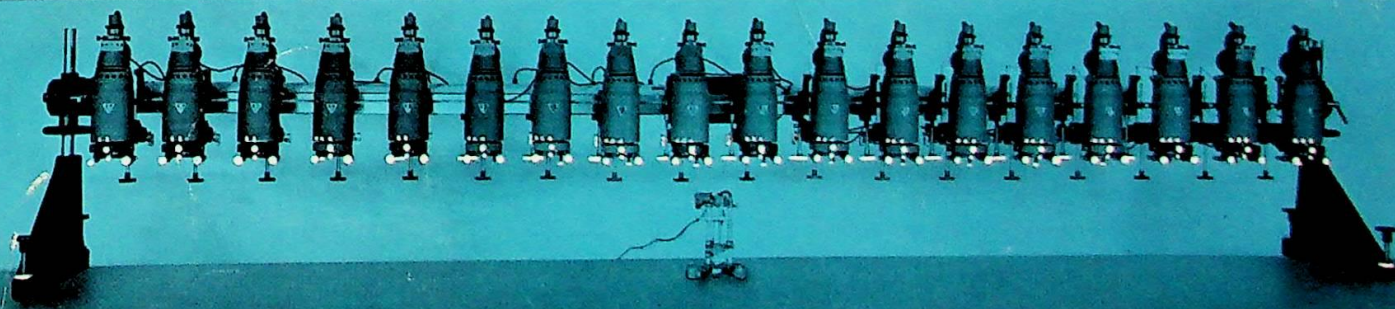




The background of the advertisement is a topographic map with contour lines. A large, three-dimensional model of a mountain range is placed over the map, showing the terrain's elevation. The map includes labels such as "Barnes Pond", "U.S. Patent Office", "AUG 19 1955", "Redford", "Clayburg", "Ore Pond", "Mud Pond", "Clark Hill", "Russian", "Lobdell P.C.", "AND 154", "1500", "1300", "1200", "1100", "1000", "900", "800", "700", "600", "500", "400", "300", "200", "100", "0", "100", "200", "300", "400", "500", "600", "700", "800", "900", "1000", "1100", "1200", "1300", "1400", "1500", "1600", "1700", "1800", "1900", "2000", "2100", "2200", "2300", "2400", "2500", "2600", "2700", "2800", "2900", "3000", "3100", "3200", "3300", "3400", "3500", "3600", "3700", "3800", "3900", "4000", "4100", "4200", "4300", "4400", "4500", "4600", "4700", "4800", "4900", "5000", "5100", "5200", "5300", "5400", "5500", "5600", "5700", "5800", "5900", "6000", "6100", "6200", "6300", "6400", "6500", "6600", "6700", "6800", "6900", "7000", "7100", "7200", "7300", "7400", "7500", "7600", "7700", "7800", "7900", "8000", "8100", "8200", "8300", "8400", "8500", "8600", "8700", "8800", "8900", "9000", "9100", "9200", "9300", "9400", "9500", "9600", "9700", "9800", "9900", "10000".

Bausch & Lomb Photogrammetric Equipment





Demonstration of the formation
of a stereoscopic scale model.

The image of two diapositives projected by Multiplex Projectors through red and green filters appears much like the anaglyph illustrated on this page.

When it is viewed through the filter spectacles, with the red over the right eye, a three-dimensional model will be observed.

Hold a sharp pointed pencil over the model and it will appear to be suspended in space. At some point where the model is "raised" above the plane of the paper, the pencil point can be brought into contact with the earth's surface.

The Multiplex scale model is formed in space. Instead of the pencil you have just used, a point of light in the center of the tracing table platen, referred to as a "floating mark" can be brought into contact with any point in the model, and the position recorded on the map sheet.





U. S. Patent Office

AUG 19 1955

Design Division

Bausch & Lomb Multiplex Mapping Instruments

This equipment consists of a group of correlated and calibrated precision instruments which transform overlapping aerial photographs into accurate topographic maps. The aerial camera, while not a component of the Multiplex group, plays a very important part in the process. Mapping starts with photographs taken with a precision camera equipped with a specially designed lens, such as the Metrogon, the accuracy of the final map depends greatly on the quality of the camera's performance.

Multiplex instrumentation necessary to transform aerial photographs into conventional maps includes the Reduction Printer, Projectors, Tracing Frame and Supporting Unit, and Drafting

A stereoscopic scale model is formed by projector of diapositive plates, which are positive prints of an overlapping pair of aerial negatives through filters of complementary colors. The model is observed through filter spectacles of the same colors, creating the effect of a three-dimensional model from which the map is compiled. To obtain a true scale model, a definite relationship



Demonstration of the formation of a stereoscopic scale model.

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The Multiplex instrumentation necessary to transform the aerial photographs into conventional maps includes the Reduction Printer, Projectors, Tracing Table, Frame and Supporting Unit, and Drafting Table.

A stereoscopic scale model is formed by projecting a pair of diapositive plates, which are positive reductions of an overlapping pair of aerial negatives, through filters of complementary colors. The image is observed through filter spectacles of the same colors, creating the effect of a three-dimensional model from which the map is compiled. To produce a true scale model, a definite relationship



Multiplex Mapping Equipment is Made by the Most Skillful Optical Workmen



of camera to printer to projector lenses must be maintained, as in illustration 1.

The plotting scale, $1/D$, is the ratio of the distance in the model to the corresponding distance on the earth's surface, and it can be seen that $1/D = P/C \times A/B \times F/H$. The reduction ratio of the printer, A/B , is made equal to C/F , and therefore $1/D = P/H$. Only when this condition has been satisfied can a model be formed with true scale in both vertical and horizontal directions.

The two projectors are then adjusted to assume the same angular relationship to the datum plane, or mapping surface, as that of the aerial camera to the earth's surface at the moment of exposure. The

Formation of the Stereoscopic Model

1

Aerial photography is obtained

2

Diapositives are made in the reduction printer

3

These diapositives, in consecutive order, are placed in two projectors

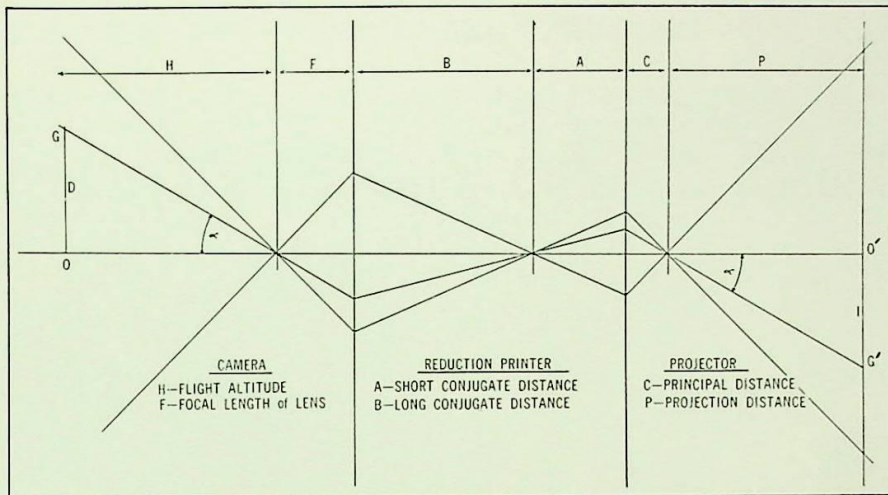


Illustration No. 1

B&L Multiplex
design and manufacture
assure highest quality
performance

two images are then projected through filters of complementary colors and are observed, superimposed, through filter spectacles of the same colors to produce a stereoscopic scale model.

Bausch & Lomb Multiplex Projectors are unique in that orientation is accomplished by mechanical procedures, without the necessity of any computations. The projectors are provided with six movements, three rotational and three translational. The correct positions of the projectors are rapidly determined by following simple, established rules, and by reference to certain predetermined data. All points in the adjusted model will be in their correct positions, both vertically and horizontally, and can be recorded on the map sheet.

When the only existing control is in the first model, stereotriangulation can be done by "extension of control" from one model to the next. A more usual procedure, "bridging," provides control in the models at both ends of the triangulation strip and, often, at one or more intermediate points.

This process of orienting a number of additional models to the preceding ones to form a triangulation strip is limited only by the number of projectors that can be accommodated on the frame.

Planimetric features of the terrain are drawn in orthogonal projection with the tracing table. The table also establishes by accurate measurement the location of points and contour lines and records them on the map sheet.

Support for the projectors is provided by the frame which has adjustments for convenient orientation of the model to ground control obtained by survey parties.

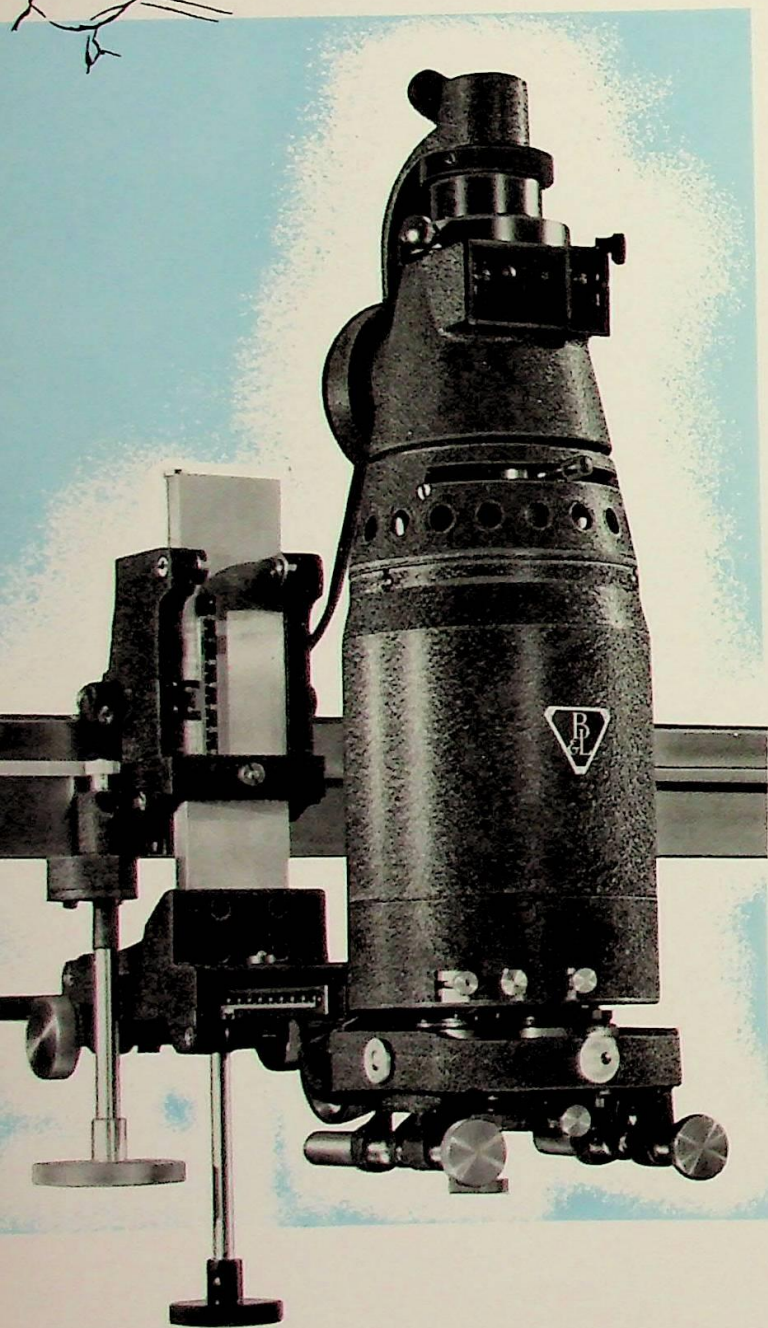
Any durable and stable material, processed to a plane surface can be used for the top of the drafting table on which the map is compiled. Since it serves as a datum plane from which measurements are made, the plane of the table surface should not vary by more than .001" per foot over its entire area. Aluminum and slate are the most commonly used materials.

Suitable dark room facilities complete the required aerial mapping equipment.

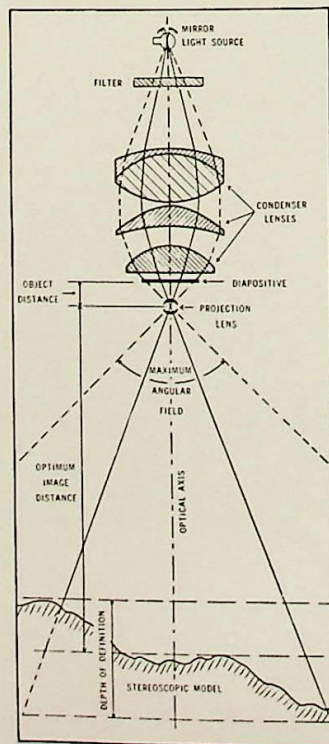
It will be seen from the foregoing that the essentials for production of topographic maps are: A reliable source of aerial photography, a knowledge of surveying by ground as well as by photogrammetric methods, and Bausch & Lomb Multiplex Equipment.



