

peterson

ELECTRONIC SWELL SHADE OPERATOR MODEL RC-100

INSTALLATION INSTRUCTIONS

INTRODUCTION

The Peterson Model RC-100 Electronic Swell Shade Operator is the newest generation of our highly successful swell shade operator line. With more than 3,000 Model C swell shade operators currently in use, we have been able to learn about virtually every situation that can arise when designing and installing swell shade systems. After gaining this experience and listening to ideas and recommendations from many of our customers, our engineers have made several important design improvements that make the Model RC-100 even better! One of the important new features of the RC-100 is a built-in power supply that derives power to move the shades from the 117 Volt A.C. line rather than the organ rectifier. This prevents any load on the rectifier from the swell shade operator that would limit its capacity for operating other parts of the organ. The Model RC-100 will automatically open or close the shades when the organ power switch is turned off or, if you prefer, can be set to leave the shades in the position determined by the shoe.

Another difference between the Model RC-100 and earlier models is the new two-part, modular design. A smaller, lighter motor module is more convenient to mount into tight spaces as is sometimes required for hook-up to the shades. A separate control module contains all of the solid state circuitry, adjustment controls and connection points. This control module can be mounted in a more accessible location, up to fifteen feet from the motor module, eliminating the need for making adjustments while in awkward positions or high on a ladder.

Various related accessories such as expression shoes, reed switch expression contact assemblies, trace arm assemblies, shade bearings and pins, and expression shoe bar graph indicators are available from Peterson. We can also provide custom jumper cables that plug onto the RC-100 and the contact assembly or a junction. Please refer to our Main and ATOOLS AND MISCELLANEOUS PARTS@ catalogs or contact the factory for more information.

Please read the following installation instructions carefully before beginning to install your new swell shade operator. And remember, your questions and comments are always welcome at Peterson!

OPERATING PRINCIPLES

A brief explanation of the principles behind the Peterson Model RC-100 Electronic Swell Shade Operator should help you to understand how to install it properly. The device consists of a D.C. gear motor, motor drive speed control, position comparator, shoe position sensor and motor shaft position sensor. Signals from the shoe position sensor and motor shaft position sensor are compared by the position comparator.

If the signals match, the motor will remain at rest because current flow to the motor is prevented and an electro-magnetic brake is applied to the motor. When the shoe changes position, the comparator senses this difference and the motor is driven in a direction that would eliminate the position difference. In

theory, the motor would stop instantly when the shoe and motor positions match. An ideal system would allow infinitely small increments of motor shaft rotation (shade travel). Due to the effects of inertia on the motor armature and shades and the limitations of the braking system, the motor does not stop at the exact instant that the shoe and the motor shaft positions match. The shaft will keep going slightly beyond this point and then stop. If the system was designed to have sensitivity to very small increments of travel, the arm would go past the desired position, return to the desired position and beyond (due to inertial effects), and would repeat this cycle indefinitely. This undesirable effect is known as overshoot or hunting.

The main causes of hunting are high inertial loads, high speed, and high sensitivity to position differences by the position comparator circuit. We have de-sensitized the position comparator circuit so that the smallest increment of travel of the trace operating arm is 3/16". This 3/16" deadband eliminates hunting at normal speeds of operation, i.e., about one second for end to end shade travel. At greater speeds the inertial effects increase; consequently if the speed is set too high the system will hunt. You might notice that the position adjust potentiometers require a small amount of rotation before the arm will begin to move, because of the built-in deadband. We have set the deadband to an optimum setting to provide a small enough increment of travel at an acceptable speed without hunting. If this deadband is widened, the arm could rotate faster while still avoiding any hunting, but the minimum travel could be larger, perhaps too large to permit satisfactory expression results.

INSTALLING AND WIRING THE CONTROL MODULE

The control module should be securely mounted in place in a location within fifteen feet of the motor module, and within 6 feet of a 117 Volt A.C. outlet that is always live (not switched with the chamber lights or organ power). All of the connection points and adjustments of interest to the installer are located on the front panel of the control module. Organ Positive and Organ Negative should be connected to the labeled terminal block on the control module. This organ rectifier voltage must fall within the range of 10-18 Volts DC. Whenever rectifier voltage is applied across the screw terminals, a yellow light directly above them will glow. Unlike on older models of Peterson swell shade operators which used the organ rectifier for power to move the shades, the motive power on the Model RC-100 is derived from a built-in transformer whose primary winding must be energized with 117 Volts A.C. The organ rectifier serves only to signal the switching of the power from the transformer's secondary winding, and to supply the current fed through the swell shoe contacts and thus indicate the shoe's position.

