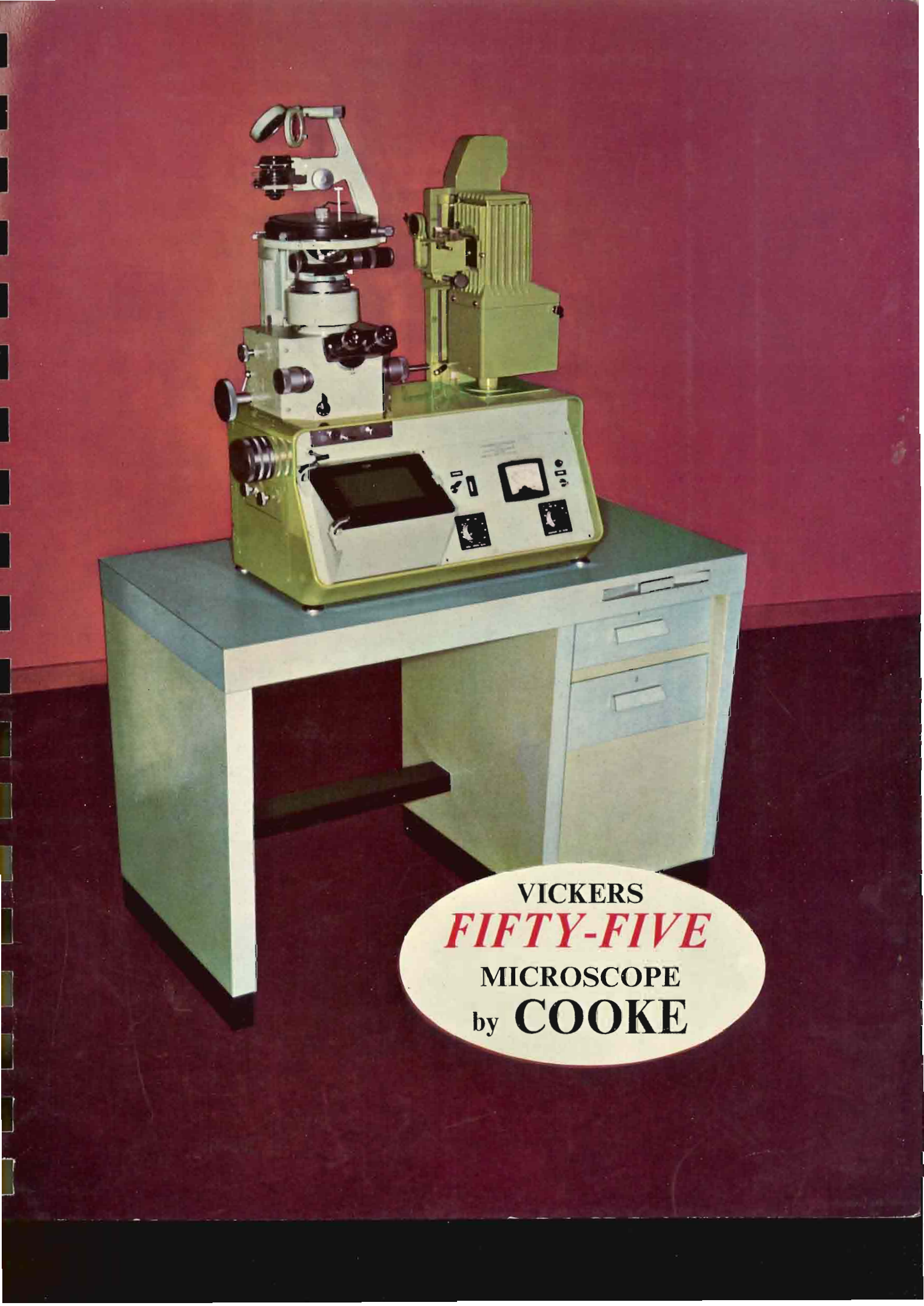
VICKERS
FIFTY-FIVE
MICROSCOPE
by COOKE

M 550002

With the addition of M 550013 high power tungsten filament lamp

VICKERS FIFTY-FIVE MICROSCOPE

INDEX

COOKE TROUGHTON & SIMMS LTD.

HAXBY ROAD

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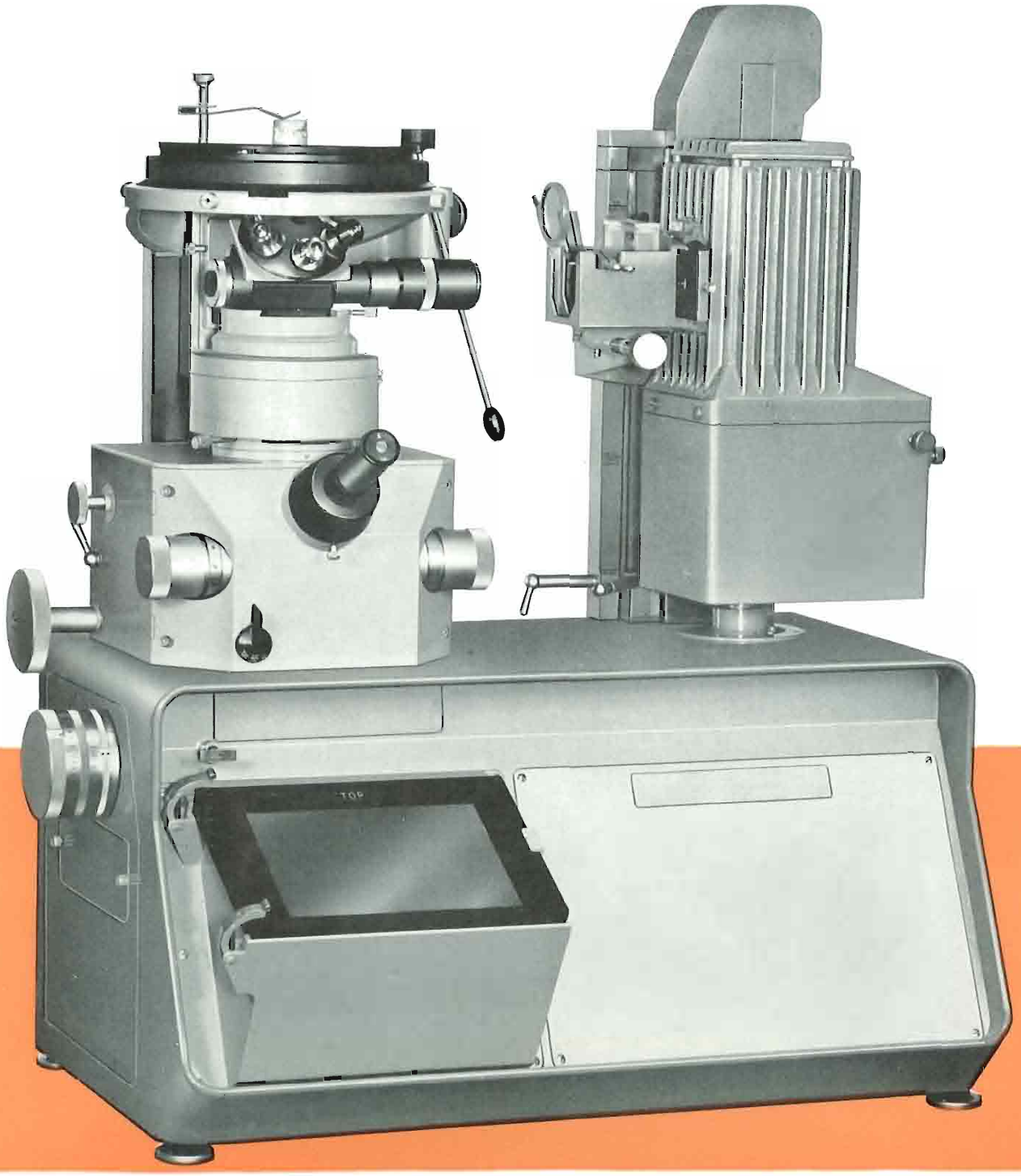

VICKERS FIFTY-FIVE MICROSCOPE

M 550001

M550001 Vickers Fifty-Five Microscope with gliding stage (joy stick control), normal incident illuminator, monocular eyepiece, sextuple carrier, magnification changer, xenon lamp (interchangeable with high pressure mercury vapour lamp), electrical supply cabinet (wall mounting), focusing screen and double plate holder for $\frac{1}{2}$ plate with two $\frac{1}{4}$ plate adaptors and hood, adjustable lamp pillar carrying xenon or mercury vapour lamp, centring controls to lamp, lamp condenser on focusing mount, water trough, colour filter, neutral filter and diffusing screen. Dimensions: Height $30\frac{1}{2}$ in., Width 44 in., Depth 24 in., Weight: 177 lbs.

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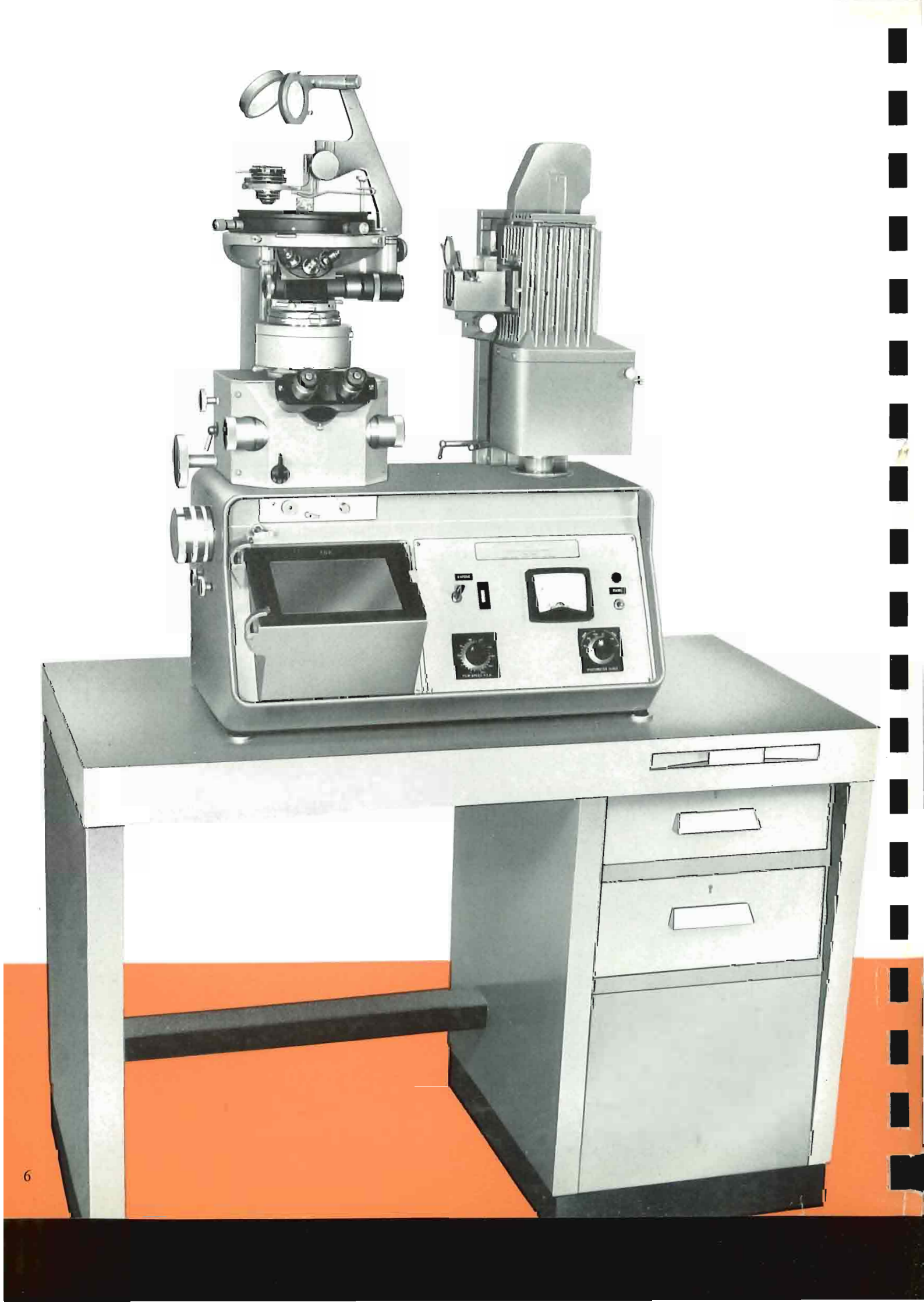
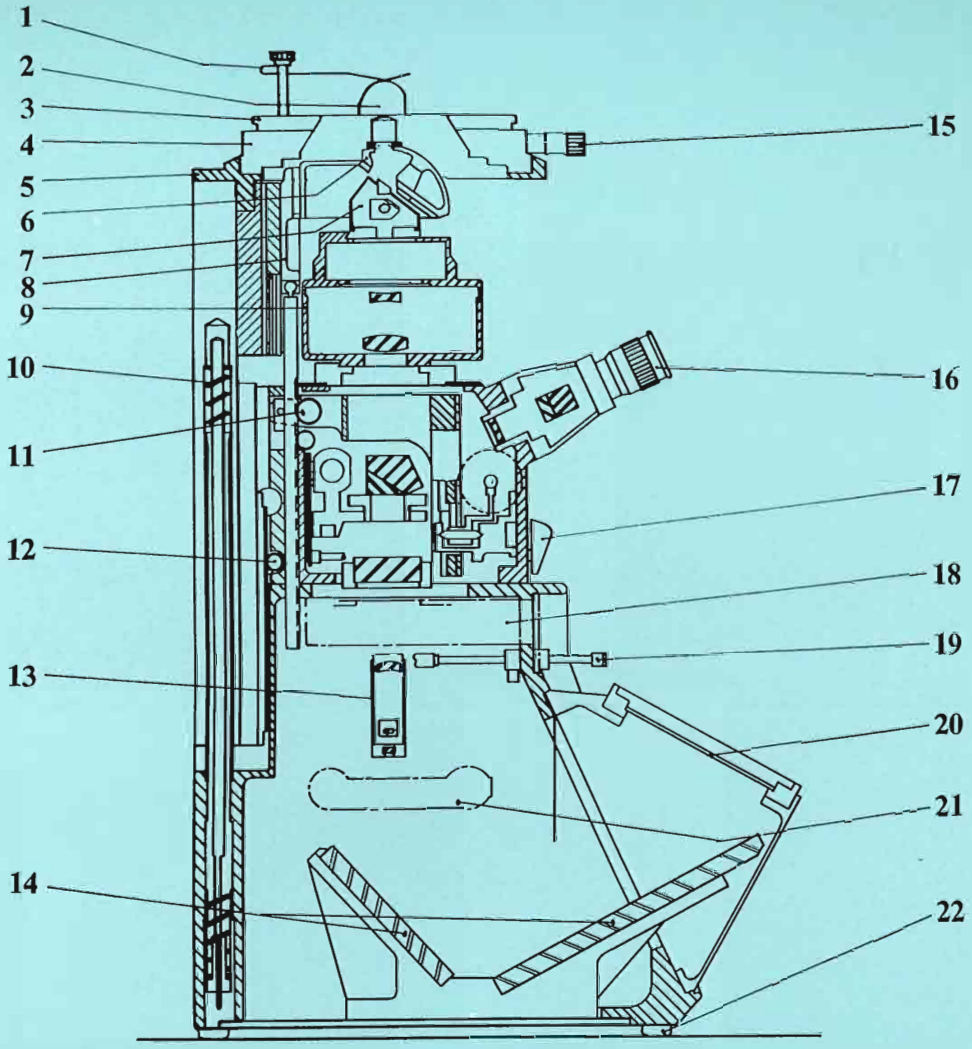


