

Errata

Title & Document Type: 5326C/27C Frequency Counters Operating and Service Manual

Manual Part Number: 05326-90038

Revision Date: June 1974

About this Manual

We've added this manual to the Agilent website in an effort to help you support your product. This manual provides the best information we could find. It may be incomplete or contain dated information, and the scan quality may not be ideal. If we find a better copy in the future, we will add it to the Agilent website.

HP References in this Manual

This manual may contain references to HP or Hewlett-Packard. Please note that Hewlett-Packard's former test and measurement, life sciences, and chemical analysis businesses are now part of Agilent Technologies. The HP XXXX referred to in this document is now the Agilent XXXX. For example, model number HP8648A is now model number Agilent 8648A. We have made no changes to this manual copy.

Support for Your Product

Agilent no longer sells or supports this product. You will find any other available product information on the Agilent Test & Measurement website:

www.agilent.com

Search for the model number of this product, and the resulting product page will guide you to any available information. Our service centers may be able to perform calibration if no repair parts are needed, but no other support from Agilent is available.

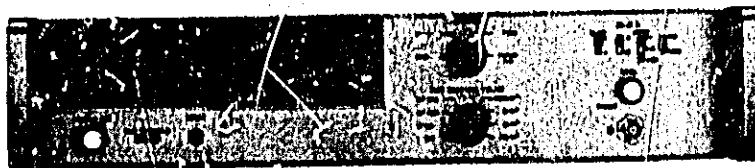


Agilent Technologies

OPERATING AND SERVICE MANUAL

FREQUENCY COUNTERS

5326C/5327C



HEWLETT  PACKARD

CERTIFICATION

The Hewlett-Packard Company certifies that this instrument was thoroughly tested and inspected and found to meet its published specifications when it was shipped from the factory. The Hewlett-Packard Company further certifies that its calibration measurements are traceable to the U.S. National Bureau of Standards to the extent allowed by the Bureau's calibration facilities, or to the calibration facilities of other International Standards Organization members.

WARRANTY AND ASSISTANCE

This Hewlett-Packard product is warranted against defects in materials and workmanship. This warranty applies for one year from the date of delivery. Hewlett-Packard will repair or replace products which prove to be defective during the warranty period provided they are returned to Hewlett-Packard. No other warranty is expressed or implied. We are not liable for consequential damages.

Service contracts or customer assistance agreements are available for Hewlett-Packard products that require maintenance and repair on-site.

For any assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.

OPERATING AND SERVICE MANUAL

FREQUENCY COUNTERS 5326C/5327C

SERIAL PREFIXES:

5326C — 1312A
5327C — 1312A

This manual applies to HP Model 5326C and HP Model 5327C having serial prefix number 1312A.

SERIAL PREFIXES NOT LISTED

For serial prefixes above 1312A (5326C and 5327C), a "Manual Changes" sheet is included with this manual. For serial prefixes below 1312A, refer to Section VII of this manual.

Copyright HEWLETT-PACKARD COMPANY 1971
5301 STEVENS CREEK BLVD., SANTA CLARA, CALIF, 95050

Printed: JUNE 1974

Manual Part No. 05326-90038
Microfiche Part No. 05328-90039

Printed in U.S.A.

HEWLETT  PACKARD

TABLE OF CONTENTS

Section		Page
I	GENERAL INFORMATION	1-1
	1-1. Description ..	1-1
	1-4. Identification	1-1
	1-6. Applications	1-1
	1-8. Options	1-1
	1-10. Equipment Supplied and Accessories Available	1-1
II	INSTALLATION	2-1
	2-1. Introduction	2-1
	2-3. Unpacking and Inspection	2-1
	2-5. Storage and Shipment	2-1
	2-6. Packaging	2-1
	2-6. Environment	2-1
	2-10. Rack Installation	2-1
	2-12. Power Connection	2-1
	2-13. Line Voltage	2-1
	2-15. Power Cable	2-2
	2-17. Remote Programming	2-2
	2-19. Front-Panel Controls	2-2
	2-23. Remote Programming Requirements	2-2
	2-25. Trigger Level Programming	2-2
	2-27. Adjusting the Display Time (Sample Rate Knob, plus FAST/NORM switch)	2-3
	2-31. Function Selection Programming	2-3
	2-33. Time Base Selection Programming	2-3
	2-35. Blanking Defeat	2-3
III	OPERATION	3-1
	3-1. Introduction	3-1
	3-3. Operating Modes	3-1
	3-5. Totalize Mode	3-1
	3-7. Frequency Mode	3-1
	3-9. Period Average Mode	3-1
	3-11. Ratio	3-1
IV	THEORY OF OPERATION	4-1
	4-1. Introduction	4-1
	4-3. Logic Symbols	4-1
	4-6. Gating and Logic	4-1
	4-8. Integrated Circuit Operation	4-1
	4-9. JK Master-Slave Flip-Flop	4-1
	4-11. Time Base Decade	4-2
	4-13. Open-Collector Gate	4-2
	4-15. Logic Levels	4-2
	4-17. Overall Counter Operation	4-2
	4-22. Frequency Mode	4-4
	4-24. Period Average Mode	4-4
	4-26. Totalize Mode	4-4
	4-28. Instrument Timing	4-4

TABLES OF CONTENTS (Continued)

Section		Page
V	MAINTENANCE	5-1
	5-1. Introduction	5-1
	5-3. Assembly Designations	5-1
	5-5. Test Equipment	5-1
	5-7. In-Cabinet Performance Check	5-2
	5-10. Trouble Isolation	5-2
	5-13. Repair	5-2
	5-15. Printed Circuit Component Replacement	5-2
	5-16. Replacing Integrated Circuits	5-2
VI	REPLACEABLE PARTS	6-1
	6-1. Introduction	6-1
	6-4. Ordering Information	6-1
VII	OPTIONS AND MANUAL CHANGES	7-1
	7-1. Introduction	7-1
	7-3. Manual Changes	7-1
	7-5. Newer Instruments	7-1
	7-7. Older Instruments	7-1
	7-9. Options	7-21
	7-11. Option 001, 8-Digit Display	7-21
	7-13. Option 002, Remote Programming	7-21
	7-15. Option 003, Digital Recorder Output	7-21
	7-17. Option 010, Oscillator Assembly A4 (05327-60036)	7-21
	7-19. Option 011, Oscillator Assembly A4 (10544-60011)	7-21
	7-21. Field Installation of Options	7-21
	7-22. Installation of Option 001, 8-Digit	7-21
	7-24. Installation of Option 002, Remote Programming	7-21
	7-26. Installation of Option 003, Digital Recorder Output	7-22
	7-28. Installation of Option 010 and 011, Oscillator Assemblies	7-22

LIST OF TABLES

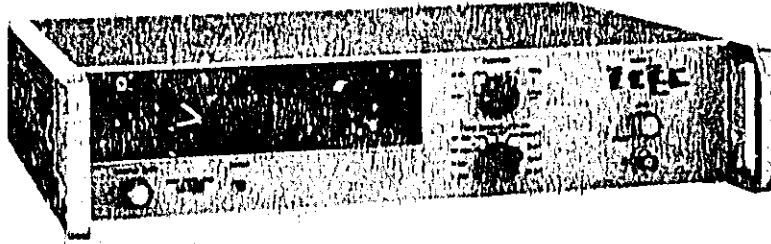
Table		Page
1-1.	Equipment Supplies	1-1
1-2.	Accessories Available	1-1
1-3.	Specifications	1-2
2-1.	115/230 Volt Conversion	2-2
4-1.	Truth Table	4-2
4-2.	Logic Levels	4-2
5-1.	Assembly Identification	5-1
5-2.	Recommended Test Equipment	5-1
5-3.	In-Cabinet Performance Check	5-3
5-4.	Adjustments	5-9
5-5.	Trouble Isolation	5-11
6-1.	Replaceable Parts List	6-3
6-2.	Manufacturers Code List	6-17
7-1.	A15 Replaceable Parts List	7-4
7-2.	A11 Parts List	7-5
7-3.	A18 Parts List (05327-60009)	7-6
7-4.	A18 Parts List (05327-60029)	7-7
7-5.	A18 Theory (05327-60009)	7-8

LIST OF FIGURES

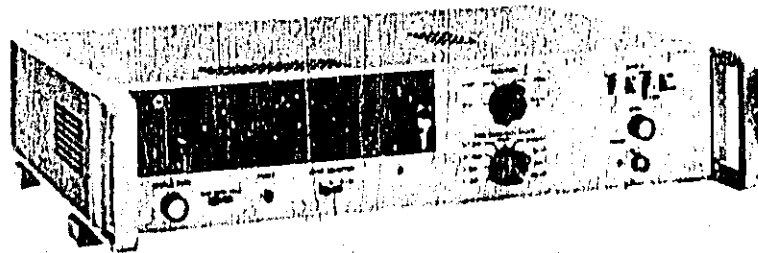
Figure		Page
1-1.	5326C/5327C Frequency Counters and Power Cord	1-0
3-1.	Front Panel Controls and Indicators	3-2
3-2.	Rear Panel Controls and Connectors	3-4
3-3.	Self-Check (For 5326C and 5327C)	3-5
3-4.	Frequency Measurements	3-7
3-5.	Period Average Measurements	3-8
3-6.	Totalizing Measurements	3-9
3-7.	Ratio Measurements	3-10
3-8.	Input B Measurements	3-11
4-1.	Gate Symbols and Logic Comparisons	4-1
4-2.	JK Flip-Flop	4-2
4-3.	Time-Base Decade 1820-0412	4-2
4-4.	Open-Collector Gate 1820-0327	4-2
4-5.	Functional Block Diagram	4-3
4-6.	Frequency Measurement Mode	4-4
4-7.	Period Average Measurement Mode	4-5
4-8.	Totalize Measurement Mode	4-5
4-9.	Instrument Diagram	4-6
6-1.	Panel Designations	6-2
7-1.	A15 Schematic	7-9
7-2.	A15 Component Locator	7-10
7-3.	A11 Schematic	7-11
7-4.	A11 Component Locator	7-12
7-5.	A9 Schematic	7-13
7-6.	A9 Component Locator	7-14
7-7.	A18 Schematic (05327-60009)	7-15
7-8.	A18 Component Locator (05327-60009)	7-16
7-9.	A18 Schematic (05327-60029)	7-17
7-10.	A18 Component Locator (05327-60029)	7-18
7-11.	A19 Schematic, Component Locator, and Parts List	7-19
7-12.	A18 Waveforms (05327-60009)	7-20
8-1.	Schematic Diagrams Notes	8-2
8-2.	Front and Rear Panel Designations	8-3
8-3.	5327C Top Internal (with Options)	8-4
8-4.	5326C Bottom Internal	8-5
8-5.	Integrated Circuit Diagrams	8-6
8-6.	A1/A4 Attenuator/Oscillator Board Assembly	8-15
8-7.	Input Amplifier Assembly	8-17
8-8.	Time Base Control Assembly	8-19
8-9.	Sample Rate Board Assembly	8-21
8-10.	A7 Function Control Board Assembly	8-25
8-11.	A8 Display Support Assembly	8-27
8-12.	A9 Display Assembly	8-29
8-13.	A10 Right Readout Board Assembly	8-31
8-14.	A11 Left Readout Board Assembly	8-33
8-15.	A15, A16 Regulator/Interconnect Board Assembly	8-35
8-16.	A18 High Sensitivity Prescaler Assembly	8-37
8-17.	Options 010 and 011 and A16 Interconnect Circuit Board	8-39
8-18.	Interconnect Diagram	Insert

Figure 1-1. 5326C/5327C Frequency Counters and Power Cord

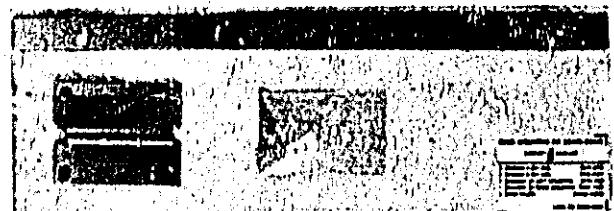
MODEL 5326C



MODEL 5327C



RACK MOUNT KIT



POWER CORD



SECTION I

GENERAL INFORMATION

1-1. DESCRIPTION

1-2. The Hewlett-Packard Models 5326C/5327C Frequency Counters measure frequency, period, period average, ratio, and perform totalizing and scaling functions. The models feature a 7-digit display (8 digits optional), 1 M Ω input impedance, and display storage. Decimal point and unit read-outs (annunciators) are displayed automatically with each operating selection. The input channel has an attenuator, trigger slope control, level control, and ac-dc coupling. The basic difference between the two models is the addition of the prescaler assembly in the 5327C. This assembly increases the frequency range from 50 MHz to 550 MHz.

1-3. Electrical and mechanical specifications are listed in Table 1-3.

1-4. IDENTIFICATION

1-5. Hewlett-Packard instruments have a 2-section, 9-digit serial number (0000A00000), located on the rear panel. The 4-digit serial prefix identifies instrument changes. The 5-digit number is the serial number of each instrument. If the serial prefix of your instrument differs from that listed on the title page of this manual, there are differences between this manual and your instrument. Lower serial prefixes are documented in Section VII, and higher serial prefixes are covered with manual change sheets included with the manual. If the change sheet is missing, contact the nearest Hewlett-Packard Sales and Service Office, listed on the inside rear cover of this manual.

1-6. APPLICATIONS

1-7. The 5326C model measures frequency from dc to 50 MHz (5327C to 550 MHz) and period average to 10 MHz. With the FUNCTION switch in the START position, the counter will totalize the number of input pulses. With an external signal applied to OSC jack and the switch set to EXT, the counter will display the ratio between EXT and INPUT A signals, scaled by the time base setting.

1-8. OPTIONS

1-9. Both models can be ordered with the following options: Option 001, 8-digit; Option 002, remote programming; and Option 003, digital recorder output.

1-10. EQUIPMENT SUPPLIED AND ACCESSORIES AVAILABLE

1-11. Table 1-1 lists equipment supplied, and Table 1-2 lists accessories available.

Table 1-1. Equipment Supplied

Description	HP Part No.
Detachable Power Cord, 7-1/2 feet (229 cm) long	8120-1378
Rack Mounting Kit	05326-60046

Table 1-2. Accessories Available

Description	HP Part No.
Digital Recorder	5055A
Interconnect Cable, Digital Recorder, 6 feet (183 cm)	562A-16C
50-ohm, BNC-to-BNC Coaxial Cable, 4 feet (122 cm)	10503-6001
Circuit Board Extender, 15-pin	5060-0049
Input Amplifier Circuit Board Extender	10532-60001
Circuit Board Extender, 18-pin	5060-2041
Extender Board Kit; includes two 5060-0049, and one each 5060-2041, and 10532-60001	10532A

Table 1-3. Specifications

INPUT CHANNEL A	Accuracy:
Range:	Direct: ± 1 count \pm time base accuracy
dc coupled: 0 — 50 MHz	Display:
ac coupled: 20 Hz — 50 MHz	kHz, MHz, or GHz with positioned decimal point
Sensitivity:	PERIOD AVERAGE
0.1 V rms sine wave	Range: 0 — 10 MHz
0.2 V peak-to-peak pulse	Periods Averaged: 1 — 10 ⁶ in decade steps
8 ns minimum pulse width	Frequency Counted: 10 MHz
Sensitivity can be decreased by 10 or 100 times, using the ATTEN switch.	Accuracy: ± 1 count \pm time base accuracy \pm trigger error*
Impedance:	Display:
1 M Ω shunted by less than 25 pF	ns, μ s with positioned decimal point
Dynamic Input Voltage Range:	RATIO
0.1 to 3 V rms ac thru attenuator setting.	Display:
± 5 V dc thru attenuator setting.	Any input function F_{ext} times Multiplier (M) M=1 to 10 ⁶ selectable in decade steps
Trigger Level:	Range:
PRESET to center triggering about 0 V or variable over the range of -3 V to +3 V thru attenuator setting. Trigger threshold band < 1.0 mV, referred to input at maximum frequency.	Any input function: See appropriate function section. F_{ext} : (External Oscillator Input) 100 Hz — 10 MHz
Overload Protection:	Mode:
250 V rms on all attenuator settings, except 25 V rms on X1 above 50 kHz.	Any input function
Slope:	Accuracy:
Independent selection of positive or negative slope.	Accuracy of selected input function \pm trigger error of F_{ext} :
START (Totalizing and Scaling)	*Trigger error is less than +0.3% of one period \div periods averaged for signals with 40 dBm or better signal-to-noise ratio and 100 mV rms amplitude.
Range: 0 — 10 MHz	FREQUENCY
Factor: 1 — 10 ⁶ in decade steps	Range: 0 — 50 MHz
Output: Rear Panel TIME BASE BNC	Input:
Display: Channel divided by scaling factor	Channel A (provides triggered frequency measurement)
Gate Times:	0.1 μ s to 10 s in decade steps

Table 1-3. Specifications (Continued)

INPUT CHANNEL B (5327C ONLY)	TIME BASE
Range:	Crystal Frequency: 10 MHz
Direct: 0 to 50 MHz. Prescaled: 0 to 550 MHz	Stability:
Sensitivity:	Aging Rate: <3 parts in 10 ⁷ /mo. Temperature: ≤±2.5 parts in 10 ⁶ , 0° to 50°C. Line Voltage: ≤±1 part in 10 ⁷ for 10% line voltage.
Direct: 15 mV rms. Prescaled: 25 mV rms.	Oscillator Output:
Impedance: 50Ω nominal.	10 MHz, TTL type output levels, 50Ω series impedance at rear panel BNC.
Maximum Input: 3.5 V rms; 5 V peak.	External Input:
Trigger Level: 3V	100 Hz — 10 MHz; 1 V rms into 1 kΩ.
Accuracy:	Time Base Output:
Direct: ±1 count ± time base accuracy Prescaled: ±1 count displayed* ± time base accuracy	Negative pulses, +3 V to 0 V (open circuit), typically 100 ns wide. In START output is INPUT A frequency divided by TIME BASE/MULTIPLIER switch setting. Available at rear panel BNC.
Display:	Gate Output:
MHz, kHz, or GHz with positioned decimal point	TTL level pulses; low while gate open, high while gate closed. Available at rear panel BNC.
GENERAL SPECIFICATIONS	
Display: 7 digits (8 optional)	Weight:
Blanking:	5326C: Net, 15 lb, 3 oz. (6, 9 kg). Shipping 18 lb, 1 oz. (8, 5 kg).
Suppresses display of unwanted zeros left of the most significant digit.	5327C: Net, 15 lb, 7 oz. (7, 0 kg). Shipping, 18 lb, 5 oz. (8, 3 kg).
Display Storage:	Dimensions:
Holds reading between samples. Rear panel switch overrides storage.	3-25/32" high by 16-3/4" wide by 11-1/4" long (88 by 425 by 286 mm).
Sample Rate:	Equipment Supplied:
FAST position: Continuously variable from less than 100 μs to approximately 20 ms. NORM position: Continuously variable from less than 20 ms to approximately 5 seconds. HOLD position: Display can be held indefinitely.	Power cord (7-1/2 ft.) and rack mounting kit
Overflow:	Accessories Available:
Neon indicates when display range is exceeded.	HP 10503A, 50Ω BNC Cable, 4 Ft. (122 cm). HP 10532A, Extender Board Kit containing 2 ea. 15-pin extender 5060-0049, 1 ea. 18-pin extender 5060-2041, and 1 ea. Amplifier Extender, 10532-60001.
Operating Temperature: 0° to 50° C	HP Cable 562A-16C (6 ft, 183 cm) to connect 5326C with Option 003 to HP 5050B or 5055A Digital Recorder.
*±10 counts of input frequency (±1 count displayed)	Option 001: 8-digit display
	Option: 002: Remote programming

Table 1-3. Specifications (Continued)

Controls: All front panel controls are single line programmable except:

NORM-CHK
FAST/NC RM Mode
Input Attenuators
AC/DC Input Signal Coupling

Control Signal: Single line control using either contact closure to ground, DTL or TTL drive on all lines except trigger level which is analog programmed (+3 to -3 Vdc).

Connector: Rear panel connector:
HP 1251-0085; Amphenol 57-40360-375.
(36-pin blue ribbon)

Mating Connector: HP 1251-0084; Amphenol 57-30360-375.

Options 003: Digital output (for numerals only)

Code: 4-line 1-2-4-8 BCD, "1" state high
"0" state +0.25V at -1 mA; "1" state: +5V
open circuit, 2.5 k Ω source impedance
nominal.

Print Command: +5 V to 0 Vdc coupled;
occurs at end of gate.

Storage: Buffer storage is provided so
BCD output is constant while next
measurement is being made.

Inhibit Input: Inhibits gate when instru-
ment's cycle time is less than the time
required for external equipment to
interrogate BCD output. Positive inhibit
+5 Vdc.

Connector: Rear panel connector:
HP 1251-0087; Amphenol 57-40500-375.
(60-pin blue ribbon).

Mating Connector: HP 1251-0086;
Amphenol 57-30500-375.

Option 010: Oscillator Assembly.

Crystal Frequency: 10 MHz
Type: TCXO
Aging Rate: $<1 \times 10^{-7}/\text{mo.}$
Temp. Stability: $<15 \times 10^{-7}$, 0° to 50°C,
Short Term Fluctuation: $<1 \times 10^{-9}$ rms*
(1 sec. avg.).

Warm-up: (room temp crystal).

Line Voltage: $<15 \times 10^{-4}$ (10% change).

Option 011: Oscillator Assembly.

Crystal Frequency: 10 MHz.
Type: Oven-controlled oscillator
Aging Rate: $<5 \times 10^{-10}/\text{day.}$
Temp. Stability: $<3 \times 10^{-9}$, 0° to 50°C,
Short Term Fluctuation: $<1 \times 10^{-11}$ rms
(1 sec avg.).

Warm-up: $<15 \times 10^{-9}$ in 15 min.

Line Voltage: $<5 \times 10^{-9}$ (10% change).

*Typical

SECTION II INSTALLATION

2-1. INTRODUCTION

2-2. This section contains information for unpacking, inspection, repacking, storage, and installation. The instructions for remote programming are also given in this section.

2-3. UNPACKING AND INSPECTION

2-4. If the shipping carton is damaged, ask that the carrier's agent be present when the instrument is unpacked. Inspect the instrument for damage (scratches, dents, broken knobs, etc.). If the instrument is damaged or fails to self-check (Self-Check Procedures, Figure 3-3), notify the carrier and the nearest Hewlett-Packard Sales and Service Office immediately (offices are listed at the back of this manual). Retain the shipping carton and padding material for the carrier's inspection. The sales and service office will arrange for the repair or replacement of your instrument without waiting for the claim against the carrier to be settled.

2-5. STORAGE AND SHIPMENT

2-6. Packaging

2-7. To protect valuable electronic equipment during storage or shipment always use the best packaging methods available. Your Hewlett-Packard Sales and Service Office can provide packing material such as that used for original factory packaging. Contract packaging companies in many cities can provide dependable custom packaging on short notice. Here are two recommended packaging methods:

a. **RUBBERIZED HAIR.** Cover painted surfaces of instrument with protective wrapping paper. Pack instrument securely in strong corrugated container (350 lb./sq. in. bursting test) with 2-inch rubberized hair pads placed along all surfaces of the instrument. Insert fillers between pads and container to ensure a snug fit.

b. **EXCELSIOR.** Cover painted surfaces of instrument with protective wrapping paper. Pack instrument in strong corrugated container (350 lb./sq. in. bursting test) with a layer of excelsior about 6 inches thick packed firmly against all surfaces of the instrument.

2-8. Environment

2-9. Conditions during storage and shipment should normally be limited as follows:

- a. Maximum altitude: 25,000 feet.
- b. Minimum temperature: -40°F (-40°C).
- c. Maximum temperature: $+167^{\circ}\text{F}$ ($+75^{\circ}\text{C}$).

2-10. RACK INSTALLATION

2-11. The counter is ready for bench operation as shipped from the factory. Additional parts necessary for rack mounting are packaged with the instrument. To convert to rack installation, proceed as follows:

- a. Remove tilt stand.
- b. Remove feet (press the foot-release button, slide foot toward center of instrument, and lift off).
- c. Remove adhesive-backed trim strips at front end of sides.
- d. Attach filler strip along bottom edge of front panel, using two screws on outer edges of filler strip. Omit the center screw.
- e. Attach flanges to front end of sides (larger corner notch toward bottom of instrument). Instrument is now ready to mount in standard rack.

CAUTION

Ambient temperature in rack during operation should not exceed 122°F (50°C). Be sure instrument position in the rack permits adequate air circulation and that nearby equipment does not discharge hot air directly on the instrument.

2-12. POWER CONNECTION

2-13. Line Voltage

2-14. The counter may be operated from either 115 or 230 volt ($\pm 10\%$) power lines. A slide switch on the rear panel permits quick conversion for operation from either voltage. Insert a narrow-blade screwdriver in the switch slot and slide the

Model 5326/27C
Installation

switch to the right for 230 volt operation ("230" marking exposed) or to the left for 115 volt operation ("115" marking exposed). The counter is supplied with a 115 volt fuse; be sure to replace this fuse for 230 volt operation (see Table 2-1).

CAUTION

Before plugging instrument into ac power line be sure LINE VOLTAGE switch is properly positioned.

Table 2-1. 115/230 Volt Conversion

Line Voltage Conversion	115 Volt	230 Volt
Slide Switch	Left (115)	Right (230)
AC Line Fuse	1.5 Ampere Slow-Blow (HP 2110-0304)	.8 Ampere Slow-Blow (HP 2110-0020)

2-15. Power Cable

2-16. The counter is equipped with a detachable 3-wire power cable. Proceed as follows for installation.

a. Connect plug (3-socket connector) to ac line jack at rear of instrument.

b. Connect plug (2-blade with round grounding pin) to 3-wire (grounded) power outlet. Exposed portions of instrument are grounded through the round pin on the plug for safety; when only 2-blade outlet is available, use connector adapter (HP part No. 1251-0048), then connect short wire from side of adapter to ground.

2-17. REMOTE PROGRAMMING

2-18. The following paragraphs describe remote programming requirements for the counter.

2-19. Front-Panel Controls

2-20. The following front-panel controls are programmable:

- a. FUNCTION
- b. TIME BASE/MULTIPLIER

2-2

- c. LEVEL control
- d. SAMPLE RATE and HOLD
- e. SLOPE
- f. RESET
- g. INPUT SELECTOR (5327C only)

2-21. The following front-panel controls are NOT programmable:

- a. AC/DC
- b. FAST/NORM
- c. ATTEN
- d. CHK

2-22. The trigger LEVEL control may be remotely programmed, or the front-panel LEVEL control may be used manually. When remote programming is used, the LEVEL control must be set to PRESET. Display time may be remotely programmed and/or the front-panel control may be used.

2-23. Remote Programming Requirements

2-24. All lines may be controlled by TTL or DTL signals or contact closure to ground J10(36), with the exception of the trig level (J10 pin 30), which is programmed by an analog level, and the sample rate hold (J10 pin 35). The sample rate hold line should NOT be pulled up to +5 V by less than 200Ω while programming. In order to remote program the counter, the following must be done:

- a. Set FUNCTION switch to any function except START or STOP.
- b. Ground the EXT line at J10 pin 17. Ground is available at J10(36).
- c. Select the desired FUNCTION (see paragraph 2-29).
- d. Select the desired TIME BASE (see paragraph 2-31).
- e. In addition to these, the following may be done:

Select the slope (+ or -) for the input channel by grounding the slope line for negative (-) and leaving it open for positive (+). This is done on J10 pin 28.

2-25. Trigger Level Programming

2-26. Before programming the trigger LEVEL control, place the knob in the PRESET position. Select the trigger level by putting a dc voltage that is between -3.0 and +3.0 volts onto the trigger level line at J10 pin 30. This voltage, times the attenuator, is the trigger level. Preset is programmed by leaving the pin open or grounded (grounding is preferable if noise exists on the remote program lines). The AC/DC and ATTEN switches on the front panel must be set manually, as they are not programmable.

2-27. Adjusting the Display Time (Sample Rate Knob, Plus FAST/NORM Switch).

2-28. Adjusting the display time, when remote programming, is accomplished by using one of the following methods:

a. Manually adjust the display time by using the front-panel controls, (SAMPLE RATE/FAST-NORM).

b. Set the SAMPLE RATE control full cw and the FAST/NORM/HOLD switch in NORM and connect a 1 MΩ variable resistor in series with 1 kΩ from +5 V to pin 35. This will give a display-time range of about 10 ms to 5 seconds. If a shorter time is desired, move the FAST-NORM-HOLD switch to FAST, which then gives a range of about 50 μs to 10 ms.

c. Set the SAMPLE RATE control full ccw, place FAST/NORM/HOLD switch in the FAST position, and hold the SAMPLE RATE HOLD line (J10 pin 35) to ground for the desired display time. The display continues for about 100 μs after the ground is released.

2-29. The sample rate disable line is used only with the start command to initiate a totalizing measurement. The sample rate disable command disables auto reset and enables continuous plus and minus transfer commands.

2-30. The computer inhibit command (when Low) inhibits the main gate from opening. This command may be sent from a computer to prevent the counter from making any further measurements. It may also be used as an external sample rate signal, since the command would determine the time between measurements. Auto reset and print command signals are not disabled by computer inhibit.

NOTE

DO NOT ground or otherwise program any of the remote programming lines if the unit is not being operated remotely (EXT line HIGH = not programmed remotely). The line should be left open or, at worst, be pulled up to +5 V by a source impedance of not less than 5 kΩ.

2-31. Function Selection Programming

2-32. To program the desired function, ground (<.7 volt) the proper line at J10 as follows:

STOP	Pin 32
START	Pin 1, 32
PERIOD AVERAGE	Pin 2
FREQ	Pin 6
ENABLE A*	Pin 8
ENABLE B*	Pin 9
ENABLE B+10*	Pin 18

NOTE

When switching between START and STOP, do not remove the ground from Pin 32.

2-33. Time Base Selection Programming

2-34. To program the Time Base, ground (<.7 volt) the proper line at J10:

.1 μs/1	Pin 19
1 μs/10	Pin 20
10 μs/10 ²	Pin 21
.1 ms/10 ³	Pin 22
1 ms/10 ⁴	Pin 23
10 ms/10 ⁵	Pin 24
.1 s/10 ⁶	Pin 25
1 s/10 ⁷	Pin 26
10 s/10 ⁸	Pin 27

2-35. BLANKING DEFEAT

2-36. This counter is designed to blank insignificant zeros (zeros to left of data). When blanking occurs, the digital recorder output for the blanked columns is BCD 15 (HHHH). To use this instrument with a digital-analog converter, it is necessary to defeat the blanking feature by repositioning the two jumpers on the A9 Display board. Move the jumpers to position 2, as shown in A9 Component Locator (Section VIII). This connects pin 10 of A9U7 and A9U8 to +5 V. Also, lift the pin 1 lead of A8U2 and connect pin 1 to ground (available at U2 pin 7).

*5327C Model only. Must also select function.

SECTION III OPERATION

3-1. INTRODUCTION

3-2. Section III contains the operating information that is needed to obtain the most effective performance from the instruments. This includes a general description of the operating modes, the function of all controls and indicators, a self-check procedure, and setup procedures for making basic measurements.

3-3. OPERATING MODES

3-4. The following paragraphs describe the operating modes of totalize, frequency, period average, and ratio.

3-5. Totalize Mode

3-6. START and STOP positions on the FUNCTION selector allow manual opening and closing of the counter's main gate. When the switch is in the START position, the counter does not measure frequency, but instead, counts the number of times the signal passes through the trigger point. The input signal, connected to the front-panel INPUT A or B jack, is divided by the MULTIPLIER switch setting prior to counting. For example, when the MULTIPLIER switch is set to the 1 position, every pulse is counted. When the switch is set to 10³, the counter registers every one-thousandth pulse. When the FUNCTION switch is set to STOP, the counter stops totalizing and holds the displayed count until the RESET switch is pressed or the MULTIPLIER switch setting is changed. If the FUNCTION switch is again set to START before a reset is generated, the count continues to totalize from the previous displayed value. With the FUNCTION switch set to START, the scaled input signal is available at the rear-panel TIME BASE OUTPUT jack. The unit indicators and decimal points are blanked during the totalize mode. The C light is on (in START), indicating counting is taking place.

3-7. Frequency Mode

3-8. In the frequency mode, the input signal connects to the front-panel jack and can be conditioned with the LEVEL, SLOPE, and ATTEN controls. Each cycle of the input signal produces an internal pulse; these pulses are counted while the main gate is open. The gate time is determined by the setting of the TIME BASE switch. The longer the gate is open, the better the resolution and accuracy.

Example: Measure 1 MHz with gate times of 0.1 ms and 10 ms.

$$1 \text{ MHz} = 1 \times 10^6 \text{ pulses/second}$$

SIGNAL	TIME BASE SWITCH	DISPLAY
1 × 10 ⁶ p/s	× 0.1 × 10 ⁻³ sec =	1.00 MHz
1 × 10 ⁶ p/s	× 10 × 10 ⁻³ sec =	1000.0 kHz

3-9. Period Average Mode

3-10. The period average mode allows multiple period averages to be made with input frequencies of up to 10 MHz. This mode is useful for making low frequency measurements where maximum resolution is desired. For example, if 10² period averaging is selected, the counter will display the average of 100 periods of the input frequency with the proper decimal point. The accuracy for period average is:

$$\pm \text{time base} \pm \frac{\text{Trigger error} \pm 1 \text{ count}}{\text{number of periods averaged}}$$

For single period measurements, set MULTIPLIER switch to the 1 position.

3-11. Ratio

3-12. The counter may be used to measure the ratio of two signals in either the frequency or period-average mode. By setting the rear-panel OSC INT-EXT switch to EXT, the counter will accept an external signal (F_{ext}) for use as the internal oscillator. This frequency should be 100 Hz to 10 MHz at 1 V rms minimum to 5 V peak maximum. A second signal (F_A), applied to either INPUT A or B jack, is used as the comparator signal. The MULTIPLIER switch controls the resolution of the display. For a ratio of frequencies,

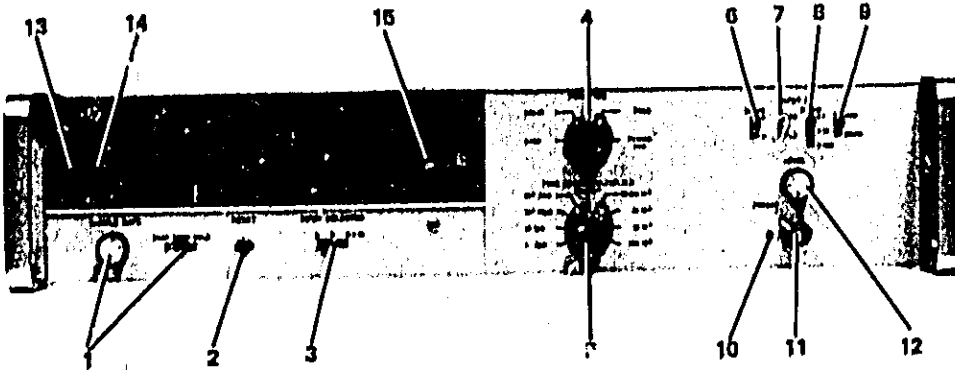
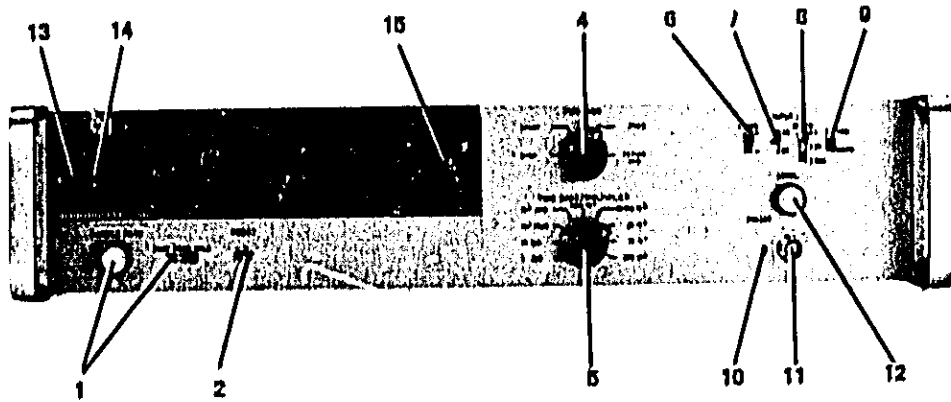
$$\text{the Ratio} = \frac{F_A}{F_{\text{ext}}} = \frac{\text{DISPLAYED NUMBER}}{\text{MULTIPLIER SETTING}} \quad \text{For a}$$

ratio of periods (P), the Ratio =

$$\frac{P_A}{P_{\text{ext}}} = \frac{F_{\text{ext}}}{F_A} = \frac{\text{DISPLAYED NUMBER}}{\text{MULTIPLIER SETTING}}$$

3-13. Disregard the units and decimal point; also, ignore any zeros to the left of the most significant digit. It makes no difference which signal is higher in frequency, as long as the two frequencies are within the specifications of their respective channels.

Figure 3-1. Front Panel Controls and Indicators

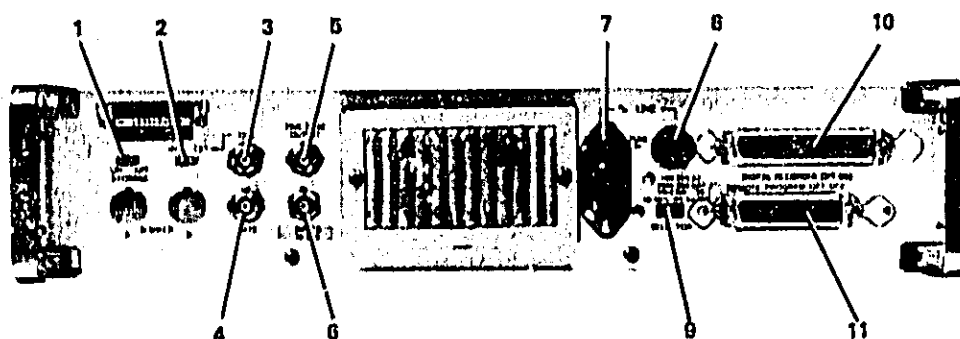


1. **SAMPLE RATE control.** Applies primary power. Works in conjunction with FAST-NORM-HOLD slide switch to control interval between measurements.
 - a. **FAST** — Varies display time from <math><100 \mu\text{s}</math> to >20 ms. STORAGE switch (rear panel) must be ON to use this mode.
 - b. **NORM** — Varies display time from <math><20 \text{ ms}</math> to >5 seconds.
 - c. **HOLD** — Holds display indefinitely.
2. **RESET pushbutton.** Resets display and internal count to zero and starts new measurement.
3. **INPUT SELECTOR switch (5327C).** Selects the desired input channel and counting method, direct or prescaled.
 - a. **A** — Counter measures signal applied to INPUT A.
 - b. **B** — Counter directly measures signal applied to INPUT B (rear panel). Channel is dc coupled to accept dc to 50 MHz at 15 mV rms (min).
 - c. **B+10** — Counter prescales signal applied to INPUT B (rear panel). Channel is dc coupled to accept 0-550 MHz at 25 mV rms (min).

Figure 3-1. Front Panel Controls and Indicators (Continued)

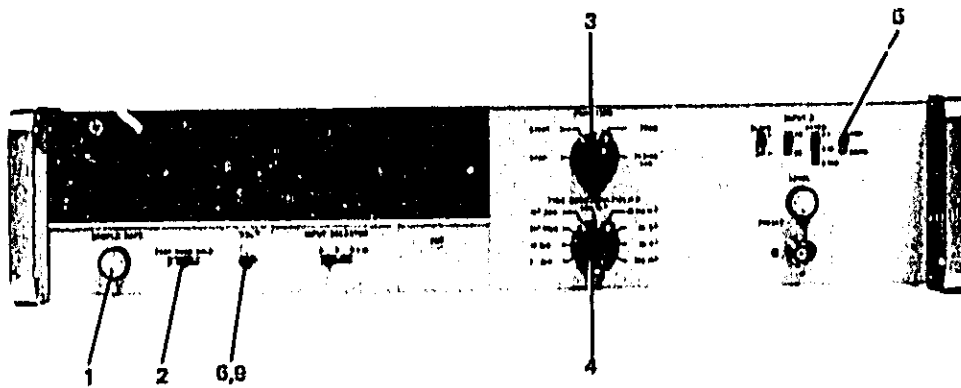
4. **FUNCTION selector.** Selects mode of operation. Blue lettering matches corresponding blue lettering on TIME BASE/MULTIPLIER switch. Select channel with INPUT SELECTOR switch (5327C).
 - a. **STOP, START** — Used during totalize mode to manually open and close counter's main gate and to turn scaled output on and off. Usable with any input channel.
 - b. **PERIOD AVG** — Sets counter to measure period of signal applied to any input channel. Use MULTIPLIER switch to select number of periods to be averaged.
 - c. **FREQ** — Sets counter to measure frequency applied to any input channel. Selecting gate time with TIME BASE switch determines resolution.
5. **TIME BASE/MULTIPLIER switch.** Works with the FUNCTION switch; and for each mode, it performs as follows:
 - a. **Totalize** — Determines scaling factor for input signal prior to counting.
 - b. **Frequency** — Opens the main gate for the selected amount of time.
 - c. **Period Average** — Used to select the number of periods to be averaged.
6. **SLOPE slide switch.** Permits triggering on positive or negative slope of input signal.
7. **AC-DC slide switch.** Used to select direct or capacitor coupling for input signal. Minimum input frequency on AC setting is 20 Hz.
8. **ATTEN (attenuator) slide switch.** Used to select attenuation for input signal. Used in conjunction with LEVEL control to set input triggering point. Maximum input; 250 V rms on all ranges except 25 V rms on X1 range above 50 kHz. Recommended input is 0.1 V rms to 2 V rms times attenuator setting.
9. **CHK-NORM (check-normal) switch**
 - a. **CHK** — substitutes internal 10 MHz oscillator signal for INPUT A signal.
 - b. **NORM** — counter performs measurements in normal manner.
10. **Trigger Lamp.** Lamp lights when input signal passes through amplifier trigger level.
11. **INPUT A jack.** Accepts signal for all measurements when INPUT SELECTOR switch is set to A position. Input impedance is 1 M Ω shunted by less than 25 pF, 10 M Ω when using ten-to-one divide probe.
12. **LEVEL control.** Used with ATTEN switch to determine trigger level. With X1 attenuator setting, level is variable ± 3 volts, on X10, ± 30 volts; and on X100, ± 300 volts.
13. **C (count) Annunciator light.** Lights when counter's main gate is open. For short-duration gate times, the annunciator circuits include a 50 ms one-shot MV to allow a visible flash to the C light.
14. **OF (overflow) Annunciator light.** Lights when accumulated count exceeds counter capacity.
15. *** (asterisk) light.** Indicates that proper units are not displayed with combination of function/time base selection. To interpret display, add a zero to right of least significant digit displayed on counter.

Figure 3-2. Rear Panel Controls and Connectors



1. STORAGE switch. When set to ON, counter displays previous measurement while new measurement is being made. In OFF position, allows continuous display of data being fed into decade dividers.
2. OSC switch. In INT position, counter operates in normal manner, using internal 10 MHz oscillator for the time base. In EXT position, permits use of external time base for increased stability, normalizing, or ratio measurements.
3. OSC jack. With INT-EXT switch set to INT, provides 10 MHz, >3 volt peak-to-peak output (no load), 50-ohm series impedance. With INT-EXT switch set to EXT, allows external time base input of 100 Hz to 10 MHz at 1 volt rms (5 V peak maximum).
4. GATE OUTPUT jack. Provides >2.4 volts output (no load) for external use (50Ω series resistance). Output is low (0 to 0.4 V) when counter's main gate is open.
5. TIME BASE OUTPUT jack. Provides negative going ± 3 V to 0 V pulses (open circuit), >50 nanoseconds wide. In totalize, output is the input frequency divided by MULTIPLIER setting.
6. INPUT B jack (5327C). Works with INPUT SELECTOR switch to measure signal directly or by prescaling. Trigger level is zero volts, and the signal is not conditioned by the LEVEL, SLOPE, or ATTEN controls.
7. AC LINE jack. IEC type with offset pin connected to chassis.
8. AC LINE fuse. 1.5 Ampere slow-blow fuse for 115 V, 0.8 Ampere slow-blow fuse for 230 V operation.
9. 115/230 volt switch. Insert narrow screwdriver and slide the switch to show desired voltage.
10. DIGITAL RECORDER connector (Option 003 only). 50-pin connector for digital recorder interconnection.
11. REMOTE PROGRAM connector (Option 002 only). 36-pin connector to allow remote control of counter modes and functions.

Figure 3-3. Self-Check (for 5326C and 5327C)



1. Set SAMPLE RATE control slightly clockwise out of OFF.
2. Set FAST-NORM-HOLD switch to NORM.
3. Set FUNCTION switch to STOP.
4. Set MULTIPLIER selector to 1.
5. Set CHK-NORM switch to CHK.
6. Press RESET button and check that counter's right-hand column displays a 0 and all other digits are blanked.
7. Set FUNCTION switch to START and check that counter totalizes and the C light is on. Check that OF light goes on as display overflows.
8. Set FUNCTION switch to STOP. Check that the C light goes out and display is held.
9. Push RESET button. Display should be zero.
10. Set FUNCTION switch to PERIOD AVG. Set MULTIPLIER switch (4) as shown in table below, and check for proper display.

Part of Figure 3-3. Self-Check (For 5326C/5327C) (Continued)

MULTIPLIER	DISPLAY (± 1 Count)			ANNUNCIATOR		
	5326/27C	5327C		5326/27C	5327C	
	A	B	B $\div 10$	A	B	B $\div 10$
1	.1	.0	.00	μ s	μ s	μ s
10	.10	.00	.000	μ s	μ s	μ s
10 ²	.100	.000	.0000	μ s	μ s	μ s
10 ³	100.0	.0	.00	ns	ns	ns
10 ⁴	100.00	.00	.000	ns	ns	ns
10 ⁵	100.000	.000	.0000	ns	ns	ns
10 ⁶	100.0000	.0000	.00000	ns	ns	ns
10 ⁷ Standard	00.00000	.00000	.000000	ns OF	ns	ns
10 ⁷ Option 001	100.00000			ns		
10 ⁸ Standard	0.000000	.000000	.0000	ns OF ¹	ns	*
10 ⁸ Option 001	00.000000			ns OF ¹		

¹Wait 10 seconds

11. Set FUNCTION switch to FREQ, set TIME BASE as shown in Table below and check for proper display.

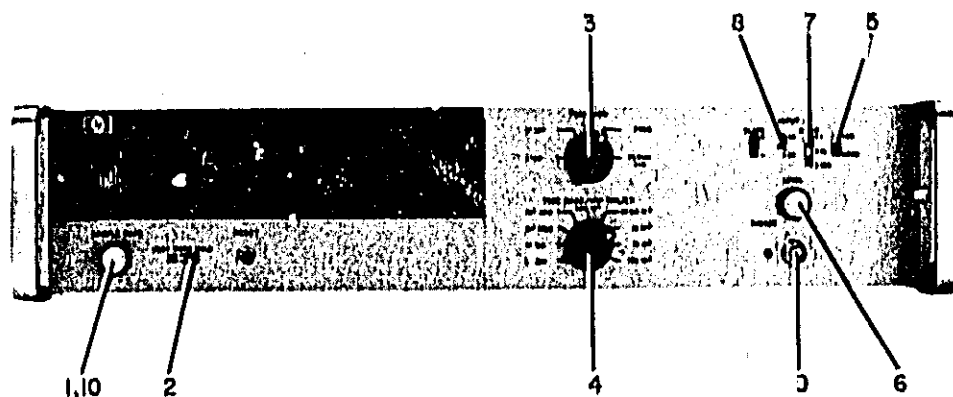
TIME BASE	DISPLAY (± 1 Count)			ANNUNCIATOR		
	5326/27C	5327C		5326/27C	5327C	
	A	B	B $\div 10$	A	B	B $\div 10$
.1 s	.01	.00	.0	GHz	GHz	GHz
1 s	10	0	.00	MHz	MHz	GHz
10 s	10.0	.0	0	MHz	MHz	MHz
.1 ms	10.00	.00	.0	MHz	MHz	MHz
1 ms	10.000	.000	.00	MHz	MHz	MHz
10 ms	10000.0	.0	0	kHz	kHz	kHz
1 s	10000.00	.00	.0	kHz	kHz	kHz
1 s Standard	0000.000	.000	.00	kHz OF	kHz	kHz
1 s Option 001	10000.000	.000	.00	kHz	kHz	kHz
10 s Standard	000.0000	.0000	.000	kHz OF ¹	kHz	kHz
10 s Option 001	0000.0000	.0000	.000	kHz OF ¹	kHz	kHz

¹Wait 10 seconds.

NOTE

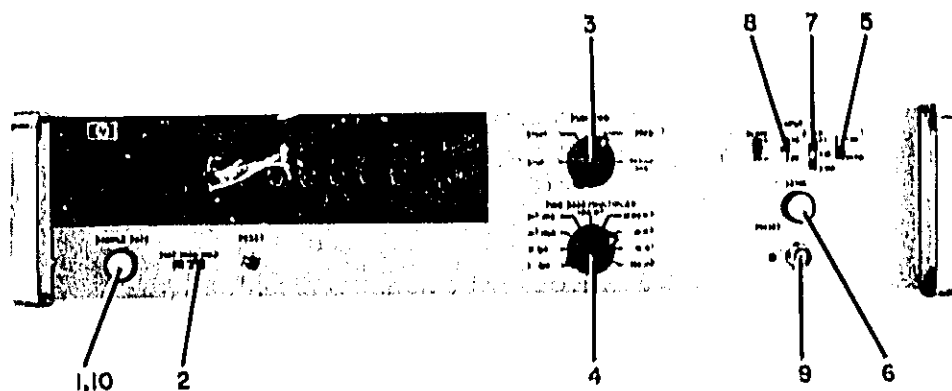
Push RESET after changing positions of INPUT SELECTOR switch.

Figure 3-4. Frequency Measurements



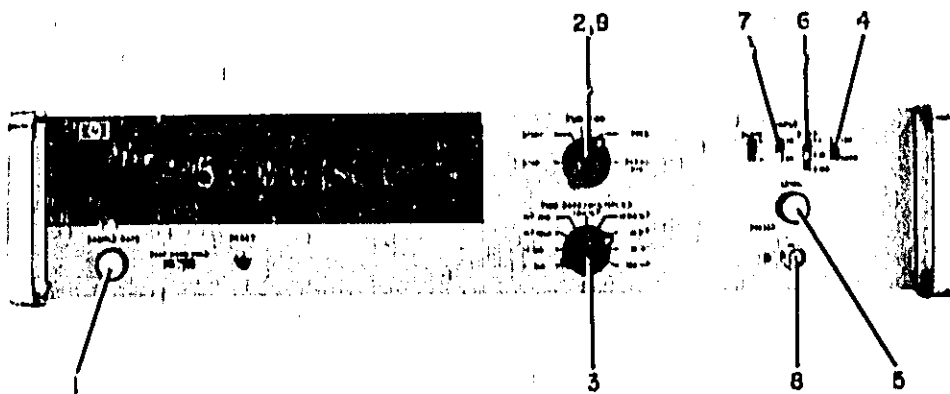
1. Set SAMPLE RATE control slightly clockwise out of OFF.
2. Set FAST-NORM-HOLD switch to NORM.
3. Set FUNCTION switch to FREQ.
4. Set TIME BASE switch for desired gate time.
5. Set CHK-NORM switch to NORM.
6. Set LEVEL control to PRESET for triggering at zero volts or to desired trigger level.
7. Set ATTEN switch to match input signal amplitude.
8. Set AC-DC switch to AC or DC.
9. Connect input signal (0 to 50 MHz) to INPUT A jack.
10. Adjust SAMPLE RATE control for convenient measurement interval. SAMPLE RATE and FAST/NORM control the delay between measurements.

Figure 3-5. Period Average Measurements



1. Set **SAMPLE RATE** control slightly clockwise out of OFF.
2. Set **FAST-NORM-HOLD** switch to **NORM**.
3. Set **FUNCTION** switch to **PERIOD AVG**.
4. Set **MULTIPLIER** to number of periods to be averaged.
5. Set **CHK-NORM** switch to **NORM**.
6. Set **LEVEL** control to **PRESET** for triggering at zero volts or to desired trigger level.
7. Set **ATTEN** switch to match input signal amplitude.
8. Set **AC-DC** switch to **AC** or **DC**.
9. Connect input signal (0 to 10 MHz) to **INPUT A** jack.
10. Adjust **SAMPLE RATE** control for convenient measurement interval.

Figure 3-6, Totalizing Measurements

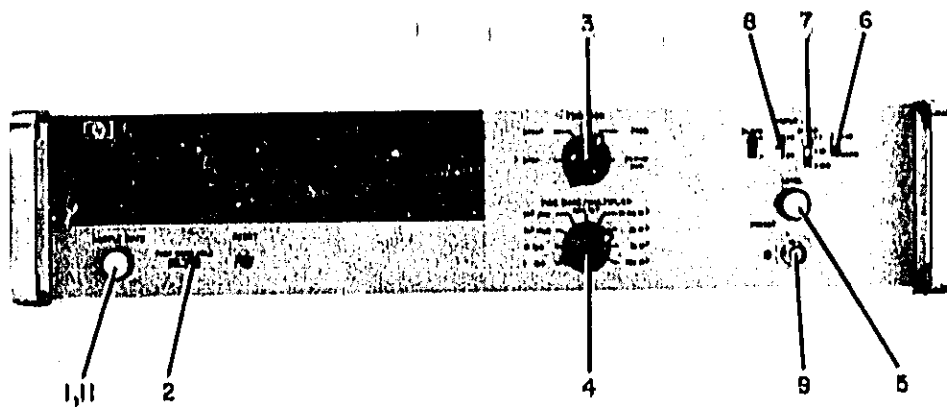


1. Set **SAMPLE RATE** control slightly clockwise out of OFF. **SAMPLE RATE** does not work in totalize, since the input signal controls the display time.
2. Set **FUNCTION** switch to STOP.
3. Set **MULTIPLIER** switch to input signal scaling factor. Input signal is divided by setting of switch.
4. Set **CHK-NORM** switch to NORM.
5. Set **LEVEL** control to desired trigger level or to PRESET for triggering at zero volts.
6. Set **ATTEN** switch to match input signal amplitude.
7. Set **AC-DC** switch as needed.
8. Connect input signal (0 to 10 MHz) to **INPUT A** jack.
9. Set **FUNCTION** switch to START. The displayed value will accumulate at a rate determined by the input signal divided by the **MULTIPLIER** switch setting.

NOTE

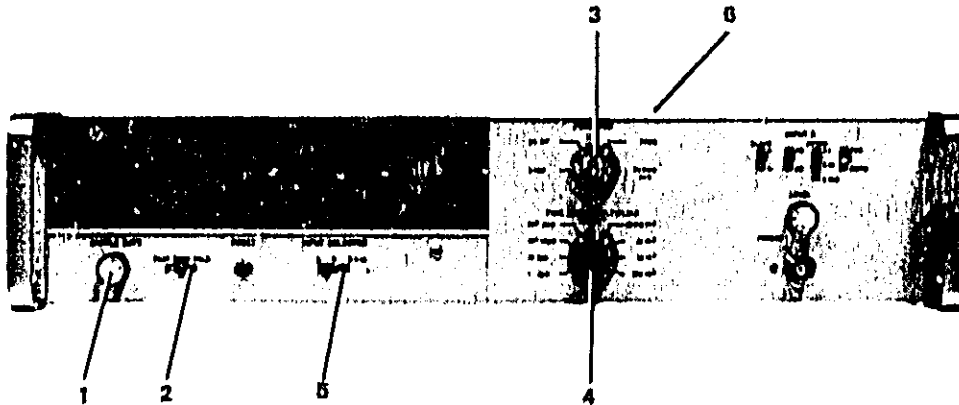
Input signal divided by **MULTIPLIER** switch setting is available at the rear-panel **TIME BASE OUTPUT** jack.

Figure 3-7. Ratio Measurements



1. Set SAMPLE RATE control slightly clockwise out of OFF.
2. Set FAST-NORM-HOLD switch to NORM.
3. Set FUNCTION switch to FREQ or PERIOD AVG.
4. Set MULTIPLIER switch to desired dividing factor.
5. Set INPUT A LEVEL control to desired trigger level or to PRESET for triggering at zero volts.
6. Set CHK-NORM switch to NORM.
7. Set ATTEN switch to match input amplitude.
8. Set AC-DC switch as needed.
9. Connect F_A (0 to 50 MHz) to INPUT A jack.
10. Set OSC INT-EXT switch (rear-panel) to EXT. Connect F_{ext} to OSC jack. F_{ext} can be 100 Hz to 10 MHz at 1 V rms (min) to 5 V peak maximum.
11. Adjust SAMPLE RATE control for convenient measurement interval.
12. Ratio = $\frac{F_A}{F_{ext}} = \frac{\text{Display}}{\text{MULTIPLIER}}$ for frequency measurements or
 Ratio = $\frac{P_A}{P_{ext}} = \frac{F_{ext}}{F_A} = \frac{\text{Display}}{\text{MULTIPLIER}}$ for the period average mode.
 Discard units and decimal point.

Figure 3-8. Input B Measurements



(5327C only)

1. Set SAMPLE RATE control slightly clockwise out of OFF.
2. Set FAST-NORM-HOLD switch to NORM.
3. Set FUNCTION switch to FREQ or PERIOD AVG.
4. Set TIME BASE/MULTIPLIER switch for desired resolution.
5. Set INPUT SELECTOR switch to B for direct counting or B+10 for prescaling by 10 of the input signal.
6. Connect input signal to INPUT B jack (rear panel). Input signal is dc to 50 MHz at 15 mV to 3.5 V rms for B position and 0 to 550 MHz at 25 mV to 3.5 V rms for B+10 position. Maximum input frequency for PERIOD AVG B+10 measurement is 100 MHz. Maximum input frequency for PERIOD AVG B measurement is 10 MHz.

SECTION IV THEORY OF OPERATION

4-1. INTRODUCTION

4-2. This section discusses the general operating principles of the instrument. Assembly description is covered in more detail in Section VIII, opposite each schematic diagram. Logic fundamentals are explained in Paragraph 4-3 through 4-16.

4-3. LOGIC SYMBOLS

4-4. Two states exist in the binary system, 1 and 0. In positive logic, the 1 state is more positive than the 0 state. High (H) and Low (L) are used to represent the 1 and 0 levels. **HIGH ALWAYS REPRESENTS THE MORE POSITIVE LEVEL, WHETHER IT BE POSITIVE OR NEGATIVE LOGIC.**

4-5. A circle at the input line of a logic symbol indicates that a low activates the function. Figure 4-1B shows that a low at both inputs produces a high output. A circle at the output line of a logic symbol indicates a low when activated, as shown in Figure 4-1C.

4-6. Gating and Logic

4-7. Figure 4-1A represents a basic AND gate. The output is high if all inputs are high. An AND

gate may have two or more inputs. Figure 4-1D represents a basic OR gate. The OR gate output is high if one or more of its inputs is high. An OR gate may have two or more inputs. An OR gate with a circle on the output is called a NOR gate. An AND gate with a circle on the output is called a NAND gate. An EXCLUSIVE NOR (Figure 4-1E) has two inputs; and the output will be low if one, but not both, of the inputs is high. The output will be high if the inputs are both low or both high.

4-8. INTEGRATED CIRCUIT OPERATION

4-9. JK Master-Slave Flip-Flop

4-10. The JK master-slave flip-flop is basically a bistable multivibrator. With simultaneous high inputs to J and K, before the clock pulse, Q and \bar{Q} will change states after the clock pulse. Refer to Figure 4-2 and Table 4-1. This circuit triggers on the trailing edge (negative transition) of the clock pulse. The set (S) and reset (R) inputs operate as follows: when a low is applied to set input, \bar{Q} goes low and Q goes high; when a low is applied to reset input Q goes low and \bar{Q} goes high. Set or reset can override all other inputs at any time.

Figure 4-1. Gate Symbols and Logic Comparisons

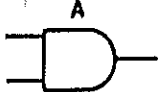

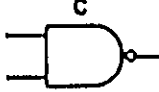
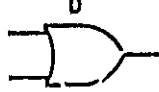
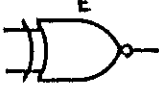
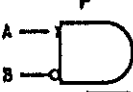
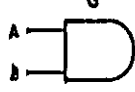
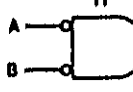
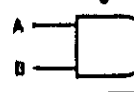
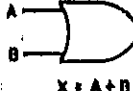
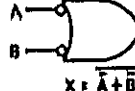
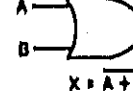
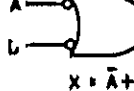
 AND			 INVERTED INPUT			 INVERTED OUTPUT			 OR			 EXCLUSIVE NOR		
 $X = \overline{A \cdot B}$			 $X = A \cdot B$			 $X = \overline{A \cdot B}$			 $X = \overline{A \cdot B}$					
 $X = A + B$			 $X = \overline{A + B}$			 $X = \overline{A + B}$			 $X = \overline{A + B}$					
A	B	X	A	B	X	A	B	X	A	B	X			
H	H	H	H	H	H	H	H	L	H	H	L			
H	L	H	H	L	L	H	L	L	H	L	H			
L	H	H	L	H	L	L	H	L	L	H	H			
L	L	L	L	L	L	L	L	H	L	L	H			

Figure 4-2. JK Flip-Flop

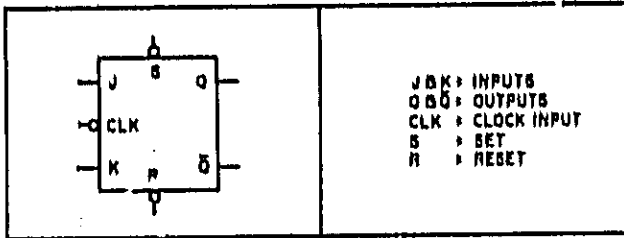


Table 4-1. Truth Table

t_n		$t_n + 1$		t_n = Before clock pulse
J	K	Q	\bar{Q}	$TN + 1 =$ After clock pulse
L	L	Q_n	\bar{Q}_n	If J = L and K = L, then Q and \bar{Q} will not change from what they were before the clock pulse.
H	L	H	H	If J = H and K = L, then Q will be H and \bar{Q} will be L after the clock pulse.
L	H	L	H	If J = L and K = H, then Q will be L and \bar{Q} will be H after a clock pulse.
H	H	Q_n	\bar{Q}_n	If J = H and K = H before the clock pulse, then after the clock pulse Q and \bar{Q} will change states.

4-11. Time-Base Decade

4-12. In the reset state, Carry Output (CO) (see Figure 4-3) is high and, if the Gate input (G) is low, Gated Output (GO) is low. Ten pulses on the Gate input produce a negative transition at the Gated Output. If the G input is high, GO is open-circuited, regardless of the count. The Carry Output gives a positive transition after 10 pulses.

4-13. Open-Collector Gate

4-14. The output of an open-collector gate can be paralleled with gates of the same type to perform a wire-OR function, as shown in Figure 4-4. When the outputs are tied to the same line, any one of the gates can pull the line low without damaging itself.

Figure 4-3. Time-Base Decade 1820-0412

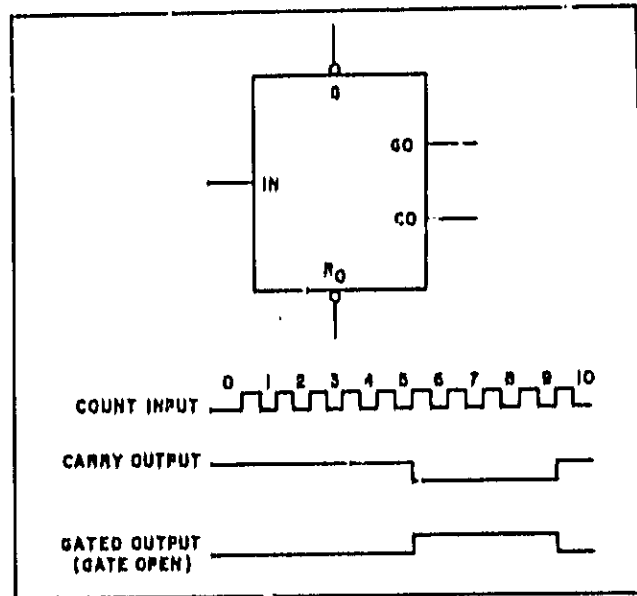
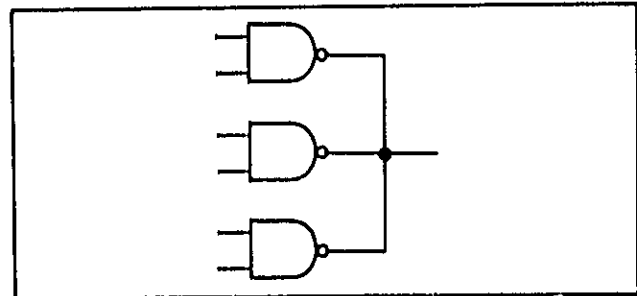


Figure 4-4. Open-Collector Gate 1820-0327



4-15. Logic Levels

4-16. This counter uses three types of logic: TTL (transistor-transistor logic), ECL (emitter-coupled logic), and DTL (diode-transistor logic). See Table 4-2 for specific logic levels.

