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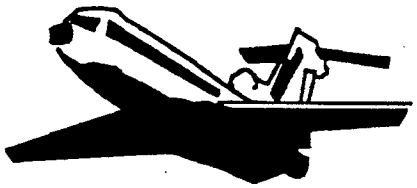
The Leader in Airfield Lighting



Since 1946

(Appendix to ALSF/MALSR Manuals)
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INSTRUCTION MANUAL

FLASHER TESTER

ADB

A SIEMENS COMPANY
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Columbus, Ohio 43230
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Additional manuals are available upon request for a nominal charge of $25.

RECORD OF CHANGES

Page	Rev.	Description	Chkd	App'd
	A	Renumbered pages	EP	ED

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SAFETY NOTICES

The operating and maintenance personnel should refer to FAA Advisory Circular AC 150/5340-26, "Maintenance of Airport Visual Aids Facilities" for instructions on safety precautions. Personnel must observe the safety regulations at all times. While every practicable safety precaution has been incorporated in this equipment, the following rules must be strictly observed:

KEEP AWAY FROM LIVE CIRCUITS

Operating and maintenance personnel must at all times observe all safety regulations. To avoid casualties, always remove power prior to making any wire connections and touching any parts. See FAA Advisory Circular AC 150/5340-26 concerning safety.

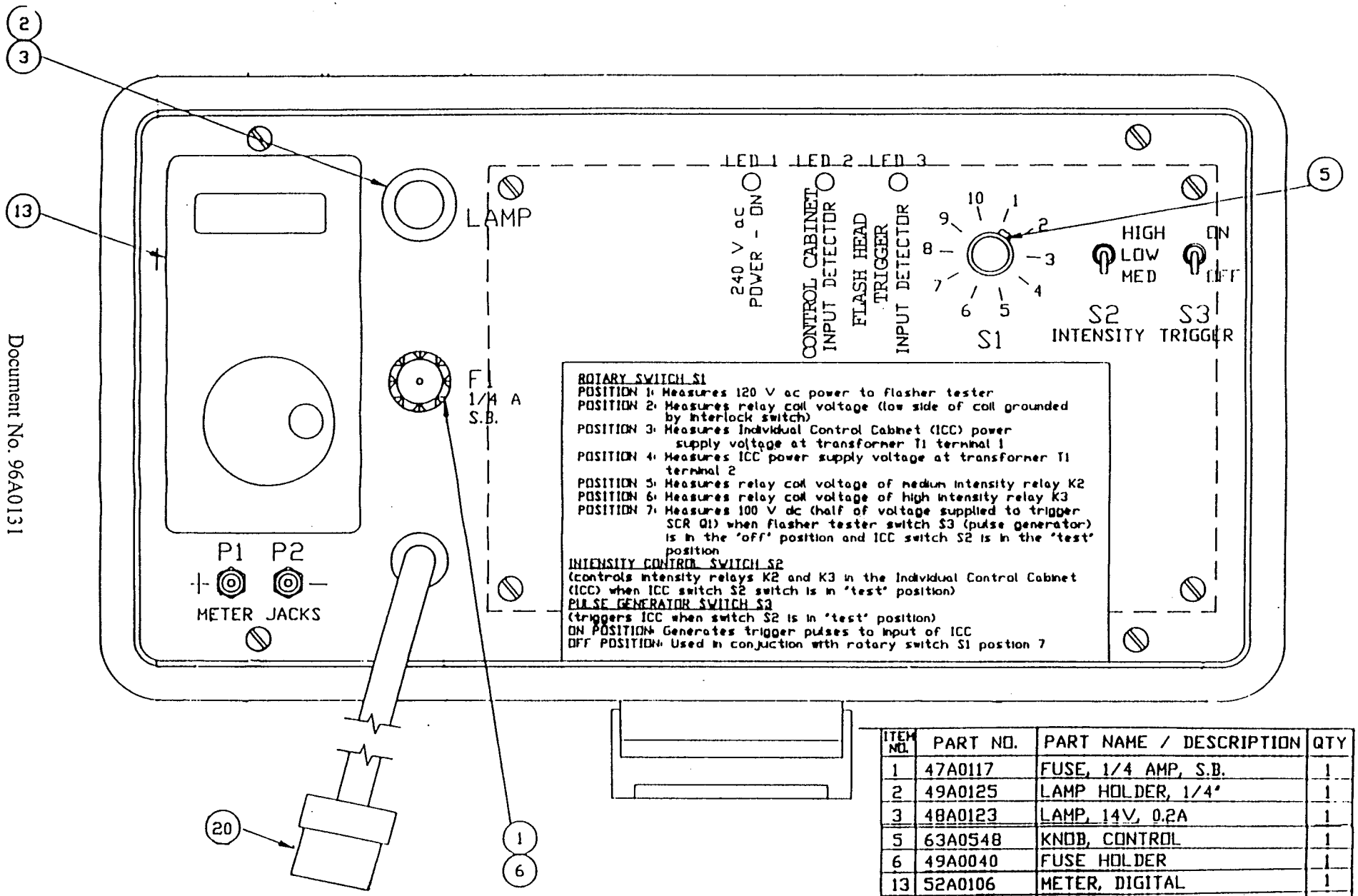
RESUSCITATION

Operating and maintenance personnel should familiarize themselves with the technique for resuscitation found in the First Aid Instruction Manual.