VICKERS FIFTY-FIVE MICROSCOPE

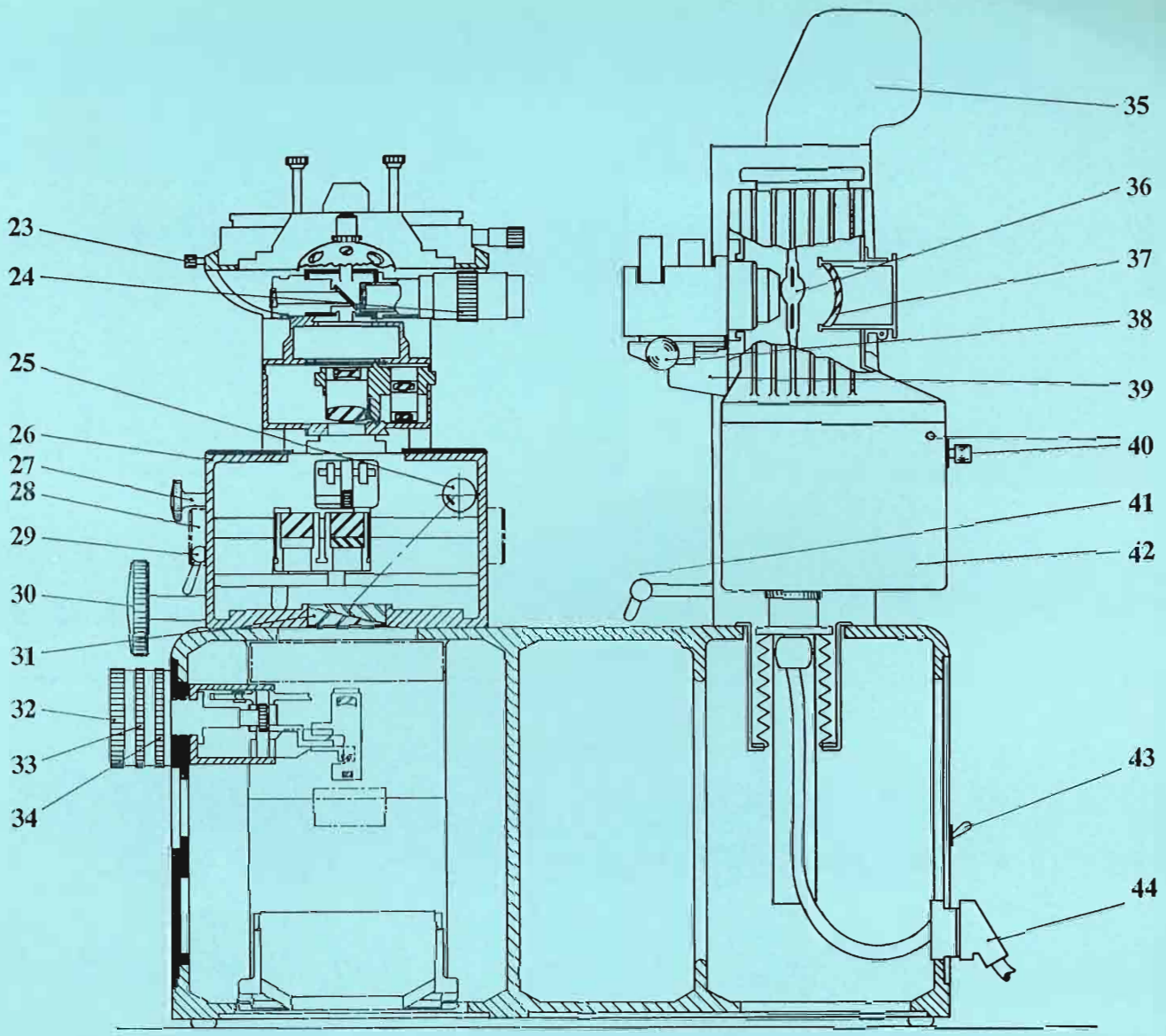
M 550002

M550002 Vickers Fifty-Five Microscope with centring, traversing, rotating and gliding stage, normal incident illuminator, binocular eyepiece, sextuple carrier, magnification changer with analyser unit, xenon lamp (interchangeable with high pressure mercury vapour lamp), transmitted light bracket, motorised 35 mm. camera unit, integrating photographic timer, motorised focal plane shutter, wood cabinet with built-in electrical supply, focusing screen and double plate holder for $\frac{1}{2}$ plate with two $\frac{1}{4}$ plate adaptors and hood, adjustable lamp pillar carrying xenon or mercury vapour lamp, centring controls to lamp, lamp condenser on focusing mount, water trough, colour filter, neutral filter and diffusing screen. Dimensions: Overall Height 61 in., Cabinet Floor Space 44 in. $\times$ 24 in. Weight: Microscope 204 lbs., Cabinet 186 lbs.

COOKE TROUGHTON & SIMMS LTD.



1. Stage Clips
2. Specimen
3. Gliding Stage
4. Micrometer Stage
5. Stage Support
6. Multiple Objective Carrier
7. Illumination Box
8. Slow Motion Carriage
9. Magnification Changer
10. Weight Relieving Spring
11. Slow Motion Transfer Gear
12. Rack and Pinion (Coarse Motion)
13. Zoom Projection Eyepiece
14. Mirrors (2)
15. Stage Traverse Micrometers
16. Binocular Eyepiece
17. Selector Switch (Visual only—35 mm. photo and visual—Macro)
18. Focal Plane Shutter
19. Selector Rod (Zoom Eyepiece—Macro—35 mm. Corrector Lens)
20. Focusing Screen
21. 35 mm. Camera
22. Anti-Vibration Mountings



23. Stage Clamp Screw
24. Field Iris Control
25. Photomultiplier Cell
26. Microscope Block
27. Subsidiary Coarse Motion Pinion Control
28. Fine Motion Heads
29. Clamp for Coarse Motion
30. Coarse Motion Milled Head
31. Pick-off Prism for Photomultiplier
32. Objective Setting Scale
33. Final Magnification Scale
34. Magnification Changer Scale
35. Weight Relieving Spring for Xenon Lamp
36. Xenon Lamp
37. Reflector Unit
38. Condenser Focusing Control
39. Condenser Bracket
40. Lamp Centring Control Heads
41. Clamp Lever for Lamp Slideway
42. Xenon Lamp Casing
43. Lamp Mains Switch
44. Multi-pin Plug

NEW
and
SUPERIOR FEATURES

Automatic Integrating Photographic Timer

Zoom Projection Eyepiece

Eyepiece Magnification Changer

35 mm. Camera, Manual or Motorised Control

Multiple Objective Carriers

Automatic Magnification Indicator

Built-in Polarizing Unit

Simultaneous Incident and Transmitted Illumination

Pneumatic Micro-Hardness Testing Equipment

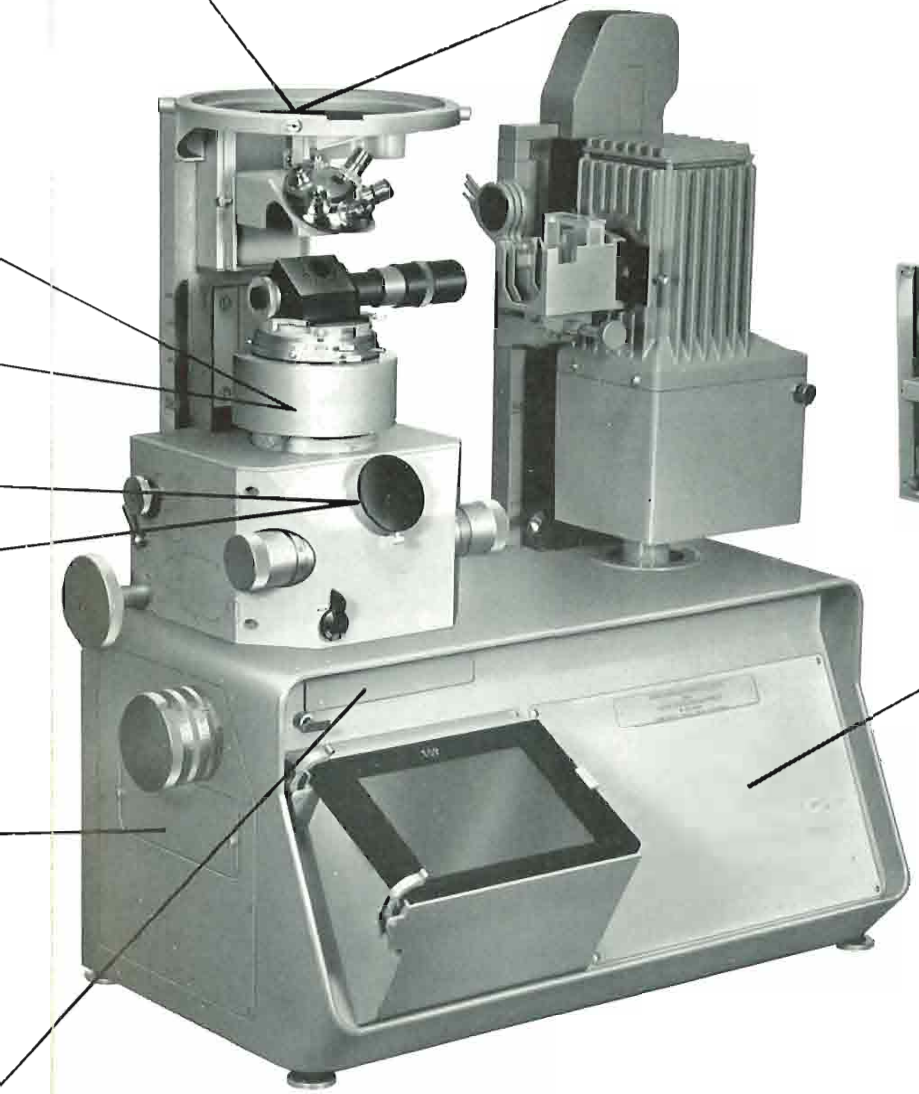
Incident Phase Contrast Unit

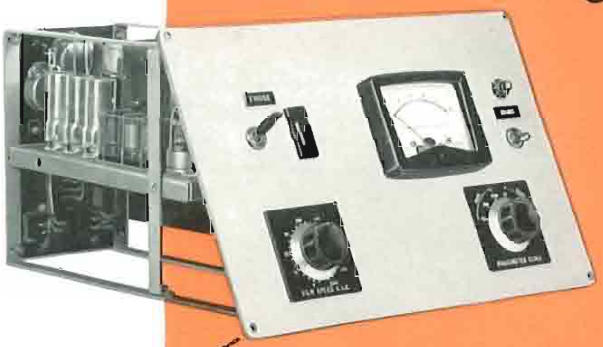
Instrument mounted on Anti-Vibration Pads

All Illumination Techniques applicable without disturbing specimen

M550300 Micrometer and Gliding Stage

M551515 Gliding Stage





M550017
Automatic Integrating
Photographic Timer

Wall Mounting
Power Supply Unit

OPE

This break-down display of major components can serve as a guide when ordering an instrument to suit individual requirements.

M550012 Eyepiece Magnification Changer
with built-in Analyser Unit

M550011
Eyepiece Magnification Changer

M550680 Binocular Body

M550670
Monocular Body

M550015 35 mm. Camera Unit

M551850 Focal Plane Shutter

VICKERS FIFTY-FIVE MICROSCO

GENERAL DESCRIPTION

The Vickers Fifty-Five Microscope is of the inverted type, the specimen being positioned above the objectives. It is a bench type instrument, with built-in anti-vibration mountings, and versions can be supplied either to fit an existing bench installation or complete with cabinet containing electrical equipment.

Exceptional stability and freedom from vibration under the highest magnifications is achieved due to the manner in which the objectives and mount, together with the fine motion mechanism, are connected to the stage support.

The standard object stage has a gliding top plate which responds smoothly to the lever control. For precise measurement and polarizing work a more comprehensive stage is available, having, in addition to the gliding motion, micrometer-controlled lateral and transverse movements, together with a graduated rotary movement so arranged as to be always centred to the optical axis.

An important feature is that once the object under examination has been placed in position on the stage it need not be moved when changing the type of illumination technique employed to view it; micro hardness testing can also be performed in situ.

The relationship between the angle of the eyepiece and the viewing screen has been so designed that the observer may rapidly alternate between this and the eyepiece when desired.

The main source of illumination is a High Pressure Xenon Lamp which is interchangeable on a vee slide with a Mercury Vapour Lamp. The lamp and lamp housing are designed to move vertically under the control of a spring-loaded device so that the light may be fed into any of the various illuminators available. Full control over the illumination beam is ensured by the provision of centring adjustments, iris diaphragm, focusing lamp condenser and built-in filters. When required, mixed illumination is available, the xenon source providing normal incident light and a tungsten filament lamp supplying transmitted light. The tungsten filament lamp is suitable for most transmitted light work.

For incident illumination, light enters the side of an incident illuminator unit via a field iris, and is reflected upwards through the selected objective, mounted on a rotatable objective carrier, to the specimen. The image-forming rays then return via a magnification changer having alternative settings providing magnifications of 1·0, × 1·4 × and 2·0 ×. The light path may now be deflected into a monocular or binocular head carrying conventional eyepieces and/or be allowed to continue to the photographic focusing screen. The choice of light path is governed by a selector switch, on the front of the focusing block, which may be set to one of three positions, "Visual only", "35 mm. Photo and Visual", or "Macro-Photo".

In the "Visual only" position all the light is directed to the viewing eyepiece. The magnification may be calculated as a product of the objective, magnification changer and eyepiece powers. When the binocular head is in use, tube-length compensators are fitted to each eyepiece tube to allow correction for varying interocular separations.

