

USE AND CARE OF SWIFT SERIES M3200  
MICROSCOPE



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## USE AND CARE OF YOUR SWIFT FLATFIELD D.I.N. M3200 SERIES MICROSCOPE

Your Swift microscope, Series M3200 is an instrument of precision, optically and mechanically, and will perform satisfactorily with minimum maintenance. M3200 is the first microscope combining the ruggedness of teaching microscopes with the design of research instruments.

### UNPACKING

If your M3200 was ordered without cabinet, it will be in a molded styrofoam container. Lay the container on its side, remove the tape from its perimeter and carefully lift the top half of the container. The microscope may then be removed from the lower half of the container. The objectives will be found within individual plastic vials.

Install the objectives into the microscope's revolving nosepiece from the lowest magnification to the highest, in a clockwise direction from the rear.

### FAMILIARIZE YOURSELF WITH THE COMPONENTS OF THE MICROSCOPE

- BASE – This is the rectangular part that houses the illuminator or mirror.
- STAGE – The table of the microscope where the slide or specimen is placed.
- CONDENSER – The optical element built into or onto the stage.
- DIAPHRAGM,  
DISC – The wheel-shaped device attached to the underside of the stage.
- IRIS – Mechanical device mounted underneath condenser — lever controlled.
- BODY – The component housing the prisms and eyepiece tube.
- ARM – The basic frame of the microscope to which the base, body and stage are attached.
- NOSEPIECE – The revolver that carries the objectives.
- OBJECTIVE – The component that magnifies the image of the specimen to form the "primary image".
- EYEPIECE – The upper optical component, that further magnifies the primary image and brings the light rays to a focus at the eyepoint.

## ABOUT THESE COMPONENTS

**EYEPIECE** – Most models of the M3200 Series are equipped with the 10X D.I.N. widefield eyepiece. Because of the extremely wide field of view and a much higher eyepoint than the 10x Huygenian eyepiece, this eyepiece enables even those with thick eyeglasses to view the specimen with ease. The widefield eyepiece on monocular models has a built-in pointer, and is designed to accept a variety of measuring and counting accessories. The lenses are highly corrected and coated to reduce glare and reflection.

**OBJECTIVES** – The D.I.N. objectives are of research type, with large numerical aperture (N.A.) to permit maximum resolution. All objectives are achromatic, color coded and parfocaled at 45MM distance. The 40XR (high dry) and 100XR objective are in a retractable mount to prevent accidental breakage of either the slide or front lens of the objective. All lenses are hardcoated for maximum resolution and produce an excellent, flat field.

**DISC DIAPHRAGM** – The wheel-shaped disc attached to the underside of the stage. It has circular openings, called apertures, at various points and may be rotated to align any of the apertures with the optical path.

**IRIS DIAPHRAGM** – Attached to substage condenser and actuated by a lever to control aperture diameter.

**COARSE (RAPID) FOCUS CONTROL** – The stage is moved up and down by a diagonally cut rack and pinion. The pinion is of steel and the rack of brass. The movement is actuated by the large knobs on both sides of the arm.

Note: The coarse focus controls have a built-in clutch device activated at either limit of movement. This clutch prevents damage to the precision gears.

**FINE FOCUS** – The fine focus is of the internal lever type with a fine micrometer screw. It is operated by small knobs found on both sides of the arm.

**CONDENSER** – The built-in or substage condenser has a numerical aperture (N.A.) matched to the objectives. For good optical results, the condenser must have an N.A. equal to or larger than the N.A. of the objective being used. The purpose of the condenser is to "squeeze" light rays into a bundle and emit them through the specimen at the precise angle to illuminate the field of view.

## USING YOUR SWIFT SERIES M3200 MICROSCOPES

After securing the slide into position with the stage clips, turn to the lowest power objective. The disc or iris diaphragm should be turned or adjusted to the largest aperture, with the condenser if focusable, adjusted to allow the built-in substage illuminator to provide a constant even dispersion of light to the optical system.

While looking through the eyepiece, rack the stage up to bring the specimen into focus. The 4X objective has a long working depth so focusing is done with ease at this power. The specimen may be centered to the field at this time, and the nosepiece rotated to the higher magnifying objectives. The objectives are parfocalized so that once the 4X objective is focused, only a slight turn of the fine focus knob is required in changing to the 10X or 40XR objective.

Note that should the 40XR objective be brought into contact with the slide no damage will result, since the 40XR objective is in a retractable mount. It is impossible for the 4X and 10X objectives to contact the slide.

