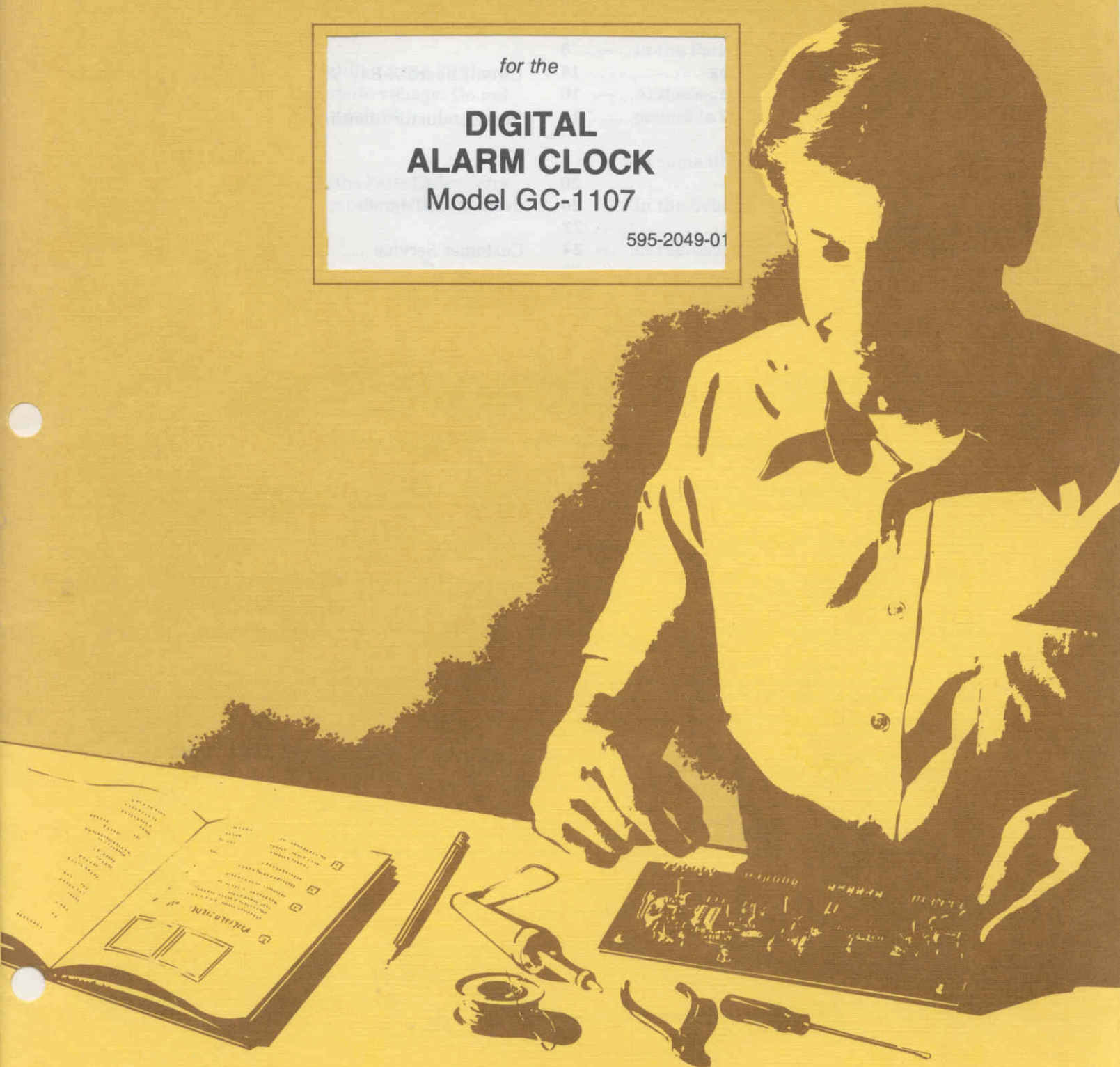


# HEATHKIT<sup>®</sup> MANUAL

for the

## DIGITAL ALARM CLOCK Model GC-1107

595-2049-01



HEATH COMPANY • BENTON HARBOR, MICHIGAN

# HEATH COMPANY PHONE DIRECTORY

The following telephone numbers are direct lines to the departments listed:

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Credit ..... (616) 982-3561  
Replacement Parts ..... (616) 982-3571

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**PARTS** — Replacements for factory defective parts will be supplied free for 90 days from date of purchase. Replacement parts are warranted for the remaining portion of the original warranty period. You can obtain warranty parts direct from Heath Company by writing or telephoning us at (616) 982-3571. And we will pay shipping charges to get those parts to you . . . anywhere in the world.

**SERVICE LABOR** — For a period of 90 days from the date of purchase, any malfunction caused by defective parts or error in design will be corrected at no charge to you. You must deliver the unit at your expense to the Heath factory, any Heathkit Electronic Center (units of Veritechnology Electronics Corporation), or any of our authorized overseas distributors.

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**NOT COVERED** — The correction of assembly errors, adjustments, calibration, and damage due to misuse, abuse, or negligence are not covered by the warranty. Use of corrosive solder and/or the unauthorized modification of the product or of any furnished component, will void this warranty in its entirety. This warranty does not include reimbursement for inconvenience, loss of use, customer assembly, set-up time, or unauthorized service.

This warranty covers only Heath products and is not extended to other equipment or components that a customer uses in conjunction with our products.

SUCH REPAIR AND REPLACEMENT SHALL BE THE SOLE REMEDY OF THE CUSTOMER AND THERE SHALL BE NO LIABILITY ON THE PART OF HEATH FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO ANY LOSS OF BUSINESS OR PROFITS, WHETHER OR NOT FORSEEABLE.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

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**ASSEMBLY** — Before seeking warranty service, you should complete the assembly by carefully following the manual instructions. Heathkit service agencies cannot complete assembly and adjustments that are customer's responsibility.

**ACCESSORY EQUIPMENT** — Performance malfunctions involving other non-Heath accessory equipment, (antennas, audio components, computer peripherals and software, etc.) are not covered by this warranty and are the owner's responsibility.

**SHIPPING UNITS** — Follow the packing instructions published in the assembly manuals. Damage due to inadequate packing cannot be repaired under warranty.

If you are not satisfied with our service (warranty or otherwise) or our products, write directly to our Director of Customer Service, Heath Company, Benton Harbor MI 49022. He will make certain your problems receive immediate, personal attention.

# Heathkit® Manual

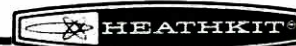
*for the*

## **DIGITAL ALARM CLOCK Model GC-1107**

595-2049-01

**HEATH COMPANY**  
BENTON HARBOR, MICHIGAN 49022

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## INTRODUCTION

The Heathkit Model GC-1107 Digital Alarm Clock has many attractive features, including a wiring option that lets it display either 12-hour or 24-hour time, an AM-PM alarm with a snooze alarm feature, a 4-digit easy-to-read display, a 50 or 60 Hz wiring option, and a 120-volt or 240-volt power option. The heart of the Clock is an MOS/LSI\* integrated circuit that performs all the logic functions of keeping time.

A simple wiring option lets your Clock display either 12-hour or 24-hour time. The clock "knows" the difference between AM and PM and will sound the alarm for the one time, either AM or PM, in 24 hours that you desire. The snooze alarm waits approximately nine minutes each time it is reset until the alarm sounds again.

The blue fluorescent readout tubes clearly display the time on a sloped surface, and the 4-digit display will continue to operate if there is any momentary interruption of AC power. This Clock can be wired to operate from either a 50 Hz or 60 Hz power line, 120 or 240-volts AC.

Attractive, modern styling; small size; and solid-state dependability make this clock ideally suited for your office, your home, or almost anywhere.

*Refer to the "Kit Builders Guide" for complete information or unpacking, parts identification, tools, wiring, soldering, and step-by-step assembly procedures.*

\*MOS/LSI-Metal Oxide Semiconductor/Large Scale Integration

## PARTS LIST

Check each part against the following list. The key numbers correspond to the numbers in the Parts Pictorial. Any part that is packaged in an individual envelope with the part number on it should be placed back in the envelope after you identify it until it is called for in a step.

**CAUTION:** The integrated circuits (#443-703 and #443-848) can be damaged by static voltage. Do not handle them until you are told to do so.

To order a replacement part, use the Parts Order Form furnished with this kit. For prices refer to the separate "Heath Parts Price List."

Each circuit part in this kit has its own component number (R2, C4, etc.). Use these numbers when you want to identify the same part in the various sections of the Manual. These numbers, which are especially useful if a part has to be replaced, appear:

- In the Parts List,
- At the beginning of each step where a component is installed,
- In some illustrations,
- In the Schematic,
- In the section at the rear of the Manual.

KEY HEATH No. Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
---------------------------	------	-------------	----------------------

### RESISTORS

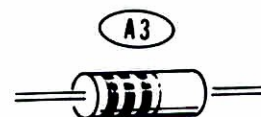
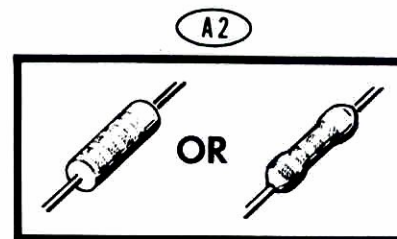
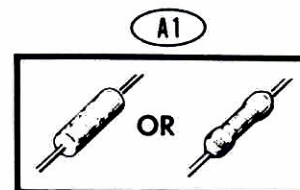
NOTE: The following resistors are 5% tolerance (gold fourth band) unless otherwise noted.

#### 1/4-Watt

A1	6-472-12	1	4700 $\Omega$ (yellow-violet-red)	R11
A1	6-682-12	2	6800 $\Omega$ (blue-gray-red)	R6, R7
A1	6-103-12	1	10 k $\Omega$ (brown-black-orange)	R10
A1	6-273-12	1	27 k $\Omega$ (red-violet-orange)	R9
A1	6-473-12	1	47 k $\Omega$ (yellow-violet-orange)	R13
A1	6-683-12	1	68 k $\Omega$ (blue-gray-orange)	R12
A1	6-104-12	1	100 k $\Omega$ (brown-black-yellow)	R4
A1	1-157-12	1	10 M $\Omega$ (brown-black-blue)	R3
A1	1-144-12	1	15 M $\Omega$ (brown-green-blue)	R2

#### Other Resistors

A2	6-151	2	150 $\Omega$ , 1/2-watt (brown-green-brown)	R1, R8
A3	1-19-1	1	220 $\Omega$ , 1-watt (red-red-brown)	R5



KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
---------	----------------	------	-------------	-------------------

**CAPACITORS**

B1	21-143	1	.05 $\mu$ F ceramic	C4
B2	25-818	2	500 $\mu$ F electrolytic	C1, C2
B3	27-47	1	.1 $\mu$ F Mylar*	C3

**DIODES**

C1	56-56	2	1N4149 diode	D4, D5 (optional)
C1	56-630	1	1N4748A zener	ZD2
C1	57-65	2	1N4002 diode	D1, D3

**TRANSISTOR-INTEGRATED CIRCUITS (IC's)**

NOTE: Transistors and integrated circuits are marked for identification in one of the following four ways:

1. Part number.
2. Type number. (On integrated circuits this refers only to the numbers; the letters may vary).
3. Part number and type number.
4. Part number with a type number other than the one listed.

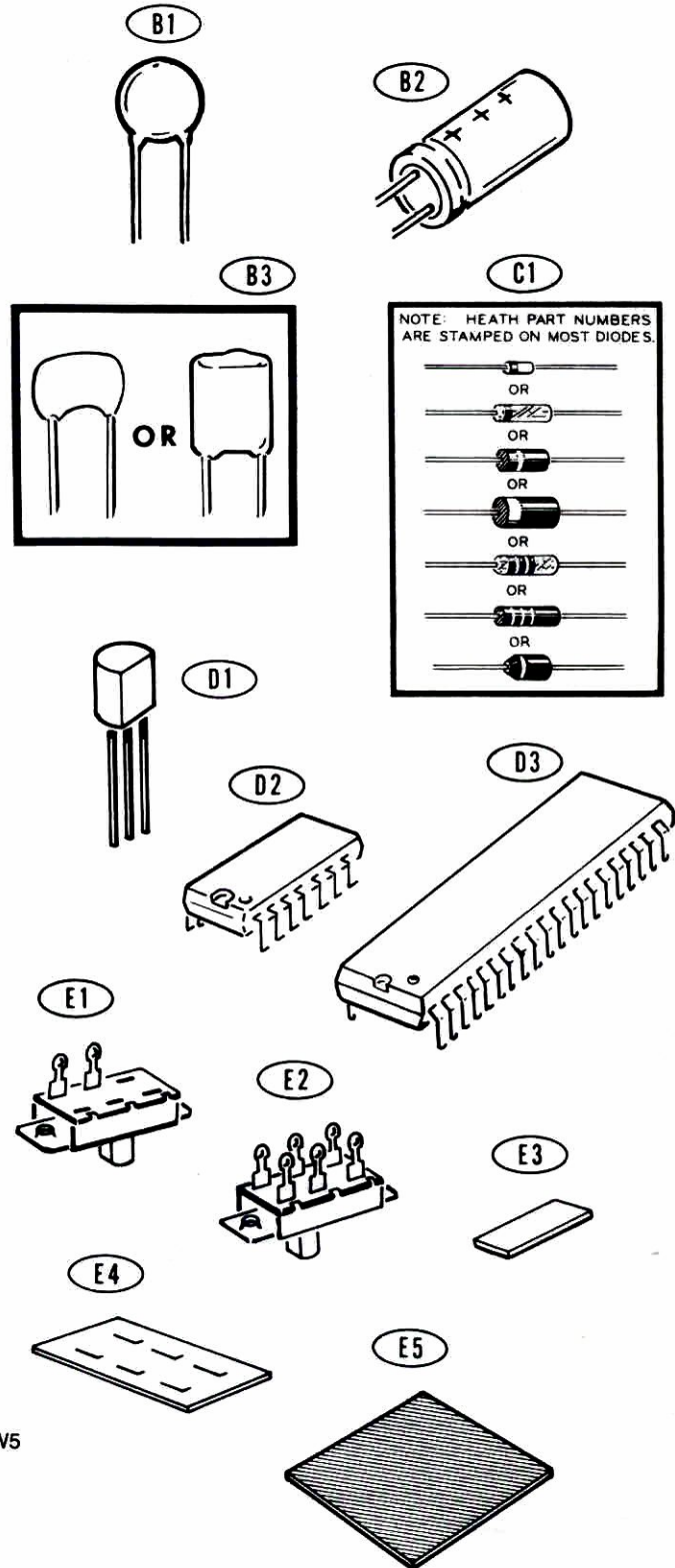
D1	417-801	1	MPSA20 transistor	Q2
D1	417-881	1	MPSA13 transistor	Q1

CAUTION: The integrated circuits (#443-703 and #443-848) can be damaged by static voltage. Do not handle them until you are told to do so.

