OMT TOOLMAKERS MICROSCOPE

This is a copy of a set of notes which came with the instrument

There were 3 other documents with it. Some were simply advertising pamphlets.

These have been copied and saved in the files

1/ OMT-Notes

2/ OMT-Pamphlet1

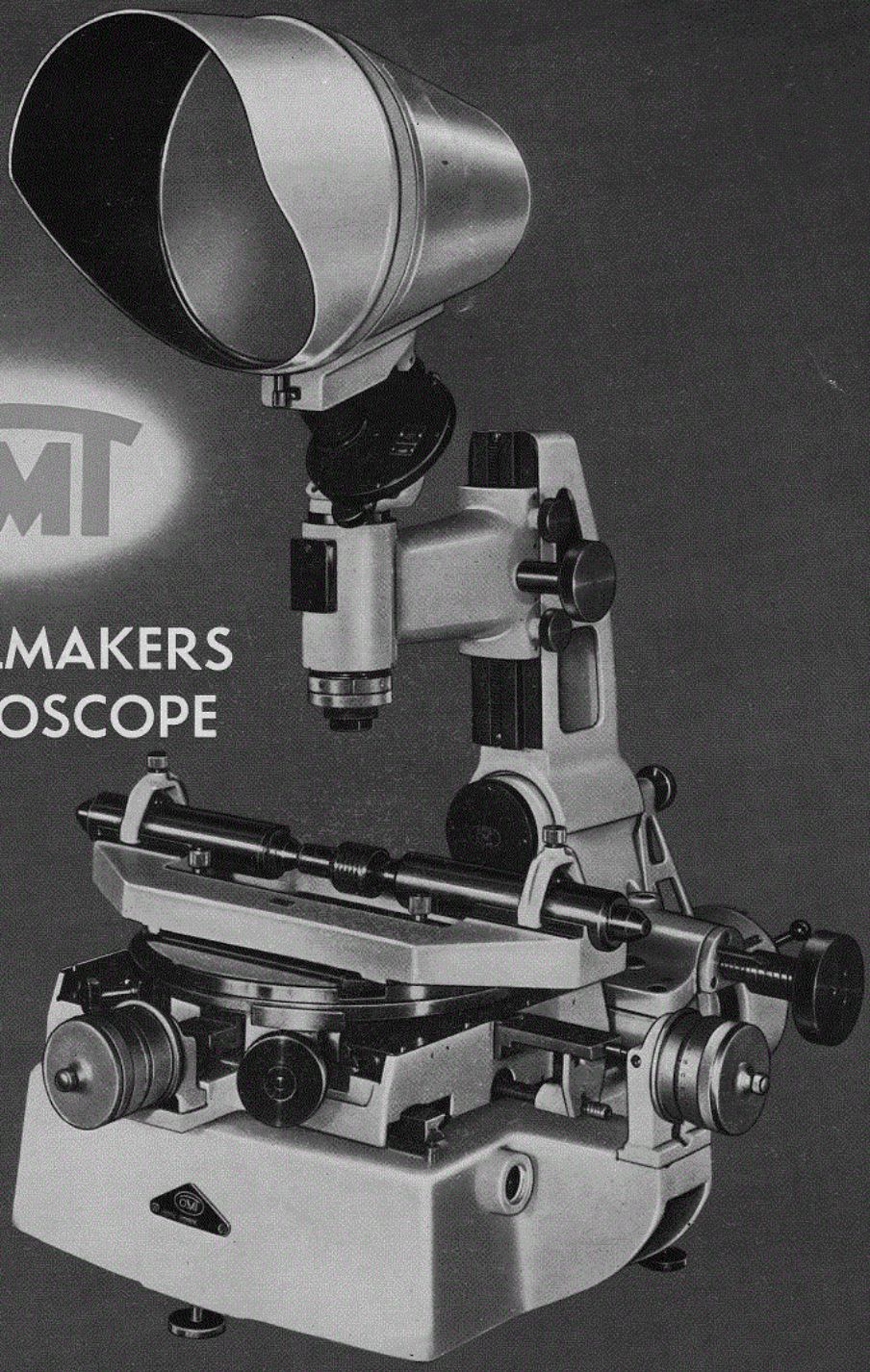
3/ OMT-Pamphlet2

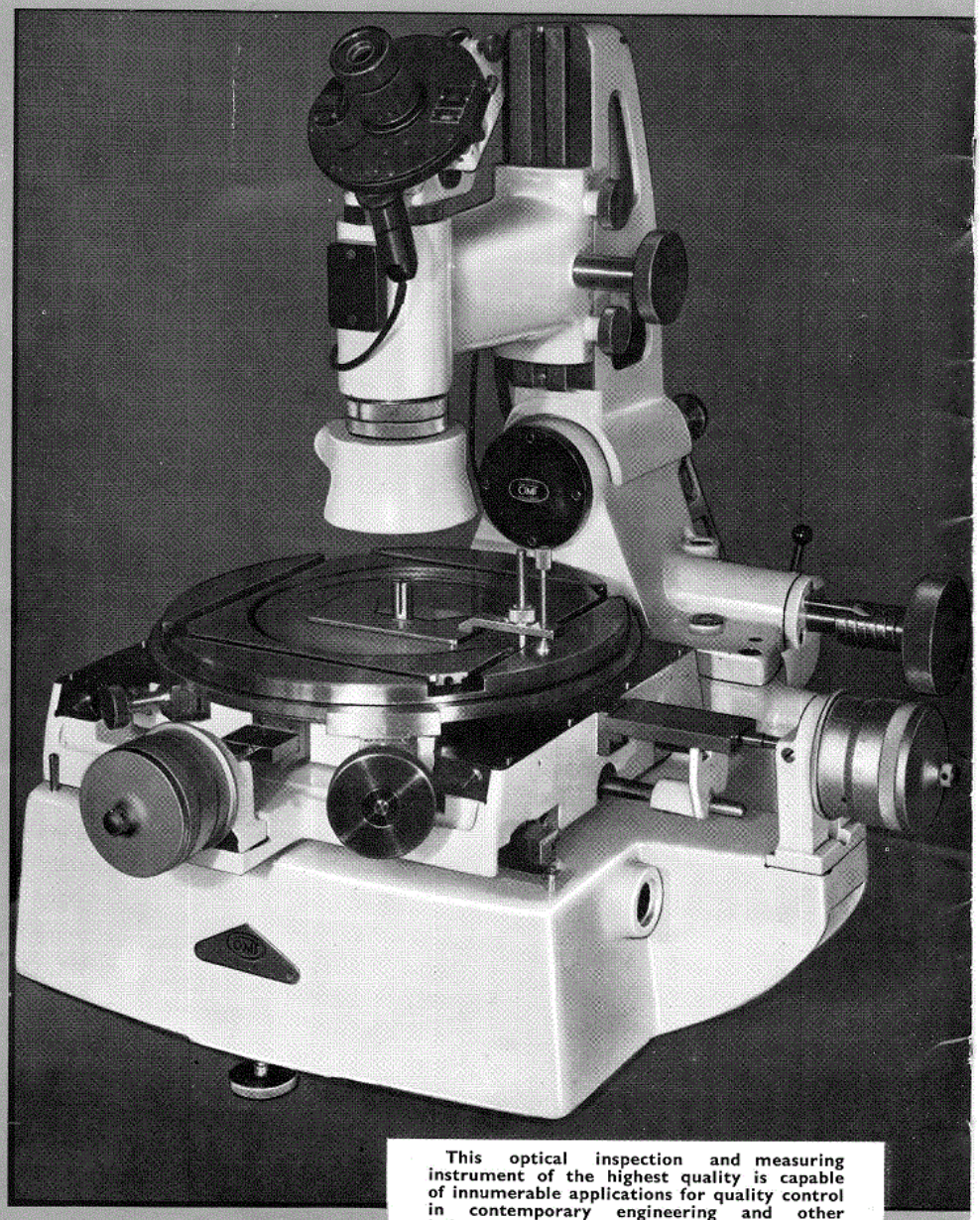
4/ OMT-Booklet

Peter Smith

OMT

TOOLMAKERS MICROSCOPE





This optical inspection and measuring instrument of the highest quality is capable of innumerable applications for quality control in contemporary engineering and other industrial processes.

Precision built to standards formulated in agreement with The National Physical Laboratory, the microscope is designed to simplify inspection methods and its versatility eliminates the need for installation of several items of equipment each with limited functions.

TOOLMAKERS MICROSCOPE

General Description

The basic instrument comprises :

(*a*) A microscope tube and arm arranged for the reception of interchangeable ocular heads, equipped with various templet graticules to cover line, angular, radius and thread form inspection and measurement. This unit also accommodates objectives to provide variations in magnification.

(*b*) A column supporting the microscope tube and arm which can be adjusted for height by means of a rack and pinion. The column, which may be pivoted to the correct rake angle required for thread inspection, also houses the main instrument lighting units.

(*c*) A base carrying a compound worktable mounted on hardened and ground slides. Longitudinal and transverse movement of the table for 1″ (25 mm.) in either direction is by means of micrometer screws, the drums of which are calibrated in 0·0001″ (0·002 mm.) divisions. Additional movement, lengthwise up to 6″ (150 mm.) and crosswise 2″ (50 mm.), is measured by slip gauges.
The upper member of the compound table, which carries a glass centre work plate, revolves through 360° and may be positioned to within 0·05° by means of a vernier scale; clamping is applied by a friction device.
Provision is made on the table for accommodation of work centres cradle, vee supports and other accessories. Three adjustable feet in the base permit the instrument to be levelled by reference to a built-in spirit level.

(*d*) A lighting unit that provides adequate illumination for projection purposes and incorporates a green filter which may be switched into position to give diffused light for eyepiece viewing.
A comprehensive range of auxiliary equipment described and illustrated in this publication enables the instrument to be employed for an extremely diverse field of inspection functions.

Field of Application

The O.M.T. Toolmakers' Microscope is recognised as an essential part of engineering inspection and measuring equipment, due to the large variety of work which can be undertaken by it, such as the examination of form tools, plate and templet gauges, punches and dies, annular grooved and threaded hobs, and the general inspection and measurement of all shaped and intricate parts within its capacity. The measurement of glass graticules, also other surface marked parts come readily within the scope of the instrument. For this work the protractor ocular and radius ocular are mostly used, which, combined with the micrometer slide movements of the compound worktable, give a very useful range particularly when higher magnification objectives are used.

