor of Botany.

WATS ON

J56/165

C

EXPORT NEWS

Some interesting facts and figures are to hand from our Export Department which it is felt will be of interest to you all. During the last quarter of 1964, our Export turnover in Barnet Ventilators to Spain was well over £4,000. The figure for Austria, which is a comparatively small country, also for the Barnet Ventilator was £2,500. On the microscope side, our Agents in Canada have been successful with the microprojector and are now selling at the rating of something like one every other month.

Whilst the Service 3 is not doing particularly well in the United Kingdom, the Export Department have just received an order for 100 to ten different schools in Singapore. Another interesting market is France, where our microscope turnover has increased from £2,900 in 1963 to over £6,500 in 1964. We have recently obtained an order from Yugoslavia for interference equipment which is the first received from that country since 1953. Again in Burma signs are that things are looking up for Watsons, where during the last quarter of 1964 orders were received for all instruments to the value of £4,500.

It is often felt that Mr. Willoughby's efforts go unheralded and it should be remembered that he is solely responsible for export of all equipment and these successes must be encouraging and form the foundation of what must be a future of increasing turnovers abroad.

At home we have just received a substantial order for student microscopes from the University of Glasgow and a sizeable order for double image microscopes and step and repeat cameras from our distributing Agents.

WATS ON

J57/165
C

C.L.E.A.P.S.E.

This unusual name stands for Consortium of Local Education Authorities for the Provision of Science Equipment. You may be interested to learn that we have just received an enquiry from the Development Group of this Consortium for details of monocular and stereoscopic microscopes which are available for use in secondary education. This particular Consortium is confined to the London Education Authorities and we received a warning of this set-up some time ago. This information was given by the General Education Officer of the Middlesex County Council, at a meeting of S.I.M.A. some months ago and in answer to a question, he considered it highly probable that this arrangement would extend to other Groups of Education Authorities in the major cities of the United Kingdom in due course.

This information is given to you to advise you of what is happening in London and if you have any indication of it starting elsewhere, we should be pleased to hear from you.

WATS ON

JANUARY, 1965.

T.S.M. No. 25

U.C.

ELEMENTARY MICROSCOPY

(Principles of Kohler Illumination)

1. The requirements for good bright field illumination under the microscope for illuminating absorbing specimens by transmitted light are as follows:-

   a) Even illumination of the field. There must be no sudden changes of illumination across the field and the gradual changes in intensity should be not more than about two to one for visual work or should not change by more than 20% for photography on Panchromatic materials or by more than 5% for photomicrography on high contrast materials such as microneg.

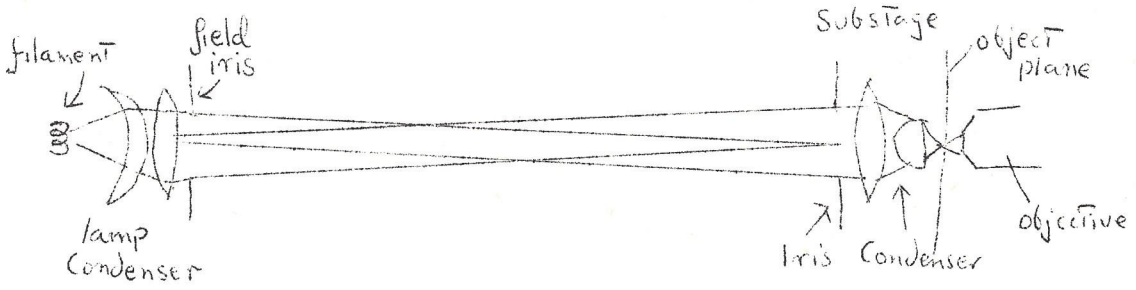
   b) Limited aperture to illuminate beam. The maximum convergence of the illuminating beam has to be limited to about 2/3 or 7/8 of the objective cone. This is always achieved with a substage iris and the exact illuminating cone depends on the type of specimen and the glare properties of the objective.

   c) Even aperture. The back lens of the objective has to be filled with light up to the limiting aperture symetrically and reasonably evenly. Local variations are acceptable.

   d) Limited field. In order to control glare, the field illuminated should be only slightly larger than that viewed by the microscope. This is important at high magnifications and also especially important for colour photomicrography because the glare arising from light scattered by parts of the specimen outside the field of view is invariably coloured the average colour of the staining, and this gives a coloured background tint to the photomicrograph.

/Contd...

2. Optical Arrangement of Kohler Illumination



The lamp condensing lens images the filament of the lamp on to the substage condenser back lens and the substage condenser images the field iris on to the specimen.

3. Kohler illuminators fall into two main classes,

a) separate light sources

b) built-in arrangements designed for a particular microscope.

