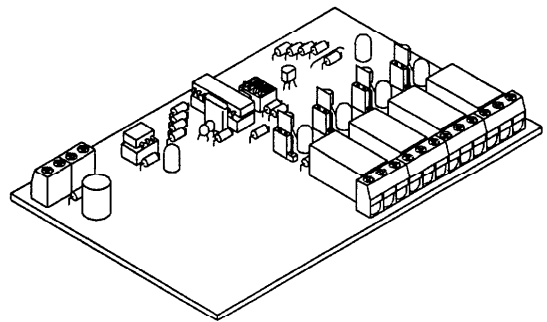




THE M977 4-CHANNEL MULTIPLEXER IS DESIGNED TO INTERFACE WITH SOLIDYNE'S CLIPPERNET SYSTEM "FAST" PWM SIGNAL. THE M977 CAN BE USED TO CONTROL A VARIETY OF ROOF TOP UNITS, AS WELL AS PROVIDE NORMAL AND REVERSE ACTING SEQUENTIAL LOAD CONTROL.

- Provides inexpensive sequential load control.
- Dip switch configurable for normal sequential control, reverse-acting sequential control or roof top unit control.
- Manual load control for fail safe operation
- Small snap track mounted package.

4 CHANNEL MULTIPLEXER BOARD



M977

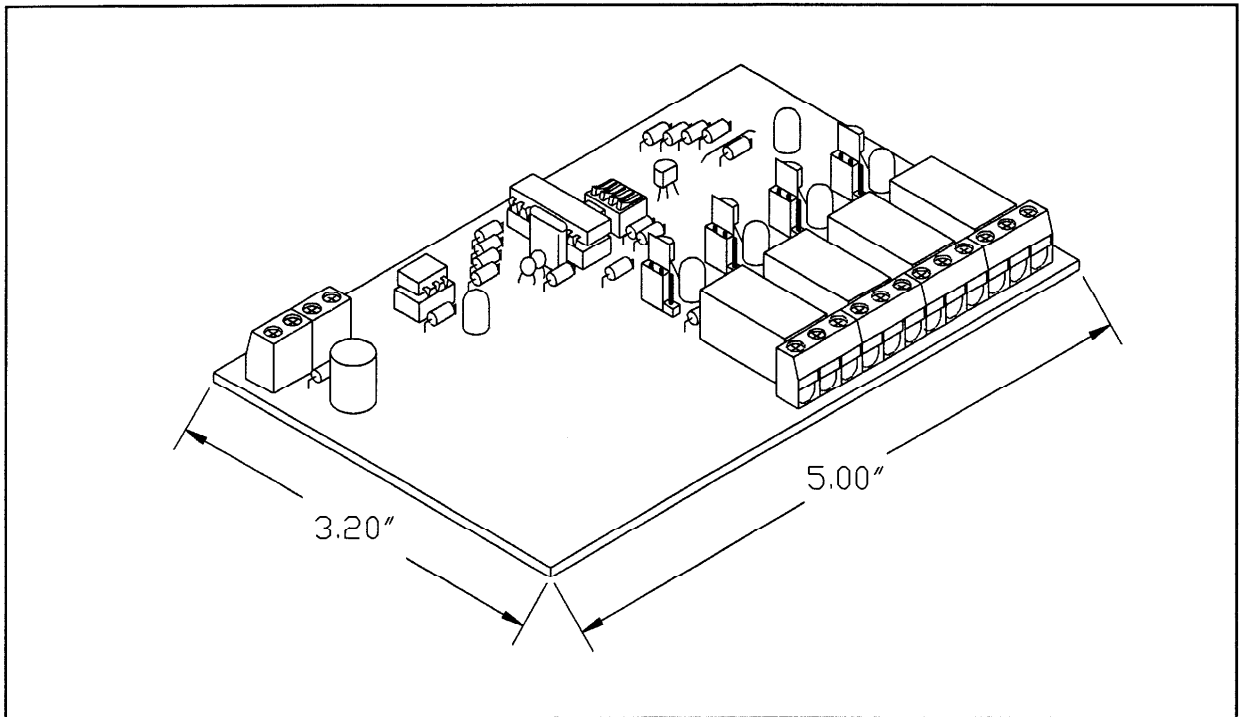


Fig. 1:Dimensions

SPECIFICATIONS

ELECTRICAL

Input Power: 24VAC, +/- 10% 7 VA

Input: FAST PWM INPUT, directly connected to Solidyne controller output. Optically isolated, 0-16 VDC PWM signal.

Outputs: 4 form "C" relays, rated 2 Amp max resistive @ 24VAC

Electrical Life: 100,000 operations @ 1 Amp

Override jumpers: 4 3-position (on/off/auto)

Operating Temp.: -20°F to 150°F

Storage Temp.: -40°F to 185°F

MECHANICAL

Dimensions: See Figure 1

CONNECTIONS

Wiring: one two-position terminal block for input, "FAST" PWM signal

one two-position terminal block for 24VAC

four three-position terminal blocks for outputs

Wire size: Up to one 14 AWG max per terminal

Terminal Type: Captive screw, moving clamp design in nickel plated copper alloy.

DISCLAIMER

Solidyne Corporation reserves the right to change product specifications without notice. Solidyne Corporation assumes no liability for damages incurred directly or indirectly from the use of this equipment or from errors, omissions or discrepancies between the equipment and the installation guides.

GENERAL

The M977 4-channel multiplexer is designed to accept the "FAST" PWM signal from the Clipper LAN/XL Controller to provide sequential load or roof top unit control. The M977 uses the "FAST" PWM signal to turn on and off relays depending on the dip switch configuration and the PWM signal. Any or all of the relays can be used depending on the application.

