

TSC MODEL 204 FLASHER

I. GENERAL DESCRIPTION

The Traffic Sensor Corporation 204 flasher unit was manufactured in accordance with the TRAFFIC SIGNAL CONTROL EQUIPMENT SPECIFICATIONS (TSCES) dated January 1989 plus applicable Addenda and the TRANSPORTATION ELECTRICAL EQUIPMENT SPECIFICATIONS (TEES) dated March 2009. This model features two separate solid state flashing circuits. Each flashing circuit contains 1) zero-voltage switching, 2) a 25 ampere triac, 3) a snubber, 4) a light emitting diode across the a.c. circuitry directly indicating the a.c. load activated, and 5) a metal oxide varistor (MOV). Every unit has been tested and is plug-in ready.

II. GENERAL CHARACTERISTICS

1. Electrical

- a. POWER INPUT – 89 to 135 volts, 57 to 63 hertz.
- b. POWER OUTPUT – 0.05 amperes to 10 amperes with a power factor greater than 0.85.
- c. LEAKAGE – less than 10 milliamperes peak (off-state.)
- d. ZERO-VOLTAGE SWITCHING – Power ON within 5 electrical degrees of a.c. sinusoid on all cycles following application of a.c. power wherein the first half cycle may turn on within ± 10 electrical degrees. Power OFF within 5 electrical degrees of first zero current point of a.c. sinusoid after removal of a.c. power.
- e. FLASH RATE - 56 ± 3 times per minute with 50% duty cycle at 60 hertz.

2. Mechanical

- a. SIZE – The nominal dimensions are 7.37 ± 0.1 " long (from mating connector surface to front panel) by 4.17 ± 0.02 " high by 1.74 ± 0.04 " wide. The handle increases the length up to 8.62 ± 0.01 ".
- b. CONNECTOR – The connector is a Beau P-5406-LAB or equal.

3. Environmental

AMBIENT TEMPERATURE – Minus 37° to plus 74° Centigrade.
 HUMIDITY - From 5 to 95%, non-condensing.

III. INSTALLATION

The TSC Model 204 Flasher unit intermates with the 332L output file. It is easily installed or removed using the attached specified handle. Interconnect is as required below.

Electrical Interconnect Drawing

Interconnect Wiring		Connector Pinout (View of Flasher unit plug)	
Pin	Connector		
7	load 1		
8	load 2	11	12
9	Case Ground		O
10	ac-	9	10
11	ac+		
12	None	7	8

IV. Adjustments

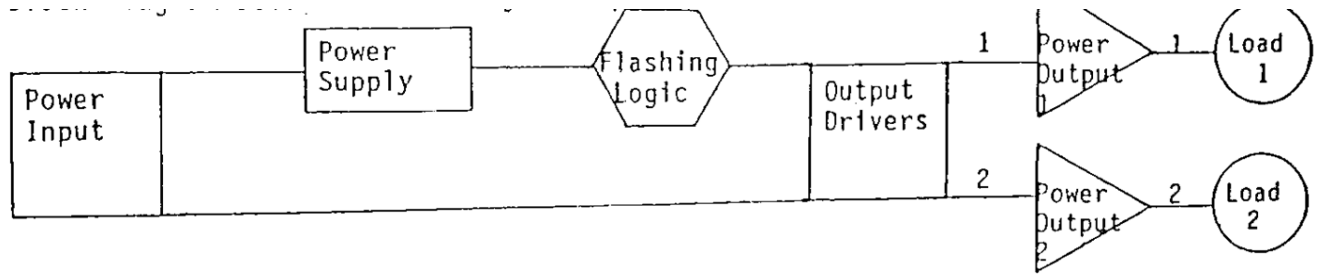
None are necessary.

V. THEORY OF OPERATION

Figure 1 is the Schematic and Logic Diagram for the Flasher Unit. When a.c. power is applied between pins #10 and #11, a d.c. voltage will develop across the electrolytic capacitor. This is the logic power supply for the flasher. The low-power driver triacs, T3 & T4, switch the Power Triacs, T1 & T2, ON and OFF at a rate of 56 ± 3 times per minute. Since the logic circuit operates from the a.c. line at a low voltage level, its output will switch within five degrees of the line voltage crossing. Output waveforms are sinusoidal with frequency and amplitude input. A capacitor, C2 or C3, in series with a resistor, R5 or R8, forms a snubber network which is connected across each power triac to assure triacs turn OFF with inductive loads.

