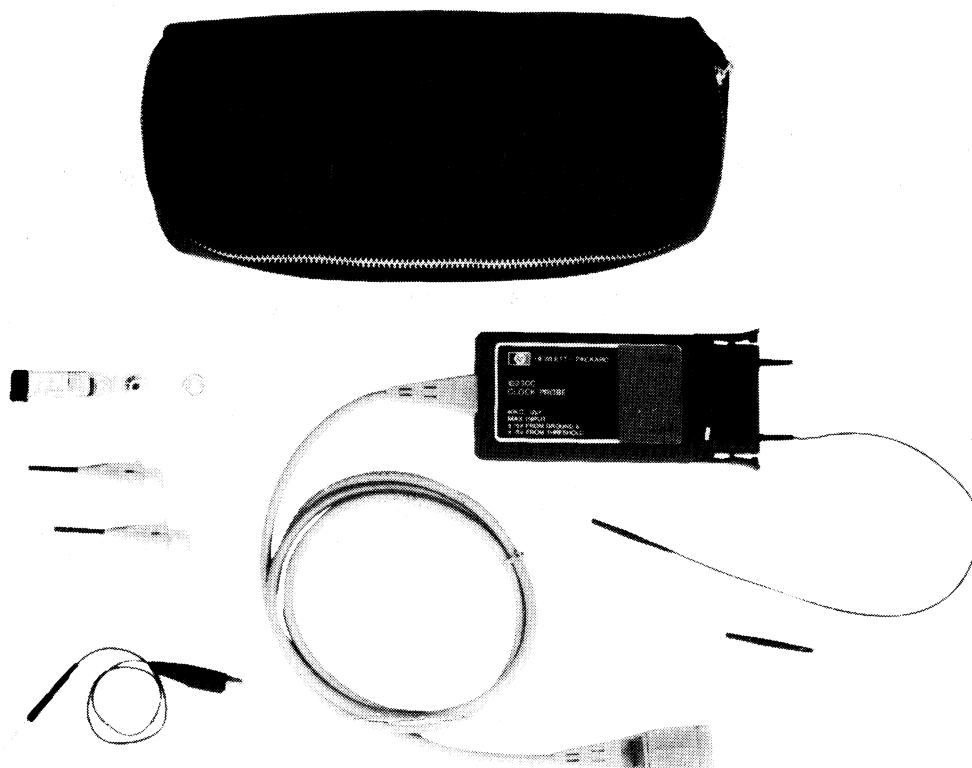




10230C-001-03-76

Figure 1. Model 10230C Clock Probe

## 1. DESCRIPTION.

2. The HP Model 10230C Clock Probe (figure 1) is an active probe providing clock signals for use with Hewlett-Packard Logic State Analyzers. Minimal loading of the circuit under test is accomplished by placing active circuitry in a compact pod located near the point of test. A variable threshold voltage from the logic state analyzer sets the threshold for logic recognition. The logic levels are translated to TTL levels and provided to the logic analyzer. Probe operating power is provided by the logic analyzer. All connections to the logic analyzer are made through a single 17-pin connector. Refer to table 1 for complete specifications and instrument compatibility for the 10230C.

## 3. ACCESSORIES SUPPLIED.

4. The 10230C is supplied with two 12-inch color coded connection leads, two detachable hook-type

circuit probes, and a vinyl carrying case. Each connection lead has a 0.025-inch female square-pin tip on the end for back-plane pin connections. The hook-type circuit probes have recessed male pins which can be attached to the lead ends. The other ends of the leads are attached to a connector clip that snaps onto the circuit pod for quick connection and disconnection.

5. A pod clip is also supplied with the clock probe. It is intended to be snapped to the coaxial cable behind the circuit pod. The clip can be attached to any secure fixture to support the weight of the circuit pod and remove the weight from the hook-type probe assemblies.

## 6. PRINCIPLES OF OPERATION.

7. Model 10230C circuitry (see figure 2) consists of a  $-5$  V supply, an averaging amplifier, a comparator, and a gating network.

