

# DIGITAL ELECTRONIC CLOCK

MODELS TRN6125A AND TRN6703A

MODEL	APPLICATION
TRN6125A	"Super Console" Base Stations
TRN6703A	"Console" Base Stations

## 1. DESCRIPTION

Either clock kit is a 12- or 24-hour digital clock which may be used with either 50 or 60 Hz ac power sources. All components are mounted on a printed circuit board which mounts behind the control panel. The digital readouts are permanently mounted at a convenient angle to assure proper viewing when installed within the control panel.

## 2. FUNCTIONAL OPERATION

(See Schematic Diagram and Circuit Board Detail PEPS-J7369.) Accuracy of the clock is determined by the line frequency. The 60 Hz (or 50 Hz) power line frequency serves as the external clock input to drive the integrated circuit decade counters. Jumper JU2 determines the counting rate of the circuit and must be cut when operating from 50 Hz power. Jumper JU1, when removed, changes the divide rate from  $\div 12$  to  $\div 24$  (hours) and allows the kit to function as a 24-hour clock.

Integrated circuit U1 has two primary outputs: a multiplexed seven-segment output and a digit enable output. Both outputs are related to the strobe frequency of U1. The strobe, which operates at a frequency of approximately 450 Hz, generates pulses which drive a divider/decoder. The divider/decoder output is the strobe frequency divided by four (the decoder has four output lines) or approximately 112 Hz on any one line alternately. The divider/decoder outputs drive the digit enable transistors sequentially and these apply power to the anodes of A1 through A4.

The seven-segment output of the multiplexer consists of a series of logic highs or lows on each

line depending upon the digit to be indicated (Table 1). The seven-segment lines are common to all the readouts. The pulse, which gates on a digit enable transistor (Q1-Q4), also interrogates the multiplexer to supply the seven-segment code for a digit to the appropriate readout. Only the readout having an enable pulse will indicate. The next output pulse from the divider/decoder gates on the adjacent digit enable transistor and also causes the multiplexer to release the seven-segment code for the associated digit. This means that each digit is actually lit for one quarter of the 450 Hz strobe frequency, or approximately 2.0 milliseconds.

Table 1. Multiplexer Seven-Segment Output Code

U1 Multiplexed 7-Segment Outputs							Digit Portrayed
10	9	8	7	6	5	4	A1-A4
0	1	1	1	1	1	1	0
0	0	0	0	1	1	0	1
1	0	1	1	0	1	1	2
1	0	0	1	1	1	1	3
1	1	0	0	1	1	0	4
1	1	0	1	1	0	1	5
1	1	1	1	1	0	0	6
0	0	0	0	1	1	1	7
1	1	1	1	1	1	1	8
1	1	0	0	1	1	1	9

\*Positive logic is assumed, 1 is high and 0 is low.



**MOTOROLA INC.**  
Communications Division

**service publications**

1301 E. Algonquin Road, Schaumburg, IL 60196

### 3. MAINTENANCE

#### 3.1 TEST EQUIPMENT REQUIRED

(1) Oscilloscope

(2) S1063B Motorola Solid-State DC Multi-meter, or equivalent.

#### 3.2 TEST PROCEDURE

The troubleshooting chart shown in Figure 1 will aid in the servicing of this clock kit. The kit may be tested while installed in the base station or it may be tested on a bench. If tested on the

bench, make the following connections to the clock kit printed circuit board:

(1) Connect a ground to pin 1.

(2) Connect A+ (13.8 V dc) to pin 3.

(3) Apply a 50 Hz or 60 Hz (depending on the status of JU2) half-wave rectified signal (approximately 25 V p-p) to pin 2.

