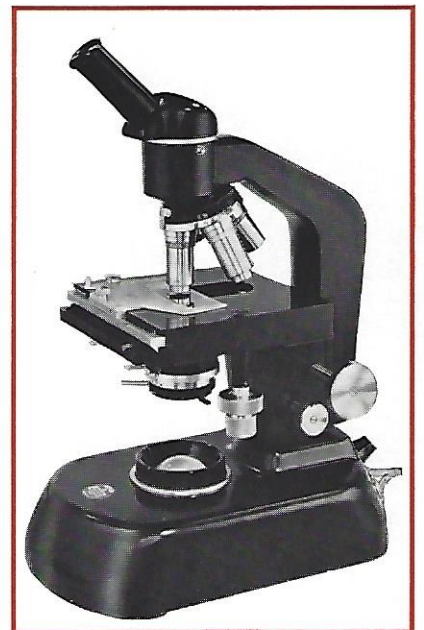


WATSON

THE IMPROVED SERVICE 3 MICROSCOPE



The Improved Service 3 profits from the latest achievements in microscope design and technology to combine the reliability and simplicity necessary to student use with the versatility essential to busy research laboratories

GENERAL SPECIFICATION

CONTROLS

The controls for coarse and fine focusing are low-placed for comfortable operation. Milled heads are situated on either side of the limb. The coarse adjustment gives a focusing range of 25mm (1in), and one complete revolution of the fine adjustment control head moves the stage 0.12mm (0.005in). Both controls have been rigorously life-tested.

FINE ADJUSTMENT

The outstanding feature of the fine adjustment mechanism is a very sensitive motion entirely free from loss. Side play is eliminated and exceptionally long trouble-free usage is guaranteed.

STAGE

The large plain stage is acid-resisting and is designed as an integral part of the microscope to ensure absolute rigidity. A choice of positions is offered for specimen clips, and all Watson attachable mechanical stages can be fitted. It should be noted that the 704 Mechanical Stage (see page 3) is not an attachable stage and can only be supplied on the Service 3 in place of the plain stage.

SUBSTAGE

A large knurled ring operates the focusing substage which will accept a condenser mount. The condenser mount may be a plain pre-centred mount or a centring

model. Centring condenser mounts with knurled screws or Allen screws are available. All mounts are supplied with iris diaphragm and filter holder. The full range of Watson condensers can be used. A special condenser mount is supplied with the 704 Mechanical Stage.

FINISH

The Service 3 is finished in a very hard-wearing semi-matt black enamel. All control heads are chromium plated. Alternative finishes may be specified only for quantity orders. Every Service 3 is supplied with a soft plastic dust cover. Fitted wooden cabinets are available if desired (for details see outside back cover).

SERVICE 3 STANDS

Low Voltage



Service 3 Microscope with low-voltage lamp base and focusing substage. Housed within the base is a complete illuminating system comprising a 6v. 18w. prefocus bulb, a self-centring condensing lens, a tapped transformer and a variable rheostat. The lamp condensing lens evenly illuminates *all* objectives irrespective of substage condenser used. The transformer tapings can be altered to enable the bulb to be over-run for special applications. An on/off switch is fitted, together with a mains socket and rheostat control knob for light intensity adjustment. A separate mains lead and plug is supplied.

Mains Voltage



Service 3 Microscope with mains voltage lamp base and focusing substage. The base incorporates a 25-watt bulb and a self-centring condensing lens for even illumination with all objectives. The mains voltage lamp is not recommended for illuminating oil immersion objectives when used in conjunction with the Binocular Head.

A MIRROR-ASSEMBLY is available for those applications requiring the use of an external lamp source. The mirror-assembly is located by spring-loaded ball bearings in place of the lamp condensing lens, thereby giving accurate centration with the optical axis. Code 1249

HEADS FOR THE SERVICE 3

ALL SERVICE 3 HEADS (monocular and binocular) will turn precisely and smoothly through 360°. Heads are quickly and easily interchangeable.

Inclined Monocular Head

The Inclined Monocular Head is set at 45° for comfortable observation. All optical elements are coated. A correcting lens maintains a tube length of 160mm. The magnification factor is unity.

