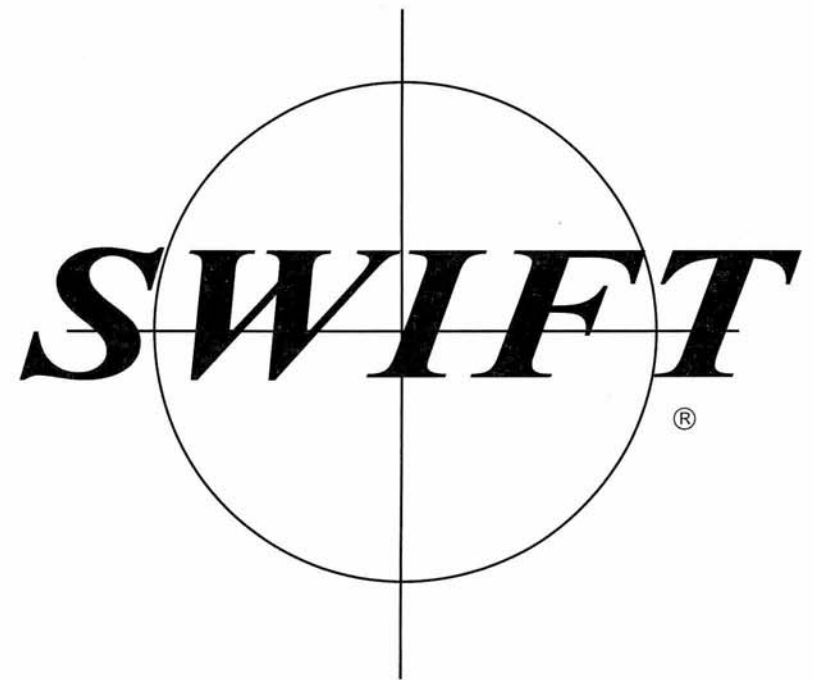


**USE AND CARE OF
SWIFT SERIES M2000DF**

MICROSCOPE



1999

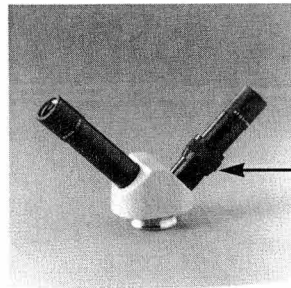


www.Swift-MicroscopeWorld.com
800-942-0528 Toll Free
760-438-0528 International
info@swift-microscopeworld.com

