

SC-24F

Lighting Control Console

OPERATOR'S MANUAL

1. INTRODUCTION.

Welcome to the SUNNSPOTS™ family. The SC-24F stage lighting control console is the heart of your new system and features four channel, two-scene control with provisions for fade-ins, fade-outs, cross-fades, black-outs and "instant-on" lighting effects. It also includes a FLASH button which causes all lights to come instantly to full brightness whenever it is touched, and audio sync which allows the lights to "dance to the music." The controller may be operated either by hand or by foot, and features modular construction, small size and phantom powering for maximum portability.

Like all SUNNSPOTS™ components, the SC-24F includes digitally controlled SUNNPLEX™, a multiplexing system that allows the various parts of the lighting system to be interconnected by way of standard three conductor microphone cables. This eliminates the fragile and expensive multi-wire snakes required by other lighting systems. The application of this technology to stage lighting equipment makes system setup and operation easy and convenient. Also, SUNNPLEX™ allows coded lighting control signals to be sent through audio snakes without interference to other signals.

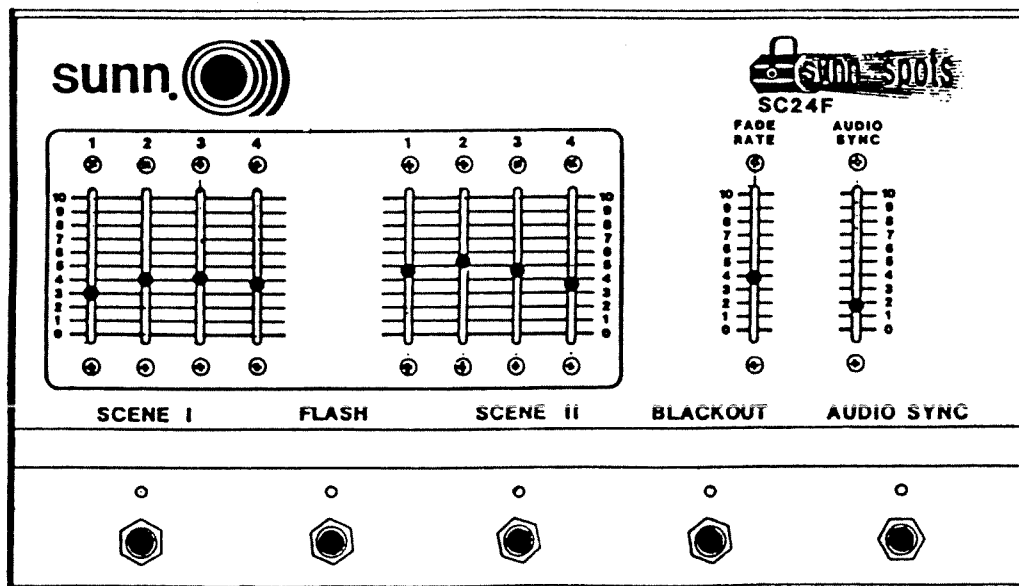


FIGURE 1

2. CONTROLS.

Figure 1 shows the top of the SC-24F lighting control console. The function of each of the controls is described in the paragraphs below.

2-1. "SCENE I" SLIDE CONTROLS. When SCENE I is selected (see Section 2-4), the positions of the four SCENE I slide controls (1-4) determine the brightness of the lights connected to channels 1-4 on the dimmer pack(s). With a control in its minimum position (0) the corresponding light(s) will be completely off, and with the control in the maximum position (10) the corresponding light(s) will be at full brightness. By setting the slide controls between these two extremes, any intermediate brightness level may be achieved.

2-2. "SCENE II" SLIDE CONTROLS. When SCENE II is selected, the SCENE II slide controls determine the brightness of their corresponding lights. Operation of these controls is identical to those of SCENE I (see Section 2-1).

2-3. FADE RATE SLIDE CONTROL. The FADE RATE control determines the rate at which transitions are made between SCENE I and SCENE II (cross-fade), between BLACKOUT and SCENE I or II (fade-in), or between SCENE I or II and BLACKOUT (fade-out). With the FADE RATE control in the extreme "FAST" position, scene changes occur almost instantaneously, and in the extreme "SLOW" position the changes take about ten seconds. The rate may be set to any value between these two extremes. Whenever any one of the SCENE or BLACKOUT pushbuttons is held down for more than approximately 1/4 second, or when the FLASH button is held down for more than approximately one second, the FADE RATE control is bypassed and the scene changes occur instantly.

