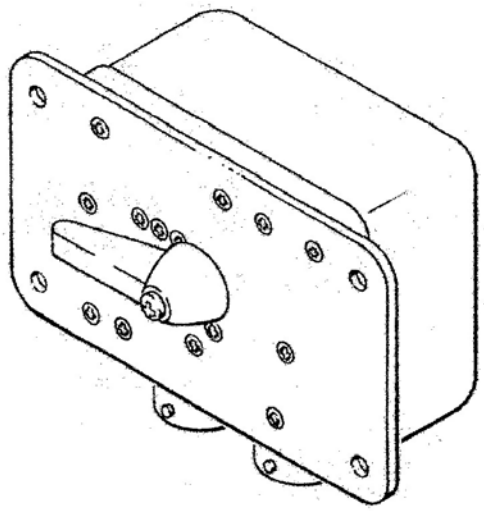
LEACH INTERNATIONAL NORTH AMERICA
6900 Orangethorpe Avenue
Buena Park, California 90620-1351, USA
Telephone (714) 739-0770

COMPONENT MAINTENANCE MANUAL

WITH ILLUSTRATED PARTS LIST

TOILET TIMER SWITCH

LEACH PART NO.	BOEING PART NO.
TD1514-1002	60B50058-3
TD1535-1002	60B50058-4
TD1715-1002	60B50058-5
TD1702-1002	60B50058-6



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SERVICE BULLETIN LIST

Service Bulletin No.	Original Issue Date	Revision Number And Date	Date Bulletin Incorporated Into Manual

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INTRODUCTION

1. Manual Make-up

This technical manual consists of 14 sections including: Introduction; Description and Operation; Disassembly; Cleaning; Inspection/Check; Repair; Assembly; Fits and Clearances; Testing; Trouble Shooting; Storage Instructions; Special Tools, Fixtures, and Equipment; Illustrated Parts List; and Light Overhaul.

Refer to Table of Contents for the page location of applicable sections.

2. Manual Use

The manual can be used to perform repairs on Toilet Timer Switch, Part Numbers TD1514-1002 / TD1535-1002 / TD1715-1002 / TD1702-1002, manufactured by LEACH INTERNATIONAL, NORTH AMERICA, after the Toilet Timer Switch has been removed from the aircraft.

The Testing and Trouble Shooting sections are written so that malfunctions can be determined and the affected component can be identified, followed by removal and replacement, after performing a complete Disassembly or Light Overhaul.

An explanation of the use of the Illustrated Parts List is provided in the beginning of that section. All weights and measurements in this manual are in US units of measure.

The manual will be revised as necessary to reflect current information. This manual was shop-verified Nov 31/78. The manual was completely re-written and revised Jan 15/02 and has been simulation checked by LEACH INTERNATIONAL, NORTH AMERICA.

3. Symbols and Abbreviations

±	Plus or Minus	F	Degrees Farenheit	REF	Reference
%	Percent	FIG.	Figure	SB	Service Bulletin
-	Item Not lustrated	Hg	Mercury	SCD	Source or Spec. Control Drawing
+	Footnote Reference	in-lbs	Inch-Pounds		
&	And	IPL	Illustrated Parts List	VAC	Volts AC (Alternating Current)
---*---	End of Attaching Parts	K	1000		
2PDT	2-Pole, Double Throw	kg	Kilogram	VDCW	Volts DC (Direct Current) Working
4PDT	4-Pole, Double Throw	kPa	kiloPascal		
AC	Alternating Current	MFD	Microfarad	W	Watts
ASSY	Assembly	mm	Millimeter		
C	Degrees Celsius	NHA	Next Higher Assembly		
CMM	Component Maintenance Manual	N.m	Newton Meter(s)		
		NO.	Number		
COML	Commercial Available	PF	Picofarad		

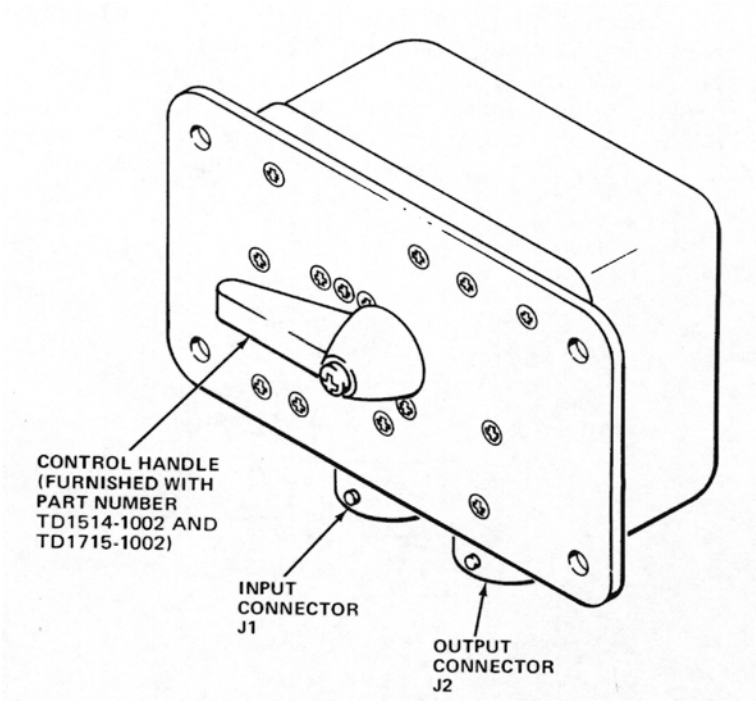
1. Description and Operation

A. Description

(1) The toilet timer switch described in this manual is used to control the operating cycle of a motor in the waste disposal system of an aircraft toilet.

(2) The switch is contained in a dust cover protected housing (Ref. Fig. 1), and consists of a mechanically-operated switch assembly, and a printed circuit board that contains the timer electronics.

(3) Four mounting holes in the base of the switch provide for external attachment of the switch to the related aircraft structure. Two electrical connectors provide means for input/output connections to the electronics of the switch. One model of switch covered in this manual provides a serrated output shaft and operating handle for manual control of the switch; the other model covered in this manual provides a square output shaft and drilled hole for installation of a suitable control handle or lever.



Toilet Timer Switch - General Arrangement
Figure 1

B. Operation

(1) The switch is designed to supply a 3-phase motor lead for a duty cycle of 10 ±2 seconds when the switch shaft is manually moved through a 13 to 23 degree excursion counterclockwise for TD1514-1002 and TD1715-1002, clockwise for TD1535-1002 and TD1702-1002. After completion of the duty cycle, the switch electronics is recycled by again turning the operating shaft. Each succeeding activation of the switch causes the external motor to be reversed.

(2) The simplified circuit diagram (Ref. Fig. 2) shows the switch contacts of the control relay K1 (contacts on right of diagram) that connect the external motor to the power source for operation during the operating cycle. The switch contacts on the left are controlled by reversing relay K2, and serve to reverse the electrical connections after each operating cycle, reversing motor direction each cycle. The control circuitry shown on Fig. 2 includes the mechanically-operated switch (that is momentarily closed when the switch operating shaft is rotated) and the timing circuits on the printed circuit board.

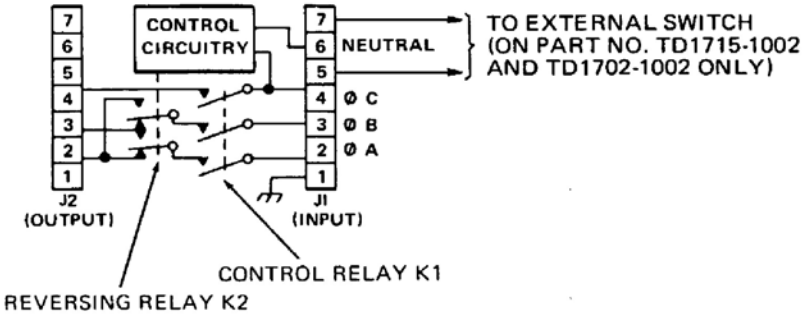
(3) The timing diagram (Ref. Fig. 3) illustrates the operating cycles of the switch. The 3-phase input (top line) represents the power bus for the motor system, and will either be off (0 VAC) when the bus is deenergized, or on (104-122 VAC) when the external bus is energized. The handle position line (middle line on diagram) represents two typical operating cycles, where the handle (or operating shaft) is rotated out of the horizontal position.

(4) When the operating handle (or shaft) is rotated 13 to 23 degrees, the internal control switch is closed, and the electrical cycle begins. The operate time shown on the lower diagram of Fig. 3 represents the mechanical operating time to rotate the shaft and operate the internal switch. The timer electronics then energizes control relay K1 (Ref. Fig. 4), and the external motor is connected to the power bus.

(5) When electrical power is turned on (aircraft 104-122 volts ac bus energized), control relay K1 (Ref. Fig. 4) will be deenergized, and the input connector J1 will be effectively disconnected from output connector J2, and the external motor will remain deenergized. Diode CR1, resistor R1, and capacitor C1 provide a half-wave rectifier for dc operating voltage for the timer and control circuits of the switch. Zener diode VR1 establishes the dc voltage at approximately 13 volts for the system.

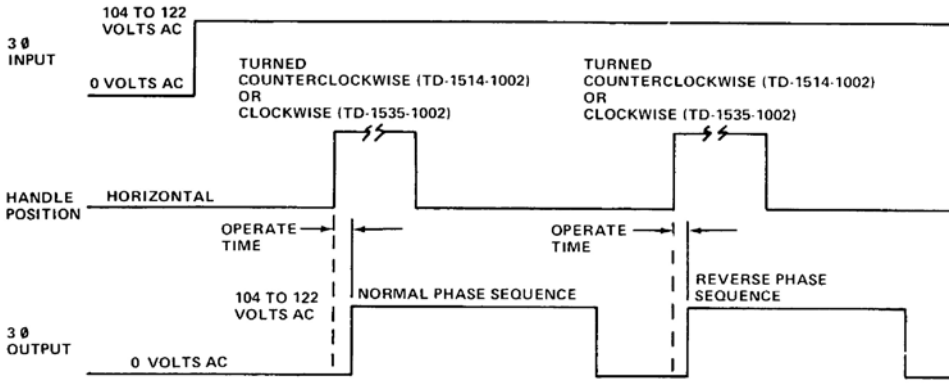
LEACH CORP.
CALIF.

