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SUNPAK THYRISTOR AUTO 322 ELECTRONIC FLASH UNIT

Owner’s Manual
Description of Parts

SLIDE RULE EXPOSURE/POWER CONTROL CENTER

Manual Power Ratio Operation Indicator Window

Power Ratio Control Index Window

Power Ratio Control Switch

Power Ratio Control Scale

Computer Operation Range
Green .... 4.6'-28'
Yellow .... 2.3'-14'

ASA Speed Indicator Window

ASA Speed Index

Accessory Mounting Groove

ASA Speed Set Knob

F/Stop Scale

Auto/Manual Selector Switch

Knurled Lock Ring

Hot Shoe Contact

Swivel Mounting Foot
Welcome to the world-wide family of SUNPAK owners!

More than seven million SUNPAK electronic flash systems have been chosen by photographers throughout the world for their rugged construction, innovative design, and fast, easy operation. To insure that you get the most out of your electronic flash, please take the few minutes required to check through this owner's manual with your SUNPAK flash in front of you.

Condensed Operating Instructions for Automatic Operation

1. Set the ASA.
2. Set the Auto/Manual Selector Switch to the green or yellow “A” position.
3. Move the On/Off Switch to the “On” position. The green auto signal will glow.
4. Wait for the Ready/Test amber light to glow.
5. Set the aperture on your camera to the corresponding aperture which appears in the computer f/stop window. You are ready to take your pictures.

For more creative use with your Sunpak Auto 322 please read pages 12 to 26.

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### Operation

**POWER SOURCES**

**A.** Your Auto 322 may be used with three different power sources:

<table>
<thead>
<tr>
<th>Batteries Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four alkaline AA batteries</td>
</tr>
<tr>
<td>Four rechargeable, nickel-cadmium AA batteries</td>
</tr>
<tr>
<td>The Sunpak Dual Voltage AC Adapter</td>
</tr>
</tbody>
</table>

**To Install Batteries:**

1. Slide the battery compartment cover toward the top of the unit. Now gently fold down cover in direction shown.

2. Insert four AA-size batteries (Alkaline or Nickel-Cadmium) as shown.

**B. Alkaline or Nickel-Cadmium Batteries?**

The major advantage of alkaline batteries is that they provide more flashes per set. While nickel-cadmium batteries will provide fewer flashes per set, they will recycle your Auto 322 slightly faster and can be recharged hundreds of times for more economical operation over the long run.
C. Using the Optional AC Adapter:

1. For AC operation, be sure to check that the voltage selector on your Dual Voltage AC Adapter is set to the appropriate voltage. Your AC Adapter has been factory set for 120 volts, the U.S. standard. For use in other countries where 100 volts, 220 volts, and 240 volts are standard, you may adjust the setting as illustrated.

2. With the On/Off switch in the Off position, plug the AC adapter into the AC socket on the flash and into standard wall outlet as illustrated. The AC adapter supplies virtually unlimited flashes and is ideal for indoor use.

NOTE: If the Dual Voltage AC Adapter is incorrectly set, the adapter will not function properly and may damage your Auto 322.

3. Press cover until it snaps into place.

Remove the small Phillips head screw located next to voltage window and rotate the selector switch with screwdriver to the proper voltage setting. After the voltage setting has been made, the screw must be reinstalled to prevent accidental movement of the selector switch.
MOUNTING THE FLASH TO YOUR CAMERA:

1. Slide the unit into the camera's accessory shoe (or shoe of flash bracket if one is required). Turn the knurled locking screw counter-clockwise to insure secure mounting to your camera's shoe.

2. For cameras with a Hot Shoe (cordless) flash contact, no further connection is necessary. (Note: leave PC cord plugged into retaining pin on the unit, if unplugged the flash will not fire.) If the camera does not have a "Hot Shoe", pull out the PC cord (illustrated) and plug into the camera's flash outlet as shown.