An Inclined Monocular Head with Drawtube is available for use with measuring accessories. The drawtube is graduated in millimetres.

Binocular Head

The Binocular Head has eyepiece tubes inclined at an angle of 45°. Independent focus control of the right-hand eyepiece tube compensates for differences between the observer's right and left eyes. The interpupillary adjustment is dust-proof, and a coupling mechanism permits adjustment to be carried out with one hand. The Binocular Head has a magnification factor of 1.5 at 160mm tube length.

A Vertical Monocular Head is also available.

Codes for all Stands and Heads are listed on the outside back cover

MECHANICAL STAGES

WATSON ATTACHABLE MECHANICAL STAGES available for use with the Service 3 Microscope enable slides to be moved with the utmost precision. Horizontal and vertical scales, reading by vernier to 0.1mm, permit features of special interest on the slide to be swiftly and accurately located. The geared movements of the stages are extremely smooth and precise in action.

Barnet Mechanical Stage

The Barnet Mechanical Stage is clamped to the plain stage of the microscope by means of two knurled screws fitting beneath the plain stage. The Barnet Mechanical Stage may be located on the plain stage to suit either left-handed or right-handed use. Range of movement is: horizontal 76mm; vertical 38mm.

Code 63

College Mechanical Stage

A simple attachable mechanical stage quickly and easily fitted to the microscope plain stage by means of attachment pins which pass through the stage clip apertures and are secured from below by knurled nuts. The College Mechanical Stage has a horizontal movement of 50mm and a vertical movement of 25mm.

Code 198

704 Mechanical Stage

The 704 Mechanical Stage is a new flat top mechanical stage with low-placed co-axial control heads. It can only be supplied built on the mains voltage Service 3 Microscope or the low-voltage Service 3 Microscope as an alternative to the plain stage. The 704 Mechanical Stage is *not* an attachable mechanical stage. Vertical and horizontal movements are actuated by a new patented drive mechanism which ensures freedom from loss and is self-compensating for wear. The 704 Mechanical Stage gives the following range of movement: horizontal 76mm; vertical 50mm.

The 704 Mechanical Stage incorporates a sleeve to accept the substage condenser and special plain mount which is constructed in such a way as to position the iris diaphragm immediately behind the condenser lens. The sleeve is provided with knurled screws for centring the complete substage condenser assembly.

As this stage is an integral part of the stand it should, if required, be ordered by code number from the stands listed on the outside back cover.



HEADS FOR THE SERVICE 3

ALL SERVICE 3 HEADS (monocular and binocular) will turn precisely and smoothly through 360°. Heads are quickly and easily interchangeable.

Inclined Monocular Head

The Inclined Monocular Head is set at 45° for comfortable observation. All optical elements are coated. A correcting lens maintains a tube length of 160mm. The magnification factor is unity.

An Inclined Monocular Head with Drawtube is available for use with measuring accessories. The drawtube is graduated in millimetres.

Binocular Head

The Binocular Head has eyepiece tubes inclined at an angle of 45°. Independent focus control of the right-hand eyepiece tube compensates for differences between the observer's right and left eyes. The interpupillary adjustment is dust-proof, and a coupling mechanism permits adjustment to be carried out with one hand. The Binocular Head has a magnification factor of 1.5 at 160mm tube length.

A Vertical Monocular Head is also available.

Codes for all Stands and Heads are listed on the outside back cover

MECHANICAL STAGES

WATSON ATTACHABLE MECHANICAL STAGES available for use with the Service 3 Microscope enable slides to be moved with the utmost precision. Horizontal and vertical scales, reading by vernier to 0.1mm, permit features of special interest on the slide to be swiftly and accurately located. The geared movements of the stages are extremely smooth and precise in action.

Barnet Mechanical Stage

The Barnet Mechanical Stage is clamped to the plain stage of the microscope by means of two knurled screws fitting beneath the plain stage. The Barnet Mechanical Stage may be located on the plain stage to suit either left-handed or right-handed use. Range of movement is: horizontal 76mm; vertical 38mm.