2-4. "SCENE I" and "SCENE II" SELECT SWITCHES. These two pushbuttons select between the two scenes. There are two modes of operation for the SCENES I and II switches—gradual scene change and instant scene change. Momentarily tapping a scene select switch causes a scene transition to occur at a rate set by the FADE RATE slide control (see Section 2-3). However, if a scene select switch is held down for more than approximately 1/4 second, the FADE RATE control is bypassed and the scene changes instantly. Operation of these buttons is described in more detail in Section 6.

2-5. BLACKOUT SWITCH. The BLACKOUT switch turns the lights off altogether, and operates in one of two modes - gradual fadeouts and instant fadeouts. Momentarily tapping the BLACKOUT switch causes all of the lights to fade out at a rate set by the FADE RATE slide control (see Section 2-3). Holding the BLACKOUT switch down for more than approximately 1/4 second causes the FADE RATE control to be bypassed and the lights to turn off instantly.

2-6. FLASH BUTTON. Whenever the FLASH button is pushed, all lights come instantly to full brightness, regardless of the scene or function currently selected. If the FLASH button is held down for more than about one second, the lights will remain at full brightness until either the SCENE I, SCENE II or BLACKOUT button is pushed. In effect, this gives you a third scene, one in which all lights are completely turned on.

2-7. AUDIO SYNC PUSHBUTTON. Tapping the AUDIO SYNC button causes the intensity of the lights to vary in step with the signal patched into the AUDIO SYNC jack on the back panel (see Section 3-2). This effect "piles on" to the light intensity levels of the currently selected scene. For example, if Scene I is active, and faders 1 and 2 are set to zero (off) and faders 3 and 4 are at five (half intensity), touching the AUDIO SYNC button will cause lights 1 and 2 to blink on and off to the music and lights 3 and 4 to fluctuate in brightness around an average level of half intensity. Similarly, if BLACKOUT is selected with AUDIO SYNC, only the AUDIO SYNC sensitivity control will affect the lights. The audio sync function is turned off by momentarily touching the SCENE I, SCENE II or BLACKOUT switch.

2-8. AUDIO SYNC SENSITIVITY CONTROL. The SC-24F has been designed to accommodate a wide range of audio input signal levels, from microphone level (0 to 1 V RMS) to line level (1 to 10 V RMS) to power amplifier output level (over 10 V RMS). By adjusting the AUDIO SYNC sensitivity control (the fader labeled "AUDIO SYNC"), a satisfactory effect can usually be obtained with virtually any signal source. The control is most easily set with the lights blacked out — with the control set too low, the lights will not pulse to the music, but will instead remain dark; with it set too high, the lights will be at full brightness, and again will not pulsate. The setting for speaker level (power amplifier output level) inputs will generally fall between 0 and 5, with 3 to 7 being best for line level inputs, and 7 to 10 for mic level inputs. Set the control for best effect.

2-9. INDICATOR LEDs. The LEDs (Light Emitting Diodes) above the switches indicate which function has been selected. Tapping the SCENE I select switch, for example, causes the LED to turn on fully. There is a minimum brightness maintained by all LEDs whenever the controller is on — this makes it easy to find the pushbuttons when the controller is used on a darkened stage. In addition, the LEDs are color coded to aid in locating the correct switch: SCENES I and II LEDs are green, the FLASH and AUDIO SYNC LEDs are yellow, and the BLACKOUT LED is red.

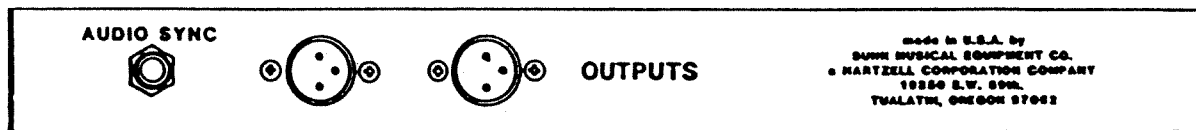


FIGURE 2

3. BACK PANEL JACKS.

3-1. OUTPUT JACKS. There are two male XLR-style 3-pin audio jacks on the back panel of the SC-24F. Either of these jacks may be used to connect the controller to a dimmer pack using standard balanced, shielded microphone cable. Both jacks are identical in function; thus, the remaining jack may be used to connect other dimmer packs into the system (see Section 7).

