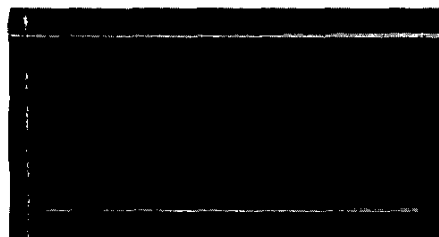


JE300
DIGITAL THERMOMETER COMPONENT LAYOUT

JE300 DIGITAL THERMOMETER KIT
DUAL SENSORS



GENERAL DESCRIPTION:

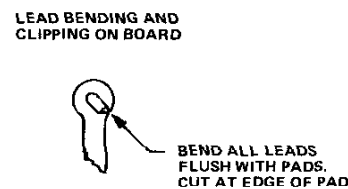
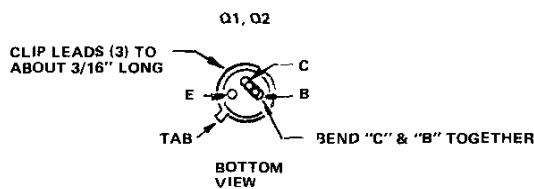
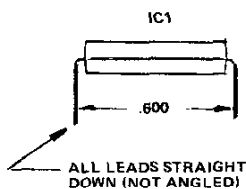
- DUAL SENSORS: SWITCHING CONTROL FOR INDOOR/OUTDOOR OR DUAL MONITORING APPLICATIONS
- CIRCUITRY: "INTERSIL" 40 PIN A/D CONVERTER CHIP
- CONTINUOUS READING OF 3 BRIGHT .80" HIGH "HP" DISPLAYS
- RANGE: -40°F TO 199°F, -40°C TO 100°C
- ACCURACY: ±1° NOMINAL (DEPENDING ON RANGE AND CALIBRATING CONDITIONS)
- SETTING FOR EITHER FAHRENHEIT OR CELSIUS DEGREES
- SENSORS CAN BE PLACED OVER 100 FT. FROM CASE
- CASE SIZE: 3-1/2"H x 6-5/8"W x 1-3/8"D

PARTS LIST:

ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY
IC1	A/D CONV CHIP, "INTERSIL" 7107CPL	1	R5,R7	RESISTOR, 47K	2
IC2	5V REGULATOR, 7805 OR EQ	1	R6	RESISTOR, 10K	1
VR1	VOLTAGE REF, "INTERSIL" 8069 CCG	1	R8	RESISTOR, 47 OHMS	1
DS1-DS3	LED DISPLAY, HP3400	3	R9,R10	RESISTOR, 100K	2
C1	CAPACITOR, ELEC. 470MF, 16V	1	R11	RESISTOR, 68K	1
C2	CAPACITOR, DISC. 100PF, 50V	1	S1	SWITCH, SLIDE, SPDT, MSL34A	1
C3	CAPACITOR, MYLAR, .1MF, 100V	1	T1	TRANSFORMER, WALL, AC250	1
C4,C7	CAPACITOR, DISC, .01MF, 100V	2		IC SOCKET, 40 PIN LP	1
C5,C6	CAPACITOR, MYLAR, .22MF, 100V	2		WIRE, KYNAR 30 AWG LT COLOR	20'
CR1-CR4	DIODE, IN4001 OR EQ	4		WIRE, KYNAR 30 AWG DK COLOR	20'
CR5	DIODE, ZENER IN4733 OR EQ	1		PRINTED WIRING BOARD NO. JE300	1
Q1,Q2	TRANSISTOR, 2N2222 (Metal Can) OR EQ	2		CASE	1
R1,R2	RESISTOR, VARIABLE, TR11, 20K	2		DISPLAY WINDOW	1
R3	RESISTOR, VARIABLE, TR11, 100 OHMS	1		BACK COVER	1
R4	RESISTOR, 6.8K	1		DOUBLE SIDED FOAM	1
				KIT INSTRUCTIONS	1

ASSEMBLY PREPARATION AND PROCEDURES:

1. **IMPORTANT:** IDENTIFY ALL PARTS ON PARTS LIST BEFORE PROCEEDING.
2. **SUGGESTION:** SIMULATE PRINTED WIRING BOARD ASSEMBLY BY PLACING COMPONENTS IN THEIR ACTUAL PLACE ON THE PICTURE ASSEMBLY. TRANSFER COMPONENTS TO THE BOARD DURING ASSEMBLY.
3. **TOOLS REQUIRED:**
 - SMALL SOLDERING IRON OR GUN (27W TO 35W).
 - RESIN CORE SOLDER .03 DIA. (DO NOT USE ACID CORE TYPE).
 - SMALL LONG NOSE PLIER
 - SMALL WIRE CUTTER
 - SMALL SPONGE FOR CLEANING SOLDER TIP
 - SMALL BOTTLE OF CONTACT CEMENT ("PLIOBOND" OR EQ)
 - SMALL AMOUNT OF EPOXY CEMENT OR SILICONE RUBBER SEALANT.
4. **COMPONENT WIRE BENDING AND LEAD CLIPPING**



BEND ALL OTHER COMPONENT LEADS AS REQUIRED.

ASSEMBLY INSTRUCTIONS:

1. PRINTED WIRING BOARD ASSEMBLY. SEE ASSEMBLY PICTURE.

- 1.1 START BOARD ASSEMBLY BY PLACING THE BOARD IN THE POSITION SHOWN ON THE ASSEMBLY PICTURE. THE ETCHED CIRCUIT WILL BE ON THE BACK SIDE.
- 1.2 INSERT SOCKET FLUSH WITH BOARD. BEND 2 LEADS TO KEEP SOCKET FROM FALLING. DO NOT SOLDER.
- 1.3 INSERT DIODES CR1 THRU CR5 AS SHOWN. THE POLARITY BANDS MUST BE FACING THE SAME DIRECTION AS SHOWN FOR EACH OF THE DIODES. NOTE THAT CR5 IS DIFFERENT FROM THE OTHER 4 DIODES. BEND AND CLIP COMPONENT LEADS. DO NOT SOLDER.
- 1.4 INSERT RESISTORS R4 THRU R11 AS SHOWN. TAKE CARE THAT THE COLORS ARE CORRECT. BEND AND CLIP LEADS. DO NOT SOLDER.
- 1.5 INSERT CAPACITORS C1 THRU C7 AS SHOWN. NOTE (-) POLARITY OF C1 IS ON THE BOTTOM. DO NOT MIX UP C2 WITH C4 OR C7 LOCATION. C6 IS FLAT AGAINST THE BOARD WITH C5 ON TOP. TOTAL HEIGHT OF C5 AND C6 MUST NOT EXCEED 5/8". BEND AND CLIP LEADS. DO NOT SOLDER.
- 1.6 INSERT COMPONENT VR1 AS SHOWN. KEEP COMPONENT ABOUT 3/16" ABOVE THE BOARD. NOTE TAB LOCATION. BEND AND CLIP LEADS. DO NOT SOLDER.
- 1.7 INSERT REGULATOR IC2. BEND LEADS SO THAT THE METAL TAB WILL BE AGAINST THE BOARD (PLASTIC CASE FACING UP). TOP OF THE TAB MUST NOT OVERLAP BOARD. BEND AND CLIP LEADS. DO NOT SOLDER.
- 1.8 INSERT DISPLAYS DS1 THRU DS3 FLUSH WITH BOARD. PLACE ONE SIDE OF THE LEADS **HALF WAY** INTO THE HOLES AND CAREFULLY WORK IN THE OTHER SIDE. TO PREVENT THE DISPLAY FROM FALLING OFF THE BOARD, PUT A SLIGHT BEND ON 2 LEADS OF EACH DISPLAY. DO NOT BEND LEADS. CLIP LEADS ABOUT 1/16" ABOVE THE BOARD. DO NOT SOLDER.
- 1.9 INSERT RESISTORS R1 THRU R3 AS SHOWN. NOTE THAT THE VALUE OF R3 IS NOT THE SAME AS R1 AND R2. HEIGHT OF THE RESISTORS SHOULD NOT EXCEED 5/8" FROM THE BOARD. BEND LEADS TO KEEP FROM FALLING. DO NOT SOLDER.
- 1.10 DOUBLE CHECK CORRECT COMPONENT INSERTION BY PLACING A CHECK MARK (✓) IN EACH OF THE CIRCLES PROVIDED ON THE ASSEMBLY DRAWING.
- 1.11 TURN COMPONENT BOARD ASSEMBLY OVER AND SOLDER ALL LEADS. CHECK CAREFULLY FOR SOLDER BRIDGES ACROSS PADS AND TRACES. REMOVE ALL SOLDER BRIDGES - IF ANY. SEE SOLDERING TIPS BEFORE SOLDERING.
- 1.12 INSERT SWITCH S1 FROM THE BACK SIDE OF THE BOARD AND SOLDER. PLACE (✓) IN CIRCLE.
- 1.13 TWIST A DARK AND A LIGHT WIRE TOGETHER. TWISTING CAN BE DONE WITH EITHER AN ELECTRICAL DRILL OR HAND TURNED WITH A ROD. CUT WIRE TO DESIRED LENGTH FOR EACH SENSOR. STRIP INSULATION ABOUT 3/16" FROM THE ENDS. BE CAREFUL NOT TO CUT INTO THE WIRES AS A PARTIALLY CUT WIRE WILL WEAKEN AND BREAK.
- 1.14 SOLDER THE **DARK** COLOR WIRE TO THE "B" AND "C" LEAD AND THE **LIGHT** COLOR WIRE TO THE "E" LEAD ON SENSOR Q1. REPEAT FOR SENSOR Q2.
- 1.15 SOLDER Q1 (SENSOR NO. 1) WIRES TO BOARD ASSEMBLY AS SHOWN - DARK COLOR WIRE TO PAD "A" AND LIGHT COLOR WIRE TO PAD "B". REPEAT FOR Q2 (SENSOR NO. 2) WITH DARK COLOR WIRE TO PAD "C" AND LIGHT COLOR WIRE TO PAD "D". PLACE (✓) IN CIRCLE.
- 1.16 INSERT IC1 CHIP INTO THE SOCKET. MAKE SURE THE NOTCH MARKING OR "DOT" IDENTIFYING PIN NO. 1 IS ON THE TOP. SEE FIG. 1.

