

# SuperBright 3

## 4000 Series

### Instruction Manual

Revision 5-11-16

#### Terms Used in This Warranty and the Instructions

**Light** – This always refers to the complete light assembly, which is the housing, handle, everything inside the housing, and the cover. The cover holds the filter. Sometimes referred to just as the **SuperBright 3**.

**Lamp** – This always refers to the bulb, tube, or light tube. The **LS-16XA** with two pins is the lamp (bulb) that is used in the **SuperBright 3** Short Wave model 4254. The **LM-16-312B** is the lamp used in the Medium Wave model 4312. The **LL-16-351A** is the lamp used in the LW350 model 4351, and the **LL-16-368A** is the lamp used in the LW370 model 4368. The last three digits of the model number refer to the peak wavelength of the output.

**AC/DC Adapter** (power supply) – This refers to the 100VAC to 240VAC to 12VDC electronic power supply that provides the 12VDC necessary to operate the light from a wall outlet [the power supply is labeled an AC/DC Adapter]. This **Hechoen model XH143** (or equivalent) AC/DC adapter is a separate unit with a separate 115VAC cord that plugs into wall power with another cord that has a round plastic female connector that plugs into the **SuperBright 3**.

#### MODELS AVAILABLE

There are four models of the **SuperBright 3**, model 4254 is Short Wave (SW) at 253.7 nm, model 4312 is Medium Wave (MW) with a peak at 312 nm, model 4351 is Long Wave (LW) with a peak at about 351 nm (LW350), and model 4368 is Long Wave with a peak at about 368 nm (LW370).

#### WARRANTY

The UV SYSTEMS, Inc. **SuperBright 3** complete with the **XH143** AC/DC adapter, and 115VAC power cord, is guaranteed to be free of defects in materials, workmanship, and manufacture for one (1) year from date of purchase. Consumable and disposable products, including –but not limited to –lamps (light tubes), filters, and rechargeable batteries are guaranteed to be free from defects in workmanship and materials for thirty (30) days from date of purchase. If equipment failure or malfunction occurs during the warranty period, UV SYSTEMS, Inc. will examine the inoperative equipment and, at its option, repair or replace any part(s) which, in the judgment of UV SYSTEMS, Inc., was (were) originally defective or became so under conditions of normal usage and service.

This warranty does not apply to any instrument or light, or part thereof that has been subject to accident, negligence, alteration abuse, or misuse by any user. Moreover, UV SYSTEMS, Inc. makes no warranty whatsoever with respect to parts not supplied by UV SYSTEMS, Inc. or that have been installed, used, and/or serviced other than in strict compliance with the instructions appearing in the operation manual supplied to the end user.

In no event shall UV SYSTEMS, Inc. be responsible for any incidental or consequential damages, whether foreseeable or not, including, but not limited to property damage, inability

to use the equipment, lost business, lost profits, or inconvenience arising out of or connected with the use of instruments or lights produced by UV SYSTEMS, Inc. Nor is UV SYSTEMS, Inc. liable or responsible for any personal injuries occurring as a result of the use, installation and/or servicing of the equipment or light.

**WARNING for Models 4254 and 4312**

When the 4254 or 4312 model lights are operating, considerable ultraviolet (253.7 nm, UV-C from the model 4254, or 312 nm, UV-B from the model 4312) energy is emitted which may produce sunburn on the skin and/or conjunctivitis to the eyes upon exposure to direct or reflected radiation. Never look into a lighted **SuperBright 3** model 4254 or model 4312 light because it could quickly sunburn your eyes and skin. Always hold the **SuperBright 3** models 4254 or 4312 so that the ultraviolet light shines away from you and others. The **SuperBright 3** models 4254 or 4312 may emit more ultraviolet than you are used to. It is suggested that protective goggles (such as UV SYSTEMS GBa, or equivalent) be used to block ultraviolet radiation from reaching your eyes, and that your skin be protected from direct exposure to the light's ultraviolet rays.