### 4. REFERENCE DIAGRAM

TRN6125A/TRN6703A Clock Kits  
Schematic Diagram and  
Circuit Board Detail. . . PEPS-17369

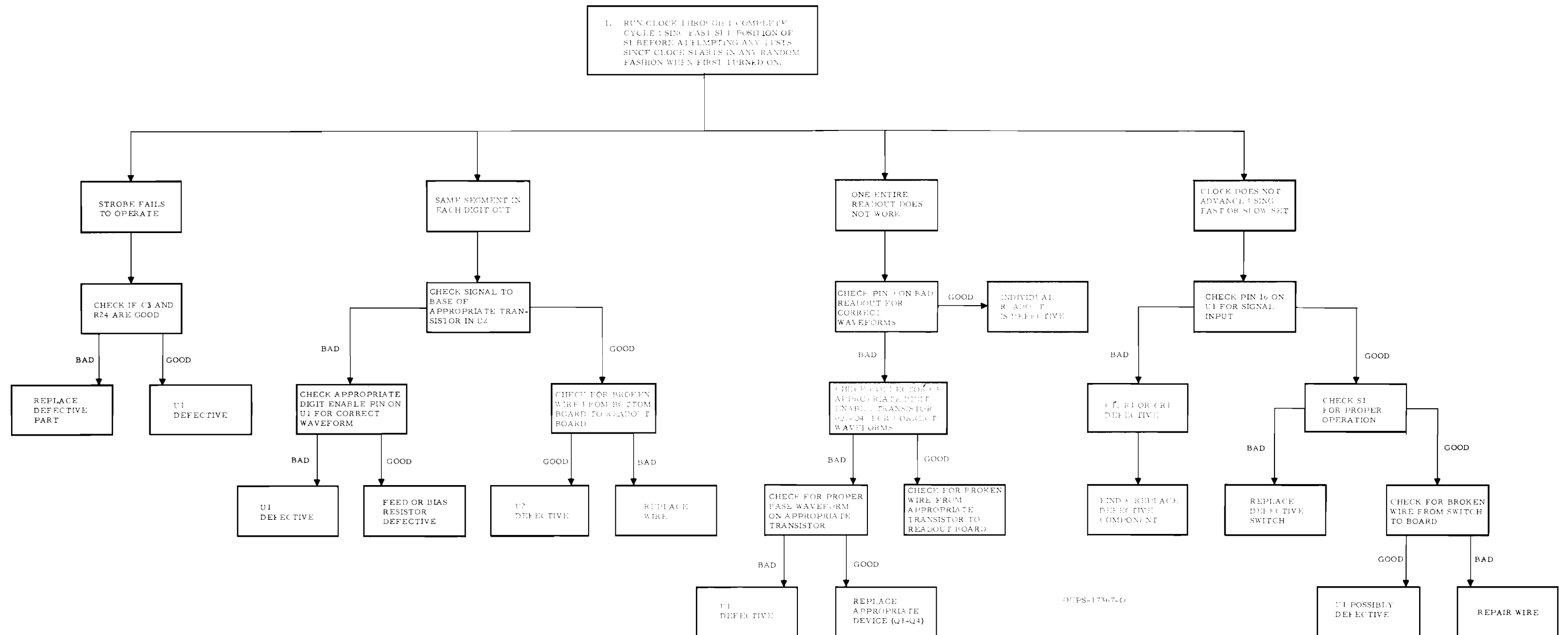


Figure 1. Clock Kit Troubleshooting Chart

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
------------------	-------------------	-------------