SWITCH, TOILET TIMER
'ON' TIME: 10-2 SEC; RECYLE TIME; 6±2SEC.
OUTPUT:104-122 VRMS,3 i 4 WIRE,20 AMP MOTOR LOAD



Circuit Diagram

Figure 2

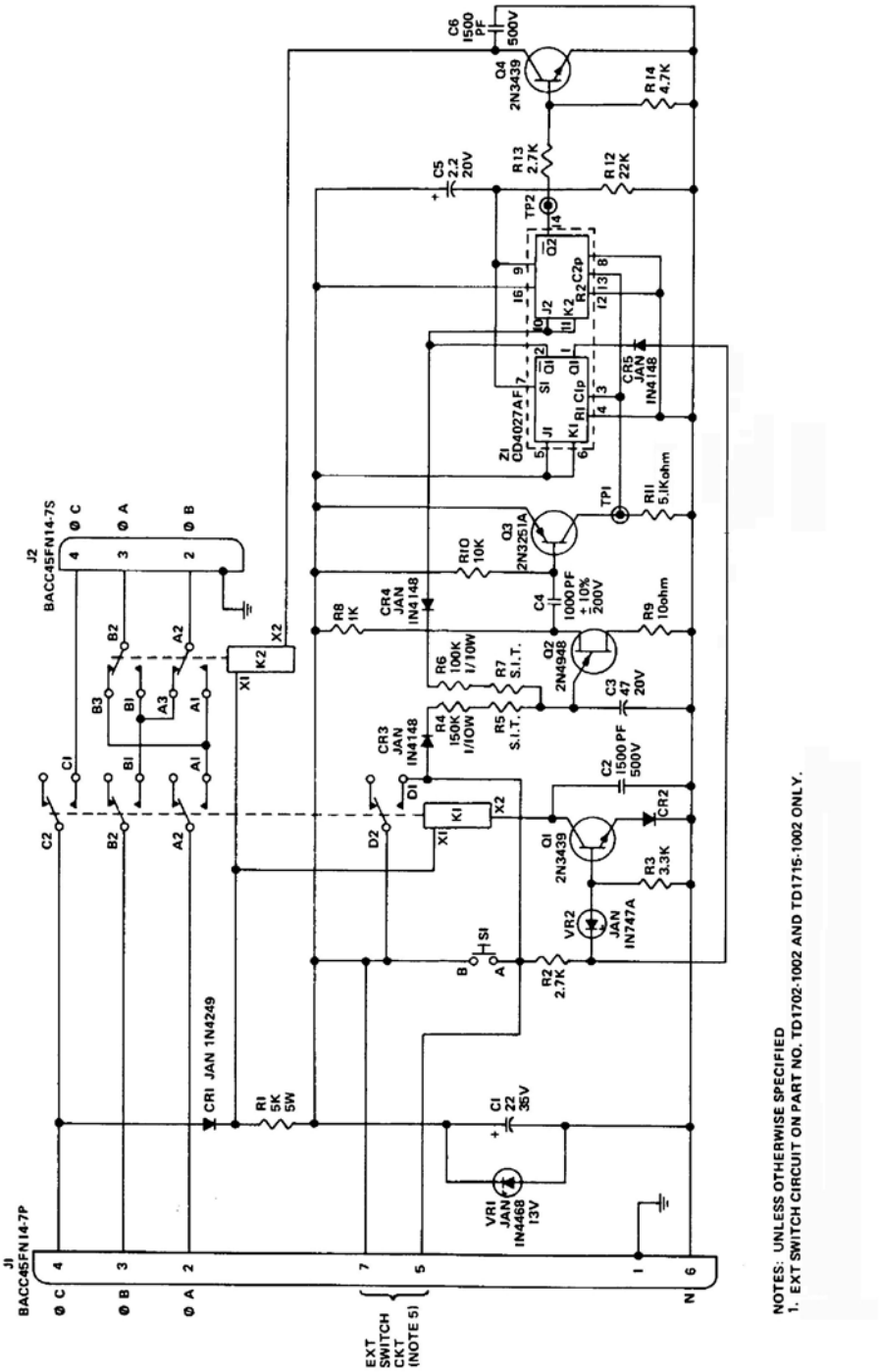


Timing Diagram
Figure 3

(6) Reversing relay K2 will be either energized or deenergized in the initial turn-on state depending upon the random switching position that the IC in the right side of integrated circuit Z1 has assumed. If the ($\overline{Q2}$) output of Z1 is positive, transistor Q4 will be conducting and reversing relay K2 will be energized; if the ($\overline{Q2}$) output of Z1 is below cutoff of transistor Q4, Q4 will be turned off, and relay K2 will be deenergized. The energized/deenergized condition of reversing relay K2 will determine the phase A and B connections between input and output connectors J1 and J2, thus establishing the direction of rotation of the external motor when control relay K1 is subsequently energized. Each time the switch is cycled, one of the effects will be a voltage appearing across resistor R11 in the emitter circuit of transistor Q3, applied to pin 13 of integrated circuit Z1, and changing the state of the output at pin 14 ($\overline{Q2}$) , thus, each time the switch is cycled, the voltage at pit 13 will cause the output at pin 14 ($\overline{Q2}$) to change sign, either turning on transistor Q4 and energizing switching relay K2, or turning off transistor Q4 and deenergizing switch relay K2. Thus, the direction of rotation of the external motor is reversed each time the switch is cycled.

(7) In the initial turn-on state, transistor Q1 is biased below cutoff by resistor R3, and is turned off, holding control relay K1 deenergized. When the control handle (or shaft) is rotated, closing switch S1, transistor Q1 is turned on, and control relay K1 is energized, closing its contact and connecting the aircraft power bus to the external motor. An additional set of contacts on relay K1 (D1, D2 contacts) connects a holding circuit across switch S1, maintaining the closed circuit after the control handle (or shaft) is released and the spring loaded shaft returns to the original position and releases momentary switch S1.

(8) In the initial turn-on state, the base of transistor Q2 is effectively at ground (neutral) level, and transistor Q2 is turned off. When transistor Q1 turns on, transistor Q2 will remain turned off until such time has passed (RC circuit consisting of capacitor C3 and resistors R4 and R5) to allow capacitor C3 to charge sufficiently for transistor Q2 to turn on. When this happens, the output of transistor Q2 turns on transistor Q3; Q3 conducts, and produces a signal at TP1 that will flip the right IC of integrated circuit Z1 to change the output sign at pin 14 ($\overline{Q2}$), either turning transistor Q4 on or off as previously described. This signal at TP1 is also used to change the state of the left IC of integrated circuit Z1, producing outputs at pins 2 ($\overline{Q2}$) and 1 (Q1). The output at Q1 produces a negative signal on the base of Q1, turning off the control transistor Q1 and deenergizing the control relay K1. The output at $\overline{Q2}$ produces a current flow and resulting voltage across resistors R6 and R7 to maintain transistor Q2 turned on so that the reversing operating of transistor Q3 and Q4 can not be cycled. This operation prevents reversing the external motor (prevents operating reversing relay to next condition) during the 10-second operating cycle, and for an additional 6 seconds after the normal operating cycle has passed.



Electrical Schematic
Figure 4

(9) Turning the operating handle (or shaft) and closing control switch S1 during the 10 ±2 second duty cycle (while motor is energized) will not be hazardous or in any way damaging to the switch or motor, and will not disrupt the reversing process. During the on-period of the duty cycle, again rotating the handle (or operating shaft) and closing switch S1 will have no effect on the operating cycle since this circuit is already held closed by the holding contacts of the control relay K1. Thus, the switch provides protection against the possibility of re-initiating electrical power of reversed-phase sequence during the 10-second operating cycle. Further, the time delay circuit maintains the left half of integrated circuit Z1 in the OFF position (output at Q1 remains low) holding transistor Q1 turned off for a period of 6 ±2 seconds after the 10-second duty cycle.

C. Leading Particulars

Operating Voltage . . . . . 104 to 122 volts ac, 3-phase, 400 Hz
Power Dissipation . . . . . 12 watts maximum
Contact Form and Rating . . . . . Per MIL-R-6106
Form 3PST

Rating (amps per pole)	Resistive	Inductive	Motor	Lamp
28 volts dc	10	8	4	2
115 volts ac, 400 Hz	10	8	4	2
115/200 volts ac, 400 Hz	10	8	4	2

Timing Specification:
On Time . . . . . 10 ±2 seconds
Recycle Time . . . . . 6 ±2 seconds
Operate Time . . . . . 100 milliseconds maximum
Temperature Ranges:
Operating . . . . . 0/C to +50/C (+35/F to +120/F)
Non-Operating . . . . . -54/C to +71/C (-65/F to +160/F)
Electrical Connectors:
Input (J1) BACC45FN14-7P
Output (J2) BACC45FN14-7S
Mounting Provisions . . . . . Four 0.201/0.204 inch diameter holes, spaced on corners of a 2.250 inch by 4.250 inch rectangle
Overall Dimensions . . . . . 5.00 inches wide, by 3.08 inchesde (not including connectors), by 1.96 inch high (not including operating shaft and handle)
Weight . . . . . 1 pound maximum

2. Disassembly

NOTE: If the switch has been removed prior to a regularly scheduled overhaul period, refer to Light Overhaul instructions prior to any disassembly. If the switch is to be subjected to a complete overhaul, proceed with instructions in the following paragraphs.

A. Disassembly Instructions

(1) On Part No. TD1514-1002 and TD1715-1002, loosen screw (Ref. 4, IPL Fig. 1102A and 1102C) and remove handle (3) from shaft (25).

(2) Remove two screws (6) and washers (7), and three screws (8), and withdraw mechanical assembly (5; components 6 through 29) from can (53). Ref. IPL Fig. 1101.

(3) Remove two screws (11), washers (12), lock washers (12A), and nuts (12B), and separate actuator (9), switch (10), two spacers (13), and alignment bracket (14) from mounting base (29). Unsolder electrical lead wires to terminals on switch (10), Ref. IPL Fig. 1102.

(4) Remove two screws (16), washers (17), and locking lugs (15), from spring retainer post (18) and end of shaft and bushing assembly (21), Ref. IPL Fig. 1102.

