

## Electronic Instrument Service

Multi-function replacement relay  
For Leslie® 147 & 251 Amplifiers

### PRODUCT OVERVIEW AND WARRANTY

The new Mark II relay replaces Leslie® part number 027649 is a totally solid state device controlled by a small microprocessor and features true zero crossing switching. This product is compatible with existing Leslie controls. It is also possible to obtain brake to off and coast to off, without additional wiring from the console. Refer to "Multi-mode operation" for details.

Our relays provide noiseless switching, both mechanically and electrically. All components used are the highest quality available. When properly installed, the relay should last the life of the amplifier. This relay is supplied in either 100 to 120v or 200 to 240v versions and may be used on any frequency from 25 to 70 HZ. . Excellent for use in Church, Studio, Professional and other applications where speed is changed frequently, noise is a factor, access to the equipment is limited, or where reliability is a major concern.

If the control circuit has been changed for three-speed operation, all cabinets **must** be equipped with the E.I.S. relays. No damage to unmodified Leslies will occur, however, you will experience hum and erratic switching from the mechanical relay.

This device is designed to supply current to the tremolo motors. It **will not** operate with aftermarket speed change devices.

We warrant the enclosed product to be free of defects in material and workmanship for two years from date of purchase. In the event of a defect during the warranty period, we will, at our option, repair or replace the product if returned to us, with proof of purchase, by the owner. The remedy for this breach of warranty is limited to servicing or replacement only and as this product is sold as a kit for installation by others, shall not cover any other damages, including but not limited to the loss of profit, special, incidental, consequential and other similar claims.

Thank you for purchasing our products. If you have suggestions, questions or comments please write, telephone or e-mail.

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**INSTALLATION REQUIRES DIRECT CONNECTION TO THE  
A.C. LINE AND SHOULD BE INSTALLED BY A QUALIFIED TECHNICIAN!**

**Model 147 Leslie® Amplifier  
Used in 145, 147, 147RV, 245, 247 and 247RV**

- Unsolder, or clip close to the old relay terminals, the Orange, Yellow and White wires from the contacts and the Red and Violet coil wires. Remove the relay, grommet and spacer, the two-.1mfd caps from the motor outlets and the .1mfd between pins 2 and 5 of the input plug.
- The new relay is adhered to the side of the chassis, 3" from the front edge flush with the bottom of the chassis. The orange, yellow and white wires should point toward the motor outlets. Clean the area with the enclosed alcohol prep pad and allow drying thoroughly. This is crucial to assure proper adhesion. Remove the protective cover from the adhesive pads and press firmly into place.
- Connect the Orange, Yellow and White wires from the new relay to the like color wires just removed from the original relay with wire nuts provided. For a neater job, you may solder the White wire to the fast motor sockets, the Yellow wire to the slow motor sockets.
- Route the Brown/Blue twisted pair toward the center of the chassis and solder the Brown wire to pin 1 and the Blue wire to pin 7 of the 6550 nearest the center of the chassis.
- Route the Red/Violet twisted pair toward the input plug and solder either wire to pin 2, the other to pin 5. For easier installation, clip these leads to about 2 inches and connect to the existing leads with the wirenuts provided.
- Double check all connections and verify that all solder joints are solid. This completes the installation.

**251 AMPLIFIER**

The procedure for this amplifier, used in 251 and 351 cabinets is the same *except* the Red/Violet pair connects to pins 2 and 4 on the input plug and the .1mfd cap to remove is across these pins as well.

## INSTALLATION AT THE CONSOLE

If only Tremolo and Chorale speeds are desired, no changes are necessary. To access the advanced features, refer to "Multi-mode operation".

## MULTI-MODE OPERATION

The easiest way to access the advanced features of this product is to replace the two-position switch in the tremolo switch housing with a three-position switch. Leslie used several switches in their installation adapters that are suitable. The most common are stamped PA 222-279 and CRL 222-330 on the spring side.