**A1. INSTRUCTIONS and INFORMATION about  
Short Wave SuperBright 3 model 4254**

You are now the owner of the newest ultraviolet light specifically designed for mineral fluorescence. The light is more powerful than the original SuperBright 2000SW or the **SuperBright II**. The model 4254 uses a quartz U-shaped lamp that is very resistant to bulb solarization. This hot cathode quartz lamp is the only one used in any hand-held ultraviolet lights for mineral fluorescence. It has an electronic instant start inverter-ballast that will allow the light to be operated in the field from a 12VDC battery. The inverter-ballast in the **SuperBright 3** has been redesigned to be more powerful than the original one used in the SuperBright. The instant start operation means that no starters or extra switches are needed to turn the lamp "on." Instant start operation also means that the **Hechoen model XH143** AC/DC adapter can be plugged directly into an external electrical or electronic timer for timing applications. Note that it takes about ½ second after the AC/DC adapter is plugged in or turned on before it produces the 12VDC necessary to operate the **SuperBright 3**. The internal inverter-ballast inside the **SuperBright 3** operates the lamp at a higher frequency than the usual 60 Hz. The result is a highly efficient lamp.

Note that the **LS-16XA** lamp has the minimum amount of mercury in the bulb to protect the environment. This means that when you **first** use the **SuperBright 3** (or if the light has sat unused for several months) you might have to initialize the **LS-16XA** lamp by turning it "on" and warming it up for about ten minutes to vaporize and distribute the mercury in the lamp. If the lamp is only bright in a small area (usually near the ends) of the bulb then it needs this one-time warm-up (do not look at the lamp without a protective faceplate or protective goggles). Once the mercury has been distributed and the whole lamp is bright, you should not have to do it again unless you don't use the **SuperBright 3** for months at a time (and the mercury settles to one end of the lamp).

**A2. INSTRUCTIONS and INFORMATION about  
Medium Wave SuperBright 3 model 4312**

These instructions are very similar to those of A1 above, since the only difference is the lamp. The model 4312 uses a **LM-16-312B** UV phosphor coated lamp with a peak output at about 312 nm. The lamp bulb is made with a special glass that transmits the UV-B wavelengths; sometimes this special glass is referred to as UV-C glass. Note that MW (UV-B) radiation will not solarize the **FS-20** filter. Therefore if the filter is kept dry it should last for many years.

The **LM-16-312B** lamp might need the one-time warmed up as mentioned above about the LS-16XA lamp in A1.

**A3. INSTRUCTIONS and INFORMATION about  
Long Wave (LW350) SuperBright 3 model 4351**

These instructions are similar to those of A1 above; however, both the filter and lamp are different. The model 4351 uses a **FL-20** long wave filter that does not solarize or deteriorate. The model 4351 uses a **LL-16-351A** UV phosphor coated lamp with a peak output at about 351 nm. The lamp bulb is made from standard soda-lime glass that transmits the UV-A wavelengths.

**A4. INSTRUCTIONS and INFORMATION about  
Long Wave (LW370) SuperBright 3 model 4368**

These instructions are similar to those of A1 above; however, both the filter and lamp are different. The model 4368 uses a **FL-20** long wave filter that does not solarize or deteriorate. The model 4368 uses a **LL-16-368A** UV phosphor coated lamp with a peak output at about 368 nm. The lamp bulb is made from standard soda-lime glass that transmits the UV-A wavelengths.

The four parts of a **SuperBright 3** are the light assembly housing, the handle assembly (including the plastic handle with a bolt and matching nut, two nylon wing nuts, slip ring and neck lanyard), the AC/DC adapter (**Hechoen model XH143** 100-240V 50-60 Hz to 12V DC) or equivalent, and the 115VAC power cord. Inspect each of the four parts to make sure there is no shipping damage. The only assembly required is to attach the handle to the light's housing, and to plug in the power cord to the AC adapter.