Code 63

College Mechanical Stage

A simple attachable mechanical stage quickly and easily fitted to the microscope plain stage by means of attachment pins which pass through the stage clip apertures and are secured from below by knurled nuts. The College Mechanical Stage has a horizontal movement of 50mm and a vertical movement of 25mm.

Code 198

Availability of 704 Mechanical Stage

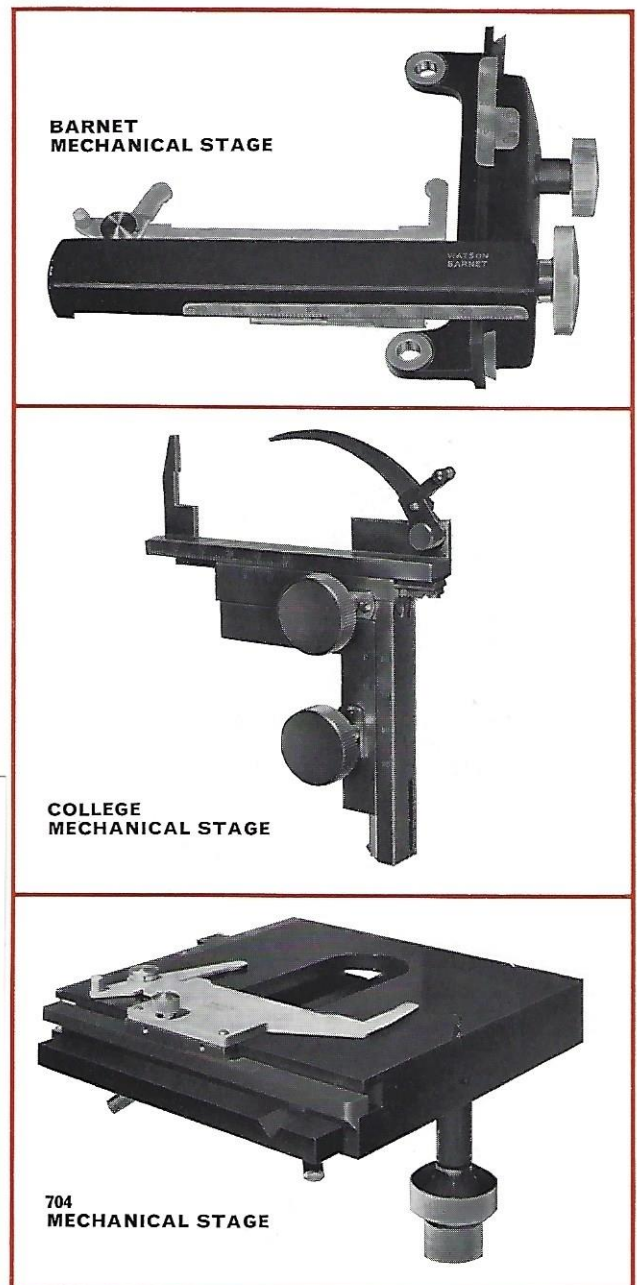
The 704 stage is currently available to special order only

Where a requirement exists for a quantity of Service 3 microscopes fitted with the 704 stage we shall be pleased to quote specially favourable delivery

Mechanical Stage gives the following range of movement: horizontal 76mm; vertical 50mm.

The 704 Mechanical Stage incorporates a sleeve to accept the substage condenser and special plain mount which is constructed in such a way as to position the iris diaphragm immediately behind the condenser lens. The sleeve is provided with knurled screws for centring the complete substage condenser assembly.

As this stage is an integral part of the stand it should, if required, be ordered by code number from the stands listed on the outside back cover.



OBJECTIVES

All Service 3 objectives are sleeve-mounted, parcentred and parfocussed. Objectives of magnifications $\times 40$, $\times 50$, $\times 60$ and $\times 100$ have spring-loaded front cells for the protection of specimens. A system of colour coding makes identification easy.