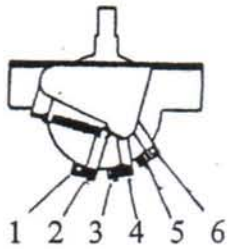


Figure 1.  
PA 222-279

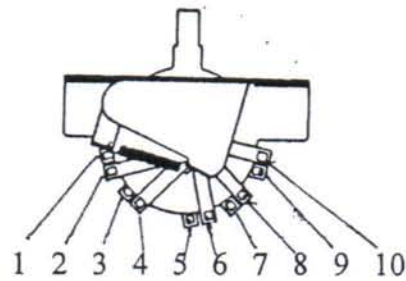


Figure 2.  
CRL 222-330

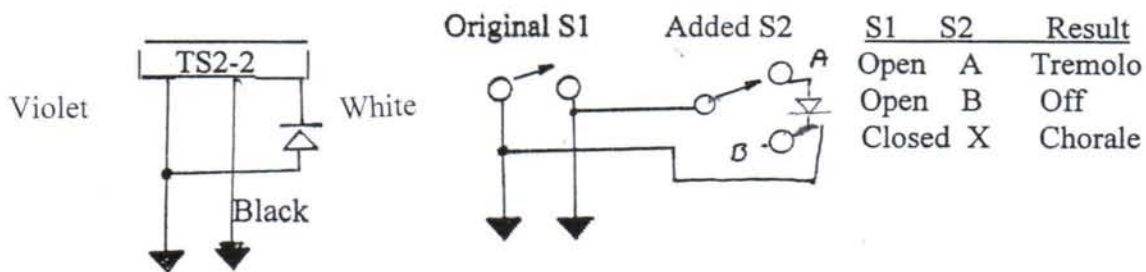
The switch in Figure 1 has six terminals, three on the top of the switch deck and three on the bottom. With the spring side up, number these 1 to 6, from left to right and connect as follows:

- Terminal 1. No connection.
- Terminal 2. Either end of diode supplied.
- Terminal 3. Jumper to terminal 4 and one side of "zip" cord.
- Terminal 4. Jumper from terminal 3.
- Terminal 5. Remaining end of diode and other lead from "zip" cord.
- Terminal 6. No connection.

The switch in Figure 2 has 10 terminals, five on either side of the switch deck. With the spring side facing up, number them from 1 to 10, from left to right and connect as follows:

- Terminal 1. No connection.
- Terminal 2. Either end of diode supplied.
- Terminal 3. No connection.
- Terminal 4. Either lead from "zip" cord
- Terminal 5. No connection.
- Terminal 6. Other end of diode and remaining lead from "zip" cord.
- Terminal 7. No connection.
- Terminal 8. No connection.
- Terminal 9. No connection.
- Terminal 10. No connection.

### ADDING A SECOND SWITCH OR THE TREK II TS2-2



D1 = 1N4006, polarity not important. X = Don't care

Any S.P.S.T., center off switch, or the later Leslie control center may also be used. Connect these switches so the contacts are shorted in Chorale, open in off and inserting the diode across the control terminals in Tremolo position.

### OPERATION

There are two ways to stop the rotors. Switching from Tremolo to Off will energize the slow motors for approx. 3 seconds. This serves to *brake* the lower rotor. All motors will then switch off. Switching from Tremolo to Chorale and then to off will turn all motors off instantly, allowing the rotors to *coast* to a stop. If the console switching has not been modified, the device will operate exactly as the original relay. If you ordered your relay as coast only, the brake feature will not function.

## NOTES

The microprocessor enters a "learning mode" when powered-up. When the control circuit has been modified for three-speed operation, the rotors will operate at fast speed if the organ is started with the switch in the off position. Switching to Tremolo will complete the learning cycle and the relay will now operate normally. This cycle will occur whenever the organ is first turned-on. If the control circuit is left unmodified, this will never occur.

In very rare instances, a cap across the switch contacts of the connector kit, or combo pre-amp may prevent proper operation of our relay. If you cannot get the relay to switch properly, remove any cap present across the switch contacts.