**B. TO ATTACH THE ERGONOMIC HANDLE AND NECK LANYARD TO  
THE LIGHT'S HOUSING**

Remove the two nylon wing nuts from the top of the light assembly. The handle-bracket can be installed in one of four positions on the top of the light. The most common position is with the handle-bracket parallel with the long sides of the **SuperBright 3**, with the open handle towards the jack. Another handle position is 90° to the length of the light. That will make the handle-bracket face toward one side of the light. You can choose either. Tighten the nuts with your hand, but do not over-tighten. The handle-bracket can be easily removed to pack for a field trip or travel if you wish, and the white nylon wing nuts are easy to be seen on the ground if you happen to drop one.

The handle has a split ring attached that allows the custom made neck lanyard to clip on to the ring. The neck lanyard will hold the **SuperBright 3** around your neck so your hands can be free. This comes in handy in the field, at mineral shows, or other locations where you cannot find a convenient location to set down your **SuperBright 3**.

### C. CONNECTING THE Hechoen Model XH143 AC/DC ADAPTER AND TURNING THE LIGHT ON

IEC male connector on the AC adapter and the female plug on the power cord

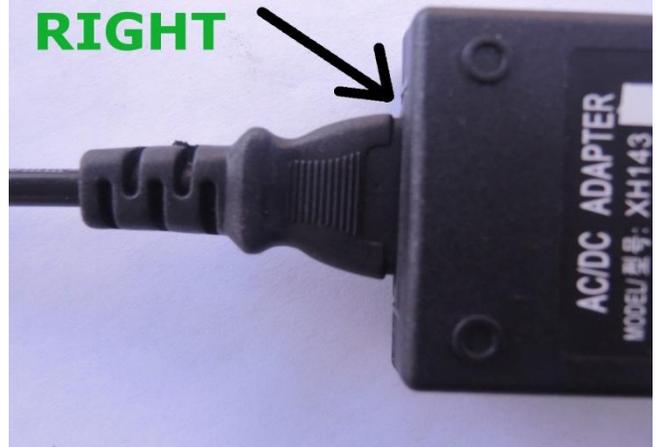


The **Hechoen** (100-240V 50-60 Hz to 12V DC) AC/DC adapter (also called a power supply) is separate from the light so that the light itself will be lightweight for easy handling. Attach the AC power cord to the AC/DC adapter (you have to push it in hard for a reliable connection) and attach the female connector from the AC/DC adapter to the **SuperBright 3** and plug the AC cord into wall power. It is not necessary to lock the female connector to the **SuperBright 3** unless you want too. Just insert the connector into the mating male

Not all the way in to the AC/DC adapter  
**WRONG**



Plug all the way into the AC/DC Adapter  
**RIGHT**



connector of the **SuperBright 3** and it will make electrical contact, if you want to lock it just twist the outer shell about one turn clock-wise.

Note that the AC power cord has an IEC (International Electrotechnical Commission) connector that plugs into the AC/DC Adapter. The AC power cord IEC connector must be plugged all the way into AC/DC Adapter, otherwise the connection may be intermittent and the light might blink “on” and “off”. You might have to push hard to get the female IEC plug all the way into the male pins. See the photos of a plug **not all the way** in and one **all the way in**.

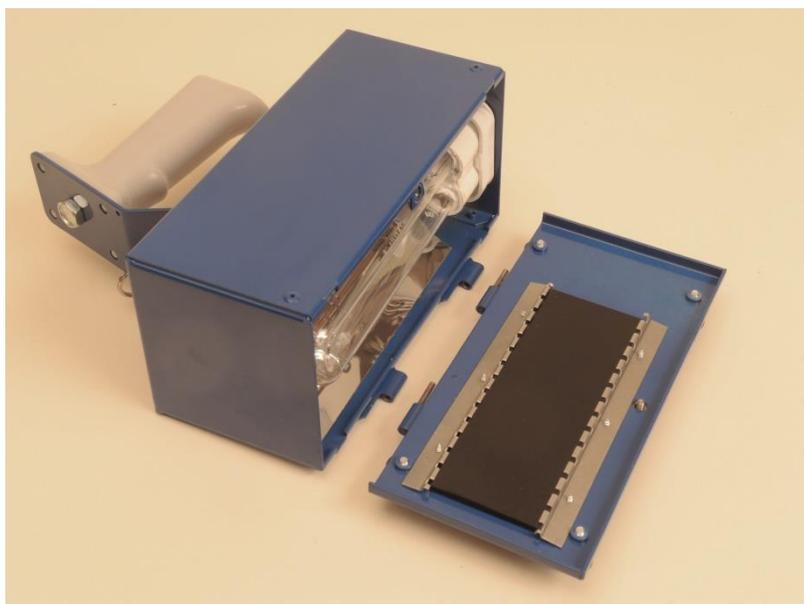
The **Hechoen Model XH143** AC/DC adapter can be left plugged into the 100V to 240V AC wall outlet continuously.