D2	443-703	1	CD4001 IC	IC2
D3	443-848	1	Clock IC	IC1

**SWITCHES-INSULATORS**

E1	60-6	3	SPST switch with spring return	SW2, SW4, SW5
E2	60-2	2	DPDT switch	SW1, SW3
E3	75-138	4	Foot	
E4	75-52	1	Switch insulator	
E5	75-93	1	1" x 1" insulator paper	



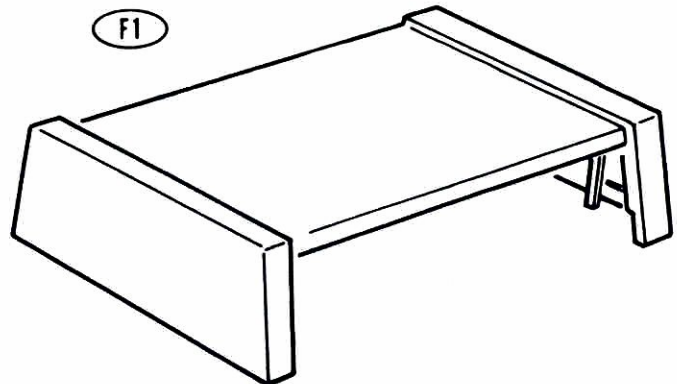
\*Registered Trademark, DuPont Corp.

KEY HEATH QTY. DESCRIPTION  
 No. Part No. \_\_\_\_\_

CIRCUIT  
 Comp. No. \_\_\_\_\_

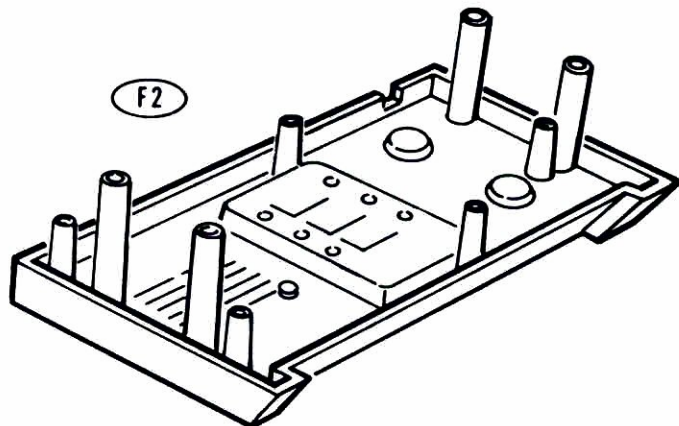
**PLASTIC PARTS**

F1	92-77	1	Cabinet top
F2	92-678	1	Cabinet bottom
F3	266-857	1	LDR shield
F4	446-690	1	Readout window



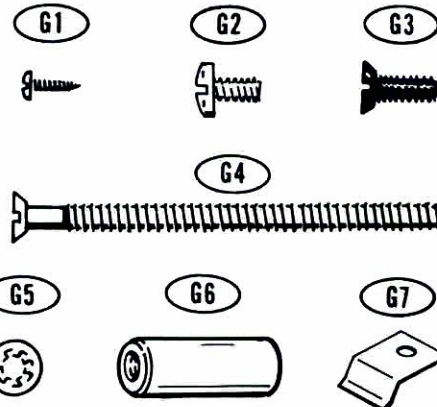
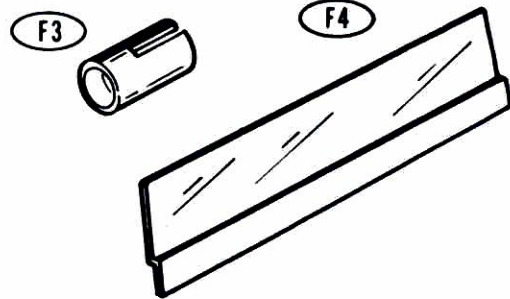
**LINE CORD-WIRE-SLEEVING**

89-49	1	Line cord
340-2	16"	Bare wire
344-90	7"	Black wire
344-92	26"	Red wire
344-93	10"	Orange wire
344-94	10"	Yellow wire
344-95	10"	Green wire
344-96	6"	Blue wire
344-99	5"	White wire
346-67	1/2"	Sleeving



**HARDWARE**

G1	250-420	6	#2 × 1/4" self-tapping screw
G2	250-235	1	6-32 × 1/4" screw
G3	250-276	10	6-32 × 3/8" black flat head screw
G4	250-1156	4	#6 × 2-1/4" flat head screw
G5	254-1	1	#6 lockwasher
G6	255-83	1	11/16" spacer
G7	258-167	2	Spring clip



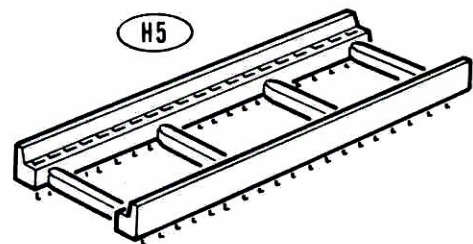
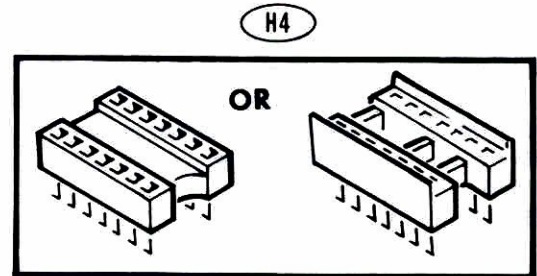
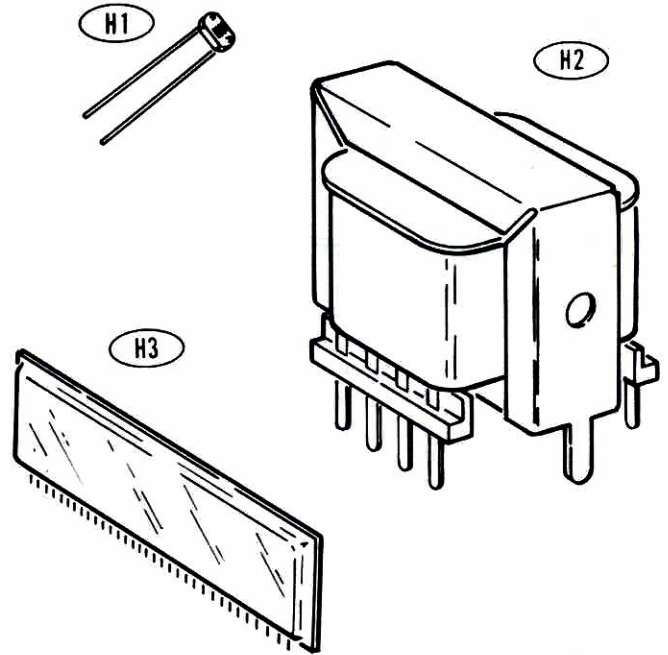
KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
---------	----------------	------	-------------	-------------------

**MISCELLANEOUS**

H1	9-67	1	LDR (light dependent resistor)	LDR1
H2	54-949	1	Power transformer	T1
	85-2024-2	1	Printed circuit board	
	401-163	1	Speaker	
H3	411-829	1	4-digit readout tube	
H4	434-298	1	14-pin IC socket	
H5	434-253	1	40-pin IC socket	
			Solder	

**PRINTED MATERIAL**

390-341	1	"Heathkit" label
390-926	1	"Caution" label
390-995	1	Wood-grain panel (2-piece)
391-34	1	Blue and white label
597-260	1	Parts Order Form
597-308	1	Kit Builders Guide
	1	Assembly Manual (see Page 1 for part number).





## STEP-BY-STEP ASSEMBLY

### ASSEMBLY NOTES

When you are instructed to mount parts on the printed circuit board, always be sure you have the board positioned as shown in the Pictorial and that each part is the correct one for the step indicated. No special soldering notes will be given for mounting circuit board components; solder each part to the circuit board foil as you install the part on the board. Be especially careful when you solder the integrated circuit sockets and the readout leads to the foil that

you do not create a "solder bridge" to other nearby foils; this would probably cause the Clock not to operate.

When you install parts on the cabinet, do not overtighten the mounting hardware. Thus, you will avoid stripping the mounting stud holes and cracking the plastic parts. Study each drawing carefully and read each step completely before you perform an operation. Then, be sure each part is mounted exactly in the manner shown before you tighten the mounting hardware.

### CIRCUIT BOARD ASSEMBLY

#### START

Position the circuit board as shown. Then proceed with the following steps. Solder each lead or pin to the foil as you mount each component on the board and cut off the excess lead lengths.

(✓) R8: 150 Ω, 1/2-watt (brown-green-brown).

(✓) R5: 220 Ω, 1-watt (red-red-brown).

(✓) R6: 6800 Ω (blue-gray-red).

(✓) R7: 6800 Ω (blue-gray-red).

( ) R9: 27 kΩ (red-violet-orange).

(✓) R10: 10 kΩ (brown-black-orange).

NOTE: When you install an IC socket, be sure that all its pins are straight and through the board before you solder them.

(✓) 14-pin IC socket at IC2.

(✓) 40-pin IC socket at IC1.

(✓) R4: 100 kΩ (brown-black-yellow).

( ) R11: 4700 Ω (yellow-violet-red).

(✓) R3: 10 MΩ (brown-black-blue).

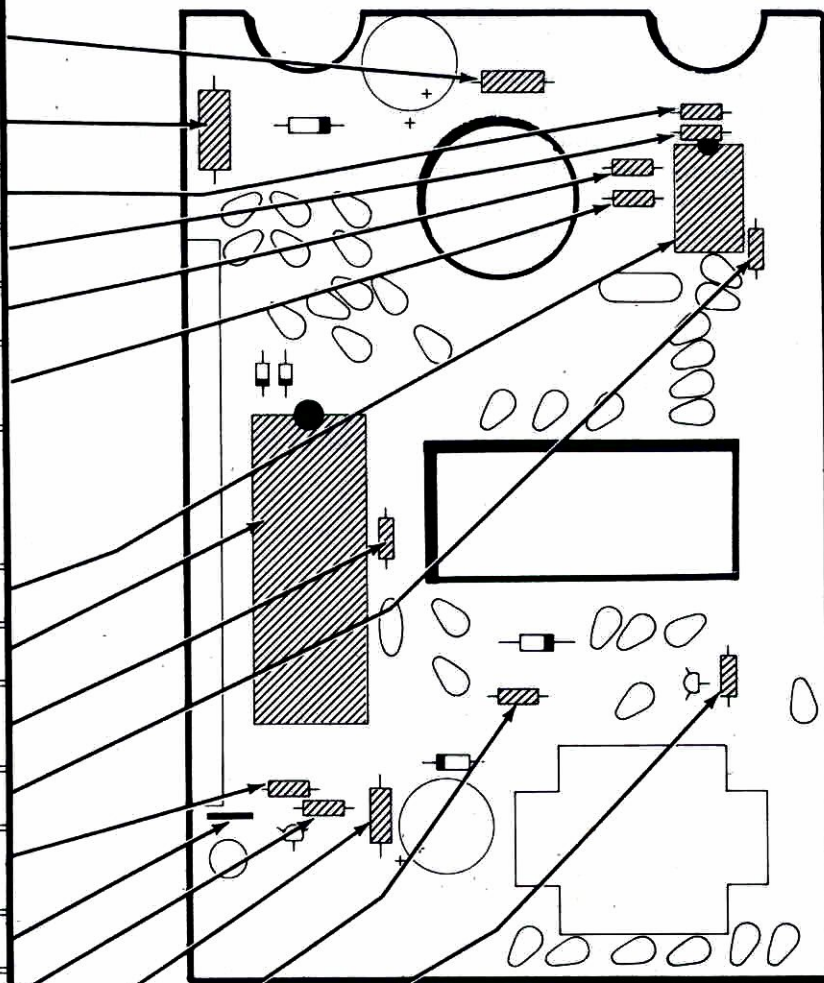
(✓) 3/4" bare wire.

(✓) R2: 15 MΩ (brown-green-blue).

( ) R1: 150 Ω, 1/2-watt (brown-green-brown).

( ) R12: 68 kΩ (blue-gray-orange).

( ) R13: 47 kΩ (yellow-violet-orange).



PICTORIAL 1-1

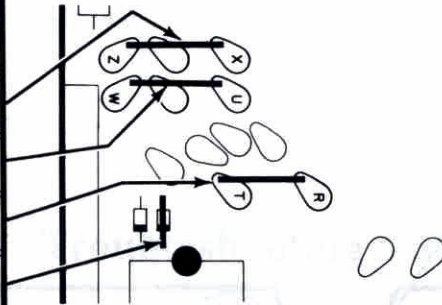


**START** ↘

**IMPORTANT:** Perform the next four steps **only** if you desire a 12-hour Clock display; that is, 01:00 to 12:00 and repeat.