When the selector switch is in the "Photo and Visual" position, 90 per cent of the available light is passed to the photographic screen, and the remainder deflected to the visual head. This is to enable accurate focusing and centring of the image. Photographs on half or quarter plates (7″ × 5″ and 5″ × 4″ respectively in North America) may then be produced by substituting sensitive material in place of the viewing screen.

The third position of the selector switch "Macro-Photo" enables the light beam to be projected directly on to the screen allowing macro examination and photography, either by means of transmitted or incident illumination, macro lenses and illuminators being substituted for the magnification changer and micro-objective assembly.

The swing-out mirror bracket is necessary when using transmitted light techniques.

The instrument is particularly well equipped for work in polarized light, since all the necessary polarizing components can be built into a special magnification changer.

The Vickers Fifty-Five Microscope incorporates a pancratic Projection Eyepiece which, in conjunction with the magnification changer and a series of objectives, allows a comprehensive range of screen magnifications to be produced, and the magnification value may be

read directly on the Zoom control knob, which is calibrated with three scales, the outer scale is set to indicate the power of the objective in use, the inner scale to the value selected on the magnification changer, while the centre scale, a graduated arc, gives a direct reading of the final screen magnification as the control is rotated against it.

The range covered by the "Zoom" projection eyepiece is from 24 diameters with a 3.5× objective, and the magnification changer set at 1, to 2,800 diameters with a 140 × objective and the magnification changer set at 2·0. A.S.T.M. recommended magnifications are shown in red.

The objectives used for incident light, transmitted light and dark field microscopy are mounted on sextuple or quintuple carriers, which are quickly interchangeable. All incident light objectives used on this instrument are computed to work at infinite tube length. 160 mm. objectives are used for transmitted light work, and their quintuple mount incorporates a corrector lens. All objectives except 3·5× and 6·0× are par-central and par-focal.

When dark field optics are used the necessary patch-stop is incorporated on a slide mounted on the front of the lamp condenser. This slide also carries an annulus which may be matched to phase rings for incident phase contrast, matching being carried out by the use of a focusing Bertrand lens fitted into the magnification changer. The incident phase contrast unit complete with the illumination box replaces the normal incident illuminator and provision is then made for positive and negative phase contrast, dark ground illumination and normal incident illumination. For transmitted phase contrast a condenser annulus changer together with 160 mm. tube length phase objective is required.

A Photographic Shutter can be incorporated into the instrument and may be used for a range of exposure times when using either a plate camera or a 35 mm. camera. When the 35 mm. camera is inserted into the instrument it automatically positions a selector switch which places a corrector lens into the light path. On removal of the 35 mm. camera the selector may be set to either the projection eyepiece or "Macro" position.

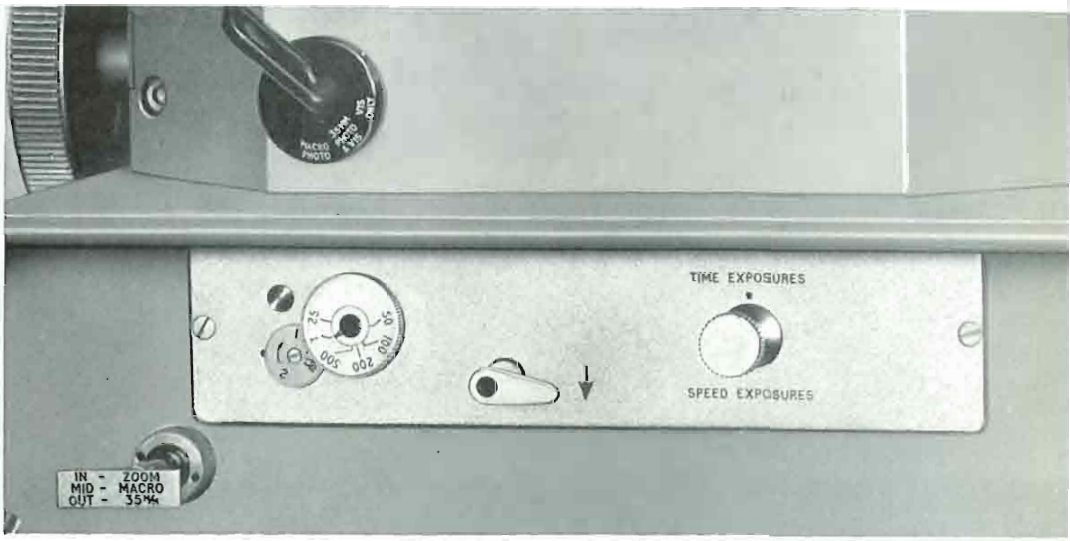
The Automatic Integrating Photographic Timer removes the need for trial exposures. A photo-cell, fed from the optical path, integrates the image-forming light and measures its intensity, terminating the exposure when a pre-determined amount of light energy has passed through. When the switches for the film speed and photometer scale have been set correctly, depression of the spring switch marked "Exposure" controls the photographic shutter and automatically gives the correct exposure to the sensitive photographic material. The Exposure Duration Indicator gives a visual warning that the shutter is open and an exposure is in progress.

AUTOMATIC INTEGRATING PHOTOGRAPHIC TIMER

The Automatic Integrating Timer (developed in collaboration with Dr. R. Barer and Mr. J. Underwood, Department of Human Anatomy, Oxford University) will accommodate film speeds over the range 5 A.S.A. to 3,200 A.S.A. and automatically timed exposures can be obtained at shutter speeds from 1/10th second to several minutes. Shutter speeds up to 1/500th second can be set on the shutter, the exposure time having been calculated from the reading of the built-in photometer. The shutter is automatically rewound after each exposure, and if the 35 mm. camera is in use, the film in the camera is transported one frame.

It is possible to follow the progress of an exposure visually by means of the exposure duration indicator.

The Automatic Timer can also be used with the macro equipment.



M551850 Focal plane shutter

M550015 35 mm. Camera unit showing cassette

M550017 Automatic Integrating Photographic Timer (including focal plane shutter).
M551850 Focal Plane Shutter.
M550015 35 mm. Camera Unit (Motorised).
M550014 35 mm. Camera Unit (Manual Control only).
M551854 Additional Laboratory Cassette (with film advance mechanism).

When ordering it is essential to give particulars of electricity supply.

AUTOMATIC MAGNIFICATION INDICATOR

Automatic magnification indicator allows direct reading from 24 to 2,800 diameters. A.S.T.M. recommended magnifications are shown in red.

EYEPIECE MAGNIFICATION CHANGERS

The magnification changer contains a rotating lens system giving 1·0×, 1·4× and 2·0× magnifications, consequently a large choice of eyepieces is unnecessary.

M550011 Eyepiece Magnification Changer.

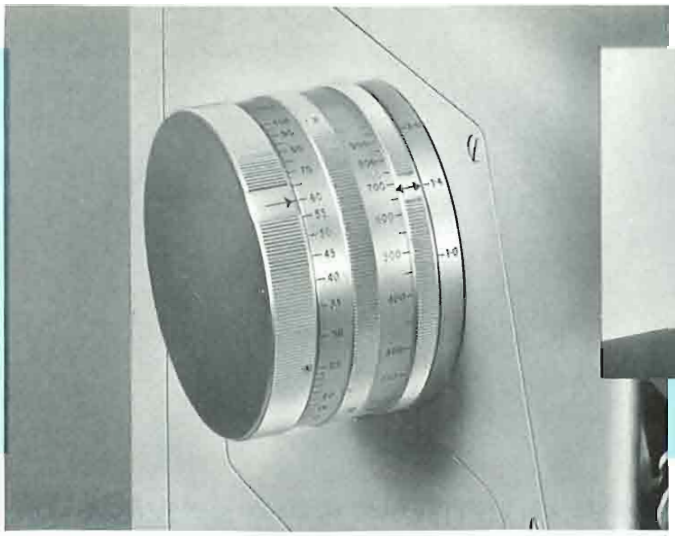
M550012 Eyepiece Magnification Changer with Built-in Analyser Unit.

MULTIPLE OBJECTIVE CARRIERS

M550560 Sextuple carrier and mount for infinite tube length normal incident objectives (supplied with the instrument).

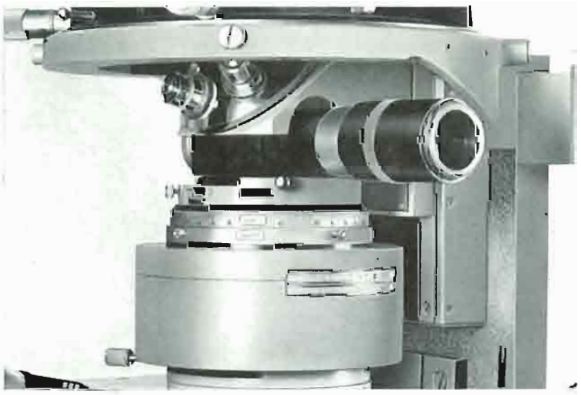
M550550 Quintuple carrier and mount for infinite tube length 4 mm., 8 mm. and 16 mm. dark ground objectives with Catoptric Condensers and two normal incident objectives.

M551545 Quintuple carrier and mount with built-in 2× corrector lens for 160 mm. tube length transmitted light objectives.