The conductors from the rectifier to the Organ Positive and Organ Negative screw terminals should be #24 AWG or larger. There are five screw terminals on another connector block. The color-coded wires of the interconnect cable, supplied pre-attached to the motor module, must be connected to these screw terminals according to the color code legend. As indicated on the legend printed near this terminal block, one arrangement of the wires will cause the motor to move in the clockwise direction, and the other arrangement will cause it to move in the counterclockwise direction, as the shoe is advanced to indicate that the shades should be opened further. Clockwise and counter-clockwise are defined as the motor module is viewed as shown in the diagram printed on the front panel. There is also a 9-pin in-line wafer pin connector located on the control module front panel. The terminal marked A+@ is fed internally with Organ Positive voltage, and may be used as a source for the feed to the expression shoe contacts. It is not necessary to use this pin to feed the expression shoe. Any source of Organ Positive may be used. CAUTION: Do not connect Organ Negative to any of the pins on this 9-pin wafer connector. Damage will likely result to the swell shade operator. Consult the factory for polarity inverters if an incompatible shoe contact configuration must be used.

The remaining terminals 1 through 8 are to be connected in order to the terminals on the shoe. EXAMPLE: The wafer pin labeled #1 on this connector is to be wired to the first contact that is made when the shoe is advanced toward the open direction. Pin #2 is to be wired to the second contact made when the shoe is further advanced toward the open direction. If there are more than 8 contacts on the shoe, skip some of the contacts so the shade positions can be set over the entire range of the shoe.

MOUNTING THE MOTOR MODULE

The base plate of the motor module has four rubber grommets with holes in them. These grommets provide vibration dampening. When bolting the module to its mounting surface, use the supplied #12 screws and large flat washers if mounting into studs. Screws are provided in 1-1/4" length for use when mounting into exposed studs, and 2" long screws are provided for use when they must be run through drywall before entering the studs. Be sure that the screws Abite@ securely into the mounting surface for a strong, permanent mount. If no studs are available, comparably sized toggle bolts or other specialty mounting hardware must be used.

ARM ORIENTATION SETTINGS

The Peterson Model RC-100 Swell Shade Operator may be set for clockwise or counterclockwise rotation of the arm to open as pictured in the diagram on the control module front panel. This is determined by the order in which the color-coded wires from the motor module are connected to the screw terminals on the control module. The order of these wires for each direction of opening rotation is shown on the control module front panel. the motor shaft and then repositioned at 90° increments just as on the Model C swell shade operators that you may be familiar with. When repositioning or replacing a crank arm, make sure a set screw bears down squarely on the flat of the motor shaft to prevent the arm from coming loose.

In many cases it will be easier to position the crank arm by using another procedure. This alternate method allows the crank arm to be set to virtually any starting position, without removing the motor module cover. This is done by rotating the shaft of the position sensing potentiometer relative to the sprocket that drives it. To use this method please observe the following steps carefully:

- 1 Before making any adjustments, set the expression shoe to the fully closed position, or unplug the cable coming from the shoe contacts at the control module.
- 2 Because this procedure may require the crank arm to rotate a full 360°, verify that the linkage to the shades allows the arm to rotate all the way around without binding. If not, disconnect the linkage from the crank arm.
- 3 To reorient the crank arm to the required "shades closed" position, insert a narrow tipped (1/8" or narrower) straight blade screwdriver through the hole in the motor module's cover until it contacts the slot in the servo pot shaft in the center of the servo sprocket. See Figure 1. Rotate the servo pot shaft by small increments, IN THE PROPER DIRECTION ONLY- play will be minimized. When using a pulley, the pulley should be as large as possible to reduce losses. Aircraft cable works well for the cable connection to the trace.

We have found on rare occasions that a "squeak" noise develops in the gear motors after much use. This type of noise is usually caused by glazing of the surfaces of the motor's two brushes. This can usually be corrected by switching the brushes into each other's holding compartment. The brushes are located on opposite sides of the motor under plastic slotted caps.

LINKAGE CONNECTION

As discussed previously, if your shade parts have play in them, a spring or a weight return system is recommended. Again, use pulleys that are large in diameter (3" or 4"). Plastic or wood pulleys are usually the quietest. The spring should be preloaded and be as long as practical, so that the difference in tension between the open and closed positions is minimal. Do not use excessive spring tension. Use only the tension needed to positively return the shades to the closed position.

When using a weight system, the loading is constant throughout the range of travel. Use only enough weight to return the shades effectively. Always have the spring or weight pulling the shades to the closed position and have the swell shade operator pull against the return spring or weight to open.