Examination and measurement of all elements of external thread forms of screw plug gauges, taps, worms and similar components is undertaken by use of the various thread templet oculars which are available. The use of these units enables the full, effective and root diameters to be measured, and the flank angle and root and crest radii of the thread to be carefully examined and checked with the master forms of the graticules. Casts taken of internal threads can be also examined on this instrument in the same manner as external threads. The Toolmakers' Microscope may be used without the projection attachment by moving the green filter unit into position and by viewing the image through the eyepiece. It can also be used for general surface inspection or similar purposes by fitting the surface illuminating attachment to the microscope tube. This feature will be found exceptionally useful where work such as graticule inspection, shallow bores and recesses, etc., is being examined.

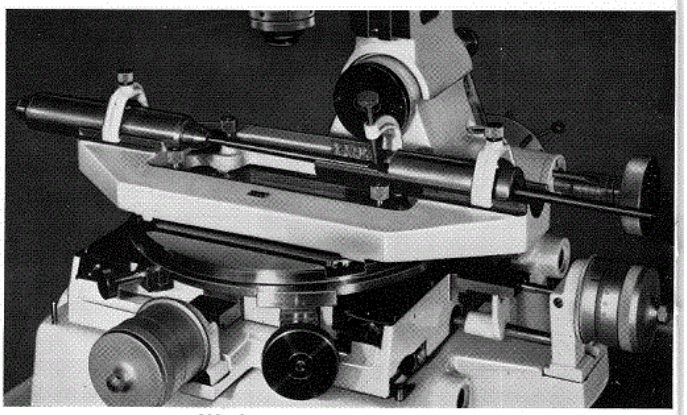
The instrument can be supplied for English or metric reading. With the former, English micrometer units are furnished for use with English size slip gauges, and it is customary to supply templet oculars with Whitworth, B.A., American and Unified forms of threads. On metric instruments, metric micrometer units are supplied for use with metric size slip gauges and the templet oculars have metric thread forms.

Special templet oculars are supplied to user's requirement.

Auxiliary Equipment

Work centres cradle

The work centres cradle is located on the compound table by means of a vee and a flat and is provided with hardened and ground male and female centres. An inverted 'U' clamp operating in slots provides maximum movement and support to the centres together with adequate clamping. An auxiliary bar is also provided equipped with vee and clamp for the accommodation of work which cannot be held between centres.



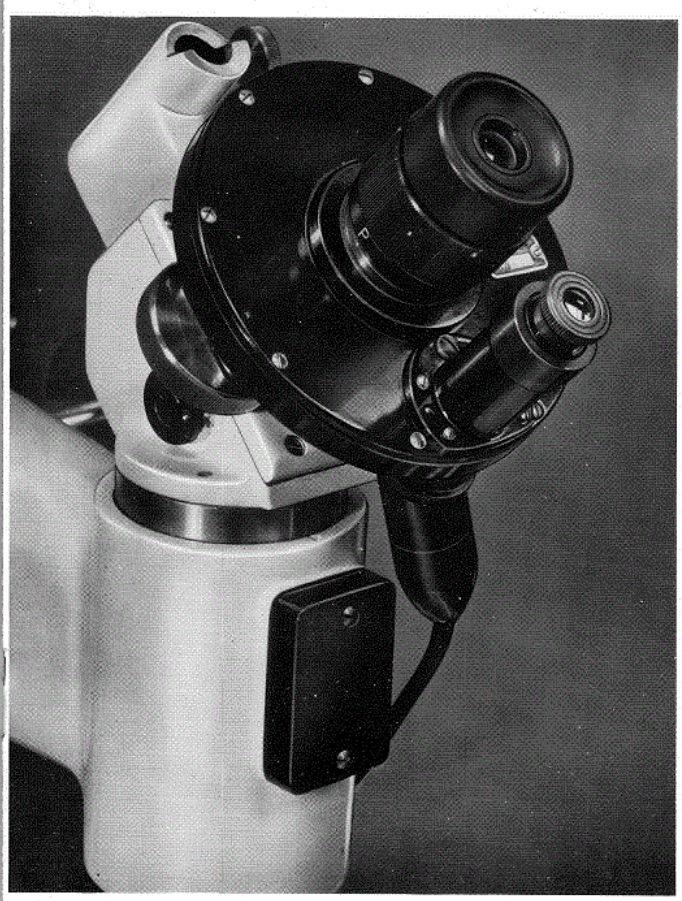
Work centres cradle TM 13.

Projection Hood and Screen

Used in conjunction with an optical projection unit, this attachment consists of a cowled hood with a 9″ (228 mm.) diameter ground glass screen and is mounted on the microscope tube.
Templets, drawn on tracing paper or Kodatrace, can be fitted into a frame in front of the screen to expedite inspection of batches of components.

Projection hood TM31, drawing frame TM42.

Objective lenses 1x, 2½x, 6x and 10x, catalogue numbers TM34, TM47, TM35 and TM41 respectively.



Protractor ocular TM33.

Objectives

The instrument is usually equipped with a 3x objective which, with the use of the projection hood and attachment, gives a total magnification on the screen of 30x. Other objectives of 1x, 2½x, 6x and 10x are available to provide total magnifications of 10x, 25x, 60x and 100x respectively. The microscope tube and arm which receives these objectives is adjustable on the column along a dove-tail slide by means of a rack and pinion and can be located in any position. Fine adjustment is obtained by means of a large knurled ring at the bottom of the microscope tube; this enables a very keen focus of the objective on the work to be obtained. The field of view for these objectives is as given in the general specifications on page 12.