GUARANTEE

ADB, Inc. guarantees that the Flasher Tester described herein, when sold by ADB, Inc. or its approved representatives, and that any defect in design, materials or workmanship which may occur during proper and normal use during a period of one (1) year from date of shipment will be corrected by repair or replacement by ADB, Inc., f.o.b. factory. Damage resulting from improper installation does not constitute proper and normal use and is not covered by the warranty. Such corrections shall constitute the limit of all ADB, Inc. liabilities for the Flasher Tester.

Figure 1. FRONT PANEL OF FLASHER TESTER



CONNECTS TO J3 RECEPTACLE
IN INDIVIDUAL CONTROL CABINET

ITEM NO.	PART NO.	PART NAME / DESCRIPTION	QTY
1	47A0117	FUSE, 1/4 AMP, S.B.	1
2	49A0125	LAMP HOLDER, 1/4"	1
3	48A0123	LAMP, 14V, 0.2A	1
5	63A0548	KNOB, CONTROL	1
6	49A0040	FUSE HOLDER	1
13	52A0106	METER, DIGITAL	1
20	72A0142	RECEPTACLE, 12 CIRCUIT	1

PART NUMBER: FLASHER TESTER
44D1686-1

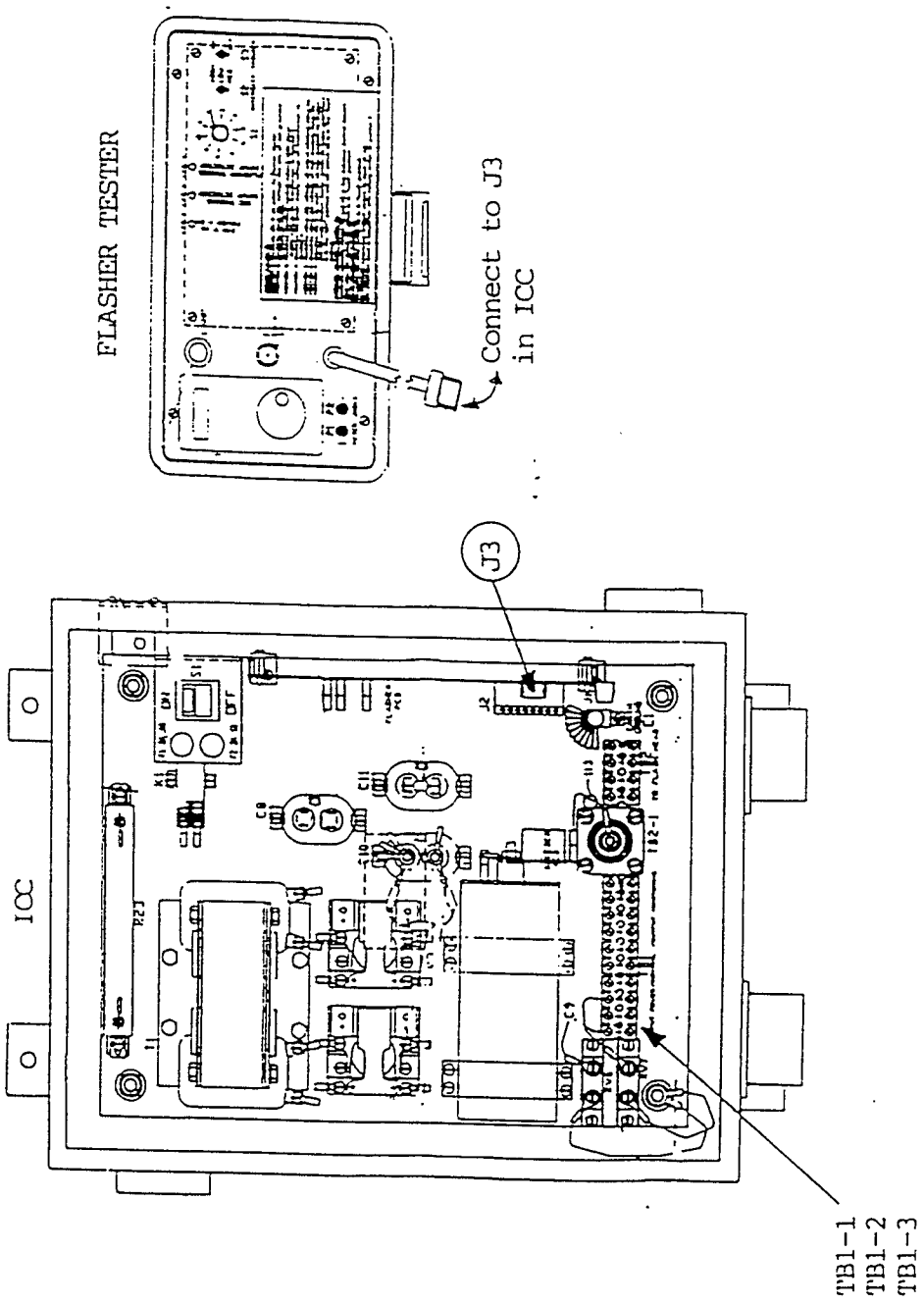


Figure 2. Flasher Tester Connection to ICC