INSTALLATION

CAUTION

DISCHARGE ANY STATIC YOU MAY HAVE ACCUMULATED BY TOUCHING A GOOD EARTH GROUND BEFORE WORKING WITH THE M977.

1. Read installation instructions carefully. If these instructions are not followed, equipment damage or personal injury may result.
2. This product should be installed by a trained, qualified service technician.
3. Before installing or removing the M977, disconnect power to prevent equipment damage or injury.
4. After the installation is complete, check the system for proper operation.

MOUNTING/LOCATION

The M977 is designed to be mounted near the equipment being controlled for ease of wiring, and easily snaps onto a standard snap track. A plastic snap track is provided. Make sure that the M977 is not exposed to direct outside environment such as rain, direct sunlight, etc. Keep in mind that it is generally better to keep the wiring from the M977 to the rooftop loads as short as possible, as the distance between the Clipper and the M977 can be up to 1500 feet (@14 AWG). The snap track should be secured to the mounting surface by screws, and the M977 then snapped into place.

WIRING WITH CLIPPERNET

The M977 has two terminals which must be wired to a Solidyne controller capable of a "FAST" PWM output. Connect the terminal labeled signal "+" on the M977 to an output terminal on the controller. Connect the terminal labeled signal "-" to the IN/OUT COM terminal on the controller, see figure 2. Typically, a twisted pair of 14 AWG wires should be used. Shielding is not necessary under most conditions. The M977 can be located up to 1500 feet from the controller. The M977 is immune to short fluctuations in the control signal as the M977 will not react until it has received 10 consecutive PWM cycles.