Table 4-2. Logic Levels

Type	H (Min)	L (Max)	Trigger	Supply
ECL	-7 V	-1.4 V	-1.2 V	-5.0 V
TTL	2.4 V	0.4 V	1.5 V	5.0 V
DTL	2.6 V	0.4 V	1.5 V	5.0 V

4-17. OVERALL COUNTER OPERATION

4-18. The signal connected to INPUT A is conditioned by the front-panel switches of the Attenuator Assembly. These switches set the operating conditions for trigger level, coupling, and the required slope. The Input Amplifier converts the signal

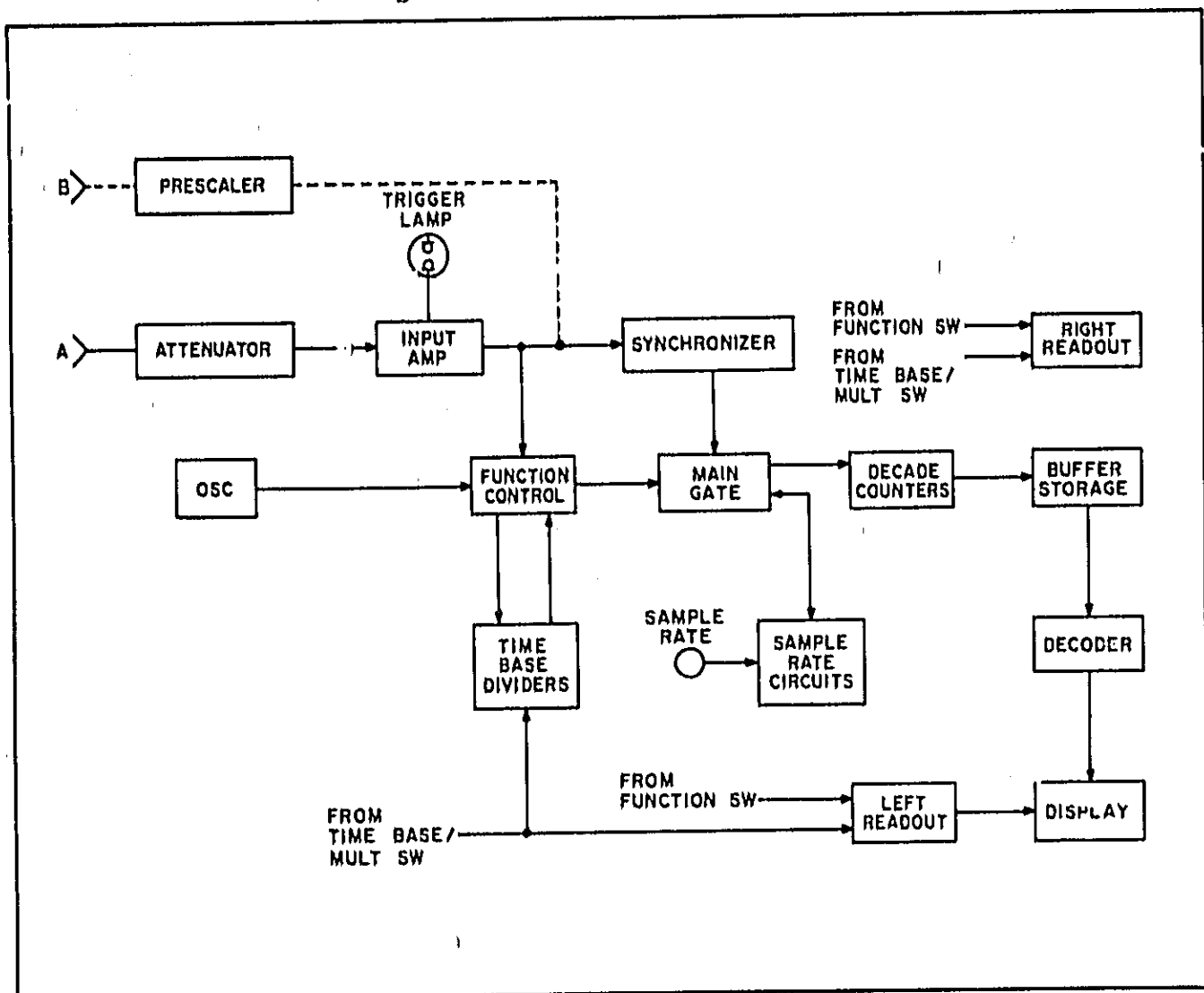
into narrow pulses for more efficient usage throughout the counter (Figure 4-5). In the 5327C, INPUT B provides an alternate path through the Prescaler Assembly, which divides the signal by 10 or passes it directly to the Function Control. The path taken is determined by the setting of the front panel INPUT SELECTOR switch.

4-19. The Function Control accepts both the input signal and the 10 MHz internal oscillator pulses and routes them in accordance with the mode of operation being used. One of these signals is sent to the Time Base Assembly, which divides the signal as determined by the front panel TIME BASE/MULTIPLIER switch. The first and last pulse of the divided signal controls the length of time the main gate is open. During this time, the other signal is sent directly to the main gate for totalizing in the decade counters and is subsequently displayed. The synchronizer prevents the main gate from opening unless an input signal is present.

4-20. The sample rate circuits control the interval between measurements. When the main gate closes, these circuits provide a delay, as controlled by the front panel SAMPLE RATE controls. When the sample rate period has elapsed, a reset pulse is generated to reset the counter and start a new measurement.

4-21. The signal to be counted, either the internal oscillator or input signal, passes through the main gate to the decade counters. The buffer storage registers store the BCD count before it is translated into a decimal equivalent and displayed on the front panel. Also displayed on the front panel are the units of measurement and the decimal point. The left and right readout assemblies contain the unit indicators and the logic necessary to position the decimal point.

Figure 4-5. Functional Block Diagram



4-22. Frequency Mode

4-23. Frequency is defined as the number of periodic events per unit of time. The counter, therefore, measures an unknown signal (COUNT) for a known length of time (Figure 4-6). The 10 MHz internal oscillator provides the known time and controls the opening of the main gate. The Time Base Assembly divides the oscillator frequency by powers of 10 to open the main gate from 10^{-7} seconds to 10 seconds. The longer the gate is open, the more pulses of the unknown frequency are counted and, therefore, the better the resolution and accuracy.

4-24. Period Average Mode

4-25. The MULTIPLIER switch selects the number of periods to be averaged (Figure 4-7). The Time Base Assembly counts the number of periods selected with the switch and holds the main gate

open until this count is complete. The Decade Counter totalizes the oscillator pulses while the main gate is open.

4-26. Totalize Mode

4-27. The main gate can be manually held open with the front-panel START/STOP positions of the FUNCTION switch. With the switch in the START position (Figure 4-8), the counter totalizes the number of times the signal passes through the trigger point. In the case of a typical frequency measurement, this would be a totalizing of the periods. Before the signal is counted, it is divided in the Time Base Assembly by the setting of the MULTIPLIER switch.

4-28. Instrument Timing

4-29. In addition to the timing diagrams relating directly to the individual measurements, Figure 4-9 shows other counter pulses necessary for operation.

Figure 4-6. Frequency Measurement Mode

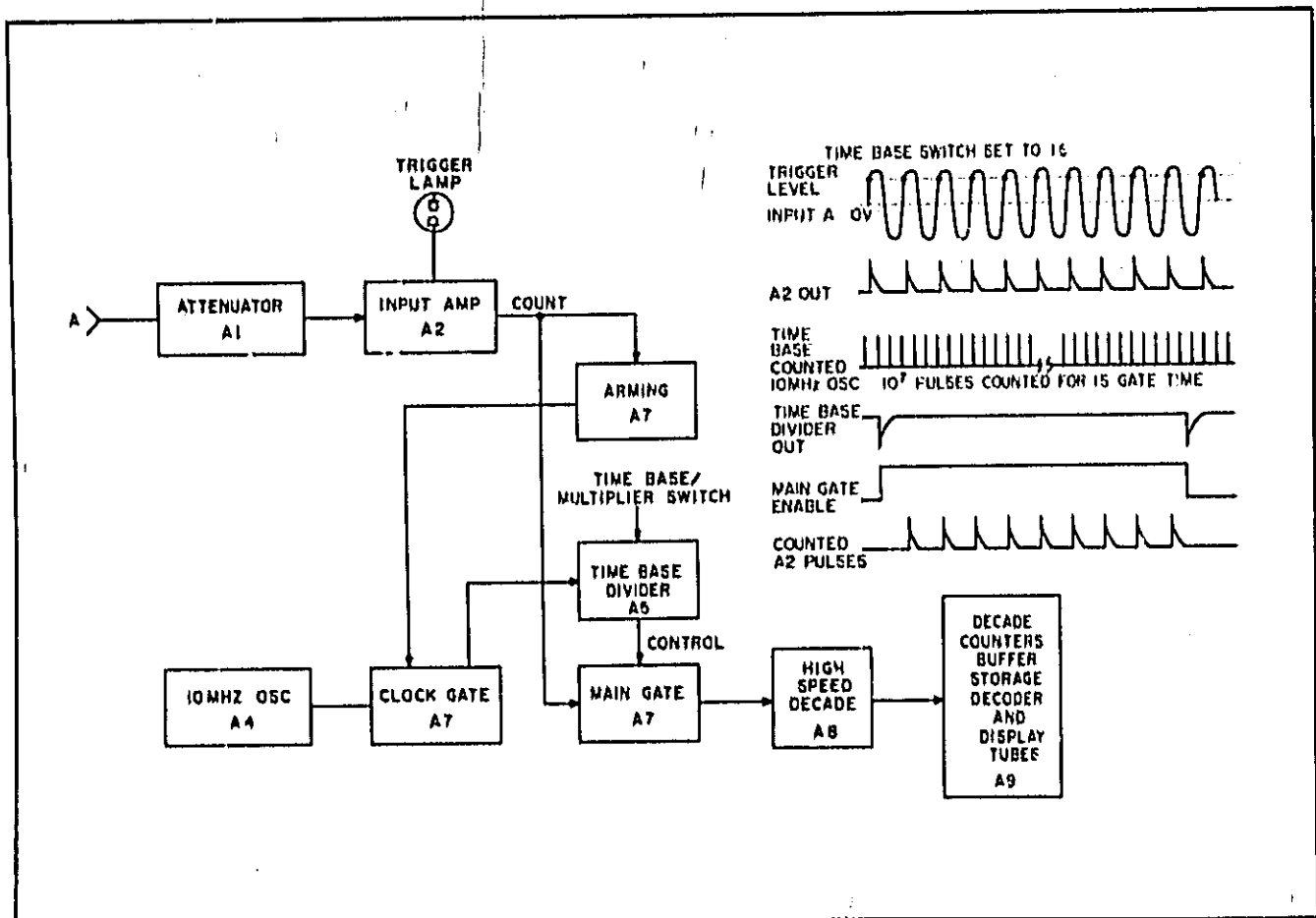


Figure 4-7. Period Average Measurement Mode

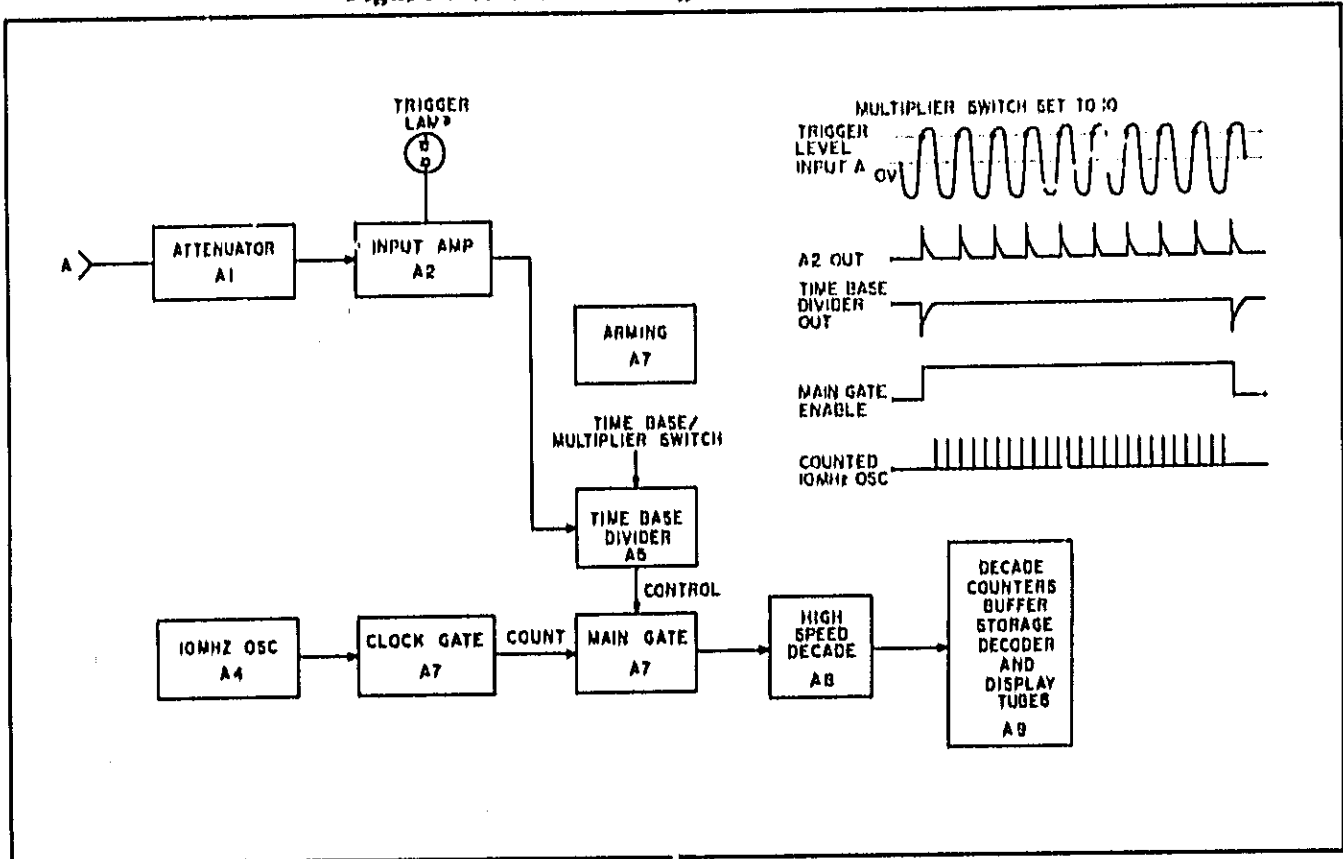


Figure 4-8. Totalize Measurement Mode

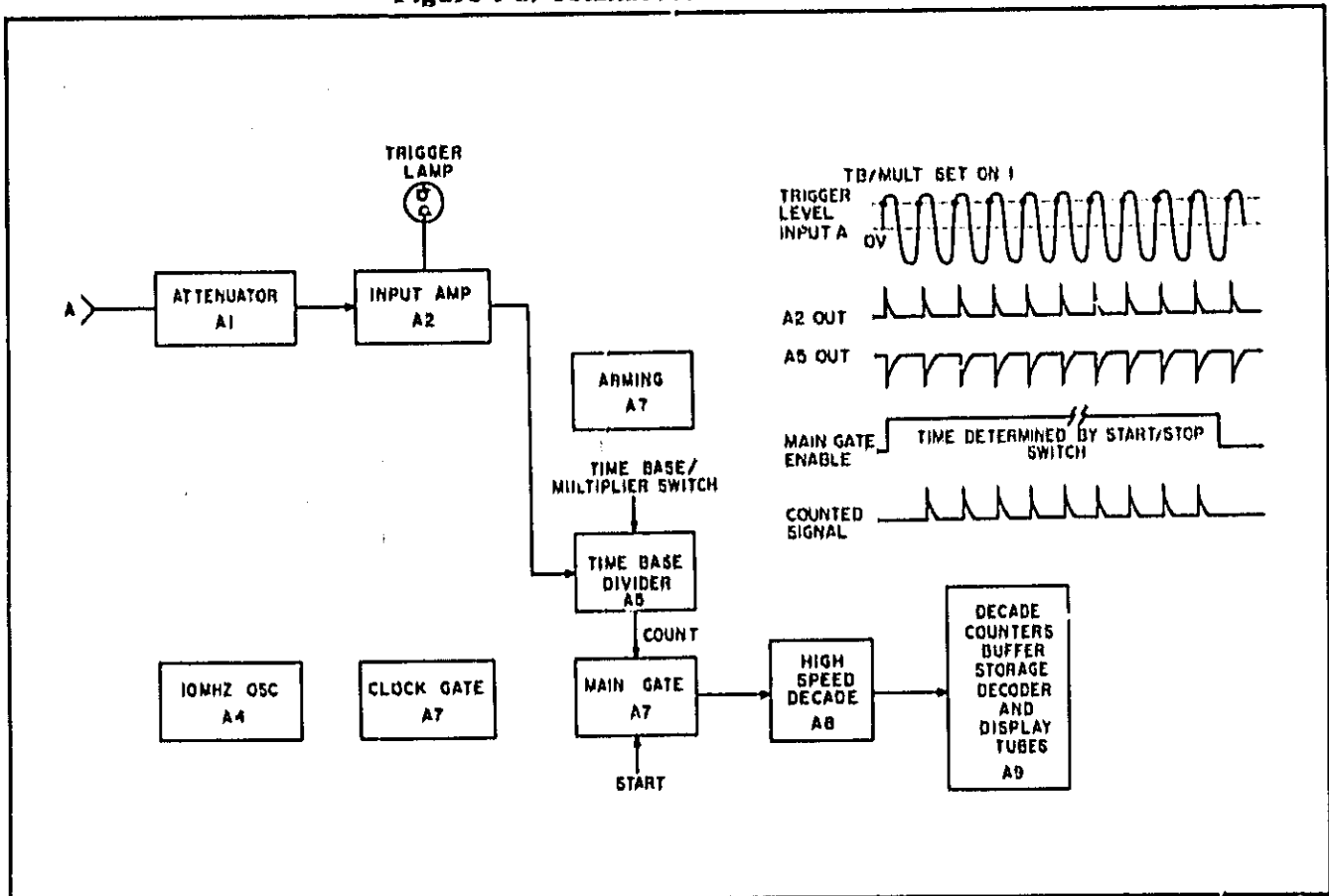
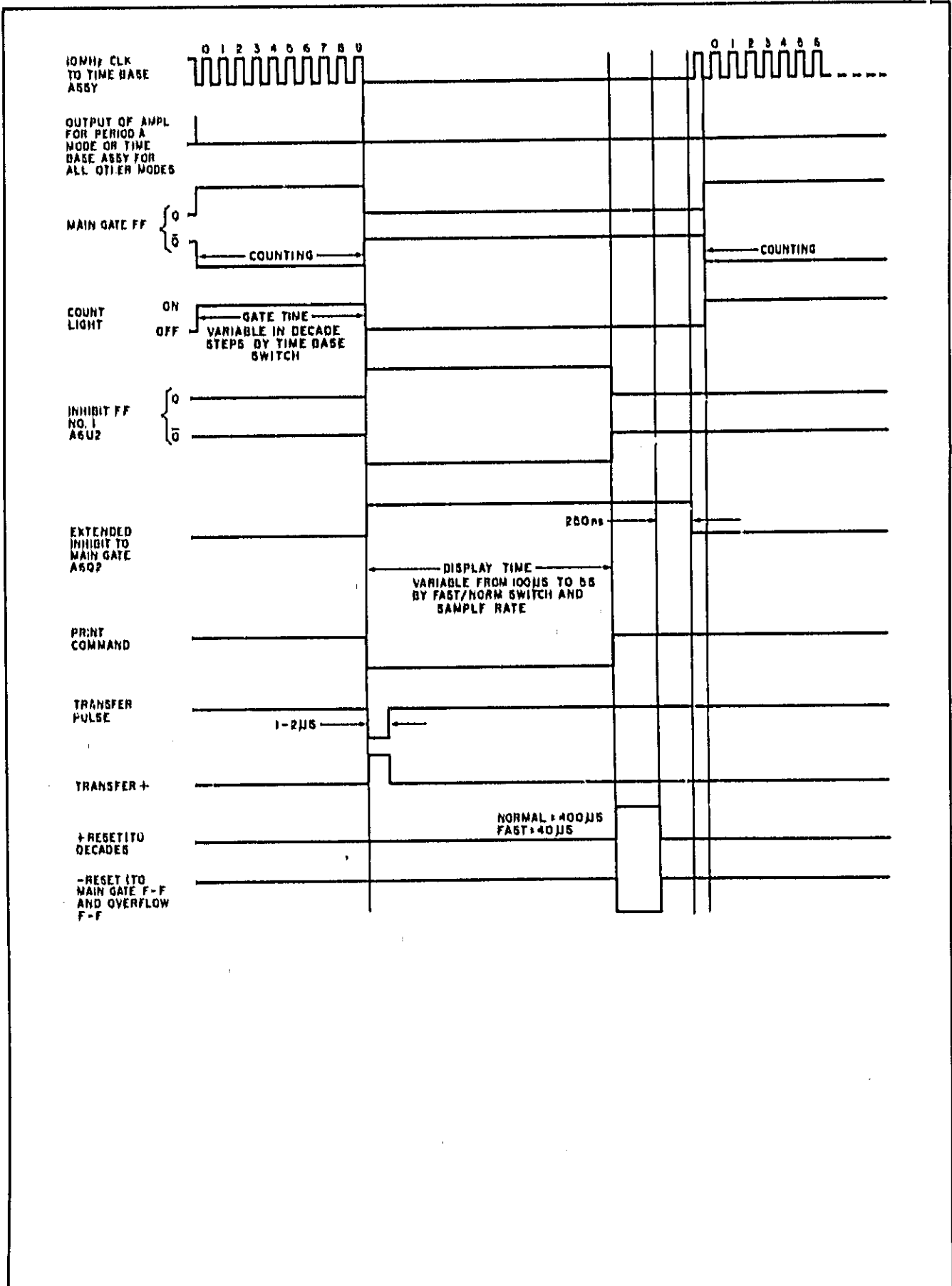


Figure 4-9. Instrument Timing Diagram



SECTION V MAINTENANCE

5-1. INTRODUCTION

5-2. This section gives maintenance and service information. Included is a table of typical problems for trouble isolation, recommended test equipment, in-cabinet performance checks, which may be used to verify proper counter operation, and adjustment procedures.

5-3. ASSEMBLY DESIGNATIONS

5-4. Table 5-1 lists the designation, name, and Hewlett-Packard part number of assemblies used in this instrument.

Table 5-1. Assembly Identification

ASSY	NAME	HP PART NO.
A1	Attenuator	05326-60048
A2	Input Amplifier	05326-60004
A3	Not Assigned	
A4	Oscillator	05326-60002
A5	Time base Control	05326-60005
A6	Sample Rate	05326-60013
A7	Function Control	05326-60045
A8	Display Support	05326-60009
A9	Display	05326-60008
A9	Display (Option 001)	05326-60025
A10	Right Readout	05326-60036
A11	Left Readout	05326-60035
A12	Not Assigned	
A13	Not Assigned	
A14	Not Assigned	
A15	Regulator	05327-60020
A16	Interconnect	05327-60028
A17	Not Assigned	
A18	Prescaler (5327C)	05327-60053

5-5. TEST EQUIPMENT

5-6. Test equipment recommended for maintaining and checking performance is listed in Table 5-2. Test equipment having equivalent characteristics may be substituted for the equipment listed.

Table 5-2. Recommended Test Equipment

Instrument Type	Required Characteristics	Recommended Type
Frequency Standard	1 MHz output	HP 107A
Oscilloscope	50 MHz Bandwidth	HP 180A
Vertical Plug-in	50 mV/cm Sensitivity	HP 1801A
Time Base Plug-in	50 MHz Bandwidth	HP 1820A
Trst Oscillator (2 required)	10 Hz to 10 MHz at 5 volts p-p	HP 651B
Audio Oscillator	2 Hz to 100 kHz 100 mV rms	HP 202C
HF Signal Generator	50 kHz to 50 MHz at 3 volts rms	HP 606B
VHF Signal Generator	10 to 480 MHz	HP 608F
Frequency Doubler	240 - 550 MHz	HP 10515A
Pulse Generator	10 MHz rep-rate 8 nsec pulse width, 0.3 volts p-p output	HP 216A
Electronic Counter	.1 Hz to 10 MHz Frequency Measurements	HP 5245L
Variable Line Transformer	103 to 127 volts rms and 206 to 254 volts rms	Superior Electronic Power Stat 3PF116 (115 V); 3PF 216 (230 V)
Digital Recorder	Print Rate: 10 lines/sec, Data Input: +8421 BCD parallel entry, accepts 1 = +5 V, 0 = +0.25 V. Accepts negative going +5 to 0V print command	HP 5355A
DC Voltmeter	0 to 200 Vdc, 1% Accuracy	HP 412A
AC VTVM	0 to 250 Vac	HP 400F
RF Voltmeter	1 mV to 3 V	HP 3406A

5-7. IN-CABINET PERFORMANCE CHECK

5-8. **GENERAL.** The performance check, Table 5-3, and test card can be used to verify proper operation of all circuits in the counter and may also be used as follows:

a. As part of an incoming inspection check of instrument specification.

b. Periodically, for instruments used in systems where maximum reliability is important.

c. As part of a procedure to locate defective circuits.

d. After any repair or adjustment and before returning instrument to regular service.

e. As a permanent record of instrument maintenance performed, because the test record page is perforated and may be removed.

5-9. **VARIABLE LINE VOLTAGE.** During the test (Table 5-3), the counter should be connected to a variable voltage source, so the line voltage may be varied $\pm 10\%$ from nominal (115 or 230 Vac).

5-10. TROUBLE ISOLATION

5-11. The trouble isolation table (Table 5-5) lists the common problems a counter might develop. Before beginning the overall troubleshooting, a quick check of the power supply voltages and the oscillator signal may save time. These test points are available on the main interconnect board — remove bottom cover.

5-12. The table is divided into three sections, under the headings of count problems, display problems, and input problems. The following is an explanation of table usage with problem 2 of "Input Problems" as the example. The Symptom column identifies the specific counter problem, while the Initial conditions column calls out the counter's switch settings or specifies a mode or modes of operation. The test point column asks that A2P1(C) be checked (Test 1) for an ECL High. Do not proceed to Test 2 until the check is evaluated. If A2P1(C) is High (Test is Positive), perform Test Point 2. If A2P1(C) is Low (Test is Negative), the problem can be either a or b; check in order listed.

5-13. REPAIR

5-14. Printed Circuit Component Replacement

5-15. Component-lead holes in the circuit boards have plated walls to ensure good electrical contact between conductors on opposite sides of the board. To prevent damage to this plating and the replacement component, apply heat sparingly, and work carefully. The following replacement procedure is recommended:

a. Remove defective component.

b. Melt solder in component-lead holes. Use clean dry soldering iron to remove excess solder. Clean holes with a wooden toothpick or splinter. Do not use metal tool for cleaning as this may damage through-hole plating.

c. Bend leads of replacement component to the correct shape and insert into component-lead holes. Using heat and solder sparingly, solder leads in place. Heat may be applied to either side of the board, but do not apply excess pressure with soldering iron.

d. Through-hole plating breaks are indicated by separation of the round conductor pad from either side of the board. To repair breaks, press conductor pad against board and solder replacement component lead to conductor pad on both sides of board.

5-16. Replacing Integrated Circuits

5-17. Following are two recommended methods of replacing integrated circuits:

a. **SOLDER GOBLER.** This is the best method. Solder is removed from the board by a hollow tip soldering iron connected to a vacuum source. The IC is removed intact, so it may be re-installed if found to be operative.

b. **CLIP OUT.** This method should be used as a last resort only. Clip the leads as close to the case as possible. With a soldering iron and long-nose pliers, carefully remove the wires from each hole. Clean holes as described in Paragraph 5-15b.

Table 5-3. In-Cabinet Performance Check

1. TIME BASE STABILITY AND OUTPUT

a. Set Counter controls as follows:

SAMPLE RATE Mid-position
 FAST/NORM/HOLD NORM
 FUNCTION FREQ
 TIME BASE/MULTIPLIER 10 s
 SLOPE +
 AC/DC DC
 ATTEN X1
 CHK-NORM NORM
 LEVEL PRESET
 STORAGE ON
 OSC INT

NOTE

Allow 1-hour warm-up before proceeding to Step b.

b. Connect 1 MHz frequency standard to INPUT A.

c. A counter display of 000,0000 (1000,0000 Option 001) indicates that counter time-base frequency is exactly 10 MHz. The offset between counter time base and 1 MHz frequency standard can be determined by subtracting 10 MHz from the indicated oscillator frequency.

COUNTER DISPLAY	AM OSCILLATOR FREQUENCY
999,9950 kHz	10 000 050 Hz
999,9960 kHz	10 000 040 Hz
999,9970 kHz	10 000 030 Hz
999,9980 kHz	10 000 020 Hz
999,9990 kHz	10 000 010 Hz
1 000,0000 kHz	10 000 000 Hz
1 000,0010 kHz	9 999 990 Hz
1 000,0020 kHz	9 999 980 Hz
1 000,0030 kHz	9 999 970 Hz
1 000,0040 kHz	9 999 960 Hz
1 000,0050 kHz	9 999 950 Hz

d. Record frequency offset on test card. For long-term stability, operate the counter continuously for at least 1-month. Measure frequency offset at 1-month intervals.

e. To calibrate the counter's time base to the frequency standard, perform time-base adjustment in Table 5-4.

NOTE

Temperature must be held constant or compensation for temperature difference must be made whenever a frequency difference is recorded. Unless a record of the temperature and date of last calibration is available, the frequency offset should not be considered drift or aging rate of the 10 MHz crystal.

Table 5-3. In-Cabinet Performance Check (Continued)

- f. To check time-base stability vs. line voltage variations, connect variable transformer to counter power cord. Vary line voltage $\pm 10\%$ and record frequency difference on test card. Should be ≤ 1 part in 10^7 .
- g. To check time-base stability vs. temperature, vary counter operating temperature between 0°C and 50°C . Record frequency on test card. Should be ≤ 2.5 parts in 10^6 .
- h. Connect oscilloscope vertical input to OSC jack on counter's rear panel. Use 10:1 probe at OSC jack to reduce load.
- i. Oscilloscope should display 10 MHz waveform nominal at >2.4 volts peak-to-peak amplitude. Record on test card.

2. DISPLAY, DECIMAL POINTS, AND DIVIDERS

Proper operation is verified in the Self-Check procedures in Figure 3-3. Record on test card.

3. FREQUENCY RESPONSE AND SENSITIVITY

- a. Set counter controls as in 1a, except TIME BASE to 1s and AC/DC switch to AC.
- b. Connect a BNC T connector to INPUT A jack. Connect sine wave test oscillator output to T connector. Connect oscilloscope's vertical input to T connector to monitor input signal amplitude; use a 50-ohm feedthrough at oscilloscope BNC.
- c. Adjust test oscillator from 20 Hz to 50 MHz, maintaining 100 mV rms input amplitude. Counter should properly display all frequencies in this range. Record on test card.
- d. Set audio oscillator frequency to 2 Hz. Counter should not count. Switch AC/DC switch to DC. Counter should count input signal.
- e. Connect a cable (using a clip-lead) to A16P1A(8) and connect other end to $\%$ axis of oscilloscope.
- f. Adjust test oscillator output for 1,000 Hz at 8 volts peak-to-peak.
- g. Set LEVEL to PRESET and check that oscilloscope marker is at 0 volts.
- h. Set SLOPE to $\%$. Vary LEVEL control and check that marker is variable over at least -3.0 to +3.0 volts on the positive slope of waveform.
- i. Set SLOPE to \cdot . Vary LEVEL control and check that marker is variable over at least -3.0 to +3.0 volts on the negative slope of waveform. Record on test card.

4. PULSE OPERATION

- a. Set counter controls as follows:

FUNCTION	FREQ
TIME BASE	0.1 s
SLOPE	+
AC/DC	AC
ATTEN	X1
LEVEL	PRESET
CHK-NORM	NORM
STORAGE	ON
OSC	INT

Table 5-3, In-Cabinet Performance Check (Continued)

- b. Connect BNC T connector to INPUT A. Connect pulse generator to T. Connect oscilloscope to T connector, using 50-ohm feedthrough at the oscilloscope BNC.
- c. Adjust pulse generator output for 10 MHz repetition rate, 15 ns pulse width at 0.3 volts peak-to-peak indication on oscilloscope.
- d. Check that counter displays the repetition rate, count light flashes, and trigger lamp is on. Record on test card.
- e. Repeat above check for 10 kHz. Record on test card.

5. PERIOD AVERAGE

- a. Set counter controls as in step 1a with FUNCTION to PERIOD AVG and MULTIPLIER to 1.
- b. Connect test oscillator to INPUT A, using BNC T. Connect oscilloscope to T, using 50-ohm feedthrough at oscilloscope BNC.
- c. Set test oscillator to 2 Hz at 100 mV rms. Counter should display the period of the input signal (approximately 0.5 sec.). Record on test card.
- d. Vary test oscillator frequency from 2 Hz to 10 MHz, maintaining 100 mV rms input amplitude. Change MULTIPLIER switch as needed to maintain meaningful display with change of frequency. Counter should properly display the period of the frequencies in this range within accuracy specifications of the instrument. Record on test card.

6. TOTALIZE

- a. Set counter controls as follows:

FUNCTION	START
MULTIPLIER	1
CHK-NORM	CHK

- b. Check that display totalizes, count light (C) is on, and trigger lamp lights. Record on test card.
- c. Using 10:1 divider probe, connect oscilloscope vertical input to TIME BASE OUTPUT jack on counter rear panel.
- d. Check that oscilloscope indicates 10 MHz negative going pulses at least 3 volts peak-to-peak, typically >30 nsec wide at 50% points. Set MULTIPLIER to 10 and observe output pulses typically 100 ns wide. The frequency output is 1 MHz.
- e. Disconnect oscilloscope from TIME BASE OUTPUT jack and connect TIME BASE OUTPUT to 5245L Electronic Counter input. Set 5245L for frequency measurements.

Table 5-3. In-Cabinet Performance Check (Continued)

f. Set TIME BASE/MULTIPLIER as follows and check for proper counter display. Record on test card,

TIME BASE/MULTIPLIER	5245 DISPLAY
1	10 MHz
10	1 MHz
10 ²	100 kHz
10 ³	10 kHz
10 ⁴	1 kHz
10 ⁵	100 Hz
10 ⁶	10 Hz
10 ⁷	1 Hz
10 ⁸	.1 Hz

7. RATIO

a. Set counter controls as follows:

FUNCTION	FREQ
MULTIPLIER	10 ⁴
SLOPE	+
AC/DC	AC
ATTEN	X1
CHK-NORM	NORM
LEVEL	PRESET
OSC (rear panel)	EXT

b. Connect test oscillator to OSC jack, using BNC T. Connect oscilloscope to T connector, using 50-ohm feedthrough at oscilloscope BNC connector. Set oscillator output for 10 MHz at 2.8 volts peak-to-peak, as observed on oscilloscope.

c. Connect a second BNC T connector to counter INPUT A jack. Connect second test oscillator to T connector. Connect B channel of oscilloscope to front-panel T connector, using 50-ohm feedthrough at oscilloscope BNC connector. Set variable oscillator for 100 kHz at 100 mV rms display on oscilloscope.

d. Check that counter displays 100. Disregard units and decimal point readouts. Record on test card.

e. Repeat test using 100 Hz into OSC jack and 100 kHz into INPUT A. Set TIME BASE/MULTIPLIER to 10³. Display should be ratio of two input frequencies x 10³, approximately 10⁶. Disregard units and decimal point. Record on test card.

8. GATE OUTPUT AND SAMPLE RATE

a. Disconnect setup.

b. Set counter controls as follows:

FUNCTION	FREQ
TIME BASE1ms
CHK-NORM	CHK
FAST-NORM/HOLD	FAST
SAMPLE RATE	max c/w

Table 5-3. In-Cabinet Performance Check (Continued)

- e. Using 10:1 divider probe, connect oscilloscope vertical input to GATE output and observe positive pulses ≥ 2.4 V with a pulse width of $< 100 \mu\text{s}$. Record on test card.
- d. Slowly rotate SAMPLE RATE clockwise and observe that the pulse width increases.
- e. Set the TIME BASE switch to 10 ms and rotate the SAMPLE RATE fully clockwise. Observe that the pulse width is > 20 ms. Record on test card.
- f. Set FAST/NORM/HOLD to NORM and turn SAMPLE RATE fully counterclockwise, just out of OFF. Observe the positive pulse width is < 20 ms. Record on test card.
- g. Slowly rotate SAMPLE RATE clockwise, observing an increase in the pulse width.
- h. Set TIME BASE to 1 sec and rotate SAMPLE RATE fully clockwise. Verify that the time between flashes of the gate (C) lamp is greater than 5 seconds. Record on test card.
- i. Set FUNCTION to START and check that gate output is TTL Low (< 0.4 V).
- j. Set FUNCTION to STOP and verify that gate output is TTL High (> 2.4 V).

9. DIGITAL RECORDER (Option 003)

- a. Set counter controls as follows:

FUNCTION	FREQ
TIME BASE	1 SEC
CHK-NORM	CHK
FAST/NORM/HOLD	NORM
SAMPLE RATE	Mid-Position

- b. Connect oscilloscope to J9(18). Observe oscilloscope display a print command (drop from > 2.4 to < 0.4 V) immediately after the C lamp goes out.
- c. Connect jumper from J9(25) to J9(22).
- d. Check that counter main gate is inhibited. C light does not flash, and no print command pulses are generated.
- e. Verify proper output by connecting a 5055A printer or interrogating lines with logic probe or voltmeter and performing display tube self-check in Section III.

10. PRESCALER (5327C ONLY)

Frequency Response and Sensitivity

- a. Set counter controls as follows:

FUNCTION	FREQ
TIME BASE	1 s
INPUT SELECTOR	B+10

Table 5-3. n-Cabinet Performance Check (Continued)

- i. Use the set of frequency generators (Table 5-2) necessary to cover the input frequency from 2 Hz to 550 MHz, while maintaining 25 mV rms input level. Adjust TIME BASE switch as necessary for best display.
- e. Check for stable count within stability of oscillator.
- d. Set INPUT SELECTOR switch to B.
- e. Use the set of frequency generators necessary to cover the input frequency from 2 Hz to 50 MHz, while maintaining 15 mV rms input level. Adjust TIME BASE switch as necessary for best display.
- f. Check for stable count within stability of oscillator.

Pulse Operation

- n. Set pulse generator output to 10 MHz repetition rate, 10 ns wide pulses at 300 mV peak-to-peak. Connect pulse generator to INPUT B jack.
- b. Check that counter displays repetition rate and that count light flashes.
- c. Repeat above check at 10 kHz.

PERFORMANCE CHECK TEST CARD

Hewlett-Packard Model 5326C/5327C
 Frequency Counter
 Serial No. _____

Test Performed by _____

Date _____

DESCRIPTION	CHECK
1. TIME BASE STABILITY AND OUTPUT	
a. Oscillator	_____ Counter displays 000,0000
b. Line voltage variations of $\pm 10\%$	_____ Frequency change is $\leq \pm 1$ part in 10^7
c. Temperature variations between 0°C and 50°C	_____ Frequency change ≤ 2.5 parts in 10^6
d. Output at OSC jack	_____ 10 MHz at > 2.4 V
2. DISPLAY, DECIMAL POINTS, AND DIVIDERS	_____ Operates in accordance with Table 3-3 procedures
3. FREQUENCY RESPONSE AND SENSITIVITY	
a. Test oscillator varies from 20 Hz	_____ Counter displays all frequencies in this range
b. Trigger level	_____ Trigger level is variable from +3 V to -3 V on + and - slopes
4. PULSE OPERATION	
a. Input at 10 MHz, 15 ns pulse width and 0.3 V peak-to-peak	_____ Counter displays repetition rate, gate light flashes, and trigger lamp is on
b. Input at 10 kHz, 15 ns pulse width and 0.3 V peak-to-peak	_____ Counter displays repetition rate, gate light flashes, and trigger lamp is on
5. PERIOD AVERAGE	
a. Test oscillator at 2 Hz, 100 mV	_____ Counter displays period of input signal (0.5 s)
b. Vary test oscillator from 2 Hz to 10 MHz at 100 mV	_____ Counter displays periods of frequencies in this range
6. TOTALIZE	
a. Totalizing internal clock pulses	_____ Display totalizes, gate light flashes, and trigger lamp lights
b. TIME BASE OUTPUT jack	_____ Scales output signal with setting of MULTIPLIER switch
7. RATIO	
a. 100 kHz on INPUT A, 10 MHz on OSC jack	_____ Counter displays 100
b. 100 kHz on INPUT A, 100 Hz on OSC jack	_____ Counter displays 10^6

PERFORMANCE CHECK TEST CARD

Hewlett-Packard Model 5326C/5327C Frequency Counter Serial No.	Test Performed by Date
DESCRIPTION	CHECK
8. GATE OUTPUT AND SAMPLE RATE	
a. SAMPLE RATE switch to FAST, control to max. cw	_____ Pulse width is $< 100 \mu s$ at $\geq 2.4 V$
b. SAMPLE RATE control max cw	_____ Pulse width is $> 20 ms$
c. SAMPLE RATE switch to NORM, control to max cw	_____ Pulse width is $< 20 ms$
d. SAMPLE RATE control max. cw	_____ Display time is $> 5 s$
9. DIGITAL RECORDER	
	_____ Printed output agrees with counter display
10. PRESCALER (5327C ONLY)	
Frequency Response and Sensitivity	_____
Pulse Operation	_____

Table 5-4. Adjustments

1. POWER SUPPLY A15

- a. Connect counter line cord to variable power transformer. Monitor output voltage with AC VTVM. Adjust transformer for 115 volt indication on VTVM.
- b. Turn counter SAMPLE RATE control clockwise out of OFF.
- c. Connect VTVM to A15 Pin 7 and adjust A15R10 for +16.5 volts.
- d. Connect VTVM to A15 Pin 6 and adjust A15R13 for -16.5 volts.

2. SENSITIVITY AND OFFSET A2

- a. Connect a BNC T connector to INPUT A jack.
- b. Connect test oscillator output to T connector.
- c. Connect oscilloscope vertical input to T connector, using 50-ohm feedthrough at oscilloscope input BNC.
- d. Using a clip lead, connect A16P1A(8) output to oscilloscope Z-axis input.
- e. Adjust test oscillator for 1 kHz output at 100 mV rms.
- f. Set counter controls as follows:

FUNCTION	FREQ
CHK-NORM	NORM
ATTEN	X1
AC-DC	DC
LEVEL	PRESET

- g. Set SLOPE switch to - and + positions and observe marker position on oscilloscope waveform.
- h. On Input Amplifier board A2, adjust A2R2 until + and - marker positions have a symmetrical offset about the zero volt axis for + and - slope switch positions.

3. OSCILLATOR A4

- a. Connect 1 MHz frequency standard to INPUT A jack.
- b. Set counter controls as follows:

CHK-NORM	NORM
FUNCTION	FREQ
TIME BASE	10 μ s
SAMPLE RATE	slightly clockwise out of OFF

- c. Remove top cover.
- d. Using insulated tuning tool, adjust A4C3 until display indicates all zeros with cover on. (Wait 10 seconds between adjustments for counter to make measurement.)

NOTE

On standard instruments without Option 001, the counter display will overflow; however, all digits are valid.

Table 5-4. Adjustments (Continued)

4. PRESCALER ADJUSTMENTS (5327C ONLY)

- a. Set counter controls as follows:

FUNCTION	FREQ
TIME BASE	0.1s
INPUT SELECTOR	B*10

- b. With no input signal applied, adjust R3 offset pot for 0 V on U2 pin 4.
- c. Adjust R10 bias pot for 0.65 ±0.05 V on U2 pin 3.
- d. Adjust R27 bias pot for 0.0 ±0.05 V on U3 pin 3.
- e. Check that the previously adjusted voltage on U2 pin 3 is correct. If voltage has shifted, adjust R10 for proper reading and recheck U3 pin 3.
- f. Set HP VHF Signal Generator and doubler for 550 MHz at 1 V rms. Measure the output with an HP 3406A RF Voltmeter using a 50Ω termination at the probe. Connect signal source to INPUT B of counter.
- g. Reduce output level until counter's display becomes unstable. Adjust R3 for a stable display. Repeat this procedure until unable to obtain a stable reading. Increase signal level until display just becomes stable.
- h. Disconnect input and connect to voltmeter; reading should be 25 mV or less. Check other frequencies with the band.
- i. Set INPUT SELECTOR switch to B.
- j. Set input signal to 50 MHz at 15 mV and connect to INPUT B. Counter should display 50 MHz.

Table 5-5. Trouble Isolation

SYMPTOM COUNT PROBLEMS	INITIAL CONDITIONS	TEST POINT	EVALUATION	
			TEST IS POSITIVE	TEST IS NEGATIVE
1. COUNTER DOES NOT COUNT — HAS TRIGGER LIGHT BUT NO COUNT LIGHT (C)	For problem in <u>one</u> function only. For problem in <u>all</u> function modes. (Use Fast Gate Time when checking OTB signal). Start position may have count light.	Check for a TTL low A7: Pin 1 for FREQ Pin 2 for PERIOD AVG Pin 4 for START 1. Check for oscillator at A7(T). 2. Check for ITB signal at A7(U). 3. Check for OTB signal at A7(V).	a. No input signal to A7. b. Problem is on A7. Perform Step 2 of Test Point. Perform Step 3 of Test Point. Problem is on A7.	Switch circuitry or wiring for specific mode is faulty Problem is in oscillator circuit of A4 or A5 a. MAIN GATE INHIBIT line is staying High, (Check A6 Inhibit circuits & A7U7A. b. No input signal to A7. c. A11(1) is High (also check A16CR1). d. Problem is on A7. a. A5 GATE ENABLE line is High. b. Problem is on A5.
2. COUNTER DOES NOT COUNT — NO TRIGGER LIGHT NO COUNT LIGHT (C)	Use an input signal with CHK/NORM switch set to NORM	1. Check A2P2(5 & 6) for input signal. 2. Check for ECL Low at A2P1(4,D).	Perform Step 2 of Test Point. Problem is on A2.	Problem is on A1. A7 OSC CH circuit is bad.
3. COUNTER DOES NOT COUNT — HAS TRIGGER LIGHT HAS COUNT LIGHT (C)		1. Check for counted signal at A8J1(5).	a. No Transfer signal at A8P1(A). b. Problem is on A8.	a. A8P1(B) is always High. b. No input signal at A8P1(2). c. Problem is on A8.
4. INACCURACY IN COUNT	Place FUNCTION to START, connect known 1 MHz frequency standard.	1. Check for exact oscillator frequency at A4(1,A) 2. Check TIME BASE output jack (using another counter) for correct A5 scaling of oscillator frequency.	Perform Step 2 of Check Point. Problem is on A8 or A9.	Frequency must be adjusted for exactly 10 MHz. Problem is on A5.
5. COUNTER TOTALIZES ALL MEASUREMENTS			No reset signal from A6(16).	
6. ONE DIGIT DOES NOT COUNT	Set counter display so that tube would normally count (use START/STOP).	Check A9 Circuitry for that position.		

Table 5-5. Trouble Isolation (Continued)

SYMPTOM DISPLAY PROBLEMS	INITIAL CONDITIONS	TEST POINT	EVALUATION	
			TEST IS POSITIVE	TEST IS NEGATIVE
1. NIXIES DO NOT LIGHT		Check A15 for +5 V, -5 V, and +175 V.	a. Problem on A8 or A9. b. A8 or A9 has bad connection.	a. Power not connected to counter. b. Blown line fuse. c. A15 or A16 power supply circuits are bad.
2. ONE NIXIE DOES NOT LIGHT	Set counter display so that tube would normally be lit.		Problem is on A9.	
3. UNLIT PORTION OF DISPLAYED DIGIT (HOLES)			Replace display tube.	
4. NIXIE DISPLAYS WRONG DIGIT	Set display on incorrect digit, using START/STOP switch.	Check A9 codes for that position.		
5. ONE DECIMAL POINT DOES NOT LIGHT	Set up combination of FUNCTION/TIME BASE switches.	Check for Low on DP line of A11.	Problem is on A8 or A9.	a. FUNCTION and/or TIME BASE lines are not pulled Low for A11. b. A11 circuitry is bad.
6. DECIMAL POINTS DO NOT LIGHT	For problem in Frequency Mode only, FUNCTION switch to FREQ	Check for Low at A11: Pin B for FREQ A or B Pin C for FREQ B ÷ 10	Several IC's on A11 are bad	a. A10 input lines for FREQ are High. (One or more; A10(B) should be Low, A10(1) may be low, or A10(2) may be Low.) b. A10 circuitry is bad.
	For problem in Period Average Mode only, FUNCTION switch to PERIOD AVG.	Check for Low at A11: Pin 4 for Per Avg A or B Pin D for Per Avg B ÷ 10	Several IC's on A11 are bad.	a. A10 input lines for Per Avg are High. (One or more; A10(A) should be Low, A10(1) may be Low, or A10(2) may be Low.) b. A10 circuitry is bad.
	For both Freq and Period Avg Modes (INPUT SELECTOR turned in different positions)	Check for Low on DP line at A8P1	A8 "Decimal Point Drivers" circuit is bad in common point.	a. A11(2) is High. b. A11(B) is High. c. A16CR2, 3 are bad.
7. ANNUNCIATOR DOES NOT LIGHT	Set front-panel controls for problem conditions.	For right readout, Check A10 for Low on selected function and time base lines.	Problem is on A10	Switch circuitry for line with High level is bad.
		For left readout, check for Low on A11 input line. (Overflow, C light, or EXT). Also, see "Count Problems."	Problem is on A11.	COUNT LIGHT-problem is on A5. OVERFLOW-problem is on A9. EXT-problem is in Option 002 wiring or pressure connector

Table 5-5. Trouble Isolation (Continued)

SYMPTOM DISPLAY PROBLEMS	INITIAL CONDITIONS	TEST POINT	EVALUATION	
			TEST IS POSITIVE	TEST IS NEGATIVE
B. DISPLAY DOES NOT STORE COUNT		Check STORAGE switch (rear panel) — must be on.	A6(K) is always Low.	Place switch to ON position.
D. COUNT LIGHT (C) DOES NOT LIGHT AT FAST GATE TIMES			Gate lamp one-shot on A5 is bad.	
INPUT PROBLEMS				
1. COUNTER MAKES MEASUREMENT HAS NO TRIGGER LIGHT	CHK/NORM switch to CHK	Check for trigger light pulses at A2P2(1)	Problem is on A1	Problem is in Trigger Light Driver circuit of A2.
2. CHECK MODE IS INOPERATIVE		1. Check for an ECL High at A2P1(C). 2. Check for $\overline{\text{OSC CH}}$ signal at A2P1(4,D)	Perform step 2. Problem is on A2.	a. Wire to A1P1 is broken. b. Problem is on A1. Problem is on A7.
3. TRIGGER LEVEL DOES NOT COVER NORMAL RANGE		1. Check for +16.5 V and -16.5 V at A2 P1(G, F) and (7, H), respectively. 2. Check that A2P2(D) is adjustable from at least +3 V to -3 V with front-panel LEVEL control	Perform step 2. Problem is on A2	Problem is on A15. Problem is on A1.

SECTION VI REPLACEABLE PARTS

6-1. INTRODUCTION

6-2. This section contains information for ordering replacement parts. Table 6-1 lists parts in alphabetical order of their reference designators and indicates the description and HP Part Number of each part, together with any applicable notes. The table includes the following information.

- a. Description of part (see abbreviations below).
- b. Typical manufacturer of the part in a five-digit code; see list of manufacturers in Table 6-2.
- c. Manufacturer's part number.
- d. Total quantity used in the instrument (TQ column).

6-3. Miscellaneous parts are listed at the end of Table 6-1.

6-4. ORDERING INFORMATION

6-5. To obtain replacement parts, address order of inquiry to your local Hewlett-Packard Sales and Service Office (see lists at rear of this manual for addresses). Identify parts by their Hewlett-Packard part numbers.

6-6. To obtain a part that is not listed, include:

- a. Instrument model number.
- b. Instrument serial number.
- c. Description of the part.
- d. Function and location of the part.