Ocular Heads

The protractor ocular and templet ocular heads are interchangeable on the microscope tube and incorporate a fine bearing mechanism for rotating the templet graticules, thus providing for very easy and fine setting for each particular thread or angle under inspection. The protractor ocular with full range from 0° to 360° is equipped with a vernier eyepiece and has added lighting; it can be read by vernier graticule to one minute.

The templet ocular heads are supplied with various graticules covering Whitworth, British Association, Metric, American, Unified, Acme and other thread forms; also with a range of English and metric radii. A complete list of these ocular heads is given in the specification shown on page 11.

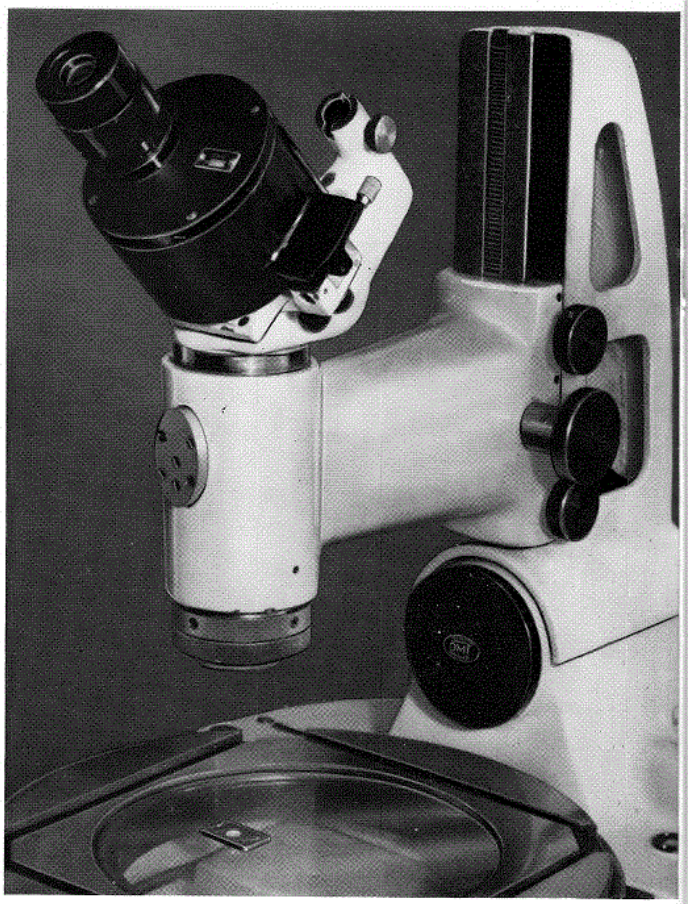
Ocular heads can also be supplied with graticules marked with any special forms, angles or cross lines.

Coincidence Ocular

This extremely useful piece of equipment provides a rapid method of measuring the distance between hole centres, centre punch marks or similar features and also for determination of diameters of bores or recesses and width of machined sections, such as slots.

The unit is mounted in place of a protractor or templet ocular and gives double reflected images of the work feature. These are made to coincide by moving the instrument slides and readings are taken on the measuring system of the microscope.

The process is repeated for the second feature and the difference between the readings obtained accurately records the distance between centres.



Coincidence ocular TM63.

Table Centring and Work Location Attachment

This attachment has been designed to locate work quickly and accurately for inspection on the axis of rotation of the worktable and with reference to the optical axis of the microscope. It is invaluable for the rapid inspection of the angular spacing of holes, gear teeth, etc., or workpieces dimensioned radially from a fixed datum.