Operating Note Part No. 10230-90908  
Microfiche Part No. 10230-90808

Table 1. Specifications

**PROBE INPUTS****INPUT RC:** 40  $\pm$ 3 k $\Omega$  shunted by  $\leq$ 14 pF.**INPUT BIAS CURRENT:**  $\leq$ 10  $\mu$ A.**INPUT THRESHOLD:** TTL, fixed at +1.45  $\pm$ 0.05 Vdc. Variable to  $\pm$ 10 Vdc.**MINIMUM INPUT SWING:** 0.5 V p-p +5% of threshold voltage.**MAXIMUM INPUT:** level;  $\pm$ 15 Vdc max. Swing; 15 V peak from threshold.**MINIMUM CLOCK PULSE WIDTH:** 20 ns.**INSTRUMENT COMPATIBILITY**

HP Model 1600A, Logic State Analyzer.

HP Model 1601A, Logic State Analyzer.

HP Model 1607A, Logic State Analyzer.

HP Model 1620A, Pattern Analyzer.

8. The  $-5$  V supply consists of C6, R17, VR1, and C7. R17 and VR1 form a voltage divider and regulator which reduces the  $-12.6$  V input to  $-5$  V. C6 and C7 bypass voltage variations to ground.

9. The output of the averaging amplifier (U1) is a dc voltage representing approximately one-fourth of the average of the input clock signal.

10. The Model 10230C accepts positive and negative input data up to 15 volts peak amplitude with threshold levels up to  $\pm$ 10 Vdc. R4 and R5 form a 6:1 voltage divider which scales input data swings to levels compatible with the input to comparator U2. The reference threshold voltage supplied by the logic analyzer has been scaled by a factor of 3 in the logic analyzer. An additional scaling factor of 2 is supplied by R9 and R10. For example, the threshold of TTL is typically +1.5 Vdc. The reference TTL threshold supplied by the logic analyzer is approximately +0.5 Vdc. The voltage supplied to pin 12 of U2 is approximately +0.25 Vdc.

11. Figure 2 shows a waveform timing chart for the clock-probe circuitry. In a static condition, U2 output pin 15 is LO (approximately  $-1.6$  V), and U2 output

pin 14 is HI (approximately  $-0.8$  V). When the input clock voltage level applied to pin 11 exceeds the threshold level present at pin 12, pin 15 goes HI and pin 14 goes LO. The pulse outputs of U2 are applied to U3 where clock slope commands SS and SI from the logic analyzer select the direction of the leading-edge transitions of PCLK and NCLK with respect to the input. U3 switches the outputs of U2 to either the line driver for PCLK (U4B) or the line driver for NCLK (U4A) as determined by control lines from the logic analyzer (SS and SI).

**12. MAINTENANCE.**

**13. PERFORMANCE TESTS.** The Model 10230C must be tested with the logic analyzer that the probe is used with. Refer to the following performance tests in the Logic Analyzer Operating and Service Manual:

INPUT RC TEST

INPUT BIAS CURRENT TEST

INPUT THRESHOLD TEST

INPUT LOGIC SWING TEST

MINIMUM CLOCK PULSE WIDTH TEST

**14. REPAIR.** When repairing PC Board A1, be careful to prevent breakage of small soldered wires where W1 attaches to A1.

**15. REPLACEABLE PARTS.** Table 2 lists the replaceable parts and the HP part number of each item. Figure 3 shows the location of each part.

16. To order a replaceable part from Hewlett-Packard, address the order to the nearest HP Sales/Service Office. Include the probe model number, reference designation of the part, and the HP part number. If a part is not listed, provide a complete description of the part, including function and location.

