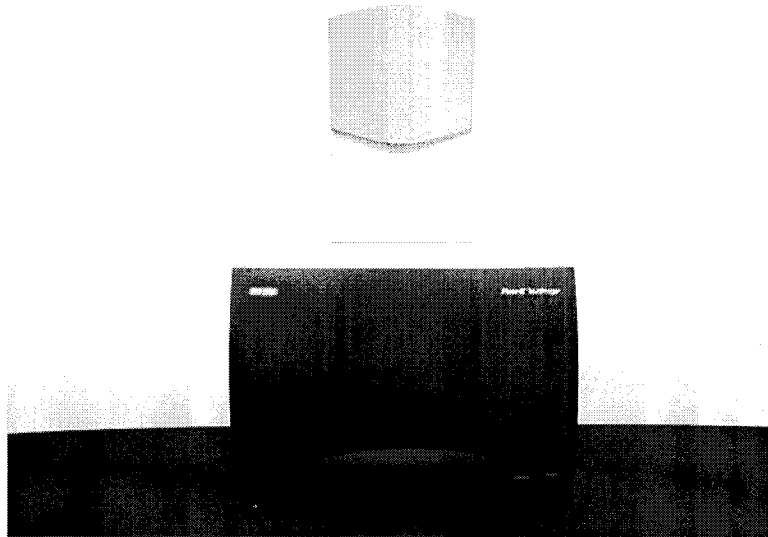


# Fluor-S<sup>®</sup> MultiImager Long UV Kit



## Instruction Manual

for Catalog Number  
170-7730



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Manual Part Number 400-0147 rev. A

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# Section 1

## General Information

### 1.1 About this Manual

This manual provides instructions for installing the Fluor-S Long UV Kit. This manual uses certain conventions to facilitate understanding of the text material and to assist operators in using the Fluor-S system.

#### Conventions

Left and right sides of the instrument are as viewed from the front (operator's position) unless otherwise stated.

#### Notes, Cautions and Warnings

Notes, cautions and warnings are used to highlight certain operating procedures and recommendations.

A note indicates a special procedure, an exception to normal operation or something else of specific interest to the reader. Notes are preceded by the word "*Note*" in italics.

A caution precedes an operational step that could damage the instrument or destroy data unless the operator takes certain precautions. Cautions are located in the main text, are preceded by a **Caution:** statement and are accompanied by a "Caution Symbol" in the left margin.



A warning precedes an operating procedure that could cause injury to the operator if not followed correctly. Warnings are located in the main text, are preceded by a **Warning:** statement and are accompanied by a "Warning Symbol" in the left margin.



## 1.2 Safety Information

Your safety and the safety of others are very important to us. To help you make informed decisions about safety, we have provided comprehensive operating procedures and safety information in this manual and on labels affixed to instrumentation. This information will alert you to any potential hazards.

### 1.2.1 General Cautions



**Caution:** Insert the scan arm lock-down screw located in the back panel of the instrument and tighten by clockwise rotation before moving the Fluor-S and avoid subjecting the system to vibration. The scanning mechanism must be disengaged from the case by removing the screws from the back panel to allow manual movement of the scan arm to the lock-down position. After positioning the scan arm and engaging the lock, reinsert the scanning mechanism.

**Caution:** After transport, always release the scan arm lock-down screw before supplying power to the Fluor-S.

**Caution:** Ensure that all of the systems ventilation openings are free of interference. Excessive heat build up in the instrument may effect performance or cause operational failure.

**Caution:** With the exception of cleaning, replacing or exchanging light bulbs, refer all servicing to qualified Bio-Rad personnel or their agents. If you experience technical difficulties with the instrument contact Bio-Rad to schedule a service appointment. The instrument should not be modified or altered in any way. Alteration of this instrument voids the manufacturer's warranty and may create a potential safety hazard for the user.

**Caution:** Bio-Rad is not responsible for any injury or damage caused by the use of this instrument for purposes other than that for which it is intended or by the modification of this instrument when not performed by qualified Bio-Rad personnel or an authorized agent.