- 1" bare wire at X-Z.
- 1" bare wire at U-W.
- 1" bare wire at R-T.
- 3/4" bare wire at "D4."

**12-HOUR DISPLAY**



**CONTINUE** ↘

**NOTE:** When the 12-hour option is used, nothing will be installed at "D5," nor at holes S, V, Y, AD, AE, and AJ.

PICTORIAL 1-2

**START** ↘

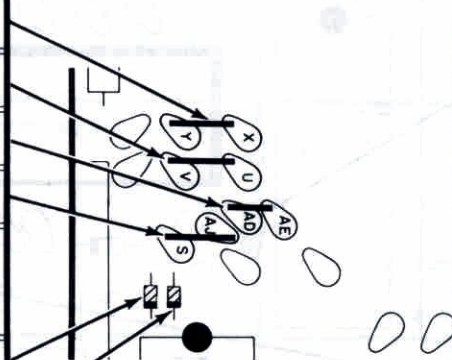
**IMPORTANT:** Perform the next six steps **only** if you desire a 24-hour display; that is, from 01:00 to 12:00, and then to 13:00, 14:00, etc . . .

- 3/4" bare wire at X-Y.
- 3/4" bare wire at U-V.
- 3/4" bare wire at AE-AD.
- 3/4" bare wire at AJ-S.

**NOTE:** Refer to right column Detail 1-3A as you install diodes in the following steps.

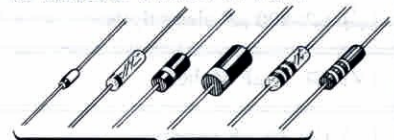
- D5: 1N4149 diode (#56-56).
- D4: 1N4149 diode (#56-56).

**24-HOUR DISPLAY**



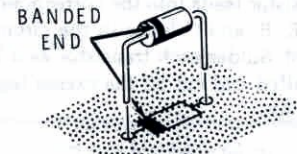
**CONTINUE** ↘

**IMPORTANT: THE BANDED END OF DIODES CAN BE MARKED IN A NUMBER OF WAYS.**



BANDED END

**NOTE:** When you install a diode, always match the banded end of the diode with the band mark on the circuit board.



Detail 1-3A

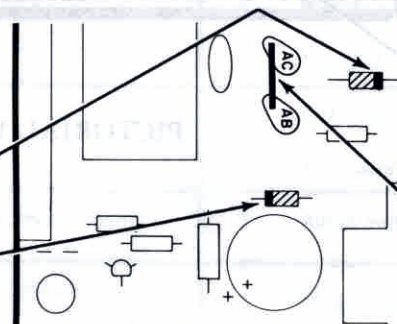
**NOTE:** Circuit board holes R, T, W, and Z will not be used.

PICTORIAL 1-3

**START** ↘

Refer to Detail 1-3A (above) as you install diodes in the following steps.

- ZD2: 1N4748A zener diode (#56-630).
- D1: 1N4002 diode (#57-65).



**CONTINUE** ↘

**IMPORTANT:** Perform the following step **only** if your utility power is 50 Hz AC. Disregard this step if your power is 60 Hz AC.

- 1" bare wire at AB-AC.

PICTORIAL 1-4

**START**

(✓) D3: 1N4002 diode (#57-65). Be sure to position the banded end as shown.

**NOTE:** When you install a vertical electrolytic capacitor, be sure you match the positive (+) mark on the capacitor with the positive (+) mark on the circuit board.

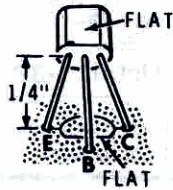


(✓) C2: 500  $\mu$ F electrolytic.

(✓) C3: .1  $\mu$ F Mylar.

( ) C4: .05  $\mu$ F ceramic.

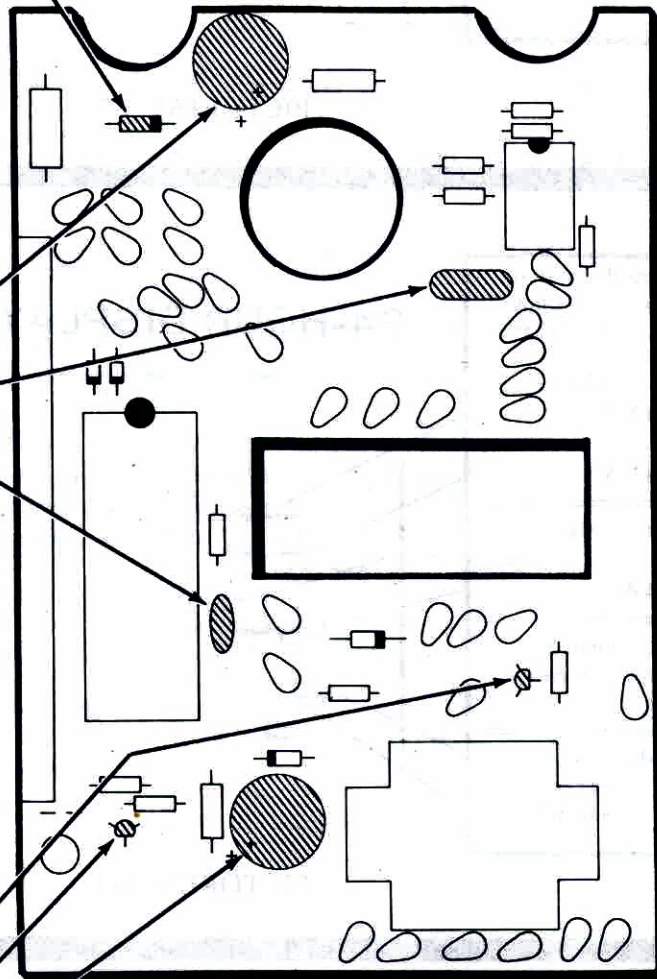
**NOTE:** In each of the following steps, where a transistor is installed, line up the flat on the transistor with the flat on the circuit board and insert the transistor leads into the corresponding E, B, and C holes in the circuit board. Solder each transistor as it is installed and cut off the excess lead lengths.



( ) Q2: MPSA20 (#417-801).

( ) Q1: MPSA13 (#417-881).

( ) C1: 500  $\mu$ F electrolytic. Be sure to position the positive marks correctly.

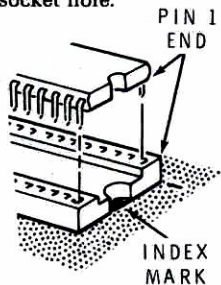


**PICTORIAL 1-5**

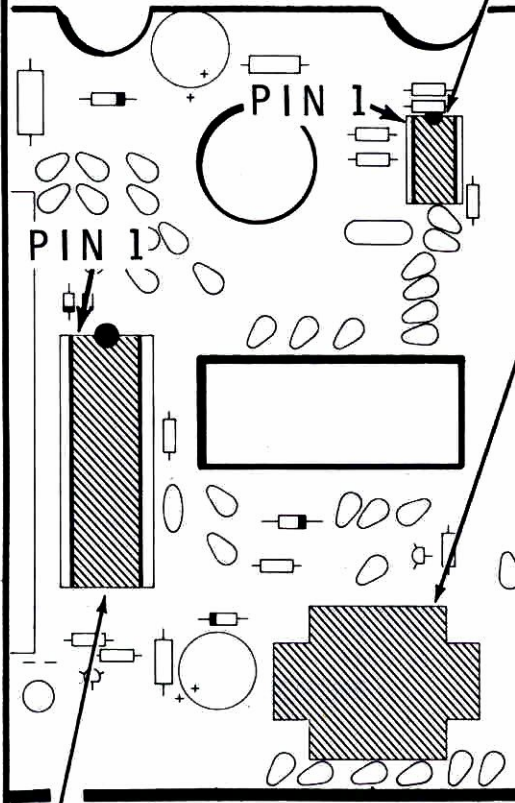
**START** ▾

**NOTE:** The integrated circuits that you will install in the next two steps are rugged and reliable components. However, normal static electricity discharged from your body, through an integrated circuit pin to an object, can damage the integrated circuits. Read the instructions first. Then carefully perform each step without interruption.

1. Remove the IC from its package, with both hands.
2. Hold the IC in one hand, remove the conductive foam, and straighten any bent pins with the other hand.
3. Continue holding the IC, being careful not to touch it to anything, while you pick up and hold the circuit board in your other hand.
4. Align the pin 1 end of the IC with socket pin 1. See Detail 1-6A. Carefully start the IC pins into the sockets; then push the IC down into the sockets. Once the IC's are inserted into the sockets they are protected against static electricity.
5. Be sure each IC is fully seated in its socket. Be sure no pins have folded flat against the underside of the IC. Be sure each pin is in the proper socket hole.



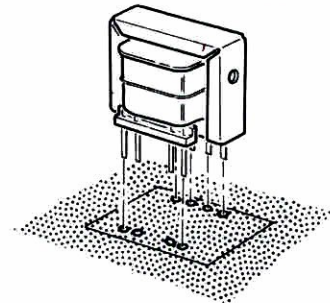
(✓) IC1: Clock integrated circuit (#443-848).



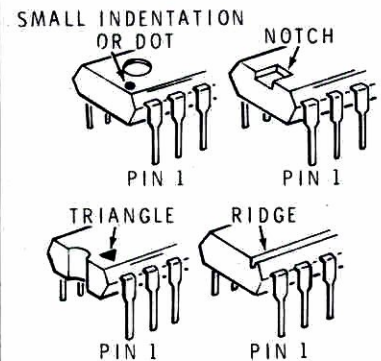
**PICTORIAL 1-6**

**CONTINUE** ▾

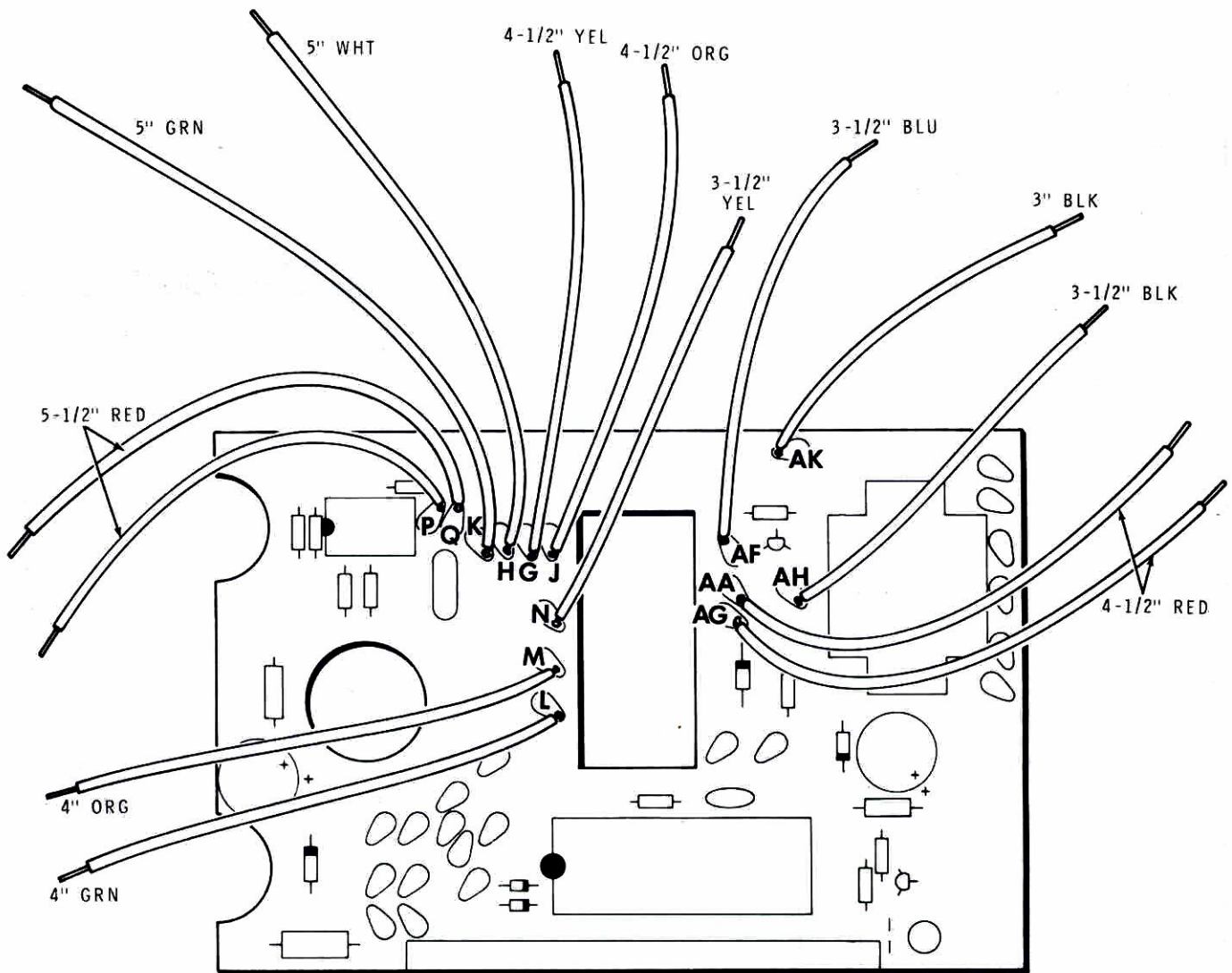
(✓) IC2: CD4001 integrated circuit (#443-703).



(✓) T1: Mount the power transformer as shown. Bend the two mounting tabs down onto the foil; then solder the mounting tabs and eight lugs to the foil.



