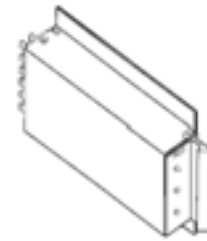# DATA SHEET :SSS-86

## Solid State Loadswitch:

### Description:
The PDC SSS-86 Solid State Loadswitch is a tri-pack solid state relay package designed specifically for the Traffic Control Industry. This unit meets NEMA specification TS1-1983, section 5.

Each switch will turn it's rated load ON or OFF within 10 deg. of the first zero cross-over point & within 5 deg. on succeeding alterations randomly timed input command signal.

The electronics are enclosed in a dust resistant, metal enclosure providing mechanical protection and excellent heat sinking for the heat

generating components in the circuit. The electronic components are easily accessible by removing the cover with a screwdriver.

### Installation:
The switchpac inter mates with any standard NEMA loadbay or with the model 332 cabinet output file.It is easily installed or removed by grasping the handle. Connector P1 pin outs are shown in FIG 1. The connector mates with a PDC BCS-12 or equal.

| PIN | FUNCTION |
|---|---|
| 1 | +115VAC, 60 Hz |
| 2 | Chassis Ground |
| 3 | A Output  (Red, Don't Walk) |
| 4 | Not Assigned |
| 5 | B  Output |
| 6 | A  Input   (Red, Don't Walk) |
| 7 | C  Output   (Green, Walk) |
| 8 | B  Input   (Yellow) |
| 9 | +24 VDC |
| 10 | C Input  (Green, Walk) |
| 11 | Not Assigned |
| 12 | Not Assigned |

P1
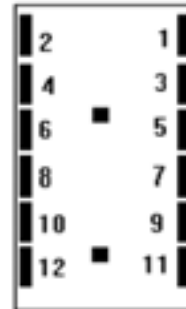(P1 as viewed from the outside of the product looking directly at the connector)

FIG 1.

### General Characteristics:

| | | |
|---|---|---|
| Load | voltage............................................ | 120 VAC |
| | current (max)................................. | 15.0 Amps (Tungsten Filament Load) |
| Control Signal | voltage............................................ | +24VDC |
| | current ............................................ | 20.0 MA (max) |
| Switching voltage at the zero | 1st alternation after.......................... | $\pm$10 Degrees of line |
| | signal is applied. | crossover point. |
| | Succeeding alterations..................... | $\pm$5 Degrees of line voltage at the zero crossover point. |
| Off State | dv/dt................................................ | 100 V per microsecond |
| | line to load resistance...................... | 15 K Ohms Min |
| | leakage current................................ | less than 20 MA |
| Isolation | voltage............................................ | 2500 VDC Min |
| | resistance........................................ | 10 Meg Ohms Min |
| Surge Current | one cycle......................................... | 175 Amps RMS Min |
| | one second....................................... | 40 Amps RMS Min |
| Life | operations........................................ | 30 million Min |
| Mechanical | lenght.............................................. | 8.40 inches |
| | width............................................... | 1.74 inches |
| | height.............................................. | 4.185 inches |
| | weight.............................................. | 1.135 LBS |

**Guarantee:**  The SSS-86 is fully guaranteed against all failures due to manufacturing defects for two years.

**Adjustments:** The switchpac has no adjustments

**Theory of operation:**

P.O. Box 10450 Zephyr Cove, NV. 89448 • PH (925) 461-0881 • FAX (925) 461-0884

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General - The switchpac is an AC zero voltage switch which can be broken down into three (3) sperate functions. The functions are illustrated in Fig 2.

Input - The input circuit is analogous to the coil of an electromechanical relay. CR1 is a reverse voltage protection diode.  CR2, CR3, CR4, R1, R5, & R10 provide the proper voltage range for switch turn on.
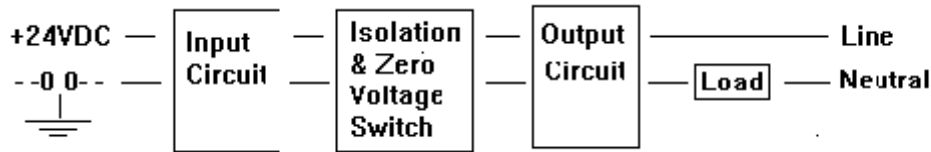


Isolation & Zero Voltage Switch - Isolation and zero voltage switching is performed by IC1, IC2, & IC3 which are optically isolated zero voltage turn on triacs.

Output - The output circuit consists of a triac and the load circuit. The triac is a simple bi-directional switch whose on - off state is controlled by the zero voltage switch circuit.

Detailed Description of Circuit Operation
See above "Theory of Operation"

Maintenance:

If the switchpac does not function properly, follow the outline I and II to isolate the problem.

I. Perform the following preliminary checks:
   A. Check  for 115VAC and 24 VDC at the input of switchpac.
   B. Check the control signal input circuit (which is part of the traffic control system)
   C. Check switchpac wiring external to P1.
   D. Check for burned out load lamp.
   E. check for broken component leads inside the switchpac.

II. If steps A through E of outline I are normal, the problem is within the switchpac. Select either problems 1 or 2 depending on the fault condition present. For example purposes, the isolation procedures shown in problem 1 assumes that the load A section of the switchpac is faulty.