### 1.2.2 General Warnings



**Warning:** There are hazardous voltages inside the scanning mechanism. Do not attempt to override the access panel safety interlock or remove service access panels when the instrument is connected to AC power.

**Warning:** Do not override any instrument interlocks; they are designed to prevent user injury.

**Warning:** Exercise caution when lifting the instrument. It is recommended that at least two people lift the instrument. Lift the instrument by the two rear hand-holds and grip the metal side covers. Never lift the instrument by the plastic threshold or door as this may damage the casing and create a light leak.

### 1.2.3 Power Safety Information

The Fluor-S contains high voltage circuits. The user must disconnect the power cord prior to opening the rear access panel to clean or replace bulbs. A safety interlock latch has been integrated into the system to avoid electrical hazard by preventing users from accidentally opening the system while power is being supplied. Please do not attempt to override this interlock.

The Fluor-S system including the long UV kit is designed and certified to meet EN55011, EN50082-1 and International Electromagnetic Compliance (IEC-1010-1/EN61010 requirements, which are internationally accepted safety standards. Certified products are safe to use when operated in accordance with the instruction manual. This safety certification does not extend to uncertified equipment or accessories, even when connected to the Fluor-S system.

### 1.2.4 UV Safety Information

The Long UV bulbs emit powerful UV radiation and may cause damage to unprotected eyes and skin. The Fluor-S provides safety interlocks on both the door to the sample chamber and optical module to protect the user from accidental UV exposure.



**Warning:** Do not remove the rear access panel when power is supplied to the instrument or defeat the UV safety interlock. Attempting to operate the unit with the cover removed may damage the instrument and expose the operator to UV radiation.

**Warning:** Use of controls or adjustments, or performance of procedures other than those specified herein may result in exposure to hazardous UV radiation.

A UV radiation symbol (Figure 1.1) is located externally on the rear panel of the instrument.



Fig. 1.1. UV radiation warning symbol.

## Section 2

### Kit Description

The Fluor-S Long UV kit contains all of the accessories required to convert a regular Fluor-S or Fluor-S MAX system so that it can image samples that are optimally excited using long wavelength UV radiation (345-390 nm). This kit is especially useful for visualizing native Green Fluorescent Protein (GFP) and some carbohydrate dyes such as ANTS.

The Fluor-S Long UV kit includes a special UV bulb and filter cover that have been designed for insertion into the second slot of the scanning transillumination mechanism (labeled UV2). The bulb and filter can easily be inserted following the procedure outlined below.

## Section 3

### System Installation

#### 3.1 Unpacking

The Fluor-S Long UV kit is shipped in a single box. Upon receipt you should open the box, carefully remove all the items and perform a shipping check to confirm that the kit is complete and that no items are damaged. If items are either missing or damaged, this should be reported to both the shipping company and Bio-Rad.

The Fluor-S Long UV kit should arrive complete with the following items:

Quantity	Item
1	Long UV Bulb
1	Long UV Filter and Housing
1	Lens and Filter Cleaning Kit
1	Instruction Manual
1	Warranty Card

#### 3.2 Installing the Long UV Bulb and Filter

To access the scanning mechanism for insertion of the long UV bulb and filter follow the procedure outlined below:

1. Turn off the Fluor-S and disconnect all power, removing the power cable.
2. Rotate the Fluor-S so that the back surface is accessible.
3. Remove all cables attached to the bottom access panel.
4. Remove the eight screws that hold the rear access panel in place using a Phillips screwdriver.
5. Unscrew and remove the grounding strap from the main case.

6. Slide down the safety interlock to release the rear access panel and gently slide the entire access panel and scanning illumination mechanism assembly 10 cm out of the instrument.
7. Disconnect the electrical connector located at the middle of the left-hand side of the illumination mechanism and remove the cable from the retaining clamp.

