Mr. T. Barkley

WATS ON

MAY 1965
J63/565
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SPECIAL TERMS ARRANGEMENT

You are reminded that the special terms offer remains open until the end of July. There has been a run on some products and the following are now withdrawn:-

Code 2064	-	x 10 Pointer eyepiece.
Code 98	-	College mechanical stage.
Code 198	-	College mechanical stage.

When distributing the lists to your customers, it should be made quite clear that they can obtain an immediate price reduction of 20% on the catalogue price but their orders must be sent direct to you and not to Barnet. At your own discretion you can also allow up to a maximum additional 33⅓% for quantity orders.

This catalogue stripping exercise is a vital one and an increased effort is asked for to make way for the introduction of Micro System 70.

The following items are being added to this scheme:-

Code 244	-	Phase-60 lamp unit with base plate and surface aluminised mirror.
Code 245	-	Phase-60 lamp unit with base plate and surface aluminised mirror.
Code 5	-	Concentric rotating mechanical stage.

WATS ON

J64/565
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FREE SERVICING

The Service Department has on more than one occasion recently been embarrassed by requests for initial free servicing at periods up to three years after first delivery. It is to be made clear to all customers that the first free service must be undertaken within eighteen months from installation.

Will you also please emphasise that NO free service is available for instruments purchased through dealers.

WATS ON

J65/565

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WATSON SALESMANSHIP OR

WATSON EXPECTS EVERY MAN TO DO HIS DUTY

In this day and age of severe competition, particularly in this industry, one of the vital roles to be played by every representative is his salesmanship as well as his technical ability. As a guide, the following points are worth remembering and serve as a useful check on your own performance:

1) Appearance - This should always be neat and tidy and give the impression of being well groomed and orderly - nobody likes to meet a scruffy representative who has not cleaned his shoes or changed his shirt for two or three days.

2) Approach - This must always be business like - too much familiarity often breeds contempt but this is not to say that you should not ask after your customer's health or how well he enjoyed his holiday (a customer likes personal attention as it is flattering) but a good salesman always knows when it is time to change such conversation to the purpose of his visit.

3) Speech - This should always be clear and objective. It is also important for a representative to be a good listener and give a well considered and truthful answer to all questions - don't try and joke away the difficult ones.

4) Be Prompt - Always be on time for an appointment - a customer is only irritated by your excuses for being late.

5) General - Show an interest in the work of his department - it may lead you to an application for a Watson instrument. Don't be afraid to ask questions about new departments, expansion plans or special techniques they may be using. Try and include in your conversation some detail of Watson instruments being used in other establishments where the application is similar - without giving the impression of name dropping.

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6) Demonstrations - Two extremely important aspects concern demonstrating the instrument and demonstrating the catalogue.

a) The Instrument: Don't just produce the instrument from its case and stand back to admire it whilst he sits down in front of it to find out how all of the controls are in unfamiliar places. Run through it with him (from top to bottom perhaps) and point out its features and advantages and how well it has been designed and constructed so that each control is simple to operate and accessible at the same time - never apologise for any point that may seem weak to you as it may be a feature that he particularly likes. There are always good reasons for the particular way in which your instrument has been constructed - explain them whether it is for stage rigidity or long life or some other advantage.

If he mentions a feature that he likes, play on it point out every possible advantage about it - it could become the one feature that decides the order.

Above all make this run through a build-up to the real reward of actually using the microscope. The car that you really want to test drive is always better than the one that you are forced to use.

b) The Catalogue: Demonstrating the catalogue is just as important in the sales sequence as demonstrating the instrument itself.

Don't just hand over the catalogue for him to fumble through later - show him how to use it properly. Try to avoid handing it to him until you have explained where to find the complete range of optics just in case he doesn't want a set outfit, where to find the accessories and so on. Use the catalogue to remind him of the features in which he has expressed interest and those you may have overlooked when demonstrating the instrument. See that he can find just what he wants in your catalogue and show him how to use the price list.

Don't attempt to hurry through this final phase of your interview as it is of vital importance to closing the sale. Use this time to find out if an early decision is to be made (this will indicate the timing of your next visit), how many are involved, when they are wanted, if finance is available, what other makes are being considered, whether quotations are required and above all who is making the decision.

If you find that very few of your demonstrations and interviews go like this at the moment, try and make the next one along these lines, it may well be that you cannot remember the various points that have been made but try to introduce them perhaps one at a time so that after a few weeks you will have mastered the technique of planning every demonstration.

WATS ON

J66/565

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BUY THE BEST - BUY WATSON

SOME CUSTOMER OBJECTIONS ANSWERED

SERVICE 3

O. We prefer the Vickers microscope as the limb does not move and it is essential for our students to put away the microscope after every session.