3. If the camera has separate flash outlets (terminals) marked "M" and "X", attach the Sunpak cord to the "X" outlet (terminal).

4. If the camera has a switch (usually around the lens barrel) marked "M" and "X", set the switch to the "X" position.

5. Set the shutter to the fastest shutter speed synchronized for electronic flash. For non-SLR cameras, this is usually the fastest speed. With SLR cameras, the highest usable speed is generally 1/60th second; however, some permit flash synchronization up to 1/125th second. To be sure, refer to your camera’s instruction manual.
TAKE THE PICTURE!

It's easy - just follow these steps:

A. Move the On/Off Switch (on the back of the flash) to the "On" position (so red is visible). Within seconds, you'll notice the . . .

B. "Ready/Test" light will glow showing that your flash is ready to fire.

C. Slide the Auto/Manual Selector Switch to either the yellow or green 'A' setting. The green "Auto Signal" window will light up. This confirms that your flash is set for automatic operation . . .

D. Take the picture!
   For succeeding exposures, just wait until the Ready/Test Light comes on; make sure you're within the distance range indicated for automatic operation.

NOTE: To verify correct automatic exposure, just aim your flash directly toward your subject and press the "Ready/Test" button. This will cause the flash to fire without actually exposing any film. If the automatic exposure is correct for your subject, the green "Auto Signal" lamp will flash immediately after the "test" exposure. If the lamp does not flash, move closer to your subject (or, if you are shooting in yellow auto mode, switch to green and adjust the aperture accordingly). This green lamp provides positive verification that in automatic operation, your picture will not be underexposed.
SUNPAK’S EXCLUSIVE EASY-TO-USE SLIDE RULE CALCULATOR

Automatic Operation

Your Sunpak Auto 322 measures the light reflected by your subject and automatically regulates the light intensity for correct exposure. The Auto (“Computer”) sensor is housed in the front of your flash, below the flash reflector. By moving the selector switch slide to either the green or yellow mark, your flash is set for automatic operation.

A. Slide the ASA Film Speed Scale so that the ASA number in use is visible from the ASA speed window (example ASA 100).

NOTE: If the ASA number for your film is not printed on the ASA Film Speed Scale, use an intermediate marking as shown:

<table>
<thead>
<tr>
<th>Marked ASA Speeds:</th>
<th>25</th>
<th>*</th>
<th>50</th>
<th>*</th>
<th>100</th>
<th>*</th>
<th>200</th>
<th>*</th>
<th>400</th>
<th>*</th>
<th>800</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate Nos.:</td>
<td>32</td>
<td>40</td>
<td>64</td>
<td>80</td>
<td>125</td>
<td>160</td>
<td>250</td>
<td>320</td>
<td>500</td>
<td>640</td>
<td></td>
</tr>
</tbody>
</table>
B. For the maximum distance range in automatic operation, move the Selector Switch (on the side of the flash) to the green "^" position, so that the green line and f/2.8 appear. Then set your camera lens opening. (For ASA 100 film, the lens opening is f/2.8).

Your flash and lens are now set for correct exposure at all distances between 4.6 feet and 28 feet.

C. For maximum depth-of-field (greatest sharpness in front of, and in back of, the subject) move the selector switch (on the side of the flash) to the yellow "^" position, so the yellow line and f/5.6 appear. Then set your camera lens opening (for ASA 100 film, the lens opening is f/5.6).

Your flash and lens are now adjusted for correct exposure at all distances between 2.3 feet and 14 feet.
Power Ratio (Manual) Operation

With the unique Power Ratio Control on your Auto 322, you can adjust the light output so your camera can be used over a six stop range, from Full to 1/32 power. This feature gives you greater depth-of-field control, ability to control battery life and recycle times (ideal for today's auto wind cameras), precise fill-in flash capability, macro/close-up capability and the ability to control flash duration.