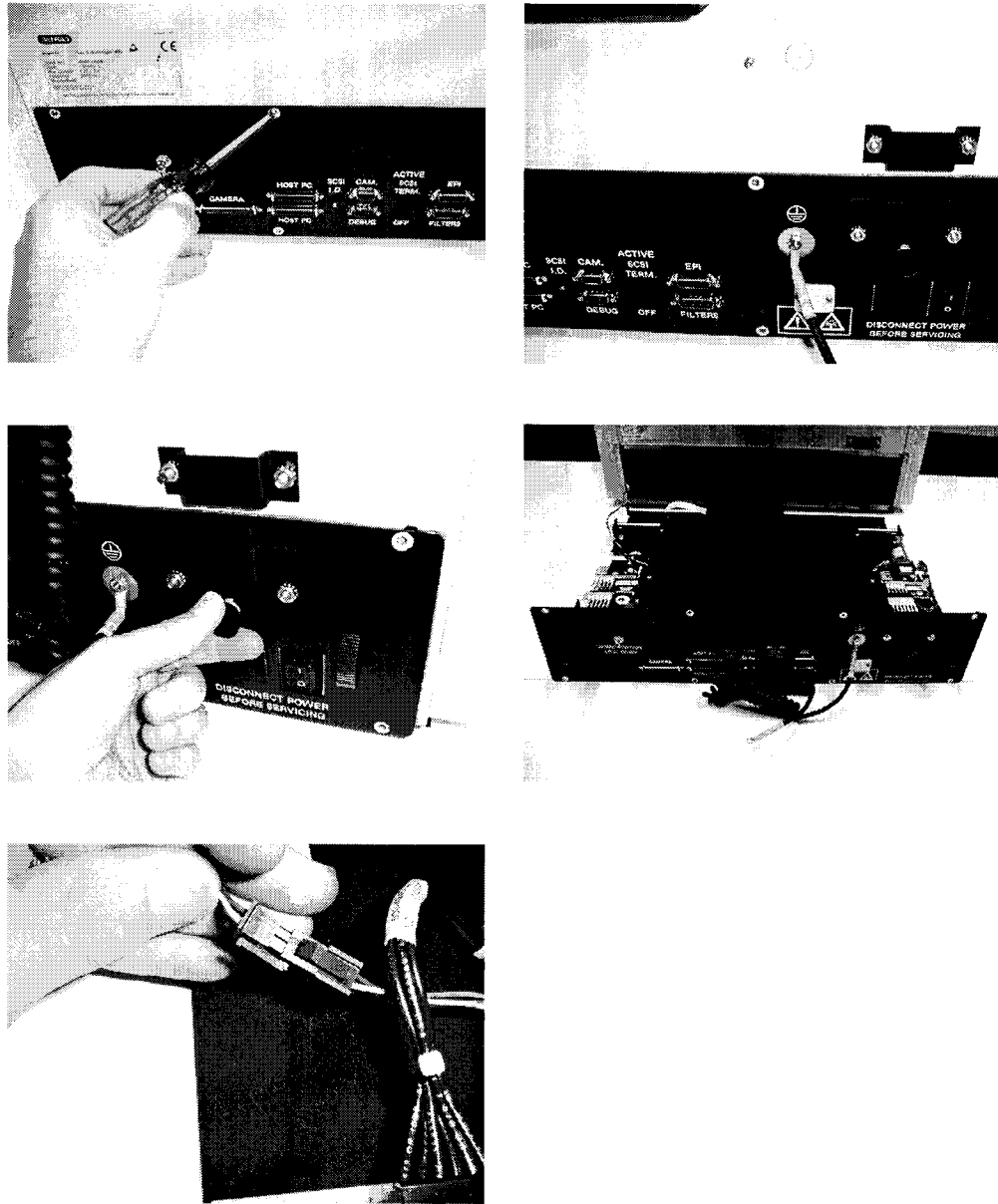


Fig. 3.1 Steps in accessing the scanning illumination mechanism.



**Caution:** Do not touch the glass parts of the bulb or bulb housing. Fingerprints on the bulb may result in non-uniform illumination. The use of power-free latex gloves is highly recommended.

To replace the standard short UV bulb with the long UV bulb and filter, follow the procedure outlined below (Figure 3.2):

*Note:* Some Fluor-S systems and all Fluor-S MAX systems are not supplied with a short bulb preinstalled in the UV2 position. When installing the long UV bulb and filter in these systems ignore the bulb removal steps 3 and 4, listed below.