(5) Remove spring retainer post (18) and washer (19) from shaft and bushing assembly, left side screw (22).

(6) Remove return spring (20) from shaft and bushing assembly (21).

(7) Remove three screws (22), and separate shaft and bushing assembly (21) from mounting base (29). Do not disassemble shaft and bushing assembly; procurable as an assembly only.

(8) If damaged, remove either of the two dowel pins (28) from mounting base (29).

(9) Remove screws (32), lockwashers (33), and flat washers (34) to remove either relay (30 or 31) from mounting base (29). Unsolder electrical leads from removed relay. If damaged, remove screws (35) and relay spacers (36) from mounting base (29).

(10) Remove two screws (38), and carefully remove circuit board assembly (39) from mounting base (29). Unsolder any lead wires necessary to completely separate circuit board assembly from relays, switches, and connectors.

Remove four screws (40), lock washers (41), and flat washers (42) to separate two mounting posts (37) and circuit board assembly (39).

(11) Remove four screws (45), lock washers (46), flat washers (47), and hex nuts (48), and remove connectors (43 and 44), locking lug (49), rubber gaskets (50), and connector mounting bracket (51) from can (53).

(12) If damaged, remove gasket (52) from can (53).

3. Cleaning

A. This section contains procedures to clean the Toilet Timer Switch after disassembly.

B. Cleaning Materials

NOTE: Equivalent substitutes may be used for items listed in Table 201.

Cleaning Materials
Table 201

Clean, Lint-Free Cloth	Commercially Available
Soft Bristle Brush, Non-Metallic	Commercially Available
Compressed Air, dry, 15 psi (103 Kpa) max	Locally Available

C. Cleaning Procedure

CAUTION: ENSURE NO LINT, FIBERS, OR DEBRIS REMAINS ON INTERNAL PARTS OR SURFACES.

CAUTION: DO NOT BURNISH CONNECTOR CONTACT SURFACES WITH COARSE CLOTH OR ABRASIVES.

(1) Clean mechanical parts by wiping with clean lint-free cloth.

CAUTION: CAREFULLY CLEAN AROUND DELICATE PARTS AND SMALL LEADS WHEN USING BRISTLE BRUSH TO PREVENT BREAKAGE OR DISLODGING LEADS.

(2) Clean electrical parts and circuit board assembly with soft bristle brush to loosen materiel caught between components; wipe flat parts clean with clean, lint-free cloth.

WARNING: EYE PROTECTION SHOULD BE WORN DURING AIR-BLOW STEP.

(3) Air blow mechanical and electrical assemblies with dry, compressed air, paying particular attention to holes, mating surfaces, circuit board component gaps, and corners. Take care to not damage delicate parts with close-proximity air pressure or direct air tool contact.

---4. Inspection/Check

A. General Checks

(1) Visually inspect all parts for cracks, breaks, corrosion, loose fasteners, and other obvious damage and contamination; reclean as necessary to remove any foreign matter to ensure adequacy of visual check.

(2) All threads shall be clean and undamaged; no evidence of cross-threading.

(3) Check mechanical parts under magnification (approximately 10-power) and adequate lighting to make sure any obvious damage will become visible.

(4) Check circuit card and electrical components for obviously broken parts, loose or broken wires, damaged solder joints, damaged or missing insulation, physical damage, and visible damage from heat and/or electrical arcing.

B. Detail Checks:

Checks
Table 301

ITEM (Ref. IPL Fig. 1101,1102)	REQUIREMENTS
Handle (3)	Satin chrome finish not penetrated to bare metal by wear or corrosion. Serrations inside handle for operating shaft not broken or visibly damaged.
Switch (10)	Check for open circuit when button is not depressed; continuity when depressed. Button shall return switch to open position immediately when released. Terminals not damaged; case not broken; mounting holes not enlarged or split.
Spring (20)	(Refer to Fits and Clearances section, page 601, paragraph 7B.
Shaft and Bushing Assembly (21)	Inside diameter of hole for shaft bushing (27) not worn over 0.536 inch. Outside diameter not worn below 0.372 inch; smooth to 32 microinch. Serrations on Part Numbers (21) or (21B) not broken or visibly worn or deformed. Square end on Part Numbers (21A) or (21B) not visibly deformed. Groove for 0-ring packing free of corrosion; smooth to 32 microinch.

Checks
Table 301
(Continued)

ITEM (Ref. IPL Fig.1101, 1102)	REQUIREMENTS
Mounting Base (29)	Iridite coating not worn through to bare metal.
Relays K1 and K2 (30, 31)	With relay deenergized, check for the following contact conditions: Continuity: A2 - A3; B2 - B3; *C2 - C3; *D2 - D3 Open Circuit: A1 - A2; B1 - B2; *C1 - C2; *D1 - D2 NOTE: See Electrical Schematic Fig. 4. With relay energized with 115 ±10 volts, 400 Hz, across X1-X2 pins, check for the following contact conditions: Continuity: A1 - A2; B1 - B2; *C1 - C2; *D1 - D2 Open Circuit: A2 - A3; B2 - B3; *C2 - C3; *D2 - D3 * These contacts not on relay K2 (31). With 115 ±10 volt 400 Hz power supply connected to terminals X1-X2, apply slowly increasing voltage (starting from 0 volts) and check pickup voltage (voltage at which relay actuates); pickup voltage shall be 65 volts maximum. Slowly decrease voltage at X1-X2 until relay drops out (de-actuates); drop-out voltage shall be 6.0 to 25 volts (relay K1, Item 30), or 8.5 to 22 volts (Relay K2, Item 31). See IPL Fig. 1103.
Circuit Board Assy (39)	No loose or broken solder connections or circuit etches; no visible heat damage.
Electrical Connectors J1 (43), J2 (44)	No loose pins or terminals.
Can (53)	Iridite coating not penetrated through to bare metal.

5. Repair

A. Repair Materials

WARNING: ISOPROPYL ALCOHOL IS TOXIC AND FLAMMABLE. AVOID PROLONGED CONTACT WITH SKIN AND KEEP AWAY FROM OPEN FLAME. USE ONLY IN WELL-VENTILATED AREAS. SEALANTS AND COATINGS ADDITIONALLY REQUIRE SAFETY GLASSES AND SOLVENT-RESISTANT GLOVES.

NOTE: For additional product characteristics and advisories, refer to each material supplier's MSDS Material Safety Data Sheet.

NOTE: Equivalent substitutes may be used for the following items.

Repair Materials
Table 401

Isopropyl Alcohol (TT-1-735)	Commercially Available
Cloth, Wiping (Clean, Lint-Free)	Commercially Available
Sealant (MIL-S-22473)	Loctite, Type AV (R.S. Hughes Co., Inc, 100 Gene Autry Way Anaheim, CA 92805)
Tech Spray Conformal Coating	Type UR #2104-125 (Tech Spray, Inc. P.O. Box 949 Amarillo, TX 79105)
Gasket Adhesive	RTV #3145 (Dow Corning Corp. South Saginaw Road Midland, MI 48686)
Brush Alodine	No. 600 & No. 22 Touch-Up Alodine (DIXCO Diversified, Chemical Sales 8475 East Street Anaheim, CA 92805)
Brush, Nylon Bristle	Commercially Available

B. General

(1) Replace all parts that are defective.

(2) When replacing components on printed circuit board assembly, remove conformal coating (use a hot knife or soldering tip).

(3) Use desoldering tools to unsolder discrete components. Unsolder quickly to prevent overheating.

(4) Use a solder sucker and solder wick to unsolder integrated circuit package. Unsolder quickly to prevent overheating.

WARNING: DO NOT ALLOW FLAME OR HEAT IN AREA WHEN USING ISOPROPYL ALCOHOL. USE ONLY IN A WELL-VENTILATED AREA.

(5) Use a solder wick, isopropyl alcohol, and clean cloth to remove any remaining solder flux that may interfere with component replacement.

(6) Touch up worn iridite coating with brush alodine.

C. Replacement of Components on Printed Circuit Board Assembly.

(1) Swage any replacement terminals (Ref. 30, IPL 1103) onto printed circuit board (33); terminal to be capable of withstanding 1/2 inch-pound torque minimum.

(2) Swage any replacement terminals (31, IPL Fig. 1103) onto printed circuitboard (33); terminal to be capable of withstanding 1 inch-pound torque minimum.

(3) Swage any replacement nut (32) onto printed circuit board (orientation of flats of nut not critical); nut to be capable of withstanding 2 inch-pounds torque minimum.

(4) There shall be 0.06 inch minimum gap between printed circuit board (Ref. 33, IPL Fig. 1103) and body of resistors R1, R4, and R6 (Item 2, 5, 7).

D. Replacement of Conformal Coating.

(1) Using isopropyl alcohol and a nylon bristle brush, clean all areas to be conformal coated until all traces of solder flux are removed.

(2) Spray or coat areas to be coated with conformal coating.

NOTE: Do not coat threads and bottom surfaces of nuts (Ref. 32, IPL, Fig. 1103) and leadwires (except at terminals). There shall be no bridging between printed circuit board (33) and body of resistors R1, R4, and R6 (Items 2, 5, 7).

(3) Allow solvent of conformal coating to evaporate completely before handling board or proceeding to next step.

(4) Allow conformal spray coating to cure in a dust-free area for 24 hours @ 25 deg C (77 deg F) or alternate: 1 hour @ 25 deg C (77 deg F), plus 2 hours @ 65 deg C (149 deg F). If material is not tack-free after curing as above, repeat cure time cycle again.

6. Assembly

A. Repair Materials

WARNING: AVOID PROLONGED CONTACT WITH SKIN WHEN USING CHEMICALS AND CONSUMABLES LISTED IN THE ASSEMBLY MATERIALS TABLE. USE ONLY IN WELL-VENTILATED AREAS. SEALANTS AND COATINGS ADDITIONALLY REQUIRE THE USE OF SAFETY GLASSES AND SOLVENT-RESISTANT GLOVES.

NOTE: For additional product characteristics and advisories, refer to each material supplier's MSDS Material Safety Data Sheet.

NOTE: Equivalent substitutes may be used for the items listed below.