FLASHER PCB

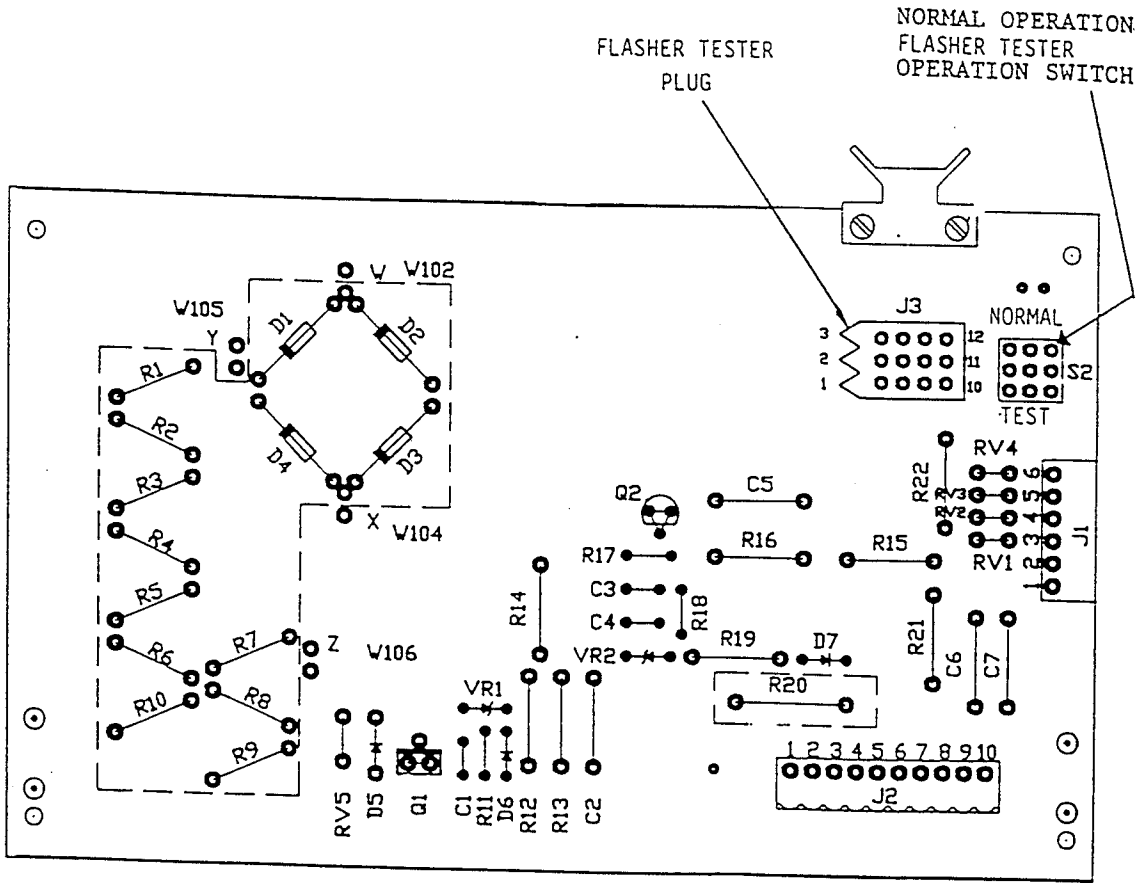


FIGURE 3. FLASHER PCB

1. GENERAL INFORMATION

1.1 INTRODUCTION

The portable flasher tester (see Figure 1) is equipped with a test cable and a twelve-pin rectangular plug which connects socket J3 on the Flasher PCB (44D1699) (see Figure 2)in the Individual Control Cabinet (ICC) to monitor the operation of the flasher light unit. The flasher tester contains a multimeter, status indication LED's, test-selection rotary switch, intensity and trigger control switches and is capable of testing the power circuits and control signals from the Master Cabinet to the Individual Control Cabinet (ICC) and from the ICC to the flash heads.

1.2 FLASHER TESTER CONTROLS AND INDICATORS

Digital Multimeter

1% accuracy, DC volts, AC volts (450 V ac max.), ohms
Uses 2 silver-oxide batteries
Two jacks (P1 & P2) for internal flasher tester readings (meter test leads are unplugged for external meter reading). Multimeter can also be removed from flasher tester for external readings.