1. Lift the end of the scanning arm that is closest to the rear panel of the scanning assembly and remove the three Phillips screws located at the end of the assembly.
2. Remove the end plate and then the metal and glass excitation filters (light shield) from the UV2 position of the bulb housing. In the MAX system then there will be a blank top plate that must be removed.
3. Remove the yellow retaining tape and keep for reuse.
4. While grabbing the two metal ends of the bulb, carefully rotate the old bulb and remove it from the housing sockets.
5. Install the new long UV bulb by inserting its ends in the sockets and rotating until it clicks into place.
6. Replace the yellow retaining tape.
7. Install the new excitation filter assembly (light shields) and screw the end plate back in place.
8. Clean the glass filters on the top surface of the three lamp housings using the cleaning solution and wipes provided.
9. Reinsert the illumination mechanism by reversing steps 1 to 7 above. Remembering to reconnect the electrical connector, reinsert the cable in the retaining clamp and replace the screws. You should move the scan arm to the very left and verify that the cables do not interfere with its movement.
10. Lift up the power safety interlock and reapply power to the system.
11. Rotate the Fluor-S back to its normal operating position.

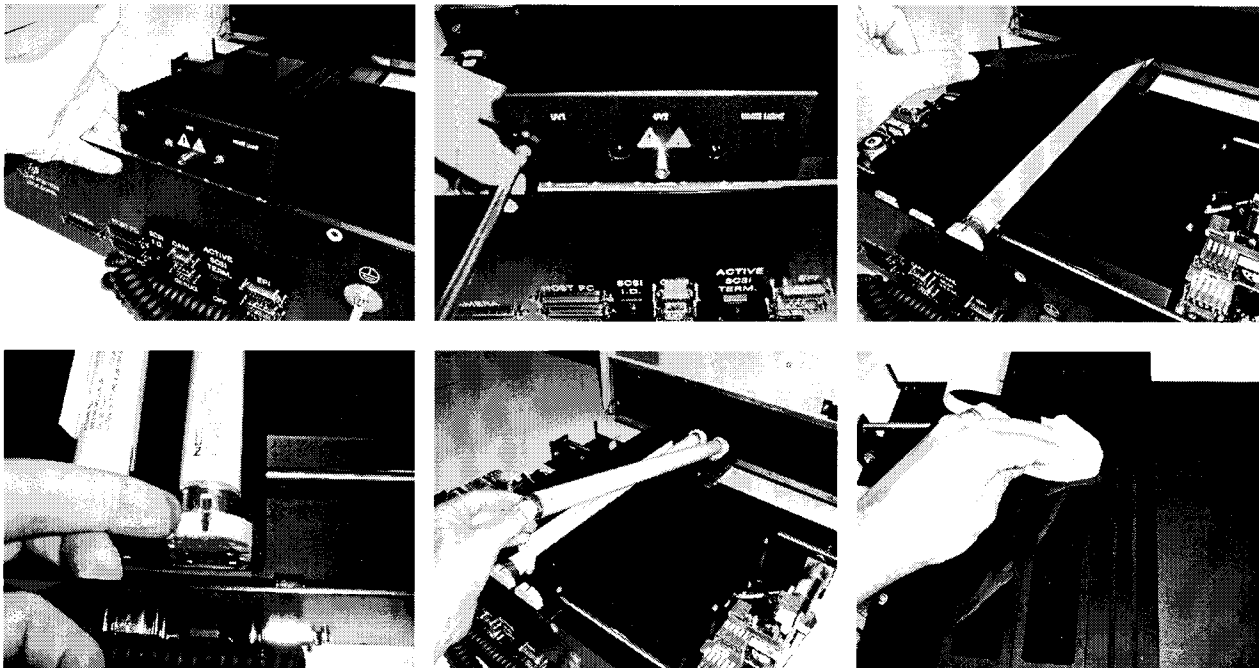


Fig. 3.2 Steps in replacing a bulb in the scanning illumination mechanism.



The life of the long wavelength UV bulb is approximately 500 to 1000 hours, depending upon use. As the bulb ages, the required integration time will increase because the intensity of the UV emission will diminish. If the integration time for image acquisition has increased more than three-fold, it is recommended that the bulbs be replaced.