Automatic magnification indicator

M 550011



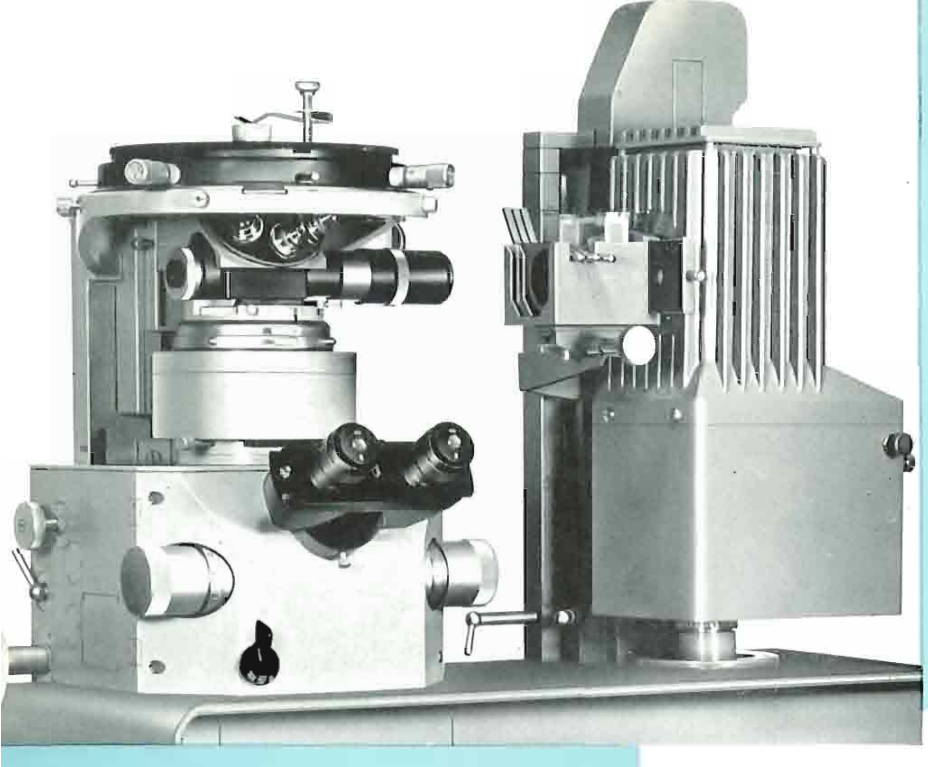
M 550012

M 550560

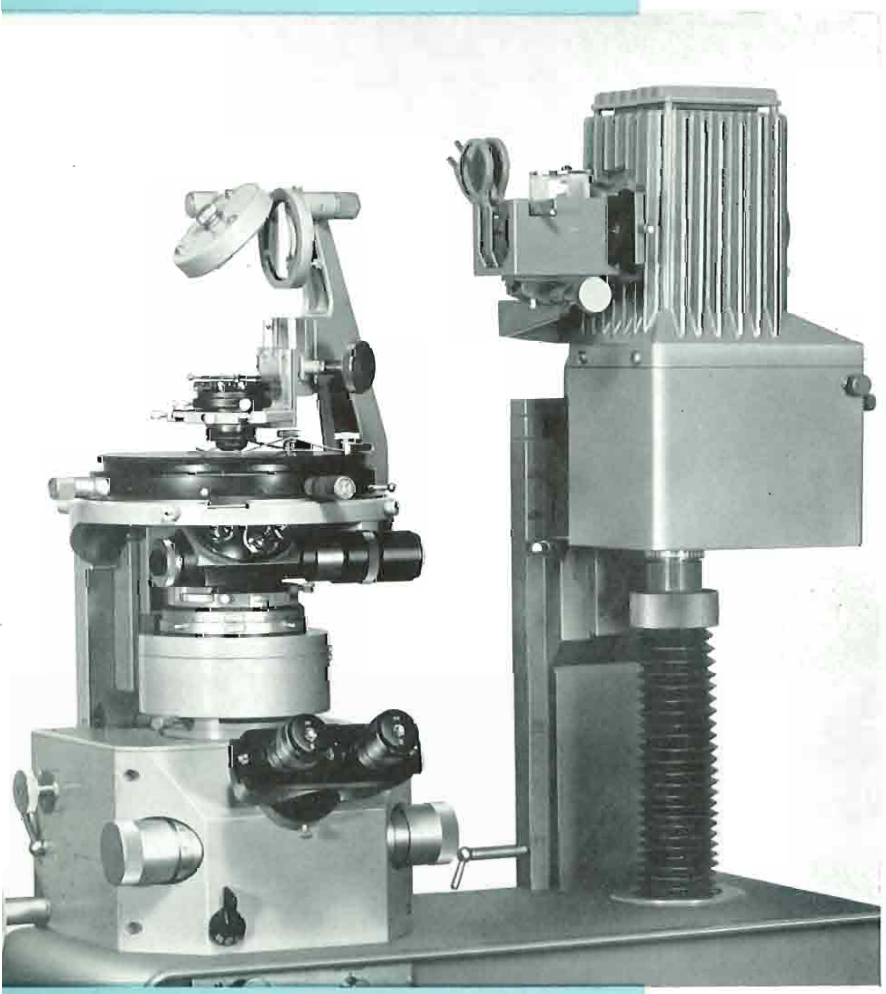
M 550550

M 551545

INCIDENT AND TRANSMITTED ILLUMINATION



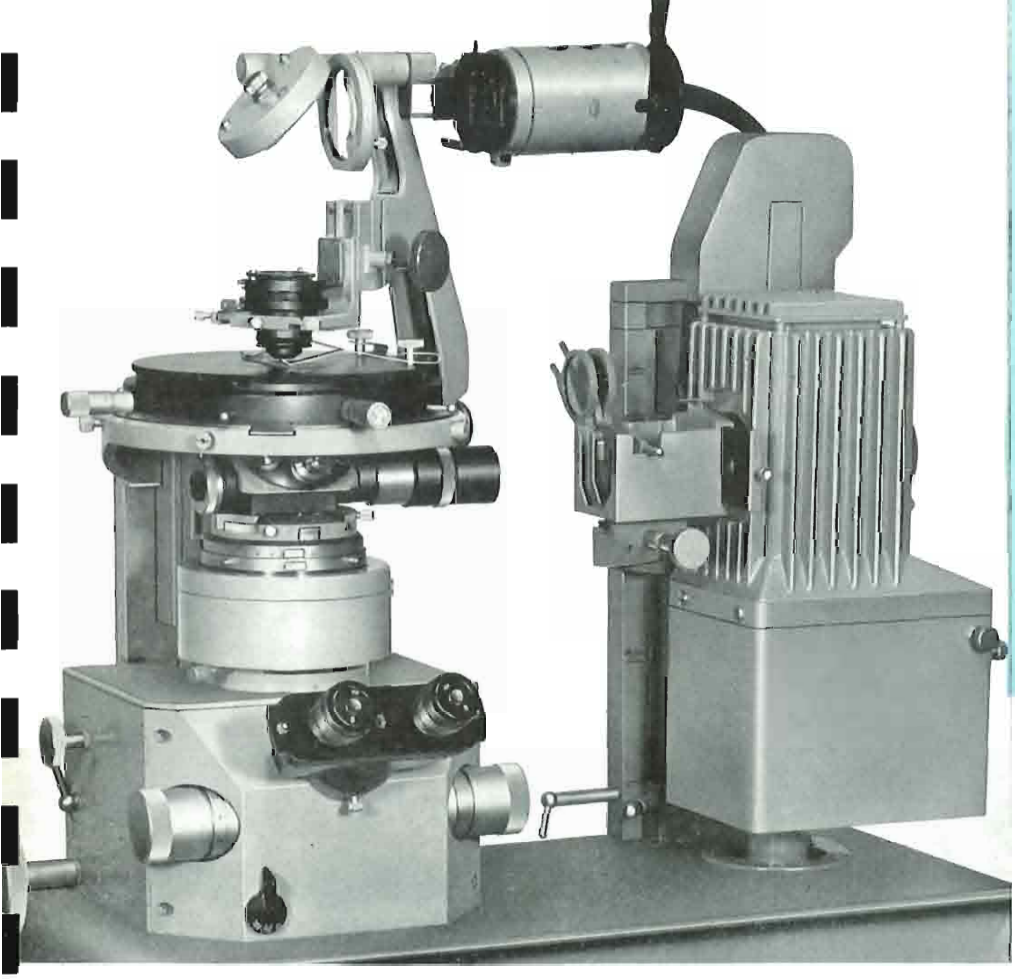
Incident light arrangement for the examination of a metallurgical specimen.



Transmitted light arrangement, with substage swing-out bracket, for the examination of a biological specimen.

EQUIPMENT FOR TRANSMITTED LIGHT

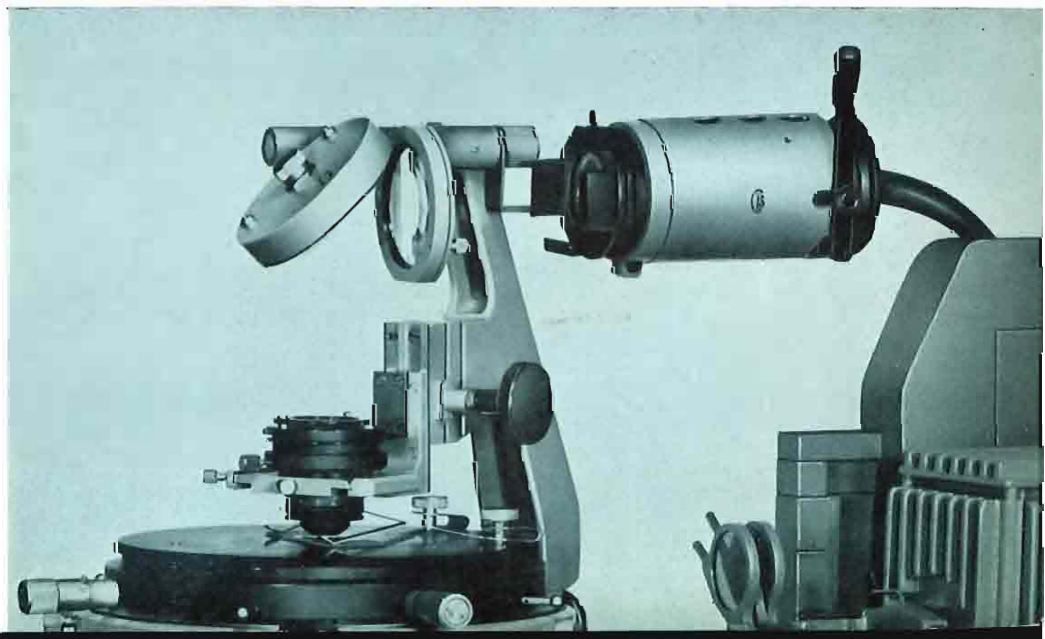
M550500	Substage Swing-out Bracket.
M001376	Centring Condenser Mount.
M001382	Abbe Condenser (2 lens).
M001383	Aplanatic Condenser (4 lens).
M001386	Achromatic Condenser N.A. 1·00
M001391	Achromatic Oil Immersion Condenser N.A. 1·30.



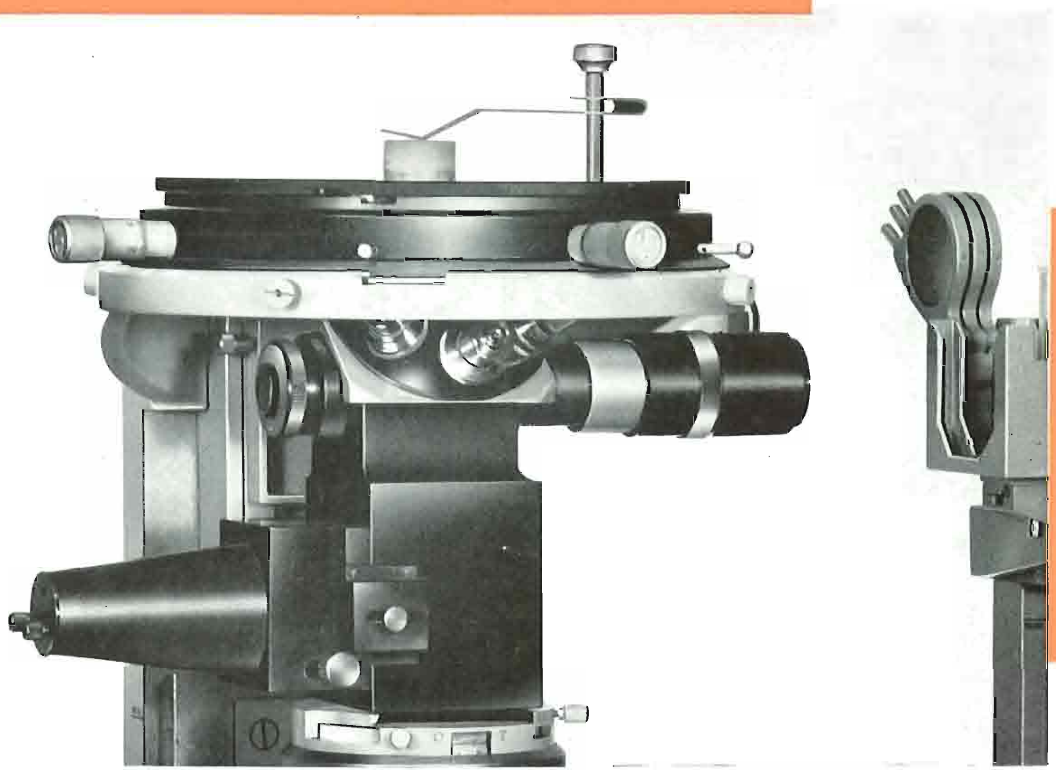
SIMULTANEOUS INCIDENT AND TRANSMITTED ILLUMINATION

Simultaneous incident and transmitted illumination can be achieved by the addition of a high power tungsten filament lamp.

M550013 High Power Tungsten Filament Lamp.



PHASE CONTRAST EQUIPMENT FOR INCIDENT LIGHT



Incident phase contrast complete with illumination box allowing positive and negative phase contrast, dark ground and normal incident illumination.

M550570 Incident Phase Unit.

OBJECTIVES FOR INCIDENT LIGHT PHASE CONTRAST

These objectives are corrected for use on uncovered specimens and infinite tube length.

Achromatic Objectives	Power	Numerical Aperture
M022352	15×	0·25
M022452	30×	0·5
M022952	50×	0·8
M022652	140×	1·3

A complete list of eyepieces appears on page 31

PHASE CONTRAST EQUIPMENT FOR TRANSMITTED LIGHT

Transmitted phase contrast showing substage swing-out bracket and phase condenser annulus.

M550500 Substage swing-out bracket.
M555625 Phase contrast unit complete with condenser and four annular diaphragms.
M555642 Phase contrast unit as M555625 but with long working distance condenser.
M551545 Quintuple objective carrier with 2× corrector lens.

OBJECTIVES FOR TRANSMITTED LIGHT PHASE CONTRAST

These objectives are corrected for use with cover glass and 160 mm. tube length.

Achromatic Objectives	Power*	Numerical Aperture
M022205	20×	0·25
M022405	40×	0·5
M022505	80×	0·65
M022605	190×	1·3
Fluorite Objective		
M023605	90×	0·95

*Including corrector lens.

A complete list of eyepieces appears on page 31

POLARIZING EQUIPMENT FOR INCIDENT AND TRANSMITTED LIGHT

The monocular eyepiece with swing-out focusing Bertrand lens and a magnification changer with built-in analyser are required for work with polarized light. The polaroid analyser and quartz sensitive tint plate incorporated in the magnification changer rotate together, and measurement of this rotation can be obtained from a graduated scale with a range 0 to 105 degrees which can be read, against a vernier, to 12 minutes. The polaroid analyser and the quartz sensitive tint plate can be withdrawn from the light path independently.

A unique feature of the magnification changer unit is the addition of a rotating slot designed to take a range of compensators, the rotary movement of 360° being divided in degrees, and read by a vernier to 6 minutes.

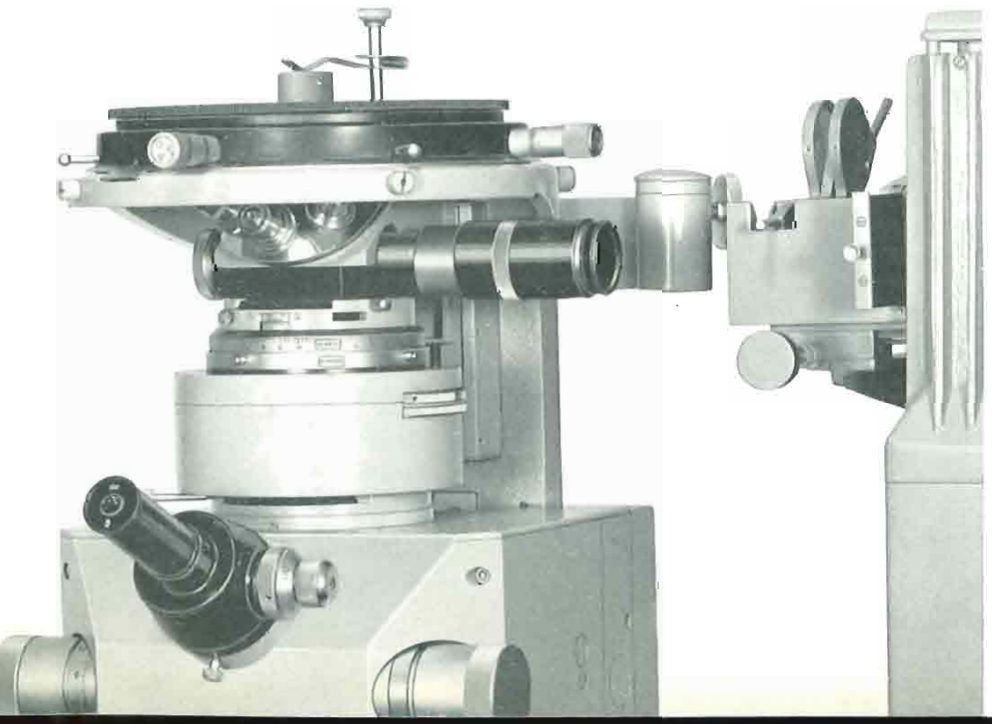
INCIDENT LIGHT

For incident light work a graduated polarizing cap, which fits on the incident illuminator, is required.

TRANSMITTED LIGHT

Additional equipment necessary for transmitted light consists of the quintuple transmitted light objective carrier, fitted with a 2× corrector lens for 160 mm. tube length objectives, and a substage swing-out mirror bracket with a condenser and polarizing substage.

M551897 Monocular eyepiece with Bertrand lens.
M550012 Magnification changer with analyser unit.
M551545 Quintuple objective carrier with 2× corrector lens.
M551040 Polarizing substage attachment.
M550500 Substage swing-out bracket.
M552065 Graduated polarizing cap (for incident light only).



Instrument set up for incident polarized work

Arrangement for transmitted polarized work

ACCESSORIES for incident and transmitted work.

M552075	Quartz wedge, 6 orders (non-graduated)
M552085	Mica ¼ wave plate.
M552090	de Sénarmont compensator.
M552080	Quartz wedge, 6 orders (graduated).
M552056	Nakamura half-shadow plate.
M550950	Compensator plate (elliptic).

CONDENSERS for transmitted polarizing work.

M007882	Abbe condenser (2 lens).
M007884	Aplanatic condenser (4 lens).
M007886	Achromatic condenser N.A. 1·0.
M007891	Achromatic oil immersion condenser N.A. 1·3.

ACHROMATIC OBJECTIVES FOR POLARIZING WORK

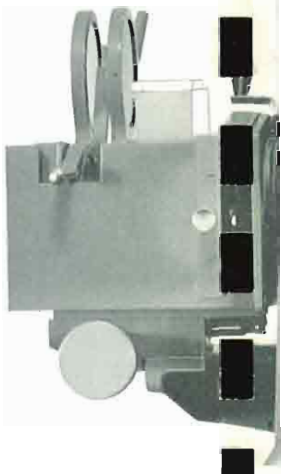
A Objectives corrected for use with uncovered specimens and for infinite tube length.