Bausch & Lomb Multiplex Projectors

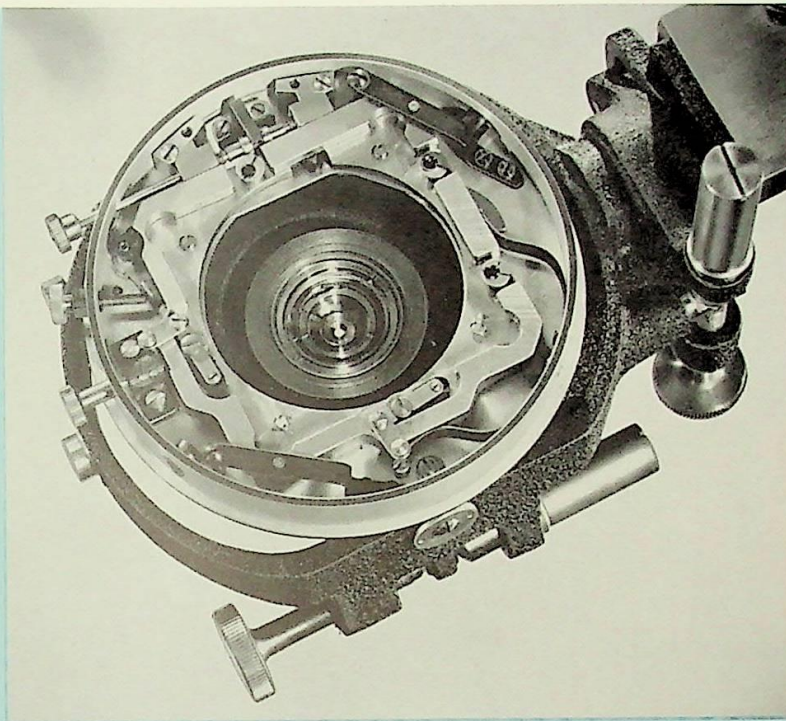


In the formation of the stereoscopic model each projector assumes the relative position of the aerial camera at the instant of exposure of the negative from which the diapositive was made. Like all the components of the Multiplex system, the projectors are critically controlled throughout manufacture and assembly, and accurately calibrated to produce the distortion-free images required to form the stereoscopic model. They are simple in mechanical design and easy to operate. With the reasonable care exercised in handling any precision instrument, the projectors will remain in calibration indefinitely, the only maintenance required being proper cleaning and lubrication.

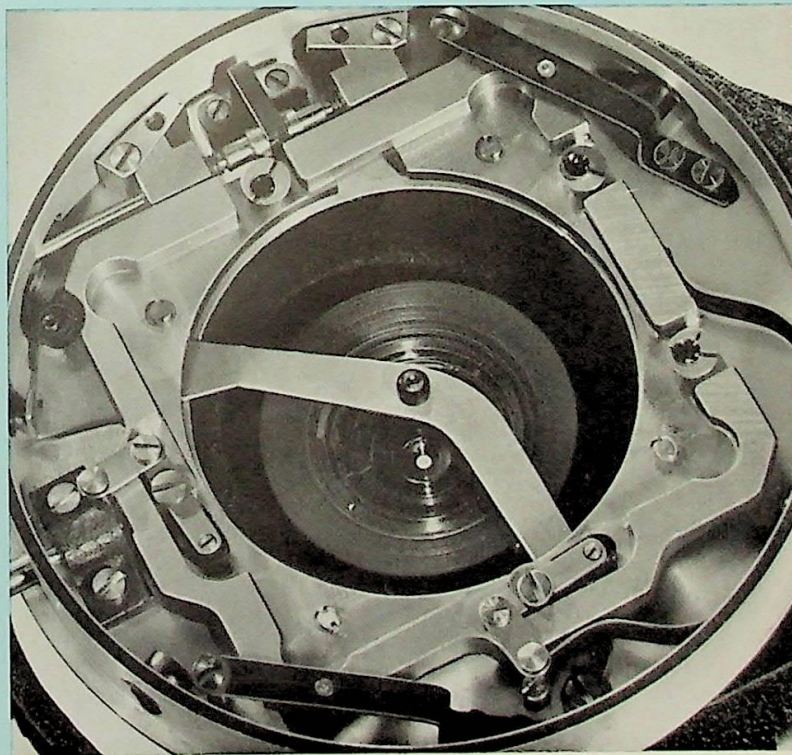




These projectors are high precision optical instruments



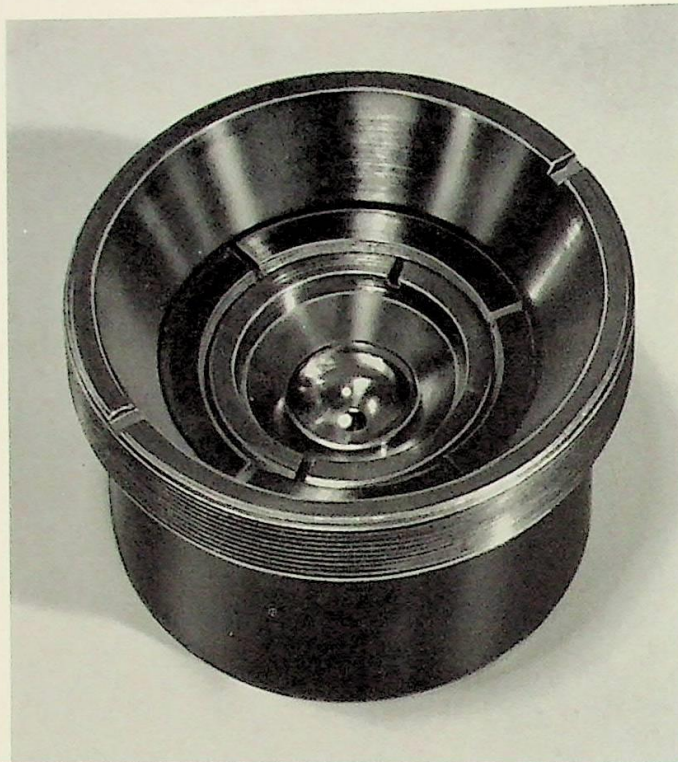
The stage on which the diapositive rests is of extremely rigid construction to prevent any displacement of the diapositive from its proper plane. Lateral motion necessary for centering the diapositive is controlled by external knobs. Adjusting screws for the swing motion, and the longitudinal and transverse tilts, have micrometer threads, hand lapped for fine adjustment and smooth operation. The projector body rotates on precision ball bearings.



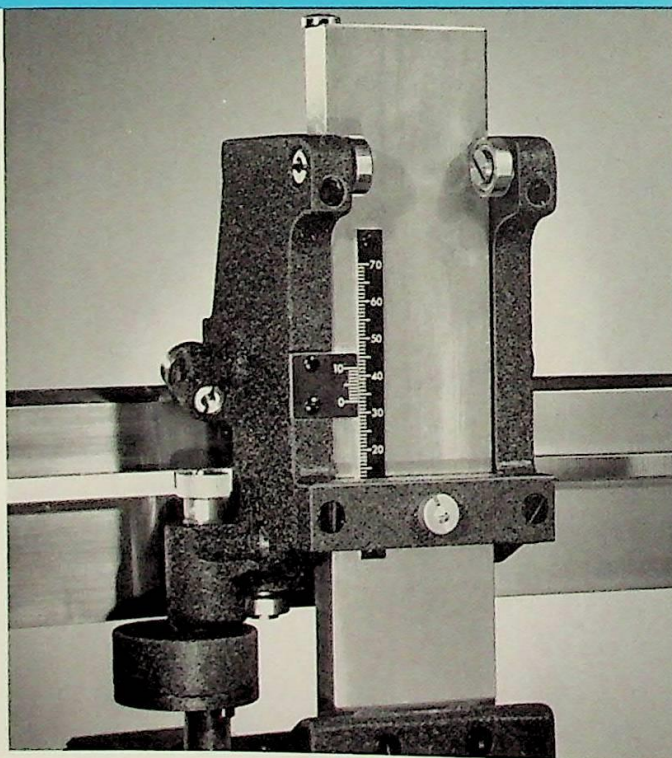
Extremely convenient means for centering the diapositive to the principal point of the projector are provided. A reticle with a small engraved dot is mounted on the swinging arm. This is moved into place against a stop, by an external knob and moved back out of the field after the centering is accomplished. The position of the diapositive can be easily checked at any time during operation without affecting the model.

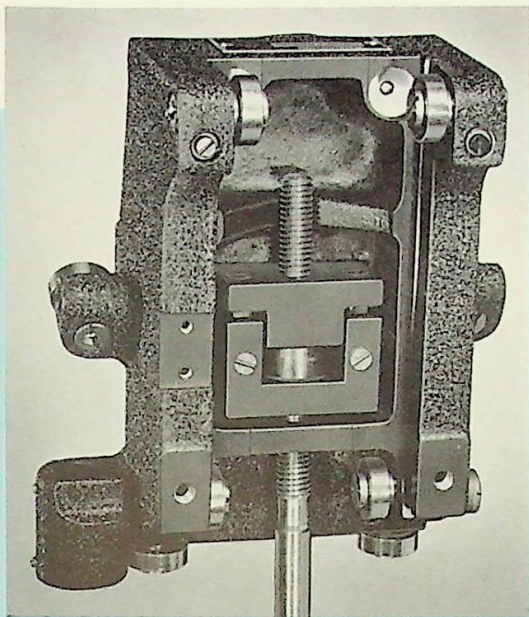
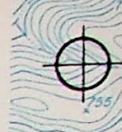
Every part in these projectors has to meet the most rigid inspection standards

A lens of the highest order of optical precision acts as the "eye" of the Bausch & Lomb Multiplex Projector. The design of this lens assures sharp, distortion-free images and is the result of years of experience in the manufacture of the finest optical elements. Each lens passes a series of rigid inspection tests before being certified for use.

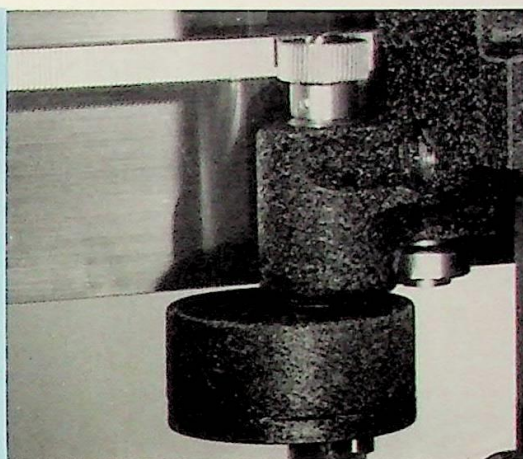
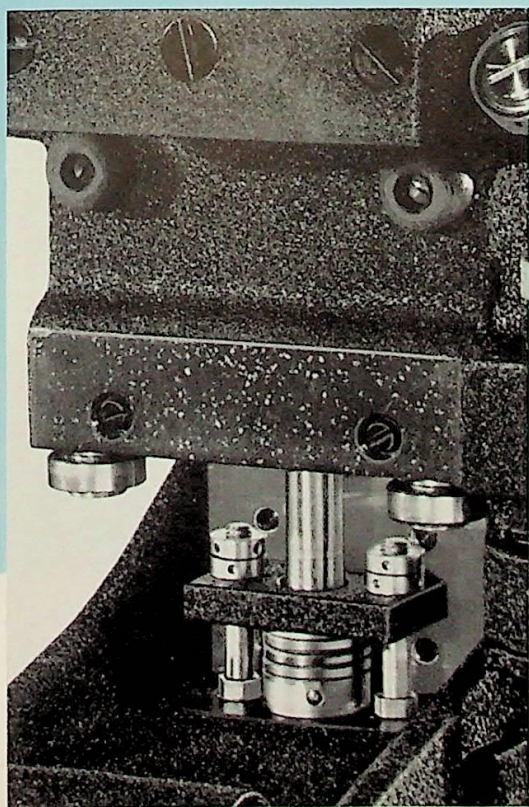


Movement along the longitudinal, transverse, and vertical axes is provided by the Slide Assembly, or carriage, on which the projector body is mounted. The slides travel on ball bearing rollers which impart smooth operation, without backlash or lost motion.



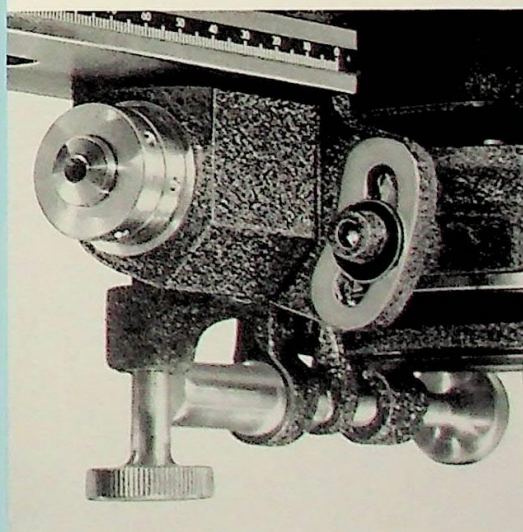


Vertical movement of the carriage is controlled by a precision screw and a ball-shaped nut, the latter rotating in a socket. Smoothness of operation is assured by hand-fitting the screw to the nut. A vertical thrust ball bearing supports the weight of the carriage, relieving the screw and nut of all strain. This design results in movement free from lost motion in either direction, free from lateral shift when the motion is reversed, and free from sticking or jumping when the operator makes his final minute adjustments in setting up a model.