Use of the Diaphragm – The disc or iris diaphragm is not intended to control the brightness of the illumination. The purpose of the diaphragm is to match the numerical aperture of the objective. Smaller apertures increase contrast in the image while larger apertures decrease the contrast. A good procedure in selecting the proper aperture is to start with the largest and reduce until the fine details of the specimen are imaged sharply.

Care must be exercised not to reduce the aperture too much to gain high contrast, as then the fine structure in the image of the specimen will be destroyed. Reducing the aperture does increase contrast and depth of focus but also reduces resolution and introduces diffraction. The proper aperture must be selected for each objective. The aperture for the 10X will not be the same as for the 40XR since the angle of the light required is determined by the numerical aperture of the objective. Proper selection of the diaphragm aperture is easily determined after a little experience with the microscope.

## CARE OF THE SWIFT SERIES M3200 MICROSCOPE

The Series M3200 is designed to require only a minimum of maintenance and has many features to prevent accidents common to the "student" microscope. Loss of stage clips is eliminated since these are secured to the stage by screws. Gear damage is eliminated by internal

devices which prevent the rack and pinion from being disengaged. Damage due to overfocusing is prevented by a unique clutch system activated at upper and lower limits of travel.

Tension of the focusing movement is controlled by a tension system found on the pinion metal of the rapid focus control. This is adjusted only by a special tool, Swift Cat. No. MT202. Unauthorized persons are cautioned against tampering with this device.

Cleaning: The front lens of the objectives, particularly the 40X, should be cleaned after using by first brushing with a soft camel-hair brush to remove particles of dust, then wiping gently with soft lens tissue moistened (not soaked) with Xylol C.P., and dried with clean lens paper immediately. The objectives should never be taken apart except by a qualified Swift serviceman. Should dust be observed on the back lens of the objective, an all-rubber ear syringe or enema tube may be utilized to blow the dust out.

The eyepiece may be cleaned in the same manner as the objectives, except in most cases Xylol will not be required. In most instances breathing on the lens to moisten it, then wiping dry with clean lens tissue will be sufficient to clean the surface.

The finish of the microscope is hard epoxy and is resistant to acids and reagents. Clean this surface with a damp cloth and mild detergent.

Mechanical Parts: Mechanical parts are mostly concealed from the outside. Microscopes should be serviced by a qualified serviceman periodically to remove contaminants from the moving surfaces. These surfaces should then be relubricated using only those lubricants recommended by Swift.

Swift microscopes are covered by the most liberal warranty available and your authorized Swift dealer has all the necessary data to insure fast, efficient service. Swift Instruments, Inc. stand ready to assist you at any time and your inquiries are invited. Your Swift Series M3200 microscope is a highly versatile instrument and many accessories are available to further enhance its use.

You will note the exploded view of M3200 Series in this manual. Each part is numbered and named on the reverse side. If the occasion should arise where it becomes necessary to order a part, specify the model of your microscope, its serial number, the number of the part and its name. Complete parts are available through authorized Swift dealers or direct from the factory.

*FOCAL LENGTH* – Parallel rays of light after refraction through a lens will be brought to a focus at the focal point. The distance from the optical center of the lens to the focal point is the focal length or focus.

*OBJECTIVE* – The lens system near the object which forms the primary image.

*PARFOCAL* – A term applied to objectives and eyepieces when practically no change in focus has to be made when one power is substituted for another. The D.I.N. objectives on your SWIFT Series M3200 are parfocalized at the factory to a standard 45MM distance so that only a slight turn of the fine adjustment is required when a change is made from low to a higher power.

*RESOLVING POWER* – The ability of a lens to clearly separate fine detail. Resolving power is directly proportional to the numerical aperture of the optical system.

*WIDEFIELD D.I.N. EYEPIECE* – An ocular with an achromatic doublet for the eyelens and with the plane side of the lower lens nearest the objective. Such a corrected system does not have to be stopped down with a diaphragm, hence a large flat field is insured.

*WORKING DISTANCE* – The distance between the front lens of the objective and the cover glass when the lens is focused on the specimen.