REFERENCE DESIGNATORS																																																																																																																																																																																																																																																													
<table style="width: 100%; border: none;"> <tr><td>A</td><td>• assembly</td></tr> <tr><td>B</td><td>• motor</td></tr> <tr><td>BT</td><td>• battery</td></tr> <tr><td>C</td><td>• capacitor</td></tr> <tr><td>CP</td><td>• coupler</td></tr> <tr><td>CD</td><td>• diode</td></tr> <tr><td>DL</td><td>• delay line</td></tr> <tr><td>DS</td><td>• device signaling (lamp)</td></tr> <tr><td>E</td><td>• misc electronic part</td></tr> </table>	A	• assembly	B	• motor	BT	• battery	C	• capacitor	CP	• coupler	CD	• diode	DL	• delay line	DS	• device signaling (lamp)	E	• misc electronic part	<table style="width: 100%; border: none;"> <tr><td>F</td><td>• fuse</td></tr> <tr><td>FL</td><td>• filter</td></tr> <tr><td>IC</td><td>• integrated circuit</td></tr> <tr><td>J</td><td>• jack</td></tr> <tr><td>K</td><td>• relay</td></tr> <tr><td>L</td><td>• inductor</td></tr> <tr><td>LS</td><td>• loud speaker</td></tr> <tr><td>M</td><td>• meter</td></tr> <tr><td>MK</td><td>• microphone</td></tr> </table>	F	• fuse	FL	• filter	IC	• integrated circuit	J	• jack	K	• relay	L	• inductor	LS	• loud speaker	M	• meter	MK	• microphone	<table style="width: 100%; border: none;"> <tr><td>MP</td><td>• mechanical part</td></tr> <tr><td>P</td><td>• plug</td></tr> <tr><td>Q</td><td>• transistor</td></tr> <tr><td>R</td><td>• resistor</td></tr> <tr><td>RT</td><td>• thermistor</td></tr> <tr><td>S</td><td>• switch</td></tr> <tr><td>T</td><td>• transformer</td></tr> <tr><td>TB</td><td>• terminal board</td></tr> <tr><td>TP</td><td>• test point</td></tr> </table>	MP	• mechanical part	P	• plug	Q	• transistor	R	• resistor	RT	• thermistor	S	• switch	T	• transformer	TB	• terminal board	TP	• test point	<table style="width: 100%; border: none;"> <tr><td>U</td><td>• integrated circuit</td></tr> <tr><td>V</td><td>• vacuum tube (neon bulb, photocell, etc.)</td></tr> <tr><td>VH</td><td>• voltage regulator</td></tr> <tr><td>W</td><td>• cable</td></tr> <tr><td>X</td><td>• socket</td></tr> <tr><td>Y</td><td>• crystal</td></tr> <tr><td>Z</td><td>• tuned cavity, network</td></tr> </table>	U	• integrated circuit	V	• vacuum tube (neon bulb, photocell, etc.)	VH	• voltage regulator	W	• cable	X	• socket	Y	• crystal	Z	• tuned cavity, network																																																																																																																																																																																						
A	• assembly																																																																																																																																																																																																																																																												
B	• motor																																																																																																																																																																																																																																																												
BT	• battery																																																																																																																																																																																																																																																												
C	• capacitor																																																																																																																																																																																																																																																												
CP	• coupler																																																																																																																																																																																																																																																												
CD	• diode																																																																																																																																																																																																																																																												
DL	• delay line																																																																																																																																																																																																																																																												
DS	• device signaling (lamp)																																																																																																																																																																																																																																																												
E	• misc electronic part																																																																																																																																																																																																																																																												
F	• fuse																																																																																																																																																																																																																																																												
FL	• filter																																																																																																																																																																																																																																																												
IC	• integrated circuit																																																																																																																																																																																																																																																												
J	• jack																																																																																																																																																																																																																																																												
K	• relay																																																																																																																																																																																																																																																												
L	• inductor																																																																																																																																																																																																																																																												
LS	• loud speaker																																																																																																																																																																																																																																																												
M	• meter																																																																																																																																																																																																																																																												
MK	• microphone																																																																																																																																																																																																																																																												
MP	• mechanical part																																																																																																																																																																																																																																																												
P	• plug																																																																																																																																																																																																																																																												
Q	• transistor																																																																																																																																																																																																																																																												
R	• resistor																																																																																																																																																																																																																																																												
RT	• thermistor																																																																																																																																																																																																																																																												
S	• switch																																																																																																																																																																																																																																																												
T	• transformer																																																																																																																																																																																																																																																												
TB	• terminal board																																																																																																																																																																																																																																																												
TP	• test point																																																																																																																																																																																																																																																												
U	• integrated circuit																																																																																																																																																																																																																																																												
V	• vacuum tube (neon bulb, photocell, etc.)																																																																																																																																																																																																																																																												
VH	• voltage regulator																																																																																																																																																																																																																																																												
W	• cable																																																																																																																																																																																																																																																												
X	• socket																																																																																																																																																																																																																																																												
Y	• crystal																																																																																																																																																																																																																																																												
Z	• tuned cavity, network																																																																																																																																																																																																																																																												
ABBREVIATIONS																																																																																																																																																																																																																																																													
<table style="width: 100%; border: none;"> <tr><td>A</td><td>• amperes</td></tr> <tr><td>AFC</td><td>• automatic frequency control</td></tr> <tr><td>AMPL</td><td>• amplifier</td></tr> <tr><td>BFO</td><td>• beat frequency oscillator</td></tr> <tr><td>BE CU</td><td>• beryllium copper</td></tr> <tr><td>BH</td><td>• binder head</td></tr> <tr><td>BP</td><td>• bandpass</td></tr> <tr><td>BR</td><td>• brass</td></tr> <tr><td>BYO</td><td>• backward wave oscillator</td></tr> <tr><td>CCW</td><td>• counter-clockwise</td></tr> <tr><td>CER</td><td>• ceramic</td></tr> <tr><td>CMO</td><td>• cabinet mount only</td></tr> <tr><td>COEF</td><td>• coefficient</td></tr> <tr><td>COM</td><td>• common</td></tr> <tr><td>COMP</td><td>• composition</td></tr> <tr><td>CCMPL</td><td>• complete</td></tr> <tr><td>CONN</td><td>• connector</td></tr> <tr><td>CP</td><td>• cadmium plate</td></tr> <tr><td>CRT</td><td>• cathode-ray tube</td></tr> <tr><td>CW</td><td>• clockwise</td></tr> <tr><td>DEPC</td><td>• deposited carbon</td></tr> <tr><td>DR</td><td>• drive</td></tr> <tr><td>ELECT</td><td>• electrolytic</td></tr> <tr><td>ENCAP</td><td>• encapsulated</td></tr> <tr><td>EXT</td><td>• external</td></tr> <tr><td>F</td><td>• farads</td></tr> <tr><td>FH</td><td>• flat head</td></tr> <tr><td>FILH</td><td>• filament head</td></tr> <tr><td>FXD</td><td>• fixed</td></tr> <tr><td>G</td><td>• giga (10⁹)</td></tr> <tr><td>GE</td><td>• germanium</td></tr> <tr><td>GL</td><td>• glass</td></tr> <tr><td>GRD</td><td>• ground(ed)</td></tr> </table>	A	• amperes	AFC	• automatic frequency control	AMPL	• amplifier	BFO	• beat frequency oscillator	BE CU	• beryllium copper	BH	• binder head	BP	• bandpass	BR	• brass	BYO	• backward wave oscillator	CCW	• counter-clockwise	CER	• ceramic	CMO	• cabinet mount only	COEF	• coefficient	COM	• common	COMP	• composition	CCMPL	• complete	CONN	• connector	CP	• cadmium plate	CRT	• cathode-ray tube	CW	• clockwise	DEPC	• deposited carbon	DR	• drive	ELECT	• electrolytic	ENCAP	• encapsulated	EXT	• external	F	• farads	FH	• flat head	FILH	• filament head	FXD	• fixed	G	• giga (10 ⁹)	GE	• germanium	GL	• glass	GRD	• ground(ed)	<table style="width: 100%; border: none;"> <tr><td>H</td><td>• henries</td></tr> <tr><td>HDW</td><td>• hardware</td></tr> <tr><td>HEX</td><td>• hexagonal</td></tr> <tr><td>HG</td><td>• mercury</td></tr> <tr><td>HR</td><td>• hour(s)</td></tr> <tr><td>HZ</td><td>• hertz</td></tr> <tr><td>IF</td><td>• intermediate freq</td></tr> <tr><td>IMPG</td><td>• impregnated</td></tr> <tr><td>INCD</td><td>• incandescent</td></tr> <tr><td>INCL</td><td>• include(s)</td></tr> <tr><td>INS</td><td>• insulation(ed)</td></tr> <tr><td>INT</td><td>• internal</td></tr> <tr><td>K</td><td>• kilo = 1000</td></tr> <tr><td>LH</td><td>• left hand</td></tr> <tr><td>LEN</td><td>• linear taper</td></tr> <tr><td>LK WASH</td><td>• lock washer</td></tr> <tr><td>LOG</td><td>• logarithmic taper</td></tr> <tr><td>LPF</td><td>• low pass filter</td></tr> <tr><td>M</td><td>• mi = 10⁻³</td></tr> <tr><td>MEG</td><td>• me = 10⁶</td></tr> <tr><td>MET FLM</td><td>• metal film</td></tr> <tr><td>MET OX</td><td>• metallic oxide</td></tr> <tr><td>MFR</td><td>• manufacturer</td></tr> <tr><td>MHZ</td><td>• mega hertz</td></tr> <tr><td>MINAT</td><td>• miniature</td></tr> <tr><td>MOM</td><td>• momentary</td></tr> <tr><td>MOS</td><td>• metal oxide substrate</td></tr> <tr><td>MTG</td><td>• mounting</td></tr> <tr><td>MY</td><td>• "mylar"</td></tr> <tr><td>N</td><td>• nano (10⁻⁹)</td></tr> <tr><td>N/C</td><td>• normally closed</td></tr> <tr><td>NE</td><td>• neon</td></tr> <tr><td>NPL</td><td>• nickel plate</td></tr> </table>	H	• henries	HDW	• hardware	HEX	• hexagonal	HG	• mercury	HR	• hour(s)	HZ	• hertz	IF	• intermediate freq	IMPG	• impregnated	INCD	• incandescent	INCL	• include(s)	INS	• insulation(ed)	INT	• internal	K	• kilo = 1000	LH	• left hand	LEN	• linear taper	LK WASH	• lock washer	LOG	• logarithmic taper	LPF	• low pass filter	M	• mi = 10 ⁻³	MEG	• me = 10 ⁶	MET FLM	• metal film	MET OX	• metallic oxide	MFR	• manufacturer	MHZ	• mega hertz	MINAT	• miniature	MOM	• momentary	MOS	• metal oxide substrate	MTG	• mounting	MY	• "mylar"	N	• nano (10 ⁻⁹)	N/C	• normally closed	NE	• neon	NPL	• nickel plate	<table style="width: 100%; border: none;"> <tr><td>N/O</td><td>• normally open</td></tr> <tr><td>NOM</td><td>• nominal</td></tr> <tr><td>NPO</td><td>• negative positive zero (zero temperature coefficient)</td></tr> <tr><td>NPN</td><td>• negative-positive-negative</td></tr> <tr><td>NRFR</td><td>• not recommended for field replacement</td></tr> <tr><td>NSR</td><td>• not separately replaceable</td></tr> <tr><td>ORD</td><td>• order by description</td></tr> <tr><td>OH</td><td>• oval head</td></tr> <tr><td>OX</td><td>• oxide</td></tr> <tr><td>P</td><td>• peak</td></tr> <tr><td>PC</td><td>• printed circuit</td></tr> <tr><td>PF</td><td>• picofarads = 10⁻¹² farads</td></tr> <tr><td>PH BRZ</td><td>• phosphor bronze</td></tr> <tr><td>PHL</td><td>• Phillips</td></tr> <tr><td>PIV</td><td>• peak inverse voltage</td></tr> <tr><td>PNP</td><td>• positive-negative-positive</td></tr> <tr><td>P/O</td><td>• part of</td></tr> <tr><td>POLY</td><td>• polystyrene</td></tr> <tr><td>PORC</td><td>• porcelain</td></tr> <tr><td>POS</td><td>• position(s)</td></tr> <tr><td>POT</td><td>• potentiometer</td></tr> <tr><td>PP</td><td>• peak-to-peak</td></tr> <tr><td>PT</td><td>• point</td></tr> <tr><td>PWV</td><td>• peak working voltage</td></tr> <tr><td>RECT</td><td>• rectifier</td></tr> <tr><td>RF</td><td>• radio frequency</td></tr> <tr><td>RH</td><td>• round head or right hand</td></tr> </table>	N/O	• normally open	NOM	• nominal	NPO	• negative positive zero (zero temperature coefficient)	NPN	• negative-positive-negative	NRFR	• not recommended for field replacement	NSR	• not separately replaceable	ORD	• order by description	OH	• oval head	OX	• oxide	P	• peak	PC	• printed circuit	PF	• picofarads = 10 ⁻¹² farads	PH BRZ	• phosphor bronze	PHL	• Phillips	PIV	• peak inverse voltage	PNP	• positive-negative-positive	P/O	• part of	POLY	• polystyrene	PORC	• porcelain	POS	• position(s)	POT	• potentiometer	PP	• peak-to-peak	PT	• point	PWV	• peak working voltage	RECT	• rectifier	RF	• radio frequency	RH	• round head or right hand	<table style="width: 100%; border: none;"> <tr><td>RMO</td><td>• rack mount only</td></tr> <tr><td>RMS</td><td>• root-mean square</td></tr> <tr><td>RWV</td><td>• reverse working voltage</td></tr> <tr><td>S-B</td><td>• slow-blow</td></tr> <tr><td>SCR</td><td>• screw</td></tr> <tr><td>SE</td><td>• selenium</td></tr> <tr><td>SECT</td><td>• section(s)</td></tr> <tr><td>SEMICON</td><td>• semiconductor</td></tr> <tr><td>SI</td><td>• silicon</td></tr> <tr><td>SIL</td><td>• silver</td></tr> <tr><td>SL</td><td>• slide</td></tr> <tr><td>SPG</td><td>• spring</td></tr> <tr><td>SPL</td><td>• special</td></tr> <tr><td>SST</td><td>• stainless steel</td></tr> <tr><td>SR</td><td>• split ring</td></tr> <tr><td>STL</td><td>• steel</td></tr> <tr><td>TA</td><td>• tantalum</td></tr> <tr><td>TD</td><td>• time delay</td></tr> <tr><td>TO1</td><td>• toggle</td></tr> <tr><td>THD</td><td>• thread</td></tr> <tr><td>Tl</td><td>• titanium</td></tr> <tr><td>TOL</td><td>• tolerance</td></tr> <tr><td>TRIM</td><td>• trimmer</td></tr> <tr><td>TWT</td><td>• traveling wave tube</td></tr> <tr><td>U</td><td>• micro = 10⁻⁶</td></tr> <tr><td>VAR</td><td>• variable</td></tr> <tr><td>VDCW</td><td>• dc working volts</td></tr> <tr><td>W</td><td>• with</td></tr> <tr><td>W</td><td>• watts</td></tr> <tr><td>WIV</td><td>• working inverse voltage</td></tr> <tr><td>WW</td><td>• wirewound</td></tr> <tr><td>W/O</td><td>• without</td></tr> </table>	RMO	• rack mount only	RMS	• root-mean square	RWV	• reverse working voltage	S-B	• slow-blow	SCR	• screw	SE	• selenium	SECT	• section(s)	SEMICON	• semiconductor	SI	• silicon	SIL	• silver	SL	• slide	SPG	• spring	SPL	• special	SST	• stainless steel	SR	• split ring	STL	• steel	TA	• tantalum	TD	• time delay	TO1	• toggle	THD	• thread	Tl	• titanium	TOL	• tolerance	TRIM	• trimmer	TWT	• traveling wave tube	U	• micro = 10 ⁻⁶	VAR	• variable	VDCW	• dc working volts	W	• with	W	• watts	WIV	• working inverse voltage	WW	• wirewound	W/O	• without
A	• amperes																																																																																																																																																																																																																																																												
AFC	• automatic frequency control																																																																																																																																																																																																																																																												
AMPL	• amplifier																																																																																																																																																																																																																																																												
BFO	• beat frequency oscillator																																																																																																																																																																																																																																																												
BE CU	• beryllium copper																																																																																																																																																																																																																																																												
BH	• binder head																																																																																																																																																																																																																																																												
BP	• bandpass																																																																																																																																																																																																																																																												
BR	• brass																																																																																																																																																																																																																																																												
BYO	• backward wave oscillator																																																																																																																																																																																																																																																												
CCW	• counter-clockwise																																																																																																																																																																																																																																																												
CER	• ceramic																																																																																																																																																																																																																																																												
CMO	• cabinet mount only																																																																																																																																																																																																																																																												
COEF	• coefficient																																																																																																																																																																																																																																																												
COM	• common																																																																																																																																																																																																																																																												
COMP	• composition																																																																																																																																																																																																																																																												
CCMPL	• complete																																																																																																																																																																																																																																																												
CONN	• connector																																																																																																																																																																																																																																																												
CP	• cadmium plate																																																																																																																																																																																																																																																												
CRT	• cathode-ray tube																																																																																																																																																																																																																																																												
CW	• clockwise																																																																																																																																																																																																																																																												
DEPC	• deposited carbon																																																																																																																																																																																																																																																												
DR	• drive																																																																																																																																																																																																																																																												
ELECT	• electrolytic																																																																																																																																																																																																																																																												
ENCAP	• encapsulated																																																																																																																																																																																																																																																												
EXT	• external																																																																																																																																																																																																																																																												
F	• farads																																																																																																																																																																																																																																																												
FH	• flat head																																																																																																																																																																																																																																																												
FILH	• filament head																																																																																																																																																																																																																																																												
FXD	• fixed																																																																																																																																																																																																																																																												
G	• giga (10 ⁹)																																																																																																																																																																																																																																																												
GE	• germanium																																																																																																																																																																																																																																																												
GL	• glass																																																																																																																																																																																																																																																												
GRD	• ground(ed)																																																																																																																																																																																																																																																												
H	• henries																																																																																																																																																																																																																																																												
HDW	• hardware																																																																																																																																																																																																																																																												
HEX	• hexagonal																																																																																																																																																																																																																																																												
HG	• mercury																																																																																																																																																																																																																																																												
HR	• hour(s)																																																																																																																																																																																																																																																												
HZ	• hertz																																																																																																																																																																																																																																																												
IF	• intermediate freq																																																																																																																																																																																																																																																												
IMPG	• impregnated																																																																																																																																																																																																																																																												
INCD	• incandescent																																																																																																																																																																																																																																																												
INCL	• include(s)																																																																																																																																																																																																																																																												
INS	• insulation(ed)																																																																																																																																																																																																																																																												
INT	• internal																																																																																																																																																																																																																																																												
K	• kilo = 1000																																																																																																																																																																																																																																																												
LH	• left hand																																																																																																																																																																																																																																																												
LEN	• linear taper																																																																																																																																																																																																																																																												
LK WASH	• lock washer																																																																																																																																																																																																																																																												
LOG	• logarithmic taper																																																																																																																																																																																																																																																												
LPF	• low pass filter																																																																																																																																																																																																																																																												
M	• mi = 10 ⁻³																																																																																																																																																																																																																																																												
MEG	• me = 10 ⁶																																																																																																																																																																																																																																																												
MET FLM	• metal film																																																																																																																																																																																																																																																												
MET OX	• metallic oxide																																																																																																																																																																																																																																																												
MFR	• manufacturer																																																																																																																																																																																																																																																												
MHZ	• mega hertz																																																																																																																																																																																																																																																												
MINAT	• miniature																																																																																																																																																																																																																																																												
MOM	• momentary																																																																																																																																																																																																																																																												
MOS	• metal oxide substrate																																																																																																																																																																																																																																																												
MTG	• mounting																																																																																																																																																																																																																																																												
MY	• "mylar"																																																																																																																																																																																																																																																												
N	• nano (10 ⁻⁹)																																																																																																																																																																																																																																																												
N/C	• normally closed																																																																																																																																																																																																																																																												
NE	• neon																																																																																																																																																																																																																																																												
NPL	• nickel plate																																																																																																																																																																																																																																																												
N/O	• normally open																																																																																																																																																																																																																																																												
NOM	• nominal																																																																																																																																																																																																																																																												
NPO	• negative positive zero (zero temperature coefficient)																																																																																																																																																																																																																																																												
NPN	• negative-positive-negative																																																																																																																																																																																																																																																												
NRFR	• not recommended for field replacement																																																																																																																																																																																																																																																												
NSR	• not separately replaceable																																																																																																																																																																																																																																																												
ORD	• order by description																																																																																																																																																																																																																																																												
OH	• oval head																																																																																																																																																																																																																																																												
OX	• oxide																																																																																																																																																																																																																																																												
P	• peak																																																																																																																																																																																																																																																												
PC	• printed circuit																																																																																																																																																																																																																																																												
PF	• picofarads = 10 ⁻¹² farads																																																																																																																																																																																																																																																												
PH BRZ	• phosphor bronze																																																																																																																																																																																																																																																												
PHL	• Phillips																																																																																																																																																																																																																																																												
PIV	• peak inverse voltage																																																																																																																																																																																																																																																												
PNP	• positive-negative-positive																																																																																																																																																																																																																																																												
P/O	• part of																																																																																																																																																																																																																																																												
POLY	• polystyrene																																																																																																																																																																																																																																																												
PORC	• porcelain																																																																																																																																																																																																																																																												
POS	• position(s)																																																																																																																																																																																																																																																												
POT	• potentiometer																																																																																																																																																																																																																																																												
PP	• peak-to-peak																																																																																																																																																																																																																																																												
PT	• point																																																																																																																																																																																																																																																												
PWV	• peak working voltage																																																																																																																																																																																																																																																												
RECT	• rectifier																																																																																																																																																																																																																																																												
RF	• radio frequency																																																																																																																																																																																																																																																												
RH	• round head or right hand																																																																																																																																																																																																																																																												
RMO	• rack mount only																																																																																																																																																																																																																																																												
RMS	• root-mean square																																																																																																																																																																																																																																																												
RWV	• reverse working voltage																																																																																																																																																																																																																																																												
S-B	• slow-blow																																																																																																																																																																																																																																																												
SCR	• screw																																																																																																																																																																																																																																																												
SE	• selenium																																																																																																																																																																																																																																																												
SECT	• section(s)																																																																																																																																																																																																																																																												
SEMICON	• semiconductor																																																																																																																																																																																																																																																												
SI	• silicon																																																																																																																																																																																																																																																												
SIL	• silver																																																																																																																																																																																																																																																												
SL	• slide																																																																																																																																																																																																																																																												
SPG	• spring																																																																																																																																																																																																																																																												
SPL	• special																																																																																																																																																																																																																																																												
SST	• stainless steel																																																																																																																																																																																																																																																												
SR	• split ring																																																																																																																																																																																																																																																												
STL	• steel																																																																																																																																																																																																																																																												
TA	• tantalum																																																																																																																																																																																																																																																												
TD	• time delay																																																																																																																																																																																																																																																												
TO1	• toggle																																																																																																																																																																																																																																																												
THD	• thread																																																																																																																																																																																																																																																												
Tl	• titanium																																																																																																																																																																																																																																																												
TOL	• tolerance																																																																																																																																																																																																																																																												
TRIM	• trimmer																																																																																																																																																																																																																																																												
TWT	• traveling wave tube																																																																																																																																																																																																																																																												
U	• micro = 10 ⁻⁶																																																																																																																																																																																																																																																												
VAR	• variable																																																																																																																																																																																																																																																												
VDCW	• dc working volts																																																																																																																																																																																																																																																												
W	• with																																																																																																																																																																																																																																																												
W	• watts																																																																																																																																																																																																																																																												
WIV	• working inverse voltage																																																																																																																																																																																																																																																												
WW	• wirewound																																																																																																																																																																																																																																																												
W/O	• without																																																																																																																																																																																																																																																												

01184-14

Figure 6-1. Panel Designations

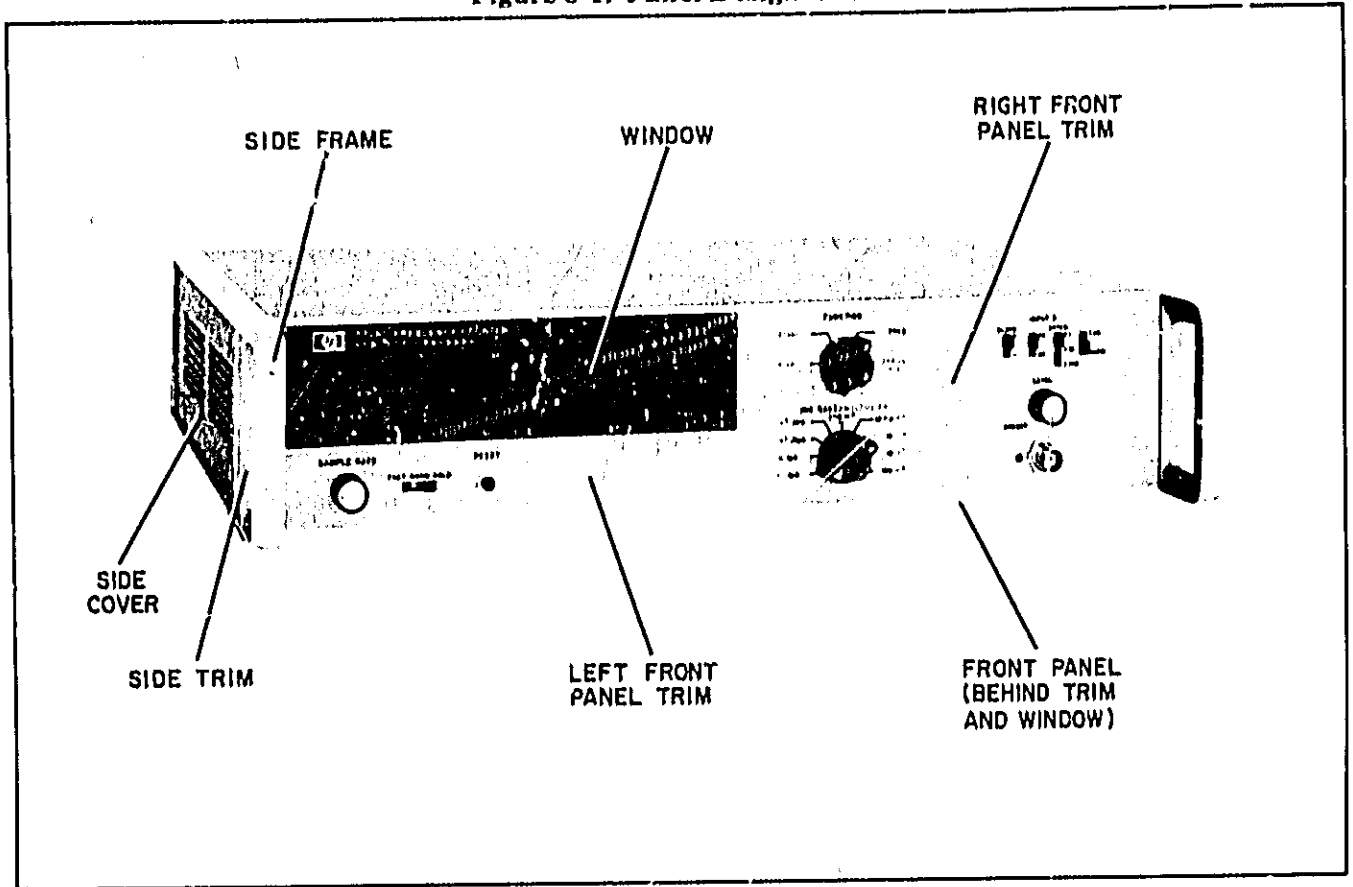


Table 6-1. Replaceable Parts

Reference Designation	HF Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1	C5326-80048	1	BOARD ASSY ATTENUATOR (SERIES 1224A) (LOADED ON C5326-80048 BLANK BOARD) NOTE 1: AIR12 IS NOT INCLUDED WHEN A1 ATTEN. ASSY IS ORDERED; ORDER AIR12 SEPARATELY.	2848C	U5326-80048
A1C1	0160-2244	1	CIFRD CER 3.0+/-0.25 PF 50GVDCM	2848C	0160-2244
A1C2	0160-0939	1	CIFRD MICA 430 PF 5K 300 VDCM	2848C	0160-0939
A1C3	0160-0378	1	CIFRD MICA 27PF 5K	72136	ADM15E270J55
A1C4	0160-0361	3	CIFRD MY 0.01 UF 10K 20GVDCM	56285	192P10392-PTS
A1C5	0160-2140	1	CIFRD CER 470 PF +80-20% 100GVDCM	9141E	TYPE B
A1C6	0160-2930	10	CIFRD CER 0.01 UF +80-20% 100GVDCM	9141E	TA
A1C7	0160-2197	1	CIFRD MICA 10 PF 5K	72136	KOM15C100J3C
A1C8	0160-2146	1	CIFRD CER 0.02 UF +80-20% 100GVDCM	9141E	TA
A1C9	0160-2930	1	CIFRD CER 0.01 UF +80-20% 100GVDCM	9141E	TA
A1CP1	1901-3040	19	DIODE SILICON 50 MA 30 MV	07263	FDG1088
A1CP2	1910-0016	11	DIODE GE 60 MV	2848C	1910-0016
A1CP3	1901-0376	2	DIODE SILICON 35V	2848C	1901-0376
A1CP4	1901-0376	1	DIODE SILICON 35V	2848C	1901-0376
A1CP5	1902-0041	2	DIODE BREAKDOWN 5.11V 5K	04713	5210939-98
A1CF6	1902-0041	1	DIODE BREAKDOWN 5.11V 5K	04713	5210939-98
A1DS1	2140-0047	1	LAMP NEON GLOW 0.8 MILLIAMPS	08806	AIC
A1J1	1251-0472	1	CONNECTOR PC 12 CONTACTS	71785	292-06-30-300
A1J2	1250-1163	1	CONNECTOR RF BNC INPUT	2848C	1250-1163
A1P1	0367-0451	1	TERMINAL SOLDER STUD 0.040" DIA SHANK	0000C	08D
A1Q1	1855-0334	1	STRIP FFT DUAL N-CHANNEL	17856	DN377
A1R1	0683-2235	2	REFRD COMP 22K OHM 5% 1/4W	01121	CR 2235
A1R2	0683-2145	1	REFRD COMP 910K OHM 5% 1/4W	01121	CR 9145
A1R3	0683-1015	14	REFRD COMP 10K OHM 5% 1/4W	01121	CR 1015
A1R4	0683-9125	1	REFRD COMP 910K OHM 5% 1/4W	01121	CR 9125
A1R5	0698-3576	2	REFRD COMP 110K OHM 5% 1/4W	2848C	0698-3576
A1R6	0683-1055	2	REFRD COMP 1 MEG OHM 5% 1/4W	01121	CR 1055
A1R7	0698-3576	1	REFRD COMP 110K OHM 5% 1/4W	2848C	0698-3576
A1R8	0683-2215	4	REFRD COMP 220 OHM 5% 1/4W	01121	CR 2215
A1R9	0683-4715	4	REFRD COMP 470 OHM 5% 1/4W	01121	CR 4715
A1R10	0683-3325	12	REFRD COMP 1 MEG OHM 5% 1/4W	01121	CR 1055
A1R11	0683-3325	12	REFRD COMP 330K OHM 5% 1/4W	01121	CR 3325
A1R12	2100-3221	1	VAR CAP 10K OHM 20V LIN 1/2W (SEE NOTE 1 ABOVE)	2848C	2100-3221
A1R13	0683-2225	8	REFRD COMP 2.2K OHM 5% 1/4W	01121	CR 2225
A1R14	0683-2225	1	REFRD COMP 2.2K OHM 5% 1/4W	01121	CR 2225
A1S1	3101-1278	2	SWITCH SLIDE DPDT (CHK-NORM)	79727	G-126-0007
A1S2	3101-1279	1	SWITCH SLIDE DP 3 POSITIONS (ATTEN)	79727	G-126-5-0016
A1S3	3101-1311	3	SWITCH SLIDE DPDT 0.5A 125V AC/DC (AC/DC)	79727	G126-0020
A1S4	3101-1278	1	SWITCH SLIDE DPDT (SLOPE)	79727	G-126-0007
A1S5	3101-1278	1	PART OF AIR12.		
A1X	0380-0046	1	SPACER CAPTIVE	0000C	08D
A1Y	01821-67401	2	KNCR TRIGGER LEVEL	2848C	01821-67401
A2	C5326-80004	1	INPUT AMPLIFIER ASSY (SERIES 972) (LOADED ON U5326-20004 BLANK BOARD)	2848C	C5326-80004
A2C1	0160-2930	1	CIFRD CER 0.01 UF +80-20% 100GVDCM	9141E	TA
A2C2	0160-2930	1	CIFRD CER 0.01 UF +30-20% 100GVDCM	9141E	TA
A2C3	0160-2930	1	CIFRD CER 0.01 UF +80-20% 100GVDCM	9141E	TA
A2C4	0160-2197	4	CIFRD ELECT 2.2 UF 10K 20GVDCM	56289	190D225X9020A2-DY5
A2C5	0160-0197	1	CIFRD ELECT 2.2 UF 10K 20GVDCM	56289	190D225X9020A2-DY5
A2C6	0160-0153	3	CIFRD MY 0.001 UF 10K 20GVDCM	56285	192P10292-PTS
A2C7	0170-7053	2	CIFRD MY 0.1 UF 20K 20GVDCM	56289	192P10402
A2C8	0170-0055	1	CIFRD MY 0.1 UF 20K 20GVDCM	56289	192P10402
A2C9	0160-2930	1	CIFRD CER 0.01 UF +80-20% 100GVDCM	9141E	TA
A2C10	0160-2930	1	CIFRD CER 0.01 UF +80-20% 100GVDCM	9141E	TA
A2CP1	1902-0049	1	DIODE BREAKDOWN 6.19V 5K	04713	5210939-122
A2CP2	1910-0016	1	DIODE GE 60 MV	2848C	1910-0016
A2CP3	1901-0376	1	DIODE SILICON 50 MA 30 MV	07263	FDG1088
A2CF4	1910-0016	1	DIODE GE 60 MV	2848C	1910-0016

See Introduction to this section for ordering information

Model 5326/27C
Replaceable Parts

Table 6-1. Replaceable Parts (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2CR5	1901-0040	2	DIODE/SILICON 50 MA 30 WV	C7263	FDG1086
A2L2	9100-2255		COIL/CHOKE 0.47 UH 1CR	28480	9100-2255
A2L3	9140-0144		COIL/IFXD RF 4.7 UH	2848C	9140-C144
A2L4	9140-0144		COIL/IFXD RF 4.7 UH	2848C	9140-C144
A2L5	9100-2255		COIL/CHOKE 0.47 UH 10X	28470	9100-2255
A2L6	9140-0144	1	COIL/IFXD RF 4.7 UH	28480	9140-0144
A2L7	9140-0144		COIL/IFXD RF 4.7 UH	2848C	9140-0144
A2L8	9140-0142		COIL/IFXD RF 2.20 UH 10T	82142	CG-4436-4M
A2L9	9140-0144		COIL/IFXD RF 4.7 UH	2848C	9140-C144
A2L10	9140-0144		COIL/IFXD RF 4.7 UH	2848C	9140-0144
A2Q1	1854-0092	14	TSTRISI NPN	80131	2N3563
A2Q2	1853-0015		TSTRISI PNP	80131	2N364C
A2Q3	1853-0015		TSTRISI PNP	80131	2N364C
A2Q4	1854-0345		TSTRISI NPN	80131	2N5175
A2Q5	1854-0345		TSTRISI NPN	80131	2N5175
A2Q6	1853-0015	7	TSTRISI PNP	80131	2N364C
A2Q7	1853-0015		TSTRISI PNP	80131	2N364C
A2Q8	1854-0092		TSTRISI NPN	80131	2N3563
A2Q9	1853-0015		TSTRISI PNP	80131	2N364C
A2Q10	1853-0015		TSTRISI PNP	80131	2N364C
A2Q11	1853-0015	19	TSTRISI PNP	80131	2N364C
A2Q12	1853-0015		TSTRISI PNP	80131	2N364C
A2Q13	1853-0015		TSTRISI PNP	80131	2N364C
A2Q14	1854-0092		TSTRISI NPN	80131	2N3563
A2Q15	1854-0071		TSTRISI NPN/SELECTED FROM 2N3704*	28480	1854-CG71
A2Q16	1854-0092	7	TSTRISI NPN	80131	2N3563
A2Q17	1854-0092		TSTRISI NPN	80131	2N3563
A2Q18	1854-0365		TSTRISI NPN	80131	2N4410
A2Q19	1854-0092		TSTRISI NPN	80131	2N3563
A2Q20	1854-0071		TSTRISI NPN/SELECTED FROM 2N3704*	28480	1854-CG71
A2R1	0683-6835	2	REFXD COMP 68K OHM 5% 1/4W	01121	CB 6835
A2R2	2100-2520		REFVAR CERMET 50 OHM 20% TYPE V 1/2W	28480	2100-2520
A2R3	0683-2215		REFXD COMP 220 OHM 5% 1/4W	01121	CB 2215
A2R4	0683-2405		REFXD COMP 24 OHM 5% 1/4W	01121	CB 2405
A2R5	0683-3625		REFXD COMP 360 OHM 5% 1/4W	01121	CB 3625
A2R6	0683-1015	6	REFXD COMP 100 OHM 5% 1/4W	01121	CB 1015
A2R7	0683-3025		REFXD COMP 3000 OHM 5% 1/4W	01121	CB 3025
A2R8	0683-1025		REFXD COMP 1000 OHM 5% 1/4W	01121	CB 1025
A2R9	0698-3113		REFXD CARBON 100 OHM 5% 1/8W	2848C	0698-3113
A2R10	0698-3381		REFXD COMP 150 OHM 5% 1/8W	2848C	0698-3381
A2R11	0698-5175	2	REFXD COMP 360 OHM 5% 1/8W	2848C	0698-5175
A2R12	0698-3379		REFXD COMP 68 OHM 5% 1/8W	2848C	0698-3379
A2R13	0698-3375		REFXD COMP 33 OHM 5% 1/8W	2848C	0698-3375
A2R14	0683-1525		REFXD COMP 1500 OHM 5% 1/4W	01121	CB 1525
A2R15	0698-5180		REFXD COMP 2K OHM 5% 1/8W	2848C	0698-5180
A2R16	0698-5175	6	REFXD COMP 360 OHM 5% 1/8W	2848C	0698-5175
A2R17	0698-3381		REFXD COMP 150 OHM 5% 1/8W	2848C	0698-3381
A2R18	0683-1025		REFXD COMP 1000 OHM 5% 1/4W	01121	CB 1025
A2R19	0698-3113		REFXD CARBON 100 OHM 5% 1/8W	2848C	0698-3113
A2R20	0683-1015		REFXD COMP 100 OHM 5% 1/4W	01121	CB 1015
A2R21	0683-3025	1	REFXD COMP 3000 OHM 5% 1/4W	01121	CB 3025
A2R22	0683-3625		REFXD COMP 3600 OHM 5% 1/4W	01121	CB 3625
A2R23	0683-2225		REFXD COMP 2.2K OHM 5% 1/4W	01121	CB 2225
A2R24	2100-2521		REFVAR FLX 2000 OHM 10% LIN 1/2W	2848C	2100-2521
A2R25	0683-2225		REFXD COMP 2.2K OHM 5% 1/4W	01121	CB 2225
A2R26	0683-1015	6	REFXD COMP 100 OHM 5% 1/4W	01121	CB 1015
A2R27	0683-1015		REFXD COMP 100 OHM 5% 1/4W	01121	CB 1015
A2R28	0683-6815		REFXD COMP 680 OHM 5% 1/4W	01121	CB 6815
A2R29	0683-6815		REFXD COMP 680 OHM 5% 1/4W	01121	CB 6815
A2R30	0683-4725		REFXD COMP 4700 OHM 5% 1/4W	01121	CB 4725
A2R31	0683-1035	17	REFXD COMP 10K OHM 5% 1/4W	01121	CB 1035
A2R32	0683-3315		REFXD COMP 330 OHM 5% 1/4W	01121	CB 3315
A2R33	0683-1035		REFXD COMP 10K OHM 5% 1/4W	01121	CB 1035
A2R34	0683-3315		REFXD COMP 330 OHM 5% 1/4W	01121	CB 3315
A2R35	0683-1035		REFXD COMP 10K OHM 5% 1/4W	01121	CB 1035
A2R36	0683-1015	1	REFXD COMP 100 OHM 5% 1/4W	01121	CB 1015
A2R37	0683-2235		REFXD COMP 22K OHM 5% 1/4W	01121	CB 2235
A2R38	0683-1025		REFXD COMP 1000 OHM 5% 1/4W	01121	CB 1025
A2R39	0683-2215		REFXD COMP 220 OHM 5% 1/4W	01121	CB 2215
A2R40	0683-2225		REFXD COMP 2.2K OHM 5% 1/4W	01121	CB 2225
A2R41	0683-1525	6	REFXD COMP 1500 OHM 5% 1/4W	01121	CB 1525
A2R42	0683-1025		REFXD COMP 1000 OHM 5% 1/4W	01121	CB 1025
A2R43	0683-3035		REFXD COMP 30K OHM 5% 1/4W	01121	CB 3035
A2R44	0683-3015		REFXD COMP 300 OHM 5% 1/4W	01121	CB 3015
A2R45	0683-3315		REFXD COMP 330 OHM 5% 1/4W	01121	CB 3315

See Introduction to this section for ordering information

Table 6-1. Replaceable Parts (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2K46	0683-1025		RFXD COMP 1000 OHM 5% 1/4W	C1121	CR 1025
A2K47	0683-1065	1	RFXD COMP 10M OHM 5% 1/4W	C1121	CR 1065
A2K48	0683-2059	1	RFXD COMP 2 MEGOHM 5% 1/4W	C1121	CR 2059
A2K49	0683-2715	1	RFXD COMP 270 OHM 5% 1/4W	C1121	CR 2715
A2K50	0683-2715	1	RFXD COMP 270 OHM 5% 1/4W	C1121	CR 2715
A2U1	1820-0218	1	INTEGRATED CIRCUIT: DTL 2 INPUT NOR GATE	04713	MC 1810P
A2U2	1820-3142	2	INTEGRATED CIRCUIT: 4 INPUT, 2-OR/NOR	04713	MC1004P
A3			NCT ASSIGNED		
A4	05326-60002	1	OSCILLATOR ASSY (SERIES 1037) (LOADED ON 05326-20002 BLANK BOARD)	2848C	05326-60002
A4C1	0160-0161		CIFXD MY 0.01 UF 10% 200VDCW	56289	192P10392-PT5
A4C2	0160-0197		CIFXD ELECT 2.2 UF 10% 20VDCW	56289	15L0225X9J20A2-DYS
A4C3	0121-0059	1	C/VAR CER 2-B PF 300VDCW	2848C	0121-C059
A4C4	0160-2264	1	CIFXD CER 20 PF 5% 500VDCW	72982	J01-000-C0G0-200J
A4C5	0160-2930		CIFXD CER 0.01 UF +85-20T 100VDCW	9141E	TA
A4L1	9100-2216	1	COIL/CHOKO 100 OHM 10%	28480	9100-2216
A4Q1	1850-7158	1	TSTRIGE PNP	80131	2N2635
A4R1	0683-4037	1	RFXD MET FLM 46.4 OHM 1% 1/8W	28480	0683-4037
A4R2	0683-1025		RFXD COMP 1000 OHM 5% 1/4W	01121	CR 1025
A4R3	0683-3015		RFXD COMP 330 OHM 5% 1/4W	01121	CR 3015
A4R4	0683-3015		RFXD COMP 300 OHM 5% 1/4W	01121	CR 3015
A4U1	1820-0142	1	INTEGRATED CIRCUIT: 4 INPUT, 2-OR/NOR	04713	MC1004P
A4Y1	0410-0405		CRYSTAL: QUARTZ 10 MHZ	2848C	0410-0405
A5	05326-60005	1	TIME PASE CONTROL ASSY (SERIES 972) (LOADED ON 05326-20005 BLANK BOARD)	28480	05326-60005
A5C1	0180-0197		CIFXD ELECT 2.2 UF 10% 20VDCW	56289	1500225X9J20A2-DYS
A5C2	0160-0127	1	CIFXD CER 1.0 UF 20% 25VDCW	56289	5C13C5-CML
A5C3	0180-0291	2	CIFXD ELECT 1.0 UF 10% 35VDCW	56289	1500105X9J35A2-DYS
A5C4	0160-2150	1	CIFXD MICA 33 PF 5%	28480	0160-2150
A5C5	0160-2204	2	CIFXD MICA 100PF 5%	72136	ADM15F101J3C
A5CR1	1854-0040		DIODE: SILICON 50 MA 30 WV	07263	FDG1088
A5Q1	1854-0092		TSTRIS1 NPN	80131	2N3563
A5Q2	1854-0092		TSTRIS1 NPN	80131	2N3563
A5Q3	1854-0071		TSTRIS1 NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q4	1854-0071		TSTRIS1 NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q5	1854-0071		TSTRIS1 NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q6	1854-0071		TSTRIS1 NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5R1	0683-1035		RFXD COMP 10K OHM 5% 1/4W	01121	CR 1035
A5R2	0683-1035		RFXD COMP 10K OHM 5% 1/4W	01121	CR 1035
A5R3	0683-5105	3	RFXD COMP 51 OHM 5% 1/4W	01121	CR 5105
A5R4	0683-3325		RFXD COMP 3300 OHM 5% 1/4W	01121	CR 3325
A5R5	0683-4715		RFXD COMP 470 OHM 5% 1/4W	01121	CR 4715
A5R6	0683-3325		RFXD COMP 3300 OHM 5% 1/4W	01121	CR 3325
A5R7	0683-1225	1	RFXD COMP 1200 OHM 5% 1/4W	01121	CR 1225
A5R8	0683-1025		RFXD COMP 1000 OHM 5% 1/4W	01121	CR 1025
A5R9	0683-1025		RFXD COMP 1000 OHM 5% 1/4W	01121	CR 1025
A5R10	0683-2215		RFXD COMP 220 OHM 5% 1/4W	01121	CR 2215
A5R11	0683-6835		RFXD COMP 68K OHM 5% 1/4W	01121	CR 6835
A5R12	0683-3325		RFXD COMP 3300 OHM 5% 1/4W	01121	CR 3325
A5R13	0683-3325		RFXD COMP 3300 OHM 5% 1/4W	01121	CR 3325
A5R14	0683-3325		RFXD COMP 3300 OHM 5% 1/4W	01121	CR 3325
A5R15	0683-3325		RFXD COMP 3300 OHM 5% 1/4W	01121	CR 3325
A5R16	0683-1025		RFXD COMP 1000 OHM 5% 1/4W	01121	CR 1025
A5R17	0683-1025		RFXD COMP 1000 OHM 5% 1/4W	01121	CR 1025
A5R18	0683-2225		RFXD COMP 2.2K OHM 5% 1/4W	01121	CR 2225
A5R19	0683-2225		RFXD COMP 2.2K OHM 5% 1/4W	01121	CR 2225
A5R20	0683-5105		RFXD COMP 51 OHM 5% 1/4W	01121	CR 5105
A5R21	0683-5105		RFXD COMP 51 OHM 5% 1/4W	01 21	CR 5105
A5U1	1820-0413	7	INTEGRATED CIRCUIT: DECADE DIVIDER	2848C	1820-0413
A5U2	1820-0413		INTEGRATED CIRCUIT: DECADE DIVIDER	28480	1820-0413
A5U3	1820-0413		INTEGRATED CIRCUIT: DECADE DIVIDER	2848C	1820-0413
A5U4	1820-0413		INTEGRATED CIRCUIT: DECADE DIVIDER	28480	1820-0413
A5U5	1820-0064	4	IC: TTL QUAD 2-INPUT NAND GATE	01295	SN7400N
A5U6	1820-0413		INTEGRATED CIRCUIT: DECADE DIVIDER	2848C	1820-0413

See introduction to this section for ordering information

Table 6-1. Replaceable Parts (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A5U7	1820-0413		INTEGRATED CIRCUIT:DECADE DIVIDER	2848C	1820-0413
A5U8	1820-0413		INTEGRATED CIRCUIT:DECADE DIVIDER	2848C	1820-0413
A5U9	1820-0413	1	11 BIT L DECADE DIVIDER 12.5 MHZ MIN.	2848C	1820-0413
A5U10	1820-0174	1	11 BIT L HEX INVERTER	01295	547404
A5	05326-60013	1	SAMPLE RATE ASSY (SERIES 12244) (MANAGED BY 05326-20013 BLANK BOARD)	2848C	05326-60013
A6C1	C16C-2201	1	CERAM MICA 51 PF 5R	7213A	ADM15E51C31C
A6C2	C16C-2134	1	CERAM MICA 220PF 5R 300VDCW	14655	FUM15F221J3C
A6C3	C16C-C226	1	CERAM ELECT 22 UF 10R 35VDCW	56285	152P10226-PTS
A6C4	C16C-C166	1	CERAM 1/2 C.600 UF 17R 35VDCW	56285	152P8392-PTS
A6C5	C16C-C193	1	CERAM MICA 82 PF 5R	2848C	0143-C193
A6C6	C16C-0153		CERAM MY 0.001 UF 10R 200VDCW	56285	152P10292-PTS
A6C7	C16C-2199	2	CERAM MICA 30 PF 5R 300VDCW	2848C	016C-2199
A6C8	C16C-0153		CERAM MY 0.001 UF 10R 200VDCW	56285	152P10292-PTS
A6C9	C180-0291		CERAM ELECT 1.0C UF 10R 35VDCW	56285	152P10352-PTS
A6C10	C16C-C161		CERAM MY 0.01 UF 10R 200VDCW	56285	152P10392-PTS
A6C11	C180-0114	6	CERAM ELECT 4.0 UF +100-10R 25VDCW	2848C	C180-0114
A6C12	C180-0114		CERAM ELECT 4.0 UF +100-10R 25VDCW	2848C	C180-0114
A6C13	1901-0040		DIOIDES: SILICON 50 MA 30 WV	07263	FUG1008
A6C14	1901-0040		DIOIDES: SILICON 50 MA 30 WV	07263	FUG1008
A6C15	1916-0016		DIOIDES: 60 MIV	2848C	1916-0016
A6C16	1916-0016		DIOIDES: 60 MIV	2848C	1916-0016
A6C17	1901-0040		DIOIDES: SILICON 50 MA 30 WV	07263	FUG1008
A6C18	1901-0040		DIOIDES: SILICON 50 MA 30 WV	07263	FUG1008
A6C19	1916-0016		DIOIDES: 60 MIV	2848C	1916-0016
A6C20	1916-0016		DIOIDES: 60 MIV	2848C	1916-0016
A6C21	1901-0040		DIOIDES: SILICON 50 MA 30 WV	07263	FUG1008
A6C22	1901-0040		DIOIDES: SILICON 50 MA 30 WV	07263	FUG1008
A6C23	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C24	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C25	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C26	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C27	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C28	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C29	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C30	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C31	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C32	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C33	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C34	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C35	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C36	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C37	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C38	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C39	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C40	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C41	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C42	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C43	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C44	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C45	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C46	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C47	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C48	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C49	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C50	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C51	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C52	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C53	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C54	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C55	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C56	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C57	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C58	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C59	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C60	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C61	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C62	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C63	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C64	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C65	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C66	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C67	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C68	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C69	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C70	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C71	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C72	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C73	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C74	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C75	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C76	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C77	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C78	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C79	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C80	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C81	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C82	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C83	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C84	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C85	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C86	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C87	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C88	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C89	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C90	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C91	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C92	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C93	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C94	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C95	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C96	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C97	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C98	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C99	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C100	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C101	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C102	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C103	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C104	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C105	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C106	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C107	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C108	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C109	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C110	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C111	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C112	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C113	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C114	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C115	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C116	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C117	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C118	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C119	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C120	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C121	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C122	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C123	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C124	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C125	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C126	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C127	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C128	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C129	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071
A6C130	1854-0071		TSTRF51 NPNISELECTED FROM 2N3704	2848C	1854-0071

See introduction to this section for ordering information

Table 6-1. Replacable Parts (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A6R31	0683-1035		REFRD COMP 10K OHM 5% 1/4W	01121	CR 1035
A6R32	0683-1035		REFRD COMP 10K OHM 5% 1/4W	01121	CR 1035
A6R33	0683-2735		REFRD COMP 27K OHM 5% 1/4W	01121	CR 2735
A6R34	0683-2735		REFRD COMP 27K OHM 5% 1/4W	01121	CR 2735
A6R35	0683-1035		REFRD COMP 10K OHM 5% 1/4W	01121	CR 1035
A6F36	0683-1035		REFRD COMP 10K OHM 5% 1/4W	01121	CR 1035
A6R37	0683-2045	1	REFRD COMP 200K OHM 5% 1/4W	01121	CR 2045
A6R38	0683-1035		REFRD COMP 10K OHM 5% 1/4W	01121	CR 1035
A6R39	0683-1035		REFRD COMP 10K OHM 5% 1/4W	01121	CR 1035
A6R40	0683-4735	2	REFRD COMP 47K OHM 5% 1/4W	01121	CR 4735
A6R41	0683-1525		REFRD COMP 1500 OHM 5% 1/4W	01121	CR 1525
A6R42	0683-1015		REFRD COMP 100 OHM 5% 1/4W	01121	CR 1015
A6R43	0683-4735		REFRD COMP 47K OHM 5% 1/4W	01121	CR 4735
A6R44	0683-1015		REFRD COMP 100 OHM 5% 1/4W	01121	CR 1015
A6J1	1820-0212		ICITTL QUAD 2-INPT NAND GATE	01295	5N7400N
A6J2	1820-0212	1	ICICL TYPE D F/F	04713	MC1022P
A6J3	1820-0068	1	ICITTL TRIFLE 3-INPT PUS NAND GATE	12040	5N7410N
A6J4	1820-0054		ICITTL QUAD 2-INPT NAND GATE	01295	5N7400N
A6J5	1820-0328	1	ICITTL QUAD 2-INPT NOR GATE	04713	5N7402N
A6J6	1820-0147	1	ICICL TRIPLE 3-INPT NOR GATE	04713	MC1007P
A7	05326-ACC45	1	BOARD ASSY:FUNCTION CONTROL (SERIES 1136A) (LOADED ON 05326-20045 BLANK BOARD)	28480	05326-60045
A7C1	0160-2100	1	CIFRD MICA 30 PF 5%	28480	0160-2100
A7C2	0140-0201	1	CIFRD MICA 12 PF 5%	28480	0140-0201
A7C3	0160-2327	7	CIFRD CER 1000 PF 20% 100VDCW	96733	B1048X102M
A7C4	0160-2327		CIFRD CER 1000 PF 20% 100VDCW	96733	B1048X102M
A7C5	0160-2327		CIFRD CER 1000 PF 20% 100VDCW	96733	B1048X102M
A7C6	0160-2327		CIFRD CER 1000 PF 20% 100VDCW	96733	B1048X102M
A7C7	0160-2327		CIFRD CER 1000 PF 20% 100VDCW	96733	B1048X102M
A7C8	0160-2327		CIFRD CER 1000 PF 20% 100VDCW	96733	B1048X102M
A7C9	0160-2327		CIFRD CER 1000 PF 20% 100VDCW	96733	B1048X102M
A7D1	1854-0215		TSTRIS1 NPN	80131	2N3904
A7D2	1854-0215		TSTRIS1 NPN	80131	2N3904
A7D3	1854-0009		TSTRIS1 NPN	80131	2N709
A7D4	1854-0009		TSTRIS1 NPN	80131	2N709
A7D5	1854-0009		TSTRIS1 NPN	80131	2N709
A7R1	0683-2425	3	REFRD COMP 2400 OHM 5% 1/4W	01121	CR 2425
A7R2	0683-2425		REFRD COMP 2400 OHM 5% 1/4W	01121	CR 2425
A7R3	0683-4315	6	REFRD COMP 430 OHM 5% 1/4W	01121	CR 4315
A7R4	0683-1525		REFRD COMP 1500 OHM 5% 1/4W	01121	CR 1525
A7R5	0683-2025		REFRD COMP 2000 OHM 5% 1/4W	01121	CR 2025
A7R6	0683-1525		REFRD COMP 1500 OHM 5% 1/4W	01121	CR 1525
A7R7	0683-2025		REFRD COMP 2000 OHM 5% 1/4W	01121	CR 2025
A7R8	0683-5125		REFRD COMP 5100 OHM 5% 1/4W	01121	CR 5125
A7R9	0683-1015	1	REFRD COMP 100 OHM 5% 1/4W	01121	CR 1015
A7R10	0683-2735	3	REFRD COMP 2700 OHM 5% 1/4W	01121	CR 2725
A7R11	0683-4715		REFRD COMP 470 OHM 5% 1/4W	01121	CR 4715
A7R12	0683-7515	1	REFRD COMP 750 OHM 5% 1/4W	01121	CR 7515
A7R13	0683-4325	1	REFRD COMP 4300 OHM 5% 1/4W	01121	CR 4325
A7R14	0683-1025		REFRD COMP 1000 OHM 5% 1/4W	01121	CR 1025
A7R15	0683-7515		REFRD COMP 750 OHM 5% 1/4W	01121	CR 7515
A7R16	0683-1025		REFRD COMP 1000 OHM 5% 1/4W	01121	CR 1025
A7R17	0683-4715		REFRD COMP 470 OHM 5% 1/4W	01121	CR 4715
A7R18	0683-3015		REFRD COMP 300 OHM 5% 1/4W	01121	CR 3015
A7R19	0683-7515		REFRD COMP 750 OHM 5% 1/4W	01121	CR 7515
A7R20	0683-3015		REFRD COMP 300 OHM 5% 1/4W	01121	CR 3015
A7R21	0683-3025		REFRD COMP 3000 OHM 5% 1/4W	01121	CR 3025
A7R22	0683-9115		REFRD COMP 910 OHM 5% 1/4W	01121	CR 9115
A7R23	0683-5615	1	REFRD COMP 560 OHM 5% 1/4W	01121	CR 5615
A7R24	0683-1525		REFRD COMP 1500 OHM 5% 1/4W	01121	CR 1525
A7U1	1820-0145	1	ICIDIGITAL QUAD 2-INPT NOR GATE	28480	1820-0145
A7U2	1820-0440	1	ICICL DUAL RS F/F	04713	MC1016P
A7U3	1820-0102	4	INTEGRATED CIRCUIT:J-K FLIP FLOP	04713	MC1013P
A7U4	1820-0212	1	ICICL QUAD LINE RECEIVER	04713	MC1020P
A7U5	1820-0489	3	ICICL	28480	1820-0489
A7U6	1820-0489		ICICL	28480	1820-0489
A7U7	1820-0252	1	ICICL DUAL 3-4 INPT OR/NOR GATE	04713	MC1026P
A7U8	1820-0252	1	INTEGRATED CIRCUIT:DIGITAL ECL DUAL	04713	MC1035P

See Introduction to this section for ordering information

Model 5326/27C
Replaceable Parts

Table 6-1. Replaceable Parts (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A8	05326-60009	1	DISPLAY SUPPORT ASSY (SERIES 944) (LOADED ON 05326-20009 PLANK BOARD)	2848C	05326-7339
ABC1	0160-2930		CIFXD CER 0.01 UF 480-20V 100VDCM	9141A	TA
ABC2	0160-2199		CIFXD MICA 3C PF 5R 100VDCM	2848C	0160-2199
ACF1	1931-0040		DIODESILICON 50 MA 30 WV	C7263	FD-1008
ACFP2	1910-0016		DIODEIGE 60 MV	2848C	1910-0016
ACFR3	1910-0016		DIODEIGE 60 MV	2848C	1910-0016
ACFR4	1901-0040		DIODESILICON 50 MA 30 WV	C7263	FDG1088
ABJ1	1251-2035	1	CONNECTORIPC EDGE (2 X 15) 30 CONTACT	71705	252-15-30-310
ABQ1	1854-0092		TSTRISI NPN	80131	2N3563
ABQ2	1854-0092		TSTRISI NPN	80131	2N3563
ABQ3	1854-0365		TSTRISI NPN	80131	2N441C
ABQ4	1854-0365		TSTRISI NPN	80131	2N441C
ABQ5	1854-0365		TSTRISI NPN	80131	2N441C
ABQ6	1854-0365		TSTRISI NPN	80131	2N441C
ABQ7	1854-0365		TSTRISI NPN	80131	2N441C
ABQ8	1854-0665		TSTRISI NPN	80131	2N441C
ABQ9	1854-0092		TSTRISI NPN	80131	2N3563
ABQ10	1854-0665		TSTRISI NPN	80131	2N3563
ABQ11	1854-0092		TSTRISI NPN	80131	2N3563
ABR1	0683-1125	1	RIFXD COMP 1100 OHM 5% 1/4W	01121	CR 1125
ABR2	0683-1045	5	RIFXD COMP 100K OHMS 5% 1/4W	01121	CR 1045
ABR3	0683-1045		RIFXD COMP 100K OHMS 5% 1/4W	01121	CR 1045
ABR4	0683-1025		RIFXD COMP 1000 OHM 5% 1/4W	01121	CR 1025
ABR5	0683-1255	6	RIFXD COMP 1.2 MEGOHM 5% 1/4W	01121	CR 1255
ABR6	0683-1255		RIFXD COMP 1.2 MEGOHM 5% 1/4W	01121	CR 1255
ABR7	0683-1255		RIFXD COMP 1.2 MEGOHM 5% 1/4W	01121	CR 1255
ABR8	0683-1255		RIFXD COMP 1.2 MEGOHM 5% 1/4W	01121	CR 1255
ABR9	0683-1255		RIFXD COMP 1.2 MEGOHM 5% 1/4W	01121	CR 1255
ABR10	0683-1255		RIFXD COMP 1.2 MEGOHM 5% 1/4W	01121	CR 1255
ABR11	0683-2425		RIFXD COMP 2400 OHM 5% 1/4W	01121	CR 2425
ABR12	0683-1015		RIFXD COMP 100 OHM 5% 1/4W	01121	CR 1015
ABR13	0683-1025		RIFXD COMP 1000 OHM 5% 1/4W	01121	CR 1025
ABR14	0683-2715		RIFXD COMP 270 OHM 5% 1/4W	01121	CR 2715
ABR15	0683-4725		RIFXD COMP 4700 OHM 5% 1/4W	01121	CR 4725
ABR16	0683-1025		RIFXD COMP 1000 OHM 5% 1/4W	01121	CR 1025
ABR17	0683-4725		RIFXD COMP 4700 OHM 5% 1/4W	01121	CR 4725
ABR18	0683-5115		RIFXD COMP 510 OHM 5% 1/4W	01121	CR 5115
ABR19	0683-1045		RIFXD COMP 100K OHMS 5% 1/4W	01121	CR 1045
ABR20	0683-1045		RIFXD COMP 100K OHMS 5% 1/4W	01121	CR 1045
ABR21	0683-2725		RIFXD COMP 2700 OHM 5% 1/4W	01121	CR 2725
ABR22	0683-5115		RIFXD COMP 510 OHM 5% 1/4W	01121	CR 5115
ABR23	0683-1045		RIFXD COMP 100K OHMS 5% 1/4W	01121	CR 1045
ABR24	0683-2725		RIFXD COMP 2700 OHM 5% 1/4W	01121	CR 2725
ABR25	0683-1535	1	RIFXD COMP 15K OHM 5% 1/4W	01121	CR 1535
ABR26	0683-2225		RIFXD COMP 2.2K OHM 5% 1/4W	01121	CR 2225
ABU1	1820-0094	1	IC:DTL QUAD 2-IN/UT GATE	04713	5C8903PK
ABU2	1820-0307	1	IC:DTL HEX INVERTER	04713	MC838P
ABU3	1820-0143	1	INTEGRATED CIRCUIT:AC COUPLED JK F/F	04713	MC1027P
ABU4	1820-0102		INTEGRATED CIRCUIT:J-K FLIP FLOP	04713	MC1013P
ABU5	1820-0102		INTEGRATED CIRCUIT:J-K FLIP FLOP	04713	MC1013P
ABU6	1820-0102		INTEGRATED CIRCUIT:J-K FLIP FLOP	04713	MC1013P
A9	05326-6000F	1	DISPLAY ASSY (SERIES 1224A) (LOADED ON 05326-20000/25 PLANK BOARD).	2848C	05326-60008
A90S1	1970-0042	15	TUBE:NUMERICAL INDICATOR	83594	B-5750-S
A90S2	1970-0042		TUBE:NUMERICAL INDICATOR	83594	B-5750-S
A90S3	1970-0042		TUBE:NUMERICAL INDICATOR	83594	B-5750-S
A90S4	1970-0042		TUBE:NUMERICAL INDICATOR	83594	B-5750-S
A90S5	1970-0042		TUBE:NUMERICAL INDICATOR	83594	B-5750-S
A90S6	1970-0042		TUBE:NUMERICAL INDICATOR	83594	B-5750-S
A90S7	1970-0042		TUBE:NUMERICAL INDICATOR	83594	B-5750-S
A9R1	0683-1025	8	RIFXD COMP 1000 OHM 5% 1/4W	01121	CR 1025
A9R2	0683-843		RIFXD FLM 7.5K OHM 2% 1/8W	2848C	0683-843
A9R3	0683-1025		RIFXD COMP 1000 OHM 5% 1/4W	01121	CR 1025

See Introduction to this section for ordering information

Table 6-1. Replaceable Parts (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A9R4	0608-8431		RIFXD FLM 7.5K OHM 2% 1/8W	2848C	0608-8431
A9R5	0608-8431		RIFXD FLM 7.5K OHM 2% 1/8W	2848D	0608-8431
A9R6	0608-8431		RIFXD FLM 7.5K OHM 2% 1/8W	2848C	0608-8431
A9R7	0608-8431		RIFXD FLM 7.5K OHM 2% 1/8W	2848D	0608-8431
A9R8	0608-8431		RIFXD FLM 7.5K OHM 2% 1/8W	2848F	0608-8431
A9R9	0608-8431		RIFXD FLM 7.5K OHM 2% 1/8W	2848C	0608-8431
A9R10	0683-1006	3	RIFXD COMP 10 OHM 5% 1/4W	01121	CB 1006
A9R11	0608-8431		RIFXD FLM 7.5K OHM 2% 1/8W	2848C	0608-8431
A9R12	0683-1006		RIFXD COMP 10 OHM 5% 1/4W	01121	CB 1006
A9U1	1820-0228	2	IC:REEL TO TTL QUAD 2-INPUT OR TRANS.	04713	MC1035P
A9U2	1820-0119	13	IC:TTL BLANKING DECADE COUNTER	2848C	1820-0119
A9U3	1820-0119		IC:TTL BLANKING DECADE COUNTER	2848C	1820-0119
A9U4	1820-0119		IC:TTL BLANKING DECADE COUNTER	2848C	1820-0119
A9U5	1820-0119		IC:TTL BLANKING DECADE COUNTER	2848C	1820-0119
A9U6	1820-0119		IC:TTL BLANKING DECADE COUNTER	2848C	1820-0119
A9U7	1820-0119		IC:TTL BLANKING DECADE COUNTER	2848C	1820-0119
A9U9	1820-0116	15	IC:14-BIT BUFF STORE GATED OUTS	2848D	1820-0116
A9U10	1820-0116		IC:14-BIT BUFF STORE GATED OUTS	2848D	1820-0116
A9U11	1820-0116		IC:14-BIT BUFF STORE GATED OUTS	2848C	1820-0116
A9U12	1820-0116		IC:14-BIT BUFF STORE GATED OUTS	2848C	1820-0116
A9U13	1820-0116		IC:14-BIT BUFF STORE GATED OUTS	2848C	1820-0116
A9U14	1820-0116		IC:14-BIT BUFF STORE GATED OUTS	2848C	1820-0116
A9U15	1820-0116		IC:14-BIT BUFF STORE GATED OUTS	2848C	1820-0116
A9U17	1820-0729	1	IC:DECODER-DIVIDER	2848C	1820-0729
A9U18	1820-0092	14	INTEGRATED CIRCUIT:DECODER-DIVIDER	2848D	1820-C092
A9U19	1820-0092		INTEGRATED CIRCUIT:DECODER-DIVIDER	2848D	1820-C092
A9U20	1820-C092		INTEGRATED CIRCUIT:DECODER-DIVIDER	2848D	1820-C092
A9U21	1820-C092		INTEGRATED CIRCUIT:DECODER-DIVIDER	2848D	1820-C092
A9U22	1820-C092		INTEGRATED CIRCUIT:DECODER-DIVIDER	2848D	1820-C092
A9U23	1820-C092		INTEGRATED CIRCUIT:DECODER-DIVIDER	2848D	1820-C092
A9X08	1200-0477	6	SOCKET:IC	2848C	1200-0477
A9X09	1200-0477		SOCKET:IC	2848C	1200-0477
A9X04	1200-0477		SOCKET:IC	2848C	1200-0477
AX051	1200-0406	16	SOCKET: TUBE, FOR 6700 SERIES	83604	5K207
AX052	1200-0406		SOCKET: TUBE, FOR 6700 SERIES	83604	5K207
AX053	1200-0406		SOCKET: TUBE, FOR 6700 SERIES	83604	5K207
AX054	1200-0406		SOCKET: TUBE, FOR 6700 SERIES	83604	5K207
AX055	1200-0406		SOCKET: TUBE, FOR 6700 SERIES	83604	5K207
AX056	1200-0406		SOCKET: TUBE, FOR 6700 SERIES	83604	5K207
AX057	1200-0406		SOCKET: TUBE, FOR 6700 SERIES	83604	5K207
A10	05326-60036	1	BOARD ASSY:RIGHT READOUT (SERIES 1036A) (LOADED ON 05326-20036 BLANK BOARD)	2848C	05326-60036
	05326-00009	3	BRACKET:READOUT	2848D	05326-00009
	05326-80008	1	INDICATOR:MASK (U,N,S,)	2848C	05326-80008
	05326-80009	1	INDICATOR:MASK (V,N,M2)	2848C	05326-80009
	05326-80010	1	INDICATOR:MASK (P,N,G)	2848C	05326-80010
	05330-40002	3	BUZZER:ANNUNCIATOR	2848C	05330-40002
	0510-0207	6	NOTICAPTIVE 4-40 X 0.188 LG	2848D	0510-0207
A10051	2140-0313	11	LAMP:NEON GLOW FROSTED 1.9 MILLIAMPS	08806	C2A-B
A10052	2140-0313		LAMP:NEON GLOW FROSTED 1.9 MILLIAMPS	08806	C2A-B
A10053	2140-0313		LAMP:NEON GLOW FROSTED 1.9 MILLIAMPS	08806	C2A-B
A10054	2140-0313		LAMP:NEON GLOW FROSTED 1.9 MILLIAMPS	08806	C2A-B
A10055	2140-0313		LAMP:NEON GLOW FROSTED 1.9 MILLIAMPS	08806	C2A-B
A10056	2140-0313		LAMP:NEON GLOW FROSTED 1.9 MILLIAMPS	08806	C2A-B
A10057	2140-0313		LAMP:NEON GLOW FROSTED 1.9 MILLIAMPS	08806	C2A-B
A10058	2140-0313		LAMP:NEON GLOW FROSTED 1.9 MILLIAMPS	08806	C2A-B
A1001	1854-0009		TSTR:SI NPN	80131	2N709
A1002	1854-0009		TSTR:SI NPN	80131	2N709
A1003	1854-0009		TSTR:SI NPN	80131	2N709
A1004	1854-0474	12	TSTR:SI NPN	2848D	1854-C474
A1005	1854-0474		TSTR:SI NPN	2848C	1854-C474
A1006	1854-0474		TSTR:SI NPN	2848D	1854-C474
A1007	1854-0474		TSTR:SI NPN	2848D	1854-C474
A1008	1854-0474		TSTR:SI NPN	2848C	1854-C474
A1009	1854-0474		TSTR:SI NPN	2848C	1854-C474
A10010	1854-0474		TSTR:SI NPN	2848C	1854-C474
A10011	1854-0474		TSTR:SI NPN	2848D	1854-C474
A10R1	0683-5125		RIFXD COMP 5100 OHM 5% 1/4W	01121	CB 5125
A10R2	0683-5125		RIFXD COMP 5100 OHM 5% 1/4W	01121	CB 5125
A10R3	0683-5125		RIFXD COMP 5100 OHM 5% 1/4W	01121	CB 5125

See Introduction to this section for ordering information

Table 6-1. Replaceable Parts (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1CR4	0683-1025		RIFRD COMP 2000 OHM 5% 1/4W	C1121	CR 1025
A1CR5	0683-2025		RIFRD COMP 2000 OHM 5% 1/4W	C1121	CR 2025
A1CP6	0683-2025		RIFRD COMP 2000 OHM 5% 1/4W	C1121	CR 2025
A1CF7	0683-1025		RIFRD COMP 2000 OHM 5% 1/4W	C1121	CR 1025
A1DNR	0683-5135	5	RIFRD COMP 51K OHM 5% 1/4W	C1121	CR 5135
A1DR9	0683-5135		RIFRD COMP 51K OHM 5% 1/4W	C1121	CR 5135
A1DU1	1820-0274	9	IC10TL QUAD 2-INPT OR GATE	2848C	1820-C274
A1DU2	1820-C274		IC10TL QUAD 2-INPT OR GATE	2848C	1820-C274
A1DU3	1820-C273	3	IC10TL QUAD 2-INPT AND GATE	2848C	1820-C273
A1DU4	1820-031C	1	IC10TL TRIPLE 3-INPT NAND GATE	0471J	5C651CPK
A1DU5	1820-0274		IC10TL QUAD 2-INPT OR GATE	2848C	1820-C274
A1DU6	1820-C274		IC10TL QUAD 2-INPT OR GATE	2848C	1820-C274
A11	05326-60035	1	BOARD ASSY LEFT PBOARD (SERIES P1136A) (LOADED ON 05326-2003, BLANK BOARD)	2848C	05326-60035
	05326-00004	1	FRACKET/PIEDCUT	2848C	05326-00004
	05326-80011	1	INDICATOR MASK (RFT, C, UF)	2848C	05326-80011
	05330-40002		BLOCK ANNUNCIATOR NOT ASSIGNED	2848F	05330-40002
A11C1	0160-2930		CFRCD CER 0.01 UF +80-20V 10VDCM	5141F	TA
A11C2	0160-2200		CFRCD MICA 43 PF 5% 50VDCM	2213B	ADM1543C3C
A11C3	2110-0313	1	LAMP NEON GLOW FROSTED 1.9 MILLIAMPS	0800C	C2A-B
A11D51	2140-0313		LAMP NEON GLOW FROSTED 1.9 MILLIAMPS	0800C	C2A-B
A11D52	2140-0313		LAMP NEON GLOW FROSTED 1.9 MILLIAMPS	0800C	C2A-B
A11D53	2140-0313		LAMP NEON GLOW FROSTED 1.9 MILLIAMPS	0800C	C2A-B
A1101	1854-0071		TSTRISI NPN SELECTED FROM 2837C4	2848C	1854-C071
A1102	1854-0474		TSTRISI NPN	2848C	1854-C474
A1103	1854-0474		TSTRISI NPN	2848C	1854-C474
A1104	1854-0474		TSTRISI NPN	2848C	1854-C474
A11R1	0683-1035		RIFRD COMP 10K OHM 5% 1/4W	01121	CR 1035
A11R2	0683-2035	2	RIFRD COMP 20K OHM 5% 1/4W	01121	CR 2035
A11R3	0683-1025		RIFRD COMP 10K OHM 5% 1/4W	C1121	CR 1025
A11R4	0683-1525		RIFRD COMP 150 OHM 5% 1/4W	01121	CR 1525
A11R5	0683-2025		RIFRD COMP 2000 OHM 5% 1/4W	C1121	CR 2025
A11R6	0683-2025		RIFRD COMP 2000 OHM 5% 1/4W	C1121	CR 2025
A11R7	0683-2025		RIFRD COMP 2000 OHM 5% 1/4W	C1121	CR 2025
A11R8	0683-5135		RIFRD COMP 51K OHM 5% 1/4W	C1121	CR 5135
A11R9	0683-5135		RIFRD COMP 51K OHM 5% 1/4W	C1121	CR 5135
A11R10	0683-5135		RIFRD COMP 51K OHM 5% 1/4W	C1121	CR 5135
A11R11	0683-1025		RIFRD COMP 10K OHM 5% 1/4W	C1121	CR 1025
A11U1	1820-0175	1	IC10TL HEX INVERTER, OPEN COLL.	01295	5N7405N
A11U2	1820-0274		IC10TL QUAD 2-INPT OR GATE	2848C	1820-0274
A11U3	1820-0274		IC10TL QUAD 2-INPT OR GATE	2848C	1820-0274
A11U4	1820-0274		IC10TL QUAD 2-INPT OR GATE	2848C	1820-0274
A11U5	1820-0274		IC10TL QUAD 2-INPT OR GATE	2848C	1820-0274
A11U6	1820-0274		IC10TL QUAD 2-INPT OR GATE	2848C	1820-0274
A11U7	1820-C273		IC10TL QUAD 2-INPT AND GATE	2848C	1820-C273
A11U8	1820-C273		IC10TL QUAD 2-INPT AND GATE	2848C	1820-C273
A11U9	1820-C054		IC10TL QUAD 2-INPT NAND GATE	01295	5N7405N
A12			NOT ASSIGNED		
A13			NOT ASSIGNED		
A14			NOT ASSIGNED		
A15	05327-60020	1	BOARD ASSY POWER SUPPLY (SERIES P112A) (LOADED ON 05326-2002 BLANK BOARD)	2848F	05327-60020
	0510-0207	3	NUT CAPTIVE 4-40 X 0.188 LG	2848D	0510-0207
	2200-0145	1	SCREW PAN HD POZI DR 4-40 X 0.438	0000C	010
	5040-0409	1	SPACER SHIELD	2848C	5040-0409
A15C1	0180-0183	1	CFRCD MY 0.033 UF 10R 250VDCM	56289	192P13392-PTS
A15C2	0180-0114	1	CFRCD ELECT 4.0 UF +100-10R 25VDCM	2848D	0180-0114
A15C3	0180-0114		CFRCD ELECT 4.0 UF +100-10R 25VDCM	2848C	0180-0114
A15C4	0180-0114		CFRCD ELECT 4.0 UF +100-10R 25VDCM	2848C	0180-0114
A15C5	0180-0114		CFRCD ELECT 4.0 UF +100-10R 25VDCM	2848C	0180-0114
A15C6	0160-0975	2	CFRCD CER 0.001 UF 20R 75VDCM	12574	55M-021-98
A15C7	0160-0975		CFRCD CER 0.001 UF 20R 75VDCM	12574	55M-001-98