We have supplied the trace operating arm with a rod end swivel joint and a length of fine thread (1/4-28) threaded rod. It is recommended that you make a direct connection from this threaded rod to the trace system of your shades, extending it if necessary with a length of threaded oak or metal rod. The other end of the threaded rod can be attached to the trace with a pivot pin of your own fabrication, or you can use an additional rod end assembly identical to the one supplied on the crank arm, available from Peterson as Part Number 400777.

If you are using a cable/pulley system, you may have trouble matching the fine thread of the trace operating arm rod. Hardware store turnbuckles usually have a coarse thread. We have a fine thread turnbuckle assembly available that will attach to the end of the trace operating arm rod. The Part Number for this is 400778. If you require these additional parts please mail your request to PETERSON ELECTRO-MUSICAL PRODUCTS, INC., 11601 South Mayfield Avenue, Worth, IL 60482-2476 or call toll free 1(800)341-3311.

THE SWELL SHOE SIMULATOR SWITCH

To make set-up adjustments of the Model RC-100 more convenient, a swell shoe simulator switch is built into the control module. When the organ's expression shoe is in the fully closed position, or its cable is unplugged from the control module, advancing this switch simulates the closing of eight shoe contacts in order. When the switch is in a position labeled A0@, the fully off shoe position is simulated. Note that switch positions 1 through 8 should be used for set-up only. Do not leave the switch in positions 1 through 8 when normal use of the expression shoe is desired. This switch is also used for selecting a powerdown mode. See the A Powerdown Mode section for information on this.

SPEED ADJUSTMENTS

There are four speed adjustment controls located on the control module front panel. These are labeled Close Fast, Close Slow, Open Fast, and Open Slow. They may be adjusted with the supplied plastic adjustment tool or with a small straight blade screwdriver. Rotating any of these controls clockwise will increase the speed of the motor in the labeled mode. An LED (Light Emitting Diode) is located next to each control. The LED will light next to the control that is operative at any given time. When the arm has reached the desired position, none of the LEDs will be lit and the motor will stop. When a small change in position is called for, the slow mode will dominate. The appropriate control should be adjusted for slow enough motion to prevent abrupt, jerky starting and stopping. The fast mode will be entered whenever a greater distance change is called for. Adjust the speed of this mode for a rate fast enough for adequate expression response.

If you see a speed adjust LED indicator lit when the motor is not turning, it means that the motor is stalled. Turn the corresponding control clockwise to increase the power in that mode. If the motor does not start moving, the linkage is probably bound up, or you are exceeding the torque limits of the swell shade operator. It is very important that the motor not be allowed to stall. A stall draws excessive current and will trip the circuit breaker or blow the fuse located on the front panel of the control module. If you have a problem with the motor stalling, remove power from the swell shade operator and correct the source of overload. In most cases, you will find that the positions are adjusted for too much travel and the shades are binding at the end of their travel limits. Refer to the Position Adjustments section. When replacing a fuse, be sure to use one of the exact type and rating specified. The fuse used here is a 1 Amp, Slow Blow, 3AG type and is available from Peterson or from Radio Shack stores as their part #270-1283. One spare fuse is supplied clipped to the control module.

POSITION ADJUSTMENTS

The positions of the shades in each of the eight stages are independently adjustable by their respective controls (potentiometers) located on the control module front panel. These controls may be adjusted with the supplied plastic adjustment tool or with a small straight blade screwdriver. Above each potentiometer is an LED, which indicates when the stage is activated. There is also a closed position potentiometer. With the shoe in the fully closed position, the closed position LED will be lit and the closed position may be adjusted as desired. As the shoe or swell shoe simulator switch is advanced, additional LEDs will light. Advance the switch one stage at a time and adjust each control accordingly.

Turning the potentiometer clockwise will open the shades, and turning it counterclockwise will cause them to move toward their closed position. Each Model RC-100 is set at the factory for maximum travel. The "shades closed" position control is set fully counterclockwise and the #8 (shades fully open) control is set all the way clockwise. When making these adjustments remember that the increment of travel must be large enough for the comparator circuitry to tell the motor to start rotating. Otherwise, the arm may not reliably move from one position to another. Refer to the Operating Principles section regarding deadbands. Do not adjust the positions so they could make the shutters bind at the end of travel. This will stall the motor and trip the circuit breaker or blow the fuse. If you must replace the fuse, always use a 1 Amp, Slow Blow, type 3AG fuse. A spare fuse is supplied, clipped to the control module, and additional fuses are available from Peterson or at Radio Shack stores as their part #270-1283.