Travel of the projectors along the base bar is controlled by a rack and pinion. Gear ratio is four to one and movement is smooth and under perfect control of the operator.

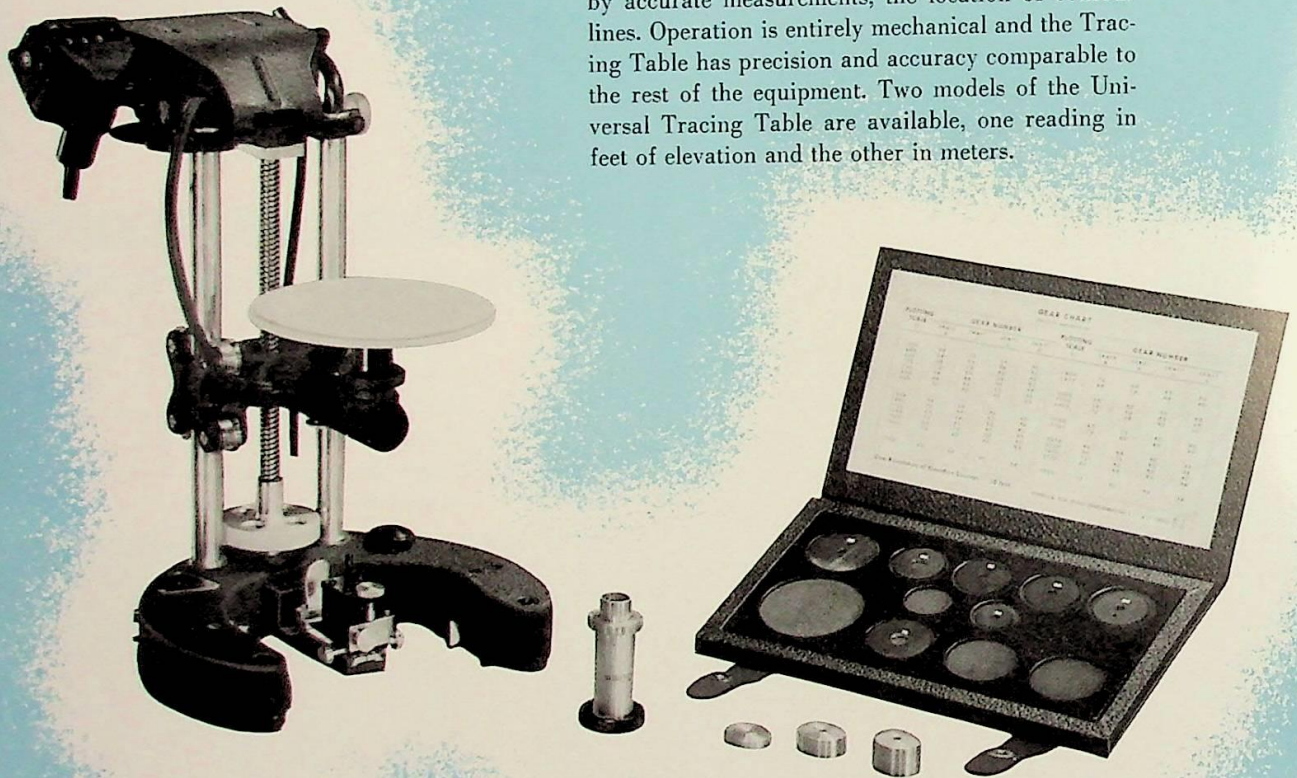
Provision has been made for using convergent photography. The convergent bearing permits tilting the projector in the direction of the flight line up to 20 degrees in either direction. This method provides a longer base distance and thus increases the map accuracy.

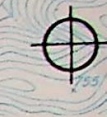




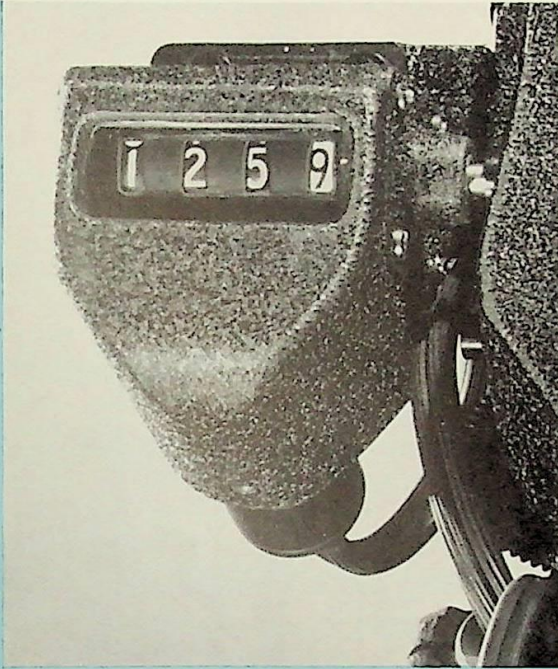
Bausch & Lomb Universal Tracing Table

The Universal Tracing Table is used to measure and record on the map sheet data shown in the stereoscopic model. It traces an orthogonal projection of the planimetric features of the terrain and establishes, by accurate measurements, the location of contour lines. Operation is entirely mechanical and the Tracing Table has precision and accuracy comparable to the rest of the equipment. Two models of the Universal Tracing Table are available, one reading in feet of elevation and the other in meters.

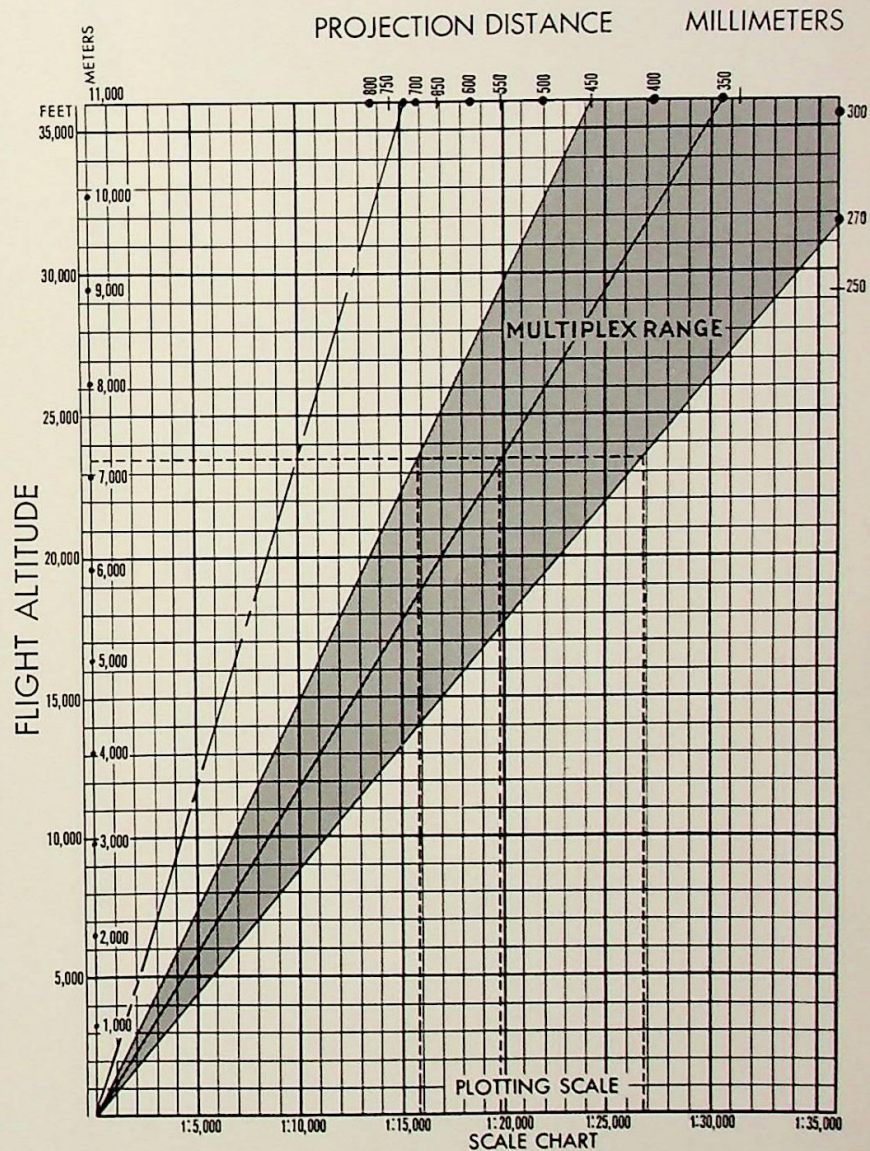


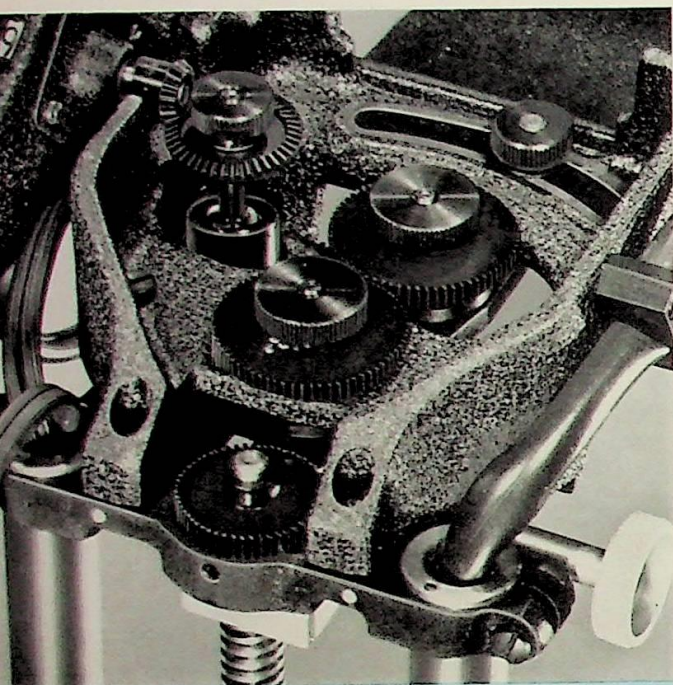


Reads in feet or meters to give elevations with greatest accuracy



Readings in elevation are taken from the counter which shows the elevation in feet or meters. The scale chart on page 9 shows the relations between the flight altitude, range of projection distance, and range of usable mapping scales. The tracing table reading in feet has a least reading of one foot for the plotting scale shown in Tables I and II. The metric tracing table has a least reading of 0.1 meter at the scales shown in Table III up to 1:1500. From 1:1500 to 1:4800 the least reading is 1 meter.





Interchangeable gears, arranged in accordance with Tables I, II and III, provide a wide range of plotting scales. One set of gears is included with each tracing table. To provide additional plotting scales a supplementary set of gears is available. This set is for use with the foot reading table only.

1

foot-reading gear chart initial gears

	Plotting Scales	Gear Numbers				$\frac{A}{B} \times \frac{C}{D}$	Revolution Ratio Counter-Spindle
		A	B	C	D		
1	1:500	60	72	36	90	1/3	5:6
2	1:600	66	66	36	90	2/5	1:1
3	1:625	60	72	40	80	5/12	25:24
4	1:720	72	60	36	90	.48	6:5
5	1:750	66	66	40	80	1/2	5:4
6	1:850	66	66	51	90	.567	17:12
7	1:900	72	60	40	80	3/5	3:2
8	1:1000	66	66	40	60	2/3	5:3
9	1:1020	72	60	51	90	17/25	17:10
10	1:1080	72	60	36	60	18/25	9:5
11	1:1125	66	66	60	80	3/4	15:8
12	1:1200	72	60	40	60	4/5	2:1
13	1:1250	60	72	60	60	5/6	25:12
14	1:1350	72	60	60	80	9/10	9:4
15	1:1500	66	66	60	60	1	5:2
16	1:1800	72	60	60	60	6/5	3:1
17	1:1875	60	72	60	40	5/4	25:8
18	1:2000	66	66	80	60	4/3	10:3
19	1:2250	66	66	60	40	3/2	15:4
20	1:2400	72	60	80	60	8/5	4:1
21	1:2500	60	72	80	40	5/3	25:6
22	1:2700	72	60	60	40	9/5	9:2
23	1:3000	66	66	80	40	2	5:1
24	1:3125	60	72	90	36	25/12	125:24
25	1:3600	72	60	80	40	12/5	6:1
26	1:3750	66	66	90	36	5/2	25:4
27	1:4500	72	60	90	36	3	15:2