3-2. AUDIO SYNC INPUT JACK. In order to use the audio sync function of the SC-24F, a signal must be patched into this 1/4" phone jack. Effective signal sources include microphones placed in front of bass guitar amps, drums and main PA loudspeakers; main, monitor, effects and auxiliary outputs from mixing consoles; and power amplifier output jacks. Generally lower frequency audio signals produce better results.

When using a balanced source, such as a low impedance balanced microphone or the balanced output of a mixing console, a balanced-to-unbalanced transformer (e.g., Shure type A95UF) should be used to create an unbalanced signal for the controller. Only shielded audio cable should be used between the audio source and the AUDIO SYNC input jack.

NOTE: If you send your audio sync input signals or controller output signals through the same snake as your mixing console's input signals, it is best to avoid using a power amplifier output for the audio sync signal. To do so runs the risk of creating a ground loop or unintentional (and sometimes inaudible ultrasonic) feedback.

4. INTERCONNECTING THE SYSTEM.

Lighting control systems consist of three fundamental components: the lights (and their fixtures); the dimmer pack(s), which provide(s) the right amount of power to each of the lights; and a controller which tells the dimmer pack(s) how much power to supply to the lights, and thus ultimately determines how bright the lights will be.

Figure 3 illustrates the simplest method of interconnecting the components of the lighting system.