L.E.D. indicators are connected directly across the output circuits to display whether the loads are ON or OFF.

The Block Diagram below describes System Operation.



VI. WARRANTY

TSC warrants that it will correct any defect in workmanship or material, by repair or replacement, F.O.B. Pomona, CA or at its option, issue credit at the original purchase price for any product manufactured by TSC for a period of TWO YEARS from the date of manufacture, unless a shorter warranty specifically applies, in which case the shorter warranty period shall apply. The alteration, misuse, repair or attempt to repair the product by anyone other than TSC shall void the warranty. All returns must have prior written authorization and are at buyer's risk and expense. All replacement parts warrantee for thirty days from date of delivery. In no event shall TSC be liable for incidental or consequential damages, whether buyer's claim is in contract negligence of otherwise.

VII. MAINTENANCE

The "PICTORIAL ASSEMBLY DIAGRAM & PARTS LIST" shows the component layout for this mode. Preventive maintenance consists of not overloading the unit or shorting loads to grounds. The following procedure to replace a Triac is provided for reference. If possible, it is suggested that a defective unit be returned to the factory for repair. The Flasher Triac Power Block, FTPB4204, consists of triacs T1 & T2 mounted on a 0.125 inch thick heat sinking plate and is available from TSC as a sub-assembly to facilitate maintenance. No alignment is necessary since the flasher unit is self-aligning.

1. Remove the #8-32 Nuts from the Case.
2. Remove the #6-32 screws from the Connector.
3. Pull the Case from the Cover Plate.
4. Remove the #8-32 Nuts, Lockwashers, and Spacers. Slide the ground wire off of the threaded stud.
5. Carefully remove solder from the Triac leads on the Printed Circuit Board using a soldering iron and 'Solder-Wick', etc. Remove the Flasher Circuit Board which holds the FTPB4204.
6. Coat the base of the new FTPB4204 with heat transfer compound (silicone thermal grease) and slip the assembly back onto the Cover Plate. Slip the Circuit Board onto the FTPB4204 already on the cover plate. Reinstall the spacers. Tighten these down by placing the #8-32 nuts and lockwashers on top and tightening.
7. Bend the Triac leads over the edge of the Printed Circuit Board. Solder the Triac leads. SLIDE GROUND WIRE OVER ONE OF TWO STUDS closest to connector. TIGHTEN WITH A #8-32 NUT.
8. Reinstall the Case and tighten the #8-32 nuts and lockwashers finger tight. The, tighten $\frac{1}{2}$ turn more.
9. Reinstall the #6-32 screws into the connector.
10. Retest to ensure the fault was corrected.

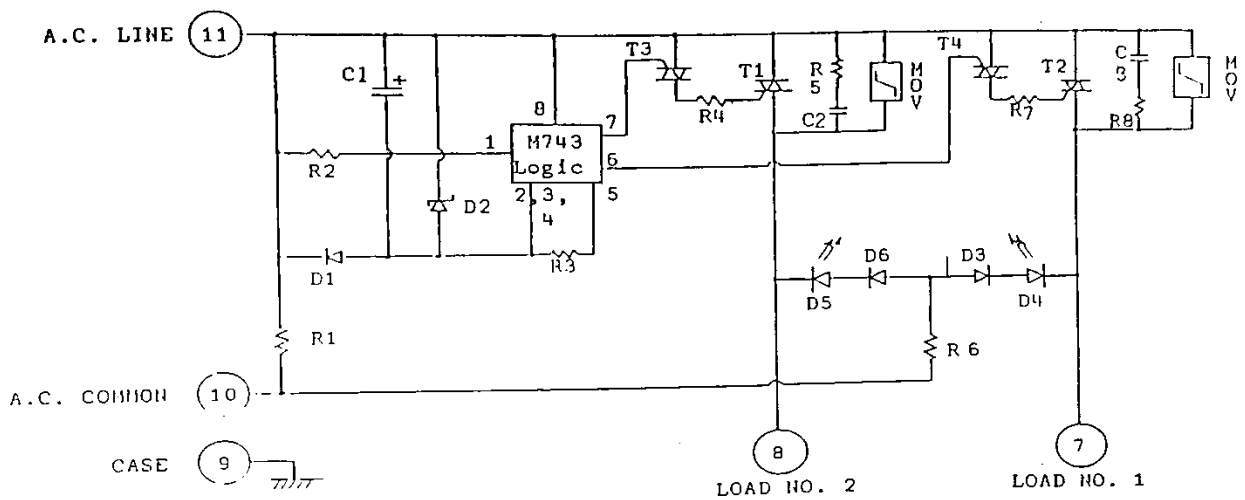
Sub-Assembly Procedure for T-3 replacement of a defective triac from the FTPB4204.