Gear sets interchange

AUG 19 1955

Design Division

2

foot-reading gear chart supplementary gears

3

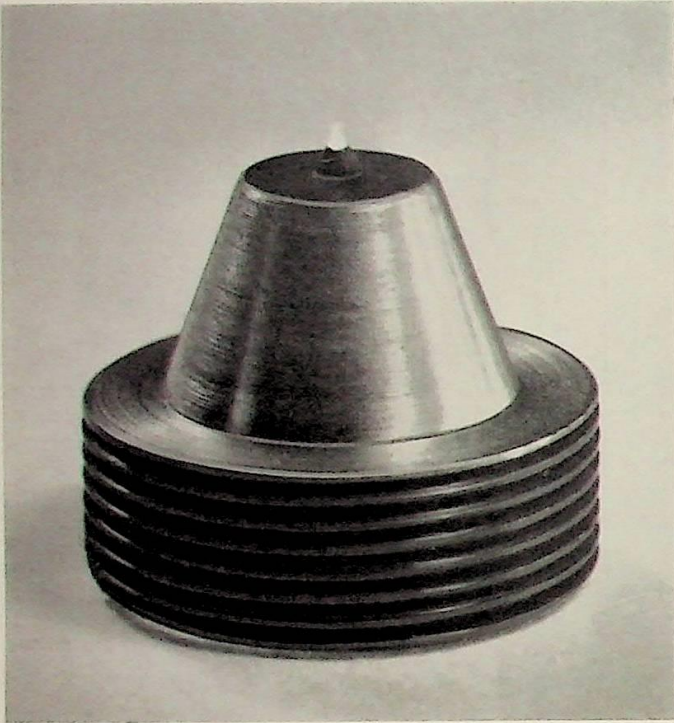
meter reading gear chart

	Plotting Scales	Gear Numbers				$\frac{A}{B} \times \frac{C}{D}$	Revolution Ratio Counter-Spindle
		A	B	C	D		
1	1:375	60	72	30	100	1/4	5:8
2	1:450	66	66	30	100	3/10	3:4
3	1:480	66	66	32	100	8/25	4:5
4	1:550	66	66	33	90	11/30	11:12
5	1:660	72	60	33	90	11/25	11:10
6	1:700	66	66	42	90	7/15	7:6
7	1:800	66	66	48	90	8/15	4:3
8	1:840	72	60	42	90	14/25	7:5
9	1:960	72	60	48	90	16/25	8:5
10	1:1050	66	66	56	80	7/10	7:4
11	1:1300	66	66	52	60	13/15	13:6
12	1:1400	66	66	56	60	14/15	7:3
13	1:1600	66	66	64	60	16/15	8:3
14	1:1700	66	66	68	60	17/15	17:6
15	1:2100	72	60	70	60	7/5	35:12
16	1:2850	66	66	76	40	19/10	19:4
17	1:3300	72	60	66	36	11/5	11:2
18	1:3500	66	66	84	36	7/13	35:6
19	1:4000	66	66	96	36	8/3	20:3
20	1:4200	72	60	84	36	14/5	7:1

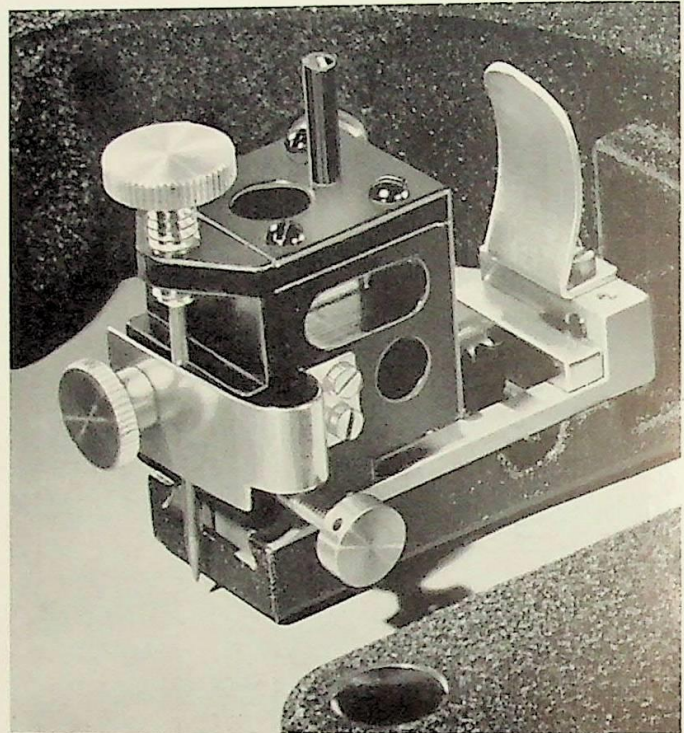
	Plotting Scales	Gear Numbers				$\frac{A}{B} \times \frac{C}{D}$	Revolution Ratio Counter-Spindle
		A	B	C	D		
1	1:500	60	48	48	60	1	5:2
2	1:550	54	54	66	60	11/10	11:4
3	1:600	54	54	96	80	6/5	3:1
4	1:640	48	60	96	60	32/25	16:5
5	1:700	54	54	84	60	7/5	7:2
6	1:750	60	48	96	80	3/2	15:4
7	1:800	54	54	96	60	8/5	4:1
8	1:875	60	48	84	60	7/4	35:8
9	1:960	48	60	96	40	48/25	24:5
10	1:1000	54	54	96	48	2	5:1
11	1:1120	48	60	112	40	56/25	28:5
12	1:1200	54	54	96	40	12/5	6:1
13	1:1250	60	48	96	48	5/2	25:4
14	1:1400	54	54	112	40	14/5	7:1
15	1:1500	60	48	96	40	3	15:2
16	1:1500	48	60	36	96	3/10	3:4
17	1:1600	48	60	40	100	8/25	4:5
18	1:1750	48	60	42	96	7/20	7:8
19	1:1875	54	54	36	96	3/8	15:16
20	1:2000	54	54	40	100	2/5	1:1
21	1:2240	48	60	56	100	56/125	28:25
22	1:2400	48	60	60	100	12/25	6:5
23	1:2500	60	48	40	100	1/2	5:4
24	1:2800	54	54	56	100	14/25	7:5
25	1:3000	54	54	60	100	3/5	3:2
26	1:3200	48	60	48	60	16/25	8:5
27	1:3500	60	48	56	100	7/10	7:4
28	1:3750	60	48	60	100	3/4	15:8
29	1:4000	54	54	48	60	4/5	2:1
30	1:4400	48	60	66	60	22/25	11:5
31	1:4800	48	60	96	80	24/25	12:5

They allow a wide range of plotting scales

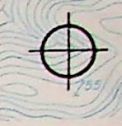
Features of Bausch & Lomb Universal Tracing Table



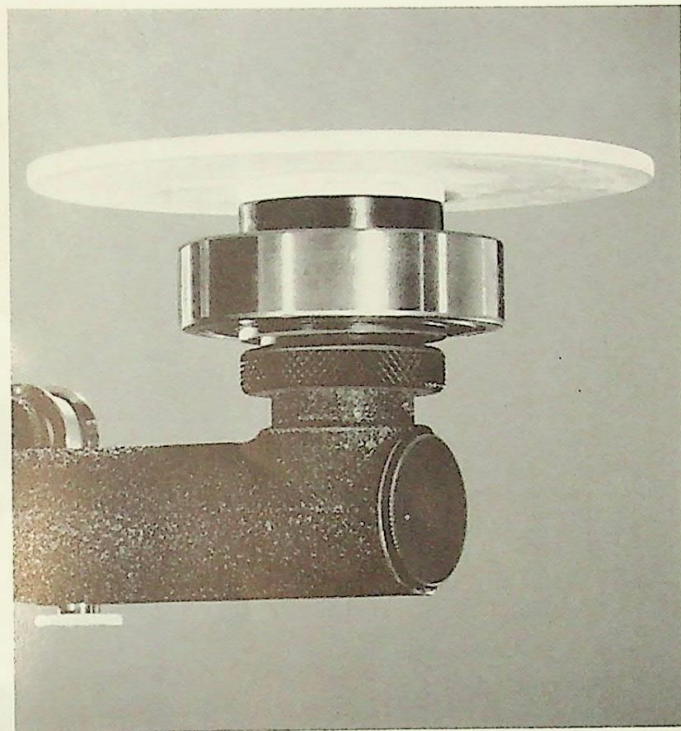
A small, cone shaped sapphire, embedded in the lacquer in the center of the platen, supplies the point of light which acts as the "floating mark." The tip of the sapphire diffuses the light to make it visible to the operator from any angle without change of intensity. However, should the operator find density changes in different areas of the image, he can vary the intensity of light by means of a rheostat.



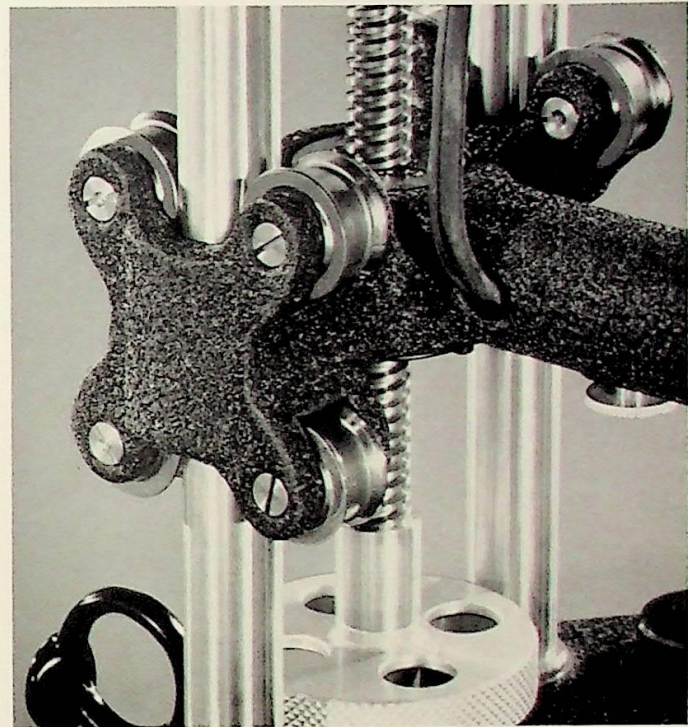
The lead is secured in a holder, readily centered, directly beneath the floating mark. Fingertip control raises or lowers the lead, while two lamps located in the ends of the horseshoe shaped base illuminate the surrounding area. These lamps and one in the counter are controlled by a convenient micro-switch.



These features add up to greater speed, accuracy and ease of operation



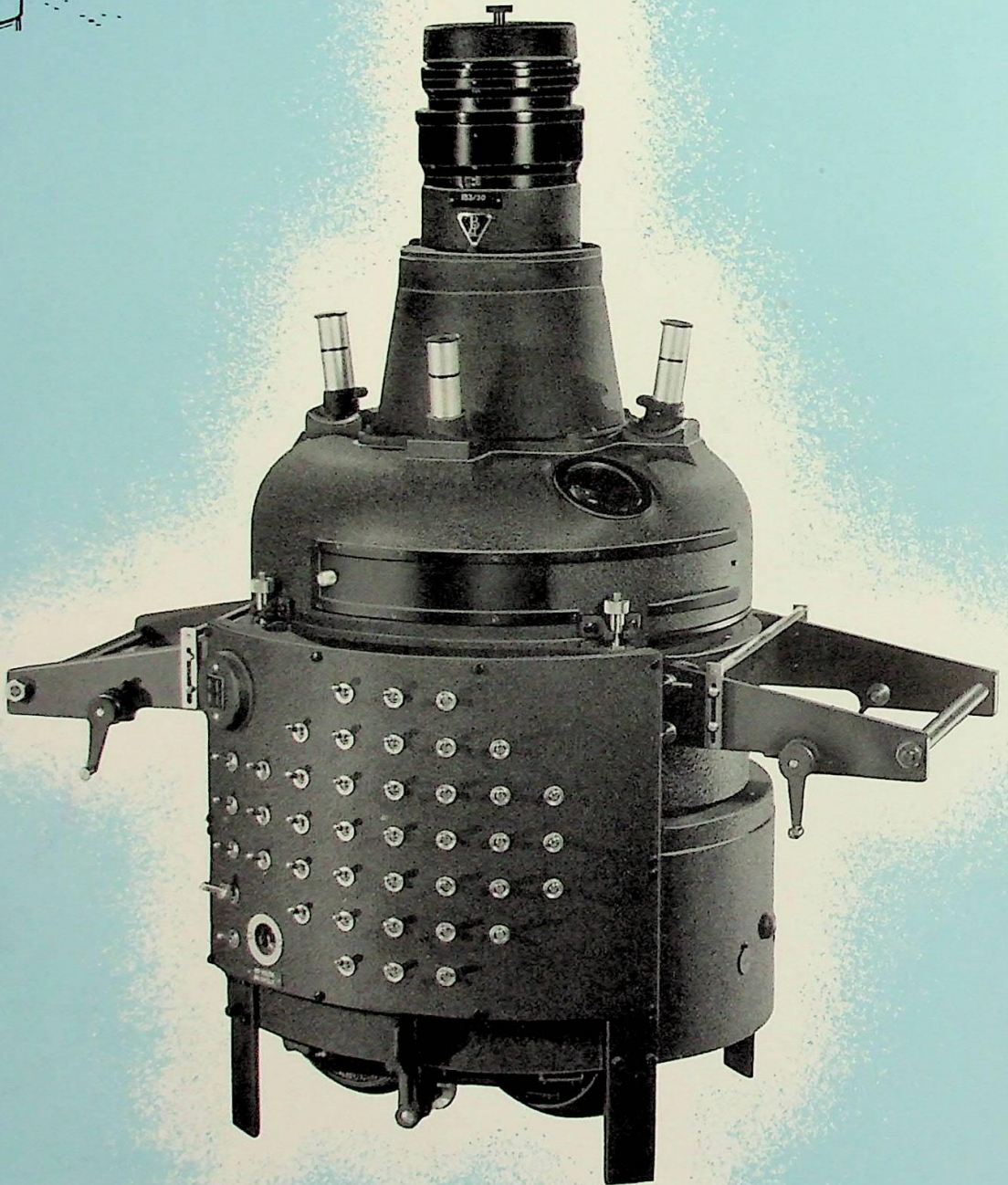
For plotters employing space rods, a platen, smaller in diameter than that used with Multiplex, is available. This platen is interchangeable on both the foot and metric tracing tables. A ball bearing is furnished to fit into the yoke on the plotter. However, the yoke itself is not supplied with the platen.