**NOTE**

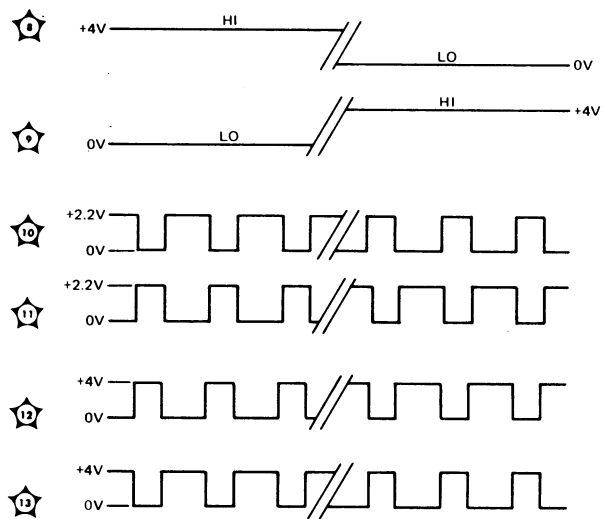
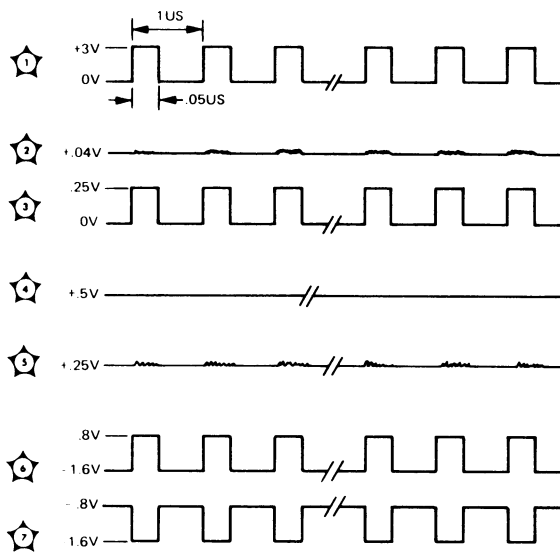
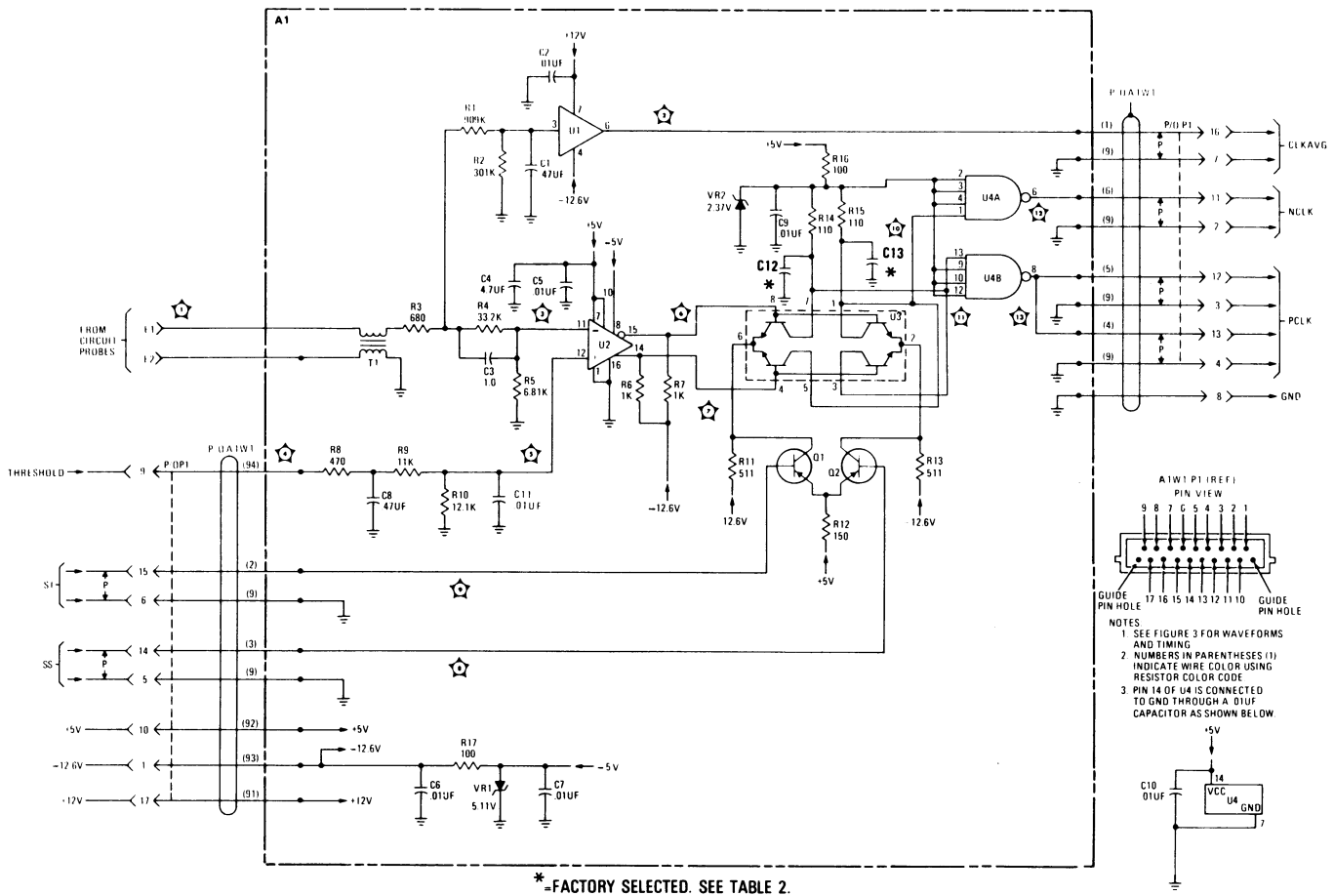
Board assembly A1 is not sold separately. To obtain a replacement, the entire probe unit (Model 10230C) must be ordered.