B Objectives corrected for use with specimens having a cover glass 0·007 in. (0·18 mm.) thick and for 160 mm. tube length. The quintuple objective carrier incorporates a 2× corrector lens.

A	B	Type	Numerical Aperture	Primary Magnification		Working Distance mm.	
				A	B*	A	B
M023054	—	Achro.	0·05	3·5×	—	69	—
M022054	**M022003**	,,	0·10	6×	6×	38	43
M022154	**M022103**	,,	0·15	10×	10×	14	17
M022354	**M022303**	,,	0·25	15×	20×	5	5
M022454	**M022403**	,,	0·50	30×	40×	1·42	1·52
—	**M022503**	,,	0·65	—	80×	—	0·71
—	**M022903**	,,	0·85	—	80×	—	0·43
M022954	—	,,	0·80	50×	—	0·48	—
M023154	—	,,	0·85	85×	—	0·28	—
M022654	**M022603**	Achro. oil	1·30	140×	190×	0·41	0·17

*Including corrector lens.

A complete list of eyepieces appears on page 31



EQUIPMENT FOR INCIDENT DARK GROUND ILLUMINATION

For dark ground work a quintuple carrier and mount to take the infinity corrected 4 mm., 8 mm., and 16 mm. dark field objectives with catoptric condenser, is required. This carrier also accommodates two normal incident objectives. The patch stop is situated on a slide in front of the lamp condenser.

M550550 Quintuple carrier for dark ground objectives.

M551896 Catoptric condenser for use with M023452 and M024152 dark ground objectives.

M551895 Catoptric condenser for use with M023252 dark ground objective.

Equipment for transmitted dark ground illumination is listed on page 33

Achromatic Objectives for Dark Ground Illumination

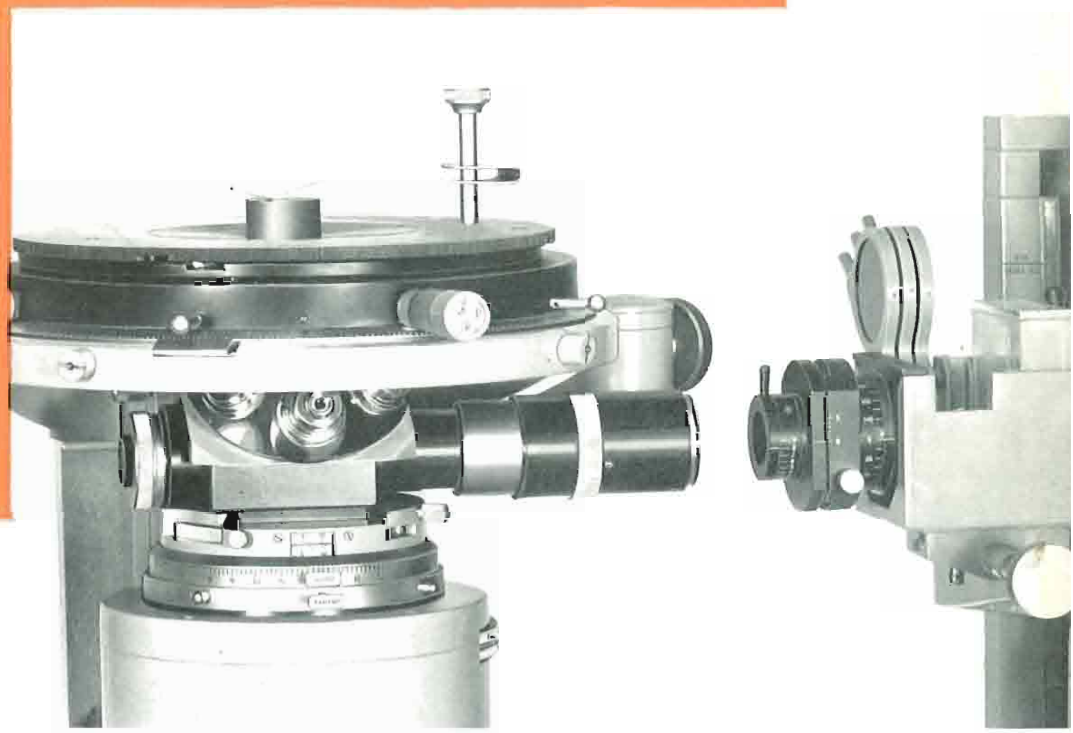
Achromatic Objectives	Type	Numerical Aperture	Primary Magnification	Working Distance mms.
M023252	Dark Ground	0·25	15×	5
M023452	,, ,,	0·50	30×	1·42
M024152	,, ,,	0·65	50×	0·75

M023252 dark ground objective without the patch stop will serve the same purpose as the M022352 15× achromatic objective.

M023452 and M024152 may also be used for bright field work.

A complete list of eyepieces appears on page 31

OBLIQUE ILLUMINATION UNIT



Incident light arrangement with oblique illumination unit.

The oblique illumination unit slides into the filter holder situated in front of the lamp condenser. To regulate the obliquity of the illumination beam, provision is made for the aperture diaphragm to be decentred and rotated. Scales are provided on both the decentring and rotating movements to enable correct and repetitive settings of the oblique beam.

This type of illumination is designed to give exceptional contrast and to increase depth perception.

M551960. Oblique Illumination Unit.

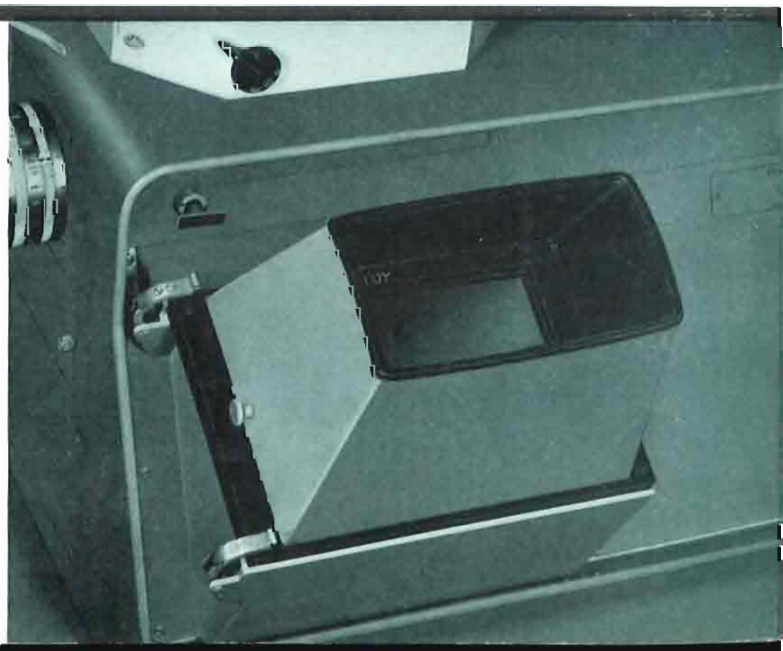
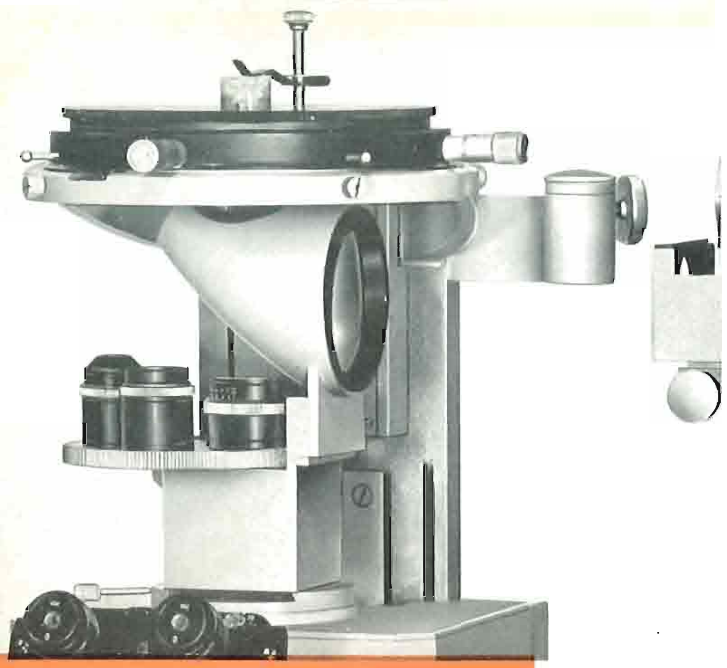


Illustration of the viewing hood which is supplied with the instrument.



Incident light arrangement for 5× macro objective.

MACRO

LOW POWER EQUIPMENT

For both incident and transmitted macro examination the eyepiece magnification changer is removed and replaced by the macro base unit which carries the 5×, 10× and 15× objectives, and a ground glass screen is inserted into the lamp condenser mounting.

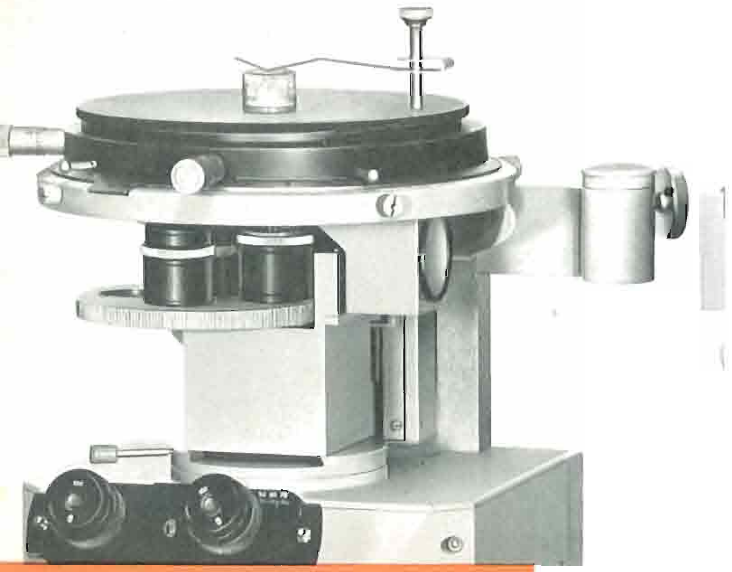
MACRO incident illumination

For incident illumination two incident illuminators are offered, one for use with the 10× and 15× objectives, the other, together with a supplementary projector lens, for use with the 5× objective.

An oblique illumination mirror is also available.

MACRO transmitted illumination

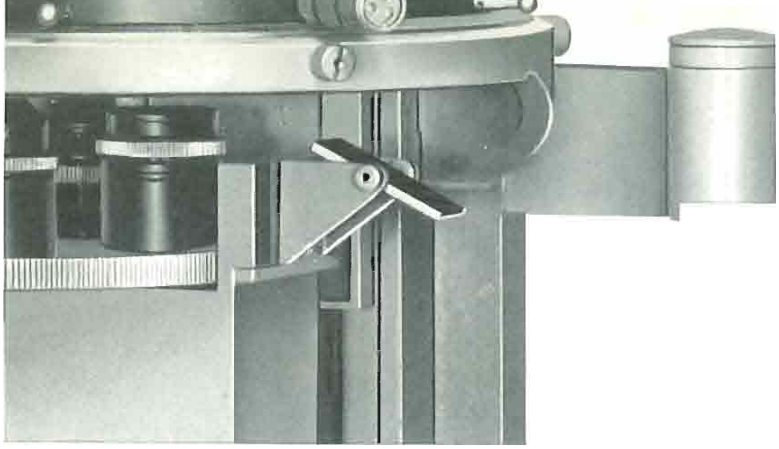
For transmitted illumination the substage swing-out mirror bracket and auxiliary condenser, together with a projection lens, are required.



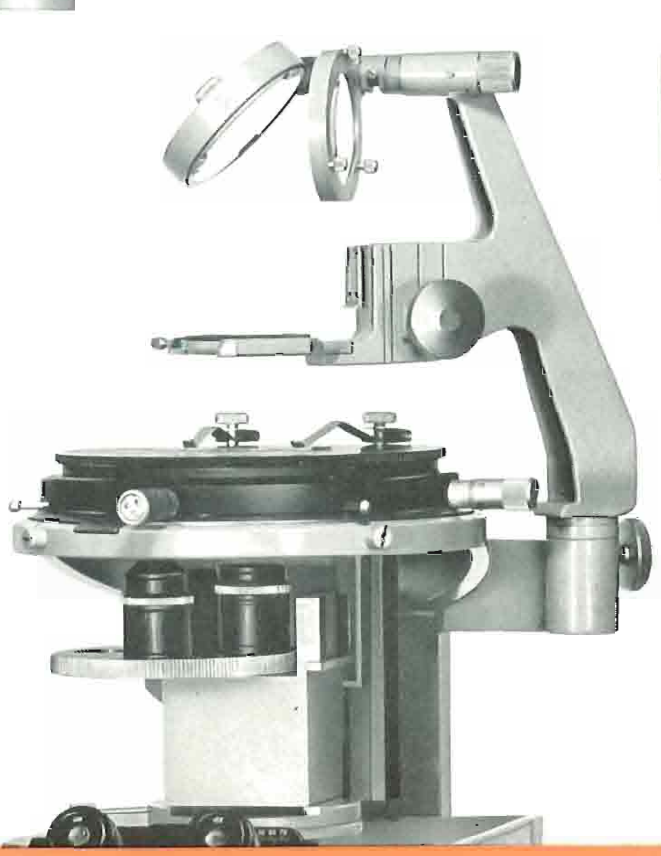
Incident light arrangement for 10× and 15× macro objectives.