See Introduction to this section for ordering information

Table 6-1. Replaceable Parts (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A15C8	C160-3277	2	CIFRD CEP 0.61 UF 20R 50VDCM	46733	G504H103P
A15C9	C160-3277		CIFRD CEP 0.61 UF 20R 50VDCM	46733	G504H103P
A15CR1	1502-3002	2	DIODE BREAKDOWN 2.37V 5V	2848E	1502-3002
A15CR2	1502-3051	2	DIODE BREAKDOWN 1.14V 5V	2848F	1502-3051
A15CR3	1502-3051		DIODE BREAKDOWN 1.14V 5V	2848C	1502-3051
A15CR4	1502-3002		DIODE BREAKDOWN 2.37V 5V	2848C	1502-3002
A15CR5	1501-C046		DIODE SILICON 50 MA 30 WV	0726J	F06100A
A15CR6	1502-3094	4	DIODE BREAKDOWN 5.11V 2R	2848C	1502-3094
A15CR7	1502-3094		DIODE BREAKDOWN 5.11V 2R	2848C	1502-3094
A15CR8	1501-C040		DIODE SILICON 50 MA 30 WV	0726J	F06100B
A15CR9	1502-3094		DIODE BREAKDOWN 5.11V 2R	2848C	1502-3094
A15CR10	1502-3094		DIODE BREAKDOWN 5.11V 2R	2848C	1502-3094
A15CR11	1502-3394	1	DIODE BREAKDOWN 7.5 V 2R	2848C	1502-3394
A15CR12	1502-3429	1	DIODE BREAKDOWN 100 V 2R	2848C	1502-3429
A15CR13	1501-C033	2	DIODE SILICON 100MA 180WV	0726J	F03369
A15CR14	1501-C033		DIODE SILICON 100MA 180WV	0726J	F03369
A15CR15	1501-C044	4	DIODE SILICON 20MA/1V	2848C	1501-C044
A15CR16	1501-C044		DIODE SILICON 20MA/1V	2848C	1501-C044
A15CR17	1501-C044		DIODE SILICON 20MA/1V	2848C	1501-C044
A15CR18	1501-C044		DIODE SILICON 20MA/1V	2848C	1501-C044
A16F1	2110-0460	1	FUSE 1/32 AMP	2848D	2110-0460
A1501	1854-C030	1	TRANSISTOR NPN	2848D	1854-C030
A1501	1205-0018	2	HEAT SINK SEMICONDUCTOR	C582C	203-C8
A1502	1853-C073	1	TRANSISTOR PNP	2848C	1853-C073
A1502	1205-C018		HEAT SINK SEMICONDUCTOR	C582C	203-C8
A1503	1854-C039	1	TRANSISTOR NPN	06131	283053
A1503	1205-0033	2	HEAT SINK SEMICONDUCTOR	C582C	207-C8
A1504	1205-0012	1	TRANSISTOR PNP	00131	282904A
A1504	1205-0033		HEAT SINK SEMICONDUCTOR	0582C	207-C8
A1505	1854-C022	1	TRANSISTOR NPN SELECTED FROM 283440	2848D	1854-C022
A1505	1205-C061	1	HEAT SINK SEMICONDUCTOR	C582C	209-C8
A1506	1853-C020	2	TRANSISTOR PNP SELECTED FROM 283702	2848D	1853-C020
A1507	1854-C071		TRANSISTOR NPN SELECTED FROM 283704	2848C	1854-C071
A1508	1854-C074		TRANSISTOR NPN	2848D	1854-C074
A1509	1854-C071		TRANSISTOR NPN SELECTED FROM 283704	2848C	1854-C071
A15010	1853-C020		TRANSISTOR PNP SELECTED FROM 283702	2848C	1853-C020
A15F1	0683-2735		RIFRD COMP 27K OHM 5R 1/4W	01121	CB 2735
A15F2	0683-1015		RIFRD COMP 100 OHM 5R 1/4W	01121	CB 1015
A15F3	0683-1015		RIFRD COMP 100 OHM 5R 1/4W	01121	CB 1015
A15F4	0683-1925	3	RIFRD COMP 3900 OHM 5R 1/4W	01121	CB 1925
A15F5	0683-1925		RIFRD COMP 3900 OHM 5R 1/4W	01121	CB 1925
A15F6	0686-1306	1	RIFRD COMP 13 OHM 5R 1/2W	01121	EB 1306
A15F7	0683-0815		RIFRD COMP 680 OHM 5R 1/4W	01121	CB 0815
A15F8	0683-0815		RIFRD COMP 680 OHM 5R 1/4W	01121	CB 0815
A15F9	0683-1325	2	RIFRD COMP 1300 OHM 5R 1/4W	01121	CB 1325
A15F10	2100-2953	2	RIFRD COMP 200 OHM 30R LIN 1/8W	2645C	2100-2953
A15F11	0683-0815		RIFRD COMP 680 OHM 5R 1/4W	01121	CB 0815
A15F12	0683-0815		RIFRD COMP 680 OHM 5R 1/4W	01121	CB 0815
A15F13	2100-2093		RIFRD COMP 200 OHM 30R LIN 1/8W	28490	2100-2093
A15F14	0683-1325		RIFRD COMP 1300 OHM 5R 1/4W	01121	CB 1325
A15F15	0683-0275	4	RIFRD COMP 2.7 OHM 5R 1/4W	01121	CB 2755
A15F16	0683-0275		RIFRD COMP 2.7 OHM 5R 1/4W	01121	CB 2755
A15F17	0683-0275		RIFRD COMP 2.7 OHM 5R 1/4W	01121	CB 2755
A15F18	0683-0275		RIFRD COMP 2.7 OHM 5R 1/4W	01121	CB 2755
A16	05327-6C028	1	BOARD ASSY CONNECTOR 15FR15 (224A) (LOADED ON 05327-20028 BLANK BOARD)	2848C	05327-6C028
A16C1	0180-2352	1	CIFRD ELECT 6000 UF +75-10R 15VDCM	2848D	0180-2352
A16C2	0180-2296	1	CIFRD ELECT 4000 UF +75-10R 15VDCM	56285	350167-05B(5E)
A16C3	0180-1962	1	CIFRD AL ELECT 1F UF +50-10R 250VDCM	56289	350166F 250EJ4-D5B
A16C4	0180-2382	2	CIFRD ELECT 700 UF +75-10R 30VDCM	2848D	0180-2382
A16C5	0180-2382		CIFRD ELECT 700 UF +75-10R 30VDCM	2848D	0180-2382
A16C6	C160-2204		CIFRD MICA 100PF 5R	72136	R0M13F101J3C
A16CR1	1910-0016		DIODE 60 WIV	2848C	1910-0016
A16CR2	1910-0016		DIODE 60 WIV	2848C	1910-0016
A16CR3	1910-0016		DIODE 60 WIV	2848C	1910-0016
A16CR4	1901-C028	2	DIODE SILICON 0.75A 400PIV	04713	5R135B-9
A16CR5	1901-C028		DIODE SILICON 0.75A 400PIV	04713	5R135B-9
A16CR6	1901-C029	4	DIODE SILICON 600 PIV	2848C	1901-C029
A16CR7	1901-C029		DIODE SILICON 600 PIV	2848D	1901-C029
A16CR8	1901-C029		DIODE SILICON 600 PIV	2648C	1901-C029

See introduction to this section for ordering information

Model 5326/27C
Replaceable Parts

Table 6-1. Replaceable Parts (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A18CR9	1901-0029	4	DIODE/SILICON 600 PIV	2848C	1901-0029
A18CR10	1901-0415		DIODE/SILICON 50 PIV 3A	2848D	1901-0415
A18CR11	1901-0415		DIODE/SILICON 50 PIV 3A	2848C	1901-0415
A18CR12	1901-0415		DIODE/SILICON 50 PIV 3A	2848D	1901-0415
A18CR13	1901-0415		DIODE/SILICON 50 PIV 3A	2848C	1901-0415
A18CR14 THRU			NOT ASSIGNED		
A18CF17			NOT ASSIGNED		
A18CR18	1910-0034	1	DIOXIDEPERMANIUM 25V	2840D	1910-0034
A18P1	5C8C-0115	1	CONNECTOR ASSY:115 CONTACT	2848C	5060-0115
A18Q1	1854-00C9		TSTR:51 NPN	80131	2N709
A18P1	0812-0021	1	RIFRD MW 0.47 OHM 5K 3W	2848D	0812-0021
A18A2	0811-1732	1	RIFRD MW 1 OHM 5K 3W	2848D	0811-1732
A18F3	0686-2045	1	RIFRD COMP 200K OHM 5K .5W	01121	CF 2045
A18A4	0683-0825	1	RIFRD COMP 0.2 OHM 5K 1/4W	01121	CF 825
A18A5	0683-1025	1	RIFRD COMP 1000 OHM 5K 1/4W	01121	CF 1025
A18A6	0683-5115		RIFRD COMP 310 OHM 5K 1/4W	01121	CF 5115
A18A7	0698-3153	1	RIFRD MET FLM 3.83K OHM 1K 1/8W	2848D	0698-3153
A18P8	0757-0439	1	RIFRD MET FLM 0.81K OHM 1K 1/8W	2848D	0757-0439
A18U1	182C-C196	1	IC:LINEAR VOLTAGE REGULATOR INPUT	2848D	1820-0196
A18XA1			NOT ASSIGNED		
A18XA2	1251-1886	6	CONNECTOR 30-CONTACT (2X15)	71785	252-15-30-340
A18XA3			NOT ASSIGNED		
A18XA4	1251-1886		CONNECTOR 30-CONTACT (2X15)	71785	252-15-30-340
A18XA5	1251-1886		CONNECTOR 30-CONTACT (2X15)	71785	252-15-30-340
A18XA6	1251-2134	4	CONNECTOR:36 CONTACTS	71785	252-18-30-340
A18XA7	1251-2134		CONNECTOR:36 CONTACTS	71785	252-18-30-340
A18XA8	1251-1886		CONNECTOR 30-CONTACT (2X15)	71785	252-15-30-340
A18XA9			NOT ASSIGNED		
A18XA10	1251-2134		CONNECTOR:36 CONTACTS	71785	252-18-30-340
A18XA11	1251-2134		CONNECTOR:36 CONTACTS	71785	252-18-30-340
A18XA12			NOT ASSIGNED		
A18XA13			NOT ASSIGNED		
A18XA14			NOT ASSIGNED		
A18XA15	1251-1886		CONNECTOR 30-CONTACT (2X15)	71785	252-15-30-340
A18XA16			NOT ASSIGNED		
A18XA17			NOT ASSIGNED		
A18XA18	1251-1886		CONNECTOR 30-CONTACT (2X15)	71785	252-15-30-340
	1400-0776	1	CLAMPABLE 4.0" DIA	2848C	1400-0776
A17			NOT ASSIGNED		
A18	05327-40033	1	BOARD A17:HIGH SENSITIVITY PRESCALEP (SERIES 1248A) (LOADER ,HP 5327-20033 BLANK BOARD).	2848C	05327-40033
A18C1	0160-0228	2	CAPXO ELECT 22 UF 10K 150VDCW	56289	15002-64901582-DYS
A18C2	0160-2049		CAPXO CER FEED-THRU 5000 PF +80-20K	2848C	0160-2049
A18C3	0160-3879	3	CAPXO CER 0.01 UF 20K 100VDCW	72982	8121-1112-K7A-103M
A18C4	0160-2049		CAPXO CER FEED-THRU 5000 PF +80-20K	2848C	0160-2049
A18C5	0160-0228		CAPXO ELECT 22 UF 10K 150VDCW	56289	15002-64901582-DYS
A18C6	0160-3879		CAPXO CER 0.01 UF 20K 100VDCW	72982	8121-1112-K7A-103M
A18C7 THRU					
A18C27	0160-3878	21	CAPXO CER 1000 PF 20K 100VDCW	80031	CV2059X7R102M
A18C28	0160-3879		CAPXO CER 0.01 UF 20K 100VDCW	72982	8121-1112-K7A-103M
A18C29	0160-3878		CAPXO CER 1000 PF 20K 100VDCW	80031	CV2059X7R102M
A18CR1	1901-C050	2	DIODE:SI 200 MA AT 1V	07263	FDA 6308
A18CR2	1901-C050		DIODE:SI 200 MA AT 1V	07263	FDA 6308
A18CR3	1901-0040	2	DIODE/SILICON 50 MA 30 WV	07263	FDG1088
A18CR4	1901-C040		DIODE/SILICON 50 MA 30 WV	07263	FDG1088
A18CR5	1901-C040		DIODE/SILICON 50 MA 30 WV	07263	FDG1088
A18CR6	1901-C040		DIODE/SILICON 50 MA 30 WV	07263	FDG1088
A18F1	2110-0436		FUSE:1/10 AMP 125V	2848C	2110-0436
A18F2	2110-0436		FUSE: 1/10 AMP 125V (SPARE)	2848C	2110-0436
A18J1	125C-0836	1	CONNECTOR:RF SUB-MINIATURE	58291	5C-093-0000
A18L1	9100-1788	2	COIL:CHOKER	C2114	VR200-10/48
A18L2	9100-1788		COIL:CHOKER	C2114	VR200-10/48
A18Q1	1854-345		TSTR:51 NPN	80131	2N5175
A18Q2	1854-0092		TSTR:51 NPN	80131	2N3563
A18A1	0683-1025	2	RIFRD COMP 1000 OHM 5K 1/4W	01121	CF 1025
A18A2	0698-5996		RIFRD COMP 360 OHM 5K 1/8W	2848D	0698-5996
A18A3	2100-2633	1	RES:AL CERMET 1K OHM 10K 1/2W	2848D	2100-2633
A18A4	0683-3925		RIFRD COMP 3900 OHM 5K 1/4W	01121	CF 3925

See Introduction to this section for ordering information

Table 6-1. Replaceable Parts (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A18P5	0698-3378	5	RIFXD CARBON 51 OHM 5% 1/8W	28480	0698-3378
A18P6	0698-3378		RIFXD CARBON 51 OHM 5% 1/8W	28480	0698-3378
A18P7	0698-3111	5	RIFXD COMP 30 OHM 5% 1/8W	28480	0698-3111
A18P8	0683-1025		RIFXD COMP 1000 OHM 5% 1/4W	01121	CB 1025
A18P9	0683-2015		RIFXD COMP 200 OHM 5% 1/4W	01121	CU 2015
A18P10	2100-2413	2	RIVAR FLM 200 OHM 10% LHM 1/2W	28480	2100-2413
A18P11	0698-2283	2	RIFXD COMP 10 OHM 5% 1/8W	01121	BB 1005
A18P12	0683-1505	2	RIFXD COMP 15 OHM 5% 1/4W	01121	CB 1505
A18P13	069-3374	4	RIFXD CARBON 20 OHM 5% 1/8W	28480	0698-3374
A18P14			NOT ASSIGNED		
A18P15	0698-5180		RIFXD COMP 7K OHM 5% 1/8W	28480	0698-5180
A18P16	0698-3378		RIFXD CARBON 51 OHM 5% 1/8W	28480	0698-3378
A18P17	0698-3374		RIFXD CARBON 20 OHM 5% 1/8W	28480	0698-3374
A18P18	0683-4315		RIFXD COMP 430 OHM 5% 1/4W	01121	CB 4315
A18P19	0698-5180		RIFXD COMP 2K OHM 5% 1/8W	28480	0698-5180
A18P20	0698-3111		RIFXD COMP 30 OHM 5% 1/8W	28480	0698-3111
A18P21	0698-5596		RIFXD COMP 560 OHM 5% 1/8W	28480	0698-5596
A18P22	0698-4131	4	RIFXD COMP 56 OHM 5% 1/8W	28480	0698-4131
A18P23	0698-4131		RIFXD COMP 56 OHM 5% 1/8W	28480	0698-4131
A18P24	0698-3111		RIFXD COMP 30 OHM 5% 1/8W	28480	0698-3111
A18P25	0683-1025		RIFXD COMP 1000 OHM 5% 1/4W	01121	CB 1025
A18P26	0683-1015		RIFXD COMP 1000 OHM 5% 1/4W FACTORY SELECT	01121	CB 1015
A18P27	2100-2413		RIVAR FLM 200 OHM 10% LHM 1/2W	28480	2100-2413
A18P28	0698-2283		RIFXD COMP 10 OHM 5% 1/8W	01121	BB 1005
A18P29	0683-5177	2	RIFXD COMP 820 OHM 5% 1/8W	28480	0683-5177
A18P30	0698-5103		RIFXD COMP 430 OHM 5% 1/4W	28480	0698-5103
A18P31	0683-1505		RIFXD COMP 15 OHM 5% 1/4W	01121	CB 1505
A18P32			NOT ASSIGNED		
A18P33	0698-3374		RIFXD CARBON 20 OHM 5% 1/8W	28480	0698-3374
A18P34	0683-8073	1	RIFXD COMP 1800 OHM 5% 1/8W	28480	0683-8073
A18P35	0698-3378		RIFXD CARBON 51 OHM 5% 1/8W	28480	0698-3378
A18P36	0698-3111		RIFXD COMP 30 OHM 5% 1/8W	28480	0698-3111
A18P37	0698-3378		RIFXD CARBON 51 OHM 5% 1/8W	28480	0698-3378
A18P38	0698-3374		RIFXD CARBON 20 OHM 5% 1/8W	28480	0698-3374
A18P39	0683-4315		RIFXD COMP 430 OHM 5% 1/4W	01121	CB 4315
A18P40	0698-4131		RIFXD COMP 56 OHM 5% 1/8W	28480	0698-4131
A18P41	0698-5503	1	RIFXD CARBON 180 OHM 5% 1/8W	28480	0698-5503
A18P42	0698-4131		RIFXD COMP 56 OHM 5% 1/8W	28480	0698-4131
A18P43	0698-3111		RIFXD COMP 30 OHM 5% 1/8W	28480	0698-3111
A18P44	0698-3113		RIFXD CARBON 100 OHM 5% 1/8W	28480	0698-3113
A18P45			NOT ASSIGNED		
A18P46	0683-1025		RIFXD COMP 1000 OHM 5% 1/4W	01121	CB 1025
A18P47	0683-3905	1	RIFXD COMP 39 OHM 5% 1/4W	01121	CB 3905
A18P48	0683-8215	1	RIFXD COMP 820 OHM 5% 1/4W	01121	CB 8215
A18P49	0683-1025		RIFXD COMP 1000 OHM 5% 1/4W	01121	CB 1025
A18P50	0683-4315		RIFXD COMP 430 OHM 5% 1/4W	01121	CB 4315
A18P51	0683-4315		RIFXD COMP 430 OHM 5% 1/4W	01121	CB 4315
A18P52	0683-4315		RIFXD COMP 430 OHM 5% 1/4W	01121	CB 4315
A18P53			NOT ASSIGNED		
A18U1	5088-7002	1	ICP INITFR	28480	5088-7002
A18U2	1826-0084	1	IC:LINEAR	28480	1826-0084
A18U3	1826-0085	1	IC:LINEAR	28480	1826-0085
A18U4	1820-0726	1	IC:DIGITAL	28480	1820-0726
A18U4 OR	1820-0558	1	IC:DUAL-BINARY	28480	1820-0558
A18U5	1820-0714	1	IC:DIGITAL QUINARY DIVIDER	28480	1820-0714
A18U6	1820-0489		IC:ECCL	28480	1820-0489
A18U7	1821-0001	2	TRANSISTOR ARRAY:SI NPN	02735	CA3046
A18U8	1821-0001		TRANSISTOR ARRAY:SI NPN	02735	CA3046
A18U9	1820-08C2	1	IC:ECCL QUAD 2-INPT NOR GATE	04713	MC10102L
			CHASSIS PARTS		
B1	3140-0030	1	MOTOR/SHADED PNL	28480	3140-0030
B1	3150-0039	1	FILTER:AIR	28480	3150-0039
B1	3160-0035	1	FAN/IMPELLER AXIAL 2-1/4 DIA	04870	2 1/4 PHF 125 S
B1	5212A-128	1	BRACKET:IFAN	28480	5212A-128
C1	0160-3043	1	CFXU CER 2 X 0.005 UF 20% 250VAC	56289	25C147A-COM
F1	2110-0020	1	FUSE:10.0A 250V SLOW-BLOW	75915	313-8005
F1	2110-0304	1	FUSE:CARTRIDGE 1.5 AMP 250V SLOW-BLOW	71400	MDX-1-1/2A
F1	1400-0084	1	FUSE:HOLES/EXTRACTOR PUST TYPE	75915	342014
J4	125C-1253	3	CONNECTOR:RF BNC MOUNT JACK	24931	20JH194-1
J5	125C-1253		CONNECTOR:RF BNC MOUNT JACK	24931	20JH194-1
J5	125C-1253		CONNECTOR:RF BNC MOUNT JACK	24931	20JH194-1
J7			PART OF 05327-80011 PRESCALER CABLE ASS		
J8	1251-7357	1	SOCKET:3-PIN MALE POWER RECEPTACLE	82389	EAC-301
J11	125C-0212	1	CONNECTOR:JACK CHASSIS BNC	95712	30409-1
Q1	1853-0233	1	TRANS:SI PNP	01295	TIP 32

See Introduction to this section for ordering information

Model 5328/27C
 Replacable Parts

Table 6-1. Replacable Parts (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
U1	05327-20024	2	HEAT SINK FOR U1 AND U2	28480	05327-20024
U2	1854-0420	1	TSTRESS NPA	28480	1854-0420
R1	2130-2901	1	HYVAR COMP L MEGOHM 10% 10 CLOG 1/4W	28480	2130-2901
R1	04180-67403	2	KNOB ASSY	28480	00180-67403
S1			PART OF R1		
S2	3101-1327	2	SWITCH-SLIDE DPDT 0.5A 125V AC/DC (FAST-NORM-HOLD)	79727	61285-0006
S3	3101-1216	1	SWITCH-PUSH-TRON (SPST) (RESET)	82385	85-1034
S4	3101-1327	1	SWITCH-SLIDE DPDT 0.5A 125V AC/DC (B327C-INPUT SELECT)	79727	61285-0006
S5	05326-60018	1	SWITCH ASSY/TIME BASE/IN FEED	28480	05326-60018
S5	0370-0104	2	KNOB/BLK RIM W/ARROW 1/4" SHAFT (FUNCTION)	28480	0370-0104
S6	05327-60030	1	SWITCH ASSY/FUNCTION	28480	05326-60030
S6	0370-0104	1	KNOB/BLK RIM W/ARROW 1/4" SHAFT (FUNCTION)	28480	0370-0104
S7	3101-1317	1	SWITCH-SLIDE DPDT 0.5A 125V AC/DC (OSC-INT/EXT)	79727	6126-0020
S8	3101-1311	1	SWITCH-SLIDE DPDT 0.5A 125V AC/DC (STORAGE)	79727	6126-0020
S9	3101-1234	1	SWITCH-SLIDE DPDT (SELECTOR 135/250V)	82385	11A-1742
T1	4100-0020	1	TRANSFORMER POWER	28480	9100-0020
	1200-0147	1	BUSHING: TRANSISTOR	28480	1200-0147
	0340-0766	2	INSULATOR: TRANSISTOR	28480	0340-0766
			OTHER CABINET PARTS		
	0460-0114	1	TAPE/POI,URETHANE 1-3/4 IN WIDE (FOR TOP COVER)	85471	11CAM-CLL-2
	1490-0030	1	STANDOFF/FLT	28480	1490-0030
	7120-1254	1	TRADEMARK (IMP. LOGO)	28480	7120-1254
	5000-0050	2	TRIM/STOPS	28480	5000-0050
	1060-0767	2	FRAME ASSY'S A (ELECTRIC)	28480	5000-0729
	11021-67401	5	PGMT ASSY: FM (ARCH) TRIGGER LEVEL (LEVEL)	28480	5000-0767
	05326-00032	1	PANEL/FRAME	28480	05327-00032
	05326-00030	1	INSULATOR (ON BOTTOM COVER)	28480	05326-00030
	05326-00011	2	PLATE/CONNECTOR, LUNG (ON J10 COVER)	28480	05326-00011
	05326-00014	1	PANEL/FRAME	28480	05326-00014
	05326-20029	1	WINDOW (5326C)	28480	05326-20029
	05327-20001	7	WINDOW (5327C)	28480	05327-20001
			PAINTED CABINET PARTS		
	05326-00027	1	LEFT FRONT PANEL TRIM (5326C)	28480	05326-00027
	06126-00028	1	RIGHT FRONT PANEL TRIM	28480	06126-00028
	05326-00024	2	SIDE COVER	28480	05326-00024
	05326-00030	1	TOP COVER	28480	05326-00030
	05326-00046	1	KIT/BACK MOUNT	28480	05326-00046
			CONSISTING OF: 2370-0012 B-32 X 260 LG (3) 2610-0057 B-32 X 438 LG (4) 6020-7810 LEFT BRACKET (1) 6020-7820 RIGHT BRACKET (1)		
	05326-40003	1	05326-40003 FILLER STRIP (1)	28480	05327-00010
	05327-00010	1	LEFT FRONT PANEL TRIM (5327C)	28480	05327-00010
	05330-00033	1	BOTTOM COVER	28480	05330-00033

See Introduction to this section for ordering information

Table 6-1. Replaceable Parts (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
			INTERNAL AND OTHER PARTS		
	0120-1378	1	CABLE ASSY:AC POWER CUP/D	709C3	NH-7081
	5C40-017J	1	GUIDE/PLUG-IN PC BOARD (A15 BOARD SUPPORT)	2648C	5C40-017C
	9C60-0109	1	CONNECTOR:15 CONTACTS	2648D	9060-0109
	05326-00010	1	SHIELD:METALIC	2648C	05326-00010
	05326-0001E	1	CHASSIS	2648D	05326-0001E
	05326-20046	1	HOARD:PLANK (REAR PANEL INTERCONNECT)	2648C	05326-20046
	05327-60037	1	CABLE ASSY:PRESCALER	2648D	05327-60037
A9	05326-60025	1	(OPTION OUIEM DIGIT DISPLAY) DELETE A9 05326-60008 AND REPLACE WITH A9 05326-60025. DISPLAY ASSY (SERIES 1224A) (LOADED ON 05326-20008/25 BLANK BOARD)	2648D	05326-60025
A9051	1970-0042		TUBE:NUMERICAL INDICATOR	8359A	H-5750-5
A9052	1970-0042		TUBE:NUMERICAL INDICATOR	8359A	H-5750-5
A9053	1970-0042		TUBE:NUMERICAL INDICATOR	8359A	H-5750-5
A9054	1970-0042		TUBE:NUMERICAL INDICATOR	8359A	H-5750-5
A9055	1970-0042		TUBE:NUMERICAL INDICATOR	8359A	H-5750-5
A9056	1970-0042		TUBE:NUMERICAL INDICATOR	8359A	H-5750-5
A9057	1970-0042		TUBE:NUMERICAL INDICATOR	8359A	H-5750-5
A9058	1970-0042		TUBE:NUMERICAL INDICATOR	8359A	H-5750-5
A9R1	0683-1026	6	R: FXD COMP 1000 OHM 2% 1/4W	01121	CR 1025
A9R2	0767-0046		R: FXD FLM 7500 OHM 2% 1/4W	2648D	0767-0046
A9R3	0683-1026		R: FXD COMP 1000 OHM 2% 1/4W	01121	CR 1025
A9R4	0767-0046		R: FXD FLM 7500 OHM 2% 1/4W	2648D	0767-0046
A9R5	0767-0046		R: FXD FLM 7500 OHM 2% 1/4W	2648D	0767-0046
A9R6	0767-0046		R: FXD FLM 7500 OHM 2% 1/4W	2648D	0767-0046
A9R7	0767-0046		R: FXD FLM 7500 OHM 2% 1/4W	2648D	0767-0046
A9R8	0767-0046		R: FXD FLM 7500 OHM 2% 1/4W	2648D	0767-0046
A9R9	0767-0046		R: FXD FLM 7500 OHM 2% 1/4W	2648D	0767-0046
A9R10	0767-0046		R: FXD FLM 7500 OHM 2% 1/4W	2648D	0767-0046
A9R11	0767-0046		R: FXD FLM 7500 OHM 2% 1/4W	2648D	0767-0046
A9R12	0683-1005		R:FXD COMP 10 OHM 5% 1/4W	01121	CR 1705
A9U1	1820-0275		IC:RECL TO TTL QUAD 2-INPT OR TRANS.	04713	MC1035P
A9U2	1820-0119		IC:TTL BLANKING DECADE COUNTER	2648C	1820-0119
A9U3	1820-0119		IC:TTL BLANKING DECADE COUNTER	2648D	1820-0119
A9U4	1820-0119		IC:TTL BLANKING DECADE COUNTER	2648C	1820-0119
A9U5	1820-0119		IC:TTL BLANKING DECADE COUNTER	2648C	1820-0119
A9U6	1820-0119		IC:TTL BLANKING DECADE COUNTER	2648D	1820-0119
A9U7	1820-0119		IC:TTL BLANKING DECADE COUNTER	2648C	1820-0119
A9U8	1820-0119		IC:TTL BLANKING DECADE COUNTER	2648C	1820-0119
A9U9	1820-0116		IC:14-BIT BUFF STORE GATED OUTS	2648C	1820-0116
A9U10	1820-0116		IC:14-BIT BUFF STORE GATED OUTS	2648D	1820-0116
A9U11	1820-0116		IC:14-BIT BUFF STORE GATED OUTS	2648C	1820-0116
A9U12	1820-0116		IC:14-BIT BUFF STORE GATED OUTS	2648D	1820-0116
A9U13	1820-0116		IC:14-BIT BUFF STORE GATED OUTS	2648C	1820-0116
A9U14	1820-0116		IC:14-BIT BUFF STORE GATED OUTS	2648C	1820-0116
A9U15	1820-0116		IC:14-BIT BUFF STORE GATED OUTS	2648C	1820-0116
A9U16	1820-0116		IC:14-BIT BUFF STORE GATED OUTS	2648C	1820-0116
A9U17	1820-0728		INTEGRATED CIRCUIT:DECODER-DIVIDER	2648C	1820-0728
A9U18	1820-0092		INTEGRATED CIRCUIT:DECODER-DIVIDER	2648C	1820-0092
A9U19	1820-0092		INTEGRATED CIRCUIT:DECODER-DIVIDER	2648C	1820-0092
A9U20	1820-0092		INTEGRATED CIRCUIT:DECODER-DIVIDER	2648C	1820-0092
A9U21	1820-0092		INTEGRATED CIRCUIT:DECODER-DIVIDER	2648D	1820-0092
A9U22	1820-0092		INTEGRATED CIRCUIT:DECODER-DIVIDER	2648D	1820-0092
A9U23	1820-0092		INTEGRATED CIRCUIT:DECODER-DIVIDER	2648D	1820-0092

See Introduction to this section for ordering information

Model 26/27C
Replaceable Parts

Table 6-1. Replaceable Parts (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A9U 4	1820-C092		INTEGRATED CIRCUIT:DECODER-DIV.DER	2648C	1820-C092
A9X051	1200-C405		SOCKET:TUBE FOR 5700 SERIES	8359A	5K 207
A9X052	1200-C405		SOCKET:TUBE FOR 5700 SERIES	8359A	5K 207
A9X053	1200-C405		SOCKET:TUBE FOR 5700 SERIES	8359A	5K 207
A9X054	1200-C405		SOCKET:TUBE FOR 5700 SERIES	8359A	5K 207
A9X055	1200-C405		SOCKET:TUBE FOR 5700 SERIES	8359A	5K 207
A9X056	1200-C405		SOCKET:TUBE FOR 5700 SERIES	8359A	5K 207
A9X057	1200-C405		SOCKET:TUBE FOR 5700 SERIES	8359A	5K 207
A9X058	1200-C405		SOCKET:TUBE FOR 5700 SERIES	8359A	5K 207
A9X08	1200-0477		SOCKET:IC	26480	1200-0477
A9X016	1200-0477		SOCKET:IC	26480	1200-0477
A9X024	1200-0477		SOCKET:IC	26480	1200-0477
			OPTION 002 (REMOTE PROGRAMMING) DELETE 6060-0100 15 CONTACT CONNECTOR AND ADD 06327-60013 CABLE ASSY		
	06327-60013	1	CABLE ASSY: PROGRAMMING CONSISTING OF:	26480	06327-60013
J10	1261-0086	1	CONNECTOR: FEMALE 30-PIN MINAT	26480	1261-0086
W2P1	6060-0113	1	CONNECTOR: 45 CONT/CT	26480	6060-0113
W2P2	1200-0063	1	LUG: CRIMP	26480	1200-0063
	06326-00033	1	ADAPTER: CONN	26480	06326-00033
			OPTION 003 (DIGITAL OUTPUT) ADD 06326-60012 CABLE ASSY		
J9	1261-0087	1	CONNECTOR: FEMALE 50-PIN MINAT	26480	1261-0087
W1P1	1261-2262	2	CONNECTOR: PC (2 X 10) 20 CONTACTS	76630	261-10-30-400
W1P2	1261-2262		CONNECTOR: PC (2 X 10) 20 CONTACTS	76630	261-10-30-400
			OPTION 010 (HIGH-STABILITY OSCILLATOR) DELETE A4 OSCILLATOR ASSY (06326-60007) AND ADD 06327-60036 OPT 010. (LOAD TO ON 06327-20036 BLANK BOARD)		
	0060-0318		TCXO	26480	0060-0318
			OPTION 011 (HIGH-STABILITY OSCILLATOR) DELETE A4 OSCILLATOR ASSY (06326-60007) AND ADD 10644-60011, OPT 011.		

See introduction to this section for ordering information

Table 6-2. Manufacturers Code List

MFP NO.	MANUFACTURER NAME	ADDRESS	ZIP CODE
00000	NO M/F DESCRIPTION FOR THIS MFG NUMBER		
00000	NO M/F DESCRIPTION FOR THIS MFG NUMBER		
00000	U.S.A. COMMON	ANY SUPPLIER OF U.S.A.	
01121	ALLEN BRADLEY CO.	MILWAUKEE, WIS.	53104
01295	TEXAS INSTRUMENTS INC. SEMICONDUCTOR COMPONENTS DIV.	DALLAS, TEX.	75231
02114	FERROXCUBE CORP.	SAUGERTIES, N.Y.	12477
02735	RCA SOLID STATE & RECEIVING TUBE DIV.	SOMERVILLE, N.J.	08876
04713	MOTOROLA SEMICONDUCTOR PROD. INC.	PHOENIX ARIZ.	85008
04870	P M MOTOR CO.	WESTCHESTER, ILL.	60156
05820	WAKEFIELD ENGINEERING INC.	WAKEFIELD, MASS.	01800
07263	FAIRCHILD CAMERA & INST. CORP. SEMICONDUCTOR DIV.	MOUNTAIN VIEW, CALIF.	94040
08806	G.E. CO. MINIATURE LAMP DEPT.	CLEVELAND, OHIO	44112
12040	NATIONAL SEMICONDUCTOR CORP.	DANBURY, CONN.	06810
12574	GULTON IND. INC. DATA SYSTEM DIV.	ALBUQUERQUE, N.M.	87108
14655	CORNELL DUBLIER ELECT. DIV. FEDERAL PACIFIC ELECT. CO.	NEWARK, N.J.	07105
17856	SILICONIX INC.	SUNNYVALE, CALIF.	94086
24931	SPECIALTY CONNECTOR CO. INC.	INDIANAPOLIS, IND.	46227
28480	HEWLETT-PACKARD CO. CORPORATE HQ	YOUR NEAREST HP OFFICE	
56289	SPRAGUE ELECTRIC CO.	N. ADAMS, MASS.	01247
70903	BELDEN CORP.	CHICAGO, ILL.	60644
71400	RUSSMANN MFG. DIV. MC GRAM-EDISON CO.	ST. LOUIS, MO.	63017
71785	CINCH MFG. CO. DIV TRW INC.	ELK GROVE VILLAGE, ILL.	
72136	ELECTRO MOTIVE MFG. CO. INC.	WILLIMANTIC, CONN.	06226
72982	ERIE TECHNOLOGICAL PROD. INC.	ERIE, PA.	16512
75915	LITTELFUSE INC.	DES PLAINES, ILL.	60016
79727	CONTINENTAL-WIRT ELECTRONICS CORP.	WARMINSTER, PA.	18974
80031	MEPCO DIV. SESSIONS CLOCK CO.	MORRISTOWN, N.J.	07960
80131	ELECTRONIC INDUSTRIES ASSOCIATION	WASHINGTON D.C.	20006
82142	AIRCO SPEER ELECT. COMP.	DU BOIS, PA.	15801
82389	SWITCHCRAFT INC.	CHICAGO, ILL.	60630
83594	RUPPROUGH'S CORP. ELECT. COMP. DIV.	PLAINSFIELD, N.J.	07061
85471	BOYD A.B. CO.	SAN FRANCISCO, CALIF.	94103
91418	RADIO MATERIALS CO.	CHICAGO, ILL.	60646
95712	RENDIX CORP. THE MICROWAVE DEVICE DIV.	FRANKLIN, IND.	46131
96733	SAN FERNANDO ELECT. MFG. CO.	SAN FERNANDO, CALIF.	91341
98291	SEAELECTRO CORP.	MAMARONECK, N.Y.	10544

SECTION VII

OPTIONS AND MANUAL CHANGES

7-1. INTRODUCTION

7-2. This section contains information necessary to adapt this manual to older instruments. Also included is the operating and installation information for available options. Refer to Section II for remote programming requirements.

7-3. MANUAL CHANGES

7-4. This manual applies directly to Model 5326C and Model 5327C having serial prefix 1312A (refer to Paragraph 1-4).

7-5. Newer Instruments

7-6. As changes are made, newer instruments may have serial prefixes that are not listed in this manual. The manuals for these instruments are supplied with a manual change sheet, containing the required information. Contact the nearest Hewlett-Packard Sales and Service Office for information if this sheet is missing.

7-7. Older Instruments

7-8. To adapt this manual to instruments having a serial prefix prior to 1312A for the 5326C or the 5327C, perform the backdating that applies to your instrument's serial prefix, as listed in the table below.

Serial Prefix		Perform Change
5326C	5327C	
	1236A	11
1224A		10
	1224A	11, 10
1204A		10, 9
	1220A	11, 10, 9
1140A		10, 9, 8
	1136A	11, 10, 9
1136A		10, 9, 8, 7
	1124A	11, 10, 9, 8, 7, 6, 5, 3
1120A		10, 9, 8, 7, 6, 5, 4, 1
	1040A	11, 10, 9, 8, 7, 6, 5, 3, 2, 1
1036A		10, 9, 8, 7, 6, 5, 4, 2, 1

CHANGE 1

- Page 6-7, Table 6-1:
Delete A7R24 from parts list.
- Page 8-25, Figure 8-10:
Delete A7R24 from schematic and component locator.
Change series number on A7 schematic to read 1040A, Rev. B.

CHANGE 2

- Page 6-7, Table 6-1:
Delete A7R23 from parts list.
- Page 6-10, Table 6-1:
Replace A15 parts list with Table 7-1.
- Page 6-14, Table 6-1:
Change part numbers to read:
COVER-SIDE 3 x 11 5000-0729, 2 ea.
COVER-TOP 05325-00008, 1 ea.
INSULATOR (Q1 & Q2) 0340-0162, 2 ea.
(Replaces Heat Sink)
- Page 8-25, Figure 8-10:
Delete A7R23 from schematic and component locator.
Change series number on A7 schematic to read 1036A, Rev. A.
- Page 8-35, Figure 8-15:
Replace A15 schematic with Figure 7-1.
Replace A15 component locator with Figure 7-2.

CHANGE 3

- Page 6-11, Table 6-1:
Change A16 Bd. Assy. Connector P/N to read 05327-60014, series number 1040A.
- Page 8-35, Figure 8-15:
Change A16 Bd. Assy. Connector P/N (top of schematic) to read 05327-60014, series number 1040A.

CHANGE 4

- Page 6-11, Table 6-1:
Change A16 Bd. Assy. Connector P/N to read 05326-60037, series number 1036A.
- Page 8-35, Figure 8-15:
Change A16 Bd. Assy. Connector P/N (top of schematic) to read 05326-60037, series number 1036A.

CHANGE 5

- Page 6-10, Table 6-1:
Replace A1 parts list with Table 7-2.
- Page 8-35, Figure 8-14:
Replace A11 schematic with Figure 7-3.
Replace A11 component locator with Figure 7-4.

CHANGE 6

- Page 6-6, Table 6-1:
Change A6R19 to read 0683-2025, 2000 ohms 5% 1/4W, Mfr. P/N is CB 2025. A6 series number is 1036A.
- Page 6-7, Table 6-1:
Change A7C1 to read 0160-2198, 20 pF, 300 VDCW
Change A7C2 to read 0160-0333, 15 pF, 300 VDCW
Change A7R10 to read 0683-2025, 2000 ohms 5% 1/4W, Mfr. P/N is CB 2025. A7 series number is 1120A.
- Page 8-21, Figure 8-9:
Change value of A6R19 to 2000 ohms.
Change series number (top of schematic) to read 1036A.
- Page 8-25, Figure 3-10:
Change value of A7C1 to 20 pF.
Change value of A7C2 to 15 pF.
Change value of A7R10 to 2000 ohms.
Change series number (top of schematic) to read 1120A.

CHANGE 7

- Page 6-14, Table 6-1:
Change T1 9100-3020 to 9100-2888

CHANGE 8

- Page 6-11, Table 6-1:
Delete A15C8 part number and description.
Change A15R17 and R18 to 0683-0395, 3.9 ohms, Mfr. P/N is CB 39G5. Series number of board is now 1040A (page 6-10).
- Page 8-35, Table 6-1:
Delete A15C8 from schematic.
Change value of A15R17 and A15R18 to 3.9 ohms.
Change A15 series number (top of schematic) to read 1040A.

CHANGE 9

- Page 6-3, Table 6-1:
Change A1 05326-60048 to 05326-60030.
Change A1 blank board number to 05326-20030.
Change A1R12 2100-3228 to 2100-2905. Series number is now 1036A.
- Page 6-14, Table 6-1:
Change 05326-00032 (rear panel) to read 05326-00004.
Change quantity of 05326-60011 to 1 ea. and description to "Plate:Connector, Long (J9 cover)."
Add "05326-60012 Plate:Connector, Short (J10 cover)."

Page 6-15, Table 6-1:

Change 05326-20046 Blank Board part number to 05326-20028.

Page 6-16, Table 6-1:

Delete part number and description of 05326-30033 Adapter.

Page 8-15, Figure 8-6:

Change A1 part number (top of schematic) to 05326-60030, Series 1036A.

CHANGE 10

Page 6-8, Table 6-1:

Change A9 series number to 1032A.
Change blank board number to 05326-20008.

Page 6-9, Table 6-1:

Delete the following parts:
A9R11, A9R12, A9XDS8, A9XU8, A9XU16, and A9XU24.

Pages 6-11 and 12, Table 6-1:

Change A16 series number to 1132A.
Delete the following parts:
A16C6, A16CR18, A16Q1, A16R4 through A16R8, and A16U1.

Pages 6-15 and 16, Table 6-1:

Change A9 (Option 001) series number to 1032A.
Change blank board number to 05326-20025.
Add A9R10 0683-1005, 10 ohms, 5%, 1/4W.
Delete the following parts:
A9R12, A9XU8, A9XU16, and A9XU24.

Page 6-16, Table 6-1:

Delete all reference to Option 010 and Option 011.

Page 7-21, Paragraph 7-23:

Add the following parts:
0683-7525, 7500Ω, 5%, 1/4W
1200-0405 Display Tube Socket
Replace Step e. with the following statement:

"R10 carries the overflow information from the decades and can be placed in one of two positions. Move R10 to position B, as shown in the component locator. In this location, R10 connects to pin 8 of U8. Replace boards in instrument." The component locator mentioned above is found in Section VII.

Page 8-29, Figure 8-12:

Replace A9 schematic with Figure 7-5.
Replace A9 component locator with Figure 7-6.

Page 8-39, Figure 8-17:

Delete Option 010 and 011 schematic and component locator.

CHANGE 11

Page 1-3, Table 1-3:

Change Range specifications to read:
Direct: 1 kHz to 50 MHz.
Prescaled: 0 to 550 MHz.

Change Sensitivity specifications to read:
Direct: 5 mV rms.
Prescaled: 100 mV rms.

Page 6-16, Table 6-1:

Replace A18 parts list with either Table 7-3 for A18 05327-60009 or Table 7-4 for A18 05327-60029. Both assemblies perform the same function, and either assembly may be supplied with the instrument.

Page 8-37, Figure 8-16:

Replace A18 schematic and component locator with either Figures 7-7 and 7-8 for A18 05327-60009 or Figures 7-9 and 7-10 for A18 05327-60029. Both assemblies perform the same function, and either assembly may be supplied with the instrument.
Add Figure 7-11 — A19 schematic, component locator, and parts list.
Add Figure 7-12 and Table 7-4.

Table 7-1. A15 Replaceable Parts Lists

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A15	05326-60001	1	REGULATOR ASSY	28480	05326-60001
A15C1	05326-20001	1	BOARD BLANK	56289	192P11197-PT5
A15C2	0160-0163		CIFXD MY 0.033 UF 10% 200VDCM	28480	0180-0114
A15C3	0180-0114		CIFXD ELECT 4.0 UF +100-10% 25VDCM	28480	0180-0114
A15C4	0180-0114		CIFXD ELECT 4.0 UF +100-10% 25VDCM	28480	0180-0114
A15C5	0180-0114		CIFXD ELECT 4.0 UF +100-10% 25VDCM	28480	0180-0114
A15C6	0160-0975	2	CIFXD CTR 0.001 UF 20% 75VDCM	12574	55M-001-98
A15C7	0160-0975		CIFXD CER 0.001 UF 20% 75VDCM	12574	55M-001-98
A15C8	1902-3002	2	DIODE BREAKDOWN:2.37V 5% DIODE BREAKDOWN:16.19V 5%	28480	1902-3002
A15C9	1902-3002		DIODE BREAKDOWN:16.19V 5%	28480	1902-3002
A15CA1	1901-3040	2	DIODE BREAKDOWN:2.37V 5%	28480	1902-3094
A15CA2	1902-3094	2	DIODE BREAKDOWN:5.11V 2%	28480	1902-3094
A15CA3	1902-3094		DIODE BREAKDOWN:5.11V 2%	28480	1902-3094
A15CA4	1902-3094		DIODE BREAKDOWN:5.11V 2%	28480	1902-3094
A15CA5	1902-3094		DIODE BREAKDOWN:5.11V 2%	28480	1902-3094
A15CA6	1902-3094	4	DIODE BREAKDOWN:5.11V 2%	28480	1902-3094
A15C7	1902-3094		DIODE BREAKDOWN:5.11V 2%	28480	1902-3094
A15C8	1901-0040		DIODE BREAKDOWN:5.11V 2%	28480	1902-3094
A15C9	1902-3094		DIODE BREAKDOWN:5.11V 2%	28480	1902-3094
A15CA10	1902-3094		DIODE BREAKDOWN:5.11V 2%	28480	1902-3094
A15CA11	1902-3394	1	DIODE BREAKDOWN:75 V 2%	28480	1902-3394
A15CA12	1902-3429	1	DIODE BREAKDOWN:100 V 2%	28480	1902-3429
A15F1	2110-0331	2	FUSE:0.3A	71400	GMW 3/10
A15F2	2110-0331		FUSE:0.3A	71400	GMW 3/10
A1501	1854-0039	4	SOCKET CONNECTOR FOR F1 and F2	80131	2N3053
A1502	1853-0012	2	TSTR:SI NPN	80131	2N2904A
A1503	1854-0039		TSTR:SI PNP	80131	2N3053
A1504	1853-0012		TSTR:SI NPN	80131	2N2904A
A1505	1854-0232	1	TSTR:SI NPN:SELECTED FROM 2N34401	28480	1854-0232
A1506	1205-0033	4	HEAT SINK FOR Q1, Q2, Q3, Q4		
A1507	1205-0061	1	HEAT SINK FOR Q5		
A1508	1853-0070	2	TSTR:SI NPN:SELECTED FROM 2N37021	28480	1853-0070
A1509	1854-0071		TSTR:SI NPN:SELECTED FROM 2N37041	28480	1854-0071
A15010	1853-0070		TSTR:SI NPN:SELECTED FROM 2N37021	28480	1853-0070
A15R1	0683-2035		RIFXD COMP 20K OHM 5% 1/4W	01121	CB 2035
A15R2	0683-1015		RIFXD COMP 100 OHM 5% 1/4W	01121	CB 1015
A15R3	0683-1015		RIFXD COMP 100 OHM 5% 1/4W	01121	CB 1015
A15R4	0683-3925	2	RIFXD COMP 3900 OHM 5% 1/4W	01121	CB 3925
A15R5	0683-3925		RIFXD COMP 3900 OHM 5% 1/4W	01121	CB 3925
A15R6	0683-1505	1	RIFXD COMP 15 OHM 5% 1/4W	01121	CB 1505
A15R7	0683-1025		RIFXD COMP 1000 OHM 5% 1/4W	01121	CB 1025
A15R8	0683-1025		RIFXD COMP 1000 OHM 5% 1/4W	01121	CB 1025
A15R9	0683-1325	2	RIFXD COMP 1300 OHM 5% 1/4W	01121	CB 1325
A15R10	2100-2093	2	RIFXD COMP 200 OHM 30% LIN 1/8W	28480	2100-2093
A15R11	0683-6815		RIFXD COMP 680 OHM 5% 1/4W	01121	CB 6815
A15R12	0683-6815		RIFXD COMP 680 OHM 5% 1/4W	01121	CB 6815
A15R13	2100-2093		RIFXD COMP 200 OHM 30% LIN 1/8W	28480	2100-2093
A15R14	0683-1325		RIFXD COMP 1300 OHM 5% 1/4W	01121	CB 1325

Table 7-2. A11 Parts List

A11	05326-60035	1	BOARD ASSY: LEFT READOUT (Series II36A)	28480	05326-60035
A11	05326-00009		BRACKET:READOUT	28480	05326-00009
A11	05326-80011	1	INDICATOR: MASK (EXT,C,OF)	28480	05326-80011
A11	05330-40002		BLOCK: ANNUNCIATOR	28480	05330-40002
A11C1			NOT ASSIGNED		
A11C2	0160-2930	1	C:FXD CER 0.01 UF +80-20% 100VDCW	91418	TA
A11C3	0160-2200	1	C:FXD MICA 43 PF 5%	72136	RDM15E430J3C
A11DS1	2140-0313		LAMP: NEON GLOW FROSTED 1.9 MILLIAMPS	08806	C2A-B
A11DS2	2140-0313		LAMP:NEON GLOW FROSTED 1.9 MILLIAMPS	08806	C2A-B
A11DS3	2140-0313		LAMP:NEON GLOW FROSTED 1.9 MILLIAMPS	08806	C2A-B
A11Q1	1854-0J71		TSTR:SI NPN (SELECTED FROM 2N3704)	28480	1854-0071
A11Q2	1854-0474		TSTR:SI NPN		
A11Q3	1854-0474		TSTR:SI NPN	28480	1854-0474
A11Q4	1854-0474		TSTR:SI NPN	28480	1854-0474
A11R1	0683-1035		R:FXD COMP 10K OHM 5% 1/2W	01121	CB1035
A11R2	0683-2035	2	R:FXD COMP 20K OHM 5% 1/2W	01121	CB 2035
A11R3	0683-1025		R:FXD COMP 1000 OHM 5% 1/2W	01121	CB 1025
A11R4	0683-1525		R:FXD COMP 1500 OHM 5% 1/2W	01121	CB 1525
A11R5	0683-2025		R:FXD COMP 2000 OHM 5% 1/2W	01121	CB 2025
A11R6	0683-2025		R:FXD COMP 2000 OHM 5% 1/2W	01121	CB 2025
A11R7	0683-2025		R:FXD COMP 2000 OHM 5% 1/2W	01121	CB 2025
A11R8	0683-5135		R:FXD COMP 51K OHM 5% 1/2W	01121	CB 5135
A11R9	0683-5135		R:FXD COMP 51K OHM 5% 1/2W	01121	CB 5135
A11R10	0683-5135		R:FXD COMP 51K OHM 5% 1/2W	01121	CB 5135
A11R11	0683-1025		R:FXD COMP 1000 OHM 5% 1/2W	01121	CB 1025
A11U1	1820-0175		IC: TTL HEX CONVERTER	01295	SN8200
A11U2	1820-0274		INTEGRATED CIRCUIT:DIGITAL	04713	MC 1808P
A11U3	1820-0274		INTEGRATED CIRCUIT:DIGITAL	04713	MC 1808P
A11U4	1820-0274		INTEGRATED CIRCUIT:DIGITAL	04713	MC 1808P
A11U5	1820-0274		INTEGRATED CIRCUIT:DIGITAL	04713	MC1808P
A11U6	1820-0274		INTEGRATED CIRCUIT: DIGITAL	04713	MC1808P
A11U7	1820-0273	1	IC: DIGITAL	04713	MC1806P
A11U8	1820-0273		INTEGRATED CIRCUIT: DIGITAL	04713	MC1806P
A11U9	1820-0054		IC: TTL QUAD 2-INPUT NAND GATE	01295	SN7400

Table 7-3. A18 Parts List (05327-60009)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number	
A18	05327-60009	1	PRESALEN ASSY (SERIES 1040A) (LOADED ON 05327-20109 BLANK BOARD)	28480	05327-60009	
A18C1	3050-0067 0180-0197	2	WASHER/FLAT, BAKELITE CIFXO ELECT 2.2 UF 10R 20VDCM	00000 56289	08D 1500725K9020A2-DYS	
A18C2	0160-0979		CIFXO CER 0.001 UF 20R 75VDCM	12574	55M-.001-98	
A18C3	0180-0106		CIFXO ELECT 30 UF 20R 6VDCM	28480	0180-0106	
A18C4	0160-0979		CIFXO CER 0.001 UF 20R 75VDCM	12574	55M-.001-98	
A18C5	0180-0106		CIFXO ELECT 30 UF 20R 6VDCM	28480	0180-0106	
A18C7	0160-0979		CIFXO CER 0.001 UF 20R 75VDCM	12574	55M-.001-98	
A18C8	0140-0229		2	CIFXO MICA 300 PF 1R	28480	0140-0229
A18C9	0160-0979		CIFXO CER 0.001 UF 20R 75VDCM	12574	55M-.001-98	
A18C10	0160-0979		CIFXO CER 0.001 UF 20R 75VDCM	12574	55M-.001-98	
A18C11	0180-0197		CIFXO ELECT 2.2 UF 10R 20VDCM	56289	1500225K9020A2-DYS	
A18C12	0180-0197		CIFXO ELECT 2.2 UF 10R 20VDCM	56289	1500225K9020A2-DYS	
A18C13	0160-2049		4	CIFXO CER FEED-THRU 5000 PF +80-20R	28480	0160-2049
A18C14	0160-2049			CIFXO CER FEED-THRU 5000 PF +80-20R	28480	0160-2049
A18C15	1902-3002	DIODE BREARDOWN 2.37V 5R		28480	1902-3002	
A18C16	1912-0007	2	DIODE TUNNEL EIA TYPE 1N3714	03508	1N3714 SPEC	
A18C17	1902-3048		DIODE BREARDOWN SILICON 3.48V 5R	28480	1902-3048	
A18J1	1250-0836	2	CONNECTOR RF SUB-MINIATURE	98291	50-053-0000	
A18J2	9106-2291		COIL FWD AF 0.22 UH 10R	28480	9106-2291	
A18J3	1853-0015		TRANSISTOR PNP	80131	2N1640	
A18J4	1854-0092		TRANSISTOR NPN	80131	2N1563	
A18J5	1854-0092		TRANSISTOR NPN	80131	2N1563	
A18K1	2100-2633			RIVAR CERMET 1K OHM 10R LHM 1/2W	28480	2100-2633
A18K2	2100-2521	RIVAR FLM 2000 OHM 10R LHM 1/2W		28480	2100-2521	
A18K3	0683-5105	RIFXO COMP 51 OHM 5R 1/4W		01121	CB 5105	
A18K4	0683-5105	RIFXO COMP 51 OHM 5R 1/4W		01121	CB 5105	
A18K5	0683-1045	RIFXO COMP 100K OHMS 5R 1/4W		01121	CB 1045	
A18K6	0683-1025	RIFXO COMP 1000 OHM 5R 1/4W		01121	CB 1025	
A18K7	0698-3376	RIFXO CARBON 51 OHM 5R 1/8W		28480	0698-3376	
A18K8	0683-1815	RIFXO COMP 180 OHM 5R 1/4W		01121	CB 1815	
A18K9	0683-1825	RIFXO COMP 1800 OHM 5R 1/4W		01121	CB 1825	
A18K10	0683-2215	RIFXO COMP 220 OHM 5R 1/4W		01121	CB 2215	
A18K11	0683-1825		RIFXO COMP 1800 OHM 5R 1/4W	01121	CB 1825	
A18K12	0683-1825		RIFXO COMP 1800 OHM 5R 1/4W	01121	CB 1825	
A18K13	0683-1825		RIFXO COMP 1800 OHM 5R 1/4W	01121	CB 1825	
A18K14	0683-2015		RIFXO COMP 200 OHM 5R 1/4W	01121	CB 2015	
A18K15	0683-2015		RIFXO COMP 200 OHM 5R 1/4W	01121	CB 2015	
A18K16	0683-1025		RIFXO COMP 1000 OHM 5R 1/4W	01121	CB 1025	
A18K17	0683-1515	2	RIFXO COMP 150 OHM 5R 1/4W	01121	CB 1515	
A18K18	0683-4315		RIFXO COMP 430 OHM 5R 1/4W	01121	CB 4315	
A18K19	0683-3315	2	RIFXO COMP 330 OHM 5R 1/4W	01121	CB 3315	
A18K20	0683-8205		RIFXO COMP 82 OHM 5R 1/4W	01121	CB 8205	
A18K21	0683-1015		RIFXO COMP 100 OHM 5R 1/4W	01121	CB 1015	
A18K22	0683-2025		RIFXO COMP 2000 OHM 5R 1/4W	01121	CB 2025	
A18K23	0683-3315		RIFXO COMP 330 OHM 5R 1/4W	01121	CB 3315	
A18K24	0683-2405		RIFXO COMP 24 OHM 5R 1/4W	01121	CB 2405	
A18U1	5088-7002		IC LIMITER	28480	5088-7002	
A18U2	6086-7080		1	IC AMP AND TRIG	28480	6086-7080
A18U3	1820-0736	IC DIGITAL		28480	1820-0736	
A18U4	1820-0714	IC DIGITAL QUINARY DIVIDER		28480	1820-0714	
A18U5	1820-0489	IC IECL		28480	1820-0489	
A18U6	1820-0147	IC IECL TRIPLE 3-INPT NOR GATE		04713	MC1007P	
A18U7	1856-0004	45		TRISTATE ARRAY 1NPN DUAL DIFF. AMPL.	28480	1856-0004
A18XU2	1251-1876			CONNECTOR SINGLE CONTACT	00779	2-330808-8

Table 7-4. A18 Parts List (05327-60020)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A18	05327-60029	1	BOARD ASSY:PRECALC (SERIES 1116A) (LOADED ON 05327-20029 BLANK BOARD)	78480	05327-60029
A18C1	0180-0197	4	CIFXD ELECT 2.2 UF 10% 20VDCM	55289	1500225X9020A2-0Y8
A18C2	0180-0977		CIFXD CER 0.001 UF 20% 75VDCM	12574	55M-.001-98
A18C3	0180-0106		CIFXD ELECT 60 UF 20% 6VDCM	28480	0180-0106
A18C4	0180-0977		CIFXD CER 0.001 UF 20% 75VDCM	12574	55M-.001-98
A18C5	0180-0106		CIFXD ELECT 60 UF 20% 6VDCM	28480	0180-0106
A18C6	0180-0977		CIFXD CER 0.001 UF 20% 75VDCM	12574	55M-.001-98
A18C7	0180-0977		CIFXD CER 0.001 UF 20% 75VDCM	12574	55M-.001-98
A18C8	0140-0227		CIFXD MICA 300 PF 1%	28480	0140-0227
A18C9	0180-0977		CIFXD CER 0.001 UF 20% 75VDCM	12574	55M-.001-98
A18C10	0180-0977		CIFXD CER 0.001 UF 20% 75VDCM	12574	55M-.001-98
A18C11	0180-0197	2	CIFXD ELECT 2.2 UF 10% 20VDCM	55289	1500225X9020A2-0Y8
A18C12	0180-0197		CIFXD ELECT 2.2 UF 10% 20VDCM	55289	1500225X9020A2-0Y8
A18C13	0180-2047		CIFXD CER FEED-THRU 5000 PF +80-20%	28480	0180-2047
A18C14	0180-2047		CIFXD CER FEED-THRU 5000 PF +80-20%	28480	0180-2047
A18C15	1902-3007		DIODE BREAKDOWN:2.37V 5%	28480	1902-3007
A18C16	1912-0067	2	DIODE:TUNNEL EIA TYPE 1N3714	03508	1N3714 5PF
A18C17	1902-3048		DIODE BREAKDOWN:SILICON 3.48V 5%	28480	1902-3048
A18J1	1250-0816	2	CONNECTOR:INF SUB-MINIATURE	98291	50-051-0000
A18L1	9140-0178		COIL:IFXD RF 1 UH 10%	99800	1025-20
A18L2	9100-2771	2	COIL:IFXD RF 0.22 UH 10%	28480	9100-2771
A18Q1	1853-0015	2	TSTRIS:PNP	80131	7N1640
A18Q2	1854-03A5		TSTRIS:NPN	80131	2N5179
A18Q3	1854-0192		TSTRIS:NPN	80131	2N5562
A18R1	2100-2433		RIVAR CERMET 1K OHM 10% LIN 1/2W	28480	2100-2433
A18R2	2100-2421		RIVAR FLM 2000 OHM 10% LIN 1/2W	28480	2100-2421
A18R3	0683-1105		RIFXD COMP 51 OHM 5% 1/4W	01121	CB 5105
A18R4	0683-1105	RIFXD COMP 51 OHM 5% 1/4W	01121	CB 5105	
A18R5	0683-1045	RIFXD COMP 100K OHMS 5% 1/4W	01121	CB 1045	
A18R6	0683-1025	RIFXD COMP 100 OHM 5% 1/4W	01121	CB 1025	
A18R7	0698-3378	2	RIFXD CARBON 51 OHM 5% 1/4W	28480	0698-3378
A18R8	C 15-1815	8	RIFXD COMP 180 OHM 5% 1/4W	01121	CB 1815
A18R9	C 15-1825		RIFXD COMP 180 OHM 5% 1/4W	01121	CB 1825
A18R10	0683-2215		RIFXD COMP 220 OHM 5% 1/4W	01121	CB 2215
A18R11	0683-1825		RIFXD COMP 180 OHM 5% 1/4W	01121	CB 1825
A18R12	0683-1825		RIFXD COMP 180 OHM 5% 1/4W	01121	CB 1825
A18R13	0683-1825		RIFXD COMP 180 OHM 5% 1/4W	01121	CB 1825
A18R14	0683-2015		RIFXD COMP 200 OHM 5% 1/4W	01121	CB 2015
A18R15	0683-2015		RIFXD COMP 200 OHM 5% 1/4W	01121	CB 2015
A18R16	0683-1025		RIFXD COMP 100 OHM 5% 1/4W	01121	CB 1025
A18R17	0683-1515		RIFXD COMP 150 OHM 5% 1/4W	01121	CB 1515
A18R18	0683-4315		RIFXD COMP 430 OHM 5% 1/4W	01121	CB 4315
A18R19	0683-5115		RIFXD COMP 510 OHM 5% 1/4W	01121	CB 5115
A18R20	0683-8205	RIFXD COMP 82 OHM 5% 1/4W	01121	CB 8205	
A18R21	0683-1015	RIFXD COMP 100 OHM 5% 1/4W	01121	CB 1015	
A18R22	0683-2025	RIFXD COMP 2000 OHM 5% 1/4W	01121	CB 2025	
A18R23	0683-3315	RIFXD COMP 330 OHM 5% 1/4W	01121	CB 3315	
A18R24	0683-2405	RIFXD COMP 24 OHM 5% 1/4W	01121	CB 2405	
A18R25	0698-3374	RIFXD CARBON 20 OHM 5% 1/4W	28480	0698-3374	
A18R26	0683-1615	RIFXD COMP 160 OHM 5% 1/4W	01121	CB 1615	
A18R27	0683-2715	RIFXD COMP 270 OHM 5% 1/4W	01121	CB 2715	
A18R28	2100-2670	1	RIVAR CERMET 20 OHM 30% LIN 1/2W	28480	2100-2670
A18U1	5088-7002		IC:LIMITER	28480	5088-7002
A18U2	5086-7080		IC:AMP AND TRIG	28480	5086-7080
A18U3	1820-0736		IC:DIGITAL	28480	1820-0736
A18U4	1820-0784	1	IC:BINARY-QUINARY	28480	1820-0784
A18U5	1820-0489	2	IC:ICEL	28480	1820-0489
A18U6	1820-0147		IC:ICEL TRIPLE 3-INPUT NOR GATE	04713	MC1007P
A18U7	1858-0004		TSTR ARRAY:SI NPN DUAL DIFF. AMPL.	28480	1858-0004
A18U8	1820-0790		IC:DIGITAL	28480	1820-0790
A18U9	1251-1556		CONNECTOR:SINGLE CONTACT	00779	2-330808-8
A18X4	1251-1556	1	CONNECTOR:SINGLE CONTACT	00779	2-330808-8
A18X5	1205-0243		HEAT DISSIPATOR	28480	1205-0243
A18X6	1705-0244		RETAINER	28480	1705-0244
A18X7	0520-0129		SCREW:IPAH HD POZI DR 2-56 X 0.312" LG	00000	080
A18X8	0610-0001		NUT:HEX 2-56 X 0.188"	00000	080
	3050-0062	2	WASHER:FLAT, BAKELITE	00000	080
	3050-0079		WASHER:NYLON 0.1875" OD	00000	080

Table 7-5. A18 Theory (05327-60000)

A18 PRESCALER OPERATION

The prescaler board serves as a direct amplifier-trigger or as a divide-by-ten amplifier-trigger, with the function controlled by the front-panel INPUT SELECTOR switch. With the switch in the PRESCALE position, the circuit performs as follows:

The signal is fed into the 50 Ω input, of J1. U1 limits the input level to about +1 V and provides protection up to 3.5 V rms. There is about 2 dB loss through U1. The signal is passed to U2 amplifier Schmitt Trigger, which is biased for sensitivity by R1. The Schmitt Trigger threshold is about 70 mV and triggers independently of frequency. The square wave from U2(11) is divided by two and again by five in U3 and U4, respectively. Q2 translates the signal to ECL levels, before presenting it to the data switch.