1. Drill out the pin holding the Triac to the FTPB4204.
2. With a hammer and cold chisel knock the bad triac off of the FTPB4204.
3. Scrap the area clean.
4. Replace the damaged triac with a new electrically ISOLATED CASE 25 ampere 500 volt Triac such as listed in the replacement parts list. Attachment of the new triac may be accomplished using an electrically non-conductive epoxy. Before epoxying, use a flux remover to clean the area to be epoxied and dry thoroughly. Use care in soldering not to overheat triacs. It is important that replacement of triacs on the FTPB4204 yield the same location as the original triac. Remove flux residues with a flux remover.

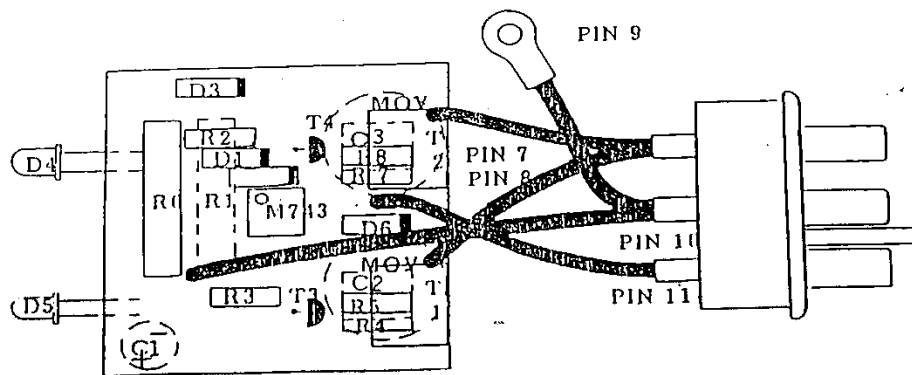
NOTE: Sub-Assembly Procedure T-3 need not be used if a new Flasher Triac Power Block is used for flasher repair.

Figure 1.

SCHMATIC and LOGIC DIAGRAM



Pictorial Component Layout - View from Component Side
(Type 170 shown)



Replacement Parts List

Symbol	Qty.	Component	Description	Source	Part Number
C1	1	Capacitor	.005 mfd 500-1kv	Any	N/A
C2	1	Capacitor	220 mfd 16v	Integra Electronics	NRSS221M16V6.3X11
C3,4	2	Capacitor	.047 mfd 400v	ITAL Electronics	DMPE473K2G-C
D1,3,6	3	Diode	1A 400V	Any	1N4004, 1N4005
D2	1	Zener Diode	4.3v 500mw	Any	1N5229B, 1N5233B
D4,5	2	LED	Indicator	LUMEX	SSL-LX5039IC
R1,6	2	Resistor	3k – 5k, 3w	Any	N/A
R2	1	Resistor	390k, 1/4w	Any	N/A
R3	1	Resistor	470, 1/4w	Any	N/A
R4,7	2	Resistor	30-100, 1/4w	Any	N/A
R5,8	2	Resistor	470, 1/4w	Any	N/A
M743	1	IC	Flasher Logic	TSC/Distributor	M743
MOV	2	MOV	.85w, 150v	Any	N/A
T1,2	2	Triac	500v, 25a	TECCOR	Q5025LX
T3,4	2	Triac	500v, Driver	TSC/Distributor	M37