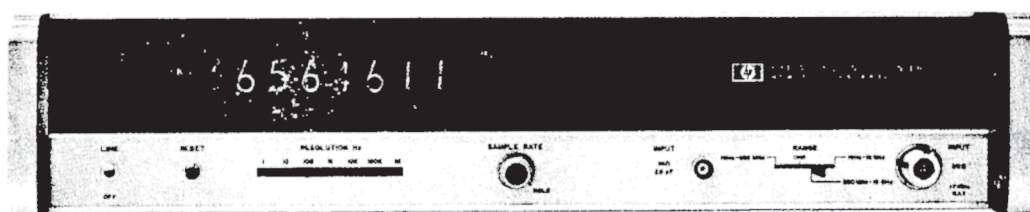


FREQUENCY COUNTER 5340A



 **HEWLETT
PACKARD**

MODEL 5340A

FREQUENCY COUNTER

OPERATING AND SERVICE MANUAL

SERIAL PREFIX: 1532A

This manual applies directly to Hewlett-Packard Model 5340A Frequency Counters with serial prefix number 1532A.

SERIAL PREFIXES NOT LISTED

For serial prefixes above 1532A, a "Manual Change" sheet is included with this manual. For serial prefixes below 1532A, refer to Section VII of this manual.

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5301 STEVENS CREEK BLVD., SANTA CLARA, CALIF. 95050



**HEWLETT
PACKARD**

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WARNING

115 VOLTS AC AND 175 VOLTS DC ARE USED IN THIS INSTRUMENT. SOME OF THE MAINTENANCE AND SERVICING OPERATIONS DESCRIBED HEREIN ARE PERFORMED WITH POWER SUPPLIED TO THE INSTRUMENT WHILE PROTECTIVE COVERS ARE REMOVED. EXERCISE EXTREME CARE WHEN PERFORMING THESE OPERATIONS. LINE VOLTAGE IS ALWAYS PRESENT ON TERMINALS INCLUDING THE POWER INPUT CONNECTOR, FUSE HOLDER, POWER SWITCH, ETC. IN ADDITION, WHEN THE INSTRUMENT IS ON, ENERGY AVAILABLE AT MANY POINTS MAY RESULT IN PERSONAL INJURY OR DEATH WHEN CONTACTED.

WARNING

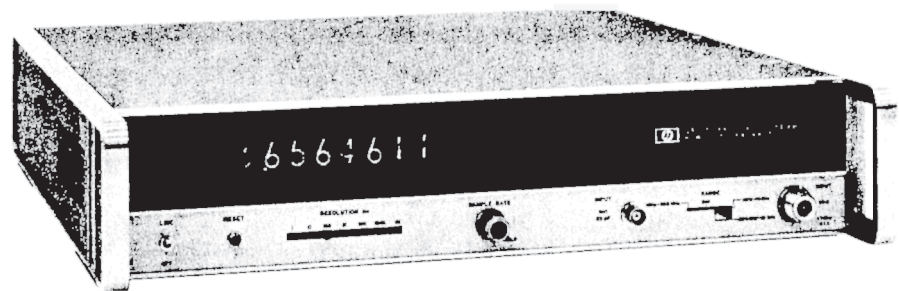
THIS INSTRUMENT IS SUPPLIED WITH A THREE-WIRE POWER CABLE. THE CENTER THIRD WIRE IS INTENDED TO CONNECT THE INSTRUMENT CHASSIS TO EARTH GROUND WHEN USED WITH A PROPERLY WIRED THREE-CONDUCTOR OUTLET. REFER TO SECTION II FOR DETAILS OF POWER CONNECTION. IMPROPERLY GROUNDED EQUIPMENT CONFIGURATIONS MAY RESULT IN HAZARDOUS POTENTIALS BETWEEN THE CHASSIS OF TWO OR MORE INSTRUMENTS OR EARTH GROUND.

CAUTION

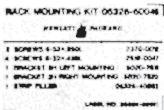
INPUT CIRCUITS AT THE 50 OHM INPUT CONNECTOR CAN BE DESTROYED WITH INPUT LEVELS EXCEEDING **1 WATT**. PLEASE READ PARAGRAPH **3-21** REGARDING ACCEPTABLE INPUT LEVELS.

Model 5340A
General Information

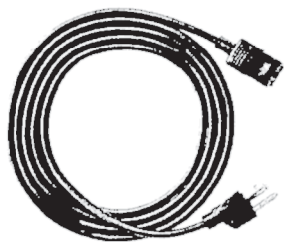
Figure 1-1. Model 5340A Frequency Counter, Rack Mount Kit, and Power Cord



Model 5340A



Rack Mount Kit



Power Cord

SECTION I

GENERAL INFORMATION

1-1. DESCRIPTION

1-2. The Hewlett-Packard Model 5340A Frequency Counter measures frequencies from 10 Hz to 18 GHz. Sensitivity is -30dBm (7.07 mV) from 10 Hz to 500 MHz, -35dBm (3.98 mV) from 500 MHz to 10 GHz and -25dBm (12.6 mV) from 10 GHz to 18 GHz. The counter makes direct measurements from 10 Hz to 250 MHz and uses an automatic transfer oscillator technique for frequencies above 250 MHz. Features include a single input connector for the entire frequency range, excellent AM and FM characteristics, eight-digit display, auto-amplitude discrimination, variable resolution from 1 Hz to 1 MHz, fast acquisition time, and wide dynamic range.

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

1-4. INSTRUMENT IDENTIFICATION

1-5. Hewlett-Packard instruments have a 2-section, 10-character 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.

1-6. For lower serial prefixes it will be necessary to backdate this manual to conform with your instrument. Refer to Section VII for a listing of the changes needed.

1-7. For higher serial prefix 5340A's, changes were made after this manual was published and it will be necessary to change this manual to conform with your instrument. A manual change sheet is included with this manual. If the change sheet is missing, contact your local Hewlett-Packard office.

1-8. APPLICATIONS

1-9. Since one input connector accepts all signals from 10 Hz to 18GHz, the 5340A is particularly adaptable to automatic systems and high speed production testing. The high sensitivity is extremely useful in microwave measurements where signal levels are typically below the sensitivity of most counters. When the 5340A is equipped with Option 011, all front panel functions can be remotely programmed. In addition, the remote programming option allows for digital outputting and programming of the octave ranges of the internal phase lock loops. Octave range selection allows for measurements in a single frequency band to reduce the acquisition time to typically less than 25 milliseconds. Other options include rear panel input connectors Option 002, and high-stability time base Option 001.

1-10. OPTIONS

1-11. The 5340A can be ordered with the following options: Option 001, high-stability time base; Option 002, rear panel input connectors; and Option 011 remote programming and digital output. Table 1-3 lists the specifications for the options; Section VII describes field installation and gives an overall description of each option. Section II covers programming for Option 011.

1-12. EQUIPMENT SUPPLIED AND ACCESSORIES AVAILABLE

1-13. Table 1-1 lists equipment supplied and Table 1-2 lists accessories available.

Table 1-1. Equipment Supplied

Description	HP Part Number
Detachable Power Cord 7-½ ft. (231 cm) long	8120-1378
Rack Mount Kit (see Table 6-1 for a listing of parts)	05326-60046

Table 1-2. Accessories Available

Description	HP Part Number
ASCII to Parallel BCD Converter (Interfaces 5340A equipped with Option 011 to HP 5050A, 5050B, 5055A, or 562A Digital Recorders). Includes inter-connect cable to 5340A .	K01-5340A
Digital Recorder (Use with K01-5340A above).	5055A
Interconnect Cable (Connects K01-5340A to 5050A/B, 5055A, or 562A Digital Recorders).	562A-16C
Interface Kit (For use with HP Computers and 5340A's equipped with Option 011).	59310A
Interface Kit (For use with HP 9820A Calculators and 5340A's equipped with Option 011).	11144A Option 20
ASCII Connecting Cables (Each cable end has stacked male and female type 57 connectors to allow multiple cable connections). 3 feet 6 feet 12 feet	10631A 10631B 10631C
Extender Board, 5340A for Testing A4 through A15 (except A5).	05340-60047

Table 1-3. Specifications

SIGNAL INPUT

Input 1

Range: 10 Hz to 18 GHz.
Symmetry: Sine wave or square wave input (40% duty factor, worst case).
Sensitivity: -30dBm, 10 Hz to 500 MHz; -35dBm, 500 MHz to 10 GHz; -25dBm, 10 to 18 GHz.
Dynamic Range: 37dB, 10 Hz to 500 MHz; 42dB, 500 MHz to 10 GHz; 32dB, 10 GHz to 18 GHz.
Impedance: 50Q.
VSWR: <2:1, 10 Hz to 12.4 GHz; <3:1, 12.4 to 18 GHz.
Connector: Precision Type N
Coupling: DC to load, AC to instrument.
Damage Level: +30dBm $\pm$ 7V dc (total power not to exceed 1W)
Acquisition Time: <150 ms mean typical.

Input 2

Range: 10 Hz to 250 MHz direct count.
Sensitivity: 50 mV rms. 150 mV p-p pulses to 0.1% duty factor minimum pulse width 2 nsec.
Impedance: 1M Ω shunted by <25 pF. Option 002 (rear panel input)
1M Ω shunted by <100 pF. 50Q termination (provided for front panel input) required to meet all specifications with Option 002 installed.
Connector: Type BNC female.
Coupling: AC.
Maximum Input:
10 Hz to 100 Hz 200V rms.
100 Hz to 100 kHz 20V rms.
100 kHz to 250 MHz 2V rms.

Automatic Amplitude Discrimination: Automatically selects the strongest of all signals present (within 250 MHz to 18 GHz phase-lock range), providing signal level is: 6 dB above any signal within 200 MHz; 10 dB above any signal within 500 MHz; 20 dB above any signal, 250 MHz—18 GHz.

Maximum AM Modulation: Any modulation index as long as the minimum voltage of the signal is not less than the sensitivity specification. For example, with a -10dBm input signal at 10 GHz, 94.5% modulation index will cause the signal to drop to -35dBm (4 mV) at its lowest amplitude and would be the limit of modulation.

TIME BASE

Crystal Frequency: 10 MHz.

Stability:

Aging Rate: $\pm 3 \times 10^{-7}$ per month.
Short Term: $< 5 \times 10^{-10}$ rms for 1 second averaging time.
Temperature: $\pm 2 \times 10^{-6}$ over the range of 0°C to 50°C.
Line Variation: $\pm 1 \times 10^{-7}$ for 10% line variation from nominal
Output Frequency: 10 MHz $\geq$ 2.4V square wave (TTL compatible) available from rear panel BNC.

External Time Base: Requires 10 MHz approximately 1.5V p-p sine wave or square wave into 1 K Ω via rear panel BNC. Switch selects either internal or external time base.

Table 1-3. Specifications (Continued)

OPTIONAL TIME BASE (Option 001)

Option 001 provides an oven controlled crystal oscillator time base with an aging rate near that of a time standard. This option results in better accuracy and longer periods between calibration. A separate power supply keeps the crystal oven ON and up to temperature when the instrument is turned off as long as it remains connected to the power line.

Frequency: 10 MHz.

Aging Rate: $<\pm 5 \times 10^{-10}$ /day after 24 hour warm-up¹ and $<1.5 \times 10^{-7}$ /year.

Short Term Stability:

1 x 10⁻¹⁰ for 1 s avg. time

1 x 10⁻¹⁰ for 10 s avg. time.

2 x 10⁻¹⁰ for 100 s avg. time.

Line Variation: $<1 \times 10^{-10}$ for $\pm 10\%$ change from nominal. A 10% change will cause a frequency change of $<1 \times 10^{-8}$ for <2 min.

Temperature: $<7 \times 10^{-9}$ over 0°C to 50°C range.

Warmup: Within 5×10^{-9} of final² value 20 minutes after turn-on, at 25°C.

Frequency Adjustment Range: $>1 \times 10^{-6}$ ($>\pm 10$ Hz from 10 MHz) with 18-turn control.

Frequency Adjustment: 1 x 10⁻⁹ (0.01 Hz) 18-turn control.

GENERAL

Accuracy: ± 1 count $\pm$ time base error.

Resolution: Front panel switch selects 1 MHz, 100 kHz, 10 kHz, 1 kHz, 100 Hz, 10 Hz, or 1 Hz.

Display: Eight in-line long life display tubes with positioned decimal point and appropriate measurement units of kHz, MHz, or GHz.

“DIR” lamp indicates measurement is direct.

“LOCK” lamp indicates phase-lock has been achieved and measurement technique is indirect.

GATE” lamp indicates measurement is in progress.

“RMT” lamp indicates instrument is controlled via external or remote device.

“OVFL” indicates most significant digits will not be displayed. Digits displayed when “OVFL” is lighted are accurate ± 1 count $\pm$ time base accuracy.

“OVFL” is necessary for some high frequency measurements where resolution of 100 Hz, 10 Hz, or 1 Hz is required.

“*” lamp indicates Option 001 crystal oven time base is in the process of warming up (10–15 min. approximately). (The lamp will remain on for longer periods of time if the line voltage is low.)

Self-Check: Counts and displays 10 MHz for resolution chosen.

Sample Rate: Controls time between measurements. Continuously adjustable from 50 milliseconds typical to 5 seconds. Hold position holds display indefinitely. Reset button resets display to zero and activates a new measurement

Operating Temperature: 0° to 50°C.

Power: 115V or 230V $\pm 10\%$, 50–60 Hz, 100 VA.

Weight: Net: 25 lb. (11, 3kg). Shipping: 31 lb. (14, 1kg).

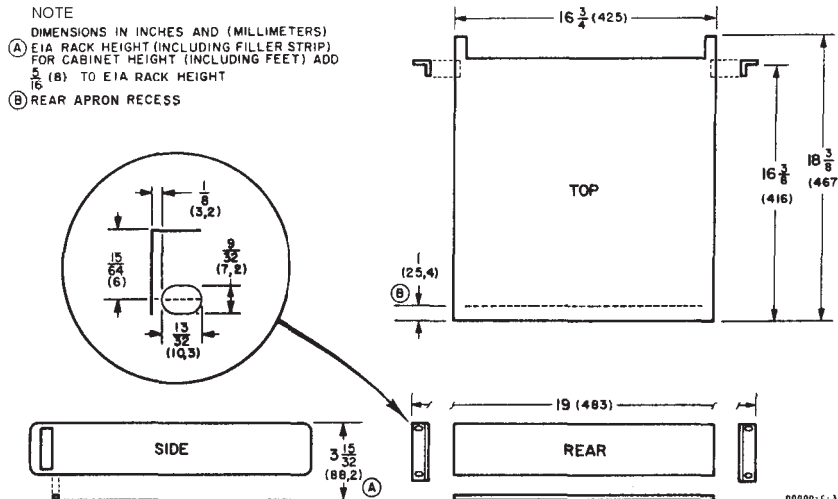
¹For oscillator off-time less than 24 hours.

²Final value is defined as frequency 24 hours after turn-on.

Table 1-3. Specifications (Continued)

GENERAL (CONTINUED)

Dimensions:



Accessories Furnished: Power cord 7½ ft (200 cm), NEMA plug (HP Part Number 8120-1378)

Accessories Available: 59310A Interface Kit for use with 5340A Option 011 and Hewlett-Packard computers.

11144A, Option 20 Interface Kit for use with 5340A Option 011 and Model 9820A Calculator.

ASCII (Option 011) to parallel BCD converter K01-5340A.

Rear Panel Connectors (Option 002)

This option provides input connectors on the rear panel. Input specifications remain the same. Input 1 (Type N) is on the rear panel in place of installation on the front panel. Input 2 (BNC) is available on the front and rear panels. Input impedance is reduced to 50 Ω .

Remote Programming and Digital Output (Option 011)

Option 011 adds the capability of digital outputting and remote programming via a 24-pin, series 57 microribbon connector on the rear panel marked DIGITAL INPUT/OUTPUT. The TTL and DTL compatible, bi-directional bus consists of eight data lines plus seven status and control lines. Both program and output information are seven-bit ASCII (USA Standard Code for Information Interchange) characters. They are passed over the data lines on a character-serial basis.

Connector: 24-pin female Amphenol #57-20240-2, HP #1251-3283.

Mating connector male, Amphenol #57-10240, HP #1251-0389.

SECTION II

INSTALLATION AND REMOTE PROGRAMMING

2-1. INTRODUCTION

2-2. This section tells how to set up the 5340A Frequency Counter. Instructions for unpacking, inspecting, installing, and remote programming are included.

2-3. UNPACKING AND INSPECTION

2-4. If the shipping carton is damaged, inspect the counter for visible damage (scratches, dents, etc.). If the counter is damaged, notify the carrier and the nearest Hewlett-Packard Sales and Service Office immediately (offices are listed at the back of this manual). Keep the shipping carton and packing material for the carrier's inspection. The Hewlett-Packard Sales and Service Office will arrange for repair or replacement of your instrument without waiting for the claim against the carrier to be settled.

2-5. INSTALLATION REQUIREMENTS

CAUTION

BEFORE CONNECTING THE INSTRUMENT TO AC
POWER LINES, BE SURE THAT THE LINE SELECTOR
IS PROPERLY POSITIONED.

2-6. LINE VOLTAGE REQUIREMENTS. The 5340A is equipped with a line voltage switch to select 115-volt or 230-volt ac operation. Before applying power, the rear panel screwdriver-operated switch must be set to the correct position ("115" or "230" visible) and the correct fuse (as labeled on the rear panel) must be installed. See Figure 3-4 for rear panel features.

2-7. LINE FREQUENCY REQUIREMENTS. The counter will operate at line frequencies between 48 Hz and 66 Hz.

2-8. THREE CONDUCTOR POWER CABLE. To protect the operator, the counter uses a grounded three-conductor detachable power cable. The male connector end is a NEMA type connector, and the female connector end is a C.E.E. type connector that mates with the 5340A rear panel power connector. Connect the power cable to a power source receptacle with a NEMA grounded third conductor. If the line power receptacle is a standard two-pin type instead of the NEMA three-pin receptacle, use a two-to-three pin adaptor (HP Part No. 8120-1348) and connect the green pigtail on the adaptor to ground.

2-9. TEMPERATURE LIMITS. Maximum and minimum allowable operating temperatures are listed in Table 1-3. If these limits are exceeded at the installation site, auxiliary cooling or heating should be used to keep the environment within limits.

2-10. RACK INSTALLATION. 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 the instrument to rack installation, refer to Figure 6-1 for parts identification and proceed as follows:

- a. Remove tilt stand **MP14** by removing the two outside front feet **MP11** from the bottom cover **MP9**. The feet are removed by pressing the foot-release button and sliding the foot toward the center of the instrument.
- b. Remove the remaining three feet from the bottom cover.

- c. Remove the two adhesive-backed trim strips MP1 from side frames MP3 and MP12.
- d. Using the three screws provided, attach the filler strip from the rack mount kit along the front of bottom cover MP9.
- e. Attach the flanges from the rack mount kit to the front end of side frames MP3 and MP12. Orient the larger corner notch toward the bottom of the instrument.

2-11. REPACKING FOR SHIPMENT

2-12. If it becomes necessary to reship a counter, good commercial packing should be used. Contract packaging companies in many cities can provide dependable custom packaging on short notice. Instruments should be packed securely in a strong corrugated container (350 lb/sq. in bursting test) with suitable filler pads between the instrument and container. Before returning instruments to Hewlett-Packard, contact the nearest Hewlett-Packard Sales and Service Office for instructions.

2-13. ENVIRONMENT DURING STORAGE AND SHIPMENT

2-14. 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: $+167^{\circ}\text{F}$ ($+75^{\circ}\text{C}$).

2-15. REMOTE PROGRAMMING AND DIGITAL OUTPUT

2-16. Option 011 adds remote programming and digital output capability to the 5340A Frequency Counter. These are accomplished with a bi-directional bus, via a 24-pin connector on the rear panel marked DIGITAL INPUT/OUTPUT. Associated with this connector are six slide switches used to address the instrument. A 5340A can be addressed to either send output data (TALK) or to accept program information (LISTEN). For the purposes of the Option 011 description, several terms are defined as follows:

- a. A TALKER is the sender of information on the bus.
- b. A LISTENER is the receiver or acceptor of information on the bus.
- c. A CONTROLLER is an instrument that has the responsibility of managing the instruments connected to the bus. It is capable of addressing other instruments on the bus as TALKERS or as LISTENERS. It is a TALKER and may be a LISTENER.
- d. "High" or "0" level of a line or switch is the relatively more positive signal level ($\geq 2.4\text{V}$).
- e. "Low" or "1" level of a line or switch is the relatively less positive signal level ($\leq 0.4\text{V}$).

2-17. What Can Be Programmed

2-18. All front panel switch functions, except power, are programmable. Also, the 5340A's octave range and its output mode can be selected. In addition, a controller can command the 5340A to make a measurement by sending either a SAMPLE TRIGGER or RESET instruction. The controller can elect to give control to the front panel controls (LOCAL) or have the 5340A operate according to the information stored in its remote program storage cells (REMOTE). These are listed in Table 2-4 along with their associated codes.

2-19. When addressed to output, the 5340A sends a string of 16 ASCII characters (USA Standard Code for Information Interchange). It includes the measurement technique (direct or by using phase locked loops), overflow, eight data digits (blank display digits are output as 0's) E

followed by the appropriate multiplier to make the reading **Hz**, and a word terminator. Table 2-5 lists the order outputted and a description of the 16 output characters.

2-20. Bus Description

2-21. The 15-line bus consists of 8 data lines plus 7 control and status lines. Addresses, program and output information are communicated on the data lines. These are based on a character-serial, seven-bit ASCII code set.

2-22. Three control lines are used to execute the transfer of each byte of information on the data lines. They employ an interlocked "handshake" technique to pass information. This allows for asynchronous data transfer without timing restrictions being placed on either the 5340A or its controller. One line is driven by the 5340A to inform the controller of its status. The controller uses the three remaining lines to manage the 5340A s on the bus.

2-23. Several 5340A s can be connected to a common bus. The exact number depends on the drive capability of the controller (see LINE CHARACTERISTICS). A specific 5340A is made to send output data (TALK) or accept program data (LISTEN) by addressing it to do so.

2-24. All bus lines have been given names and mnemonic acronyms that convey the message being carried on that line. Each line is described below, followed by Table 2-1 which lists the relationship of the Attention line and the three handshake lines. Figure 2-1 shows the signal levels and timing relationship of the handshake and data lines. *ALL INSTRUMENTS CONNECTED TO THE BUS, INCLUDING THE CONTROLLER, MUST OBEY THESE DESCRIPTIONS.*

a. SERVICE REQUEST (SRQ)

By setting SRQ low, a 5340A indicates to the controller that it has completed a measurement and is ready to output. It drives SRQ only if programmed to "WAIT" in the output phase of its operating cycle until addressed to output. When programmed in the other output mode "output ONLY IF addressed", the 5340A sets SRQ high at all times. When SRQ is high, service is not being requested.

If two or more 5340A s are connected to the bus and one of them sets SRQ low, the controller must go through a process of elimination to determine which one requested service. It does this by addressing each one to TALK in an orderly manner. Only the 5340A with output information will respond.

b. REMOTE ENABLE (REN)

REN can be used by a controller to select remote or local (front panel) control of the operating of a 5340A. It works in conjunction with the information stored in the local-remote program storage cell (see Table 2-4). When REN is low and the 5340A has been sent an ASCII "0", it will operate according to the information previously stored in its remote-local program storage cells. It operates according to its front panel controls for all other combinations of these, i.e., REN is low and the remote-local storage cell contains an ASCII "N" or when REN is high regardless of what is stored in the remote-local cell. ASCII "N" is stored in the local-remote program storage cell when either the power is turned on or the RESET pushbutton is depressed.

c. INTERFACE CLEAR (IFC)

A controller uses IFC to clear the bus. When it sets IFC low for $>100 \mu\text{sec}$, all 5340A s immediately stop driving the data lines (DIO1 through DIO7) and handshake lines (RFD, DAC, and DAV). IFC will not clear a 5340A s service request (SRQ). A controller may drive IFC low at any time. When IFC is high, it has no effect on the bus operation. The 5340A monitors IFC at all times.

d. ATTENTION (ATN)

ATN is used by a controller to address a 5340A. The 5340A monitors ATN at all times. When ATN is low, all 5340A's connected to the bus interpret the information on the data lines as an address. They will handshake on the appropriate lines and will not drive the data lines. The 5340A requires the controller to hold ATN low for 1 μ sec before it sets the handshake line DATA VALID low.

When ATN is high, a 5340A that has been addressed to TALK will drive the data lines. Those that have been addressed to LISTEN will interpret the information on the data lines as program data. Those that have not been addressed will not drive the data lines.

e. DATA LINES (EIGHT-BITS DIO1, D102...DIO8)

DIO1 through D107 carry data between the 5340A and its controller. The 5340A drives these lines when it has been addressed to TALK. The 5340A receives information on the data lines when addressed to LISTEN or when ATN is low. D108 is permanently terminated in the 5340A.

When a DIO line is high, the data bit is a logic zero (0).

When a DIO line is low, the data bit is a logic one (1).

f. READY FOR DATA (RFD)

RFD is the handshake line that indicates LISTENERS are ready to accept information on the data lines. Its relationship to the other handshake lines and ATN is shown in Figure 2-1 and Table 2-1.

RFD is driven by LISTENERS: all 5340A's when ATN is low and those instruments addressed to listen when ATN is high. It is sensed by TALKERS: the controller when ATN is low, and the instrument addressed to talk when ATN is high.

When RFD is high, all listeners are unconditionally ready for data. The TALKER may, at its own time, put a byte of information on the data lines and set DAV low. When RFD is low, one or more listeners are not ready for data.

When the controller sets ATN low, all 5340A's will set RFD to its valid state within 200 nsec. When the controller sets ATN high, all 5340A's that have not been addressed to listen will not drive RFD, those addressed to listen will set RFD to its valid state within 200 nsec.

The listener must not set RFD low until it senses DAV is low. It may do so before or at the same time that it sets DAC high. It must not return RFD high until it senses DAV is high and may do so after, or at the same time that it sets DAC low.

g. DATA ACCEPTED (DAC)

DAC is the handshake line that indicates the acceptance of information on the data lines. Its relationship to the other handshake lines and ATN is shown in Figure 2-1 and Table 2-1.

DAC is driven by LISTENERS: all 5340A's when ATN is low and those instruments addressed to listen when ATN is high. It is sensed by TALKERS: the controller when ATN is low and the instrument addressed to talk when ATN is high.

When DAC is high, all LISTENERS have unconditionally accepted the byte of information on the data lines and no longer need it. The TALKER may, at its own time set DAV high, remove that byte of information and continue. When DAC is low, one or more LISTENERS have not accepted the information on the data lines.

When the controller sets ATN low, all 5340A's will set DAC to its valid state within 200 nsec. When the controller sets ATN high, the 5340A's that have not been addressed to listen will not drive DAC, those addressed to listen will set DAC to its valid state within 200 nsec.

The listener must not set DAC low until it senses DAV is high. It may do so before or at the same time that it sets RFD high. It must not return DAC high until it senses DAV is low and may do so after or at the same time that it sets RFD low.

h. DATA VALID (DAV)

DAV is the handshake line that indicates the validity of information on the data lines. Its relationship to the other handshake lines and ATN is shown in Figure 2-1 and Table 2-1.

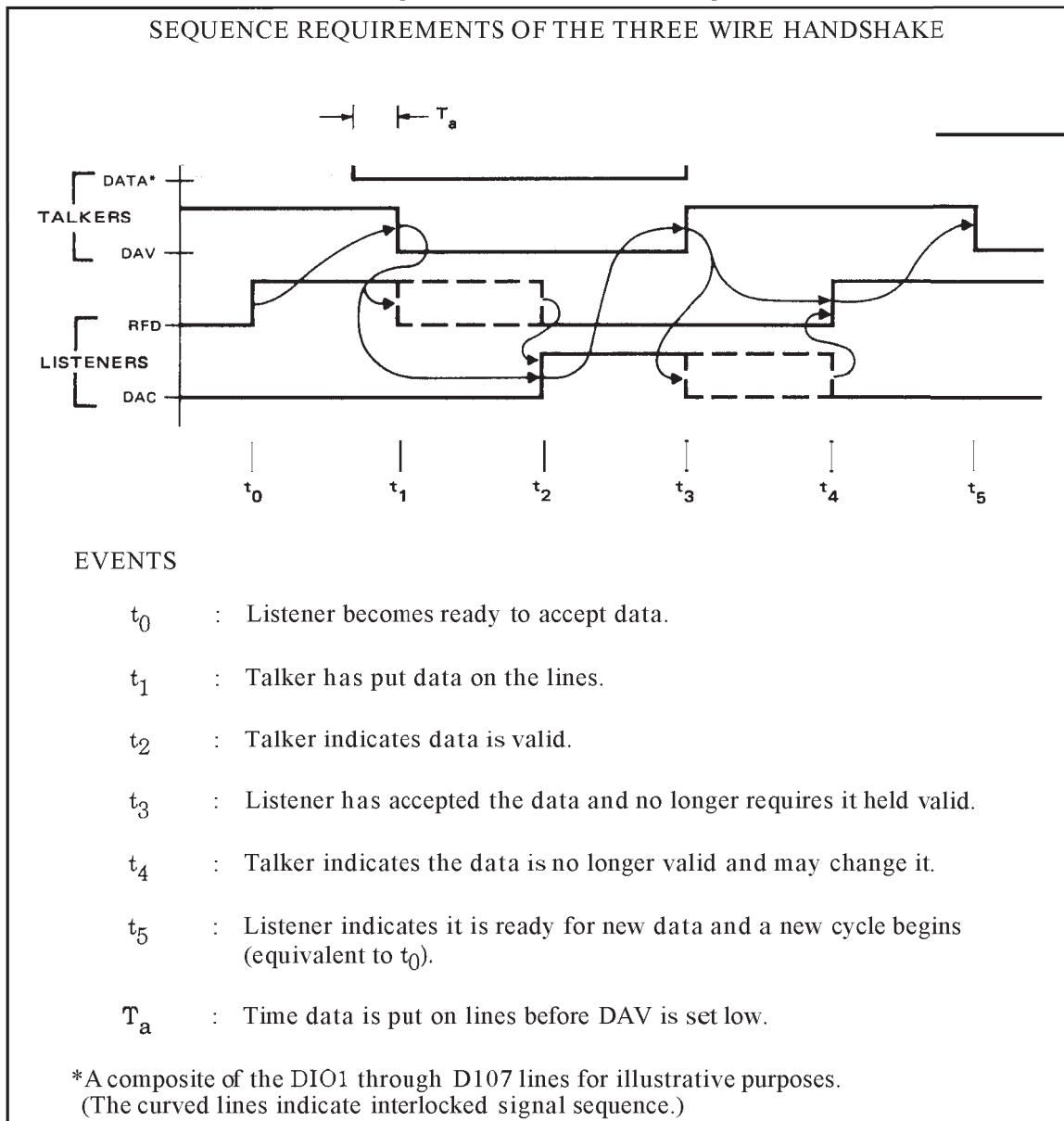
It is driven by TALKERS: the controller when ATN is low and by the instrument addressed to talk when ATN is high. It is sensed by LISTENERS: all 5340A's if ATN is low and by the instruments addressed to listen when ATN is high.

When DAV is low, the states of data lines DIO1 through DIO7 are unconditionally valid and may be accepted by all listeners at their own time. To allow for cable rise time, ringing, etc., the 5340A, when addressed to TALK, does not set DAV low until 2 vsec after it has placed valid data at its output connector. It assumes that the controller has taken similar precautions. DAV can only be driven low if RFD and IFC are high. When DAV is high, the information on the data lines is not valid. DAV cannot be set high unless DAC is high and RFD is low.

Table 2-1. Relation of ATN and the Handshake Lines (RFD, DAC, DAV)

STATE OF ATTENTION LINE (ATN)	READY FOR DATA (RFD)		DATA ACCEPTED (DAC)		DATA VALID (DAV)	
	LOW	HIGH	LOW	HIGH	LOW	HIGH
ADDRESS MODE L O W	One or more 5340A's not ready for data	All 5340A's are ready for data	One or more 5340A's has not accepted the data	All 5340A's have accepted the data	Controller has valid data on lines	Controller's data not valid
	(1) Driven by all 5340A's (2) Sensed by controller (3) 5340A's drives to its valid state within 200 ns of ATN going low				(1) Driven by controller (2) Sensed by 5340A's	
DATA MODE H I G H	One or more LISTENERS are not ready for data	All addressed LISTENERS are ready for data	One or more LISTENERS have not accepted data	All addressed LISTENERS have accepted the data	The addressed TALKER has valid data on lines	The addressed TALKERS data not valid
	(1) Driven by ALL instruments addressed to LISTEN (2) Sensed by the instrument addressed to TALK (3) All instruments not addressed will not drive				(1) Driven by the instruments addressed to TALK (2) Sensed by ALL instruments addressed to LISTEN	

Figure 2-1. Handshake Timing



2-25. Data Transfer

2-26. Transfer of data on the bus is asynchronous. It places no restrictions on the data rates of instruments connected to the bus. The timing and levels required to transfer a byte of information on the data lines are shown in Figure 2-1. Transfer is under the control of three handshake lines DAV, RFD, and DAC. The TALKER (sender of data) drives DAV (Data Valid) and the LISTENER (acceptor of data) drives both RFD (Ready for Data) and DAC (Data Accepted).

2-27. The transfer of a byte is initiated by the LISTENER signifying it is ready for data by setting RFD high. When the TALKER recognizes RFD is high and has placed valid data on the data lines it sets DAV low. When the LISTENER senses that DAV is low and is finished using the data, it sets DAC high. Notice that the assertive or action state of both RFD and DAC is high. Since all instruments on the bus have their corresponding lines connected together (e.g., RFD), all LISTENERS must be in a high state before that line goes high. This wire-AND situation allows a TALKER to recognize when the slowest listener has accepted a byte of data and is ready for the next byte.

2-28. Let's look at the timing of the transition to the non-assertive state for these lines. DAV may be driven high by the TALKERS after it recognizes that DAC is high. RFD may be set low as soon as the LISTENER recognizes that DAV has been set low. The 5340A requires RFD to be set low no later than 50 nsec after the LISTENER sets DAC high. When the 5340A is a listener it drives RFD low at the same time it sets DAC high. The timing of DAC is similar to RFD, i.e., it may go low as soon as DAV is high and it must be low no later than 50 nsec after RFD is driven high. The 50 nsec permits a controller, when working with only one 5340A on the bus, to generate either DAC or RFD and invert it to get the other.

2-29. Addressing the 5340A

2-30. Before a 5340A can send output data or accept program information it **MUST** be addressed to TALK or LISTEN. The method used to address it depends on the rear panel switch marked TALK ALWAYS — ADDRESSABLE (See Figure 2-2). When in the TALK ALWAYS position, the 5340A is addressed to TALK — it outputs **ONLY**. It operates according to the front panel controls and outputs each measurement. This position is intended for operation where there is no controller, e.g., with a digital recorder. When the rear panel switch is set to ADDRESSABLE, the 5340A can either be:

- a. Sent program information by a controller and the measured results are observed visually, or
- b. Both program and output information are passed on the bus managed by a controller.

2-31. Addresses are communicated on the data lines. When the controller sets ATN low, all 5340A's interpret the information on data lines, DIO1 through DIO5 as an address. During this time, the signal levels on DIO6 and DIO7, designate whether the addressed 5340A is to communicate as a TALKER or a LISTENER.

D	D	D	D	D	D	D	
I	I	I	I	I	I	I	
O	O	O	O	O	O	O	
7	6	5	4	3	2	1	
1	0	A ₅	A ₄	A ₃	A ₂	A ₁	- TALK ADDRESS*
0	1	A ₅	A ₄	A ₃	A ₂	A ₁	- LISTEN ADDRESS*
0	0	X	X	X	X	X	- Ignored by 5340A
1	1	X	X	X	X	X	when ATN is low

A_n - Address switches on rear panel

X - Don't care

* - The clear address characters (11111) not allowed.

2-32. The thirty-one (31) possible LISTEN and TALK address characters and their signal levels are shown in Tables 2-2 and 2-3. A unique character is selected for each 5340A with the five (5) slide switches on the rear panel marked ADDRESS (A₅, A₄, A₃, A₂, A₁) (see Figure 2-2). These switches may be set to either 0 or 1 (0 represents a high level and 1 a low level).

2-33. Two characters are reserved for the special function of clearing or removing a 5340A from the active state of an addressed TALKER or LISTENER. The 5340A is cleared as a LISTENER if it is sent an ASCII "?" while ATN is low. The 5340A is cleared as a TALKER if another instrument is addressed to TALK or it is sent an ASCII "_" (underscore) while ATN is low. It is cleared as either a TALKER or LISTENER when IFC is low.

Table 2-2. Talk and Listen Addresses

BITS					USA STANDARD CODE FOR INFORMATION INTERCHANGE							
b ₄	b ₃	b ₂	b ₁	COLUMNS b ₇ b ₆ b ₅	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
					0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	@	P	`	p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	\$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	{	8	H	X	h	x
1	0	0	1	9	HT	EM	}	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	:	J	Z	j	z
1	0	1	1	11	VT	ESC	+	;	K	[	k	}
1	1	0	0	12	FF	FS	,	<	L	\	l	!
1	1	0	1	13	CR	GS	-	=	M	]	m	}
1	1	1	0	14	SO	RS	.	>	N	^	n	~
1	1	1	1	15	SI	US	/	?	O	—	o	DEL

ADDRESS	CLEAR ADDRESS	ADDRESS	CLEAR ADDRESS
└──────────┘		└──────────┘	
LISTEN		TALK	

STANDARD CODE		DATA LINE		ADDRESS SWITCH
b ₁	≡	DI01	≡	A1
b ₂	≡	D102	≡	A2
b ₃	≡	D103	≡	A3
b ₄	≡	D104	≡	A4
b ₅	≡	D105	≡	A5

2-34. Example of Setting an Address

2-35. Except for ? and _ (underscore), any talk-listen address combination in the shaded areas of Table 2-2 can be used. Selecting a particular listen address will result in a corresponding talk address or vice versa. For example, if the ASCII # symbol is chosen for the listen address, then ASCII "C" would be the corresponding talk address. This can be seen in Tables 2-2 and 2-3 and as follows:

D107	D106	D105	D104	D103	D102	DIO1	—	BUSDATA LINES
b7	b6	b5	b4	b3	b2	b1	—	ASCII BITS
0	1	0	0	0	1	1	—	LISTEN ADDRESS = #
		A ₅ =0	A ₄ =0	A ₃ =0	A ₂ =1	A ₁ =1	—	ADDRESS SWITCHES
1	0	0	0	0	1	1	—	TALK ADDRESS = C

2-36. Note that for a given setting of the address switches, the listen address is determined by driving D107 to 0 and D106 to 1. The talk address is implemented by driving D107 to 1 and D106 to 0. Table 2-3 lists the available address codes.

2-37. Other examples of 5340A talk listen addresses are as follows:

5340A ADDRESS SWITCH SETTINGS					RESULTANT LISTEN ADDRESS	RESULTANT TALK ADDRESS
A ₅	A ₄	A ₃	A ₂	A ₁		
0	0	0	1	1	#	C
0	0	1	0	0	\$	D
0	1	0	1	0	*	J
1	1	1	0	0	<	\
1	0	0	1	1	3	S

2-38. Line Characteristics

2-39. All 15 bus lines are designed to be compatible with TTL or DTL integrated circuits. Since wire-ANDing is used on some lines, the TTL line drivers must be either open collector or tri-state. Each line in the 5340A is terminated in a resistor divider consisting of a 3K connected to 5V and a 6.2K connected to ground. All receivers are hex inverters (SN 7404N or equivalent) and the drivers are open collector NAND gates (SN 7438N or equivalent). These may be put into four groups:

- IFC, ATN, and REN are receivers only. They require -3.2 mA maximum at 0.4V to drive.

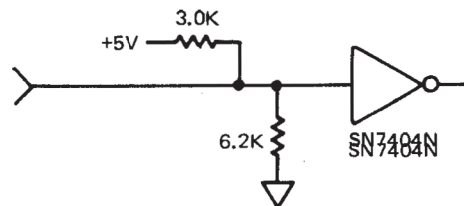
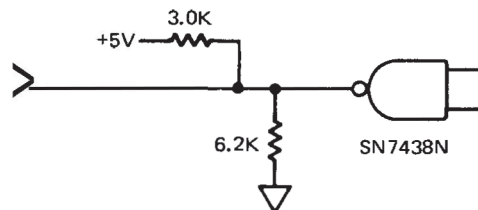


Table 2-3. Available Address Codes

DIO7 DIO6		DATA LINES					TALK ADDRESS	LISTEN ADDRESS
		DIO5	DIO4	DIO3	DIO2	DIO1		
		ADDRESS SWITCHES						
		A5	A4	A3	A2	A1		
See Note 2	0	0	0	0	0	@	SP	
	0	0	0	0	1	A	!	
	0	0	0	1	0	B	"	
	0	0	0	1	1	C	#	
	0	0	1	0	0	D	\$	
	0	0	1	0	1	E	%	
	0	0	1	1	0	F	&	
	0	0	1	1	1	G	'	
	0	1	0	0	0	H	(	
	0	1	0	0	1	I	)	
	0	1	0	1	0	J	*	
	0	1	0	1	1	K	+	
	0	1	1	0	0	L	,	
	0	1	1	0	1	M	-	
	0	1	1	1	0	N	.	
	0	1	1	1	1	O	/	
	1	0	0	0	0	P	0	
	1	0	0	0	1	Q	1	
	1	0	0	1	0	R	2	
	1	0	0	1	1	S	3	
	1	0	1	0	0	T	4	
	1	0	1	0	1	U	5	
	1	0	1	1	0	V	6	
	1	0	1	1	1	W	7	
	1	1	0	0	0	X	8	
	1	1	0	0	1	Y	9	
	1	1	0	1	0	Z	:	
	1	1	0	1	1	[	;	
	1	1	1	0	0	\	<	
	1	1	1	0	1	]	=	
	1	1	1	1	1	^	>	

NOTES: 1. Changing the listen address changes the talk address and vice versa.
2. Only first five bits of binary code are given. Sixth and seventh bits determine whether address is Talk or Listen. 01 for Listen, 10 for Talk.

- b. SRQ is output only: It is capable of sinking 45 mA at +0.4V.



- c. Data lines (DIO1 through DIO7) and the handshake lines (RFD, DAC, and DAV) are bi-directional. They are a combination of a and b, i.e., when a TALKER, capable of sinking 45 mA at +0.4V. When a LISTENER, requires -3.2 mA maximum at 0.4V to drive.
- d. DIO8 is connected to a similar divider and is always at 3.2V at 2K impedance.

2-40. Hardware

2-41. The 5340A's digital INPUT/OUTPUT connector is on the rear panel (Figure 2-2). Pin connections to this Type 57 Microribbon connector are shown in Figure 2-3.

2-42. Cables of three different lengths are available for connecting a 5340A to a controller or to another 5340A:

- a. 3 feet long HP Part No. 10631A.
- b. 6 feet long HP Part No. 10631B.
- c. 12 feet long HP Part No. 10631C.