At the same time, U2 amplifier is supplying the direct triggering network with the input signal. C1 ac couples the signal and eliminates the effect of U2 amplifier drift. U7 consists of a dual-differential amplifier, which converts the input voltage to an output current which is driven through tunnel diode CR2. The diode performs a Schmitt Trigger function and squares the output. R2 is used to vary the bias current through CR2 to control the sensitivity. Q1, Q3, C8, and R3 differentiate the signal and pass the negative pulses at an ECL level to U5 data switch.

The data switch is controlled by the INPUT SELECTOR switch (TTL high at U5(2) = Direct; TTL low at U5(2) = Prescale) and connects either the direct or prescaler signal to A7 Function Control by way of the one-shot, U6. The one-shot output goes high (U6(4)) when the input goes low. The output goes low again after about 12 ns when the level changes have propagated through the gates in a domino effect.

A18 TROUBLESHOOTING

Check for operation by placing the INPUT SELECTOR switch in both B and B \div 10 positions. If the counter does not work with the switch in either position, the trouble is probably in U1, U2, U5, or U6. In the direct mode, start by checking in the tunnel diode (CR2) area; check for proper waveforms of 5 and 6. For the prescale mode, start by checking the output of divide-by-two circuit, U3(6).

Figure 7-1. A15 Schematic

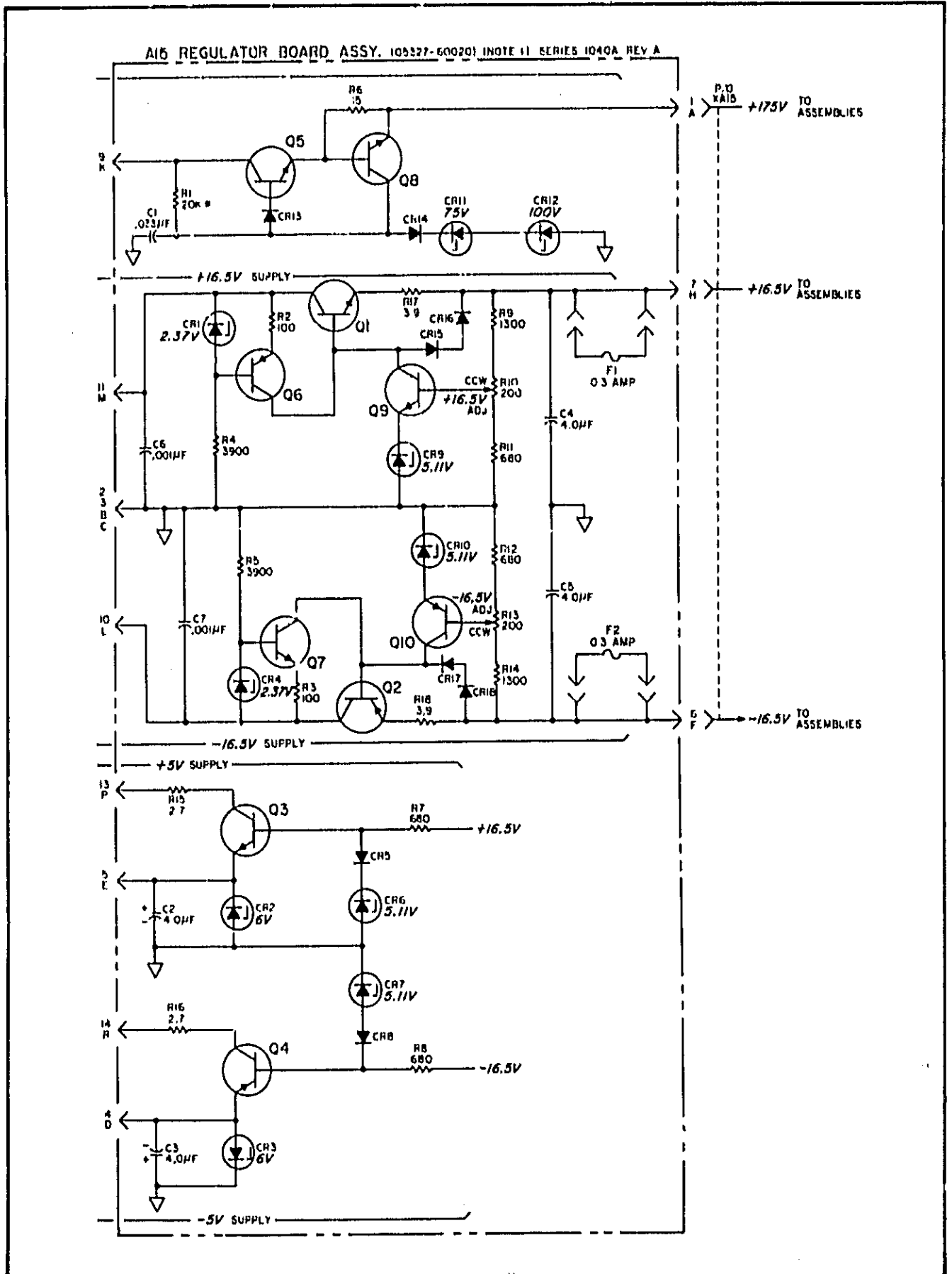
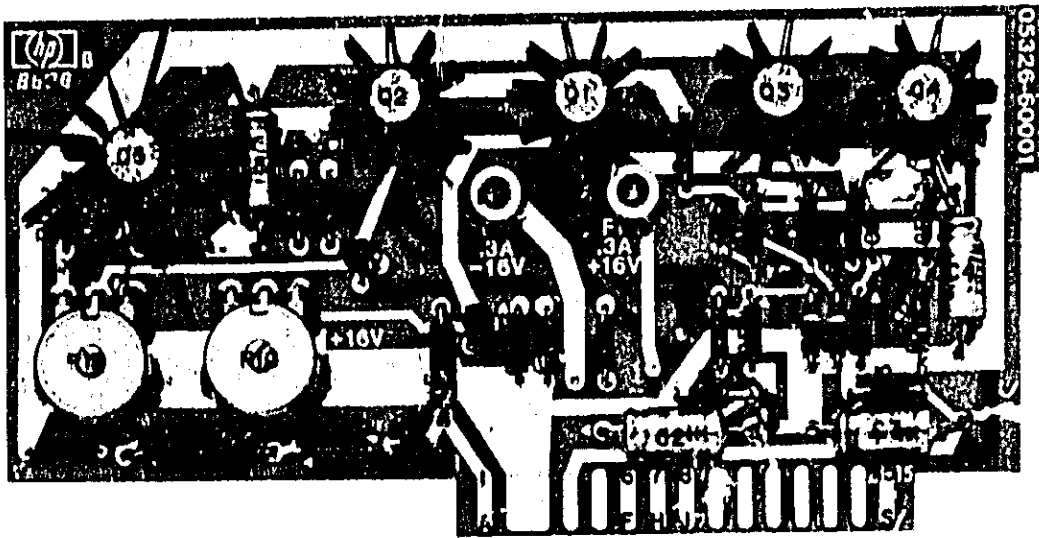


Figure 7-2. A15 Component Locator



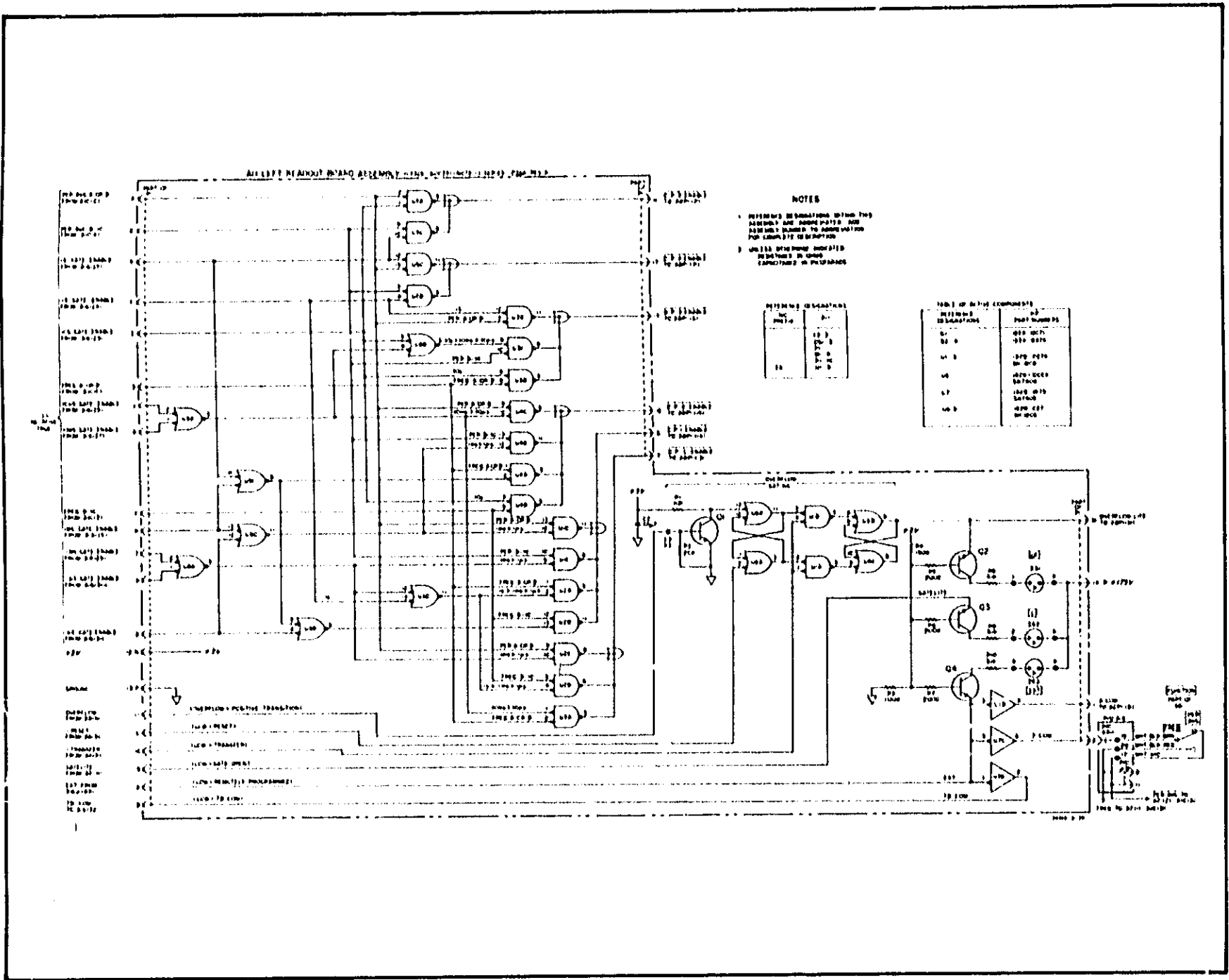


Figure 7-3. A11 Schematic

Model 396/27C
Options and Manual Changes

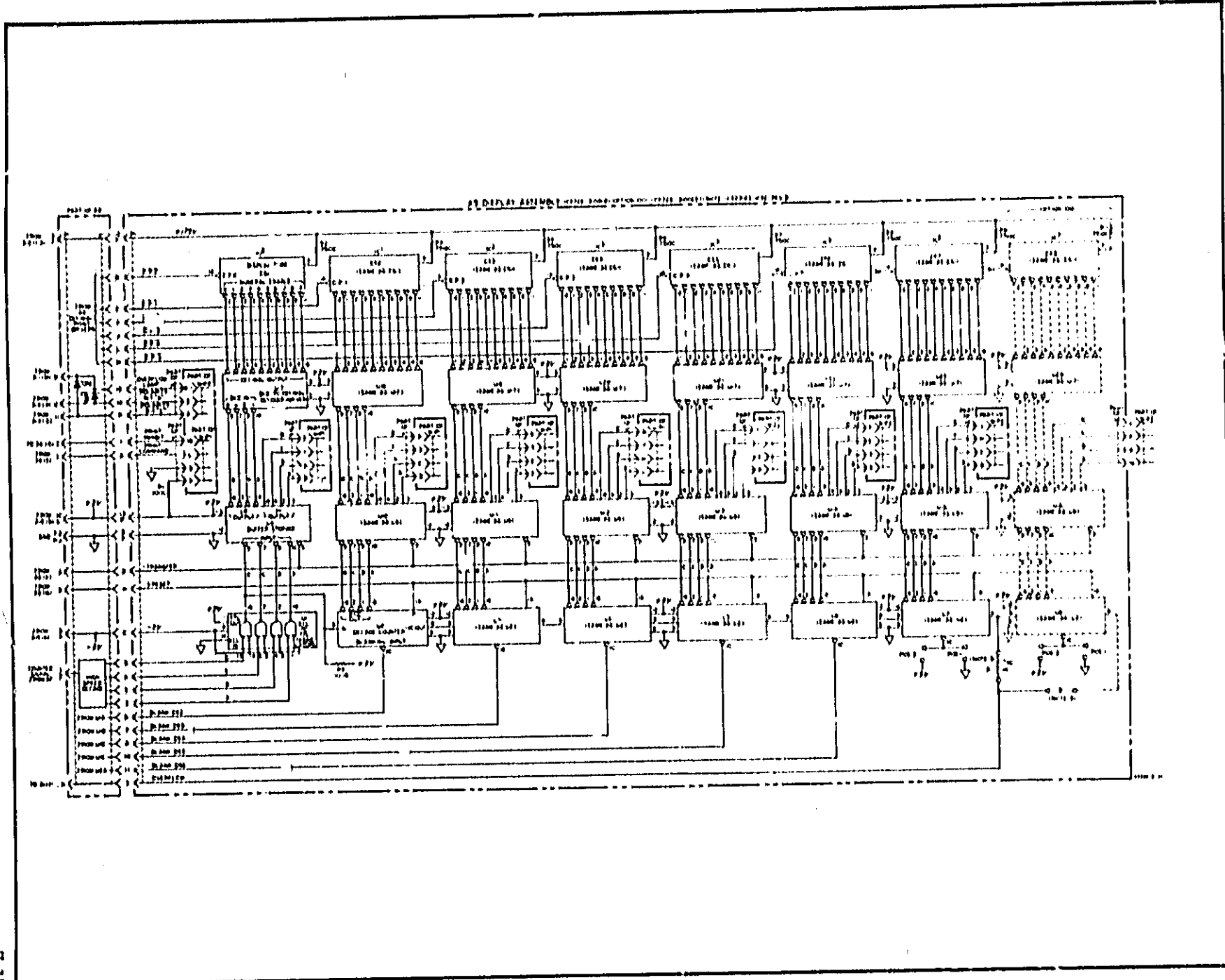


Figure 7-5. A5 Schematic

Model 5326/27C
 Optics and Manual Changes

Figure 7-6. A9 Component Locator

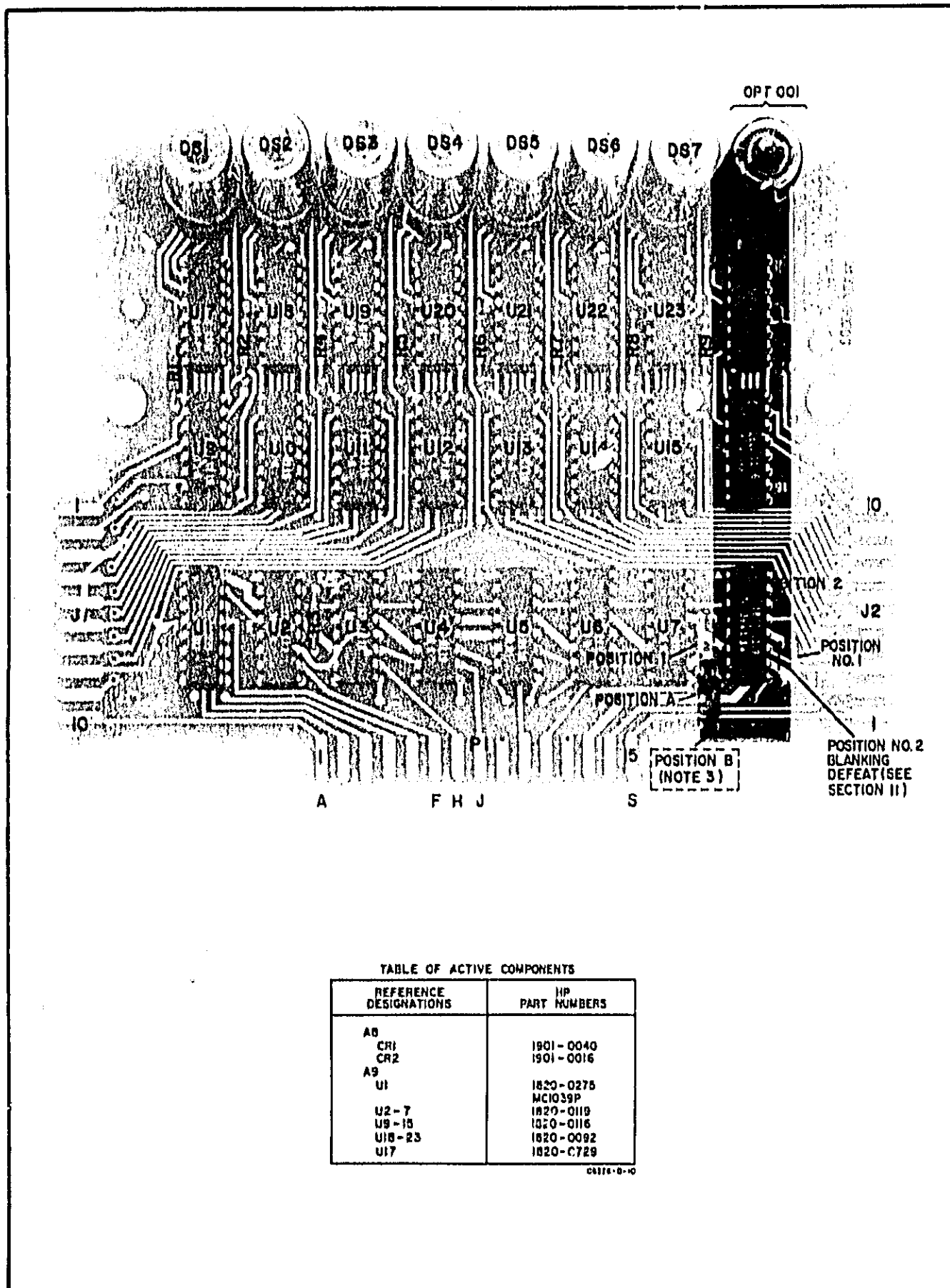


TABLE OF ACTIVE COMPONENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
A8	
CR1	1901-0040
CR2	1901-0016
A9	
U1	1820-0275 MC1039P
U2-7	1820-0119
U9-15	1820-0116
U18-23	1820-0092
U17	1820-C729

03176-0-10

Figure 7-7. A18 Schematic (06327-60009)

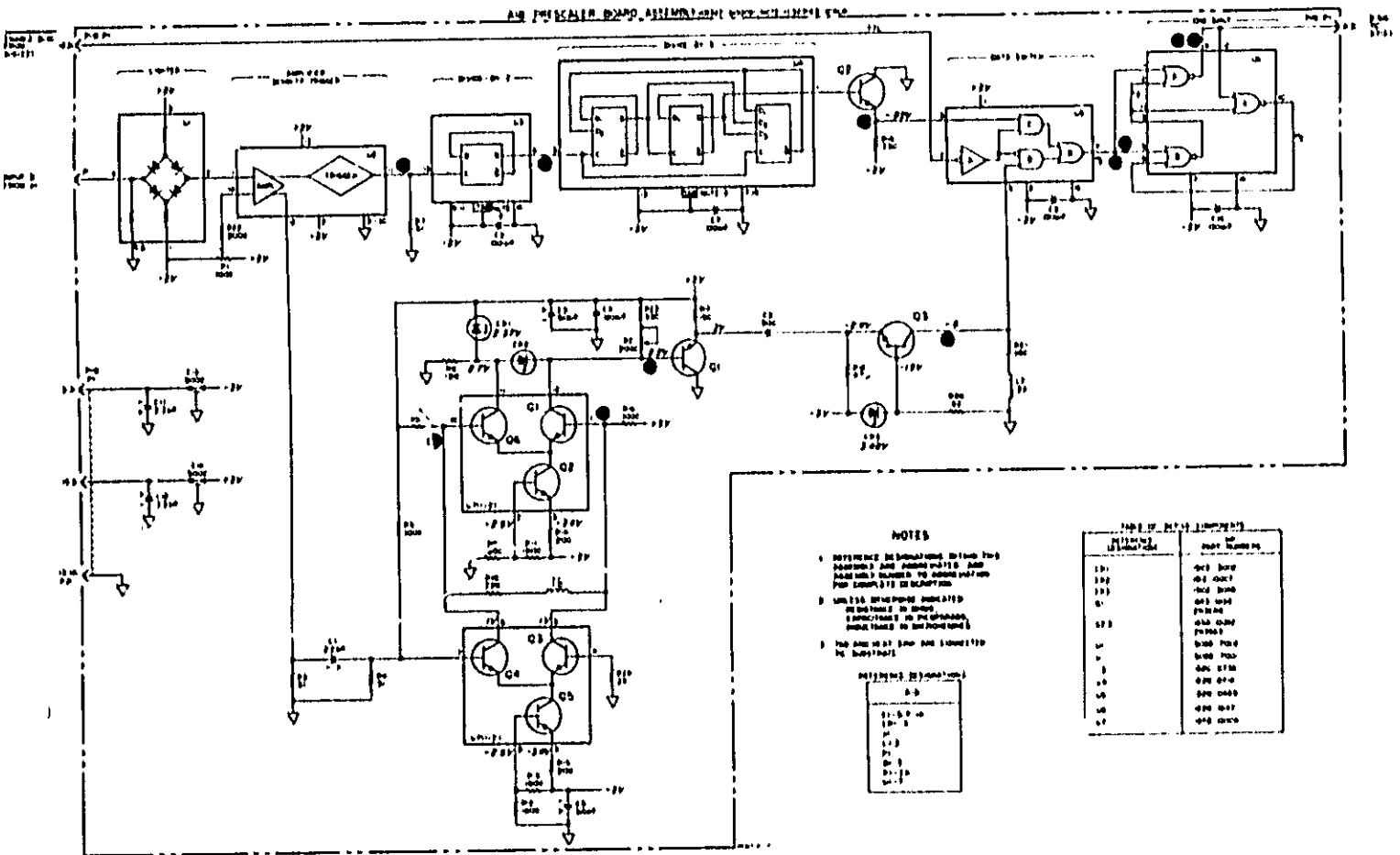


Figure 7-8. A18 Component Locator (05327-60009)

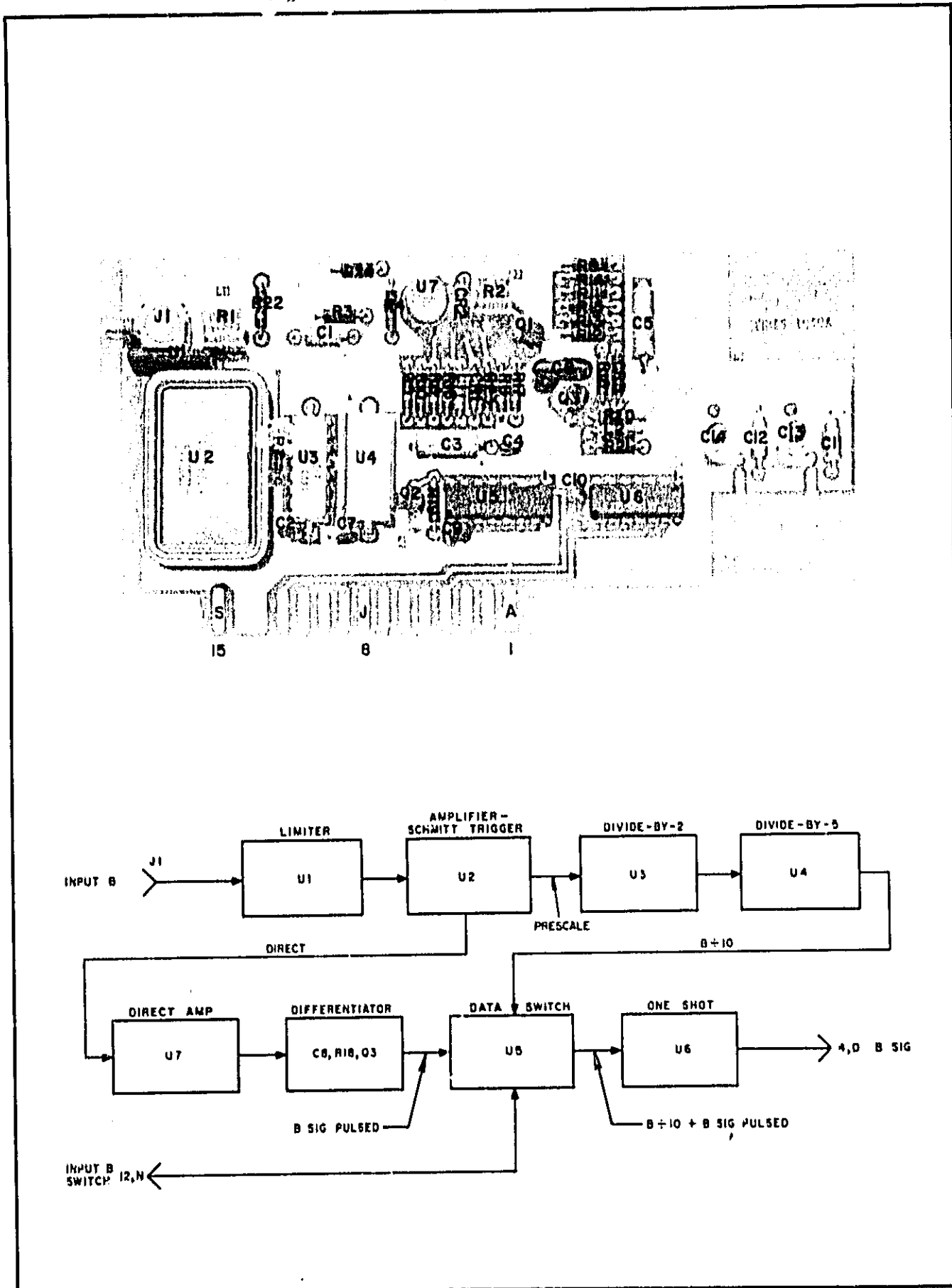


Figure 7-9. A18 Schematic (05327-60029)

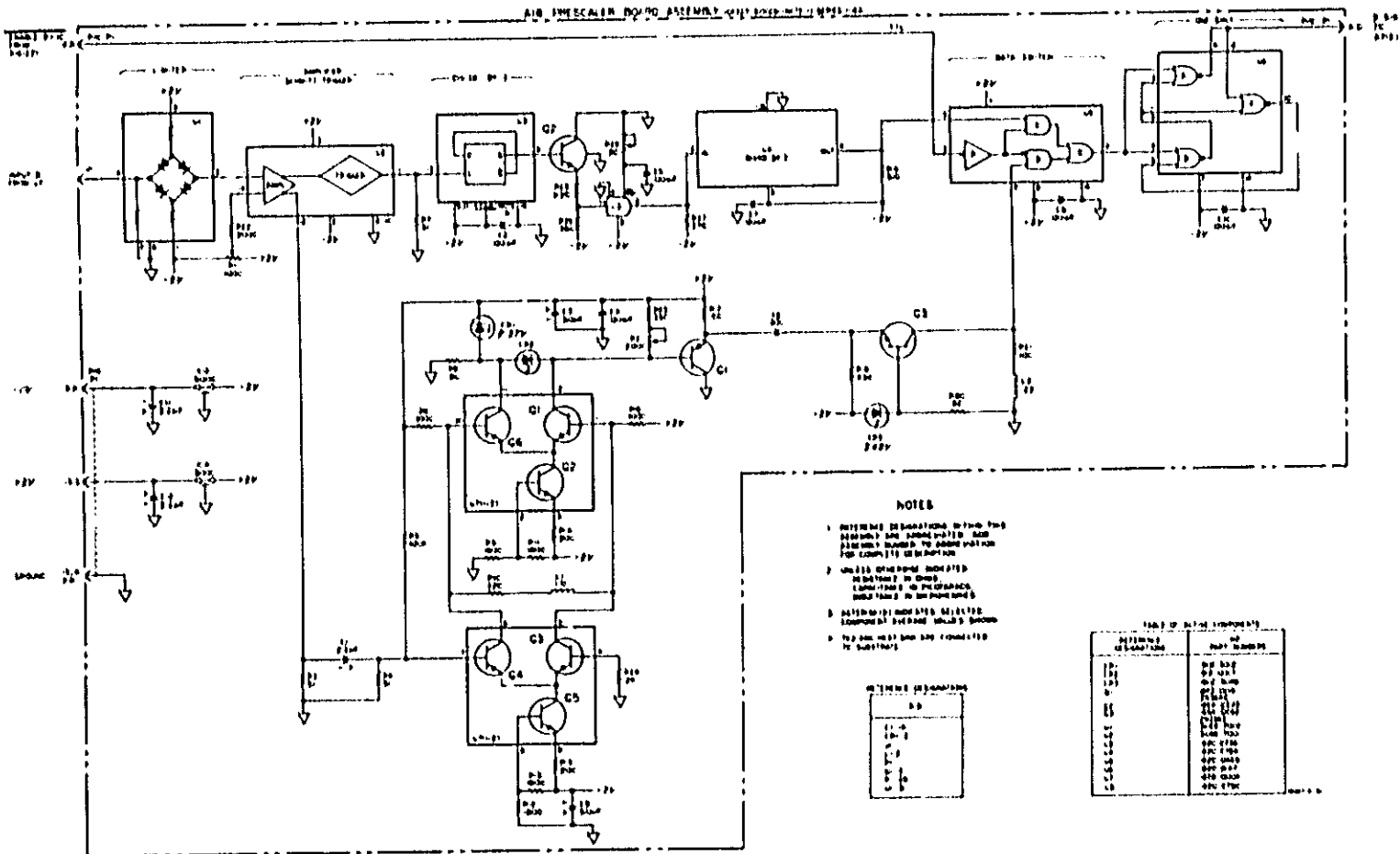
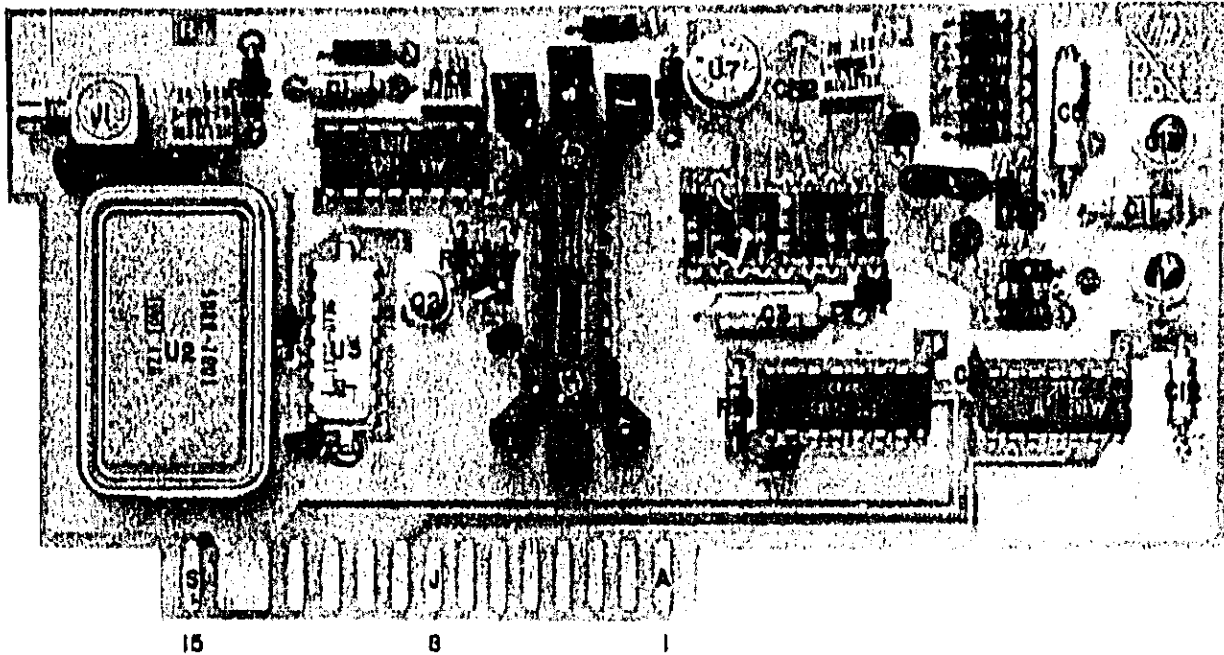
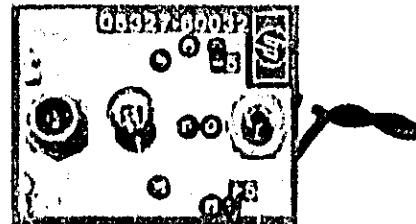
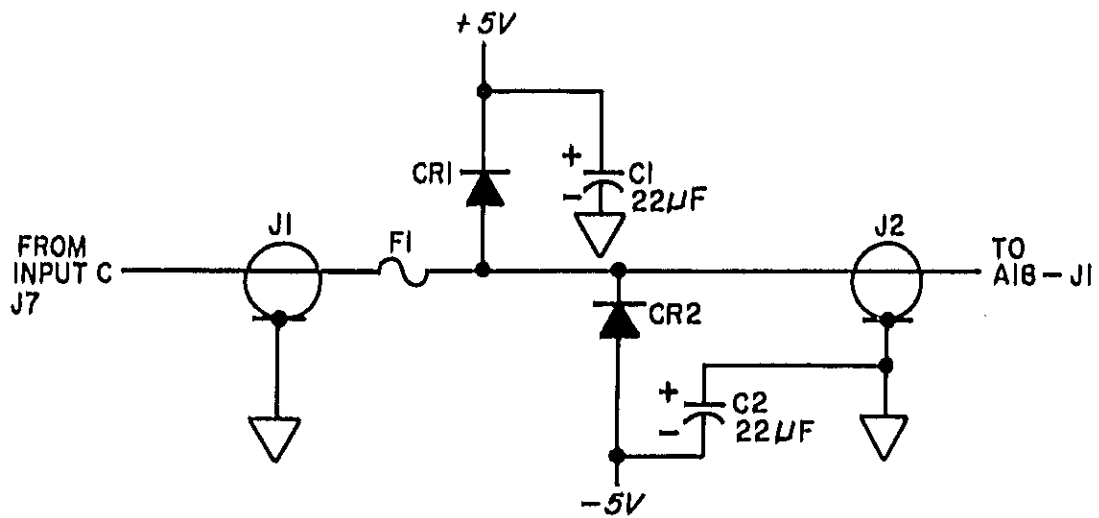


Figure 7-10. A18 Component Locator (05327-60020)



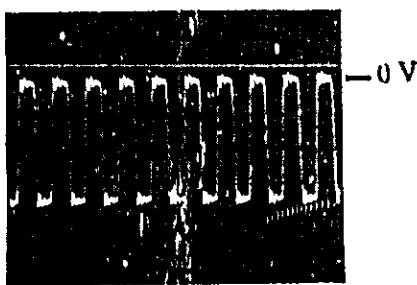
The 5327C model may be supplied with either A18 Prescaler Assembly. Both assemblies perform the same function. Note that separate schematics, component locators and parts lists are supplied for each assembly.

Figure 7-11. A19 Schematic, Component Locator, and Parts List

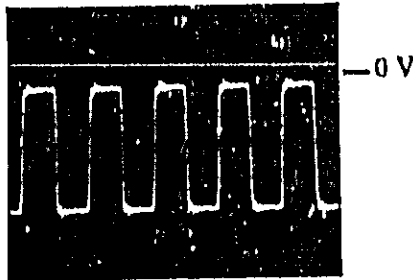


- A19 05327-60032 Protection Board
- A19 05327-20032 Blank Board
- A19C1, 2 0180-0228 C:FXD TANT 22 UF 10% 15V
- A19CR1, 2 1801-0050 DIODE:SILICON
- A19F1 2110-0436 FUSE: 0.1 AMP
- A19J1 1250-1408 CONNECTOR:RF SUBMINIATURE
- A19J2 1250-0835 CONNECTOR:RF SUBMINIATURE
- A19XF1A/B 1251-3205 SOCKET:MINIATURE (2)

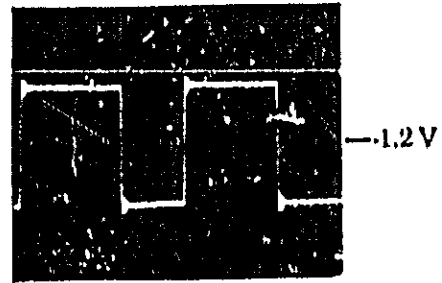
Figure 7-12. A18 Waveforms (05327-60009)



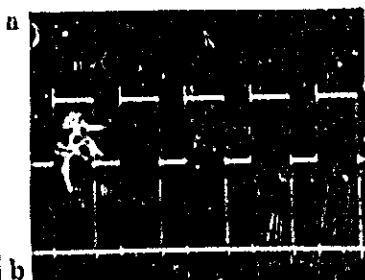
1 .02 V/cm
.1 μs/cm



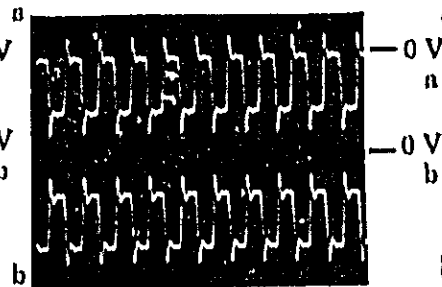
2 .02 V/cm
.1 μs/cm



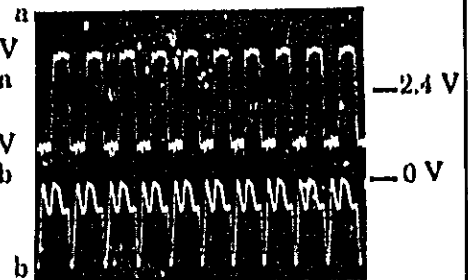
3 .02 V/cm
.2 μs/cm



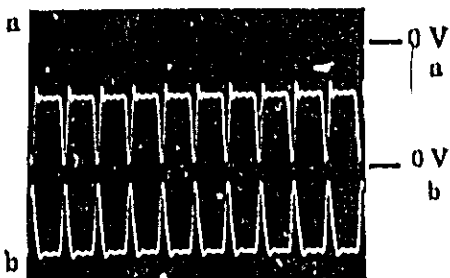
4 a. U5(7)
b. U6(4)
.05 V/cm
.5 μs/cm



5 a. U7(10)
b. U7(1)
.05 V/cm
.1 μs/cm



6 a. Q1 - .02 V/cm
b. Q3 - .1 V/cm
.1 μs/cm



7 a. U5(7)
b. U6(4)
.05 V/cm
.1 μs/cm
B position

All waveforms taken with 10:1 divider probe; ground lead is connected to ground side of C5. A18 is mounted on extender board.

COUNTER CONTROLS:

(except as noted)

INPUT B jack connect 10 MHz sine wave at 1 V rms
INPUT SELECTOR B
FUNCTION FREQ
TIME BASE 1 ms
CHK/NORM NORM

OSCILLOSCOPE CONTROLS:

SWEEP MODE AUTO
TRIGGER INT
SLOPE +
DISPLAY for dual waveforms, use ALT B

DC VOLTAGES:

Set counter controls as stated. Disconnect input signal.

7-9. OPTIONS

7-10. Options 001 through 003 and Options 010 and 011 are available for the 5326C and 5327C and models. The following paragraphs describe each option's purpose and installation procedure.

7-11. Option 001, 8-Digit Display

7-12. Option 001 is the addition of an eighth digit to the display assembly. This addition becomes the most significant digit and extends the counter's display at higher frequencies. The digit is always blanked if the reading is "0".

7-13. Option 002, Remote Programming

7-14. Option 002 allows the counter to be computer controlled from a 36-pin connector on the counter's rear panel. Programming instructions are given in Section II. A schematic diagram is included in Section VIII, Interconnect Diagram.

7-15. Option 003, Digital Recorder Output

7-16. The data displayed on the counter's front panel can be permanently recorded by connecting a printer to the counter via Option 003. The necessary signals are coupled to an HP 5055A or 5050B Digital Recorder through J9 on the counter's rear panel (also, see Table 1-3 for specifications and interconnect diagram for pin references).

7-17. Option 010, Oscillator Assembly A4 (05327-60036)

7-18. Option 010 is a temperature-controlled crystal oscillator. This option replaces the standard A4 Oscillator Assembly and provides increased measurement accuracy. Specifications are given in Table 1-1. Schematic diagram is included in Section VIII.

7-19. Option 011, Oscillator Assembly A4, (10544-60011)

7-20. Option 011 is an oven-controlled crystal oscillator. This option replaces the standard A4 Oscillator and provides the highest stability available in the 5326/5327 Counters. Specifications are included in Table 1-1.

7-21. FIELD INSTALLATION OF OPTIONS

7-22. Installation of Option 001, 8th Digit

7-23. Parts required to install this option are:

1820-0119 Decade Counter U8
1820-0116 Buffer Storage U16
1820-0092 Decoder Driver U24
197C-0042 Display Tube DS8

a. Remove right and left readout boards, A10 and A11.

b. Remove two screws holding display tube shield and remove shield.

c. Remove display board A9 and display support board A8 from the counter by pulling up on the display support board A8. Separate A8 from A9.

d. Install parts on A9 as shown in the component location photo on Figure 8-12 of this manual.

e. Remove R10 to prevent overflow information from U7. R12 carries the overflow when Option 001 is installed. Replace boards in instrument.

f. Perform Self-Check in Figure 3-3. Especially note that the OF (overflow) lamp lights when the left-most digit changes from 9 to 0.

7-24. Installation of Option 002, Remote Programming

7-25. To install remote programming capability in units not so equipped, order remote cable assembly HP Part No. 05327-60013, two 4-40 x 1/4-inch machine screws, and one 6-32 x 3/8-inch machine screw with hex nut.

a. Remove the plate covering the lower opening in the rear panel for Option 002.

b. The rear-panel interconnect board containing the wiring for the rear-panel BNC's and switches must be removed. To accomplish this, remove the nuts holding the rear-panel BNC's.

c. Remove two screws holding P1A, the 1 1/2-inch long, black, pressure connector to the motherboard A16.

d. Remove side covers and six screws holding rear panel. Loosen one side frame. Pull rear panel away from the instrument.

e. Remove the rear-panel interconnect board from the instrument and separate it from P1A by removing two screws.

f. Feed the pressure connector through hole in rear-panel and mount rear-panel connector J10, with screws removed earlier. Position J10 with pin 1 near the side frame.

g. Assemble the rear-panel interconnect board and the new 5-inch long pressure connector P1 with three 6-32 x 3/4-inch screws and hex nuts. Be certain that proper contact is made between interconnect board and P1.

h. Attach P1 to the motherboard using four 4-40 x 1/4-inch screws. Do not tighten screws. Route cable as shown in the top internal photo of instrument, Figure 8-3.

CAUTION

Screws longer than 1/4-inch will damage P1.

i. Gently reinstall rear panel. Install BNC lock nuts so that the board is still moveable.

j. Observe the alignment of the connector in the motherboard. Tighten the four screws holding P1 to the motherboard, making sure to maintain proper contact.

k. Check contact alignment of P1 with motherboard and with the rear-panel interconnect board. If necessary, loosen the screws in P1 and shift slightly to obtain proper terminal contact.

l. Tighten BNC lock nuts and reassembly instrument.

m. Run a complete performance check on the unit to verify that remote programming is working properly.

7-26. Installation of Option 003, Digital Recorder Output

7-27. Order digital recorder cable assembly HP Part No. 05326-60012.

n. Remove the plate covering the upper opening in the rear panel.

o. Remove right and left readout boards A10 and A11. Remove two screws holding the display tube shield and remove shield. Remove display support board A8 and the display board A9 by pulling up on A8.

p. Feed the two pressure connectors of the recorder cable through the rear panel and mount J9 on the rear panel, using the screws previously removed. Position J9 so pin 1 is near the side frame.

q. Slide the connectors on the A9 board, shown in the photo on Figure 8-3. The connector with the long wires attaches to J1 and is positioned so that pin 1 is toward the front of the instrument. The other connector attaches to J2, and pin 1 is toward the rear of the instrument.

r. Position the P1 cable so it passes between A8 and A11, completely clearing A8. Reinstall A8 and A9.

s. Route the cable around T1 as in the top internal photograph, Figure 8-3.

t. Reassembly unit and run a proof-of-performance check of the digital output to verify that the option is installed properly.

7-28. Installation of Option 010 and 011, Oscillator Assemblies.

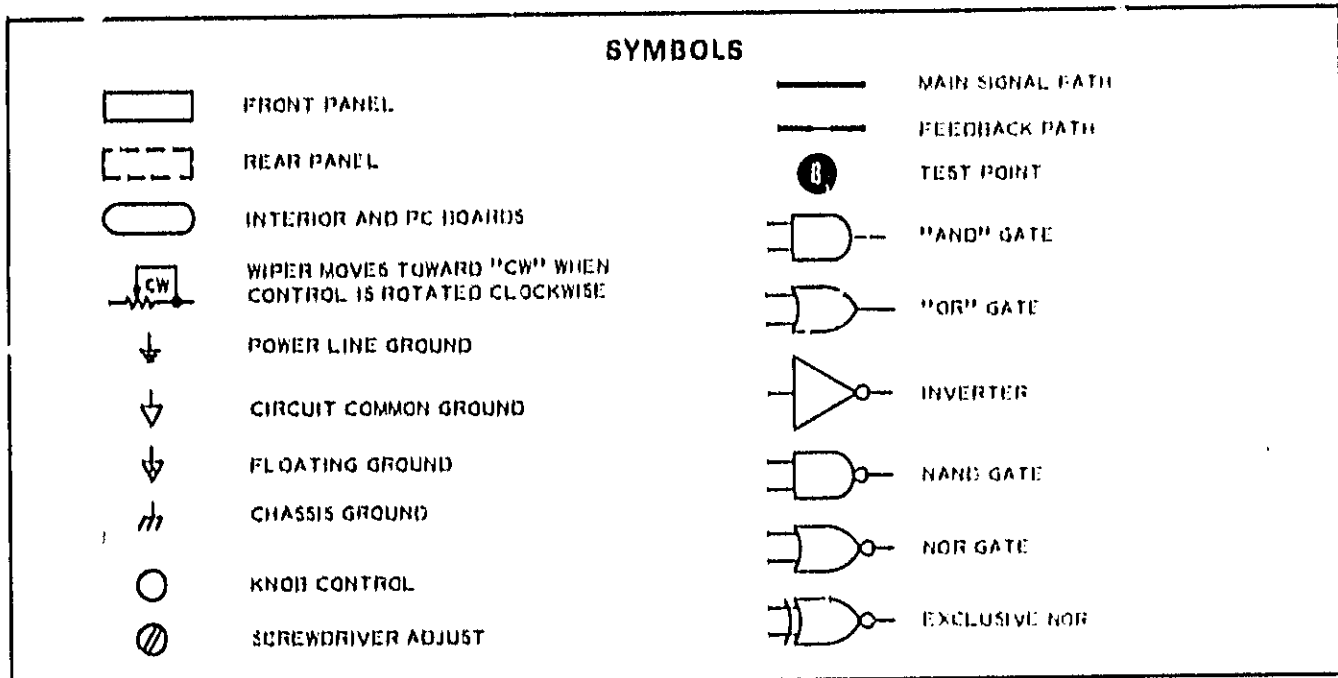
7-29. Remove the standard A4 oscillator and insert the option into the XA4 connector. The Option 011 assembly must be mounted to the interconnect board with two 6 x 32, 3/8" screws. Place the fiber washers on the underside of the board.

SECTION VIII CIRCUIT DIAGRAMS

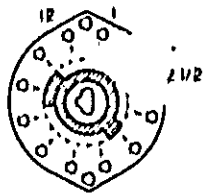
This section contains the following:

- a. Schematic diagram notes.
- b. Component locators.
- c. IC outline drawings.
- d. Waveforms.
- e. Simplified block diagrams.

Figure 5-1. Schematic Diagram Notes

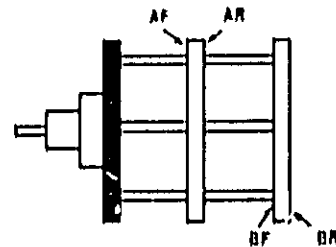


SWITCH DESIGNATIONS



A351BR(2-1/2)

- A351 SWITCH S1 WITHIN ASSEMBLY A3
- B 2ND WAFER FROM FRONT (A=1ST, ETC)
- R REAR OF WAFER (F=FRONT)
- (2-1/2) TERMINAL LOCATION (2) (VIEWED FROM FRONT)



REFERENCE DESIGNATIONS

REFERENCE DESIGNATIONS WITHIN ASSEMBLIES ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION. JACKS ARE THE STATIONARY CONNECTORS AND PLUGS ARE THE MORE MOVEABLE OF TWO CONNECTORS.

ASSEMBLY	ABBREVIATION	COMPLETE DESCRIPTION
A25	C1	A25C1
A25A1	CR1	A25A1CR1
NO PREFIX	J3	J3

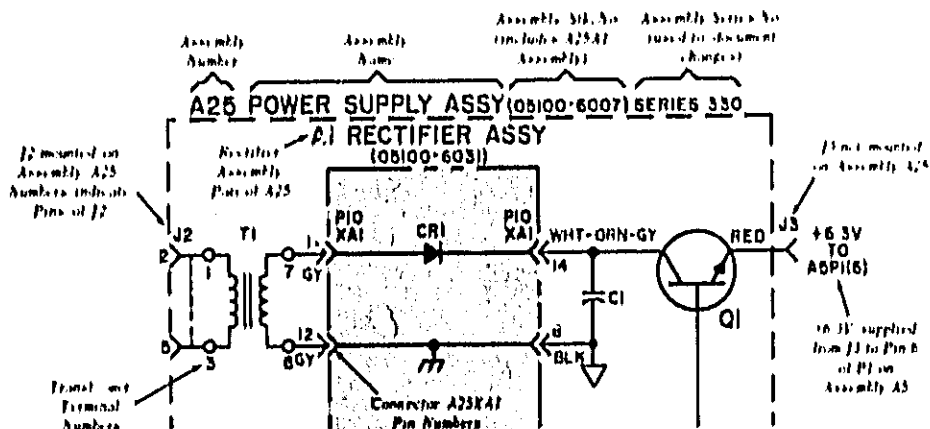


Figure 8-2. Front and Rear Panel Designations

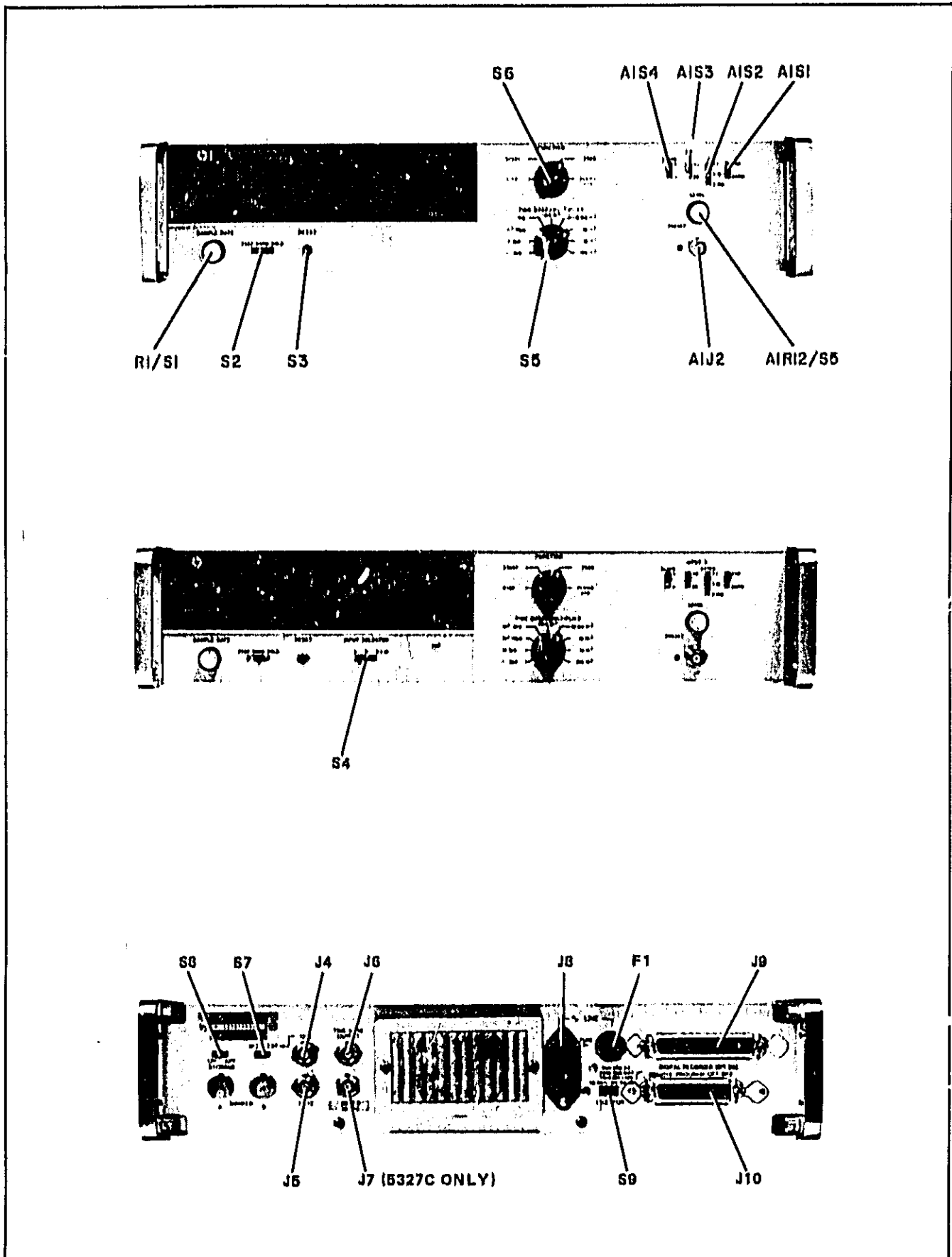


Figure 8-3. 5327C Top Internal (with Options)

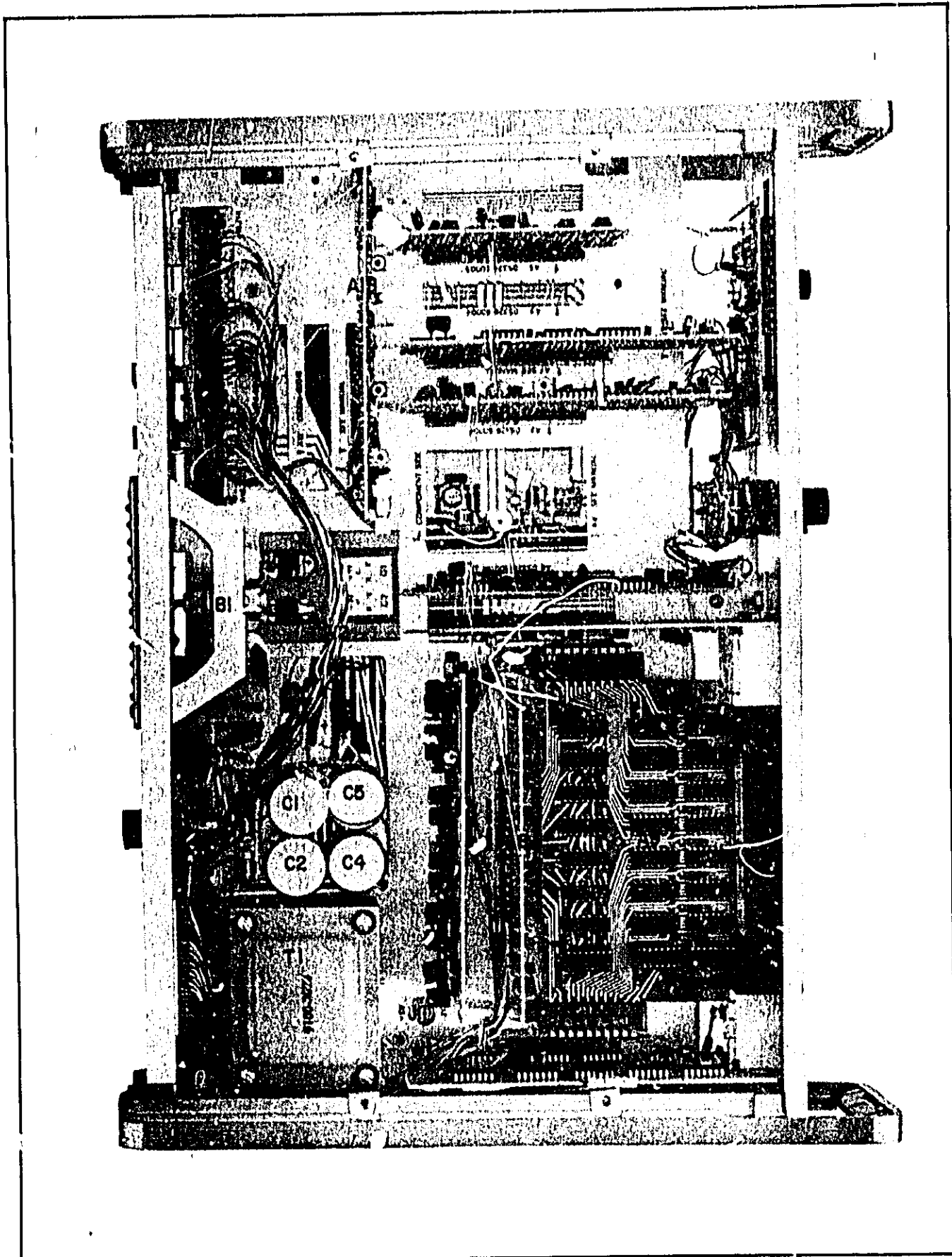
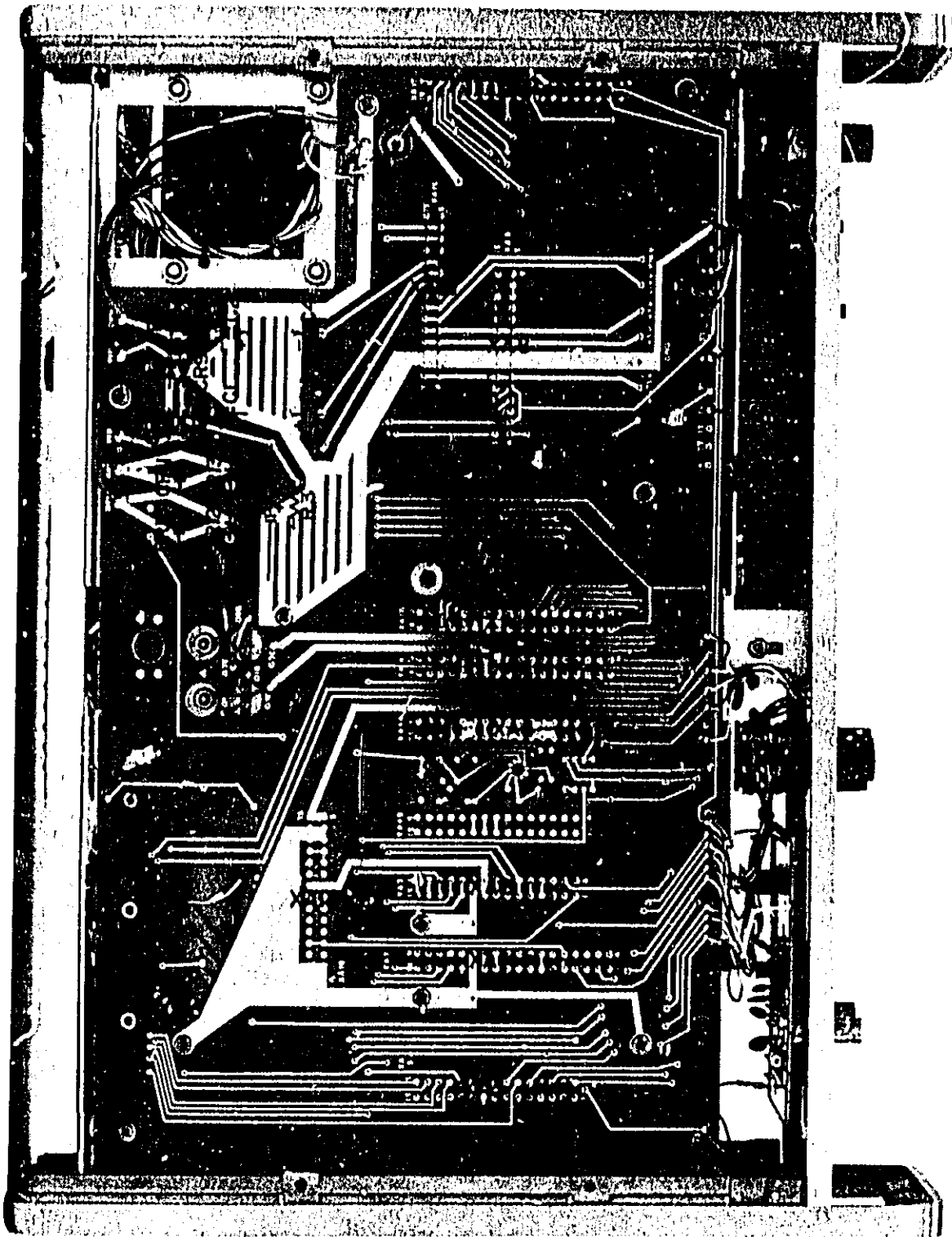
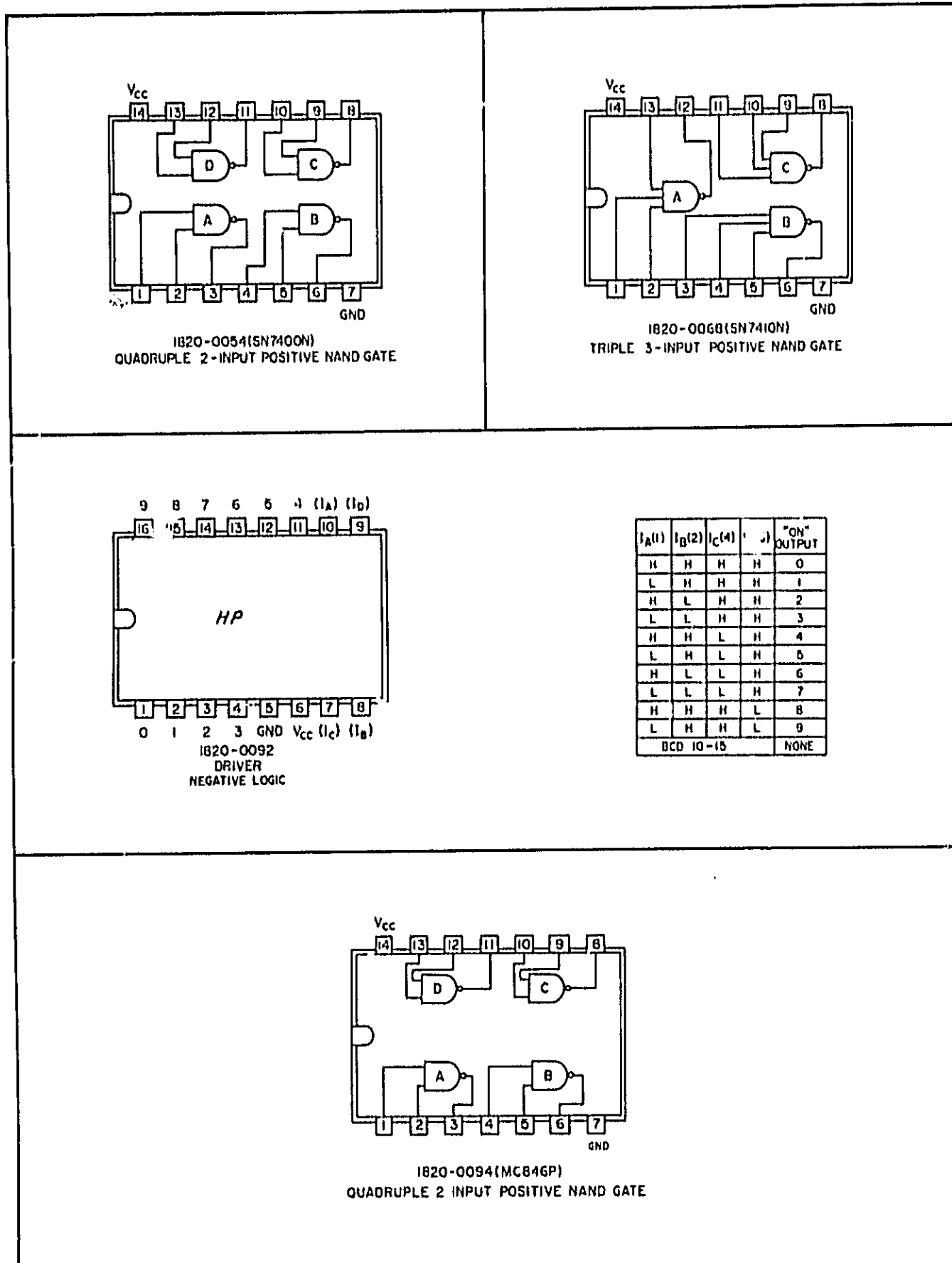