Use of Power Ratio Control at Full Power

1. Set the Auto/Manual Selector Switch to "M" for manual operation.

2. Set the Film Speed Scale to the appropriate ASA setting (example ASA 100).

3. Adjust the Power Ratio Control to Full power.

4. You may determine the proper f/stop by matching the aperture and distance scales on your calculator scale. The distance scale refers to the flash-to-subject distance, not the camera-to-subject distance, so be sure to measure flash-to-subject when you are using the Auto 322 for bounce lighting. (EXAMPLE: At 10', use f/8 with ASA 100 film.)
USING POWER RATIO

1. As when using the Power Ratio at Full power, set the Film Speed Scale to the appropriate ASA rating and be sure the Auto/Manual Selector Switch is on "M".

2. Determine the distance of your subject from your flash. When the Auto 322 is mounted to the camera, you can easily do so by focusing your camera's lens and reading the distance indicated by the distance scale on the lens.

3. Slide the Power Ratio Control Switch until you have the desired f/stop opposite this distance. ALWAYS SLIDE THE POWER RATIO CONTROL SWITCH TO A MARKED (CLICK STOP) POSITION. DO NOT SET THE POWER RATIO BETWEEN MARKED RATIOS OR THE UNIT WILL NOT OPERATE AS DESIRED.

(Example: 7 feet, with ASA 100 film, you may choose f/11, 8, 5.6, 4, 2.8 and 2).

4. Be sure the distance scale shows there is the proper amount of light for a correct exposure of your subject. If not, increase or decrease the power as needed.

5. You are now ready to take your picture. Remember to adjust the aperture on your lens to match the aperture indicated on the calculator scale.
USING POWER RATIO FOR BETTER PICTURES

Depth-of-Field

Note that the top picture has great depth-of-field (the background and the subject are in focus) and the bottom picture has little depth-of-field (the subject is in focus but the background is not).

Because of the versatility of your Power Ratio control, you have a choice of up to six different apertures for maximum control of depth-of-field. You can use this control to create the pictures you want.

Examples:

When photographing still life, more depth-of-field is often required. Use the higher power settings and smaller lens openings for best results.

For portraits, use the lower power settings and larger lens openings to get less depth-of-field.
**Precise Fill-In Flash**

The major advantage of fill-in flash is that it renders attractive outdoor portraits because it eliminates harsh shadows. Simply set your camera’s aperture according to the meter reading for the background. Next set your Power Ratio to that aperture opposite the actual flash-to-subject distance. Be sure to use a shutter speed that will synchronize with electronic flash.

The top picture was taken without fill-in flash. The bottom picture was taken with fill-in flash. Note how much more pleasing the lower one is.

**Freezing Action**

Your Auto 322 can freeze almost any action at full power with a flash speed of just 1/1,300th second. For even briefer flash duration, which will allow freezing of the fastest action, you can use the Power Ratio’s lower settings to obtain speeds as fast as 1/18,500th second. See chart below.

**Working With Motor Drive**

By using the 1/32nd Power Ratio setting, far less energy is expended with each flash and the Auto 322 will recycle almost instantly. With fresh batteries, you can shoot up to three pictures per second, thus making the Auto 322 ideal for use with motor-driven and auto-wind cameras.

<table>
<thead>
<tr>
<th>POWER RATIO</th>
<th>FULL</th>
<th>1/2</th>
<th>1/4</th>
<th>1/8</th>
<th>1/16</th>
<th>1/32</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLASH DURATION</td>
<td>1/1300</td>
<td>1/1400</td>
<td>1/3400</td>
<td>1/7400</td>
<td>1/13300</td>
<td>1/18500</td>
</tr>
</tbody>
</table>
Selecting Flash Position

Your Sunpak Auto 322 has a unique flash head assembly which allows you to aim the light in many directions. This enables you to use the Sunpak Auto 322 to render more pleasing and more creative lighting results. For added convenience, the adjustable Bounce Flash Head is marked so you can determine the exact angle of bounce you desire. For even more creative control, you can rotate the swivel mounting foot to obtain more bounce flash angles.