**Detail 1-6A**



**PICTORIAL 1-7**

Refer to Pictorial 1-7 for the following steps.

Position the circuit board as shown in the Pictorial; then proceed with the following steps.

**NOTE:** To prepare stranded wires, as in the following step, cut each wire to the length indicated and remove  $1/4$ " of insulation from each end. Then tightly twist each bare wire end and add a small amount of solder to hold the fine strands together.

( ) Prepare the following wires:

- 5-1/2" red    3-1/2" blue
- 5-1/2" red    5" white
- 5" green      4-1/2" yellow
- 4" green

Install one end of each wire in a circuit board hole as directed in the following steps. Solder the wire end to the foil and cut off the excess wire. The free wire ends will be connected later.

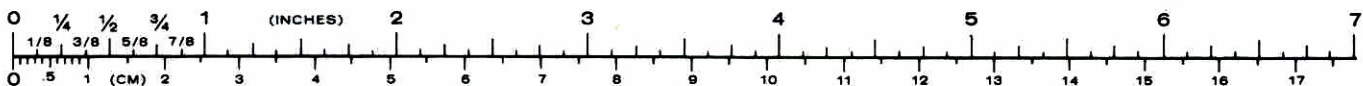
- ( ) 5-1/2" red wire to hole P.
- ( ) 5-1/2" red wire to hole Q.
- ( ) 5" green wire to hole K.
- ( ) 4" green wire to hole L.
- ( ) 3-1/2" blue wire to hole AF.
- ( ) 5" white wire to hole H.
- ( ) 4-1/2" yellow wire to hole G.

( ) Prepare the following wires:

- 3-1/2" yellow    3-1/2" black
- 4-1/2" orange    4-1/2" red
- 4" orange        4-1/2" red
- 3" black

Install these wires on the circuit board as directed in the following steps.

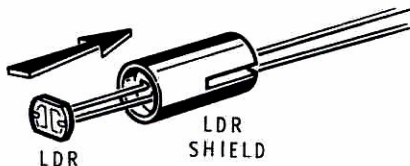
- ( ) 3-1/2" yellow wire to hole N.
- ( ) 4-1/2" orange wire to hole J.
- ( ) 4" orange wire to hole M.
- ( ) 3" black wire to hole AK.
- ( ) 3-1/2" black wire to hole AH.
- ( ) 4-1/2" red wire to hole AG.
- ( ) 4-1/2" red wire to hole AA.



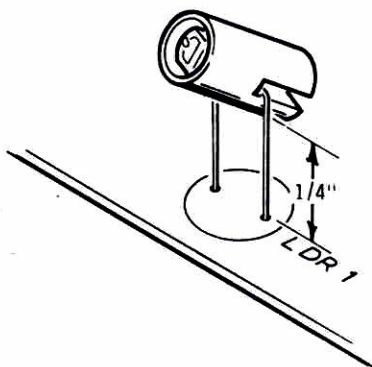
Refer to Pictorial 1-8 (Illustration Booklet, Page 1) for the following steps.

- ( ) Refer to Part A of Detail 1-8A and push the leads of the LDR all the way into the LDR shield as shown.
- ( ) LDR1: Bend the leads of the LDR in the slots of the LDR as shown in Part B of Detail 1-8A. Then push the leads of the LDR into the circuit board at LDR1 until the LDR shield is 1/4" above the circuit board. Solder the leads to the foil and cut off the excess lead lengths.
- ( ) On the top of the circuit board, form the leads of the LDR so the shield and LDR are at an angle of approximately 45 degrees to the surface of the board, as shown in the Pictorial.
- ( ) Cut the bare wire ends from the end of the line cord. Separate the line cord end for a length of 2".
- ( ) Cut 1" from each of the line cord wires. Save these 1" wires for the following steps.

**PART A**



**PART B**



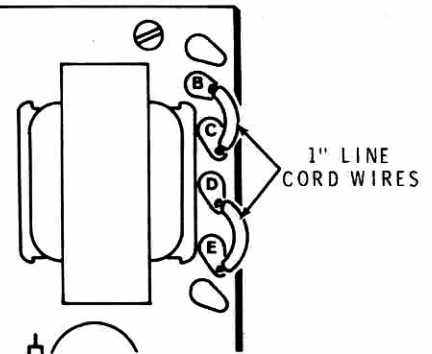
**Detail 1-8A**

**ALTERNATE LINE VOLTAGE WIRING**

NOTE: Two sets of line voltage wiring instructions are given below, one for 120 VAC line voltage and the other for 240 VAC line voltage. In the U.S.A., 120 VAC is most often used, while elsewhere 240 VAC is more common. USE ONLY THE INSTRUCTIONS THAT AGREE WITH THE LINE VOLTAGE IN YOUR AREA.

**120 VAC WIRING**

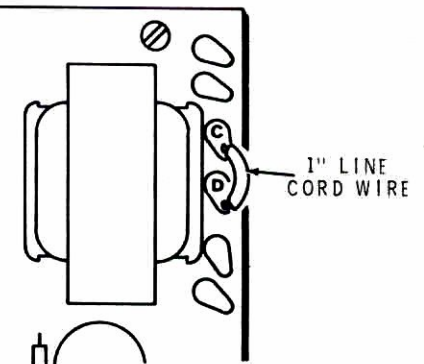
**Detail 1-8B**



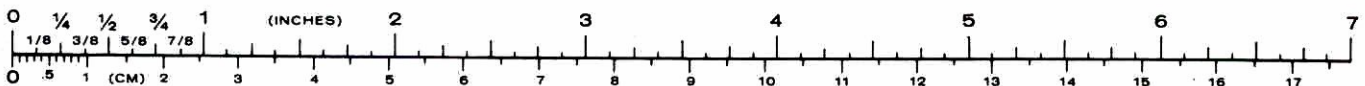
- ( ) Prepare both ends of the two 1" pieces of line cord wire.
- (✓) Refer to Detail 1-8B and install a 1" line cord wire on the circuit board from hole B to hole C. Solder both circuit board foil connections and cut off the excess wire ends.
- ( ) In the same manner, install a 1" line cord wire from hole D to hole E.

**240 VAC WIRING**

**Detail 1-8C**

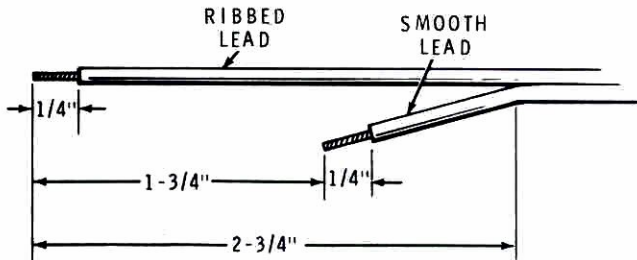


- ( ) Prepare both ends of one 1" piece of line cord wire. You may discard the remaining 1" piece.
- ( ) Refer to Detail 1-8C and install a 1" line cord wire on the circuit board from hole C to hole D. Solder both circuit board foil connections and cut off the excess wire ends.

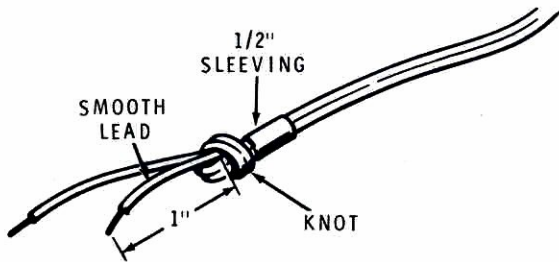




**PART A**



**PART B**

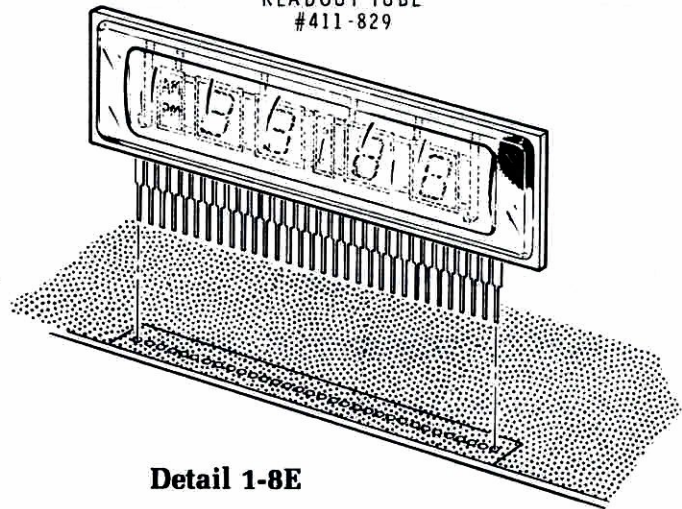


**Detail 1-8D**

Refer to the inset drawing on Pictorial 1-8 and identify the line cord ribbed and smooth leads.

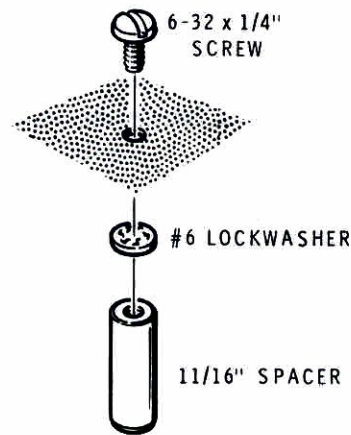
- ( ) Refer to Part A of Detail 1-8D and cut and prepare the end of the line cord as shown. Tightly twist the bare wire ends and add a small amount of solder to hold the fine strands together.
- ( ) Refer to Part B of Detail 1-8D and slide the 1/2" of sleeving over the ends of the line cord and up onto the cord approximately 4". Tie an overhand knot in the line cord 1" above the smooth-lead wire end as shown. Slide the sleeving down against the knot.
- ( ) Connect the ribbed lead to circuit board hole F and connect the smooth lead to hole A. Solder both leads to the foil and cut off the excess lead ends.

READOUT TUBE  
#411-829



**Detail 1-8E**

- ( ) Locate the 4-digit readout tube (#411-829). Check to be sure all its pins are straight.
- ( ) Refer to Detail 1-8E and mount the readout tube onto the circuit board in the manner shown. Be sure all the pins are through the board and that the tube is fully seated on the component side. Carefully solder the tube pins to the foil and cut off the excess pin ends.
- ( ) Check the front (sloped) edge of the cabinet top and bend the readout tube rearward at the top to the same slope on the cabinet.
- ( ) Refer to Detail 1-8F and mount a 11/16" spacer on the circuit board at the upper right corner as shown in the Pictorial. Use a 6-32 x 1/4" screw and a #6 lockwasher.



**Detail 1-8F**

### CIRCUIT BOARD CHECKOUT

Carefully inspect the circuit board for the following conditions. ( ) Integrated circuits for the correct position of the marked (pin 1) end.

- ( ) Unsoldered connections or pins.
- ( ) Poor solder connections.
- ( ) Solder bridges between foil patterns.
- ( ) Protruding leads which could touch together.
- ( ) Transistors for proper installation.
- ( ) Electrolytic capacitors for the correct position of the positive (+) marking.
- ( ) Diodes for the correct position of the banded ends.

#### NOTES:

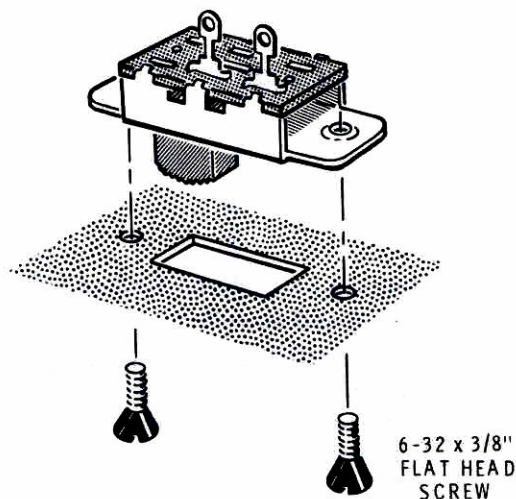
1. If you elected the 12-hour option, you will have two 1N4149 (#56-56) diodes left over. These may be discarded.
2. There are a number of unused holes in the circuit board; you may wish to recheck the 12- and 24-hour option steps to make sure the correct holes have been used. Also note that holes AB and AC will be unused if your power is 60 Hz AC.

### CABINET ASSEMBLY

Refer to Pictorial 2-1 (Illustration Booklet, Page 1) for the following steps.

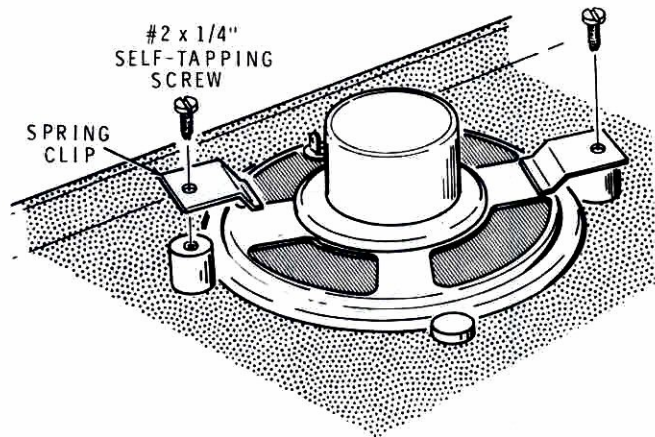
**NOTE:** It is suggested that you place a soft cloth on your work area as you perform the following steps to avoid scratching your Clock cabinet parts.

- ( ) Position the cabinet bottom on your work area as shown in the Pictorial.
- ( ) SW5: Refer to Detail 2-1A and loosely mount an SPST switch with spring return (#60-6) at SW5. Use two 6-32  $\times$  3/8" flat head screws. Be sure to position the switch lugs as shown in the Pictorial.
- ( ) SW4: In the same manner, loosely mount another SPST switch with spring return at SW4.