- ① IC LEADS RESTING IN SOCKET
- ② APPLY EVEN PRESSURE UNTIL LEADS ON OPPOSITE SIDE PASS SOCKET FINGERS.
- ③ LET IC DOWN INTO SOCKET. (IT WILL SPRING BACK TO THE OTHER SIDE)
- 4 PUSH IC INTO SOCKET. FORCING MEANS PIN MISALIGNMENT.

PLACE (✓) IN CIRCLE.

- 1.17 STRIP TRANSFORMER T1 LEADS 1/4" BACK. PASS THROUGH HOLE ON BACK COVER. PRE-TIN LEADS AND SOLDER TO PADS MARKED "12 VAC" ON PRINTED WIRING BOARD. PLACE (✓) IN CIRCLE.
- 1.18 TAPE THE SENSOR AND TRANSFORMER LEADS TO THE BACK OF BOARD OR INSIDE THE BACK COVER FOR STRAIN RELIEF.

SOLDERING TIPS:

1. FEED SOLDER TO THE CRACK BETWEEN THE PAD AND THE IRON TIP NEXT TO THE LEAD. DO NOT FEED SOLDER TO THE TIP ONLY.
2. LEAVING THE IRON TIP TOO LONG ON A PAD WILL LIFT THE PAD. ALLOW APPROXIMATELY 2 SECONDS PER SOLDER JOINT.
3. KEEP IRON TIP CLEAN BY WIPING THE TIP ACROSS A WATER-DAMPENED SPONGE.