PARTS LIST

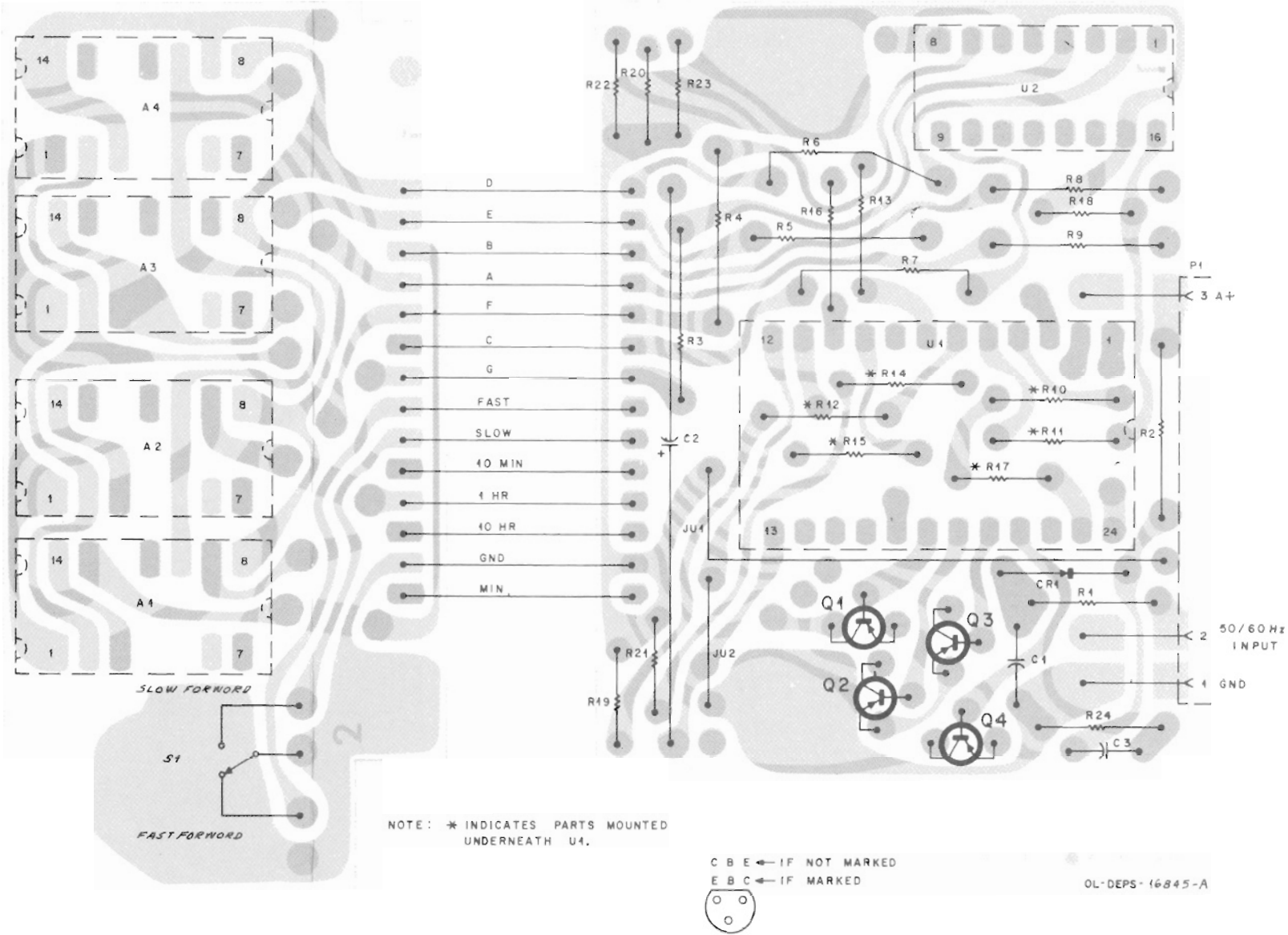
TRN6125A/TRN6703A Clock Kits PL-3337-D

A1 thru 4	48-84405E06	LIGHT EMITTING DIODE ARRAY; 7 segment
C1	21-82428B59	CAPACITOR, fixed: $\mu$ F: 200 V; unless otherwise stated
C2	23-83210A19	.01 $\pm$ 20%
C3	21-82428B26	500 +100-10%; 20 V .02 +80-20%
CR1	48-83654H01	SEMICONDUCTOR DEVICE, diode: (SEE NOTE) silicon
Q1 thru 4	48-869800	TRANSISTOR: (SEE NOTE) PNP: type M9800
R1	6-124C97	RESISTOR, fixed: $\pm$ 10%; 1/4 W; unless otherwise stated
R2	6-125D55	100k
R3 thru 9	6-125C41	2.7; 1/2 W
R10 thru 16	6-124C57	470; 1/2 W