Rotary Switch S1 (used to select 7 meter functions)

Position 1: Measures 120 V ac power to flasher tester

Position 2: Measures relay coil voltage (low side of coil which is grounded by interlock switch)

Position 3: Measures Individual Control Cabinet (ICC) power supply voltage at transformer T1 terminal 1 which is supplied from TB1-1 thru switch S1a, fuse F1, and power-on/off relay K1

Position 4: Measures ICC power supply voltage at transformer T1 terminal 2 which is supplied from TB1-3 thru switch S1b, fuse F2, resistor R30, and power-on/off relay.

☑ **Note**: The voltage from TB1-1 to neutral and TB1-3 to neutral is 120 V ac. The voltage from TB1-1 to TB1-3 is 240 V ac.

Position 5: Measures relay coil voltage of medium intensity relay K2

Position 6: Measures relay coil voltage of high intensity relay K3

Position 7: Measures 100 V dc (half of voltage supplied to trigger SCR Q1) when flasher tester switch S3 (trigger pulse generator) is in the OFF position and switch S2 on the Flasher PCB (44C1699 in ICC) is in the TEST position

☑ **Note**: S1 positions 8, 9 and 10 are not used.

Panel Illuminator	Uses a pin-ball lamp #1815 with a 3000 h rated life
Fuse	Fuses entire flasher tester [1/4 amp, slow-blow (ADB 48A0123)]
LED Indicators	Sunlight-Readable LED 1: 240 V ac power-on LED indicator LED 2: ICC Trigger Input Detector LED (indicates input trigger pulse to ICC) LED 3: Flasher Trigger Input Detector LED (indicates output trigger pulse from ICC to flash head)
Intensity Control Switch S2	Three-position switch for control of the intensity relays K1 and K2 in the ICC when switch S2 on the Flasher PCB (44C1699) in the ICC is in the TEST position Top Position (S2)—High Intensity (energizes relays K2 and K3 in ICC) Center Position (S2)—Low Intensity (relays K2 and K3 deenergized in ICC) Bottom Position (S2)—Medium Intensity (relay K2 energized and K3 deenergized in ICC)
Trigger Generator Switch S3	Two-position switch when switch S2 on the Flasher PCB (44C1699) in the ICC is in TEST position Top Position (S3)—ON position generates trigger pulses to input of ICC Bottom Position (S3)—OFF position used in conjunction with rotary switch S1 in position 7

1.3 FLASHER TESTER OPERATIONAL PROCEDURES

The following operational test procedures are to be followed sequentially. Before proceeding with the next sequential step, make sure that any malfunctions detected in any previous steps are corrected. At installation perform the complete operational test procedures listed below on each Individual Control Cabinet (ICC), and record the voltages and LED indications measured on the data sheet provided on the back of this instruction booklet for future reference.

☑ **Note**: A general visual check of the uniformity of brightness all flashers should be made periodically on all brightness steps to detect any flash lamps which are too dim or too bright.

☑ **Note**: Running ICC directly from Flasher Tester at Maintenance Shop: To run the individual control cabinet (ICC) directly from flasher tester at maintenance shop, a 240 V ac power supply must be connected to TB1 (TB1-1= L1, TB1-2 =N, TB1-3 = L2) on the ICC and the flasher tester plug must be connected to the J3 receptacle in the ICC (see Figure 2).

1.3.1 Testing of Power and Control Signals from Master and Operation of Control Circuits in ICC

Step 1: Open Individual Control Cabinet (ICC) door and set switch S1 in the ICC to OFF.

WARNING

120/240 Vac is still present at TB1 from the Master Control Cabinet even through the ICC is off.

☑ **Note**: Opening the door should automatically place interlock switch S3 in the OFF position.

WARNING

Wait two minutes for the high voltage capacitors to discharge.

Step 2: Insert flasher tester plug into receptacle J3 on the ICC Flasher PCB (44C1699) in the ICC, and set switch S2 on Flasher PCB to TEST position.

☑ **Note**: The engagement of the flasher tester plug may be facilitated by firmly grasping the PCB near the J3 receptacle and then pushing the tester plug into the receptacle. Do not attempt to bottom out plug into receptacle. Only 1/8 inch engagement of plug into receptacle is necessary to make proper connection.

Step 3: Turn S1 in ICC to ON position.

WARNING

2000 V dc is present in the ICC. Do not manually probe high voltage points in ICC with power on.

Step 4: Turn system on with S3 trigger to ON position. Panel illuminator labeled LAMP on flasher tester should turn on.

Step 5: Set multimeter dial on flasher tester for AC voltage. Meter jacks must be plugged into plug P1 (red or +) and P2 (black or –).

Step 6: Set rotary switch S1 on flasher tester to position 1. Meter should read 120 V ac ±10% with switch S1 in ICC set to ON (**record voltage on data sheet**). If panel lamp is not on, replace lamp (48A0123).

If meter shows zero voltage, then switch S1 in ICC is set to OFF or is defective or no power is supplied to ICC. Do not proceed until corrected.

Step 7: Set flasher tester rotary switch S1 to position 2. Make sure ICC interlock switch S3 is in the OFF position (plunger not pulled out).