A. The limb of the Service 3 has been drop life tested to represent 10 years of putting the instrument away 4 times a day. There was no apparent wear whatsoever and certainly no deterioration of performance. Our slides are precision machined to very fine tolerances and will withstand any amount of movement. Unlike other makes, the motion itself is directly connected to a central non-moving block so that any wear on the fine adjustment slide is not transmitted to the coarse adjustment and subsequently amplified in the observed image.

O. But other makes offer concentric control knobs!

A. This special construction of the Service 3 does necessitate separate controls but also ensures a very long trouble-free life. You will have noted also that the objectives are very accurately parfocalled so that except for initial focusing of the slide all subsequent focusing can be done with the fine adjustment. The knobs are positioned so that the users arms rest comfortably on the bench and are not cramped up towards the chest as with the Patholette for example.

O. Every other make has fitted a rack focusing substage.

A. In practice the optimum position for the condenser is at the top of its travel whichever objective is being used and focusing is only needed for special techniques such as phase contrast and dark ground microscopy. The knob of a rackwork substage usually impedes access to the other controls and is an open invitation to students to position the condenser incorrectly. The Service 3

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substage has a multi threaded focusing device similar to the zoom lens control on an expensive camera.

ZOOM STEREO

O. The maximum free working distance on your instrument appears to be just under 4" - we must have at least 4" clearance.

A. A new auxiliary lens is now available giving over 7" working distance with a top magnification of x 40. (Bausch & Lomb 7" at x 30 - incident light stands only) (Zeiss 5" maximum at x 50)

O. The zoom box is very bulky.

A. Yes but it is the only Zoom Stereomicroscope with a 5 : 1 ratio as well as a converging optical system. The importance of this system is twofold - 1) a higher degree of stereoscopy is possible than with a parallel system and 2) a higher numerical aperture is achieved with a correspondingly high degree of resolution and freedom from colour fringing.

O. It doesn't hold focus throughout the zoom run.

A. It will hold focus throughout the zoom range if you carry out the following simple procedure:-

1) Using the coarse adjustment, focus the specimen with the left eye when the zoom travel is set at the highest magnification.

2) Zoom down to the lowest magnification.

3) Adjust the right individual eyepiece to optimum focus (this is described in more detail in the instruction booklet).

This procedure is most important as you are handling a high aperture optical system where focus is always critical. For example, with a box camera, the focus is not critical as the lens is fixed and of low aperture, but if you have a camera where you can open up the stop to say F 1.9, then focusing is essentially very critical.

O. The zoom control is quite stiff at the low end.

A. The control knobs operate the moving lenses through a cam and to achieve the 5 : 1 range, a feat in itself, this cam has a steep rise at the bottom end. No harm will be done if you find it necessary to use a little more pressure on the knobs at that point. The latest production models have a spring to help this motion.

WATS ON

J67/565

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NEWS FROM THE MEDICAL SCHOOLS, UNIVERSITIES ETC.

University of Newcastle upon Tyne. The Wellcome Trust is to grant the department of medicine £66,000 for a research laboratory and equipment. Up to £60,000 is for work on thyroid disorders which at present takes place in four separate laboratories. The money will enable this to be concentrated in one building.

A Wellcome Senior Research Fellowship in clinical science for five years, has, additionally, been awarded to Dr. J.R. Hall to enable him to carry out research into the biochemistry of thyroid disease.

Dr. E.J. Field has received a grant of £6,200, also from the Wellcome Trust, to buy equipment for his work on demyelinating diseases.

University of Bristol. The following members of the teaching hospital staff have been given the status of tutor in the specialty concerned for the duration of their appointments: Alexander Harley registrar to professorial unit in medicine; Michael I.S. Keir, registrar in dermatology; Clive G. Plant, registrar in department of dental medicine; A.P.C.H. Roome, registrar in clinical pathology; T.E. Blecher, Senior registrar in pathology (haematology); R.V. Magnus, research assistant and honorary senior registrar at Glenside Hospital (working in the department of mental health).

University of Aberdeen. The following appointments have been announced: C.R. Pringle, B.Sc., Ph.D., lecturer in bacteriology; G. Innes, M.D., D.P.H., lecturer in mental health; Miss Alison J. Donaldson, Research assistant in bacteriology; Dr. Robert E. Robertson, lecturer in pathology; Dr. Arthur McEwan, lecturer in anatomy.

University of Edinburgh. The Medical Research Council has made a grant of £5,660 to Dr. J.R. Smythies, department of psychiatry, for research into structureactivity relationships of psychotomimetic drugs.