Parachromatic Series

Code	Primary Magnification at 160mm t.l.	Focal Length	N.A.	Recommended Eyepieces
1200	$\times 3$	40mm $1\frac{1}{2}$ "	0.11	H
1203	$\times 4$	40mm $1\frac{1}{2}$ "	0.13	H
1202	$\times 5$	25mm 1 "	0.12	H
1205	$\times 10$	16mm $\frac{2}{3}$ "	0.28	H
1216	$\times 20$	8mm $\frac{1}{2}$ "	0.50	H or C
1208	$\times 40$	4mm $\frac{1}{4}$ "	0.70	H or C
1218	$\times 60$	3mm $\frac{1}{8}$ "	0.85	H or C
1219	$\times 100$ (oil)	2mm $\frac{1}{12}$ "	1.30	H or C

Flat Field Parachromatic Series

Code	Primary Magnification at 160mm t.l.	Focal Length	N.A.	Recommended Eyepieces
1237	$\times 4$	40mm $1\frac{1}{2}$ "	0.10	H
1209	$\times 40$	4mm $\frac{1}{4}$ "	0.63	C

Fluorite Series

Code	Primary Magnification at 160mm t.l.	Focal Length	N.A.	Recommended Eyepieces
1233	$\times 10$	16mm $\frac{2}{3}$ "	0.30	C
1234	$\times 50$ (oil)	3.6mm $\frac{1}{7}$ "	0.95	C
1236	$\times 90$ (oil)	2mm $\frac{1}{12}$ "	1.30	C

Recommended Eyepieces H—Huygenian C—Compensating

EYEPIECES

Huygenian Eyepieces

Power	Single Eyepieces Code	Paired Eyepieces Code
$\times 5$	1250	1251
$\times 7$	1252	1253
$\times 10$	1254	1255
$\times 14$	1256	1257

Compensating Eyepieces

Power	Single Eyepieces Code	Paired Eyepieces Code
$\times 7$	1268	1269
$\times 10$	1270	1271
$\times 14$	1272	1273
$\times 20$	1274	—

Polaroid Analyser and Polariser

An ideal substitute for the special prisms otherwise used. The discs are mounted; one fits over the eyepiece, the other into the filter carrier. Polaroid Analyser Code 50 Polariser Code 2209

CONDENSERS AND MOUNTS

Abbe Condenser

The Abbe condenser is a two-lens illuminator with a maximum numerical aperture of 1.20
Code 196

Aplanatic Condenser

A three-lens Abbe condenser adequate for most routine work with achromatic objectives of all powers. When used as an immersion condenser the numerical aperture is 1.40; when used dry, the numerical aperture is 1.0
Code 192

Universal No 1 Achromatic Condenser

A triple back lens is used to obtain a high degree of correction of the spherical aberration and a large aplanatic aperture. The condenser is corrected for slides 1.2mm thick, but it can be used with thinner slides by unscrewing the front lens so that it touches the slide when in focus. Numerical and aplanatic apertures are both 1.0
Code 180

Zonal Dark Ground Condenser

A catoptric condenser designed on the concentric principle. It is for use with slides 1.2mm thick with which it must be in oil contact. With the objective aperture reduced to unity by means of a funnel stop, an intense black background is obtained
Code 188

FUNNEL STOPS to fit
2mm Parachromatic objective
2mm Fluorite objective

Code 789

Code 785



Abbe condenser in plain condenser mount

Plain Condenser Mount

with pre-centred iris diaphragm, filter carrier
Code 158

Plain Condenser Mount with iris diaphragm and filter carrier, for use with the centring substage of the 704 Mechanical Stage only
Code 161

Centring Condenser Mount

with tubular sleeve, iris diaphragm and filter carrier. By adjustment of the knurled screws the entire assembly is aligned with the optical axis of the microscope
Code 159

An alternative centring mount identical in all respects to the above, but with Allen centring screws in place of knurled centring screws, is also available. Separate Allen keys are provided
Code 160

The filter carriers of the four condenser mounts listed above accept filters 32mm in diameter

MEASURING ACCESSORIES

Huymic Eyepieces

Huymic eyepieces are Huygenian in type and are fitted with a focusing eye lens. The eyepieces are parfocalled when in normal adjustment. Huymic eyepieces are not supplied with an eyepiece micrometer or graticule unless these are specifically ordered.

Power	Code
x5	275
x10	328

Eyepiece Scales

Watson manufactured scales and graticules are of unsurpassed quality. The most stringent tests are applied at every stage of production to ensure that the highest standard is maintained.