www.Swiftoptical.com
877-967-9438

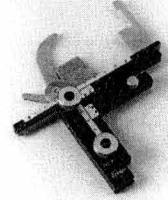
Copyright 1999

M2000DF

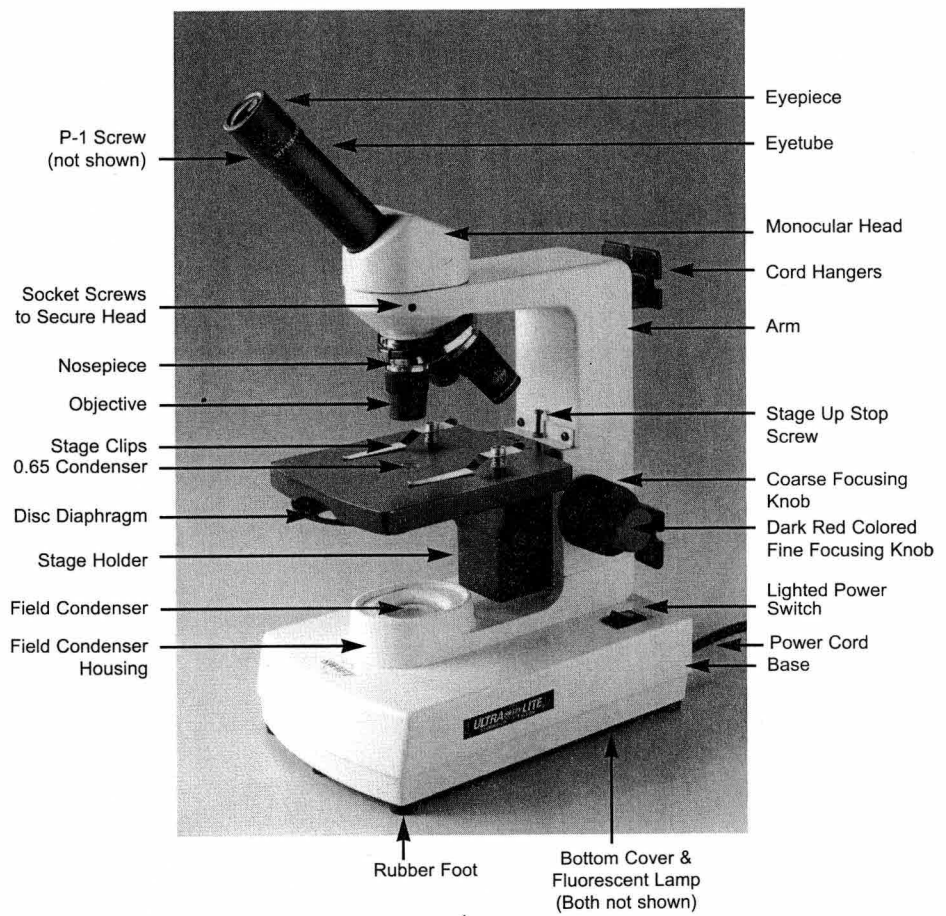


MA2012
Dual View Head

Diopter
Adjustable
Ring



MA889A
Mechanical Stage



SPECIFICATIONS & FEATURES OF M2000DF

HEIGHT	13 ¾" (350 mm)
WIDTH	5 ½" (140 mm)
LENGTH	9 ½" (240 mm)
WEIGHT	9 lb (4 kg)
CORD LENGTH	5 ½' (1.7 m)
STAGE PLATE:	4 ½" x 5" (115 mm x 130 mm) with chemical-resistant surface, "locked-on" stage clips, 0.65 condenser, 5-annulus disc diaphragm, one-piece molded with stage holders.
EYEPIECE:	(MA2010) W10X Din, FN:18 with pointer.
OBJECTIVES:	(MA350) 4X Din Achromat (MA351) 10X Din Achromat (MA353) 40XRD Din Achromat (Retractable)
MONOCULAR HEAD:	(MA2011) 360° rotatable 45° inclined (standard).
DUAL VIEW HEAD:	(MA2012) 360° rotatable 45° angled head (optional), interchangeable with monocular head.
FOCUSING:	Fine & coarse coaxial quick focusing mechanism, with color-coded knobs.
NOSEPIECE:	Reversed Nosepiece for easy slide placement and protection of the objectives.

DISC DIAPHRAGM:	Sturdy with easily visible annulus numbers.
FIELD (BASE) CONDENSER:	Installed in the one-piece casting condenser housing of the base top. "100% Student Proof"
CORD HANGERS:	Installed on back of arm for convenient storage of the electrical cord, which can be wound around the cord hangers when not in use.
ILLUMINATION:	<u>U.L. & C.U.L. Approved</u> electrical system. US Patented Ultra Lite® illuminator, US Patent No. 4955978 5 watt, 4100 Kelvin color temperature fluorescent lamp.
LIGHT SWITCH:	Lighted on/off switch, easily recognizable when in the "on" position.
DESIGN AND FINISH:	U.S. Design Patented, chemical-resistant finish. (DES-400548) - <i>Design patent pending in China.</i>
WARRANTY:	Covered by a " LIMITED LIFETIME WARRANTY " which protects against defects in material and workmanship.

UNPACKING INSTRUCTIONS

Your M2000DF Microscope is packed in a molded styrofoam container. Place the container on its side, remove the tape from its perimeter and carefully lift off the top half of the styrofoam. The microscope may then be removed from the lower half. The fully assembled scope has already been inspected at the factory and is ready for use.