☑ **Note**: 240 V ac power-on indicator LED 1 should be off. If LED 1 is lit, contacts on on/off relay K1 are welded together (replace relay). Meter should read 120 V ac ±10% **(record voltage on data sheet)**, which indicates coil of power-on/off relay is not defective and is receiving proper voltage and interlock switch is in the open (off) position.

If meter shows less than 20 V ac, then fuse F1 is blown or relay coil is defective or interlock switch is in the ON position or shorted. Replace defective part.

Step 8: Pull out plunger on ICC interlock switch S3 (S3 in ON position). Meter reading should change from 120 V ac to less than 2 V ac **(record final voltage on data sheet)**.

WARNING

Pulling out plunger on interlock switch S3
energizes the ICC power-on/off relay and
turns on the high voltage supply.

If meter reading stays at 120 V ac, either contact on ICC interlock switch S3 has failed to close (defective) or interlock switch in flash head is open.

Step 9: Set flasher tester switch S1 to position 3. Meter should read 120 V ac ±10% **(record voltage on data sheet)**.

If less than 2 V ac, the contacts in power-on/off relay K1 are defective.

Step 10: Set flasher tester switch S1 to position 4. Meter should read 115 V ac ±10% **(record voltage on data sheet)**.

If less than 2 V ac, no power is present on TB1-3 in ICC.

If meter reading is correct for Steps 9 and 10, check if LED 1 is lit. This indicates 240 V ac is present across transformer T1 terminals 1 and 2. If LED 1 is not lit, fuse F2 is blown or on/off relay contacts are defective or resistor R30 is open or a bad contact exists in ICC switch S1b.

Step 11: Set switch S2 on Flasher PCB in the ICC to the NORMAL position (the flasher will stop flashing). This allows the flasher tester to monitor control signals from the Master to the ICC.

Set flasher tester switch S1 to position 5. Operate system from Master cabinet at low intensity level. Meter should read less than 20 V ac **(record voltage on data sheet)**. If more than 20 V ac but less than 90 V ac, an abnormal electrical noise is present on cables leading to the ICC (probable insulation failure).

If meter reads 120 V ac, there is a probable failure on the Master I/O PCB.

Step 12: With S2 on Flasher PCB in NORMAL position, operate system at medium intensity. Meter should read 120 V ac ±10% **(record voltage on data sheet)**. If meter reads less than 20 volts, ICC switch S2 on Flasher PCB is in TEST position (switch set toward rear) or defective or there is a probable failure on the Master I/O PCB.

Step 13: With S2 on Flasher PCB in NORMAL position, set flasher tester switch S1 to position 6. Operate system from Master cabinet at medium intensity level. Meter should read less than 20 V ac **(record voltage on data sheet)**. If more than 20 V ac but less than 90 V ac, an abnormal electrical noise is present on cables leading to the ICC (probable insulation failure).

If meter reads 120 V ac, there is a probable failure on the Master I/O PCB.

Step 14: With S2 on Flasher PCB in NORMAL position, operate system at high intensity. Meter should read 120 V ac ±10% **(record voltage on data sheet)**. If meter reads less than 20 volts, switch S2 on Flasher PCB is in TEST position or defective or there is a probable failure on the Master I/O PCB.

☑ **Note**: Input trigger detector LED 2 should flash twice per second. If LED 2 is continuously off, check to see if switch S2 on Flasher PCB is in TEST position. If it is, set S2 to NORMAL position.

If LED 2 is still continuously off, either the I/O PCB in Master is defective or there is shorted cable between the Master and the ICC.

If LED 2 is continuously on, there is a failure on the I/O PCB in the Master.

If the LED 2 flashes irregularly, there is excessive noise on cable from the Master to the ICC.

Step 15: Set switch S2 on Flasher PCB to TEST position. This allows flasher tester to provide trigger signals and control voltage for operating intensity-level relays.

Set flasher tester switch S1 to position 5, flasher tester switch S2 (INTENSITY) to center position (low intensity), and flasher tester switch S3 (TRIGGER) to OFF. Meter should read zero volts **(record voltage on data sheet)**. If not, check to make sure flasher tester switch S2 (INTENSITY) is in the center position.

Observe ICC relay K2. Relay K2 contacts should be open. If closed, contacts are welded shut and the relay must be replaced. Continue observing relay K2 while changing flasher tester switch S2 (INTENSITY) to the bottom position (medium intensity). Relay contact should close (audible click). If not, read meter. If meter reads less than 20 volts, switch S2 in the ICC is defective and Flasher PCB must be replaced. If meter reads 120 V ac, R21 on ICC Control PCB is open and/or C6 on ICC Control PCB is shorted or coil of relay K2 is defective.

Step 16: Set flasher tester switch S1 to position 6, flasher tester switch S2 (INTENSITY) to center position (low intensity), and flasher tester switch S3 to OFF. Meter should read less than 20 volts **(record voltage on data sheet)**. If not, check to make sure flasher tester switch S2 (INTENSITY) is in the center position.

