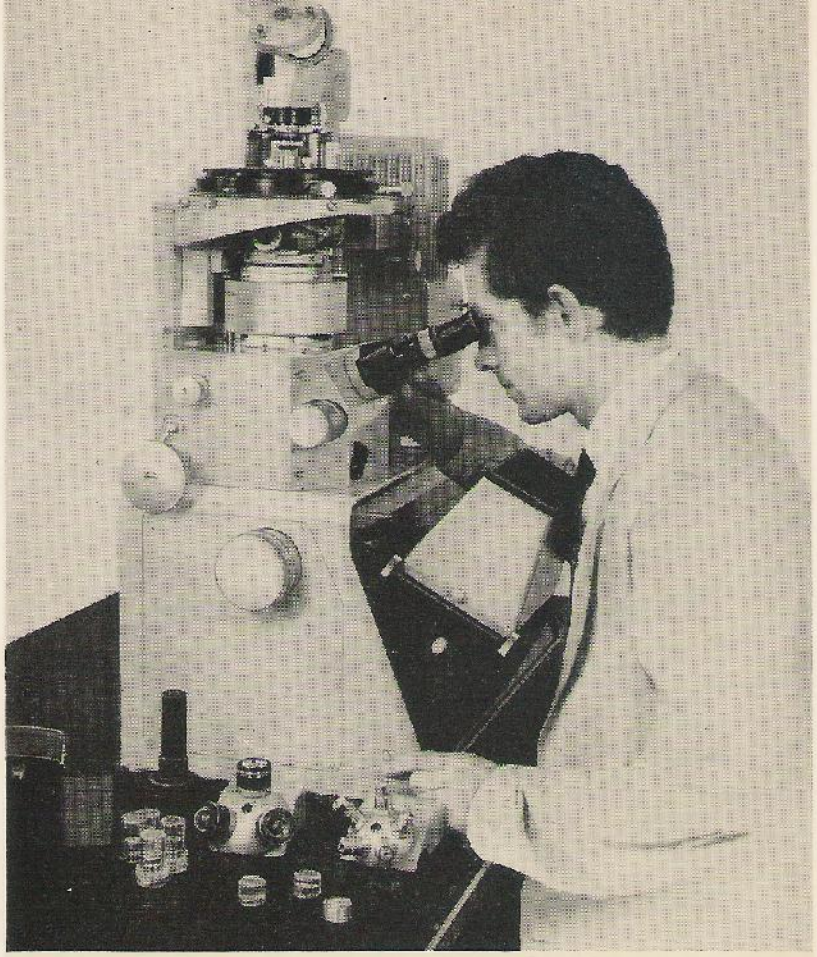
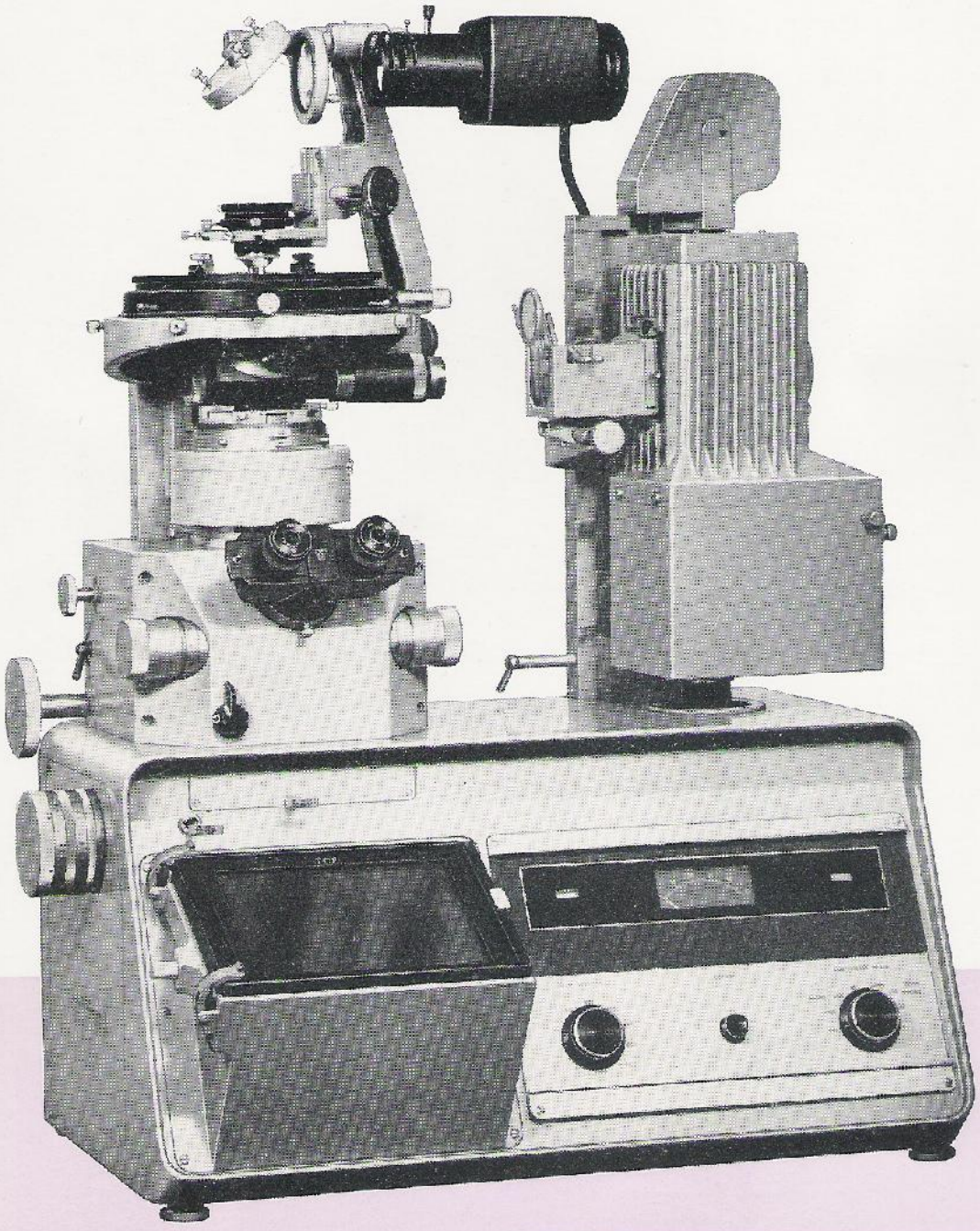