Figure 8-4. 5326C Bottom Internal



*Indicates A18 Prescaler connection for 5327C

Figure 8-5. Integrated Circuit Diagrams



1B20-0054(SN7400N)
QUADRUPLE 2-INPUT POSITIVE NAND GATE

1B20-0068(SN7410N)
TRIPLE 3-INPUT POSITIVE NAND GATE

1B20-0092
DRIVER
NEGATIVE LOGIC

I _A (1)	I _B (2)	I _C (4)	O	"ON" OUTPUT
H	H	H	H	0
L	H	H	H	1
H	L	H	H	2
L	L	H	H	3
H	H	L	H	4
L	H	L	H	5
H	L	L	H	6
L	L	L	H	7
H	H	H	L	8
L	H	H	L	9
BCD 10-15				NONE

1B20-0094(MC846P)
QUADRUPLE 2 INPUT POSITIVE NAND GATE

Figure 8-5. Integrated Circuit Diagrams (Continued)

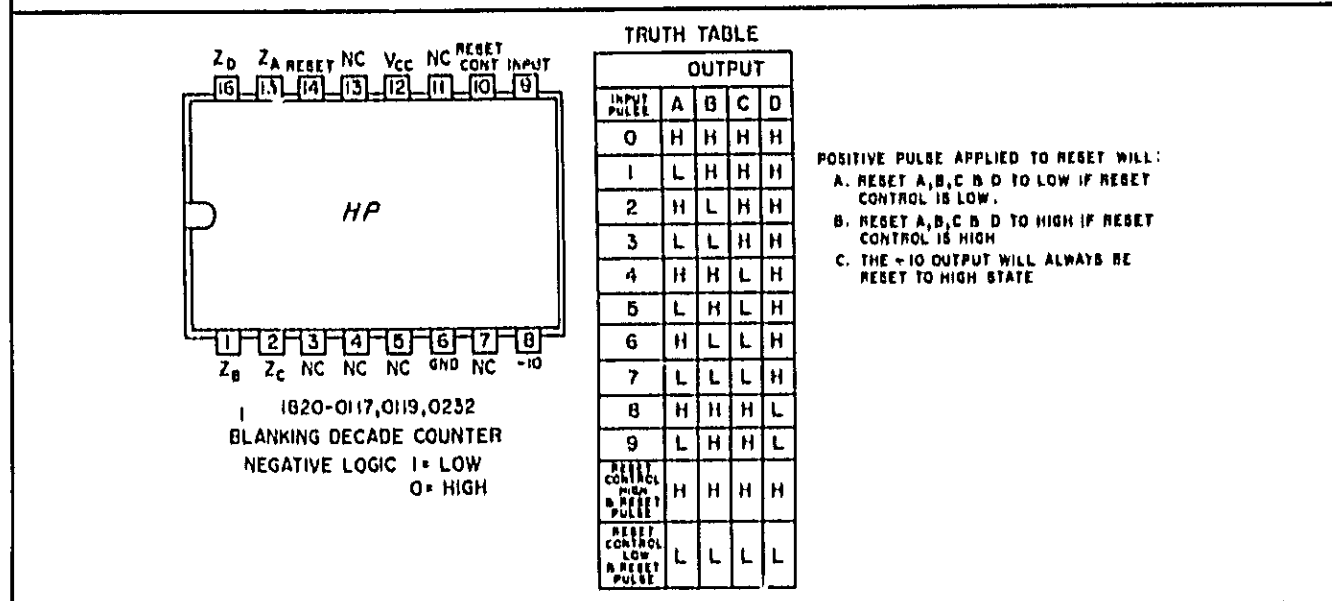
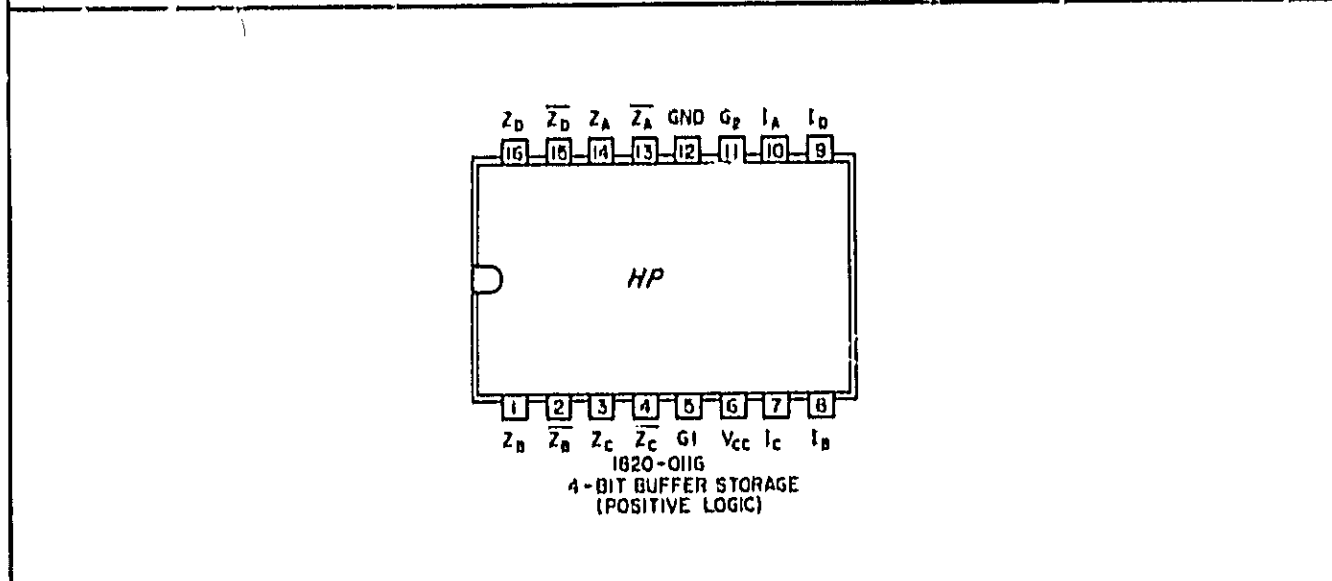
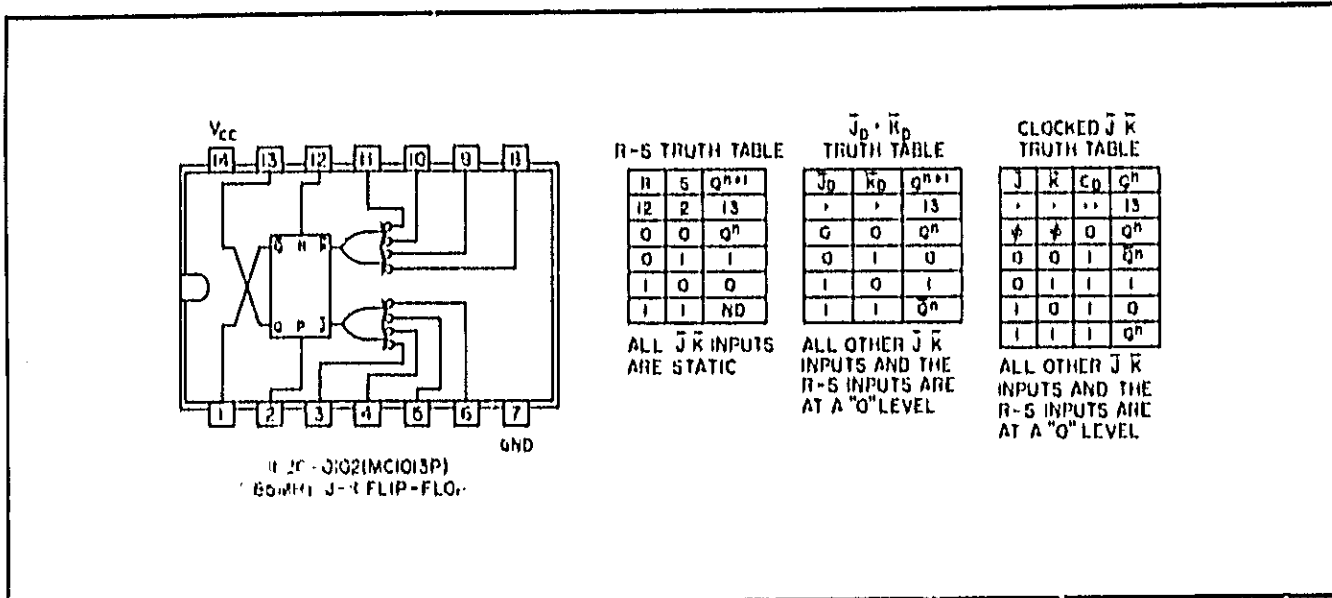
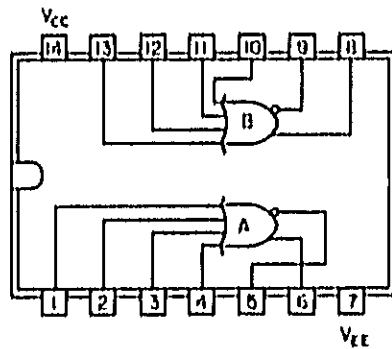
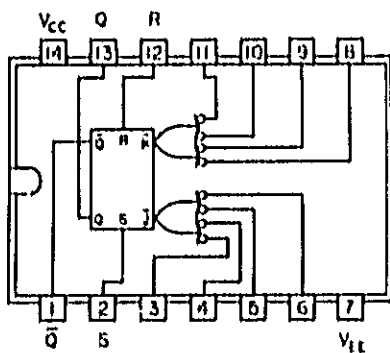


Figure 8-5. Integrated Circuit Diagrams (Continued)



1820-0142(MC1004P)
ECL DUAL 4-INPUT OR/NOR



1820-0143(MC1027P)
ECL 120MHz J-K FLIP-FLOP

CLOCKED \bar{J} \bar{K}
TRUTH TABLE

J	K	\bar{Q}^n	Q^n
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0

ALL OTHER \bar{J} \bar{K} INPUTS AND THE R-S INPUTS ARE AT A "0" LEVEL

R-S
TRUTH TABLE

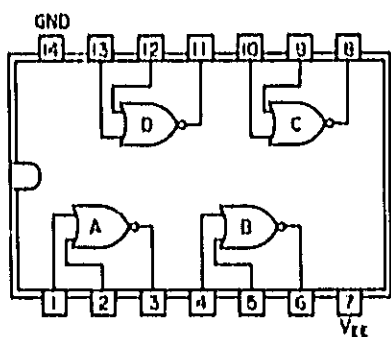
R	S	Q^{n+1}
0	0	0
0	1	1
1	0	0
1	1	ND

ALL \bar{J} \bar{K} INPUTS ARE STATIC

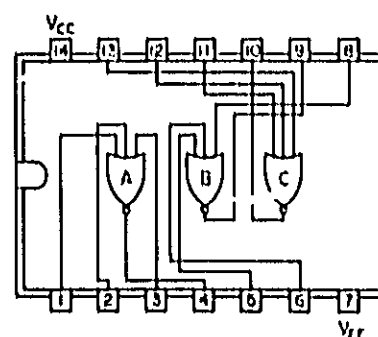
\bar{J} \bar{K}
TRUTH TABLE

\bar{J}	\bar{K}	Q^{n+1}
0	0	0
0	1	0
1	0	1
1	1	Q^n

ALL OTHER \bar{J} \bar{K} INPUTS AND THE R-S INPUTS ARE AT A "0" LEVEL

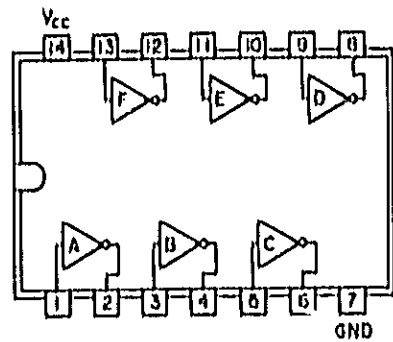


1820-0145(MC1010P)
ECL QUAD 2-INPUT NOR

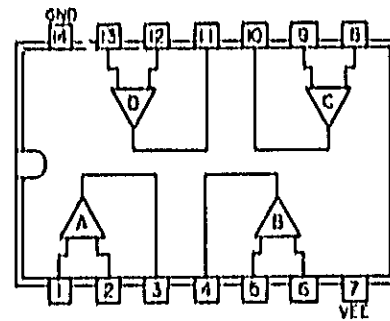


1820-0147 (MC1007P)
TRIPLE 3-INPUT GATES

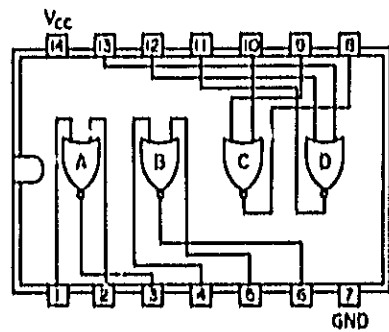
Figure 8-5. Integrated Circuit Diagrams (Continued)



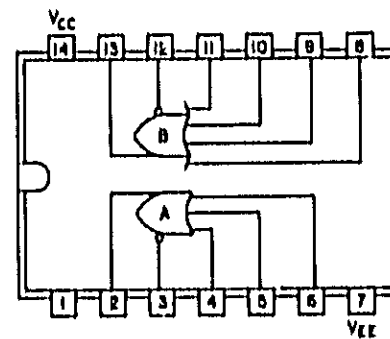
1820-0176, 0307
HEX INVERTER



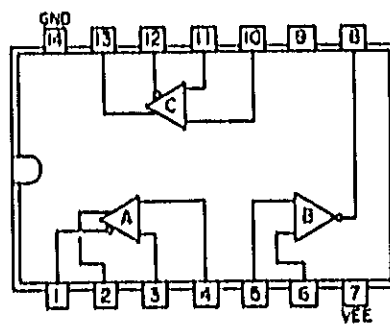
1820-0212
QUADRUPLE LINE RECEIVER



1820-0258 (MC1810P)
QUAD 2-INPUT NOR GATES

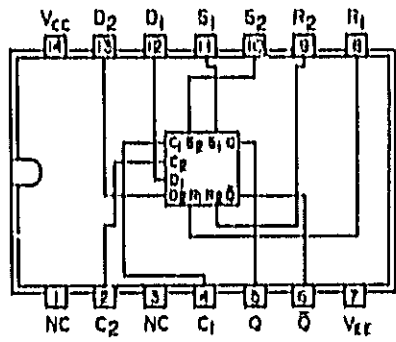


1820-0262 (MC1026, 1226)
OR/NOR



1820-0263
TRIPLE DIFFERENTIAL AMPLIFIER

Figure 8-5. Integrated Circuit Diagrams (Continued)



1820-0272 (MC1022P)
TYPE "D" FLIP-FLOP

CLOCKED TRUTH TABLE

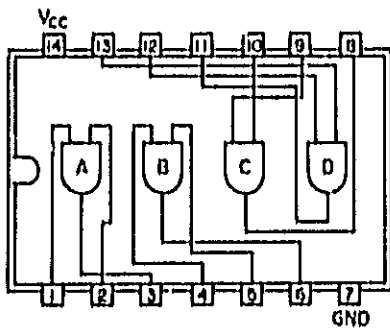
D	C	Q^{n+1}	\bar{Q}^{n+1}
0	0	Q^n	\bar{Q}^n
0	1	0	1
1	0	1	0
1	1	1	0

*A "1" IN CLOCK INPUT IS DEFINED FOR THIS FLIP-FLOP AS A CHANGE IN LEVEL FROM A LOW INPUT TO A HIGH INPUT.

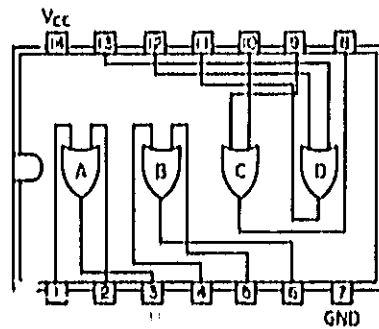
R-S TRUTH TABLE

R	S	Q^{n+1}	\bar{Q}^{n+1}
0	0	Q^n	\bar{Q}^n
0	1	1	0
1	0	0	1
1	1	ND	ND

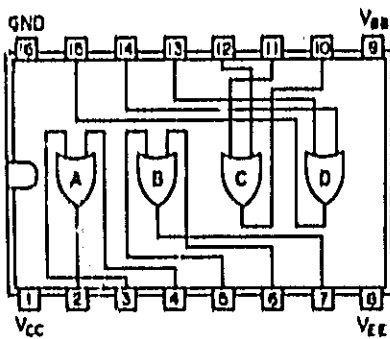
NC - NOT DEFINED



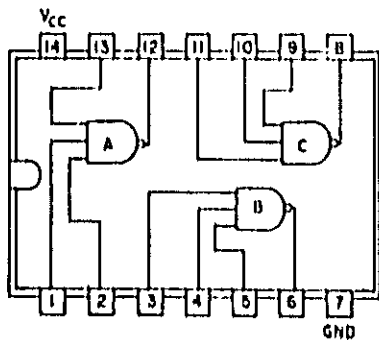
1820-0273 (MC1806P)
QUAD 2-INPUT AND GATES



1820-0274 (MC1807P)
QUAD 2-INPUT OR GATES

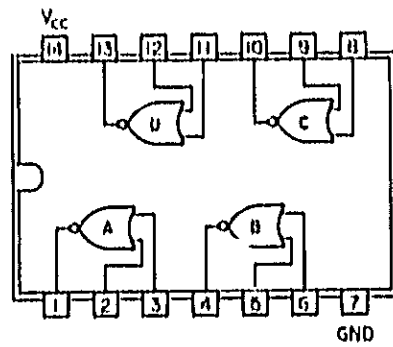


1820-0275 (MC1039P)
QUAD TRANSLATOR 2-INPUT OR GATES

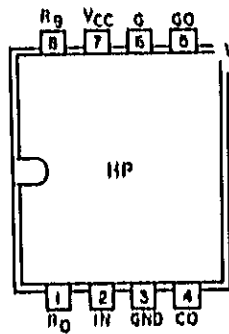


1820-0310 (MC652P)
3-INPUT NAND

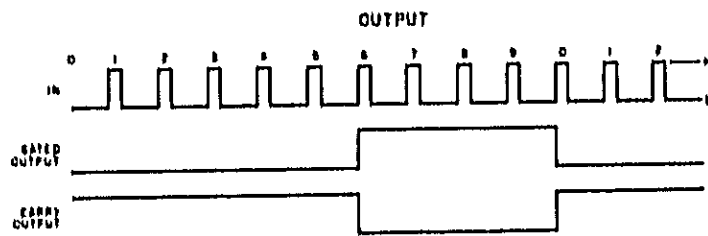
Figure 8-5. Integrated Circuit Diagrams (Continued)



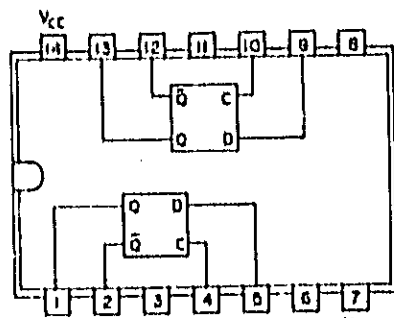
1820-0320(5N7402N)
QUAD 2-INPUT NOR GATE



1820-0412,0413
DECADE DIVIDER



TIME BASE DECADE
1820-0412, 1820-0413

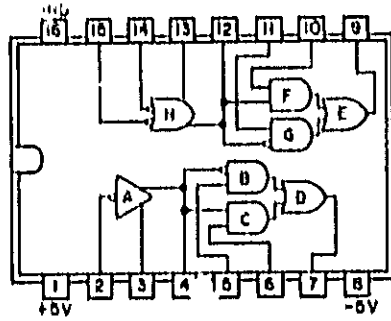


1820-0440(1MC1016, 1216)
DUAL H-S FLIP-FLOPS

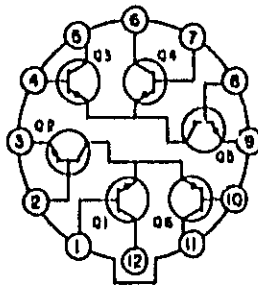
TRUTH TABLE

D	C	Q ⁿ⁺¹
0	0	Q ⁿ
1	0	Q ⁿ
0	1	0
1	1	1

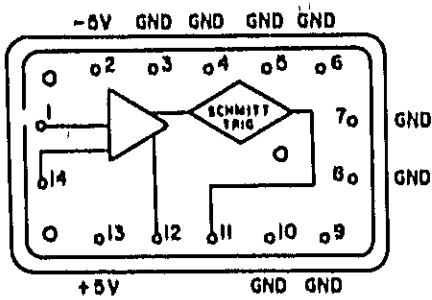
Figure 8-5. Integrated Circuit Diagrams (Continued)



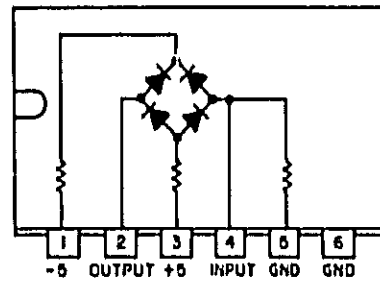
1820-0489
TRANSLATOR AND DATA
SWITCH



1850-0004
TRANSISTOR ARRAY
(BOTTOM VIEW)



5088-7001
SCHMITT & AMP



5088-7002
LIMITER

A1 ATTENUATOR OPERATION

Channel A input signals are routed through the front-panel input jack to the attenuator network. With the ATTEN switch in X1, the full input signal is fed to the gate of Q1A. When the ATTEN switch is set to X10, R2, R5, C1, and C3 serve as a 10:1 voltage divider. In the X100 position, the 100:1 voltage divider consists of R2, R4, C1, and C2. R3 provides damping.

For the check mode, the NORM-CHK switch grounds P1 via CR1. This programs A2 and A7 to disconnect the input signal and connect the 10 MHz internal oscillator signal.

When the AC/DC switch S4 is set to AC, C4 is in series with the signal path. CR3 and CR4 limit the input amplitude to Q1A to approximately ± 3.8 V. R7 and R8 provide current limiting. C5 compensates Q1A input capacitance.

Q1A and Q1B form a differential amplifier, connected as source followers. Outputs are fed to A2 via pins 5 and 6 of J1. LEVEL potentiometer R12 determines the trigger level on Q1B gate. The trigger level can be preset to zero volts or varied from -3 to +3 volts. In addition, an external trigger level can be applied at J10 to A1J1(D) for remote programming. Diodes CR5 and CR6 develop a stable 5-volt reference for the input protection circuits and for the trigger level control. R11 lowers the impedance of Q1B gate circuit to limit stray charges and false triggering. R10 and C8 form a filter to prevent noise from triggering the differential amplifier.

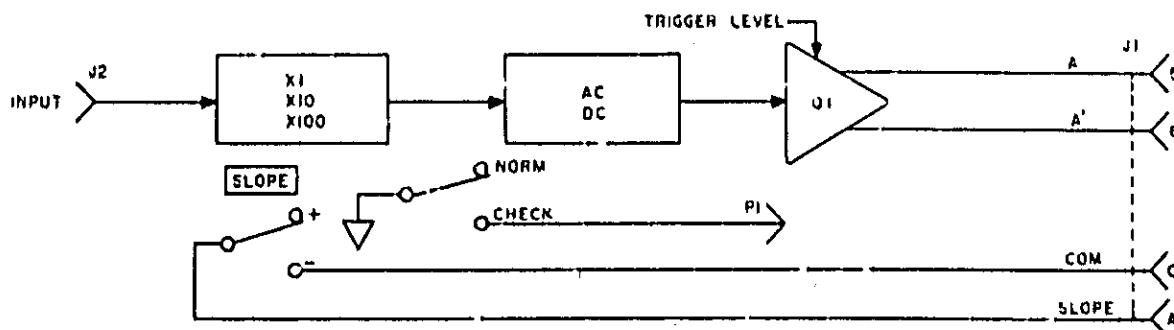
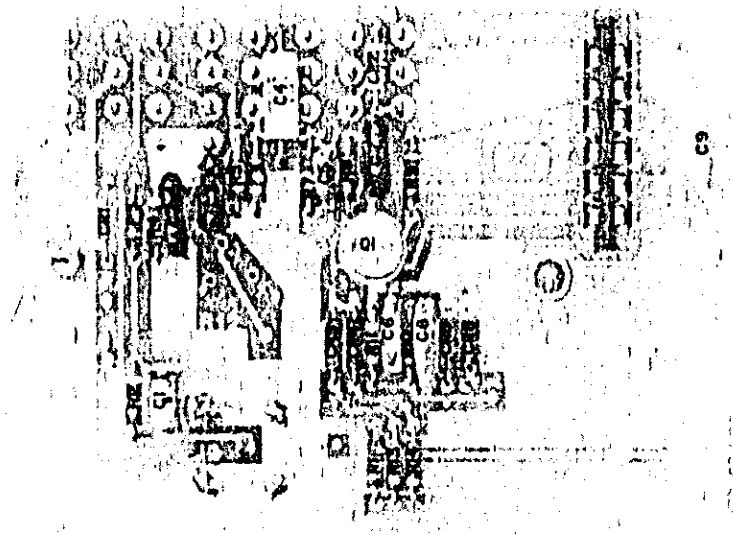
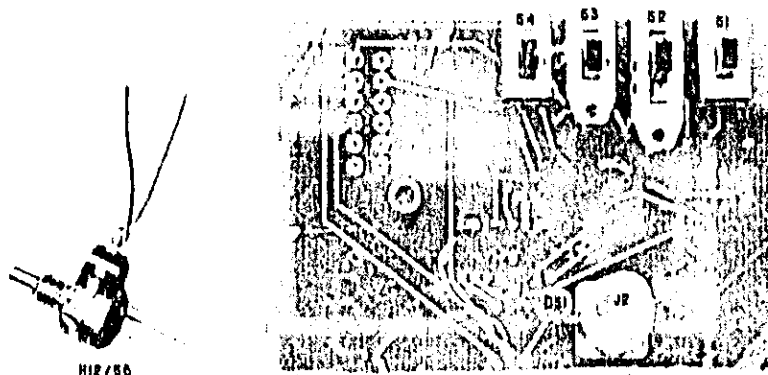
When the SLOPE switch is set to -, a Low is supplied to J1 pin A via CR2. This sets amplifier trigger A2 to trigger on the negative slope of the input signal. When remote programming is used, J1(C) is held High to disable the SLOPE switches.

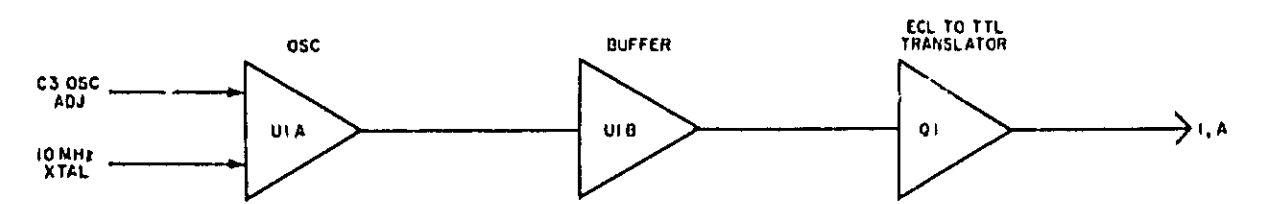
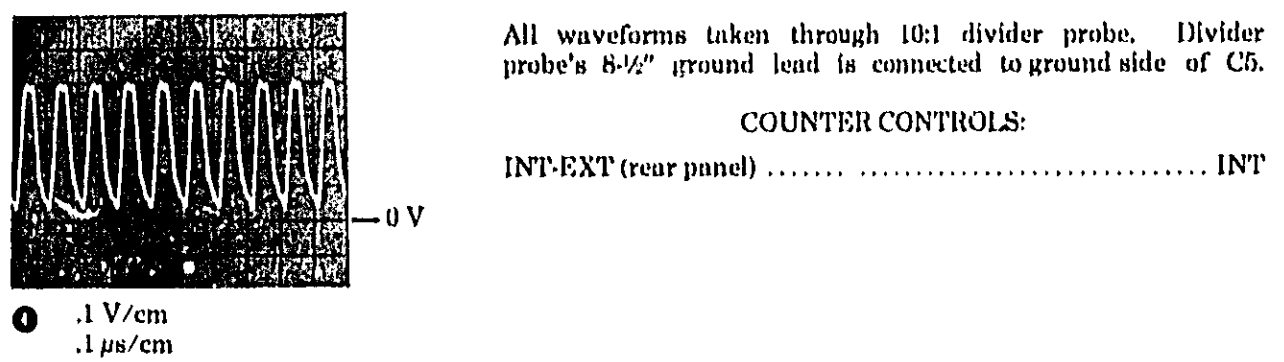
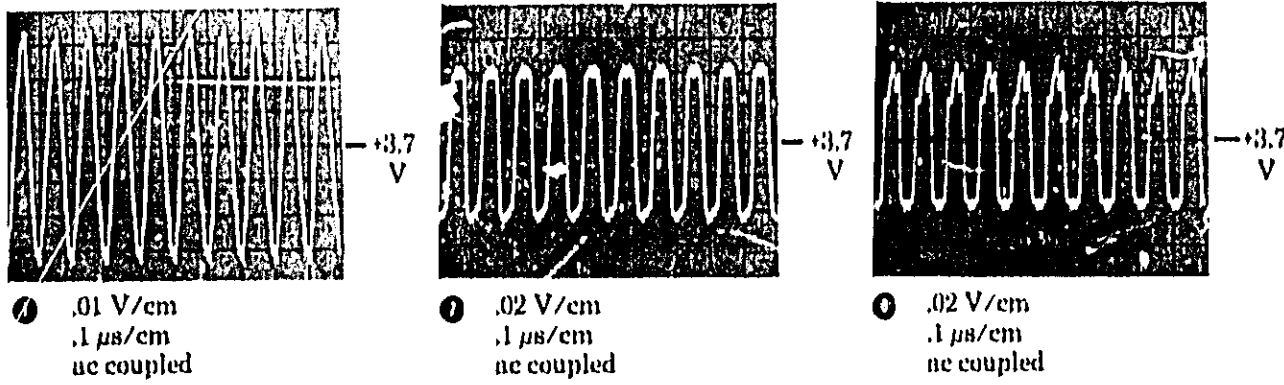
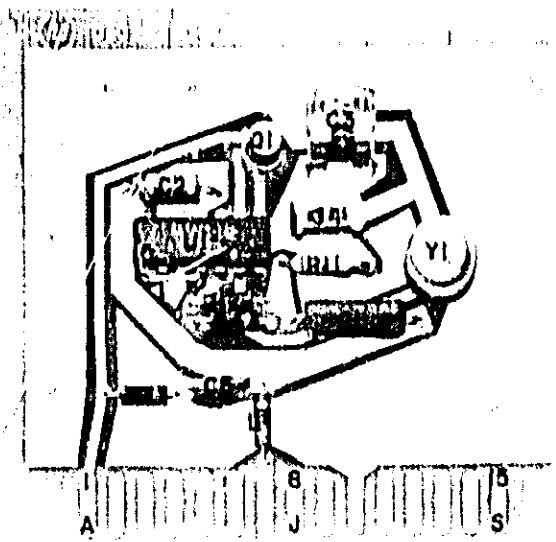
A4 OSCILLATOR OPERATION

The 10 MHz oscillator assembly consists of oscillator U1A, buffer U1B, and level shifter Q1. U1A operates like an amplifier with positive feedback. The positive feedback path is from the noninverted output of U1A(6) through 10 MHz crystal Y1, trimmer capacitor C3, and C4 to U1A(4). Negative feedback is used to establish the input bias for U1A. The negative feedback path consists of R1 and R2. The inverted output of U1A(5) connects to buffer U1B(10). The buffer provides isolation between the oscillator and the output. The outputs of U1B(8) and (9) switch from approximately 3.5 to 4.25 volts. When one output is 3.5 volts, the other output is 4.25 volts. Level shifter Q1 converts the output of U1B to an approximate square wave of 0 to +4 volts.

(see Figure 8-6)

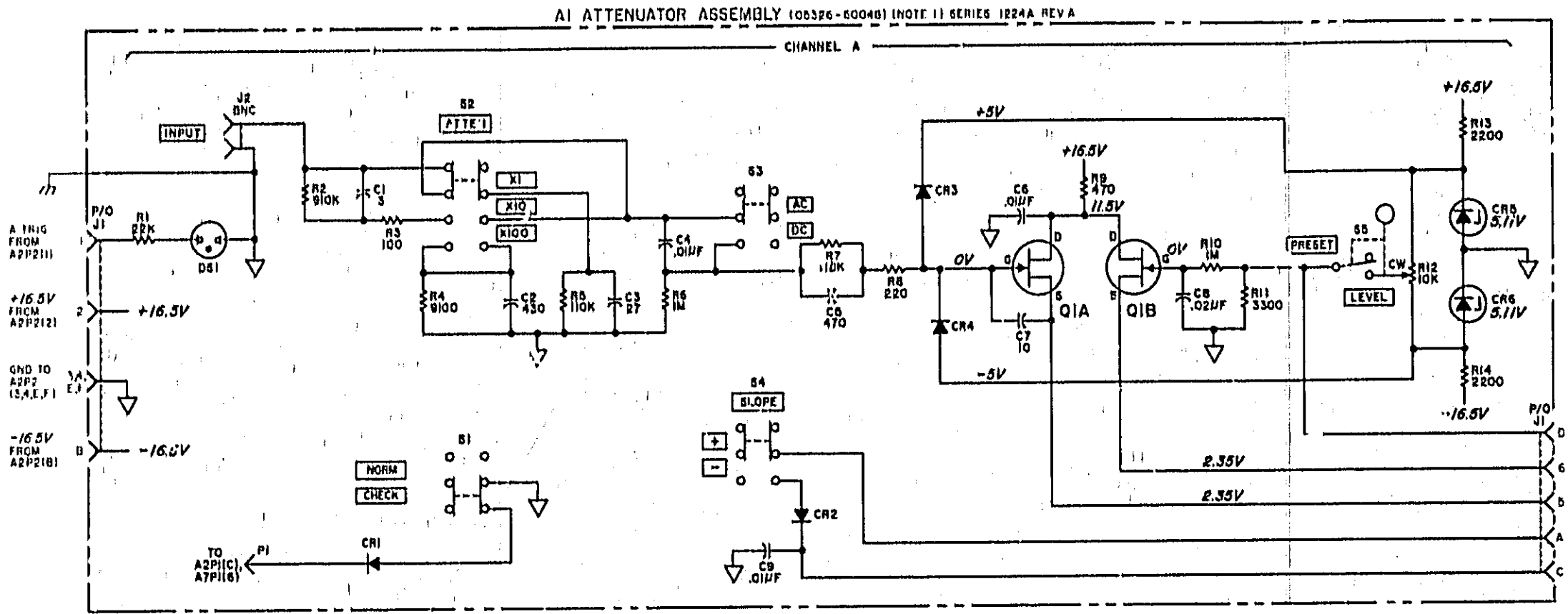
Part of Figure 8-6, A1/A4 Attenuator/Oscillator Board Assembly





All waveforms taken through 10:1 divider probe. Divider probe's 8-1/2" ground lead is connected to ground side of C5.

COUNTER CONTROLS:
INT-EXT (rear panel) INT



- NOTES
- 1 REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
 - 2 UNLESS OTHERWISE INDICATED: RESISTANCE IN OHMS, CAPACITANCE IN PICOFARADS, INDUCTANCE IN MICROHENRIES
 - 3 ASTERISK(*) INDICATES SELECTED COMPONENT, AVERAGE VALUES SHOWN
 - 4 U1 IS ECL LOGIC TYPE, HOWEVER:
V_{CC} = +5VOLTS
V_{EE} = GROUND
H = +4.15VOLTS
L = +3.60VOLTS

REFERENCE DESIGNATIONS

A1	A4
C1-9	C1-5
CR1-6	
DS1	
J1,2	
P1	L1
Q1	Q1
R1-14	R1-4
S1-5	U1
	Y1

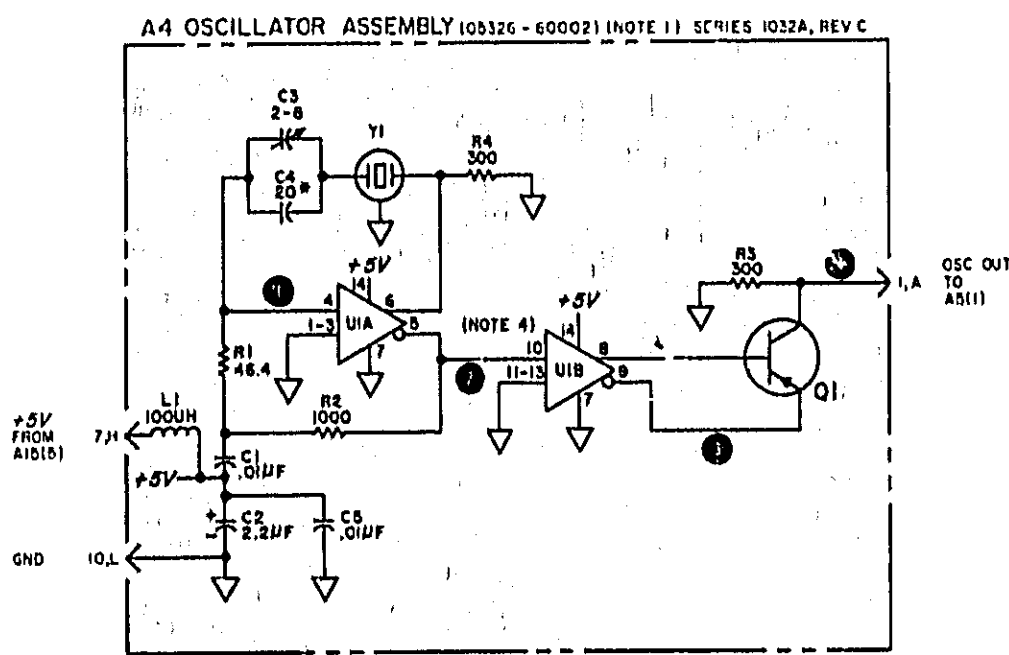


TABLE OF ACTIVE COMPONENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
A1	
CR1	1901-0040
CR2	1910-00'6
CR3,4	1901-0376
CR5,6	1902-0041
Q1	1855-0334
A4	
Q1	1850-0158
U1	1820-0142
Y1	0410-0405

Figure 8-6. A1/A4 Attenuator/Oscillator Board Assembly

A2 AMPLIFIER/TRIGGER OPERATION

The input signal and the trigger level are received from A1 via P2(5) and P2(6), respectively. Potentiometer R2 is adjusted to cancel offset voltages that are due to imbalances in the circuit.

The differential amplifier (Q1 and Q8) serves to clip a small window out of the input signal waveform. The outputs of Q1 and Q8 drive another differential amplifier Q2 and Q6. Q2 and Q6 inject a current drive input to differential Schmitt trigger Q3, Q4, Q5, and Q7.

Q3 and Q7 are common base amplifiers, which present a low input impedance and high output impedance to Q4 and Q5. This arrangement allows for greater high-speed operation of Q4 and Q5. C2 and R15 reduce the hysteresis of the Schmitt trigger to give greater reliability at the high frequencies. Two out-of-phase signals from this circuit are routed to Q9 and Q10. The output levels shift from approximately +0.8 to +0.5 volts.

The SLOPE switch on A1 drives U1D(11) low for a +slope selection and U1A(3) low for a -slope selection. This allows either the in-phase signal or the out-of-phase signal to be switched to Q13 via Q10 and Q12 for +slope or via Q9 and Q11 for -slope.

The differentiator circuit consists of Q13 and feedback network L8 and R32. The circuit develops 10 ns pulses at the collector of Q13. CR3 and CR4 bias Q13 so that the collector circuit is compatible with ECL output driver U2B.

U2A(6) drives trigger-lamp driver Q16, Q17, Q18, Q19, and Q20. The circuit consists of RS FF Q16-Q17 and one-shot Q19-Q20. When U2A(6) is low, Q16 turns off and Q17 turns on. With Q17 on, Q18 cuts off to drive P1(1) high, which will light the trigger lamp DS1 on A1. As C8 charges, Q20 base goes positive. When Q20 base is approximately ground potential, the one-shot fires to turn off Q19 and Q17.

The marker circuit, Q15 and Q14, is a pulse stretcher that provides a low marker output at P1(12, N). When the input amplifier circuits trigger, U2B(8) provides a positive spike to Q14 base to drive Q14 collector below ground and allow CR5 to conduct. This makes the charge on C6 more positive. When U2B(8) returns to logical zero (approximately -1.6 V), Q14 is back biased and turns off, allowing Q15 to turn on to drive the marker output line low. After C6 has discharged through R36, Q14 turns on again, Q15 turns off, and the marker output line returns to the high state.

During the check mode, A1P1(C) is held high to disable U2B and enable U2A. With U2B disabled, the marker pulses are inhibited. With U2A enabled, the 10 MHz check signal at P1(4,D) connects to the amplifier output line P1(5,E).

A2 TROUBLESHOOTING

When tracing the signal through the amplifier assembly, a good starting point is the collector of Q4, test point 4. With a sine wave input and the LEVEL control set to zero, this waveform should always resemble a square wave, due to the action of the Schmitt Trigger. A second check would be test point 6. If no signal is available there, check the slope gates of U1 and transistors Q9-Q12. Make use of the waveforms that are provided on this page. Once the problem is confined to a general area, use dc voltage checks to pinpoint the trouble.

Model 5326/27C
Circuit Diagrams

Part of Figure 8-7. Input Amplifier Assembly

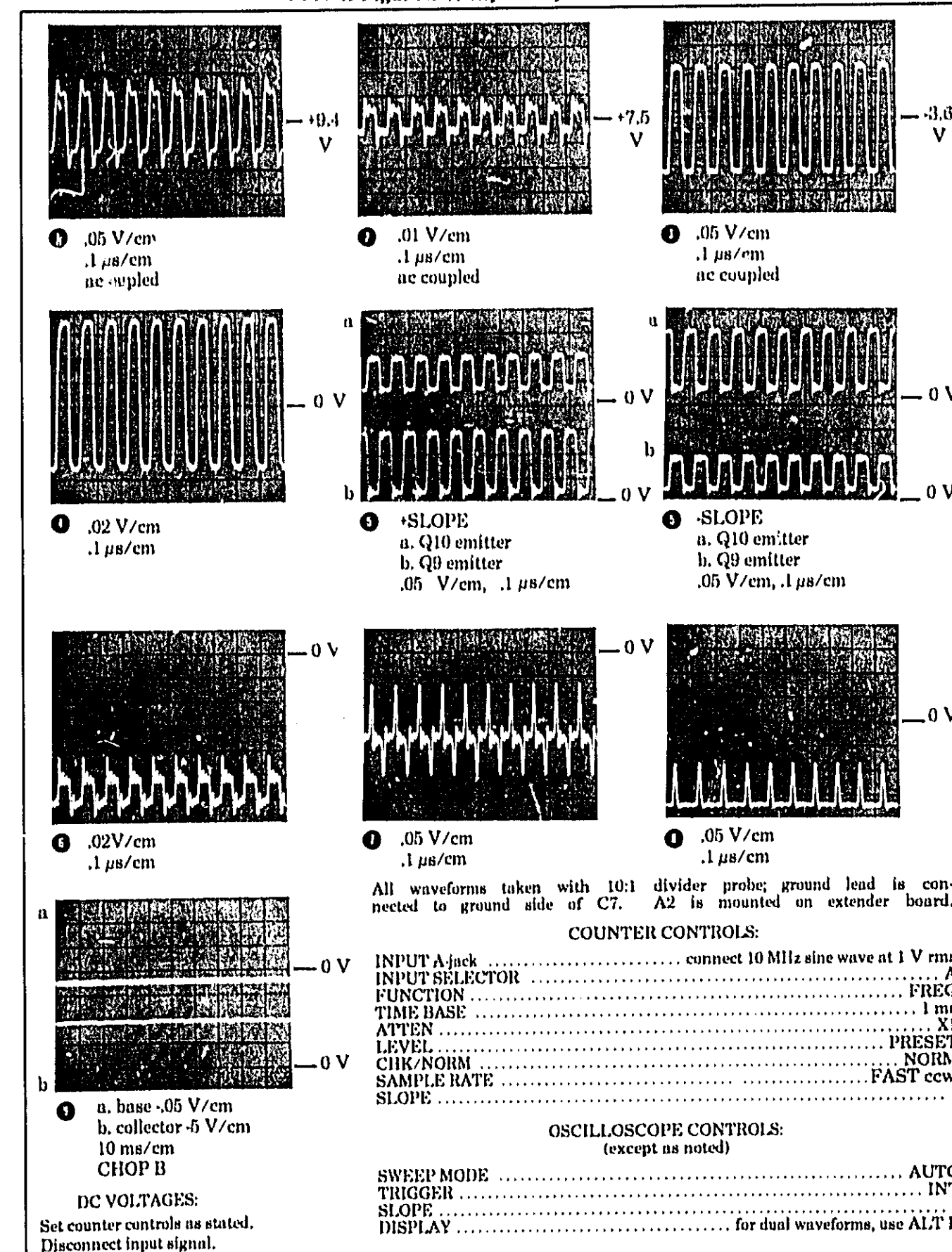


Figure 8-6
A1/A4 ATTENUATOR/OSCILLATOR BOARD ASSEMBLY
(See Page 8-15)

MORE DATA UNDER FOLD

Part of Figure 8-8, Time Base Control Assembly

A5 TIME BASE OPERATION

This assembly contains 8 decade dividers, which are controlled by TIME BASE switch S5. The input signal is 10 MHz for the frequency mode. For the totalize and period-average modes, the decade dividers receive INPUT A signals.

When a particular decade receives a gate-enable signal, the corresponding gated output line is enabled. For example, if S5 is set to .1 second U1(8) is grounded. This gates the divided signal out on U1(5). The gated outputs are connected together on a common line to C5. C5 differentiates the high to low transitions into approximately 100 ns pulses at U5C(8). When S5 is set to .1 μ s, the input signal bypasses the decade dividers and passes through U10D and U5D. The output of U5C feeds through U10C to A7 and also through U10E to the rear-panel TIME BASE OUTPUT jack J6.

Q1 and Q2 form an ECL to TTL translator. When the main gate opens (low is main-gate enable), Q2 turns on the start one-shot Q3/Q4. During short gate-length times, this holds the gate lamp enable line low for approximately 50 ms to extend the time the gate lamp is on. When Q1 collector goes high, a low is developed

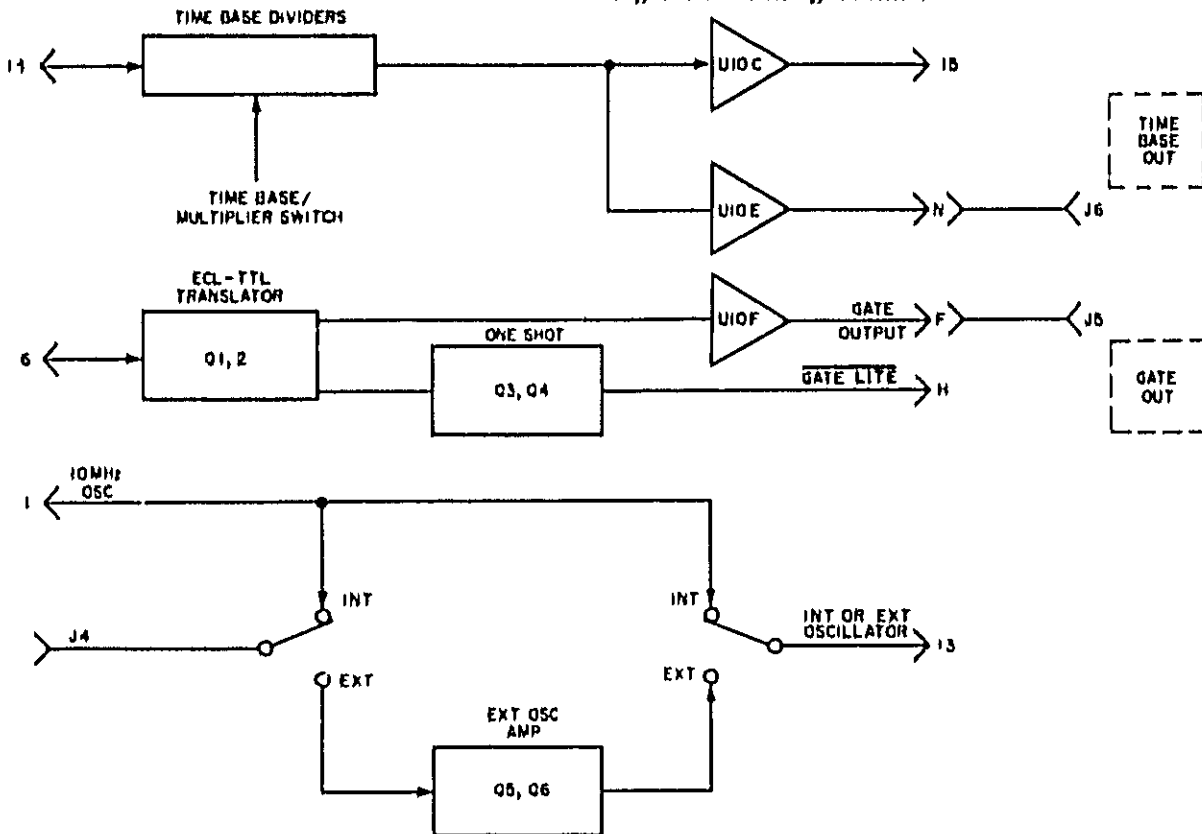
at U10F(12) and routed to the GATE OUT jack J5.

U5A and U5B select either the internal or external oscillator signal. When S7 is set to EXT, the internal oscillator signal is inhibited and the external oscillator signal passes through Schmitt trigger Q5 and Q6 to U5B and XA5(13).

A5 TROUBLESHOOTING

When troubleshooting the Time Base Dividers, place the FUNCTION switch to START and CHK/NORM to CHK. Step the TIME BASE switch through each position and note the counter's display. When the counter stops totalizing, check for a low on pin 6 of the selected decade. If the counter does not totalize for any position of the TIME BASE switch, the problem is in the circuitry of U10B, U10C, or U5C. Before the gated output is sent to the A7 Function Control, it is differentiated by C5 and R1b. This produces extremely sharp pulses, which are best observed when the gate time is 0.1 μ s (TIME BASE switch).

To check the operation of the Gate Lamp one-shot, check for waveform 5 and 6 with SAMPLE RATE switch to NORM. The Collector of Q3 should be Low for about 50 ms, regardless of the gate time.



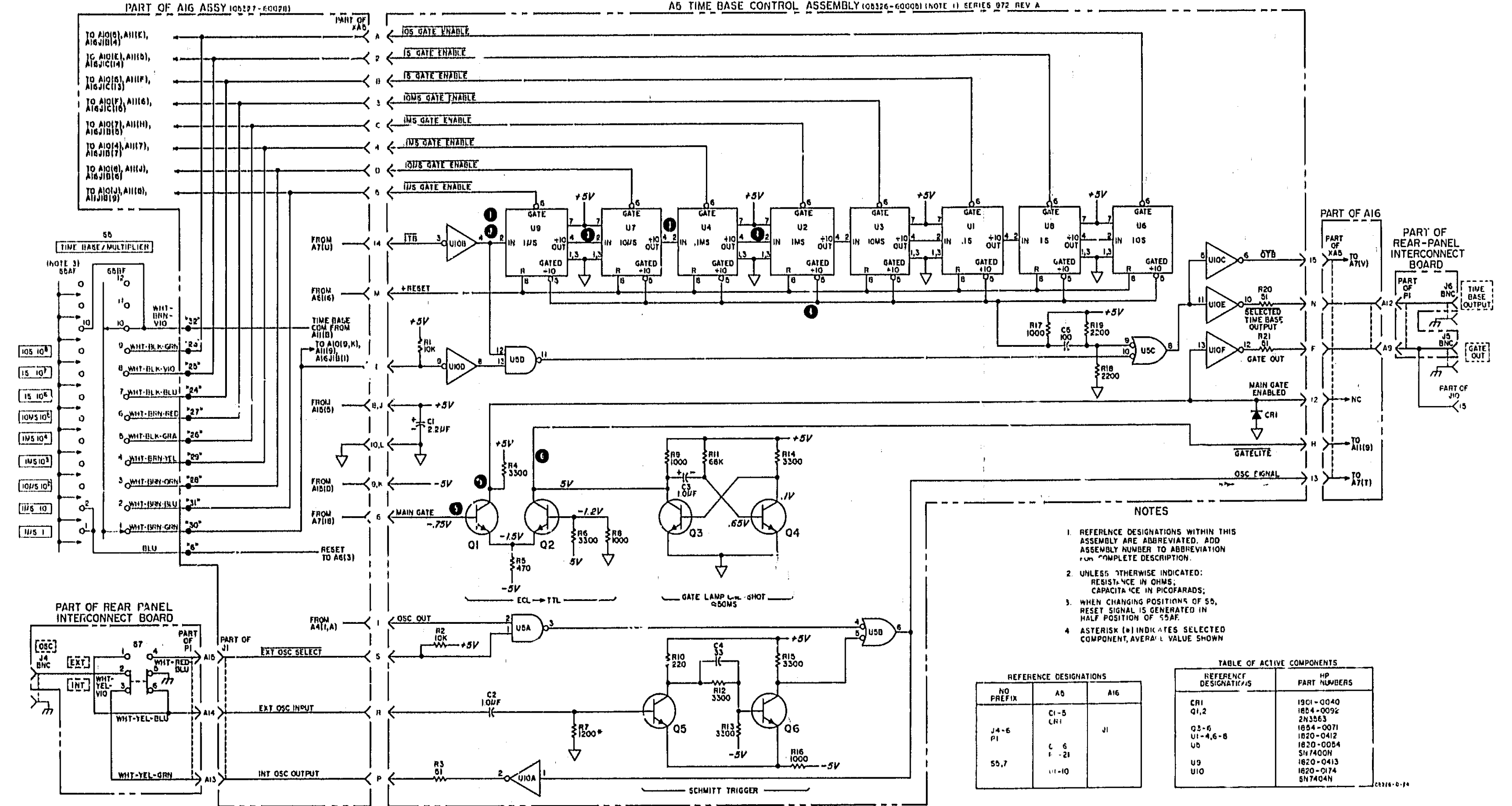
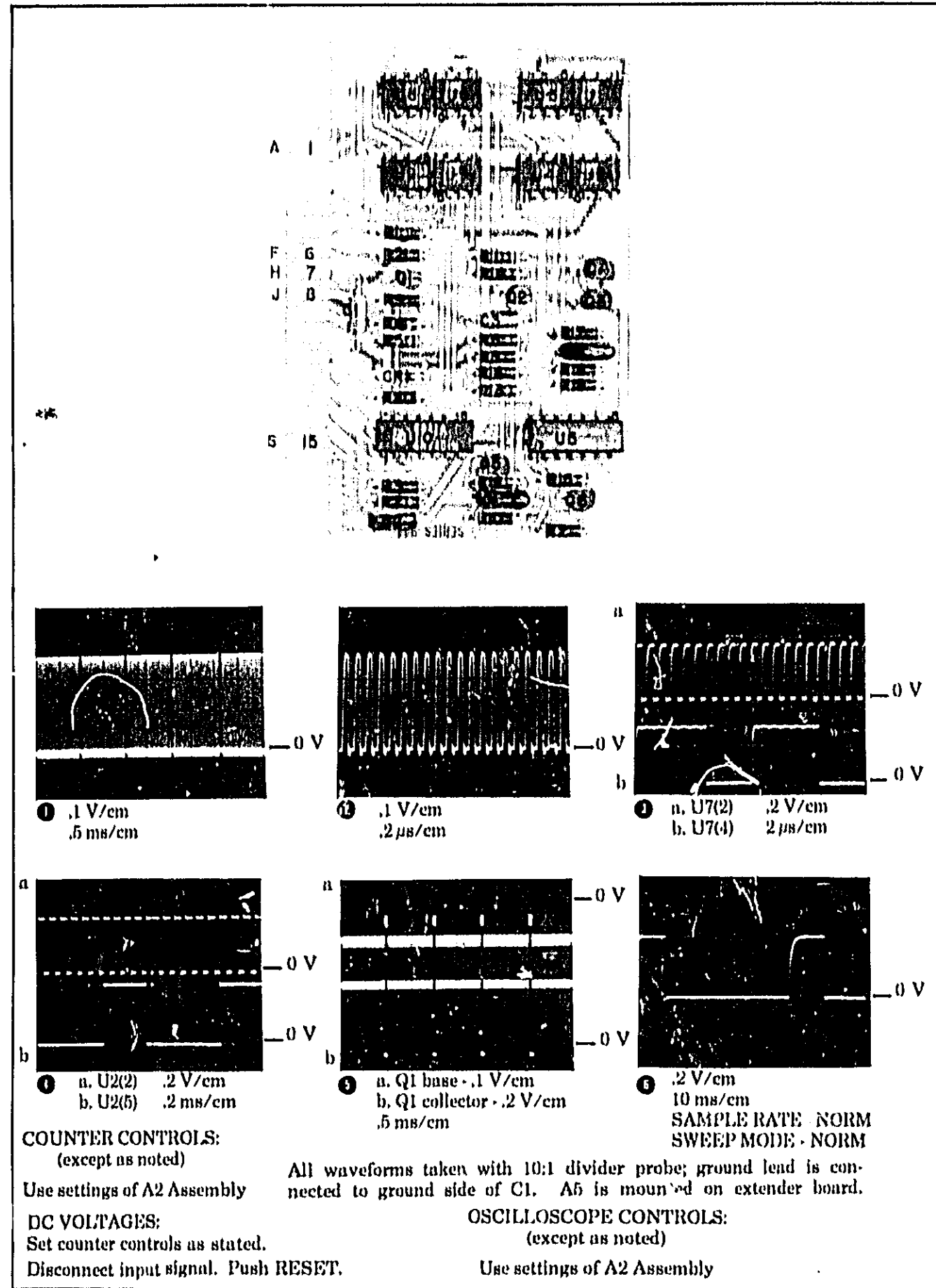


Figure 8-8. A5 Time Base Control Assembly

A6 SAMPLE RATE OPERATION

The sample-rate circuits determine interrogation rates for the input signal and provide several functions for the various operating modes. These functions include generating reset, transfer, print command, and main-gate inhibit signals. In addition, the circuits receive computer inhibit, printer inhibit, and manual reset signals. The circuits also serve to control storage and display-hold functions.

As an example of operation, assume the following operating conditions: STORAGE to ON, SAMPLE RATE to FAST, no printer inhibit, no computer inhibit, no manual reset, and main gate open. At the end of the gate time, Pin 17 goes high, which sets inhibit flip-flop U2. This sends a signal to U6C to generate a high inhibit at U6B(9). In addition, a low is generated at Q4 collector to trigger the sample rate one-shot if no printer inhibit is present at U6B(9). The display time starts at this point, and the high at U6C(10) generates a low at U1D(11). The resulting high on U1C(8) turns on Q6, giving a low at the collector, which is the print command. Also at this time, the low on U1B(6) activates U4C through differentiator C5 to generate the positive and negative transfer signals at pins T and K, respectively.

When the sample rate one-shot is set, U1B(6) goes low to turn off Q7, allowing the +5 V supply and R41 - R1 to charge C4 for the display time. C2 is also connected for the NORM position. R1 varies the display time by varying the time required to bring Q8 base to a sufficient plus value to trigger Schmitt Trigger Q8 through Q10. This gives a high at U1A(1). The reset will be delayed until there is no print inhibit. U1A(3) will go low, generating a high at U3B(6), which is fed out at A6(16). The negative reset at U3C(8) is fed out at pin 9 in addition to being used to reset the sample rate one-shot.