The routine for setting up a microscope for Kohler with a separate light source is given below:-

a) Centre the lamp bulb to the lamp condensing lens if not precentred. This can easily be done by pointing the lamp at a piece of white paper and centring the image of the filament to the ring of glare produced by the edge of the lamp condensing lens.

b) Place the lamp about 10" from the microscope and direct it accurately at the centre of the substage mirror. This is done by turning the lamp to full intensity and looking at the bright spot on the surface of the mirror.

c) Close the substage iris fully and close the field iris to about 1/3 full diameter. Look at the substage iris using the mirror and adjust the mirror tilt and the lamp focusing to form an image of the filament centrally on the substage iris.

d) Turn down the lamp to a comfortable level. Centre the substage condenser by viewing it with the 16mm. objective.

e) Open the substage iris to about ½ diameter, close the field iris and focus the microscope on to the specimen with the objective to be used. Focus the substage condenser so that the field iris is also focused on to the specimen and make a slight adjustment to the mirror tilt to centre the field iris.

f) Note the effect of changing the substage iris setting. When it is too far open glare is seen round the image of the field iris and when it is too far closed the specimen loses fine detail. Adjust the substage iris so that the glare round the field iris has not quite disappeared.

g) Finally open the field iris until it just disappears from the field.

The substage condenser in a Kohler illumination system has to form a good image of the field iris on to the specimen and the advantages of an Achromatised condenser cannot be over emphasised. When an uncorrected condenser is used severe colour fringing is seen round the image of the field iris and one has to open the field iris until not only the iris itself but also all the colour fringing disappears from the field. This sometimes requires such a wide open field iris that it can be dispensed with and the system reverts to a simpler form of illumination.

4. The routine for setting up built-in Kohler systems varies from one design to another. The manufacturers instructions should be followed.

WATS ON

JANUARY, 1965

T.S.M. No. 26

R.

WATSON TRINAC ATTACHMENT

Procedure for Adjustment

The TRINAC attachment should normally be returned to Barnet for adjustment in the case of centring or other errors but the notes below are intended as a guide for customers having skilled instrument mechanics on the premises who wish to avoid returning the instrument, they are not intended for general distribution.

1. To set the first mirror for "float":-

   a) Place a centred crossline eyepiece in the bino body and bring a point on the object on to the centre of the cross-line.

   b) Transfer the crossline eyepiece to the camera tube of the TRINAC and use the "float" adjustment of the first mirror to bring the object point on to the horizontal crossline centre only (ignore any misadjustment along the vertical crossline at this stage).

2. To set the stop screw of the mirror slide:-

   a) Replace the crossline eyepiece in the bino body and check that the point is still on the centre of the crossline.

   b) Transfer the crossline eyepiece to the meter cell tube of the TRINAC (and refocus the object) and adjust the stop screw of the slide to bring the object on to centre on the vertical crossline only (ignore any misadjustment along the horizontal crossline).

3. To set the stop screw of the second (swing-out) mirror:-

   a) Replace the crossline eyepiece in the bino body and check that the point is still on the centre of the crossline.

/Contd...

b) Transfer the crossline eyepiece to the camera tube of the TRINAC and adjust the mirror stop screw to bring the object on-to centre on the vertical crossline only.

4. Check that a point in the centre of the field with the bino body is also on centre with the TRINAC camera tube.

5. Apply a small dab of bakelite varnish or Shellac to the two stop screws.

G.T. Parkyn,
Technical Department.

29.7.64.

WATS ON

JANUARY, 1965
T.S.M. No. 27
U.C.

LOW POWER PHOTOMICROGRAPHY

Because of the pressure of new development work in hand at present, we are unable to contemplate the introduction of special equipment for low power photomicrography in the near future. As an interim measure we have been looking into the possibility of performing this kind of work with existing equipment and successful photomicrographs have been taken using a Service stand with graduated drawtube in conjunction with the 2" and 3" Para objective. The instrument is used without a nosepiece so that the 3" objective can be used screwed into the drawtube itself. It is not possible to do this with a rotating nosepiece in place as this will vignette the field. The magnification of the objectives were as follows:-

3" Para, used in drawtube, x 1.25.

3" Para, used in body tube, x 2.

2" Para, used in body tube x 2.75.

corresponding to magnifications on the 35mm. negative of x 2.5, x 4 and x 5.5 respectively.

Good colour rendering and clear backgrounds with only slight field curvature was obtained on a Tungsten corrected colour film. Exposure times were in the order of one quarter of a second using high speed Anscochrome.

Illumination consisted of the low voltage substage lamp run at about 7v. and no substage condenser but using a piece of opal glass placed on the substage bracket. The illumination was quite even across the field.