	Code
Scale of 10mm divided into 100 parts, each division 0.1mm	332
Scale as above but with cross lines	336
Scale of 7.5mm divided into 100 parts, each division 0.075mm	825
Scale of 5mm divided into 100 parts, each division 0.05mm	337
Scale of 2mm divided into 100 parts, each division 0.02mm	338
Step wedge of 10mm with 100 divisions, numbered	339
Square, each side 1cm divided into 1mm squares, numbered and lettered	340
Total area ruled into 1mm squares	390

Stage Micrometers

Two types are available: one graduated in inches and the other in millimetres. Both types are on finest quality glass slides size 3x1in. The graduated areas are protected by cover glasses.

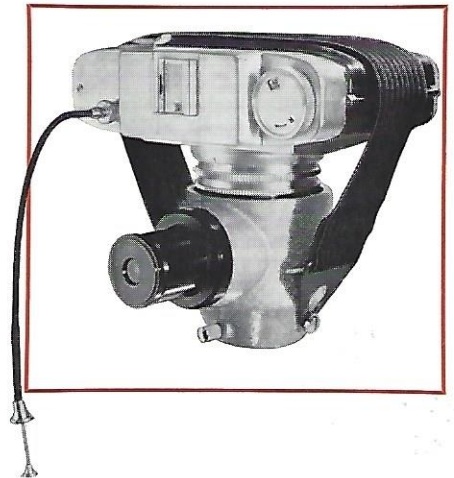
	Code
Divisions of 0.1mm and 0.01mm	100
Divisions of 0.01in and 0.001in	101

a complete catalogue of scales and graticules is available upon request: ask for List No 12B

MICROSCOPE ATTACHMENT FOR 35mm CAMERAS

The Microscope Attachment for 35mm Cameras has been designed to enable inexpensive 35mm cameras to be used for photomicrography. It provides a means of fixing the camera over a standard microscope eyepiece tube and of focusing the instrument quickly and accurately. It is suitable for use with most 35mm cameras other than those which are equipped with folding bellows. As the Microscope Attachment is intended primarily to fit vertical monocular microscopes it should preferably be used only in conjunction with a Vertical Monocular Head (Code 298)

Microscope Attachment for 35mm Cameras Code 766



WATSON IMAGE-SHEARING EYEPIECE

For simple and rapid particle sizing; diameter measurements; measurement of transistor components and photographic masks; measurement of many biological specimens and bacteria; dust control; measurement of diamond pyramid indents in hardness testing. By comparing the image with itself instead of with a fixed scale, the difficulties of measuring moving or drifting objects are largely eliminated. The wise incorporates a dichroic beam splitter giving colour differentiation of the beams with less than 3% light loss due to absorption. The shear is proportional both to the movement of the two mirrors in the system and to the rotation of the setting head from which readings are taken. The setting head is designed to give a quick, easy and accurate read-out. Use of filters is normally unnecessary. The wise will fit most microscopes having Royal Microscopical Society standard tube diameter, and will accept interchangeable eyepieces. Direction of shear can be altered simply by turning the device in the microscope tube. A graticule indicates direction of shear and defines a standard area for particle counting. Overall magnification of the wise as supplied is x20.

Code 329

PHASE CONTRAST EQUIPMENT FOR THE SERVICE 3 MICROSCOPE

PHASE CONTRAST EQUIPMENT is available for the Service 3 Microscope with low-voltage lamp base (*please see page 2*). The principles involved are identical to those employed in the Watson Research Phase Contrast equipment, and the results obtained are of the same high quality. Alignment of the phase plate and annular disc is by means of either a Bertrand Lens built into the microscope, or an auxiliary telescope. Each Phase Contrast outfit is supplied in a fitted case.

The table on the right lists four typical complete outfits for phase contrast work. If your requirements call for individual selection of components, please refer to the SCHEDULE OF PARTS below.