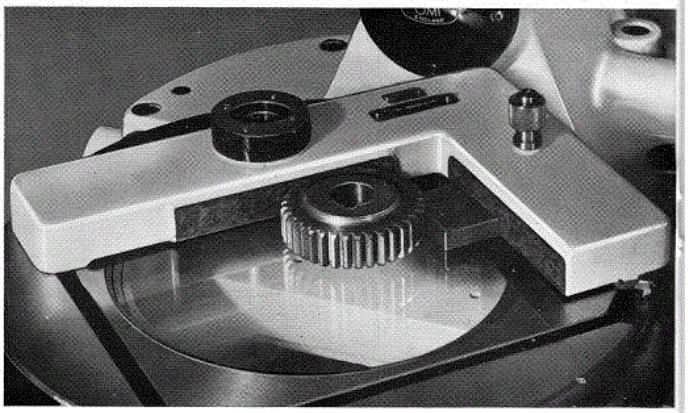
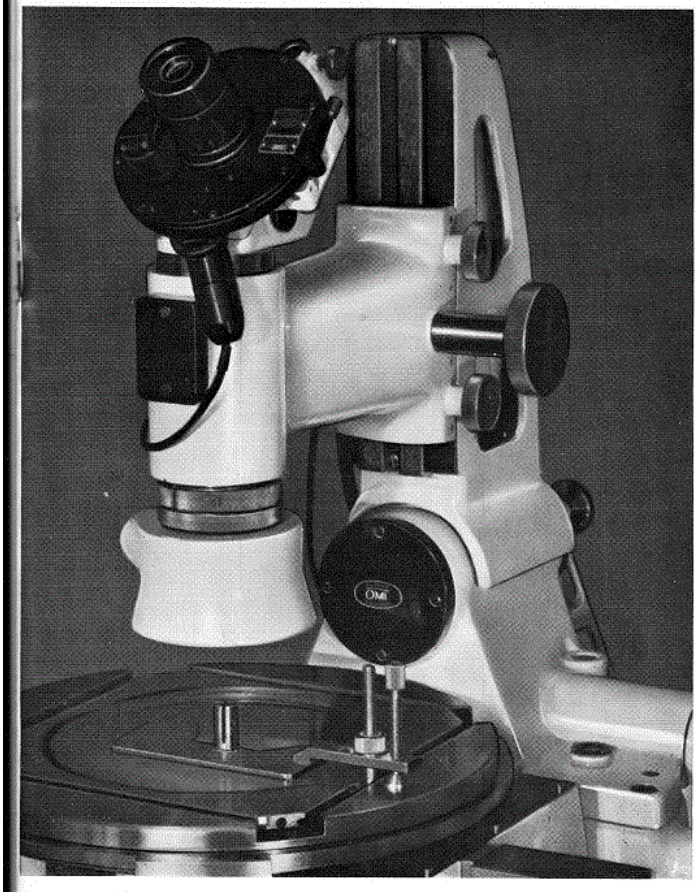


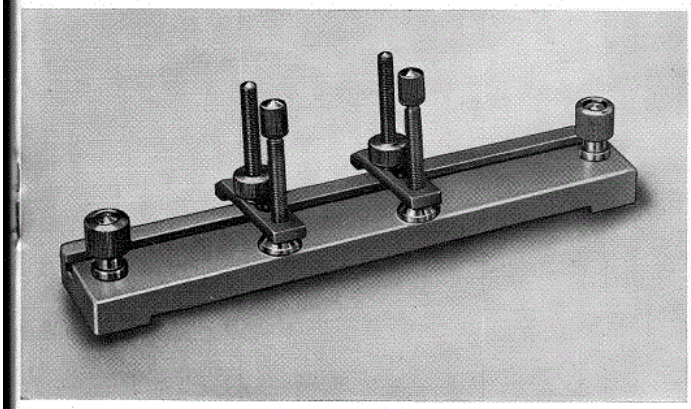
Table centring—work location attachment TM53.



Surface illuminating attachment TM30.

Surface Illuminating Attachment

The surface illuminating attachment is readily clamped to the lower part of the microscope tube and will be found very useful when examination of surfaces, fine line graticules, etc., is required, or when internal diameters and bores are under inspection. It is equipped with six 6v. lighting bulbs which give the brilliance of light required for such work.



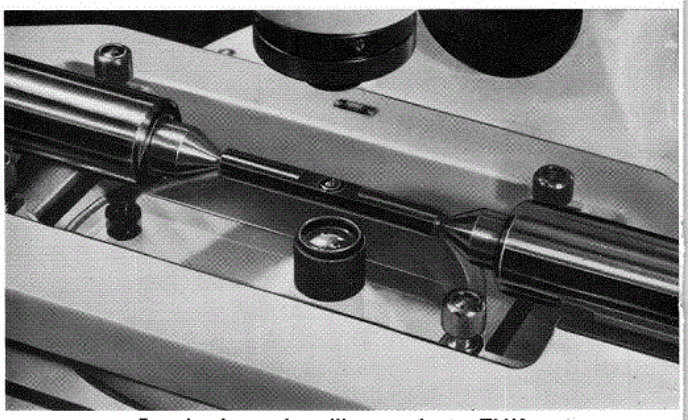
Clamp bar TM14.

Clamp Bar

This precisely machined accessory is employed for clamping work on to the glass worktable. It enables flat parts under inspection to be positioned squarely and to be given a location face.

Focusing Bar and Lamp Centring Gauge

The focusing bar is recommended for use in order to pre-set correct focal length to the line of centres when employing the work centres cradle. The lamp centring gauge is a collimator unit used to accurately establish centralisation of projected light on the glass worktable.



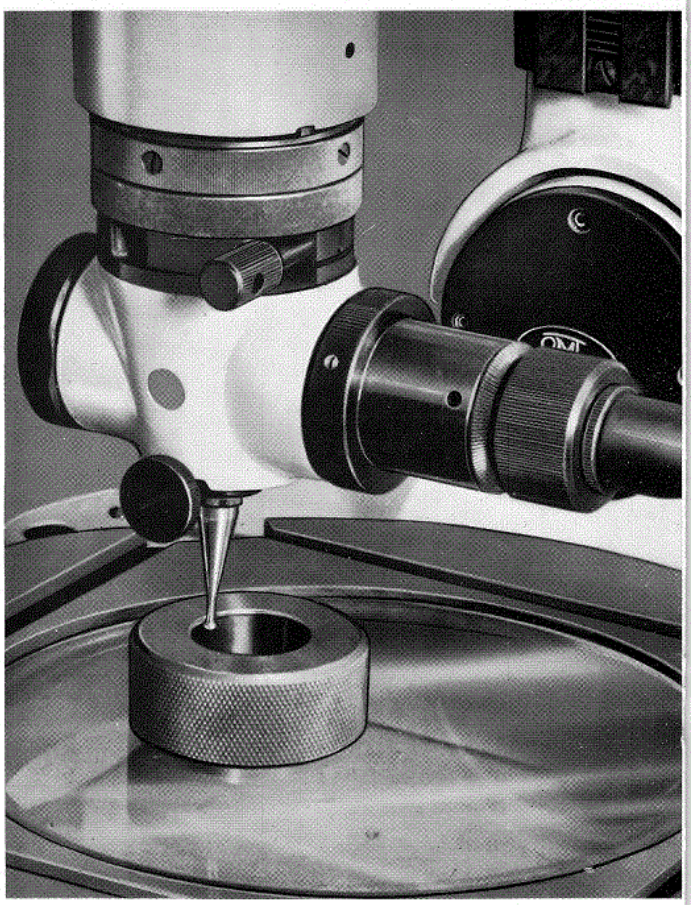
Focusing bar and auxiliary condenser TM19.