Assembly Materials
Table 501

Solder (QQ-S-571, Comp. Sn60 or Sn63, Type R)	Commercially Available
Tape, Kapton, mil thick, Type H	Commercially Available
Lubrication, O-ring, Hi Temp, #44 Molokote	(Dow Corning Corp. South Saginaw Road Midland, MI 48686)
Lubrication, Shaft Assembly, #200 Fluid (20 cs)	(Dow Corning Corp.) South Saginaw Road Midland, MI 48686)
Tubing, Teflon, 1/16 in. ID	Commercially Available
Hysol, #2038 Base, & #3475 Hardener	(Dexter Electronic Material Division 15051 East Don Julian Road, Industry, CA 91746
Sealant, MIL-S-22473), Type AV	Loctite (R.S. Hughes Co., Inc., 1500 Gene Autry Way, Anaheim, CA 92805)

Assembly Materials
Table 501
(Continued)

Wire, Copper, Stranded, Insulated, No. 24 AWG	Commercially Available (see Wire List Table 502)
Wire, Copper, Stranded, Uninsulated, No. 20 AWG	Commercially Available
Conformal Coating, Conathane, CE-1155	EV Roberts & Associates, P.O. Box 868 Culver City, CA 90280
Red Paint, Glyptal, 1201	Glyptal Inc., 305 Eastern Ave. Chelsea, MA 02150

B. Assembly Procedure

NOTE: The following instructions apply only to removed and disassembled parts. Disregard instructions for parts that were not removed or disassembled during Disassembly.

(1) If any wires in harness assembly that connects electrical connectors, relays, and printed circuit board assembly are to be replaced (or complete harness assembly is to be replaced), note the following.

Wire List
Table 502

WIRE LIST (NO. 24 AWG)							
LENGTH (IN.)	FROM	TO	COLOR	LENGTH FROM	TO	COLOR	(IN.)
5	K1-A1	B3-A1	Green	K2-A2	J2-A2	Yellow	7-1/4
--	K2-B3	K2-A1	Jumper	K2-B2	J2-3	Blue	7-1/2
5-1/2	K1-B1	K2-B	Brown	E1	K1-D2	Vio/Wht	5-3/4
--	K2-B1	K2-A3	Jumper	E2	K1-D1	Brn/Wht	5-1/4
7	K1-C	J2-4	Grn/Wht	E3	K1-X2	Orange	5-1/2
5	K1-D1	S1-A	Brn/Wht	E4	K1-X1	Red	6
7-3/4	K1-A2	J1-2	Grey	E5	K1-C2	Gry/Wht	6
8-1/4	K1-B2	J1-3	Violet	E7	K2-X2	White	5
8-1/2	K1-C2	J1-4	Gry/Wht	E8	J1-6	Black	8-1/4
5-3/4	K1-D2	S1-B	Vio/Wht	GL-3	J1-1	Black	2
5	K1-X1	K2-X1	Red	GL-1	GL-2	(No. 20 AWG Uninsulated)	
*8-1/2	K1-D1	J1-5	Brn/Wht				
*8-1/2	K1-D2	J1-7	Vio/Wht				

*Part No. TD1715-1002 & TD1702-1002 only.

(a) There shall be a 3-inch minimum service loop; wires shall not interfere with mechanism of switch.

(b) Spot tie points every 1-1/2 inches maximum.

(c) Bend locking lug (GL-1) (Ref. 15, IPL Fig. 1102) up 90 degrees, 0.02 inch radius minimum. The ground strap between locking lugs GL-1and GL-2 to be flexible with shaft movement, and must not flex at solder joints.

(d) Coat the three grouped lug solder joints, microswitch terminals, and relay terminals with conformal coating per MIL-V-173.

(e) Insulate terminals of microswitch (10) with Teflon tubing.

(2) Adhere two layers of Kapton tape to mounting base (Ref. 29, IPL Fig 1102) in area below printed circuit board assembly (39). The taped area shall extend over the circuit board mounting holes in the base, shall be at least as long and as wide as the complete circuit board assembly.

(3) If removed, replace gasket (52) on can (53) using gasket adhesive. Gap between ends of gasket shall not exceed 0.06 inch.

(4) Install connector mounting bracket (51), gaskets (50), and electrical connectors (43, 44) on can (53) with four screws (45), lock washers (46), flat washers (47), and nuts (48); install locking lug (49) on one screw (45) in position shown in IPL Fig. 1101. Tighten screws (45) to a torque of 6 inch-pounds.

NOTE: Apply Hysol to all exterior screw heads; apply sealant (Loctite) to all screw heads that do not use lock washers.

(5) Install mounting posts (37) on ends of circuit board assembly (39) with four screws (40), lock washers (41), and flat washers (42). Tighten screws (40) to a torque of 6 inch-pounds.

(6) Assemble mechanical assembly (5; components 6 thru 29) as follows:

(a) If either dowel pin (28) is to be replaced, install replacement dowel pin in base plate (29), and ball punch on outside face of base plate (dowel pin hole) to reduce edge diameter by 0.007/0.015 inch and verify snug fit of pin(s).

(b) Install shaft and bushing assembly (21) on mounting base (29) with three screws (22). Gradually tighten screws (22) in sequence several times (with equal force each time) until 6 inch-pounds torque is reached. This sequential tightening is necessary to locate shaft/bushing assembly perpendicular to mounting base and optimize internal alignment.

(c) Install lock washer (19) and spring retainer post (18) onto lower left screw (22), against bushing clamp plate, in position shown on IPL Fig. 1102. Tighten post to 6 inch-pounds torque.

(d) Place and install one locking lug (15) against spring retainer post (18) using one screw (16) and one lock washer (17); orient as shown on IPL Fig. 1102. Tighten screw (16) to 6 inch-pounds torque.

(e) Install return spring (20) onto shaft/bushing assembly (21). Install locking lug (15) on end of shaft (21) using one screw (16) and one lock washer (17) each. Orient as shown on IPL Fig. 1102. Tighten screw (16) to 6 inch-pounds. Hook looped end of spring on actuator pin of shaft and bushing assembly (21). Push straight wire-end of spring around spring retainer post (18) and into groove (do not pull, as this will tighten spring around shaft bushing. Make sure that spring is centered on the shaft housing (21); then, carefully push bent end of spring around retainer post. Cut off excess.

(f) Check terminal ends of switch (10) coated with epoxy.

(g) Install alignment bracket (14), microswitch spacers (13), switch (10), and actuator (9) on base plate (29) with two screws (11), flat washers (12), lock washers (13), and nuts (14). Tighten screws (11) to 6 inch-pounds torque.

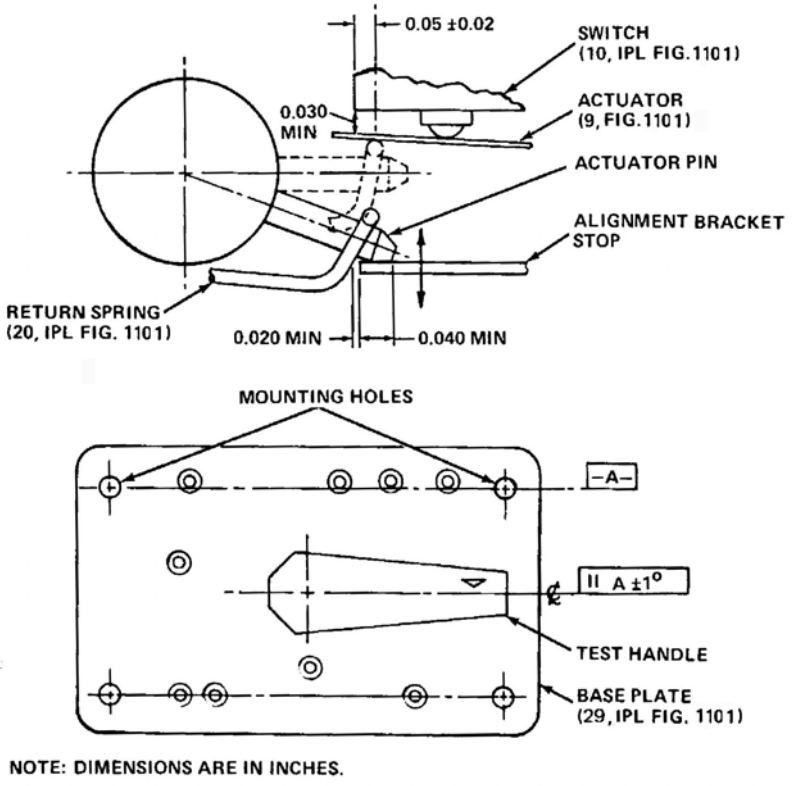
(7) Check operation of mechanical assembly (5; components 6 thru 29) as follows:

(a) Install a test handle on the shaft of the shaft and bushing assembly (21).

(b) Bend alignment bracket (14) up or down until the centerline of the test handle is parallel with the upper row or lower row of mounting holes on the base plate within ±1 degree (Ref. Fig. 502).

(c) Operate test handle upward against alignment bracket until stopped by actuator pin in shaft and bushing assembly (21); make sure actuator pin does not slip off alignment bracket, and test handle is still centered after operating several times as instructed above.

(d) Actuate test handle downward to the stop; the actuator pin on the shaft and bushing assembly (21) will rest against the slot in the shaft bushing. During this movement, the switch (10) button shall have bottomed out, and the leaf spring of the actuator (9) shall have moved 0.000 to 0.015 inch past the bottoming point. The leaf spring of the actuator should clear the switch body end by 0.030 inch minimum. Alignment and clearances shall be as shown in Fig. 502.



Assembly, Alignment, and Clearance Data - Mechanical Assembly
Figure 502

(8) Install circuit board assembly (39) on mounting base (29) with two screws (38) into mounting posts (37). Tighten two screws (38) alternately several times (with equal force) until 6 inch-pounds torque is reached.

(9) Install five relay spacers (36) on mounting base (29) with five screws (35). Then install relay (30) on three of the relay spacers with three screws (32), lock washers (33), and flat washers (32); and install relay (31) on other two relay spacers with two screws (32), lock washers (33), and flat washers (34). Tighten screws to 6 inch-pounds torque.

(10) Install mechanical assembly (5; components 6 thru 29) in can (53), and secure with two screws (6) and washers (7), and three screws (8).