Low-voltage stand, Bertrand Lens and plain stage

Code 1241

Low-voltage stand, Bertrand Lens and 704 mechanical stage

Code 1242

Auxiliary Telescope

For existing low-voltage Service 3 Microscopes, or for those not fitted with a Bertrand Lens

Code 640

Phase Plates

For 4mm (x40) Parachromatic objective
Code 1243

For 3.6mm (x50) Fluorite objective
Code 1244

For 2mm (x100) Parachromatic objective
Code 1245

It is essential that phase plates be fitted to objectives at the factory

Annulus Centring Device

complete with lamp condensing lens and annular discs for x40, x50 and x100 objectives

Code 1240

The annulus centring device and lamp condensing lens is interchangeable with the standard Service 3 lamp condensing lens

Abbe Condenser

Code 196

Universal No 1 Achromatic Condenser

Code 180

An achromatic condenser should be used for improved performance, particularly when an outfit includes a x50 Fluorite objective

Centring Condenser Mount

with iris diaphragm

Code 159 or 160

Special Plain Condenser Mount

with iris diaphragm

For use with Stand 1242—i.e. for use with the 704 Mechanical Stage

Code 161

SUGGESTED OUTFITS

Code

Service 3 Microscope with built-in Bertrand Lens, plain stage, low-voltage lamp base, focusing substage	1241
Inclined monocular head	295
Quadruple rotating nosepiece	262
x10 Parachromatic objective	1205
x40 Parachromatic objective	1208
Phase plate for x40 objective	1243
x10 Huygenian eyepiece	1254
Abbe condenser in centring mount with iris diaphragm	196 & 159
Annulus centring device, lamp condensing lens, annular disc	1240
Code for complete outfit	890

Service 3 Microscope with built-in Bertrand Lens, plain stage, low-voltage lamp base, focusing substage	1241
Barnet mechanical stage	63
Inclined monocular head	295
Quadruple rotating nosepiece	262
x4 Parachromatic objective	1203
x10 Parachromatic objective	1205
x40 Parachromatic objective	1208
Phase plate for x40 objective	1243
x100 Parachromatic objective	1219
Phase plate for x100 objective	1245
x5 and x10 Huygenian eyepieces	1250 & 1254
Abbe condenser in centring mount with iris diaphragm	196 & 159
Annulus centring device, lamp condensing lens, two annular discs	1240
Code for complete outfit	891

Service 3 Microscope with built-in Bertrand Lens, 704 mechanical stage, low-voltage lamp base, focusing substage	1242
Inclined monocular head	295
Quadruple rotating nosepiece	262
x4 Parachromatic objective	1203
x10 Parachromatic objective	1205
x40 Parachromatic objective	1208
Phase plate for x40 objective	1243
x100 Parachromatic objective	1219
Phase plate for x100 objective	1245
x5 and x10 Huygenian eyepieces	1250 & 1254
Universal No. 1 Condenser in special plain mount (centring fitted to 704 mechanical stage)	180 & 161
Annulus centring device, lamp condensing lens, two annular discs	1240
Code for complete outfit	892

Service 3 Microscope with built-in Bertrand Lens, 704 mechanical stage, low-voltage lamp base, focusing substage	1242
Inclined monocular head	295
Quadruple rotating nosepiece	262
x10 Parachromatic objective	1205
x40 Parachromatic objective	1208
Phase plate for x40 objective	1243
x50 Fluorite objective	1234
Phase plate for x50 objective	1244
x100 Parachromatic objective	1219
Phase plate for x100 objective	1245
x7 and x10 Compensating eyepieces	1268 & 1270
Universal No. 1 Condenser in special plain mount (centring fitted to 704 mechanical stage)	180 & 161
Annulus centring device, lamp condensing lens, three annular discs	1240
Code for complete outfit	893