It is suggested that this kind of equipment could be supplied solely for low power photomicrography as it is not convenient to use the instrument for high power microscopy as well.

WATS ON

TO: The Editor,
"WATS ON".

5th January, 1965.

Dear Sir,

With reference to the article J45/1164 U.C. - CdS Exposure Meter, in which it is suggested that for a given interpupillary setting it is possible with the Trinac to focus the Eyepiece Camera by using the Binocular head, without using the viewing eyepiece of the Eyepiece Camera; the undersigned is of the opinion that an unreasonable assumption is being made, which could cause a considerable amount of trouble if allowed to pass without comment.

The microscope image will be focused sharply at the film plane of the camera only if the light which enters the camera is parallel (i.e. the camera lens is set for an object at infinity). It would be possible to use the Binocular head for focusing in the way suggested only if the user were to relax his eyes so as to be looking, in effect, at infinity, and only then if his eyesight were normal. Few people are able to do this with confidence of accuracy. Hence the use, in the viewing eyepiece of the E/P Camera, of a graticule to give the eye a reference plane for focusing, and an adjustable eyepiece to allow for variations in eyesight of different users. This graticule is, of course, set at the focal plane of the objective of the viewing eyepiece, so that when the microscope image is set at infinity it will appear superimposed upon, and in the same plane as the graticule, thereby ensuring that the microscope image is formed also exactly at the film plane (via the beam splitter).

It is unlikely that one could guarantee a really sharp photo-micrograph unless the camera viewing system is used correctly, and any suggestion of a 'short cut' is liable to lead to unsatisfactory results.

Yours faithfully,

G. Parkyn,
Technical Department.

WATS ON

TO: The Editor
"WATS ON",
Barnet.

Poynton.

17.12.64.

Dear Sir,

The COMPARATOR MICROSCOPE

After writing my note on "Watson's in Literature" in which I made references to the Comparator Microscope, it occurred to me that some of the more junior members of staff may never have seen one. In view of this, the following notes may be of some interest.

A Comparator (or as some people call it, Comparison) Microscope consists, essentially, of a pair of matching microscopes in which the output from each eyepiece is received in the two bottom tubes of a Comparator Eyepiece. On entering, light from the two microscopes is reflected by two prisms to a central combination prism and then sent up vertically through a top eyepiece to the eye or to a vertical camera. The plate of the camera shows a circular picture which is bisected by a line across the diameter, this line being the junction of the two prisms forming the central combination prism. All the image in the left-hand half of the picture is from the objective of the left-hand microscope, and, similarly for the right-hand half from the other microscope. If it is required to compare, say, the size, or markings of an unknown object against those of a known one, the unknown is put on one microscope stage and the known on the other and the stage motions are operated to bring both objects into approximation so that the two can be viewed simultaneously, and the comparison made and recorded.

An essential is that the total magnification of each microscope be identical (readily checked by comparing the spacing of the lines of a stage micrometer on one microscope against the lines of a similar micrometer on the other instrument). Further, particularly with solid objects such as bullets and cartridge cases, the illumination on each side must be equal. It is of help, when the comparator eyepiece is in position on the two microscopes if the stages have a vertical focusing movement, as in the metallurgical types.

It is not essential that the two microscopes be an exactly matched pair provided that the magnification can be matched exactly, so that any two instruments could be used. But it is obviously easier to match the magnification and position of the eyetubes with a pair of similar instruments, and, furthermore, as the results of the investigation have frequently to be produced in Court and sworn as to equality, this is much easier with matched instruments.

/Contd...

WATS ON

For work on bullets and casts of the rifled barrels of weapons, rotatable holders for the specimens are essential so that the grooves, scratches and so on may be exactly positioned to make a comparison between the known and the unknown. In the case of bullets, for example, the grooves of the rifling of the barrel are imprinted on the outer shell of the bullet during its travel through the barrel. (Incidentally, the rifling grooves in the barrel impart a twist to the bullet so that, emerging from the weapon, it is rotating at between 2000 and 3000 revs. per second along its long axis, thus achieving vastly greater accuracy in its line of flight than if it were not so rotated). In a murder case by shooting, a bullet can frequently be obtained from the body, and this is called the Crime Bullet. If a a weapon is found, suspected of being the murder weapon, test shots can be fired from the weapon into boxes of cotton-wool and collected undamaged. These are called the Test Bullets. The Comparator microscope enables one to examine the test bullet against the crime bullet.