Observe ICC relay K3. Relay K3 contacts should be open. If closed, contacts are welded shut and the relay must be replaced. Continue observing relay K3 while changing flasher tester switch S2 (INTENSITY) to the top position (high intensity). Relay contact should close (audible click). If not, read meter. If meter reads less than 20 volts, switch S2 in the ICC is defective. If meter reads 120 V ac, R22 on ICC Control PCB is open and/or C7 on ICC Control PCB is shorted or coil of relay K3 is defective.

1.3.2 Signal and Control Diagnostics on ICC

The following tests are performed with system operating and flashers energized and after the previous flasher tester steps have been performed.

Step 17: Make sure that ICC switch S2 is in the TEST position.

Set flasher tester switch S2 (INTENSITY) to the center position (low intensity) and flasher tester switch S3 (TRIGGER) to OFF.

Set flasher tester switch S1 to position 7.

☑ **Note**: In order to use meter in position 7, flasher tester switch S3 (TRIGGER) must be in the OFF position.

Set meter dial to DC volts. Meter test probes must be plugged into jacks P1 (red or +) and P2 (black or -). Meter should read between +90 V dc and +120 V dc (**record voltage on data sheet**).

If meter reads greater than +120 V dc, there is an overvoltage condition in the +2000 V dc power supply.

If meter reads between +2 and +89 V dc, this indicates a failure in which the HV power supply is less than the +2000 V dc, such as a failed HV transformer T1 or a shorted high voltage bridge D1, D2, D3, D4 or shorted resonant capacitor C8 or shorted low intensity capacitor C11 or shorted +2000 V cable from ICC to flash head.

If meter reads less than +2 V dc and flash-head trigger-input-detector LED 3 is continuously on, there is either a shorted trigger SCR Q1 or flash head capacitor C11 or complete failure of the +2000 V dc power supply.

Step 18: Set flasher tester switch S1 to position 3 and meter dial switch to read AC volts. LEDs 2 & 3 should be continuously off. If input pulse detector LED flashes twice per second, ICC switch S2 is not in TEST position.

☑ **Note**: If LED indications are correct, write OK for step 18 on Table 1.

Set flasher tester switch S3 (pulse generator) to "ON" position. Both input and output pulse detector LEDs should flash simultaneously on (twice per second). If input pulse detector LED is continuously off, there is either a shorted capacitor C2 or varistor VR1 or defective ICC switch S2.

If output pulse detector LED is continuously off, there is either a defective trigger SCR Q1 or varistor VR1 or capacitor C1.

Step 19: With meter switch set to read AC volts, the meter should read 120 V ac ±10% **(record voltage on data sheet)** and the voltage should not vary more than a few volts during the flashing operation.

Step 20: Set flasher tester switch S2 (INTENSITY) to the top position (high intensity). Meter should read 120 V ac ±10% **(record voltage on data sheet)** and the variation in the voltage should be no more than twice the variation displaced in previous step.

If the voltage variation is more than twice the variation in Step 3, either the ICC input power cable gauge is too small or there are bad connections.

WARNING

Turn power off in ICC by turning S1 off.
Wait two minutes before removing flasher tester plug from ICC receptacle J3.

After all test have been completed and system is found to be operating satisfactorily, remove flasher tester plug from ICC receptacle J3.

☑ **Note**: Disengage flasher tester plug from J3 receptacle by firmly grasping the PCB near the receptacle and then pulling plug out of receptacle using a rocking motion.

Make sure ICC switch S2 is in the normal position and close Master and ICC doors. Turn meter in flasher tester off.

Table 1

DATA SHEET FOR FLASHER TESTER VOLTAGE MEASURLMENTS

DATE TEST PERFORMED:_____

	STEP 6	STEP 7	STEP 8	STEP 9	STEP 10	STEP 12	STEP 13	STEP 14	STEP 15	STEP 17	STEP 18	STEP 19	STEP 21	STEP 22
ICC #1*														
ICC #2														
ICC #3														
ICC #4														
ICC #5														
ICC #6														
ICC #7														
ICC #8														
ICC #9														
ICC #10														
ICC #11														
ICC #12														
ICC #13														
ICC #14														
ICC #15														
ICC #16														
ICC #17														
ICC #18														
ICC #19														
ICC #20														
ICC #21														

*NOTE: ICC #1 = Individual Control Cabinet #1. Indicate on data sheet which ICC is designated as #1, i.e, the one closest to the threshold or the one furthest from the threshold.