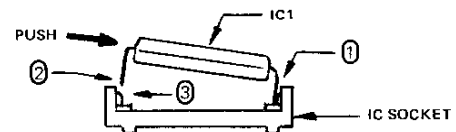
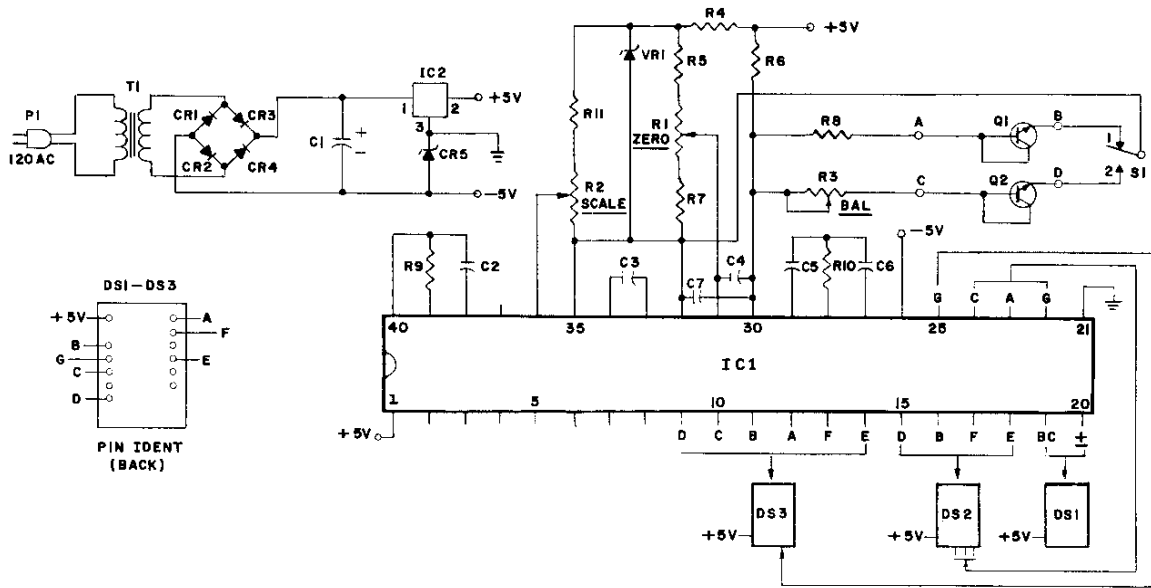
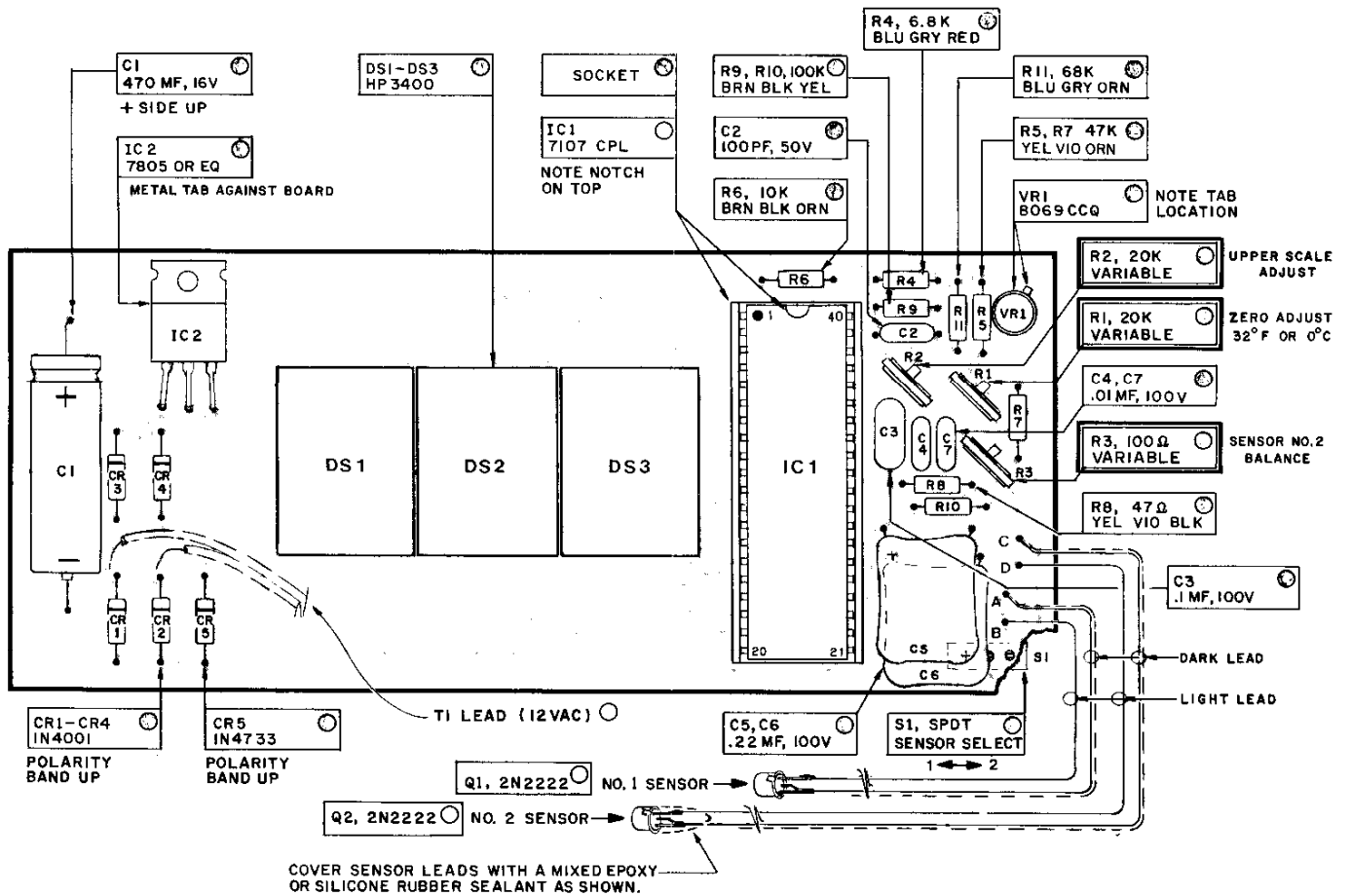