USE & CARE OF YOUR SWIFT M2000DF MICROSCOPE

We would first like to take this opportunity to welcome you to the "Swift Family of Microscope Users". We are certain you will enjoy using your M2000DF. However, in order that you make the best use of your instrument, begin by familiarizing yourself with its basic components.

COMPONENTS OF THE MICROSCOPE

Starting from the top, here are the major components you will have to know in using the instrument. Please refer to the illustration on (page 1).

EYEPIECE

The optical component that further magnifies the primary image and brings the light rays to a focus at the eyepoint. M2000DF is equipped (standard) with a widefield 10X Din eyepiece with a pointer installed. The lenses are highly corrected and coated to reduce glare and reflection.

HEAD

The component which houses prisms inside and holds the eyetube and eyepieces. The dual view head (MA2012), illustrated on page 1, is available for the M2000DF as an option. The (standard) monocular head and (optional) dual view head are interchangeable.

ARM

The basic frame of the microscope to which the base, head, nosepiece,

stage and cord hangers are installed. It is made of aluminum casting.

REVERSE NOSEPIECE

The revolver that carries the objectives. Contrary to most of the educational microscopes on the market, this reverse (or inward) nosepiece makes it easier for the user to place and observe the slide on the stage plate. It also protects the objectives from being damaged.

OBJECTIVE

The component that magnifies the image of the specimen to form the primary image. It is screwed into the opening of the nosepiece. M2000DF is equipped with 4X, 10X, and 40XRD Din Achromat Objectives. They are color-coded (red for 4X, yellow for 10X, and blue for 40XRD). All are hard coated and parfocaled. 40XRD is in a retractable mount to prevent accidental breakage of either the slide or front lens of the objective.

CORD HANGERS

A pair of half circled devices, installed on the back of the arm. The electrical cord may be wound around them when the scope is not in use, or in storage.

STAGE

The table of the microscope where a slide or specimen is placed for viewing. This component moves upward and downward when the focusing knobs are turned.

STAGE CLIPS

A pair of springs that hold the slide on the stage.

DISC DIAPHRAGM

The wheel-shaped device with five (5) openings (apertures), mounted to the underside of the stage. The apertures are numbered from one to five, from the smallest opening to the largest. These numbers are visible at the front side of the stage when the disc is rotated.

CONDENSER

The optical lens that is built into the center of the stage. M2000DF has a N.A. (numerical aperture) 0.65 condenser that is matched to the objectives. For good optical results, the condenser must have a N.A. equal to or larger than the N.A. of the objective that is used. The condenser squeezes light rays into a bundle and emits them through the specimen at a precise angle to illuminate the field of view.

COARSE FOCUSING MECHANISM

Moves the stage rapidly upward and downward, it is engaged by the large black knobs located on both sides of the arm. Mechanically, this movement is generated by a diagonally cut rack and pinion that mesh with each other. The coarse focusing mechanism is used in conjunction with 4X objective for rough focusing of the aimed specimen.

FINE FOCUSING MECHANISM

The fine focus is of the internal mechanism with a micrometer movement, which is also automatically connected with the coarse focusing. The fine focusing is operated by turning the smaller red-colored knobs found in the center of the coarse focusing knobs.

COAXIAL FOCUSING MECHANISM

It is used to obtain a clear, detailed image of the specimen being viewed.

The M2000DF microscope is equipped with a coaxial focusing mechanism, where coarse & fine focusing mechanisms are connected in the axle. The fine focusing knobs are located in the center of the coarse focusing knobs. They are red in color so that they can easily be identified (Swift pioneered this idea). The M2000DF coaxial focusing mechanism has a safety device to prevent gear damage.

FIELD (BASE) CONDENSER

Installed in the one-piece casting condenser housing of the base top. *"100% Student Proof"*.

LIGHTED POWER SWITCH

On/off switch, lights up when in the "on" position and is easily recognizable.

IN-BASE ILLUMINATOR

Light source in the base that illuminates the specimen through the field condenser. Swift's patented "Ultra-Lite®" is a 45° angled 5W, 41K fluorescent lamp. Lamp replacement is easily accomplished by opening the hinged bottom plate.