(11) Gradually tighten three screws (8) in sequence several times (with equal force each time) until 6 inch-pounds torque is reached. Sequential tightening of these three screws (8) is necessary to ensure connector bracket (51) sets flat on mounting base (29) and gasket (52) is tight.

(12) Tighten two screws (6) in recesses in top of can (53) until they bottom out, and reach torque of 6 inch-pounds.

(13) Touch up red paint markings around heads of screws (6 and 38) on mounting base (29) and can (53) to identify screws for disassembly of switch.

7. Fits and Clearances

A. Fits

(1) Fits data is provided in the applicable steps of ASSEMBLY Section and Fig. 502.

B. Wear Tolerances

(1) See Inspection/Check Section, Page 301, paragraph 4.B (DETAIL CHECKS), for wear and tolerance information.

C. Spring Data

(1) Springs (Ref. 20, IPL Fig. 1102) shall require 680 ±10% grams to windup approximately 60 to 70 degrees (to normal test point when assembled on mechanical assembly), and a nominal increase in force shall be necessary to increase an additional 20 degrees (normal operating force to actuate switch assembly).

D. Special Torque Values

CAUTION: ALL SCREWS AND THREADED PARTS SHALL BE TIGHTENED TO A TORQUE OF 6 INCH-POUNDS.

(1) Torque data is provided in applicable steps of ASSEMBLY Section.

8. Testing

A. Test Equipment and Materials

NOTE: Equivalent substitutes may be used for the following equipment and materials.

Testing Equipment/Materials
Table 701

Electrical Power Supply	0 to 122 volts, 3-phase, 400 Hz
Overvoltage Supply	172 volts rms, 3-phase, 400 Hz, 0.5 seconds in duration, at 5-second intervals
Electrical Timer or Stop Watch	Capable of measuring 6 ±2 seconds and 10 ±2 second periods
Dielectric Strength Tester	1250 volts rms, 60 Hz, leakage current 2 milliamps
Insulation Resistance Tester	Capable of measuring resistance to 110 megohms at 500 volts dc
Digital Multimeter, 3.5 digit, 1% accuracy	0-1 ohms

B. Test Conditions

(1) Unless otherwise specified, all measurements and tests shall be conducted under standard ambient conditions. Ambient air pressure shall be 710 to 810 millimeters of mercury. Ambient air temperature shall be +15/C to +35/C (+59/F to +95/F), with relative humidity not more than 90 percent.

(2) Test equipment shall have an accuracy of at least one fourth of the tolerance of the variable to be measured.

C. Test Procedures

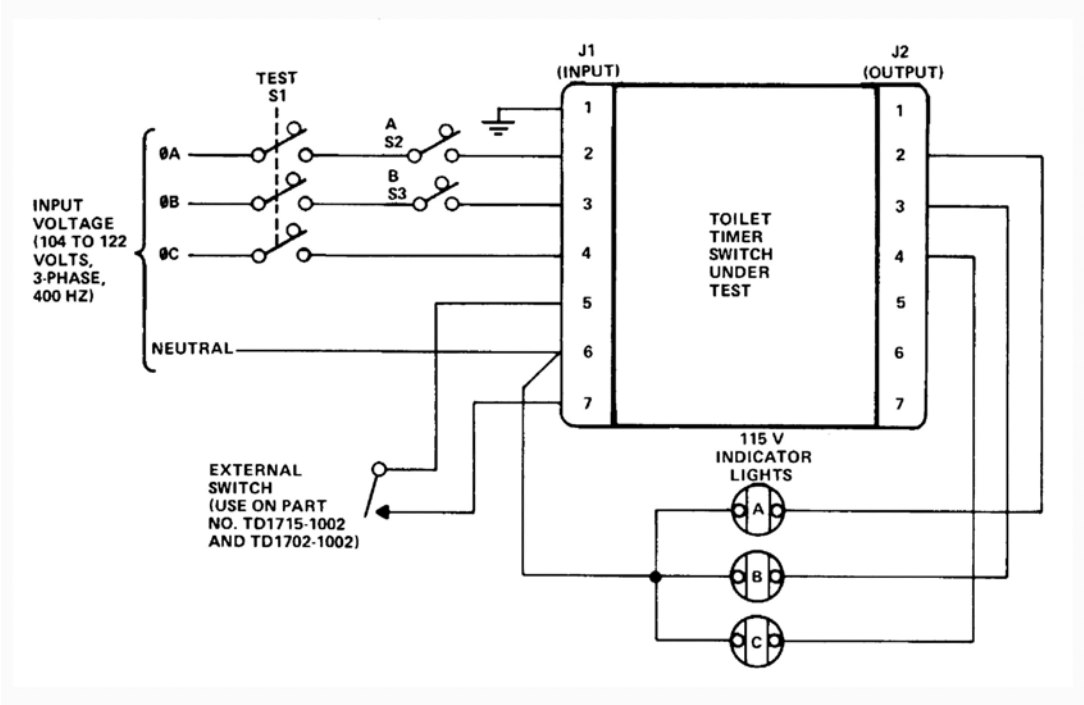
(1) Wiring Check

(a) Using an ohmmeter, measure the resistance between the case of the switch and pin 1 of connector J1 (input connector); resistance shall not exceed 1 ohm.

(b) Measure resistance between operating shaft of switch and pin 1 of connector J1; resistance shall not exceed 1 ohm;

(c) Set up device under test and connect switches into test setup as functionally shown in Fig. 701.

(d) Close indicator light switches A and B (S2 and S3) in test setup; then close TEST switch S1. Observe that indicator lights A, B, and C do not light up.



Test Setup Diagram
Figure 701

(e) Rotate actuating shaft of switch under test (rotate fully clockwise on Part No. TD1535-1002 and Part No. TD1702-1002, or fully counterclockwise on Part No. TD1514-1002 and TD1715-1002, and check that indicator lights A, B, and C light up immediately. Before 10 ±2 seconds have passed (and with actuating shaft still in full CW or CCW position), open indicator light switch A (S2) in test setup; indicator light A (or B) shall go out. The two indicator lights that remain lit up will go out after the 10 ±2 second cycle has passed. Close indicator light switch A.

NOTE: If indicator light B goes out instead of indicator light A, this indicates that the reversing relay in the switch was energized. When the switch is next cycled, the reversing relay will be deenergized, and the opposite condition will occur.

(f) Repeat step (e), except open indicator light switch B (S3) in test setup; indicator light A (or B) shall go out.

(3) Dielectric Strength Test

(a) Jumper pins 4 and 6 of input connector J1 together.

(b) Apply 1000 volts at 60 Hz for 3 seconds between all mutually insulated points listed below. There shall be no evidence of arcing or sparking, and leakage current shall not exceed 2 milliamperes.

	INPUT CONNECTOR PINS (J1)				OUTPUT CONNECTOR PINS (J2)			
TEST	1	2	3	4&6	1	2	3	4
1	0	X	X	X		X	X	X
2		X		0				
3			X	0				
4		0				X		
5		0					X	
6		0						X
7			0			X		
8			0				X	
9			0					X
10						0	X	
11						0		X
12							0	X

NOTE: 0 = Low, X = High.

(c) If leakage is excessive in any of the above tests, check dielectric strength in the following paths to determine the leakage path that is defective.

INPUT CONNECTOR PINS (J1)				OUTPUT CONNECTOR PINS (J2)				
1	2	3	4&6	1	2	3	4	CASE
	X							X
		X						X
			X					X
					X			X
						X		X
							X	X

(4) Insulation Resistance Test

(a) Jumper pins 4 and 6 of input connector J1 together.

(b) Apply 500 volts dc across pins listed in table following step (b) of paragraph 8B(3) above; insulation resistance shall be not less than 110 megohms.

(c) If insulation resistance in any test is less than 110 megohms, make direct measurements between points listed in table following step (c) in paragraph 8B(3) above to locate faulty insulation.

(5) Operational Test

(a) Connect switch into test setup (Ref. Fig. 701).

(b) Close switches A (S2) and B (S3) in test setup.

(c) Close TEST switch S1 in test setup.

(d) Rotate actuating shaft (full clockwise on Part No. TD1535-1002, or full counterclockwise on Part No. TD1514-1002) until indicator lights A, B, and C come on; then immediately release actuating shaft, and measure time until indicator lights A, B, and C go out; shall be 10 ±2 seconds.

(e) Repeat step (d), except do not release actuating shaft from full CW or CCW position; indicator lights shall come on immediately, go out after 10 ±2 seconds, and remain out for 6 ±2 seconds; after which they shall again light, and the cycle repeats.

(f) On Part No. TD1715-1002 and TD1702-1002, repeat steps (d) and (e), except use external switch (Ref. Fig. 701) instead of rotating the actuating shaft of the toilet timer; the same operating requirements shall be met.

9. Trouble Shooting

Trouble Shooting
Table 801

TROUBLE	PROBABLE CAUSE	REMEDY
High resistance between J1-1 and case of switch, or between J1-1 and operating shaft of switch.	Pin 1 of connector J1 not connected to GL-3 (ground lug).	Repair or replace jumper (Ref. para. 6B(1), Assembly).
	Defective connector J1.	Replace connector J1 (43, IPL Fig.1101).
	Loose components in mechanical assembly (Ref. 5; components 6 thru 29).	Check switch assembled properly per para. 6, Assembly.
No output at output connector J2 when switch is actuated.	Defective switch S1.	Replace switch (10, IPL Fig. 1101).
	Defective electrical connections between switch S1, circuit board assembly, and connectors J1 and J2.	Repair or replace electrical harness (Ref. para. 6B (1), Assembly.
	Defective relay K1	Replace relay (30, IPL Fig. 1101).
	Defective transistor Q1.	Replace transistor (24, IPL Fig. 1102).
	Defective component in circuit for relay K1.	Ref. Fig. 4; replace defective component.
Output at J1 stay on too long or too short a period (cycle not within 10 ±2 seconds).	Resistor R5 too large or too small.	Select; increase to lengthen on cycle, decrease to shorten cycle (Ref. 6, IPL Fig. 1102). Replace integrated circuit (18, IPL Fig. 1102).
Operating cycle can be started too soon, or too long between cycles (not within 6 ±2 seconds).	Resistor R7 too large or too small.	Select; increase to lengthen off cycle, decrease to shorten off cycle (Ref. 6, IPL Fig. 1102).
	Defective transistor Q2, Q3, or integrated circuit Z1.	Replace defective component (Ref. Fig. 4).
Output at pins 2 and 3 of output connector does not reverse between on-cycles.	Defective relay K2.	Replace relay (Ref. 31, IPL Fig. 1101).
	Defective integrated circuit Z1.	Replace integrated circuit (Ref. 18, IPL Fig. 1102)

Trouble Shooting
Table 801
(Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Output at pins 2 and 3 of output connector does not reverse between on-cycles. (Cont.)	Defective transistor Q4.	Replace transistor (24, IPL Fig. 1102).
	Defective circuitry or component in reversing circuit.	Ref. Fig 4; replace defective components.
No operation when external switch is used (Ref. Fig. 701).	Open wire between K1-D1 and J1-5, or K1-D2 and J1-7.	Repair per Fig. 1102 and para. 6B (1).