R17 thru 23	6-185B99	2.2k
R24	6-124D12	47k; 1/8 W 390k
S1	40B83402K02	SWITCH, toggle; spdt, normally open
U1	51-84320A20	INTEGRATED CIRCUIT: type M2020
U2	51-84320A32	type 20A32

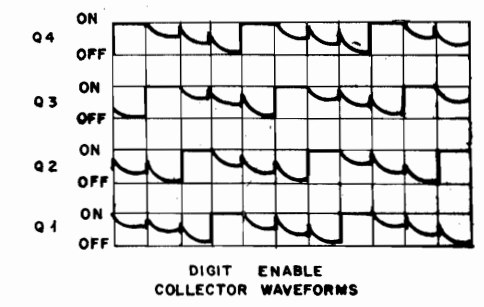
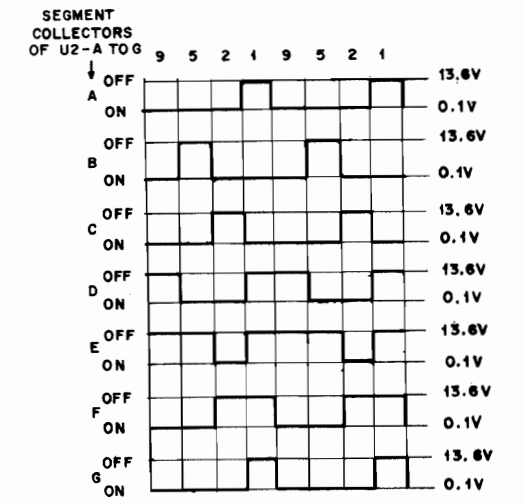
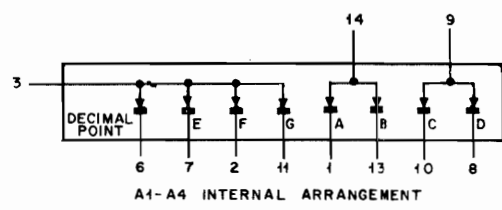
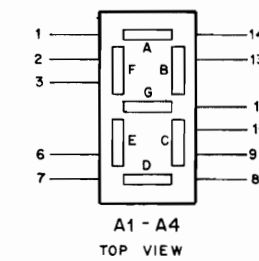
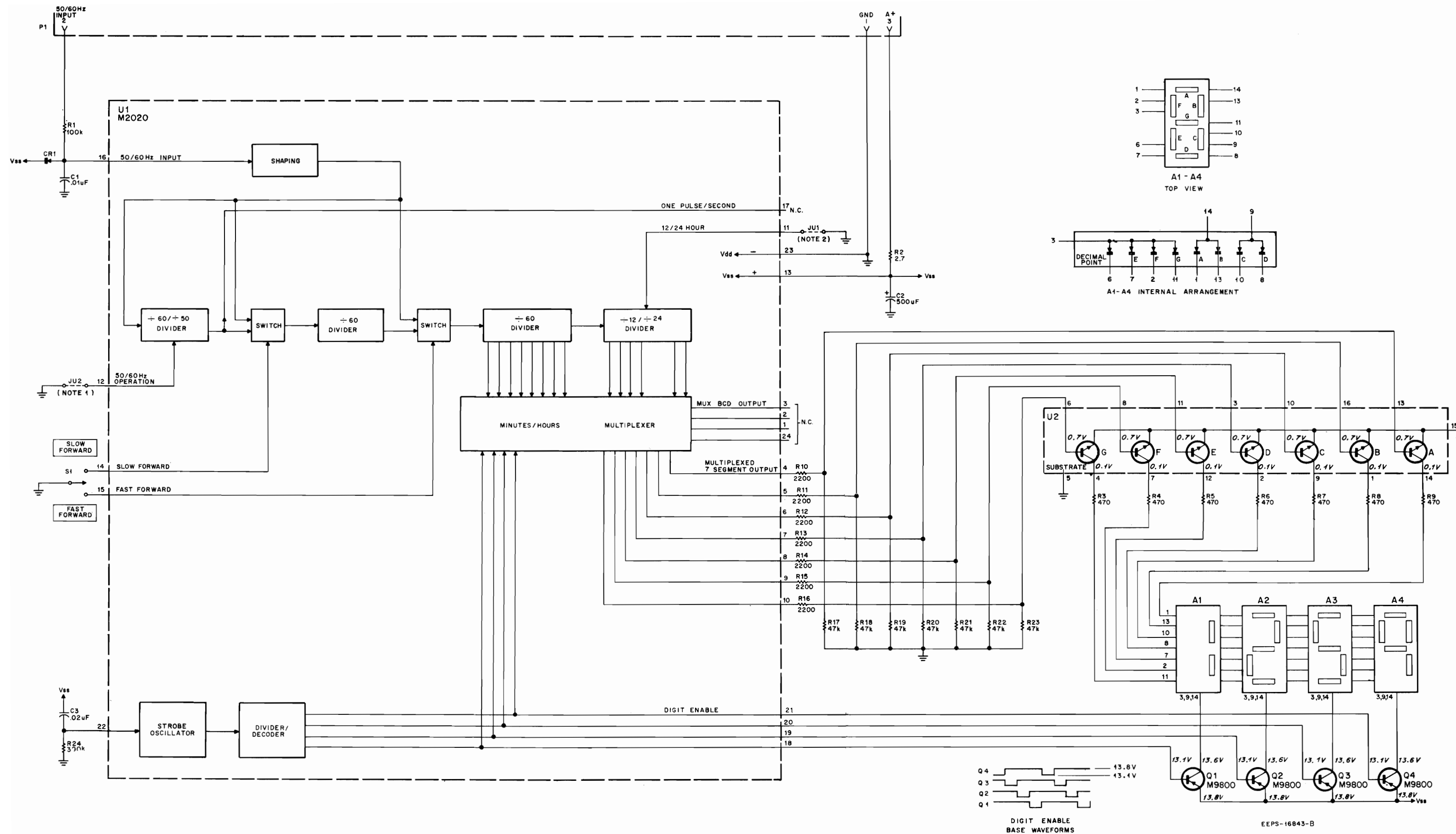
NON-REFERENCED ITEMS

9-83965G01	CONTACT, receptacle: 3 req'd.
7-82868K01	BRACKET
64-84217A04	FACEPLATE (TRN6125A)
64-84217A03	FACEPLATE (TRN6703A)
61-83066K01	LENS
43-84115C03	SPACER: 2 req'd.

NOTE:  
For optimum performance, replacement diodes and transistors must be ordered by Motorola part number.



SHOWN FROM COMPONENT SIDE



- NOTES:**
1. CUT JU2 FOR 50 Hz OPERATION.
  2. CUT JU1 FOR 24 HOUR CLOCK OPERATION.
  3. DC VOLTAGES ARE POSITIVE WITH RESPECT TO GROUND UNLESS OTHERWISE SPECIFIED.
  4. WAVEFORMS SHOWN FOR TIME 12:59 STROBE CYCLES 9 TO 5 TO 2 TO 1 AND THEN REPEATS.

TRN6124A/TRN6703A Clock Kits  
Schematic Diagram and Circuit Board Detail  
Motorola No. PEPS-17369-C  
(Sheet 2 of 2)  
2-24-84 GGI