2-43. These have one overall shield to reduce susceptibility to external noise. The cables use a mixture of individual wires and twisted pairs to reduce crosstalk. Both ends are identical. They are terminated in two 24-pin piggy back connectors; one male and one female. This termination permits several cables to be connected to the same 5340A. Pin connections of these connectors are shown in Figure 2-4. There is a restriction of no more than 12-feet between the first two instruments in the system and 6-feet between the remaining instruments. The 5340A can drive a maximum of 50-feet of this cable.

2-44. Programming the 5340A

2-45. The 5340A has a group of storage cells that are used to store program information. They are used ONLY when a controller has the 5340A operating under remote control. The ASCII characters that can be stored in each cell and their relationship to the 5340A's operation are shown in Table 2-4. (Refer to Table 2-2 for signal levels.)

Figure 2-2. 5340A Rear Panel

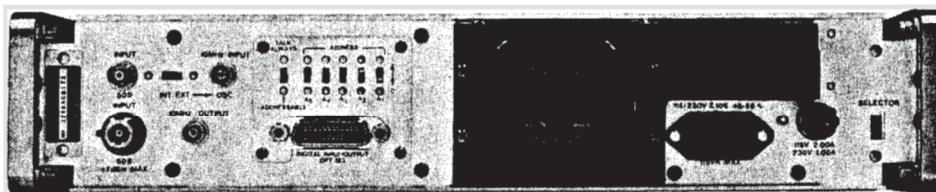


Figure 2-3. 5340A Digital Input/Output

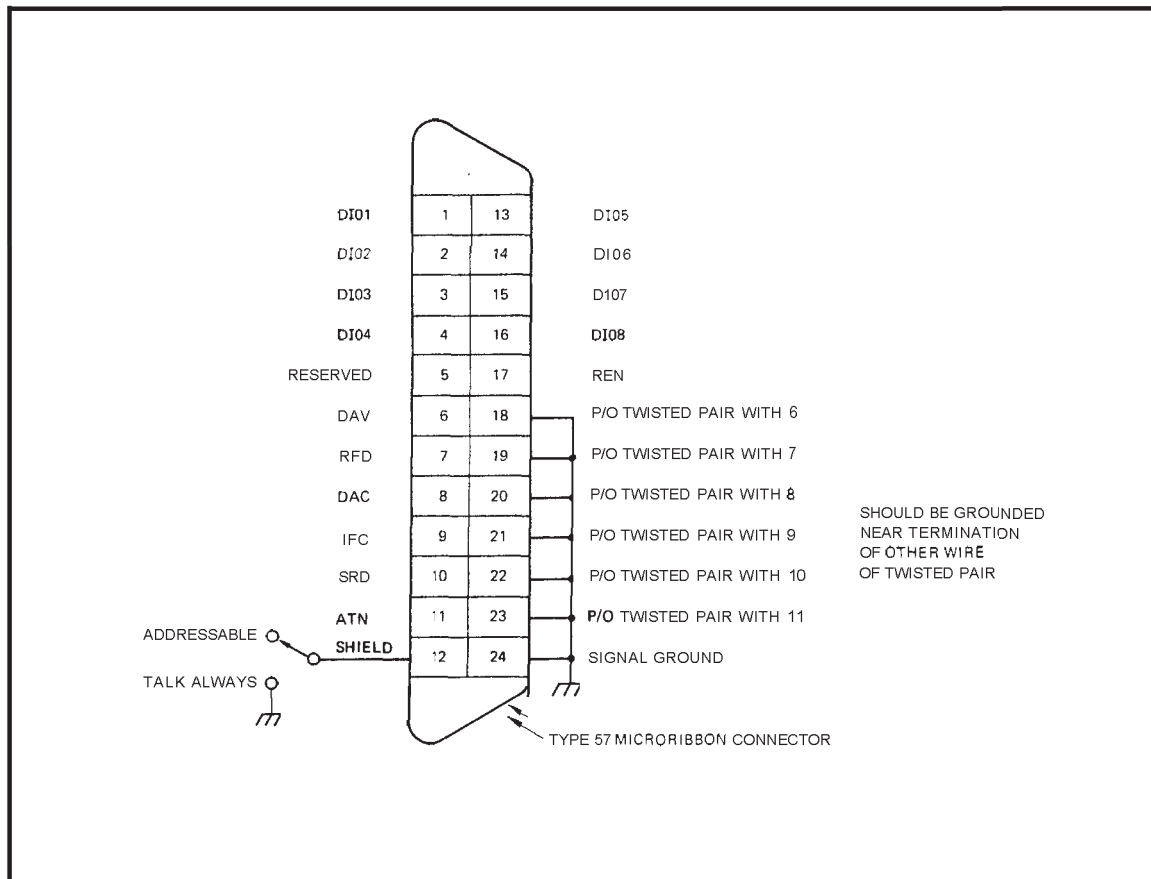


Figure 2-4. Pin Connections of the 10631A, B, C Cables

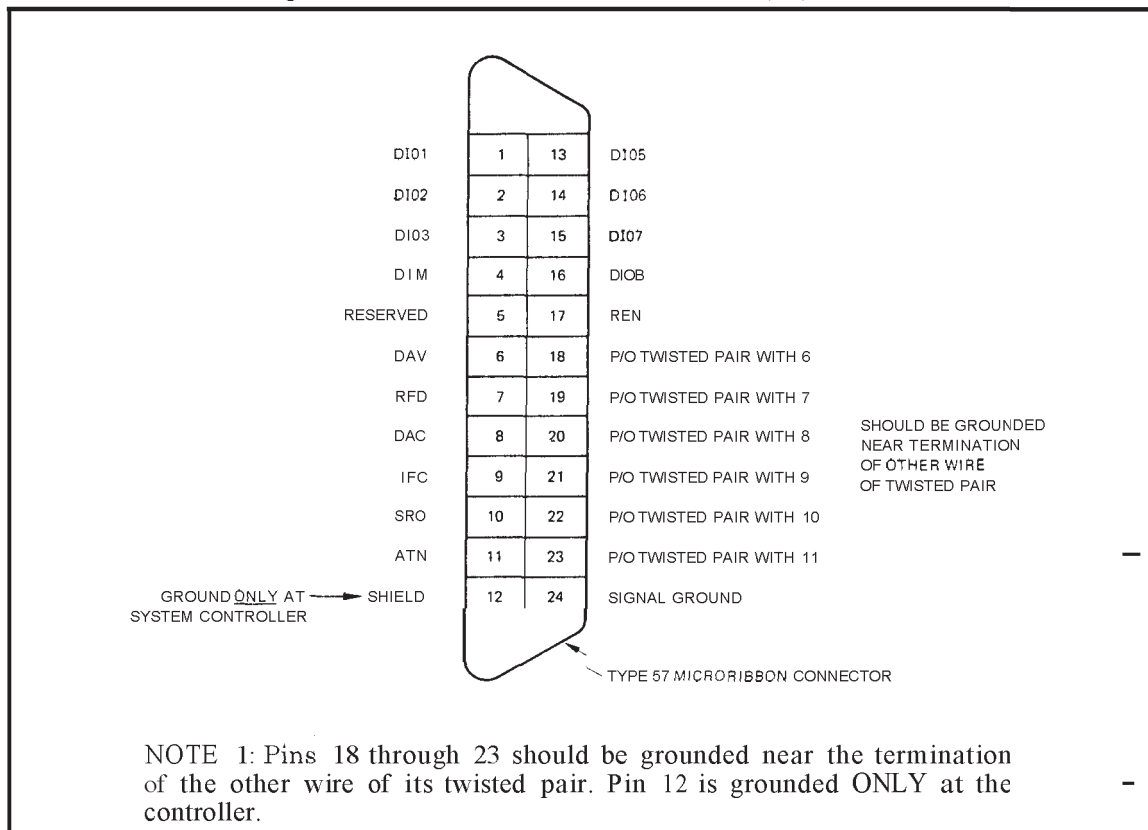


Table 2-4. 5340A Program Code Set

Resolution	Hz	ASCII*	Binary							Octal
			B ₇	B ₆	B ₅	B ₄	B ₃	B ₂	B ₁	
1	10 ⁰	0	0	1	1	0	0	0	0	060
10	10 ¹	1	0	1	1	0	0	0	1	061
100	10 ²	2	0	1	1	0	0	1	0	062
1K	10 ³	3	0	1	1	0	0	1	1	063
10K	10 ⁴	4	0	1	1	0	1	0	0	064
100K	10 ⁵	5	0	1	1	0	1	0	1	065
1M	10 ⁶	6	0	1	1	0	1	1	0	066
Ranges										
10 Hz - 250 MHz (hi Z)		S	1	0	1	0	0	1	1	123
Check		U	1	0	1	0	1	0	1	125
250 MHz - 18 GHz (50Ω)		T	1	0	1	0	1	0	0	124
10 Hz - 18 GHz (50Ω)		P	1	0	1	0	0	0	0	120
Octave Ranges (use with T&P only)										
Auto		@	1	0	0	0	0	0	0	100
>8 GHz		A	1	0	0	0	0	0	1	101
4 GHz - 8 GHz		B	1	0	0	0	0	1	0	102
2 GHz - 4 GHz		C	1	0	0	0	0	1	1	103
1 GHz - 2 GHz		D	1	0	0	0	1	0	0	104
500 MHz - 1 GHz		E	1	0	0	0	1	0	1	105
250 MHz - 500 MHz		F	1	0	0	0	1	1	0	106
10 Hz - 250 MHz		G	1	0	0	0	1	1	1	107
Sample Rate										
Internal Sample Rate		J	1	0	0	1	0	1	0	112
Hold		K	1	0	0	1	0	1	1	113
SAMPLE TRIGGER (measure)		I	1	0	0	1	0	0	1	111
RESET		H	1	0	0	1	0	0	0	110
OUTPUT MODES										
ONLY IF addressed		L	1	0	0	1	1	0	0	114
WAIT until addressed		M	1	0	0	1	1	0	1	115
Local-Remote										
Local (front panel) control		N	1	0	0	1	1	1	0	116
Remote (program storage cell) control		O	1	0	0	1	1	1	1	117
RESET PUSHBUTTON/POWER UP conditions are 0, P, @, J, L, N										
*Signal levels also shown in Table 2-2.										

2-46. The program storage cells are loaded with a pre-determined set of conditions when either the front panel RESET pushbutton is depressed or when power is turned on. The initial conditions are listed in Table 2-4 under RESET PUSHBUTTON/POWER UP. Notice that each time either the RESET pushbutton is depressed or power is turned OFF - then ON, the 5340A operates according to its front panel controls.

- Resolution and Range - Relate directly to the front panel controls and are self-explanatory. For example, ASCII "S" selects the 10Hz - 250 MHz range and the BNC input connector.

- b. Octave Ranges - The 5340A can be made to operate in a particular octave range by sending it the proper ASCII character. This feature can save up to 110 msec of search time when the signal to be measured is in one of the octave ranges. When a controller wants to take control of the 5340A's operation, it only changes those cells where initial conditions are different than the desired program. Program information may be sent in any sequence. The 5340A will not make a measurement if there is either no signal in the selected range or there is one with a larger amplitude in some other range. When AUTO is selected, the 5340A automatically sweeps through all ranges until it finds the signal to be measured.
- c. Sample Rate Modes
 - (1) Internal Sample Rate - Sample rate time is determined by the 5340A's SAMPLE RATE control.
 - (2) Hold - The 5340A waits in the Sample Rate phase of its operating cycle until made to continue by either a SAMPLE TRIGGER instruction, a RESET instruction or the front panel RESET pushbutton is depressed.
- d. Sample Trigger Instruction - Is intended to be used in conjunction with the SAMPLE RATE HOLD mode. It makes the 5340A leave the Sample Rate HOLD phase of its operating cycle and make a measurement. Sample trigger does not reset the display nor does it initialize the phase locked loops (make the 5340A go through its search procedure). The 5340A will ignore the Sample Trigger instruction unless it is waiting in the Sample Rate phase of its operating cycle.
- e. Reset Instruction - Clears the display, initializes the phase locked loops and starts a new measurement procedure. It may be sent at any time in the 5340A's operating cycle. A reset instruction does not initialize the remote program storage cells as does the front panel RESET pushbutton. The 5340A obeys the Reset instruction if addressed to LISTEN whether in local or remote operation.
- f. Output Modes - A 5340A outputs in one of two modes providing it has been addressed to TALK.
 - (1) ONLY IF addressed (ASCII "L" stored in the program storage cell). The 5340A will output each measurement if it has been addressed to TALK. If not so addressed, it bypasses the entire output phase of its operating cycle.
 - (2) WAIT until addressed (ASCII "M" stored in this program storage cell). The 5340A will make a measurement then wait in the output phase of its operating cycle until it is addressed to TALK. As soon as it is so addressed, it will output and continue according to the information in its program storage cells.

Notice that the 5340A ALWAYS outputs when it reaches the output phase of its operating cycle IF it has been addressed to TALK. When programmed ONLY IF, the 5340A continues to go through its operating cycle bypassing the Output phase until addressed to TALK. When programmed to WAIT, the 5340A will stop at its output phase and stay there until addressed to TALK.

- g. Local-Remote
 - (1) Local - The 5340A operates according to its front panel controls.
 - (2) Remote - Used in conjunction with the control line REN (Remote Enable) to have the 5340A operate according to the information in its program storage cells.
- h. Reset Pushbutton/Power Up
When power is first turned on (Power UP) or the front panel RESET pushbutton is depressed, the 5340A performs according to its front panel controls. However, it has stored

in its remote programming storage cells the initial conditions of 0, P, @, J, L, and N. There are:

- 0 - 1 Hz resolution
- P - 10 Hz to 18 GHz range
- @ - AUTO (sweeps through all ranges)
- J - Internal Sample Rate
- L - Output ONLY IF addressed
- N - Local operation

When taking remote control of the 5340A it is necessary to change only those cells that are different from the above. For example, if the 5340A is to be used under remote control, 1 Hz resolution, 10 Hz to 18 GHz range, automatic searching, sample rate HOLD and WAIT in output phase until addressed; it is only necessary to change the ASCII "J" to "K", "L" to "M", and "N" to "0". These changes can be made in any order.

2-47. What is Outputted

2-48. When addressed to TALK the 5340A outputs a string of 16 ASCII characters provided there is an addressed LISTENER on the bus. The handshake routine, necessary for passing information on the data lines, cannot be started unless there is both an addressed LISTENER and TALKER on the bus. The LISTENER must be able to recognize LF (line feed) as the end of the 5340A's output data. As soon as the LISTENER accepts LF (sets DAC high) the 5340A leaves the output phase and continues through its operating cycle.

2-49. The 16 output characters, their description and the order in which they are outputted are shown in Table 2-5. Refer to Table 2-2 for signal levels.

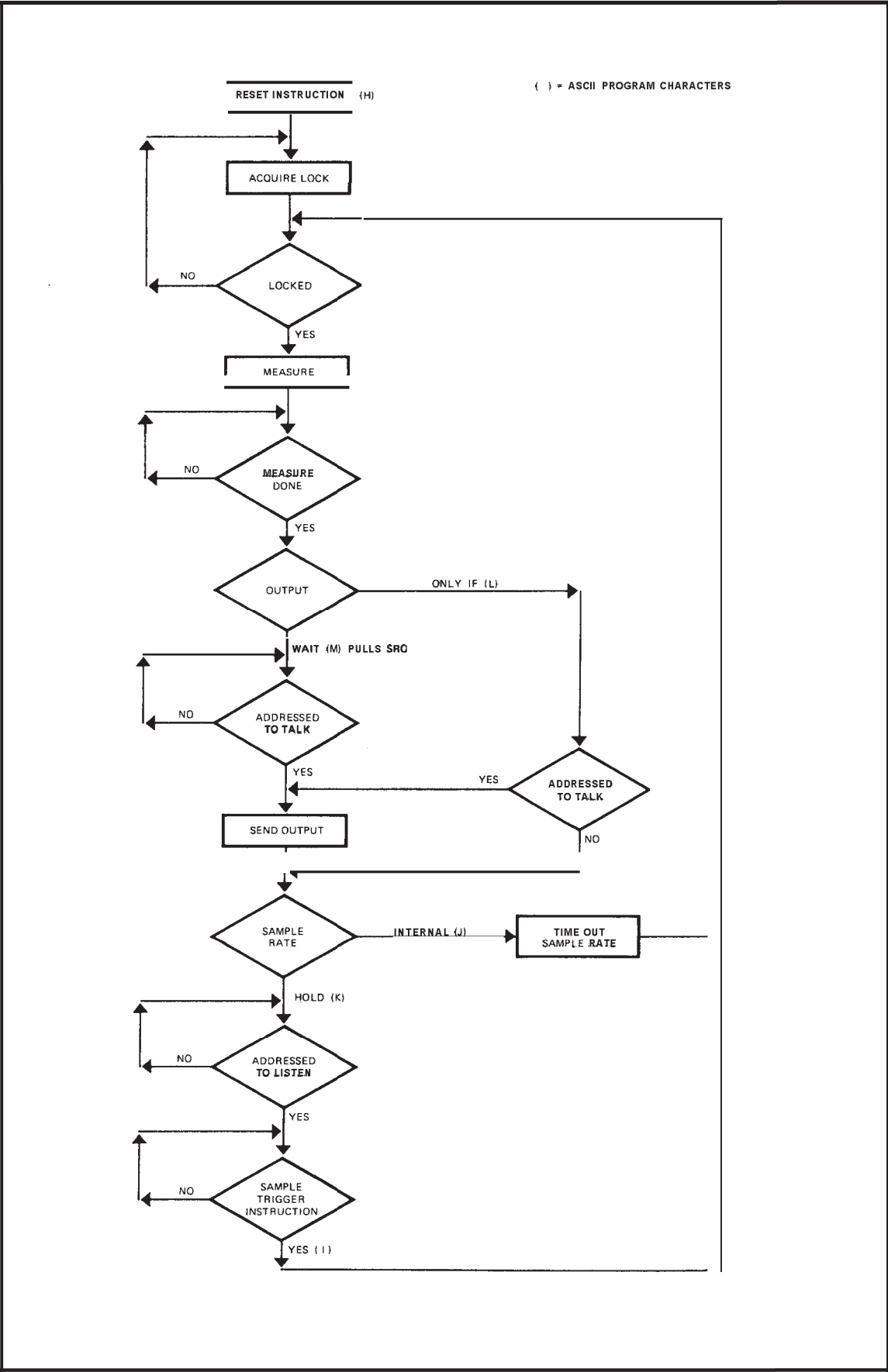
Table 2-5. 5340A Output Code Set

ORDER OUTPUTTED	CHARACTER	DESCRIPTION
1	D/L	D - measurement made direct or L - measurement made using phase locked loops
2	O/SP	O - 5340A's display has overflowed or SP - Space (0 100 000 binary, 040 octal)
3	SP	Space
4 thru 11	0 - 9	Digits 0 thru 9 (blank display digits outputted as 0) most significant digit first
12	E	Power of 10 exponent to follow
13	+	Exponent is positive (0 101 011 binary, 053 octal)
14	0 - 6	One digit exponent
15	CR	Carriage return (0 001 101 binary, 015 octal)
16	LF	Line feed (used as a word terminator) (0 001 010 binary, 012 octal)

2-50. Modes of Operation

2-51. The 5340A has several remote operating modes. They depend on the Sample Rate and Output modes and the method used to initiate a measurement procedure. This section includes a description of these modes, a simplified flow chart (Figure 2-5) showing all operating modes and a sample program.

Figure 2-5. 5340A Remote Operation



2-52. The two principal modes of remote operation based on the Sample Rate and Output modes are described in (a) and (b) below. Modes (c) and (d) are possible by selecting the remaining combinations of the Sample Rate and Output modes.

- a. Internal Sample Rate (J) and Output ONLY IF (L)
 - (1) If NOT addressed to TALK the 5340A makes measurements continuously at a rate determined by its Sample Rate time plus measurement time. It skips the output phase of its operating cycle.
 - (2) If 5340A is addressed to TALK, it no longer skips its output phase. The next and all subsequent measurements are outputted.
- b. Sample Rate HOLD (K) and WAIT until addressed (M) the 5340A sequence is:
 - (1) Addressed to LISTEN.
 - (2) Instructed to make a measurement.
 - (3) Makes a measurement and stops in its output phase.
 - (4) Addressed to TALK.
 - (5) Outputs and stops in its Sample Rate phase.
 - (6) Addressed to LISTEN.
 - (7) Instructed to make measurement, then repeats 3 through 6.
- c. Internal Sample Rate (J) and WAIT until addressed (M) the 5340A:
 - (1) Makes a measurement and stops in its output phase.
 - (2) Is addressed to TALK.
 - (3) Outputs, goes through its sample rate, and makes another measurement and if
 - (a) Still addressed to TALK it repeats (3).
 - (b) Not addressed to TALK it stops in its output phase and waits until so addressed then repeats (3).
- d. Sample Rate HOLD (K) and Output ONLY IF addressed (L) the 5340A is:
 - (1) Addressed to LISTEN.
 - (2) Instructed to make a measurement.
 - (3) Makes the measurement and if:
 - (a) Addressed to TALK by the end of the measurement phase it outputs and stops in the Sample Rate phase until (1) and (2) are repeated.
 - (b) Not addressed to TALK by the end of the measurement phase it skips output and stop in the Sample Rate phase until (1) and (2) are repeated.

2-53. Starting a Measurement Procedure

2-54. When operating the 5340A under remote control, a measurement procedure may be initiated by sending a Reset or Sample Trigger Instruction or by letting its sample rate time run out.

- a. Internal Sample Rate (J) - a measurement starts at the end of sample rate time.
- b. Reset Instruction (H)
 - (1) Can be given at any time during a 5340A's operating cycle.
 - (2) Does not change the information in the program storage cells.

- (3) Clears the display.
- (4) Initializes the phase locked loops forcing a new search procedure.
- (5) Starts measurement phase of the 5340A's operating cycle.

c. Sample Triggers Instruction (I):

- (1) Can be given only if the 5340A is stopped in the Sample Rate phase of its operating cycle. If given at any other time it will be ignored by 5340A.
- (2) Does not change the information in the program storage cells.
- (3) Does not clear the display.
- (4) Does not initialize the phase locked loops, i.e., the 5340A does not go through a search procedure unless it has lost phase lock since the previous measurement.
- (5) Starts the measurement phase of the 5340A's operating cycle.

2-55. Examples of Programming

2-56. Assume that it is desired to program a 5340A for a measurement of approximately 3.5 GHz to a 1 kHz resolution. In addition, it is desired to instruct the 5340A to make a measurement and subsequently output when so instructed. One method of programming this is shown in Table 2-6. (Assume the 5340A listen address is ASCII “#” and the talk address is ASCII “C”).

2-57. Another example of programming is with a mark sense card reader. Assume that it is desired to program a 5340A using a 3260A Mark Sense Programmer for an automatic measurement to a 1 kHz resolution (where a digital output is not required). Figure 2-6 shows the marked program card.

Table 2-6. 5340A Programming Example

Sequence	Control and Status Lines				Data Lines ASCII Codes	Description of Program Sequence
	SRC	IFC	REN	AT		
1	H	H	H*	L	_ (underscore) or controller's talk address	Clears 5340A as a TALKER
2					?	Clears all LISTENERS
3					#	5340A LISTEN ADDRESS is on Data Lines
4				H		5340A is addressed to LISTEN
5					3 T C K M O	1 kHz resolution is selected 250 MHz to 18 GHz range selected 2 to 4 GHz range selected Sample Rate HOLD selected WAIT until addressed to TALK 5340A remote-local cell loaded with REMOTE Loading program cell operation (can be loaded in any order)
6			L			5340A in REMOTE control (operates according to Sequence 5)
7					H	RESET and start search procedure
8	L					5340A has completed measurement and is ready to output
9				L	C	5340A TALK ADDRESS is on Data Lines
10					?	Clears all LISTENERS
11					Listener's Address	LISTENER'S ADDRESS on Data Lines
12				H		LISTENERS are addressed, 5340A addressed to TALK, it OUTPUTS and waits in the SAMPLE RATE phase of its operating cycle
13	H	H		L	_ (underscore) or controller's talk address	Clears 5340A as a TALKER
14					?	Clears all LISTENERS
15					#	5340A LISTEN ADDRESS is on Data Lines
16				H		5340A is addressed to LISTEN
17					I	Sample Trigger Instruction initiates new measurement
Repeats from Sequence 8						

*REN may be low during entire example, but must be low before Step 7.

Figure 2-6. Example Program Card

ATN
D 7
D 6
D 5
D 4
D 3
D 2
D 1
DAV

PROGRAM CARD
TITLE _____

CARD NO. _____ OF _____

NO.	STEP	CODE	200	100	40	20	10	4	2	1
1	CLEAR	—	■	■	□	■	■	■	■	■
2	CLEAR	7	■	□	■	■	■	■	■	■
3	ADDRESS	#	■	□	■	□	□	□	■	■
4		3	□	□	■	■	□	□	■	■
5		P	□	■	□	■	□	□	□	□
6		@	□	■	□	□	□	□	□	□
7		J	□	■	□	□	■	□	■	□
8		L	□	■	□	□	■	■	□	□
9		O	□	■	□	□	■	■	■	■
10		H	□	■	□	□	■	□	□	□
11	CLEAR	?	■	□	■	■	■	■	■	■
12			■	■	■	■	■	■	■	■
13			□	□	□	□	□	□	□	□
14			□	□	□	□	□	□	□	□
15			□	□	□	□	□	□	□	□
16			□	□	□	□	□	□	□	□
17			□	□	□	□	□	□	□	□
18			□	□	□	□	□	□	□	□
19			□	□	□	□	□	□	□	□
20			□	□	□	□	□	□	□	□
21			□	□	□	□	□	□	□	□
22			□	□	□	□	□	□	□	□
23			□	□	□	□	□	□	□	□
24			□	□	□	□	□	□	□	□
25			□	□	□	□	□	□	□	□
26			□	□	□	□	□	□	□	□
27			□	□	□	□	□	□	□	□
28			□	□	□	□	□	□	□	□
29			□	□	□	□	□	□	□	□
30			□	□	□	□	□	□	□	□
31			□	□	□	□	□	□	□	□
32			□	□	□	□	□	□	□	□

1. LOW (1)

2. HIGH (0)

3. 3260A MARK SENSE PROGRAMMER SETS REN LOW ALL THE TIME POWER IS ON.

1. USE SOFT PENCIL
2. DO NOT MARK IN SHADED AREA (TOP)
3. ERASE COMPLETELY
4. INSERT THIS SIDE UP

13M88252 hp PART NO. 9320-2886 13M88252

FOR DIGITAL OUTPUT, ADD C AND () 5340 TALK ADDRESS

SECTION III

OPERATION

3-1. INTRODUCTION

3-2. This section contains operating information including operating characteristics, input cable considerations, controls and indicators, and operating procedures. Programming instructions are contained in Section 11.

3-3. OPERATING CHARACTERISTICS

3-4. The following paragraphs describe the operating ranges and modes, resolution, sample rate, AM and FM characteristics, and auto-amplitude discrimination.

3-5. Operating Ranges

3-6. There are two basic operating ranges available: 10 Hz to 250 MHz and 250 MHz to 18 GHz. Frequencies in the lower range are measured directly while measurements in the 250 MHz to 18 GHz range are made with an indirect transfer oscillator technique. Provision is made to select three operating ranges, these are:

- a. 10 Hz to 250 MHz at the BNC connector (1 MR, 25 pF).
- b. 250 MHz to 18 GHz at the N connector (50 Ω).
- c. 10 Hz to 18 GHz at the N connector (50 Ω).

3-7. The 10 Hz to 250 MHz range restricts the counter to direct measurements. The 250 MHz to 18 GHz range restricts the counter to the transfer oscillator mode, and the 10 Hz to 18 GHz range allows both modes of operation to be in effect. Annunciator lights are included to indicate when the counter is measuring directly (DIR light) or indirectly (LOCK light). It should be noted that during the 10 Hz to 18 GHz operation, the counter may lock on a signal in the 10 Hz to 250 MHz range in preference to a signal in the transfer oscillator range. Thus, to measure a high frequency signal (>250 MHz) containing high levels of residual low frequencies, it is necessary to select the 250 MHz to 18 GHz range. Otherwise, the switch position is dictated by the impedance requirements and frequency of the input signal.

3-8. Resolution and Blanking

3-9. In a frequency counter, resolution can be defined as the value represented by the least significant digit (LSD). In the 5340A, a maximum resolution of 1 Hz can be selected. Decade multiples of 1 Hz to 1 MHz are available. For example, with an input of 12,345,678 Hz, setting the RESOLUTION switch to 1, the counter displays the 8 in the LSD. Selecting 100 on the RESOLUTION switch places the 6 in the LSD. If a frequency such as 123,456,789 Hz is measured with 1 Hz resolution selected, the counter will overflow so that the 1 is not displayed and the 9 will appear in the LSD. For high resolution of measurements which would result in an overflow, two measurements can be made. The first measurement is made with a resolution setting that is adequate to display the most significant digits. The second measurement is made with maximum resolution to display the least significant digits.

3-10. The counter blanks all digits to the left of the most significant digit, suppressing leading zeros.

3-11. Sample Rate, Measurement Time, and Reset

3-12. The sample rate control sets the interval between measurements, but not the interval of the measurement. On the **5340A**, the minimum sample rate is variable between approximately **50** milliseconds and **5** seconds. For **1 Hz** RESOLUTION settings, an additional **1 sec** delay is incurred. A hold feature can be selected to “freeze” a measurement display indefinitely.

3-13. The measurement interval (gate time) is the time that the counter’s gate remains open to accumulate counts. In the **5340A**, the gate time is a function of the resolution selected and the input frequency. Typical measurement time for an **18 GHz** signal with **1K** resolution selected is about **120 msec**. With **1 Hz** resolution selected and an **18 GHz** input, the gate time is quite long, approximately **120** seconds. However during this time, the LOCK annunciator lights to indicate that a measurement is in progress.

3-14. Reset is accomplished by pressing the RESET switch or changing the RESOLUTION or RANGE switch. When the counter is reset, the display reads all zeros and a new measurement cycle is initiated.

3-15. AM Characteristics

3-16. The **5340A** will measure inputs containing amplitude modulation provided that the minimum level of the input signal is greater than the sensitivity specification. The maximum modulation permissible can be calculated by the following formula:

$$\frac{V_u - V_s}{V_u} = \% \text{ modulation} \quad \text{where: } V_u \text{ is the unmodulated rms input level.}$$

$$V_s \text{ is the sensitivity specification at the frequency of interest.}$$

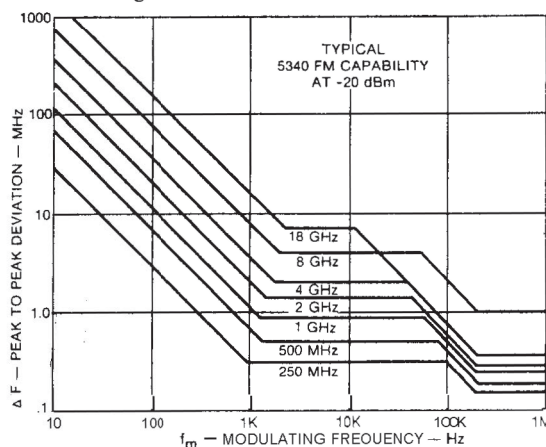
As an example of the use of the formula, calculate the maximum permissible modulation for a **-10 dBm (70 mV)** input at **10 GHz**. At **10 GHz**, the sensitivity specification is **-35 dBm (4 mV)**
Using the formula:

$$\frac{V_u - V_s}{V_u} = \frac{70 \text{ mV} - 4 \text{ mV}}{70 \text{ mV}} = \frac{66 \text{ mV}}{70 \text{ mV}} = 94.5\% \text{ modulation}$$

3-17. FM Characteristics

3-18. The **5340A** will measure carrier frequencies in the presence of frequency modulation, phase modulation, or residual noise. The FM characteristics are a function of the modulation rate and carrier frequency as shown in Figure 3-1.

Figure 3-1. FM Characteristics



3-19. Auto-Amplitude Discrimination

3-20. This feature allows the counter to select and measure the signal with the largest amplitude in the 250 MHz to 18 GHz range. This is with the provision that the largest signal is 20 dB greater in amplitude than any other signal present. Although 20 dB is the guaranteed specification, typical operation is about 10 dB. The auto-amplitude discrimination feature is useful for discriminating against harmonics, and spurious signals.

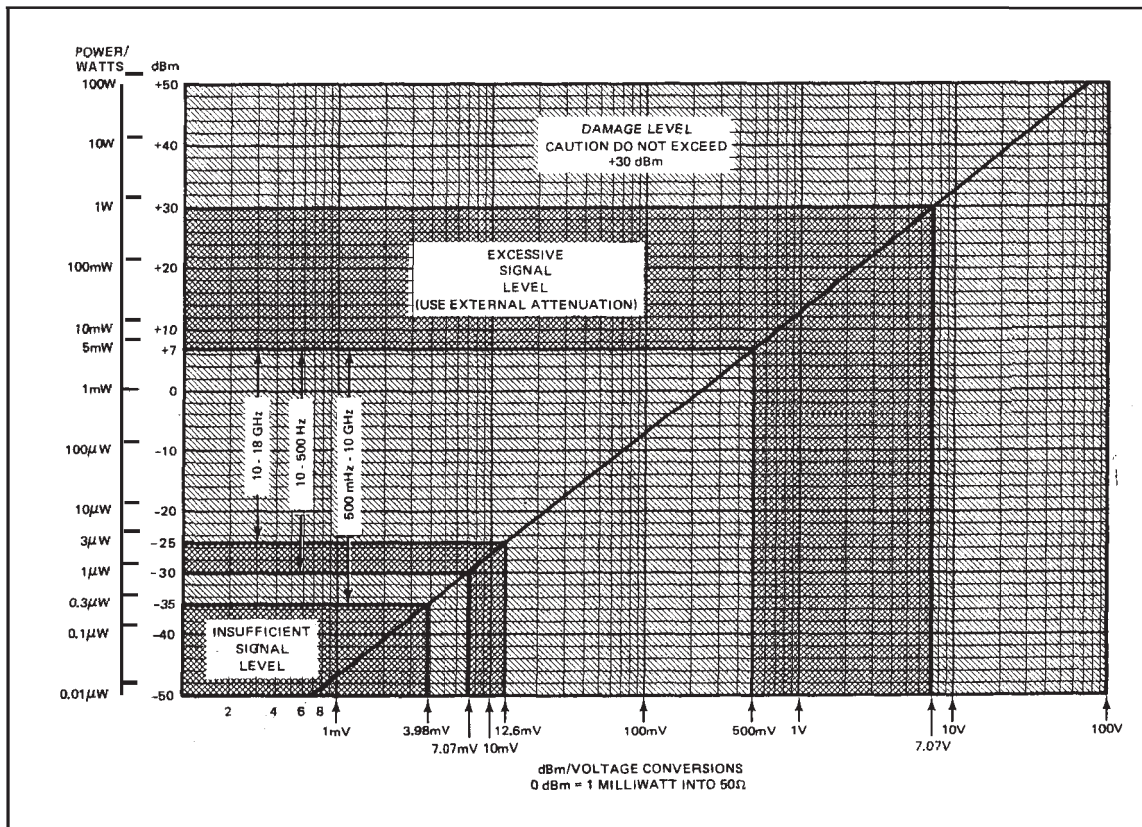
3-21. MAXIMUM INPUT SIGNAL POWER

CAUTION

DO NOT EXCEED 1 WATT OF INPUT POWER AT THE 50-OHM N CONNECTOR. DAMAGE TO THE INTERNAL SAMPLERS MAY OCCUR. PLEASE READ PARAGRAPH 3-22 FOR FULL EXPLANATION OF INPUT LEVELS.

3-22. The 5340A will function within specifications for signal inputs up to +7 dBm (5.012 milliwatts or 0.5006 volts into 50-ohms). Under no circumstance should the input level exceed 1-watt (+30 dBm RF power or ± 7 volts dc into 50-ohms, dc power). If the input power exceeds 1-watt, damage to the internal samplers may occur and these are quite expensive to replace. Measurements from +7 dBm to +30 dBm are not recommended because false harmonic locks and readings may occur. When signal levels exceed +7 dBm, external attenuators should be used. The 1-watt maximum input level is the total RF and dc power at the input connector. Figure 3-2 shows power levels with conversions to volts and dBm.

Figure 3-2. DBM to Volts Conversions



3-23. INPUT CABLE CONSIDERATIONS

3-24. Consideration should be given to input cable losses at higher frequencies. For example, a 6-foot RG-214/U coaxial cable has about 15dB loss at 18GHz. Such losses should be taken into consideration along with the sensitivity specifications given in Table 1-3.

3-25. For low capacity input measurements, a 10:1 low capacity oscilloscope probe (HP 10004A) can be used on the BNC connector for frequency inputs up to approximately 100 MHz.

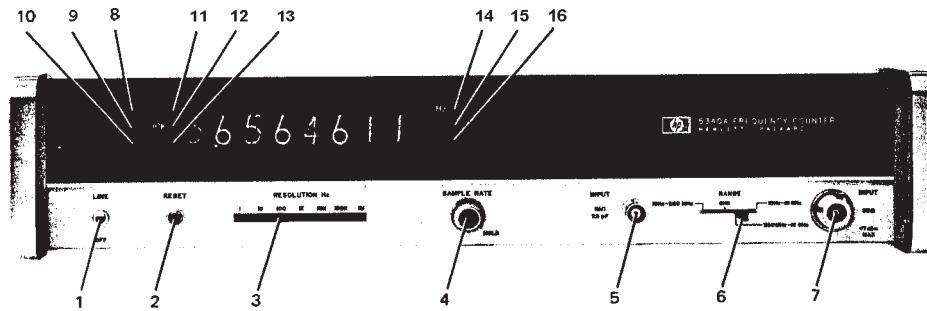
3-26. CONTROLS, INDICATORS, AND CONNECTORS

3-27. Figure 3-3 describes the front panel controls, indicators, and connectors. Figure 3-4 describes the rear panel connectors and controls.

3-28. OPERATING PROCEDURES

3-29. Figure 3-5 illustrates the operating procedures. Self check procedures are given in Figure 3-6.

Figure 3-3. Front Panel Controls and Indicators



1. LINE switch. Applies primary power to all circuits except crystal oven Option 001, when so equipped. When the counter is equipped with Option 001, the crystal oven connects through a thermal circuit breaker and fuse to the ac line. This allows the oven to maintain its operating temperature and accuracy when the LINE switch is OFF, thereby eliminating warm-up delays.
2. RESET switch. Resets display and internal count to zero and initiates a new measurement.
3. RESOLUTION Hz selector. Determines resolution of the measurement. See Paragraph 3-8 for a detailed description. In general, the 1 kHz setting is a good starting point.
4. SAMPLE RATE control. Adjusts the interval between measurements from approximately 50 milliseconds to 5 seconds. For 1 Hz RESOLUTION settings an additional 1 second delay is incurred. When rotated to the HOLD position, the display will be held indefinitely.
5. BNC 1 MEG Ω Input Connector. High impedance (1 Megohm) input for direct count measurements in the 10 Hz to 250 MHz range. Shunt input capacity is 25 pF maximum. Measurements made at this input require that the RANGE switch is set to the 10 Hz - 250 MHz position. Sensitivity is 50 millivolts rms and the coupling is ac.
6. RANGE switch. Selects input connectors and ranges as indicated by the black leader lines. When set to the CHECK position, the circuits count the frequency of the internal clock to verify proper counter operation.

CAUTION

DO NOT EXCEED +30 dBm (1 WATT) INPUT AT THE 50 Ω N CONNECTOR. DAMAGE TO THE INTERNAL SAMPLERS MAY OCCUR. PLEASE READ PARAGRAPH 3-21 FOR DETAILS OF ACCEPTABLE INPUT LEVELS.

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

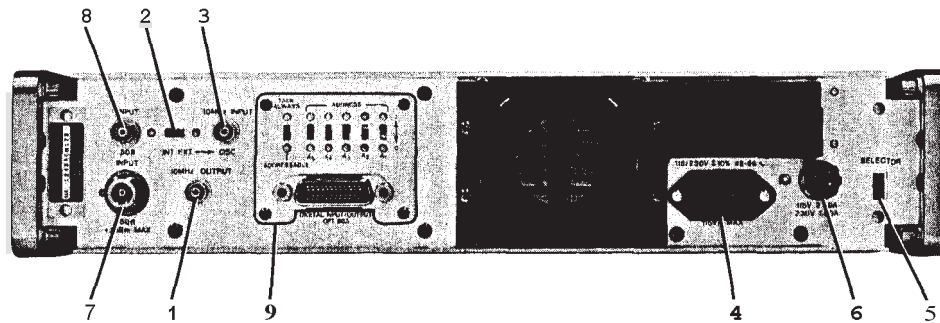
7. N Type 50 Ω Input Connector. Input for measurements in the 10 Hz to 18 GHz or 250 MHz to 18 GHz range as determined by the RANGE switch. Sensitivity is -30 dBm from 10 Hz to 500 MHz, -35 dBm from 500 MHz to 10 GHz and -25 dBm from 10 GHz to 18 GHz.
8. RMT annunciator. For counters equipped with Option 011 only. Lights when the counter is in remote operation.
9. DIR annunciator. Lights when counter is in direct measurement mode. (10 Hz to 250 MHz.)
10. * annunciator. Operative with Option 001 only. Lights when the oven is heating to indicate oscillator is not stabilized. Full counter accuracy is obtained when the oven has stabilized. Twenty minutes after turn on, additional oscillator error is less than 5 parts in 10⁹ at 25°C. If the line voltage is low, the * may remain lit for longer periods of time.

NOTE

At low environmental temperatures, e.g., 0°C, the * annunciator may remain on for longer periods of time. When the oven temperature stabilizes, it may continue to draw power in order to maintain operating temperature.

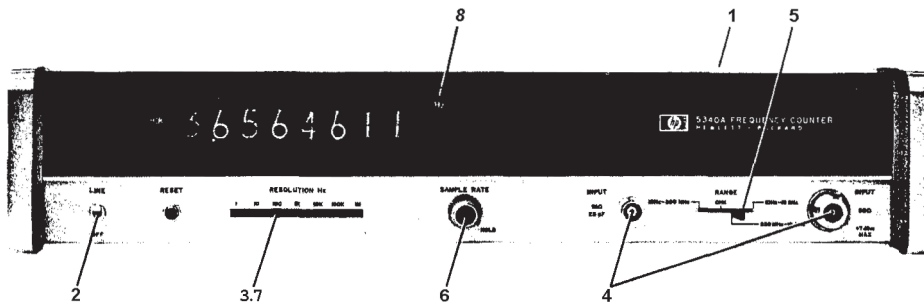
11. OVFL annunciator. Indicates that one or more of the most significant digits (digits left most from the decimal point) are not displayed. The digits that are displayed will be accurate to within ± 1 count $\pm$ the time base accuracy. For example, if 123,456,789 Hz is measured with 1 Hz RESOLUTION selected, the OVFL annunciator will light, the 1 will not be displayed, and the numbers 23456789 will be displayed and are valid.
12. LOCK annunciator. Indicates that phase LOCK has occurred and a measurement is being made with the transfer oscillator technique.
13. GATE annunciator. Indicates when the counter's main gate is open and a measurement is in progress.
- 14, 15, 16. GHz, MHz kHz annunciators. Indicates the units multiplier of the measurement.