   A.  Problem 1.
       Switchpac stays on all the time, even in absence of a control signal.
       Probable Cause - Either IC1 or TR1 is shorted.
       Isolation Procedure- Remove one side of R3. If  switchpac is still shorted change TR1. If not , change IC1.

   B.  Problem 2.
       Switchpac does not turn on when signal is applied.
       Probable cause - I1,CR2,IC1,or TR1 is open. If TR1 is open, R2 would be burnt.
       Isolation Procedure-
       1. Lift one side of R1 and put ammeter in series. Switchpac should draw approximately 20MA. If current measures approximately 20MA, change IC1.
       2. If no current, then jumper CR2. If current flow is over 20MA, change CR2.
       3. Jumper I1. If current flow of 20MA or more , change I1.
       4. Measure resistance of R1. If it is not 510 ohms, change R1

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FIG. 3



FIG. 4
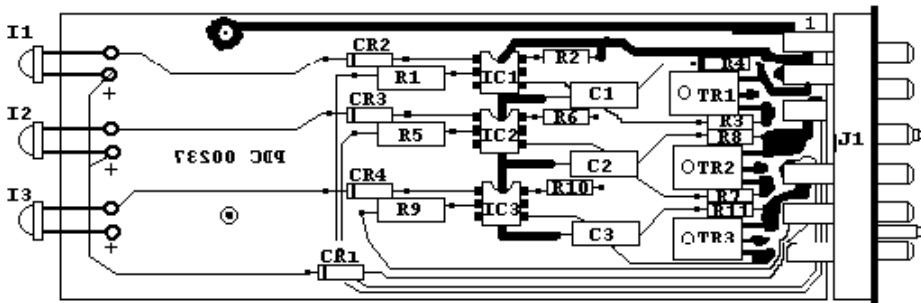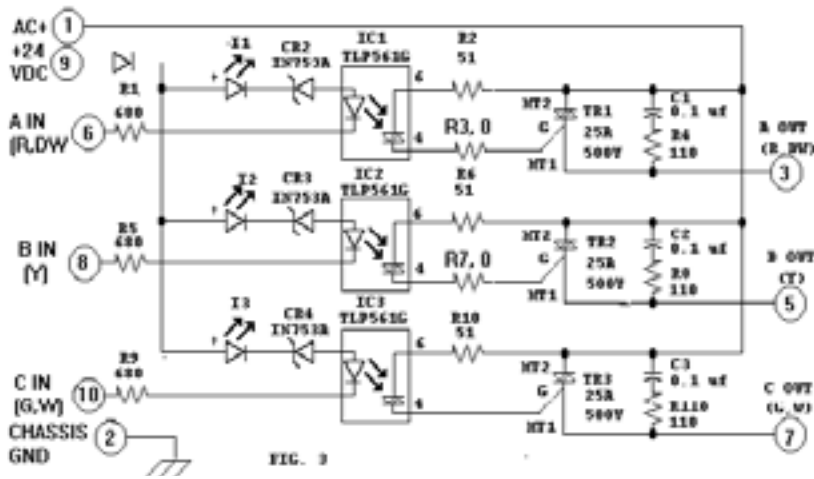
## SSS-86-3 Partslist          Assembly NO. 00239

| Item No. | QTY | DESC. | PDC PN | MFG | MFG PN | REF DES |
|---|---|---|---|---|---|---|
| 1 | 1 | Label,S/N | OOO43 | PDC | OOO43 | |
| 2 | 1 | Chassis | OO204 | PDC | OO204 | |
| 3 | 1 | Cover | OO206 | PDC | OO206 | |
| 4 | 1 | Bar,Triac | OO212 | PDC | OO212 | |
| 5 | 1 | Label,Front | OO214-1 | PDC | OO214-1 | |
| 6 | 1 | PC Board | OO237 | PDC | OO237 | |
| 7 | 3 | Cap .1uf 400v | COOO3 | Thomson | MC104K4G | C1,2,3 |
| 8 | 3 | Diode,1N753A,Zener | CR0005 | Fairchild | 1N753A | CR2,3,4 |
| 9 | 1 | Diode,1N914 | CR0007 | Fairchild | 1N914 | CR1 |
| 10 | 2 | Spacer | H0015 | | | |
| 11 | 3 | Nut,6-32 | H0038 | | | |
| 12 | 4 | Screw,#5x3/8 | HOO40 | | | |
| 13 | 2 | Screw,6-32x3/8 | H0041 | | | |
| 14 | 3 | Screw,6-32x15/16,Fill | H0042 | | | |
| 15 | 2 | Screw,6-32x1"3/16 | HOO43 | | | |
| 16 | 3 | Opto Triac | IC0023 | Sharp | S21MD4 | IC1,2,3 |
| 17 | 1 | Conn, 12 pin | J0002 | Beau | P5412-S | J1 |
| 18 | 3 | L.E.D. | LD0004 | G.I. | MV5020 | I1,2,3 |
| 19 | 3 | Res,680 ohm 1/2W | R0004 | Dale | | R1,5,9 |
| 20 | 3 | Res,2.2K ohm 1/4W | R0010 | Dale | | R2,6,10 |
| 21 | 2 | Res,0 ohm | R0052 | Dale | | R3,7 |
| 22 | 3 | Triac,500V,25Amp | TR0012 | Teccor | Q5025LX | TR1,2,3 |