VICKERS M55 MICROSCOPE

VICKERS INSTRUMENTS

M550002

With the addition of M550013 high power tungsten filament lamp



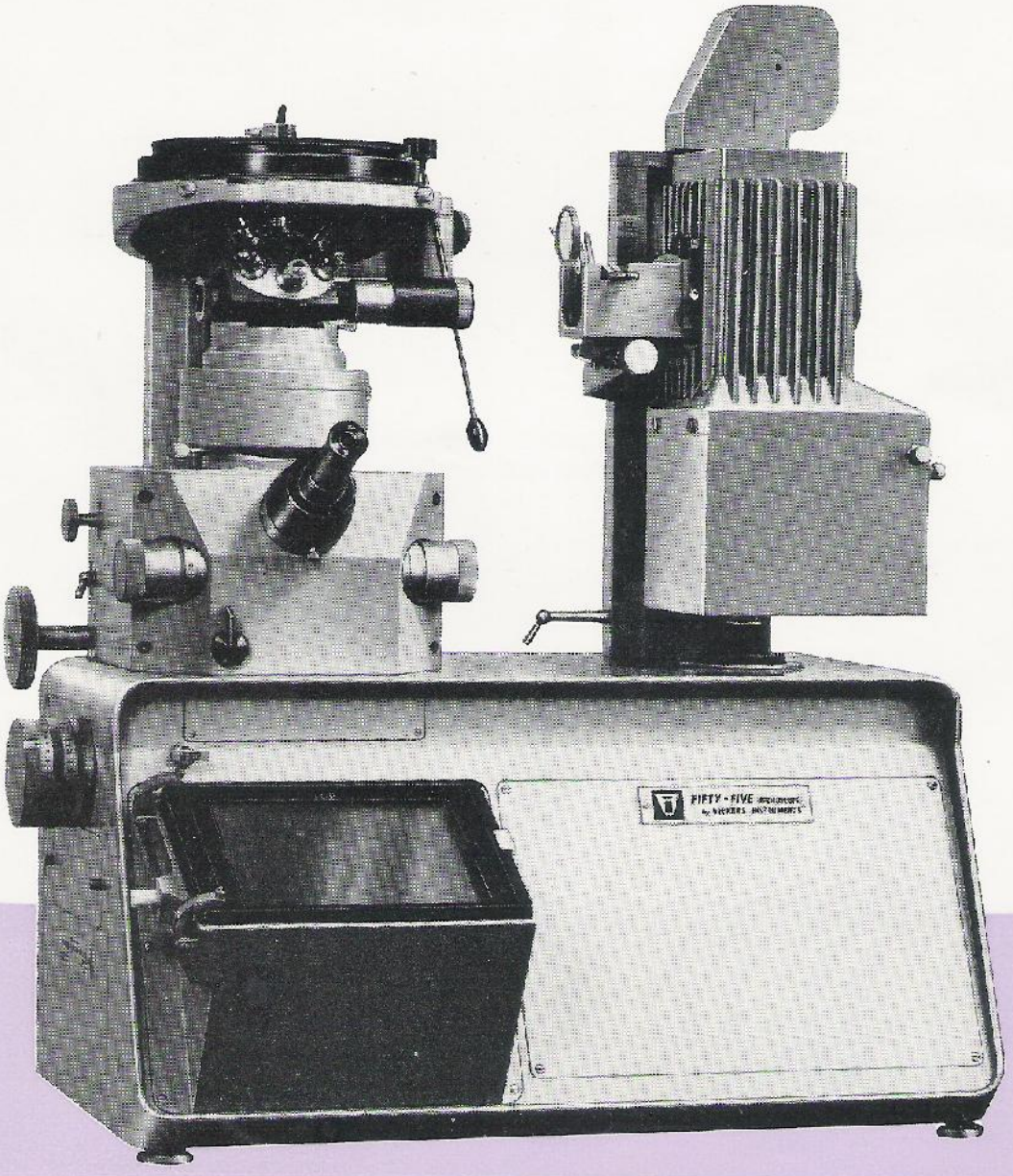
VICKERS M55

INDEX

VICKERS INSTRUMENTS
YORK & CROYDON

VICKERS M55

BASIC MICROSCOPE M550001



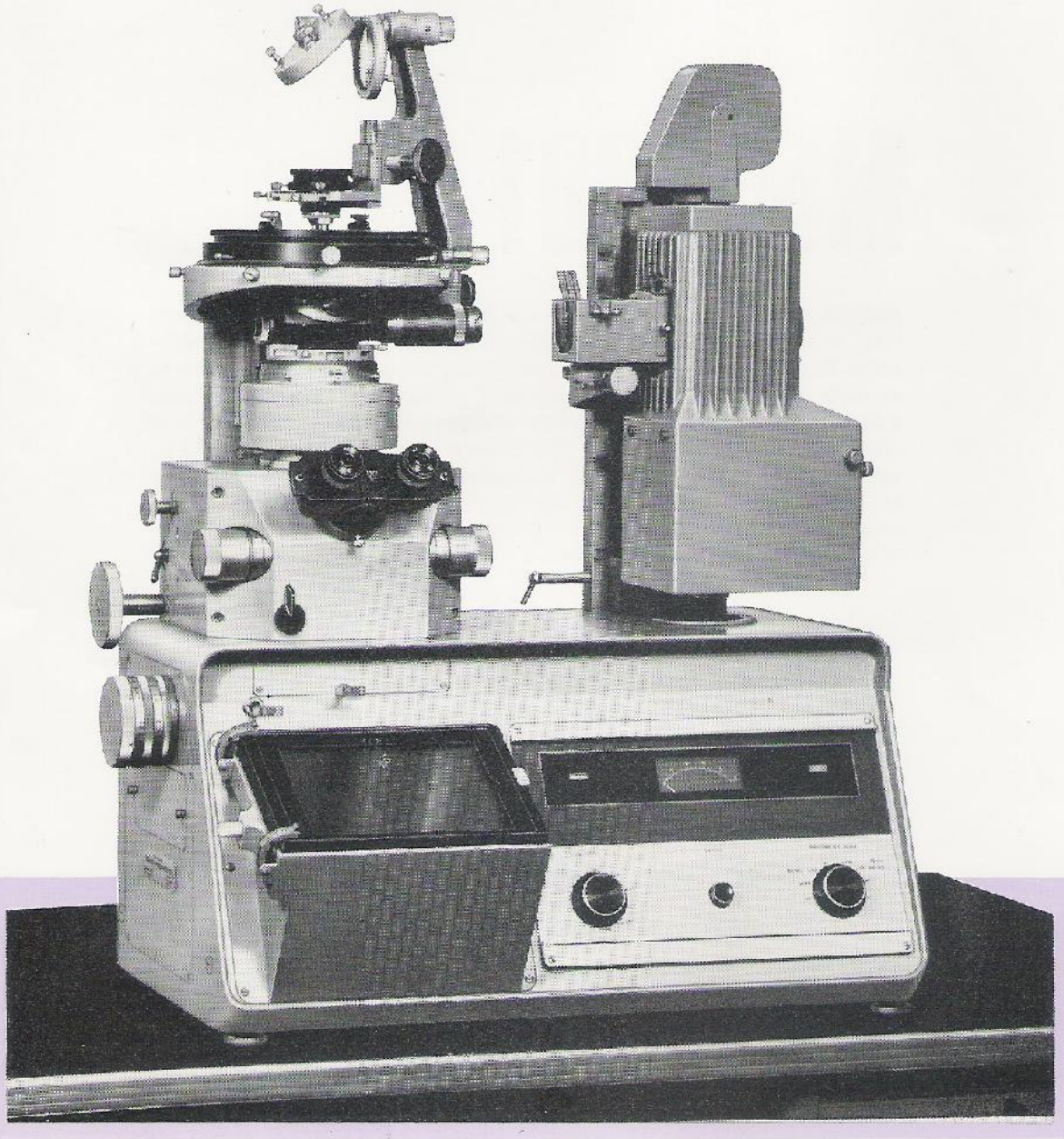
M550001

M550001 Vickers Fifty-Five Microscope including incident illuminator unit, lamp condenser unit, zoom projection unit, xenon lamp, electrical equipment, fixed wiring for integrator unit, gliding stage with joystick control, sextuple objective changer, magnification changer unit, monocular head, double plate holder for half plates with quarter plate adaptors, micro crystalline wax focusing screen, 10× Kellner eyepiece with graticule, 2 in. square heat absorbing filter, water trough, accessory box, soft plastic cover for instrument. Dimensions of base: length: 24½ in., width: 13½ in. Overall dimensions: length: 28½ in., width: 18 in., height: 32 in.—39½ in. when lamp is in raised position. Weight: 177 lb.

VICKERS INSTRUMENTS
YORK & CROYDON

VICKERS M55

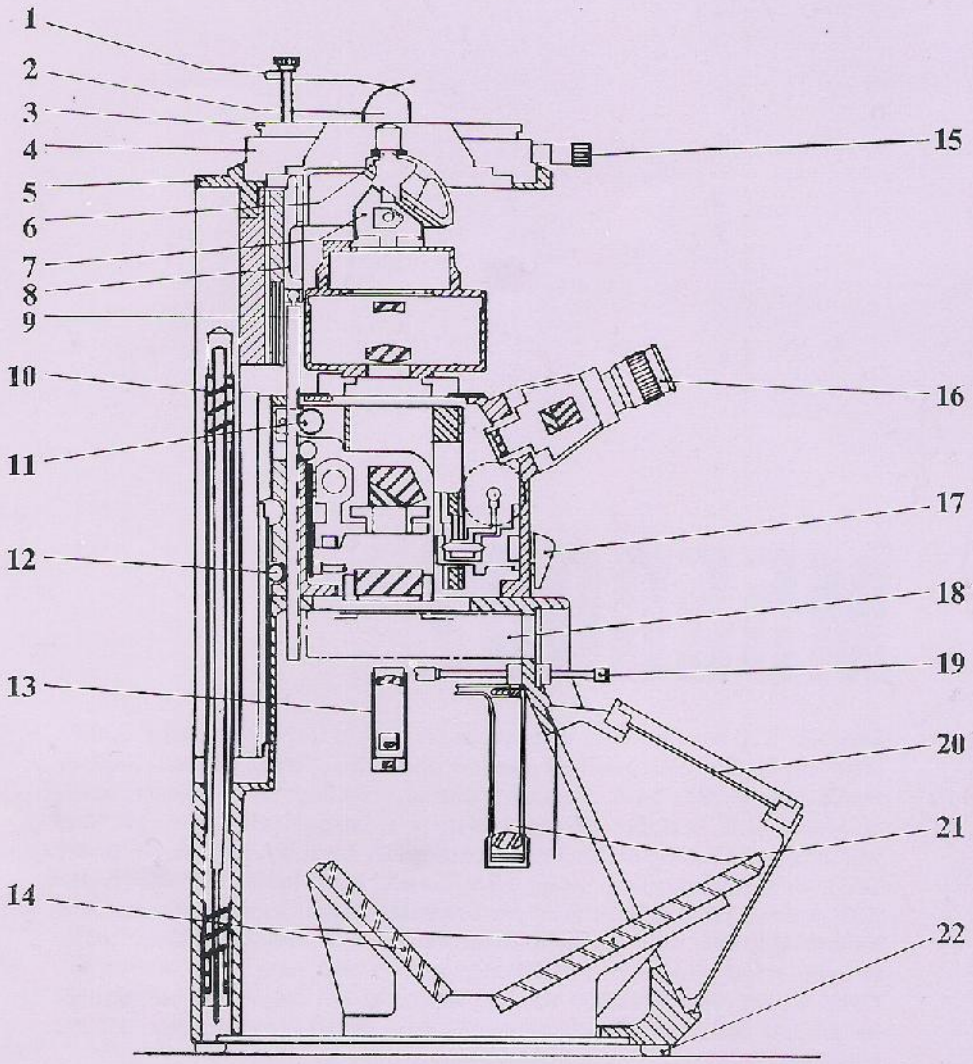
RESEARCH MICROSCOPE M550002



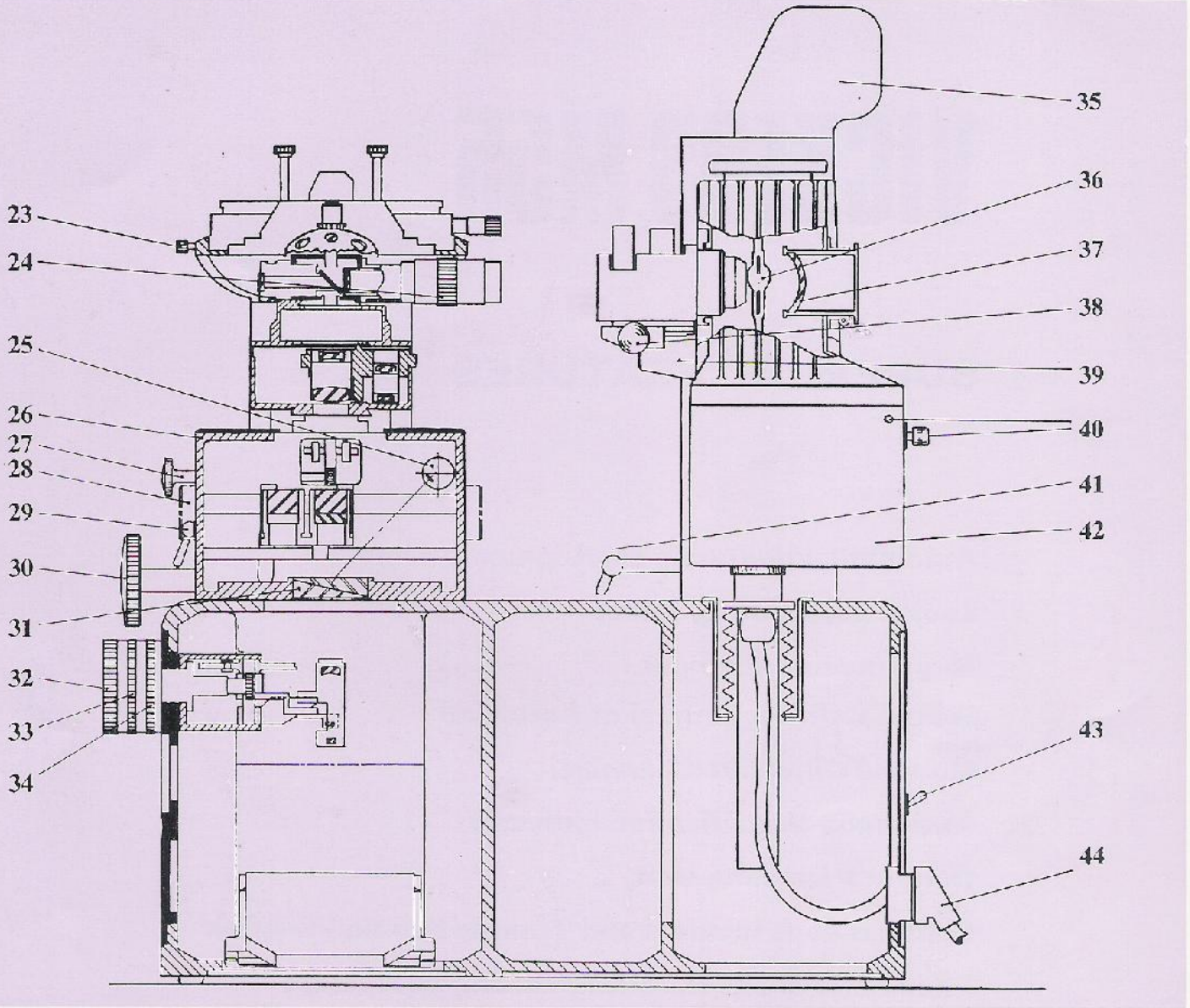
M550002

M550002 Vickers Fifty-Five Microscope, including incident illuminator unit, lamp condenser unit, zoom projection unit, xenon lamp, electrical equipment, transmitted light bracket, centring, rotating, and gliding stage, quintuple and sextuple objective changers, magnification changer unit with analyser unit, binocular head, autowind 35 mm. camera unit, automatic integrating photographic timing unit, double plate holder for half plates with quarter plate adaptors, micro crystalline wax focusing screen, 10× Kellner eyepiece with graticule, 2 in. square heat absorbing filter, water trough, metal desk for microscope, soft plastic cover for instrument. Dimensions: desk: length: 62 in., width: 32 in., height: 30 in. Overall height with lamp in raised position: 70 in. Weight: microscope: 204 lb., metal desk: 301 lb.

VICKERS INSTRUMENTS
YORK & CROYDON



1. Stage Clips
2. Specimen
3. Gliding Stage
4. Micrometer Stage
5. Stage Support
6. Sextuple Objective Changer
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 Visual—Macro)
18. Micro Shutter
19. Selector Rod (Zoom Eyepiece—Macro—35 mm. Corrector Lens)
20. Focusing Screen
21. 35 mm. Corrector Lens
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

VICKERS M55

SUPERIOR FEATURES

Automatic Integrating Photographic Timer

Zoom Projection Eyepiece

Magnification Changer

35 mm. Camera, Manual or Autowind

Multiple Objective Changers

Automatic Magnification Indicator

Built-in Polarizing Unit

Simultaneous Incident and Transmitted Illumination

Pneumatic Micro Hardness Testing Equipment

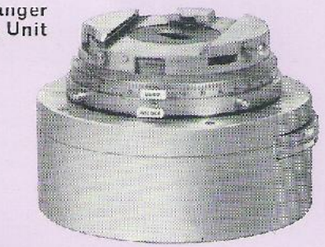
Incident Phase Contrast Unit

Nomarski Interference Contrast Equipment

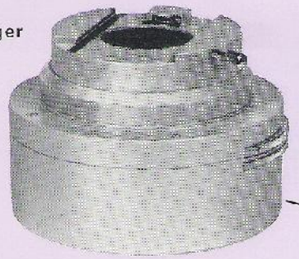
Instrument mounted on Anti-Vibration Pads

All Illumination Techniques applicable without disturbing specimen

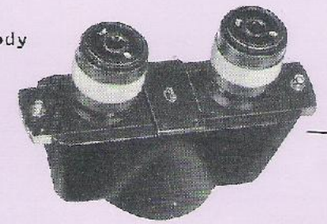
M550012 Magnification Changer with built-in Analyser Unit