Table 2. Replaceable Parts

| Reference Designation | HP Part No. | Qty | Description                       | Mfr Code | Mfr Part No.   |
|-----------------------|-------------|-----|-----------------------------------|----------|----------------|
| A1C1                  | 0160-0174   | 2   | C:FXD CER 0.47 UF +80—20% 25 WVDC | 28480    | 0160-0174      |
| A1C2                  | 0160-3451   | 7   | C:FXD CER .01 UF +80—20% 100 WVDC | 28480    | 0160-3451      |
| A1C3                  | 0160-2236   | 1   | C:FXD CER 1 PF +—25 PF 500 WVDC   | 28480    | 0160-2236      |
| A1C4                  | 0180-0309   | 1   | C:FXD TA 4.7 UF +—20% 10 WVDC     | 56289    | 150D475X0010A2 |
| A1C5                  | 0160-3451   |     | C:FXD CER .01 UF +80—20% 100 WVDC | 28480    | 0160-3451      |
| thru<br>A1C7          |             |     |                                   |          |                |

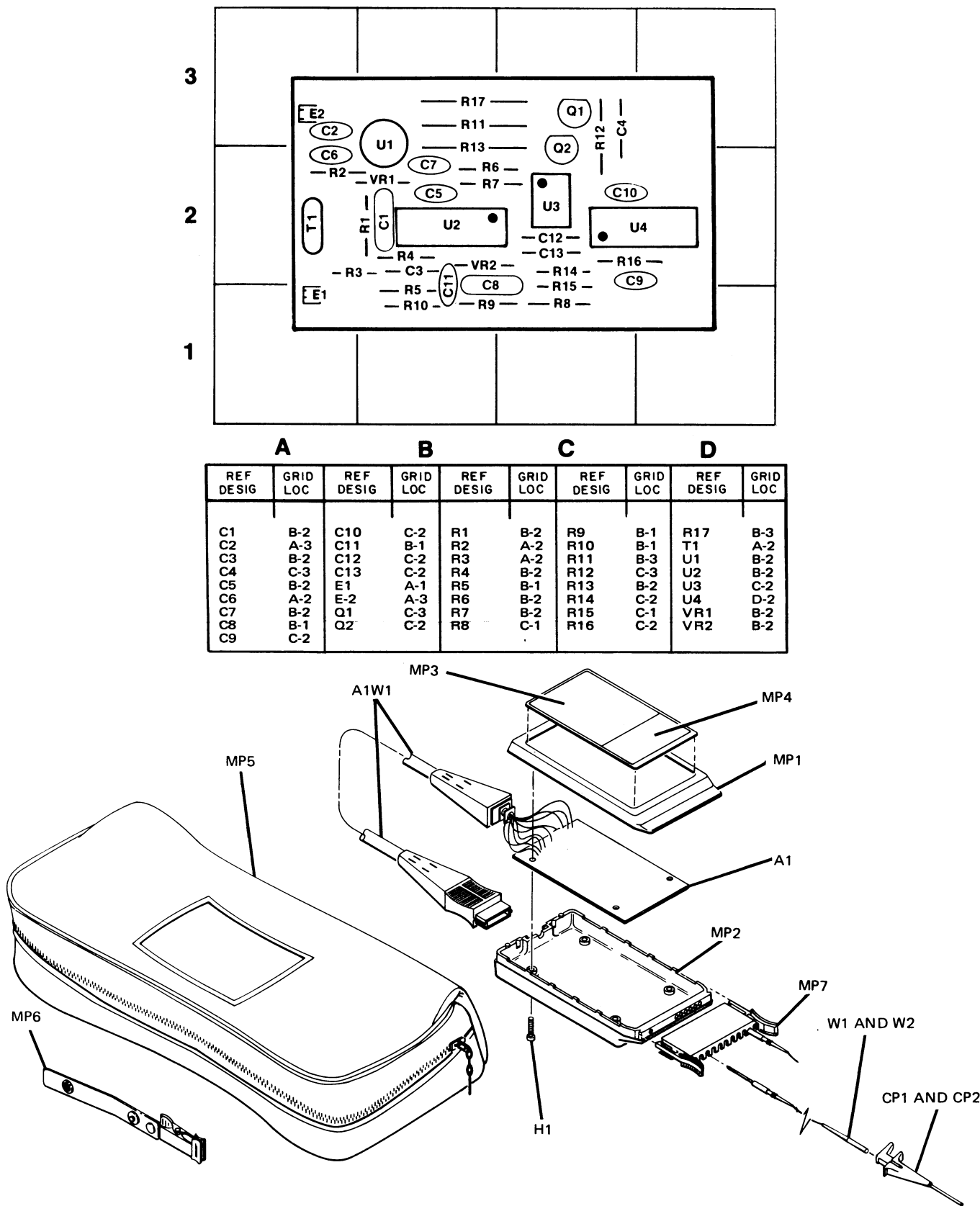
Table 2. Replaceable Parts (Cont'd)