BASE

The structure at the bottom of the microscope, supported by four rubber feet. This component houses the electrical parts.

OTHER IMPORTANT TERMINOLOGY YOU SHOULD KNOW IN USING M2000DF

COMPOUND MICROSCOPE

A microscope having a primary magnifier (the objective) and a secondary magnifier (the eyepiece) to further enlarge the image and bring the light rays to a focal point (the eyes).

ACHROMAT OBJECTIVE

An optical system corrected for two colors (yellow-green) chromatically and one color spherically.

N.A. (NUMERICAL APERTURE) NUMBER

This is a measure of performance, and can be used to grade expected performance of an objective. It refers to its ability to resolve fine details, features or parts of a specimen. Achromat objectives can go to 1,000 times N.A. before getting into "empty magnification," which means increased magnification, but decreased resolution.

FIELD OF VIEW

The area of the object that is seen when the image is focused.

DIN

(Deutsche Industrial Norman) was originated as a West German standard of interchangeability. It is not a quality standard but one of commonality.

PARFOCALITY

This is the ability to see the specimen in some degree of focus when going from one objective to another. One-quarter turn of the fine focusing knob is a standard tolerance for school microscopes.

(W.D.) WORKING DISTANCE

The distance between the frontal lens of the objective and the specimen when it is in focus.

USING YOUR M2000DF MICROSCOPE

1. After securing the slide into position with the stage clips, turn the power on. Then turn to the 4X objective. The disc diaphragm should be turned to (No. 3)
2. While looking through the eyepiece, rack the stage up by turning the coarse focusing knobs (see the illustration), focusing is done with ease at 4X, as it has a long working distance and wide field of view. The specimen may be centered to the field of view at this time. Then by turning the (red-colored) fine focusing knobs, focus clearly on the details of the specimen. Now you can turn the nosepiece to the higher magnification objectives. The objectives are parfocalized so that once the 4X objective is focused, only a slight turn of the (red-colored) fine-focus knobs is required in changing to the 10X or 40XRD objective.

If the 40XRD objective is brought into contact with the surface of the slide, neither damage to the slide, nor objective front lens will result, as the 40XRD objective is in a retractable mount. 4X and 10X objectives will never make contact with the slide.

3. Please note that smaller apertures of the disc diaphragm increase contrast in the image while large apertures decrease the contrast. (Disc diaphragm is not intended for controlling the brightness of the illumination). A good procedure to follow in selecting the proper aperture (opening) is to start with the largest (No. 5) and reduce until the fine detail of the specimen is in exact focus. Using an inappropriate aperture results in a "washing-out" of the image. However, 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 causes diffraction. The aperture for the 10X objective will not be the same as for the 40XRD objective, since the angle of the required

light is determined by the (numerical aperture) N.A. of the objective, the proper aperture of the disc diaphragm must be selected. This can easily be achieved after minimal experience with the microscope.

4. The wire pointer that is installed in the (standard) W10X eyepiece enables the user to easily point out the object in the specimen being viewed. The pointer can be rotated by turning the eyepiece.
5. When the dual view head is being used in place of the standard monocular head, please notice that the dual view head has a "straight" eyetube on one end and a "diopter adjustable" eyetube on the other. Focus the specimen through the straight eyetube first. Then focus with the other eyetube, by adjusting the diopter ring to obtain the clearest image.

CARE OF M2000DF MICROSCOPE

1. The M2000DF is designed to require a minimal amount of maintenance and has many preventative features for reducing the occurrence of accidents common to "Student" microscopes. Such as; Loss of stage clips, which is eliminated because these are secured to the stage with screws, and gear damage to the focusing mechanism, which is eliminated by internal devices, which prevent the rack and pinion from being disengaged by over-focusing.

Tension of the focusing movement is adjusted at the factory and is controlled by a tension system on the pinion metal of the rapid focus control, which can be adjusted only by an "Authorized Repair Person." Unauthorized persons are strongly cautioned against tampering with this device.