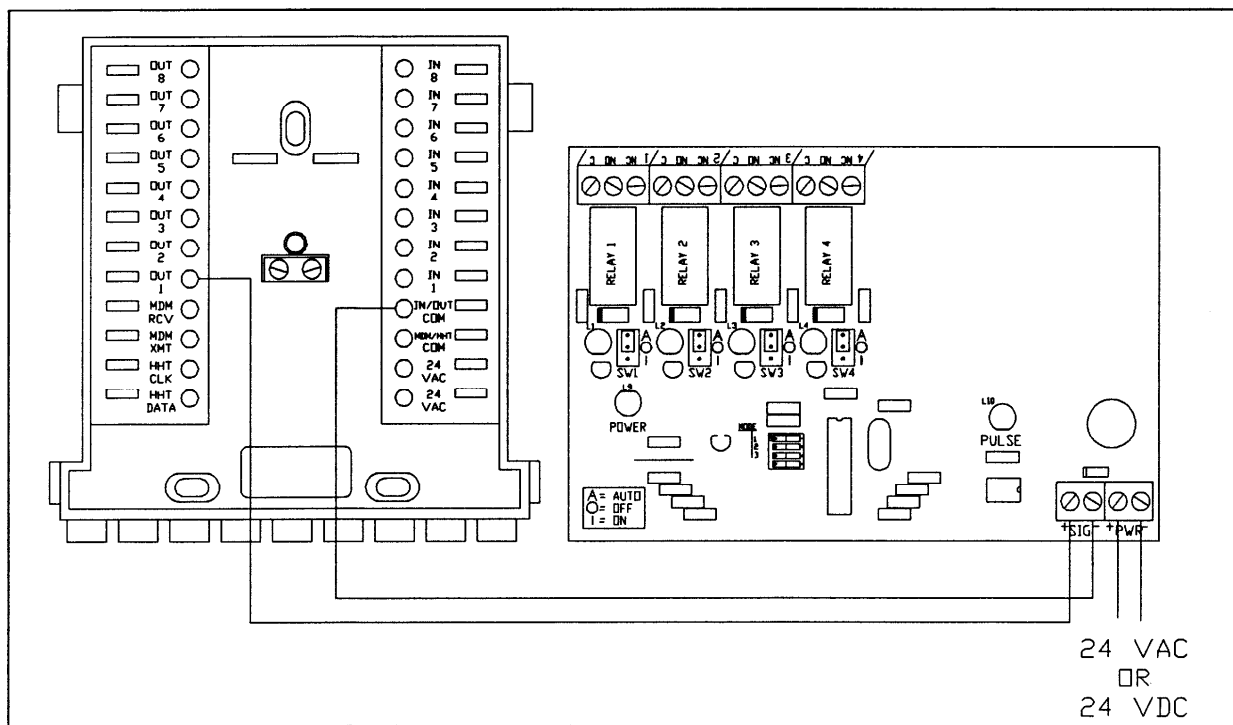


Fig. 2: M977 Clipper Wiring

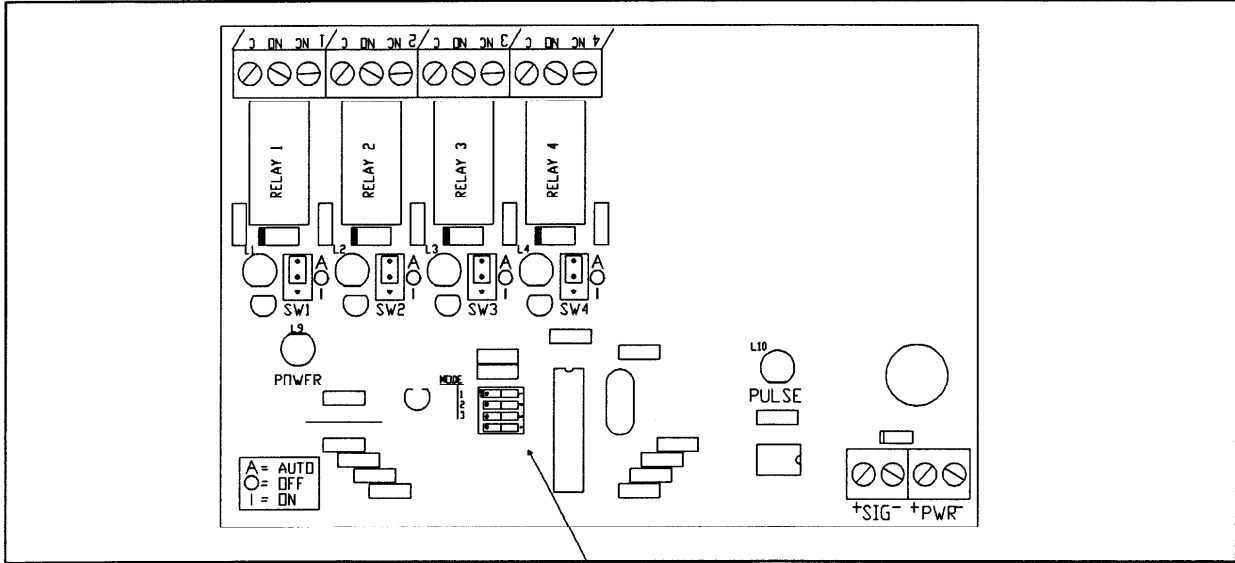


Fig. 3: M977 Details

POWER

The M977 requires 24 VAC or 24 VDC. Power should be isolated from earth ground, chassis ground and the neutral leg of the primary winding. If the 24 VAC or DC power is shared with other devices that have coils such as relays, solenoids or other inductors each coil should have a diode, MOV, transorb or other spike snubbing device across each of the shared coils.

OUTPUTS

Each of the four relays of the M977 has Normally Open and Normally closed contacts, see Figure 3.

DIP SWITCH SETTINGS

The Dip Switches on the M977 must be set for the M977 to operate properly.