The positive reset is used on A6 after passing through level shifter CR7 and CR8. The positive reset turns on Q1 and applies an ECL high to clear U2 and also turns on Q2, which maintains inhibit approximately 200 ns after the end of the reset pulse. At this time, the inhibit goes low and the main-gate circuits are free to function.

Q11 circuitry is a reset one-shot that ensures a sufficiently long reset pulse. The reset pulse width is approximately 40 μ s or 400 μ s, as determined by the FAST/NORM switch. For NORM sample rates, S2 switches C10 in parallel with C8. The sample rate disable line (pins 10, L) is low during START mode and maintains continuous transfer through CR2 and prohibits main-gate inhibit through U4D in addition to holding down Q8 base through CR2. This prevents the reset from being generated.

When STORAGE is OFF, U5A is activated to maintain transfer through CR4. The manual reset (pin 3) holds the reset one-shot in the ON state as long as the RESET button is depressed (reset low). It also maintains the transfer during the same time to clear the display. In addition, it turns on the main-gate inhibit, even if the main gate is open. The manual reset signal is low if the RESET button is depressed or if the TIME BASE or FUNCTION switch is between positions. (No reset is generated between start and stop positions.)

A6 TROUBLESHOOTING

Troubleshooting the Sample Rate board is best accomplished when the board is in a static state. The procedure given below examines each section separately when the circuit is in a working, but static, condition. Perform the tests in order listed. The schematic shows the circuit levels after RESET is pushed. These levels should be used as a reference.

NOTE

Do not use an input signal when performing the tests below.

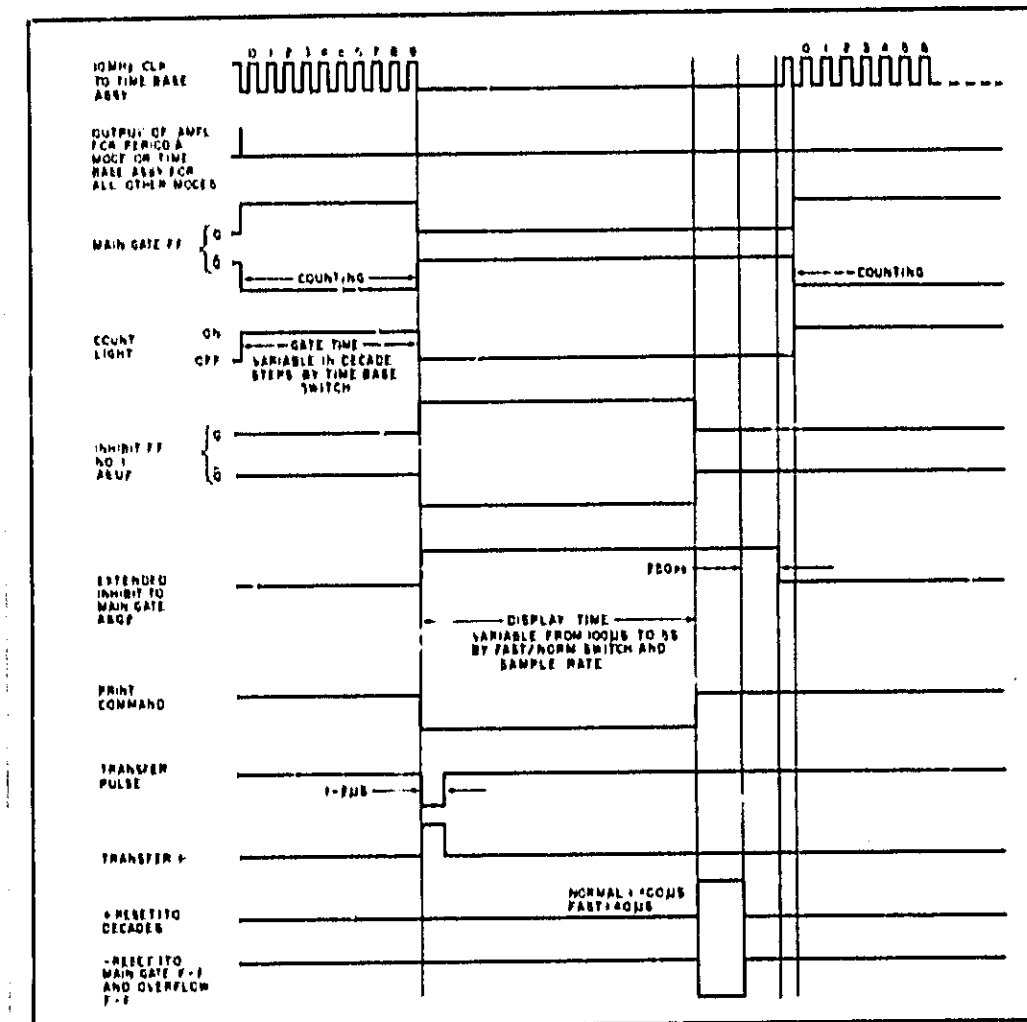
MAIN GATE INHIBIT, PRINT COMMAND DRIVER, and SAMPLE RATE ONE-SHOT. Before troubleshooting, perform the procedure below:

FUNCTION switch FREQ A
 TIME BASE switch 1 s
 SAMPLE RATE switch HOLD
 SLOPE switch +
 CHK/NORM NORM
 STORAGE switch ON
 LEVEL control full cw
 Push RESET
 LEVEL full ccw
 (Note that trigger lamp fires)

The purpose of this procedure is to set these circuits to the point immediately after the main gate closes. Varying the LEVEL control triggers a pulse to open the main gate for 1-second, and pin 17 goes Low during the gate time. U2 sets when the gate closes (positive transition) and remains set with the SAMPLE RATE switch set to HOLD. Once U2 sets, check for a Low on U5C(8). This generates a High on U1C(8) and a Low on U1D(6). Check that U4C(8) pulses High and Q6 collector sets Low. The main gate inhibit line at U6B(9) should now be High. The collector of Q7 is not now affected.

SAMPLE RATE INHIBIT. The sample rate inhibit gates are controlled by the FUNCTION and STORAGE switches and by a print inhibit signal. With the controls set as above, check for the levels shown on the schematic.

SCHMITT TRIGGER. The Schmitt Trigger and Q7 should be checked by using an input signal. Set the counter controls as listed under the waveforms. In waveform five, the repetition rate of the pulses changes with gate time, but pulse width remains the same. Pulse width changes with the SAMPLE RATE controls, but not spacing.



Model 5326/27C
 Circuit Diagrams

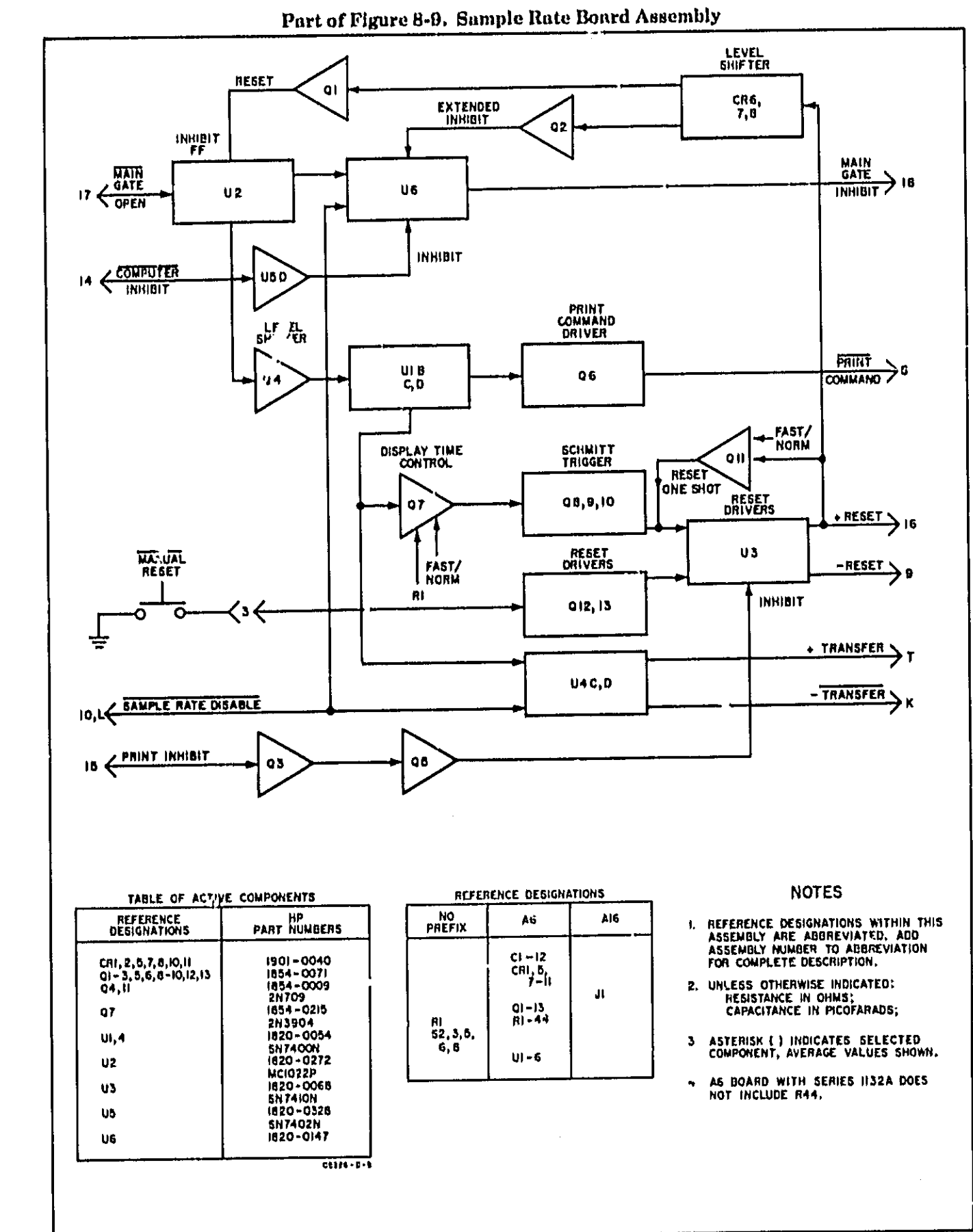
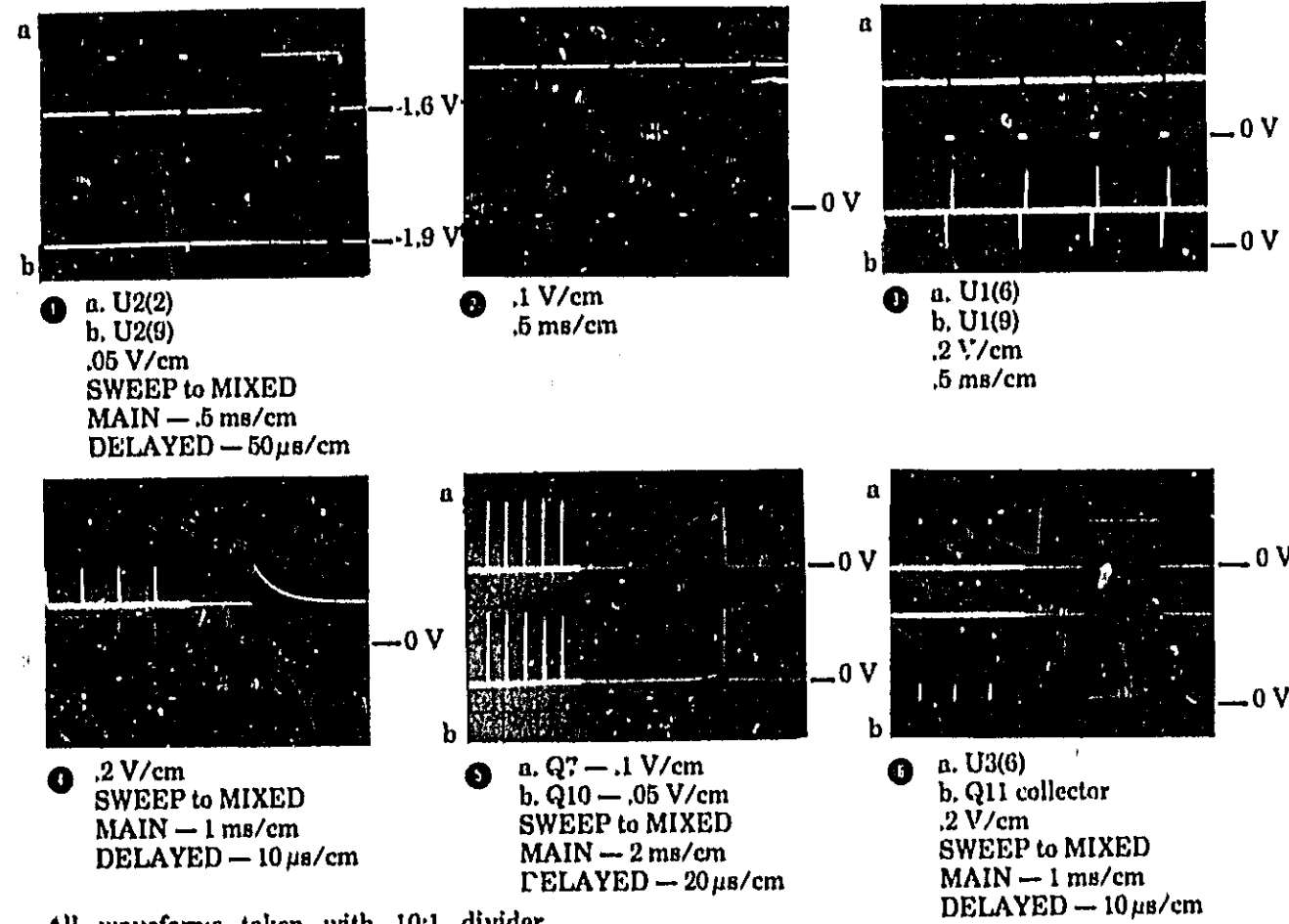
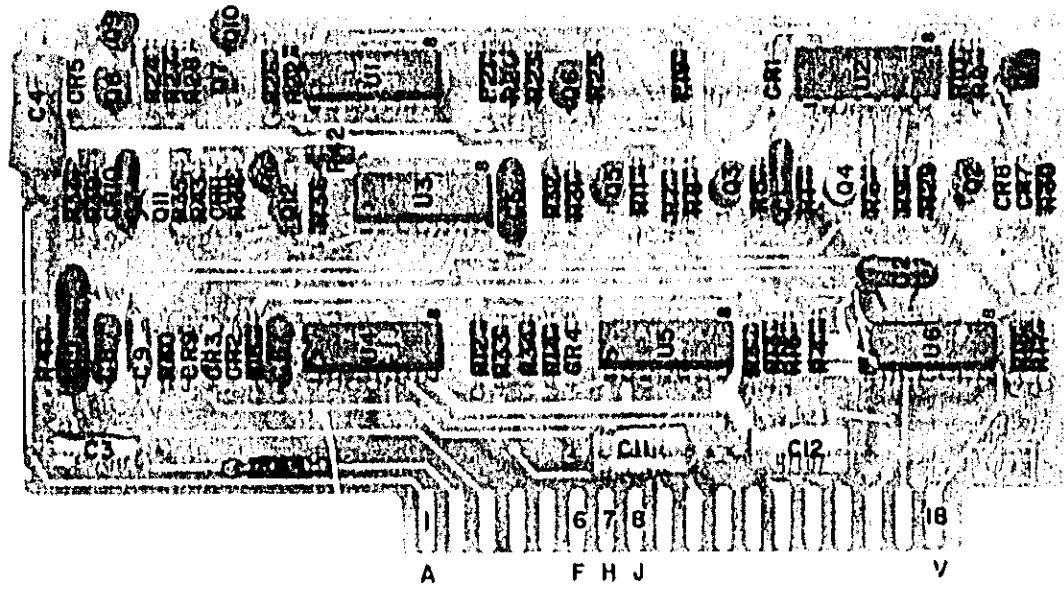


Figure 8-8
 A6 TIME BASE CONTROL ASSEMBLY

(See Page 8-19)

MORE DATA UNDER FOLD



All waveforms taken with 10:1 divider probe; ground lead is connected to ground side of C11. A6 is mounted on extender board.

DC VOLTAGES:
Set counter controls as stated.
Disconnect input signal.
Push RESET.

COUNTER CONTROLS:
Use settings of A2 Assembly

HE, LE — ECL levels
H, L — TTL levels

OSCILLOSCOPE CONTROLS:
Use settings of A2 Assembly.

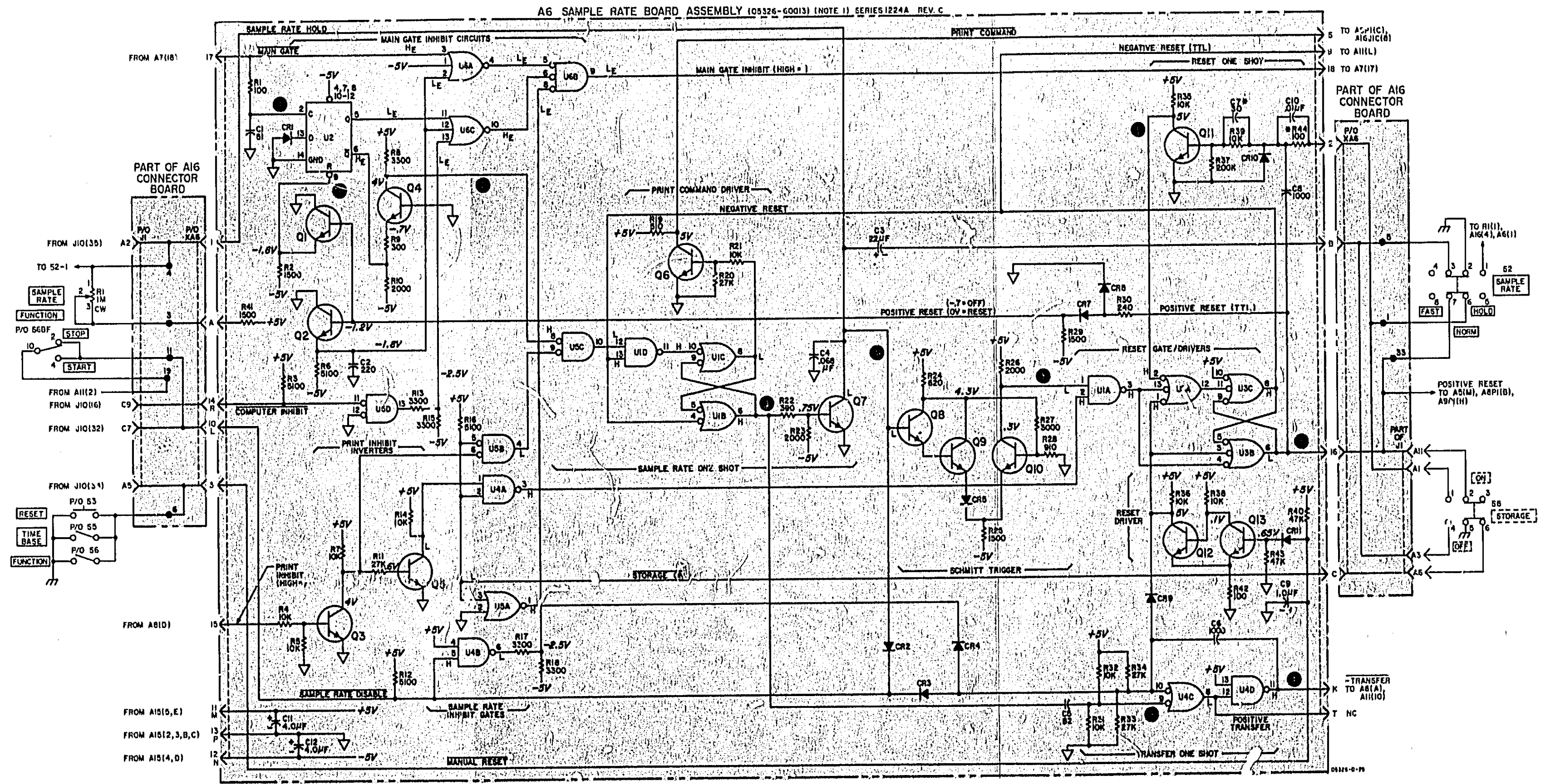


Figure 8-9. A6 Sample Rate Board Assembly
8-21

A7 FUNCTION CONTROL

Controlled by the front-panel FUNCTION switch, A7 directs the flow of the input, time-base output, and oscillator signals to the time-base decades (A5) and decade counter (A8). The scaled time-base signal (\overline{OTB}) returns to A7 and opens the main gate for a time determined by the setting of the TIME BASE/MULTIPLIER switch and the period of the time base input signal.

Frequency Measurement (A or B)

The INPUT A frequency enters on P1(J) and passes through an enabled U6F to U5B(5). This gate is also enabled, since the FUNCTION switch pulls only the FREQ line low. The input signal passes through U5D and U6D to U7B(8, 9). At the same time, the input signal, along with a low from U4C(10), sets the oscillator arming flip-flop, which places a high at U2(5). The next positive-going oscillator signal sets synchronizer U2 and allows the signal to pass through U1A and U5E to the base of Q1, which conducts, since U4C(10) is pulling Q2 base low. The time base input one-shot stretches the pulse width to about 50 ns before sending the signal to A5. The decade dividers on A5 scale the signal by a power of 10 and return it to A7 on P1(V). The main gate toggles with the first incoming negative pulse from the time-base dividers. The input frequency is then sent to the decade counters through U7B. The next time base output pulse toggles the main gate flip-flop closed, ending the measurement. The main gate inhibit line (from A6) goes high, locking closed U3A, resetting U2 and U1C&D, and turning off ITB (input to time base) gate by pulling Q2 base high.

Period Average

Period average measurements are similar to frequency measurements, except the input frequency is sent to the time-base dividers, and the oscillator signal is counted by the decade counters on A8 for subsequent display. The main gate is held open until A5 totals the number of periods selected with the MULTIPLIER switch.

Start

When totalizing the input signal, a high on U6(4) holds the main gate open (U3A set) as long as the FUNCTION switch is in the START position. The input signal is sent to the decade counters after being scaled by A5.

Check

When the CHK-NORM switch is in CHK, the oscillator signal (OSCCH) substitutes for the Channel A amplifier output. The check line is high, allowing the oscillator square wave from U8C(13) to be differentiated by C1, R1, and R2. The negative-going pulses are sharpened by U4B and sent to A2 amplifier. These pulses return on A7P1(J) and are treated like any other amplifier signal in each of the above functions.

Levels

The incoming signals of A SIG, B SIG, check, and inhibit are ECL levels. All other input lines are TTL and are converted to ECL through translators. The output signals are ECL, except the \overline{ITB} , which is TTL.

A7 TROUBLESHOOTING

Before troubleshooting A7 Function Control, note the Trouble Isolation Table in Section V; also, the flow diagrams of the A7 schematic provide signal paths and logic levels for a specific mode. Assuming the input signals and control lines are operating properly, troubleshooting the circuit can be simplified if tested as follows:

NOTE

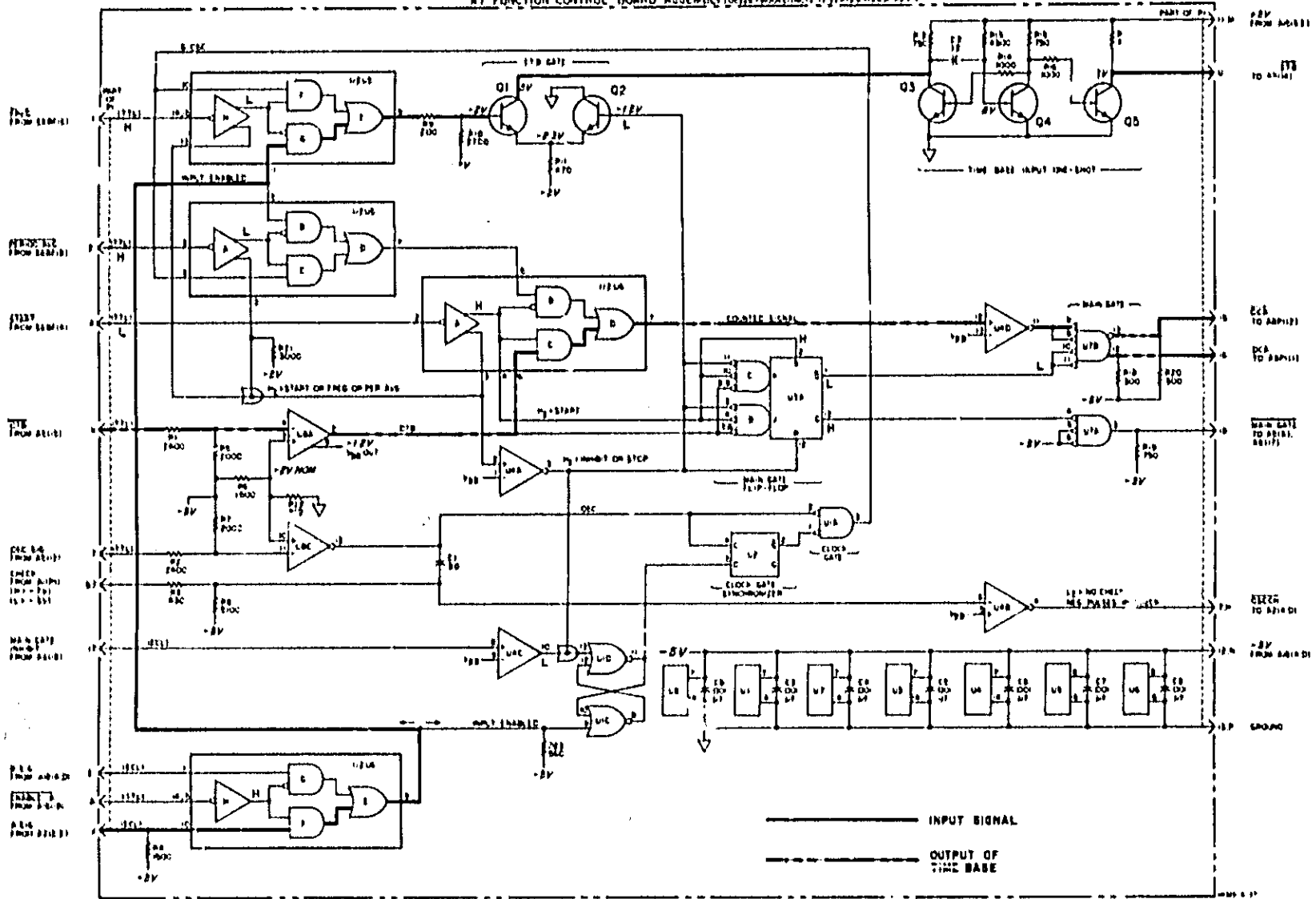
Set SAMPLE RATE switch to FAST and control full ccw. Use a 1 s gate time.

FREQUENCY	PERIOD AVERAGE	TOTALIZE
1. Check U4D(11) for counted signal	1. Check U4D(11) for gated oscillator signal	1. Check U5(9) for input signal.
2. Check U5(9) for gated oscillator signal	2. Check U5(9) for input signal.	2. Check A7(U) for \overline{ITB} signal.
3. Check A7(U) for \overline{ITB} signal.	3. Check A7(U) for \overline{ITB} signal.	3. Check U4D(11) for counted signal.
4. Switch to fast gate time. Check that \overline{OTB} signal has set Main Gate flip-flop U3A (pin 1=L, pin 13=H).	4. Switch to fast gate time. Check that \overline{OTB} signal has set Main Gate flip-flop U3A (pin 1=L, pin 13=H).	4. Check that High on U3A(2) has set the flip-flop (pin 1=L, pin 13=H).
5. Check for gated count signal at U7B(13 and 12).	5. Check for gated count signal at U7B (13 and 12).	5. Check for gated count signal at U7B(13 and 12).

Figure 8-9
A6 SAMPLE RATE BOARD ASSEMBLY

(See Page 8-21)

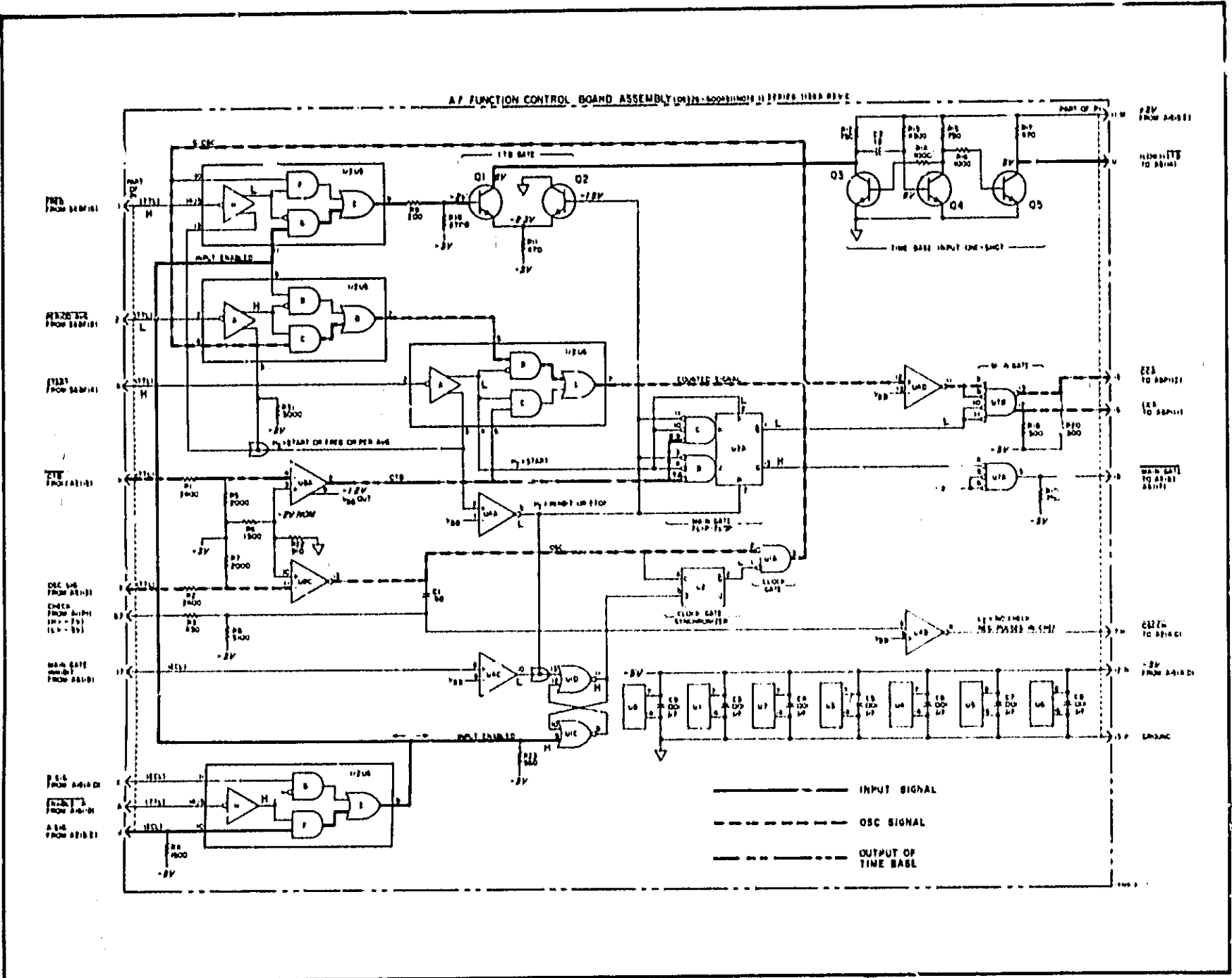
AY FUNCTION CONTROL BOARD ASSEMBLY (REV. 1)

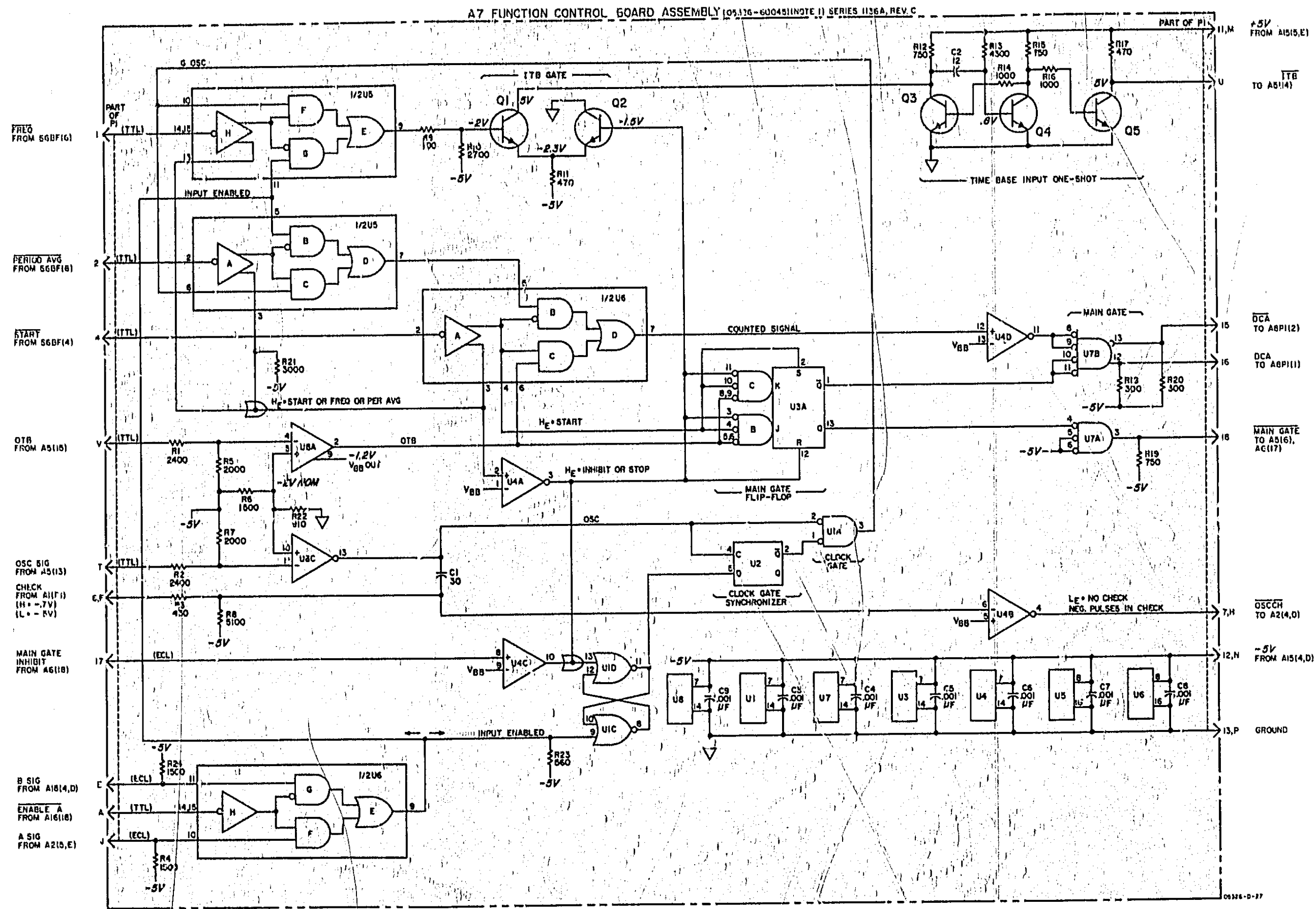
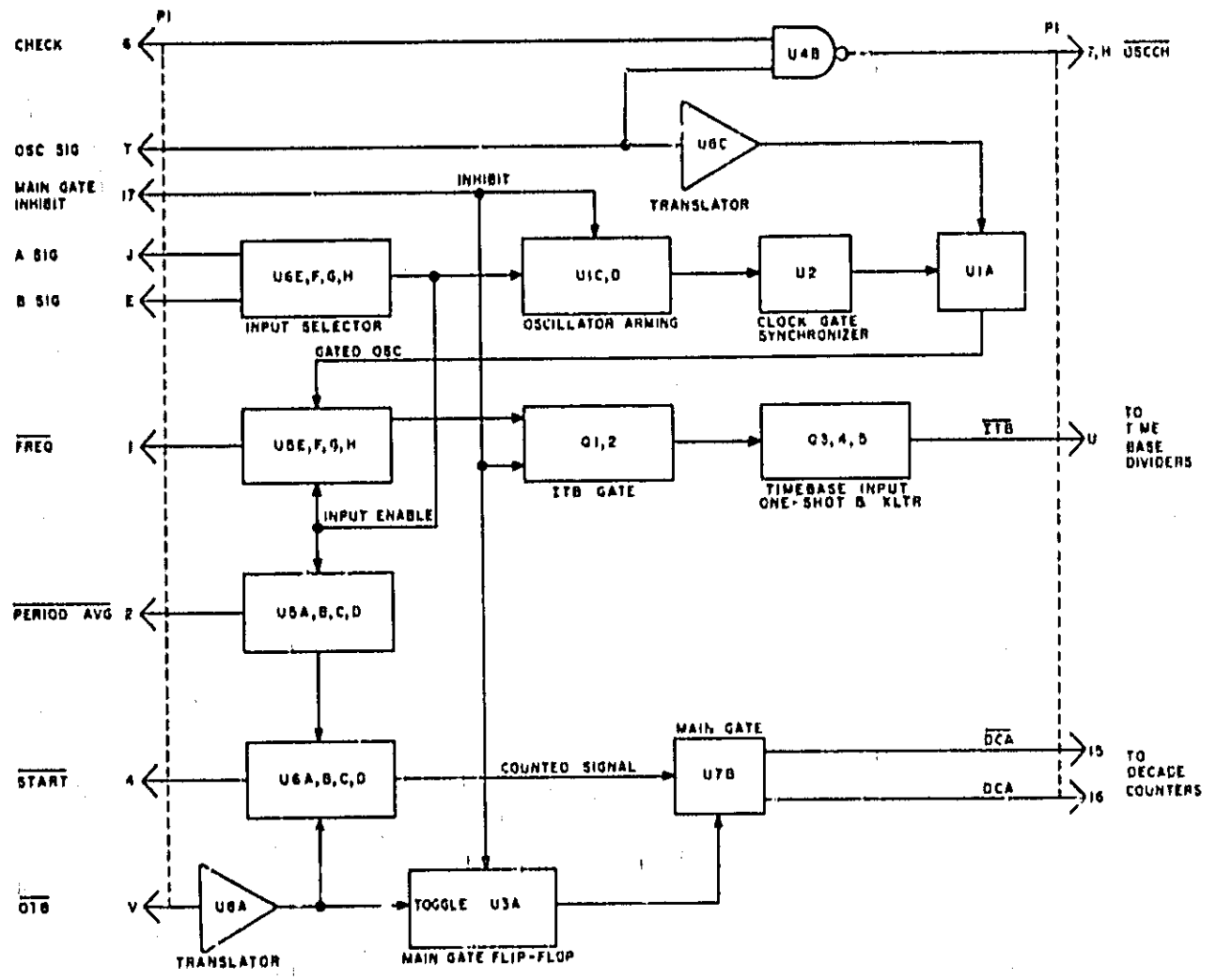
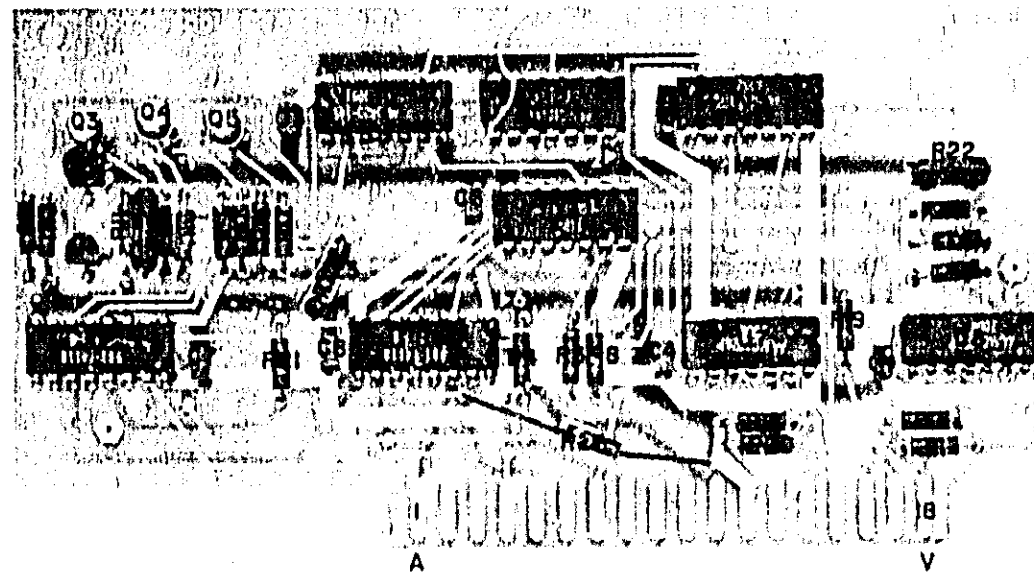


TOTALIZE

Model 5326/27C
Circuit Diagrams

PERIOD AVERAGE





- NOTES
- REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
 - UNLESS OTHERWISE INDICATED: RESISTANCE IN OHMS; CAPACITANCE IN PICOFARADS;

REFERENCE DESIGNATIONS

A7
C1-9
P1
Q1-5
U1-8

TABLE OF ACTIVE COMPONENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
Q1, 2	1854-0215
Q3, 4, 5	1854-0009
U1	1820-0145
	MC1010
U2	1820-0440
	MC1016
U3	1820-0102
U4	1820-0212
	MC1020
U5, 6	1820-0489
U7	1820-0252
	MC1026
U8	1820-0253
	MC1035

TRUTH TABLE

FUNCTION	GATE TOGGLE	DCA	1TB
FREQ	OTB	1E	G OSC
PER AVG	OTB	G OSC	1E
START	1	OTB	1E
STOP	0	0	0
NONE	0	0	0

Figure 8-10. A7 Function Control Board Assembly

A8 DISPLAY SUPPORT OPERATION

The display support assembly A8 serves to interconnect the display assembly A9 with the interconnect assembly A16. In addition, A8 contains a high-speed decade counter, decimal point drivers, and blanking (logic) circuits.

The high-speed decade consists of four JK flip-flops U3 through U6. The line receiver, Q2 and Q9, serves to reduce noise levels on the signal from A7 prior to driving U3(6, 9). U3 divides by two and the combination of U4 through U6 divides by five. The decade supplies BCD outputs to A9 via J1(5, 4, 2, 3) for the 10⁰ display tube. The D output is also used as the carry output to the next decade counter on A9. Q1 translates the positive TTL reset signal to ECL levels to reset the high-speed decade to zero.

Decimal point drivers Q3 through Q8 work in conjunction with logic circuits on A11 to light the proper decimal points. R15 and R17 provide operating bias for Q3 through Q8. R19, R20, and R23 are current limiters. R2 and R3 provide 87.5 volts pre-bias for the OFF decimal points. R5 through R10 connect the off decimals to the pre-bias voltage to eliminate background glow.

As an example of operation, when a ground is received at P1(S) from A11, Q5 conducts. With Q5 on, decimal point enable line 3 (DP3) is pulled to ground to light the decimal point on A9DS4(10³). Also with P1(S) low, U1D(11) is high to unblank A9 U4. When U1D(11) goes high, U1B(6) and U1A(3) are also high to unblank A9U3 and U2. This unblanks A9DS4, DS3, and DS2. DS5 and DS6 remain blanked. DS1 is never blanked, and DS7 and DS8 (Option 001) will always be blanked.

CR2 and CR3 are included for use with the digital recorder Option 003. When overflow occurs, P1(M) and J1(15) go low. CR2 and CR3 cause J1(14 and R) to also go low. When J1(15, 14, R) are low, the recorder will print a zero on the annunciator line. R21 and R24 are pull-up resistors.

A8 TROUBLESHOOTING

High Speed Decade

If a problem in the High-Speed Decade is not readily apparent when checking for the correct waveforms, a step-through method may be preferable. Set the counter as follows:

1. MULTIPLIER switch to 10⁷.
2. CHK/NORM switch to CHK.
3. FUNCTION switch to START.
4. Press RESET.

The High-Speed Decade has four output lines that are binary weighted DCBA. Release the RESET button and note the counter's display. A typical problem is as follows: The display counts 1...2...3...0...1...2...3...0. When the display reads "0," set the FUNCTION switch to STOP and check the C line for a Low (refer to the table below). Check the input lines of the IC, since their levels depend on the state of other IC's in the circuit (note U4 pin 3 and U6 pin 13). The levels given below are ECL.

	A	B	C	D
DISPLAY	U3(13)	U4(1)	U5(1)	U6(1)
1	L	H	H	H
2	H	L	H	H
3	L	L	H	H
4	H	H	L	H
5	L	H	L	H
6	H	L	L	H
7	L	L	L	H
8	H	H	H	L
9	L	H	H	L
10	H	H	H	H
11	REPEATS			

Decimal Point and Blanking

Before testing the decimal point and blanking circuitry, set the CHK/NORM switch to NORM and disconnect the input signal.

DECIMAL POINT. To check the decimal point circuitry, set FUNCTION switch to PERIOD AVG and position the TIME BASE switch to pull the required D.P. line Low.

LINE	MULTIPLIER POSITION	DRIVER
D.P.0	1	Q8
D.P.1	10 ¹	Q7
D.P.2	10 ²	Q6
D.P.3	10 ⁴	Q5
D.P.4	10 ⁷	Q4
D.P.5	10 ⁸	Q3

BLANKING. To check the blanking circuitry, set the FUNCTION switch to PERIOD AVG and MULTIPLIER switch to 1. All digits, except the first one, should now be blanked. If another digit is lit, check that line at A8J1 for a High level, which indicates a problem on that line.

Model 522G/27C
Circuit Diagrams

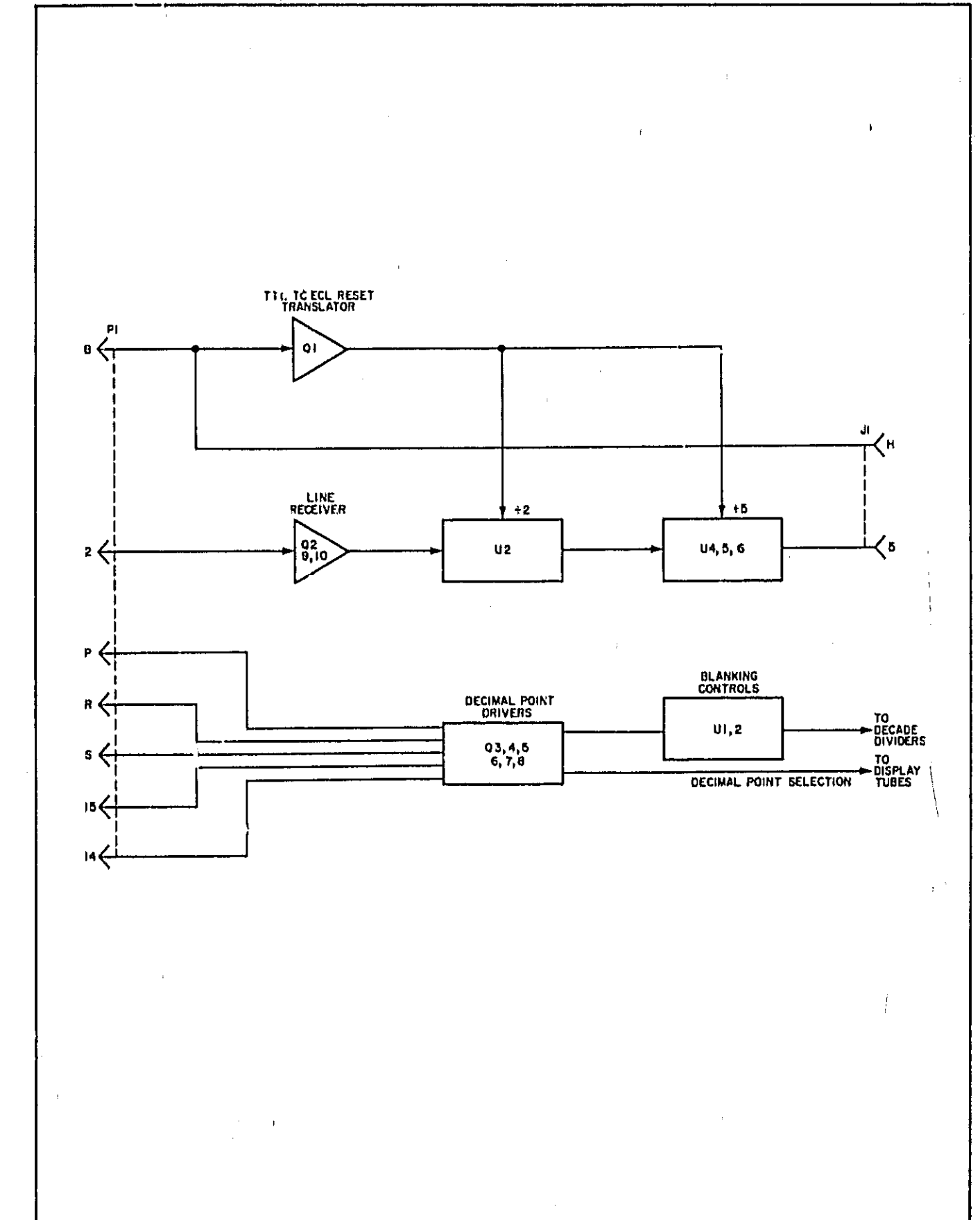


Figure 8-10
A7 FUNCTION CONTROL BOARD ASSEMBLY
(See Page 8-25)

MORE DATA UNDER FOLD

A9 DISPLAY ASSEMBLY OPERATION

Display assembly A9 contains decade counters U2 through U7, buffer storage units U9 through U15, BCD to decimal converters U17 through U23, and display tubes DS1 through DS7.

U1 translates the ECL data from A8 into TTL levels for use by circuits on A9. Each translator of U1 is noninverting. The D output at U1(15) is the counted signal divided by 10 and is used as the input to 10¹ decade U2.

Decade counters U2 through U7 count the number of input pulses while the main gate is oper. Each decade provides a -8421 BCD output to the corresponding buffer storage unit. When pin 14 (reset) goes High, the decades reset to zero if pin 10 is High; the decades reset to 15 (blank) if pin 10 is Low. The ECL decade on A8 never blanks. U7 and U6 (Option 001) always blank. The last decade supplies an overflow output at pin 8 when the count exceeds the capacity.

Buffer storage units U9 through U15 receive the BCD outputs of the decades. When the counter operates in the storage-on mode, data is transferred when a low transfer pulse arrives at pin 5 of the buffers. When the transfer line is high, the buffers will store the data to allow a continuous display while a new measurement is being made. During storage-off or totalize mode, BCD data is continuously fed from the buffers to the decoders. The buffers also supply +8421 BCD outputs to A9 J1 and J2 for further distribution to J9 when Option 003 is included.

Decoder drivers U17 through U23 receive the -8421 BCD data and provide a decoded decimal output to light the corresponding numeral on the display tube. The terminal for an illuminated numeral will be approximately +2 volts whereas an extinguished numeral is typically +100 volts. The decimal point terminal (14) of the display tube is <5 volts when lit and about 87.5 volts when extinguished.

A9 TROUBLESHOOTING

The A9 Display Assembly may be set up for troubleshooting with either of two methods. A highly accurate oscillator may be used for a front-panel input signal. Any difference in count from the input signal is then immediately obvious on the display. Check for the proper signal division of the decade counter in previous column. As an alternate method, place the CHK/NORM switch in CHK and the FUNCTION switch in START. Allow the count to totalize until the problem occurs; then, set the FUNCTION switch to STOP. Use the TIME BASE switch to adjust the rate of counting. When the problem appears, check the circuitry of that column.

Start by checking the Buffer-Storage outputs (U9-U15) for the BCD code of the number that should be displayed, rather than what is displayed (see Table 1). Check that the Buffer-Storage code pulls the proper decimal line low on the BCD-to-Decimal Decoder.

Table 1

DISPLAYED DIGIT	BUFFER STORAGE BCD (TTL)			
	8	4	2	1
0	H	H	H	H
1	H	H	H	L
2	H	H	L	H
3	H	H	L	L
4	H	L	H	H
5	H	L	H	L
6	H	L	L	H
7	H	L	L	L
8	L	H	H	H
9	L	H	H	L
Blank	L	L	L	L

Model 5326/27C
Circuit Diagrams

Part of Figure 8-12. A9 Display Assembly

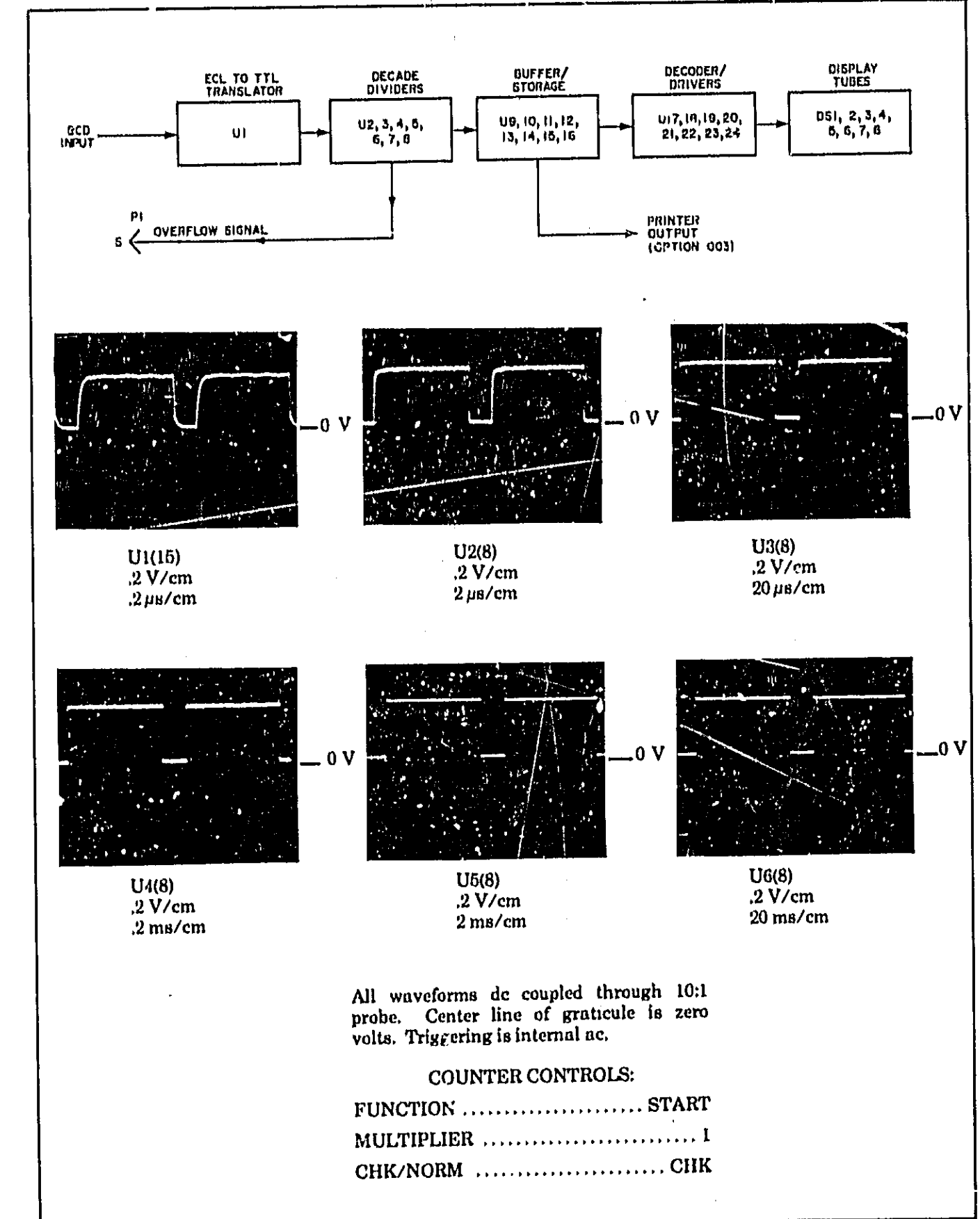


Figure 8-11
A8 DISPLAY SUPPORT ASSEMBLY
(See Page 8-27)

MORE DATA UNDER FOLD

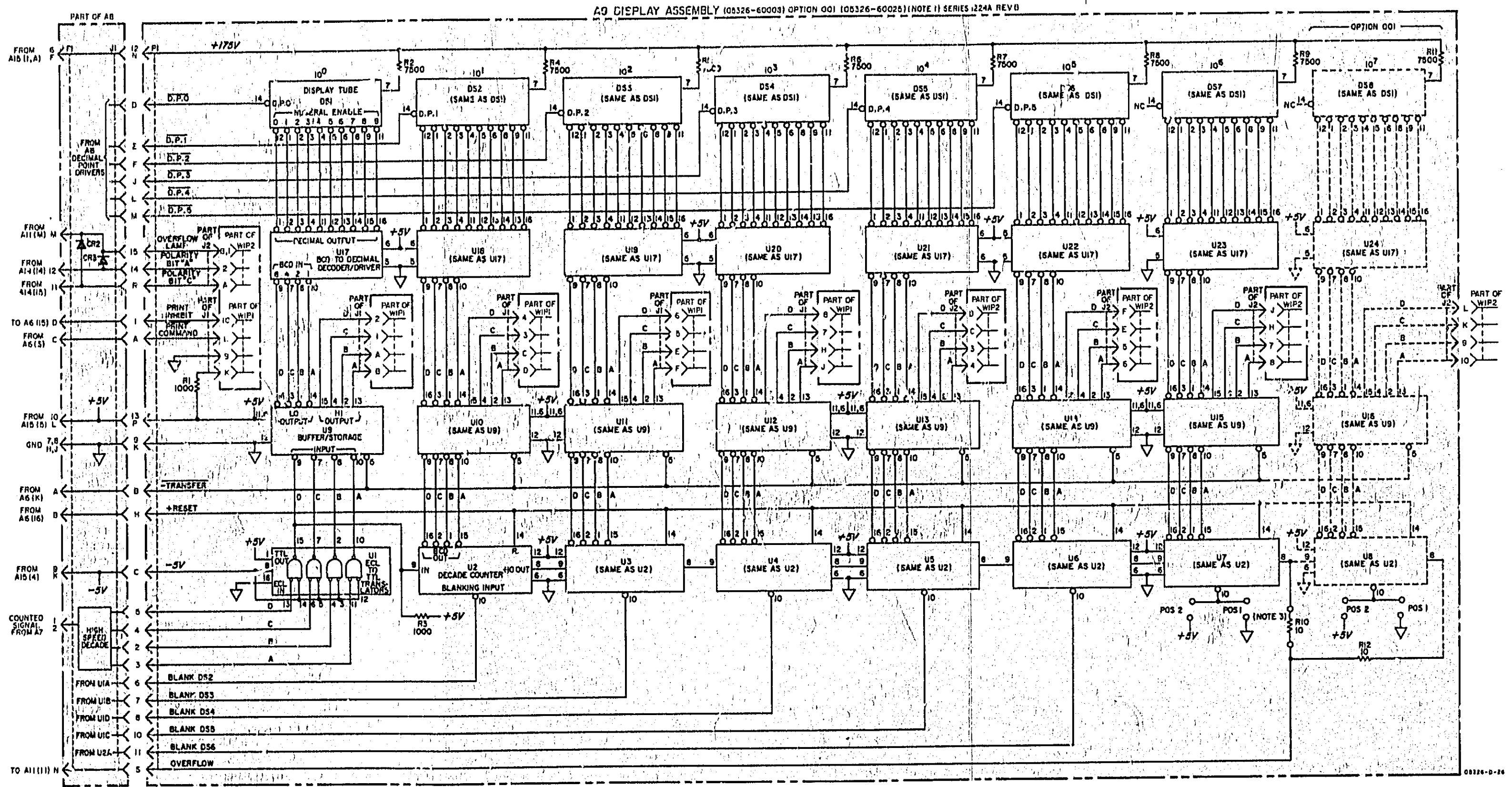
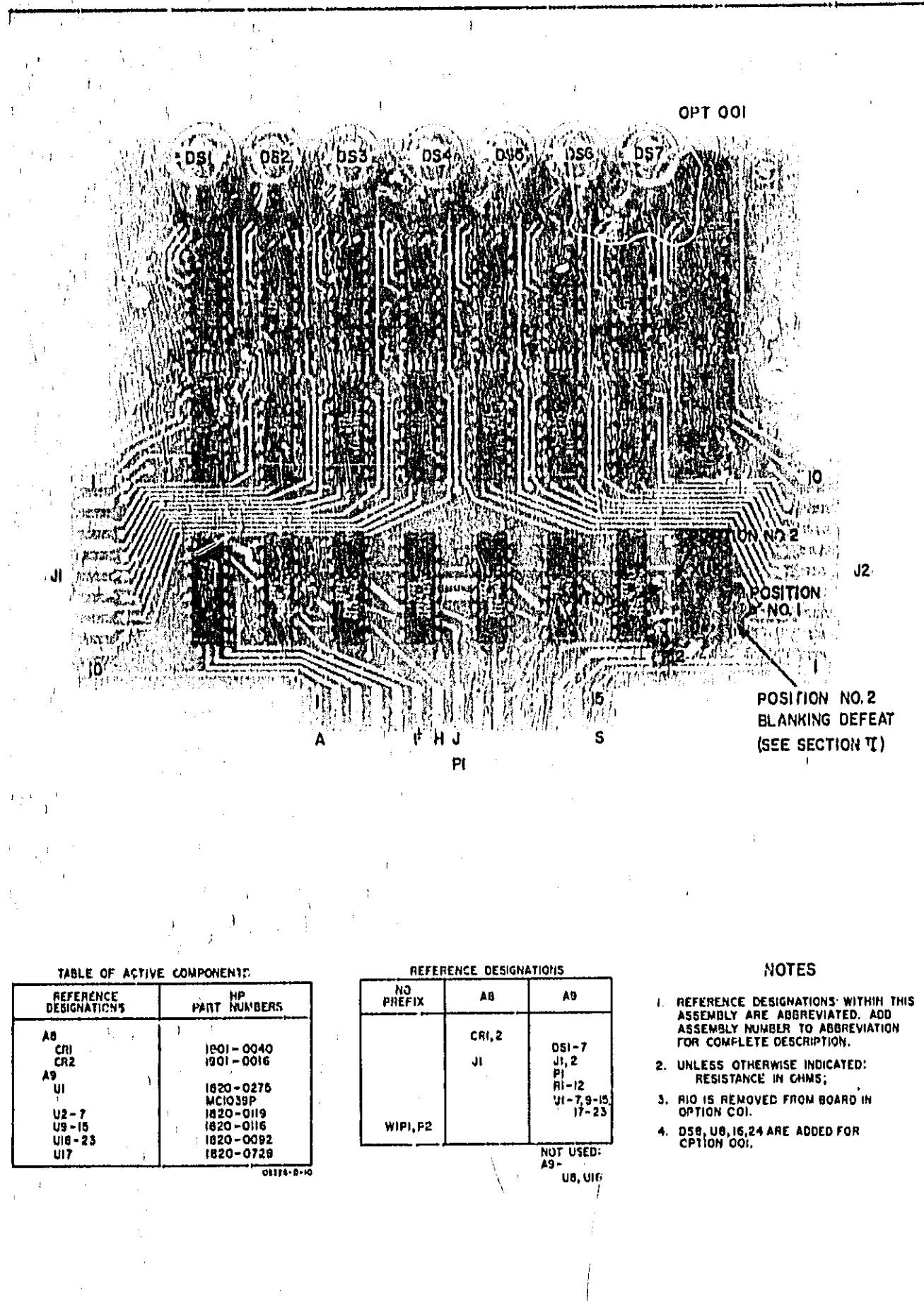


TABLE OF ACTIVE COMPONENTS:

REFERENCE DESIGNATIONS	HP PART NUMBERS
AS	
CR1	1801-0040
CR2	1801-0016
A9	
U1	1820-0275
U2-7	MC1039P
U8-15	1820-0116
U16-23	1820-0092
U17	1820-0729

REFERENCE DESIGNATIONS

NO PREFIX	AS	A9
	CR1,2	DS1-7 J1,2 PI RI-12 VI-7,9-15, 17-23
	WIP1,F2	

NOTES

- REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
- UNLESS OTHERWISE INDICATED: RESISTANCE IN OHMS.
- RI0 IS REMOVED FROM BOARD IN OPTION C01.
- DS8, U8, 16,24 ARE ADDED FOR OPTION C01.