10. Storage Instructions

A. Storage Materials

NOTE: Equivalent substitutes may be used for the items listed below.

Storage Materials
Table 901

Paper Barrier	MIL-B-121, Type 1, Grade A, Class 1
Cloth, Lint Free	Commercially Available

B. Storage Instructions

(1) Rub external surfaces of Timer Switch with a clean, lint-free cloth, until the entire outside assembly surface is clean and dry.

(2) Protect external connectors with appropriately sized push-on caps or covers.

(3) Wrap and seal Toilet Timer in barrier paper, mark the paper to identify its contents, and place in a suitable container for storage (Reference ASTM-D-3951-88, and best commercial practices).

(4) Identify the contents on the outside of the container.

NOTE: Shelf life is 60 months at room temperature (25 deg. C or 68 deg. F).

11. Special Tools, Fixtures, and Equipment

A. Special Tools

(1) None

B. Fixtures

(1) None

C. Equipment

(1) Test equipment required during testing of the Toilet Timer Assembly is listed in Table 701.

12. Illustrated Parts List

A. Introduction and Purpose

(1) This section provides illustrations and breakdown of parts for the assemblies that can be disassembled, repaired or replaced, and reassembled.

(2) The Illustrated Parts List and IPL Figures 1 and 2, list and illustrate replaceable parts of the toilet timer switches and are covered in this manual. The identification plate on each switch lists the part number, serial number, and nomenclature data for each switch.

B. Explanation and Usage

(1) The parts lists provide item numbers keyed to the item numbers on the exploded view illustration (Ref. IPL Fig.1), and the pictorial view of the circuit board assembly (Ref. IPL Fig. 2), with PART NUMBER, NOMENCLATURE, EFFECT CODE, and UNITS PER ASSY to identify each part used on the switch. The item numbers are presented in the general order of disassembly of each switch. The quantities in the UNITS PER ASSY column of the parts lists are the total parts per switch.

(2) The figure and item column lists the figure number and the item number for each detail part. The figure number is listed once at the top of the column. Each part is called out by an item number. Any part which is not illustrated has a dash (-) preceding the item number.

(3) The code letters A, B, C, D in the EFFECT CODE column of the parts list indicate parts used only on one or more of the toilet timer switches covered in this manual. When no code letter appears in the EFFECT CODE column, the part is used on all toilet timer switches covered in this manual. Code letters and their effectivities are as follows:

CODE LETTER	EFFECTIVITY (PART NUMBER)
A	TD1514-1002
B	TD1535-1002
C	TD1715-1002
D	TD1702-1002

C. Nomenclature

(1) If a part is not manufactured at Leach International, North America, a vendor code is provided. The name and address of each vendor is at the end if this section.

(2) The part descriptions in the nomenclature column are intended to depict the relationship of the part to the next-higher assembly, as follows:

- TOP ASSEMBLY
- DETAIL PARTS FOR TOP ASSEMBLY
- SUB ASSEMBLY
- ATTACHING PARTS
---*---
- DETAIL PARTS
- - DETAIL PARTS FOR SUB ASSEMBLY
- - SUB/SUB ASSEMBLY
- - ATTACHING PARTS
---*---
- - - DETAIL PARTS FOR SUB/SUB ASSEMBLY

D. Symbols and Abbreviations

(1) A complete listing of symbols and abbreviations is located in the INTRODUCTION SECTION, refer to Page INTRO-1 and Page INTRO-2.

E. Parts Replacement Data

(1) The interchangeability relationship between parts is identified in the NOMENCLATURE column of the IPL. A list of the items used and their definition is contained in Table 1101 as follows:

Parts Replacement Terms
Table 1101

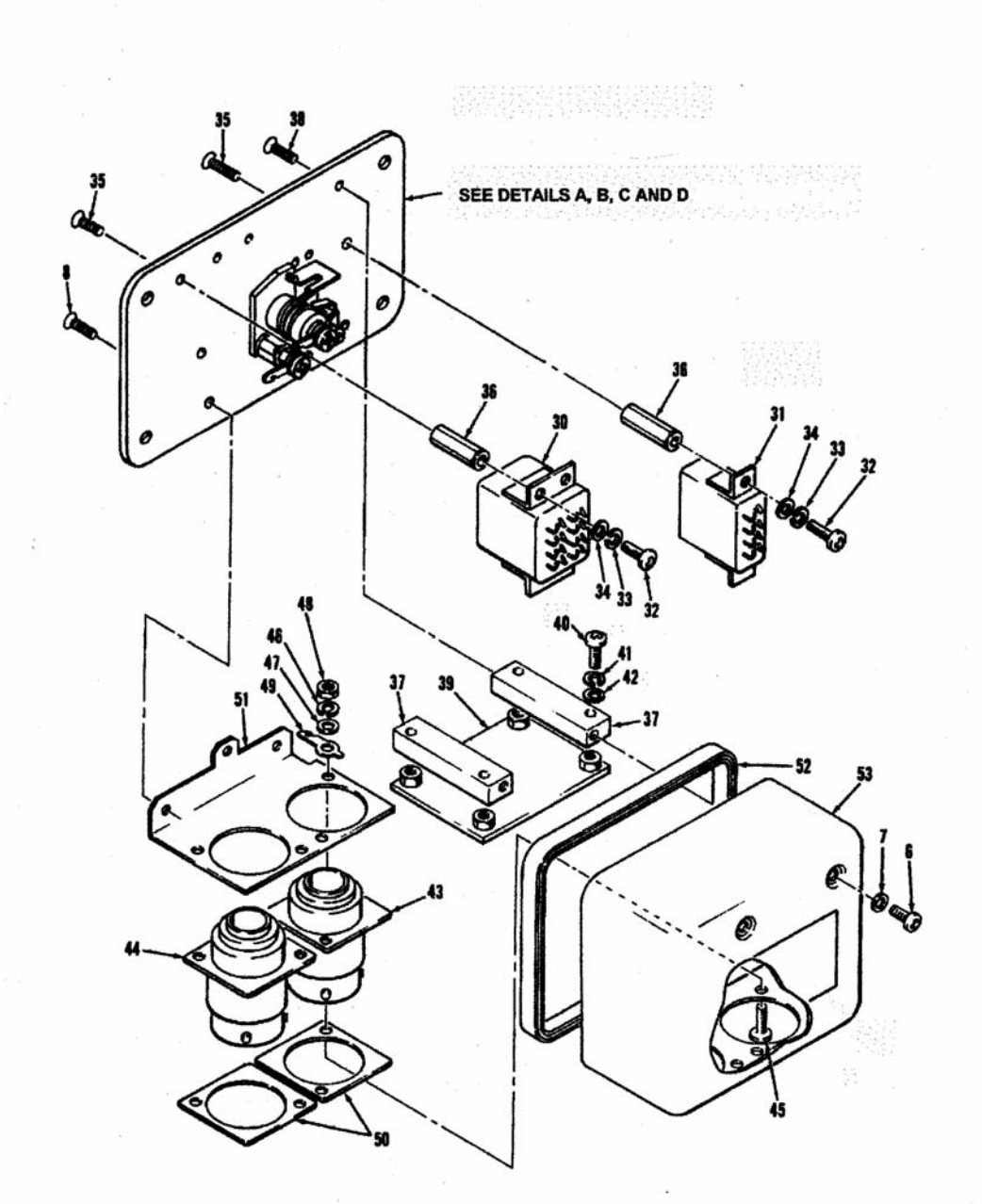
TERM	PARTS LIST ABBREVIATION	DEFINITION
Alternate	ALT	The part fully meets required functional specifications, but differs either in overall external dimensions, connection installation, and/or mounting provisions, and may require additional rework to install in a specific application.
Optional	OPT	The part is completely interchangeable in form, fit, and function with the subject part number, thus providing a choice of parts for procurement and support purposes.
Preferred	PRFD	The part is first choice over other alternate or optional parts listed.
Replaced by	REPLD BY	The part is replaced by and is interchangeable with the item number listed in the notation.
Replaces	REPLS	The part replaces and is interchangeable with the number listed in the notation.
Superseded by	SUPSD BY	The part is replaced by and is not interchangeable with the item number listed in the notation.
Supersedes	SUPSDS	The part replaces and is not interchangeable with the item number listed in the notation.