Swift 45MM D.I.N. Objective Specifications

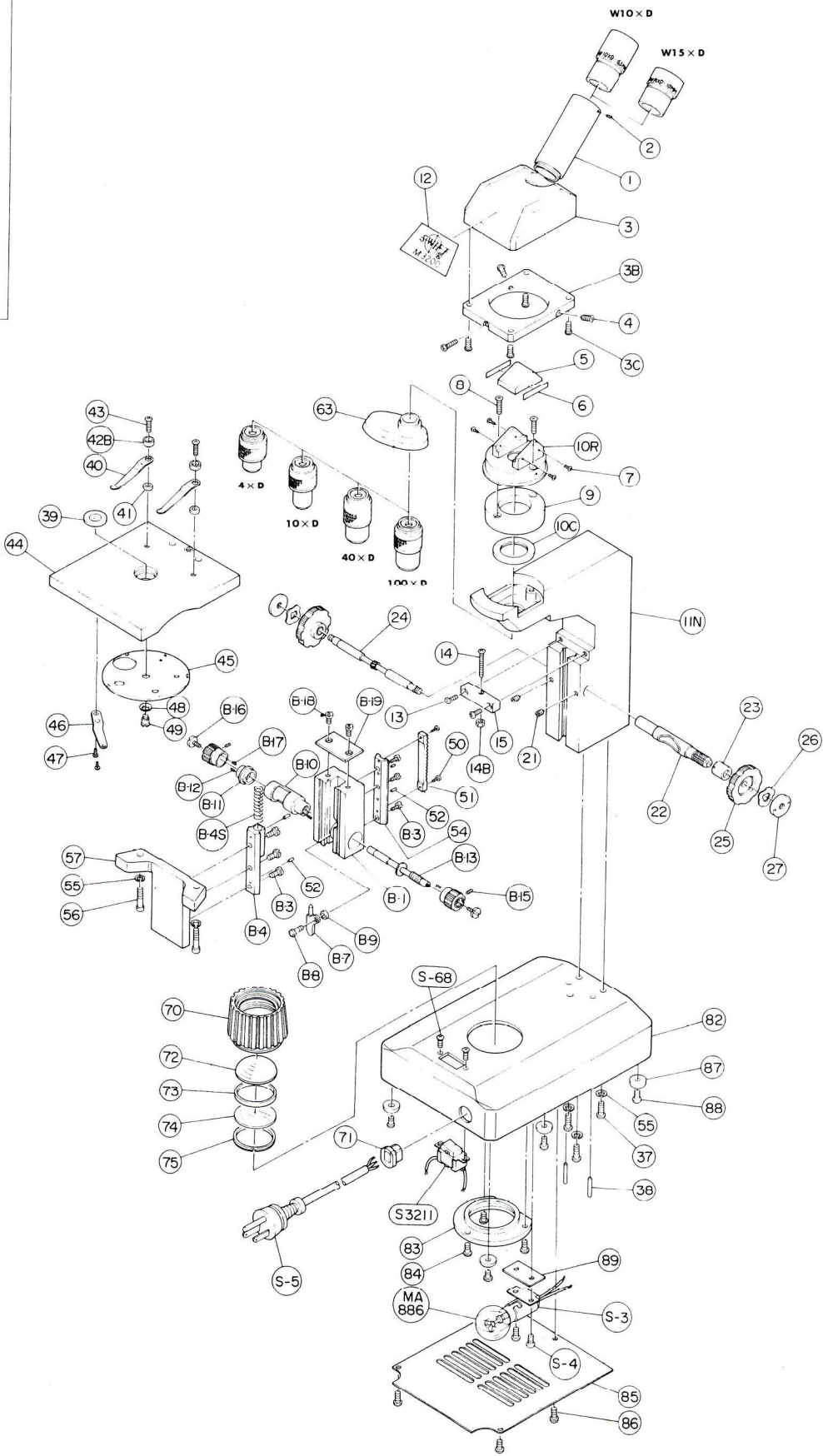
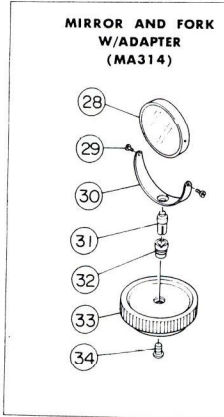
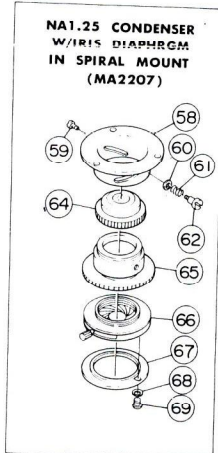
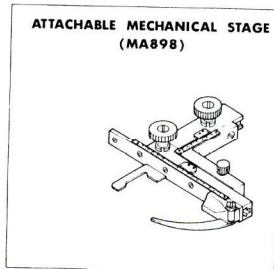
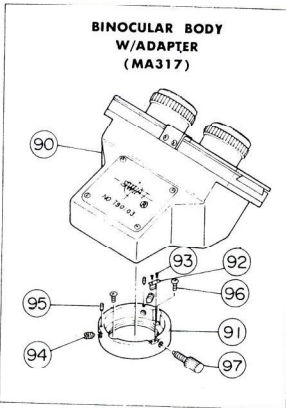
Mag.	N.A.	Working Distance	Field of View	Color Code
4X	0.10	15.83 MM	4.5 MM	Red
10X	0.25	6.32 MM	1.8 MM	Yellow
40XR	0.65	0.53 MM	0.45 MM	Blue
100XR	1.25	0.18 MM	0.18 MM	White