MACRO OBJECTIVES

	Focal Length (inches)	Aperture	Magnification
M551325	5·0	f/4·5	5×
M551340	2·6	f/4·5	10×
M551360	1·9	f/3·5	15×



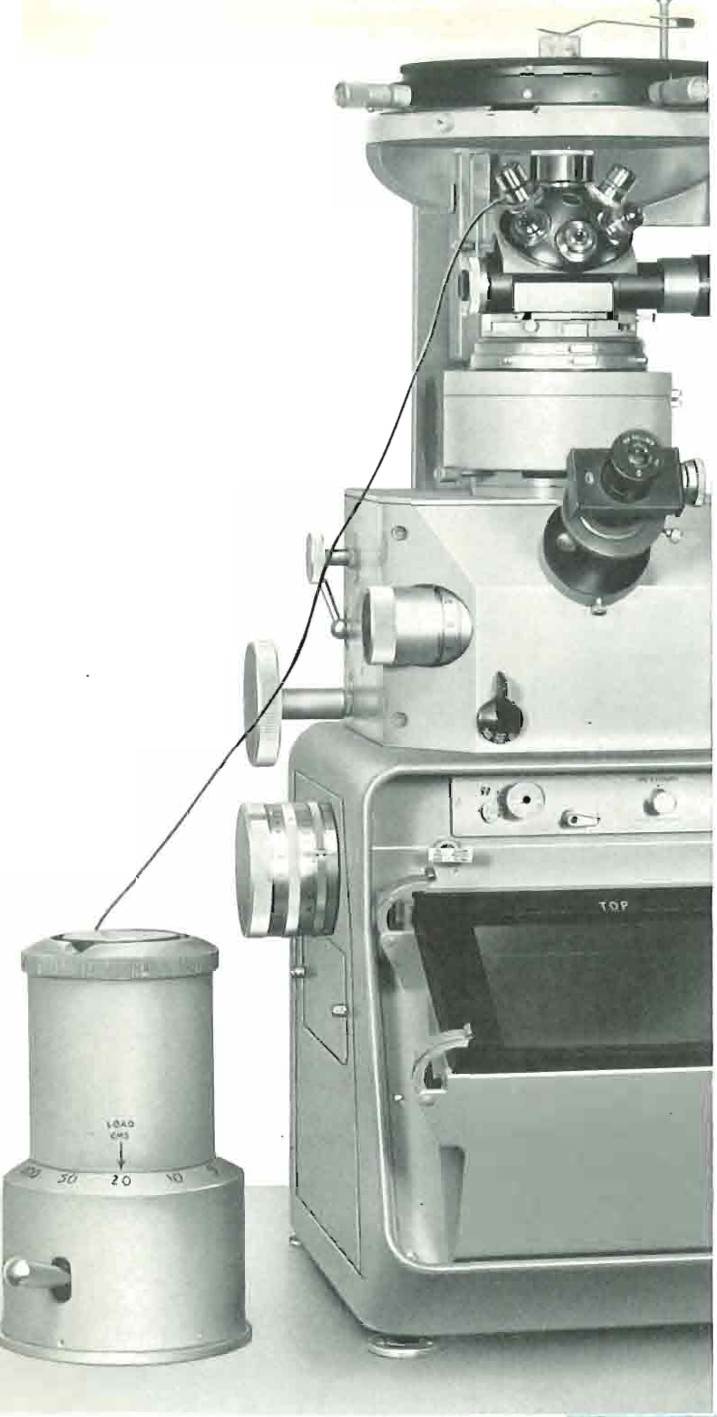
Oblique incident illumination mirror.



Arrangement for transmitted macro work.

COMBINATIONS OF MACRO EQUIPMENT

Macro Objectives and types of Illumination	M551270 Macro Base Unit	M551795 10× & 15× Incident Illuminator	M551815 5× Incident Illuminator	M551310 Oblique Illuminator Mirror	Ground Glass Screen	M551825 Auxiliary Condenser, Transmitted	M551990 Projection Lens for Transmitted	M551830 Projection Lens for 5× Incident	M550500 Swing-out Mirror Bracket
15× Incident	√	√			√				
15× Transmitted	√				√	√	√		√
10× Incident	√	√			√				
10× Transmitted	√				√	√	√		√
5× Incident	√		√		√			√	
5× Transmitted	√				√	√	√		√
15× Inc. Oblique	√			√					
10× Inc. Oblique	√			√					
5× Inc. Oblique	√			√					
10× & 15× Inc.	√	√			√				
10× & 15× Trans.	√				√	√	√		√
5×, 10× & 15× Inc.	√	√	√		√			√	
5×, 10× & 15× Trans.	√				√	√	√		√



Arrangement for micro hardness testing.

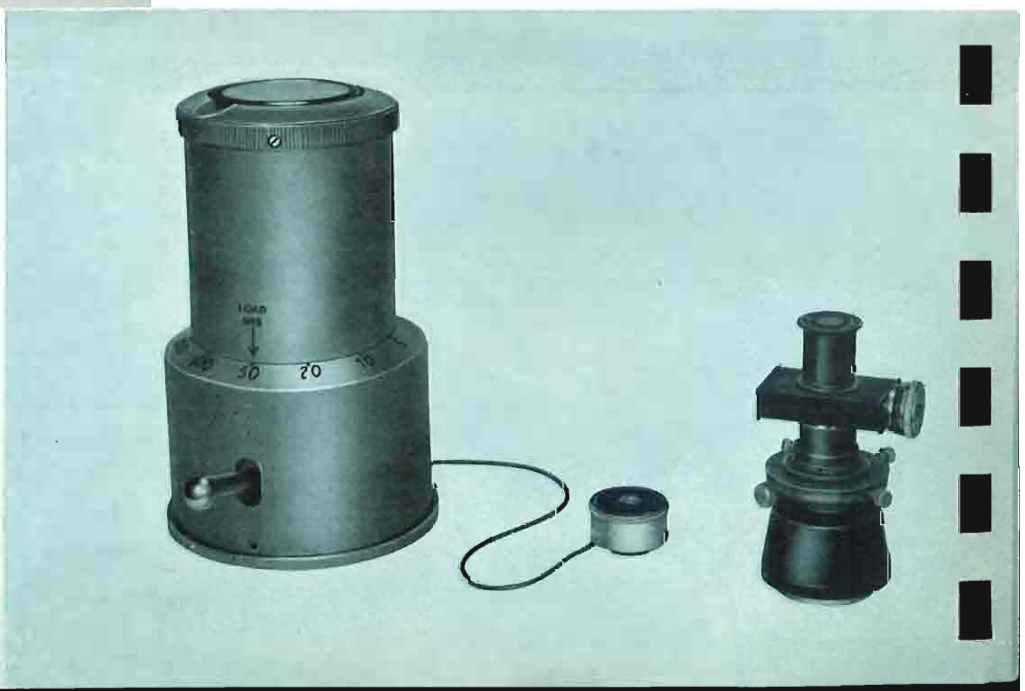
MICRO HARDNESS TESTING EQUIPMENT

Micro hardness testing can be efficiently carried out by non-specialised personnel, the apparatus having been designed to operate automatically under predetermined loads between 5 gms. and 200 gms. Specimens may be tested without the use of special holders or chucks.

The micro hardness testing equipment consists of a combined indenter and microscope objective in which the housing for the optical lens system is fixed, and only the diamond indenter, mounted on a thin rubber diaphragm, moves.

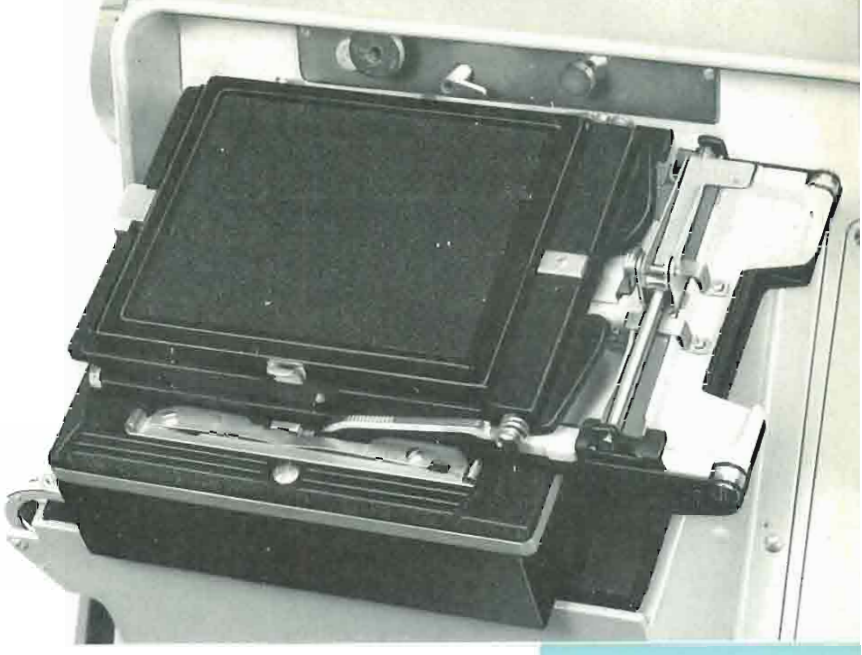
After the selection of the required load, which is read against the index on the cylinder of the transmitter, a lever is depressed, and the correct load at a constant rate for that load is automatically applied to the indenter by pneumatic pressure. When the lever is allowed to return, the pneumatic pressure is released, and the indenter is restored to its original position. The indenting operations are entirely impersonal, and variations in the rate of operation of the lever, which may be expected between different operators, do not influence the final results.

M550016 Micro Hardness Testing Equipment, including micro hardness transmitter, microscope indenter objective, 4 mm. achromatic objective and centring eyepiece, with filar micrometer.



Micro hardness transmitter, microscope indenter objective and filar micrometer eyepiece.

M552095



M552100

PHOTOGRAPHIC EQUIPMENT

M552095 M.P.P. camera back (to take 5 in. × 4 in. plates), wood adaptor, and focusing hood.

M552100 M.P.P. camera back, wood adaptor, focusing hood, and polaroid land (5 in. × 4 in.) film holder.

M552105 M.P.P. camera back, wood adaptor, focusing hood, and polaroid roll film back.

Photographic accessories are listed on page 33.

M552105

ELECTRICAL EQUIPMENT

The power supply unit is available in two forms; one designed for wall mounting, the other built into the wood cabinet.

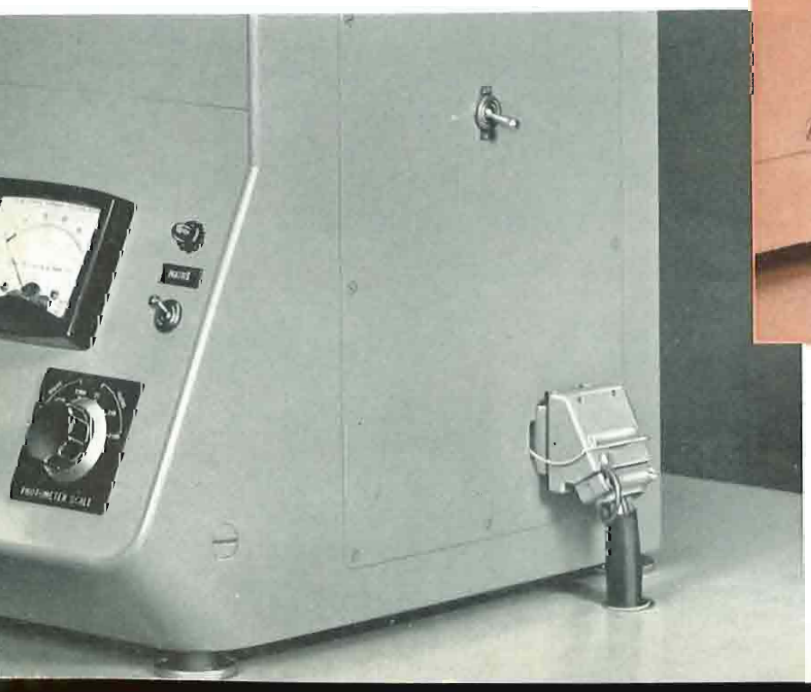
The xenon lamp, which is the normal source of illumination, is fitted with a control and starter unit suitable for 50 or 60 cycles and 110, 200 and 240 mains voltage. A high pressure mercury vapour lamp with choke can be supplied as an alternative to the xenon lamp, and is interchangeable on a V-slide attachment. The mercury vapour lamp is only suitable for 220 to 240 mains voltage. Either the xenon or the mercury vapour lamp can be used for transmitted or incident light techniques.

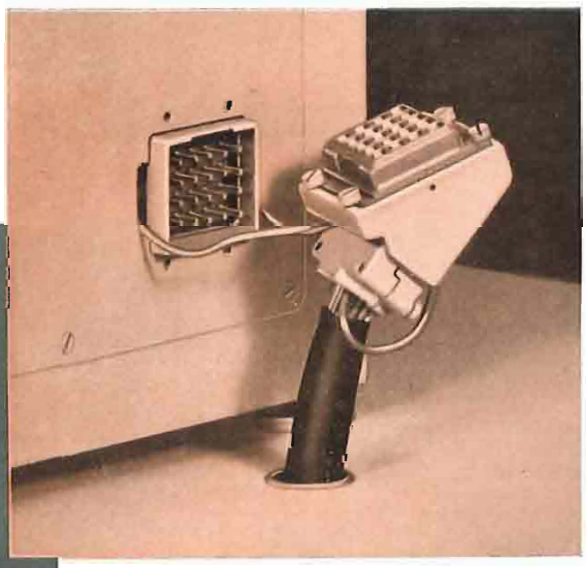
With the addition of a high power tungsten filament lamp (48 watt), operating in conjunction with either the xenon or mercury vapour lamp, simultaneous incident and transmitted light can be obtained. The filament lamp is supplied with a control panel, mains switch, rheostat and transformer, which can be built into the instrument.

M550013 High Power Tungsten Filament Lamp.
M550018 Mercury Vapour Lamp (includes choke).
M550790 Xenon Lamp (included with microscope).

When ordering it is essential to give particulars of electricity supply.

When electrical equipment not of our manufacture is supplied, our liability, in respect of any defect in or failure of the articles supplied, or for any consequential loss, injury, or damage, is limited to the benefit of any guarantee, condition or warranty given to us by the supplier or manufacturer, and then only to the extent to which we can enforce the same.





20-way plug connecting the instrument to the built-in power supply unit.

COOKE ACHROMATIC, APOCHROMATIC AND FLUORITE OBJECTIVES

A—Objectives for uncovered specimen. Infinite tube length.
B—Objectives for covered specimens, 160 mm. tube length used with transmitted light nosepiece containing 2× corrector lens.

