WATS ON

MR. T.W. BARKLEY

6th March, 1964.

As this is the first edition of WATS ON, I am taking the opportunity of introducing it with a few words about our future intentions. We are very anxious that you should receive something every month, and plan to send this to you on or about the first Thursday in each month. I am sure you will find the technical reports to be most informative, and these are being done on separate sheets so that they can be filed for future reference.

A considerable amount of commercial information has been filed for sending to you, but it may be April before this is properly collated. In the meantime, I would just add that I hope you will find this, and future editions, to be both instructive and enjoyable, and may I remind you that the success of the scheme as a whole will depend very much on your own contributions.

A. E. Jackson.

Ref: J1/364.

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THE SERVICE 3 MICROSCOPE.

Following some complaints regarding optical performance with Service 3 microscopes and particularly with regard to apparent curvature of field, the following is a condensed version of a report received from the Technical Department after investigation into this matter.

(A) The objectives supplied on the Service 3 are exactly the same as those supplied on our other microscopes. Most of the comments on field curvature concerned the 4mm. Parachromatic objective. Steps have been taken to reduce the N.A. to 0.65.

Eyepieces: Design figures do not suggest any significant difference between the old and new types from the point of view of field curvature.

(B) Measurements have been taken of the amount of adjustment necessary to focus the edge of the field compared with centre of field focus, and these show identical results on Service II and Service 3. The impression of curvature with the Service 3 can be given by non-uniformity of illumination, particularly on the lower power objectives. On the latest production Service 3 microscopes this effect is very slight, although it is more noticeable on earlier instruments. The difference is due to a change in the coarseness of the grinding on the back of the lamp condenser. This will be closely controlled in future production batches. The curvature of field is also due in some cases to the test object, and this has been proved by changing certain test objects from one instrument to another, when the apparent curvature is also transferred.

Alternatively, it may be that we have lost orders to demonstration instruments fitted with genuine flat field objectives. It would be most informative if we could be advised of any instance where you suspect that other makers have been demonstrating instruments with expensive objectives and eyepieces rather than those specified by the customer. If you have positive evidence of demonstrations of expensive optics followed by deliveries of standard optics, please let us know immediately.

It has now been proved possible to fit the new friction drive stage to the Service 3, and this exercise is being taken to the point of production drawings. In view of this adaptation, it may well be that we will not consider putting the new stage on the Service 69, stocks of which will be exhausted using the present type flat top mechanical stage. Further information, together with prices, will follow in due course.

Ref: J3/364.

WATS ON

MARCH 1964

R.

TECHNICAL SALES MEMORANDUM NO. T 1

Introduction to Technical Sales Memoranda (T.S.M's)

A series of Technical Sales Memoranda are to be distributed as part of a monthly news sheet primarily for the benefit of the outside sales staff.

The main purpose of these memoranda will be to provide the sales staff with up to date technical information on our own products and applications for them. Information will also appear on competitors products, on subjects of general interest to microscopists, on long term trends and ideas on instrumentation and on current publications in the form of abstracts and occasional reviews. Correspondence or criticism of the memoranda will be welcomed and published when suitable.

It must be emphasised that the outside representatives themselves are in direct contact with the world of microscopy and must be the source of much material for this project. New material as well as comments on published material is required.

The T.S.M.'s will each carry a number and title for easy reference and an index of those not of a temporary nature will appear from time to time.

Code letters will appear on each indicating the security classification. The meanings of these codes are given below:-

P.R. Press release or publicity required. Information should be circulated where relevant.

U.C. Unclassified. Intended for internal use but may be shown to anyone interested.

R. Restricted. For Watson employees and staff only. (Some material which would normally be unclassified, may have to be restricted to avoid infringing copyrights).

C. Confidential. Strictly for staff only.

Additional copies of memoranda classified P.R. or U.C. will be available for representatives to use at their own discretion.

WATS ON

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U.C.

TECHNICAL SALES MEMORANDUM NO. T 2

The use of filters for photomicrography

Filters are commonly used in photomicrography for one or more of the following reasons:-

a) To restrict the illumination to that part of the visible spectrum for which the lens system is best corrected.

b) To increase the contrast of a coloured specimen.

c) To reduce the contrast of a coloured specimen.

d) To alter the relative contrast of differentially stained material.

e) To extend the exposure time to suit the shutter.

f) To control colour temperature.

g) To eliminate ultra-violet or infra-red from the illumination.

Limitation of spectrum (Black and white photography)

Most microscope optical systems are optimised for the green as this is in the centre of the visible spectrum. There are three distinct reasons for restricting the spectrum of the light used for photomicrography.

1) The cheaper Achromatic objectives have the same focus for two colours but show slight departures for intermediate colours which give rise to some loss in definition with white light. A green filter will improve definition with these objectives and also ensure that the visual focus coincides with the best photographic focus.

2) High power objectives show transverse colour fringing away from the centre of the field which often looks like field curvature on a black and white photograph. Although this can and should be reduced with Compensating eyepieces, it is seldom possible to match the highest powers exactly. A steep cut green filter will reduce the transverse colour fringing considerably.