Beckman Industrial™

CIRCUITMATE™ MODEL DM78 DIGITAL MULTIMETER

OPERATOR'S MANUAL

P/N 3000-940-205

SPECIFICATIONS (23°C ± 5°C, 80% RH Max)*

1. **DISPLAY**
   a. Numerical display: 3½ digit LCD, 10mm high, maximum reading 1999
   b. Unit and Sign: V, KΩ, ⇻ ⊟ AC, - and decimal point
2. **RANGE SELECTION:** Autoranging
3. **OVERRANGE INDICATION:** MSD "1" blinks
4. **POLARITY:** Autopolarity, (−) sign when minus
5. **BATTERY WARNING:** "⊟" sign when battery voltage goes down below 1.25V ±0.1V
6. **SAMPLING RATE:** 2 times per second
7. **OPERATING TEMPERATURE & HUMIDITY:** 0 to 40°C, less than 80% RH non-condensing
8. **STORAGE TEMPERATURE & HUMIDITY:** −20°C to 60°C, less than 70% RH non-condensing
9. **BATTERY TYPE:** Two 1.5V (LR-44) Batteries
10. **BATTERY LIFE:** 70 hours continuous operation
11. **DIELECTRIC STRENGTH:** 1.5kV for one minute
12. **CONTINUITY TEST:** Buzzer Warning and ⇻ sign on LCD
    a. Threshold Level, approx. 1.5kΩ to 15kΩ
    b. Response Time: approx. 1msec.
    c. Open Circuit Voltage: approx. 1.5V
13. **DIODE CHECK:** GOOD or BAD judged by the displayed value
14. **DIMENSIONS & WEIGHT:** 4.25 in (108 mm) H x 2.13 in (54 mm) W x 0.40 in (10.2 mm) D, 99 g (incl. carrying case)
15. **INCLUDED WITH METER:** Two 1.5V (LR-44) Batteries, Operator's Manual, Carrying Case

DC VOLTAGE

Range	Accuracy	Resolution	Input Impedance	Max. Input Voltage
2.000V	±(0.7%rdg + 4dgt)	1mV	≈ 12MΩ	450V
20.0V	±(1.3%rdg + 4dgt)	10mV	≈ 11MΩ	
200.0V		100mV		
450 V		1 V		

AC VOLTAGE

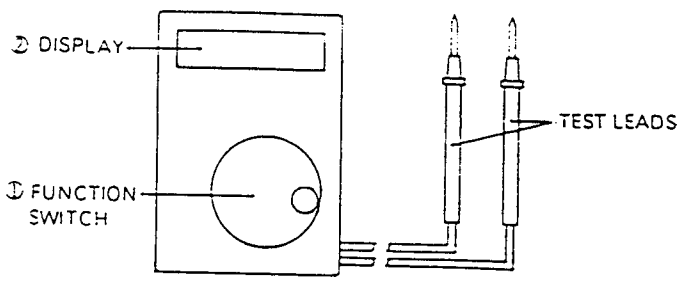
Range	Accuracy	Resolution	Input Impedance	Max. Input Voltage
2.000V	±(2.3%rdg + 4dgt) (40 Hz to 500 Hz)	1mV	≈ 12MΩ	450V RMS
20.00V		10mV	≈ 11MΩ	
200.0V		100mV		
450 V		1 V		

RESISTANCE

Range	Accuracy	Resolution	Open Circuit Voltage	Max. Input Voltage
2.000kΩ	±(2.0%rdg + 4dgt)	1Ω	≦0.45V	DC 250V AC 250V RMS
20.00kΩ		10Ω		
200.0kΩ		100Ω		
2000 kΩ		1kΩ		

*Specifications are subject to change without notice.

FUNCTION INDICATIONS



① **FUNCTION SWITCH:** Functions and POWER on and off are selected with this rotary switch.
   a. V⎓ position: 0 to 450V DC in 4 ranges
   b. V~ position: 0 to 450V AC in 4 ranges
   c. Ω position: 0 to 2000kΩ in 4 ranges
   d. ⇻ position: continuity test and diode check

② **DISPLAY:** 3.5 digit max. 1999 display with decimal point, minus polarity, overrange and low battery

③ **TEST LEADS:** One pair of TEST LEADS consisting of a Red Test Lead and a Black Test Lead used to make contact with the circuit being measured. Black Test Lead is contacted to negative side of the circuit and Red Test Lead to positive side.

④ **BUZZER WARNING:** Buzzer is available in the following usage.
   a. Switch Warning: Buzzer sounds whenever FUNCTION SWITCH is turned or the range is going up on the V range functions.
   b. Continuity Test: Buzzer sounds when continuity resistance is less than Threshold Level, approx. 1.5kΩ to 15kΩ.

WARNINGS

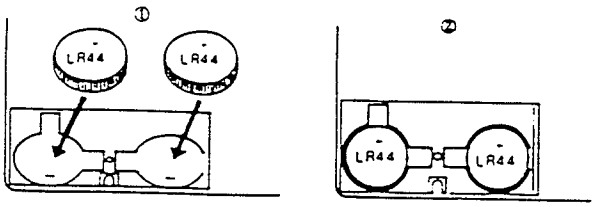
- Before measuring, make certain that FUNCTION SWITCH is set on correct position. When turning FUNCTION SWITCH, always disconnect Test Leads from the circuit being measured.
- Measurement of high voltages can be lethal. Use extreme caution when working with high-voltage sources. High-voltage transients may occur in nearly any defective electronic equipment.
- Maximum input voltage is 450V AC/DC on VOLT range.
  Do NOT attempt to take any voltage measurement that might exceed 450V AC/DC to avoid electrical shock hazard and/or damage to the instrument.
- Do NOT fail to confirm before every measurement that the body of this instrument and the handle insulator of the test leads have no cracks nor any other damage on it. Make sure that the body and the test leads are free of dust, grease and moisture.
- Before each use of the multimeter, inspect test leads, connectors, case and probes for cracks, breaks, or crazes in the insulation. If any defects are found, replace item immediately.
- To avoid electrical shock hazard, do not touch test leads, tips, or the circuit being tested while power is applied to the circuit being measured.
- Avoid severe mechanical shock or vibration, extreme temperature or very strong magnetic fields.
- Do NOT polish the tester case, or attempt to clean it with any cleaning fluid, gasoline, benzine, etc. If necessary, use silicon oil or antistatic fluid.