FIG. 1

JE300 DIGITAL THERMOMETER SCHEMATIC DIAGRAM



PRINTED WIRING BOARD ASSEMBLY



CALIBRATIONS

1. GENERAL RULES AND PROCEDURES
 - 1.1 DO NOT TOUCH ANY METAL PART OF THE SCREWDRIVER.
 - 1.2 DO NOT TOUCH ANY COMPONENT OTHER THAN THE COMPONENT BEING ADJUSTED.
 - 1.3 DO NOT TOUCH ANY PRINTED BOARD TRACES.
 - 1.4 TURN R1, R2 AND R3 TO THEIR CENTRAL POSITION (TAB ON TOP) TO START CALIBRATION.
 - 1.5 ALLOW BOILING WATER 2°F DROP FOR EVERY 1000 FT ABOVE SEA LEVEL. EXAMPLE: WATER BOILS AT 200°F INSTEAD OF 212°F AT 6000 FT ABOVE SEA LEVEL.
 - 1.6 USE A THERMOS CONTAINER FILLED WITH ICE AND WATER AS YOUR FREEZING REFERENCE POINT.
 - 1.7 RECALIBRATE WHEN LENGTH OF SENSOR WIRES IS CHANGED.
2. CENTIGRADE CALIBRATION: (CELSIUS)
 - 2.1 SLIDE SWITCH TO SENSOR NO. 1 POSITION (TO LEFT AS SHOWN).
 - 2.2 PLACE SENSOR NO. 1 (Q1) IN ICE WATER AND ADJUST R1 TO "00" (READING ON DISPLAY)
 - 2.3 PLACE SENSOR NO. 1 IN BOILING WATER AND ADJUST R2 FOR "100" READING.
 - 2.4 REPEAT LAST 2 STEPS (5 TIMES OR MORE) UNTIL "00" AND "100" CAN BE REPEATED WITHOUT AN ADJUSTMENT.
 - 2.5 SLIDE SWITCH TO SENSOR NO. 2 POSITION AND PLACE SENSOR NO. 2 (Q2) CLOSE TO, BUT NOT TOUCHING, SENSOR NO. 1. ADJUST R3 FOR SENSOR NO. 2 TO READ THE SAME TEMPERATURE AS SHOWN ON SENSOR NO. 1.
3. FAHRENHEIT CALIBRATION (F°)

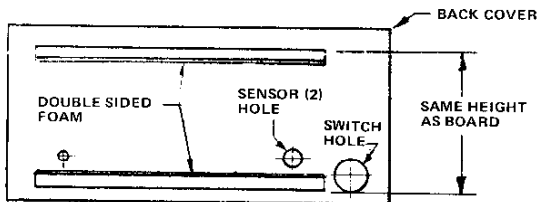
NOTE: SINCE THE RANGE IN FAHRENHEIT IS LIMITED TO 199°F, A GOOD CHEMICAL THERMOMETER WITHIN THAT RANGE IS REQUIRED OR HAVE A THERMOS OF HOT WATER SET AT 92°C WHICH NOW CAN BE CONVERTED TO CALIBRATE AT 198°F. KEEP THERMOS COVERED TO MAINTAIN TEMPERATURE.