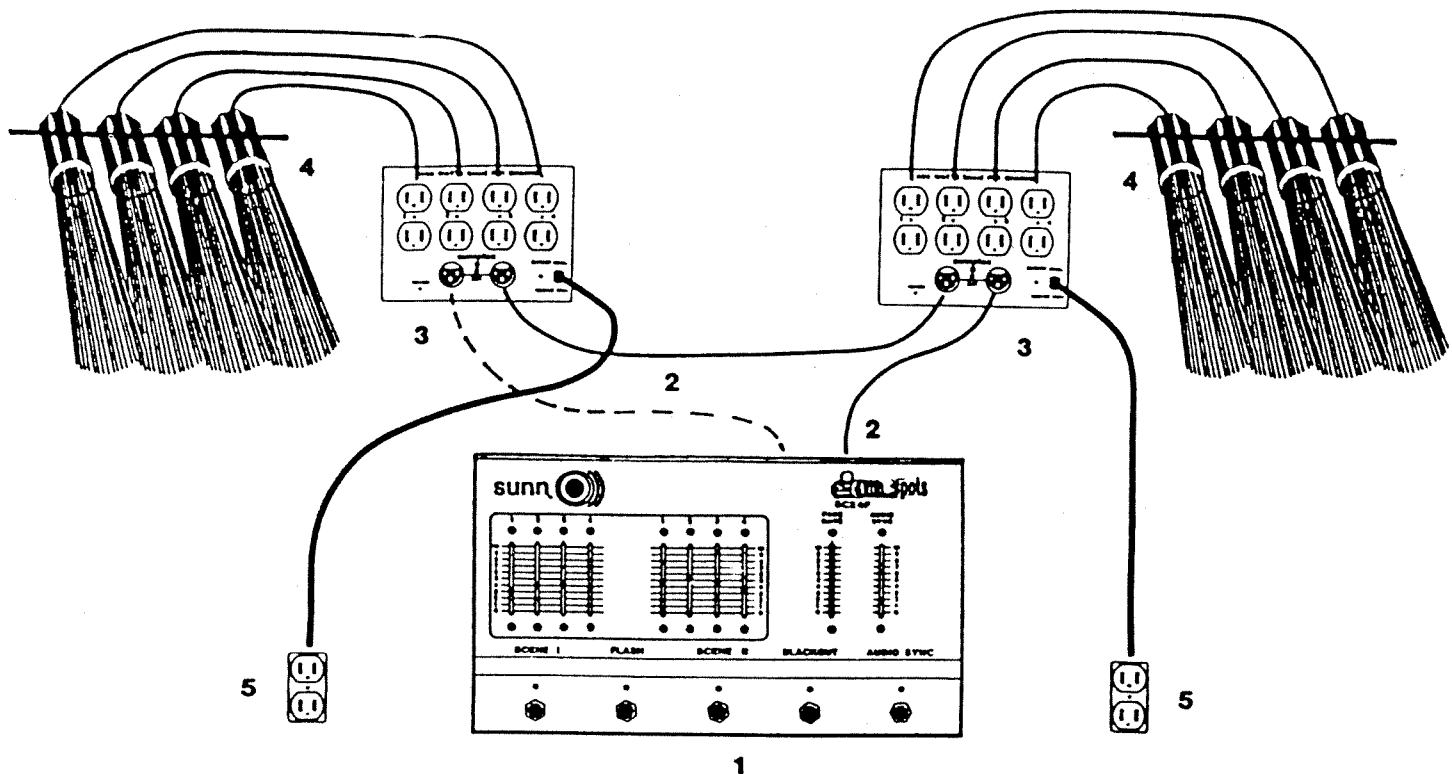


FIGURE 3

The controller (1) is connected via mic cable (2) to dimmer pack (3), which in turn is connected to lights (4). The dimmer pack (3) also must be connected to an AC outlet (5). Since the controller is "phantom powered" (it receives its power from the dimmer pack via the mic cord), there is no need for it to be located near an outlet.

If a single microphone cord is not long enough to reach between the controller and the dimmer pack in your application, cords may be hooked in series to create longer cords. To do this, simply connect the male end of one cord to the female end of another. In similar fashion an audio snake may be wired in series with the mic cord. Note, however, that any cord used in this application MUST be wired properly. Pin 1 on the male connector at one end of the cord must be connected to Pin 1 on the female connector at the other end, and similarly Pin 2 must go to Pin 2 and Pin 3 to Pin 3. Otherwise, the system will not operate. Be sure to check this, because not all cords are wired the same.

On the back panel of the controllers (see Figure 2) are two male XLR-type connectors. Either one of these may be connected to the female end of the mic cord that runs to the dimmer pack. There is one male and one female XLR-style connector on the back of the dimmer pack. Connect the male end of the mic cord from the controller to the female connector on the dimmer pack. The unused male connectors on the dimmer pack and controller may be used for patching to other dimmer packs in larger systems (see Section 7).

CAUTION: Once a mic cable has been plugged into a dimmer pack, be certain that no microphone is accidentally plugged into the other end of the cable, as this may destroy the microphone.

The four AC outlets on the dimmer pack (marked 1, 2, 3 and 4) correspond to the markings above the slide controls on the controller. The lights should be plugged into the appropriate outlets.

CAUTION: The outlets on the dimmer packs are **ONLY** for resistance type loads (e.g. quartz or incandescent lamps). **DO NOT** connect transformer or ballast-type lamps (e.g. low voltage "rain lights", mercury, halide or fluorescent lamps) or anything other than lighting fixtures (no guitar amps, PA equipment, fans, refrigerators) to the outlets. Extension cords, however, may be connected between the outlets and the lighting fixtures. **FAILURE TO OBSERVE THE ABOVE PRECAUTIONS MAY VOID THE WARRANTY AND CAUSE DAMAGE TO THE UNIT AND TO THE CONNECTED EQUIPMENT.**

When you plug the dimmer pack in, you will obtain the best results if you adhere to the following rules:

1. Use a power outlet located as close as possible to an electrical service panel (fusebox). It is best if that outlet is on a separate fuse or circuit breaker from your audio equipment.
2. Always use quality 16 gauge (or heavier) grounded extension cords.
3. Make certain that the rating of the breaker or fuse for the chosen outlet is adequate. The number of amps needed can be calculated with the formula:

$$I = \frac{P}{E}$$

where I = the current (in amps),
P = the power (in watts),
and E = the voltage (in volts).