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3) Glare in microscopy is reduced, especially at high magnifications, by using strict Kohler illumination with the field and aperture iris diaphragms properly set. This is not possible with an uncorrected condenser like an Abbe or so called Aplanatic which cannot form a good image of the iris diaphragms. A steep cut green filter will enable uncorrected condensers to give a much closer approximation to Kohler illumination.

Increasing the contrast of stained specimens

If this were the sole criterion one would merely select a filter with complimentary colour to the specimen.

i.e.	red filter	for	blue green	specimen
	orange filter	"	blue	"
	yellow filter	"	violet	"
	green filter	"	magenta	"
	blue green filter	"	red	"
	blue filter	"	orange	"
	violet filter	"	yellow	"
	magenta filter	"	green	"

In practice a magenta filter is never used and violet or red filters are hardly ever used because these are contrary to the principles of the previous paragraph.

In practice one uses yellow, green or blue green filters to cover all but yellow, green or blue green specimens. Fortunately yellow stains are seldom used and green stains are usually dense enough to show up without filtration. Orange or blue filters can be used for difficult cases of weakly stained blue or orange specimens and it should be noted that Apochromatic objectives stand this treatment much better than Achromats.

To reduce excessive contrast

This is a rare requirement which would usually be met by using shorter development time or changing to a Panchromatic film. In an extreme case one would use a filter of similar colour to the specimen.

To alter relative contrast of differentially stained material

The common case is that of Haematoxalyn and Eosin staining; the red can be accentuated by a blue green filter and the blue by a yellow filter.

To extend the exposure time

Many shutters used for photomicrography give rise to shake when used at the shorter exposure times. To extend the exposure more than a few times by reducing the voltage on the lamp will upset the colour balance seriously. The usual alternative is a grey (neutral) filter. Chance ON11A and ON10 will extend the exposure time five times and fifteen times respectively. The most satisfactory way of reducing exposure time to photograph moving objects is with electronic flash.

To alter colour temperature

Colour temperature correction filters are available to enable daylight corrected colour film to be used with artificial light. Details are available in the instruction sheet for the Voltmeter Light Control Unit.

Ultra-violet stopping filters

Not usually required with a Tungsten light source as this emits little U.V. An exception is for photo resist materials which are very sensitive to light in the near ultra-violet.

Infra-red stopping filters

Heat stopping filters as Chance ON22 are invaluable for the following:-

Protecting gelatine or interference filters from intense sources.

Reducing the heat focussed onto living specimens.

Reducing the rate of drying of wet specimens.

Reducing Brownian movement of particles in viscous liquids.

Types of Filter

Three basic types are currently available;

Glass filters made by Chance and others are robust, inexpensive and cheap but have shallow curves and will not give a sharp cut off at an exact wavelength. They were extensively used when most photomicrography was done on large plates with intense light sources as they were able to withstand the heat.

Gelatine filters Dyed gelatine films are sandwiched between glass. These filters have much sharper cut off than glass filters and are therefore more suitable for the purposes indicated in these notes. Their main disadvantage is that they are vulnerable to damage by heat and must not be placed close to an intense source. They are made by Ilford and Wratten (Kodak).

Interference filters are multi layer dielectric films which can be made into very sharp filters to isolate a narrow band of wavelength. They are expensive and not generally necessary for photomicrography.

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TECHNICAL SALES MEMORANDUM NO. T 3

Advanced information on product changes

4mm. Parachromatic Objective

The 4mm. Para is to be reduced in aperture to N.A. 0.65. The reduction is to be achieved by reducing the clear bore of the back cell (268403) from 6.00 mm. to 5.57 mm.

The alteration applies to both parfocal lengths of sleeve mounted types and the objectives are to be engraved with their true aperture. Drawings will be amended so that the change can be put in hand as soon as possible.

Experiments indicate the reduction in resolving power so slight as to be difficult to detect but that a noticeable improvement in field curvature is achieved.

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U.C.

TECHNICAL SALES MEMORANDUM NO. T 4

Abstracts from recent publications

'New Scientist' (No. 376) 30th January, 1964.

Medical and surgical uses for the laser,
by Professor Leon Goldman, University of Cincinnati.

Professor Goldman discusses the use of lasers for treatment of certain cancers and skin complaints and illustrates how the beam can be focussed to destroy a single cell. He also speculates on future trends in this field.

'J.R.M.S.' (Vol. 82) October 1963.

Some experiments concerning the limitation and errors in size measurement of small objects by visual microscopy,
by W.N. Charman, Imperial College, University of London.

The systematic errors which arise in the measurement of small objects are discussed together with a method for reducing the errors by calibration with objects of known size.

'New Scientist' (No. 378) 13th February, 1964.

Science in overseas industry (U.S.A.)

Welding with bursts of light,
by T.R.G. Syosset, New York.

A fully automatic welding machine for experimental work in the aircraft industry is described using a 30,000 joule ruby laser.

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'British Journal of Photography' February 7th 1964.

Modern methods of testing photographic lenses,

A useful description of lens assessment by measuring spacial frequency response.

'British Journal of Photography' February 28th 1964.

The Institute for Cinematic Cell Research,
by S.W. Bowler, F.R.P.S.

A description of the equipment used for cine-photo micrography of living cultures,
by Professor Dr. Willi Kurhl at Frankfurt.