Particular care has been given to the design of the tracing table carriage to assure maximum ease of movement. Accuracy of the operator's work is directly proportional to smooth travel and free movement of the carriage. For this reason it rides on ball-bearing rollers adjusted to make firm contact with the upright columns. Fingertip pressure on the knurled wheel at the base of the elevating screw controls the vertical travel through a range of 125mm. A 50mm extension increases this range to 175mm when required.

Special agate foot pads support the table and glide smoothly over the map sheet.

Bausch & Lomb Multiplex Reduction Printer





The printer is the link between the aerial camera and the Multiplex projector. Its functions are two-fold: first, to compensate for radial distortion in the camera lens by introducing equal and opposite distortion, and, second, to reduce the negative in the correct ratio. The net result is the production of distortion-free diapositives of the proper size which will produce a true scale stereoscopic model of the terrain as photographed from the air.

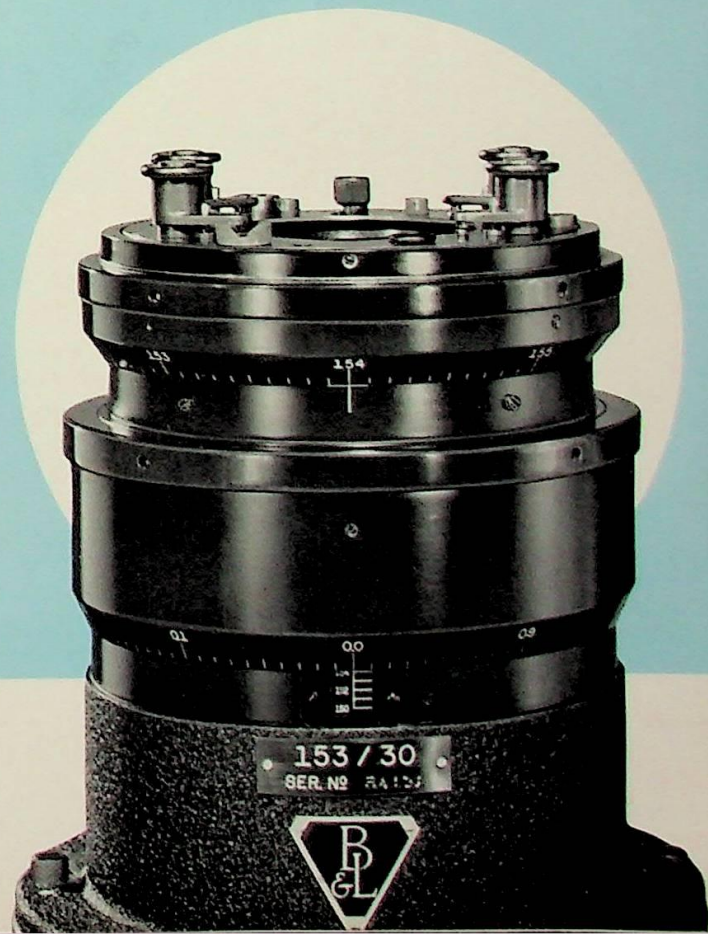
The base of the Reduction Printer contains the light source consisting of 37 15-watt filament lamps, cooled by twin blowers. Between the lamps and the lower pressure plate there are a heat absorbing glass and an opal glass diffusing screen.

A master switch controls all lamps, and circuit switches control each of three separate circuits. In addition each lamp is controlled by an individual switch. By this arrangement density differences in the film negative can be equalized. A gradient density filter between the lens and diapositive plate compensates for radial differences in light intensity. By proper choice of either high or medium contrast diapositive plates and judicious use of the multiple light source and gradient density filter the diapositive can be made with uniform over-all density. Four microscopes are focused on the fiducial marks on the lower pressure plate to facilitate adjustment of each negative for centration.

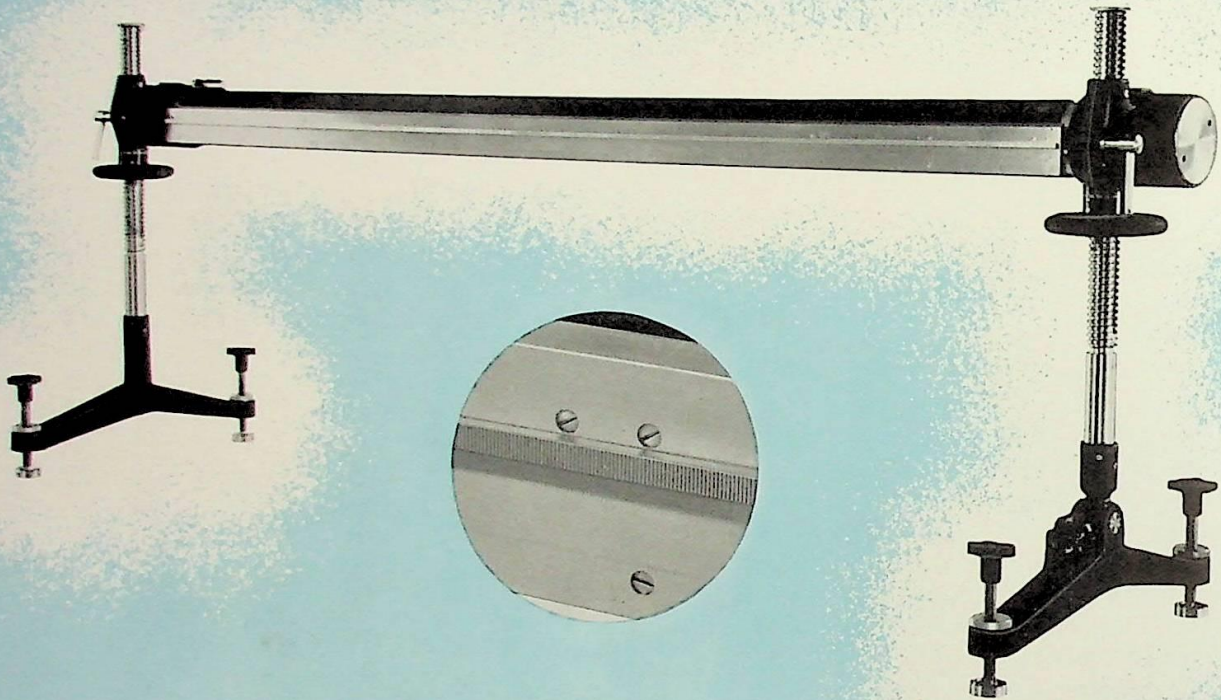
Distortion-free diapositives
are routinely produced

Because of small unavoidable manufacturing variations in the nominal focal length of camera lenses, provision is made for setting the reduction factor of the printer to match the camera lens used. The scales are engraved to indicate camera lens focal length. Thus, if the photography was made with a camera lens of 153.6mm focal length, it is only necessary to set both scales at this figure and the correct reduction ratio is automatically obtained.

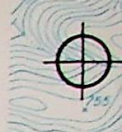
The most widely used printer has a nominal reduction ratio of 153/30 for use with a 153mm, f/6.3 Metrogon lens and projectors having a principal distance of 30mm.



Bausch & Lomb Multiplex Frames



The double frame is used in the preparation of long triangulation strips, and will accommodate up to eighteen projectors. For convenience in transporting and handling, it is made in three sections, carefully fitted together to provide one continuous base bar and to permit free movement of the projectors over the entire length of fourteen feet. Rigid construction of its members, joined by tie rods inside the supporting tube, makes it possible to span the distance from one end to the other without any auxiliary support in the center.



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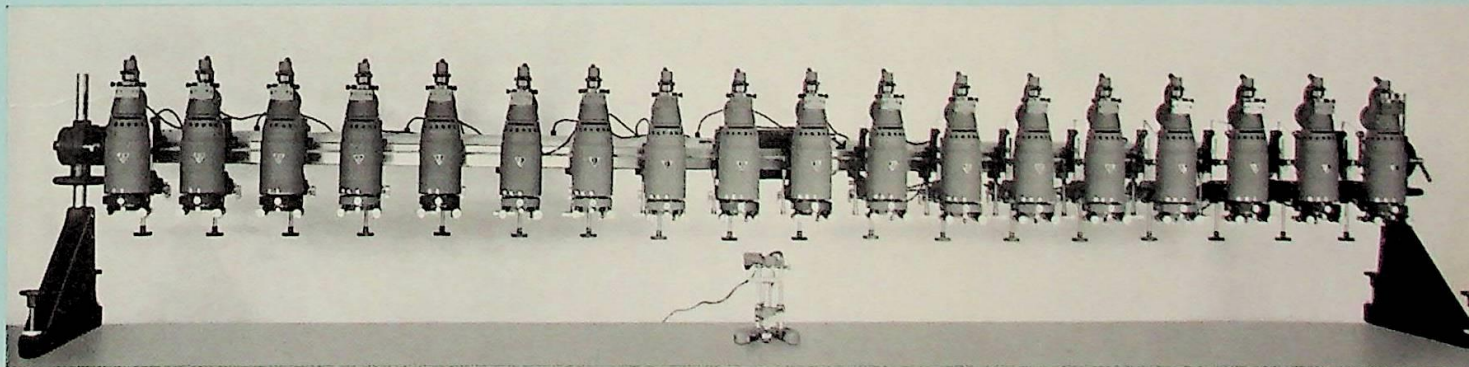
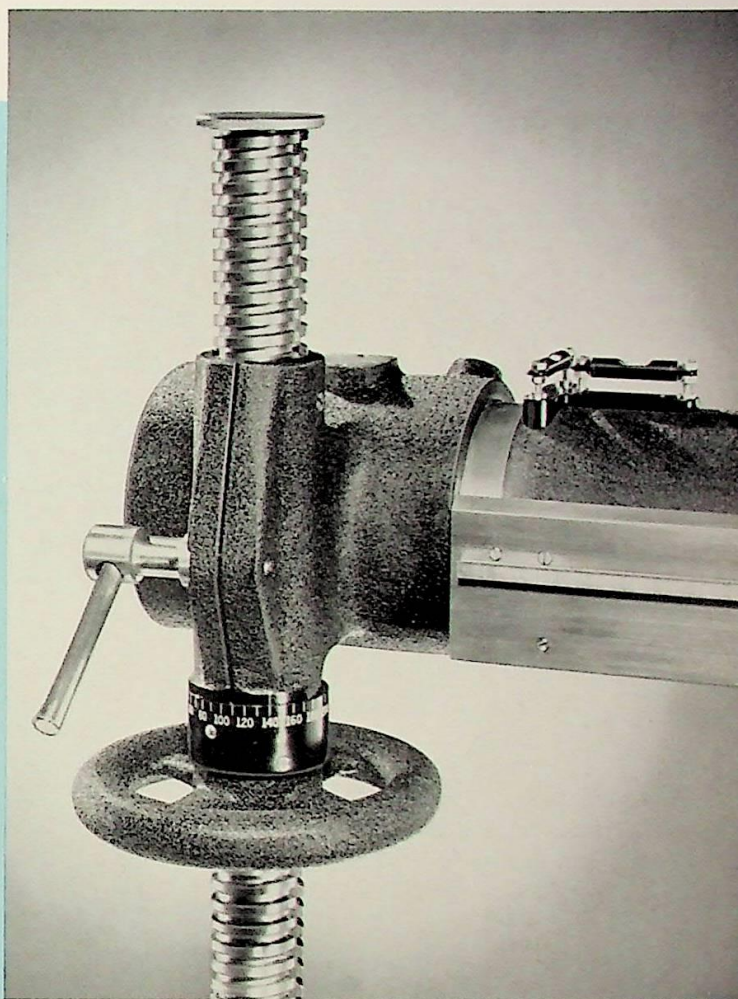
Design Division

... stability and ease of adjustment

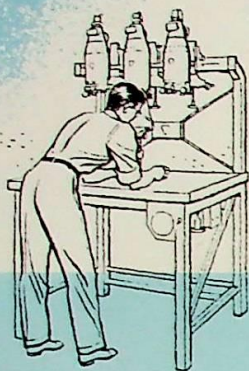
The single frame is seven feet long and accommodates up to nine projectors. Like other components of Bausch & Lomb Multiplex equipment, it is precision-built, provides a rigid support for the projectors, and is designed for every convenience of operation.