NOT USED:
A9-
U8, U16

Figure 8-12. A9 Display Assembly
8-29

A10 RIGHT READOUT OPERATION:

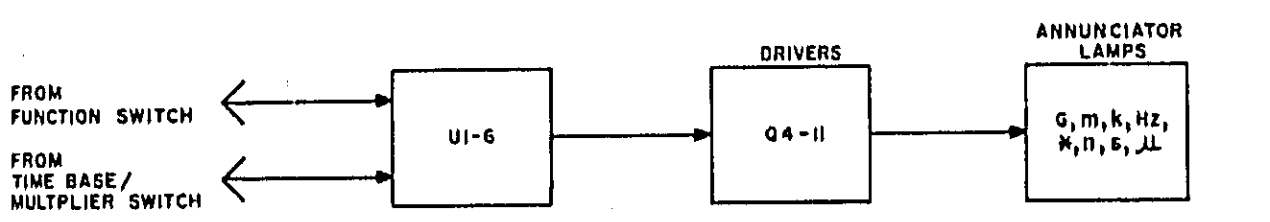
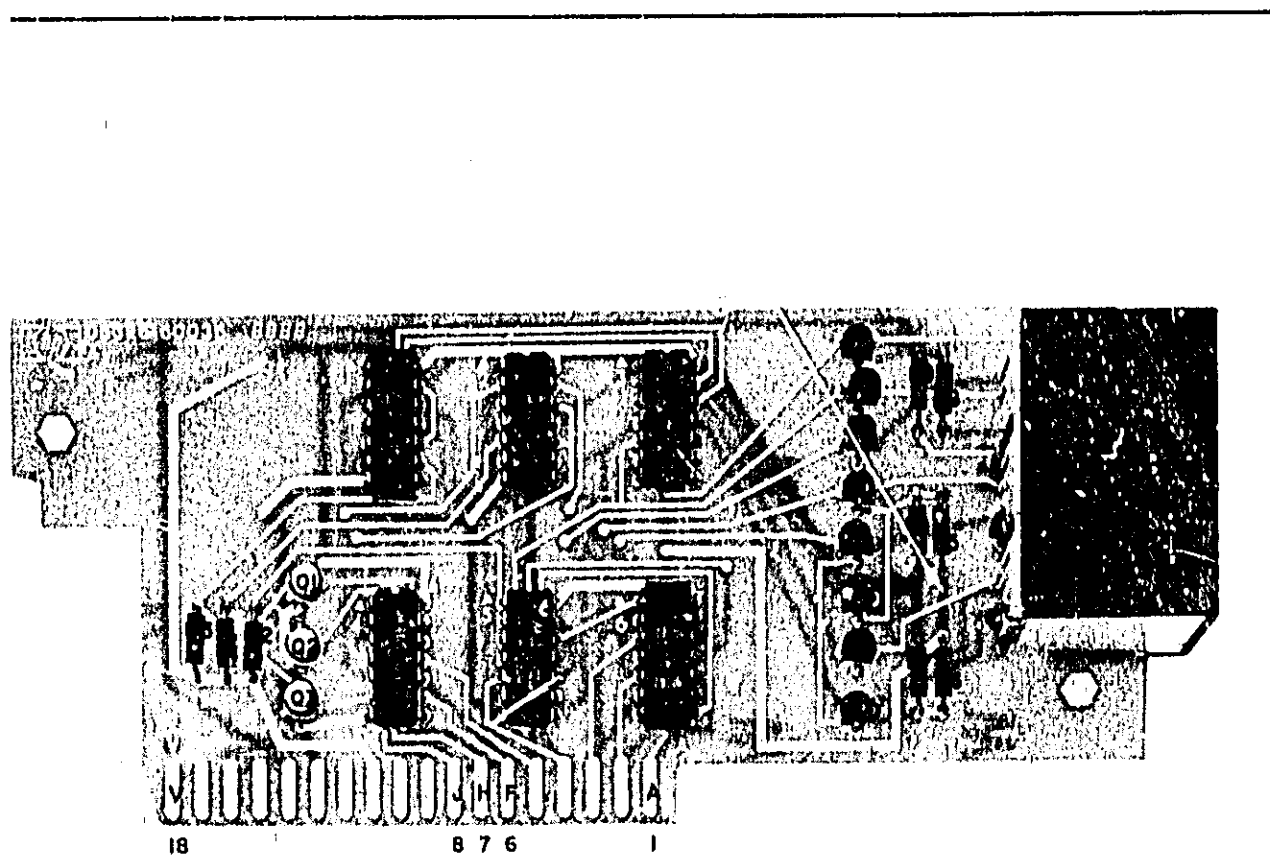
The right readout contains DTL logic to provide the proper measurement units for a given setting of the front-panel controls. A10 logic is negative true, and a low (0.8 volt) to the emitter of any driver transistor will light the given neon. When a DTL high is applied on the emitters, the transistor reverse biases to turn off the neon lamps. The voltage dividers provide a reference of 1 V (nominal) to the bases of the drivers.

Selecting a function mode and time by pulling a pair of these lines low, activating a gate. The low on the gate output will forward bias the driver transistor to turn on the annunciator lamp. For example, selection of frequency and 1 ms makes the output of U2B(6) low, turning on Q5 to light DS2. U3B(6) is also low, lighting DS4.

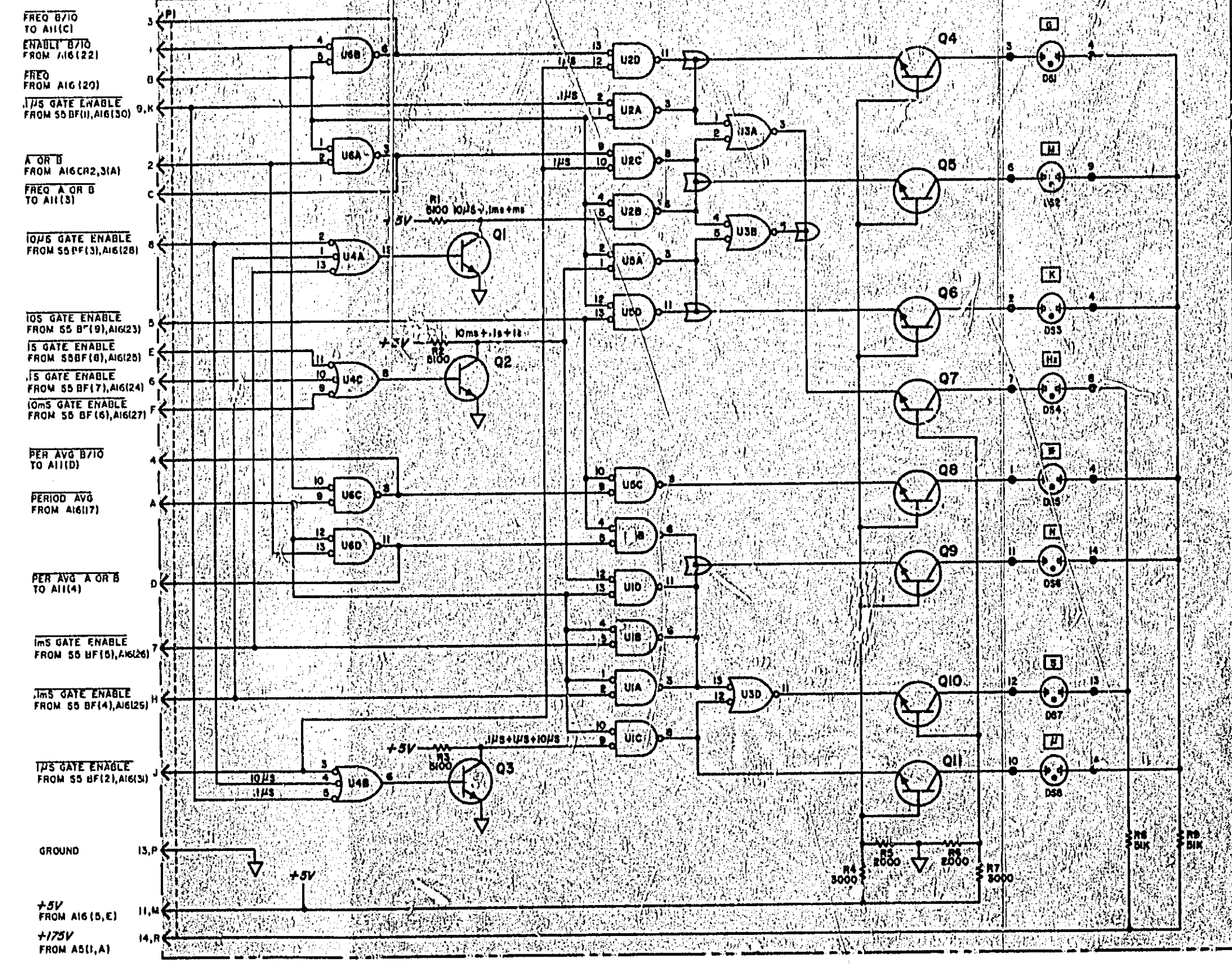
The asterisk (*) annunciator is activated for the 5327C model only. This occurs when the instrument is in PERIOD AVG, B*10, and 10 s gate time. An asterisk indicates the proper units are not displayed.

A10 TROUBLESHOOTING

If one of the annunciator lights does not work, set the front panel switches to the positions that would normally cause the lamp to be on. Refer to the tables in Figure 3-3 for the appropriate switch settings. Check the gates whose input lines correspond to the switch settings. As an example, the G lamp lights under either one of two conditions: U2D and U6B are activated when the 1 μ s GATE ENABLE, FREQ, and ENABLE B*10 lines are pulled low, or U2A is activated when the .1 μ s GATE ENABLE and FREQ lines are pulled low.



A10 RIGHT READOUT BOARD ASSEMBLY (105326-60036) (NOTE 1) SERIES 1036A, REV. A



- NOTES**
- REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
 - UNLESS OTHERWISE INDICATED: RESISTANCE IN OHMS; CAPACITANCE IN PICOFARADS;

REFERENCE DESIGNATIONS

A10
DS1-8
P1
Q1-11
R1-9
U1-6

TABLE OF ACTIVE COMPONENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
Q1-3	1854-0009 2N709
Q4-11	1854-0474 2N5501
U1, 2, 5, 6	182C-0274 MC1808
U3	1820-0273 MC1806
U4	1820-0310 MC662

Figure 8-13. A10 Right Readout Board Assembly

A11 LEFT READOUT OPERATION

The left readout contains DTL logic to select the proper decimal point corresponding to the front panel settings. It also contains the switch common drivers for the time base, function, and amplifier common lines (for remote programming), a storage circuit and lamp for the overflow signal, gate light, and EXT light.

The overflow signal from the divide-by-ten output of AGU7, (U8, Option 001) enters through pin 11 and is differentiated by C3 and R2. Q1 turns on momentarily to set flip U9A&D. During the transfer pulse, the information at U9A&D is transferred to the overflow storage flip-flop U9B&C. The overflow condition drives U9B(6) low to turn Q2 on and light overflow lamp DS1. The next reset pulse clears flip-flop U9A&D; however, U9B&C are not reset until the transfer pulse arrives. With storage off, transfer is on continuously.

A low at pin 9 turns on Q3 to light the gate lamp, DS2. Similarly, a low at pin A lights the EXT lamp and opens the common lines for the TIME BASE, FUNCTION, and SLOPE switches. This disables these controls to allow remote programming of the unit.

A11 TROUBLESHOOTING

If one of the decimal lights does not work, set the front panel switches to the positions that would normally cause the lamp to be on. Refer to the tables in Figure 3-3 for the appropriate switch settings. Check the gates whose input lines correspond to the switch settings. As an example, the D.P.5 ENABLE line goes low under either one of two conditions: U2A is activated when the PER B+10 and 1 s GATE ENABLE, and U2D is activated when the PER A OR B and 10 s GATE ENABLE lines are pulled Low.

To check the overflow circuits, set the FUNCTION switch to START and select a fast gate time. When the most significant digit on the counter's display changes from 9 to 0, both flip-flops in the overflow circuit should set. As an initial test, check U5 for a High on pin 5. The second flip-flop (U9B & U9C) should have a Low on pin 6 and a High on pin 8.

In a frequency or period average measurement, the -TRANSFER line pulses Low, rather than being held Low as in START. If the OF light does not turn off at the end of the display time, check that the -RESET pulse clears flip-flop U9A and D.

A15-A16 POWER SUPPLY OPERATION

The power supply provides +175, +16.5 V and +5 V. Transformer T1 has a 115/220 primary and secondaries with open circuit voltages of 181 V at the red leads, 21 V at the orange, and 18.6 V between the green leads, with the winding center tapped to ground.

A15 CR6-9 comprise a full-wave bridge whose output is fed to filter C3 and bleeder R3. Q5 is a series pass regulator. A constant reference voltage is developed across CR11 and CR12 through resistor R1. When the output voltage at XA15(1, A) decreases, Q5 increases conduction to increase the output voltage. Q8 is a current limiter that senses the voltage drop across R6. Output current above approximately 60 mA turns on Q8 and shunts base current from Q5, tending to turn Q5 off and limit the current. C1 adds oscillation stability to the regulator.

For the +16.5 V supplies, the orange leads of T1 connect to half wave rectifier CR4 and filter C4. Q1 is a series pass regulator and Q9 performs the same function as CR11&CR12 in the 175 V supply except that R10 provides a means to adjust the output. Assume that a Q1 base current is flowing through R2 and Q6. The resulting Q1 collector current establishes a voltage at the output, which is divided across R9, R10, and R11. If the voltage at the wiper of R10 is greater than that across CR9, Q9 will be turned on, shunting base current from Q1. This will tend to turn off Q1 and lower the regulated voltage. Thus, varying R10 establishes the largest output voltage that can exist before Q9 turns on to cut back Q1. Resistors R17, R18, and diodes CR15-18 provide current limit action at 180 mA similar to the +175 V supply.

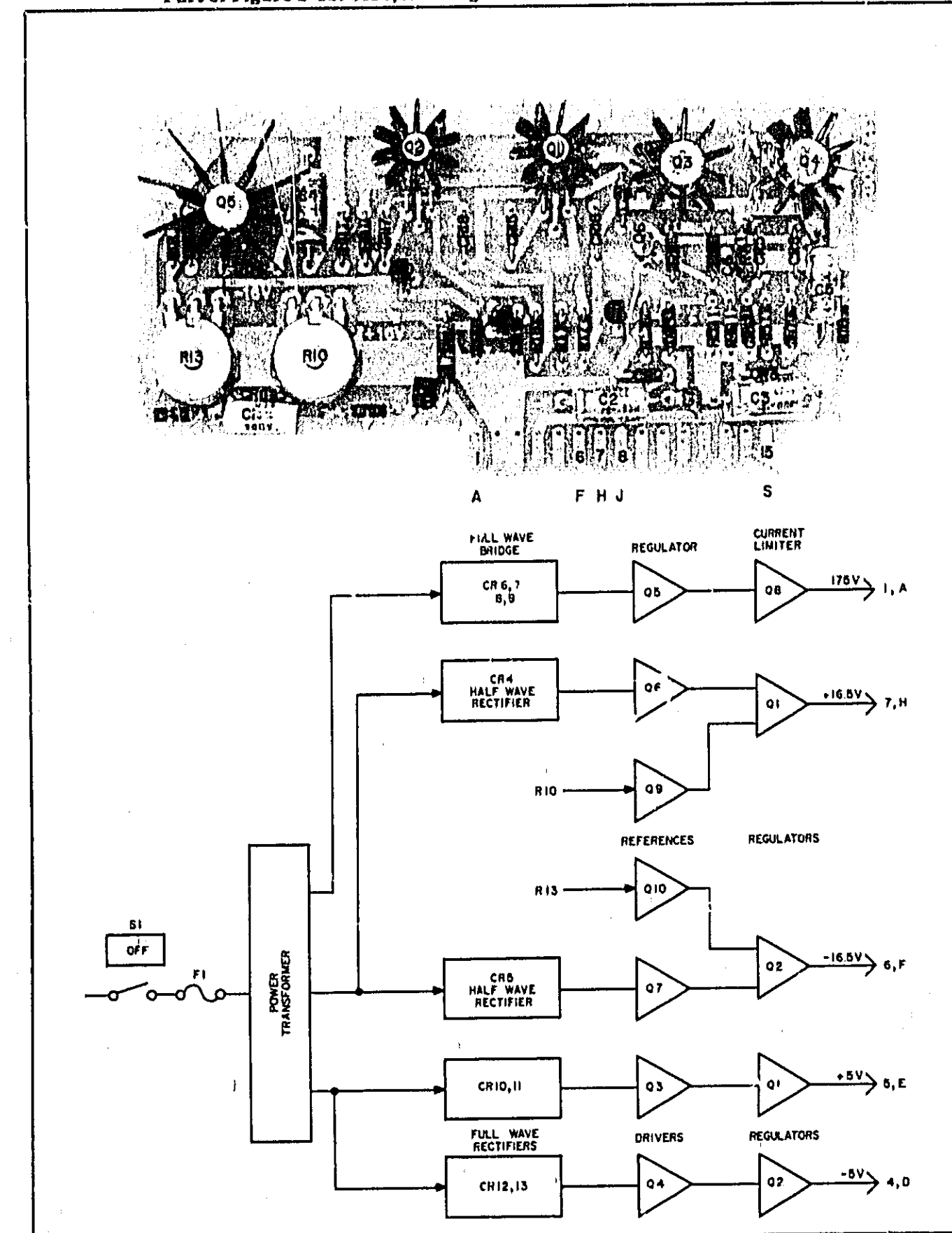
Q6 is a preregulator that gives the circuit better line regulation and lower ripple than the Zener diodes of the 175 V supply. With CR1 as a reference, Q6 is a constant current circuit that maintains a Q1 base current independent of variations of the input (line voltage changes and ripple). R4 is needed to establish the current through CR1. The -16.5 V supply is complementary. The 5 V supplies are also complementary and only the + will be discussed.

The output from the T1 green leads is fed through full wave rectifier CR10 and CR11 into filter C1. It then passes through over-load current limiter R1 and into the series pass regulator Q1, to the 5 V output at Q1C. Q3 is a driver for Q1 and has approximately 5.75 V on its base, developed across CR6 and CR5 by the current from the 16.5 V supply through R7. If the voltage at the emitter 5.1 V, Q3 is turned on providing base current to turn on Q1, raising the output voltage. Q3 turns off when its emitter gets above 5.1 V. C2 is the output filter to maintain a low output impedance at high frequencies.

CR2 clamps the output at 6 V to provide protection for the IC's in case the 16.5 V or 175 V line should momentarily short to the 5 V line. CR5 provides thermal compensation for Q3.

Note that the 16.5 V supply is needed for operation of the 5 V supply. If the + or - 16.5 V supply fails, the corresponding 5 V supply will be inoperative.

Part of Figure 8-15. A15, A16 Regulator/Interconnect Board Assembly



MORE DATA UNDER FOLD

Figure 8-14
A11 LEFT READOUT BOARD ASSEMBLY
(See Page 8-33)

A18 PRESCALER OPERATION

The prescaler board serves as a direct amplifier-trigger or as a divide-by-ten amplifier with the function controlled by the front-panel INPUT SELECTOR switch. With the switch in the B*10 position, the circuit performs as follows:

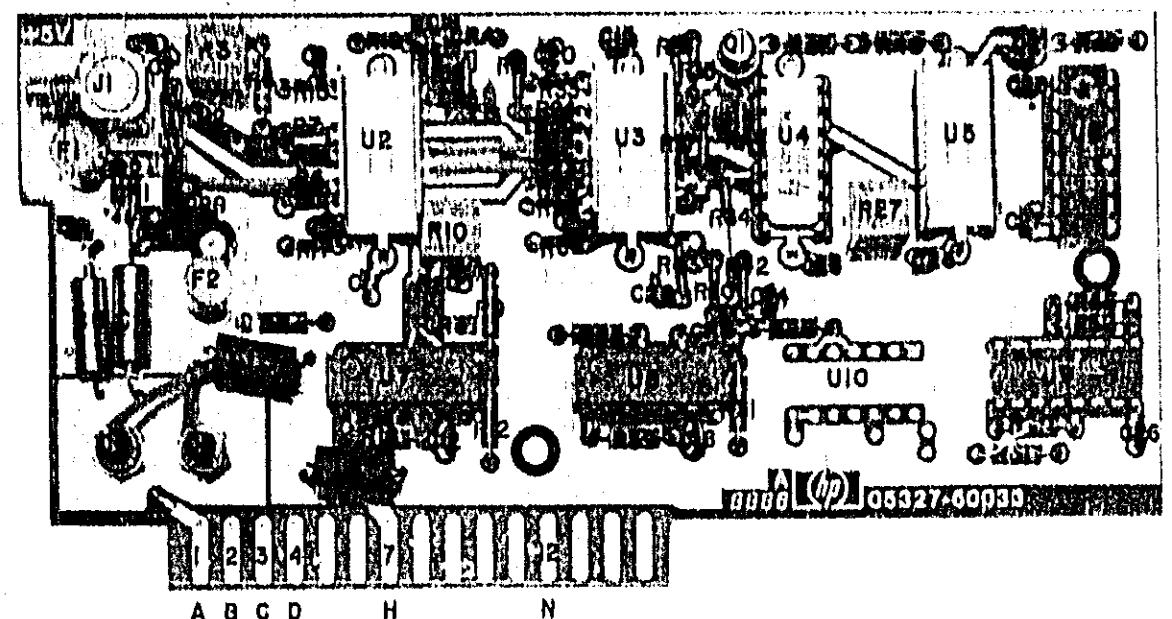
The signal is fed into the 50 Ω input of J1. CR1, CR2, and U1 provide protection above 3.5 V rms or 5 V peak. There is about 2 dB loss through U1. The signal is passed to U2 amplifier, which is biased for sensitivity by R3. U3 amplifies the differential input and shapes the signal into a square wave. U4 and U5 combine to divide the signal by ten and Q2 translates the signal from EECL to ECL levels before presenting it to the data switch.

The direct signal, also from U3(13), bypasses the divider network and is sent to the data switch through the level translator Q1. The setting of the INPUT SELECTOR switch determines whether the data switch will accept the direct or prescaled signal. Pin 2 of U6 is High for direct and Low for prescaled. U9 shapes the positive, square-shaped pulses into narrow spikes before sending the signal to A7 Function board. U7, U8, and U10 (a production option) are constant-current sources for the amplifier circuits.

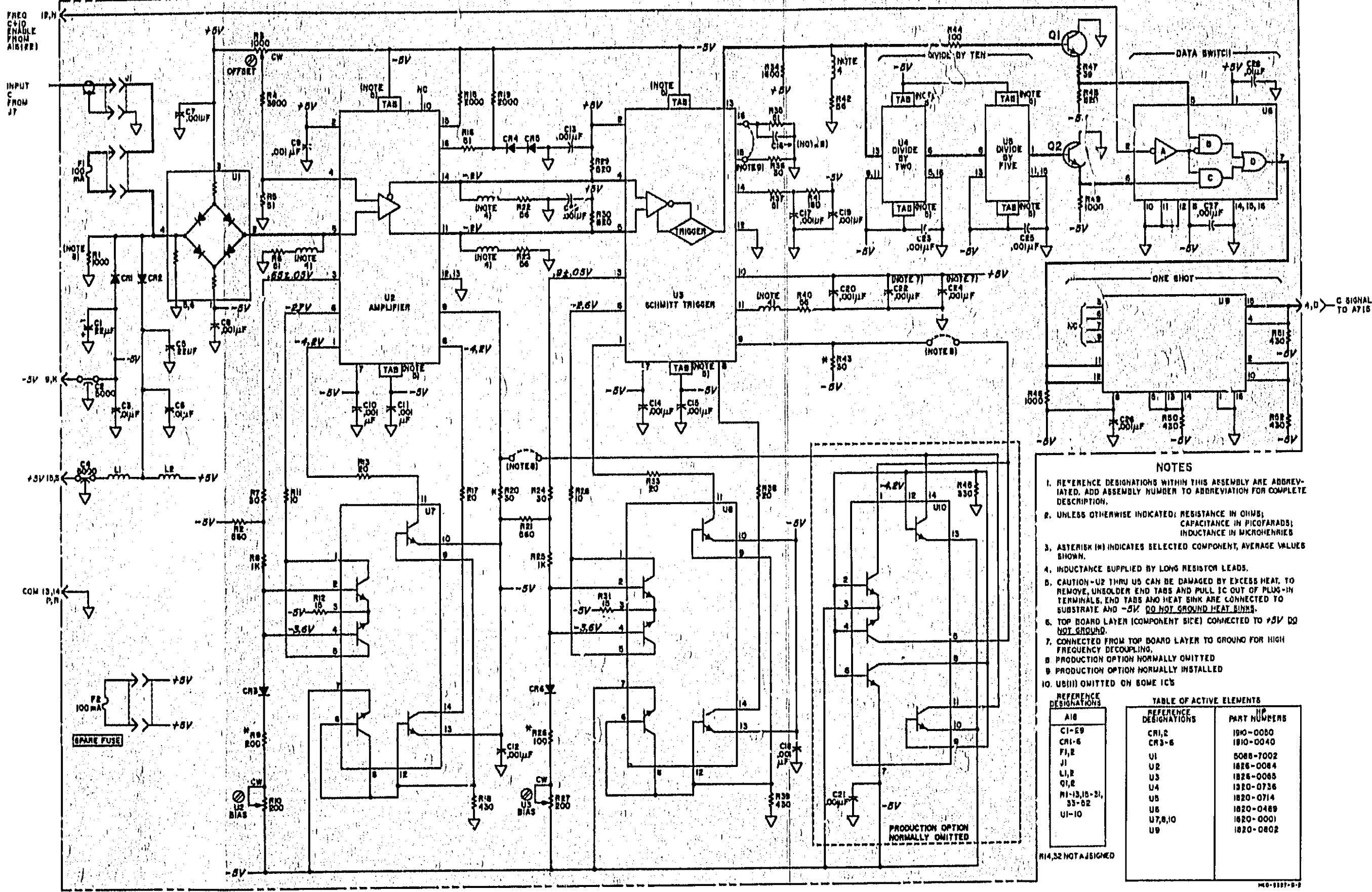
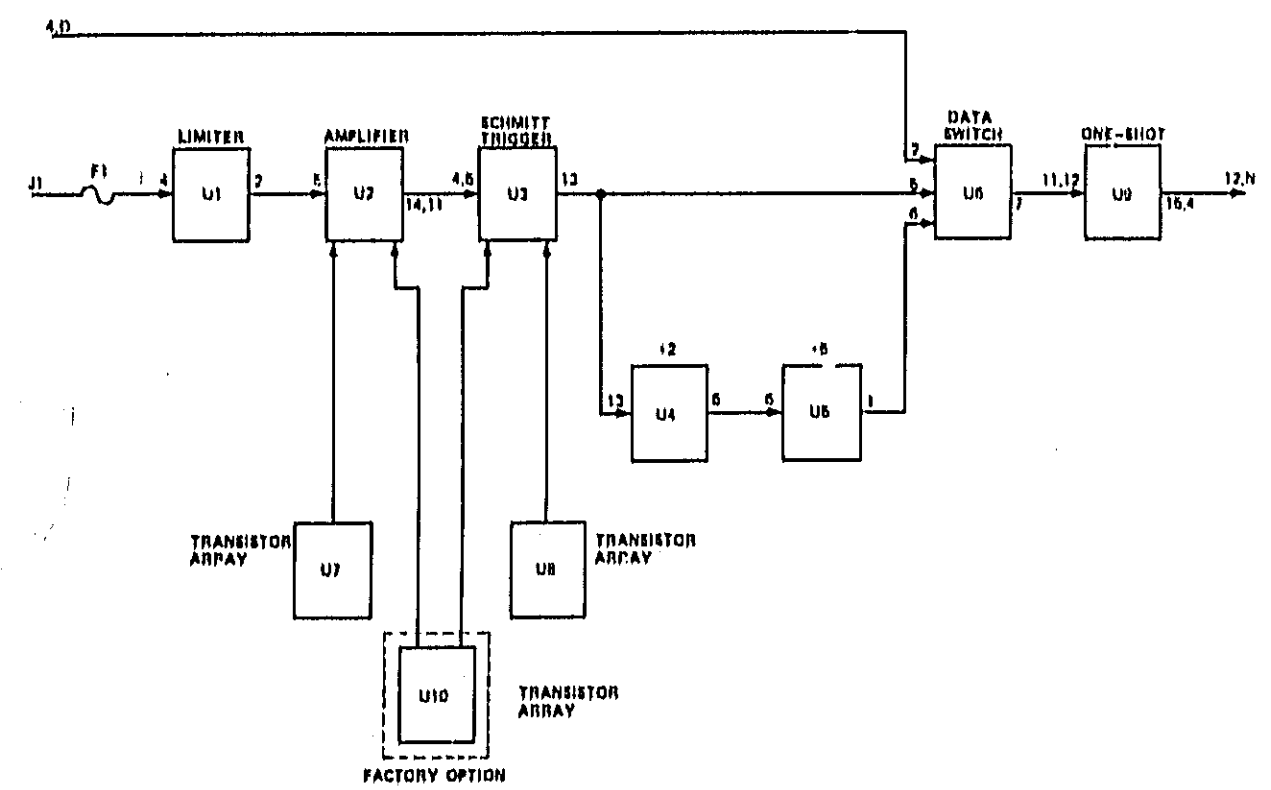
A18 TROUBLESHOOTING

Before troubleshooting the circuits, check the input protection fuse. If problem is in direct mode only, check Q1 and U6. If problem is in prescale mode only, check U4, U5, and U6, and Q2. If a problem is found in the amplifiers (U2 and U3), remove the input signal and check the dc voltages supplied by the constant-current sources U7 and U8.

A18 HIGH SENSITIVITY PRESCALER ASSEMBLY (06327-60033) SERIAL 1248



BLOCK DIAGRAM 06327-60033 HIGH SENSITIVITY PRESCALER BOARD



- NOTES**
1. REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
 2. UNLESS OTHERWISE INDICATED: RESISTANCE IN OHMS; CAPACITANCE IN PICOFARADS; INDUCTANCE IN MICROHENRIES
 3. ASTERISK (*) INDICATES SELECTED COMPONENT, AVERAGE VALUES SHOWN.
 4. INDUCTANCE SUPPLIED BY LONG RESISTOR LEADS.
 5. CAUTION—UP THRU US CAN BE DAMAGED BY EXCESS HEAT. TO REMOVE, UNWELD END TABS AND PULL IC OUT OF PLUS-IN TERMINALS. END TABS AND HEAT SINK ARE CONNECTED TO SUBSTRATE AND -5V. DO NOT GROUND HEAT SINKS.
 6. TOP BOARD LAYER (COMPONENT SIDE) CONNECTED TO +5V DO NOT GROUND.
 7. CONNECTED FROM TOP BOARD LAYER TO GROUND FOR HIGH FREQUENCY DECOUPLING.
 8. PRODUCTION OPTION NORMALLY OMITTED
 9. PRODUCTION OPTION NORMALLY INSTALLED
 10. U8(III) OMITTED ON SOME IC'S

REFERENCE DESIGNATIONS

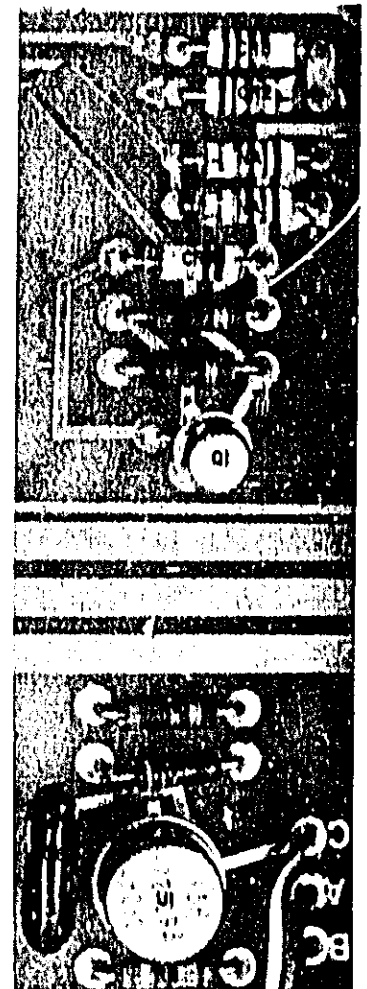
A18	REFERENCE DESIGNATIONS	HP PART NUMBERS
CI-E9	CR1,2	190-0080
CR1-6	CR3-6	190-0040
F1, E	U1	0088-7002
J1	U2	1828-0084
L1, E	U3	1828-0085
Q1, E	U4	1320-0736
U1-13, 15-31, 33-52	U5	1820-0714
U1-10	U6	1820-0489
	U7, 8, 10	1820-0001
	U9	1820-0802

TABLE OF ACTIVE ELEMENTS

R14,32 NOT AS SHOWN

140-9187-5-1

Figure 8-16. A18 High Sensitivity Prescaler Assembly



OPTIONS 010 AND 011 A16 INTERCONNECT CIRCUIT BOARD (PARTIAL DIAGRAM) (05327-60026/27/28) SERIES 1224A

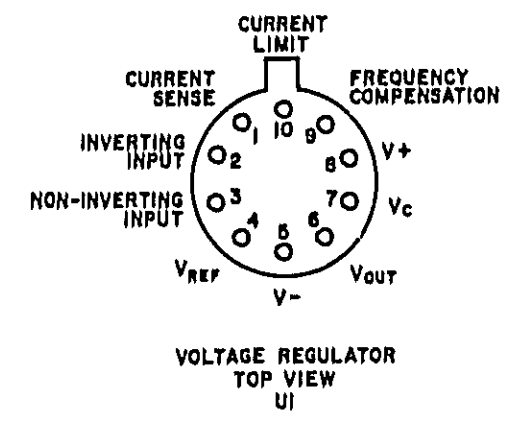
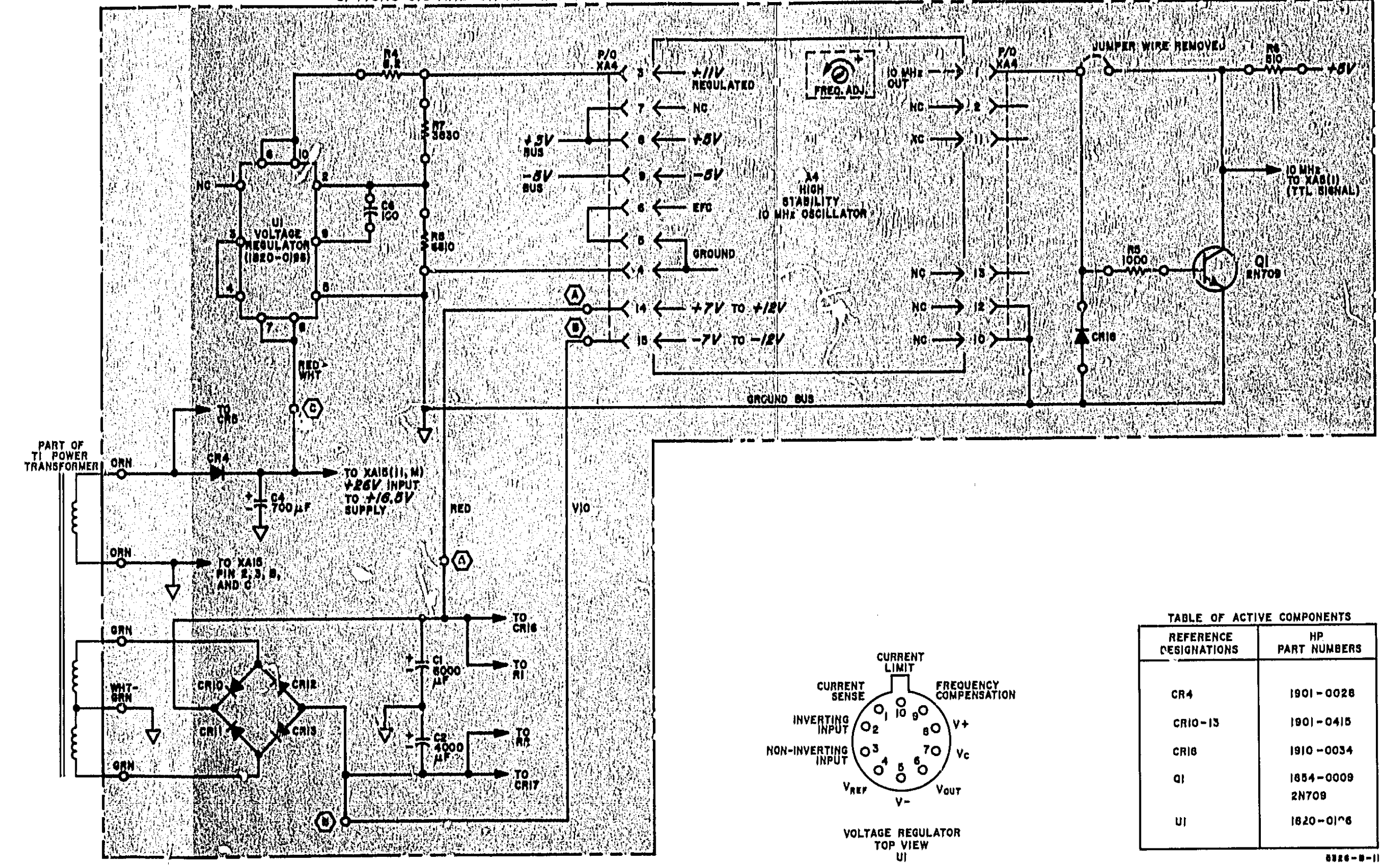
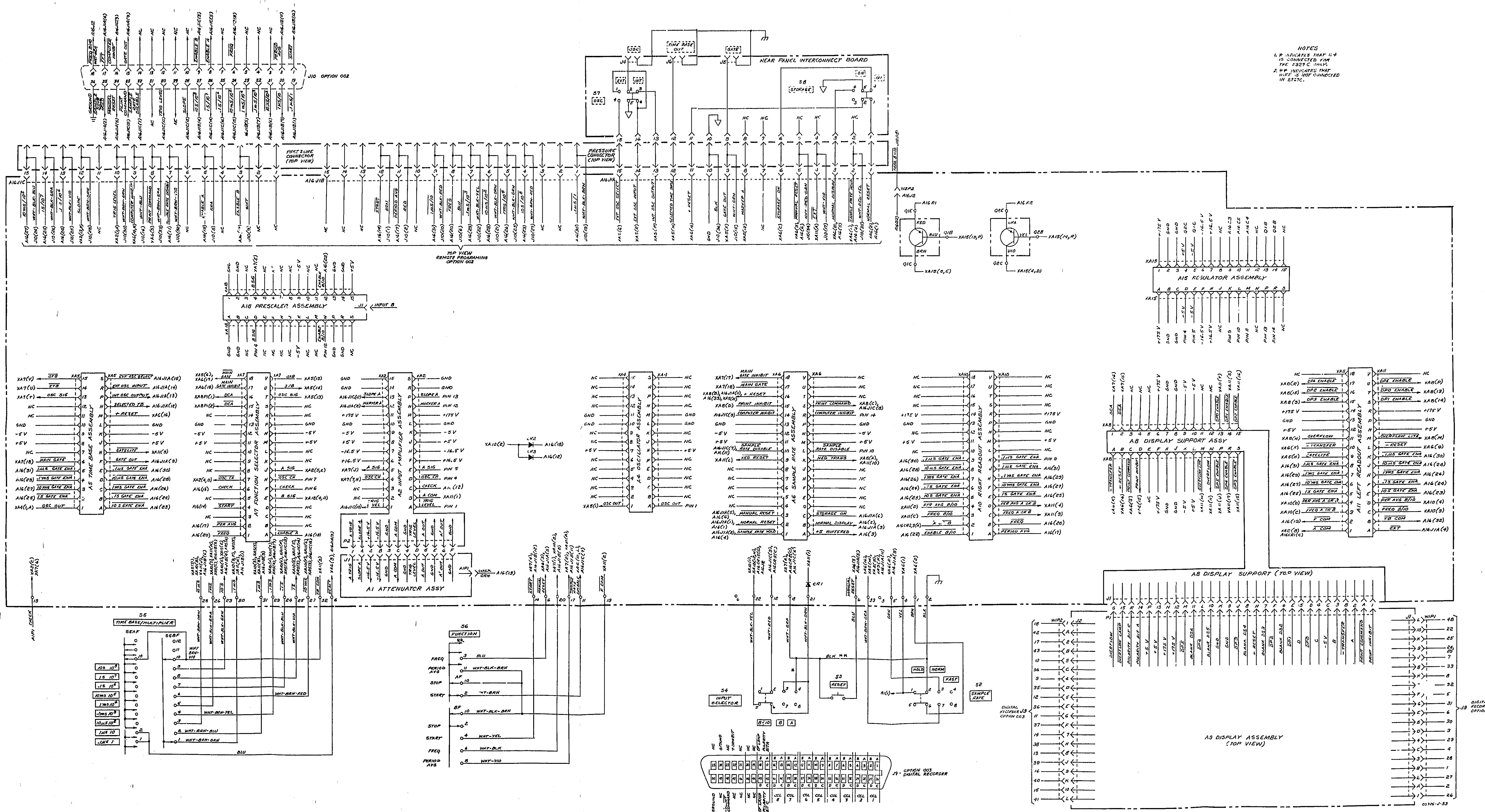


TABLE OF ACTIVE COMPONENTS	
REFERENCE DESIGNATIONS	HP PART NUMBERS
CR4	1901-0028
CR10-13	1901-0415
CR16	1910-0034
Q1	1854-0009 2N709
U1	1820-0106

Figure 8-17. Options 010 and 011 and A16 Interconnect Circuit Board



NOTES
 1. * INDICATES THAT 5-V IS CONNECTED FOR THE 5326C MODEL.
 2. ** INDICATES THAT WHT IS NOT CONNECTED IN 5326C.

Figure 8-18
 5326C/5327C INTERCONNECT DIAGRAM
 (Block No. 05326-90022)

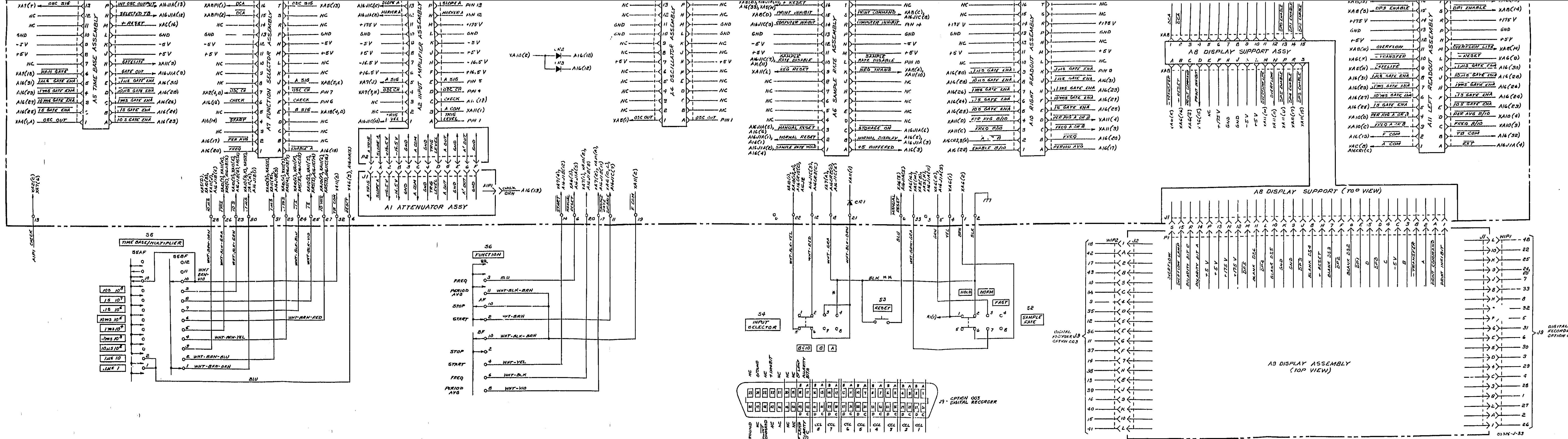


Figure 8-18
 5326C/5327C INTERCONNECT DIAGRAM
 (Stock No. 05326-90022)

MANUAL DESCRIPTION	
INSTRUMENT:	5326C/5327C Freq. Counters
SERIAL PREFIX:	5326C-1312A 5327C-1312A
DATE PRINTED:	JUNE 1974
HP PART NO:	05326-00033
MICROFICHE NO:	05326-00039

CHANGE DATE October 5, 1976
(This change supersedes all earlier dated changes)

- Make all changes listed as ERRATA.
- Check the following table for your instrument's serial prefix or serial number and make listed change(s) to manual.

IF YOUR INSTRUMENT HAS SERIAL PREFIX OR SERIAL NUMBER	MAKE THE FOLLOWING CHANGES TO YOUR MANUAL	IF YOUR INSTRUMENT HAS SERIAL PREFIX OR SERIAL NUMBER	MAKE THE FOLLOWING CHANGES TO YOUR MANUAL
1428A (5326C/27C)	1	1544A (5327C only)	1, 2, 3
1544A (5326C only)	1, 3	1604A (5327C only)	1, 2, 3, 4
		▶ 1820A (5326C/27C)	1, 2, 3, 4, 5

▶ NEW OR REVISED ITEM
ERRATA

Page 6-11, Table 6-1:

Add A15XF1 1400-0110; 1; FUSEHOLDER; 2-PIN; 28480; 1400-0110.
Change "Description" for A16C4 and A16C5 from 700 to 1500 UF.

Page 6-13, Table 6-1:

Change A18U3 from 1826-0085 to 1826-0085 or 1826-0151 in HP and Mfr. Part Number columns.
Add "FACTORY SELECT" after description for A18R34 and A18R42.

Page 6-14, Table 6-1:

Change 1200-0147 to 1200-0081 in "HP Part Number" and "Mfr Part Number" columns and "Qty" to 2.

Page 6-17, Table 6-2:

Add 00779 AMP, INC P.O. BOX 3608, Harrisburg, Pa. 17105.

Page 6-34:

Replace A15 component locator photo with attached Figure 1.

Page 6-37, Figure 8-16, Schematic Diagram:

Add asterisk (*) by A18R34 and A18R42.

In TABLE OF ACTIVE ELEMENTS show 1826-0085 or 1826-0151 for A18U3 and 1820-0736 or 1820-0558 for A18U4.

Page 6-10, Table 5-4, Steps 5c and 5d:

Change 0.65V to 0.9V at A18U2(3).
Change 0.90V to 0.8V at A18U3(3).

Page 6-37, Figure 8-16, A18 schematic:

Change 0.65V at A18U2(3) to 0.9V.
Change 0.90V at A18U3(3) to 0.8V.

Page 6-11, Table 6-1:

Change description for A16C4 and A16C5 from 700 to 1500 μF.

Page 7-21, Paragraph 7-24:

Add following sentence: "An HP Part No. 05326-00033 adapter plate will also be required for mounting 36-pin remote programming connector J10."

ERRATA (Cont'd)

Pages 5-4 and 5-5, 4. PULSE OPERATION:

In step a, set LEVEL (A) to "SLIGHTLY +" in place of PRESET.

Change step c to read "Adjust pulse generator for positive output for 10 MHz repetition rate, 15 ms pulse width for 0.3 volts peak-to-peak indication on oscilloscope."

Change step d to read "Adjust counter LEVEL A control until counter triggers and counts. Check that counter displays the repetition rate, count light flashes, and trigger A lamp is ON. Record on test card."

CHANGE 1 (1420A)

Page 6-11, Table 6-1:

Change A15F1 from 2110-0460 to 2110-0487 1/20 Amp.

Change A15R6 from 0698-1305 to 0698-5470 0.2 OHM; 01121; EB82G5.

Add A15XF1 1251-3205; 2; SOCKET, MINIATURE SINGLE PIN; 00770; 2-331272-7.

With these changes A15 assembly 05327-60020 is "SERIES 1420A REV. D" Component locator in attached Figure 1 is applicable for A15 with SERIES 1312A or 1420A.

Page 6-12, Table 6-1:

Add A18L3; 05303-80001, 1, COIL, FXD, RF PEAKING, 28480, 05303-80001.

Add "FACTORY SELECTED" to A18R34 and A18R42 "Description".

With these changes A18 assembly 05327-60033 is "SERIES 1420A".

Page 6-35, Figure 6-15, A15 schematic diagram:

Change A15F1 value from 1/32A to 1/20A.

Change A15R6 value from 13 to 0.2 OHM.

Change "SERIES 1312A REV. A" at top of A15 schematic to "SERIES 1420A REV. D".

Page 6-37 Figure 6-16, A18 schematic diagram:

Add A18L3 in series with A18U3(13) output line. Output circuit trace is cut and one end of A18L3 is connected to the junction of A18U3(13) and A18R34. The other end of A18L3 is connected to the junction of ABR44 and the coil from A18R42.

Change series number at top of A18 schematic diagram to "SERIES 1420A".

Page 6-12, Table 6-1, A16 Connector Board Assy:

Change A16R7 from 0698-3153 (3830 OHM) to 0698-3155, 4630 ohms. HP and Mfr. Part Number are the same. Change SERIES to 1420.

Page 6-30, Figure 6-17, Schematic:

Change A16R7 from 3830 to 4630 ohms.

Change SERIES number at top of schematic from 1224A to 1420A. Make same change on various pages where portions of A16 appear in this manual.

Page 6-13, Table 6-1:

Change A18R29 and A18R30 from 0698-5177 (820 OHM) to 0698-5103, 430 OHM
FACTORY SELECT.

Add FACTORY SELECT to A18R30 description.

Page 6-37, Figure 6-16, A18 Schematic:

Add asterisk (*) adjacent to A18R22, A18R23, A18R29, A18R30, and A18R40. All of these resistors should have FACTORY SELECT as part of their description in Table 6-1.

CHANGE 2 (PART OF 1544A FOR 5327C ONLY)

Page 5-10, Table 5-4, Paragraph 4 Prescaler Adjustments:

Change paragraph 5-9 to read as follows: "Reduce output level until counter's display becomes unstable. Alternately adjust A18R3 and A18R53 for a stable display. Repeat procedure until unable to obtain a stable display. Increase signal level until display just becomes stable and make any final adjustments of A18R3 and A18R53."

Page 6-12, Table 6-1, A18 Replaceable Parts:

Change A18 SERIES number to 1540 in "Description" column.

Add A18C30; 0160-3879; CAPACITOR-FXD 0.01 μ F 20% 100 VDCW CER; 28480; 0160-3879.

Change A18R22 and A18R23 from 0698-4131 (56 ohms) to 0698-3111; RESISTOR-FXD 30 OHM 5% .125W CC; 01121; BB3005.

CHANGE 2 (PART OF 1544A FOR 5327C ONLY) (Cont'd)

Page 6-12, Table 6-1, A15 Replaceable Parts: (Cont'd)

Change A10R20 and A10R30 from 0600-5103 (430 ohms) to 0600-5177; RESISTOR-FXD 820 OHM 5% .125W CC; 01121; BB0216.

Change A10R34 from 0600-8073 (1600 ohms) to 0600-5170; RESISTOR-FXD 1500 OHMS 5% .125W CC; 01121; BB1525.

Add A10R53; 2100-2633; RESISTOR VAR 1000 OHMS 10% COMP SIDE ADJ; 30003; EX50X102.

Add A10R54 and A10R55; 0600-3374; RESISTOR-FXD 20 OHM 5% .125W CC; 01121; BB2005.

Add A10R56; 0600-6283; RESISTOR-FXD 10 OHMS 5% .125W CC; 01121; BB1005.

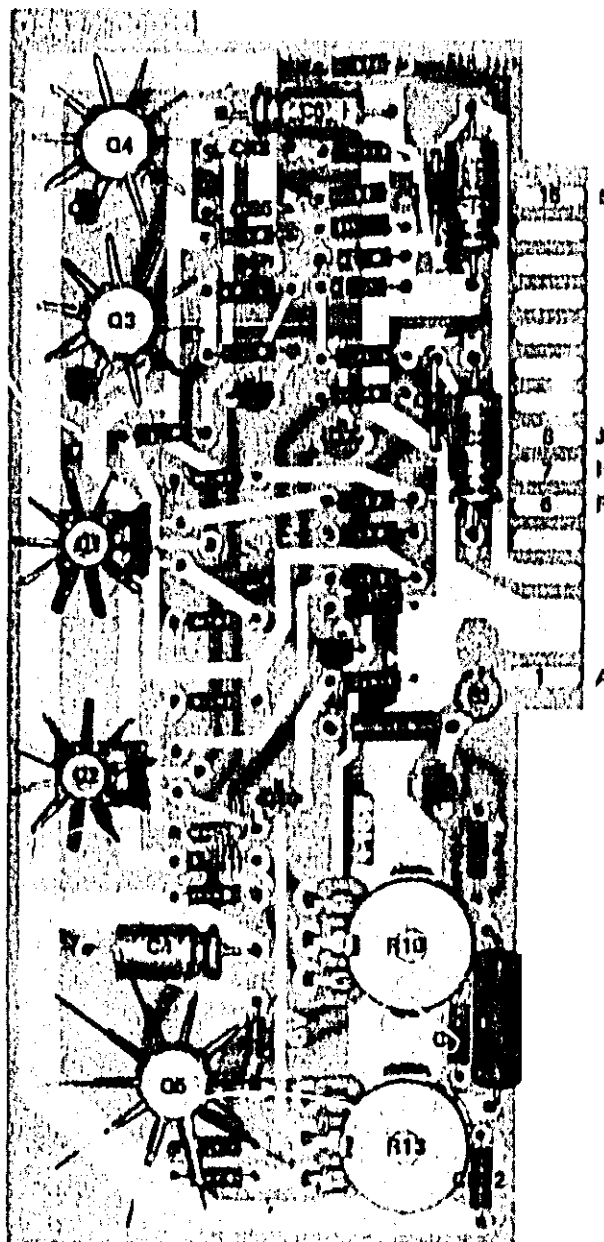


Figure 1. A15 Regulator Board Assembly Component
Locator 05327-60020 Series 1312A or 1428A

CHANGE 2 (PART OF 1544A FOR 5327C ONLY): (Cont'd)

Page 8-37, Figure 8-16, A18 Preselector Assembly Schematic:

Add A18C30 (.01 μ F) between common and the "+5V" end of A18R34.

Add A18R53 (1000 ohms) variable resistor between +5.2V and -5.2V. Connect junction of A18C30 and A18R34 to arm of A18R53 in place of "+5V" as shown on schematic diagram.

Change value of A18R34 from 1600 to 1500 ohms.

Change A18R22 and A18R23 from 50 to 30 ohms and remove asterisk (*) adjacent to each resistor.

Change A18R20 and A18R30 from 430 to 820 ohms.

Add A18R54 (20 ohms) in series between A18U2 pin 11 and the junction of A18R23, A18R30, and A18U3 pin 5.

Add A18R55 (20 ohms) in series between A18U2 pin 14 and the junction of A18R22, A18R20, and A18U3 pin 4.

Add asterisk (*) adjacent to A18R54 and A18R55.

Add A18R56 (10 ohms) in series between A18U1 pin 2 and the junction of A18U2 pin 5 and A18R6.

Change "SERIES" number at top of schematic from 1428 to 1540.

CHANGE 3 (1544A FOR 5326C) (PART OF 1544A FOR 5327C)

Page 1-3, Table 1-3, Specifications for OPTIONS:

Add to Option 001: 8-digit display. "Part of standard instrument; discontinued as an Option."

Page 1-4, Table 1-3, Specifications for OPTIONS:

Add to Option 003: Digital Output (for numerals and polarity only). "Discontinued as an Option and included as part of the standard instrument."

Delete Option 010 Temperature Compensated Oscillator. This option is discontinued and is no longer available.

Page 7-21, Paragraphs 7-9 and above for OPTIONS:

Paragraph 7-11, Add: "Part of Standard Instrument; Discontinued as an Option."

Paragraph 7-22, Add: "Part of Standard Instrument; Discontinued as an Option."

Paragraph 7-17, Add: "Discontinued as an Option and is no longer available."

Page 6-8, Table 6-1, A9 Replaceable Parts:

Replace A9 table for 05326-60008 with table for 05326-60025 A9 on page 6-15 of Table 6-1.

Page 6-16, Table 6-1:

Add parts for Option 003 as part of standard instrument.

The 5326C/5327C Frequency Counters are furnished with the RACK MOUNTING KIT described in this manual. If ordered at the same time as the instrument, the RACK MOUNTING KIT described in the manual is available as Option 008 at additional cost. If not ordered with an instrument, the RACK MOUNTING KIT is available under HP Part No. 05326-60046. Disregard any manual references stating the instrument is supplied with a rack mounting kit.

Page 6-14, Table 6-1, Chassis Replaceable Parts:

Change XF1 fuseholder from 1400-0084 to the following recommended replacement for all instruments. Add the following on Page 6-14 under CHASSIS PARTS:

XF1; 2110-0466; FUSEHOLDER BAYONET CAP; 75915; 345003-020

XF1; 2110-0470; FUSEHOLDER BODY UL/IEC; 75915; 345003-010

XF1; 2050-0054; NUT FUSEHOLDER MTG 1/2-28; 28480; 2050-0054

CHANGE 4 (1604A for 5327C)

Pages 6-12 and 6-13, Table 6-1, A18 (05327-60033) Replaceable Parts:

Change A18 from SERIES 1540 to SERIES 1604.

Add A18R57; 0683-3113; R; FXD COMP 100 OHM 5% 1/8W; 01121; BB1015.

Page 8-37, Figure 8-16, A18 Schematic Diagram:

Change SERIES 1540 at top of schematic to SERIES 1604.

Add 100 ohm resistor R57 in series with +5V input to pin 10 of SCHMITT TRIGGER A18U3.

CHANGE 5 (1020A)

Page 6-6, Table 6-1, AG (05326-00013), Replacement Parts:

Change AG series number to 1020.

Change AGCB from 0160-0163 (.001 μ F) to 0160-0200; CAPACITOR, FXD, 1000 PF 10% 200WVDC POLYE; 66280; 202P12202.

Add AGC13; 0180-1736; CAPACITOR-FXD .22 μ F 10% 35WVDC TANT; 66280; 160D224 X 0036A2.

Page 6-21, Figure 6-9, AG (05326-00013) Schematic Diagram:

Change series number, at top of diagram, from "1224A REV C" to "1020."

Change AGCB from 1000 to 1800 pF.

Add AGC13 capacitor (.22 μ F) between circuit board common and junction of ABR12, AGU43(6), AGR2 and AGR3. The positive side of the capacitor goes to the SAMPLE RATE DISABLE line from connector pins 10L and the negative side to circuit board common. Add AGC13 in REFERENCE DESIGNATIONS tables.

HP MANUAL CHANGES

MAKE ALL CORRECTIONS IN YOUR MANUAL ACCORDING TO ERRATA.

MANUAL TITLE: 5326C/27C
 MANUAL PRINTED: June, 1974
 MANUAL PART NO: 05326-90038
 CHANGE DATE: 23rd December, 1975.

Check the following table for your instrument serial prefix and make any indicated changes to the manual:

SERIAL PREFIX	MAKE CHANGE	SERIAL PREFIX	MAKE CHANGE	SERIAL PREFIX	MAKE CHANGE
1443U	1	1544U	1-4		
1443U-00230 (26C)	1-2				
1443U-00192 (27C)	1-2				
1519U	1-3				

ERRATA

- Page 6-11, Table 6-1
 Add : A15XF1 FUSEHOLDER 2 PIN part no. 1400-0110
 Change : A16C4 and A16C5 to C FXD 1500uF part no. 0180-2382
- Page 6-13, Table 6-1
 Change : A18U3 part no. 1826-0085 to "1826-0151 or 1826-0085"
 Add : "FACTORY SELECT" after description for A18R34 and A18R42
- Page 6-14, Table 6-1
 Change : BUSHING TRANSISTOR part no. 1200-0147 to part no. 1200-0081
- Page 8-34
 Delete : A15 Component Location and insert "Fig 1" new component Location provided
- Page 8-37, Fig 8-16, A18 Schematic
 Add : "Asterisk" (*) to A18R34 and A18R42
 Change : 0.65V at A18U2 (3) to 0.9V
 Change : 0.9V at A18U3 (3) to 0.8V
 Add : In TABLE OF ACTIVE ELEMENTS show 1826-0085 or 1826-0151 for A18U3 and 1820-0736 or 1820-0558 for A18U4.
- Page 7-21, Paragraph 7-24
 Add : following sentence: "An HP Part No. 05326-00033 adapter plate will also be required for mounting 36-pin remote programming connector J10".
- CHANGE 1 Table 6-1, Page 6-11
 Change : A15R6 to part no. 0698-5479 R FXD 8,2n 5%
 A15F1 to part no. 2110-0487 1/20 Amp.
 Add : A15XF1 1251-3205 Socket : Miniature
 With these changes assy 05327-60020 is Series 1443U REV D
 This change supersedes applicable data in Errata.
- Page 8-35, Figure 8-15, A15 Schematic
 Change : A15F1 value from 1/32A to 1/20A
- CHANGE 2 Table 6-1
 Change : Rear Panel part no. 05326-00032 to part no. 05326-60049
- CHANGE 3 Page 6-13, Table 6-1
 Change : A18R29, 30 to part no. 0698-5103 R FXD 430n 5% 1/2W
 Add : Asterisk (*) to A18R22, 23, 29, 30, 40 to indicate select on test.

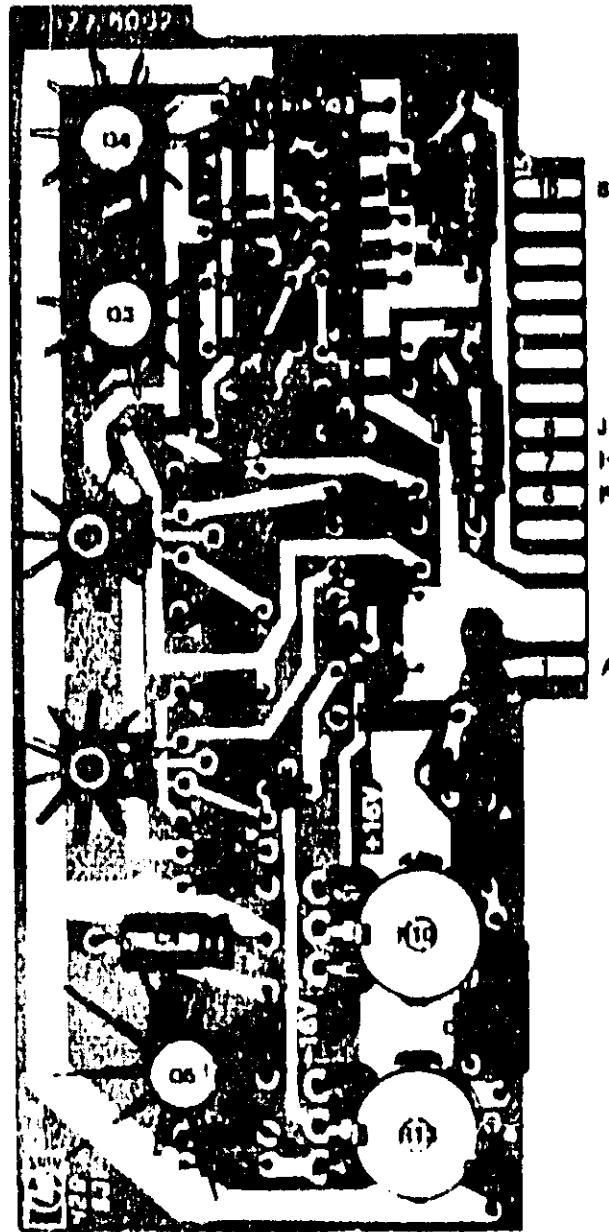


Fig. 1 A15 Component Location.

- CHANGE 4
- Add : Page 1-3, Table 1-3 Specifications for OPTIONS:
to Option 001: 8-digit display. "Part of standard instrument;
discontinued as an Option".
- Add : Page 1-4, Table 1-3, Specifications for OPTIONS:
to Option 003: Digital Output (for numerals and polarity only).
"Discontinued as an Option and included as part of the standard
instrument"
- Delete : Option 010 Temperature Compensated Oscillator. This Option is
discontinued and is no longer available.
- Page 7-21, Paragraphs 7-9 and above for OPTIONS:
Paragraph 7-11 Add: "Part of Standard instrument; Discontinued as an Option"
Paragraph 7-22 Add: "Part of Standard instrument; Discontinued as an Option"
Paragraph 7-17 Add: "Discontinued as an Option and is no longer available"
- Page 6-8, Table 6-1, A9 Replaceable Parts:
Replace A9 table for 05326-60008 with table for 05326-60025 A9 on page
6-15 of Table 6-1
- Add : Page 6-16, Table 6-1:
parts for Option 003 as part of standard instrument.