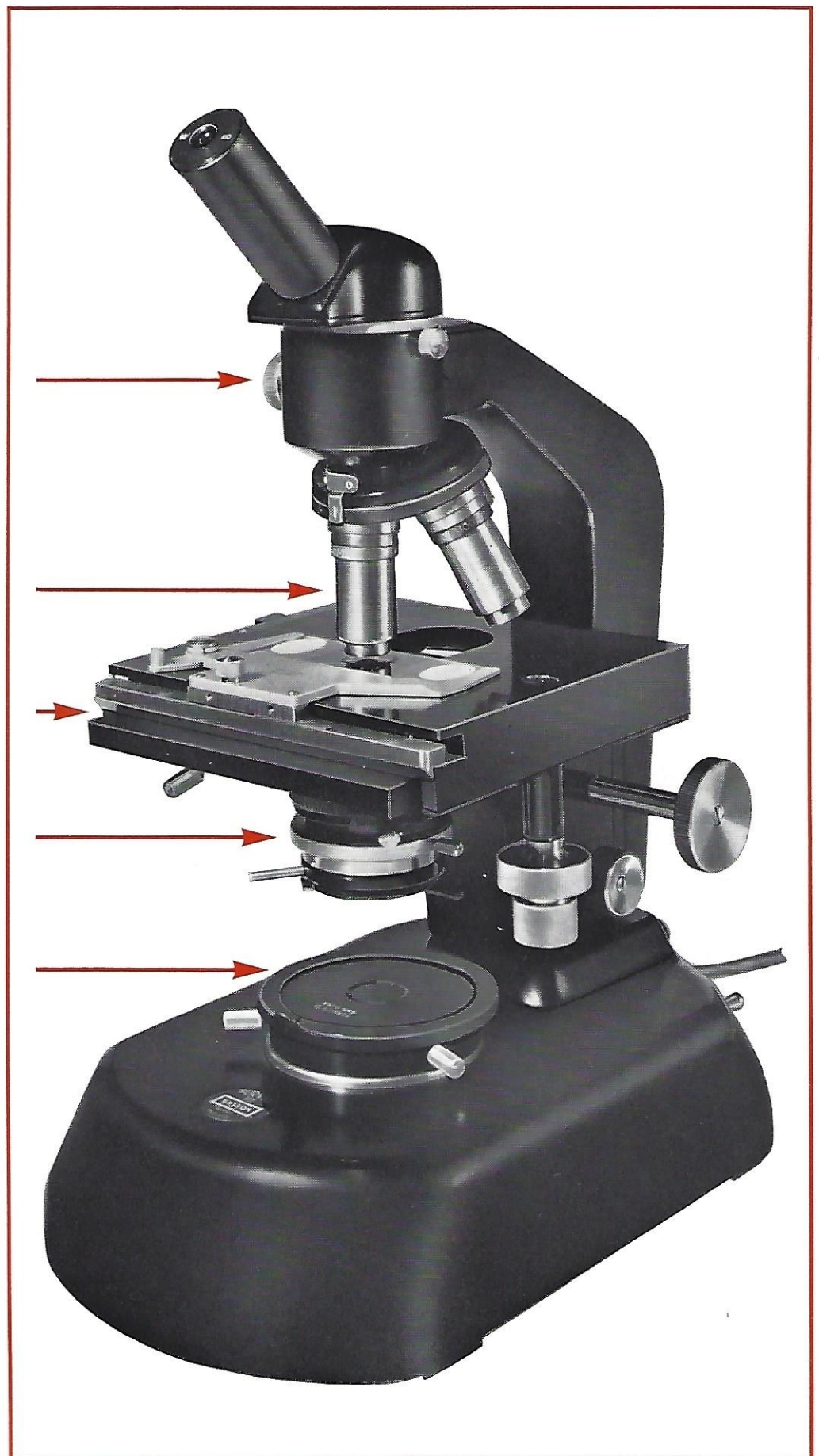
control head for Bertrand Lens

standard Watson objectives fitted with phase plates

704 flat top mechanical stage

achromatic condenser in special plain condenser mount

annulus centring device, lamp condensing lens and annular disc



HOW TO ORDER

select your complete outfit from this **SCHEDULE OF EQUIPMENT**

Microscope Stands (see page 2)

All Service 3 Microscope stands are fitted with a focusing substage

Illumination	Stage	Code	Code with Bertrand Lens
Mains voltage	Plain	292	—
Low voltage	Plain	293	1241
Mains voltage	704 Mechanical	1292	—
Low voltage	704 Mechanical	1293	1242

Heads (see page 3)