Optical Contact Lever

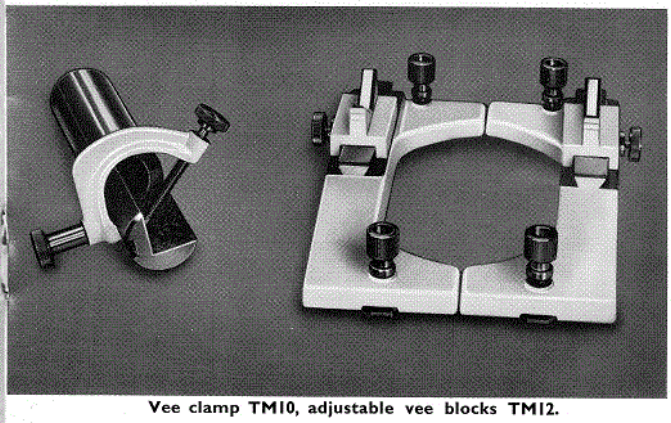
This accessory, which clamps to the lower flange of the objective lens mount and can be mounted or removed very quickly, is supplied for internal and external measurement of work such as plugs, rings and gap gauges. It may be also advantageously employed in tests for parallelism, checking cam profiles, etc.

A pivoted stylus contacts the workpiece and is arranged to tilt a mirror which reflects the image of a graticule. This image is viewed in conjunction with the cross-line of the microscope and by making use of the instrument slides and micrometers, precision measurements can be made.

Design of the attachment and the availability of interchangeable stylus units permits deep holes to be measured or checked for parallelism and bore diameters from $\frac{3}{16}$" (5 mm.) to $5\frac{3}{4}$" (146 mm.) to be ascertained.



Optical contact lever TM65.



Vee clamp TM10, adjustable vee blocks TM12.

Adjustable Vee Blocks and Vee Clamp

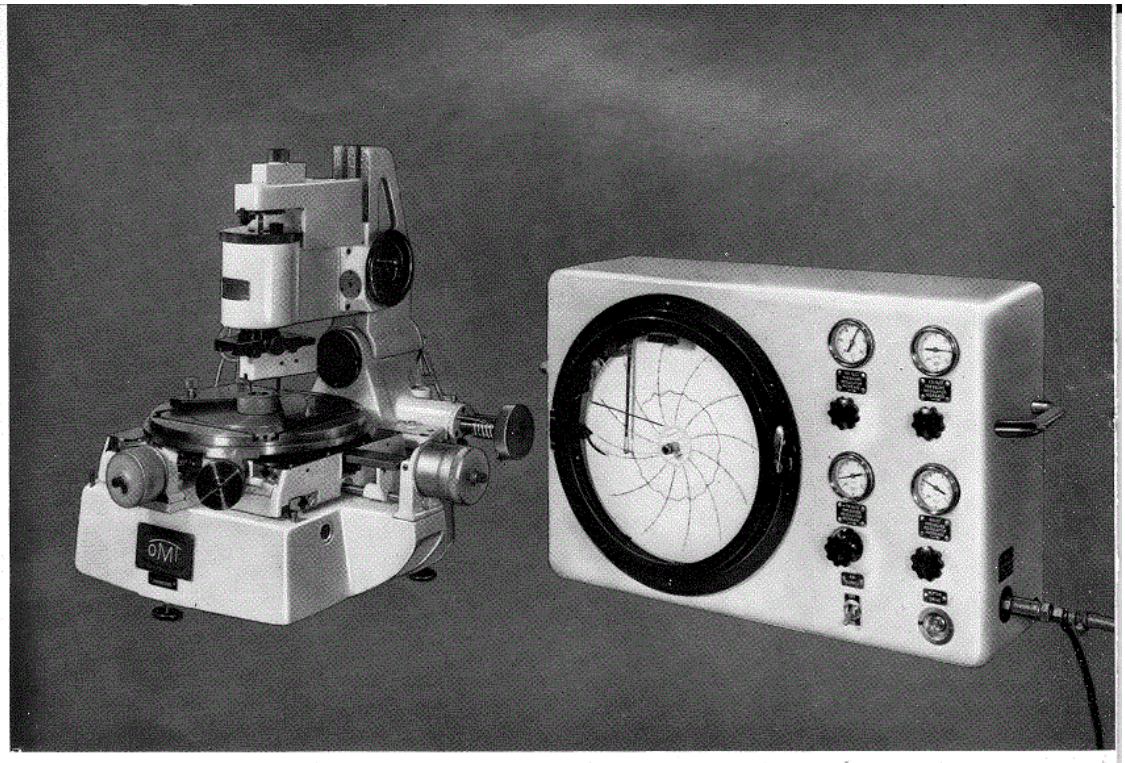
The pair of vee supports clamp directly to the compound table on which they are located and positioned squarely by engagement with the table grooves. The supports may be employed to accommodate work which cannot be held in the centres cradle.