Swift D.I.N. Eyepieces

	Field of View	Focal Length	Eye Point
W10XD	18 MM	25 MM	15.5 MM
W15XD	13 MM	16.7 MM	10 MM

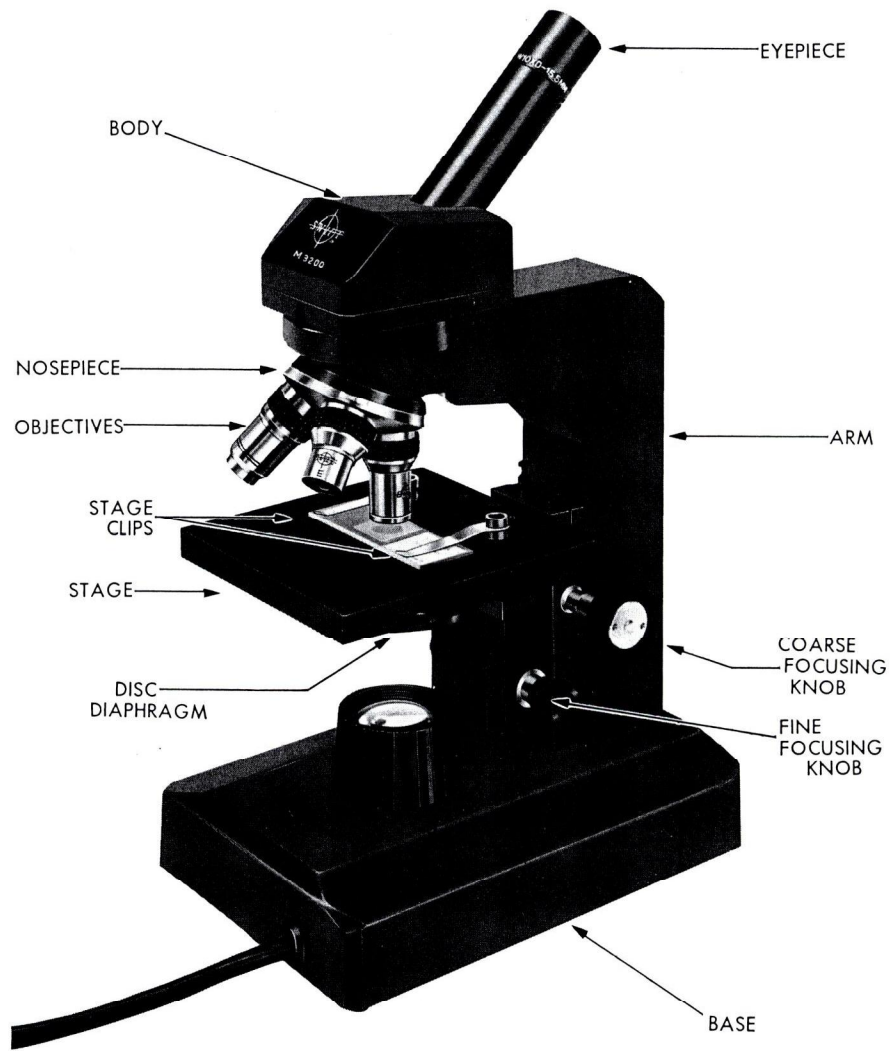
Inquiries regarding the M3200 Series or other Swift products should be directed to your authorized Swift dealer or: *Swift Instruments Inc., P.O. Box 562, San Jose, California 95106, U.S.A.*

# MODEL M3200 SERIES









# SWIFT INSTRUMENTS, INC.

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