In a standard 120 VAC electrical system, 100 watts = 5/6 amp. A safe rule of thumb is to call 100 watts 1 amp. Thus, if you are using four 500 watt bulbs (2000 watts total), you should have at least a 20 amp service.

4. **IMPORTANT!** Do not run any lighting power cords near sensitive audio cables (e.g. mic cords, guitar cords, snakes, etc.).

Following these rules will allow you to run your lights safely and with minimum interference to your audio system.

5. OPERATING HINTS.

When you set up your lighting system, there are several factors to consider: coverage, placement and aiming of lights; color; availability of AC power; and convenience of operation.

5-1. COVERAGE AND PLACEMENT OF LIGHTS. Stage lighting can be divided into two prime areas of concern — floodlighting and spotlighting. The goal of floodlighting is to bathe rather broad areas of the stage in color, while spotlighting is used to focus attention on one part of the stage. With both floodlighting and spotlighting, the intensity and the color of the light will play important roles in affecting the mood of the audience.

Since floodlighting is intended for broader coverage of the stage, lamps with a wide beam should be chosen for this application. For spotlighting, a lamp with a narrow beam should be chosen. Many different types of lighting fixtures are available through professional lighting supply companies. One option is **sunn's** LG-4 light group which contains four F-40 "par" fixtures. The lamps for these fixtures contain a built-in lens and reflector and are available in several sizes, wattages, and beam width. Choose the lamps most appropriate to your needs.

Some adjustment in coverage is possible simply by moving the light; the area covered by a light increases as the light is placed further away (good for floodlighting) and becomes smaller as it is moved closer (good for spotlighting). There is, however, a limit on how far away you can locate the fixture, since the light's intensity DECREASES with distance.

Placement of the lights is often a compromise between physical considerations (shape of the room and stage, available power, mounting options) and the ideal set-up. Room architecture and mounting options will probably determine whether you place the lights individually in different locations or mount them to a truss assembly. If you use a truss assembly you will have to determine whether to hang it from hooks screwed into the ceiling or set it atop a tripod (or "tree"). In any case, you want to place the lights where they will most effectively enhance the show.

Where you locate your floodlights is largely a matter of personal preference. If you have enough lights available (see Section 7), it is best to illuminate each area of the stage with several lights. This minimizes unwanted shadows, and allows you to change the colors illuminating the area by using different gels on each of the lights and mixing the lights in different proportions.

The best location for spots is usually in front of the stage, and fairly close in.

If you are only using a few lights (e.g. a single LG-4 group) they will have to serve dual functions; as spots and floods. In this case, medium beam width lights should be selected. They should be aimed on specific people, but should cover a wider area than a spot would cover. If only one or two people will be spotlighted in the performance, it is possible to use two or three of the lights as floods and one or two as spotlights. Since circumstances vary so much from one user to the next, the best advice we can give is to observe and to experiment.

5-2. AIM. When you aim the lights, it is best to have two people working together - one to aim, and one to stand in the target area. If you are setting up alone, remember that people have height. If you aim the lights at the floor of the target area, you will end up illuminating people's feet, not their bodies. One useful trick with spotlights is to aim the beams at the microphones of the people you are trying to highlight. This will usually get you in the ballpark. Unfortunately, it is awkward to have to re-aim a light, and especially a spotlight, during a show; so try to aim as well as possible BEFORE the show begins.

5-3. COLOR. Color can have profound psychological effects on the audience, and gearing the color to the material being performed can greatly increase the impact of the performance. Blue light creates quiet, contemplative moods, while red generally has the opposite effect. Yellow is energetic. Pinks and purples are usually complementary to skin tones. Brighter colors are generally preferred for spots. Experiment.

5-4. DIMMER PACK PLACEMENT. The dimmer packs should be located as close as possible to the lights they drive. Not only is it less expensive to run one extension cord to a dimmer pack than it is to run four from the dimmer pack to the lights, but also the "switching transients" generated by the dimmer packs are more likely to be a problem when more extension cords are used (for more on this, see Section 8 and the rules listed in Section 4).

How and where you choose to mount your dimmer packs depends upon your particular circumstances; the operator's manuals included with your dimmer packs outline the available options. Whatever method you choose, however, always make sure that you:

- Keep the dimmer pack away from low-level audio lines,
- Protect the dimmer packs from possible spilled drinks,
- If you rack-mount the dimmer packs, do not mount audio equipment in the same rack, as doing so may result in audio interference problems.