The projectors are suspended on a base bar mounted on a strong tubular support. A rack is mounted along the length of the bar (enlarged illustration on opposite page) to permit moving the projectors which are fitted with pinion gears. The base bar is accurately machined and mounted on precision pads. This refinement of design permits free movement of the projectors along the base bar without disturbing their angular relationship to the datum plane.

The frame is supported at the ends by upright members, each of which has an elevating screw and hand wheel to change the height of the base bar or to tilt it along its longitudinal axis. Movement of the bar when supporting its full complement of projectors is remarkably easy and graduated drums permit adjustments in measured increments to assist the operator in orienting the model.



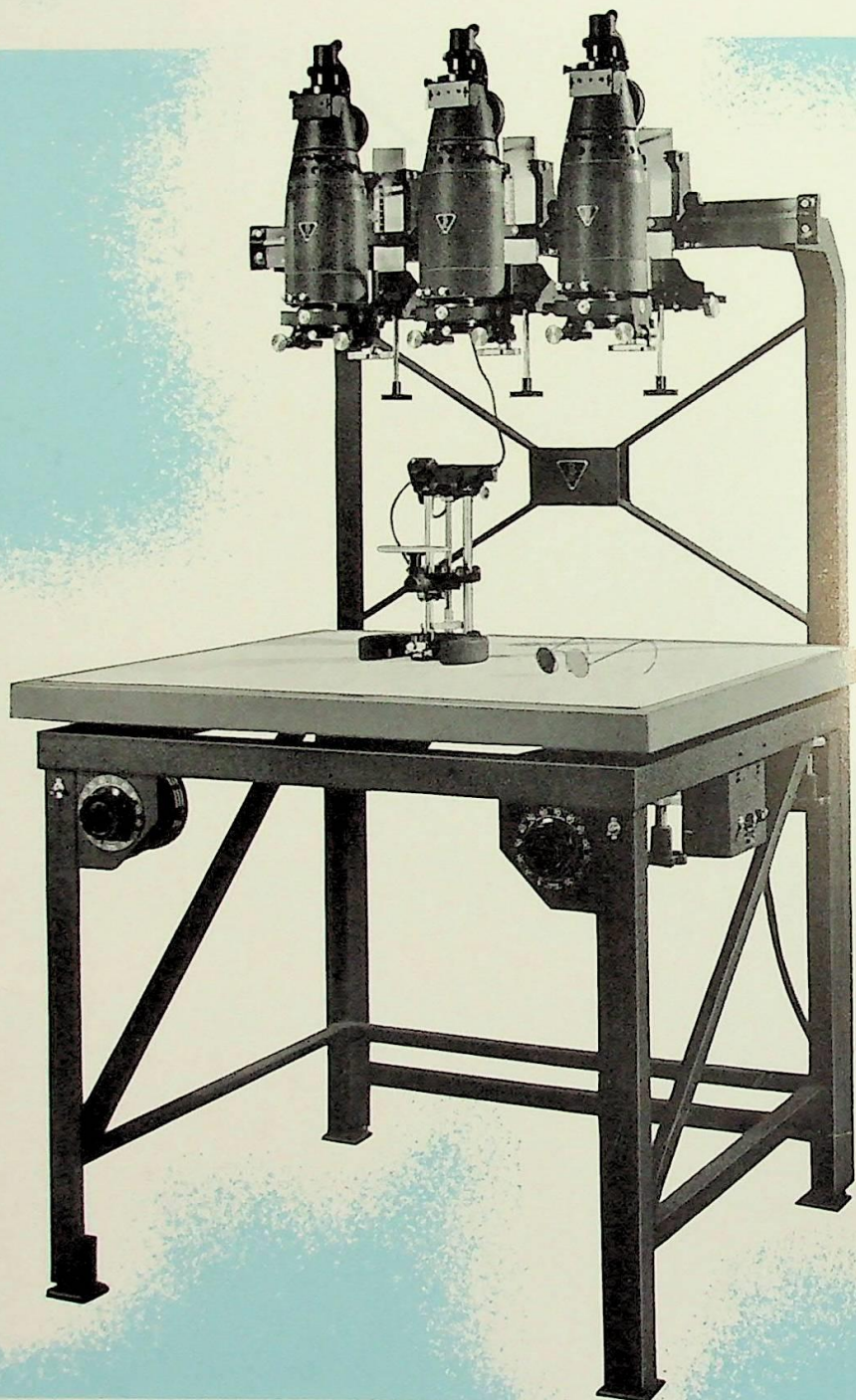
Bausch & Lomb Supporting Unit

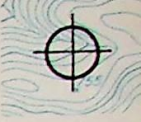


This unit will accommodate two or three projectors and has proven its value as a compilation unit, freeing the longer frames for triangulation work. Engineering schools have found it extremely useful and well adapted to instruction in photogrammetry.

Compilation of the map is done on a slate table. Two variable transformers control the current for the projectors and a selector switch passes the current from the left-hand control to either the No. 1 or No. 3 outlet, while the other supplies outlet No. 2. By this means the operator controls the current to any two of the three projectors. Three outlets for projectors and one with fixed voltage for the tracing table are provided.

The Bausch & Lomb Auxiliary Multiplex Projector Unit, consists of a supporting unit, three projectors with red and green filters, tracing table, and two pairs of filter spectacles, one with reversible temples and one with the clip-on type.

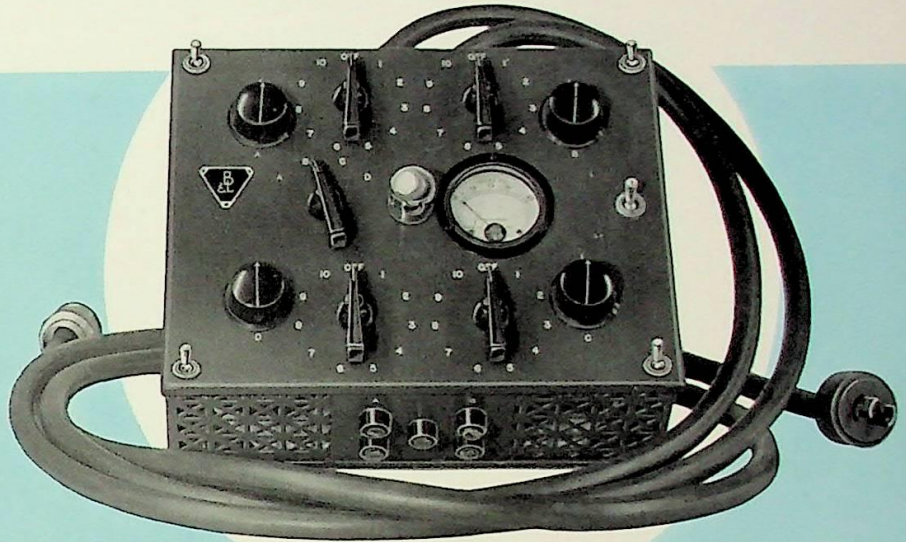




Bausch & Lomb standards of quality are not excelled anywhere

Current Control

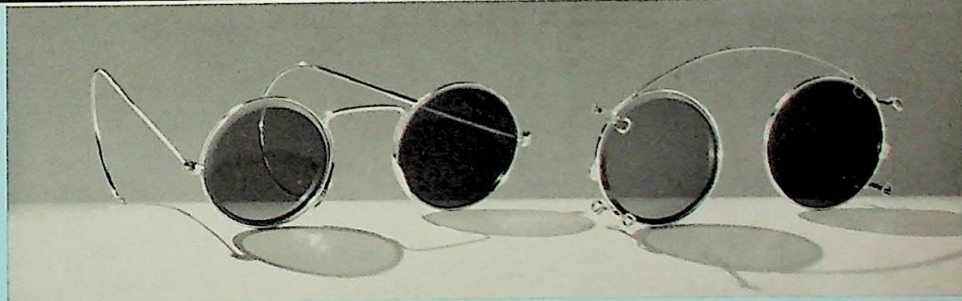
Four circuits are provided in the current control, each with a ten-contact selector switch and a rheostat. Numbers on the selector switches correspond to those on the projector frame outlets. The operator can quickly select and illuminate any projector, at the same time regulating the voltage. A built-in voltmeter can be connected to any circuit, through a four-contact selector switch, permitting a quick check to prevent overvolting.



Filter Spectacles

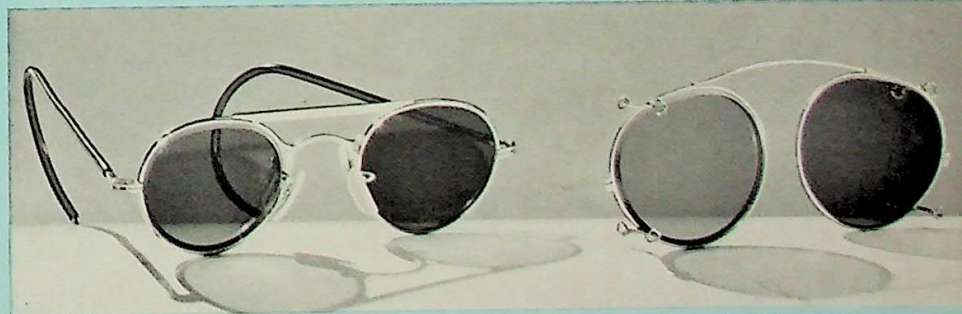
There is a choice between two types of filter spectacles and clip-ons. All have one red and one green lens, accurately ground and polished to prevent eye fatigue over long periods of use. One of the reversible temple spectacles, No. 53-18-08, has 40mm diameter lenses in a light nickel frame, metal temples, and nose pads. Corresponding clip-on style, No. 53-18-22, is suitable for use on gold frame or rimless spectacles.

The alternate type of reversible temple filter spectacles, No. 53-18-48, has 43mm drop shape lenses. Temples are plastic covered metal. Corresponding clip-on style, No. 53-18-58, is for use with plastic frame spectacles.



No. 53-18-08

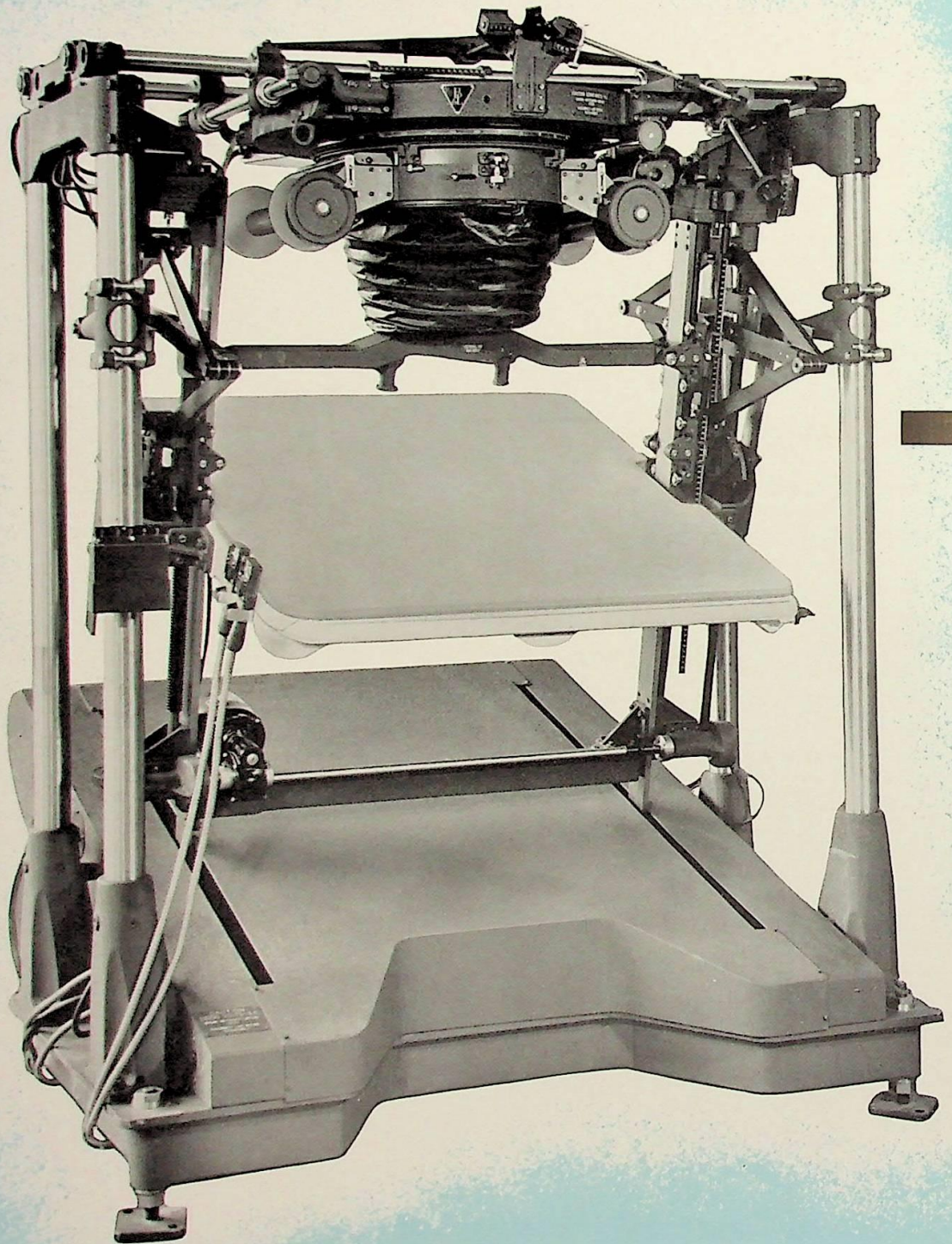
No. 53-18-22



No. 53-18-48

No. 53-18-58

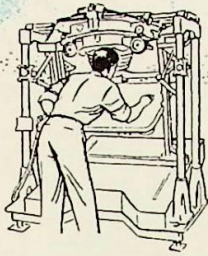
Another type of Multiplex Equipment is available, the basic difference being that the projectors have a principal distance of 28.182mm instead of 30mm. The Reduction Printer required with these projectors has a reduction ratio of 153/28.182. Prices will be furnished on request.