**WIDE-ANGLE LENSES:** For best results when using moderate wide-angle lenses with direct flash, such as a 35mm focal length lens with a 35mm camera, adjust the bounce flash head so that the rectangular reflector matches the rectangular format of the camera. In most cases, this is accomplished by pivoting the reflector 90 degrees to the left or right. For other wide-angle lenses, use the optional accessory wide-angle diffusion filters (these accessories are included in the Sunpak Filter Kit-Cat. No.651-738) or bounce lighting may also be used for maximum flash coverage.

A. To rotate the adjustable Bounce Flash Head, gently slide it forward with your thumb and forefinger and turn to desired setting. **DO NOT FORCE THE HEAD.**

B. To adjust the three position swivel mounting foot, twist as illustrated with your thumb and forefinger. The column automatically locks in either a vertical or horizontal position, but can be left in any in-between position.
For Better Bounce Flash Pictures

Don’t Stand Too Close to Your Subject.

Wrong Way

Wrong Way

Wrong Way

Wrong Way

Wrong Way

Wrong Way

Wrong Way

Wrong Way

Wrong Way

Reason: The light will be reflected downward at an angle so acute that no light (or very little light) can reach your subject’s face. This will cause unpleasant looking dark (shadow) areas under the subject’s eyes and nose.

Right Way

Right Way

Right Way

Right Way

Right Way

Right Way

Right Way

Right Way

Rotate the flash sufficiently to prevent the subject or the background immediately behind the subject from receiving any portion of direct light from the flash.

In small rooms, try bouncing the light off the wall onto the ceiling. Provided it is a white wall and ceiling, this technique gives much more even lighting than direct off-ceiling bounce where space is limited.
Remember that you can bounce light off the wall if the ceiling is too high. In many homes, a white wall makes an excellent reflective surface for bounce flash ... and, quite often, more light can reach the subject since the light does not have to travel as far.

If you can't find a suitable bounce surface, you can make one ... if the wall or ceiling is any color other than white, your subject will show that color in the finished photograph. Therefore, create your own bounce surface ... possibly you can use an ordinary piece of white cardboard held or taped in front of the flashtube housing so that it reflects the light onto the subject.
In close-up photography, many excellent lighting effects can be achieved by using one or more pieces of white cardboard as reflective surfaces in bounce flash. The soft, diffused effect of “bounce” light often reveals fascinating details of small objects.

For extensive use in portrait and child photography, many photographers prefer “umbrella” lighting, created by bouncing the flash off a white or silvered umbrella. Check with your dealer for recommendations on umbrellas and lightstands if this approach interests you.

NOTE: To determine the bounce lighting technique which satisfies you, try experimenting using all of the flash head positions.
Copy Photography

Because of its unique Power Ratio Control, your Auto 322 is ideal for copy photography. By adjusting the power, you can use your Auto 322 to control light output, which is critical with the relatively short flash-to-subject distances. For copying, you can use a copy stand, modified enlarger baseboard and girder or a tripod which can have its pan head mounted to the bottom of the center column. In addition, you can use one, two or four Auto 322’s.

Copy Photography is fun and can be used for:

- **Hobbies:** You can reproduce stamps, coins, seashells, butterflies, plant life and other items.
- **Vital Documents:** Diplomas, birth certificates, cancelled checks, licenses, etc.
- **Charts:** You can keep a photographic record of any charts or graphs you prepare for school or business. In addition, color transparencies of the charts can be made for slide presentations.
- **Valuable Possessions:** Items such as jewelry, silverware and works of art can be pre-photographed and used for insurance purposes.