**Detail 2-1A**

- ( ) SW3: Loosely mount a DPDT switch (#60-2) at SW3 with two 6-32 flat head screws.
- ( ) Cut a 2-1/2" piece of bare wire. Form a small loop in one end of the wire.
- ( ) Refer to Pictorial 2-1 and pass the end of the wire under the indicated ends of switches SW5, SW4, and SW3 as shown.
- ( ) Tighten the six screws on the three switches.
- ( ) Place the switch insulator down over the lugs of switch SW3 as shown in the Pictorial.
- ( ) Cut a 2-1/4" piece of bare wire.



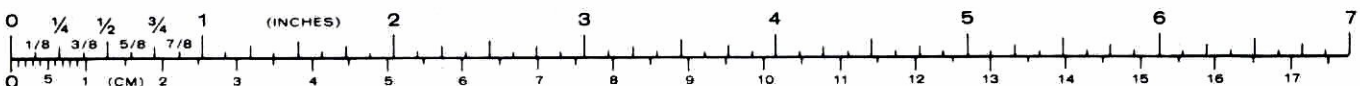
Detail 2-1B

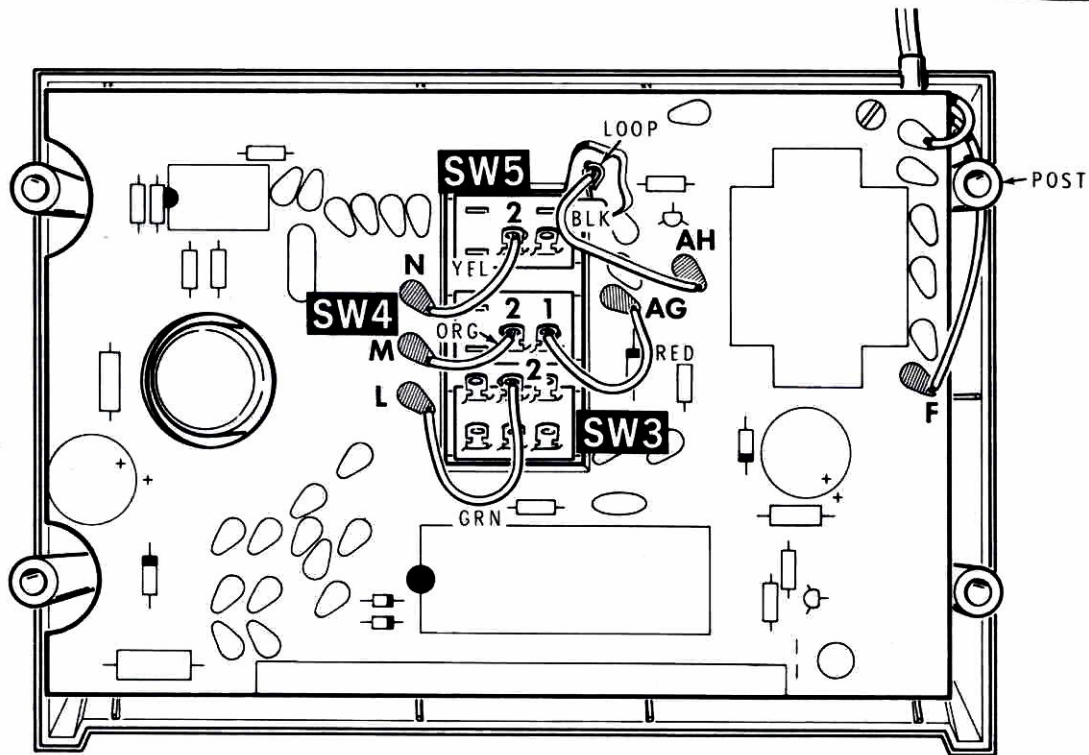
NOTES:

1. In the following steps, (NS) means not to solder the connections because other wires will be added later. (S-) with a number, such as (S-3), means to solder the connection. The number tells how many wires are at the connection.
  2. Where a wire passes through a connection and then goes to another point, as in the next step, it will count as two wires in the solder instructions (S-2), one entering and one leaving the connection. Be especially careful when soldering these connections, to apply enough solder and heat to solder these "through wires."
  3. On DPDT switch SW3, you will not use switch lugs 4, 5, and 6 — nearest you in Pictorial 2-1.
- ( ) Pass the end of the 2-1/4" bare wire into SW5 lug 1 (S-1), through SW4 lug 1 (NS), and into SW3 lug 1 (S-1). Cut off any excess wire ends on SW3 and SW5.

NOTE: As you install the speaker in the following step, be sure to handle it carefully to avoid damage to the speaker cone.

- ( ) Place the speaker into the cabinet bottom with its lugs positioned as shown in the Pictorial.
- ( ) Refer to Detail 2-1B and secure the speaker to the cabinet with two #2 x 1/4" self-tapping screws and two spring clips as shown. Perform this step carefully with a small screwdriver to avoid damage to the speaker cone.
- ( ) On the circuit board, locate the red wires coming from P and Q. Pass these wires down through the round (speaker) hole as shown in Pictorial 2-1. Secure one of these wires to speaker lug 1 (S-1) and the other to lug 2 (S-1).





PICTORIAL 2-2

Refer to Pictorial 2-2 for the following steps.

- ( ) Locate the black wire coming from AH. Pass the free end of this wire through the rectangular opening in the circuit board and connect it to the bare wire loop at SW5 as shown in the Pictorial (S-1).
- ( ) Position the circuit board down into the bottom of the cabinet as shown in the Pictorial. Do not secure the circuit board to the cabinet bottom at this time. Position the line cord wire from F outside the cabinet post as shown.

**NOTE:** The wires that connect between the circuit board and components mounted on the cabinet are long enough to permit you to temporarily raise the circuit board away from the cabinet, if necessary, without unsoldering any of the connections.

Connect the wires coming from the circuit board to the three cabinet switches as directed in the following steps.

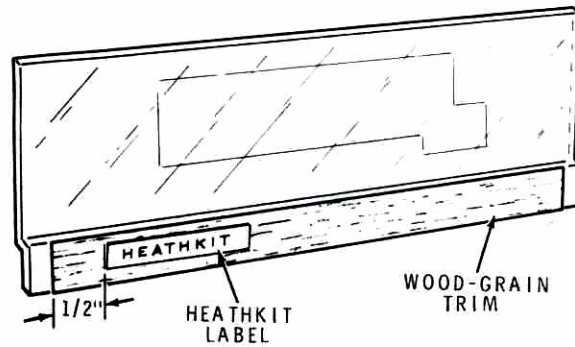
- ( ) Green wire coming from L to SW3 lug 2 (S-1).
- ( ) Orange wire coming from M to SW4 lug 2 (S-1).
- ( ) Yellow wire coming from N to SW5 lug 2 (S-1).
- ( ) Red wire coming from AG to SW4 lug 1 (S-3).

Set the cabinet bottom-circuit board assembly aside temporarily.

Refer to Pictorial 2-3 (Illustration Booklet, Page 2) for the following steps.

- ( ) Position the cabinet top on your work area as shown in the Pictorial.
- ( ) SW1: Loosely mount the DPDT switch (#60-2) into the cabinet top as shown. Use two 6-32  $\times$  3/8" flat head screws.
- ( ) SW2: Similarly, mount the remaining SPST switch with spring return at SW2 with 6-32  $\times$  3/8" flat head screws. **NOTE:** Be sure to position the switch lugs as shown in the Pictorial.
- ( ) Cut a 4-1/2" piece of bare wire. Form a small loop in one end of the wire.
- ( ) Pass the end of the bare wire under switch SW1 and across to SW2. Position the wire close against the shanks of the nearer two screws on SW1 and SW2; then tighten all four switch mounting screws.
- ( ) Cut and prepare a 4-1/4" red wire. Connect the red wire from SW2 lug 1 (S-1) to SW1 lug 1 (NS).

- ( ) Position the cabinet top close to the back of the cabinet bottom.
- ( ) Connect the black wire coming from circuit board callout AK to the bare wire loop at SW1 (S-1).
- ( ) Connect the end of the green wire coming from K to switch SW2 lug 2 (S-1).
- ( ) Connect the red wire coming from AA to switch SW1 lug 1 (S-2).
- ( ) Connect the blue wire coming from AF to SW1 lug 4 (S-1).
- ( ) Connect the orange wire coming from J to SW1 lug 2 (S-1).
- ( ) Connect the yellow wire coming from G to SW1 lug 5 (S-1).
- ( ) Connect the white wire coming from H to SW1 lug 6 (S-1).
- ( ) Tip the cabinet top rearward until it rests on its top side as shown.



**Detail 2-3A**

- ( ) 3. Carefully position the narrow wood-grain strip onto the lower window flange so the ends of the strip are equally distant from the edges of the window. When you are sure the strip is centered top to bottom and end to end on the flange, press the strip down firmly along its length.
- ( ) 4. Remove the paper backing from the "Heathkit" label. Center the label, from top to bottom, on the wood-grain window strip, 1/2" from the left edge of the window as shown.
- ( ) Refer to Pictorial 2-3 and slide the window down into the window cutout in the cabinet top as shown.
- ( ) Locate the 1" x 1" paper insulator. From the insulator cut two 1" x 1/4" pieces. Discard the 1" x 1/2" piece.
- ( ) Remove the paper backing from a 1" x 1/4" piece of insulator. Fold this piece in the center so it forms a right angle; then press the insulator into the left corner of the cabinet top and against the window as shown in Pictorial 2-3.
- ( ) In the same manner, install the other 1" x 1/4" piece of insulator in the right corner of the cabinet top and window.

**NOTE:** In the following steps you will work on and install the cabinet window. If you wish at this time, you may wash the window in a warm, mild detergent solution and dry it with a soft cloth. Thereafter, try to handle the window only by its edges to avoid finger smudges.

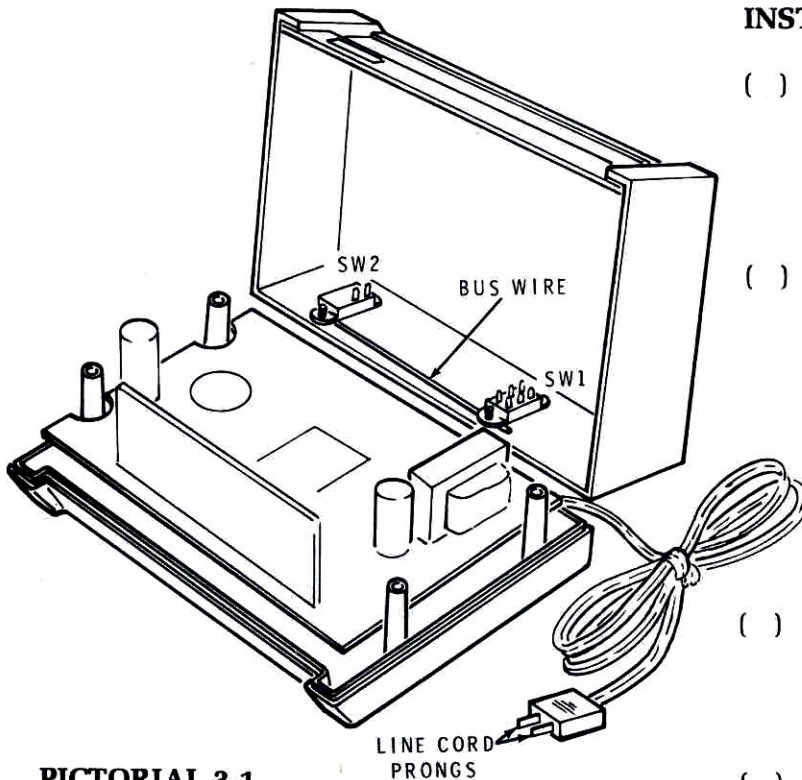
Refer to Detail 2-3A for the next four steps.

- ( ) 1. Position the window on a soft cloth on your work area as shown. Be sure the narrow flange on the lower edge is facing upward.
- ( ) 2. Locate the wood-grain panel and peel off the narrow (approximately 1/2" x 6-1/2") strip.

This completes the step-by-step assembly of your Digital Alarm Clock, except for "Final Assembly." Proceed to the following "Initial Tests."



## INITIAL TESTS



**PICTORIAL 3-1**

Refer to Pictorial 3-1 for the following steps.

### NOTES:

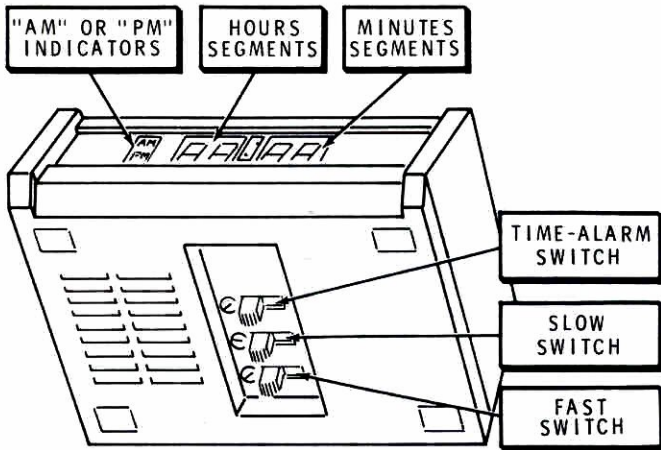
1. Do not plug your Digital Alarm Clock into an AC outlet until you are instructed to do so.
2. If, during the following tests, you fail to obtain the indicated results, refer to the "In Case of Difficulty" section on Page 26.
3. If you have an ohmmeter, perform the steps under "Instrument Tests" in the following section. If you do not have an ohmmeter, proceed directly to "Operational Tests."