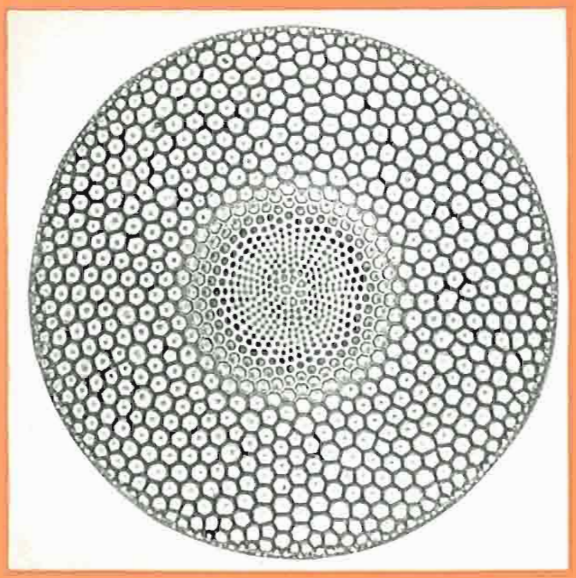
		Strain free objectives for polarized light		Type	Normal Focal Length mm.	N.A.	Primary magnification		Working Distance mm.	
A	B	A	B				A	B*	A	B
M023052		M023054		Achro.	68	0·05	3·5×		69	
M022052	M022001	M022054	M022003	,,	33	0·10	6×	6×	38	43
M022152	M022101	M022154	M022103	,,	25	0·15	10×	10×	14	17
M022352	M022301	M022354	M022303	,,	16	0·25	15×	20×	5	5
M022452	M022401	M022454	M022403	,,	8	0·5	30×	40×	1·42	1·52
—	M022501	—	M022503	,,	4	0·65	—	80×	—	0·71
—	M022901	—	M022903	,,	4	0·85	—	80×	—	0·43
M022952	—	M022954	—	,,	4	0·8	50×	—	0·48	—
M023152	—	M023154	—	,,	3	0.85	85×	—	0·28	—
M022652	M022601	M022654	M022603	Achro. Oil	2	1·3	140×	190×	0·41	0·17
M024052	M024001	—	—	Apo.	16	0·3	17×	20×	39	5
M023852	M023801	—	—	,,	4	0·95	50×	80×	0·3	†
M023352	—	—	—	,,	3	0·95	85×	—	0·18	—
M023752	M023701	—	—	Apo. Oil	2·2	1·32	115×	160×	0·3	0·12
M023552	M023501	—	—	Fluorite Oil	1·8	1·3	140×	190×	0·3	0·12
M023252	—	—	—	Achro. Dark Ground	16	0·25	15×	—	5	—
M023452	—	—	—	,,	8	0·5	30×	—	1·42	—
M024152	—	—	—	,,	4	0·65	50×	—	0·76	—
Transmitted light phase contrast										
—	M022205	—	—	Achro.	16	0·25	—	20×	—	5
—	M022405	—	—	,,	8	0·5	—	40×	—	1·52
—	M022505	—	—	,,	4	0·65	—	80×	—	0·71
—	M022605	—	—	Achro. Oil	2	1·3	—	190×	—	0·17
—	M023605	—	—	Fluorite Oil	3·75	0·95	—	90×	—	0·23

* Including corrector lens. † With correction collar for cover glasses.
Any 160 mm. tube length objective with a 34 mm. shoulder length can be used with the transmitted light nosepiece.
M550560 Sextuple carrier and mount for infinite tube length normal incident objectives is supplied with the instrument.

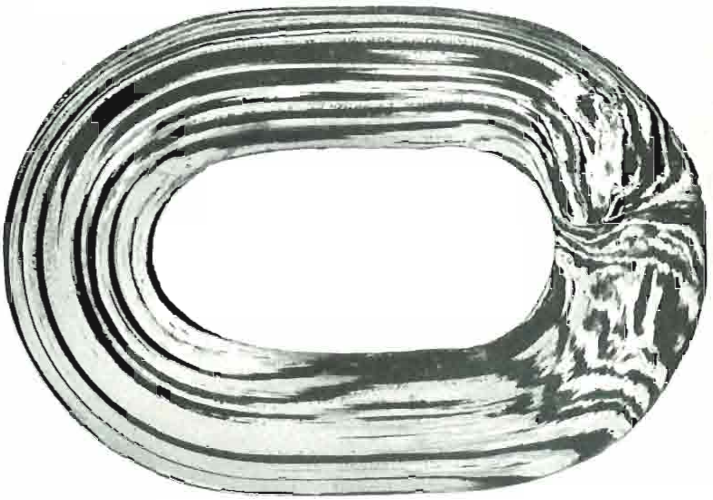
EYEPIECES

HUYGHENS			COMPENSATING			KELLNER		
Single	Paired	Power	Single	Paired	Power	Single	Paired	Power
M001506	M001507	6×	*M001526	*M001527	6×	M001541	M001542	10×
M001511	M001512	8×	*M001531	*M001532	8×	M001546	M001547	15×
M001516	M001517	10×	*M019536	*M019537	10×			
			*M001551	*M001552	20×			

* Can be used with spectacles.



Diatom
craspedodiscus
coscinodiscus
Ehrenberg



Flow lines in section
of forged chain link

Copper—copper phosphide eutectic

PHOTOGRAPHIC ACCESSORIES

M505705 Photographic shutter.

M505890 Screen focusing magnifier.

M505664 Double plate holder for 7 in. × 5 in. plates.

M505689 Adaptors (2) for 5 in. × 4 in. plates for M505664.

M505647 Double plate holder for ½ plates.

M505960 Adaptors (2) for ¼ plates for M505647.

M505790 Adaptors (2) for 12 cm. × 9 cm. plates for M505647.

M505931 Film holder for M505664.

M505932 Film holder for M505689.

M505933 Film holder for M505647.

M505934 Film holder for M505960.

M505935 Film holder for M505790.

M551610 Frame for focusing screens.

M505904 Focusing screen, ruled with cross lines.

M505906 Focusing screen, with horizontal and vertical lines intersecting at centre of plate, each graduated 100 mm.

M505907 Focusing screen, with grid 10 cm. × 10 cm. ruled in mm., with break at intersection of 1 cm. lines.

M505908 Focusing screen, with grid 10 cm. × 10 cm. ruled in cm.

Other ruled focusing screens for measurement of particles, determination of grain size, etc. (Porton Globe and Circle, McQuaid and Ehn hexagon grain size screens), are available. Particulars on request.

It should be noted that although plate holders M505664 and M505931 take 7 in. × 5 in. plates and film, the size of the picture will be less than this.

EQUIPMENT FOR TRANSMITTED DARK GROUND ILLUMINATION

M001396 Dark ground condenser for transmitted light.

M001397 Funnel stop for objectives of N.A. above 1·00 when used with M001396.

M001394 Low power dark ground condenser for transmitted light fixed focus, 0·7—0·8 N.A.

ACCESSORIES

M550670 Monocular body
M550680 Binocular body
M551515 Gliding stage.
M550300 Micrometer and gliding stage.
M001195 Small bottle of non-drying immersion oil, as supplied with each immersion objective, (ALP_1) R.I. 1·524.
M001196 8 oz. bottle of non-drying immersion oil (ALP_1) R.I. 1·524.
M001197 Small bottle of non-drying immersion oil (ALP_2) R.I. 1·515.
M001198 8 oz. bottle of non-drying immersion oil (ALP_2) R.I. 1·515.
M001581 Eyepiece micrometer of glass, 1 cm. divided into 100 parts.
M001586 Stage micrometer of glass, 1 mm. divided into 100 parts.
M001591 Stage micrometer of metal, 1 mm. divided into 100 parts.
M001555 Filar micrometer 10× eyepiece with travelling web reading against a millimeter scale, and read directly to 0·01 mm. on a micrometer drum with estimation to 0·002 mm.
M001556 Filar micrometer as M001555, but with 15× eyepiece.
M551440 Cabinet and fittings.

SPARES

M505970 Water trough.
M505608 Heat absorbing filter.
M505733 Xenon bulb X.B.O. 162 Neron Ltd.
M551649 Mercury vapour bulb H.B.O. 200 Neron Ltd.
E855 Tungsten filament bulb 6 volts, 8 amps (Siemens).
M505795 Soft plastic dust cover (supplied with instrument).

Details of surface topography techniques will be provided on request.

As designs are constantly subject to revision the particulars listed throughout, may not be final in all respects.

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VICKERS M55 MICROSCOPE — JULY 1964

			Price £	s.	d.	Number Required	Total £	s.	d.
Vickers Fifty-Five Microscope, comprising:— microscope block, main casing, incident illuminator unit, lamp slide-way, lamp condenser unit, zoom projection unit, small projection mirror, large projection mirror, xenon lamp, electrical equipment, end panel normal illumination, 2 in. square, ground glass diffuser; 2 in. square, heat absorbing filter (ON.20); water trough, plastic instrument cover, stop collar for 10× Kellner eyepiece, 10× Kellner eyepiece with graticule, objective hole plugs, coarse focusing adjusting spanner, instruction book, goggles for xenon lamp, frame for focusing screen, and fixed wiring for integrator	M550000	☐	1140	0	0				
Gliding stage with joystick control	M551515	☐	44	0	0				
Revolving sextuple objective changer	M550560	☐	19	4	0				
Magnification changer unit	M550011	☐	100	16	0	X			
Monocular head	M550670	☐	4	4	0				
Plain front panel	M551955	☐	2	8	0				
Double plate holder for ½-plates	M505647	☐	7	12	0				
Two ¼-plate adaptors for M505647	M505960	☐	4	16	0				
Micro crystalline wax focusing screen	M551700	☐	4	16	0				
Accessory box for objectives and eyepieces	M552310	☐	3	18	0				
M55 Microscope, as above, for manually operated photography	**M550001**	☐	1331	14	0				

		Price £	s.	d.	Number Required	Total £	s.	d.
Vickers Fifty-Five Microscope, comprising:— microscope block, main casing, incident illuminator unit, lamp slide-way, lamp condenser unit, zoom projection unit, small projection mirror, large projection mirror, xenon lamp, electrical equipment, end panel normal illumination, 2 in. square, ground glass diffuser; 2 in. square, heat absorbing filter (ON.20); water trough, plastic instrument cover, stop collar for 10× Kellner eyepiece, 10× Kellner eyepiece with graticule, objective hole plugs, coarse focusing adjusting spanner, instruction book, goggles for xenon lamp, frame for focusing screen, and fixed wiring for integrator	M550000 ☐	1140	0	0				
Swing-out transmitted light bracket	M550500 ☐	88	0	0				
Centring, rotating and gliding stage	M550300 ☐	120	0	0				
Revolving sextuple objective changer	M550560 ☐	19	4	0				
Revolving quintuple objective changer	M551545 ☐	24	0	0				
Magnification changer unit with analyser unit	M550012 ☐	129	12	0				
Binocular head	M550680 ☐	40	0	0				
Motorised 35 mm. camera unit	M550015 ☐	160	0	0				
Automatic integrating photographic timing unit	M550017 ☐	282	0	0				
Double plate holder for ½-plates	M505647 ☐	7	12	0				
Two ¼-plate adaptors for M505647	M505960 ☐	4	16	0				
Micro crystalline wax focusing screen	M551700 ☐	4	16	0				
Desk for microscope	M552380 ☐	98	0	0				
M55 Microscope, as above, for automatic 35 mm. and plate photography	**M550002** ☐	2118	0	0		2118 00		

PHOTOGRAPHIC EQUIPMENT

Automatic integrating photographic timer (including motorised focal plane shutter M551850)	**M550017** ☐	282	0	0				
Motorised focal plane shutter	**M551850** ☐	122	0	0				
Motorised automatic 35 mm. camera	**M550015** ☐	160	0	0				
Manual control 35 mm. camera unit	**M550014** ☐	97	18	0				
Additional laboratory cassette	**M551854** ☐	67	4	0				
MPP camera back (to take 5 in. × 4 in. plates), wood adapter, focusing screen and hood	**M552095** ☐	19	16	0				
MPP camera back, wood adapter, focusing screen, hood and polaroid land cut film holder (5 in. × 4 in.)	**M552100** ☐	60	8	0				
MPP camera back, wood adapter, focusing hood and polaroid J.66 roll film back	**M552105** ☐	90	2	0				
Simple photographic shutter	**M505705** ☐	11	14	0				

			Price £	s.	d.	Number Required	Total £	s.	d.
Screen focusing magnifier	**M505890**	☐	8	0	0				
Double plate holder for 7 in. × 5 in. plates	**M505664**	☐	9	12	0				
Two adapters for 5 in. × 4 in. plate for M505664	**M505689**	☐	3	4	0				
Double plate holder for half plates ($6\frac{1}{2}$ in. × $4\frac{3}{4}$ in.)	**M505647**	☐	7	12	0				
Two adapters for $\frac{1}{4}$-plates ($3\frac{1}{4}$ in. × $4\frac{1}{4}$ in.) for M505647	**M505960**	☐	4	16	0				
Two adapters for 9 cms. × 12 cms. plates for M505647	**M505790**	☐	3	16	0				
7 in. × 5 in. cut film holder for M505664	**M505931**	☐	1	14	0				
5 in. × 4 in. cut film holder for M505689	**M505932**	☐		16	0				
$6\frac{1}{2}$ in. × $4\frac{3}{4}$ in. cut film holder for M505647	**M505933**	☐		10	0				
$3\frac{1}{4}$ in. × $4\frac{1}{4}$ in. cut film holder for M.505960	**M505934**	☐		10	0				
Frame for focusing screens	**M551610**	☐	2	16	0				
Focusing screen ruled with cross lines	**M505904**	☐	3	12	0				
Focusing screen with horizontal and vertical lines intersecting at centre of the plate, each graduated every 100 mms	**M505906**	☐	3	10	0				
Focusing screen with grid 10 cms. × 10 cms. ruled in mms. with break at intersections of 1 cm. lines	**M505907**	☐	3	14	0				
Focusing screen with grid 10 cms. × 10 cms. ruled in cms.	**M505908**	☐	3	18	0				
STAGES									
Divided rotating stage with micrometer movements and gliding top plate	**M550300**	☐	120	0	0				
Gliding stage with joystick control	**M551515**	☐	44	0	0				
VIEWING HEADS									
Binocular head	**M550680**	☐	40	0	0				
Monocular head	**M550670**	☐	4	4	0				
MAGNIFICATION CHANGERS									
Magnification changer with focusing Bertrand lens	**M550011**	☐	100	16	0				
Magnification changer with focusing Bertrand lens and rotating polarizer, rotating quartz plate (both swing out) and rotating compensator slot	**M550012**	☐	129	12	0				
OBJECTIVE CHANGERS									
Revolving sextuple objective changer for incident light field objectives	**M550560**	☐	19	4	0				
*Revolving triple objective changer for incident dark ground objectives with catoptric condensers and for use with micro-hardness testing objectives	**M552145**	☐	16	8	0				

**The quintuple objective changer, M550550, previously supplied is now obsolete*

			Price £	s.	d.	Number Required	Total £	s.	d.
Revolving quintuple objective changer incorporating a 2× correcting lens for use with standard 160 mm. tube length, transmitted light objectives	**M551545**	☐	24	0	0				

*INCIDENT LIGHT PHASE CONTRAST

Incident phase contrast unit for positive and negative phase contrast	**M550570**	☐	176	0	0				

** This apparatus uses the standard ∞ corrected objectives*

TRANSMITTED LIGHT PHASE CONTRAST

Swing out substage bracket with focusing substage and mirror	**M550500**	☐	88	0	0				
Phase contrast condenser with rotating disc of four substage annuli	**M555625**	☐	56	0	0				
Long working distance phase contrast condenser with rotating disc of four substage annuli	**M555642**	☐	52	0	0				

(Phase contrast objectives are listed under objectives)