A TYPICAL COPY SET UP FOR DOCUMENTS

1. An ideal set-up for shadow-free copies is having two Auto 322’s, one connected to your camera, another to the Sunpak Auto Slave, aimed at a 45° angle to the subject on the same axis as the camera. As the illustration shows, twice the normal amount of light is hitting the subject, so you should either close down the lens aperture by one stop (two stops when using four units) or adjust the Power Ratio Control by half the Power Ratio setting (−1 stop).

2. If you own another electronic flash unit, you can use the Power Ratio Control on your Auto 322 to set the unit at a similar power level as the other unit. Simply match the guide number from the specification chart on page 26 with the appropriate power level to your other unit.
Hints for Taking Photographs Using a Copy Set-Up

1. When photographing a three-dimensional subject, such as a coin, try setting the flash units at a 60° axis from the lens. This is also excellent for subjects with an irregular flat surface such as an oil painting, and high gloss subjects. For best possible results, experiment with different angles until you get the results you like.

2. For showing shadow and texture on three-dimensional subjects, use your Auto 322s with each at different power levels. Again, experimentation is the best way to discover what is the best lighting ratio between the Auto 322s for the subject you are copying.

3. For a softer lighting effect, fire the 322 through a material that will diffuse its light. Items such as artist’s tracing paper and commercially available photographic diffusion material are ideal. For special effects, use one Auto 322 with an accessory color filter at a higher power level than an Auto 322 without a filter.

4. For lighting a highly-reflective subject with controlled light, try the tent lighting method. By simply taking heavy white paper or oak tag and bending it so the light from the unit surrounds, but won’t directly hit the subject as illustrated.
Other Flash Hints

Multiple Exposures
When shooting multiple exposures, your Auto 322 is ideal because of its multi-directional capability. Be sure to use a dark background and center your flash on each individual subject. When placing the same people in one background scene, a tripod or other rigid camera support is recommended.

Special Effects
One of the most popular special effects today is the “Shoot” technique of superimposing one image over another. The only requirement is a simple cardboard tube. Take the first exposure using available light and center the area of the image you wish to superimpose the image on. Then, take a second exposure on the same film, using your auto 322. Simply use the tube to cover all but the centered area. For smaller centering areas, use two tubes for a telescope effect. Because the light from your Auto 322 is higher than the available light in most cases, the image shot through the tube will dominate the available light image. For best results using this technique, make your superimposition on a dark area.

Open Flash
When shooting at night, you can use your Auto 322 to act as a fill-in flash while setting your shutter speeds for background exposure. Simply push the Test (open flash) Button on your unit for one, two or more flashes while the shutter is open.

Macro/Close-Up
By using the lower power levels on your Auto 322, the exciting world of Macro/Close-Up photography can be mastered. Because of the lower power levels available from the Auto 322, you can properly expose close-ups even when your flash is very close. To lower light intensity even further, bounce the light or use the diffusion filter available in the accessory filter kit.
Multiple Flash Operation with the Sunpak Auto Slave Unit

Using two or more Sunpak electronic flash units can produce stunningly attractive professional portraits. Equally, using additional flash units strategically positioned can substantially expand your photographic capabilities. To do this use the compact, solid-state Sunpak Auto Slave Unit, available from your Sunpak dealer (Cat. No. 651-715). This permits wireless synchronization of any number of Sunpak electronic flash units at distances up to 100’ from the “Master” unit. When the master unit (with shutter cord connected to the camera) is fired, all other slave-equipped units fire simultaneously.

A. Plug the Sunpak Slave Unit into the flash cord of your auxiliary (second) flash unit.

B. Adjust the sensor eye of the Slave so that it faces the master flash unit.

C. Determine the correct lens opening (as a starting guide close down lens one f/number from indicated aperture when using two directly-aimed flashes).

D. Connect the main flash to your camera in the normal manner.

E. Shoot . . . when the light from the master (camera-connected) flash reaches the Sunpak Slave’s sensor, the Slave automatically fires the second flash in perfect synchronization with the first! The Sunpak Slave operates at distances of up to 100 feet from the master flash, and is unaffected by even the brightest color lighting.
Accessories Available for the Auto 322

For maximum creativity and ease of operation, many optional accessories are available for your Auto 322. Just like today’s system cameras, you can customize your Auto 322 to suit your exact photographic requirements.