5-5. LIGHTING CONTROLLER PLACEMENT. Since the SC-24F controller is phantom powered, it may be located anywhere within reach of the mic cord. If the lights are to be run from the stage or by a soundman, the controller may be placed on the floor or on a table, and the scenes "setup" (the fader positions adjusted) when it is convenient. The pushbuttons may be hand- or foot-operated. If you are fortunate to have a person whose sole job is to run lights, he will probably want to sit out in front of the stage and operate the controller by hand.

6. OPERATION OF THE SC-24F CONTROLLER

Once you have set your system up, it is time to see it in action. First, select Scene I by momentarily depressing the SCENE I button. The SCENE I indicator LED will come on to full brightness and the SCENE II LED will be dim. A signal (the SUNNPLEX™ signal) will be sent from the controller to the dimmer pack via the mic cord, telling the dimmer pack how much power to supply to each light. This allows the brightness of each light to be controlled by the SCENE I slide controls. Changing any one of the SCENE I slider settings will cause that channel's light to brighten or dim proportionately.

Now, momentarily touch the SCENE II switch. This will cause the SCENE I LED to dim and the SCENE II LED to turn fully on. The SUNNPLEX™ signal will now begin to send information about the slider positions of SCENE II to the dimmer packs. The amount of time it takes for the transition from SCENE I to SCENE II to occur depends upon the setting of the FADE RATE control, as described in Section 2. Tapping the BLACKOUT switch will turn off the lights at the rate set by the FADE RATE control.

A nice feature of the SC-24F controller is that by holding down any pushbutton for more than a brief time, the FADE RATE control is bypassed and the scene changes instantly. Thus, by selecting a gradual fade rate on the FADE RATE control, you have a choice between gradual or instant fades at the push of a button.

Some of the most dynamic effects available with the SC-24F are made possible by the FLASH button. Tapping it in rhythm allows you to play along with the music, and with a simple "push and hold" of the FLASH button all lights can be brought to full brightness and remain there until a different scene is selected. To return to another scene, or to blackout, simply push the appropriate switch.

If you are caught napping and discover the show is about to start before you have set up your scenes (of course this will never happen to you), you can hit the FLASH button (the panic button) and adjust the scenes without being embarrassed by having the stage lost in the darkness. The performers will probably congratulate you on your dramatic use of the lights, and you won't have to look for another job.

Audio Sync can be used to create variety and interest in the lighting without requiring constant attention. Because it "piles on" to whatever scene or function is selected, Audio Sync can assume a variety of appearances. To demonstrate this, set SCENE I faders 1 and 2 to "0" and faders 3 and 4 to "10"; set SCENE II faders 1 and 2 to "10" and 3 and 4 to "0". Now, tap the SCENE I and AUDIO SYNC switches. Adjust the AUDIO SYNC fader so that lights 1 and 2 pulse to the music — lights 3 and 4 will be fully on. Next, quickly tap the SCENE II and AUDIO SYNC pushbuttons in sequence and observe how the crossfade interacts with the Audio Sync. At the end of the crossfade lights 1 and 2 should be fully on and 3 and 4 should be blinking in time to the music. Tapping the BLACKOUT switch and the AUDIO SYNC switch in sequence will cause lights 1 and 2 to fade out until only the Audio Sync is affecting the lights. As the music fades, so will the lights.

Adding Audio Sync to a scene (say Scene II) and returning to that scene without Audio Sync is simple; first tap the AUDIO SYNC button to conjure up the Sync effect, then tap

the original scene's button (the SCENE II button in this example) to remove the sync effect.

With a little experimentation you will develop a repertoire of effects using the Flash and Audio Sync functions. The more you use the SC-24F lighting control console, the more you will appreciate how much power has been packed into its small package.

7. EXPANDING THE SYSTEM.

There are several ways to expand your SUNN.SPOTS™ Lighting System: by using more than one dimmer pack, a controller with more channels, or multiple systems.