Rather than unplugging the AC/DC adapter the switch on the light then can be used to turn the light "on" or "off". The switch is a rocker switch with a rubber boot to protect it from

sand and water. The switch is not sand or waterproof, but the boot will provide some protection.

The **SuperBright 3** connector system is designed to be robust and very reliable. The Military Specification type connectors have four pins for redundancy; although only two pins are actually used. In the **SuperBright 3** male connector, pin 1 is positive and pin 3 is negative. The male and female connectors will make electrical contact just by inserting them together; they can also be locked into place by turning the sleeve clock-wise about one turn.

### **EASY-OPEN FEATURE**



The **SuperBright 3** has an easy-open feature that lets you quickly open the cover with the blue round knob to change the lamp or replace the filter. The cover is on slip-hinges; so that once the cover is open it can be slid up to remove the pins from the slip-hinges. You might have to wiggle the cover back and forth several times to remove it from the slip hinges since it is a tight fit. The **SuperBright 3** easy-open cover allows quick prospecting for rare-earth minerals. With the SW filter out of the way, the green light

emitted by the UV lamp at 576 nm and 579 nm will be reflected from some rare-earth minerals, notably those in the monazite and bastnäsite groups. When closing the cover be careful not to pinch your fingers.

#### **D. REPLACING THE SHORT WAVE FS-20 FILTER**

Reasons you might want to replace the special glass filter in your **SuperBright 3** are included below at the end of this section D. If you are already familiar with this subject, you can go right on to the following directions for removing it.

To remove the glass **FS-20** filter, first unplug the 115V AC plug and disconnect the connector to the **SuperBright 3**. (1) Open the cover and remove the cover from the slip hinges. (2) Loosen (but do not remove) all six Phillips head sheet metal screws on the cover that hold the two aluminum filter holders. (3) Remove the three screws on one side. (4) Remove that metal filter holder and slide the filter out. To install a filter just reverse this procedure. Use care when installing a new filter so that the aluminum cover or metal filter holders do not put undue stress on the filter. For example, the recommended method is to tighten each screw a little bit, going around to all six screws several times, rather than tightening first one screw completely and then another. Tighten only enough to hold the filter gently in place.

## Reasons you Might Want to Replace the Filter

Because the **SuperBright 3** model 4254 is so powerful, more short wave ultraviolet passes through the **FS-20** filter than with many other lights on the market. Short wave ultraviolet radiation causes a chemical reaction in the filter glass that reduces the transmission of the 253.7 nm [UV] wavelength with time. This is called solarization. The visible light that you can see transmitted through the filter does not change as the filter solarizes, and so in no way indicates the degree of solarization. This solarization effect is a function of the amount and duration of short wave ultraviolet light exposure. In addition, if the light is stored in a damp or humid environment, a white coating can form on the glass that also causes a reduction in 253.7 nm UV transmission. The coating is caused by a chemical action with the moisture in the air. The coating can be cleaned off, but the glass under the coating has already been affected, resulting in reduced transmission. The filter can be checked periodically for solarization by obtaining an ultraviolet radiometer and measuring the actual 253.7 nm transmission. When the light is not being used, turn it off to reduce the filter's exposure to excessive ultraviolet. Turning the light "on" and "off" frequently has a negative effect on the life of the lamp, but it has a positive effect on the life of the filter (with less ultraviolet exposure), so there is a tradeoff. I prefer turning the light off. A life test of several SW filters in a **SuperBright 3** test showed that the filters will last about 3,100 "on" hours. For many owners this will be 2 to 4 years or normal use. A humid environment can shorten the life of a SW filter. When not in use, the light should be stored in a dry environment to protect the filter. Note that MW (UV-B) will not solarize a SW **FS-20** filter.