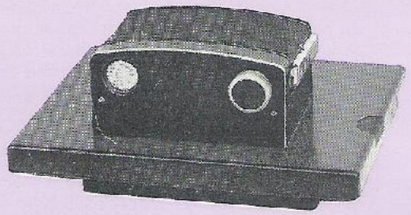
M550011 Magnification Changer



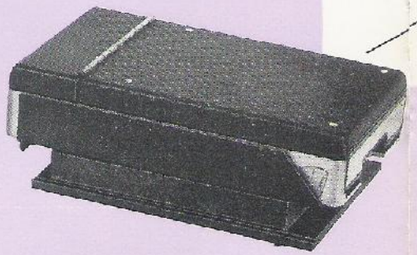
M550680 Binocular Body



M550670 Monocular Body

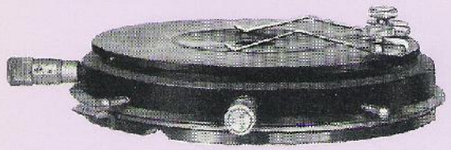


M552590 Autowind 35 mm. Camera Unit



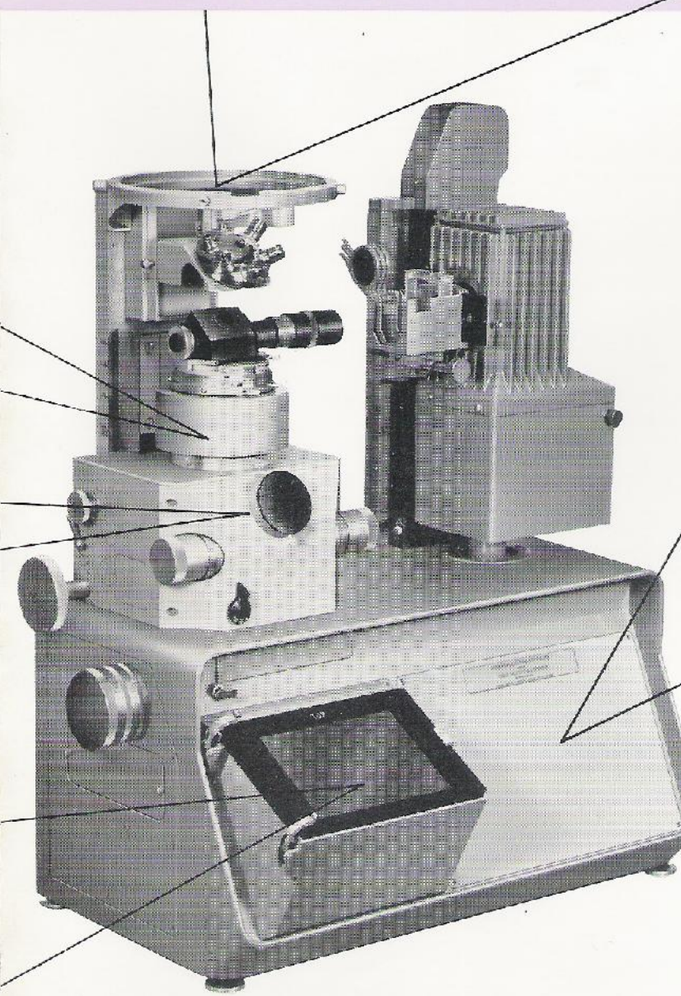
M030640 CB100 Polaroid Camera

VICKERS FIFTY-FIVE MICROSCOPE

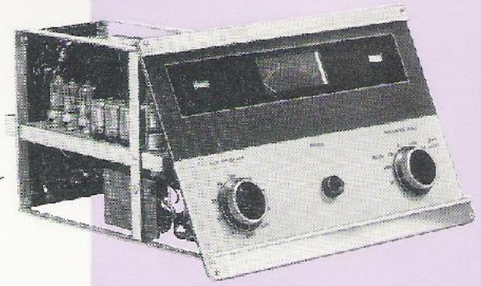


M550300 Micrometer and Gliding Stage

M551515 Gliding Stage



M550022 Photometer Timer



M550021 Automatic Integrating Photographic Timer

Power Supply Unit

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

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 metal desk 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.

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. 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. 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 ×. A focusing Bertrand lens is fitted to the magnification changer. 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. The following range of photographic formats are available: half plate, quarter plate, 7 in. × 5 in., 5 in. × 4 in., 35 mm. and Polaroid type CB100, 500 and J66.

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 particulary well equipped for work in polarized light, since all the necessary polarizing components can be built into the special magnification changer.

The Vickers Fifty-Five Microscope incorporates a zoom 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. A.S.T.M. recommended magnifications are shown in red.

The magnification range of the M55 using micro objectives is from 24 diameters with a 3·5 × objective to 2,800 diameters with a 140 × objective.

The objectives used for incident light, transmitted light and dark field microscopy are mounted on separate revolving objective 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 changer incorporates a corrector lens. All objectives except 3·5 × and 6·0 × are par-central and par-focal.

Dark field illumination is provided by a range of objectives which are fitted into catoptric condenser mounts. Positive and negative incident phase contrast is obtained by using a special phase contrast unit which replaces the normal incident illuminator. Special phase contrast objectives are not required as the phase retarding plates are incorporated in the phase contrast unit. For transmitted light phase contrast, a condenser annulus changer unit and 160 mm. tube length phase objectives are required.

Automatic photographic timers eliminate the need for repeated trial exposures. Two different timers are available. Each of them uses a photocell to measure the intensity of a sample of the image forming light.

The automatic integrating photographic timer both exposes the photographic material automatically and at the same time indicates the light intensity to the user by means of a meter. A photomultiplier receives a definite fraction of the image forming light. An electric current proportional to the light intensity is produced and operates a circuit which charges a condenser. When a predetermined energy level has been reached, the condenser is discharged and the exposure terminated. This level is set when the instrument controls are adjusted to suit the type of photographic material and film speed. The exposure indicator gives a visual indication that the shutter is open and of the progress of the exposure.

The simpler photometer timer uses a cadmium sulphide cell to measure the intensity of the fraction of the image forming light. This information is presented as a meter reading. The user then determines the correct exposure by reference to calibration tables provided with the instrument for particular photographic materials, or filled in by the user on the basis of trial exposures. The exposure is set manually on a dial calibrated from 1/20 second to 32 seconds, and is made accordingly by the unit on pressing the "Expose" button. Again, an indicator gives visual indication of the progress of the exposure. A "Time" setting is also provided.

Manually controlled or motorised 35 mm. cameras are offered, the latter being used in conjunction with the integrating timer.

MAGNIFICATION INDICATOR

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

MAGNIFICATION CHANGERS

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

M550011 Magnification changer.
M550012 Magnification changer with built-in analyser unit

OBJECTIVE CHANGERS

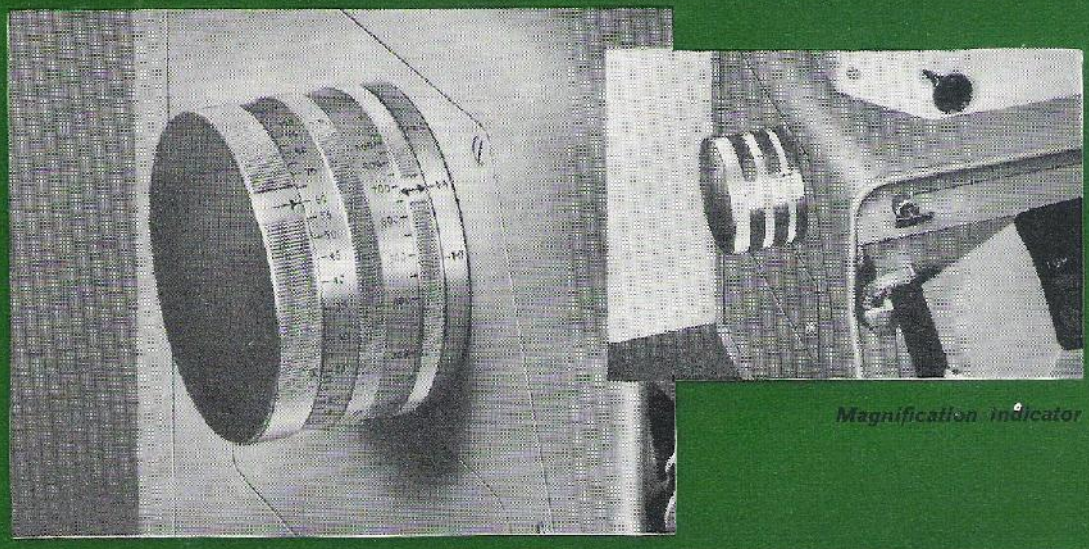
M550560 Revolving sextuple objective changer and mount (supplied with the instrument) for infinite tube length, 24 mm. shoulder length, incident objectives.

M552145 Revolving triple objective changer and mount for infinite tube length 15×, 30×, and 50× dark ground objectives with catoptric condensers, and for use with micro hardness testing objectives.

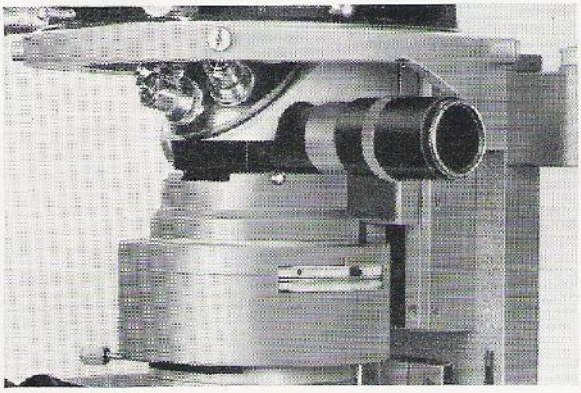
M552440 Revolving quintuple objective changer and mount with built-in 2× corrector lens for 160 mm. tube length, 34 mm. shoulder length, transmitted light objectives (supplied with M550002 microscope).

M552450 Revolving quintuple objective changer and mount for infinite tube length, 34 mm. shoulder length, incident flat field objectives.

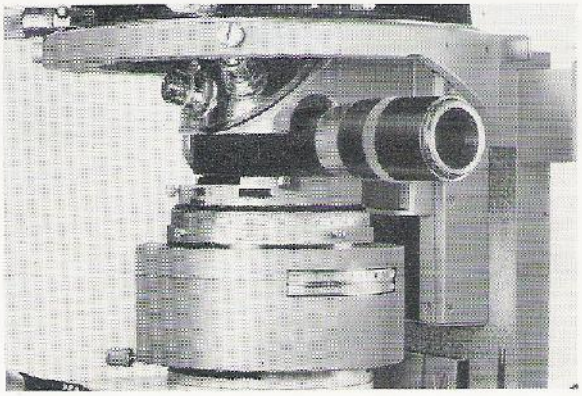
M552445 Adaptor for M552450 to enable 24 mm. shoulder length flat field objectives to be par-focal with 34 mm. shoulder length flat field objectives.



Magnification indicator



M550011



M550012

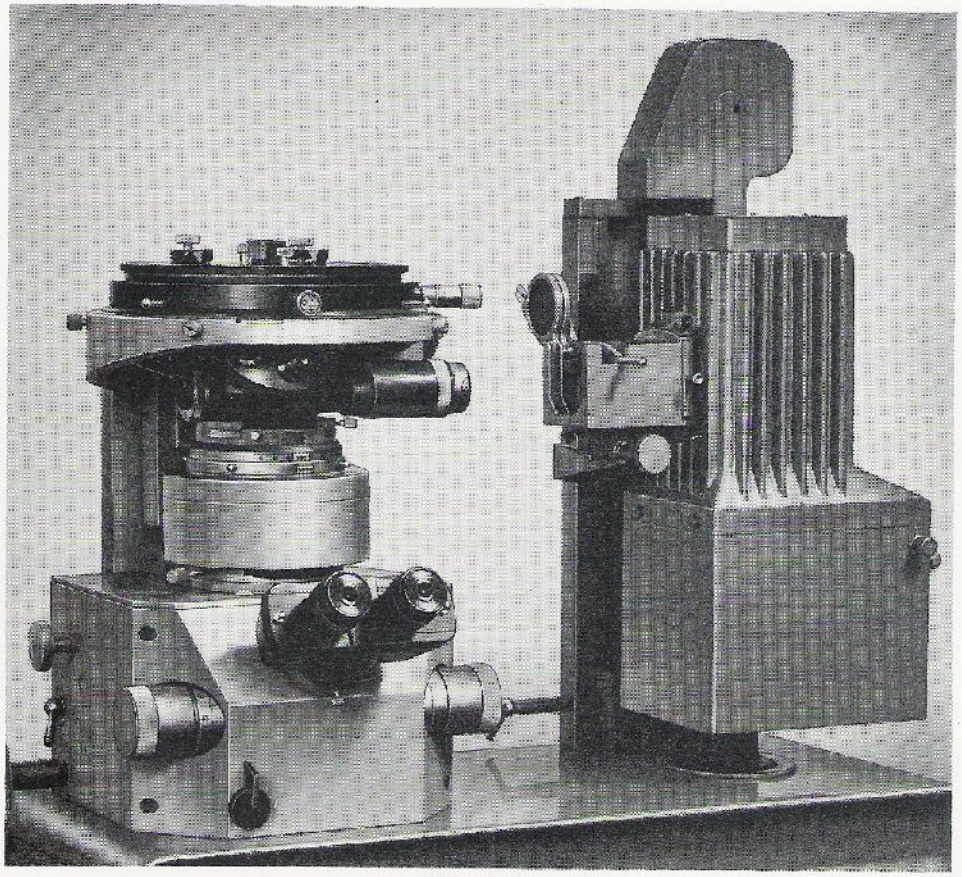
M550560

M552145

M552440

M552450

INCIDENT AND TRANSMITTED ILLUMINATION



Incident light arrangement for the examination of a metallurgical specimen.

EQUIPMENT FOR TRANSMITTED LIGHT

M550500 Swing-out mirror bracket.

M001376 Centring condenser mount.

M552440 Quintuple objective changer.

CONDENSERS

M001382 Abbe condenser (2 lens).