7-1. MULTIPLE DIMMER PACKS. A single SC-24F controller can run as many as 25 dimmer packs at once, thus allowing you to add practically any number of lights. With the controller connected to one dimmer pack, the SUNNPLEX™ signal may be routed over a mic cord to a second dimmer pack by patching it to the unused connector of either the controller or the first dimmer pack (see Figure 4). This process may be repeated to "daisy-chain" many dimmer packs together. Turning up the channel 1 fader will now turn up light 1 on each dimmer pack. The same is true for fader 2, etc. You still have two scenes of four channels, but with more lights.

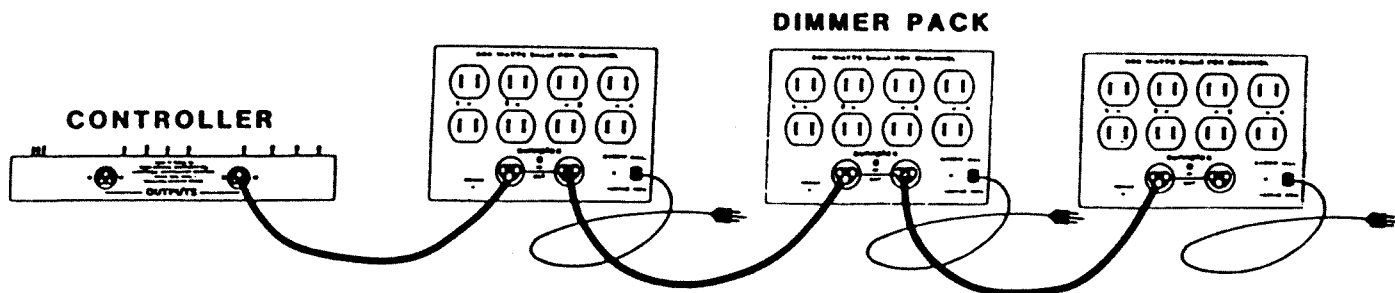


FIGURE 4

7-2. CONTROLLER WITH MORE CHANNELS OR SCENES. SUNNPLEX™ controllers having more than four channels may be used with any **sunn** dimmer pack. This will require slight modification to some of the dimmer packs. This is because each dimmer pack contains an "address decoder" which causes it to respond to a specific four of a possible 32 channels. The dimmer pack is factory pre-set to respond to channels 1-4, but may be reassigned to other channels by moving internal jumpers (or resetting address switches, depending on the model) within the dimmer pack. Any number of dimmer packs may still be linked together, in any order. Each dimmer pack will respond only to the channels to which it is assigned.

NOTE: The SC-24F only controls channels 1-4. Therefore make sure all dimmer packs connected to the SC-24F are set up to respond to these channels. Otherwise some dimmer packs may appear to be inoperative. Details on reassigning dimmer packs to other channels are given in your dimmer pack operator's manual.

7-3. MULTIPLE SYSTEMS. You may also use more than one controller, making more scenes and more channels available, and giving you much more control over the stage lighting. In this case, you will need at least two dimmer packs, one dedicated to one controller and the other dedicated to the other controller. This gives you two independent lighting systems at your command. Each system can have up to 25 dimmer packs.

CAUTION: Care MUST be taken to insure that the dimmer packs of one controller are not connected to those of another controller, and that the controllers themselves are not connected together. Otherwise "buss contention" and unpredictable results will ensue.

8. TROUBLESHOOTING.

PROBLEM: Buzz in the audio system.

Lighting control and audio signals have always been enemies. That annoying little buzz that gives lighting control a bad name is caused by "switching transients," which are high current spikes of power originating in the triacs that control the intensity of the lights. These transients are the source of a couple of different kinds of interference. One of these is radio frequency interference (RFI), which radiates from unfiltered control systems and is picked up by the audio system. **Sunn** dimmer packs control this problem with high frequency filters that suppress the RFI.

If a buzz is present, make sure you have followed the rules listed in Section 4. In addition, always follow good audio practices:

- Use balanced (3 pin) mics and cords.
- Use high quality instrument cords.
- Use three wire (grounded) power cords on instrument amplifiers.
- Repair faulty jacks on guitars and equipment.

This should eliminate any buzz caused by the lighting system. However, if you still have problems, try plugging the dimmer pack(s) into another AC outlet.