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Design Division



Bausch & Lomb

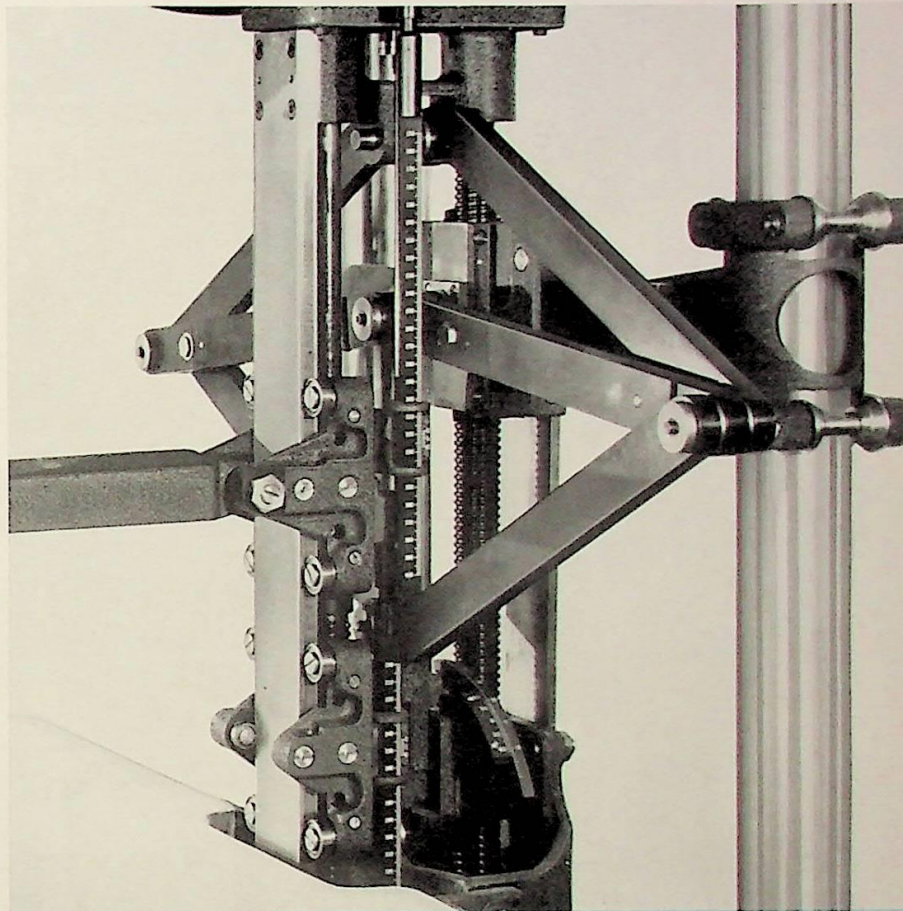
Auto Focus Rectifier

The Bausch & Lomb Auto Focus Rectifier is an instrument for quantity production of rectified prints that are suitable for compilation of controlled mosaic maps.

Negatives up to 9" x 9" format from any focal length camera can be accommodated. The rectifier has a magnification range of $0.7\times$ to $3.3\times$ and 20° tilt, when rectifying negatives from a 6" focal length camera.

The principal features of the Auto Focus Rectifier are its relatively low height of 71"; light weight; convenient motor-driven controls; automatic focusing mechanism; high degree of accuracy, and excellent illumination. The base and frame are exceptionally rigid, and guide bars stabilize the easel. The photo-sensitive paper is held in place on the easel by small paperweight-size magnets placed on the edges of the paper.

A lens shutter provides lens stops from $f/6.3$ to $f/32$ and speeds from $1/50$ sec. to 1 sec. A cable release provides for bulb and time exposures.

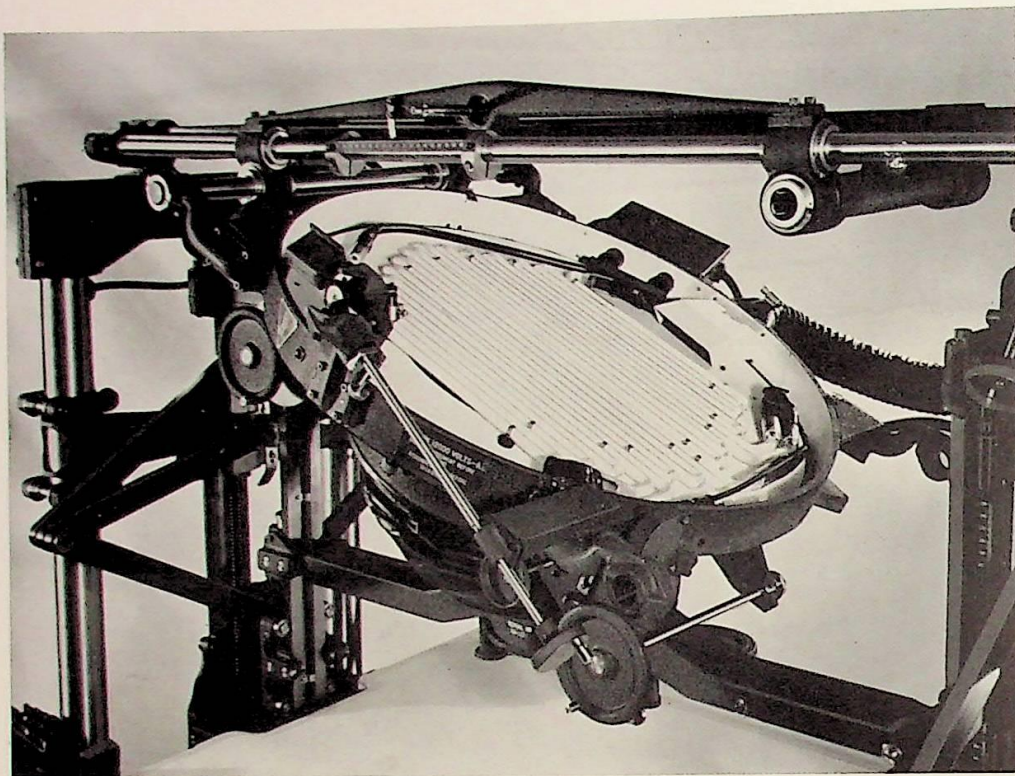


The inversor mechanism, by which sharp image quality is maintained at all settings of magnification and tilt, is a combination Peaucellier-Carpenter type. The negative plane is immobilized to keep the over-all height constant.

Both the tilt and magnification mechanisms are motor-driven and move in either direction by manipulation of micro-switches mounted in hand-held controls. Fine settings can be made by a "flick" of the micro-switches.

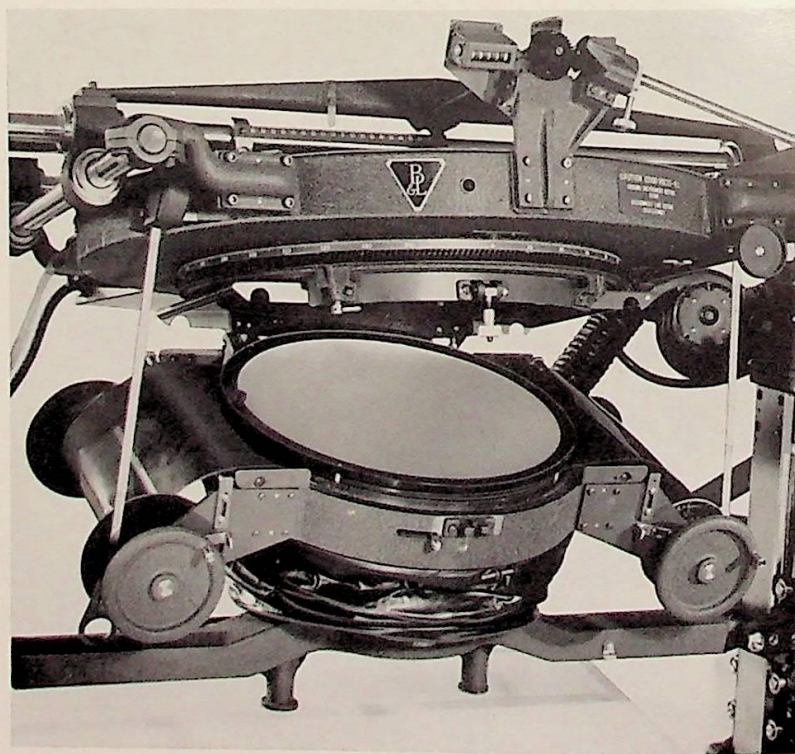
Manual controls provide for negative displacement of plus or minus 90mm in both x and y directions.

Linear and angular motions are equipped with appropriate scales for proper setting of the instrument.



Uniform illumination on the easel is furnished by a fluorescent grid. The lamp assembly is readily accessible for replacement by lowering the housing as shown in the illustration.

The illustration shows the film carrier, held by counterbalances, in its lowered position, allowing easy access to the pressure plates and film. After the film carrier has been returned and locked in its operating position, the film is advanced from one negative to the next by raising the upper pressure plate and turning the film spool.





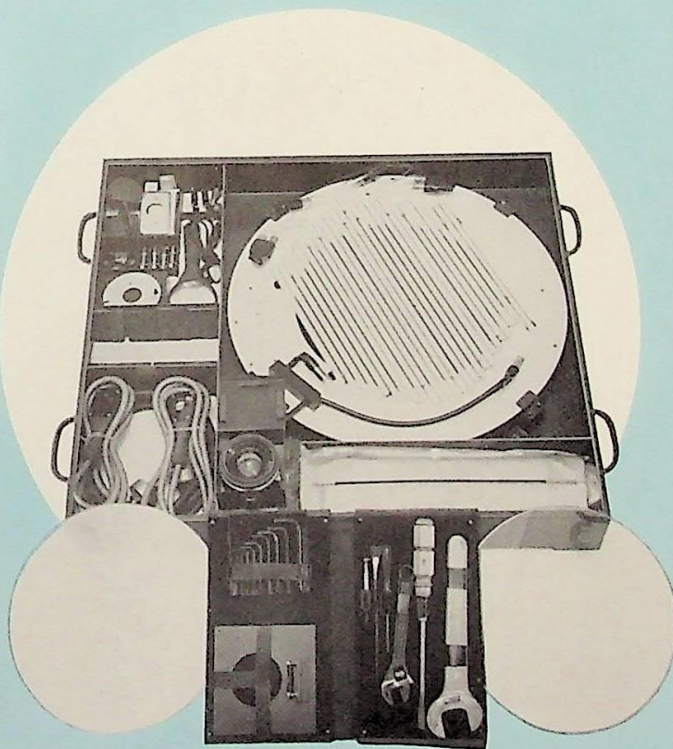
U. S. Patent Office

3 19 1955

Design Division

A super-speed instrument proved under the most trying conditions

A storage and spare parts kit is provided with each instrument. This provides ample space for storage of detachable accessories, and contains a tool kit, spare light source, spare pressure plates, and various renewal parts such as switches, cable releases, and counterbalances. Spare belts are placed over the drive shaft and are held by clips in the base, for easy replacement without requiring any disassembly of the drive mechanism.