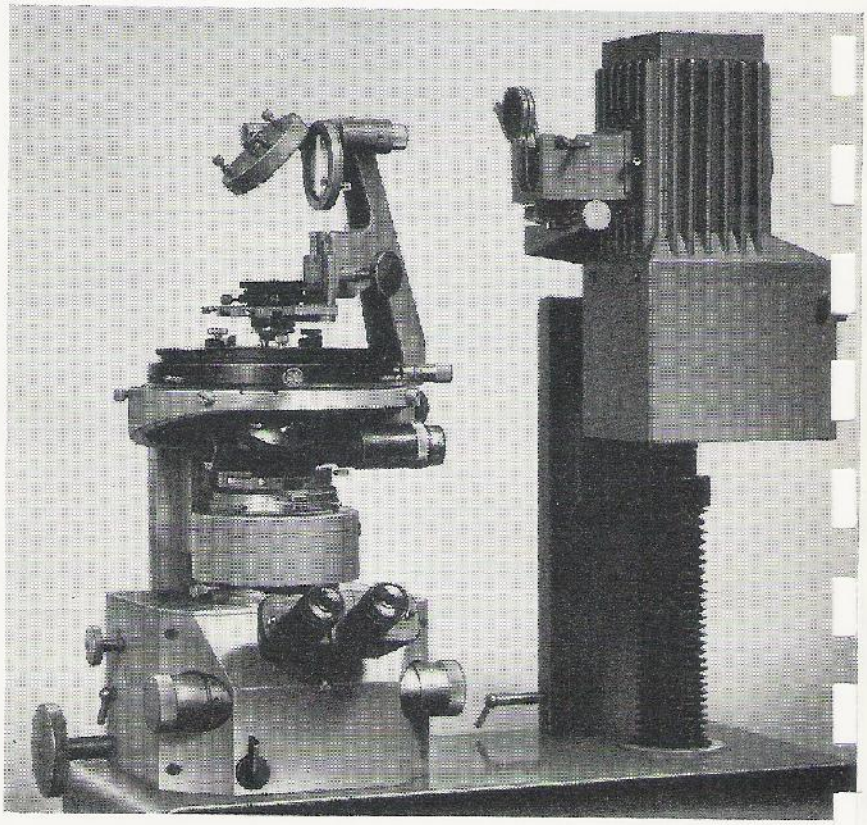
M001383 Aplanatic condenser N.A. 1·30.

M001391 Achromatic oil immersion condenser N.A. 1·30.

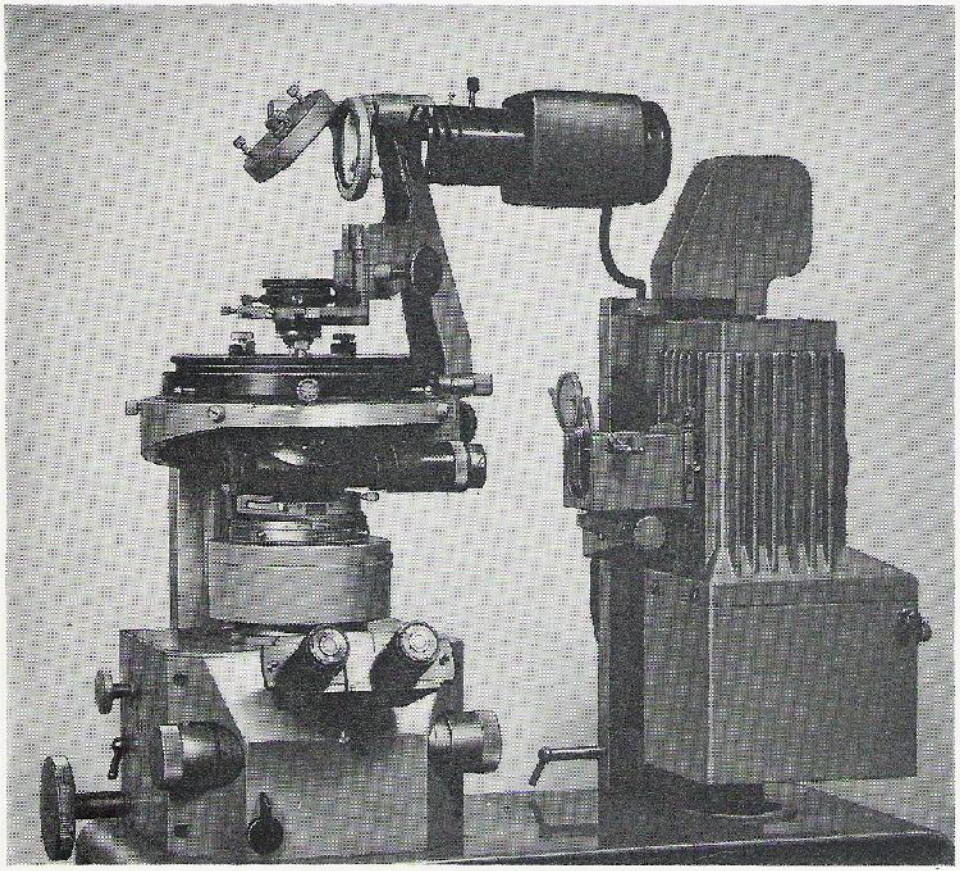
M252793 Semi-achromatic condenser (4 lens) N.A. 1·0.

M220261 Adapter essential for M252793 condenser.

M001396 Focusing dark ground condenser.



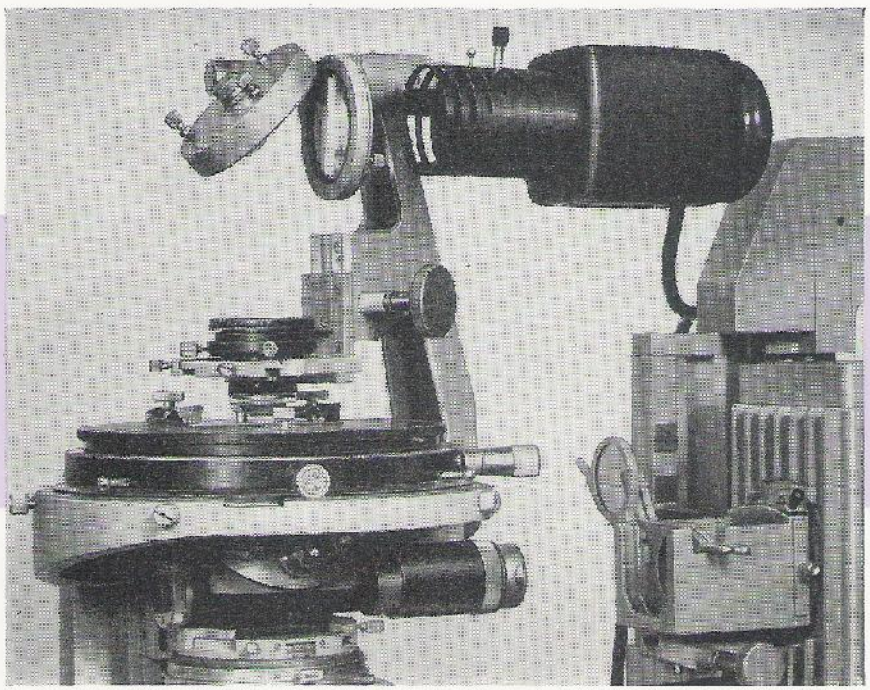
Transmitted light arrangement, with swing-out mirror bracket, for the examination of a biological specimen.



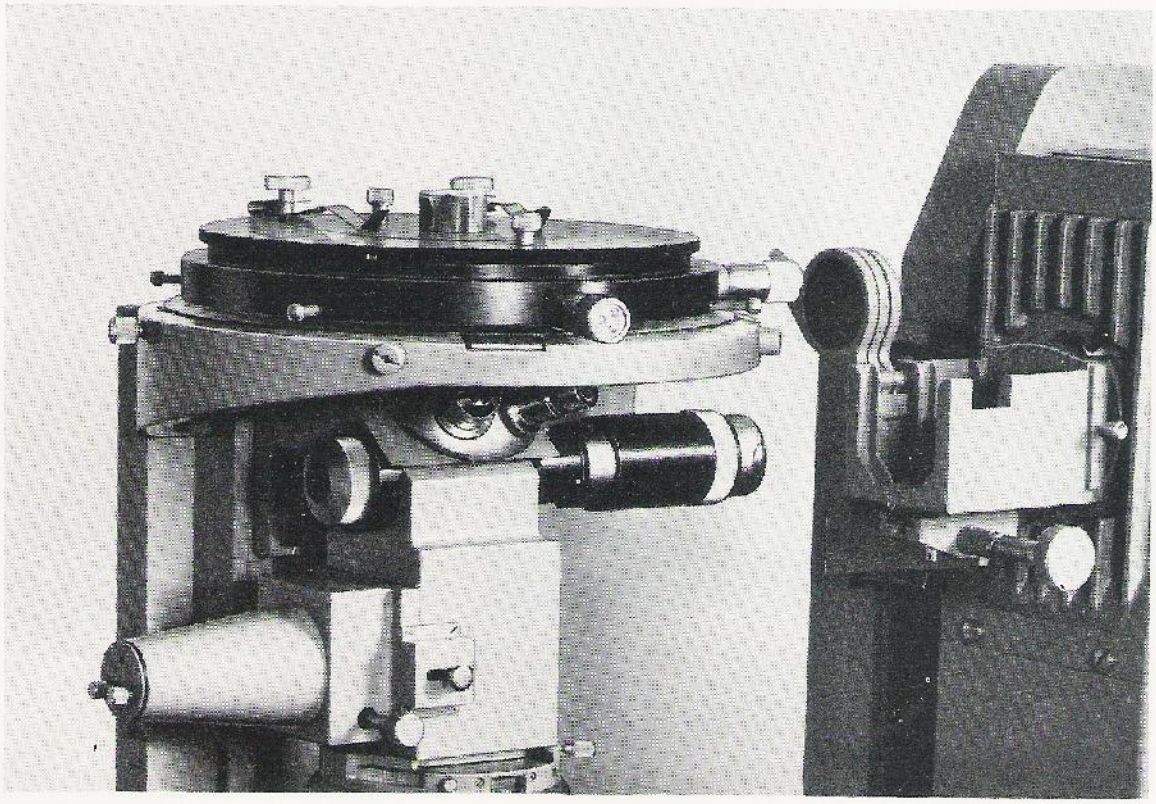
SIMULTANEOUS INCIDENT AND TRANSMITTED ILLUMINATION

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

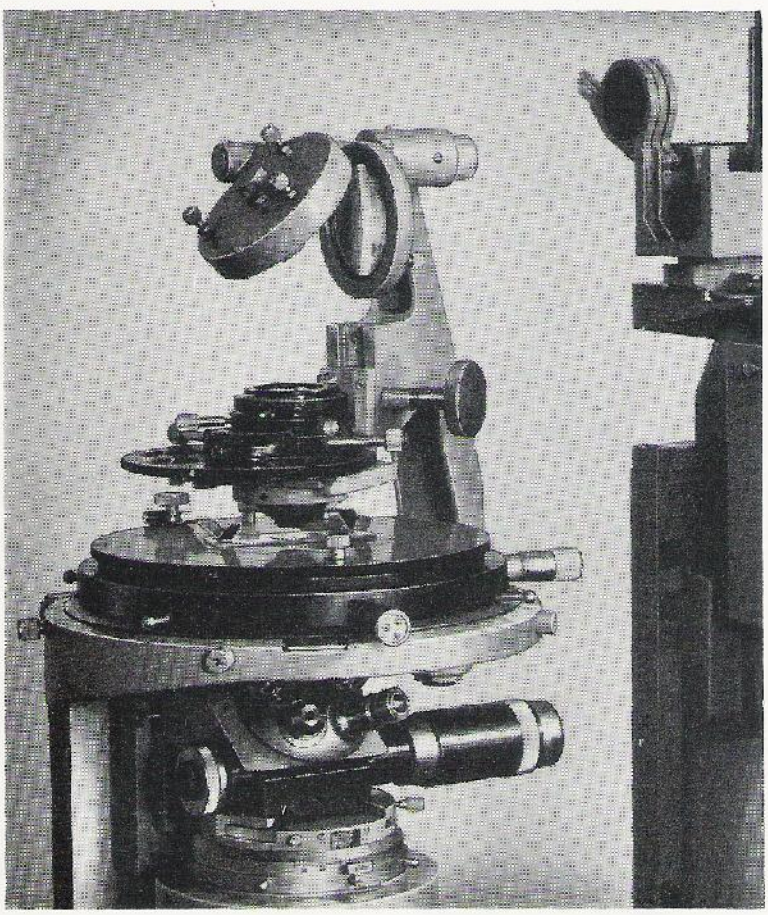


Incident phase contrast complete with illumination box allowing positive and negative phase contrast, dark ground and normal incident illumination.

M550570 Incident phase contrast unit.

OBJECTIVES FOR INCIDENT LIGHT PHASE CONTRAST

All infinite tube length objectives for uncovered specimens with the exception of 3×, 6× and 10× objectives, are suitable for incident light phase contrast. A complete list of objectives and eyepieces appears on page 32.