PROBLEM: High pitched "whine" in the audio system.

If a whine is present, and you are sending controller signals through a snake, then either the snake has some unbalanced channels, or it has excessive "crosstalk." If either is the case, use a mic cord. (NOTE: a "whine" on unterminated or unused channels may be normal).

PROBLEM: The lighting system does not operate properly.

Whenever you troubleshoot any system, first verify that it is correctly interconnected and that it is plugged into a working AC outlet. Next, isolate the problem to one part of the system by verifying the proper operation of the other parts.

DIMMER PACKS. All **Sunn** dimmer packs have a self-test feature built into them; with lights plugged into the dimmer pack, and the dimmer pack plugged into an AC socket, the lights will come on at full intensity when no mic cord is attached to the dimmer pack. If any lights do not come on, and the lights are known to be good, the problem may be caused by one or more blown fuses inside the dimmer pack. These should only be replaced by qualified service personnel.

WARNING: Busses, triacs, heatsinks and parts of the circuit board are at 120 VAC potential. Do not open the case without first disconnecting the AC cord. Install only fuses of the same rating indicated on the circuit board.

If there is still a problem in the dimmer pack, refer it to a qualified service technician.

LIGHTS. If you suspect a burned-out light, try plugging it into a working channel. If it still doesn't come on, replace it. Lights may also be tested by plugging them directly into any 3-prong AC outlet (be careful- the lights get hot, and they are bright). Replace any burned out lights.

MIC CORD. The quickest way to determine if you have a faulty mic cord is to swap it with one that is known to be good. If the problem disappears, your cord is probably bad. Cords can be tested easily with an ohmmeter. Measure the resistance between pin 1 on the male end and pin 1 on the female end. The reading should be close to 0 ohms. Now repeat the test for pins 2 and for pins 3. Again, you should read 0 ohms. If these readings are correct, measure between pin 1 and 2, between pin 1 and 3, and between pin 2 and 3 on one of the connectors. The meter should show an open circuit. If the cord is bad, repair or replace it.

CONTROLLER. After verifying proper operation of the other parts of the system, plug in the controller. The red LED above the BLACKOUT switch should glow brightly and the other LEDs should glow dimly. If this is not the case, unplug the cord from the controller and measure the voltage between pin 1 (the ground) and pin 2 of the cord. +15 VDC should be present at pin 2. If it is not, the problem is either in the mic cord or in the dimmer pack. If the voltage is present and the LEDs did not come on, there is a problem with the controller. If the LEDs did light, but the controller doesn't affect the lights, re-check the mic cord. If you have an expanded system in which one of the controllers has more than four channels, make sure that the dimmer pack you are testing is set up to be addressed by the controller you are plugging into it. There are no user-serviceable parts in the controller; therefore, any problem with the controller should be referred to a qualified service technician.

9. SERVICE INFORMATION.

LIGHTS: The lights that are suitable for use with your lighting system depend upon the intended use, the size and style of your light fixtures, and the power rating of your dimmer packs.

If you are using "par" fixtures, the suitability of a lamp may be determined from its part number. A typical such number is:

150 Par 38/NSP.

The first number (150 in this example) is the power rating of the lamp; "Par" stands for "parabolic aluminized reflector" and indicates that the lamp has a reflector built into it; the par number (38 in the example), divided by eight gives the lamp's diameter in inches; and the letters following the par number indicate the lamp's intended use (N = narrow, M = medium, W= wide, VW = very wide, SP = spot, and FL = flood). Thus, the above example translates to:

150 watt lamp with built-in parabolic aluminized reflector; the lamp has a diameter of 4.75" and is intended for use as a narrow spot.

Lamps with the same diameter as pars are available for use as washes, and are indicated by the letter "R", in the place of "Par". "R" stands for "reflector".

For further information on lamps, see lighting specialty stores, books and catalogs.

GELS: Gels are available in many colors through lighting specialty stores. We recommend using the high temperature variety. Their greater life expectancy more than offsets their greater cost.

Other than lights, gels and microphone cords, there are no user-serviceable parts in the SUNNSPOTS™ Lighting System. If you have problems, contact your dealer for the location of the nearest **sunn** Authorized Service Center.