It is an accepted fact that every tool or weapon which is formed by cutting or grinding of the metal carries a series of scratch marks from the grinding wheel or cutting tool, and as in use both the wheel and the tool are constantly being abraded, the scratches which they leave can never be exactly repeated, consequently every tool or weapon so produced carries its own individual scratch-pattern and no two are alike, differing by observable differences as is the case with fingerprints. This being so, it is possible to demonstrate in the Comparator microscope that the scratches in the grooves produced by the scratches in the rifling of the barrel of a particular weapon and impressed on, say, the crime bullet are exactly the same in number, distribution and position as those on the test bullet, and that, therefore, both have been fired from the same weapon. Evidence to this effect can be given in Court, and is acceptable.

But not only bullets are so examined. Cartridge cases can reveal similarities impressed by a particular weapon, by the firing pin, the breech-block and, in some weapons, by the ejector mechanism which discards the used cartridge, and leaves recognisable marks on the metal of the cartridge case. Also hairs and fibres of all kinds can be compared for size, shape, microscopical detail and colour under a Comparator microscope.

I have had various contacts with the comparator microscope during my time with Watson's. In the mid-1930's Watson's staged an exhibition of instruments in the Caxton Hall, Westminster, which I visited. One of the exhibits was a series of enlargements of comparator micrographs of the cutting edge of a domestic carving knife and the cut end of a telephone wire, showing exact comparison between the irregularities always found on a knife edge and the scratches made in the copper wire. (This was part of the evidence given in the Saxton Grange murder case). (1933).

Before the establishment of the Home Office Forensic Science Laboratories up and down the country, it was the custom for the Home Office to appoint a Pathologist, resident in the area, to undertake forensic investigations, particularly in the case of murder. In one such case I was asked, by the pathologist concerned to assist in view of my connection and standing with Watson's as their representative. This was a murder case, known, later, as the Nelson murder case. Briefly, in Nelson, Lancs., an old woman was found in bed with her head battered in. At the foot of the bed her pet dog, a Terrier, was found tied to the bed post with its head battered and crushed. There was evidence of robbery of the old woman's money, kept under the mattress.

Enquiries were made (and, as I always say in my lecture "The Microscope in Crime Detection", this represents over 90% of the work in crime detection) and resulted in a man being suspected. In his possession was a large tyre lever, stained with what looked like dried blood. He had boots with metal tips to the toes, and these tips appeared to have dried blood on them.

At the lab. various hairs were found embedded in the dried blood on the tyre lever and others on the boots. Under a Comparator Microscope it was possible to match hairs from the head of the dead woman with hairs from the lever, while hairs found in the blood of the boots matched hairs from the dog.

As the pathologist wished to be absolutely sure if his evidence were questioned by the defence, he asked me to set-up the Comparator microscope, checking the magnification and illumination. He then selected the hairs to be compared, and then a police photographer took the actual photographs, leaving my set-up unaltered. Had the pathologist been challenged on this evidence, he was in the position of being able to call 2 expert witnesses to testify on the photographs submitted to Court. In actual fact, he was not challenged and I was, therefore, not called.

In another case I was similarly asked to assist, but, again, I was not called. This was the East Lancashire Road murder case, in which a Manchester prostitute was found dead at the side of the East Lancashire Road, between Liverpool and Manchester. Enquiries showed that, the previous night, she had been seen in Manchester with a man, who was described as to appearance, and, more importantly, they were seen to go off in a car which could be described, but whose registration number was unknown.

A curious development occurred a little later. In London a policeman stepped off the footpath to stop a car which was travelling in the wrong direction in a one-way street. To his surprise, the driver stopped the car, leapt out and took to his heels. The reaction of a London Bobby to this can well be imagined, and the man was chased and eventually caught. His car

was taken in and examined and it tallied with the circulated description of the car seen before the murder.

In the lab. we found hairs on the clothing of the dead woman which, under the Comparator Microscope, matched exactly hairs from a brightly coloured travelling rug found in the car. Further, on the rug were blood stains of the same group as that of the murdered woman, and, in addition, several coloured fibres were found on the rug and these matched other fibres taken from the head-scarf worn by the woman.

As I have said, I did the setting-up, the police took the photographs, the evidence of the pathologist was unchallenged, and I was not called. Incidentally, and to round off these two stories, in both cases the suspect was found guilty, and duly hanged.

I still have, as lantern slides, some of the comparator micrographs from the above cases, plus numbers of others donated, later, by Dr. J.B. Firth, of the North-Western Forensic Science Laboratory at Preston, and they show the wide range of cases in which comparator micrographs can be of assistance. I used to use them as illustrations in my lecturing days, for a popular, as distinct from technical lecture, which I called "The Microscope in Crime Detection", and the first slide which I show is a Watson Comparator Microscope which was, I think, one of those made for Robert Churchill, and shown at the British Industries Fair.

Yours faithfully,

J.D. Casartelli