SPECIFICATIONS

Height	72 in.
Weight	1000 lbs.
Floor space	5 x 5 ft.
Maximum Negative size	9 1/2 x 9 1/2 in.
Film Spool capacity	390 ft.
Easel size	3 x 3 ft.
Nominal Metrogon Focal Length	5.5 in.
Metrogon Lens speeds	f/6.3 to f/32
Illumination on easel	cold cathode light grid
Exposure speeds	1/10 sec.—Time
Electric Power Supply	115V 60c.
Swing (Rotation of Film)	Through 360°
Lateral Displacement	±80mm
Transverse Displacement	$\left\{ \begin{array}{l} + 40\text{mm} \\ - 100\text{mm} \end{array} \right.$
Easel Tilt	30° to —10°
Lens Tilt	30° to — 5°

specifications • BAUSCH & LOMB PHOTOGRAMMETRIC EQUIPMENT

<i>Catalog Number</i>	<i>Description</i>	<i>Catalog Number</i>	<i>Description</i>
53-12-71-14	Multiplex Projector Set, including 3 No. 53-12-71 projectors; 2 No. 53-18-15 red filters; 2 No. 53-18-16 green filters; and 6 No. 53-53-86 lamps. (Projectors may be ordered in less than sets of three.)	53-14-76-02	Universal Tracing Table, same as No. 53-14-76-01, above, except with a No. 53-14-79 platen instead of No. 53-14-77.
53-12-71-01	Auxiliary Multiplex Projector Unit, including 1 No. 53-16-02 supporting unit; 1 No. 53-12-71-14 projector set; 1 No. 53-14-75-01, or 1 No. 53-14-76-02 Universal tracing table, as specified; 1 pair No. 53-18-08 filter spectacles; and 1 pair No. 53-18-22 clip-on filters.	53-14-74	Supplementary Gear Set, providing additional gears for use with No. 53-14-76 Universal Tracing Table.
53-12-71-02	Auxiliary Multiplex Projector Unit, same as No. 53-12-71-01 equipment, above, except with 2 instead of 3 projectors; and 1 each of the No. 53-18-15 and No. 53-18-16 filters.	53-14-77	Platen, 3 $\frac{1}{4}$ " dia., with an R-14 bearing to fit into the yoke of plotters using space rods; sapphire point "floating mark."
53-14-75-01	Universal Tracing Table, reading in meters of elevation; No. 53-14-79 platen; 4 extra lamps; and plastic dust cover.	53-14-79	Platen, 4 $\frac{5}{16}$ " dia., for use with Multiplex; sapphire point "floating mark."
53-14-75-02	Universal Tracing Table, same as No. 53-14-75-01, above, except with a No. 53-14-77 platen instead of No. 53-14-79.	53-16-02	Supporting Unit, with frame and slate mapping table, 3' x 3', for two or three projectors (not included); 2 built-in variable transformers.
53-14-76-01	Universal Tracing Table, reading in feet of elevation; No. 53-14-77 platen; 4 extra lamps; and plastic dust cover.	53-16-76-01	Single Multiplex Frame, consisting of 1 No. 53-16-76 frame and 1 No. 53-16-78-01 current control.
		53-16-86-78	Double Multiplex Frame, consisting of two 7' supporting tube and base bar assemblies; 1 center adapter; connecting rods; 2 end supports; and 2 No. 53-16-78-01 current control units.
		53-16-78-01	Current Control Unit, including 22-24-v., transformer.

<i>Catalog Number</i>	<i>Description</i>
53-23-62	Multiplex Reduction Printer, with reduction ratio of 153-/30, for use in combination with No. 53-12-71 projectors and photography taken with a 6", <i>f</i> /6.3 Metrogon mapping lens.
53-23-64	Multiplex Reduction Printer, with reduction ratio of 131/30, for use in combination with No. 53-12-71 projectors and photography taken with a 5 1/8", <i>f</i> /6.3 Metrogon mapping lens.
53-31-03	Bausch & Lomb Autofocus Rectifier for making rectified prints of aerial negatives used in the production of mosaic maps.
53-18-08	Reversible Temple Filter Spectacles, 1 red and 1 green lens, 40mm round, nickel frame, reversible temples.
53-18-22	Reversible Clip-on Filter Spectacles, 1 red and 1 green lens, 40mm round, nickel frame.
53-18-48	Reversible Temple Filter Spectacles, 1 red and 1 green lens, 43mm drop shape, reinforced bridge, plastic nose pads and plastic covered temples.
53-18-58	Reversible Clip-on Filter Spectacles, 1 red and 1 green lens, 46mm drop shape, gold-filled frame. Will fit most plastic spectacle frames.

<i>Catalog Number</i>	<i>Description</i>
53-18-15	Replacement Red Filter, for condensers on all Bausch & Lomb Multiplex Projectors.
53-18-16	Replacement Green Filter, for condensers on all Bausch & Lomb Multiplex Projectors.
53-53-86	Lamp for Multiplex Projectors using spherical lamp in horizontal position; 100-w., 20-v., single contact, prefocus base, Mftrs. No. 5A/G 16-1/2/1.
41-41-76	Lamp for Multiplex Projectors using tubular lamp in vertical position; 100-w., 20-v., double contact, bayonet base; Mftrs. No. 100T8/1 DC-20.
31-31-80	Lamp for Reduction Printer, 15-w., 115-v., medium screw base; Mftrs. No. 15A15/115 I.F.
41-41-75	Lamp for Universal Tracing Table base and for counter; 0.25-amp., 6-8-v., miniature screw base; Mftrs. No. 46 (frosted).
71-71-71	Lamp for Illuminated Tracing Table platen and current control panel 0.25-w., 6-8-v., miniature screw base, Mftrs. No. 46.

<i>Catalog Number</i>	<i>Description</i>	<i>Price</i>
53-23-64	Multiplex Reduction Printer, with reduction ratio of 131/30, for use in combination with No. 53-12-71 projectors and photography taken with a 5 1/8", f/6.3 Metrogon mapping lens	\$ 4500.00
53-31-03	Bausch & Lomb Autofocus Rectifier for making rectified prints of aerial negatives used in the production of mosaic maps	15000.00
53-18-08	Reversible Temple Filter Spectacles, 1 red and 1 green lens, 40mm round, nickel frame, reversible temples	5.00
53-18-22	Reversible Clip-on Filter Spectacles, 1 red and 1 green lens, 40mm round, nickel frame	5.00
53-18-48	Reversible Temple Filter Spectacles, 1 red and 1 green lens, 43mm drop shape, reinforced bridge, plastic nose pads and plastic covered temples	7.50
53-18-58	Reversible Clip-on Filter Spectacles, 1 red and 1 green lens, 46mm drop shape, gold-filled frame. Will fit most plastic spectacle frames	7.50
53-18-15	Replacement Red Filter, for condensers on all Bausch & Lomb Multiplex Projectors	10.00
53-18-16	Replacement Green Filter, for condensers on all Bausch & Lomb Multiplex Projectors	10.00

<i>Catalog Number</i>	<i>Description</i>	<i>Price</i>
53-53-86	Lamp for Multiplex Projectors using spherical lamp in horizontal position; 100-w., 20-v., single contact, prefocus base, Mfrs. No. 5A/G 16-1/2/1	\$1.55*†
41-41-76	Lamp for Multiplex Projectors using tubular lamp in vertical position; 100-w., 20-v., double contact, bayonet base; Mfrs. No. 100T8/1 DC-20	1.20*†
31-31-80	Lamp for Reduction Printer, 15-w., 115-v., medium screw base; Mfrs. No. 15A15/115 I.F.	.15*†
41-41-75	Lamp for Universal Tracing Table base and for counter; 0.25-amp., 6-8-v., miniature screw base; Mfrs. No. 46 (frosted)	.15*†
71-71-71	Lamp Substituted	
71-71-71	Lamp for Illuminated Tracing Table platen and current control panel 0.25-w., 6-8-v., miniature screw base, Mfrs. No. 46	.12*°

*Lamp prices do not include tax.

†25% discount if lamp order is for over \$5.00.

°45% discount if order is for 10 or more lamps.

PRICES

Prices are f.o.b. Rochester, N. Y., U. S. A., and are subject to acceptance at Rochester, N. Y., U. S. A., at prices prevailing at time of shipment. Orders for standard items may be cancelled if not wanted because of price advance. Excise taxes or other governmental charges will be added wherever applicable. Shipments to points outside Continental United States of America, and to its territories, dependencies and possessions, except Hawaii and Alaska are not subject to excise taxes.

BAUSCH & LOMB OPTICAL CO.

ROCHESTER 2, NEW YORK, U. S. A.

PRICE LIST FOR CATALOG F-301

BAUSCH & LOMB PHOTOGRAMMETRIC EQUIPMENT

January 25, 1954

Catalog Number	Description	Price
53-12-71-14	Multiplex Projector Set, including 3 No. 53-12-71 projectors; 2 No. 53-18-15 red filters; 2 No. 53-18-16 green filters; and 6 No. 53-53-86 lamps Projectors ordered in less than sets of 3, \$1250.00 each: i.e., if 7 or 8 are wanted, order 2 No. 53-12-71-14 sets at \$3500.00 per set and 1 or 2 No. 53-12-71 projectors at \$1250.00 each.	\$3500.00
53-12-71-01	Auxiliary Multiplex Projector Unit, including 1 No. 53-16-02 supporting unit; 1 No. 53-12-71-14 projector set; 1 No. 53-14-75-01, or 1 No. 53-14-76-02 Universal tracing table, as specified; 1 pair No. 53-18-08 filter spectacles; and 1 pair No. 53-18-22 clip-on filters.....	4800.00
53-12-71-02	Auxiliary Multiplex Projector Unit, same as No. 53-12-71-01 equipment, above, except with 2 instead of 3 projectors; and 1 each of the No. 53-18-15 and No. 53-18-16 filters...	3800.00
53-14-75-01	Universal Tracing Table, reading in meters of elevation; No. 53-14-79 platen; 4 extra lamps; and plastic dust cover.....	590.00
53-14-75-02	Universal Tracing Table, same as No. 53-14-75-01, above, except with a No. 53-14-77 platen instead of No. 53-14-79	590.00
53-14-76-01	Universal Tracing Table, reading in feet of elevation; No. 53-14-77 platen; 4 extra lamps; and plastic dust cover	590.00

Catalog Number	Description	Price
53-14-76-02	Universal Tracing Table, same as No. 53-14-76-01, above, except with a No. 53-14-79 platen instead of No. 53-14-77	\$ 590.00
53-14-74	Supplementary Gear Set, providing additional gears for use with No. 53-14-76 Universal Tracing Table..	30.00
53-14-77	Platen, 3 $\frac{1}{4}$ " dia., with an R-14 bearing to fit into the yoke of plotters using space rods; sapphire point "floating mark"	40.00
53-14-79	Platen, 4 $\frac{5}{16}$ " dia., for use with Multiplex; sapphire point "floating mark"	40.00
53-16-02	Supporting Unit, with frame and slate mapping table, 3' x 3', for two or three projectors (not included); 2 built-in variable transformers.....	700.00
53-16-76-01	Single Multiplex Frame, consisting of 1 No. 53-16-76 frame and 1 No. 53-16-78-01 current control.....	1400.00
53-16-86-78	Double Multiplex Frame, consisting of two 7' supporting tube and base bar assemblies; 1 center adapter; connecting rods; 2 end supports; and 2 No. 53-16-78-01 current control units	3400.00
53-16-78-01	Current Control Unit, including 22-24-v. transformer.....	300.00
53-23-62	Multiplex Reduction Printer, with reduction ratio of 153-/30, for use in combination with No. 53-12-71 projectors and photography taken with a 6", f/6.3 Metrogon mapping lens..	4500.00

TERMS AND PROCEDURE

CATALOG NUMBERS

When ordering, be sure to give catalog number and name of item.

FINANCIAL STANDING

To avoid delay, a purchaser with whom Bausch & Lomb has not previously transacted business should accompany his first order with commercial references or remittance in cash.

TRANSPORTATION CHARGES

Unless otherwise stated on a B&L quotation, all purchases of photogrammetric equipment are f.o.b., Rochester, N. Y., U. S. A. Shipping charges on products sent on memorandum are not prepaid. There is no charge for packing, unless otherwise stated. Products made on special order cannot be forwarded c.o.d.

SHORTAGE OR DAMAGE

To avoid error, Bausch & Lomb exercises the utmost care in checking and packing all shipments. All packing should be carefully examined for small items. If a discrepancy is found, report it to Bausch & Lomb immediately. Report to the transportation company at once any claim for loss, damage or breakage. Carriers are responsible for loss or damage to goods in transit. When shipping container shows damage, do not give a clear receipt, but sign for "in bad order." Save the container and obtain an inspection report from the carrier.

RETURNING GOODS

If it is desired to return goods, first send Bausch & Lomb full information by letter. Goods should not be returned for any

reason until approval for their return has been received from Bausch & Lomb. Each item should be plainly tagged with sender's name and address. Identification tags will be sent on request.

ELECTRICAL EQUIPMENTS

Electrical equipments for use on voltages other than those listed are available on special order. Send complete specifications for quotations.

INQUIRIES

When writing, please give the date of your order, the Bausch & Lomb order number which appears on the packing slip and, if possible, the Bausch & Lomb invoice number.

PRICES

Prices are subject to change without notice. Orders are subject to acceptance at Rochester, N. Y., U. S. A., at prices prevailing at time of shipment. Orders for standard items may be cancelled if not wanted because of price advance. Excise taxes or other governmental charges will be added wherever applicable. Shipments to points outside Continental United States of America and to its territories, dependencies and possessions, except Hawaii and Alaska, are not subject to excise taxes. Delivery dates are estimated and cannot be guaranteed.

DESIGN CHANGES

Bausch & Lomb reserves the right to make changes in instrument design in accordance with scientific progress, and to supply apparatus resultingly different from that described or illustrated in its literature.

U. S. Patent Office
AUG 19 1955
Design Division



BAUSCH & LOMB OPTICAL CO.

Rochester 2, New York, U. S. A.

U. S. Patent Office
AUG 19 1955
Design Division

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