Figure 3-4. Rear Panel Controls and Connectors



1. 10 MHz OUTPUT. Supplies a 10 MHz square wave output at 2.4 volts peak-to-peak or greater. Output is TTL compatible.
2. INT-EXT OSC switch. Selects time base source. When set to INT, the counter operates from its internal 10 MHz oscillator. When set to EXT, it allows an external 10 MHz sine wave or square wave at the 10 MHz INPUT jack to operate the counter. External oscillator requirements are 10 MHz at approximately 1.5 volts peak-to-peak into 1 k Ω .
3. 10 MHz INPUT jack. Accepts external time base signal. Requirements are a 10 MHz sine wave or square wave at approximately 1.5 volts peak-to-peak (1 k Ω impedance). The INT-EXT switch must be set to EXT to accept the external OSC input.
4. AC Input Connector. Ac power receptacle. IEC type with offset pin connected to the chassis. Accepts 115 volts or 230 volts $\pm 10\%$, 48 to 68 Hz. Maximum power draw is 100 volt amperes.
5. SELECTOR switch. Allows the 5340A to operate off of 115 volts or 230 volts ac. Use a narrow bladed screwdriver and slide the switch to show the desired operating voltage.
6. FUSE. Requires a 2.0 amp normal blow fuse for 115-volt operation or a 1.0 amp normal blow fuse for 230-volt operation.
7. Input Option 002 N connector. Same as front panel N connector, see Figure 3-3.
8. BNC input connector Option 002. Similar to front panel BNC input except that this option includes a 50-ohm termination on the front panel BNC connector.
9. Digital Input/Output Option 011. Connector and address switches for remote programming and digital output. See Section II for details of operation.

Figure 3-5. 5340A Operating Procedures



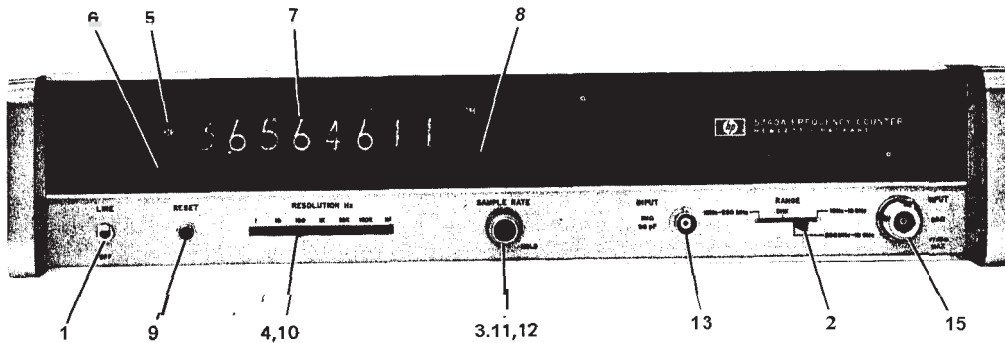
1. On Rear Panel set INT-EXT switch to INT position.
2. Set LINE switch to on (up) position.
3. Set RESOLUTION Hz to desired resolution. Recommended starting setting is 1 kHz.

CAUTION

DO NOT EXCEED +30 dBm (1 WATT) INPUT AT THE 50 Ω N CONNECTOR. DAMAGE TO THE INTERNAL SAMPLERS MAY OCCUR. PLEASE READ PARAGRAPH 3-21 FOR DETAILS OF ACCEPTABLE INPUT LEVELS.

4. Connect input signal to appropriate input connector according to input frequency and impedance requirements.
5. Set RANGE switch to correspond with input connector being used.
6. Adjust SAMPLE RATE control for desired interval between measurements.
7. Adjust RESOLUTION Hz switch for desired number of significant digits.
8. Display is in units shown with correct decimal point and significant digits.

Figure 3-6. Self Check and Operational Check Procedures



1. Set LINE switch to on (up) position.
2. Set RANGE switch to CHK position.
3. Rotate SAMPLE RATE control fully ccw.
4. Set RESOLUTION switch to 1 Hz.
5. Check that DIR annunciator lights.
6. Check that GATE light flashes.
7. Check that display indicates 10.000000 ± 1 count.
8. Check that MHz annunciator lights.
9. Press and hold RESET switch, DIR and GATE lights should go out and display should be 00.000000. Release RESET switch, check that display is $10.000000 \text{ MHz} \pm 1$ count.
10. Change RESOLUTION switch to the following positions and check for proper display. When the switch is in between positions, the DIR light and GATE light should go out and the display should reset (all zeros).

RESOLUTION Switch

10 Hz
100 Hz
1 kHz
10 kHz
100 kHz
1 MHz

DISPLAY (B = Blank Display Tube)

B1000000 MHz ± 1 count
BB100000 MHz ± 1 count
BBB10.000 MHz ± 1 count
BBBB10.00 MHz ± 1 count
BBBBB10.0 MHz ± 1 count
BBBBB.010 GHz ± 1 count

Figure 3-6. Self Check and Operational Check Procedures (Continued)

11. For the 1 MHz RESOLUTION setting, check that GATE light flashes rapidly. Rotate SAMPLE RATE control fully clockwise but not in HOLD. Gate light should flash once approximately every 5 seconds.
12. Set SAMPLE RATE to HOLD and check that GATE light goes out and display is held indefinitely.
13. Connect a 220 MHz signal at 0 dBm (0.2236 volts rms) to the 10 Hz - 250 MHz INPUT. Set RANGE switch to 10 Hz to 250 MHz. Set RESOLUTION switch to 1K. Rotate SAMPLE RATE control fully ccw.
14. Check that gate lamp flashes, DIR lamp lights, and counter displays proper frequency for all positions of RESOLUTION switch.
15. Connect the 220 MHz signal (0 dBm) to the 50 Ω INPUT and set RANGE switch to 10 Hz - 18 GHz. Set RESOLUTION switch to 1 kHz.
16. Check that GATE lamp flashes, DIR lamp lights, and counter displays correct frequency for all positions of the RESOLUTION switch.
17. Set RANGE switch to 250 MHz - 18 GHz. Check that LOCK lamp lights, GATE lamp flashes, and counter displays correct frequency for all positions of the RESOLUTION switch.
18. For each position of the RESOLUTION switch, move RANGE switch between "250 MHz - 18 GHz" and "10 Hz - 18 GHz" positions. The displayed frequencies should agree within 1 count.
19. If counter fails in any of the above steps, refer to Section V.

SECTION IV

THEORY OF OPERATION

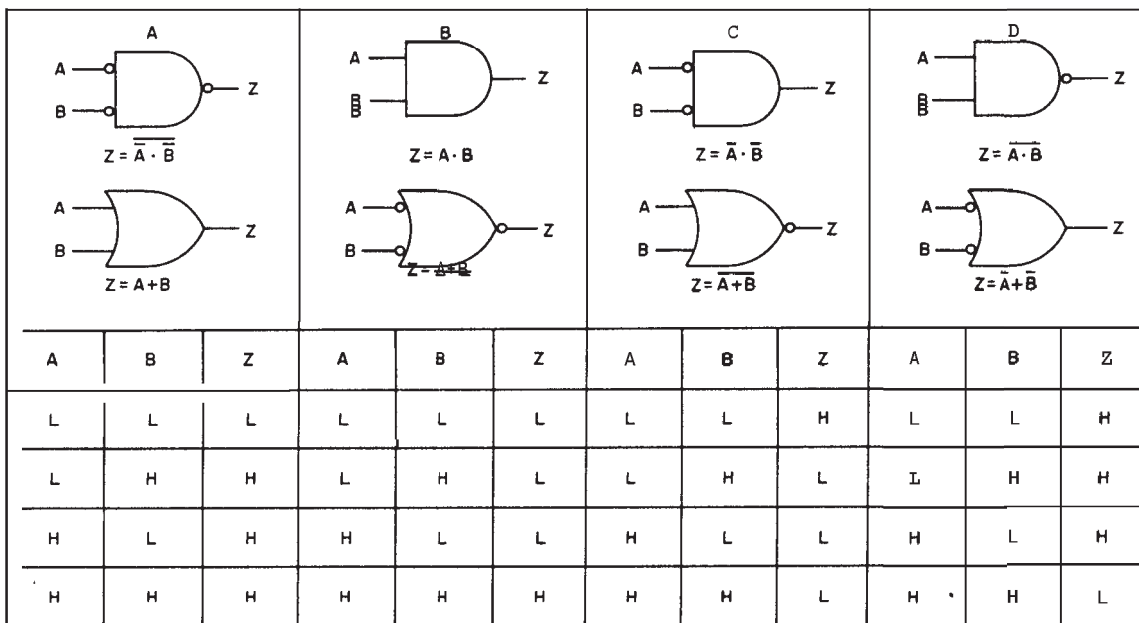
4-1. INTRODUCTION

4-2. This section describes the individual logic elements, overall counter operation, and theory of operation for each printed circuit assembly. The overall counter theory starts in Paragraph 4-103. The theory for each pc board starts in Paragraph 4-137.

4-3. LOGIC ELEMENTS

4-4. Two states exist in the binary system, 1 and 0. HIGH (H) and LOW (L) are used to represent the levels of 1 and 0. HIGH always represents the more positive level, whether it be positive or negative logic. Figure 4-1 shows four pairs of logic symbols that have the same truth tables and can be used interchangeably. The same function is performed by what appears to be two different logic symbols.

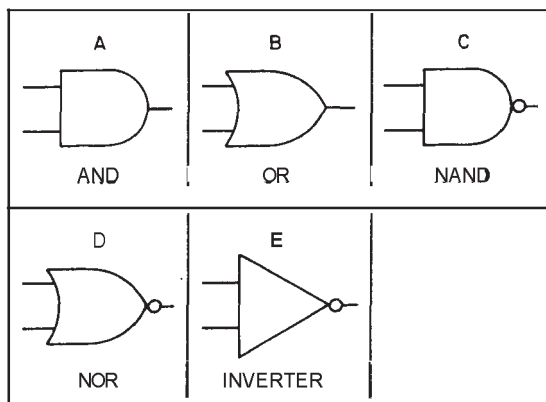
Figure 4-1. Logic Comparison Diagrams



4-5. GATES. Figure 4-2(A) represents a basic **AND** gate. The AND gate output is HIGH if all inputs are HIGH. An AND gate may have two or more inputs. Figure 4-2(B) 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.

4-6. INVERSION. AND and OR gates are shown in Figure 4-2(A,B). A circle on the output of a logic symbol indicates a LOW when activated as shown in Figure 4-2(C and D). Thus, a circle indicates inversion. An AND gate with an inverted output is called a NAND gate; and OR gate with an inverted output is called a NOR gate. A unity-gain amplifier with an inverted output is called an inverter, Figure 4-2(E).

Figure 4-2. Gate Symbols



NOTE

Three types of digital signals are present in this instrument. They are:

1. Transistor Transistor Logic (TTL).
2. Emitter Coupled Logic (ECL).
3. Emitter Emitter Coupled Logic (EECL).

Digital signals have two logic states, referred to as High and Low. The voltage associated with the High or Low state is different for each logic type.

	TTL	ECL	EECL
Low	0 to +0.4V	approximately -1.5V	approximately -0.6V
High	2.4 to 5V	approximately -0.8V	approximately 0V

When logic levels are stated in this manual, they will be prefaced by TTL, ECL, or EECL. When no preface is given, assume that the logic level under discussion is TTL.

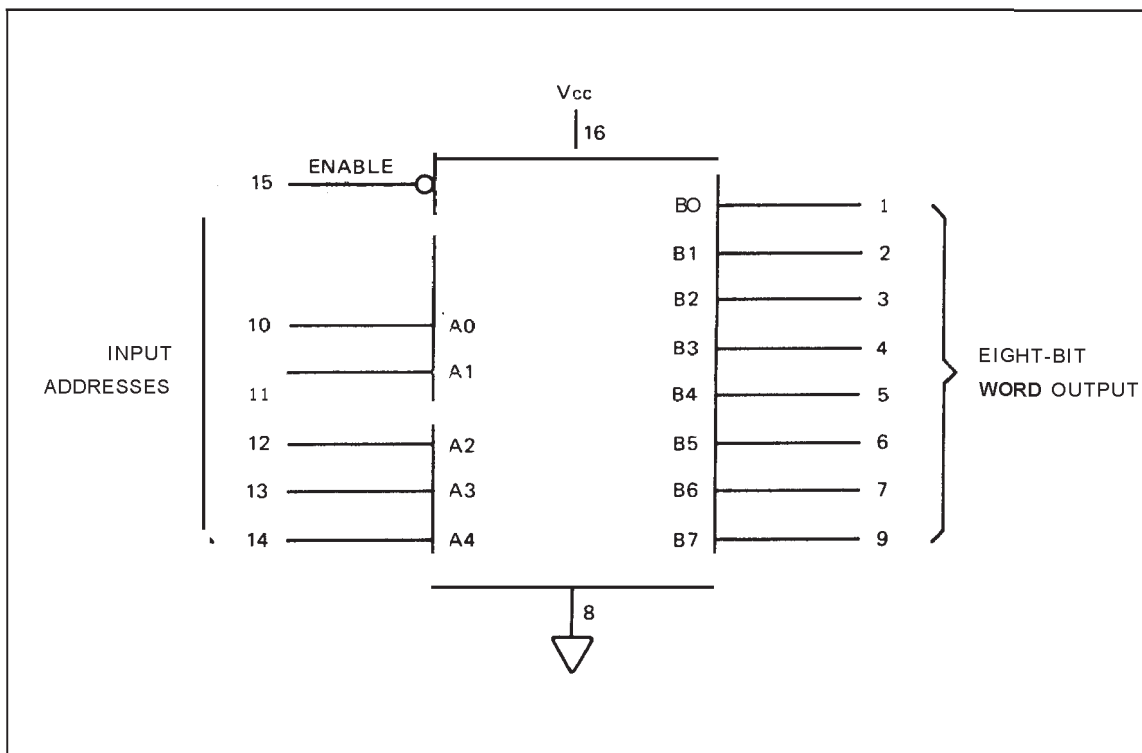
4-7. 5340A INTEGRATED CIRCUITS — THEORY OF OPERATION

4-8. The 5340A uses 70 different types of integrated circuits. Twenty-two of these are basic logic gates described in Paragraph 4-3. The following paragraphs describe the integrated circuits used in the 5340A other than the basic logic types.

4-9. 256-Bit Read-Only-Memories 1816-0003,1816-0004,1816-0184, and 1816-0185

4-10. A read-only-memory is a device that allows storage of pre-programmed data for later retrieval. The 1816 series of ROM's are 16-pin dual in-line IC's that allow eight different bits to be stored for each of the 32 addresses. The five input lines give rise to $2^5 = 32$ possible combinations of input addresses. Figure 4-3 shows the pin connections for the 1816 series.

Figure 4-3. Logic Diagram for 1816-0003,1816-0004,1816-0184,and 1816-0185ROM's



4-11. One use of ROM's is in calculators where they are used to store conversion information or to perform transformation. For example, a ROM could be used to output (in binary) the equivalent Fahrenheit temperature for a given centigrade temperature. ROM's can also be used for other simple transforms. For example, assume it is desired to solve the equation $Y = 2X + 1$. For any value of X (from 0 to 31), a ROM could be pre-programmed to give the value of Y that satisfies the above equation. Table 4-1 lists the data that would be pre-programmed for this example.

Table 4-1. Example ROM Programming for the Equation $Y = 2X + 1$

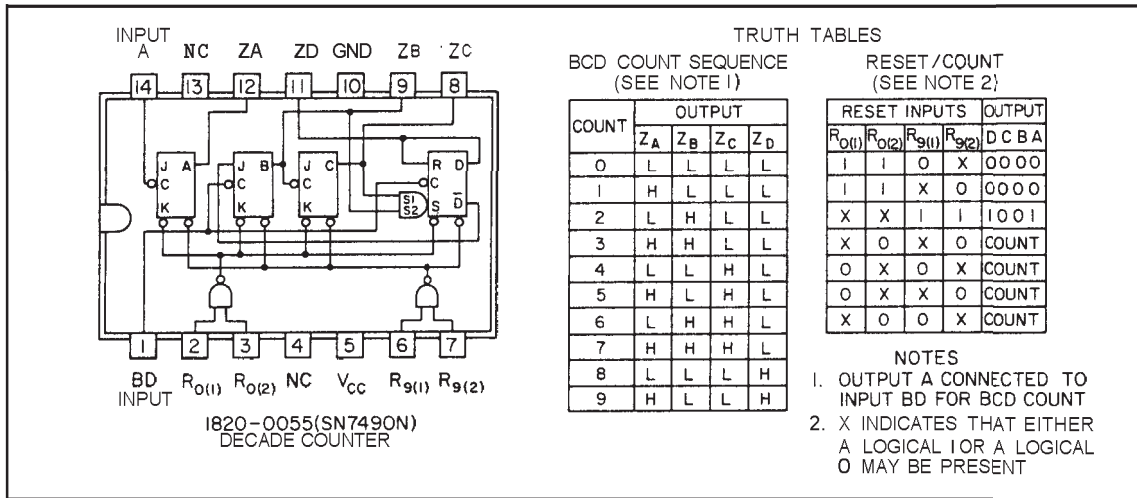
X		Y	
(decimal)	(binary)	(decimal)	(binary)
0	00000	1	0000 0001
1	00001	3	0000 0011
2	00010	5	0000 0101
3	00011	7	0000 0111
4	00100	9	0000 1001
5	00101	11	0000 1011
6	00110	13	0000 1101
7	00111	15	0000 1111
8	01000	17	0001 0001
9	01001	19	0001 0011
10	01010	21	0001 0101
11	01011	23	0001 0111
12	01100	25	0001 1001
13	01101	27	0001 1011
14	01110	29	0001 1101
15	01111	31	0001 1111
16	10000	33	0010 0001
17	10001	35	0010 0011
18	10010	37	0010 0101
19	10011	39	0010 0111
20	10100	41	0010 1001
21	10101	43	0010 1011
22	10110	45	0010 1101
23	10111	47	0010 1111
24	11000	49	0011 0001
25	11001	51	0011 0011
26	11010	53	0011 0101
27	11011	55	0011 0111
28	11100	57	0011 1001
29	11101	59	0011 1011
30	11110	61	0011 1101
31	11111	63	0011 1111

4-12. The programs for the ROM's used in the 5340A are given next to the schematic where they are used. See Section VIII schematics.

4-13. Decade Counter 1820-0055

4-14. The logic diagram, outline drawing, and truth table for this decade counter are shown in Figure 4-4. The unit consists of four dual-rank, master-slave flip-flops that are connected internally to provide a +5 counter and a +2 counter. Gated direct reset lines are provided to inhibit count inputs and return all outputs to logic 0 or BCD 9. The $\overline{R0}$ inputs at pins 2 and 3 reset the decades to zero and the $\overline{R9}$ inputs at pins 6 and 7 reset the decades to nine. When the BD input is externally connected to the A output, the unit operates as a **BCD** decade counter. With the D output connected to the A input, +10 operation is obtained.

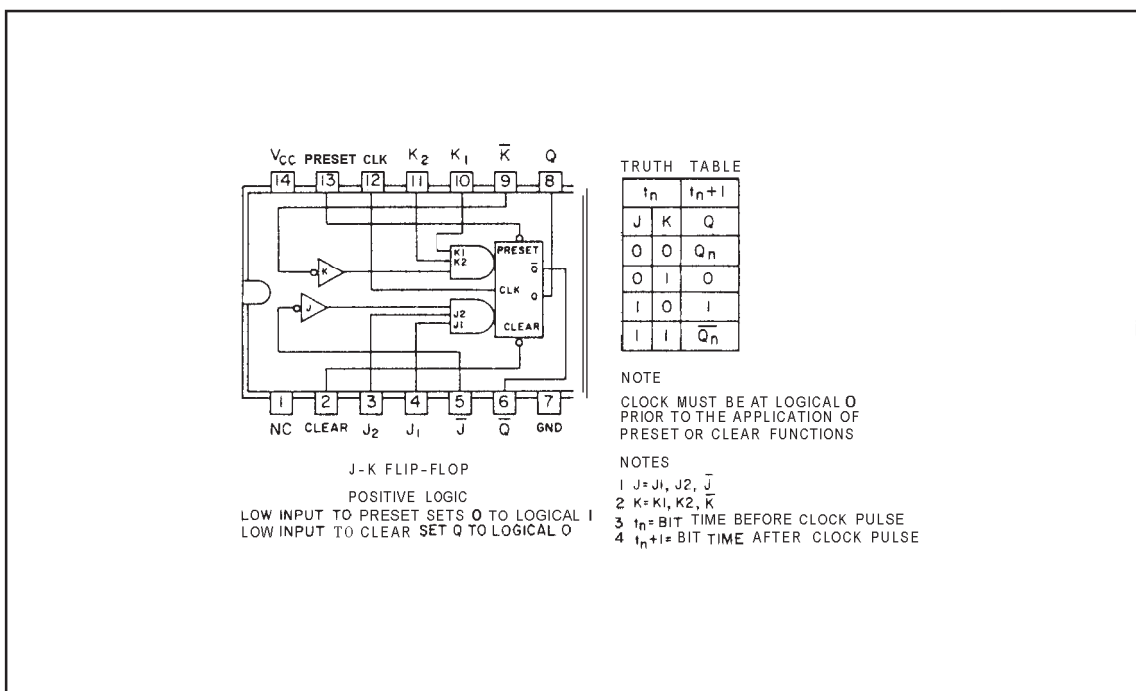
Figure 4-4. Decade Counter 1820-0055



4-15. J-K Flip-Flop 1820-0065

4-16. Figure 4-5 shows the logic diagram, outline drawing, and truth table for the 1820-0065 J-K flip-flop. The flip-flop is an edge-triggered type having direct clear and preset inputs. Input information will transfer to the outputs on the positive edge of the clock pulse. The J input is defined as $J_1 \cdot J_2 \cdot \bar{J}$. The K input is $K_1 \cdot K_2 \cdot \bar{K}$, i.e., when J_1 and J_2 are high and $\bar{J}$ is low, $J = 1$. When J and K are both low, the clock pulses have no effect. When J is high and K is low, the positive clock transition will set the flip-flop so that Q is high and $\bar{Q}$ is low. When $\bar{K}$ is high and J is low, the positive clock transition will reset the flip-flop so that Q is low and $\bar{Q}$ is high. If both J and K are high, the flip-flop will change states (toggle) with each positive clock transition. A low input at pin 13 will set the flip-flop and a low input to pin 2 will reset the flip-flop. The clock must be at logic 0 before set or reset pulses are applied.

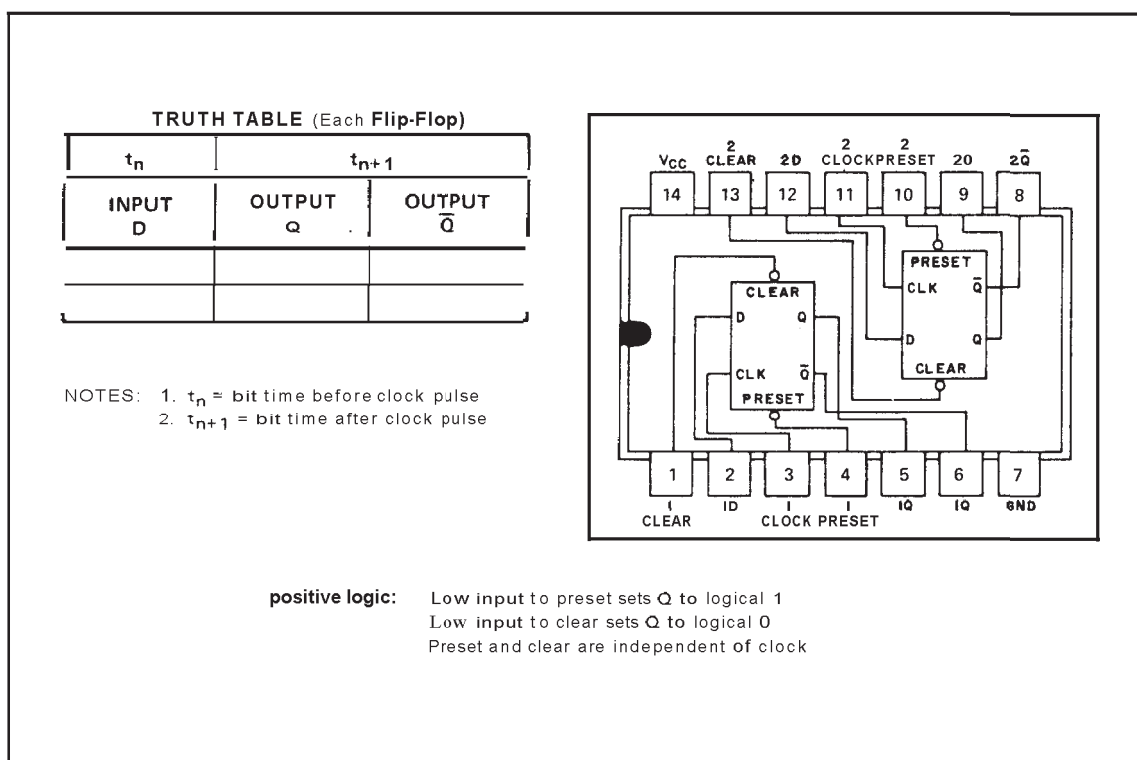
Figure 4-5. J-K Flip-Flop 1820-0065



4-17. Dual D-Type Edge-Triggered Flip-Flop 1820-0077

4-18. Figure 4-6. shows the logic diagram, outline drawing, and truth table for the 1820-0077. As the truth table shows, the input data (D) is transferred to the output on the positive edge of the clock pulse. Clock triggering is determined by a voltage level of the clock pulse and is not directly related to the transition time of the positive going pulse. After the clock input threshold level has been passed, the D input is locked out. A low at pin 4 or 10 will set the respective FF so the Q is high and $\bar{Q}$ is low. A low at pin 1 or 13 will reset the flip-flop so that Q is low and $\bar{Q}$ is high. The set and reset inputs will override all other inputs.

Figure 4-6. Dual D-Type Edge-Triggered Flip-Flop 1820-0077



4-19. Four-Bit Binary Counter 1820-0099

4-20. The binary counter (Figure 4-7) consists of four J-K flip-flops connected to provide a $\div 2$ counter and a $\div 8$ counter. When pin 12 is connected to pin 1, the unit is a four-bit binary counter. The input pulses are applied at pin 14 and simultaneous divisions of 2, 4, 8, and 16 are available at the output pins as shown in the truth table. Thus, the counter converts the input pulses to an equivalent binary output. To reset the counter to zero, both pins 2 and 3 must be high.

4-21. Monostable Multivibrator 1820-0207

4-22. This IC (Figure 4-8) contains a retriggerable monostable multivibrator. The inputs are dc level sensitive, i.e., triggering occurs on the rising or trailing edges of the input waveform. For triggering on the rising edge, the input can be applied to pins 3 and 4. For trailing edge triggering, pin 1 or 2 is used. The logic diagram shows the input logic. When the multivibrator is triggered, the external resistor and capacitor determine the output pulse width; however, successive inputs with a period shorter than the delay time will retrigger the multivibrator.

Figure 4-7. Four-Bit Binary Counter 1820-0099

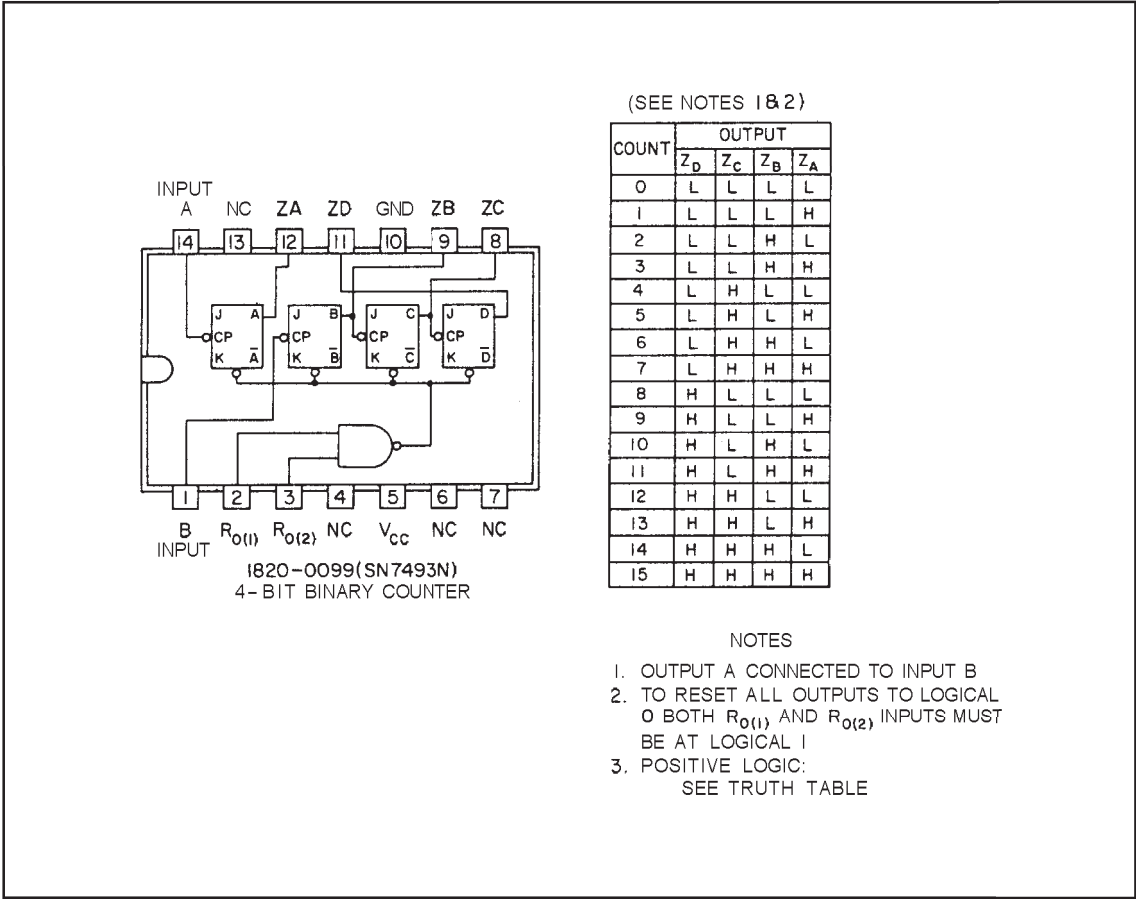
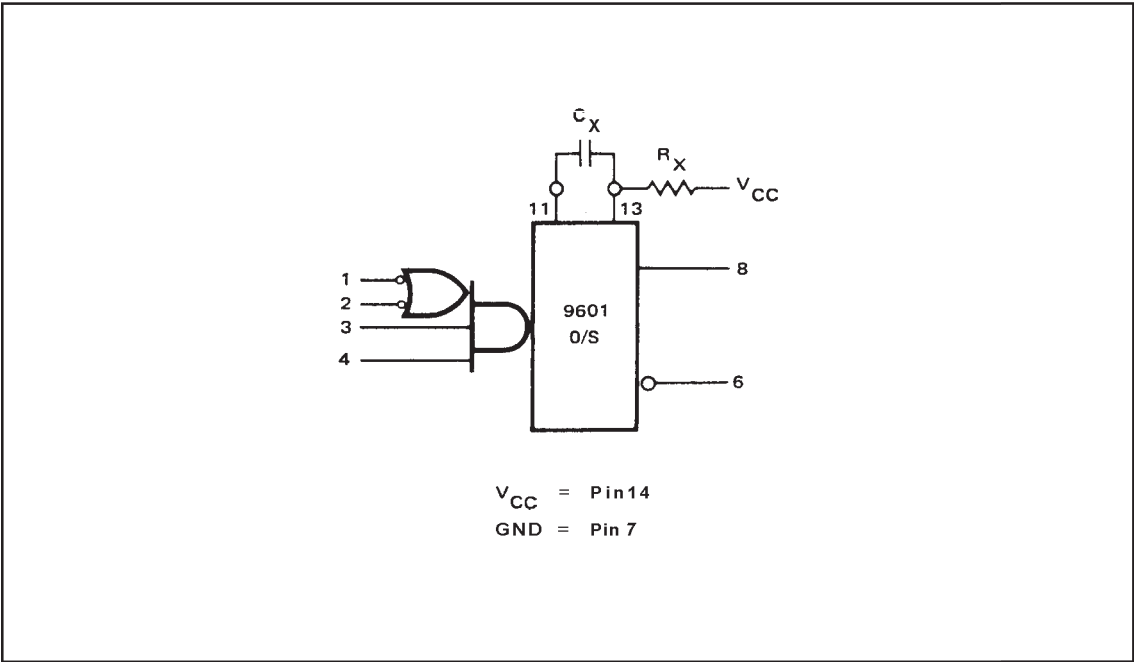


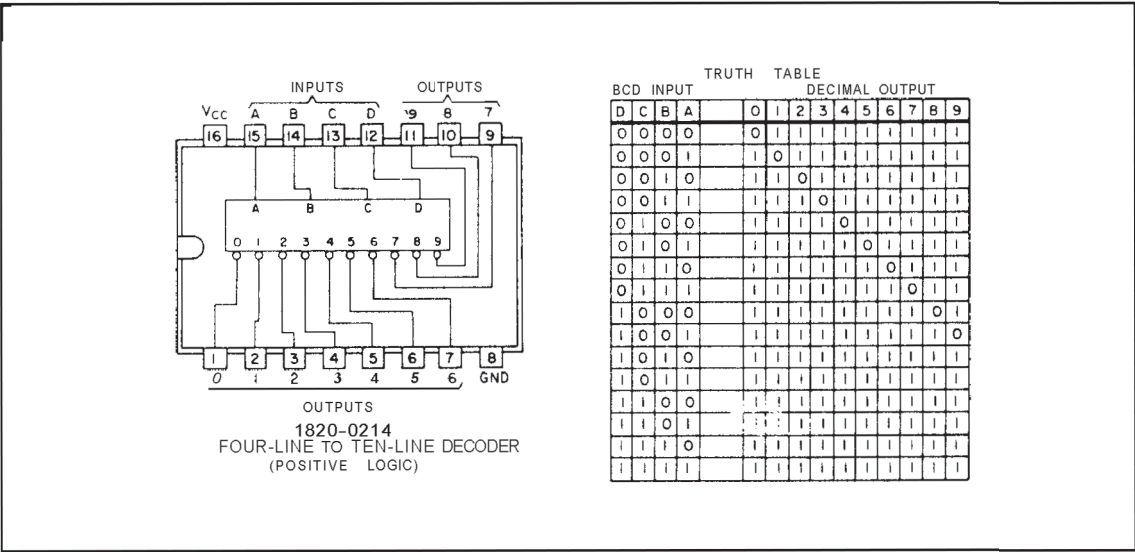
Figure 4-8. Monostable Multivibrator 1820-0207



4-23. Four-Line to Ten-Line Decoder 1820-0214

4-24. The 1820-0214 decoder (Figure 4-9) consists of eight inverters and 10 four-input NAND gates. As shown in the truth table, the unit accepts BCD inputs and provides the equivalent decimal output. The activated output will be a logic low. For example, if the BCD input is DCBA = 0111, then the decimal 7 output will go low and all others will be high.

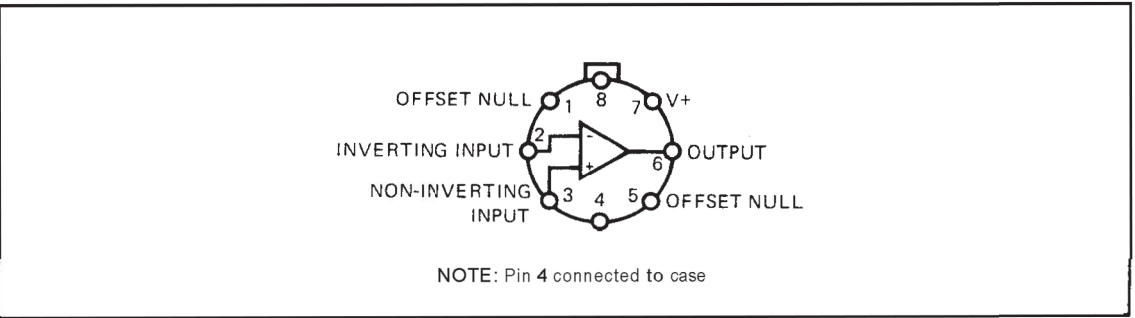
Figure 4-9. Four-Line to Ten-Line Decoder 1820-0214



4-25. Operational Amplifier 1820-0216

4-26. Figure 4-10 shows the diagram for the operational amplifier. Operational amplifiers are so named because they perform a mathematical operation in a circuit. The type of operation is determined by the feedback network. In the 5340A, this IC is used in a dc stabilizing feedback network on A17.

Figure 4-10. Operational Amplifier 1820-0216

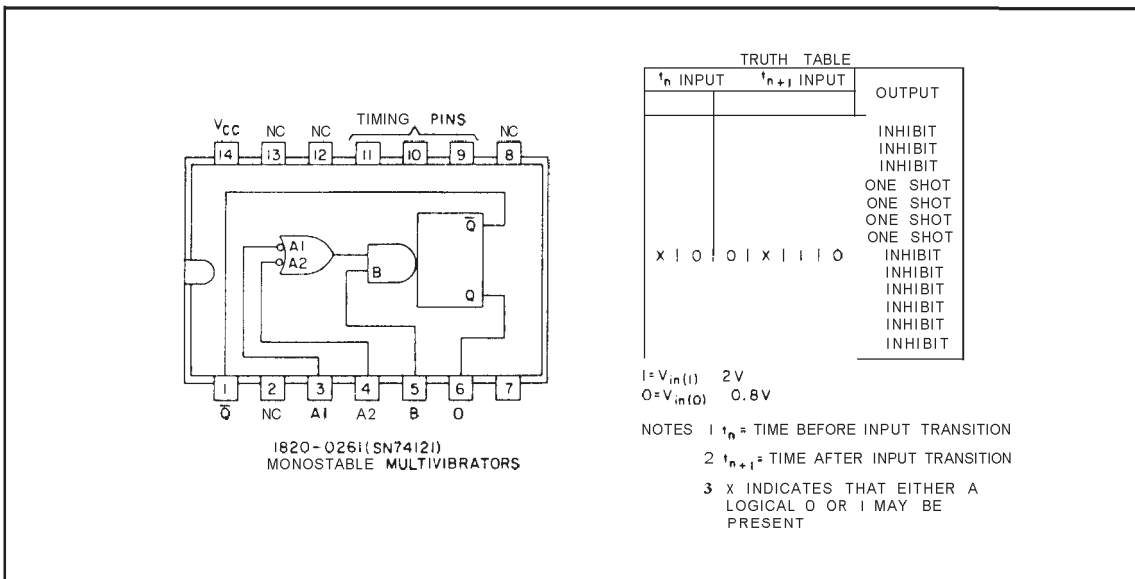


4-27. Monostable Multivibrator 1820-0261

4-27. This multivibrator (Figure 4-11) is stable in one state only; i.e., when not triggered, Q is low and $\bar{Q}$ is high. Triggering is dc from either positive or negative-going inputs and is not directly related to the transition time of the input pulse. A1 and A2 are negative-edge-triggered logic inputs and will trigger the one-shot when either or both go low provided that B is high. B is the positive Schmitt trigger input that triggers the one-shot when B goes high with either A1 or A2 low. When the monostable triggers, Q goes high and $\bar{Q}$ goes low for a period determined by

circuit time constants. An internal timing resistor is available by connecting Vcc (pin 14) to pin 9, also an external resistor may be used between these two pins. The external timing capacitor connects between pins 10 and 11. The output pulse duration is determined by the RC time constant of the timing components. The truth table shows the logic states that result in a one-shot output. When the multivibrator fires, the outputs are independent of further input transitions and are dependent only on the timing components.

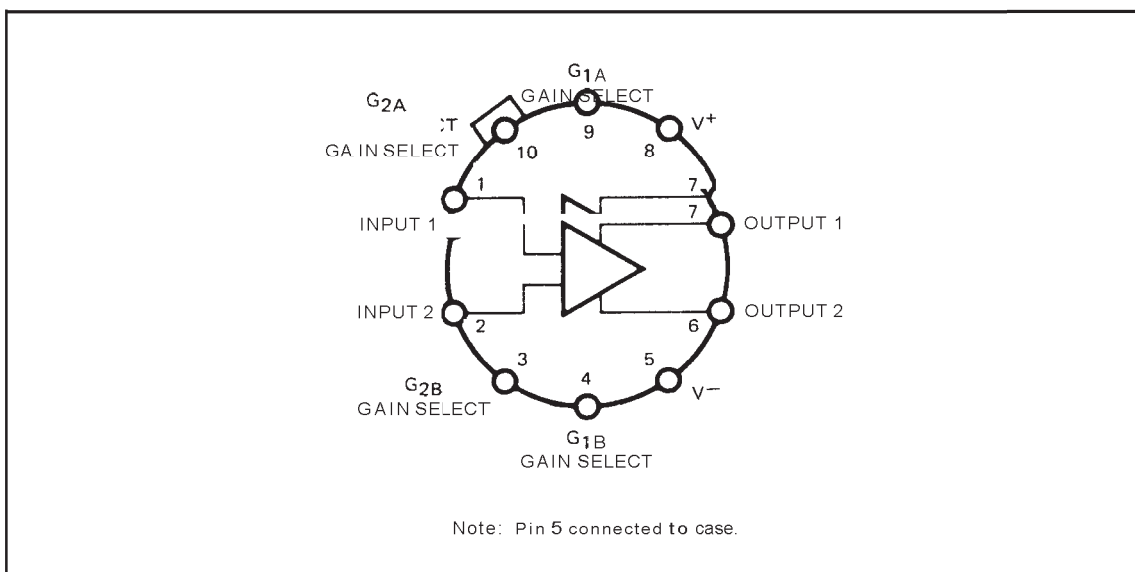
Figure 4-11. Monostable Multivibrator 1820-0261



4-29. Differential Video Amplifier 1820-0270

4-30. The video amplifier is shown in Figure 4-12. This IC consists of a two-stage differential output amplifier with differential inputs. The unit features 120 MHz bandwidth, selectable gain and high input impedance. Gain is determined by connecting a resistor from pin 4 to pin 9. For maximum gain, pins 4 and 9 are shorted together.