POWERDOWN MODE SELECTION

The Model RC-100 is different from earlier models of Peterson swell shade operators in that it may be set to automatically move the shades to a predetermined position when the organ rectifier is turned off. This is possible because of the built-in power supply that derives power for moving the shades from the 117 VAC line, rather than from the organ rectifier. Any one of three powerdown modes may be selected by leaving the swell shoe simulator switch in a designated position after all of the shoe positions are set as explained above.

To set the Model RC-100 so that the shades open upon power-down, slide the swell shoe simulator switch to the position labeled AAUTO OPEN@. This will cause the shades to move to the position determined by the setting for shoe position #8 when the organ power is turned off.

To set it so that the shades close upon powerdown, put the swell shoe simulator switch in the position labeled AAUTO CLOSE@. This will cause the shades to move to the position determined by the CLOSED position adjust pot upon powerdown.

If you prefer that the shades not automatically move to the fully open or fully closed position when the rectifier is turned off, leave the swell shoe simulator switch in the position labeled AAS DETERMINED BY SHOE@. The shades will not move as the rectifier is powered down.

IMPORTANT: THE SWELL SHOE SIMULATOR SWITCH MUST BE LEFT IN ONE OF THESE THREE POSITIONS EXCEPT DURING SET-UP ADJUSTMENTS. ANY TIME THE SWITCH IS IN ONE OF THE POSITIONS LABELED 1 THROUGH 8, THE SWELL SHADE OPERATOR WILL NOT CLOSE THE SHADES FULLY UNDER NORMAL USE CONDITIONS.

FUSE INFORMATION

The Peterson Model RC-100 Electronic Swell Shade Operator is supplied with a 5 Amp resettable circuit breaker for the motor drive circuit and a 1 Amp Slow Blow fuse for the primary (117 V.A.C. side) of the transformer. Both are located on the front panel of the control module. When the organ rectifier is on, a yellow LED above the screw terminals labeled Organ Positive and Organ Negative, and the green LED above the control for adjusting the "shades closed" position should both be illuminated. If either of these power indicator lights is not illuminated when the organ rectifier is on, check the fuse and breaker. If the breaker is Athrown@, simply push it back in to reset. If it throws repeatedly, the shades are probably binding. Locate the source of the trouble and reset the breaker. If the fuse is blown, check for possible sources of trouble and contact the factory for assistance if necessary. Be sure to replace the fuse with one of exactly the same type and current rating. One spare fuse is provided with the control module and can be found clipped to the right side panel of the control module. Note that the amber indicator light for the 117 Volt A.C. power should always be illuminated, indicating that the control module is plugged into a Ahot@ A.C. outlet.

WARRANTY INFORMATION

The Peterson Model RC-100 Electronic Swell Shade Operator is fully warranted for a period of five (5) years from the date of purchase. During the period from five (5) to ten (10) years, there will be a maximum charge of \$125.00 for repair of a motor or gear train only. All other components are covered for a full ten (10) years. Any swell shade operator that is returned to the factory prepaid during this period will be repaired according to the above terms if in our opinion, it is defective in material or workmanship. Any unit that requires repairs due to accidental damage, abuse or operation on power sources other than those specified, will be repaired and charged for at current rates.

IN CASE OF DIFFICULTY

PETERSON recognizes the importance of giving good customer service. Providing comprehensive support to the customer after the sale has given us a fine reputation in the industry. If you experience any difficulty with the swell shade operator, please contact the factory for technical assistance. A simple phone call may save much time and money. Our phone numbers are 1(708) 388-3311 and 1(800) 341-3311 (Toll Free in the United States and Canada).

RETURNING A SWELL SHADE OPERATOR

Should it become necessary to return a swell shade operator, please observe the following:

Because of the modular, two-part design of the Model RC-100, it will rarely be necessary to disconnect

the shade mechanism and remove the motor module. The motor module contains only the gear motor and a potentiometer. Both are very rugged and have proven in thousands of Peterson swell shade operators to give very dependable service. Please contact the factory if you need help determining which module should be sent in if repairs are needed.

Use a shipping carton that will allow at least 2" of packing material around the entire module. Crumpled newspaper works very well for packing. Mark the carton AFragile-Delicate Instrument@. We suggest shipping via United Parcel Service if possible, or Parcel Post Special Handling, Insured. Be sure to enclose a letter which describes the difficulty you have experienced. Also, enclose your return address and a phone number where you can be reached if we have any questions. Ship the unit Prepaid to:

PETERSON ELECTRO-MUSICAL PRODUCTS, INC.
11601 South Mayfield Avenue
Worth, Illinois 60482-2476

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