The vee clamp is accessory to the works centres cradle shown on page 4.

Photographic attachment TM50 (English) TM45 (Metric).

Photographic Attachment

This useful accessory permits excellent quality, permanent inspection records to be obtained at magnifications of 5·8x, 14·5x, 17·4x, 34·8x, and 58x depending on the objective system in use.



ROUNDNESS MEASURING MACHINE

While providing facilities for roundness measurement to an extremely high order of precision, this equipment, developed in conjunction with the National Engineering Laboratory, East Kilbride, is offered at a price permitting it to be considered for general workshop application and production line inspection in addition to standards room employment.

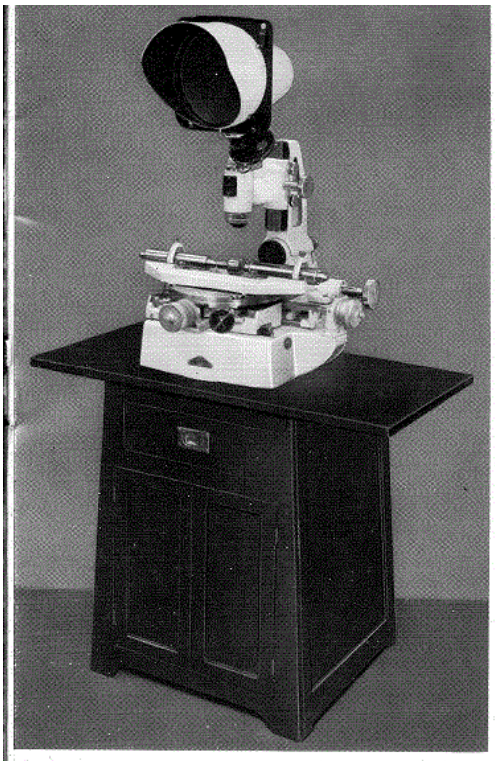
The instrument comprises a bearing in which a spindle carrying a gauging pick-up is power rotated at 1 r.p.m. The pick-up bears a spring-loaded controlling stylus to contact the work periphery; as the spindle is rotated the stylus moves round the periphery of the component and produces a signal in the pick-up head. This signal is amplified and fed to a circular chart recorder thereby indicating the state of roundness in documentary form.

To obtain a high degree of concentricity and low frictional torque necessary in this equipment an air bearing is used which requires a working pressure of 60 pounds per square inch. The concentricity with this bearing is maintained to within 0·000005″ (0·000125 mm.). The pick-up is a pneumatic type working from a pressure of 4 pounds per square inch. The magnification obtained is 5,000 or 1,000, the change-over being effected by rotating a small knob at the top of bearing unit (on the recorder chart a radial space of 0·05″ (1·25 mm.) represents 0·00001″ (0·00025 mm.) at 5,000 magnification.

The bearing and measuring unit may be assembled on the O.M.T. Toolmakers' Microscope or can be supplied pedestal mounted. In both cases co-ordinate movements are provided to enable the workpiece to be centred beneath the axis of rotation of the measuring unit.

Measuring range of the unit for internal diameters is from $\frac{1}{8}$″ (3 mm.) to 6″ (152 mm.) and for external diameters from $\frac{1}{16}$″ (1·5 mm.) to 6″ (152 mm.).

The recording cabinet which includes an air filter, pressure regulators and pressure gauges, can be placed in any convenient position for the operator.



In addition to the accessories detailed and illustrated in the foregoing pages, the following equipment is also available :—

MAHOGANY STAND (OG 492/3)

Designed to accommodate the instrument at a convenient working height and constructed of solid mahogany, the cabinet incorporates a recessed drawer and fitted cupboard for equipment storage. Hinged flaps are provided for temporary location of accessories or workpieces.

SLIP GAUGES

To measure table movement beyond the limits of the micrometer screws, a set of 6 English or metric slip gauges is available.

English 2–1″, 1–2″, 1–3″, 1–4″, 1–5″.
Metric 2–25 mm., 1–50 mm., 1–75 mm., 1–100 mm., 1–125 mm.

TRANSFORMER

For 230 volts A.C. supply giving 2 tappings at 6 volts, or to customer's requirement.

EQUIPMENT CASE

A polished wooden case recessed to house equipment is offered in lieu of the mahogany cabinet detailed above.

OMT THREAD FORM TEMPLET OCULARS

CATALOGUE No. OGO 120—ALL AT 3X

WHITWORTH (BSW & BSF), B.A. & C.E.I. and ANGLES

Whitworth (T.P.I.) 6, 7, 8, 9, 10, 11, 12, 14, 16, 18, 19, 20, 22, 24, 26, 28, 32, 40, 48, 60.
B.A. 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14.
C.E.I. (T.P.I.) 20, 24, 26, 32, 40, 44, 56, 62.
Angles. 60°, 55°, 47°, 30°, 90°.