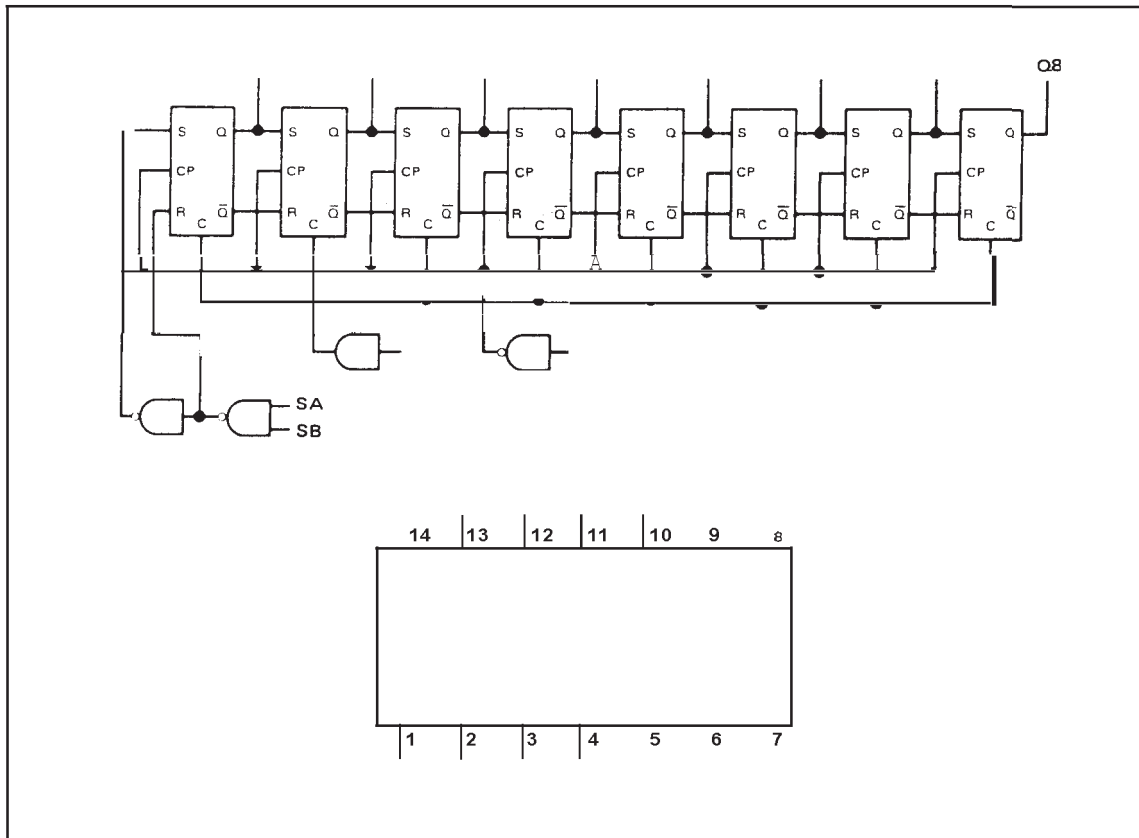
Figure 4-12. Differential Video Amplifier 1820-0270



4-31. Eight-Bit Serial-In Parallel-Out Shift Register 1820-0294

4-32. This IC (Figure 4-13) accepts serial input data and provides parallel outputs. The unit consists of eight RS flip-flops connected in a shift register configuration. Clocking occurs on the positive going edge of the clock pulse. Input gates are provided for the RS inputs to allow for strobe capability. Logic 1 levels at SA and SB enter logical "1's" into the shift register. When the clear input (pin 9) is driven low, all flip-flops are asynchronously set to the logical 0 state.

Figure 4-13. Eight-Bit Serial-In Parallel-Out Shift Register 1820-0294



4-33. BCD to Decimal Decoder 1820-0426

4-34. The decoder (Figure 4-14) is a BCD to one-of-ten decoder capable of driving gas-filled cold-cathode indicator tubes. As an example of operation, if the input is D=0 C=0 B=1 and A=1, then the 3 output at pin 9 will go low to turn on the numeral 3 in an indicator tube.

4-35. Voltage Comparator/Buffer 1820-0475

4-36. This IC is shown in Figure 4-15 and serves as a high-speed voltage comparator to detect low level analog signals and drive digital loads. The unit can drive RTL, DTL, or TTL circuits.

Figure 4-14. BCD to Decimal Decoder 1820-0426

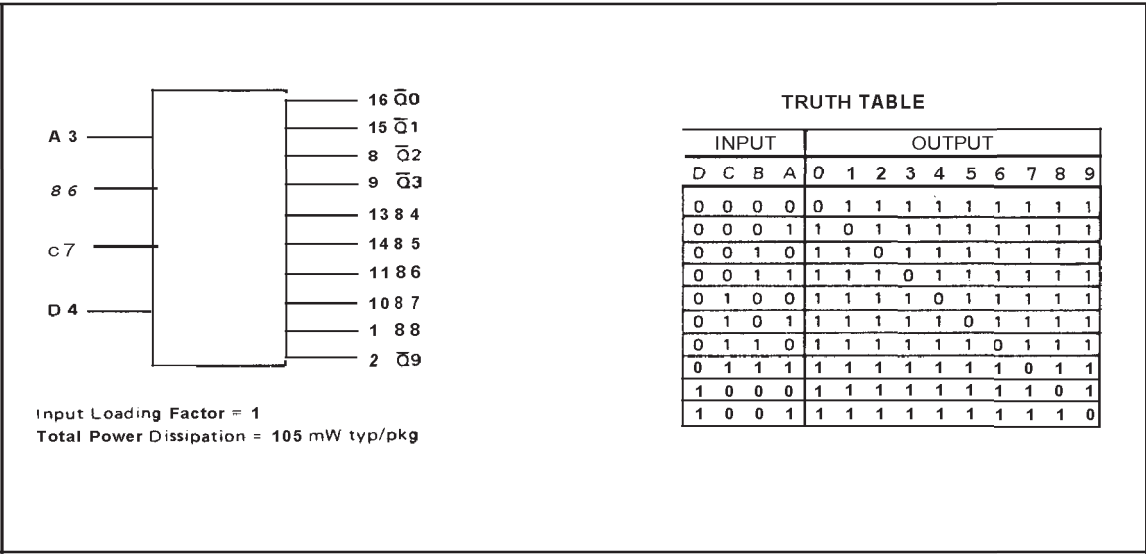
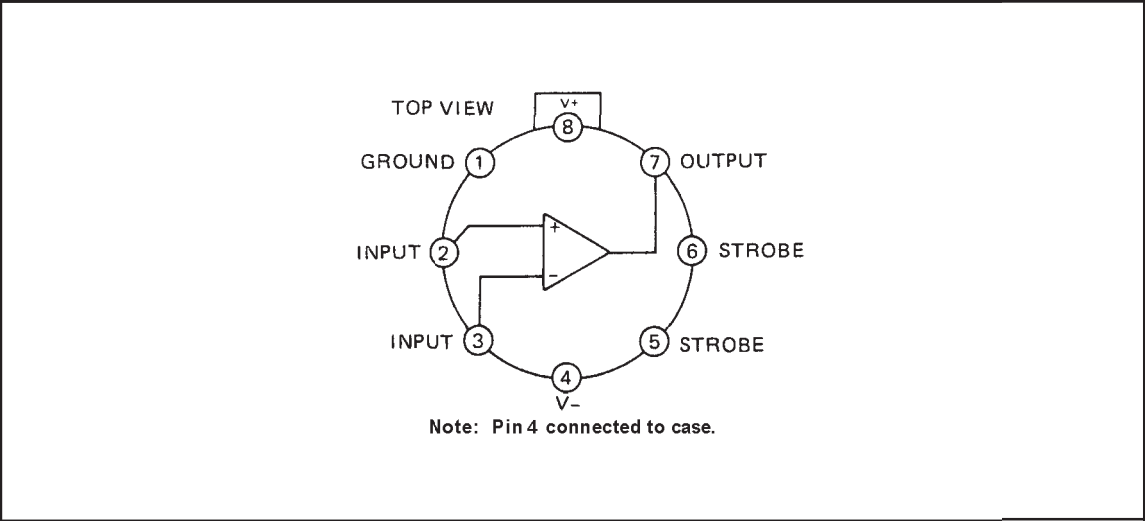


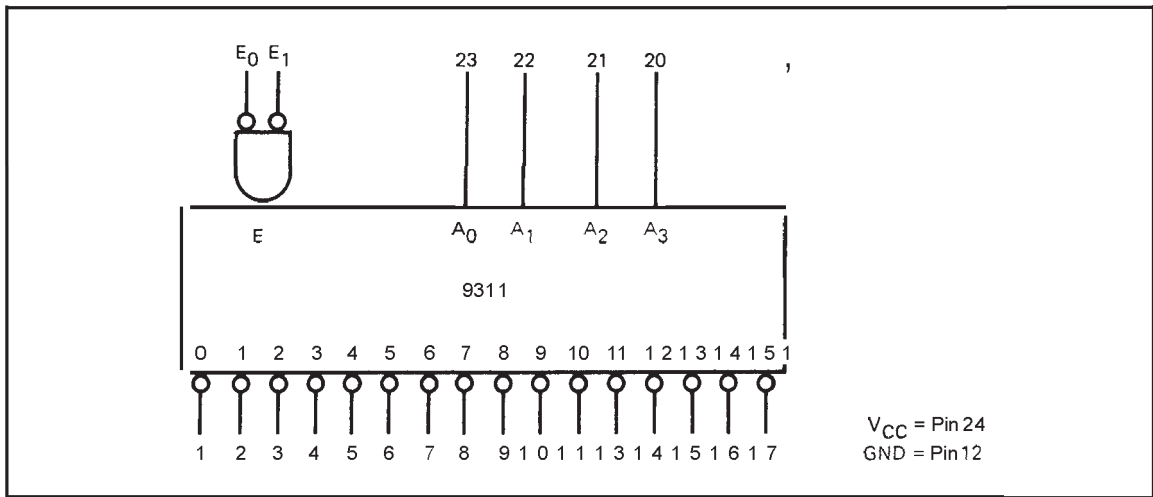
Figure 4-15. Voltage Comparator/Buffer 1820-0475



4-37. Binary to Decimal Decoder 1820-0495

4-38. The decoder (Figure 4-16) accepts four binary weighted inputs and provides one of 16 outputs corresponding to the input code. $\overline{E}0$ and $\overline{E}1$ are low AND enable inputs. When $\overline{E}0$ and $\overline{E}1$ are both low, the inputs at A0 through A3 are decoded and the corresponding decimal output goes low. For example, when A0=1, A1=0, A2=0, and A3=1, then the 9 output goes low.

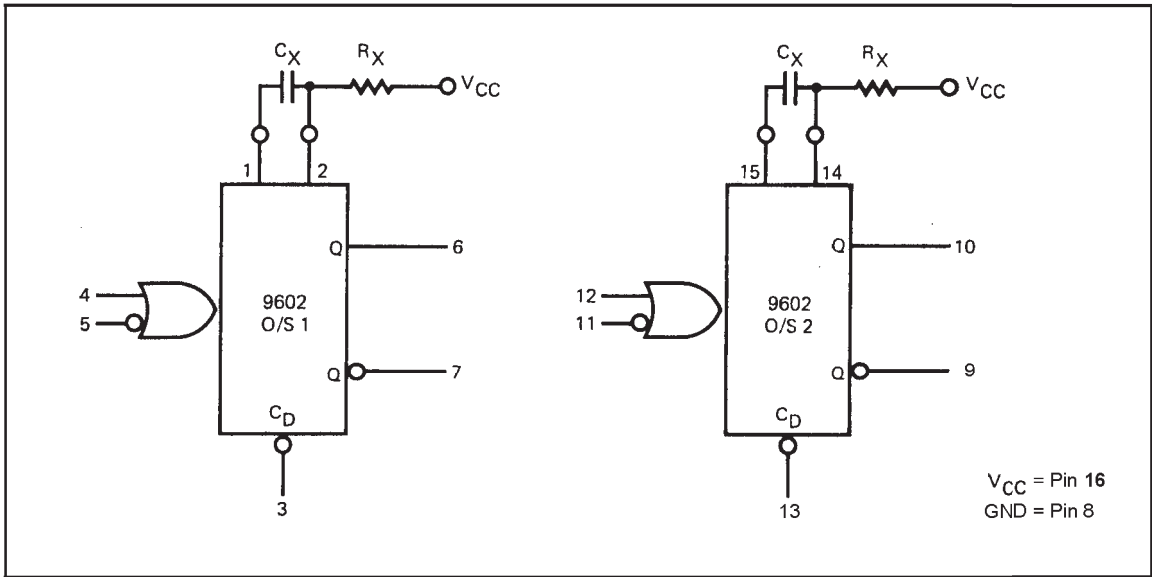
Figure 4-16. Binary to Decimal Decoder 1820-0495



4-39. Dual Monostable Multivibrator 1820-0515

4-40. The dual multivibrator is shown in Figure 4-17. The units are retriggerable and resettable multivibrators which provide an output pulse whose duration is a function of the external timing components. The inputs are dc level sensitive; i.e., triggering occurs on the rising or trailing edges of the input waveform. Successive inputs with a period shorter than the delay time will retrigger the one-shot resulting in a continuous true output. The output pulse may be terminated at any time by applying a low logic level to the reset input.

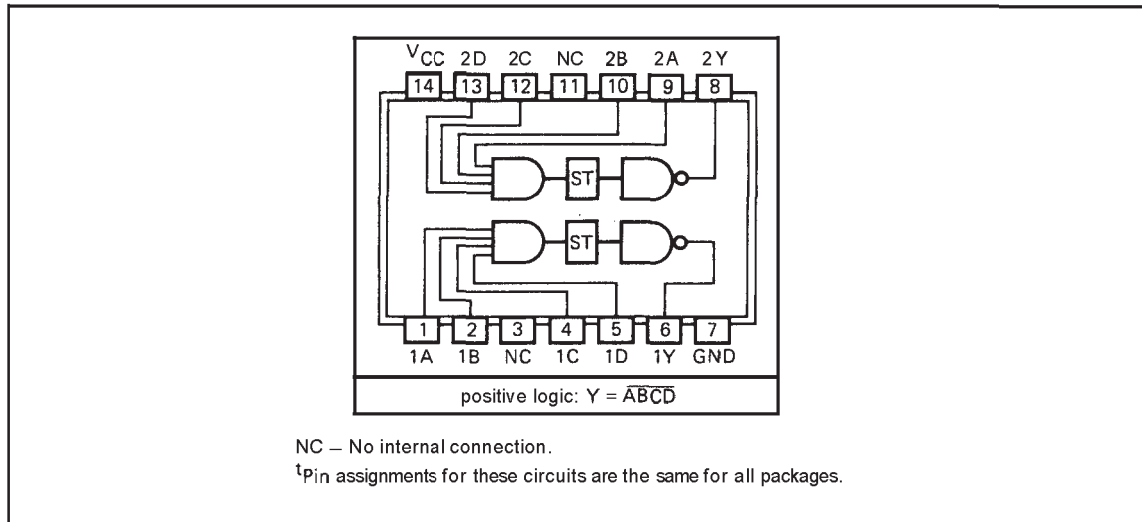
Figure 4-17. Dual Monostable Multivibrator 1820-0515



4-41. Dual NAND Schmitt Triggers 1820-0537

4-42. This IC (Figure 4-18) functions as a four-input NAND gate with Schmitt trigger action. The Schmitt action gives different input threshold levels for positive- and negative-going signals. This difference between the threshold levels is called hysteresis and is typically 800 millivolts. Built in temperature compensation is included to ensure high stability of the threshold levels and hysteresis. These characteristics allow triggering on slow input ramps and ensure clean, jitter-free outputs.

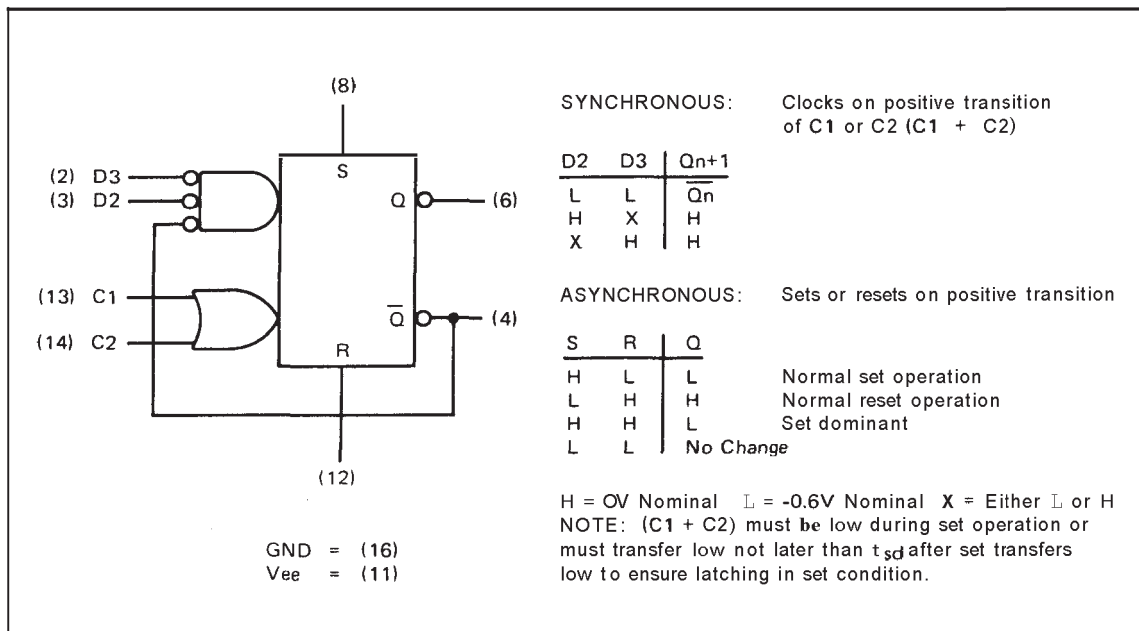
Figure 4-18. Dual NAND Schmitt Triggers 1820-0537



4-43. EECL High-speed D-Binary 1820-0557

4-44. The 1820-0557 is a 350 MHz binary counter using the dual rank master-slave design. The truth table for synchronous or asynchronous operation is shown in Figure 4-19.

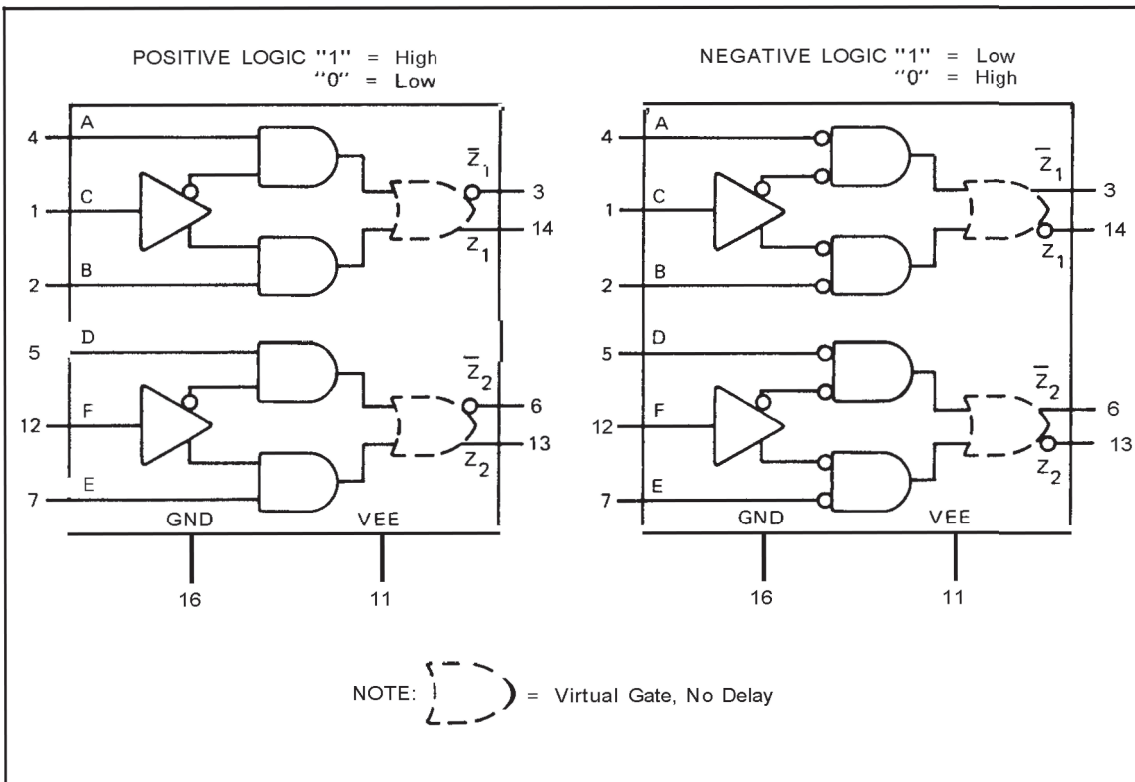
Figure 4-19. EECL High-speed D-Binary 1820-0557



4-45. Dual Two-Input Logic Switch 1820-0560

4-46. The logic switch (Figure 4-20) functions as a single pole, double throw switch for EECL logic signals. The C input controls selection of either the A or B input; similarly, the F input controls the D and E input selection. Complementary 50 ohm outputs are provided from the output gates.

Figure 4-20. Dual Two-Input Logic Switch 1820-0560



4-47. Dual D-Type Edge-Triggered Flip-Flops 1820-0596

4-48. This IC contains low-power dual edge-triggered flip-flops as shown in Figure 4-21. Information at the D-input is transferred to the Q output on the positive-going edge of the clock pulse. Clock triggering occurs at a voltage level of the clock pulse and is not directly related to the transition time of the positive-going pulse. When the clock is at either a high or low level, the D-input signal has no effect. Maximum clock frequency is typically 3 MHz with a typical power dissipation of 4.25 milliwatts per flip-flop.

4-49. Four-Input Multiplexer 1820-0610

4-50. The 1820-0610 (Figure 4-22) consists of two 4-line input multiplexers with common input select logic. This configuration allows two bits of data to be switched in parallel to the appropriate outputs from two 4-bit data sources. Complementary outputs are provided. The truth table for the multiplexer is shown below.

Figure 4-21. Dual D-Type Edge Trigger Flip-Flops 1820-0596

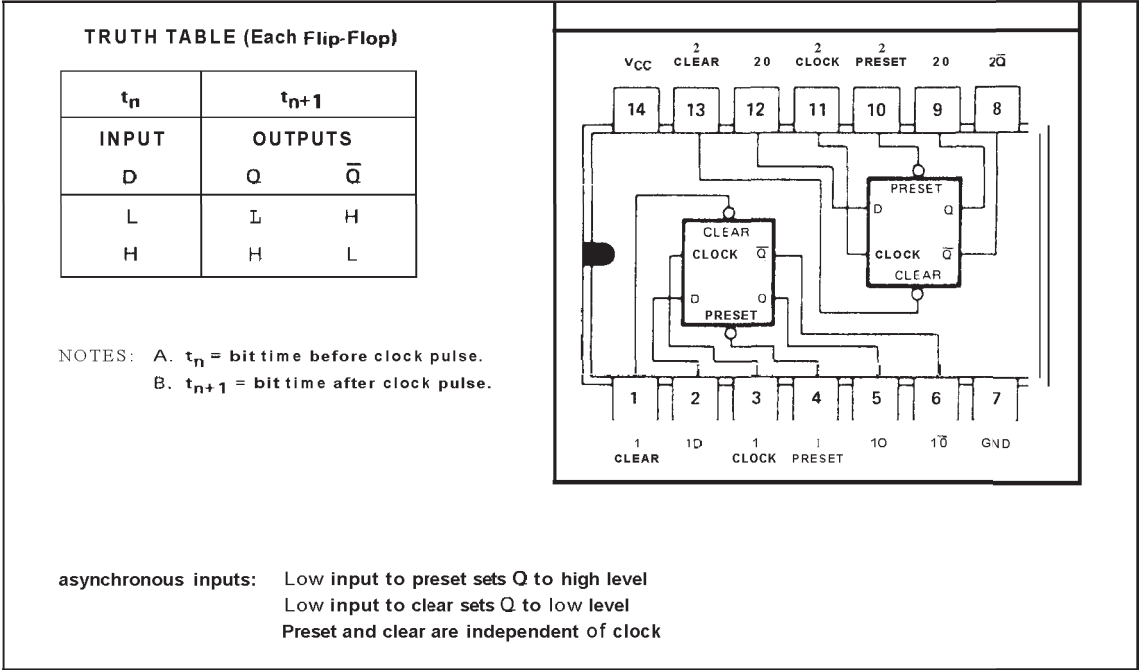
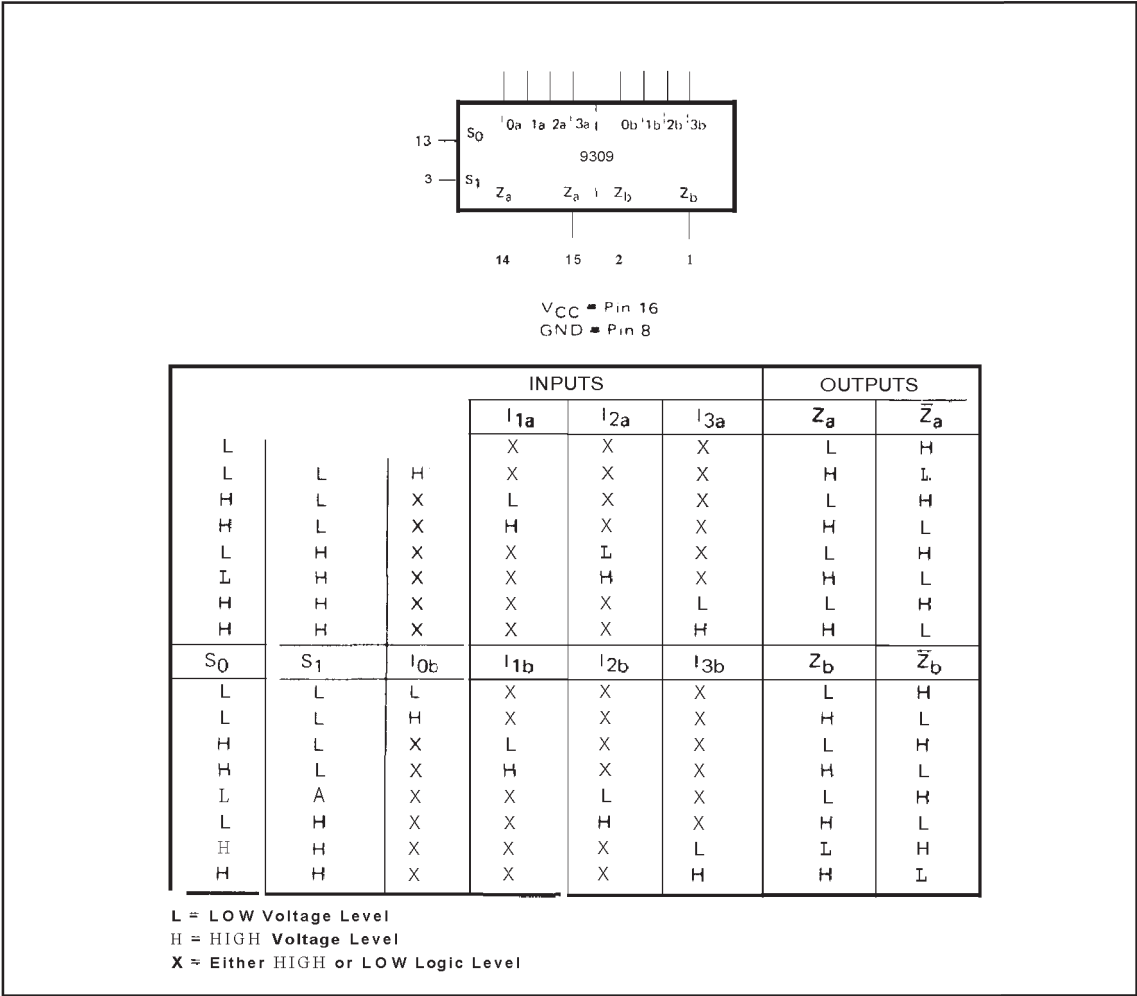


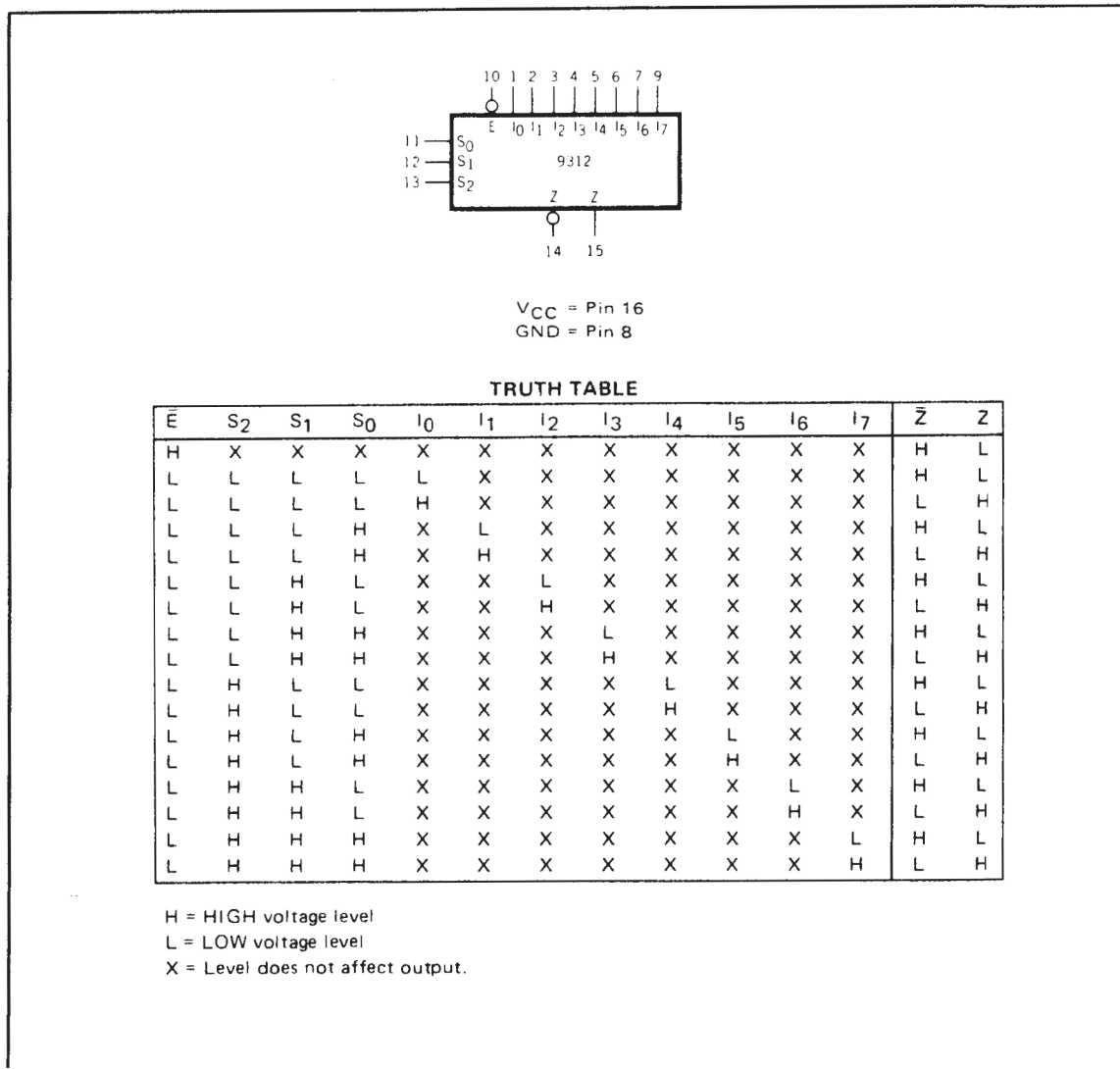
Figure 4-22. Four-Input Multiplexer 1820-0610



4-51. Eight-Input Multiplexer 1820-0615

4-52. The 1820-0615 (Figure 4-23) selects one-bit of output data from eight inputs. The unit has complementary outputs, and an enable input (low activates the multiplexer). With the enable line inactive, the multiplexer output (Z) is low and the complementary output ($\bar{Z}$) is high regardless of the input states. The logic operation is shown in the truth table.

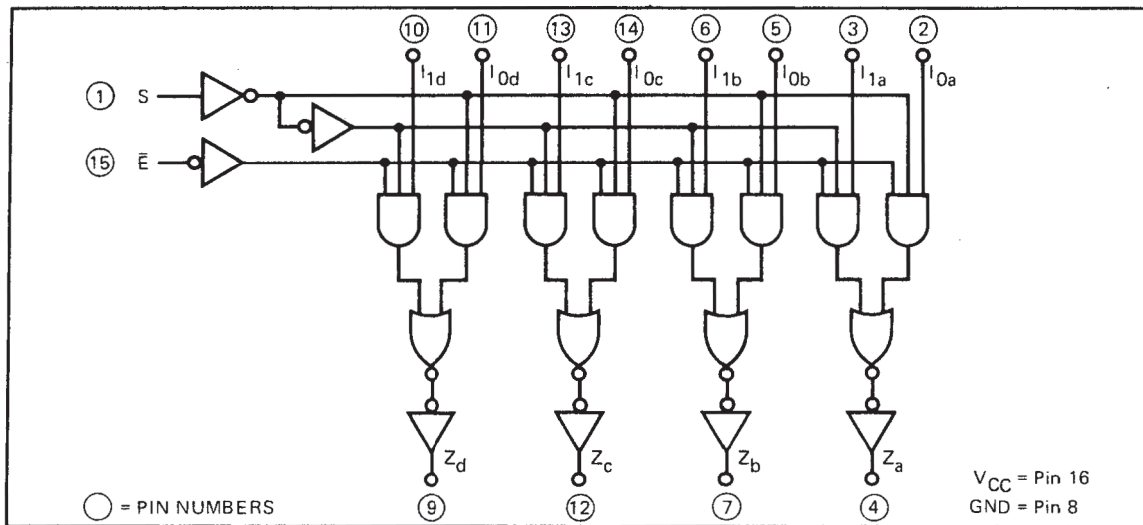
Figure 4-23. Eight-Input Multiplexer 1820-0615



4-53. Quad 2-Input Multiplexer 1820-0616

4-54. The 1820-0616 (Figure 4-24) consists of four 2-input multiplexers with common input select logic, common active low enable and active high outputs. This allows four bits of data to be switched in parallel to the appropriate outputs from four 2-bit data sources. When the enable input is high (inactive), all outputs are held low. When the S input is high, the I1a, I1b, I1c, and I1d inputs are transferred to the Za, Zb, Zc, and Zd outputs respectively. The transfer takes place without polarity inversion. For example, if S is high and I1a is low, then Za will be low, conversely if I1a is high (with S=H) then Za will go high. When S is low, the I0 outputs will appear at the Z outputs.

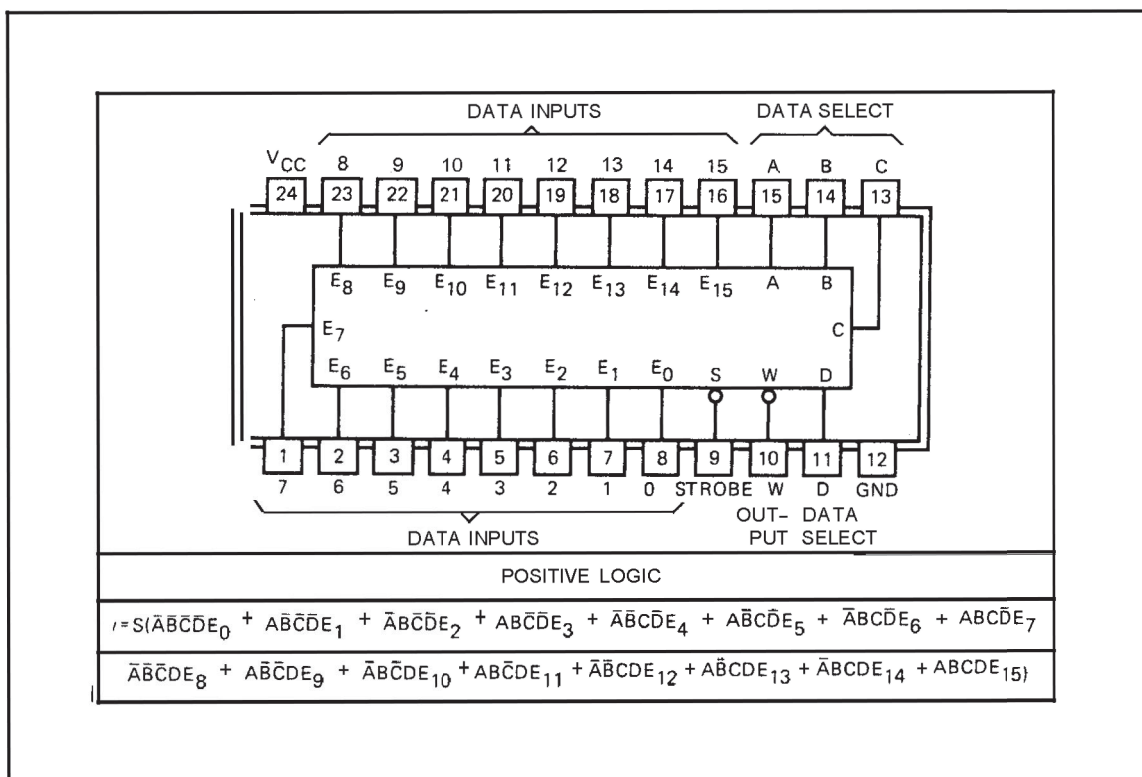
Figure 4-24. Quad 2-Input Multiplexer 1820-0616



4-55. Data Selectors/Multiplexers 1820-0640

4-56. This IC (Figure 4-25) selects 1 of 16 data sources and can be used for parallel-to-serial conversion, multiplexing, or as a five-variable function generator. Four data select lines are used to select which input is routed to the output. The select lines perform binary decoding. When the strobe input is driven low, the multiplexers are enabled. The truth table shows the logic requirements of the multiplexers. For example, when the strobe is low, and the data select lines are $\overline{A}\overline{B}\overline{C}\overline{D}$, then input E_3 is gated to the output W line.

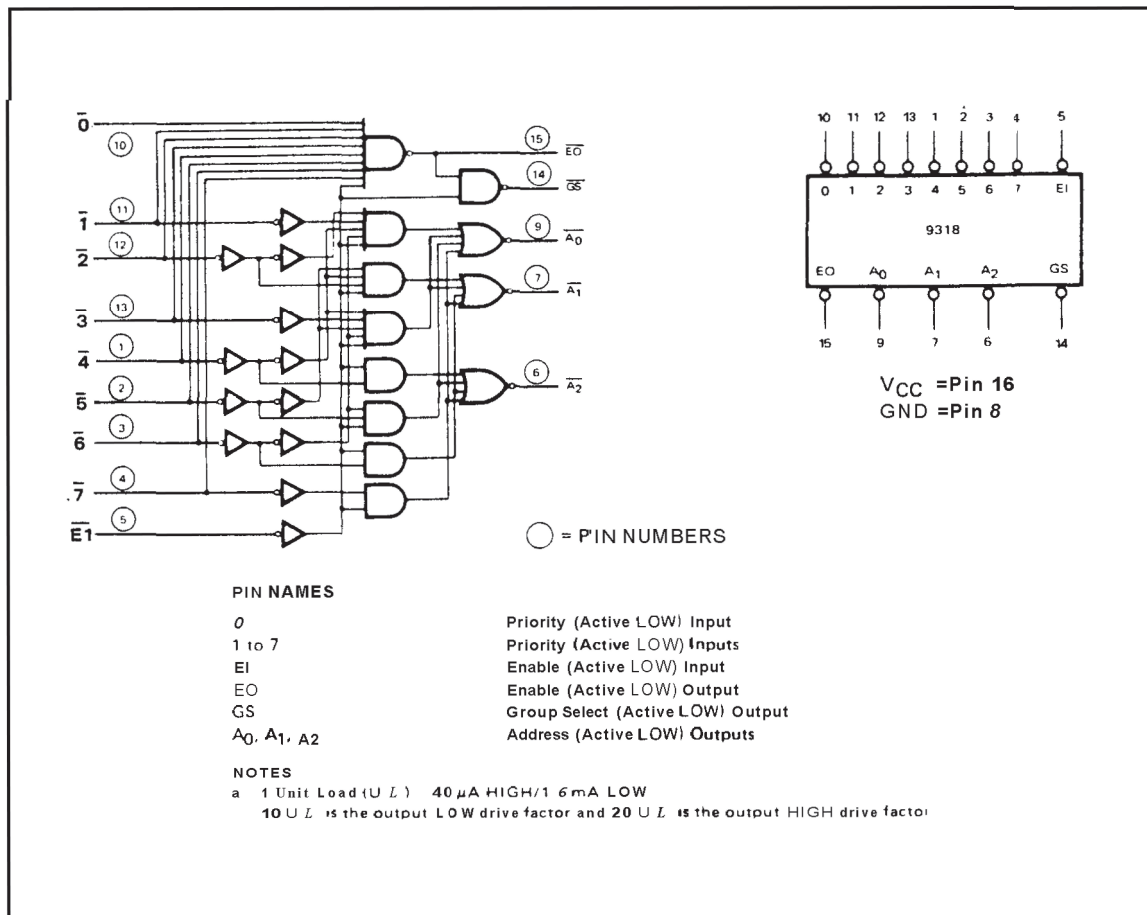
Figure 4-25. Data Selectors/Multiplexers 1820-0640



4-57. Eight-input Priority Encoder 1820-0657

4-58. Figure 4-26 shows the logic diagram, and outline drawing, for the 1820-0657. This IC accepts eight active low inputs and produces a binary weighted output corresponding to the highest order input. Priorities are assigned to each active low input so that when two or more inputs are simultaneously active, the input with the highest priority appears at the output. —Input 7 has the highest priority. An active low enable input ($\overline{EI}$) and active low enable output ($\overline{EO}$) are provided to expand priority encoding to more inputs. This mode of operation is achieved by connecting the more significant encoder's enable output ($\overline{EO}$) to the next less significant encoder enable—input ($\overline{EI}$). In addition, a group signal is provided which is active if any input is active and $\overline{EI}$ is low. As an example of encoder operation, assume that input 2 and 6 are low and $\overline{EI}$ is low. In this case, the encoder gives priority to the 6 input and gives a binary output of $A_0=H$, $A_1=L$, and $A_2=L$.