**Sunpak Auto Slave:** Allows your Auto 322, or any flash unit with a PC cord, to be used to trigger an auxiliary flash unit by plugging its PC cord into a built-in PC socket on the Slave.
Cat. No. 651-715

**Sunpak Dual Voltage AC Adapter:**
The Sunpak Dual Voltage AC Adapter allows you unlimited flashes. Moreover, the world-wide voltage selector on the adapter gives you maximum convenience for your picture taking.
Cat. No. 651-740

**Sunpak QBC-3 Nicad 3-Hour Charger:** This charger is for use with Sunpak QB-3 Nicad Batteries. It charges one to four batteries at a time. It will fully recharge batteries in approximately 3 hours.
Cat. No. 651-731
Sunpak QB-3 Nicad Batteries (4 pcs.)
Cat. No. 651-732
Sunpak QBC-3 Nicad Charger with QB-3 Nicad Batteries (4 pcs.)
Cat. No. 651-733
Wide-Angle Illumination

The use of wide-angle lenses is very popular in photography today. Your Auto 322 (horizontal position) can be used with up to 35mm lenses without any accessories. By using the diffusion filters available in the accessory Auto 322 Filter Kit, lenses up to 28mm focal length on 35mm cameras may be used. By using bounce light, even wider focal length lenses may be used.

Sunpak Filter Kit/Sunpak Filter Holder: Filter kit consists of red, blue, green and yellow color filters as well as a neutral density filter, 85B color correction filter for use with tungsten film, and two wide-angle diffusers. Supplied with case. Filter Holder is also available separately.

Filter Kit Cat. No. 651-738
Filter Holder Cat. No. 651-739

Sunpak Pro Grip/Standard Grip/6x6 Bracket: The Sunpak Pro Grip features a built-in rotating hot shoe, ball head, contoured grip, tripod socket and allows aiming of the flash in virtually any direction. It is supplied with a 35mm Sunpak 12-position bracket and cable release. The Standard Grip is identical except it features a fixed hot shoe. The Sunpak 6x6 Bracket can be used with either grip when using 2 1/4 film format cameras.

Pro Grip Cat. No. 651-774
Standard Grip Cat. No. 651-773
6x6 Bracket Cat. No. 651-752

Aged Gold-Tone Flash Tube

Modern electronic flash units operate at speeds of 1/600th second or less. This burst of light is far shorter than the optimum exposure time today's films have. Your Auto 322 uses a unique gold-tone flash tube that has been aged and pre-flashed until critical color balance is achieved. This means your Auto 322 will give you warm, pleasing, correct color rendition with all daylight films.

Thyristor Circuitry

Sunpak's advanced thyristor circuitry is the latest in electronic flash technology. In less advanced automatic flash units, when the automatic sensor shuts off the flash, the circuit still expends the available energy as if a "full" power flash had been produced. However, thyristor circuitry saves the unused energy for the next flash. This means more flashes per battery and recycling times are more rapid, depending on distances and lighting conditions.
A “Guide Number” is simply a number expressing the power of a flash unit in relation to the sensitivity (ASA film speed) of the film in use. In use, the photographer divides the flash-to-subject distance into the Guide Number, and the result is the f/stop for correct exposure. Normally, reference to Guide Numbers is not necessary as the computer mechanism and scale of your Sunpak Auto 322 make such calculations automatically. However, there are instances in which precise Guide Number information is needed:

### Guide Numbers of the Auto 322

<table>
<thead>
<tr>
<th>Manual Power Ratio</th>
<th>ASA FILM SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25</td>
</tr>
<tr>
<td><strong>GUIDE NUMBERS</strong></td>
<td></td>
</tr>
<tr>
<td>Full</td>
<td>40</td>
</tr>
<tr>
<td>1/2</td>
<td>28</td>
</tr>
<tr>
<td>1/4</td>
<td>20</td>
</tr>
<tr>
<td>1/8</td>
<td>14</td>
</tr>
<tr>
<td>1/16</td>
<td>10</td>
</tr>
<tr>
<td>1/32</td>
<td>7</td>
</tr>
</tbody>
</table>

To determine maximum effective range in manual operation (in feet) divide the Guide Number by the aperture (f/stop).

\[
\text{Distance} = \frac{\text{G.N.}}{\text{f/stop}}
\]
Care of Your Electronic Flash

Your Sunpak electronic flash has been engineered to require almost no maintenance. Still to insure best performance year-in and year-out follow these basic pointers:

1. Inspect Batteries Frequently:
   "Inspect" means for reasonable recycling time (the length of time it takes the ready light to come on between flashes): if it's more than 10 or 15 seconds, a fresh set of alkaline batteries should be obtained (or if nickel cadmium batteries are used, they must be recharged).
   It's also wise to check your batteries for appearance: sometimes even the best of batteries discharge or leak some chemical material through the jacket... and leave a whitish powder on the battery, which passes onto your Sunpak flash unit's electrical contacts. If this has happened, replace the batteries after cleaning the Sunpak's internal battery contacts with a pen-knife. Finally, it's a good idea to remove the batteries once in a while and wipe them with a handkerchief—the cleaner the battery surface, the easier it is for the energy to pass through your flashgun's electrical system.

2. Remove Batteries:
   If for some reason you do not intend to use your flash unit for a period of several weeks or more, remove the batteries and store them separately. Storage inside a plastic bag is one good way.

3. Maintenance:
   If your Auto 322's reflector window becomes dirty, use one drop of lens cleaner on a lens cleaning tissue to clean it. A small amount of lens cleaner and lens tissue or a slightly moist cloth can be used to clean the rest of the unit. BE SURE TO THOROUGHLY DRY THE UNIT IMMEDIATELY AFTER CLEANING.

4. Service:
   In the unlikely event that your Sunpak electronic flash requires service, return it to your dealer or the sole U.S. distributor at the address shown on page 29. Do not, under any conditions, attempt to disassemble and/or adjust it yourself: electronic flash operates on high voltage and should not be taken apart. However, keep in mind that flash failure is more likely to result from weak batteries than any other single cause; if it doesn't fire, check batteries and contacts carefully.
Specifications:

Guide Numbers:
BCPS:
With AA NiCad Batteries (4):
   Number of flashes per set
   Recycle time
With AA Alkaline Batteries (4):
   Number of flashes per set
   Recycle time
With Dual Voltage AC Adaptor:
   Recycle time (at 120 V)
Automatic Distance Range:

Flash Duration:
Sensor Acceptance Angle:
Angle of illumination:

Color Temperature:
Dimensions:
Weight:

80 (ASA100 film), 40 (ASA25 film)
1076

<table>
<thead>
<tr>
<th>Maximum Power</th>
<th>Minimum Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 4 sec.</td>
<td>600 0.3 sec.</td>
</tr>
<tr>
<td>190 7 sec.</td>
<td>950 0.3 sec.</td>
</tr>
<tr>
<td>10 sec.</td>
<td>0.3 sec.</td>
</tr>
</tbody>
</table>

55" - 28' (at maximum aperture)
27" - 14' (at minimum aperture)
1/1300th - 1/20000th sec.

15°
Horizontal 46° x Vertical 60° (Standard position)
35 mm lens on 35 mm camera (Horizontal position)
50 mm lens on 35 mm camera (Vertical position)
5500° Kelvin
4" x 1.6" x 4"
10.9 oz. (less batteries)

NOTE:
* Specifications subject to change without notice.
All specifications are based upon American National Standards Institute (ANSI) testing procedures.