To set the M977 for Roof-Top Unit control, switch 1 must be in the OFF position, while switches 2 and 3 must be in the ON position.

To set the M977 for sequenced relay control, all three switches must be in the OFF position.

To set the M977 for reverse sequence relay control, switches 1 and 3 must be in the OFF position, while switch 2 must be in the ON position.

Switch 4 is not used. Its position is not important.

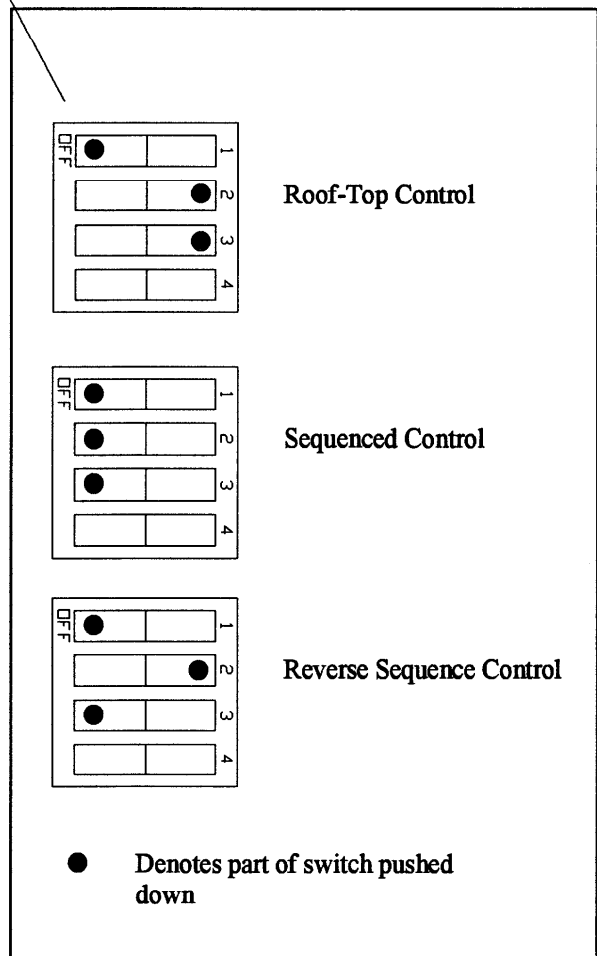


Fig. 4: M977 Dip Switches

Roof-Top Unit Control

The M977 can be set for Roof-Top Unit control for 4-relay Roof-top applications. To set the M977 for Roof-Top Unit control, set dip switches 2 and 3 ON.