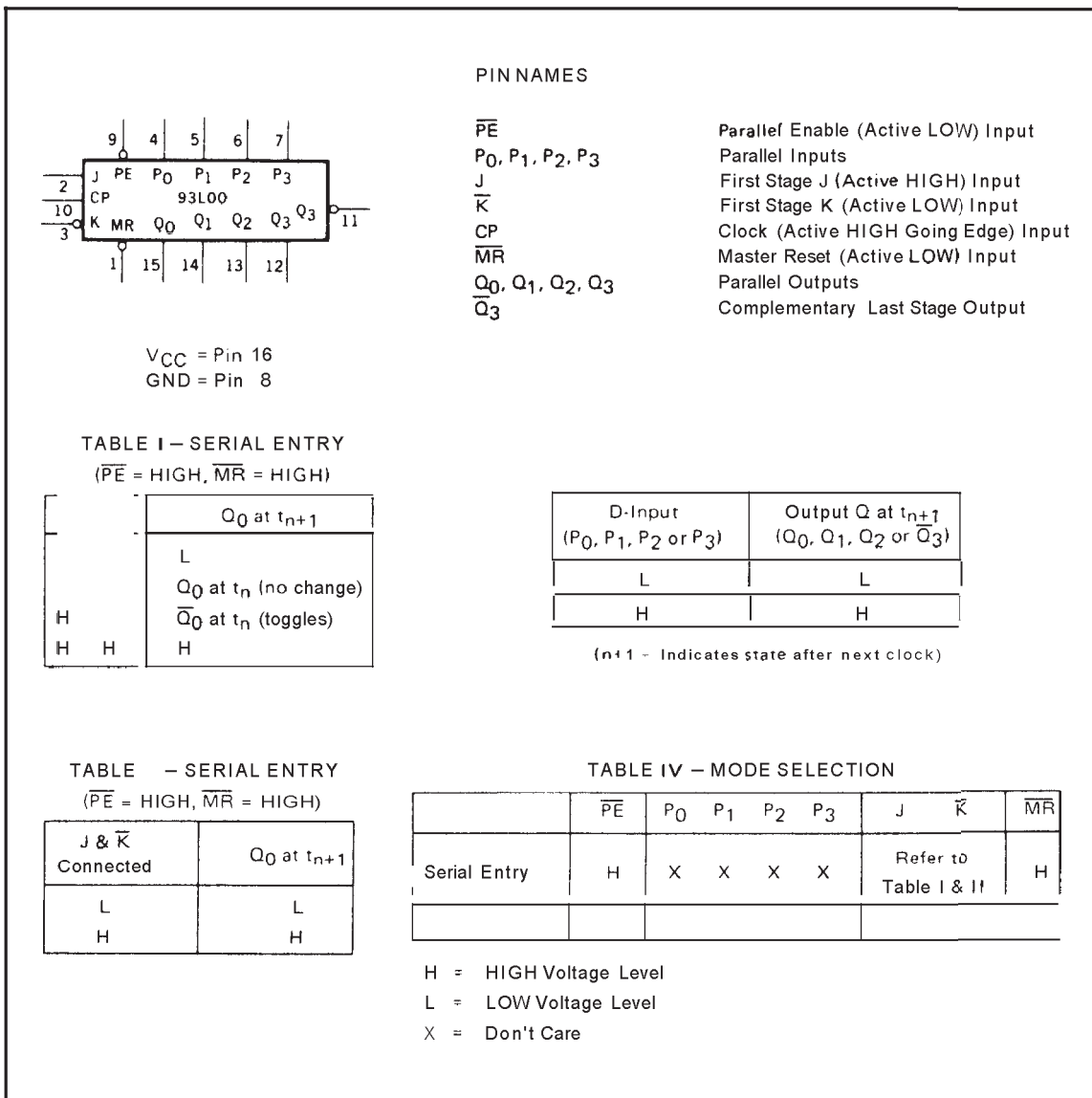
Figure 4-26. Eight-Input Priority Encoder 1820-0657



4-59. Low-Power 4-Bit Shift Register 1820-0659

4-60. Figure 4-27 shows the logic diagram and pin connections for the 1820-0659. A $\overline{JK}$ input is provided for the first flip-flop in the register. This arrangement requires a low to activate the $\overline{K}$ input. A D-type input can be obtained by tying the J and $\overline{K}$ inputs together. Parallel inputs for all four stages are provided. These determine the next conditions of the shift register synchronous with the clock input, whenever the parallel enable input is low. When the parallel enable input is low, the unit appears as four clocked D flip-flops. When the parallel enable is high, the shift register performs a one-bit shift for each clock input. Clocking occurs after the low to high transistion of the clock input. Active high outputs are provided for all four stages and an active low output is also provided for the last stage ($\overline{Q_3}$). The master reset input allows all stages to be set to zero independent of all input conditions.

Figure 4-27. Low-Power 4-Bit Shift Register 1820-0659



4-61. Low-Power BCD Decade Counter 1820-0669

4-62. Figure 4-28 shows the logic diagram and pin connections for the 1820-0669. The counter is fully synchronous with the clock pulse driving four master/slave flip-flops in parallel through a clock buffer. During the low to high clock transition, the master is inhibited from further change. After the masters are locked out, data is transferred from the master to the slaves and reflected at the outputs. When the clock is high, the masters are inhibited and the master/slave data path remains established. During the high to low transition of the clock, the slave is inhibited from further change, followed by the enabling of the masters for the acceptance of data from the counting logic or the parallel entry logic. The control inputs, $\overline{PE}$, CEP, and CET, select the operating mode as shown in the tables below. During the count mode, the rising edge of the clock changes the counters to the next state of count sequence shown in the state diagram below.

4-63. When $\overline{PE}$ is low, the unit can be synchronously preset from the four parallel inputs $P0 - P3$. When $\overline{PE}$ and the clock are low, each master of the flip-flops is connected to the appropriate parallel input and the slaves are steady in their previous state. When the clock goes high, the masters are inhibited and the information is transferred to the slaves and reflected at the outputs. The parallel enable input overrides both count enable inputs, presetting the counter when low.

4-64. Terminal count is high when the counter is at terminal count (state 9), and CET is high. Without using additional logic, multistage synchronous counting at high speeds is possible with a high speed look-ahead technique. The asynchronous master reset (active low) overrides all other inputs to reset the four outputs low.

4-65. Five-Bit Comparator 1820-0706

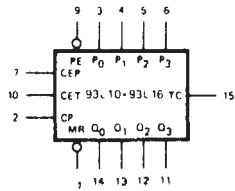
4-66. This IC (Figure 4-29) is a high-speed expandable comparator which compares two 5-bit words to give one of three outputs: "equal to", "less than", or "greater than". An active low enable line is provided to enable the comparator function. When the enable line is high, all three outputs are held low. For words containing more than 5-bits, comparators can be connected in series by respectively connecting the $A > B$ and $A < B$ outputs of the first comparator to the $A0$ and $B0$ inputs of the next comparator. The truth table shows the logic operation.

4-67. Low-Power Quad Two-Input Multiplexer 1820-0710

4-68. The multiplexer consists of four multiplexing circuits with common select and enable logic. Each circuit contains two inputs and one output. The logic symbol and truth table are shown in Figure 4-30.

Figure 4-28. Low-Power BCD Decade Counter 1820-0669

LOGIC SYMBOL

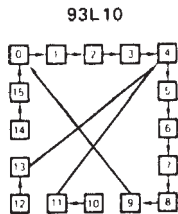


V_{CC} = Pin 16
GND = Pin 8

PIN NAMES

$\overline{PE}$	Parallel Enable (Active LOW) Input
P_0, P_1, P_2, P_3	Parallel Inputs
CEP	Count Enable Parallel Input
CET	Count Enable Trickle Input
CP	Clock (Active HIGH Going Edge) Input
$\overline{MR}$	Master Reset (Active LOW) Input
Q_0, Q_1, Q_2, Q_3	Parallel Outputs
TC	Terminal Count Outputs

STATE DIAGRAM



LOGIC EQUATIONS

Count Enable = $CEP \cdot CET \cdot \overline{PE}$
 TC for 93L10 = $CET \cdot Q_0 \cdot \overline{Q_1} \cdot \overline{Q_2} \cdot Q_3$
 TC for 93L16 = $CET \cdot Q_0 \cdot Q_1 \cdot Q_2 \cdot Q_3$
 Preset = $\overline{PE} \cdot CP$ (rising clock edge)
 Reset =

NOTE

The 93L10 can be preset to any state, but will not count beyond 9. If preset to state 10, 11, 12, 13, 14, or 15, it will return to its normal sequence within two clock pulses.

93L10 AND 93L16
MODE SELECTION

$\overline{PE}$	CEP	CET	MODE
L	L	L	Preset
L	L	H	Preset
L	H	L	Preset
L	H	H	Preset
H	L	L	No Change
H	L	H	No Change
H	H	L	No Change
H	H	H	Count

($\overline{MR}$ = HIGH)

TERMINAL COUNT GENERATION

CET	93L10 ($Q_0 \cdot \overline{Q_1} \cdot \overline{Q_2} \cdot Q_3$)	93L16 ($Q_0 \cdot Q_1 \cdot Q_2 \cdot Q_3$)	TC
L	L	L	L
L	H	H	L
H	L	L	L
H	H	H	H

$TC = CET \cdot Q_0 \cdot \overline{Q_1} \cdot \overline{Q_2} \cdot Q_3$ (93L10)

$TC = CET \cdot Q_0 \cdot Q_1 \cdot Q_2 \cdot Q_3$ (93L16)

POSITIVE LOGIC = H = HIGH Voltage Level
L = LOW Voltage Level

Figure 4-29. Five-Bit Comparator 1820-0706

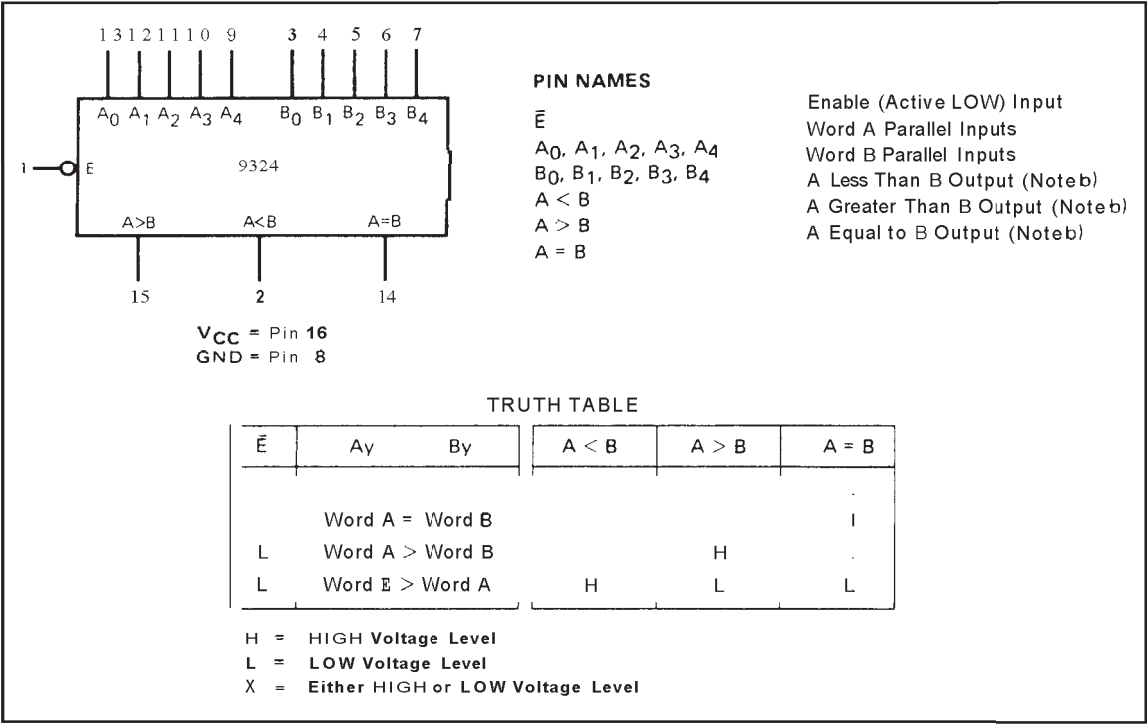
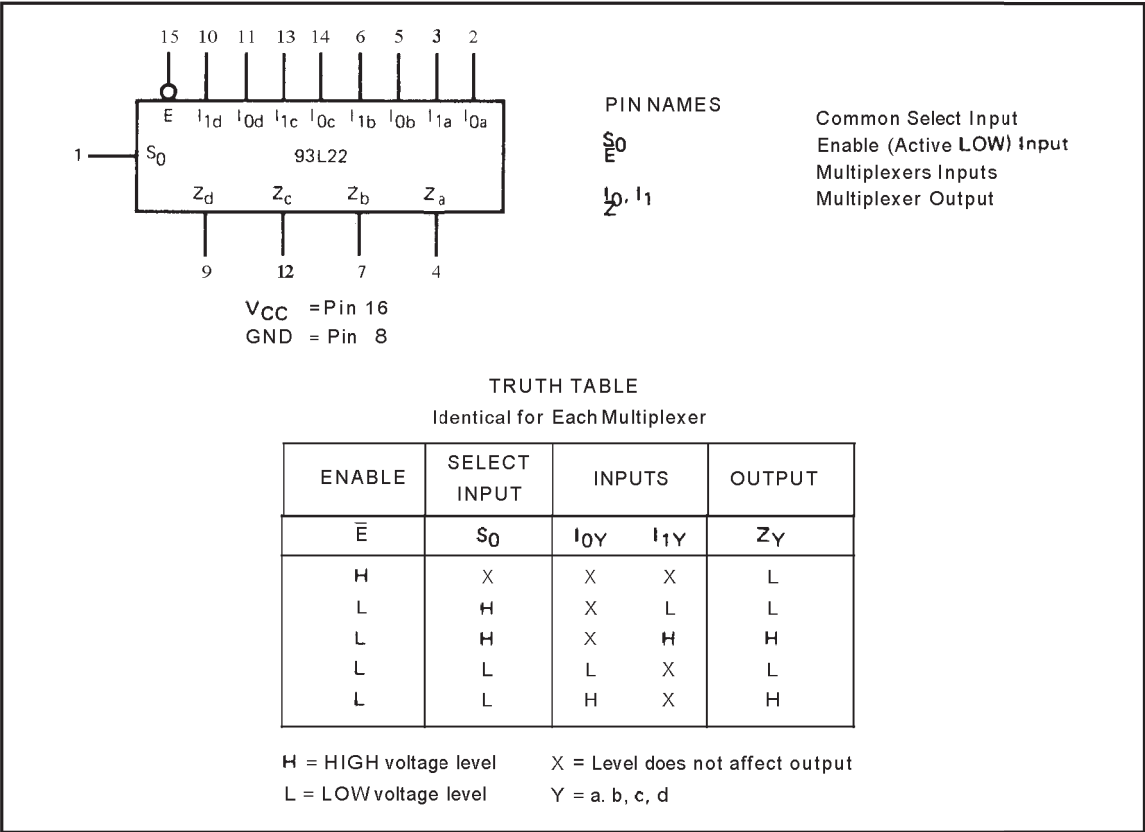


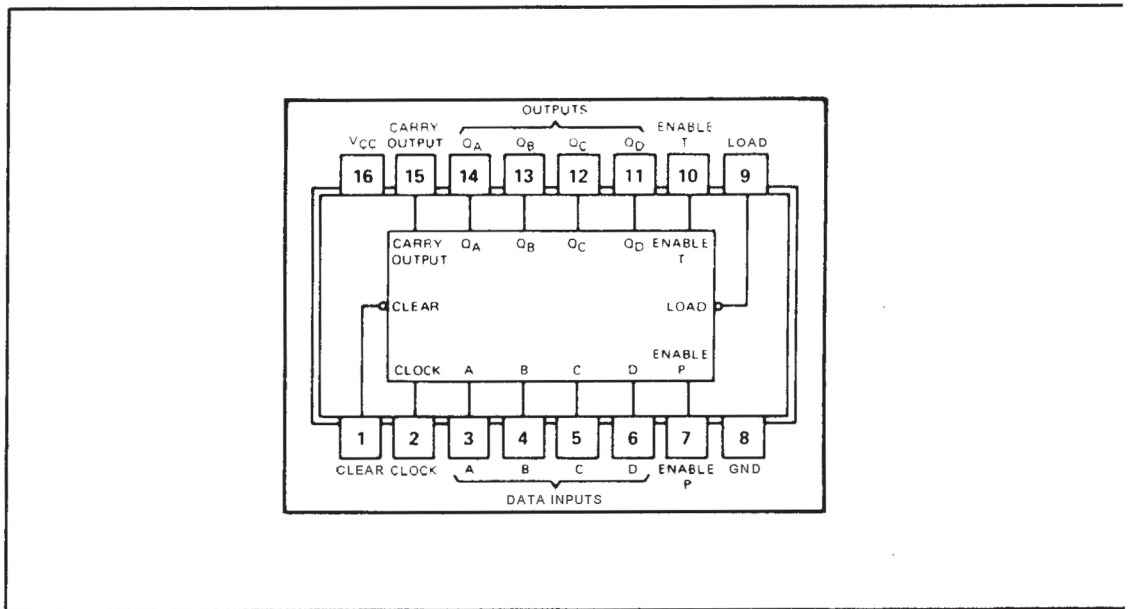
Figure 4-30. Low-Power Quad Two-Input Multiplexer 1820-0710



4-69. Synchronous Four-Bit Counter 1820-0716

4-70. This IC (Figure 4-31) is a high-speed, synchronous, presettable, four-bit binary counter using an internal carry ahead circuit. The carry ahead circuitry provides for cascading counters for n-bit synchronous configurations without additional gating. Synchronous operation is achieved by clocking all flip-flops simultaneously to change all outputs coincidentally. A buffered clock input triggers the four J-K master-slave flip-flops on the positive rising edge of the clock input. The counters are programmable and maybe preset to either state. Since presetting is synchronous, a low on the load input (pin 9) disables the counter and causes the outputs to agree with the data inputs after the next clock pulse. The clear input is synchronous and a low level at the clear input sets all four of the flip-flops low after the next clock pulse. The carry look-ahead function is accomplished with two count-enable inputs and a carry output. Both count-enable inputs (P and T) must be high to count, and input T is fed forward to enable the carry output. When enabled, the carry output will produce a positive output pulse with a duration approximately equal to the positive portion of the QA output. This positive overflow carry pulse can be used to enable successive cascaded stages. High-to-low-level transitions at the enable P or T inputs should occur only when the clock input is high.

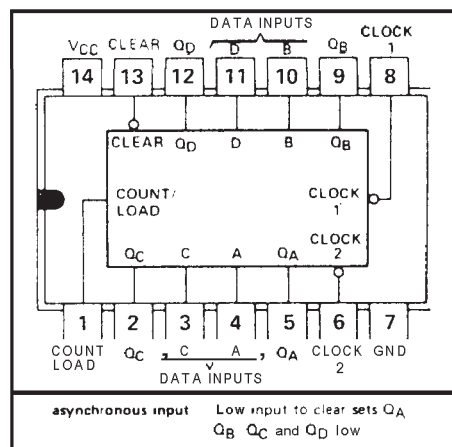
Figure 4-31. Synchronous Four-Bit Counter 1820-0716



4-71. Presettable Decade Counter/Latch 1820-0751

4-72. This IC (Figure 4-32) consists of four dc-coupled, master-slave flip-flops internally connected to provide a $\times 2$ and a $\times 5$ counter. The outputs may be preset to any state by driving the count/load input (pin 1) low and entering data at the data input lines. The outputs will follow the inputs independent of the clock. The counter can also be used as four-bit latches by using pin 1 as the strobe and entering data on the data inputs. In this mode, the outputs will follow the inputs when pin 1 is low, but will remain unchanged (latched) when pin 1 is high and the clock is inactive. The counters accept 0 to 50 MHz at the clock 1 input and 0 to 25 MHz at the clock 2 input. During the count operation, transfer of information to the outputs occurs on the negative-going edge of the clock pulse. When the clear input is driven low, all outputs go low regardless of the clock states.

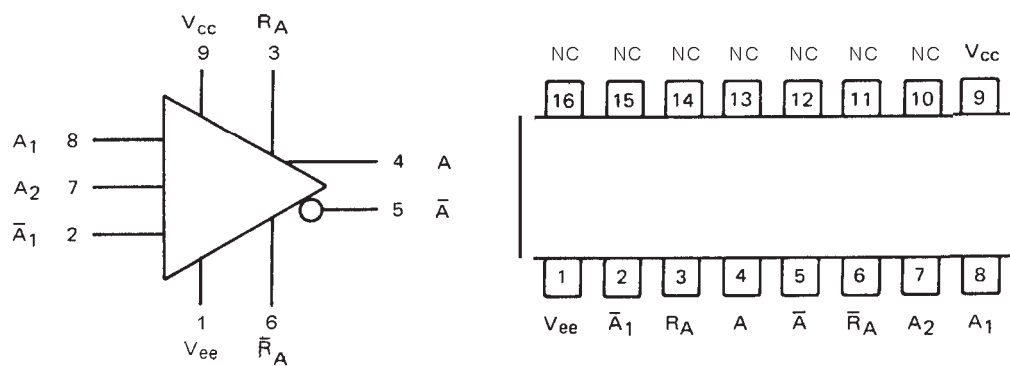
Figure 4-32. Presettable Decade Counter/Latch 1820-0751



4-73. EECL Differential Amplifier/Limiter 1820-0754

4-74. The differential amplifier/limiter (Figure 4-33) can be used for differential or single-ended amplification, balanced to unbalanced transformation or vice-versa, RF to EECL conversion, and Schmitt trigger circuits. The 1820-0754 has 100Ω output impedances.

Figure 4-33. EECL Differential Amplifier/Limiter 1820-0754



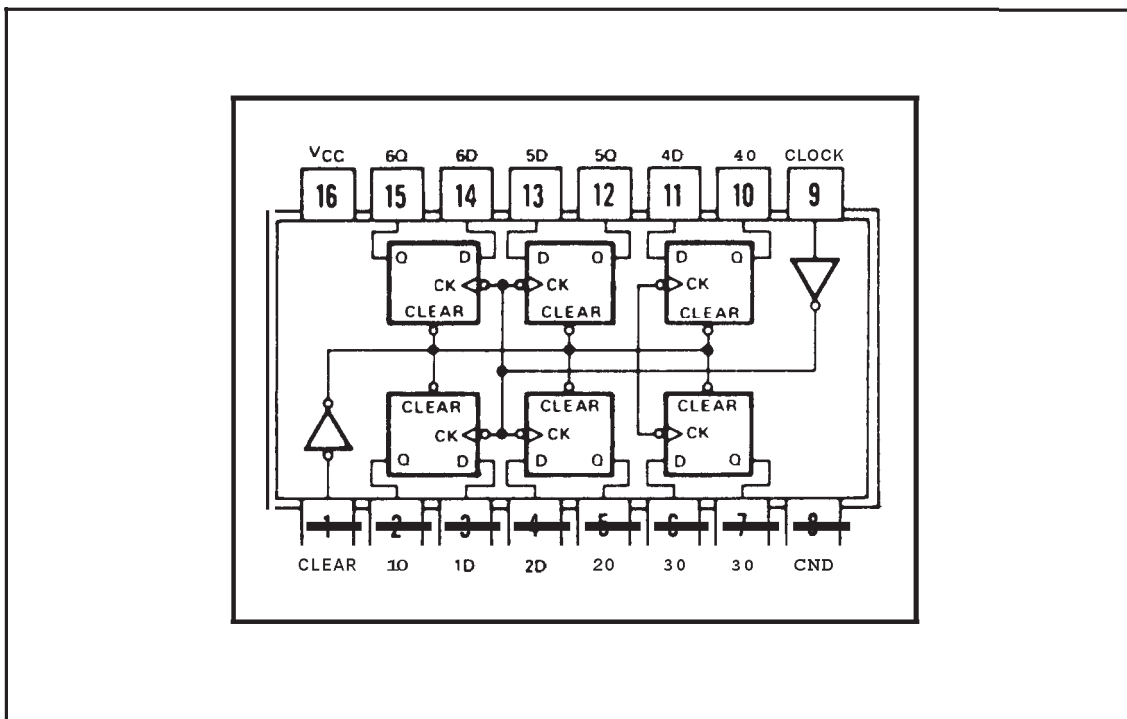
4-75. Presettable Binary Counter/Latch 1820-0765

4-76. The 1820-0765 is similar to the 1820-0751 except that the 1820-0765 has a $\div 2$ and $\div 8$ configuration.

4-77. Hex D-Type Flip-Flops 1820-0788

4-78. The 1820-0788 (Figure 4-34) consists of six positive-edge-triggered D flip-flops. Information at the D inputs is transferred to the Q outputs on the positive-going edge of the clock pulse. Clock triggering occurs at a particular voltage level and is not directly related to the transition time of the positive-going pulse. When the clock input is at either the high or low level, the D input has no effect on the output. A low input to pin 1 resets all Q outputs to low.

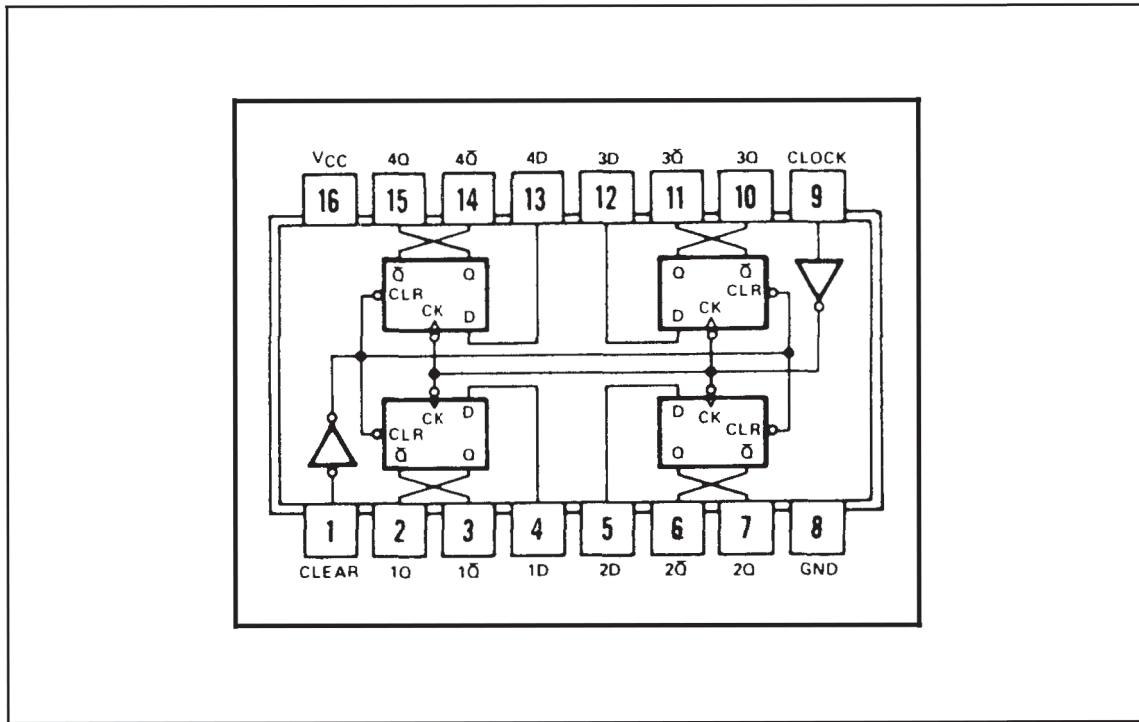
Figure 4-34. Hex D-Type Flip-Flops 1820-0788



4-79. Quadruple D-Type Flip-Flops 1820-0839

4-80. The 1820-0839 (Figure 4-35) is similar to the 1820-0788 except that the 1820-0839 has complementary outputs from each flip-flop.

Figure 4-35. Quadruple D-Type Flip-Flops 1820-0839



4-81. Low Power 5-Bit Comparator 1820-0904

4-82. The 1820-0904 is a low power version of the 1820-0706.

4-83. Four-Bit Binary Full Adder 1820-0910

4-84. The 1820-0910 (Figure 4-36) uses low power Schottky TTL circuits to achieve speeds comparable to standard IC's at approximately one-fifth of the power. The adder performs the addition of two 4-bit binary numbers. The sum (C) outputs are provided for each bit and the resultant carry (C4) is obtained from the fourth bit. The operation of the adder is shown in the truth table below.

4-85. EECL Bi-Quinary Counter 1820-1019

4-86. The 1820-1019 (Figure 4-37) consists of four EECL D-type flip-flops interconnected to perform binary and quinary functions. The quinary output is in BCD code. The clock input of the quinary may be connected to the Z₄ input of the binary to yield a +10 with a BCD output code for direct readout of frequencies below 350 MHz. For prescaling, the Z₄ or the Z₈ outputs may be connected to the clock input of the binary to give a +10 output with 50% duty cycle on the binary output. Change of state occurs on the positive transition of the clock inputs (C₁, C₂, or C_Q). A positive transition of the reset input forces all outputs into the high state. Maximum allowable clock risetime is 25 nanoseconds. The truth table below shows the count sequence for BCD.

Figure 4-36. Four-Bit Binary Full Adder 1820-0910

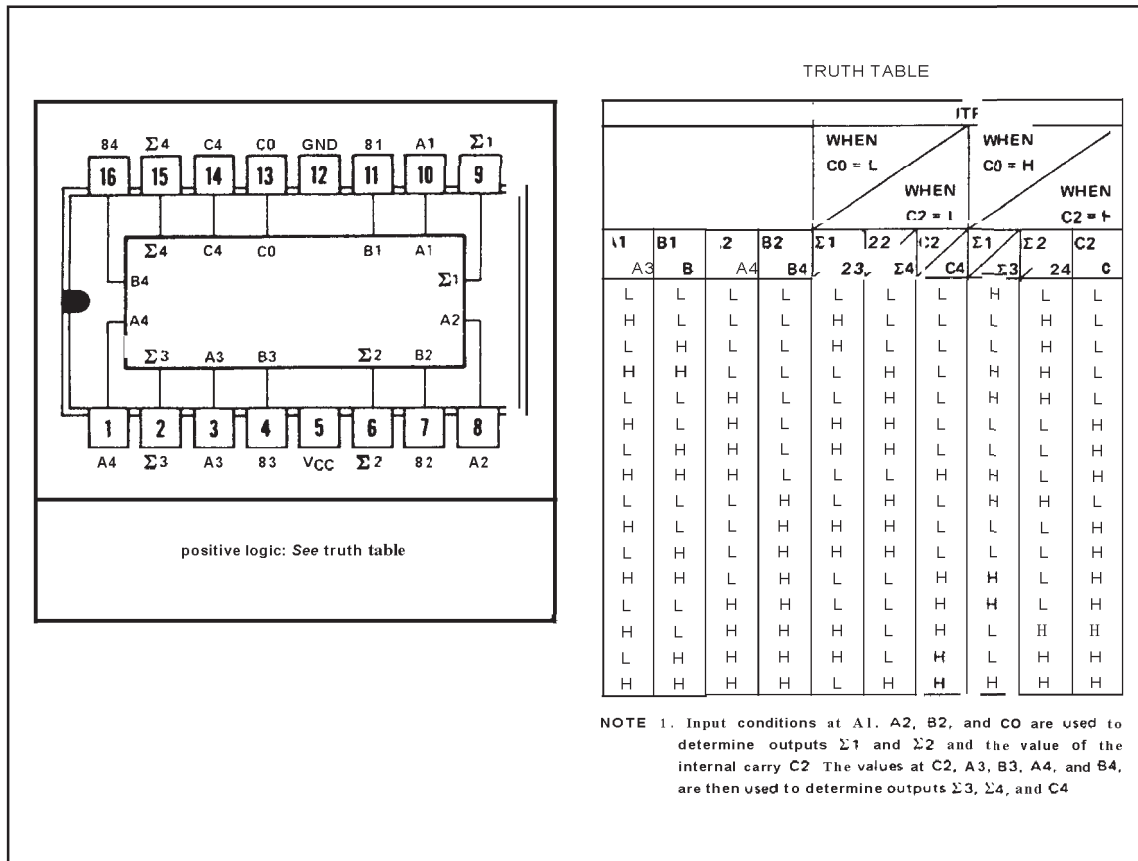
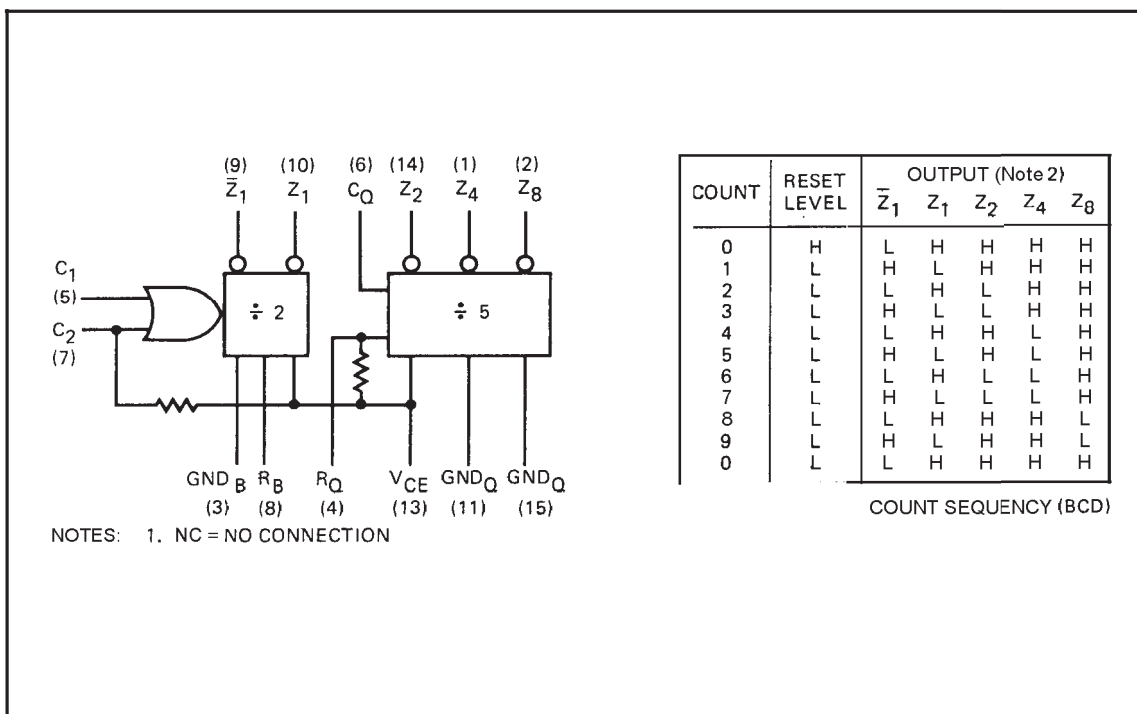


Figure 4-37. EECL Bi-Quinary Counter 1820-1019



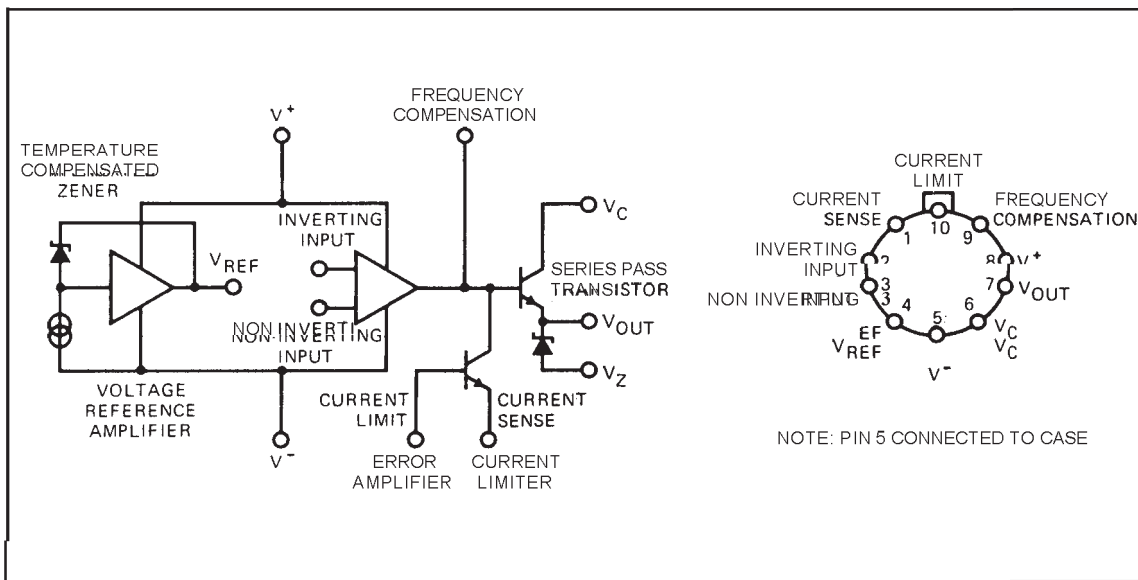
4-87. BCD to Decimal Decoder 1820-1047

4-88. The 1820-1047 is a low power version of the 1820-0214. Power dissipation is typically 70 milliwatts.

4-89. Voltage Regulator 1826-0010

4-89. The outline drawing and equivalent circuit for the 1826-0010 are shown in Figure 4-38. The regulator consists of a current source, a voltage reference amplifier, an error amplifier, a current limiter, and a series pass transistor. The current source, zener diode, and voltage reference amplifier provide a constant 7.2 volt reference output (V_{ref}) for the non-inverting input of the difference amplifier. The inverting input of the difference amplifier senses the power supply output voltage through an external voltage divider. An example of operation is as follows. If the power supply output voltage decreases, the voltage at the inverting input (pin 2) also decreases. This drives the error amplifier output to bias the series pass transistor to decrease its impedance. When the impedance of the series pass transistor decreases, the output voltage tends to increase to regulate the output. The frequency compensation input prevents high frequency oscillations.

Figure 4-38. Voltage Regulator 1826-0010



4-91. Voltage Regulator 1826-0016

4-92. The 1826-0016 (Figure 4-39) is a negative regulator. Operation is similar to the 1826-0010.

4-93. Operational Amplifier 1826-0021

4-94. The 1826-0021 (Figure 4-40) is an operational amplifier internally connected as a unity-gain non-inverting amplifier. Pins 1 and 8 allow for offset balancing.

Figure 4-39. Voltage Regulator 1826-0016

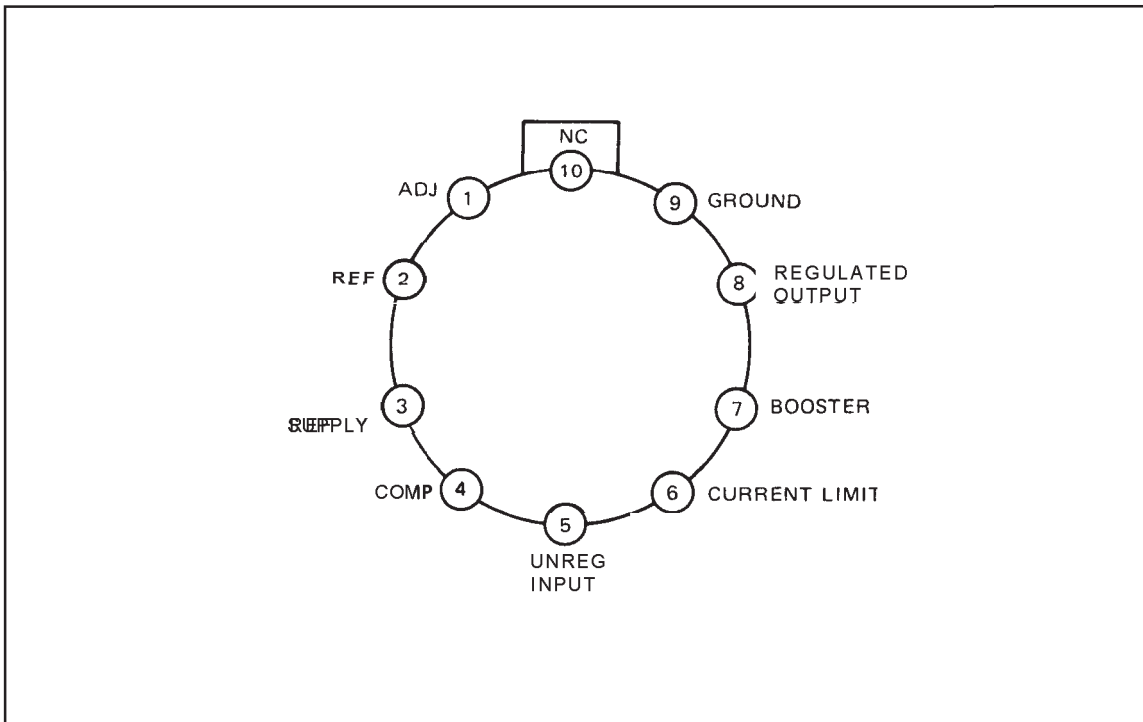
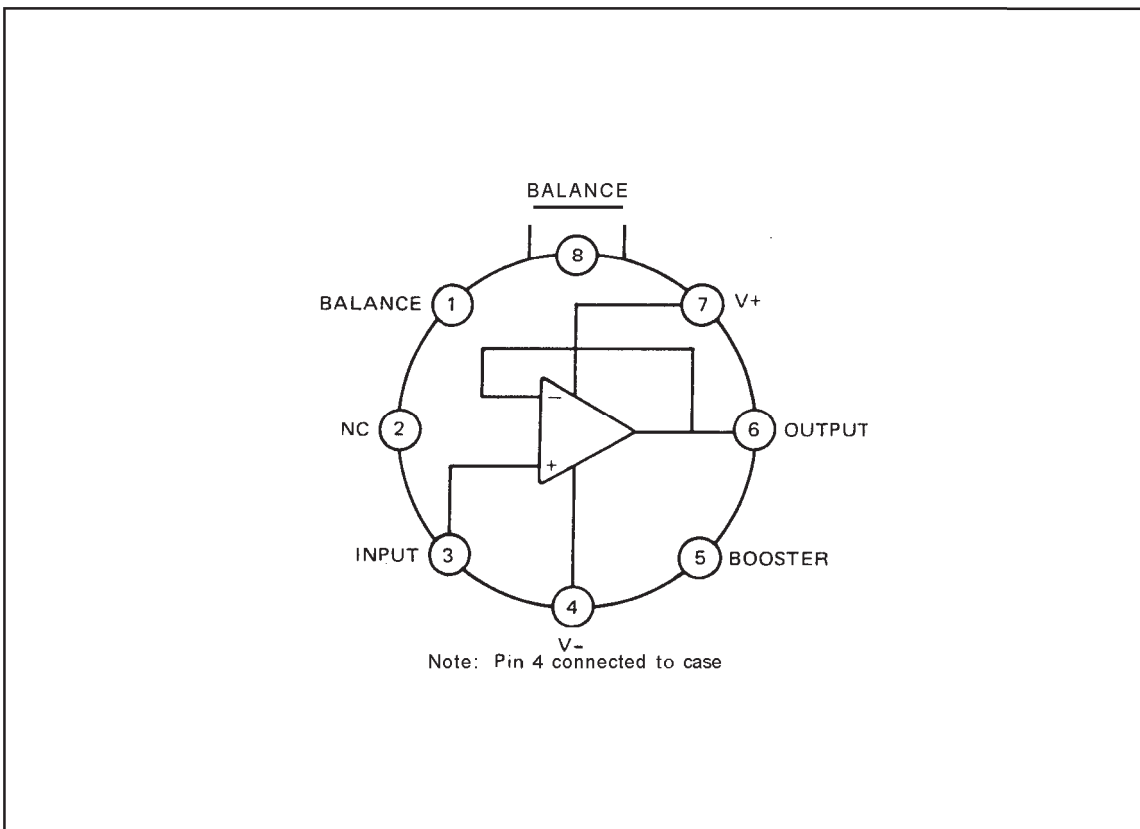


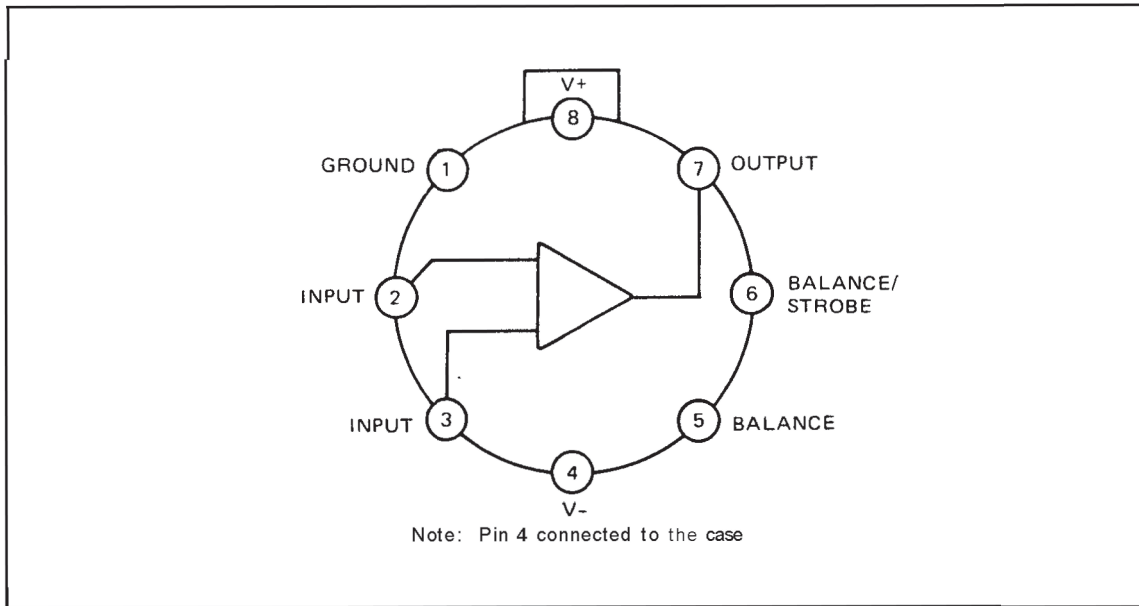
Figure 4-40. Operational Amplifier 1826-0021



4-95. Voltage Comparator/Buffer 1826-0026

4-96. The 1826-0026 (Figure 4-41) is a voltage comparator capable of handling differential input voltages up to ± 30 volts. Provision is included for offset balancing.