### INSTRUMENT TESTS

- ( ) Position your Digital Clock on your work area as shown. Set the cabinet top to the rear so it is resting on the back and so the switches are accessible from the inside. Position the circuit board into the cabinet bottom as shown.
- ( ) Connect the ohmmeter common (ground) lead to the bus wire between rear panel switches SW1 and SW2.
- ( ) With the positive ohmmeter lead, measure the resistance first to one line cord prong and then to the other prong. In both cases the reading should be infinity.
- ( ) Connect the common ohmmeter lead to one line cord prong and the positive lead to the other prong. You should get some reading near 200 ohms. If the reading is at or near zero, refer to the "In Case of Difficulty" section of the Manual.

### OPERATIONAL TESTS

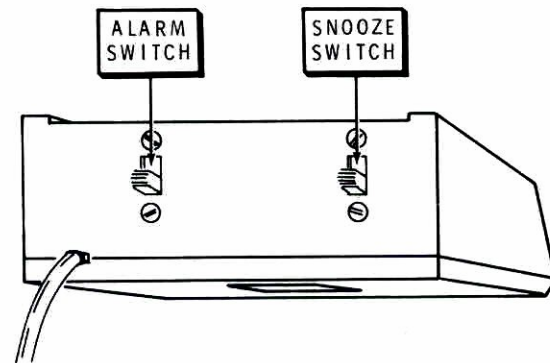
- ( ) Be sure the LDR is still positioned at approximately 45 degrees to the surface of the circuit board, and that the readout tube is slanted slightly rearward.
- ( ) Temporarily position the cabinet top down onto the cabinet bottom.



PICTORIAL 3-2

Refer to Pictorials 3-1, 3-2, and 3-3 as you make the following checks.

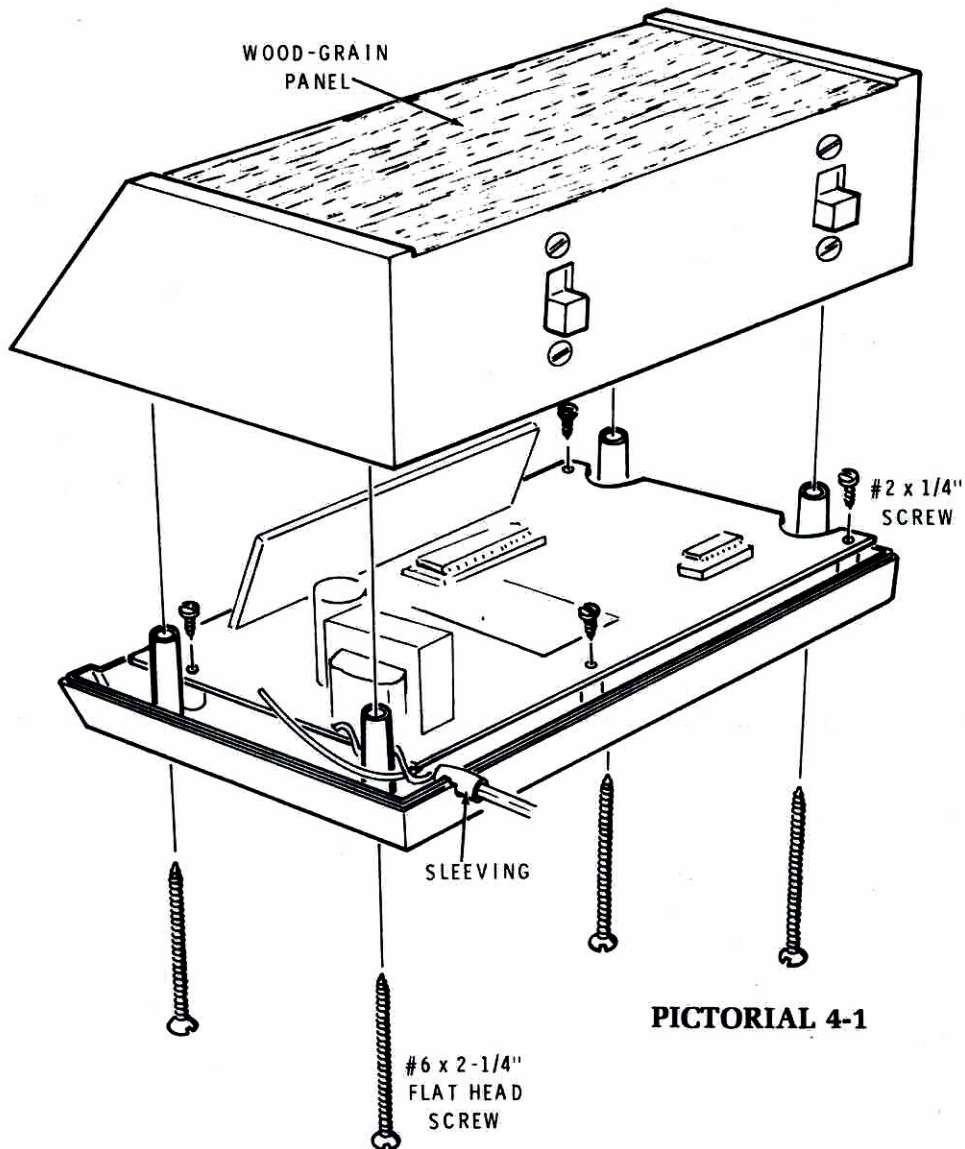
- ( ) Plug the line cord into an AC outlet. Since the Clock has no on-off switch, the readout tube should come on.
- ( ) If you assembled your Clock for 12-hour time, the "AM" or the "PM" indicator should blink slowly on and off. If your Clock is to indicate 24-hour time, the left digit of the hours clock segment should blink.
- ( ) Push the ALARM switch down.
- ( ) On the cabinet bottom, briefly push the FAST switch and release it; the blinking indicator on the readout tube should now be steadily lit.
- ( ) On the bottom of the cabinet, push the TIME-ALARM switch to the TIME position.
- ( ) Push and hold the FAST switch slide. The Clock readout should cycle rapidly through a full 12 or 24-hour cycle, and the "AM" and "PM" indicators should change at 12-hour intervals if your clock is wired for a 12-hour indication. Release the FAST switch.
- ( ) Note the time indicated on the Clock.
- ( ) Push the TIME-ALARM switch to ALARM.
- ( ) Push the FAST switch until the readout indicates one hour **earlier** than the time noted above. Release the FAST switch.



PICTORIAL 3-3

- ( ) Push the SLOW switch. Note that the cycling rate of the Clock is very slow as compared to the previous cycling rate. Continue to cycle at the slow rate until the time indicated is approximately ten minutes **later** than originally set with the TIME switch. Release the SLOW switch.
  - ( ) Note the time indicated on the Clock readout. Then push the TIME-ALARM switch to the TIME position. Be sure the time indication is **earlier** than the alarm time set with the SLOW switch above.
  - ( ) On the cabinet rear panel, push the ALARM switch upward. Wait a few minutes until the time comes up to the alarm time you set with the TIME-ALARM switch and the SLOW switch. You should now hear a loud sound from the Clock speaker.
  - ( ) Operate the SNOOZE switch momentarily; the alarm should stop.
  - ( ) Wait approximately nine minutes longer and the alarm should sound again.
  - ( ) Push the rear panel ALARM switch down.
  - ( ) Remove the line cord from the AC outlet.
- This completes the "Initial Tests" of your Clock. Proceed to "Final Assembly."

## FINAL ASSEMBLY



PICTORIAL 4-1

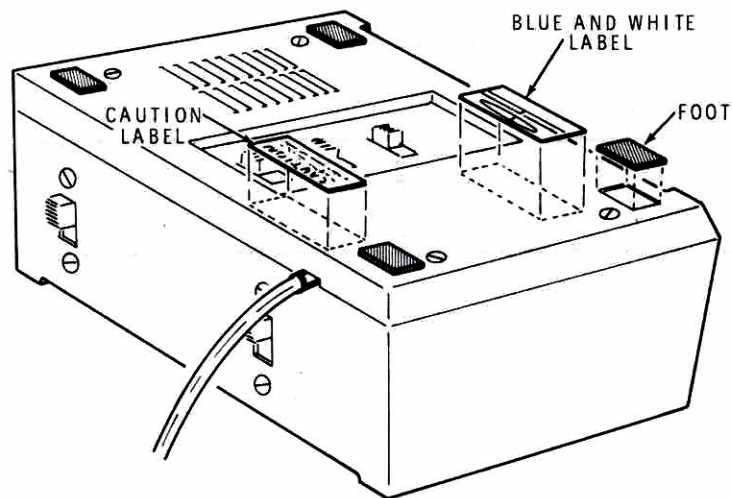
Refer to Pictorial 4-1 for the following steps.

- ( ) Position the circuit board into the cabinet bottom as shown. Then secure the board to the cabinet studs with four #2 × 1/4" screws. Do not overtighten the screws and strip out the screw holes.

- ( ) Place the sleeving on the line cord down into the notch on the rear edge of the cabinet. Position the cabinet top down onto the bottom half as shown and secure the two halves together with four #6 × 2-1/4" flat head screws.

**NOTE:** In the following step, as you install the wood-grain panel on the top of the cabinet top, perform the operation carefully and slowly. Once the wood-grain panel is in place it is very difficult to lift and reposition the panel.

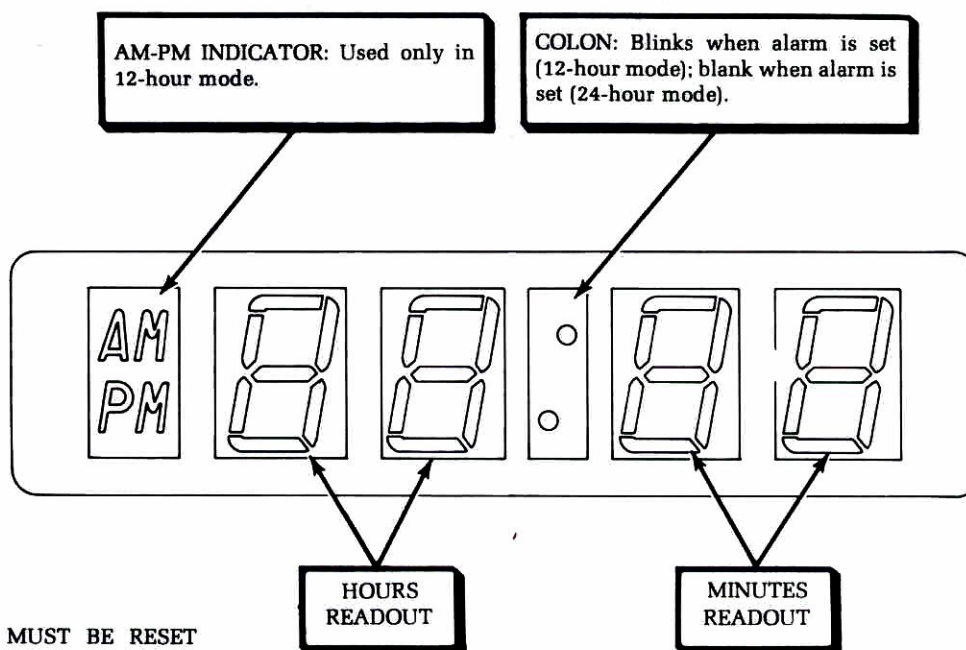




PICTORIAL 4-2

- ( ) Peel the wood-grain panel from its paper backing. Position the panel along the front edge of the clock, squarely in the center of the depressed area. Carefully smooth the panel, from the front toward the rear, until it is in place. NOTE: If any air bubbles should occur, lift the nearest corner slightly and work the bubble toward that corner with your fingertip until the panel is smooth.
  - ( ) With a soft cloth, smooth the wood-grain panel firmly down onto the cabinet top.
- Refer to Pictorial 4-2 for the following steps.
- ( ) Turn the Clock cabinet over so it is resting on its top as shown in the Pictorial.
  - ( ) Peel the backing from the "Caution" label and press the label in place as shown.
  - ( ) Peel the backing from the blue and white label and press the label in place on the cabinet bottom in the area shown. NOTE: Be sure to refer to the numbers on this label in any communications you have with the Heath Company about this kit.
  - ( ) Remove the paper backing from one of the feet. Press the foot in place in the rectangular area near one corner of the cabinet bottom.
  - ( ) In the same manner, install the other three feet near the remaining corners of the cabinet as shown.
- This completes the "Final Assembly" of your Digital Alarm Clock.