### E. REPLACING THE LAMP (Figure A)

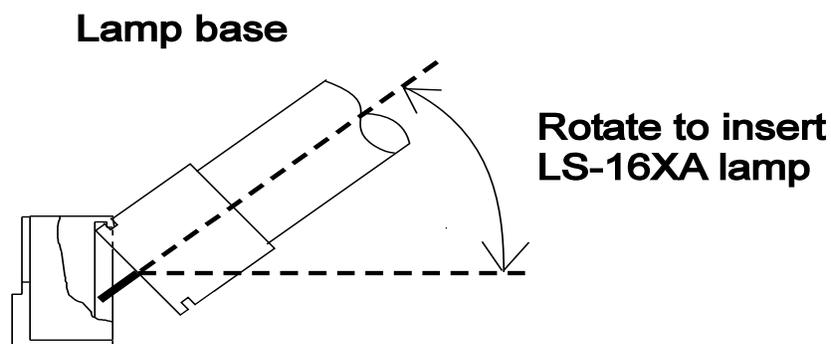


To either remove or install a **LS-16XA**, **LM-16-312B**, **LL-16-351A** or **LL-16-368A** lamp, first unplug the cord going to the **SuperBright 3**. Open the cover (it is not necessary to remove it from the slip hinges). Remove the bare wire that holds the lamp in the lamp clip. Hold the light facing up with the lamp horizontal. Note that the lamp **WILL NOT** come straight out of the socket, but will pivot. Grasp the lamp near the bent "U" end and gently pull it up out of the metal lamp clip. Now pivot with the pins still in the socket. As you continue to pivot the "U" end up, (still within the first approximately 15° of the pivot) you may feel some slight resistance (or hear a pop) as the back of the lamp base snaps past a plastic tab in the back of the lamp socket. As you pull up more (greater than about 20°) the

lamp will clear the back plastic tab and the pins will clear the socket so the lamp can be removed.

Note that the **LS-16XA**, **LM-16-312B**, and **LL-16-368A** lamps only have two pins (pins 2 and 3), and that is all that are needed.

## INSERTING THE LS-16XA LAMP INTO THE SuperBright 3



**Figure 1**  
**3-13-16**



Notice that the socket tab is **NOT** over the base ridge



**CORRECT** Showing the socket tab over the base ridge

To install the new lamp, hold the light facing up with the socket on your left\*\*. Notice that there is a plastic tab\* in the middle of the top of the plastic socket. Also notice on the lamp base that there is a 0.1" wide straight ceramic ridge near the pins, between, and connecting, the two partly circular bases. See Figure 1. Hold the lamp in your right hand near the ceramic base (not the bent "U" end), with your thumb on one side and your other fingers on the other side.

\*\* If you are right handed.



Insert the lamp base at an angle so that pins go into the socket **AND** the straight ceramic ridge of the lamp base is **under** the plastic tab of the socket. The plastic tab must be hooked over the ceramic ridge. Apply slight pressure into the socket (the direction of the force should be from the bent "U" end along the lamp and toward the lamp ceramic base) as you pivot the lamp downward. If done correctly, the lamp pins will make contact, and the lamp can be clipped into the metal lamp clip. Note: if the plastic socket tab is not over the ceramic ridge of the lamp base the pins will not make contact, and you must try again. It may take more than one try to get the lamp pins into the

socket. Note that there might be some play in the lamp when the pins are correctly in the

\* That is 0.2 inch wide and only 0.05 inch deep.

socket; however, the pins are making electrical contact, and the lamp clip will keep the lamp from moving. The wire between the lamp clip prongs is not required, but it does give added stability, and it is suggested that you use it.

