

# Swift M2252DGL Series Microscope

## Use and Care Manual

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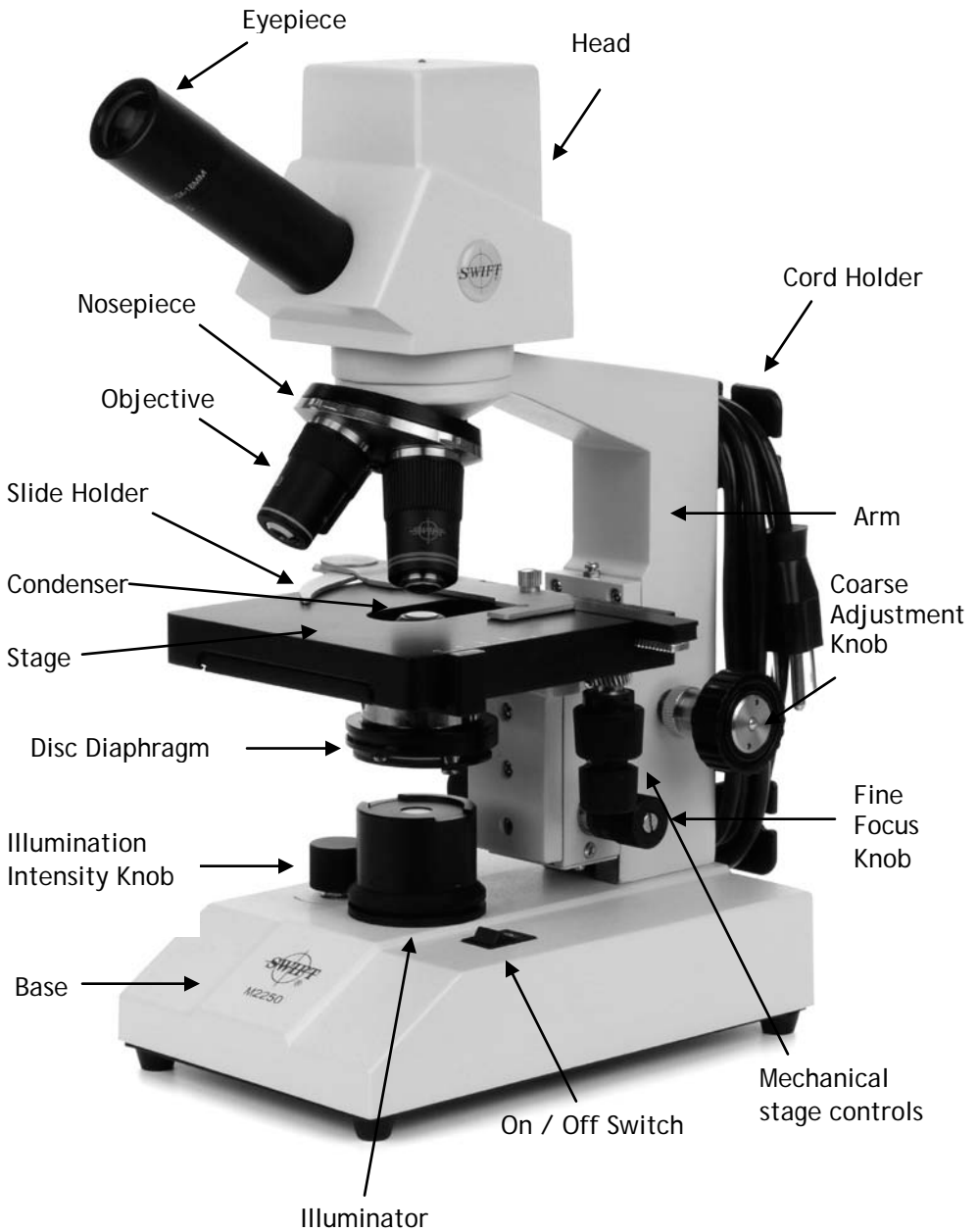
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# Swift Series M2252DGL Microscope

The M2252DGL Series is ideal for elementary to high school classrooms. Built to withstand student use, this series has locked-on eyepieces, objectives, illuminator housing and a “slip-clutch” focusing system to protect gears from over-focusing. The M2252DGL Series incorporates a digital camera into the monocular head with a maximum resolution of 1280 X 1040 and LED illumination for efficient, cool, white light that rarely needs to be replaced.



# Components of the Microscope

**ARM** - the vertical column (attached to the base) which supports the stage and contains the coarse and fine adjusting knobs and focusing mechanism.