PHASE CONTRAST EQUIPMENT FOR TRANSMITTED LIGHT

Transmitted phase contrast showing swing-out bracket and phase contrast unit M555625.

M550500 Swing-out mirror bracket.
M555625 Phase contrast unit complete with condenser and four annular diaphragms.
M555642 Phase contrast unit as M555625 but with long working distance condenser.
M410975 Semi-achromatic phase contrast condenser with individual annulus centring.
M410955 Auxiliary lens in cell, essential for use with M410975 phase contrast condenser.
M552440 Quintuple objective changer with 2× corrector lens.
M552140 Centring condenser slide.

OBJECTIVES FOR TRANSMITTED LIGHT PHASE CONTRAST

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

A Objectives for use with M555625 and M555642 phase contrast units, only.

B Objectives for use with M410975 phase contrast unit, only.

Objectives		Type	Power	Numerical Aperture
A	B			
M022205	M022308	Achromatic	10×	0·25
M022405	—	,,	20×	0·5
M022505	M022508	,,	40×	0·65
M022605	M022608	,,	95× oil	1·3
M023605	M023608	Fluorite	45× oil	0·95
M023505	M023508	,,	95× oil	1·3
M025105	M025108	Microplan	10×	0·25
M025205	M025208	,,	40×	0·7

A complete list of eyepieces appears on page 32

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 range 0 to 105 degrees which can be read, against a vernier, to 6 minutes of arc. 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 12 minutes of arc.

INCIDENT LIGHT

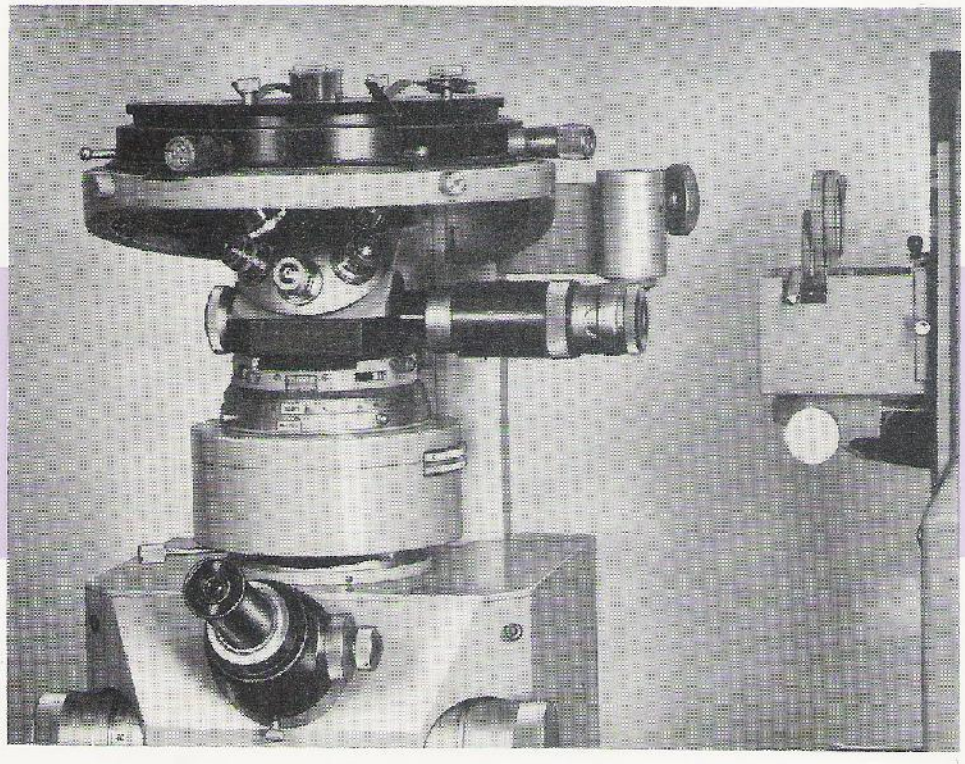
For incident light work a graduated polarizing cap, which fits on the incident illuminator, is required.

M552065 Graduated polarizing cap.

TRANSMITTED LIGHT

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

M551897 Monocular eyepiece with Bertrand lens.
M550012 Magnification changer with analyser unit.
M552440 Quintuple objective changer with 2× corrector lens.
M551040 Polarizing substage attachment.
M550500 Swing-out mirror bracket.
M001376 Centring condenser mount.



Instrument set up for incident polarized work.

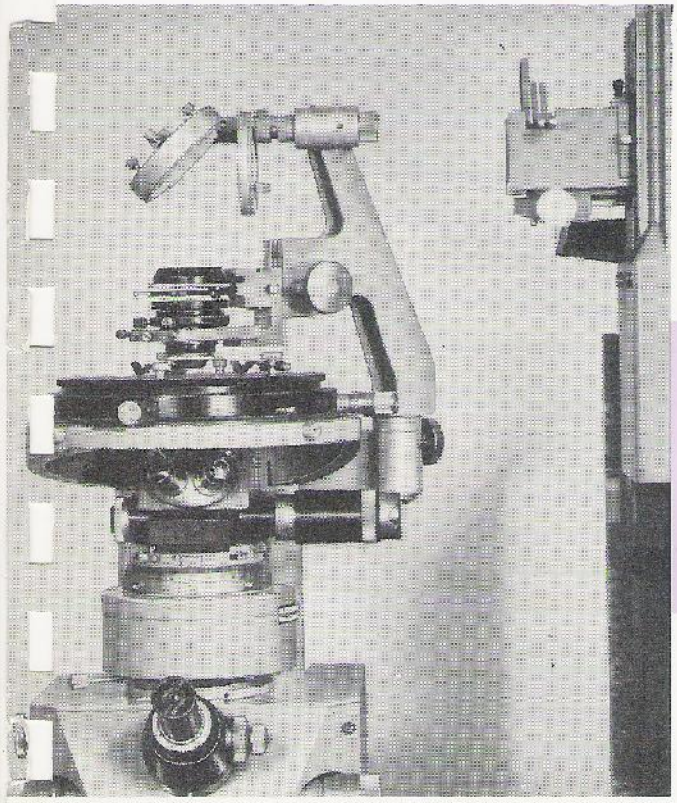
ACHROMATIC OBJECTIVES FOR POLARIZING WORK

A Incident Light	B Transmitted Light	Type	Numerical Aperture	Power		Working Distance mm.	
				A	B	A	B
M023054		Achro.	0·05	3·5×	—	68	—
M022054	M022013	,,	0·1	6×	3·5×	38	43
M022154	M022103	,,	0·15	10×	5×	14	17
M022354	M022303	,,	0·25	15×	10×	5	5
M022454	M022403	,,	0·5	30×	20×	1·42	1·52
—	M022503	,,	0·65	—	40×	—	0·71
—	M022903	,,	0·85		40×	—	0·43
M022954	—	,,	0·85	50×	—	0·48	—
M023154	—	,,	0·85	85×	—	0·28	—
M022654	M022603	Achro. oil	1·3	140×	95×	0·41	0·17

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 complete list of eyepieces appears on page 32.



Arrangement for transmitted polarized work.

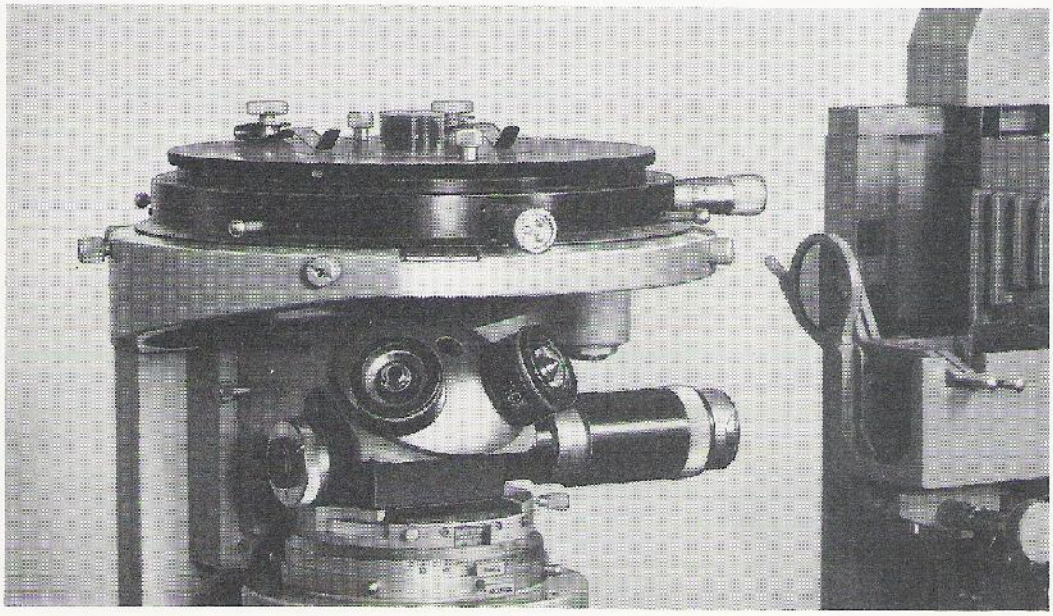
Accessories for incident and transmitted work.

M552075 Quartz wedge, 6 orders (non-graduated).
M552080 Quartz wedge, 6 orders (graduated).
M552085 Mica $\frac{1}{4}$ wave plate.
M552090 de Sénarmont compensator.
M552056 Nakamura half-shadow plate.
M550950 Compensator plate (elliptic).

Condensers for transmitted polarizing work.

M007884 Aplanatic condenser (4 lens) N.A. 1·3.
M007891 Achromatic oil immersion condenser N.A.1·3.
M720360 Semi-achromatic condenser N.A. 1·0.
M220261 Adaptor essential for M720360 condenser.

EQUIPMENT FOR INCIDENT DARK GROUND ILLUMINATION



For dark ground work a triple objective changer and mount to take the infinity corrected 15×, 30× and 50× dark field objectives with catoptric condensers, is required. The patch stop is situated on a slide in front of the lamp condenser.

M552145 Revolving triple objective changer for dark ground objectives.

M551896 Catoptric condenser for use with dark ground objectives. A separate condenser is required for each objective.

ACHROMATIC OBJECTIVES FOR DARK GROUND ILLUMINATION

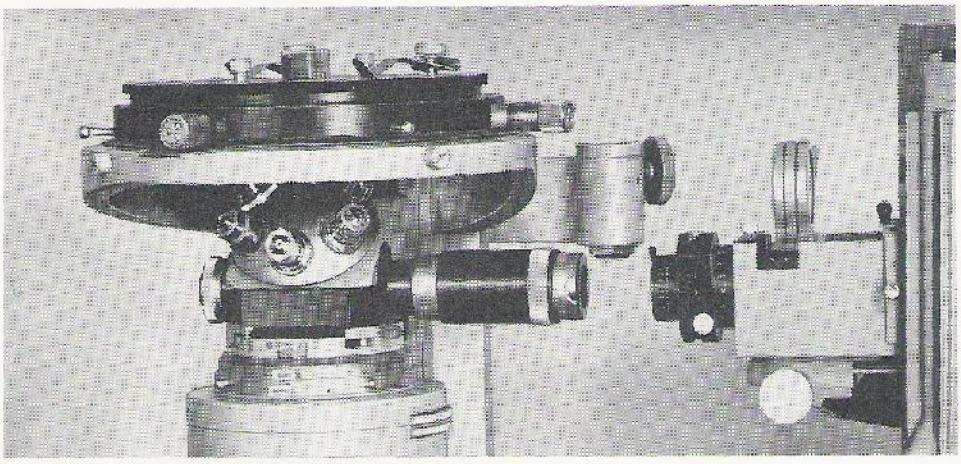
Achromatic Objectives	Type	Numerical Aperture	Power	Working Distance mms.
M023252	Dark Ground	0·25	15×	5
M023452	,, ,,	0·5	30×	1·42
M024152	,, ,,	0·65	50×	0·76

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.

Equipment for transmitted dark ground illumination is listed on page 35.
A complete list of eyepieces appears on page 32.