## Section 4 Troubleshooting & Technical Information

### 4.1 Problem Solving Guide

Problem	Possible Cause	Solution
Fluor-S is not responding to host computer	Power is not supplied or the system is not switched on	Ensure power is supplied to the system and that the switch is turned on
	Scanner door is open	Close Door
	SCSI cable is not properly connected to scanner or computer	Reconnect SCSI cable and ensure it is seated properly
	Filter cable or camera cable is not properly connected	Makes sure that the cables are connected and seated properly
	SCSI ID conflict	Change SCSI ID setting
	Fluor-S is operating as a stand alone or last item and is not terminated	Turn on the SCSI termination switch
	SCSI cable is defective	Replace SCSI cable
	Start-up sequence is incorrect	Turn off all components and restart in opposite sequence
	Computer has a conflicting program or initiation (init.) file	Contact Bio-Rad for assistance
Image is not visible on the monitor or only low signal counts are detected	The 'Transform' function in the software is set too high	Set to a lower maximum value
	Lens cap is covering lens	Remove lens cap
	Insufficient integration time	Integrate sample for a longer time
	Chemi tray not removed when imaging non-chemi sample	Remove chemi tray from sample chamber
	Wrong application selected	Verify / reselect correct application
	Wrong scanning area selected	Verify / reselect correct scanning area
	Bad lamp	Replace lamp
	Dirty optics	Ensure that platen, filter and lens are clean
Image intensity varies across the scan	Bad lamp	Replace lamp
UV scanning or epi-illumination not working	Door to either optical module or scanning module is open	Ensure doors are closed properly
Scanned image has horizontal streaks	Dust or small particles on the scanning source	Clean the scanning assembly
Fluorescent image has spots	Dust or small particles on the quartz platen or optics	Clean the quartz platen, lens and filters
White light Image has vertical lines	White light scanning plate was not used	Insert the white light scanning plate and rescan sample

Fluorescent image has high background	Image was scanned without being removed from glass plate	Remove plate from sample. Thin polyacrylamide samples can be transferred to exposed x-ray film and imaged using UV-epi mode
	660 nm filter is not in place	Install 660 nm filter onto lens
	Wrong application selected	Verify / reselect correct application
	Light leak	Check for light leaks, ensure optics module tightly connected to scanner
	High fluorescence agarose used	Use low fluorescence agarose
	Auto-fluorescence from sample	Remove sample and perform control scan
	Destain (if appropriate) was insufficient	Increase destain
Filter wheel does not turn	Obstruction in filter wheel housing	Check for and remove obstruction
	Cable was removed when power was on, damaging main board	Contact Bio-Rad for assistance
	Custom lens is causing obstruction	Contact Bio-Rad for assistance
	Bad filter wheel cable or connection	Reconnect / replace cable
Epi bulbs are not turning on	Bad lamps	Replace lamps
	Door interlock not working	Contact Bio-Rad
Integration time to acquire image has increased	Bulb intensity has decreased with age	Replace bulbs
	Image area has increased	Verify scan area selected
Poor chemiluminescence sensitivity	Incorrect application selected	Verify application is correct for sample
	Incorrect lens used	Use the 50 mm high NA lens for best chemi results.
	Sample on platen with chemi tray installed	Place sample on chemi tray or remove tray from sample chamber
	Incorrect f-stop setting	Adjust f-stop to a lower value, f/1.4 recommended.
	The 660IR cutoff filter was not removed from the lens	Remove 660 cutoff filter
	Insufficient integration time	Integrate sample for a longer time

## 4.2 Technical Service

For technical assistance with the Fluor-S system including all hardware and software, contact your local Bio-Rad office, or in the US call 1-800-424-6723. All spare parts not listed in this document can be ordered by contacting your local Bio-Rad office.

For inquiries and requests regarding system repair or service, contact your local Bio-Rad office or distributor (in the U.S., call Technical Service at 1-800-424-6723). Please have the following details available:

1. Instrument model and catalog number.
2. Serial number (located on the back of the optics module door).
3. Hardware, firmware and software version information (in operating software, "About" box).