F. Vendor Information

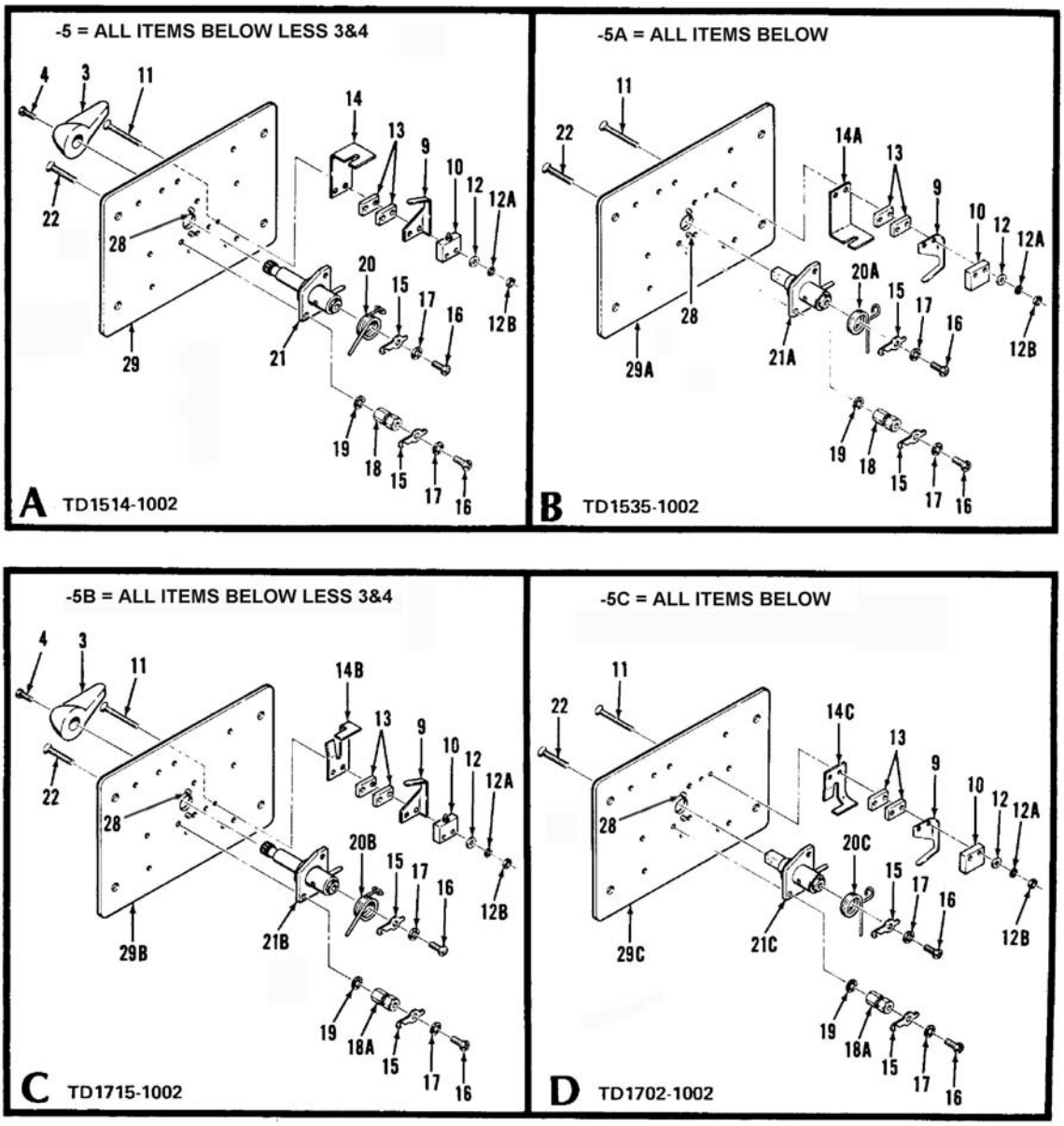
(1) The following listing contains names and addresses of each vendor whose code number is used in the nomenclature column of the Illustrated Parts List, in alphanumeric order of codes.

(V) CODEVENDOR'S NAME AND ADDRESS

0USH1	Newark Electronics 12631 E. Imperial Hw Santa Fe Springs, CA 90670
01AN0	TTI Inc. 2441 North East Parkway Fort Worth, TX 76106
05WE5	Avnet Inc. 60 S. McKemy Ave. Chandler, AZ 85226
1A795	Wyle Electronics 1955 East Skyharbor Circle North Phoenix, AZ 85034
1HZP6	Pacific Western Technology 1616 Sierra Madre Circle Placentia, CA 92670
14552	Microsemi Corporation 2830 South Fairview Street Santa Ana, CA 92704
30687	Jacon Fasteners & Electronics 9539 Vassar Ave. Chatsworth, CA 91311
58657	Leach International North America 6900 Orangethorpe Ave. Buena Park, CA 90622-5032
86044	California Gasket & Rubber Company 1601 West 134th Street Gardena, CA 90249



Toilet Timer Switch - Exploded View
IPL Figure 1 (Sheet 1 of 2)



Toilet Timer Switch - Exploded View
IPL Figure 1 (Sheet 2 of 2)

FIG. ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	EFFECT CODE	UNITS PER ASSY
1 -1	TD1514-1002	SWITCH, TOILET TIMER (SUPERSEDED BY TD1715-1002) (SB TD1514-38-01)	A	RF
-1A	TD1535-1002	SWITCH, TOILET TIMER (SUPERSEDED BY TD1702-1002) (SB TD1535-38-01 & TD1535-38-02)	B	RF
-1B	TD1715-1002	SWITCH, TOILET TIMER (V58657) (SUPERSEDES TD1514-1002) (SB TD1514-38-01)	C	RF
-1C	TD1702-1002	SWITCH, TOILET TIMER (V58657) (SUPERSEDES TD1514-1002) (SB TD1514-38-01 & TD1535-38-02)	D	RF
-2, -2B	201-2478-000	. SWITCH ASSY	A,C	1
-2A, -2C	201-2477-000	. SWITCH ASSY	B,D	1
3	002-2090-001	. . HANDLE (V1HZP6)	A,C	1
		(ATTACHING PARTS)		
4	MS27039C0807	. . SCREW, PAN HEAD, RECESSED, 8-32, 0.47 INCH LONG	A,C	1
-5, -5B	002-5144-000	. . MECHANICAL ASSY	A,C	1
-5A, -5C	002-5141-000	. . MECHANICAL ASSY	B,D	1
		(ATTACHING PARTS)		
6	MS35206-215	. . SCREW, PAN, HEAD, RECESSED, NO. 4-40, 0.38 INCH LONG		2
7	NAS1149GN432P	. . WASHER, FLAT, SEMI-STANDARD NO.4		2
8	MS24693-52	. . SCREW, FLAT HEAD, RECESSED, NO.4-40, 0.25 INCH LONG		3
		---*---		
9	001-9035-001	. . . ACTUATOR, SPRING LEAF (V0USH1)		1
10	001-9033-001	. . . SWITCH, SUBMINIATURE (V0USH1)		1
		(ATTACHING PARTS)		
11	001-1692-244	. . . SCREW, FLAT HEAD, 82-DEGREE, CROSS RECESSED, NO. 2-56, 0.75 INCH LONG		2
12	AN960-3L	. . . WASHER, FLAT, NO.3		2
12A	MS35333-35	. . . WASHER, LOCK, NO.2		2
12B	MS35333-82	. . . NUT, HEX, .086-56 UNC, CS, CD, PL		2
		---*---		
13	002-0829-000	. . . SPACER, SWITCH		2
14, 14B	002-1951-001	. . . BRACKET, ALIGNMENT	A,C	1
14A, 14C	002-5099-000	. . . BRACKET, ALIGNMENT	B,D	1