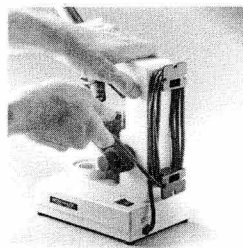
2. CLEANING: The front lens of the objectives (particularly the 40XRD) should be cleaned after use by first brushing with a soft camel-hair brush to remove particles of dust, then by wiping gently with soft lens tissue, moistened with Xylene or clean water and drying with clean lens paper immediately following. The objective should never be taken apart except by a qualified Swift Repair Person. If dust is seen on the back lens of the objective, an all-rubber ear syringe or nasal aspirator may be utilized to blow the dust out.

The eyepiece may be cleaned in the same manner as the objectives, except in most cases Xylene 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.

3. The power switch should be turned off or the microscope unplugged when the microscope is not in use. The M2000DF is equipped with a lighted on/off switch, whereby you can easily recognize whether the switch is in the "on or off" position.
4. Swift Microscopes are covered by a "Limited Lifetime Warranty" for any manufacturing defects found in its instruments. Your "Authorized Swift Dealer" has all of the necessary data to ensure fast, efficient service. Swift Instruments, Inc. stands ready to assist you at any time and your inquiries are invited via our toll-free number, 1-800-523-4544. Your M2000DF Microscope is a versatile instrument and some accessories are available to further enhance its use. Please refer to the "Accessories Section" detailed on page 12.
5. You will note the exploded view of M2000DF in this manual. Each component is numbered and named on the reverse side. If the occasion should arise when it becomes necessary for you to order a replacement part, specify the model number of your microscope, its serial number and the number and name of the required parts. Complete parts are available through "Authorized Swift Distributors."
6. DUST COVER AND STORAGE: All microscopes should be protected from dust by a dust cover when not in use or in storage. 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 a cabinet. It is good practice to always turn the objective revolver so that 4X is in place. You can utilize the cord hangers, installed on the back of the arm, for easy storage of the microscope. Carefully wind the electrical cord around them and insert the end of the cord in one of the grooves of the cord hanger.



**OPTICAL DATA FOR M2000DF
(STANDARD SPECIFICATION)**

OBJECTIVE	N.A.	WORKING DISTANCE	FIELD OF VIEW	COLOR CODE
DIN 4X	0.10	14.83 mm	4.50 mm	RED
DIN 10X	0.25	6.32 mm	1.80 mm	YELLOW
DIN 40XRD	0.65	0.53 mm	0.45 mm	BLUE

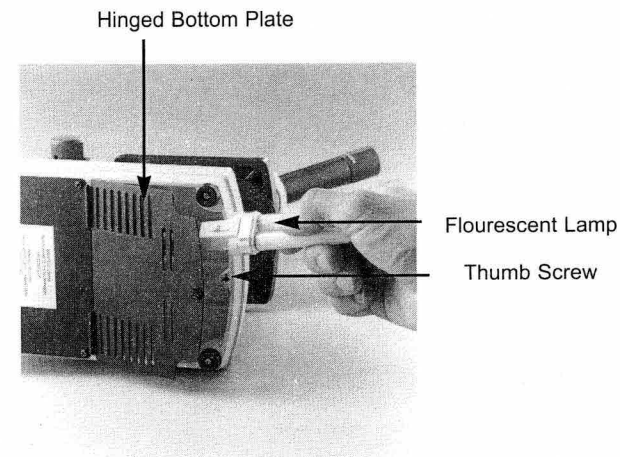
	FOCAL LENGTH	FIELD OF VIEW	EYEPOINT
DIN W10X EYEPIECE	25.0 mm	18.0 mm	12.0 mm

**OPTIONAL ACCESSORIES FOR STANDARD
M2000DF MICROSCOPE**

- MA311** W15X DIN Eyepiece
- MA210D** 10X-20X Zoom Eyepiece
- MA2012** 45° angled Dual View Head (see page 1 of this manual for illustration)
- MA889A** Attachable Mechanical Stage
- SVMA 37** SwiftCam II Video Camera Package (16 mm lens) without monitor
- SVMA 38** SwiftCam II Video Camera Package (8.5 mm lens) without monitor

REPLACING THE LAMP OF IN-BASE ILLUMINATOR

First of all, ensure that the power cord is unplugged. Carefully lay your microscope on its side, then open the hinged bottom cover by loosening the thumbscrew using a screwdriver or coin. You will see a “U” shaped fluorescent lamp in the lamp compartment. With extreme care not to break the lamp, remove by pulling it gently from the socket. Replace with a new lamp.