| Reference Designation  | HP Part No. | Qty | Description                                   | Mfr Code | Mfr Part No.      |
|------------------------|-------------|-----|-----------------------------------------------|----------|-------------------|
| A1C8                   | 0160-0174   |     | C:FXD CER 0.47 UF +80—20% 25 WVDC             | 28480    | 0160-0174         |
| A1C9                   | 0160-3451   |     | C:FXD CER .01 UF +80—20% 100 WVDC             | 28480    | 0160-3451         |
| thru<br>A1C11<br>A1C12 |             | 2   | SELECTED WITH A1C13 FROM FOLLOWING CAPACITORS |          |                   |
|                        | 0160-2203   |     | C:FXD 91PF +—5% 300WVDC                       | 28480    | 0160-2203         |
|                        | 0140-0193   |     | C:FXD 82PF +—5% 300WVDC                       | 28480    | 0140-0193         |
|                        | 0160-0179   |     | C:FXD 33PF +—5% 300WVDC                       | 28480    | 0160-0179         |
| A1C13                  |             |     | SEE A1C12 ABOVE                               |          |                   |
| A1E1                   | 1460-1413   | 2   | SPRING:CONTACT                                | 28480    | 1460-1413         |
| A1E2                   | 1460-1413   |     | SPRING:CONTACT                                | 28480    | 1460-1413         |
| A1Q1                   | 1853-0016   | 2   | TRANSISTOR:PNP SI CHIP PD=300 MW              | 28480    | 1853-0016         |
| A1Q2                   | 1853-0016   |     | TRANSISTOR:PNP SI CHIP PD=300 MW              | 28480    | 1853-0016         |
| A1R1                   | 0757-0488   | 1   | R:FXD 909K 1% .125W F TUBULAR                 | 19701    | MFR-1/8, T-1      |
| A1R2                   | 0757-0476   | 1   | R:FXD 301 K 1% .125W F TUBULAR                | 28480    | 0757-0476         |
| A1R3                   | 0675-6811   | 1   | R:FXD 680 OHM 10% .125 W CC                   | 01121    | BB 6811           |
| A1R4                   | 0757-0454   | 1   | R:FXD 33.2 K 1% .125 W F TUBULAR              | 24546    | C41/8-T0-3322-F   |
| A1R5                   | 0757-0439   | 1   | R:FXD 6.81 K 1% .125W F TUBULAR               | 24546    | C41/8-T0-6811-F   |
| A1R6                   | 0684-1021   | 2   | R:FXD 1K 10% .25W CC TUBULAR                  | 01121    | CB 1021           |
| A1R7                   | 0684-1021   |     | R:FXD 1K 10% .25W CC TUBULAR                  | 01121    | CB 1021           |
| A1R8                   | 0684-4711   | 1   | R:FXD 470 OHM 10% .25 W CC                    | 01121    | CB 4711           |
| A1R9                   | 0757-0443   | 1   | R:FXD 11 K 1% .125W F TUBULAR                 | 24546    | C41/8-T0-1102-F   |
| A1R10                  | 0757-0444   | 1   | R:FXD 12.1 K 1% .125 W F TUBULAR              |          | C41/8-T0-1212-F   |
| A1R11                  | 0757-0814   | 2   | R:FXD 511 1% .5 W F TUBULAR                   | 30983    | MF7C1/2-T0-511R-F |
| A1R12                  | 0757-0715   | 1   | R:FXD 150 OHM 1% .25W F TUBULAR               | 24546    | 1/4-T0-151R       |
| A1R13                  | 0757-0814   |     | R:FXD 511 OHM 1% .5 W F TUBULAR               | 30983    | MF7C1/2-T0-511R-F |