*When Dip switch 1 is in the OFF position, no relays will energize in the deadband range of 44-55%. With Dip switch 1 in the ON position, the Relay #4 (FAN) will be ON for 9 minutes while the PWM% remains in the deadband range of 44-55% before going OFF.

The following table illustrates which relays will be energized based on the PWM%.

PWM %	Relay(s) Energized
4-19	4,2,1
20-31	4,1
32-43	4
44-55	None*
56-67	4
68-96	4,3

EXAMPLE: Roof-top unit with two stages of cool, 1 stage of heat and a fan.

Cooling stages 1 and 2 can be connected to relays 1 and 2 of the M977. Heating stage 1 is connected to relay 3 and the fan connected to relay 4. As the PWM% decreases from 50% towards 4%, cooling is turned ON. As the PWM% increases from 50% to 96% heat is turned ON.

The fan is turned ON (Relay 4) before any cooling or heating stages turn ON.

Sequential Relay Control

The M977 can be utilized as a sequential load controller. To configure the M977 for sequential load control, Dip switches 1, 2 and 3 must be in the OFF position. The M977 must see 10 identical cycles before any sequencing action can occur. The following table illustrates which relays will be energized based on the PWM%.

PWM %	Relay(s) Energized
4-19	None
20-39	1
40-59	1,2
60-79	1,2,3
80-96	1,2,3,4

Reverse Sequence Relay Control

To configure the M977 for reverse sequence relay control Dip switches 1 and 3 must be in the OFF position and Dip switch 2 must be in the ON position. As the PWM value rises, relays will come ON sequentially until a deadband at the 50% range for an "ALL OFF" condition. As the PWM value rises from 50% to 96%, the sequence of relays will be reversed.

Rising PWM %	Relay(s) Energized
4-8	None
12-16	1
20-24	1,2
28-32	1,2,3
36-40	1,2,3,4
44-60	None
64-68	4
72-76	4,3
80-84	4,3,2
88-96	4,3,2,1

As the PWM% decreases the relays de-energize in the following manner:

Falling PWM %	Relay(s) Energized
4	None
12-8	1
20-16	1,2
28-24	1,2,3
40-32	1,2,3,4
56-44	None
64-60	4
72-68	4,3
80-76	4,3,2
96-84	4,3,2,1

4. If the Controller and the M977 are mounted some distance from each other, an assistant would be helpful for this procedure.

Under the EXAMINE LOGGED DATA menu of the Controller, select the PWM OUTPUT DUTY CYCLE VALUES menu. This menu will allow you to see the PWM value of that output, as well as "manually enter" a known test value (See Controller Operations Manual for details). The display should now show 50%, which if no program was entered, would be the default value.

With the PWM output at 50%, check the M977 load LED's for the correct operation depending on the configuration selected by the Dip switches. Enter a test PWM value into the Clipper and observe the M977 operation.

5. Enter your program to control the M977.

JUMPER SETTINGS

Each relay has an AUTO/OFF/ON jumper. The AUTO/OFF/ON jumper allows manual control for each relay. Set in the AUTO position, the relay will be controlled by the PWM input signal from the controller. Set in the OFF position the relay would be deenergized. Set in the ON position the relay would remain energized.

CHECK OUT PROCEDURE

1. Apply power to the controller. The output should be selected under the Miscellaneous Menu as a "FAST" PWM OUTPUT and the LOAD POLARITY under the same menu should be selected to be ENERGIZED=ON. Refer to the Controller's Operations manual for details. Do *not* enter a PWM setpoint at this point.
2. Verify the 24VAC supply to the M977 is present and that the POWER LED is ON. The loads connected to the M977 *should not* be powered at this time.
3. Verify that the PULSE LED on the M977 is flashing at approximately 4 Hz.