**BASE** - the housing and platform of the instrument to which the arm is attached. The base stands on rubber feet and contains the illuminator assembly. The bulb replacement part number is printed on the underside of the base.

**COARSE FOCUS CONTROLS** - this model is a stage focusing model meaning the stage moves up or down by means of a brass rack and steel pinion gear to bring the specimen into focus. The movement is achieved by two large knobs on the sides of the arm. In order to prevent gear damage, the focus control is equipped with a slip clutch that allows slippage at both ends of the focusing range. The system is also furnished with a tension control to prevent "stage drift".

**CONDENSER** - the condenser is mounted in the stage and it is used in conjunction with the iris diaphragm. The function of the condenser is to provide full illumination to the specimen plane and to enhance the resolution and contrast of the object being viewed.

**EYEPIECE** - the upper optical element that further magnifies the primary image of the specimen and brings the light rays in focus at the eyepoint.

**FINE FOCUS CONTROLS** - the fine focusing knobs, located on either side of the microscope, in front of and slightly lower than the coarse focusing knobs, are used for precise focusing adjustments once the specimen has been brought into view with the coarse focus controls

**HEAD** - it is the top portion of the microscope that contains the refracting prisms and the eyepiece tube. The eyepiece is locked onto the eyepiece tube with a set screw. The head rotates allowing operation of the microscope from the front or the back, whichever is more convenient, or allows the microscope to be shared by simply rotating the head.

**ILLUMINATION INTENSITY KNOB** - allows the user to control the brightness of the LED illumination system

**IRIS DIAPHRAGM** - a round multi-leaf device mounted below the condenser which is controlled by a lever. It is similar to a

camera shutter and controls the amount of light entering the condenser, allowing the user to control contrast.

**NOSEPIECE** - a revolving turret that holds the objective lenses, permitting changes in magnification by rotating different powered objective lenses into the optical path.

**OBJECTIVES** - the optical systems which magnify the primary image of the instrument. Typical magnifications are 4X, 10X, and 40X.

**ON/OFF SWITCH** - turns the illuminator electrical power on or off

**STAGE** - the platform on which the specimen slide is placed. The standard version comes equipped with locked-on stage clips, and is pre-drilled to accept an optional mechanical stage.

## Terminology

**"COATED" LENS** - in attempting to transmit light through glass, much of the light is lost through reflection. Coating a lens increases the light transmission by reducing or eliminating reflection, thus allowing more light to pass through.

**EYE POINT or EYE RELIEF** - the distance from the eye lens of the eyepiece to your eye where a full field of view is seen.

**FIELD OF VIEW** - the actual circular area seen through the eyepiece.

**PARFOCAL** - a term applied to objectives when very little fine focusing is needed to bring the specimen into focus when changing objectives.

**RESOLUTION or RESOLVING POWER** - the ability of a lens to define the details of the specimen at a maximum magnification. This is governed by the N.A. (Numerical Aperture) of the lens. For example, a 40X objective with N.A. 0.65 has a maximum resolving power of 650X, equal to 1000 times the N.A. This rule of  $N.A. \times 1000$  is true of all achromatic objectives.

**WORKING DISTANCE** - the distance from the lens of the objective to the cover slip on the slide, when the specimen is in focus.

# Using Your Microscope

Once you have learned the terminology, the operation of the microscope is simple. By following these easy steps, you will be able to begin studying the specimen quickly and easily:

1. Use the slide holder to secure the slide in place. Be sure the specimen is directly over the opening in the stage.
2. Rotate the nosepiece to place the lowest power 4X objective over the specimen. Be sure the objective “clicks” into position.
3. While viewing through the eyepiece, rotate the coarse focusing knob to bring the specimen into view. Next, sharpen the focus using the fine focus knob.
4. If the image of the specimen appears pale, the iris diaphragm should be closed slightly. This will increase contrast in the specimen’s image. If the specimen appears dark, slightly open the iris diaphragm.
6. Use the mechanical stage controls to position the specimen directly into the center of the field of view.
7. Rotate the nosepiece to the highest power objective. A slight turn of the fine focusing knob may be required to bring the image of the specimen into sharp focus. Once the specimen is in focus with the highest power objective, it will be in focus with each lower power objective.