### 4.3 Fluor-S Warranty Information

This warranty statement may vary outside of the continental United States. Please contact your local Bio-Rad office for the exact terms of your warranty.

Bio-Rad Laboratories warrants to the customer that the Fluor-S Long UV kit (catalog number 170-7730) will be free from defects in material and workmanship. This warranty covers all parts.

If any defects should occur during this period, Bio-Rad Laboratories will either replace the defective parts free of charge. For the exact terms of warranty, please see the Instrument Warranty Card.

Bio-Rad shall not be liable for any incidental, special or consequential loss, damage or expense, directly or indirectly arising from use of the Fluor-S system. Bio-Rad makes no warranty whatsoever in regard to products or parts furnished by third parties, such being subject to the warranty of their respective manufacturers. Service under this warranty shall be requested by contacting your nearest Bio-Rad office.

This warranty does not extend to any instruments or parts thereof that have been subject to misuse, neglect, or accident, or that have been modified or serviced by anyone other than Bio-Rad or its representative, or that have been used in violation of Bio-Rad instructions. It also does not extend to instruments or parts thereof that have been used with fittings or other spare parts not authorized by Bio-Rad Laboratories, that are interfaced to inappropriate external devices, that have been exposed to inappropriate solvents, cleaning agents or samples. The warranty also does not cover instrument damage resulting from facility problems such as power surges.

The foregoing obligations are in lieu of all other obligations and liabilities including negligence and all warranties of merchantability, fitness for a particular purpose otherwise expressed or implied in fact or by law, and state Bio-Rad's entire and exclusive liability and the buyers exclusive remedy for any claims or damages in connection with the furnishing of goods or parts, their design, suitability for use installation and operation. Bio-Rad Laboratories will in no event be held liable for any special, incidental or consequential damages whatsoever, and Bio-Rad's liability under no circumstances will exceed the contract price for the goods for which liability is claimed.

### 4.4 Glossary of Imaging Terms

CCD:	Charge-Coupled Device.
CCD Element:	Each CCD element or pixel is capable of detecting light and storing the resulting electronic information.
CCD Array:	A CCD array can be visualized as a periodic grid array of individual CCD elements, (analogous to a water buckets). When the shutter is open, photons of light (analogous to drops of rain) fall into the photo-detectors (water buckets).

Integration:	When the camera shutter is open and the CCD is exposed to light.
Thermoelectric Cooler:	A thermoelectric cooler (TEC) that pulls heat away from the CCD. The heat is then transferred to the camera body, which is cooled by forced air.
Dark Current:	Dark current arises from the creation of electrons generated through the process of thermal emission within the silicon layers comprising the CCD. Dark current noise is the square root of the number of dark current electrons. The presence of dark current is an additional concern in low light level applications. It is important to ensure that dark current noise does not exceed read noise from the signal even when long integration times are used
Signal to Noise:	Signal to noise ratio (SNR) is the measure of the signal quality at a given pixel. It is the ratio of the measured signal to the overall measured noise at that pixel.
Dynamic Range:	Dynamic range of a CCD is simply defined as the ratio of CCD saturation to the read noise. It is the ability to quantitatively detect very dim and very bright pixels within a single image.
Quantum Efficiency:	Quantum efficiency is the measure of the effectiveness of an imaging device to produce electronic charge from incident photons. This is an especially important property when performing very low light level imaging.
Dead Pixels:	There are a variety of different grades of CCD chips. Each grade has some percentage of dead or bad pixels. These are typically displayed as white or dark lines on the image. Most CCD systems correct for dead pixels.
Image Resolution:	Image resolution refers to the spacing of pixels in the image and is measured in pixels per inch (ppi). If an image has a resolution of 72 ppi this means that it contains 5182 pixels (72 x 72) in a square inch.
Monitor Resolution:	Monitor resolution defines the number of dots or pixels per unit length of output. It is commonly measured in dots per inch (dpi). The monitor resolution determines the size of the displayed image and should not be confused with image resolution, which reflects the spacing of pixels in the image.