University of Sussex. Dr. J.H. Sang has recently been appointed to the staff of the University of Sussex, where he will have the status and title of professor in the School of Biology. Since 1948 he has been with the Agricultural Research Council in Edinburgh, first in the Animal Breeding and Genetics Research Organization and later at the Poultry Research Centre, where he is now assistant director. His advent will bring a wide knowledge of biology and an enquiring mind to Sussex.

WATS ON

MAY, 1965

T.S.M. No. 30

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Notes On

VERTICAL MEASUREMENTS WITH THE MICROSCOPE

Many microscope stands are fitted with calibrated fine focusing mechanisms. The inference being that they can be used for vertical measurements. Some of the possibilities and limitations are indicated in the notes below.

The principle of a vertical measurement with a calibrated fine adjustment is to focus the microscope first on the top and then on the bottom of the object to be measured noting the readings of the fine adjustment mechanism at each position. The chief problems are,

a) Hysteresis losses in the F.A. mechanism making it essential that the focus should be approached from the same direction for each setting.

b) Some non-linearity is present in most types of mechanism even when they have been designed on linear principles. To obtain good linearity with a lever type of mechanism, the exact profile of the lever and the surfaces on which it bears must be controlled to extremely close limits. Periodic errors can usually be detected also due to errors in the micrometer screw or the flange on the spindle.

c) The setting accuracy is limited by the depth of focus of the objective. If the object to be measured had fine recognisable detail on the top and bottom surfaces, a skilled observer might be able to set an objective on to it to a repeatable accuracy of about $\pm \lambda \div (\text{N.A.})^2$ where λ is the wavelength of the light and N.A. is the numerical aperture of the objective. In most practical cases, the repeatability is several times worse than this and it would be unwise to assume a repeatability of better than about $\pm$

2 microns for a 4mm. objective, N.A. 0.7

10 microns for a 16mm. objective, N.A. 0.3

50 microns for a 40mm. objective, N.A. 0.13

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d) The range of most fine adjustment mechanisms is limited to about 1 mm.

e) It is important to be clear exactly what one is measuring. If the specimen is mounted in a media of refractive index n_2 and the medium between the front lens of the objective and the cover glass, whose thickness varies as the microscope is focused, has a refractive index n_1 then the actual height of the specimen will be greater than the distance the microscope is moved by a factor $n_2 \div n_1$.

Additional complications arise when the lower surface of the specimen is viewed through the specimen itself, especially if the refractive index of the specimen is significantly different from that of the mounting medium and the specimen has a complex shape.

There are two things which can be done, on some occasions, to avoid some of these difficulties. One can avoid some of the vagaries of calibrated fine adjustment mechanisms by fitting a good quality engineer's dial gauge to the microscope stand and making the vertical measurements on this. Some manufacturers list a stand with a dial gauge built on to it and we are looking into the possibility of offering this on the Service or Standard Met. instruments. Specific enquiries are welcomed at Barnet. A typical engineer's dial gauge will read directly to .0001" or 2 microns.

A second trick which can prove valuable for measuring the depth of grooves, wear tracks or transparent films which are too thick to measure by fringe counting is to use an Interference Objective, with white light fringes, as an indicator to determine exactly where the best focus is. The microscope should first be focused on one of the surfaces as accurately as possible and the white light fringes should then be brought to the centre of the field, indicated by a crosswire eyepiece, by adjusting the path difference screw on the Interference Objective. The dial gauge is then read and the microscope gradually focused down to the second surface until the white light fringes again appear on the crosswire and a second dial gauge reading can be taken. The important point is that provided the controls on the Interference Objective are not moved, the white light fringes will always be exactly the same distance below the objective. In practice it is possible to detect these fringes patterns even when the surface is not polished. Sometimes they can be seen just as a band of scrambled colour crossing the field but it is possible to set this

band to the crosswire and obtain dial gauge readings which are highly repeatable.

This method is suitable for measuring vertical heights of several thousandths of an inch which would not be practical by ordinary Interference Objective techniques because several hundred fringes would have to be counted.

WATS ON

The Editor,
'WATS ON',
Barnet.

May, 1965.

Dear Sir,

TWO TALES OF MYSTERY

I had thought of writing an artical on "Mistakes I have made" as a warning and a guide to others, but I realised that, to cover these, would require a whole issue of WATS ON. Instead, I have selected two true stories which may be of interest.

THE MYSTERY OF THE UNFOCUSSABLE MICROSCOPE:

When I was green and inexperienced, I was called in by a customer who had a Watson Horizontal Photomicrographic set with a Watson microscope, and was met with the complaint that, while the equipment had performed perfectly for a considerable time, it was suddenly unusable as they could not focus any image on the screen.