## OPERATION

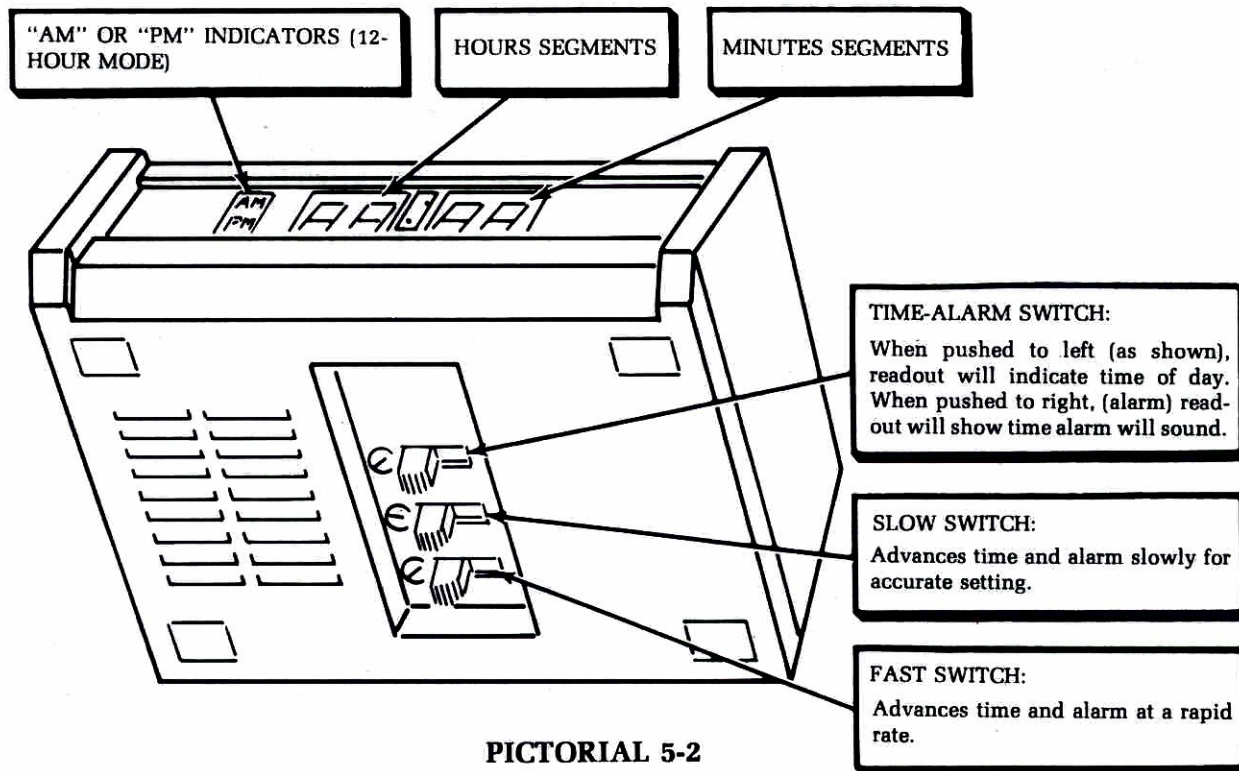


**NOTE:** CLOCK MUST BE RESET when AM-PM (12-hour) or left digit blinks; this indicates power has been interrupted.

**PICTORIAL 5-1**

Refer to Pictorials 5-1, 5-2 (above), and 5-3 (Illustration Booklet, Page 2) which illustrate the readout and switches as described in the following text.

1. **ALARM ON-OFF SWITCH:** Turns the alarm on and off; up is On. **NOTE:** After the alarm sounds, if you wish, you may turn the alarm off and immediately return the switch to the On position; the alarm will sound after another 24 hours.
2. **SNOOZE ALARM SWITCH:** Resets the alarm to go off approximately nine minutes later.
3. **FAST SET-AHEAD SWITCH:** Advances the display sixty minutes each second.
4. **SLOW SET-AHEAD SWITCH:** Advances the display one minute each half second.
5. **TIME-ALARM SWITCH:** Allows you to set the alarm using the FAST and SLOW-SET-AHEAD switches. Also allows the display to indicate the time for which the alarm is set. (Time continues to be kept even though it is not displayed when this switch is used in the ALARM position). Return the switch to TIME after you set the alarm; the Clock display will return to the correct time display.
6. **AM-PM INDICATOR:** Indicates 12-hour segment of the day, either "AM" or "PM", when the Clock is wired for 12-hour operation. Also active when you set the alarm.
7. **HOURS AND MINUTES READOUT:** Indicated the time of day or the time the alarm is set for, depending on the setting of the TIME-ALARM switch.



PICTORIAL 5-2

8. **COLON**: A steady colon indicates that the alarm is Off. In the 12-hour mode, a flashing colon indicates that the alarm is set to On. In the 24-hour mode, the colon will be blank when the alarm switch is On.

### TO SET THE TIME

1. Push the **FAST SET-AHEAD** and **SLOW SET-AHEAD** switches as necessary to advance the display to the desired time. Be sure the AM or PM indicator is as desired. The AM-PM indicator is inactive in the 24-hour mode of operation.

### TO SET THE ALARM

1. Push the **TIME-ALARM** switch to the **ALARM** position. The clock will continue to keep the correct time even though the alarm display is stationary.

2. Push the **FAST SET-AHEAD** and **SLOW SET-AHEAD** switches as necessary to advance the display to a desired alarm time. Be sure the AM-PM indicator appears as desired. The AM-PM indicator is inactive in the 24-hour mode of operation.
3. Push the **TIME-ALARM** switch to the **TIME** position.

4. Set the alarm. Push up the **ALARM ON-OFF** switch. Observe that the colon will blink on and off (12-hour mode) or blank out (24-hour mode).

## IN CASE OF DIFFICULTY

This section of the Manual is divided into two parts. The first part, titled "General Troubleshooting Information," describes what to do about the difficulties that may occur right after your Clock is assembled.

The second part, titled "Troubleshooting Chart", is provided to assist you in servicing the Clock if the "General Troubleshooting Information" fails to clear up the problem, or if difficulties occur after your Clock has been in use for some time. The "Troubleshooting Chart" lists a number of possible difficulties that could arise along with several possible solutions to those difficulties.

Try to analyze the symptoms of any problem you might have before starting any troubleshooting procedure. You can usually do this by trying the various functions of your Clock to determine abnormal operations. A review of the "Operation" section may help your analysis.

NOTE: Refer to the "Circuit Board X-Ray Views" on Page 30 for the physical location of parts on the circuit board.

### GENERAL TROUBLESHOOTING INFORMATION

1. Check all the wires that are connected between the circuit board and other parts. Trace each wire in colored pencil on the Pictorial as you check it. Make sure these wires are connected to the proper points and are properly soldered. Someone not familiar with the unit may notice something you have consistently overlooked.
2. Be sure the IC's are seated properly in their sockets.
3. About 90% of the kits that are returned for repair do not function properly because of poor connections and soldering. Therefore, many troubles can be located by a careful inspection of connections to make sure they are soldered as described in the "Soldering" section of the "Kit Builders Guide." Reheat any doubtful connections.
4. Closely examine each circuit board foil in a good light to see that no solder bridges exist between adjacent connections. If available, a magnifying glass would be helpful for this purpose. Remove any solder bridges by holding a clean, hot soldering iron tip between the two points that are bridged until the excess solder flows down onto the tip. Compare your foil pattern against the "X-Ray Views" on Page 30.
5. Be sure each transistor is in its proper location. Be sure that each transistor lead is in the right hole and has a good solder connection to the foil.
6. Check the integrated circuits for proper positioning. (Be sure the dot or notched end of the IC is over the dot printed on the circuit board).
7. Check each electrolytic capacitor to be sure the lead near the positive (+) marking is at the correct position.
8. Check each resistor value carefully. If would be easy, for example, to install a 4700  $\Omega$  (yellow-violet-red) resistor where a 47 k $\Omega$  (yellow-violet-orange) resistor is called for. A resistor that is discolored, or cracked, or shows any sign of bulging would indicate that it is damaged and should be replaced. Since damaged resistors are often the result of some other difficulty (such as faulty wiring), you should try to find out what caused the damage before you replace the part.
9. Be sure the correct diode is installed at each diode location, and that the banded end is positioned correctly.
10. Check all component leads connected to the circuit boards. Make sure the leads do not extend through the circuit board and come in contact with other connections or parts.

If you still cannot locate and correct the trouble after the above tests are completed, and if a voltmeter is available, check your Clock's voltages against the voltages shown on the Schematic Diagram (fold-in).

NOTE: In an extreme case where you are unable to resolve a difficulty, refer to the "Customer Service" information at the rear of the Manual. Your Warranty is also located inside the rear of the Manual.

## Troubleshooting Chart

PROBLEM	POSSIBLE CAUSE
1. Incorrect readout segments lit.	1. Poor solder connections or solder bridges. 2. Integrated circuit IC1. 3. Display tube. 4. Incorrect jumper wires installed.
2. Time does not advance.	1. Time-Alarm switch incorrectly set at Alarm position. 2. Resistor R4. 3. Integrated circuit IC1.
3. Readout display does not light, or is very dim even under bright room lighting.	1. Diodes D1 or ZD2. 2. Transistor Q1. 3. Light dependent resistor LDR1. 4. Resistors R2, R3, or R5.
4. Clock gains time.	1. 50 Hz jumper (AB-AC) installed and you have 60 Hz service.
5. Alarm does not work properly.	1. Transistor Q2. 2. Diode D3. 3. Integrated circuit IC2. 4. Switches SW1 or SW2. 5. Speaker.
6. Readout display does not dim.	1. Light dependent resistor LDR1. 2. Transistor Q1.
7. Alarm-On indicator (colon) does not function properly.	1. Alarm switch SW1.
8. Speaker buzzes.	1. Wire or lead ends in speaker cone.



## SPECIFICATIONS

Display .....	Four full-fluorescent digits, AM and PM indicators, and colon.
Format .....	12 or 24 hour.
Accuracy .....	As determined by line frequency.
Snooze Alarm .....	Recycles at nine-minute intervals.
Power Requirement .....	3.5 watts, 120 or 240 VAC, 50 or 60 Hz.
Dimensions .....	7" wide × 5" deep × 2-1/2" high (16.8 × 12 × 6cm).
Weight .....	1-3/4 lbs. (.79 kg).

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The Heath Company reserves the right to discontinue products and to change specifications at any time without incurring any obligation to incorporate new features in products previously sold.

## CIRCUIT DESCRIPTION

Refer to the fold-in Schematic Diagram and Schematic Notes as you read the following Circuit Description.

All the digital logic for the Clock is performed inside integrated circuit IC1. The remaining external circuits provide DC power, dimming control, and an alarm oscillator.

Diode D1, capacitor C1, resistor R1, and zener diode ZD2 form a DC supply for IC1 and the display tube. This voltage is also used by the switch circuits of SW1 through SW5 and it provides control signals to IC1. Time regulation is derived from the line frequency and is applied as an AC signal through resistor R4 to IC1.

The segment anodes of the fluorescent display tube are driven directly by the display drivers within IC1. The display filament is heated by an AC voltage applied through resistor R5 to display tube pin 1. A DC grid bias voltage, controlled by a dimming circuit, is applied to display tube pin 18.

Resistors R2 and R3, with light-dependent resistor LDR1 and transistor Q1 form a dimming circuit. As the intensity of the surrounding room light increases

or decreases, the internal resistance of LDR1 varies accordingly. When the room lighting is bright, the resistance of LDR1 decreases to permit a higher forward bias on the base of transistor Q1. This causes more current to flow in Q1 and the emitter voltage goes up. Since the emitter of Q1 is connected directly to pin 18 of the display tube, a greater voltage causes the tube to conduct harder to create a brighter display. The opposite is true when the surrounding light is dimmer; the resistance of LDR1 is increased, the emitter voltage of Q1 is lowered, and the grid bias voltage at pin 18 is lowered to cause the display tube to conduct less. This produces a dimmer display for a lowered light intensity outside the Clock.

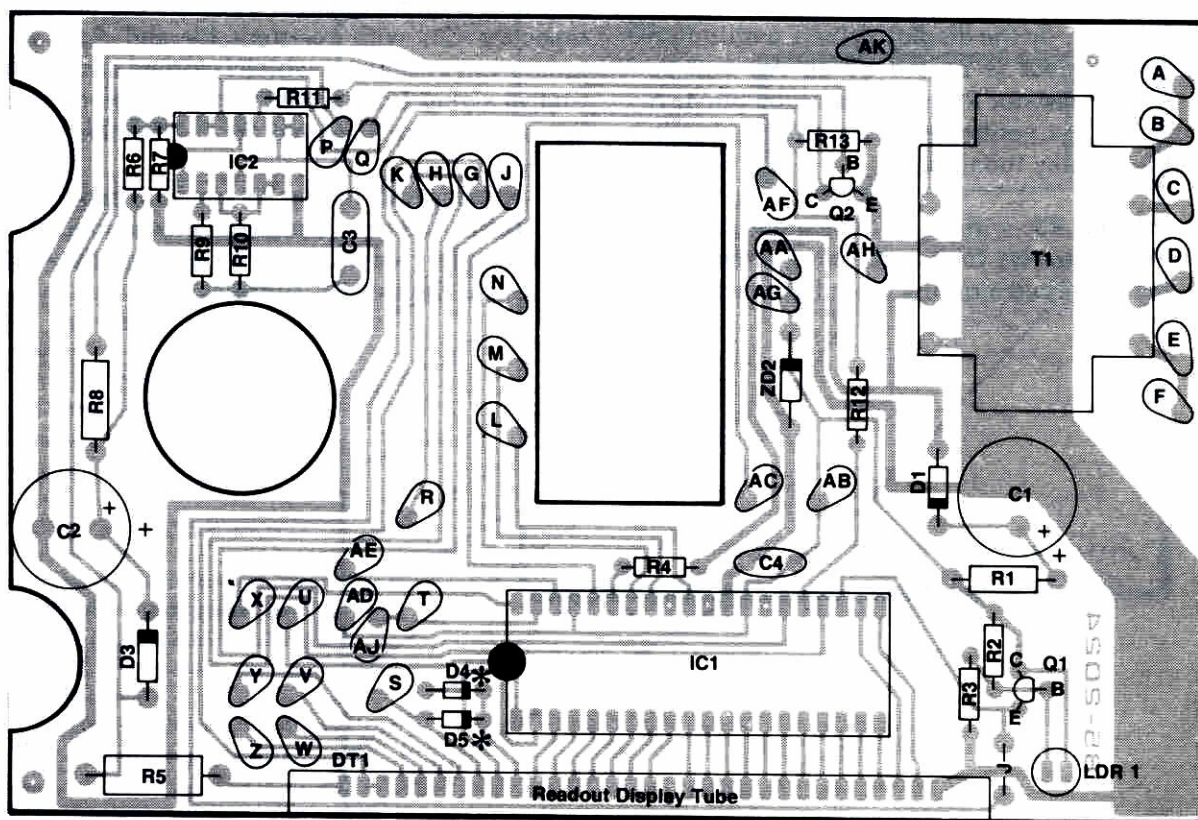
Diode D3 and capacitor C2 provide a second DC voltage for the alarm circuits. Integrated circuit IC2 and capacitor C3, with resistors R9 and R10, form a square-wave oscillator which is turned on and off by a control signal from pin 25 of integrated circuit IC1. Transistor Q2 is the driver for the speaker.