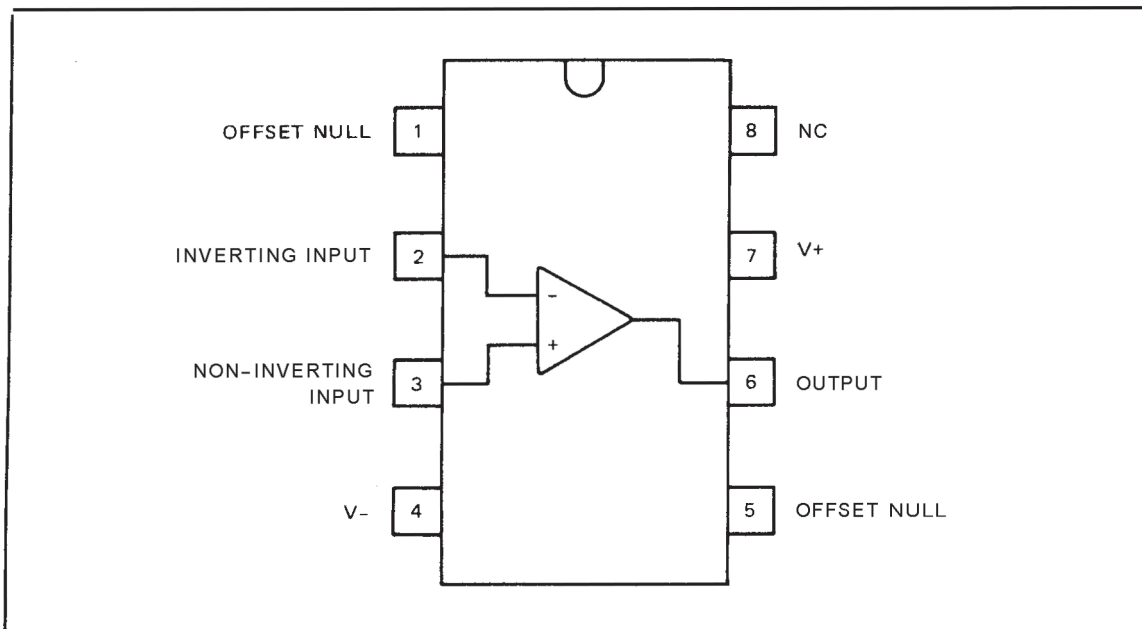
Figure 4-41. Voltage Comparator/Buffer 1826-0026



4-97. Operational Amplifier 1826-0073

4-98. The 1826-0073 (Figure 4-42) is a general purpose operational amplifier.

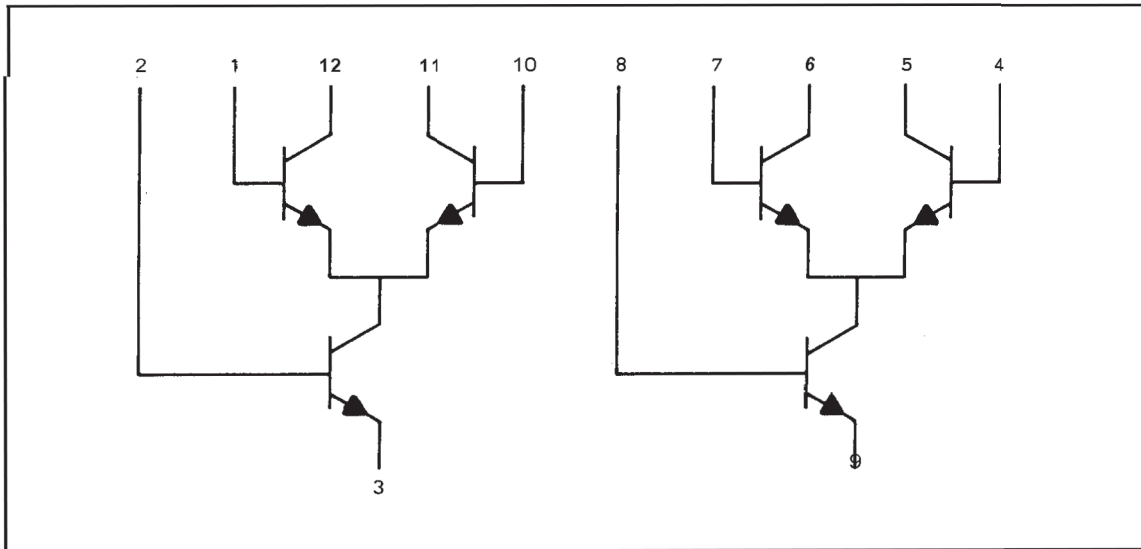
Figure 4-42. Operational Amplifier 1826-0073



4-99. Dual Differential Amplifier 1858-0004

4-100. The 1858-0004 (Figure 4-43) consists of two independent differential amplifiers with associated constant current sources. The six npn transistors are high frequency devices making the IC useful to 500 MHz.

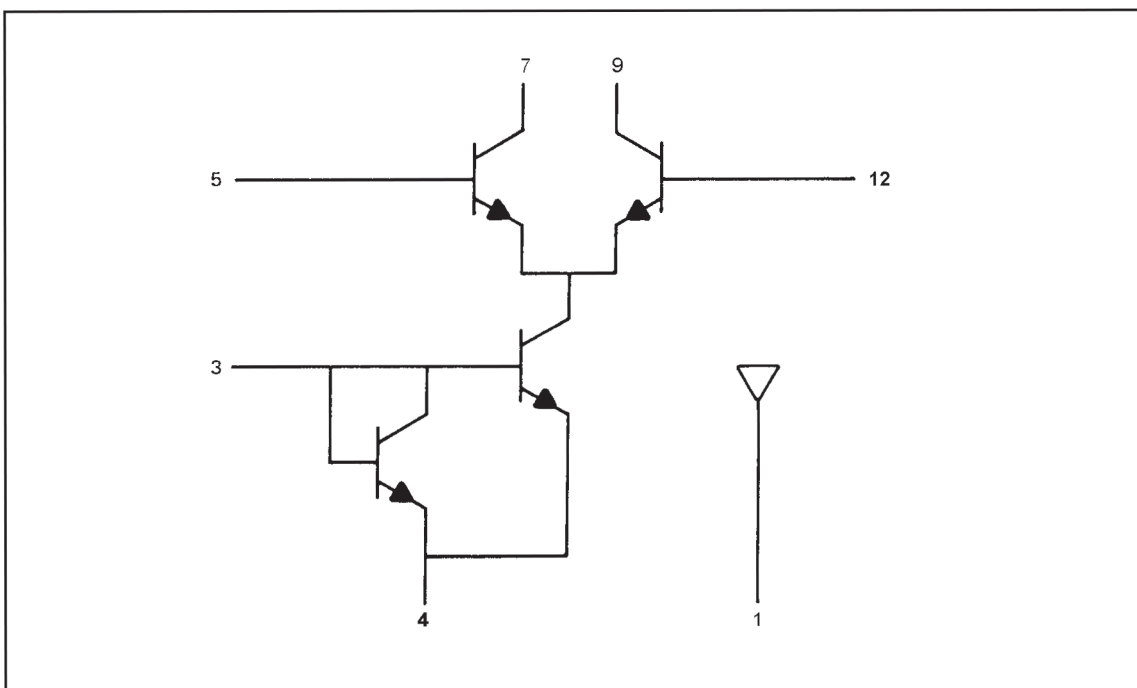
Figure 4-43. Dual Differential Amplifier 1858-0004



4-101. Transistor Array 1858-0018

4-102. The 1858-0018 (Figure 4-44) contains four transistors and is used as a mixer. F_t is approximately 1.5 GHz.

Figure 4-44. Transistor Array 1858-0018



4-103. SIMPLIFIED BLOCK DIAGRAM DESCRIPTION

4-104. Figure 4-45 illustrates the simplified block diagram for the 5340A Frequency Counter. The counter has five major functional circuit groups; the input-phase lock loop, the transfer phase lock loop, the N determination circuits, the counter circuits, and the interface circuits.

4-105. Two separate inputs are provided for frequency measurements: the high impedance-low frequency (10 Hz - 250 MHz) input, and the 10 Hz to 18 GHz input. The high Z input provides a direct count path with high input impedance. The 10 Hz to 18 GHz input path either counts directly from 10 Hz to -225 MHz or uses a transfer oscillator technique to count from -225 MHz to 18 GHz. Two phase lock loops are used in the transfer oscillator to down convert the input frequency to a countable range.

4-106. F_x represents frequencies to be counted from 10 Hz to 18 GHz. The counter program first disables the transfer oscillator circuits while the counter "looks" for a direct count input from 10 Hz to -225 MHz. If there is an input signal between 10 Hz and -225 MHz, the counter establishes a direct count path. Signal flow is through the power divider and sampler (inactive) to the counter circuits. When a direct count path is established, the phase lock loops are kept inactive. If a direct count is not established within approximately 10 milliseconds, the transfer oscillator circuits are activated and the input phase lock loop searches for the presence of signals between -225 MHz and 18 GHz. If two or more signals are encountered, the phase lock loop acquires the signal with the larger amplitude.

4-107. When the input phase lock loop locks on a signal, it provides an output frequency F_1 which is harmonically related to the value of F_x as follows: $F_x = NF_1 - 20 \text{ MHz}$. N is an integer equal to the harmonic relationship between F_x and F_1 .

4-108. When the input phase lock loop locks, the transfer phase lock loop locks to provide a frequency output from the N determination circuits which is proportional to N. Since $F_x = NF_1 - 20 \text{ MHz}$, the counter has the necessary information to calculate and display the value of F_x .

4-109. The interface board for the standard instrument provides the control signals required for completing and displaying a measurement. The interface board for Option 011 provides for digital output data and remote programming in addition to supplying control signals.

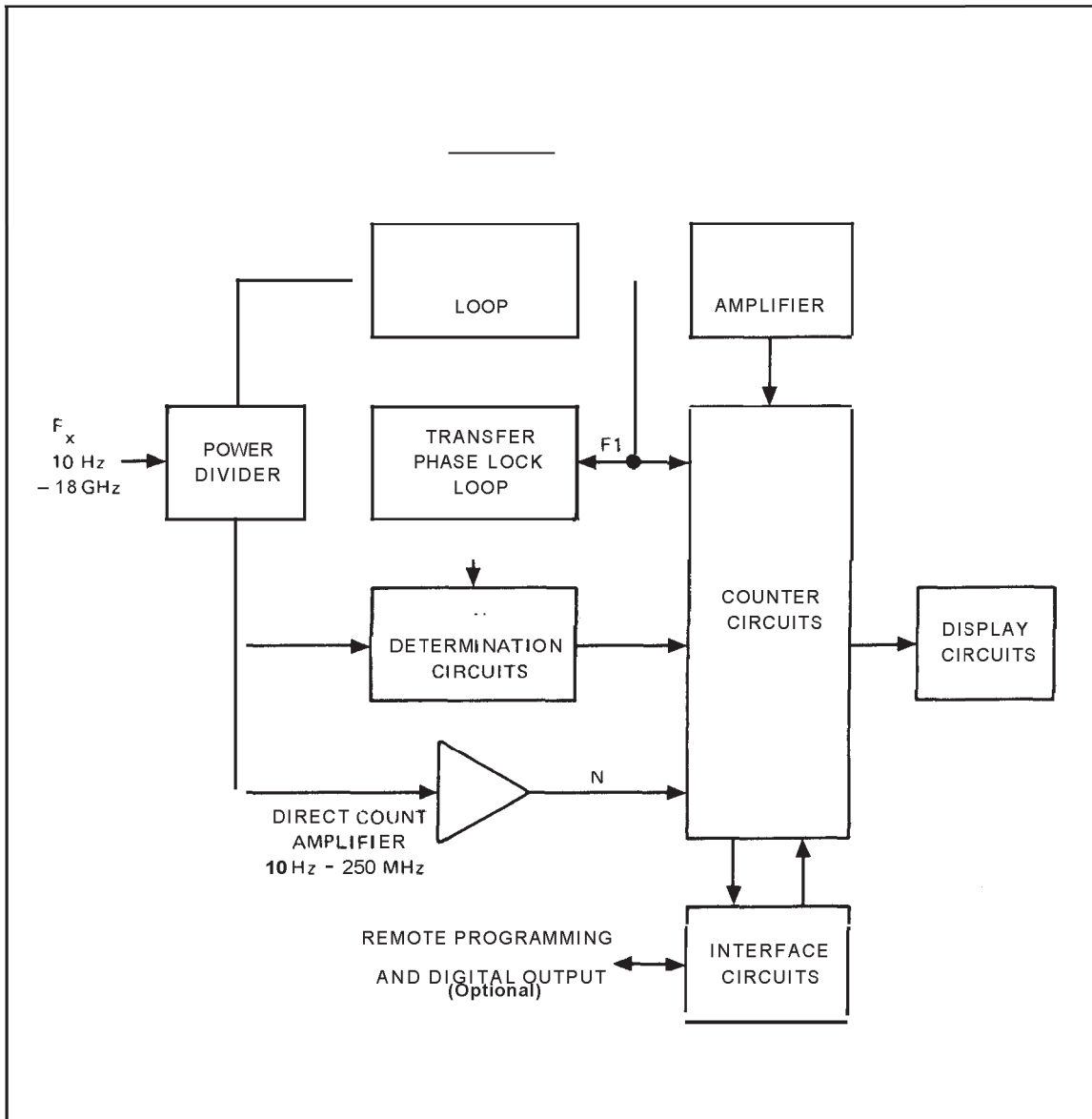
4-110. OVERALL THEORY OF OPERATION

4-111. The overall block diagram for the 5340A is located in Section VIII on a foldout sheet. See Figure 8-6.

4-112. Input Circuits

4-113. Two separate input paths are used: a high impedance direct count path (10 Hz to 250 MHz) via input amplifier A3, and a 10 Hz to 18 GHz path through power divider CP1, A1 and A2. When the input frequency to CP1 is between 10 Hz and 250 MHz, a direct count path is used consisting of CP1, A2A1, A2FL1, A17, and the counter circuits A18 through A26. For frequencies into CP1 above 250 MHz, the transfer oscillator technique is used.

Figure 4-45. Simplified Block Diagram



4-114. Input Phase Lock Loop

4-115. The input phase lock loop consists of A1, A13, A4, A15, A6, A5, A7, and A12. Overall, the purpose of the input phase lock loop is to accept input signals from -225 MHz to 18 GHz and generate an output (F_1) which is harmonically related to the input signal. This relationship is expressed as $F_x = NF_1 - F_{IF1}$. F_x is the input frequency, N is the harmonic multiplier of F_1 , and F_{IF1} is 20 MHz. VCO No. 1 (A12) operates from -100 MHz to 185 MHz and is controlled initially by the search generator A5. A5 supplies A7 with a triangular search signal to drive VCO No. 1 from ~100 MHz to 185 MHz. A12 supplies three F_1 outputs: an output to the counter circuits, an output to A1, and an output to A11.

4-116. Sampler driver A1A2 produces very narrow pulses at the VCO frequency with usable harmonics up to the 180th order. Sampler No. 1 consists of a thin film hybrid circuit which provides high sensitivity and wideband sampling.

4-117. Preamplifier board assembly No. 1 (A1A4) consists of a matching network and a 100 MHz low-pass filter. If NF_1 is either 20 MHz above or below F_s , a 20 MHz output will be produced. Subsequent circuits in phase detector A4 are used to ensure that the Nth harmonic of VCO1 is 20 MHz above F_s . This eliminates ambiguity problems in the transfer oscillator phase lock loop.

4-118. Limiter amplifier A13 provides wide-band, high-gain amplification and will limit on signal inputs of -35 dBm or greater. This ensures that phase detector A4 will operate on the highest signal amplitude present at the input of A13. This feature prevents the counter from measuring spurious inputs or harmonically related signals that are lower in amplitude than the signal of interest. Amplitude discrimination is effective for signals 20 dB different in amplitude (10 dB typical).

4-119. Phase detector A4 receives the 20 MHz limiter output from A13 and a 20 MHz reference signal from A15. The reference signal originates as 10 MHz in the frequency standard A18. A15 provides frequency doubling. A4 determines the phase difference between the 20 MHz reference signal and the 20 MHz input signal and provides a dc output which is proportional to the sine of the phase angle between the two 20 MHz signals. This output is used to change the VCO frequency to provide a 20 MHz output from A13 which is in phase with the 20 MHz doubler output. In addition, A4 has a 90° phase-shifter and a quadrature detector to determine whether the VCO harmonic is 20 MHz above or below F_s . The output of the quadrature detector connects to circuits in A5. If phase detector No. 1 in A4 has a zero output but the quad detector senses that NF_1 is 20 MHz below F_s , then the circuits in A5 will allow the VCO to continue searching until the other 20 MHz point is reached. When the quad detector determines that the proper value of NF_1 has been reached, A5 disables the search function. If there are phase differences between the 20 MHz reference and the 20 MHz output of A13, the dc output of A4 (phase detector 1) will drive A7 to correct the VCO frequency. In this manner, the input phase lock loop searches, determines the proper lock point, and locks on the input signal F_s . When lock is achieved, the VCO output (F_1) drives A11 and A22.

4-120. Search programmer A6 serves to normalize the phase lock loop gain. When F_s is in the upper frequency range (toward 18 GHz), the loop gain and search amplitude are minimized. Conversely, higher loop gain and search amplitudes are required for lower frequencies. To determine at what frequency range the loop is operating, the search programmer receives N information from the N determination circuitry via the control board. The loop gain and search level are controlled by the program attenuator and program shunt attenuator in A6. These in turn are controlled by the step programmer.

4-121. The input phase lock loop will track input frequency variations including FM. For example, if a signal generator frequency is being measured, the generator frequency can be varied and the phase lock loop will track the frequency change until the VCO frequency reaches the end of its range then acquires a new lock point near the middle of the VCO range. For signal inputs containing frequency modulation, see Figure 3-1 for the FM characteristics of the 5340A.

4-122. Transfer Phase Lock Loop

4-123. The transfer phase lock loop consists of A11, A10, A9, and A8. This phase lock loop produces an output (F_2) that is related to F_1 as follows: $F_2 = F_1 \pm 20$ kHz. F_2 is used to drive the sampler driver in A2 which produces narrow pulse outputs that are rich in harmonics. Sampler No. 2 also receives F_s and produces an intermediate frequency F_{IF2} which is related to the inputs as follows: $F_{IF2} = NF_2 - F_s = F_{IF1} \pm NF_0$; where F_0 is a 20 kHz offset introduced into phase lock loop No. 2. The 20 kHz is derived from time base A20 and connects to a bandpass filter gate in A8. VCO No.2 receives a feed-forward signal from A7 to set VCO No. 2 frequency (F_2) approximately equal to F_1 . Mixer A11 determines the difference frequency between F_1 and F_2 . A8 determines the phase difference between the output of the mixer A11 and the 20 kHz reference signal and supplies a dc output to A9 which is proportional to the phase difference. A9 drives A10 to lock F_2 to a frequency which is 20 kHz above or below F_1 .

4-124. Harmonic Determination Circuitry

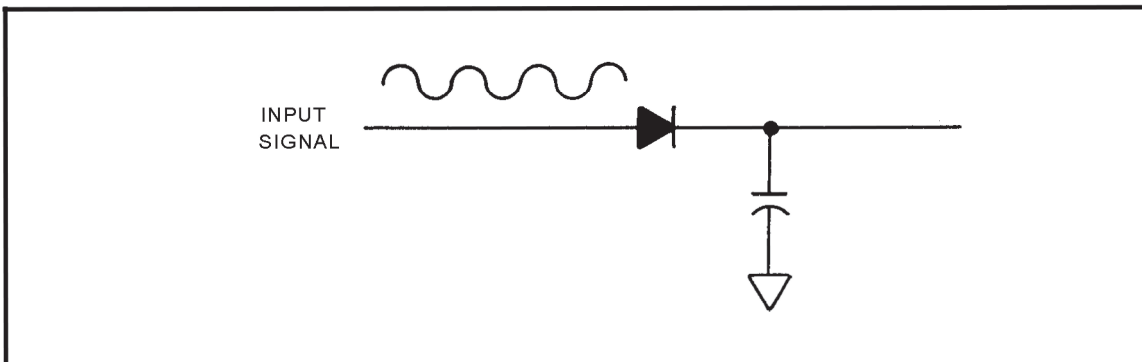
4-125. When sampler No. 2 produces an F_{IF2} output, the bandpass filter and preamp A2A4 provide a 6 MHz bandpass. Limiter amplifier-mixer A14 receives F_{IF2} , and the 20 MHz reference from A15. When 20 MHz is mixed with F_{IF2} , a difference frequency that is equal to $N \cdot 20$ kHz is produced. The value of N is determined in the counter circuits and used as a gate extension factor.

4-126. SAMPLING THEORY

4-127. Sampling techniques are used for measuring frequencies that are too high to count with direct counting circuits. This method provides an output signal whose frequency is a fraction of the input frequency and low enough to count directly. The 5340A uses a 20 MHz phase lock loop. However for simplicity, a dc phase lock loop will be described followed by an explanation of the type of phase lock techniques used in the 5340A.

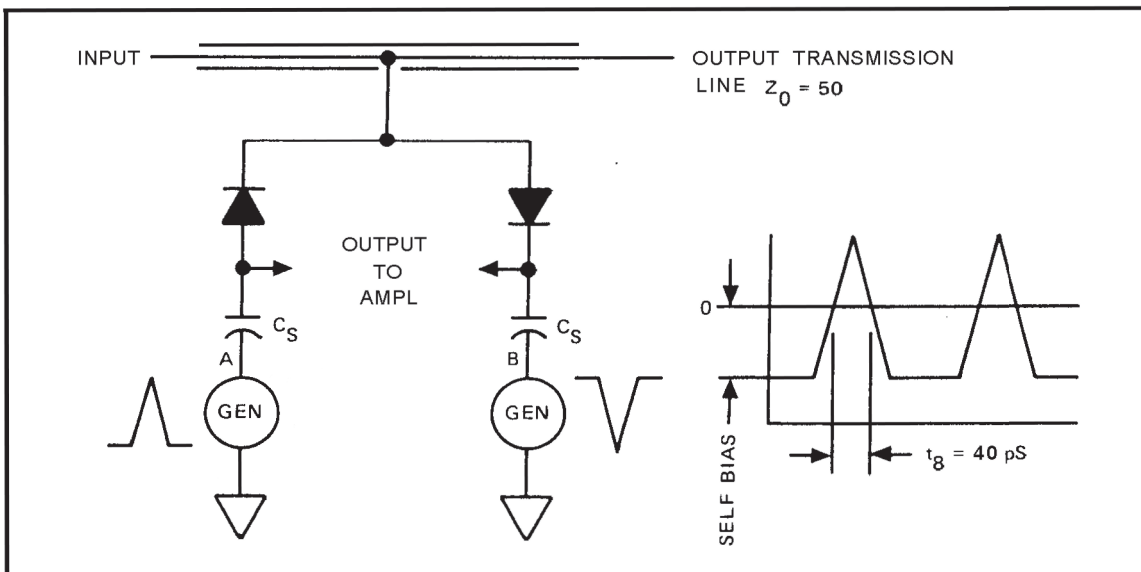
4-128. A sampler looks at the input signal for a brief interval of time and charges a capacitor to the instantaneous voltage of the signal. For each sample event, the capacitor charges to the instantaneous voltage of the input waveform. Figure 4-46 shows one method of sampling using a diode as a switch.

Figure 4-46. Sampling Diode Switch



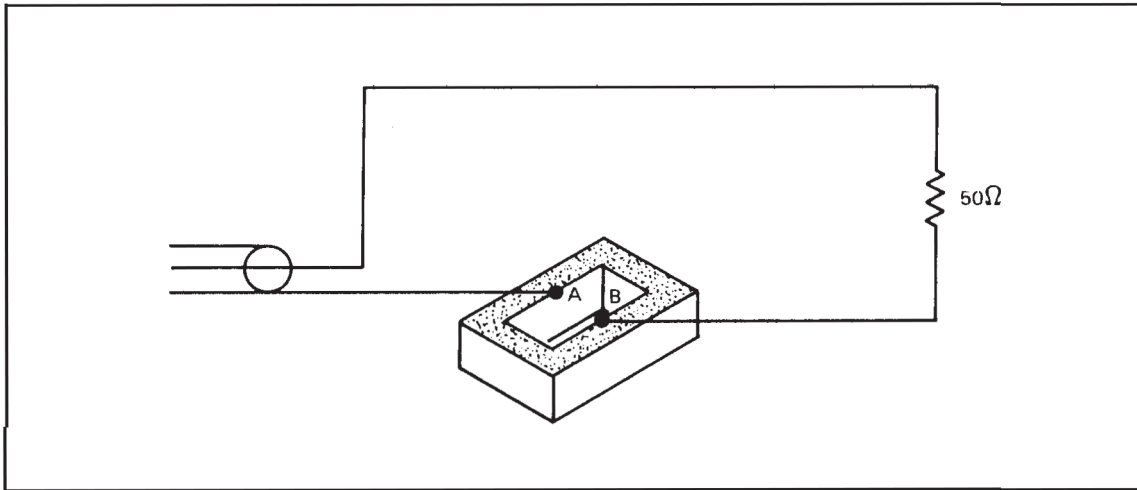
4-129. To minimize sampling pulses on the input signal, a balanced sampler is used as shown in Figure 4-47. The outputs of the balanced sampler connect to an amplifier for summing.

Figure 4-47. Balanced Sampler



4-130. A means must be provided to turn on the diodes periodically and this is achieved by biasing the diodes into conduction by a sampler driver. Assume that a positive pulse is injected into point A and a negative pulse into point B by the generators. The diodes are normally self-back biased and are gated in a balanced fashion such that a low impedance path is provided through the diodes and the amplifying capacitors to ground. The sampling capacitors charge towards the voltage appearing at the input. To achieve high frequency response, it is necessary to turn the diodes on for a very short time (typically 40 ps). Two hot carrier diodes are used because of their extremely fast switching characteristics. The pulses required to turn on the diodes are developed by inducing a traveling wave in a slot as shown in Figure 4-48.

Figure 4-48. Sampler Slot



and negative pulses needed to turn on the diodes in Figure 4-47. The two capacitors in Figure 4-47 connect to points A and B in Figure 4-48.

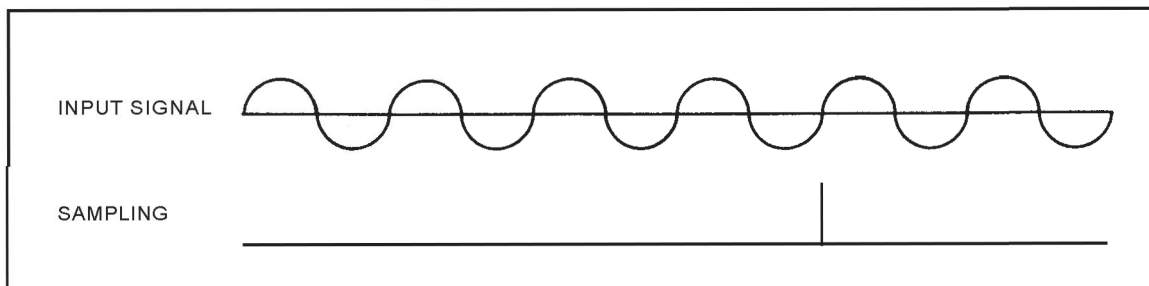
4-132. Sampler Driver

4-133. The sampler driver output is differentiated by the slot in the sampler to provide fast transitions. These are obtained from a Schmitt trigger circuit that drives a Step-Recovery-Diode (SRD) through an inductor, yielding extremely sharp spikes. One spike is supplied for each cycle of the Voltage Controlled Oscillator (VCO) output.

4-134. When Sampling Occurs

4-135. The time and rate of sampling is carefully controlled by feedback in the phase lock loop. In a DC phase lock loop (a method NOT used in this counter) the sampling rate is adjusted for a constant sampler output.

Figure 4-49. Sampling Timing



4-136. As shown in Figure 4-49, sampling occurs at the zero crossing of the input signal, and the sampler output is zero volts. When the sampler output goes positive, it indicates that the sampling occurs later than the correct time. This generates an error signal to increase the sampling frequency so that sampling occurs at the zero crossing. In this example, the VCO frequency is exactly one-half the input frequency. Thus, an output frequency is obtained that is harmonically related to the input frequency and is also low enough to be counted. When phase lock occurs, the VCO frequency is some fraction of the input frequency. Additional circuitry is needed to determine the ratio between the input frequency and VCO frequency. This instrument does NOT use a DC phase-lock loop, but instead uses a 20 MHz intermediate frequency (IF) circuit such that the sampler output will be exactly 20 MHz when phase lock occurs. The relationship between the input signal and the VCO is:

$$NF_{VCO} - F_{input} = 20 \text{ MHz}$$

where N = Harmonic number

When phase lock occurs, the output of the sampler will be a 20 MHz signal.

4-137. A1 PREAMPLIFIER ASSEMBLY NO. 1, 05340-60017

4-138. Preamplifier No. 1 (Figure 8-7) consists of Sampler Driver A1A2, Sampler Output A1A3, and Preamplifier Board A1A4. A1 receives Fx (-225 MHz to 18 GHz) at 52 and the VCO signal (-100 MHz to 185 MHz) at A1A2J1. The Sampler Driver produces sharp rise time signals at the VCO frequency, which when differentiated by the sampler have usable harmonic outputs up to the 180th order. Sampler A1A1 consists of a thin-film hybrid circuit which provides high sensitivity and wide band sampling. The Sampler Output assembly consists of R1, C1, C2, and L1. A1A3R1 is a factory selected resistor that sets the bias on the sampler diodes in A1A1. A1A3C1 and C2 comprise a capacitive adding network for the output of the two sampling diodes in A1A1. A1A3L1 matches impedances between the sampler output and the preamplifier input.

4-139. Preamplifier Board A1A4 consists of common emitter amplifiers Q1 and Q2, two low pass filters, and an integrated circuit U1 which contains two independent differential amplifiers. Overall, the amplifier provides wide band amplification from .1 MHz to 100 MHz. Input amplifier Q1 is a common emitter amplifier; where R1 and R2 set the base bias, R4 serves as the collector load and R3 and C1 provide decoupling from the +5V supply. R6 and C2 give increased high frequency gain by reducing the emitter load impedance at high frequencies. Two low pass filters are included: L1, C3-C5, and L3, L4, L6, C9, C11, C13, and C15. These filters provide roll-off for frequencies above 100 MHz to attenuate the VCO frequency.

4-140. The differential amplifiers U1A and U1B provide additional gain and include high frequency peaking networks L7 and L9. Resistors R15 and R16 set the operating bias for the constant-current transistor in the IC. L8 provides high frequency peaking for the input of U1B.

4-141. A2 PREAMPLIFIER ASSEMBLY NO. 2, 05340-60027

4-142. Preamplifier No. 2 (Figure 8-8) is similar to Preamplifier No. 1 previously discussed. The assembly receives Fx at 52 and the output of VCO No. 2 at A2A2J1. The output of VCO No. 2 is equal to F1 ±20 kHz. The Sampler and Sampler Driver A2A1 and A2A2 are identical to those used in Preamplifier A1.

4-143. The input circuit on A2A4 consists of an FET amplifier Q1 and pnp amplifier Q2. The output of Q2 feeds through a low pass filter L3, C6, and C7. The filter rolls off at 60 MHz. The circuits used for U1A and U1B are similar to those on A1A4. A 20 MHz bandpass filter consisting of L8-L10, C20, and C22 is used in the output to provide an overall 8 MHz bandwidth. The frequency range for the output of preamplifier No. 2 (F_{IF2}) is 16 to 24 MHz.

4-144. A3 HIGH-IMPEDANCE INPUT AMPLIFIER ASSEMBLY, 05340-60001

4-145. This assembly (Figure 8-9) receives the input signal at J4 and provides limiting for the signal. Capacitor C4 blocks any DC on the input signal. CR5 and CR6 are hot-carrier limiter diodes that clamp the voltage on the gate of Q1A to + and - 1.3 volts (developed across forward biased diodes CR1 - CR3 and CR2 - CR4 respectively).

4-146. Q1B is a current source for Q1A to maintain the proper DC level for the input to U1. Varying R10 changes the DC level on the drain of Q1B. Q1A is a unity gain amplifier that presents a high input impedance to 54. To compensate for the loss of Q1A transconductance at high frequencies and to keep the gain constant, C6 and R6 shunt high frequencies past Q1A.

4-147. U1 is used as an RF to EECL converter. A reference voltage is maintained on U1 pin 8 and the RF input signal is applied to pin 2. When pin 2 is more positive than pin 8, the output on pin 4 will be logic high (EECL logic levels). A complementary output on U1 pin 5 is detected by CR9 - C15 and CR10 -C16 to give automatic base line shift to compensate for the shift due to a non-symmetrical input signal (such as a pulse train). When the output goes negative for more than a 50% duty cycle, Q2 will turn on, forming a divider network of R17 and R12 with the +15V supply. This raises the reference voltage at U1(8) by half the hysteresis of the circuit to increase the sensitivity to a positive pulse train.

4-148. When Option 002 is installed, a rear panel connector J8 is installed in parallel with 54. To ensure that the instrument meets all specifications, a 50-ohm termination (R4) is normally installed on the front panel connector 54. R4 should be connected to the rear panel connector 58 when it is desired to use the front panel input.

4-149. A4 PHASE DETECTOR/QUAD DETECTOR ASSEMBLY, 05340-60002

4-150. The Phase Detector (Figure 8-10) consists of 20 MHz bandpass filter L1, L2, C5, C7, and R14; 90° phase shifter Q3, L4, and C13; quad detector CR6-CR9; phase detector CR1-CR4; and detector drivers Q1 and Q2. The detector receives the 20 MHz IF at pin 12 from Limiter/Amplifier A13 and the 20 MHz reference signal at pin 15 from the 10 MHz Doubler. Overall, the circuits detect the phase difference between the two inputs and determine whether the VCO harmonic is 20 MHz above or below Fx.

4-151. The 20 MHz signal from A13 goes through the bandpass filter to the phase detector and to the 90° phase shifter. The filter is tuned to 20 MHz with a bandpass of 7 MHz. The 20 MHz reference signal is routed to a differential amplifier Q4-Q5. Q6 is a constant current source for the differential amplifier.

4-152. Phase detector No. 1 compares the phase of the 20 MHz reference to the phase of the 20 MHz IF. When phase differences exists, the phase detector produces a dc output which is used to drive the VCO to produce an output which is phase coherent with the 20 MHz reference signal. When phase coherence is achieved, the quad detector detects whether the VCO harmonic is 20 MHz above or below Fx. When the VCO harmonic is 20 MHz above Fx, the quad detector output is about -450 mV; and slightly positive when the VCO harmonic is 20 MHz below Fx. The -450 mV output is used to lock the loop.

4-153. Q4 and Q5 produce two reference signals of opposite phase to drive the phase detector and the quad detector. The reference signal is coupled through C8 and C10 to the phase detector. C14 and C16 provide coupling for the reference signal to the quad detector. The phase detectors produce an output which is proportional to the sine of the phase difference between the two inputs. For example, when the two inputs are exactly in phase, the output of the phase detector is zero. At 90° phase difference, the output is maximum. The detector drivers Q1 and Q2 provide the required filtering and level shifting for the phase detector outputs. The 90° phase shifter Q3 uses an LC network to shift the phase of the 20 MHz IF to be in quadrature (90°) with the reference signal.

4-154. A5 SEARCH ASSEMBLY, 05340-60003

4-155. The Search Assembly (Figure 8-11) consists of Schmitt triggers U2 and U4, buffers Q2 and Q3 and operational amplifiers U1 and U3 which serve as a ramp integrator. The circuits receive two inputs, one from Quad Detector A4 and the other from Search Programmer A6. The quad detector output determines if the lock is valid. When the quad detector on A4 detects that the VCO harmonic is 20 MHz above Fx, the quad detector supplies a negative signal to A5(8).

A negative level at pin 8 turns U2 and U4 off which turns off Q1. Q1 determines when the search ramp signal is routed to DC Compensation Amplifier A7. The search ramp signal is derived from the search pulse signal which is supplied from Search Programmer A6. U1 and U3 function as an integrator to provide a ramp voltage output. C7 is the integrating capacitor and R15 sets the dc level for the ramp signal.

4-156. A6 SEARCH PROGRAMMER ASSEMBLY, 05340-60004

4-157. The Search Programmer (Figure 8-12) determines the search ramp amplitude and sets the loop gain compensation. The circuits consist of counter U4, binary to decimal decoder U2, buffer U1, loop compensation switches Q1 through Q6, search programming switches Q7 through Q12, and pulse conditioner U5.

4-158. Pulse conditioner U5 is a one-shot multivibrator used to shape the incoming start search pulse from A21. C1 and R3 set the multivibrator pulse width at 5 milliseconds. The prf is determined by Control Assembly A21. The conditioned pulse is used by the Search Assembly A5 to derive the search ramp signal.

4-159. The counter circuit U4 receives three-line binary data and a strobe from interface assembly A19. In addition, U4 receives the inhibit control and start search signals from A21. These are used to drive the clock 2 input and the reset input of U4. The strobe input allows parallel-entry for the DB, DC, and DD inputs. When the strobe line receives a logic 0, the data inputs are transferred to the D, C, and B outputs (U4 pins 12, 2, and 9). Counting occurs on the negative going edge of the input clock pulse. The count function will start from the number strobed in or will start from zero when the counter is reset. The outputs are binary and connect to a binary-to-decimal decoder U2. U2 provides a decimal output between 0 and 6. As an example of operation, assume that U2 receives A=H, B=H, and C=L. With this input, the 3 line (pin 4) goes low to drive U1(4) high. With U1(4) high, Q4 and Q10 are on and all other FET's are off. For this programming segment, R11, C8, and R19 provide the proper loop compensation and R25 sets the search amplitude. Two modes of operation can be selected, normal and programmed.

4-160. A7 DC AMPLIFIER/COMPENSATOR NO. 1 ASSEMBLY, 05340-60005

4-161. A7 (Figure 8-13) consists of lock mode switches Q1, Q2, Q3, Q6, and dc amplifiers U1 and U4, Q5, Q8, Q9. The lock mode switches are controlled by the search switch signal from A5 and the input loop lock from A5. The output from Phase Detector No. 1 represents the error signal required to drive VCO No. 1 to be phase coherent with the 20 MHz reference signal. When Q2 is on, the phase detector signal is amplified by U1. R13 sets the dc level output. R27 sets the gain of Q4 and Q5. Diodes CR5 and CR8 provide limits for the maximum dc.

4-162. A8 BANDPASS FILTER/PHASE DETECTOR ASSEMBLY, 05340-60006

4-163. The BPF/Phase Detector Assembly (Figure 8-14) consists of a bandpass filter amplifier U1, comparator U2, retriggerable one-shot multivibrator U3B, sampler driver U3A, sampler Q2, and high impedance amplifiers Q1A and Q1B. A8 receives the 20 kHz reference signal from Time Base A20 and the 20 kHz mixer signal from Mixer A11. A8 produces two outputs: the transfer loop SEARCH signal and the phase detector 2 signal. The transfer loop SEARCH signal is sent to DC Compensator Amplifier A9. A9 uses the transfer loop SEARCH signal as an indication of loop lock. The phase detector 2 output is used to drive VCO 2 so that the 20 kHz mixer signal is coherent with the 20 kHz reference signal.

4-164. The input to U1 is the mixer output from A11 at approximately 1V peak-to-peak amplitude. U1 is an operational amplifier connected in a bandpass filter feedback configuration. The filter is tuned to 20 kHz with a Q of about 2 and a bandpass of ± 5 kHz at the 3 dB points.

4-165. Comparator U2 compares the output level of U1 with the positive level set by R13. When the output level of U1 exceeds the level set by R13, U2 produces a positive output to trigger U3B. U3B is a retriggerable one-shot multivibrator. When U3B pin 12 goes high, the multivibrator triggers to drive U3B pin 10 high for approximately 50 psec. The duration of the 50 μ sec

pulse is determined by R20 and C19. The multivibrator can be retriggered at any time during the 50 psec period to establish a new 50 psec pulse output. As long as the multivibrator is retriggered within 50 psec, the Q output U3(10) will remain high. In practice, this is the manner in which the circuit operates. Since U2 turns on and off for each cycle of its input, U3B will be retriggered as long as the signal at U2(2) is sufficient to trigger comparator U2. When lock is achieved, U3B(10) is high.