On arrival, I did all the usual checks which were then known to me - check the eyepiece for dirt or other blemishes: check the objective for a missing front lens or for balsam and dirt on the front lens: check the illumination for faults and lack of alignment - in fact, check everything both likely and unlikely, and still without result. It was, in fact, quite impossible to focus any of the three objectives to produce an image on the screen.

With the customer's technical staff breathing down my neck, panic began to take over from reason, and I brought in a microscope from the car and started substitution, of objectives, eyepieces and condensers - still without result. Following this, I removed their microscope from the camera and set it up on the bench alongside the new instrument. Using one specimen, I was able to focus the new instrument perfectly, but, on transferring the specimen to their microscope I could not see a thing. At all events, this eliminated the camera and the illumination of the photomicro set.

I then removed all optics from their microscope, and being, by now in full sweat and panic, started, foolishly as I thought, to dismantle the stand, why, I do not know. But, to see if there was any obstruction in the aperture of the nosepiece, I poked my finger through the nosepiece and immediately found an obstruction behind it. Of course, by now, you will have guessed at the answer. Yes, it was a low power objective, actually a 3" Para. in short mount, sitting coyly in the R.M.S. thread at the bottom

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of the draw-tube. The objective had been used a few days previously, and then forgotten. The next user, seeing no objectives on the nose-piece had fitted the usual ones and what they, and I confess, I had been trying to do, was to focus two objectives simultaneously.

It will be remembered that this objective location at the bottom of the draw-tube had to be used when the shorter rack and pinions became customary to allow the objective to be brought far enough back from the specimen to allow for focussing of the objective which had such a long working distance. If you ever have an unfoccusable microscope, remember my story.

THE MYSTERY OF THE SHADOW:

This story also concerns a Watson Horizontal Photomicro set, in a University Department. Again, I was called in to inspect and correct equipment which had been giving every satisfaction for a long time and which suddenly produced a fault.

The complaint was that every plate, no matter what object had been photographed nor which objective had been used, displayed what appeared to be a shadow running down the middle to the plate, parallel to the long sides. The appearance was almost as if some straight object had been introduced at a position where it was not in focus but was casting a shadow.

Again, I checked the set-up, the optical parts, the camera for light leaks, and then started a series of substitutions of each optical part, but without success. There was no object hanging down inside the camera, no blemish on the Pointolite bulb or lamp condenser, no cracked lens anywhere, and, after exposing dozens of plates, I remained where I was when I started.

I was well and truly puzzled, and spent many weary hours trying to work out what could be the cause, and, finally I decided that it was beyond me, and I sent the facts to Head Office and asked for advice, as, by now, the customer was not very happy and was starting to suggest unpleasant things about Watson equipment in general, and Watson's representative in particular.

Head Office were not helpful by way of advice, but they decided to send to my assistance one who was doing much photography at that time, Mac Smith. I duly met him in Liverpool, and took him to the scene. He confirmed all my checks and then made an exposure and, while the plate was being developed by the technician made other exposures at different powers. When the plates came out of the dark room, all displayed the same shadow bands.

Mac Smith seemed quite worried, but he repeated one of the exposures, and decided to develop it himself, so we all went into the dark room and watched. Result - a perfect photograph.

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Enquiries then started, and it emerged that the start of the trouble seemed to coincide with the starting of this technician in the dark room. It appeared that he had been instructed by the chief technician and then left to manage on his own.

At that time, several departments of the university had installed in their dark rooms a simple device to keep the developing dish rocking automatically - just a platform on a pivot with a weighted long arm, like a pendulum which, in swinging from side to side, gently rocked the dish and kept the developer in motion over the plate. Unfortunately, the young technician, having been impressed by the necessity of this motion tried to improve matters by keeping the pendulum swinging at the maximum. Admittedly, this produced the utmost movement of the developer over the plate, but unfortunately, at each swing of the pendulum, the solution washed across the plate and up the side of the dish, leaving a strip of plate uncovered at each side during each swing. The result was that the central strip of the plate which was never uncovered received more contact with the developer than the sides in a given developing time, thus producing the shadow effect, due to unequal development of sides and centre.

The Professor who, by now, was watching every step ordered the technician to develop some of the other exposures, but to rock the plates GENTLY, and the result was quite satisfactory.

While I think that I might be excused for not spotting the cause, the result did teach me that, while I was quite competent to set up for the production of good photomicros. I ought not to have left the subsequent processing to the customer. I did, in fact, thereafter, learn enough about processing to be able to develop and print from my exposures, and therein, may lie a useful suggestion for all representatives.

Yours faithfully,

Jos. D. Casartelli