OBLIQUE ILLUMINATION UNIT



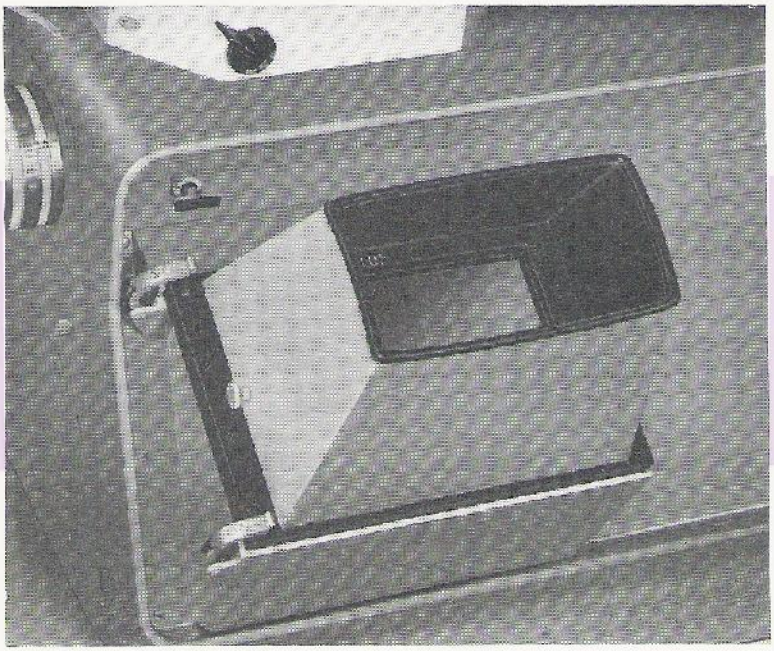
Incident light arrangement with oblique illumination unit.

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.

To achieve optimum performance it is necessary to interchange the normal illuminator lens situated at the end of the illuminator tube with the oblique illuminator lens.

M550020 Oblique illumination unit complete with lens.

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



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. The macro base unit also incorporates an electro-magnetic shutter.

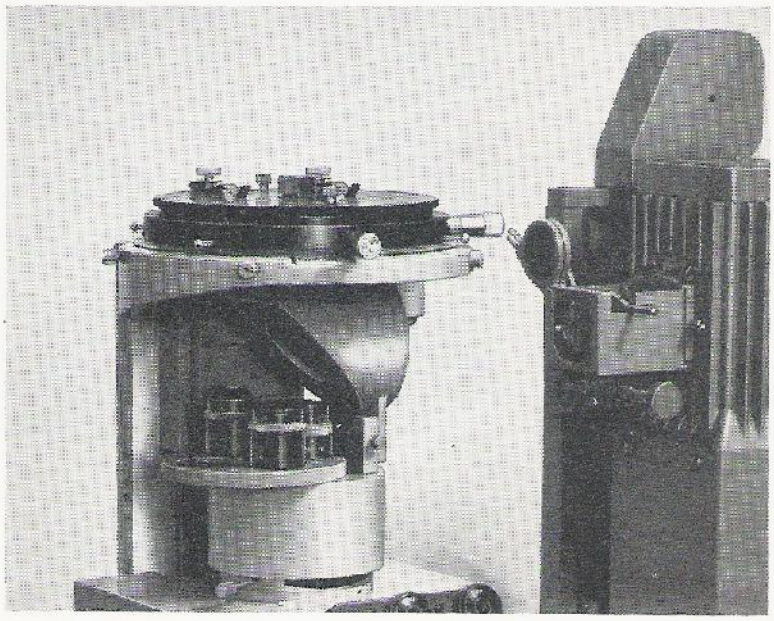
MACRO incident illumination

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.

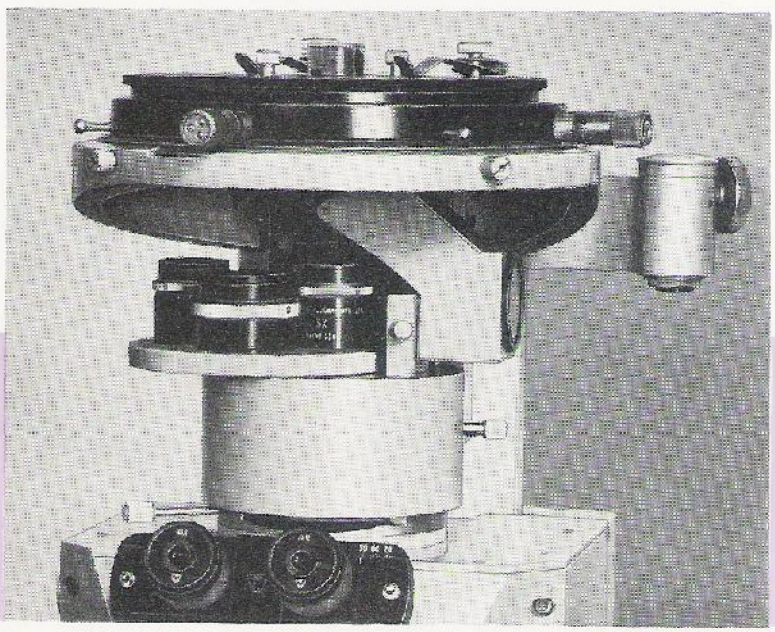
An oblique illumination mirror is also available.

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 5× macro objective.



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

MACRO objectives

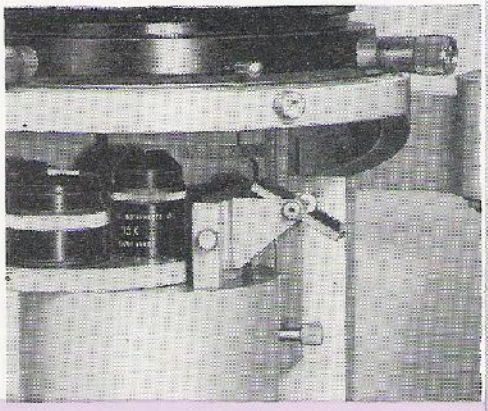
M551325 5× magnification, 127 mm. focal length, f/4·5 aperture.

M551340 10× magnification, 66 mm. focal length, f/4·5 aperture.

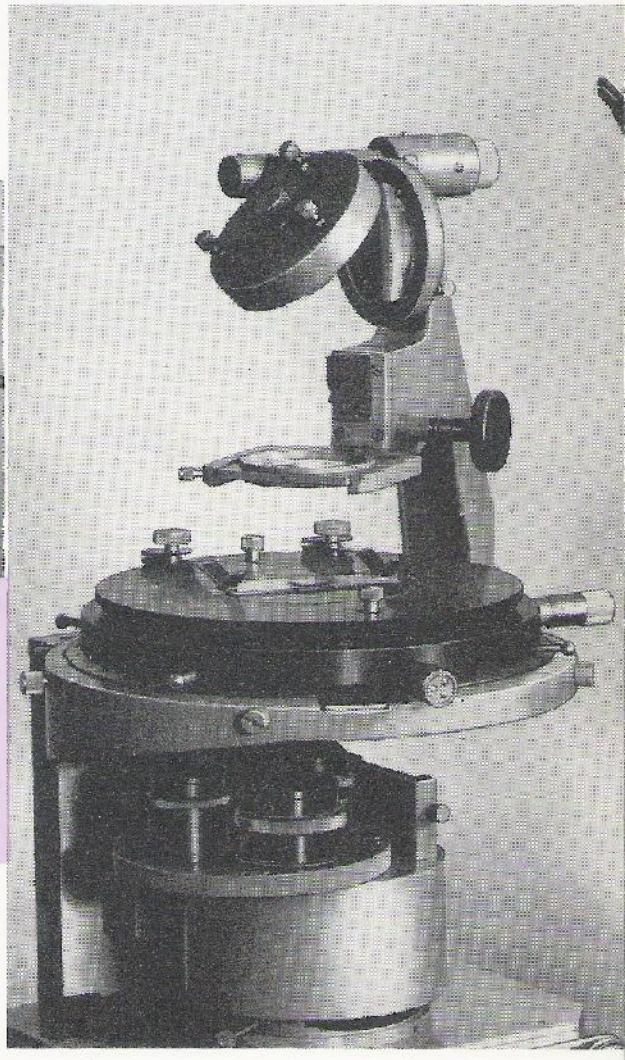
M551360 15× magnification, 48 mm. focal length, f/3·5 aperture.

COMBINATIONS OF MACRO EQUIPMENT

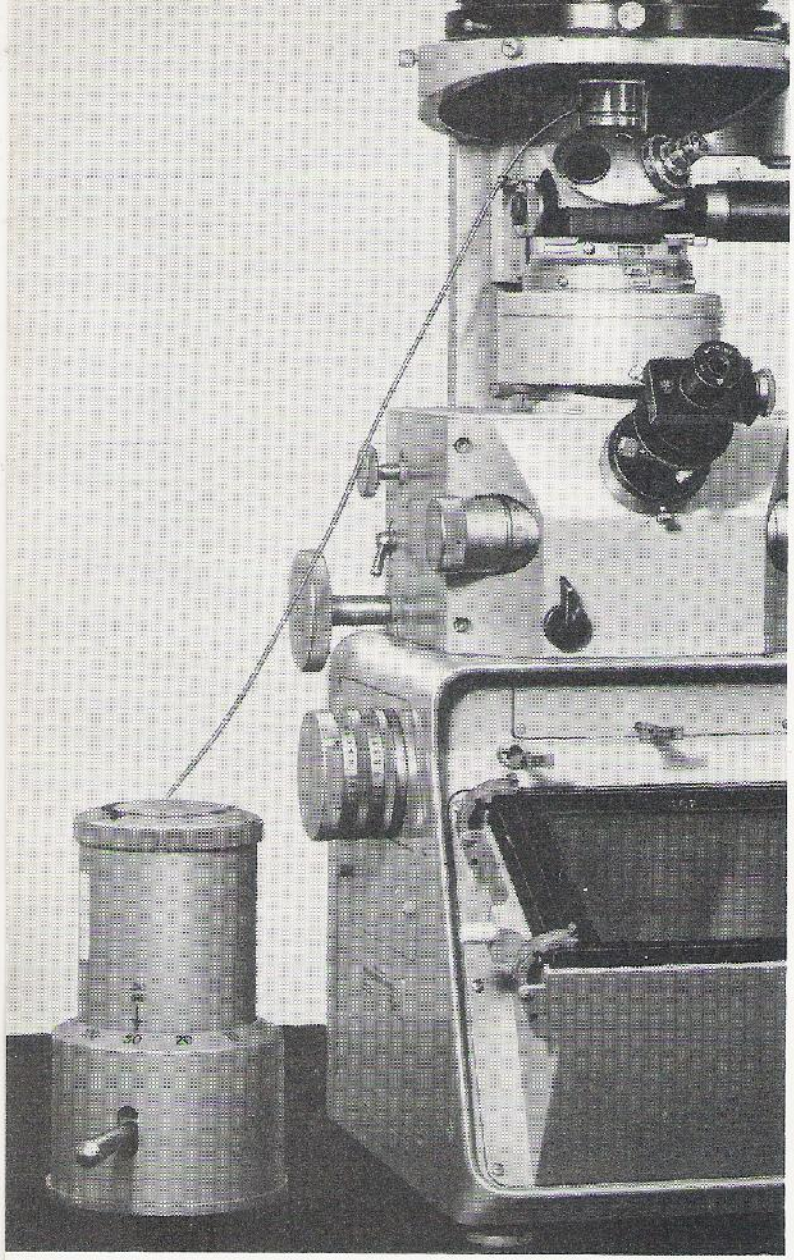
Macro Objectives and types of illumination	M552470 Macro Base Unit	M551325 5× Objective	M551340 10× Objective	M551360 15× Objective	M551795 10×&15× Incident Illuminator	M551815 5× Incident Illuminator	M551310 Oblique Illuminator Mirror	M551825 Auxiliary Condenser Transmitted	M551890 Projection Lens for Transmitted light	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.	√	√	√	√				√	√		√



Oblique incident illumination mirror.



Arrangement for transmitted macro work.



Arrangement for micro hardness testing.

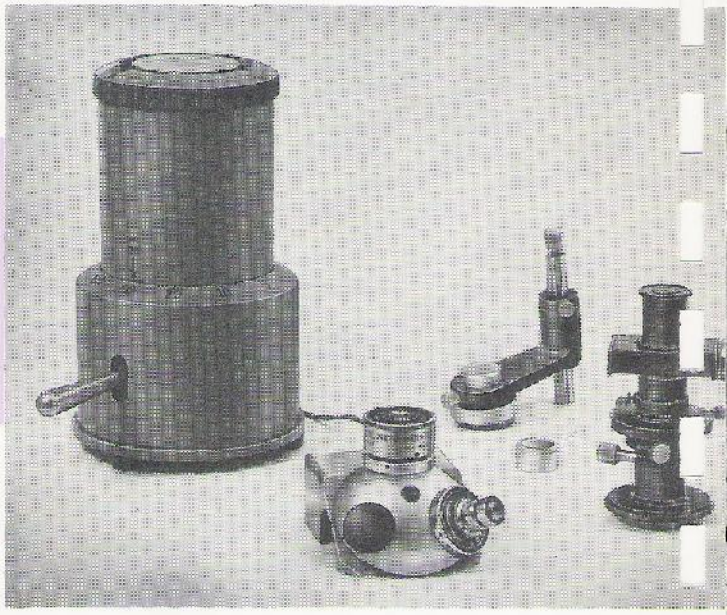
MICRO HARDNESS TESTING EQUIPMENT

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.