4-166. In the phase detector portion of A8, C16 couples the 20 kHz mixer signal through a high impedance tie point to Q2. The high impedance tie point prevents humidity from discharging the high impedance points and C18. Q2 is an N-channel insulated gate field-effect transistor (IGFET) used as a sampler, U3A generates 0.8 psec (± 0.2 psec) pulses to gate Q2 on and off at the 20 kHz reference rate. The mixer signal from A11 is sampled by Q2 to produce a charge across C18. When the mixer signal is at 20 kHz and is coherent with the 20 kHz reference signal, the voltage across C18 will be dc. When the loop is out of lock, the voltage across C18 is ac. The frequency of this ac is the difference between the instantaneous values of the reference signal and the mixer signal. U3A is disabled when U3B(10) is low, thereby preventing sampler operation until the transfer loop SEARCH line goes high. This prevents false locks on harmonics of 20 kHz such as 10 kHz, 40 kHz, etc.

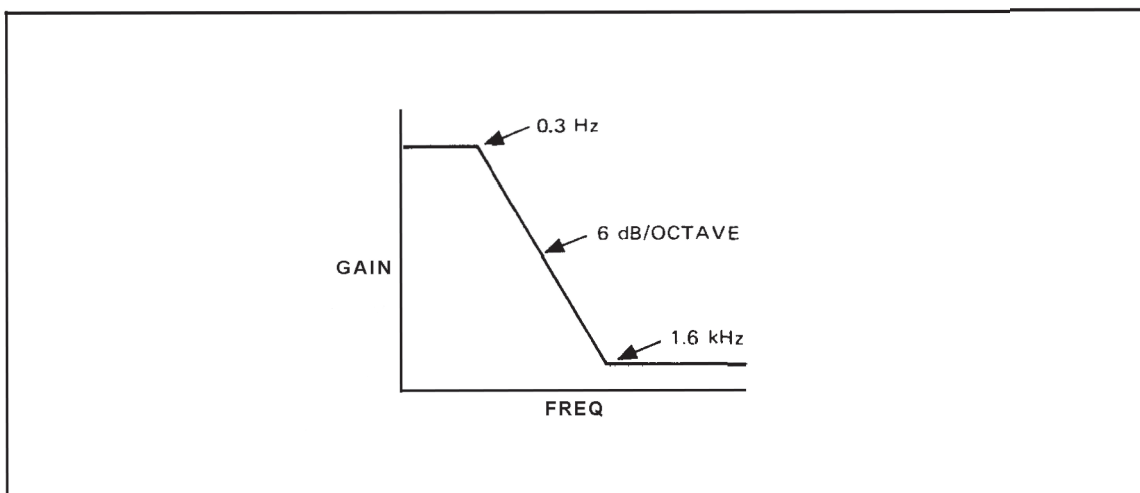
4-167. Q1A and Q1B comprise a dc stabilized FET pair. Connecting Q1A and Q1B between + and - 15 volts reduces the dc variation on the output of pin 6. CR2 and CR3 provide ± 10 volts for proper operation of Q1A and Q1B. C20 through C23 filter out noise generated in the zener diodes. 4-168. When phase lock is achieved, the dc output of Q1A and Q1B is amplified by DC Compensator/Amplifier No. 2 A9. A9 drives the VCO 2 (A10) frequency to maintain a 20 kHz difference frequency out of A11 which is phase coherent with the 20 kHz reference signal.

4-169. A9 DC AMPLIFIER/COMPENSATOR NO. 2 ASSEMBLY, 05340-60007

4-170. This assembly (Figure 8-15) performs two main functions. One of the functions provides dc amplification and compensation required for the loop gain and frequency response characteristics. The other function is to process the search and lock signals to develop a transfer loop lock output to "tell" the counter circuits when the transfer loop is locked.

4-171. U1 is a low-noise operational amplifier which provides dc gain combined with a lag network. The dc gain is variable from approximately 1 to 25 as determined by the ratio of R8 to R4 + R2. R1 inserts a current into the operational amplifier input to adjust the dc offset. The lag network consists of C5, C7, R11, and R8. At higher frequencies, C5 and C7 increase the amount of feedback to reduce the gain. Figure 4-50 shows the frequency response of amplifier U1. The rolloff characteristics are designed to provide the proper compensation for the loop.

Figure 4-50. Frequency Response of A9 Input Amplifier

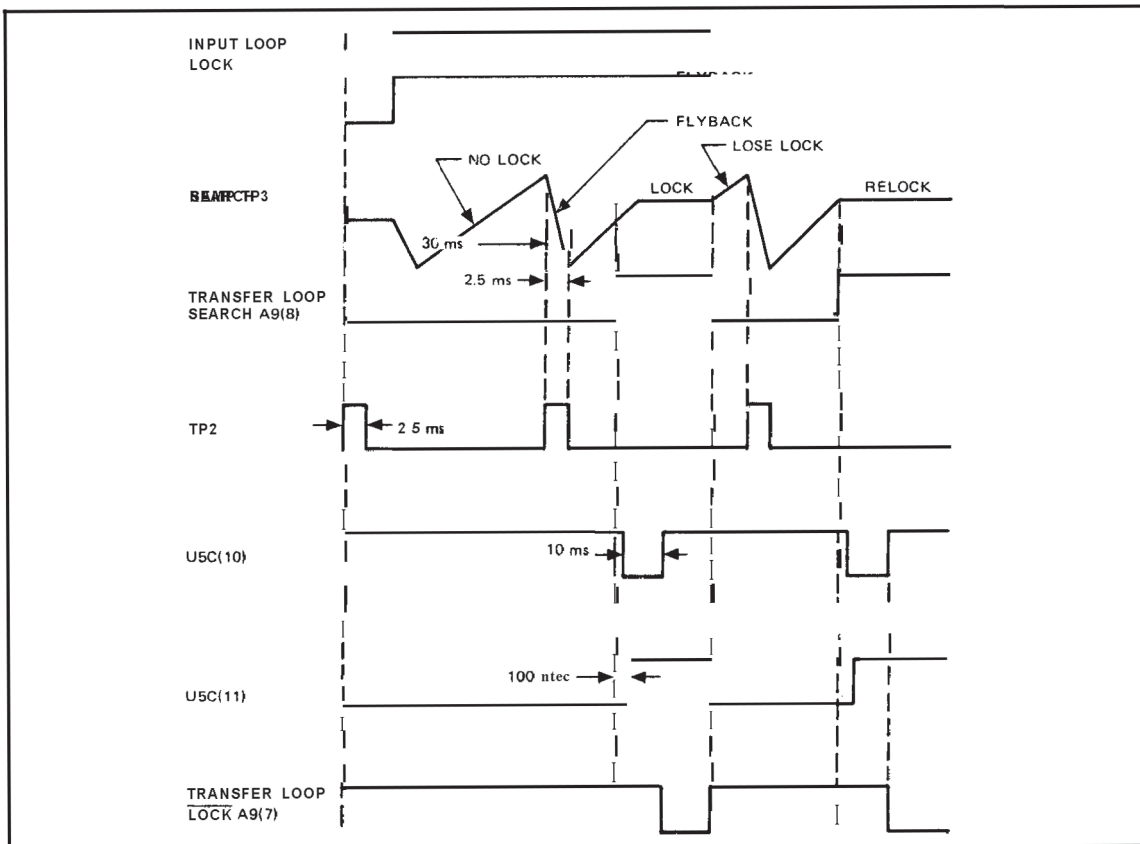


4-172. U2 serves as a summing amplifier for the phase detector output and the output of U4. The gain of U2 for the phase detector signal is 5 as set by R20 and R15. The gain for the output of U4 is 1 as determined by R20 and R13. The output of U2 is between +5 and +13volts and is used to fine tune VCO 2.

4-173. The search signal is a sawtooth waveform which is developed across C8. When the level at A9(8) is low, Q1 is off and Q3 is on. This allows C8 to charge through Q3 and R12 toward +15 volts. The high-impedance tie point is a teflon-insulated connector that prevents humidity from discharging C8. The ramp developed on C8 couples through a voltage follower U4 to comparator U3. U3 has a +5V reference input at pin 2. After 30 milliseconds, the ramp voltage at U4(6) will reach +5 volts and U3(7) will trigger one-shot multivibrator U6A for 2.5 milliseconds. When U6A(6) goes high, Q2 turns on to discharge C8. This develops the flyback portion of the sawtooth, which lasts for 2.5 milliseconds. U6A can also be triggered when the input loop lock signal at A9(12) goes high. C4 and L4 differentiate this input into a spike which triggers U6A to discharge C8 and start the transfer loop search cycle. When a harmonic of the VCO frequency beats against the incoming Fx to produce an approximate 20 kHz difference, the transfer loop SEARCH signal goes high. When A9(8) is high, Q1 switches on to turn off Q3. This interrupts the charging source for C8 allowing C8 to maintain its charge.

4-174. The transfer loop LOCK signal is developed by ANDing the transfer loop SEARCH signal an the input loop lock signal. As an example of operation, assume that the input loop is locked (A9 pin 12 is high) but the transfer loop search signal at A9 pin 8 is low. Under these conditions, U5C pins 9 and 10 are high but U5C pin 11 is low. Thus there is no transfer loop LOCK signal at A9(7), i.e., A9(7) is high. When A9(8) goes high, U5C(11) will go high after 100 nsec and U5C(10) will go high after 10 msec. U5A and B provide the 100 nsec delay and U6B gives the 10 msec delay. The purpose of U5B and A is to prevent U5C(8) from going low at the first instant that A9(12) and A9(8) are both high. This allows U6B to provide an overall delay of 10 msec before U5C(8) can go low. Thus the circuit "waits" for 10 msec to ensure a stable lock. The closed loop bandwidth of the transfer phase lock loop is 5 kHz. Figure 4-51 shows the timing relationship of the circuits.

Figure 4-51. Transfer Loop Timing Diagram



4-175. A10 VCO NO. 2 ASSEMBLY, 05340-60008

4-176. When the counter is in the search phase, the VCO (Figure 8-16) provides an output which varies from -100 to 185 MHz. When phase lock occurs, the frequency of the VCO is held constant and used by other circuitry. There are two outputs, one to the sampler driver A2A2, and the other to the mixer A11. Buffer U1B drives matching transformer T1 and receives a VCO inhibit signal from control board A21.

4-177. U1A is a digital device that outputs EECL levels but it is biased in its active region by dc feedback through low pass filter L10, C14, and R21. The VCO consists of Q5, C10, C12, L11, CR4, and CR5. CR4 and CR5 are voltage variable capacitors used to tune the VCO in response to voltage variations at the collector of Q5. The oscillator consists of Q5 and the resonant circuit formed by CR4, which is capacitive, and L11-CR5, which appears inductive. C10 and C12 form a capacitive divider feedback path. The oscillator output is amplified and buffered by Q6.

4-178. R17 and R20 are current limiting resistors and L7, L8, and C13 are decoupling filters for the two circuits. Input decoupling is accomplished with a wideband ferrite choke Z1. This prevents the VCO signal from leaking back to the input leads and interfering with other circuits. Z1 has the property of looking resistive over a wide band of frequencies and appears as a DC short. The impedance of Z1 is constant over the frequency range of the oscillator.

4-179. Q3 is a constant current source for Q2. CR1, R8, and R25 set a constant bias voltage for Q3 to determine the value of the constant current. The emitter of Q2 is a low impedance point and the resistor networks R1-R6 and R2-R7 are summed at the emitter of Q2. Voltage changes at A10(7 and 8) change the current through Q2. This varies the collector voltage of Q2 which in turn causes a voltage change at the emitter of Q4 and the cathodes of CR4 and CR5 to change the VCO frequency. Q2 has a nonlinear collector load to compensate for the nonlinear tuning characteristic of the VCO. The linearizing circuit consists of CR2, R5, and R9. As the collector voltage of Q2 changes, additional load resistors are switched in by CR2 to change the gain of the stage. Q4 is an emitter follower to buffer the linearizer.

4-180. Q1 provides noise rejection for the power supply line. If the +15 volt supply decreases, the current through Q1 decreases to drop less voltage across CR1 and R8. This tends to reduce the current in Q3 thereby increasing the voltage on the collector of Q2 to compensate for the decrease on the +15V supply. Any increase of voltage on the +15V supply is similarly compensated. The circuit is decoupled from noise on the -15V supply by constant current source Q3.

4-181. L5 and C7 constitute a lowpass filter to reduce noise generated by input amplifier Q1-Q3. L3-C3 and L4-C4 provide a corresponding high frequency boost to maintain a flat overall response. Filters L1, L2, C1, C5, C6, L6, C9, C11, L9, and C16 prevent noise from being distributed by the power supply lines.

4-182. A11 MIXER ASSEMBLY, 05340-60009

4-183. The mixer (Figure 8-17) receives the two VCO signals and provides a difference frequency output to Bandpass Filter/Phase Detector A8. Mixer U2 is a differential amplifier with a constant current source. The signal from VCO No. 1 is attenuated by R1, C4, R3 and drives the current source. The signal from VCO No. 2 connects to one side of the differential amplifier (U2 pin 12). The other input to the differential amplifier connects to ground (U2 pin 5). Pin 1 of U2 is the substrate which connects to -5 volts. The output of U2 is a 20 kHz (nominal) square wave output. U1 provides a gain of 22 with low response to the harmonics and supplies a 20 kHz sine wave at approximately 1V p-p output. The power supply voltages (+15V and -5V) are decoupled from the power supplies by L1, L2, and C1, C2, and C5 through C9. The 20 kHz output connects to bandpass filter phase detector A8.

4-184. A12 VCO NO. 1 ASSEMBLY, 05340-60008

4-185. Figure 8-18 shows the schematic diagram for A12. The operation of A12 is identical to that of A10. One additional output at pin 5 is used to route the VCO No. 1 output to A22 for counting.

4-186. A13 LIMITER/AMPLIFIER ASSEMBLY, 05340-60010

4-187. Figure 8-19 shows the schematic diagram for A13. The Limiter/Amplifier input receives the 20 MHz output of Preamplifier No. 1 at pin 10 and provides the necessary limiting action for automatic amplitude discrimination. U1 and U2 are dual independent differential amplifiers each containing a current source. Limiting action is due to current limiting in the IC. R4, R6, R8, and R9 set the operating bias for the constant current source in U1A. L4 provides high frequency peaking. The circuitry for U1B, U2A, and U2B is similar to U1A.

4-188. A14 LIMITER/AMPLIFIER/MIXER ASSEMBLY, 05340-60011

4-189. The inputs to A14 (Figure 8-20) are the preamplifier No. 2 signal and the 20 MHz reference signal. The output provided by A14 is F_n , where $F_n = 20 \text{ kHz} \cdot N$. N is the harmonic multiplier of VCO No. 1 frequency that provides the required 20 MHz IF. The signal output of Preamplifier No. 2 is the result of mixing the harmonics of F2 with the counter input signal F_x .

4-190. Operational amplifier U1 provides approximately 46 dB of gain for the preamplifier signal. U1 operates open loop to provide maximum gain. L5, C10, L6, and C12 are decoupling networks. L7 and C13 give bandpass filtering at 20 MHz. Q1 and Q2 form a differential amplifier to provide two signals out of phase to drive the mixer (CR1-4). Q3 amplifies the 20 MHz reference signal from A15. The mixer detects the difference frequency between the two input signals which is in range of 20 kHz to 3 MHz. The demodulator output connects to low pass filter L8, C19, and C20. The filter rolloff point is approximately 3 MHz. Comparator U2 has a 10% hysteresis to discriminate against noise that could give a false indication of zero crossover. The input to U2 is approximately 1 volt p-p and the TTL signal output of U2 connects to A20 in the counter circuits.

4-191 A15 10 MHz DOUBLER ASSEMBLY, 05340-60012

4-192. The 10 MHz Doubler (Figure 8-21) receives a 10 MHz reference from A19, doubles the reference frequency to 20 MHz, and supplies two outputs. One of the 20 MHz outputs is used by Phase Detector A4 and the other is routed to the Limiter Amplifier/Mixer A14.

4-193. The 10 MHz reference couples through C1 to a 10 MHz tank circuit consisting of L1, C2, and C3. The tank circuit helps to filter out noise on the reference signal. Diode CR1 couples the positive half cycle of the 10 MHz signal to U1A(1) and CR2 couples the negative half cycle to U1A(10). U1A consists of a differential amplifier driven by a current source. When the positive half cycle of the 10 MHz drives U1A(1), the left side of the differential amplifier conducts and develops a negative going half cycle at U1A(12). Since the left half of the differential amplifier increases conduction and a constant current source supplies the emitters of the differential amplifier, then the right half of the differential amplifier will decrease conduction. This develops a positive going half cycle of U1A(11). When CR2 conducts, the right half of the differential amplifier again decreases conduction and the left half increases conduction. The net result is a full wave rectified signal of 20 MHz at U1A(12) and U1A(11). C7 and C8 couple the 20 MHz signals to U1B. The operation of U1B is similar to U1A. The signal out of the left half of U1B is developed across a 20 MHz tank circuit and coupled through C15 to A14. In a like manner, the output of the right half of U1B is coupled to A4. R1-C5, R11-C9, and L2-C6 serve as filters for the power supply voltages. R11 lowers the collector voltage of U1B to meet the maximum voltage specification for U1.

4-194. A17A1 DIRECT COUNT AMPLIFIER ASSEMBLY, 05340-60038

4-195. This assembly (Figure 8-23) is a wide band analog amplifier with automatic gain control. The input signal at A17J1 is received from the sampler via A2FL1. The output, which is digital (EECL levels), is routed to A22 for counting. The input is ac coupled through C1 and C2. The series capacitor arrangement allows polarized capacitors to be used to couple ac.

4-196. U3 operates as a differential amplifier with U5 providing additional gain. R3, R13, and R16 are terminating resistors for each amplifier. The output of U5B(11) feeds to the first decade count board A22. The amplifier has a gain of about 30 dB and is dc coupled. A stable dc output level is achieved by feeding back part of the output signal via operational amplifier U1 to the input of U3. U1 detects any difference between the average (dc) level of U5(12) and the wiper of R11. Any imbalance produces a change in the level at U1(6). The output of U1 is used as feedback for the amplifier chain. C13, C14, and R4 give U1 a very slow time constant. Keeping the output stable yields the best sensitivity for the counting circuits on A22.

4-197. R14 provides minor feedback loops within the wideband amplifier to flatten the frequency response. C21 controls the high frequency response of the circuit to eliminate any possible counting of noise.

4-198. U2 circuitry is a detector and comparator that determines if a signal below -225 MHz is present. If so, this will take precedent over energizing the operation of the phase lock mode of the instrument. The presence of a signal causes CR5 to reduce the positive charge on C19 obtained through R21. This is matched by CR4 and C20 on the other side of the comparator U2. A low pass filter (L5) is included in one leg and a high pass filter (C16, L6, and L7) is installed in the other leg of the amplifier inputs. R18 and R17 control the response of the detector by reducing the Q.

4-199. If a signal exists below -225 MHz, CR5 places a voltage on C19 which is less positive than that on C20, this will flip the comparator to a TTL high on U2(7). This tells the counter to implement the direct count mode. If the signal is higher in frequency, the voltage on C19 will increase because of filter L5. The voltage on C20 will be less positive than before since a greater signal level is coupled through the high pass filter C16, L6, and L7. Thus U2 will flip with pin 7 going to a TTL low level, and the instrument will begin phase lock searching. R22 is adjusted so that only a signal that is strong enough to be counted will flip U2. This eliminates unstable displays. R21 and R20 keep a small amount of current flow through CR4 and CR5 to increase the sensitivity of the detector to small signals that would not normally turn on the diodes. L1 through L4 and associated capacitors are power supply filters. The output signals of U2 are valid only during direct count check (Test #8). During other times, the outputs of the VCO's (A10 and A12) may cause A17U2 to incorrectly indicate the presence of a direct count signal.

4-200. A18 STANDARD OSCILLATOR ASSEMBLY, 05340-60036

4-201. See Figure 8-24 for the schematic diagram of A18. The temperature compensated crystal oscillator (TCXO) supplies a 10 MHz sine wave on pins 1 and A for use in the 5340A. Input power consists of +5 and -5 volts dc. The TCXO is factory repairable only. Adjustments are contained in Section V.

4-202. A18 OPTION 001 OSCILLATOR ASSEMBLY, 10544A

4-203. The 10544A Oscillator (Figure 8-24) is used when Option 001 is installed. It has an internal oven and controller that maintains a constant temperature, with a resulting stable output frequency on pins 1 and A.

4-204. Any 5340A that is wired for Option 001 will work when the standard oscillator is installed. This may be helpful in troubleshooting. To install Option 001 in an instrument not so equipped, see Section VII: The 10544A is factory repairable only. Adjustment procedures are contained in Section V.

4-205. A19 INTERFACE A ASSEMBLY, 05340-60031 AND A27 RESOLUTION SWITCH ASSEMBLY, 05340-60026

4-206. Interface A Assembly (Figure 8-25) provides the control signals necessary for completing and displaying a measurement. The circuitry associated with U5 selects either the internal 10 MHz oscillator or an external standard. U5D, U5C, and R11 form a Schmitt trigger for the internal oscillator; U5B, U5C, and R12 are used for the external oscillator. U2A and U2B serve as buffers for the oscillator signal.

4-207. The sample rate circuitry consists of A19Q1, A19U1A, A19U2E, R1, and R2. R1 and R2 are located off of the pc board on the main chassis. The sample rate circuitry determines the length of waiting time between measurements. At the end of a measurement, XA19P1A(4) goes low, allowing A19C1 to be charged through R1 and R2. Sample rate potentiometer R1 varies the rate of charge on A19C1. When A19C1 charges sufficiently, Q1 conducts to trigger Schmitt trigger U1A. When U1A triggers, U2E(11) goes low and XA19P1A(6) goes high.

4-208. Schmitt trigger U1B generates a reset when the RANGE and RESOLUTION switches are changed or when RESET pushbutton S2 is pushed. When power is first turned on, reset is maintained as C5 charges, allowing all circuits to stabilize.

4-209. U6D and U6C are buffers for the inhibit signal. The inhibit signal is low for the phase lock mode and high for the direct count mode. U6B and U6A provide RANGE switch information to A21 and A22.

4-210. Digit Counter U4 keeps track of the counted data while it is being serially shifted into the display. U3C outputs a low at the seventh data shift.

4-211. For measurements using the phase lock loops, it is necessary to subtract 20 MHz from the counted number to compensate for the 20 MHz phase lock loop IF's. This is accomplished by subtracting a "2" from the appropriate column, as determined by the setting of the RESOLUTION switch. U7 is a 5-bit comparator that determines the proper time to subtract a "2" when U7(1) is low. U7(14) goes high for coincidence. At all other times, U7(14) is low. This subtracts a "0" thereby leaving the number unchanged.

4-212. A19 INTERFACE B ASSEMBLY 05340-60032 (Part of Option 011)

4-213. Refer to Figure 8-26 for the schematic diagram. This board provides control signals necessary for completing and displaying a measurement and establishes interconnection with the A34 ASCII Bus Communicator. The logic level on XA19P1A(D) controls the U1 circuitry to select either the internal or an external 10 MHz oscillator with Schmitt triggering circuitry U1A, U1D, R8, and U1C, U1D, R9, respectively. U20E, U20D, L1, L2, and C4 provide isolation and buffering.

4-214. The sample rate circuitry, which consists of A19Q1, A19U2A, and A19U14C, determines the time between measurements. At the end of a measurement XA19P1A(4) goes low, allowing A19C6 to be charged at a rate determined by R2 and the setting of Sample Rate pot R1. R1 and R2 are located on the main chassis, not on A19. See Figure 8-25 for R1 and R2 connections. When A19C6 charges sufficiently, A19Q1 conducts to trigger Schmitt trigger A19U2A(6) to a low if A19U2A(Pins 1 and 2) are high. Schmitt trigger A19U2B is activated when XA19P1A(7) goes low, or when A19C5 is charging when power is first applied to the instrument.

4-215. When the unit is operating on the ASCII bus, many signals that indicate switch settings, etc., that are normally internally supplied, must be replaced with signals off the bus. U23 is a four-pole two position switch that selects resolution information from either the front panel switch or from U24. U24 stores the information from the bus when U24(9) is clocked. U24 recognizes ASCII codes zero through six.

4-216. U17 is also a four-pole two position switch that selects range information from either the front panel switch or from U18. When U18(9) is activated, U18 accepts range information by recognizing ASCII characters "S", "T", "U", or "P". U19, which recognizes ASCII characters "A", "B", "C", "D", "E", "F", and "G", stores ASCII data that restricts the sweep circuits of the 5340A to a certain frequency range. The ASCII codes and frequency ranges are listed in Table 2-3.

4-217. U25 is a ROM that converts the information on five of the seven ASCII lines to the required binary code to accomplish the desired function.

4-218. U22A decodes an "OUTPUT" command and U22B controls the SAMPLE RATE when the counter is in remote operation. During remote operation, these two circuits are switched on by a section of U17 and U23, respectively.

4-219. Counter U3 identifies what digit is currently being shifted in the serial display. U21 compares this data with the RESOLUTION information and subtracts a “2” offset at the appropriate time during a phase lock measurement. For direct count measurements, a zero is subtracted, leaving the number unchanged. U4C detects the seventh character shift. U15 is used to strobe output data into U11 by comparing counts from U3 and U12.

4-220. At the completion of a measurement for which an ASCII output is desired, U22A will set, supplying a low on U16C(10). An output is also generated when the TALK line (J1-8) is driven low by the controller, this is gated along with the PE line from A21 to set U8A, causing U8A(5) to give a high to A21 and A34.

4-221. U12 is a ÷ 16 presetable counter that sets to 13 when the PE line (P1A-15) goes low. U12(12) goes high to switch U13A(3) low, which switches ROM U7 to read a character and switches U6 to read the output of U12. Character “10” is detected by U4A.

4-222. The logic level of the Inhibit line at P1A(N) is low for Phase Lock measurements and drives U6(2) low. The ROM interprets this data and outputs an ASCII “L” to indicate the Phase lock mode. When P1A(N) is high, the ROM outputs an ASCII “D” to indicate the Direct mode.

4-223. A21 then sets DAV low, indicating to the bus that this data is valid, and then again goes high, incrementing counter U12 to 14. This code causes U6 to select the output of U12, which causes U7 to output the ASCII code for “space”, or overflow, if overflow has occurred. DAV again cycles and U12 increments to 15, which similarly causes a “space”. U12 then increments to 0 (zero). This causes U6 to select the output of four pole switch U5, which is accepting displayed digit information from quad flip-flop U11. Eight digits of data are processed as U12 counts from 0 to 7. When U12 increments to 8, the output of U12 is fed through U6 to U7, which converts the data to an ASCII “E” (for exponent). U12 increments to 9 and similarly a “+” is generated. U12 increments to 10, U6 selects the output of U5, and U5 reads the setting of the resolution switch. This supplies the exponent for the measurement. U12 increments to 11 and U7 supplies the ASCII code for “Cr” (carriage return); U12 increments to 12 and U7 supplies a “Lf” (line feed).

4-224. As an example of operation, assume that a 1.2345 GHz signal is measured with 100 kHz resolution. A typical output sequence is as shown below:

<u>U12 Count</u>	<u>U7 Output</u>
13	L
14	(Space)
15	(Space)
0	0
1	0
2	0
3	1
4	2
5	3
6	4
7	5
8	E
9	+
10	5
11	(Cr)
12	(Lf)

4-225. The data is read $12345 \times 10^{+5}$ Hz, which is 1.2345 GHz. The L indicates that this measurement was made using the phase lock technique.

4-226. U7(9) goes low at Lf (line feed), and this is clocked into U8A. This indicates to Control Board A21 that the output sequence is complete.

4-227. Sample rate time is then started. If U2A (pins 1 and 2) are high, the front panel Sample Rate control will determine the delay until the next measurements. Sample rate delay can be terminated by an ASCII “J”.

4-228. The 5340A can be reset externally by supplying an ASCII “H” to U25. This turns on U9C, generating a reset through U9B. Moving resolution switch A27 between detents also generates a reset through U9A if local (front panel control) operation is being used. If the 5340A is in remote control, U8B detects this and disables U9A. The output of U14B is low for remote operations and is used to light the front panel annunciator.

4-229. A20 TIME BASE ASSEMBLY, 05430-60073

4-230. The 10 MHz oscillator signal connects to A20 pin 5 and is divided from 10^7 to 10^1 by decade dividers U24, U22, U15, U8, U1, U9, and U16. U23 receives resolution control information at XA20 pins F, E, and D, and determines which decade divider output is selected as shown in Table 4-2.

Table 4-2. Time Base Signal Selection

Resolution Switch Setting	U23(13) Binary Weight = 4	U23(12) Binary Weight = 2	U23(11) Binary Weight = 1	Equivalent input of pins 13, 12, and 11 (H = activated]	Selected Signal
1M	L	L	H	1	I ₁ 1 MHz pin 2
100K	L	H	L	2	I ₂ 100 kHz pin 3
10K	L	H	H	2 + 1 = 3	I ₃ 10 kHz pin 4
1K	H	L	L	4	I ₄ 1 kHz pin 5
100	H	L	H	4 + 1 = 5	I ₅ 100 Hz pin 6
10	H	H	L	4 + 2 = 6	I ₆ 10 Hz pin 7
1	H	H	H	4 + 2 + 1 = 7	I ₇ 1 Hz pin 9

4-231. U10A receives the “Main Gate Control”: (Action #4 of program) from the A21 Control Assembly. This triggers the following sequence of events: U10A pin 5 Low, U10B pin 8 Low, U17B pin 8 High, U11B pin 8 Low, and U4C pin 8 momentarily High. The main gate in A22 opens upon completion of the above sequence. U5B is a +2 circuit for the 500 Hz output of U1 and it also switches U3B for 4 ms (the period of 250 Hz). U3B toggles when it receives the “N Gate” command (Action #14 of program) from the A21 Control Assembly. U25 is a pulse shaper whose input frequency from A14 is N times 20 kHz. N equals the harmonic number of the phase lock loops. “N” Counter Main Gate U4D lets through $20(10^3) \frac{\text{pulses}}{\text{sec}} \times N \times 4(10^{-3}) \text{ sec} = 80N$ pulses during the time U3D is switched.

4-232. Divide by 10 circuit U12 and divide by 8 circuit U5A provide an output which is $80N \div 80 = N$. U6 and U7 are binary counters that receive the N count after it has been inverted by U13D. The outputs of U6 and U7 are inverted (one’s complement) and fed to preset counters U21 and U18.

4-233. As an example of operation assume that the resolution switch is set to 100 kHz causing U23 to select the 100 kHz signal. Assume also that the phase lock loops are locked on an input such that $N = 22$. The input to U25 is a signal of $22(20 \text{ kHz}) = 440 \text{ kHz}$. When U4D opens for 4 ms, $440 \times 4 \times 10^{-3} = 1760$ pulses are passed through U4D. U12 and U5 drive the signal by 80 and the output is N. U6 and U7 count these pulses and output total in binary, which is 00010110 (Decimal 22). U13 and U14 invert this to 11101001 (Decimal 233), which gets preset into U18 and U21. Next U18 and U21 are released to count the 100 kHz signal. (N-1) counts later U18 and U21 will be at 1111 1110 (Decimal 254), U17A pin 6 will go Low and U17B pin 8 will go High. On the Nth count, U11B pin 8 will go Low, U4C pin 8 will go momentarily High and the main gate closes.

4-234. U3A generates the "N Gate" qualifier for test #2 of the program (N Gate ? has been determined). When the count of U6 reaches 2, U13C(6) goes Low to drive the Q output of U11A High. This signal is a qualifier for test #7 of the program (N ≥ 2 ?). BCD to decimal decoder U28 decodes the A6 Search Assembly information which indicates what range the instrument is on. U26, 27, 19, and 20 are comparators that monitor the inverted outputs of U6 and U7 and compares them with the output of U28.

4-235. The purpose of these circuits is to determine if N is within its limits. There are six possible ranges of N for the 5340A. For each range, the instrument selects different passive components so as to obtain a particular gain for the Input Phase Lock Loop. When the instrument is in local control or in remote control and auto range, the signal at U14F pin 13 is High, enabling the N checking circuits. When in remote control and in a particular octave range, the input to U14F goes low disabling the N checking circuits. The six ranges are as follows:

<u>N</u>	<u>RANGE</u>
64-256	1
32-64	2
16-32	3
8-16	4
4-8	5
2-4	6

4-236. A21 CONTROL ASSEMBLY 05340-60021

4-237. The control assembly controls the sequence of activity as a measurement is being made. Refer to Figure 5-3 and note that actions are required and tests are made at various points in the cycle. From the test results, decisions are made and these determine the path through the flow chart.

4-238. U12 is a single pole 16 position switch that selects the desired test and feeds the result out on pin 10. By placing binary 0 through 15 on input pins 11, 13, 14, and 15, U12 selects tests 0 to 15. For example, having HHHH on pins 15, 14, 13, and 11, respectively, selects test #7. Pin 10 will then output the result of the $N \geq 2$ test from XA20(R). Note that test #0 is connected to common. When no test is desired, test #0 is selected, giving a known output.

4-239. Similarly U13 is another single pole 16 position switch that selects one of 16 possible actions. For example, placing HLHH into U13 pins 20, 21, 22, and 23, respectively, will select action #11 by pulling U13(13) low. This sets flip-flop U5D-U5C to trigger one-shot U9B. C3 and R6 control the time constant of the one-shot. The output of U9B is fed back to the test selector U12 because the program requires a test for completion of this delay. U8, U5, and U14 are flip-flops that store five of the outputs of U13. All of the outputs of U13 are **routed** to other areas to initiate a new action. U13(18, 19) are connected to the clock to synchronize actions with the clock signal. U10B and U10A are flip-flops that indicate to U12 whether the main gate is opened or closed. Gates U15C and U15A activate the front panel main gate annunciator (A25DS11) when the main gate is opened. U9A is a one-shot that keeps A25DS11 on long enough to be visible during short gate times. Note that when no action is desired (for example when a test is being made), action #0 is selected, which does nothing.

4-240. Read Only Memory (ROM) U4 is a storage device that will supply a predetermined 8-bit output code for each of 32 possible input codes.

4-241. For example when program address HLLLH is on pins 14, 13, 12, 11, and 10, respectively, the output on pins 1 through 7 will be HLLHLLLL, respectively. This will select test #9 and action #0 (nothing). Other input codes similarly select other tests and actions. See U4 Truth Table.

4-242. U3 is another ROM that outputs the program address of the next step in Figure 5-3. U1 is a three pole two position switch that connects, respectively, pins 12, 7, and 4 to pins 13, 6, and 3 or pins 14, 5, and 2, depending on the test result logic level on pin 1. High selects pins 13, 6, and 3. The three switch lines are used with the two unswitched outputs of U3. The next clock pulse, storage flip-flop U2 transfers this data to ROM's U3 and U4.

4-243. For example, assume we are completing the step in the fifth symbol in Figure 5-4 marked "Done ? 14". ROM U3 input on pins 14, 13, 12, 11, and 10 is LLHLH and will output LLHLHLL on pins 9, 7, 6, 5, 4, 3, 2, and 1, respectively. For the present program address, U4's output will be HLHH HHLH on pins 1, 2, 3, 4, 5, 6, 7, and 9, respectively.

4-244. U13 will select action #11, ("Start Delay") by activating U5D, U5C, U9B. U12 will select test #14 ("Done?") that will drive U12(10) low when the delay is complete. U2's input on pins 11, 6, 13, 4, and 3 will be LLHLL, respectively, as U1 switches to the 0_C , 0_B and 0_A inputs, because of the low from U12. At the next clock pulse, U2 will feed the LLHLL on its input to U3 and U4.

4-245. U3 will then output LHHH HHLH. U4 will output HLLH HLLL, causing U13 to select action #9 (clear) and causing U12 to select test #8 ("Direct?").

4-246. If U12 does not sense a DIRECT signal, U12(10) will output a H, causing U2 to be fed a LHHHH for the next address. If a DIRECT signal is sensed, U1 will select the other three lines of U3, causing U2 to be fed LH HLH for the next address. Note that in the first case, the next action would have been #6 (INH) and in the second case the next action would have been #1 (R. Count). Thus we control the paths through the flow chart.

4-247. A22 HIGH FREQUENCY COUNTER ASSEMBLY, 05340-60016

4-248. This assembly (Figure 8-29) contains the first two decade counters of the decade counting chain. Logic switch U8 selects either the direct count or the HI Z input and provides an output which is shaped by Schmitt trigger U9. Data switch U3B selects between the VCO input and the check signal. Data switch U3A selects the input for main gate/decade counter U2B. U6 is the main gate flip-flop, which is controlled by differential amplifier Q4 and Q10. Q4-Q10 converts the TTL signal from A20 to the EECL logic levels required by U6. The $\div 10$ output of U2A feeds $\div 2$ circuit U7, which drives U4 after passing through EECL to TTL level shifter circuitry Q17-Q20.

4-249. The outputs of U2 and U7 are EECL (0 to -0.6V). Q13 through Q16 convert this to ECL (0.85 to -1.5V). U1 shifts the ECL to TTL (approximately +2.5V to 0V). U5 receives the four line output from each decade counter and multiplexes the information (transfers it one line at a time) to A23 after counting has been completed. The logic levels on U5 (pins 3 and 13) determine which line is outputted.

4-250. The output of U7 is EECL and connects to emitter follower Q17 which in turn feeds differential amplifier Q18-Q20. The differential amplifier drives saturated switch Q19 giving TTL levels at the collector of Q19. This is fed to +5 circuit U4 and also outputted via U5. CR1 is a catcher diode to keep Q19 from complete saturation. Differential amplifiers Q1-Q7, Q2-Q8, etc., shift from TTL control levels to the EECL needed for the IC's. The RC network (C3, R4, etc.) speeds up the transition time.

4-251. A23 COUNT REGISTER ASSEMBLY, 05340-60030

4-252. Refer to Figure 8-30 for the schematic diagram. When the $\overline{PE}$ (parallel entry) line at A23, pin K is high, U7 receives inputs from A23, pin 13 via U18A, U15B, and U14C. This input is derived from A22U4. U7 through U2 are a series of decade counters and shift registers with U2 being the most significant digit. When the main gate on A22 is open U7, U6, U5, U4, U3, and U2 will count the output of A22U4. This counter chain will contain the 10^2 to 10^7 digits of the measurement. $\overline{PE}$ goes high when the main gate on A22 closes. The output of the two least significant digits on A22 must then be shifted 1-bit at a time into A23U8 and U9 through A22U5. U16A and B generate the 00, 01, 11, and 10 code necessary to shift the BCD data for the 10^0 and 10^1 digits into U8 and U9.

4-253. By pulling $\overline{PE}$ low, the control board A21 initiates shifting of the BCD data in A23U2 through A23U9 into A24. In the direct count mode, the information is fed in directly. In the phase lock mode, it is necessary to subtract 20 MHz from the stored information because of the 20 MHz IF circuit. Flexibility is obtained by being able to add or subtract. U10, U11, U21, U18, U19B, and U20 comprise a BCD adder/subtractor. A BCD "2" is generated on A19 and routed

into A23U20. Using range information and the resolution switch setting, A19 determines when the “2” must be inserted as the eight columns of BCD information are shifted into A24.

4-254. U21A and U21B are activated for addition and U18D is used for subtraction. The carry information from U19B is sent into the carry input of the first BCD adder U10. U1A, U1B, and U12 determine when overflow occurs and activate flip-flop U19A to turn on the overflow light. U17A and U17B turn on the lock and direct annunciator lamps as determined by circuits on A21. U11 is a binary to BCD converter.

4-255. A24 DISPLAY REGISTER ASSEMBLY, 05340-60019

4-256. This Display Register (Figure 8-31) accepts and stores information to be displayed on the display tubes and the annunciator lights.

4-257. U4 receives BCD inputs (weighted 8, 4, 2, and 1) from A23 and supplies outputs to U11, U17, U9, and U16. U3, U10B, and U3B detect zeroes and store a TTL high in U1 whenever a zero is detected. U2 determines how many insignificant (leading) zeroes exist and outputs a binary code. U18 is a binary to decimal converter that receives the resolution switch information and determines proper positioning of the decimal point. This information is coupled with leading zero information to activate the appropriate blanking circuitry on A25. When shifting is complete, the BCD “1” information is stored in U16, with the Q8 output holding the 10^6 information and the Q1 output holding the 10^8 information. Similarly U9, U17, and U11 contain the BCD “2”, “4”, and “8” information, respectively.

4-258. A25 DISPLAY ASSEMBLY, 05340-60020

4-259. The Display Assembly (Figure 8-32) consists of display tubes DS1 through DS8, display tube drivers U1 through U8, decimal decoder U9, units indicators DS15-17, annunciators DS9 through DS14, and annunciator drivers Q1 through Q6.

4-260. The display tube drivers U1 through U8 are four-line BCD to decimal decoders. The table below shows the decoder truth table.

4-261. When a particular output line of a decoder is on, the line is low to allow the corresponding digit on the display tube to light. As an example of operation, assume that U8 receives a BCD input of D = L, C = H, B = L, and A = H. In this case, decoder U8 drives the 5 output low to light the 5 digit in DS8, the 10^6 display tube. The anodes of the 10^0 , 10^1 , and 10^2 display tubes receive +175 volts from the power supply through R5, R7, and R9. The remaining anodes are connected to the blanking board A26.

4-262. The decimal point decoder U9 receives four-line BCD from A24 and drives the left decimal point in the display tube. The decimal point decoding is not proportional, for example, when the BCD input is LLLL, the 0 output of U9 goes low to light the left decimal point in the 10^3 display tube. The theory of operation for the BCD decoding is described in the theory for A24. To determine the required BCD input for a particular decimal point, the schematic (Figure 8-32) and truth table can be used. For example, to light the decimal point in the 10^5 display tube, U9(13) (decimal 4) should go low which requires a DCBA input of LHLL.

4-263. The units decoder U10 is similar to the decimal point decoder U9. The GHz indicator will light when the BCD input is equivalent to either 0, 3, 4, or 9. Similarly, the MHz indicator is driven by the 1 or 7 output of U10. When the BCD input to U10 is equivalent to decimal 5, the kHz light will light. For the theory of operation for this BCD input, refer to the description for A24.

4-264. The annunciators DS9 through DS14 are controlled by inputs from A24. Emitter follower Q7 and voltage divider R24 and R25 establish a +2 volt bias for Q1 through Q6 and also for the blanking board. As an example of operation, when system lock occurs, A24 supplies a low to the emitter of Q2 to allow Q2 to conduct and light DS10. Zener diode CR1 drops the 175 volts by approximately 25 volts to operate DS9 through DS17.

Display Tube Decoder Driver, Truth Table

INPUT				OUTPUT ON	PIN NO. PULLED TO TTL LOW
D Pin 4	C Pin 7	B Pin 6	A Pin 3		
L	L	L	L	0	16
L	L	L	H	1	15
L	L	H	L	2	8
L	L	H	H	3	9
L	H	L	L	4	13
L	H	L	H	5	14
L	H	H	L	6	11
L	H	H	H	7	10
H	L	L	L	8	1
H	L	L	H	9	2
H	L	H	L	NONE	---
H	L	H	H	NONE	---
H	H	L	L	NONE	---
H	H	L	H	NONE	---
H	H	H	L	NONE	---
H	H	H	H	NONE	---

4-265. A26 BLANKING ASSEMBLY, 05340-60037

4-266. The Blanking Assembly (Figure 8-32) is controlled by logic circuits on A25 and controls the +175V supply to the display tube(s) that require blanking thus suppressing insignificant zeroes. For example, with a TTL low on the emitter of Q5, Q5 conducts to turn on Q10 which in turn supplies +175V to the display tube. Similarly the other four tubes are controlled.