Incidentally, the lamp clip is also designed to function as a heat sink. That is, it helps to cool the lamp. This helps to maintain the correct mercury vapor pressure in the lamp. As is typical of most ultraviolet lights, if the mercury vapor pressure gets too high because the lamp or bulb wall gets too hot, the ultraviolet output will temporarily drop. The **SuperBright 3** is designed for optimum performance with intermittent use. If the light is left on continuously, no harm will be done to the light, lamp, inverter-ballast, or AC/DC adapter. However, after a period of time the light may exceed the optimum operating temperature that the lamp was designed for and the ultraviolet output will be temporarily reduced by a small amount. In order to regain peak ultraviolet output, the light should be turned off for a short time and allowed to cool. After the lamp cools and is turned back on, it's ultraviolet output will again be at maximum output. Typical service design for the lamp is ten minutes on and twenty to forty seconds off repeated continuously. If the light is operated longer than about ten minutes no harm will be done; the ultraviolet output will just be temperately reduced by a small amount. It is extremely unlikely that the slight temporary reduction in ultraviolet output will be noticeable. If the owner gets in the habit of turning off the light every time he sets it down, this will not only preserve the life of the short wave filter, but also help cool the lamp for optimum bulb wall temperature and optimum ultraviolet output. If the light will be used for a permanent display and left on for hours as a time, it can be modified to maintain peak ultraviolet output. The owner can contact UV SYSTEMS, Inc. to find out how to quickly and permanently modify the light for optimum continuous use.

As with most hot cathode fluorescent lamps, each time the lamp is started, the life of the lamp is reduced by a small amount. However, whenever the lamp is "on", it is causing the SW filter to solarize. Keep in mind however, that turning the light "off" saves the filter. The life of a typical lamp depends on how many times it is turned "on" and "off". Three life tests were conducted over 21 months on several **SuperBright 3** lamps, with each lamp being cycled "on" and "off". The test cycle was 10 minutes "on" and about 36 seconds "off". The tests indicate that the SW **LS-16XA** or **LS-16X** lamp, on average, should last over 19,900 "on-off" cycles. The MW **LM-16-312** or **LM-16-312B** lamp, on average, should last over 16,000 "on-off" cycles, and the LW350 **LL-16-351** lamp, on average, should last over 6,900 "on-off" cycles. Because there are so many factors involved, it is impossible to recommend an ideal use of the **SuperBright 3** that exactly balances SW lamp life and SW UV filter life. However, I would suggest turning the light "off" after every use.

#### **F. IMPROVEMENTS IN THE SuperBright 3 OVER THE SuperBright II**

There are at least four improvements in the **SuperBright 3** over the **SuperBright II**.

1. The UV light was redesigned so the cover could be opened with one simple knob.
2. The cover is attached with slip hinges so it can be easily removed from the housing.
3. The reflector is a higher efficiency resulting in about a 6% increase in UV output.

4. The new switcher AC/DC adapter (also called a power supply) is smaller and lighter in weight. It will operate from 100 to 240VAC and from 50 Hz to 60 Hz so it can operate from house current anywhere in the world.

### **G. MAJOR PARTS LIST FOR SuperBright 3**

SW or MW Filter	<b>FS-20</b>
LW350 or LW370 Filter	<b>FL-20</b>
SW Lamp (U-shaped tube) [2 pins]	<b>LS-16XA</b>
MW Lamp	<b>LM-16-312B</b>
LW350 Lamp	<b>LL-16-351A</b>
LW370 Lamp	<b>LL-16-368A</b>
AC/DC adapter (100 - 240VAC to 12VDC)	<b>HECHOEN CHINA XH143</b>
Inverter-ballast	<b>IB-26B</b>
Fuse in <b>B2</b> battery pack	<b>10A auto fuse.</b>

### **H. Other UV SYSTEMS, Inc. products and accessories to the SuperBright 3**

Automobile cigarette lighter power fifteen-foot cord     **B215**  
Allows you to operate your **SuperBright 3** from your car battery. This is a fifteen-foot cord.