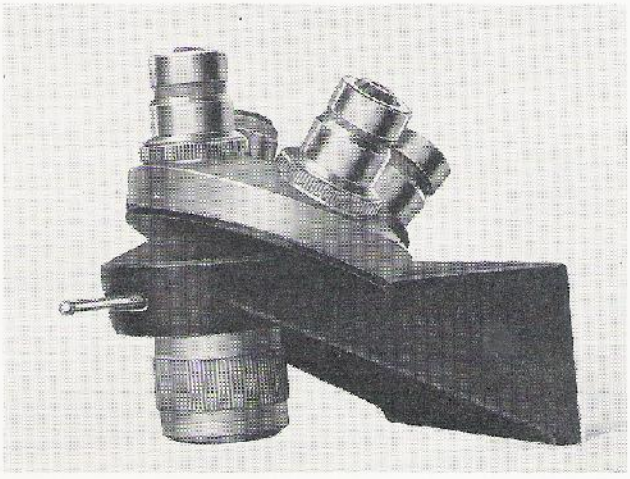
The micro hardness testing equipment consists of a combined indenter and microscope objective in which the housing for the optical lens system is fixed, and only the diamond indenter, mounted on a thin rubber diaphragm, moves.

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 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 wooden box.



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



NOMARSKI INTERFERENCE CONTRAST EQUIPMENT

The Nomarski interference contrast system provides an extremely sensitive technique for detecting slight surface irregularities in opaque specimens. In this respect its function is similar to that of the incident phase contrast system, but unlike the latter it will only reveal changes of slope in the surface.

Its use is limited by the size and separation of the surface irregularities, and generally, etched specimens with fine detail are not suitable for examination by the Nomarski method.

An advantage of the Nomarski interference technique over the conventional phase contrast method is that it allows continuous variation in contrast over any particular part of the object. The images rendered are easier to interpret than those produced by phase contrast methods.

The Nomarski system is a qualitative one and is therefore unlike most other interference systems which allow measurements of path difference to be made.

M552122 Nomarski interference contrast unit.

INCIDENT LIGHT OBJECTIVES FOR THE NOMARSKI UNIT

Achromatic Objectives	Power	Numerical Aperture
M022354	15×	0·25
M022454	30×	0·5
M022954	50×	0·85
M022654	140× oil	1·3

These objectives are included in the list of strain free objectives on page 32.

ELECTRICAL EQUIPMENT

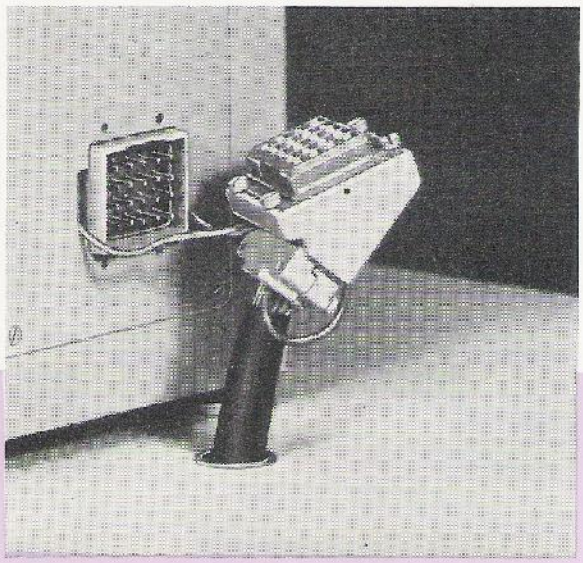
The xenon lamp, which is included with the microscope, is fitted with a control and starter unit suitable for 50 or 60 cycles and 110/120 and 220/240 mains voltage. This lamp can be used for transmitted or incident light techniques. With the addition of a high power tungsten filament lamp (48 watt) operating in conjunction with the xenon 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.

M012801 Spare tungsten filament bulb 6 volts, 48 watts.

M550829 Spare xenon bulb XBO 150W/1.

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.



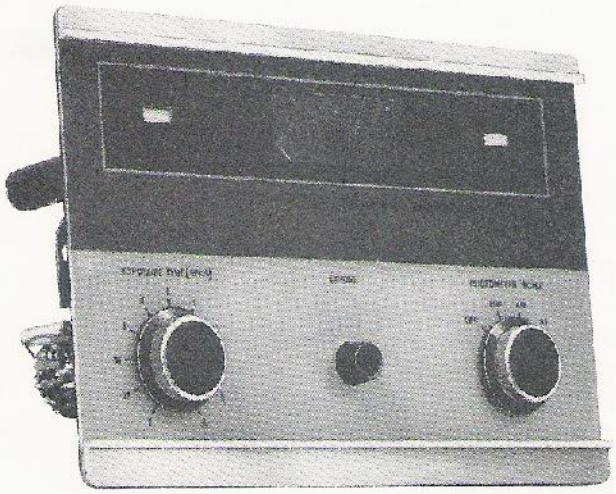
20-way plug connecting the instrument to the built-in power supply unit.

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

PHOTOGRAPHIC EQUIPMENT

PHOTOMETER TIMER

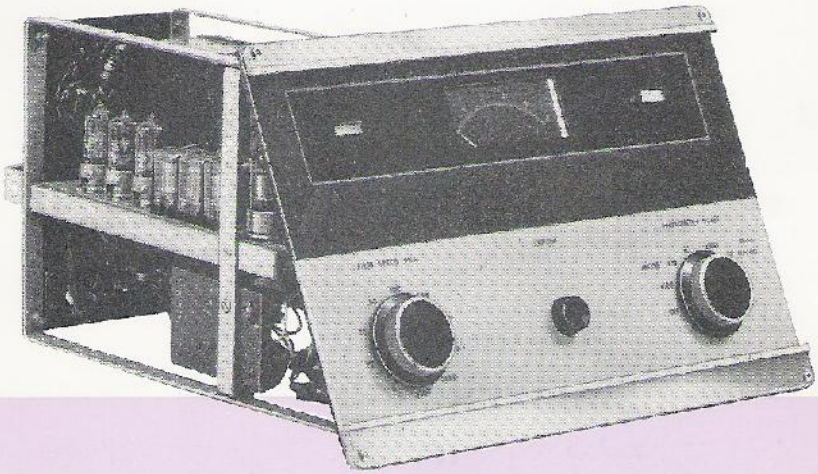
The timer meets the need for an exposure measuring device which is more economically priced than the sophisticated fully automatic exposure unit. It simplifies the work and provides consistent results. It is composed of a multi-range cadmium sulphide photometer and an electronic timer which is manually set by means of a dial and has a range of exposure times from 1/20 second to 32 seconds, plus a "Time" setting. The timer operates an electromagnetic shutter which is virtually free from vibration. The unit automatically winds-on the film after each exposure when the Autowind 35mm. camera is used.



M550022 Photometer timer.

AUTOMATIC INEGRATING PHOTOGRAPHIC TIMER

This unit has an electronic circuit which controls the exposure time according to the amount of integrated light falling on a photomultiplier during the exposure, and by the A.S.A. setting (5—3200 A.S.A.) on the film speed control. The shutter speeds are from 1/10 second to 15 minutes and an exposure duration indicator allows the operator to follow visually, the progress of an automatic exposure. When the Autowind 35 mm. camera is used the film is automatically advanced one frame after each exposure. The M550021 unit is supplied with the M550002 microscope.

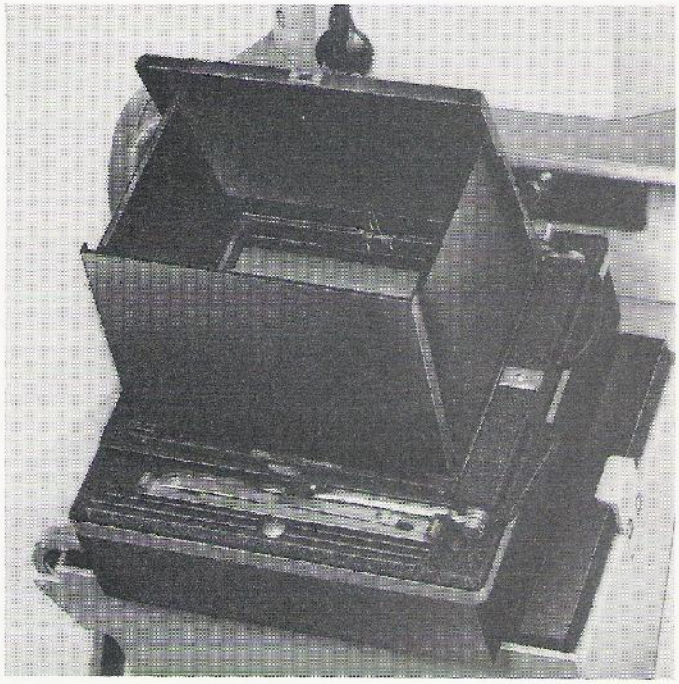


M550021 Automatic integrating photographic timer.

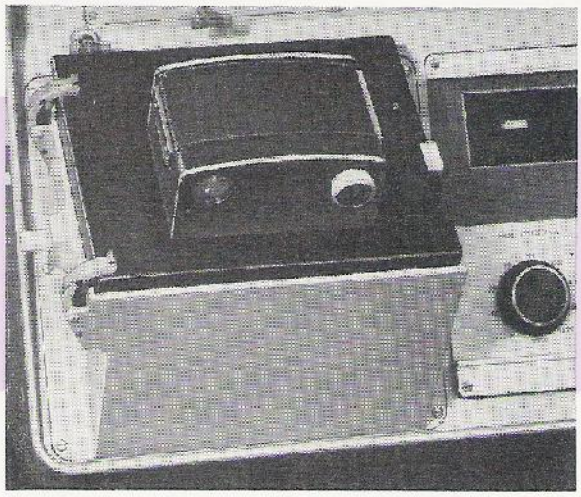
PHOTOGRAPHIC EQUIPMENT

CAMERAS

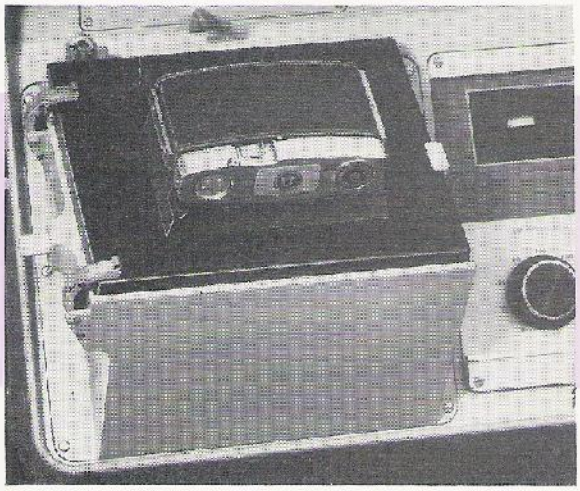
To meet the many requirements of photomicrography a wide choice of instantly interchangeable cameras is available. Fast and uniform exposures can be obtained in your choice of format—35 mm. with or without automatic film wind-on, plate camera with adaptors for various plate sizes, and Polaroid ® cameras, type 500, CB100 and J66. A light path selector switch on the M55 microscope allows simultaneous observation and photography, and during macro examination all the light is directed on to the film. It should be noted that M552095, MPP camera back, is necessary to accomodate the Polaroid cameras.



M552095 MPP camera back



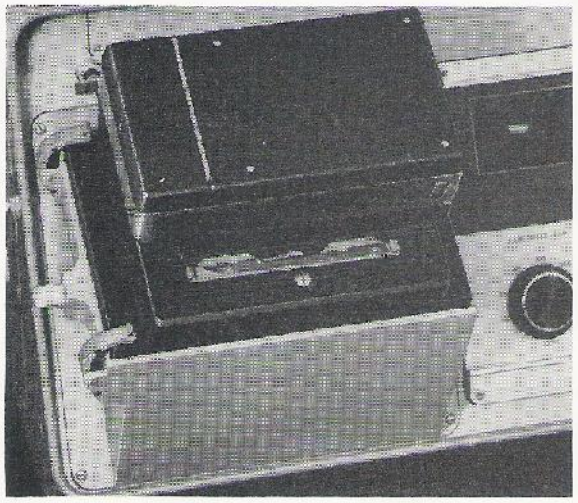
M552590 Autowind 35 mm. camera



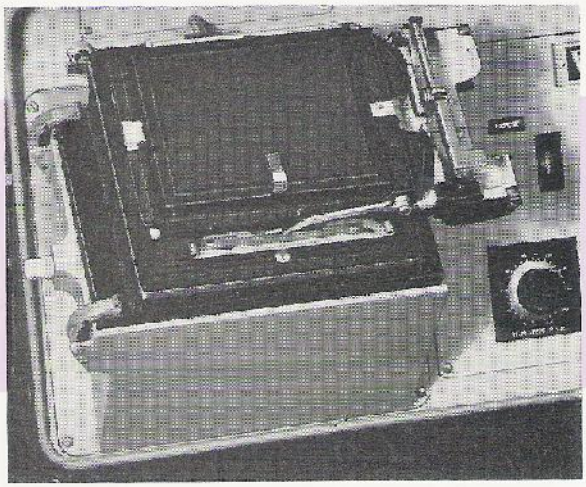
M552630 Manual 35 mm. camera

CAMERAS

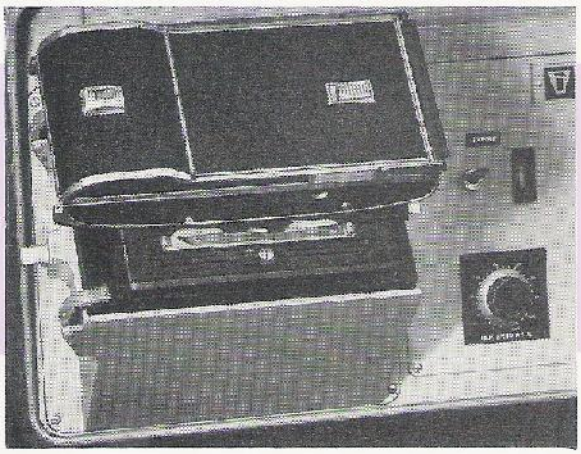
M550021 Automatic integrating photographic timer (including micro shutter).
M550022 Photometer timer complete with cadmium sulphide photo-cell (including micro shutter).
M552590 Autowind 35 mm. camera unit.
M552630 Manual control 35 mm. camera unit.
M552095 MPP camera back (to take 5 in. × 4 in. plates), wood adapter, focusing screen and hood. This unit is necessary to accommodate the camera backs and holder listed below.
M030640 "Polaroid" CB.100 camera back (to take 4¼ in. × 3¼ in. film pack) special focusing screen and hood, for use with M552095.
M552102 "Polaroid" type 500, 5 in. × 4 in. cut film holder, for use with M552095
M552107 "Polaroid" type J.66, roll film camera back, special focusing screen and hood for use with M552095.
M505705 Manually operated photographic shutter.