**SOLVING SIMPLE PROBLEMS WITH YOUR
MICROSCOPE**

The chart on page 14 and 15 may help you to solve simple problems by yourself or assist you in determining the need for a service specialist to remedy more serious problems. Please call for service if you cannot identify the cause of a problem. Before you attempt to fix any problems you are strongly advised to do the following:

- 1. Ensure that you have unplugged the microscope power cord.**
- 2. Never disassemble mechanical or optical components,** as these components should be repaired by an Authorized Swift Technician or Swift Repair Dealer ONLY. Your warranty may be voided if your microscope is disassembled by a non-qualified person.

PROBLEM **POSSIBLE CAUSE OR REMEDY**

No illumination

- Is the power plug connected to an active A.C outlet?
- Is on/off power switch working properly?
- Check the bulb and also try a new bulb.
- Check contact points of socket and bulb.
- If all the above fails, contact your authorized dealer.

Illumination "hot spots" and uneven brightness in the field of view?

- If you have a white diffusing filter, is it in the correct position inside your condenser illuminator filter holder?
- Is the disc diaphragm in the click stop position?
- Is the condenser properly centered?
- Is the objective and nosepiece in the click-stop position?
- Is the illuminator and bulb centered to the condenser?
- Are there any cracked lenses?

Poor Optical Image

- Check condition of your objective frontal lens and clean it if needed. To clean, use lens paper folded several times & moisten with approved lens cleaner, such as Xylene or Windex.
- Check that the retractable objective is in the correct forward position.
- Check that other optical components such as your eyepieces, condenser, and illuminator lens are clean and in the right position.

Flatness of field and curvature

- All achromat objectives have some natural curvature. To achieve a flatter field, you must upgrade to a Micro Plan.
- Check to make sure front lens is clean.

PROBLEM **POSSIBLE CAUSE OR REMEDY**

Broken stage clip

- Remove and return the stage clip assembly to the dealer for service or replacement.

Mechanical stage not working properly

- Remove and return to the dealer.
Do not send entire microscope or stage assembly

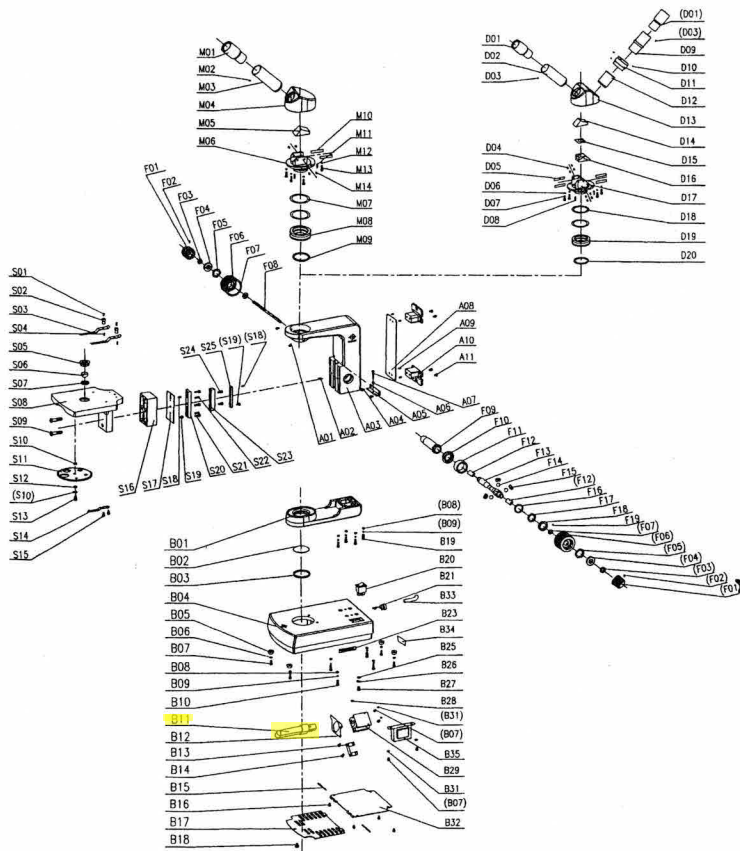
Need parts?