ILLUMINATION

High power tungsten filament lamp in lamp house with condenser (for transmitted light only)	**M550013**	☐	62	16	0		62	16	
Spare xenon bulb CSX 150 W.	**M550828**	☐	21	0	0				
Spare high pressure mercury bulb	**M551649**	☐	18	10	0				
Spare 6V., 30W. filament bulb	**E855**	☐		14	8				

MICRO HARDNESS TESTING

Micro hardness testing equipment, including transmitter, indenter objective in centring mount, 50× measuring objective in centring mount, revolving triple objective changer, monocular head with centring filar micrometer eyepiece, specimen holder and wood box	**M550016**	☐	200	0	0				

OBLIQUE ILLUMINATION UNIT

Oblique illumination unit with lens to go into incident illuminator tube	**M550020**	☐	26	0	0				

MACRO EQUIPMENT

Macro Objectives

Focal length		Magnification								
5.0 in.	f/4.5	5×	**M551325**	☐	15	8	0			
2.6 in.	f/4.5	10×	**M551340**	☐	8	16	0			
1.9 in.	f/3.5	15×	**M551360**	☐	12	16	0			

		Price £	s.	d.	Number Required	Total £	s.	d.
For Macro Incident Illumination								
*Macro base unit with revolving changer for macro objectives	M551270 ☐	15	10	0	1			
Incident illuminator for 10× and 15× macro objectives	M551795 ☐	19	4	0	1			
Incident illuminator for 5× macro objective	M551815 ☐	16	16	0	1			
Projection lens for incident light macro with 5× objective	M551830 ☐	4	12	0	1			
Mirror for oblique illuminator	M551310 ☐	3	12	0	1			
For Macro Transmitted Illumination								
*Macro base unit with revolving changer for macro objectives	M551270 ☐	15	10	0				
Swing-out mirror bracket	M550500 ☐	88	0	0	1			
Auxiliary condenser for transmitted light macro	M551825 ☐	5	12	0	1			
Projection lens for transmitted light macro with 5×, 10× and 15× objectives	M551990 ☐	4	4	0	1			
The macro base unit M551270 *is common to both incident and transmitted illumination*								
POLARIZING ACCESSORIES								
Monocular head with swing out focusing Bertrand lens	M551897 ☐	48	0	0	1			
Polarizing substage attachment	M551040 ☐	24	8	0	1			
Graduated polarizing cap (for incident light only)	M552065 ☐	6	8	0	1			
(Strain free objectives are listed separately)								
Compensators								
Quartz wedge (not graduated)	M552075 ☐	7	2	0	1			
Quartz wedge (graduated)	M552080 ☐	9	16	0	1			
Mica ¼-wave plate	M552085 ☐	2	8	0	1			
de Sénarmont compensator	M552090 ☐	3	4	0	1			
Nakamura half shadow plate	M552056 ☐	9	12	0	1			
Elliptic compensator	M550950 ☐	9	12	0	1			
ACCESSORIES								
Small bottle of non-drying immersion oil as supplied with each immersion objective (ALP_1) nd. =1.524	M001195 ☐		4	0				
8 oz. bottle of above oil	M001196 ☐	2	0	0				
Small bottle of non-drying immersion oil (ALP_2) nd. =1.515	M001197 ☐		4	0				
8 oz. bottle of above oil	M001198 ☐	2	0	0				
Eyepiece micrometer 1 cm. divided into 100 parts	M001581 ☐	2	12	0				

			Price £	s.	d.	Number Required	Total £	s.	d.
Glass stage micrometer 1 mm. divided into 100 parts		M001586 ☐	4	0	0				
Polished metal stage micrometer 1 mm. divided into 100 parts		M001591 ☐	5	12	0				
Filar micrometer eyepiece 10× normal field, reading directly to 0.01 mm. on a micrometer drum with estimation to 0.002 mm.		M001555 ☐	32	8	0				
As above with 15× eyepiece		M001556 ☐	32	8	0				
Water trough		M505970 ☐	1	4	0				
Heat absorbing filter (O.N. 20)		M505608 ☐	1	0	0				
Soft plastic dust cover (supplied with the instrument)		M552300 ☐	1	14	0				
EYEPIECES									
Huyghens	Old No.	New No.							
6× single	M001506	M040100 ☐	1	14	0				
8× single	M001511	M040700 ☐	1	14	0				
10× single	M001516	M040300 ☐	1	14	0				
6× pair	M001507	M040120 ☐	3	14	0				
8× pair	M001512	M040720 ☐	3	14	0				
10× pair	M001517	M040320 ☐	3	14	0				
Compensating									
6× single	M001526	M041100 ☐	2	12	0				
8× single	M001531	M041700 ☐	2	16	0				
10× single		M041300 ☐	3	8	0				
20× single	M001551	M041602 ☐	5	16	0				
6× pair	M001527	M041120 ☐	5	10	0				
8× pair	M001532	M041720 ☐	5	18	0				
10× pair		M041320 ☐	7	2	0				
20× pair	M001552	M041622 ☐	11	18	0				
Kellner									
10× single	M001541	M042302 ☐	4	14	0				
10× pair	M001542	M042322 ☐	9	14	0	X			
Complan									
10× single	M019536	M041301 ☐	7	2	0				
10× pair	M019537	M041321 ☐	14	10	0	X			

			Price £	s.	d.	Number Required	Total £	s.	d.
CONDENSERS FOR TRANSMITTED LIGHT									
Centring condenser mount	M001376	☐	7	0	0				
Abbe condenser	M001382	☐	3	8	0				
Aplanatic condenser	M001383	☐	7	16	0	X			
Achromatic condenser (N.A. 1.30 when oil immersed)	M001391	☐	14	16	0				
Focusing dark ground condenser	M001396	☐	22	8	0	X			
Low power dark ground condenser with fixed focus N.A. 0.7-0.8	M001394	☐	18	0	0				
STRAIN FREE CONDENSERS FOR TRANSMITTED LIGHT									
Aplanatic condenser	M007884	☐	7	16	0				
Achromatic condenser (N.A. 1.30 when oil immersed)	M007891	☐	14	16	0				
OBJECTIVES FOR UNCOVERED SPECIMENS									
Infinite tube length									
Achromatic									
Magnification	*N.A.*								
3.5×	0.05	M023052 ☐	2	16	0				
6×	0.10	M022052 ☐	2	18	0				
10×	0.15	M022152 ☐	5	12	0				
15×	0.25	M022352 ☐	5	16	0				
30×	0.5	M022452 ☐	8	18	0				
50×	0.8	M022952 ☐	9	0	0				
85×	0.85	M023152 ☐	11	6	0				
140× oil	1.30	M022652 ☐	14	0	0				
Fluorite									
140× oil	1.30	M023552 ☐	32	0	0				
Microplan									
30×	0.5	M025452 ☐	25	0	0				
40×	0.65	M025352 ☐	34	4	0				
Apochromatic									
17×	0.3	M024052 ☐	27	0	0				
50×	0.95	M023852 ☐	53	0	0				
85×	0.95	M023352 ☐	44	12	0				
115× oil	1.32	M023752 ☐	43	0	0				
Funnel stop for objectives with N.A. above 1.0 when used with M001396 dark ground condenser		M001397 ☐		6	0				

OBJECTIVES FOR UNCOVERED SPECIMENS (continued)

	Magnification	N.A.		Price £ s. d.	Number Required	Total £ s. d.
Infinite tube length						
Strain Free for Polarized Light						
Achromatic						
	3.5×	0.05	**M023054** ☐	3 6 0		
	6×	0.10	**M022054** ☐	3 6 0		
	10×	0.15	**M022154** ☐	6 0 0		
	15×	0.25	**M022354** ☐	5 16 0		
	30×	0.5	**M022454** ☐	9 4 0		
	50×	0.8	**M022954** ☐	9 10 0		
	85×	0.85	**M023154** ☐	11 8 0		
	140× oil	1.3	**M022654** ☐	14 2 0		
For Incident Light, Dark Field						
	15×	0.25	**M023252** ☐	10 12 0		
	30×	0.5	**M023452** ☐	9 8 0		
	50×	0.65	**M024152** ☐	10 2 0		
Catoptric Condensers for Incident Light Dark Field						
Catoptric condenser for objectives M023452 or M024152			**M551896** ☐	8 16 0		
Catoptric condenser for objective M023252			**M551895** ☐	6 16 0		

OBJECTIVES FOR COVERED SPECIMENS

160 mm. Tube Length to be used with objective changer M551545 having a 2× corrector lens

Achromatic						
	3×	0.10	**M022011** ☐	2 14 0		
	5×	0.15	**M022101** ☐	5 18 0		
	10×	0.25	**M022301** ☐	4 10 0		
	20×	0.50	**M022401** ☐	8 16 0		
	40×	0.65	**M022501** ☐	7 8 0		
	40×	0.85	**M022901** ☐	10 10 0		
	95× oil	1.30	**M022601** ☐	11 6 0		
Fluorite						
	95× oil	1.30	**M023501** ☐	31 10 0		
Microplan						
	10×	0.25	**M025111** ☐	9 16 0		
	20×	0.50	**M025411** ☐	15 14 0		
	40×	0.70	**M025211** ☐	12 18 0		
Apochromatic						
	10×	0.30	**M024001** ☐	27 0 0		
	40×	0.95	**M023801** ☐	53 0 0		
	80×	1.32	**M023701** ☐	43 0 0		

OBJECTIVES FOR COVERED SPECIMENS (continued)			Price £ s. d.	Number Required	Total £ s. d.
Objectives, Strain Free for Polarized Light					
Achromatic					
3×	0.10	M022013 ☐	3 4 0		
5×	0.15	M022103 ☐	6 6 0		
10×	0.25	M022303 ☐	4 18 0		
20×	0.50	M022403 ☐	9 2 0		
40×	0.65	M022503 ☐	7 12 0		
40×	0.85	M022903 ☐	10 12 0		
95× oil	1.30	M022603 ☐	11 8 0		
Objectives for Transmitted Light Phase Contrast					
Achromatic					
10×	0.25	M022205 ☐	5 18 0		
20×	0.5	M022405 ☐	9 14 0		
40×	0.65	M022505 ☐	9 4 0		
95× oil	1.30	M022605 ☐	13 0 0		
Fluorite					
45× oil	0.95	M023605 ☐	36 10 0		

DELIVERY

Packing and carriage

TOTAL

Yours faithfully,
for VICKERS INSTRUMENTS LTD.

Signed.....

SUMMARY in numerical order

	£	s.	d.
E855		14	8
M001195		4	0
M001196	2	0	0
M001197		4	0
M001198	2	0	0
M001376	7	0	0
M001382	3	8	0
M001383	7	16	0
M001391	14	16	0
M001394	18	0	0
M001396	22	8	0
M001397		6	0
M001506	1	14	0
M001507	3	14	0
M001511	1	14	0
M001512	3	14	0
M001516	1	14	0
M001517	3	14	0
M001526	2	12	0
M001527	5	10	0
M001531	2	16	0
M001532	5	18	0
M001541	4	14	0
M001542	9	14	0
M001551	5	16	0
M001552	11	18	0
M001555	32	8	0
M001556	32	8	0
M001581	2	12	0
M001586	4	0	0
M001591	5	12	0
M007884	7	16	0
M007891	14	16	0
M019536	7	2	0
M019537	14	10	0
M022011	2	14	0
M022013	3	4	0
M022052	2	18	0
M022054	3	6	0
M022101	5	18	0
M022103	6	6	0
M022152	5	12	0
M022154	6	0	0
M022205	5	18	0
M022301	4	10	0
M022303	4	18	0
M022352	5	16	0
M022354	5	16	0
M022401	8	16	0
M022403	9	2	0
M022405	9	14	0
M022452	8	18	0
M022454	9	4	0
M022501	7	8	0
M022503	7	12	0
M022505	9	4	0
M022601	11	6	0
M022603	11	8	0
M022605	13	0	0
M022652	14	0	0
M022654	14	2	0
M022901	10	10	0
M022903	10	12	0
M022952	9	0	0
M022954	9	10	0
M023052	2	16	0
M023054	3	6	0
M023152	11	6	0
M023154	11	8	0
M023252	10	12	0
M023352	44	12	0
M023452	9	8	0
M023501	31	10	0
M023552	32	0	0
M023605	36	10	0
M023701	43	0	0
M023752	43	0	0
M023801	53	0	0
M023852	53	0	0
M024001	27	0	0
M024052	27	0	0
M024152	10	2	0
M025111	9	16	0
M025211	12	18	0
M025352	34	4	0
M025411	15	14	0
M025452	25	0	0
M040100	1	14	0
M040120	3	14	0
M040300	1	14	0
M040320	3	14	0
M040700	1	14	0
M040720	3	14	0
M041100	2	12	0
M041120	5	10	0
M041300	3	8	0
M041320	7	2	0
M041602	5	16	0
M041622	11	18	0
M041700	2	16	0
M041720	5	18	0
M042302	4	14	0
M042322	9	14	0
M505608	1	0	0
M505647	7	12	0
M505664	9	12	0
M505689	3	4	0
M505705	11	14	0
M505790	3	16	0
M505890	8	0	0
M505904	3	12	0
M505906	3	10	0
M505907	3	14	0
M505908	3	18	0
M505931	1	14	0
M505932		16	0
M505933		10	0
M505934		10	0
M505960	4	16	0
M505970	1	4	0
M550000	1140	0	0
M550001	1331	14	0
M550002	2118	0	0
M550011	100	16	0
M550012	129	12	0
M550013	62	16	0
M550014	97	18	0
M550015	160	0	0
M550016	200	0	0
M550017	282	0	0
M550020	26	0	0
M550300	120	0	0
M550500	88	0	0
M550560	19	4	0
M550570	176	0	0
M550670	4	4	0
M550680	40	0	0
M550828	21	0	0
M550950	9	12	0
M551040	24	8	0
M551270	15	10	0
M551310	3	12	0
M551325	15	8	0
M551340	8	16	0
M551360	12	16	0
M551515	44	0	0
M551545	24	0	0
M551610	2	16	0
M551649	18	10	0
M551700	4	16	0
M551795	19	4	0
M551815	16	16	0
M551825	5	12	0
M551830	4	12	0
M551850	122	0	0
M551854	67	4	0
M551895	6	16	0
M551896	8	16	0
M551897	48	0	0
M551955	2	8	0
M551990	4	4	0
M552056	9	12	0
M552065	6	8	0
M552075	7	2	0
M552080	9	16	0
M552085	2	8	0
M552090	3	4	0
M552095	19	16	0
M552100	60	8	0
M552105	90	2	0
M552145	16	8	0
M552300	1	14	0
M552310	3	18	0
M552380	98	0	0
M555625	56	0	0
M555642	52	0	0