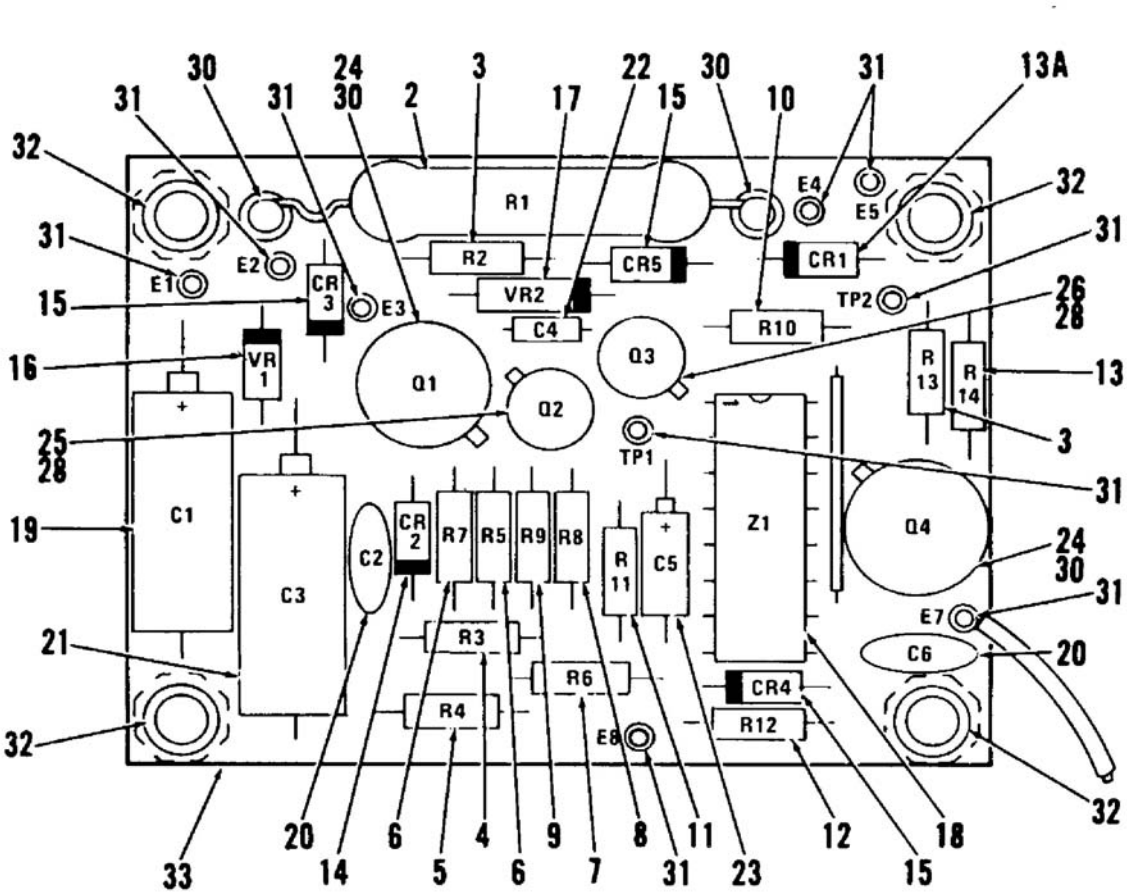
- NOT ILLUSTRATED

FIG. ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	EFFECT CODE	UNITS PER ASSY
15	000-3052-000	. . . LUG, LOCKING		2
		(ATTACHING PARTS)		
16	MS35206-213	. . . SCREW, PAN HEAD, NO. 4-40, 0.25 INCH LONG		2
17	MS35333-36	. . . WASHER, LOCK, INTERNAL TOOTH, NO.4		2
18, 18A	002-5143-000	BRACKET, ALIGNMENT		1
19	MS35333-36	. . . WASHER, LOCK, INTERNAL TOOTH, NO.4		1
20, 20B	002-5138-000	. . . SPRING, RETURN	A,C	1
20A, 20C	002-5089-000	. . . SPRING, RETURN	B,D	1
21, 21B	002-5145-000	. . . SHAFT & BUSHING ASSY	A,C	1
21A, 21C	002-5142-000	. . . SHAFT & BUSHING ASSY	B,D	1
		(ATTACHING PARTS)		
22	MS24693-55	. . . SCREW, FLAT HEAD, 82-DEGREE, CROSS-RECESSED, NO. 4-40, 0.44 INCH LONG		3
		---*---		
-23 THRU -27	DELETED			
28	002-0224-000	. . . PIN, DOWEL		2
29, 29B	002-5086-001	. . . BASE, MOUNTING	A,C	1
29A, 29C	002-5086-000	. . . BASE, MOUNTING	B,D	1
30	238-1211-004	. . RELAY, 10 AMPERE, 4PDT, 115 VAC (K1)		1
31	237-0033-001	. . RELAY, 10 AMPERE, 2PDT, 115 VAC (K2)		1
		(ATTACHING PARTS)		
32	MS35206-215	. . SCREW, PAN HEAD, RECESSED, NO. 4-40, 0.38 INCH LONG		5
33	MS35338-40	. . WASHER, LOCK, NO.4		5
34	AN960-4	. . WASHER, FLAT, NO.4		5
35	MS24693-54	. . SCREW, FLAT HEAD, RECESSED, NO. 4-40, 0.38 INCH LONG		5
36	002-1957-000	. . SPACER, RELAY		5
		---*---		
37	002-1955-000	. . POST, MOUNTING		2
		(ATTACHING PARTS)		
38	MS24693-54	. . SCREW, FLAT HEAD, RECESSED, NO. 4-40, 0.38 INCH LONG		4
		---*---		

- ITEM NOT ILLUSTRATED

FIG. ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	EFFECT CODE	UNITS PER ASSY
39	002-5214-000	. . CIRCUIT BOARD ASSY, PRINTED (RF IPL FIG. 2)		1
		(ATTACHING PARTS)		
40	MS35206-205	. . SCREW, PAN HEAD, RECESSED, NO. 2-56, 0.38 INCH LONG		4
41	MS35338-39	. . WASHER, LOCK, NO.2		4
42	AN960-3L	. . WASHER, FLAT, NO. 3		4
		---*---		
43	SEE DESCRIPTION	. . CONNECTOR, ELECTRICAL (J1) P/N MS24264R14B-7PX		1
44	SEE DESCRIPTION	. . CONNECTOR, ELECTRICAL (J2) P/N MS24264R14B-7SX		1
		(ATTACHING PARTS)		
45	MS35206-215	. . SCREW, PAN HEAD, RECESSED, NO. 4-40, 0.38 INCH LONG		4
46	MS35338-40	. . WASHER, LOCK, NO. 4		4
47	AN960-4	. . WASHER, FLAT, NO. 4		4
48	MS35649-242	. . NUT, HEX, NO. 4-40		4
		---*---		
49	000-3052-000	. . LUG, LOCKING		1
50	001-8425-002	. . GASKET, RUBBER, RECEPTACLE (V01AN0)		2
51	002-1883-000	. . BRACKET, CONNECTOR, MOUNTING		1
52	002-1928-000	. . GASKET, EXTRUSION (V86044)		1
53	002-1831-001	. . CAN, MACHINED		
-54 THRU -56A	DELETED DELETED			

- ITEM NOT ILLUSTRATED



NOTE: For IPL items 2, 5, and 7, see Page 402, paragraph C. (4) for clearance gap detail

Printed Circuit Board Assembly
IPL Figure 2

FIG.	ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	EFFECT CODE	UNITS PER ASSY
2	1	002-5214-000	CIRCUIT BOARD ASSY, PRINTED (REF ITEM 39, IPL FIG. 1)		1
	2	001-5056-046	. RESISTOR, FIXED, WIRE WOUND, 5K ±5% 5W (R1) (V5R553), 243E5025		1
	3	RCR07G272JS	. RESISTOR, FIXED, CARBON, 2.7K ±5%, 1/4 W (R2, R13) (V01AN0)		2
	4	RCR07G332JS	. RESISTOR, FIXED, CARBON, 3.3K ±5%, 1/4 W (R3)		1
	5	RN55D1503F	. RESISTOR, FIXED, FILM, 150K ±1%, 1/10 W (R4)		1
	6	RCR07G102JS	. RESISTOR, FIXED, CARBON, 1K ±5%, 1/4 W (R5, R7) +		2
	6	RCR07G152JS	. RESISTOR, FIXED, CARBON, 1.5K ±5%, 1/4 W (R5, R7) +		RF
	6	RCR07G222JS	. RESISTOR, FIXED, CARBON, 2.2K ±5%, 1/4 W (R5, R7) +		RF
	6	RCR07G332JS	. RESISTOR, FIXED, CARBON, 3.3K ±5%, 1/4 W (R5, R7) +		RF
	6	RCR07G472JS	. RESISTOR, FIXED, CARBON, 4.7K ±5%, 1/4 W (R5, R7) +		RF
	6	RCR07G682JS	. RESISTOR, FIXED, CARBON, 6.8K ±5%, 1/4 W (R5, R7) +		RF
	6	RCR07G103JS	. RESISTOR, FIXED, CARBON, 10K ±5%, 1/4 W (R5, R7) +		RF
	6	RCR07G153JS 5	. RESISTOR, FIXED, CARBON, 15K ±5%, 1/4 W (R5, R7) +		RF
	6	RCR07G223JS	. RESISTOR, FIXED, CARBON, 22K ±5%, 1/4 W (R5, R7), +		RF
	6	RCR07G333JS	. RESISTOR, FIXED, CARBON, 33K ±5%, 1/4 W (R5, R7) +		RF
	6	RCR07G473JS	. RESISTOR, FIXED, CARBON, 47K ±5%, 1/4 W (R5, R7) +		RF
	7	RN55D1003F	. RESISTOR, FIXED, FILM, 100K ±1%, 1/10 W (R6)		1
	8	RCR07G102JS	. RESISTOR, FIXED, CARBON, 1K ±5%, 1/4 W (R8)		1
	9	RCR07G100JS	. RESISTOR, FIXED, CARBON, 10 OHMS ±5%, 1/4 W (R9)		1
	10	RCR07G103JS	. RESISTOR, FIXED, CARBON, 10K ±5% 1/4 W (R10)		1

+ Select value during Testing

FIG.	ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	EFFECT CODE	UNITS PER ASSY
	11	RCR07G512JS	. RESISTOR, FIXED, CARBON, 5.1K ±5% 1/4 W (R11)		1
	12	RCR07G223JS	. RESISTOR, FIXED, CARBON, 22K ±5% 1/4 W (R12)		1
1103	13	RCR07G472JS	. RESISTOR, FIXED, CARBON, 4.7K ±5% 1/4 W (R14)		1
	13A	JAN 1N4249	. DIODE, (CR1) (SB TD1535-38-01, TD2535-38-02, & TD1514-38-01) (V14552)		1
	14	JAN 1N4247	. DIODE (CR2) (V14552)		1
	15	JAN TX 1N4148-1	. DIODE (CR3, CR4, CR5) (V14552)		1
	16	JAN 1N4468	. DIODE, ZENER (VR1) (V14552)		1
	17	JAN 1N747A	. DIODE, ZENER (VR2) (V14552)		1
	18	CD 4027AF	. CIRCUIT, INTEGRATED, C/MOS FLIP-FLOP (Z1) (V05WE5)		1
	19	150D226X0035	. CAPACITOR, FIXED, SOLID TANTALUM, 22 MFD ±20% 35 VDCW (C1) (V01AN0)		1
	20	CK60AW152M	. CAPACITOR, FIXED, MICA, 1500 PF ±20% 200 VDCW (C2, C6) (V01AN0)		2
	21	150476X0020	. CAPACITOR, FIXED, SOLID TANTALUM, 47 MFD ±20% 20 VDCW (C3) (V01AN0)		1
	22	CK05BX102K	. CAPACITOR, FIXED, CERAMIC, 1000 PF ±10% 200 VDCW (C4) (V01AN0)		1
	23	1500225X0020	. CAPACITOR, FIXED, SOLID TANTALUM, 2.2 MFD ±20% 20 VDCW (C5), (V01AN0)		1
	24	2N3439	. TRANSISTOR (Q1, Q4) (V1A795)		2
	25	JAN 2N4948	. UNIJUNCTION TRANSISTOR (Q2)		1
	26	SEE DESCRIPTION	. TRANSISTOR (Q3) P/N JAN 2N3251A-CCD		1
	27	7717-114DAP	. PAD, TRANSISTOR, TO-5 LOW PROFILE (V30687)		2
	28	RC-TD18090-1A	. PAD, TRANSISTOR, TO-18 (V1HCP6)		2
	29	DELETED			
	30	002-1881-000	. . TERMINAL, SWAGE (V30687)		2
	31	002-6033-022	. . TERMINAL, WIRE, COPPER, STR, #22 AWG (V30687)		9
	32	001-8490-000	. . HEX NUT, SPACER, SWAGE, 2-56, 2B, (V30687)		4

- NOT ILLUSTRATED

13. Light Overhaul

A. General

(1) The procedures provided in this manual may be accomplished by any level of maintenance-authorized tools and materials necessary to test, inspect, disassemble, replace components, and reassemble the switch.

B. Procedure

(1) Perform test listed in Testing Section, paragraph 8, Page 701.

(2) If malfunctions are detected during the testing, refer to Trouble Shooting Section, paragraph 9, Page 801, for trouble localization data.

(3) Disassemble per Disassembly Section, paragraph 2, Page 101, to extent necessary to gain access to defective part (or parts). Reassemble per Assembly Section, paragraph 6, Page 501, and repeat test procedure to make sure switch assembly has been returned to a serviceable condition.