- Acquire the following information:
 1. Model or Series for which the parts are needed.
 2. Serial number of the microscope
 3. Part number or part name from the manual
- Contact your authorized dealer

Where to get Swift

- Contact your local authorized Swift service dealer or
Swift Instruments, Inc.
1190 North 4th Street
San Jose, CA 95112
Phone: (800) 523-4544
Fax: (408) 292-7967

MODEL M2000DF SERIES



PARTS LIST

PART	DESCRIPTION	PART	DESCRIPTION
MONOCULAR HEAD PARTS LIST		ARM PARTS LIST	
M01	W10X Eyepiece	A01	Locking screw
M02	Screw (P-1)	A02	Screw
M03	Eyepiece tube	A03	Arm
M04	Prism housing	A04	Screw
M05	Prism	A05	Upper stop plate
M06	Prism holder	A06	Hex nut upper stop adjusting
M07	Rotating carrier washer	A07	Upper stop adjusting screw
M08	Connector ring	A08	Arm back cover
M09	O ring	A09	Screw
M10	Prism adjusting plate	A10	Cord hanger
M11	Pin	A11	Screw
M12	Locking washer	FOCUSING PARTS LIST	
M13	Screw	F01	Fine focusing knob
M14	Screw	F02	Screw
DUAL VIEW HEAD PARTS LIST		F03	Rubber washer
D01	W10X Eyepiece	F04	Clamp nut
D02	Eyepiece tube	F05	Wave washer
D03	Screw (P-1)	F06	Coarse focusing knob
D04	Screw	F07	Washer
D05	Prism adjusting plate	F08	Spindle
D06	Locking washer	F09	Main gear shaft tube
D07	Screw	F10	Connecting ring
D08	Pin	F11	Recliner ring
D09	Eyepiece tube	F12	Washer
D10	Screw	F13	Gear shaft
D11	Diopter Adjusting ring	F14	Stainless steel ball bearing
D12	Eyepiece tube	F15	Supporter for ball bearing
D13	Prism housing	F16	Ball bearing holder
D14	Prism	F17	WAVE WASHER
D15	Washer	F18	Retainer ring
D16	Prism	F19	Screw
D17	Prism holder	BASE PARTS LIST	
D18	Rotating carrier washer	B01	Base connector
D19	Connector ring	B02	Field condenser lens
D20	O ring	B03	Retainer ring
STAGE PARTS LIST		B04	Base
S01	Screw	B05	Rubber foot
S02	Spacer	B06	Washer
S03	Specimen clip	B07	Screw
S04	Spring	B08	Washer
S05	Condenser support	B09	Locking washer
S06	Condenser	B10	Screw
S07	Container ring	B11	Fluorescent lamp (MA2202F)
S08	Stage	B12	Barrier plate
S09	Special screw	B13	Pressing plate
S10	Washer	B14	Screw
S11	Disc diaphragm	B15	Pin
S12	Wave washer	B16	Screw
S13	Axle screw	B17	Cover plate
S14	Diaphragm click spring	B18	Thumb screw
S15	Screw	B19	Screw
S16	Focusing block	B20	On/off switch (red)
S17	Brass plate	B21	Grommet
S18	screw	B23	Label
S19	Screw	B25	Screw ext tooth washer
S20	Sliding Plate	B26	Round terminal ring
S21	Screw	B27	Screw
S22	Pin	B28	Grounding label
S23	Spacer	B29	Fluorescent lamp holder
S24	Screw	B31	Washer
S25	Rack	B32	Base cover
		B33	Power cord
		B34	label
		B35	Ballast