 - 3.1 USE SAME PROCEDURE AS ABOVE EXCEPT ADJUST R1 FOR SENSOR NO. 1 TO "32" IN ICE WATER.
 - 3.2 PLACE SENSOR NO. 1 INTO THE HOT THERMOS AND ADJUST R2 FOR "198" READING.
 - 3.3 REPEAT LAST 2 STEPS (5 TIMES OR MORE) UNTIL "32" AND "198" CAN BE REPEATED WITHOUT AN ADJUSTMENT.
 - 3.4 SLIDE SWITCH TO SENSOR NO. 2 POSITION AND PLACE SENSOR NO. 2 CLOSE TO, BUT NOT TOUCHING, SENSOR NO. 1. ADJUST R3 FOR SENSOR NO. 2 TO READ THE SAME TEMPERATURE AS SHOWN ON SENSOR NO. 1.

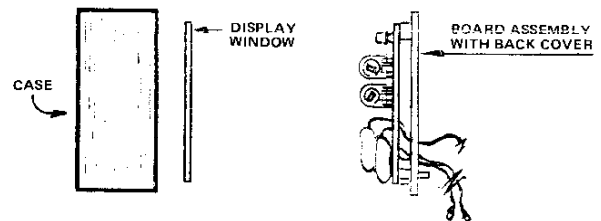
CASE AND BACK COVER ASSEMBLY

1. SET UP SIDES ON A FLAT SURFACE AND FASTEN WITH CEMENT. TAKE CARE IN BRINGING THE CORNERS TOGETHER.
2. APPLY A SMALL AMOUNT OF CEMENT TO THE 4 CORNERS OF THE WINDOW AND GLUE TO THE INSIDE OF THE CASE. (TAPE MAY ALSO BE USED).
3. APPLY A THIN COAT OF CEMENT TO THE BACK COVER AND CASE (ABOUT 6 PLACES). PRESS TOGETHER TO FASTEN. A COUPLE OF SMALL HOLES CAN BE DRILLED ON THE BACK COVER FOR ALTERNATIVE SCREW FASTENING.

BACK COVER FOAM MOUNTING



BOARD AND CASE ASSEMBLY



TROUBLE SHOOTING TIPS:

1. DOESN'T WORK AT ALL:
 - 1.1 CHECK AC ADAPTER PRONGS.
 - 1.2 CHECK FOR TRANSFORMER LEAD SOLDERING TO BOARD.
2. VOLTAGE TEST:
 - 2.1 SHOULD HAVE 14VDC ACROSS C1. CHECK DIODES FOR IMPROPER INSERTION.
 - 2.2 +5V TO GND AND -5V TO GND AS MARKED ON BOARD. CHECK IC2 AND CR5 FOR IMPROPER INSERTION.
 - 2.3 SHOULD HAVE 1.2VDC ACROSS VR1. VR1 INSERTED BACKWARDS WILL READ .75VDC.
3. DS1 DISPLAY READS "1" ONLY:
 - 3.1 SHORTED TERMINALS ON SENSORS Q1 AND/OR Q2.
4. DS1 DISPLAY READS "-1" ONLY:
 - 4.1 OPEN CONNECTION ON SENSORS Q1 AND/OR Q2.
 - 4.2 VR1 BACKWARDS
5. ERRATIC DISPLAY READING:
 - 5.1 STRONG SIGNAL FROM NEARBY TRANSMITTER STATION. USE SHIELD CABLES ON SENSORS WITH CENTER LEADS TO "A" AND "C" PADS ON BOARD FOR Q1 AND Q2 RESPECTIVELY.
6. CERTAIN SEGMENTS NOT ON:
 - 6.1 UNSOLDER PADS AROUND DISPLAY AREA.
7. GENERAL AND INTERMITTENT PROBLEMS:
 - 7.1 IMPROPER COMPONENT INSERTION OR UNSOLDER PADS.
 - 7.2 SOLDER BRIDGES, REMOVE CAREFULLY.

IMPORTANT: IF REPAIRS ARE REQUIRED, FORWARD KIT ALONG WITH EXPLANATION TO JAMECO ELECTRONICS REPAIR CENTER, 1355 SHOREWAY ROAD, BELMONT, CALIFORNIA 94002.
THIS KIT WILL NOT BE REPAIRED BY YOUR JIM-PAK DEALER.

WARRANTY:

A \$5.00 minimum service fee will be charged on each kit returned for repairs. We will replace, free of charge, all components which are defective due to manufacturer defects within 90 days from date of purchase. Customer will be subject to charges for misuse of components or damage to the printed wiring board during assembly.