M030640 CB100 Polaroid camera



M552102 Type 500 Polaroid camera



M552107 J66 Polaroid camera

OBJECTIVES

INFINITE TUBE LENGTH OBJECTIVES FOR UNCOVERED SPECIMENS

Infinite tube length objectives have a 24 mm. shoulder length, except those flat field objectives marked with an asterisk* which are 34 mm. shoulder length and can only be used with M052450 objective changer.

ACHROMATIC—incident light

	Magnification	N.A.	Working Distance mm.
M023052	3·5×	0·05	68
M022052	6×	0·1	38
M022152	10×	0·15	14
M022352	15×	0·25	5
M022452	30×	0·5	1·42
M022952	50×	0·85	0·48
M023152	85×	0·85	0·28
M022652	140× oil	1·3	0·41

FLUORITE—incident light

M023552	140× oil	1·3	0·3

FLAT FIELD—incident light

M025152*	17×	0·25	3·63
M025452	30×	0·5	0·89
M025352	40×	0·65	0·46
M025252	50×	0·7	0·37

APOCHROMATIC—incident light

M024052	17×	0·3	3·9
M023852	50×	0·95	0·3
M023352	85×	0·95	0·18
M023752	115× oil	1·32	0·3

APOPLAN—incident light

M027152	50×	0·85	0·48

ACHROMATIC—Strain free for incident polarized light

M023054	3·5×	0·05	68
M022054	6×	0·1	38
M022154	10×	0·15	14
M022354	15×	0·25	5
M022454	30×	0·5	1·42
M022954	50×	0·85	0·48
M023154	85×	0·85	0·28
M022654	140× oil	1·3	0·41

FLAT FIELD—strain free for incident polarized light

M025154*	17×	0·25	3·63
M025454	30×	0·5	0·89
M025354	40×	0·65	0·46
M025254	50×	0·7	0·36

DARK FIELD—incident light

M023252	15×	0·25	5
M023452	30×	0·5	1·42
M024152	50×	0·65	0·76

EYEPIECES

HUYGENS

Single	Paired	Power
M040100	M040120	6×
M040700	M040720	8×
M040300	M040320	10×

COMPENSATING

Single	Paired	Power
M041100	M041120	6×
M041700	M041720	8×
M041300	M041320	10×
M041602	M041622	20×

KELLNER

M042302	M042322	10×

COMPLAN WIDE FIELD

M041301	M041321	10×

OBJECTIVES

160 mm. TUBE LENGTH OBJECTIVES FOR COVERED SPECIMENS

All 160 mm. tube length objectives have a shoulder length of 34 mm. and can only be used with objective changer M552440 with a 2× corrector lens.

ACHROMATIC—transmitted light

	Magnification	N.A.	Working Distance mm.
M022011	3·5×	0·1	43
M022101	5×	0·15	17
M022301	10×	0·25	5
M022401	20×	0·5	1·52
M022501	40×	0·65	0·71
M022901	40×	0·85	0·43
M022601	95× oil	1·3	0·17

FLUORITE—transmitted light

M023501	95× oil	1·3	0·12

MICROPLAN—transmitted light

M025101	10×	0·25	3·66
M025401	20×	0·5	0·74
M025201	40×	0·7	0·51

APOCHROMATIC—transmitted light

M024001	10×	0·3	5
M023801	40×	0·95	*
M023701	80× oil	1·32	0·12

*With correction collar for cover glass

ACHROMATIC—strain free for transmitted polarized light

M022013	3·5×	0·1	43
M022103	5×	0·15	17
M022303	10×	0·25	5
M022403	20×	0·5	1·52
M022503	40×	0·65	0·71
M022903	40×	0·85	0·43
M022603	95× oil	1·3	0·17

MICROPLAN—strain free for transmitted polarized light

M025103	10×	0·25	3·66
M025403	20×	0·5	0·74
M025203	40×	0·7	0·51

ACHROMATIC—for transmitted light phase contrast (for use with M555625 and M555642 phase contrast units, only)

M022205	10×	0·25	5
M022405	20×	0·5	1·52
M022505	40×	0·65	0·71
M022605	95× oil	1·3	0·17

FLUORITE—for transmitted light phase contrast (for use with M555625 and M555642 phase contrast units, only)

M023605	45× oil	0·95	0·23
M023505	95× oil	1·3	0·12

MICROPLAN—for transmitted light phase contrast (for use with M555625 and M555642 phase contrast units, only)

M025105	10×	0·25	3·66
M025205	40×	0·7	0·51

OBJECTIVES

160 mm. TUBE LENGTH OBJECTIVES FOR COVERED SPECIMENS (contd)

ACHROMATIC—for transmitted light phase contrast (for use with M410975 phase contrast unit, only)

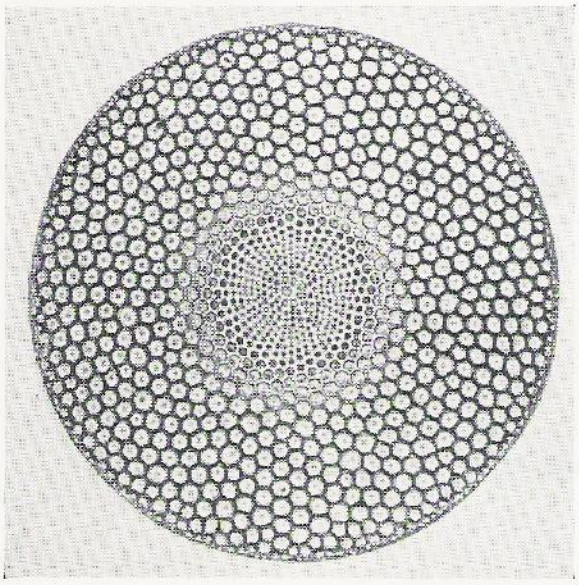
	Magnification	N.A.	Working Distance mm.
M022308	10×	0·25	5
M022508	40×	0·65	0·71
M022608	95× oil	1·3	0·17

FLUORITE—for transmitted light phase contrast (for use with M410975 phase contrast unit, only)

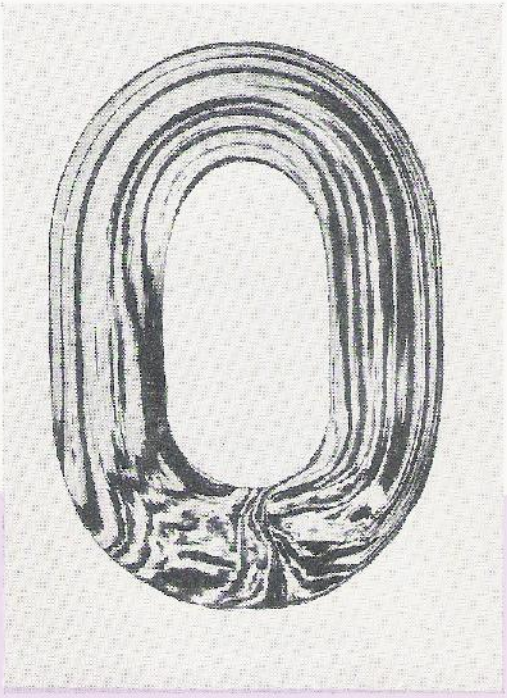
M023608	45× oil	0·95	0·23
M023508	95× oil	1·3	0·12

MICROPLAN—for transmitted light phase contrast (for use with M410975 phase contrast unit, only)

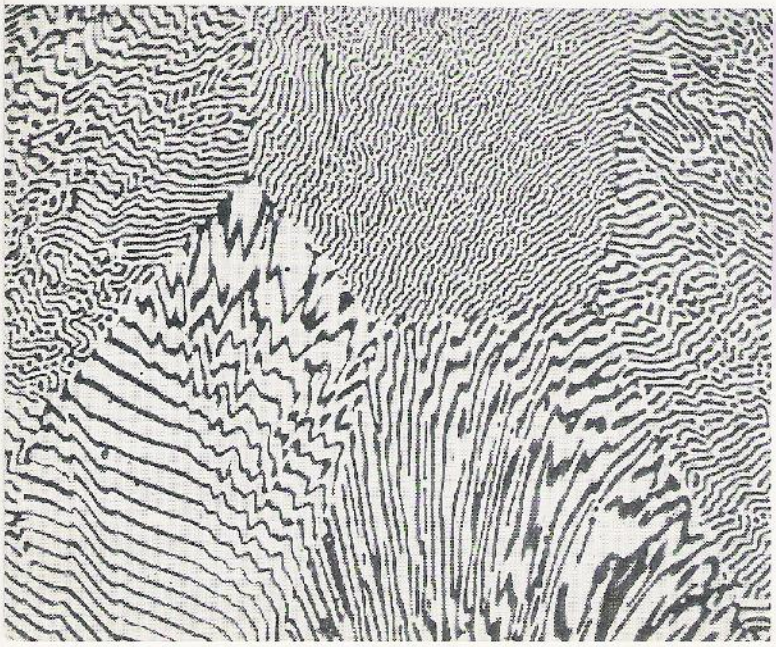
M025108	10×	0·25	3·66
M025208	40×	0·7	0·51



Diatom
craspedodiscus
coscinodiscus
Ehrenberg



Flow lines in section of forged chain link



Copper—copper phosphide eutectic

PHOTOGRAPHIC ACCESSORIES

M505705 Manually operated photographic shutter.

M505890 Screen focusing magnifier.

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

M505689 Two adaptors for 5 in. × 4 in. plates for M505664.

M505647 Double plate holder for $\frac{1}{2}$ plates ($6\frac{1}{2}$ in. × $4\frac{3}{4}$ in.).

M505960 Two adaptors for $\frac{1}{4}$ plates ($4\frac{1}{4}$ in. × $3\frac{1}{4}$ in.) for M505647.

M505790 Two adaptors for 12 cm. × 9 cm. plates for M505647.

M505931 7 in. × 5 in. cut film holder for M505664.

M505932 5 in. × 4 in. cut film holder for M505689.

M505933 $6\frac{1}{2}$ in. × $4\frac{3}{4}$ in. film holder for M505647.

M505934 $4\frac{1}{4}$ in. × $3\frac{1}{4}$ in. cut film holder for M505960.

M551610 Spare frame to take focusing screen.

M505904 Focusing screen only, ruled with cross lines.

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

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

M505908 Focusing screen only, 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 maximum size of the picture will be 6·35 in. × 4·6 in.

EQUIPMENT FOR TRANSMITTED DARK GROUND ILLUMINATION

M001396 Dark ground condenser for transmitted light.

M022698 Funnel stop for objectives of N.A. above 1·00 when used with M001396.

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) Nd. = 1·524.

M001196 8 oz. bottle of non-drying immersion oil (ALP_1) Nd. = 1·524.

M001581 Eyepiece micrometer of glass, 1 cm. divided into 100 parts.

M001586 Stage micrometer of glass, 1 mm. divided into 100 parts.

M151290 Stage micrometer of metal, 1 mm. divided into 100 parts.

M011525 Filar micrometer 10× eyepiece with travelling web reading against a millimetre scale, and read directly to 0·01 mm. on a micrometer drum with estimation to 0·002 mm.

M552150 Holder for small specimens.

M552380 Metal desk for microscope (without electrical supply unit).

SPARES

M505970 Water trough.

M505608 Heat absorbing filter (KG 1).

M552300 Soft plastic dust cover (supplied with instrument).

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