| A1R14                  | 0757-0402   | 2   | R:FXD 110 OHM 1% .125 W F TUBULAR             | 24546    | C41/8-T0-111-F    |
| A1R15                  | 0757-0402   |     | R:FXD 110 OHM 1% .125 W F TUBULAR             | 24546    | C41/8-T0-111-F    |
| A1R16                  | 0684-1011   | 1   | R:FXD 100 OHM 10% .25 CC                      | 01121    | CB 1011           |
| A1R17                  | 0760-0024   | 1   | R:FXD 100 OHM 5% 1 W MO TUBULAR               |          | FR003C32          |
| A1T1                   | 10230-66001 | 1   | TRANSFORMER BALANCE                           | 28480    | 10230-66001       |
| A1U1                   | 1820-0158   | 1   | IC:VOLTAGE FOLLOWER                           | 12040    | LM302H            |
| A1U2                   | 1820-0919   | 1   | IC:DGTL COMPARTOR                             | 04713    | MC 1650L          |
| A1U3                   | 1858-0041   | 1   | IC:LINEAR TRANSISTOR ARRAY                    | 28480    | 1858-0041         |
| A1U4                   | 1820-0697   | 1   | IC:TTL DUAL 4-INPUT LINE DRIVER               | 01295    | SN74S140N         |
| A1VR1                  | 1902-0041   | 1   | DIODE:ZENER 5.11 V 5% .4 W MAX PD             | 04713    | SZ10939-98        |
| A1VR2                  | 1902-3002   | 1   | DIODE:ZENER 2.37 V 5% .4 W MAX PD             | 04713    | SZ10939-02        |
| A1W1                   | 10231-61618 | 1   | CABLE ASSY: 17 PIN                            | 28480    | 10231-61618       |
| CP1                    | 10230-62101 | 2   | PROBE ASSY:HOOK TYPE                          | 28480    | 10230-62101       |
| CP2                    | 10230-62101 |     | PROBE ASSY:HOOK TYPE                          | 28480    | 10230-62101       |
| H1                     | 0624-0306   | 4   | SCREW:TS 2-28 0.500 LG                        | 28480    | 0624-0306         |
| MP1                    | 5040-8125   | 1   | COVER:TOP                                     | 28480    | 5040-8125         |
| MP2                    | 5040-8008   | 1   | COVER:BOTTOM                                  | 28480    | 5040-8008         |
| MP3                    | 7120-5182   | 1   | LABEL:IDENT                                   | 28480    | 7120-5182         |
| MP4                    | 7120-5181   | 1   | LABEL:IDENT STICK-ON ORG/GRN                  | 28480    | 7120-5181         |
| MP5                    | 1540-0320   | 1   | CASE:CARRYING                                 | 28480    | 1540-0320         |
| MP6                    | 5040-0538   | 1   | HANGER:CIRCUIT POD                            | 28480    | 5040-0538         |
| MP7                    | 5040-0563   | 1   | CONNECTOR:CLIP                                | 28480    | 5040-0563         |
| W1                     | 5061-1215   | 1   | CABLE:PIN ADAPTER, BLACK                      | 28480    | 5061-1215         |
| W2                     | 5061-1216   | 1   | CABLE:PIN ADAPTER, YELLOW                     | 28480    | 5061-1216         |
| W3                     | 10231-61625 | 1   | CABLE:GROUND                                  | 28480    | 10231-61625       |



10230C-003-01-79

Figure 2. Model 10230C Schematic



10230C-002-10-76

Figure 3. Model 10230C Parts Identification