All Service 3 Microscope heads are interchangeable and rotate through 360°

	Code		Code
Inclined monocular head	295	Inclined binocular head	297
Inclined monocular head with drawtube	296	Vertical monocular head	298

Fitted Cabinets

All fitted cabinets for Service Microscopes are soundly constructed of seasoned wood and well finished. Each is complete with strong carrying handle, lock and two keys. It is essential that a cabinet be specified for overseas orders. The weight of a Service 3 Microscope in cabinet with average equipment is 55kgs (25lbs)

For Service 3 Microscope with monocular head *Code 2112* with binocular head *Code 2113*

Optical Outfits

Objectives	Eyepieces	Condenser:Mount	Service 3 and plain stage outfit code	Service 3 and 704 stage outfit code
PA x10 x40	one H (x5 x7 or x10)	Abbe P	2129	2141
PA x10 x40	two H (from x5 x7 x10)	Abbe P	2132	2142
PA x3 x10 x40	two H (from x5 x7 x10)	Abbe P	2133	2143
PA x10 x40 x100	two H (from x5 x7 x10)	Abbe P	2134	2144
PA x3 x10 x40 x100	two H (from x5 x7 x10)	Abbe P	897	2145
PA x10 x40 x100	two H (from x5 x7 x10)	Aplanatic C	898	2146
FL x10 x50 PA x40 x100	two C (x7 and x10)	Universal C	2135	2147

PA — Parachromatic **H** — Huygenian **P** — Precentred **A** quadruple nosepiece is supplied with each outfit
FL — Fluorite **C** — Compensating **C** — Centring

When ordering an outfit which includes a binocular head remember that *paired eyepieces* should be specified

always order by code number only

Our policy is one of continuous development. Current production models of the Service 3 Microscope and accessories may, therefore, differ in minor details from the specifications contained in this brochure

W. WATSON & SONS LTD

TELEPHONE: BARNET 4404

BARNET · HERTS · ENGLAND

CABLES: 'OPTICS' BARNET

SERVICE 3 MICROSCOPE

PRICE LIST FOR CATALOGUE LIST NO. 3G.

JAN. 1st 1965.

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Page 2	1249	3. 0. 0.
Page 3	63	18.10. 0.
	198	14.10. 0.
Page 4	1200	3.14. 0.
	1203	3.14. 0.
	1202	3.14. 0.
	1205	4.10. 0.
	1216	7.18. 0.
	1208	8. 0. 0.
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	180	13. 8. 0.
	188	11. 0. 0.
	789	1.10. 0.
	785	1.10. 0.
	158	2.10. 0.
	161	4.10. 0.

	Code	£. s. d.
Page 4	159	6. 6. 0.
	160	6. 6. 0.
	50	5.16. 0.
	2209	5.16. 0.
Page 5	275	4. 4. 0.
	328	4. 4. 0.
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	336	1. 7. 6.
	825	1.10. 0.
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	390	1. 7. 6.
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	101	2. 8. 0.
	766	18.10. 0.
	329	67.10. 0.
Page 6	1241	51.10. 0.
	1242	84. 0. 0.
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	1243	7. 0. 0.
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	1245	7. 0. 0.
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	890	97.14. 0.
	891	143.12. 0.
	892	165.14. 0.
	893	199. 2. 0.
Page 8	292	35. 0. 0.
	293	42. 0. 0.
	1292	67.10. 0.
	1293	74.10. 0.

Page 8

Code	£.	s.	d.
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1242	84.	0.	0.
295	5.	0.	0.
296	7.	10.	0.
297	37.	10.	0.
298	3.	10.	0.
2112	3.	0.	0.
2113	3.	10.	0.
2129	23.	8.	0.
2132	25.	2.	0.

Page 8

Code	£.	s.	d.
2133	28.	16.	0.
2134	40.	2.	0.
897	43.	16.	0.
898	50.	6.	0.
2135	89.	3.	0.
2141	25.	8.	0.
2142	27.	2.	0.
2143	30.	16.	0.
2144	42.	2.	0.
2145	45.	16.	0.
2146	48.	10.	0.
2147	87.	7.	0.

(2)

W. WATSON & SONS LTD

BARNET

HERTS