BATTERY REPLACEMENT

Two 1.5V type LR-44 batteries are furnished with this instrument.
For replacement, replace the both batteries at a time using specified ones or any equals.

When opening battery hatch, turn off power and disconnect Test Leads from circuit being measured to prevent electrical shock hazard, and or damage to the instrument

1. Remove the battery hatch on back case and install batteries.
   NOTE: If the batteries are installed in the wrong polarity and FUNCTION SWITCH is turned on, the display will not operate. Do not leave the instrument in this condition as it results in excessive battery drain.
2. If the instrument is taken out of service for an extended time, remove the batteries from the battery case and store separately.



MEASUREMENT PROCEDURE

1. DC VOLTAGE (V⎓)

For safety, do not attempt to measure voltages greater than 450V AC DC

(1) Set FUNCTION SWITCH to V⎓ position.
(2) Connect Black Test Lead to the negative side of the circuit being measured and Red Test Lead to the positive side.
The connection should be **IN PARALLEL** with the circuit being measured.
(3) Read the value on the display.

2. AC VOLTAGE (V~)

For safety, do not attempt to measure voltages greater than 450V AC DC

(1) Set FUNCTION SWITCH to V~ position.
(2) Connect Black Test Lead to the negative side of the circuit being measured and Red Test Lead to the positive side.
The connection should be **IN PARALLEL** with the circuit being measured.
(3) Read the value on the display.

3. RESISTANCE (Ω)

Before taking any in-circuit resistance, remove power to the circuit being tested and discharge all capacitors in the circuit

(1) Set FUNCTION SWITCH to Ω position. 1000KΩ appears on LCD with the most significant "1" digit blinking.
(2) Connect Test Leads to the circuit being measured.
(3) Read the value on the display.

4. CONTINUITY TEST • DIODE CHECK (⇥⇤)

Before taking any continuity test, remove power to the circuit being tested and discharge all capacitors in the circuit

(1) Set FUNCTION SWITCH to ⇥⇤ position.
(2) **a. Continuity Test**
Connect Test Leads to the circuit to be tested.
Buzzer sounds and ⇥⇤ sign appears on LCD when continuity resistance is less than the threshold level of 1.5kΩ to 15kΩ.

b. Diode Check

① Connect Black Test Lead to Anode and Red Test Lead to Cathode of the diode being measured.
Make sure that the reading is same as in open circuit.
② Reverse Test Lead connections with the device being checked. If the device is good, the LCD will read half the value at condition ①.

NOTE: 1. Diode Check should be done with the diode disconnected from the circuit or the other devices.
2. This tester can not check the diodes requiring a forward voltage higher than 1V.

WARRANTY

90-Day Limited Warranty
Circuitmate™ Model DM78 Multimeter is warranted in entirety against defects of material or workmanship which develop for any reason whatsoever, except abuse, within a period of 90 days following the date of purchase of the multimeter by the original purchaser. This warranty is extended by Beckman Industrial Corporation only to the original purchaser or original user of the multimeter.
In the event a defect develops during the warranty period, Beckman Industrial Corporation at their election will repair or replace the multimeter with a new or reconditioned model of equivalent quality. In order to obtain performance of any obligation of Beckman Industrial Corporation under the warranty, the original purchaser or original user must return the defective multimeter postage prepaid along with a handling charge of $3.00 to:

Instrumentation Products Division
Beckman Industrial Corporation
A subsidiary of Emerson Electric Company
630 Puente St.
Brea, CA 92621

In the event of replacement with a new or reconditioned model, the replacement unit will continue the warranty period of the original multimeter. The turnaround time for replacement units at the Service Center is typically only two (2) working days. Out of warranty repairs will be available at the Factory Service Center for a fee of $15.00.
ANY IMPLIED WARRANTIES ARISING OUT OF THE SALE OF A CIRCUITMATE MULTIMETER, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED IN DURATION TO THE ABOVE STATED 90-DAY PERIOD. BECKMAN INDUSTRIAL CORPORATION SHALL NOT BE LIABLE FOR LOSS OF USE OF THE MULTIMETER OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES, EXPENSES OR ECONOMIC LOSS OR FOR ANY CLAIM OR CLAIMS FOR SUCH DAMAGE, EXPENSES OR ECONOMIC LOSS.
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Beckman Industrial Corporation

Brea, CA

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