EYEPIECE	OBJECTIVE	MAGNIFICATION	FIELD OF VIEW
W10X	4X, 10X, 40X	40X, 100X, 400X	4.10mm, 1.65mm, 0.41 mm

## Digital photography

The M2252DGL Series microscope features a built-in 1280 X 1024 pixel digital camera to capture still images or video clips onto a computer. In order to use the camera, the software must first be installed on a computer. The minimum computer requirements to use the camera is having an available USB 2.0 port and either Windows XP or Mac OS X operating systems installed on the computer. **Instructions on how to install and use the software is included on the software CD that was packaged with the M2252DGL Series microscope.**

## M2252DGL Parts and Accessories

MA10071	4XD Objective
MA10072	10XD Objective
MA10073S	40XRD Objective
MA10074	100XRD Objective
MA10512	W10X Eyepiece
MA10513	W10X Eyepiece with pointer
MA14283	Cold Holder (Pair)
MA2215	3.4V, .06W
MA336	Dustcover

## Care of Your Swift Series M2252DGL Microscope

Swift M2252DGL microscope is designed to function satisfactorily with minimum maintenance. Certain components should be cleaned frequently to ensure ease of viewing.

**CLEANING** - the front lens of the objectives (particularly the 40XRD and 100XRD) should be cleaned after use. First brush with a soft, camel hair brush or blow off with clean compressed air to remove dust particles. Then wipe gently with a soft lens tissue, moistened with optical cleaner (eyeglass or camera lens) or clean water and immediately dry with a clean lens paper.

**CAUTION** - Objectives should never be disassembled by the user. If repairs or internal cleaning should be necessary, this should only be done by a qualified, authorized technician.

The eyepiece may be cleaned in the same manner as the objectives, except in most cases optical cleaner will not be required. In most instances breathing on the eyepiece to moisten the lens and wiping dry with a clean lens tissue is sufficient to clean the surface. Lenses should never be wiped while dry as this will surely scratch or otherwise mar the surface of the glass.

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.

Periodically, the microscope should be disassembled, cleaned and lubricated. This should only be done by a qualified, authorized technician.

**DUST COVER AND STORAGE** - All microscopes should be protected from dust by a dust cover when in storage or not in use. A dust cover is the most cost-effective microscope insurance you can buy. Ensure that the storage space is tall enough to allow the microscope to be placed into the cabinet or onto a shelf without making undue contact with the eyepieces. Never store microscopes in cabinets containing chemicals, which may corrode your microscope. Also, be sure that the objectives are placed in the lowest possible position and the rotating head is turned inward and not protruding from the base. Microscopes with mechanical stages should be adjusted toward the center of the stage to prevent the moveable arms of the mechanical stage from being damaged during storage in the cabinet.

**BULB REPLACEMENT** - To prolong the life of the bulb you should always turn off the unit when not in use.

To replace an LED, you must first turn the power off and unplug the microscope's electrical cord from the electrical socket and remove any slides on the stage. Use the small allen wrench (.09mm) that was included with the microscope to loosen the set screws that hold the black plastic illuminator housing onto the base of the microscope. Remove the illuminator housing to expose the LED. Simply pull the LED straight up to remove it from the light socket. Align the 2 metal socket pins with the holes at the bottom of the new LED and push the LED onto the socket. Re-install the illuminator housing.

### **TENSION CONTROL OF FOCUSING MOVEMENT**

The focus tension is easily adjusted by using the collar found on the coarse focusing controls, between the knob and upright support. A clockwise turn of this collar moves it toward the upright support and increases tension, while a counter clockwise turn moves the collar toward the knob and decreases tension.



## Common Problems in Microscopy

**A. PROBLEM** - The illuminator light does not come on

**CORRECTION** -

1. Make sure the microscope is plugged into a functional electrical socket.
2. The bulb may need to be replaced. See "Bulb Replacement on page 7.

**B. PROBLEM** - Image appears "washed out" or weak.

**CORRECTION** -

1. Slightly close the iris diaphragm.
2. Objective lens is dirty. Clean as described under "Cleaning".
3. Eyepiece is dirty. Clean as described under "Cleaning".

**C. PROBLEM** - Dust or hairs seem to be moving in the image.

**CORRECTION** - Disc diaphragm is at too small an aperture. Rotate to larger aperture.

**D. PROBLEM** - Unable to bring specimen into focus.

**CORRECTION** -

1. Eye lens of the eyepiece is partially unscrewed. Remove the eyepiece and screw the two sections together.
2. The nosepiece may need to be rotated to "click" an objective into the correct position.
3. The specimen may not be centered properly on the stage and needs to be re-positioned to be in the optical path

**E. PROBLEM** - Image of the specimen goes out of the focus all by itself.

**CORRECTION** - Use the tension control collar to tighten the focusing mechanism found on the coarse focus spindle.

**F. PROBLEM** - Focusing knobs turn with difficulty even with tension-collar loosened.

**CORRECTION** - Microscope should be disassembled, cleaned and re-lubricated by a qualified, authorized technician.

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