**B2** Portable battery pack     **B2**  
This battery pack is a carrying case complete with shoulder strap, sealed lead-acid 12V 8.5 AH rechargeable battery, heavy duty coiled-cord, and 115VAC charger.

Contrast and Safety Goggles     **GB**  
These goggles will block all ultraviolet from getting in your eyes. A necessity for every collector.

Replacement filters     **FILTERS**  
8 sizes of replacement SW or LW filters for your other ultraviolet light assemblies.

Replacement lamps (tubes)     **LAMPS**  
17 sizes of replacement SW, MW, LW350, or LW370 lamps for your other ultraviolet light assemblies.

### **I. 12VDC BATTERY OPERATION**

The **SuperBright 3** is designed to operate from 12VDC ( $\pm 1.2$ VDC) power. The external **Hechoen Model XH143** AC/DC adapter supplied by UV SYSTEMS is designed to supply the 12VDC needed to operate the light. Any 12VDC power supply that can deliver at least 2.5 Amperes can be used to operate the **SuperBright 3**, providing that the polarity is correct. Pin 1 is positive (+) while pin 3 is negative (-). If reverse polarity power is plugged into the light, damage could be done to the inverter-ballast that might cause it to fail. The application of incorrect power to the **SuperBright 3** that results in damage or failure voids the warranty.

A **B215** accessory cord is available that will allow you to operate the **SuperBright 3** from your car battery by plugging it into your car's cigarette lighter jack. The **B215** accessory is 15 feet long.

### **J. B2 BATTERY PACK**

The B2 battery pack has been designed from the bottom up. It includes a sealed rechargeable lead-acid battery that comes complete with a heavy duty coiled cord, 115VAC battery charger, heavy duty nylon carrying case, and shoulder strap. The battery will operate the **SuperBright 3** for over 7 hours per charge. The heavy duty coiled cord is permanently attached to the carrying case. The battery carrying case is nylon "Cordura" and can be either attached to your belt or put over your shoulder with the included shoulder strap. The shoulder strap is removable and can be snapped together to use as a belt. The charger plugs into the end of the coiled cord to recharge the battery.

### **K. MY "MOST IMPORTANT LIGHT"**

I want to give recognition to the most important light in my life, Jesus Christ, who said, "I am the world's light. No one who follows me stumbles around in the darkness. I provide plenty of light to live in." -John 8:12 "The Message" translation.

*Don Newsome*

## **FLUORESCENT MINERAL SOCIETY**

The Fluorescent Mineral Society, Inc. (FMS), it is an international organization for those interested in the fluorescence and luminescence of minerals. It is not connected in any way with UV SYSTEMS, Inc. The FMS members keep in touch through the *UV Waves*, a bimonthly newsletter with articles about fluorescent minerals and their localities, ultraviolet lamps, and related matters. The yearly *Journal of the Fluorescent Mineral Society* publishes technical articles of lasting interest. FMS members have regular regional meetings, and meet at major mineral shows like those at Denver, Tucson, and Franklin, NJ. The FMS was founded in 1971 and incorporated in 1993.

To receive a free application for FMS contact UV SYSTEMS, Inc. or contact directly the FMS at PO Box 572694, Tarzana, CA 91357 USA or on the web at: <http://www.uvminerals.org>. You may also communicate by e-mail with the FMS President at [president@uvminerals.org](mailto:president@uvminerals.org)

**UV SYSTEMS, Inc.**  
16605 127th Ave. S.E.  
Renton, WA 98058-5549

Phone (425) 228-9988  
Toll free: 1-877-689-5142  
FAX (425) 793-8712  
E-mail: **info@uvsystems.com**  
Web site: <http://www.uvsystems.com>