CATALOGUE No. OGO 121—ALL AT 3x

INTERNATIONAL METRIC, WHITWORTH and ANGLES

International Metric M/M Pitch.
0·2, 0·25, 0·3, 0·35, 0·4, 0·45, 0·5, 0·6, 0·7, 0·8, 0·9, 1, 1·25, 1·5, 1·75, 2, 2·5, 3, 3·5, 4, 4·5, 5, 5·5, 6.
Whitworth (T.P.I.)
4, 4½, 5, 6, 7, 8, 9, 10, 11, 12, 14, 16, 18, 19, 20, 22, 24, 26, 28, 32, 40, 48, 60.
Double Angles. 55°, 60°, 30°, 40°, 90°.
Vertical and Horizontal Scales.
4 mm. long, subdivided 0·02 mm. divisions.

CATALOGUE No. OGO 122—ALL AT 3x

U.S.S. WHITWORTH & ANGLES

U.S.S. (T.P.I.) 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 20, 22, 24, 28, 30, 32, 36, 40, 44, 48, 50, 56, 64, 72, 80.
Whitworth. 6, 7, 8, 9, 10, 11, 12, 14, 16, 18, 19, 20, 22, 24, 26, 28, 32, 40, 48, 60.
Angles. 55°, 60°, 90°.

CATALOGUE No. OGO 123

NATIONAL ACME U.S.A. & EDISON B.S.S.

National Acme (T.P.I.) 2, 4, 5, 8, 10, 12, 14, 16. 1x.
Edison B.S.S. E40, E27, E14, E10. 1·5x.

CATALOGUE No. OGO 127

UNIFIED SYSTEMS AND ANGLES

(T.P.I.) 4, 4½, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 20, 24, 28, 32, 36, 40. Angles 90° and 60°.

OMT RADII OCULARS

CATALOGUE No. OGO 125

CIRCULAR ARCS, M/Ms.

From 25 mm. to 80 mm. inclusive in increments of 1 mm.

CATALOGUE No. OGO 124

CIRCULAR ARCS M/Ms.

Angle 90° Cross Line 1x.
0·5, 0·6, 0·7, 0·8, 0·9, 1·0, 1·1, 1·2, 1·5, 1·8, 2·0, 2·2, 2·5, 2·8, 3·0, 3·2, 3·5, 3·8, 4·0, 4·2, 4·5, 4·8. All at 3x.
5·0, 5·2, 5·5, 6·0, 6·5, 7, 8, 9, 10, 12, 15, 18, 20, 22, 25, 28, 30, 32, 35, 38, 40, 42, 45, 48, 50, 55, 60. From 5·0 to 60 1x.
Angle 90° Cross line.

CATALOGUE No. OGO 126

CIRCULAR ARCS, INCHES, RADII

1/64″ to 13/64″ rad. in increments of 1/64″. 3x.
7/32″ to 3/4″ rad. in increments of 1/64″. 1x.
Angle 90° Cross line.

TOOLMAKERS MICROSCOPE

SPECIFICATION

COMPOUND TABLE

	English	Metric
Measuring range using micrometer screw only, lengthwise	1″	25 mm.
Measuring range using micrometer screw and slip gauges, lengthwise	6″	150 mm.
Measuring range using micrometer screw only, crosswise	1″	25 mm.
Measuring range using micrometer screw and slip gauges, crosswise	2″	50 mm.
Graduations of micrometer	0·0001″	0·002 mm.
Diameter of circular table	11″	280 mm.
Graduations of circular table	1·0°	
Vernier division	0·05°	
Greatest distance between worktable and objective	8·0″	205 mm.
Depth of throat	6·5″	165 mm.

FIELD OF VIEW

Diameter of worktable field of view with 10x magnification	·6″	15 mm.
Diameter of worktable field of view with 25x magnification	·24″	6·1 mm.
Diameter of worktable field of view with 30x magnification	·2″	5 mm.
Diameter of worktable field of view with 60x magnification	·1″	2·5 mm.
Diameter of worktable field of view with 100x magnification	·06″	1·5 mm.

WORK CENTRES CRADLE

	English	Metric
Greatest distance between centres at 1·5″ diameter	12·5″	318 mm.
Greatest distance between centres at 2·75″ diameter	10·0″	254 mm.
Greatest distance between centres at 3·75″ diameter	7·25″	184 mm.
Largest diameter of work that can be held between centres	3·75″	95 mm.

VEE SUPPORTS

Largest diameter of work that can be held in vee supports	4·5″ dia.	114 mm.
Rake adjustment of microscope column to right and left	12°	

PROTRACTOR OCULAR

Range of protractor template scale	360°
Graduations of protractor templet scale	1 min.

OVERALL DIMENSIONS

Overall height of instrument with projection attachment	35″	900 mm.
Overall depth of instrument with projection attachment	34″	870 mm.
Overall width of instrument	24″	600 mm.

a product of

OPTICAL MEASURING TOOLS LIMITED, OLDFIELD ROAD, MAIDENHEAD, BERKSHIRE, ENGLAND

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