Dual primary transformer T1 can be wired to operate from either 120 or 240-volt AC power sources. Separate secondary windings in T1 provide the voltages needed for the two DC supplies.

## CIRCUIT BOARD X-RAY VIEW

NOTE: To find the PART NUMBER of a component for the purpose of ordering a replacement part:

- A. Find the circuit component number (R3, C1, etc.) on the "X-Ray View."
- B. Locate this same number in the "Circuit Component Number" column of the "Parts List."
- C. Adjacent to the circuit component number, you will find the PART NUMBER and DESCRIPTION, which must be supplied when you order a replacement part.



(Shown from component side.)

\*NOTE: Diodes D4 and D5 are 24-hour display options.



# SEMICONDUCTOR IDENTIFICATION CHARTS

## DIODES

COMPONENT	HEATH PART NUMBER	MANUFACTURER'S NUMBER	IDENTIFICATION
D1, D3	57-65	1N4002	<p>IMPORTANT: THE BANDED END OF DIODES CAN BE MARKED IN A NUMBER OF WAYS.</p>
ZD2	56-630	1N4748A	
D4 D5 (optional)	56-56	1N4149	

## TRANSISTORS

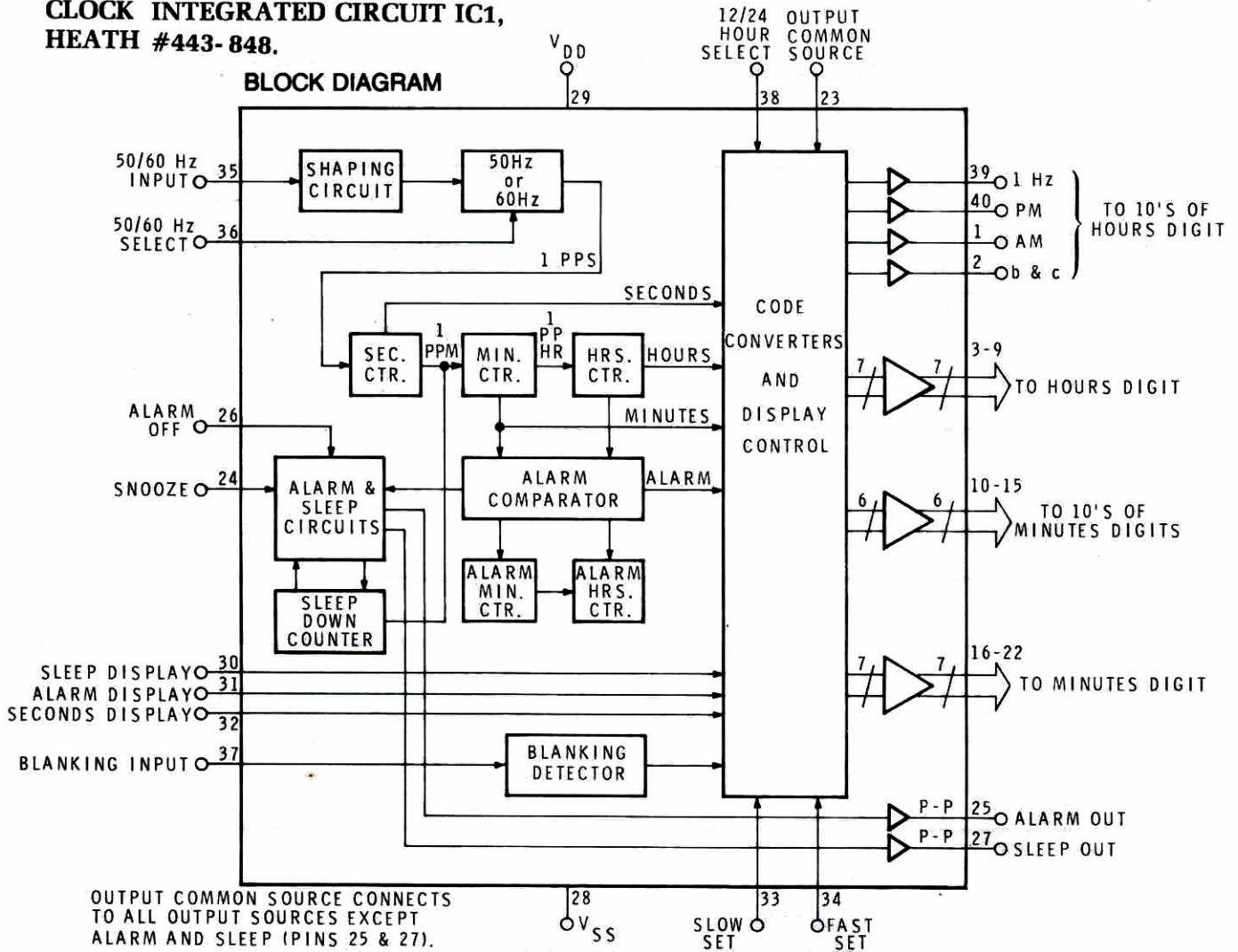
COMPONENT	HEATH PART NUMBER	MANUFACTURER'S NUMBER	IDENTIFICATION
Q1	417-881	MPSA13	
Q2	417-801	MPSA20	

## INTEGRATED CIRCUITS

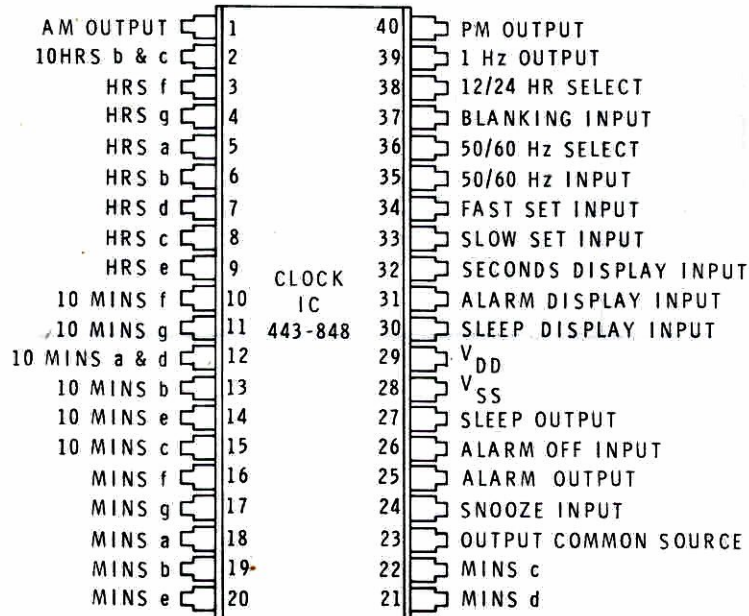
COMPONENT	HEATH PART NUMBER	MANUFACTURER'S NUMBER	IDENTIFICATION
IC2	443-703	CD4001	<p>TOP VIEW</p>

**CLOCK INTEGRATED CIRCUIT IC1,  
HEATH #443-848.**

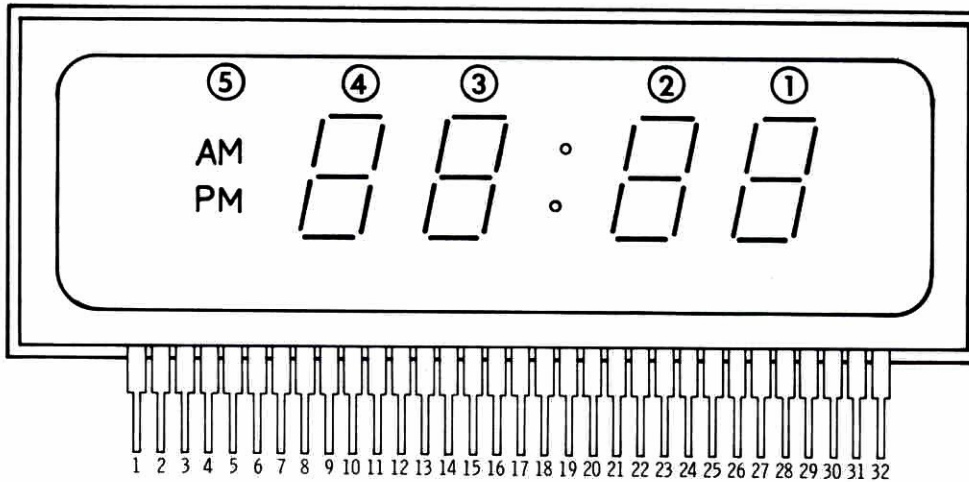
**BLOCK DIAGRAM**



**PIN-OUT DIAGRAM**

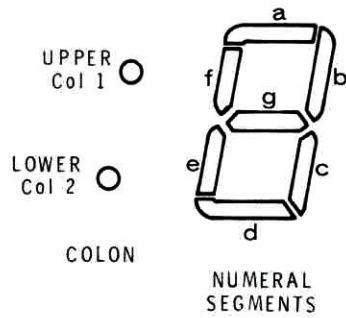


**READOUT TUBE**  
**HEATH #411-829, MFR. TYPE 5-LT-02.**



PIN CONNECTION (from Left to Right facing display).

PIN NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32		
CONNECTION	F	Col <sub>1</sub>	Col <sub>2</sub>	P	M	A	M	f <sub>4</sub>	g <sub>4</sub>	a <sub>4</sub>	c <sub>4</sub>	b <sub>4</sub>	f <sub>3</sub>	g <sub>3</sub>	a <sub>3</sub>	b <sub>3</sub>	d <sub>3</sub>	c <sub>3</sub>	e <sub>3</sub>	G	f <sub>2</sub>	g <sub>2</sub>	a <sub>2</sub>	b <sub>2</sub>	e <sub>2</sub>	c <sub>2</sub>	f <sub>1</sub>	g <sub>1</sub>	a <sub>1</sub>	b <sub>1</sub>	e <sub>1</sub>	c <sub>1</sub>	d <sub>1</sub>	F



Key: Count DIGIT from right to left. (AM-PM is the fifth digit).

a<sub>3</sub> = "a" segment of third digit.

G = GRID connections.

F = FILAMENT.







# CUSTOMER SERVICE

## REPLACEMENT PARTS

Please provide complete information when you request replacements from either the factory or Heath Electronic Centers. Be certain to include the **HEATH** part number exactly as it appears in the parts list.

## ORDERING FROM THE FACTORY

Print all of the information requested on the parts order form furnished with this product and mail it to Heath. For telephone orders (parts only) dial 616 982-3571. If you are unable to locate an order form, write us a letter or card including:

- Heath part number.
- Model number.
- Date of purchase.
- Location purchased or invoice number.
- Nature of the defect.
- Your payment or authorization for COD shipment of parts not covered by warranty.

Mail letters to: Heath Company  
Benton Harbor  
MI 49022  
Attn: Parts Replacement

**Retain original parts until you receive replacements. Parts that should be returned to the factory will be listed on your packing slip.**

## OBTAINING REPLACEMENTS FROM HEATH ELECTRONIC CENTERS

For your convenience, "over the counter" replacement parts are available from the Heath Electronic Centers listed in your catalog. Be sure to bring in the original part and purchase invoice when you request a warranty replacement from a Heath Electronic Center.

## TECHNICAL CONSULTATION

Need help with your kit? — Self-Service? — Construction? — Operation? — Call or write for assistance. you'll find our Technical Consultants eager to help with just about any technical problem except "customizing" for unique applications.

The effectiveness of our consultation service depends on the information you furnish. Be sure to tell us:

- The Model number and Series number from the blue and white label.
- The date of purchase.
- An exact description of the difficulty.
- Everything you have done in attempting to correct the problem.

Also include switch positions, connections to other units, operating procedures, voltage readings, and any other information you think might be helpful.

**Please do not send parts for testing**, unless this is specifically requested by our Consultants.

Hints: Telephone traffic is lightest at midweek — please be sure your Manual and notes are on hand when you call.

Heathkit Electronic Center facilities are also available for telephone or "walk-in" personal assistance.

## REPAIR SERVICE

Service facilities are available, if they are needed, to repair your completed kit. (Kits that have been modified, soldered with paste flux or acid core solder, cannot be accepted for repair.)

**If it is convenient, personally deliver your kit to a Heathkit Electronic Center. For warranty parts replacement, supply a copy of the invoice or sales slip.**

If you prefer to ship your kit to the factory, attach a letter containing the following information directly to the unit:

- Your name and address.
- Date of purchase and invoice number.
- Copies of all correspondence relevant to the service of the kit.
- A brief description of the difficulty.
- Authorization to return your kit COD for the service and shipping charges. (This will reduce the possibility of delay.)

Check the equipment to see that all screws and parts are secured. (Do not include any wooden cabinets or color television picture tubes, as these are easily damaged in shipment. Do not include the kit Manual.) Place the equipment in a strong carton with at least **THREE INCHES** of *resilient* packing material (shredded paper, excelsior, etc.) on all sides. Use additional packing material where there are protrusions (control sticks, large knobs, etc.). If the unit weighs over 15 lbs., place this carton in another one with 3/4" of packing material between the two.

Seal the carton with reinforced gummed tape, tie it with a strong cord, and mark it "Fragile" on at least two sides. Remember, the carrier will not accept liability for shipping damage if the unit is insufficiently packed. Ship by prepaid express, United Parcel Service, or insured Parcel Post to:

Heath Company  
Service Department  
Benton Harbor, Michigan 49022



HEATH COMPANY • BENTON HARBOR, MICHIGAN  
***THE WORLD'S FINEST ELECTRONIC EQUIPMENT IN KIT FORM***

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