4-267. POWER SUPPLIES

4-268. The power supplies include Time Base Power Supply A33 (part of Option 001), +5 Volt Regulator A32, +15 Volt Regulator A29, -15 Volt and +175 Volt Regulator A28, and - Volt Regulator A31. Since the power supplies use similar regulator IC's and circuit arrangements, the simplest will be described first and the applicable circuit theory will suffice for the remaining regulator units.

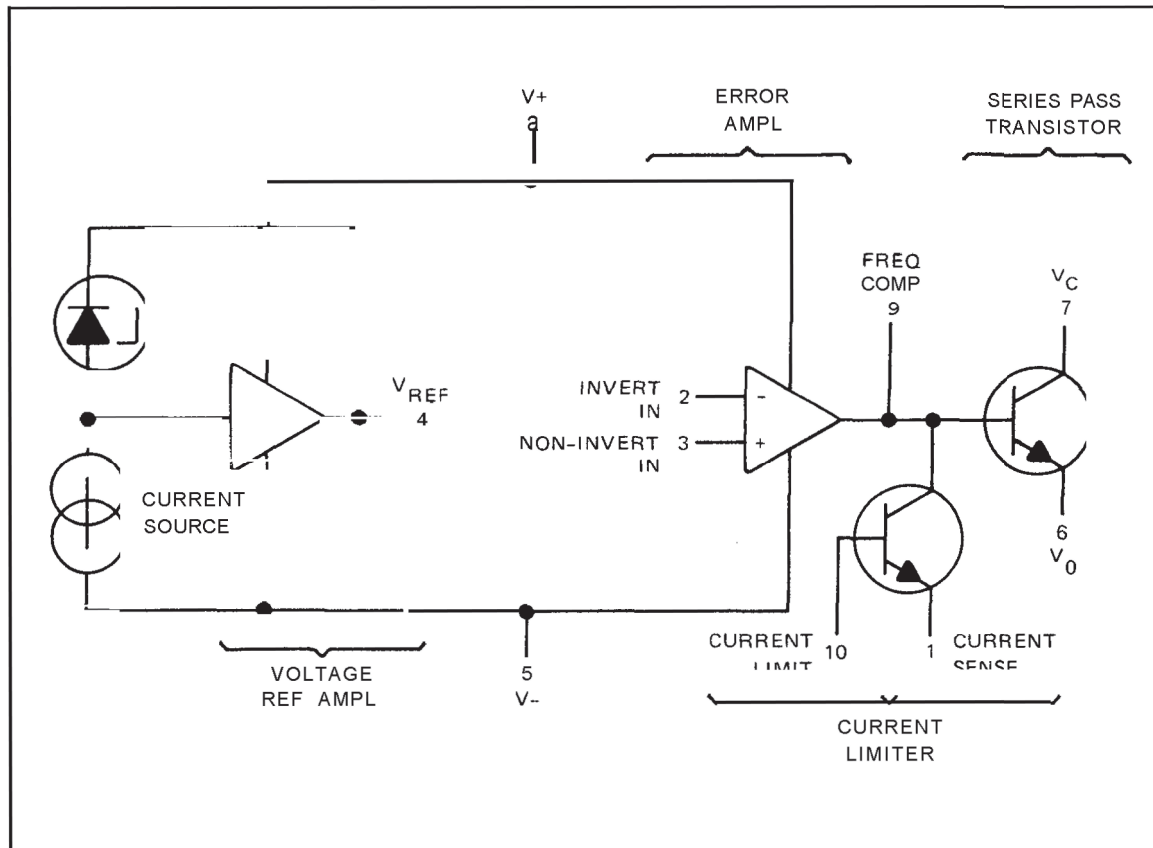
4-269. A33 Time Base Power Supply Assembly, 05340-60039, (Part of Option 001)

4-270. The Time Base Power Supply (Figure 8-35) provides +21 volts unregulated at approximately 100 mA and +11 volts regulated power at approximately 25 mA to optional oscillator A18. The +21 volt supply consists of full-wave rectifier A33CR1, A33CR2, and A33C1. The regulated +11 volt supply is made up of A33CR3, A33CR4, A33C2, A33U1, and associated circuitry. A33U1, the voltage regulator IC has the equivalent circuit shown in Figure 4-52.

4-271. The regulator consists of a current source, voltage reference amplifier, error amplifier, current limiter, and series pass transistor. The current source, zener diode, and voltage reference amplifier provide a constant 7.2 volt reference output (V_{ref}) for the noninverting input of the difference amplifier. The inverting input of the difference amplifier senses the power supply output voltage through voltage divider A33R7, A33R8, and A33R9 (see schematic for A33). A33R8 is adjusted to set the output voltage. An example of regulation is as follows. If the output voltage decreases, the voltage at A33R8 and the inverting input (U1 pin 2) also decreases. This drives the error amplifier output more positive which biases the series pass transistor to decrease its impedance. When the impedance of the series pass transistor decreases, the output voltage tends to increase to regulate the output.

4-272. The current limiter consists of A33R4, A33R5, A33R6, and the current limiter transistor in the IC (see Figure 4-52). A33R6 determines the current limit point and A33R4 and A33R5 determine the foldback current limit operation. When the drop across R6 is sufficient to forward bias the current limit transistor (Figure 4-52), the current limit transistor draws base current away from the series pass transistor thereby reducing the output voltage and limiting the current. The foldback current limiting provides a further reduction in current to prevent excessive power dissipation in the IC. A33R2 provides temperature compensation and supplies the reference voltage at A33U1(4) to the noninverted input at A33U1(3). A33C4 bypasses zener diode noise on Vref. A33C5 provides frequency compensation to prevent high frequency oscillations.

Figure 4-52. Equivalent Regulator Circuit



4-273. A32 +5 Volt Regulator Assembly, 05340-60023

4-274. A32 (Figure 8-34) contains two +5 volt regulators, one for the RF circuits and the other for the digital circuits (+5DG). The RF +5 volt regulator supplies approximately 32 mA and consists of preregulator A32Q1, A32Q2, A32U1, and series pass transistor A32Q5. The digital +5 volt regulator supplies approximately 3 amperes and consists of regulator A32U2, driver A32Q3 and series pass transistor Q2 which is mounted on the rear panel of the instrument. Connections from A32 to Q2 are made through the power supply mother board A30 and three wires to the rear panel.

4-275. +5 VOLT RF REGULATOR (PART OF A32). To prevent drift and instability in the RF circuits of the 5340A, the +5 volt RF regulator in A32 (Figure 8-34) uses a preregulator to achieve the required regulation and low ripple voltage. A32CR1 and A32CR2 establish a constant current through A32Q1 and A32CR4. Zener diode A32CR4 provides a constant 11 volt output which is connected to the Vc input of A32U1 via a darlington transistor pair A32Q2A and B. A32C1 filters out noise generated in the Zener diode. The operation of A32U1 is similar to that described for the Time Base Power Supply A33 (see Paragraph 4-270). The reference supply voltage for A32U1 is derived from the +15 volt supply A29.

4-276. In the event that the +15 volt reference fails or falls below 11 volts, **A32CR3** conducts to turn off **A32Q2** thereby disabling the supply. This prevents **A32U1** from locking in the off position. The series pass transistor in **A32U1** drives **A32Q5** to handle the larger current requirements of the regulator. **A32R17** sets the current limit point and **A32R16** and **R18** set the current foldback characteristics.

4-277. +5 VOLT DIGITAL REGULATOR (PART OF A32). The +5 volt digital regulator (Figure 8-34) is similar to the +5 volt RF regulator except for no preregulator, additional series pass transistors, and two current limit circuits. In order to handle the 3 amp load, an external series pass transistor (**Q2**) and driver (**A32Q3**) are provided. **A32R9** serves as the collector load for **A32Q3**. The operation of **U2** is similar to that described in Paragraph 4-270. **A32R10** provides current limiting for the IC. For example, if **Q2** opens, the series pass transistor in **A32U2** and **A32Q3** would be seriously overloaded. In this case, the drop across **A32R10** drives **A32U2** into current limiting. **A32Q4** provides current limiting for loads above 3 amperes. When the drop across **A32R13** and **R15** forward biases **A32Q4**, **A32U2** is driven into the current limit mode. The collector of **A32Q4** connects to the compensation input (see Figure 4-52) which is in parallel with the current limit amplifier in the IC. The current foldback circuit is made up of **A32R11** and **R12**. **A32R14**, **A32CR6**, and **A32C10** provide regulation for the current foldback point to prevent line voltage variations from changing the foldback characteristics. **A32CR5** and **A32C9** provide ripple filtering for the current foldback circuit.

4-278. A29 +15 Volt Regulator Assembly, 05340-60025

4-279. The +15 volt regulator (Figure 8-33) is similar to the +5 volt RF regulator described in Paragraph 4-275. The supply provides approximately 170 milliamperes. The preregulator is composed of **A29Q1**, **A29Q2**, and **A29CR1-CR3**. **A29Q3** is the series pass transistor. Current limiting is set by **A29R7** and **A29R10**. **A29R6** and **A29R9** set the current foldback characteristics. **A29R5** adjusts the output voltage.

4-280. A28 -15 Volt and +175 Regulator Assembly, 05340-60022

4-281. The -15 volt regulator (Figure 8-33) supplies about 180 milliamperes and consists of a preregulator, regulator, series pass transistor and driver, and current limit circuits. **A28Q1** and **A28Q3** serve as a constant current source for **A28CR2**. Zener diode **A28CR2** establishes a constant 19.6 volts for the regulator reference input. **R5** sets the proper current input for the regulator reference. **A28U1** is a negative supply voltage regulator similar to the positive voltage regulator previously discussed. The reference current input at **A28U1** flows internally through the IC to pin 1 and **A28R6** and **A28R7**. Adjusting **A28R7** sets the output supply voltage. The boost output at **A28U1(7)** drives **Q7** and **Q10** to regulate the output voltage. **A28C4** provides compensation to prevent high-frequency oscillation. Current limiting for the IC is determined by **A28R11**. **A28R16** is the current limit resistor and works in conjunction with **A28Q8**. When the current limit point is reached, the drop across **A28R16** turns on **A28Q7** which diverts drive current from **A28Q10**. **A28R13** and **A28R14** determine the current foldback limiting characteristics.

4-282. The +175 volt regulator provides +175 volts at about 28 milliamperes to drive the display tubes in **A25**. Since no filter capacitors are used for rectifier **A30CR1**, a pulsating dc is developed for driving the display tubes. **A28Q2**, **A28R2**, and **A28CR1** serves as a current source for **A28CR3** and **A28CR4**. **A28CR3** and **A28CR4** provide the +175 volt reference for **A28Q4**. **A28Q4** drives **A28Q6** which serves as the series pass transistor. Current limiting is set by **A28R15** and the current foldback limiting characteristics are determined by **A28R8** and **A28R10**. When the drop across **A28R15** is sufficient to turn on **A28Q9**, **A28Q9** diverts current from **A28Q4** thereby reducing the output voltage to maintain a constant current. With overloads, the voltage across **A28R8** and **A28R10** biases **A28Q9** to conduct further to reduce the output current below the current limit point set by **A28R15**. This is foldback action and prevents excessive power dissipation in the regulator. **A28R9** suppresses oscillations. **A28C6** filters out the pulsating dc from **A28Q9** to prevent **A28Q9** from conducting at the peak levels of the pulsating dc.

4-283. A31 -5 Volt Regulator Assembly, 05340-60024

4-284. The -5 volt regulator assembly (Figure 8-34) consists of two supplies, one for the RF circuits (-5V) in the 5340A and the other for the digital circuits (-DG). The supply for the RF circuits provides about 190 milliamperes and the digital supply provides approximately 1.1 amperes. The RF supply consists of a preregulator A31Q1, A31Q2, A31Q3, and A31CR1. A31Q8 is the series pass transistor and A31Q4 serves as the regulator driver. The circuit is similar to the -15 volt regulator previously described. A31R17 sets the current limit point and A31R13 and A31R14 determine the current foldback characteristics. The regulator for the digital circuits consists of A31U2, A31Q6, A31Q7, and Q1 which is mounted on the rear panel. Connection to Q1 is made via the power supply motherboard A30. This regulator is similar to the -5 volt regulator previously discussed except that no preregulator is used.

4-285. A34 Theory of Operation, 05340-60067 (Part of Option 011)

4-286. There are two basic modes of remote operation for the 5340A, they are TALK and LISTEN. The three wire handshake must occur before the instrument can function in either mode. A35S6 is the "Talk Always-Addressable" switch. In the "Talk Always" mode, A35S6 keeps the talk flip-flop (U7) in the set condition. This allows the 5340A to communicate with a simple listener that doesn't have addressing capability. When A35S6 is in the "Addressable" position, the instrument can be either a talker or listener. A low on IFC is a direct clear, which resets U6 and U7.

4-287. Talk Mode

4-288. In the first sequence of the talk mode, the 5340A is addressed to talk. At this time ATN is Low and the controller sends data via DIOI through DIO7. Switches A35S1 through A35S5 establish the 5-bit binary code which is an arbitrarily designated address of the 5340A. U14 compares this code to the data on lines DIOI through D105 and outputs a high when coincidence occurs. D106 and D107 carry the information which determines whether the instrument will function as a talker or listener, this information is decoded by U6 and U7. The controller set DAV Low, this signal is delayed by R4, C2, and R5, C3 which allow transients to die down. As C3 charges through R5, U1D(11) will remain high. This enables U5A to provide the clock pulse for U6 and U7. U5A also receives the IFC signal which must be high. ATN low will enable the RFD driver U10C and the DAC driver U19B. RFD will go low and DAC will go high, completing the three wire handshake. (See Section II for a more detailed explanation of the handshake). When U5A clocks U6 or U7, only one will set. When Talk Flip-Flop U7 is set, U11B(6) goes high enabling the DIOI through D107 drivers U2A, B, C, D, U3A, B, C, D, and DAV driver U4D. U11B(6) will also enable the RFD and DAC listeners U13C, D. U13C provides the qualifier for test #3 of the program (HRFD ?) and U13D provides the qualifier for test #10 (HDAC ?).

4-289. The second sequence of the Talk Mode is data outputting. After handshaking, the controller sets ATN high to disable the RFD and DAC gates (U10B,C). The instrument can now output measurements it has taken via the DIOI through D107 drivers. SRQ (Service Request) is an output driven low by U10D when the instrument has been programmed to wait in the output phase of its operating cycle until addressed to output.

4-290. Listen Mode

4-291. In the first sequence of the listen mode, the 5340A is addressed to listen. It is identical to the address sequence of the talk mode, with the exception that command on the DIOI through D107 lines now tells the instrument to listen. U6 is set and U5B(8) goes low for the duration of DAV's delay. U5B(8) generates the LOAD signal.

4-292. The second sequence is listening. U11C(8) enables the RFD and DAC drivers (U10B,C) to allow the instrument in this mode of operation to have control of these lines. The DAV driver (U4D) is disabled. At this point in the sequence, the instrument is ready to accept data.

SECTION V

MAINTENANCE AND SERVICE

5-1. INTRODUCTION

5-2. This section contains maintenance and service information including a table of assemblies, recommended test equipment, in-cabinet performance check, troubleshooting, and adjustment procedures.

5-3. ASSEMBLY DESIGNATIONS

5-4. Table 5-1 lists the designation, nomenclature, and Hewlett-Packard part number of assemblies used in the 5340A.

5-5. TEST EQUIPMENT

5-6. Table 5-2 lists test equipment recommended for maintaining and checking the performance of the counter. Test equipment having equivalent characteristics may be substituted for the equipment listed.

5-7. POZIDRIV SCREWDRIVERS

5-8. Pozidriv screws are used in this instrument. To avoid damage to the screw slots, a pozidriv screwdriver (HP Part Number 8710-0900) should be used.

5-9.. ADJUSTMENTS AND IN-CABINET PERFORMANCE CHECK

5-10. Figure 5-2 contains adjustment procedures for the 5340A. Adjustments should be made when the necessity is established by the performance test or when components are replaced that affect an adjustment. If all adjustments are to be performed, they should be performed in the order listed. Table 5-3 contains the in-cabinet performance check.

5-11. BLOWER FAN CONFIGURATION

5-12. The cooling fan in the 5340A is an exhaust fan, not an intake type. The fan discharges air out of the rear of the instrument. If the flow of air was reversed, the heat generated by the fan would preheat the intake air and tend to raise the internal temperature of the instrument.

5-13. K05-5340A DESCRIPTION

5-14. The K05-5340A Feed Forward Simulator or equivalent is required to adjust A8 and A9. During the adjustment procedure, A7 is removed and the K05-5340A is installed in XA7. The K05-5340A provides a variable simulated feed-forward signal to A10 and A12. The K05-5340A Feed-Forward Simulator can be purchased through your local Hewlett-Packard Sales and Service Office. An equivalent of the K05-5340A can be fabricated with the following parts and schematic diagram (see Figure 5-1).

5-15. An alternate method is to connect a 0-15V dc power supply from XA7 pin 10 to XA7 pin 5.

Table 5-1. Assembly Identification

Reference Designation	Description	HP Part No.
A1	Preamplifier No. 1	05340-60017
A1A1	Sampler No. 1	5088-7004
A1A2	Sampler Driver	5088-7005
A1A3	Sampler Output	05340-60042
A1A4	Preamplifier Board	05340-60014
A1A5	Filter	05340-60077
A1A5A1	Filter Board	05340-60075
A2	Preamplifier No. 2	05340-60027
A2A1	Sampler No. 2	5088-7004
A2A2	Sampler Driver	5088-7005
A2A3	Sampler Output	05340-60043
A2A4	Preamplifier Board	05340-60040
A2A5	Filter	05340-60078
A2A5A1	Filter Board	05340-60076
A3	High-Impedance Input Amplifier	05340-60001
A4	Phase/Quad Detector	05340-60002
A5	Search	05340-60003
A6	Search Programmer	05340-60004
A7	DC Amplifier/Compensator No.	05340-60005
A8	Bandpass Filter/Phase Detector	05340-60006
A9	DC Amplifier/Compensator No. 2	05340-60007
A10	Voltage-Controlled-Oscillator No. 2	05340-60008
A11	Mixer	05340-60009
A12	Voltage-Controller-Oscillator No. 1	05340-60008
A13	Limiter/Amplifier	05340-60010
A14	Limiter/Amplifier/Mixer	05340-60011
A15	10 MHz Doubler	05340-60012
A16	Casting Motherboard	05340-60015
A17	Direct Count Amplifier	05340-60041
A17A1	Direct Count Amplifier Board	05340-60038
A18	10 MHz Oscillator	05340-60036
A18	10 MHz Oscillator (Part of Option 001)	10544A
A19	Interface A	05340-60031
A19	Interface B (Part of Option 011)	05340-60032
A20	Time Base	05340-60073
A21	Control	05340-60021
A22	High-Frequency Counter	05340-60016
A23	Count Register	05340-60030
A24	Display Register	05340-60019
A25	Display	05340-60020
A26	Blanking	05340-60037
A27	Resolution Switch	05340-60026
A28	-15 Volt and +175 Volt Regulators	05340-60022
A29	+15 Volt Regulator	05340-60025
A30	Power Supply Motherboard	05340-60029
A31	-5 Volt Regulators	05340-60024
A32	+5 Volt Regulators	05340-60023
A33	Time Base Power Supply (Part of Option 001)	05340-60039
A34	Bus Communicator (Part of Option 011)	05340-60067
A35	Connector Assembly (Part of Option 011)	05340-60068

Table 5-2. Recommended Test Equipment

Instrument	Required Characteristics	Recommended Type
Oscilloscope	150MHz	HP 183A with 1830A and 8140A Plug-ins
Divider Probes (3)	10:1 Divider Ratio	HP 10001A
Test Oscillator	10 Hz	HP 651B
Signal Generator		HP 606B
Signal Generator		HP 608E
Signal Generator		HP 612A
Signal Generator		HP 618C
Signal Generator		HP 620B
Signal Generator		HP 626A
Signal Generator		HP 628A
Signal Source		HP 8614B
Signal Generator	18 GHz	HP 8616A
Frequency Standard	1 MHz, or 5 MHz, or 10 MHz	HP Cesium Beam Type
Spectrum Analyzer	300 MHz	HP 8554L/8552A
Feedthrough Termination	50R	HP 11048B
Logic Probe	Logic State Tests	HP 10525T
Logic Clip	Logic State Test	HP 10528A
Logic Pulser	Logic State Tests	HP 10526A
Logic Comparator	IC Testing	HP 10529A
Digital Voltmeter	0 to +175 Volts Accuracy .3%	HP 3480A and HP 3482A
Feed Forward Simulator	0 to +15Volts dc	HP K05-5340A
RF Extender Board		HP 05340-60047
Screwdriver	Pozidriv	HP 8710-0900
Wrench for Rigid Coax Fittings	5/16" open end	
Nutdriver	5/16"	

Figure 5-1. K05-5340A Feed-Forward Simulator. Schematic Diagram

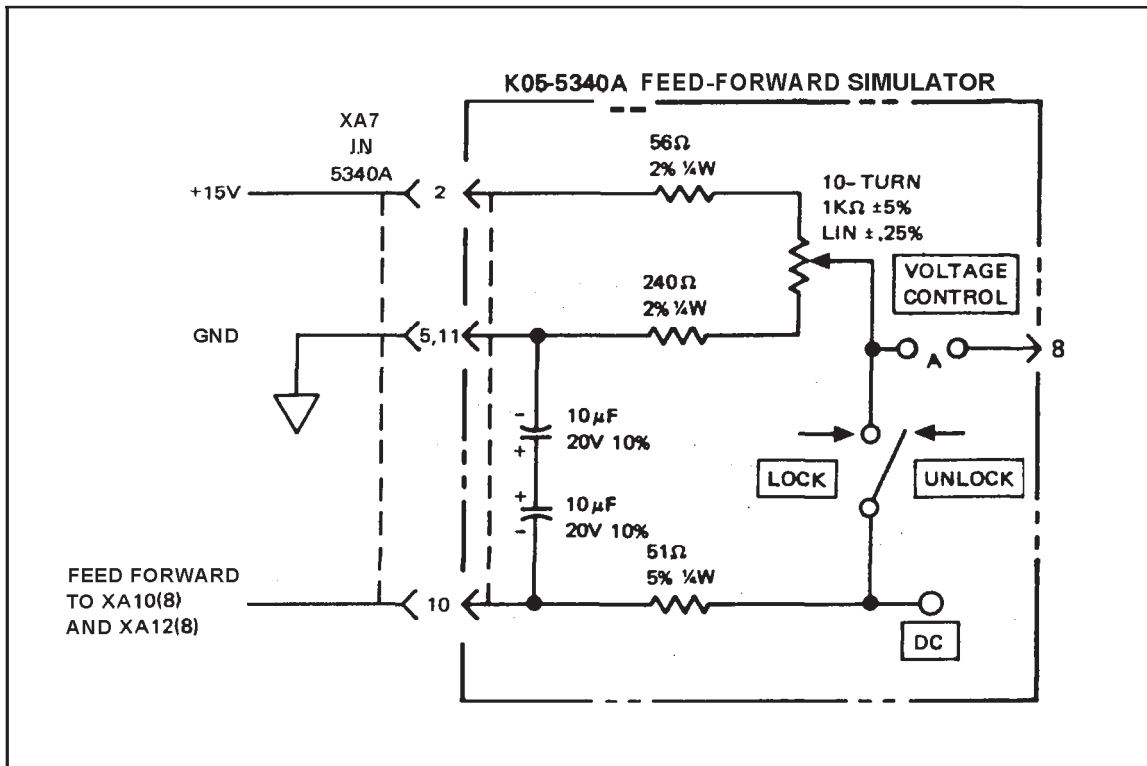


Figure 5-2. Adjustment Procedures

1. POWER SUPPLY ADJUSTMENTS (05340-60012)

- a. -15V Adjustment. On A28 -15V Regulator board (05340-60022), connect voltmeter to TP2. Connect other lead to chassis. Adjust potentiometer A28R7 for -15.00 ± 0.05 volts indication.
- b. +15V Adjustment. On A29 +15V Regulator board (05340-60025), connect voltmeter lead to TP2. Adjust potentiometer A29R5 for $+15.00 \pm 0.05$ volts indication.
- c. -5V RF Supply Adjustment. On A31 -5V Regulator board (05340-60024), connect voltmeter probe to TP2. Adjust potentiometer A31R9 for -5.00 ± 0.05 volts indication. A31R9 is near TP1.
- d. -5V Digital Supply Adjustment. On A31 -5V Regulator board (05340-60024), connect voltmeter probe to TP3. Adjust potentiometer A31R2 for -5.00 ± 0.05 volts indication. A31R2 is near the front edge of the board.
- e. +5V RF Supply Adjustment. On A32 +5V Regulator board (05340-60023), connect voltmeter to TP1. Adjust potentiometer A32R6 for $+5.00 \pm 0.05$ volts indication. A32R6 is adjacent to TP1.
- f. +5V Digital Supply Adjustment. On A32 +5V Regulator board (05340-60023), connect voltmeter to TP2. Adjust potentiometer A32R3 for $+5.00 \pm 0.05$ volts indication. R3 is adjacent to TP2, and near the front edge of the board.
- g. Time Base Power Supply (+11V) Adjustment (Option 001). On A33 +11V Regulator board (05340-60039), connect voltmeter to TP1. Adjust potentiometer A33R8 for $+11.00 \pm 0.05$ volts.

2. HIGH IMPEDANCE AMPLIFIER ADJUSTMENT (05340-60001)

- a. Connect a 608 Signal Generator to "10 Hz to 250 MHz" input BNC on 5340A using a 50 ohm feedthru termination.
- b. Set 608 to 100 MHz at 100 mV rms. (283 mV p-p) (-7 dBm).
- c. Set 5340A RANGE switch to 10 Hz -250 MHz and resolution switch to 100 Hz.
- d. On A3 Input board (05340-60001), adjust potentiometer A3R10 for a stable count.
- e. Decrease input signal level and adjust A3R10 for a stable display.
- f. Continue to decrease input signal level and adjust A3R10 for maximum sensitivity.
- g. Verify that the 5340A properly measures input signals of 50 mV rms or less (140 mV p-p) (-14 dBm).

3. 50Q DIRECT COUNT ADJUSTMENT (05340-60041)

- a. Connect a 608 Signal Generator to the type N connector on the 5340A. Set the generator to 100 MHz at -25 dBm (12.6 mV rms) (35.6 mV p-p).
- b. Set 5340A RESOLUTION switch to 100 Hz and the RANGE switch to the 10 Hz to 18 GHz position.
- c. Remove the four screws attaching the cover on the A17 (05340-60041) Direct Count Assembly. Verify that the knurled screw is firmly finger tight, securely holding board in position. Replace cover.
- d. Adjust the threshold detector potentiometer A17A1 R22 full counterclockwise. This is accessible through the front hold in the A17 casting cover.
- e. Adjust sensitivity potentiometer A17A1 R11 for a stable display.
- f. Decrease signal generator output and again adjust A17A1 R11 for a stable display.
- g. Continue to decrease signal generator output and adjust A17A1 R11 until maximum sensitivity is achieved.
- h. Increase generator output until a stable reading is displayed.
- i. Rotate threshold detector potentiometer A17A1 R22 fully clockwise, observing a display of all zeros.
- j. Increase signal generator output by 1 dB from the level obtained in step h.
- k. Rotate threshold detector potentiometer A17A1 R22 sufficiently counterclockwise until correct reading is always displayed.
- l. Verify that sensitivity is at least -32 dBm. If not, perform A22R52 adjustment (step 11).

Figure 5-2. Adjustment Procedures (Continued)

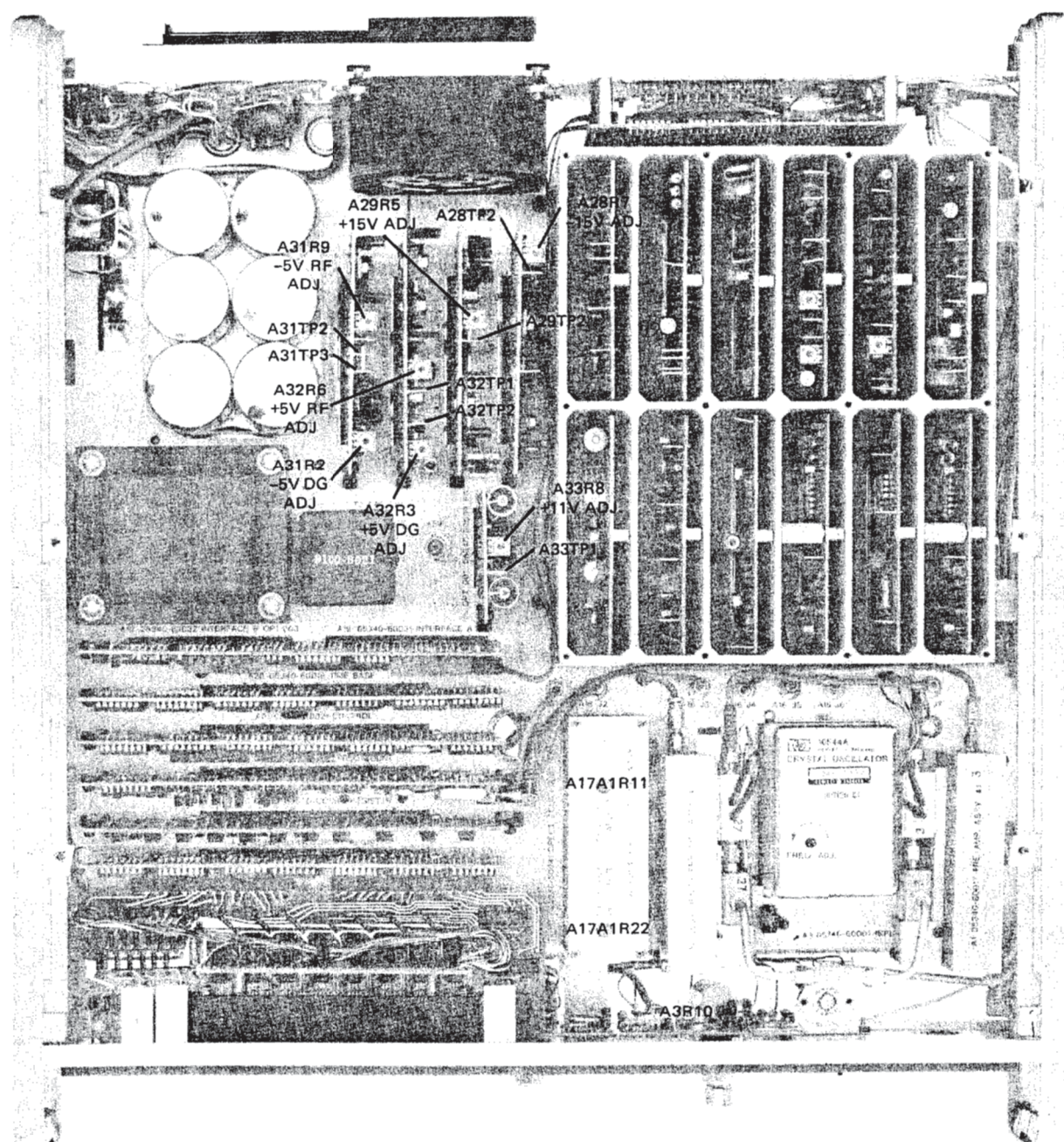


Figure 5-2. Adjustment Procedures (Continued)

4. 10 MHz DOUBLER ADJUSTMENT (05340-60012)

- a. Remove the cover on the large casting by removing 12 screws. Locate A15 10 MHz Doubler Board (05340-60012). Do not remove board. Do not use an extender board.
- b. Set Dual Trace Oscilloscope for sensitivity of 0.05 V/cm with a sweep time of 0.1 $\mu\text{sec}/\text{cm}$. Set Channel B polarity to “-” up and A to “+” up.
- c. Using 10:1 divider probes, connect oscilloscope Channels A and B to XA15(1) and XA15(2). Switch oscilloscope display control to A plus B.
- d. Adjust capacitor A15C3 for maximum amplitude of the signal on the oscilloscope.
- e. Adjust A15C13 and A15C11 for maximum amplitude on the oscilloscope. Since these two adjustments interact, repeat the procedure several times to achieve the optimum setting.
- f. Switch Oscilloscope to A&B only. Verify that signals are of approximately the same amplitude.

5. ADJUSTMENT OF A8 (05340-60006) AND A9 (05340-60007)

- a. Remove A7 (05340-60005) board and install Feed-Forward Simulator K05-5340A in XA7. See Paragraph 5-13 for description of K05-5340A.
- b. Set K05 switch to LOCK.
- c. Using VTVM, measure feed-forward voltage (FF) from XA7(10) to ground. Adjust VOLTAGE CONTROL on K05-5340A for a 9.00 volt reading.
- d. Adjust A8R13 (LEVEL) and A9R4 (GAIN) fully clockwise.
- e. Set controls on Oscilloscope to:
 - CHANNEL A to 0.02 V/cm; AC coupled; + up
 - TRIGGER to internal; - slope; AC
 - MODE to Norm
 - SWEEP to 50 $\mu\text{s}/\text{cm}$
 - DISPLAY to CHANNEL A
- f. Using 10:1 divider probe, connect Channel A of the oscilloscope to XA11(1) (MIX SIG. 20 kHz).
- g. Adjust Channel A position to center the sine wave on the screen.
- h. If a large misadjustment exists, no sine wave will be displayed on Channel A. If necessary, adjust A9R1 (OFFSET) until a sine wave is displayed.
- i. Using BNC to alligator clip adaptor, connect “VCO #1 to Counter” signal (available at A16J6) to INPUT BNC on the 5340A. Set RANGE switch to “10 Hz to 250 MHz”. Display should be between 100 to 185 MHz. Vary the K05 VOLTAGE CONTROL potentiometer so that counter displays a range of frequencies from 100 to 185 MHz and note the point of maximum distortion of the scope display. Adjust K05 potentiometer for maximum distortion of the sine wave and the counter display within the 100 to 185 MHz range.
- j. Set the scope sweep to 5 $\mu\text{s}/\text{cm}$.
- k. Back off A9R4 (GAIN) ccw just enough for minimum side jitter (phase noise) of the sine wave. It may be helpful to set the scope sweep to 2 $\mu\text{s}/\text{cm}$ and 1 $\mu\text{s}/\text{cm}$ to observe parts of the wave.
- l. Connect a DVM to “TL Control” voltage, available at XA9(15).
- n. Vary VOLTAGE CONTROL on K05 so counter display ranges from 100 to 185 MHz, and note the point “TL Control” voltage is maximum. Record this voltage. $V_{\text{max}} = \underline{\hspace{2cm}}$
- n. Find the point in the 100-185 MHz range where “TL Control” voltage is minimum. Record this voltage. $V_{\text{min}} = \underline{\hspace{2cm}}$

Figure 5-2. Adjustment Procedures (Continued)

- o. Calculate the average value of the two voltages measured in steps n and o above by finding the algebraic sum of the voltages in step n and in step o and dividing by 2.

Example 1: $V_{\max} = +0.544$ volts

$V_{\min} = +0.012$ volts

$+0.556 \div 2 = +0.278$ volts

Example 2: $V_{\max} = 0.456$ volts

$V_{\min} = -0.102$ volts

$+0.354 \div 2 = +0.177$ volts

- p. Move oscilloscope probe to XA10(7) (T.L. Control). Change oscilloscope controls: Channel A to 0.2 V/cm dc coupled, SWEEP to 5 ms/cm.
- q. Adjust the oscilloscope Channel A position so zero volts dc is at the center of the screen.
- r. Set K05 switch to UNLOCK.
- s. Adjust A9R1 (OFFSET) so that the wave form display is symmetrical about the value calculated in step p. For Example 1, the ramp should be centered at 0.278 volts. Since the center of the screen is 0 volts, +0.278 volts is .139 cm above the center of the screen ($+0.278V \div 2V/cm$). The 2V/cm is due to the 10:1 divider probe and the 0.2V/cm sensitivity ($0.2V/cm \times 10 = 2V/cm$).

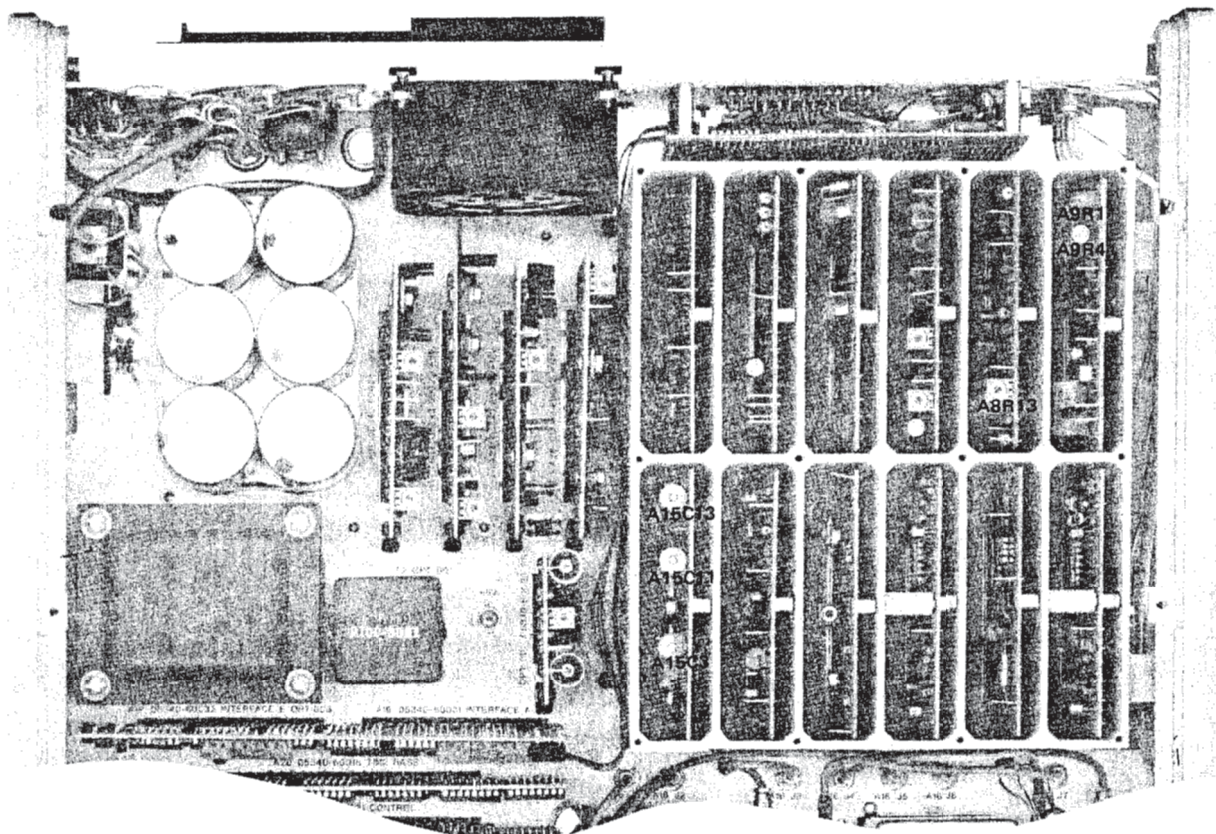


Figure 5-2. Adjustment Procedures (Continued)

6. A8R13 ADJUSTMENT (LEVEL)

- Connect oscilloscope probe to XA11(1) (Mix sig 20 kHz). Set Channel A controls to 0.02 V/cm, ac coupled. Set SWEEP to 50 μ s/cm.
- Set K05 switch to LOCK and observe 20 kHz waveform.
- Vary K05 VOLTAGE CONTROL so that the 5340A Display varies from 100 MHz to 185 MHz.
- Adjust K05 VOLTAGE CONTROL so 150 MHz is displayed.
- While continually flipping the K05 LOCK-UNLOCK switch, vary potentiometer A8R13 (LEVEL) counterclockwise until scope waveform jumps from 20 kHz to 40 kHz.
- Set the K05 switch to LOCK. Vary potentiometer A8R13 clockwise until 20 kHz is again displayed.
- Measure and record the voltage from the wiper of A8R13 to ground (easily accessible without removing A8) _____ volts.
- Add 10% to the voltage obtained in step g. _____ volts + 10% = _____ volts.
- Adjust A8R13 until voltage on its wiper equals that calculated in step h.
- While constantly flipping the K05 LOCK-UNLOCK switch, vary K05 VOLTAGE CONTROL so that the 5340A display varies from 100 MHz to 185 MHz. Observe oscilloscope for a constant 20 kHz display. If 10 kHz, 30 kHz, or 40 kHz appears on the scope at any time, readjust A8R13 clockwise for an additional 10% voltage.
- Change oscilloscope SWEEP to 5 μ s/cm.
 - Observe the small transient (marker pulse) riding on the 20 kHz sine wave.
- As K05 VOLTAGE CONTROL is varied for a 5340A display of 100 MHz to 185 MHz, observe marker pulse. It should not move more than $\pm 5 \mu$ s (1 cm).

7. INPUT LOOP ADJUSTMENT

- Adjust K05 for a 100 MHz display. Measure and record Feed-Forward (FF) signal, available at XA7(10). V1 = _____.
- Adjust K05 for a 150 MHz display. Measure and record FF. V2 = _____.
- Adjust K05 for a 185 MHz display. Measure and record FF. V3 = _____.
- Remove K05 from XA7 and install A7. Disconnect all other test connections.
- Set oscilloscope controls:

CHANNEL A to 0.2 V/cm; DC coupled: + up	SWEEP to 10 ms/cm
SYNC to INT, + slope, AC	DISPLAY to CHANNEL A
MODE to NORM	
- Adjust Channel A position so that zero volts is at the bottom graticule on the screen.
- Using 10:1 divider probes, connect Channel A to Feed-Forward (FF) signal available at XA7(10).
- Set the 5340A RANGE switch to 10 Hz - 18 GHz and RESOLUTION switch to 100 Hz.
- Set A7R27 (GAIN) fully clockwise.
- Adjust A7R13 (BAL) so that the level start and end of the waveform is at V2 measured in step b.
- Adjust A7R25 (AMP) and A5R15 (DC ADJ) until excursion of the waveform goes from V1 to V3. See waveform shown at right.
- Disconnect all test connections.

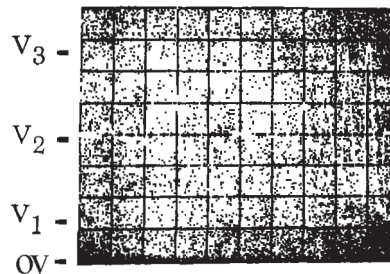


Figure 5-2. Adjustment Procedures (Continued)

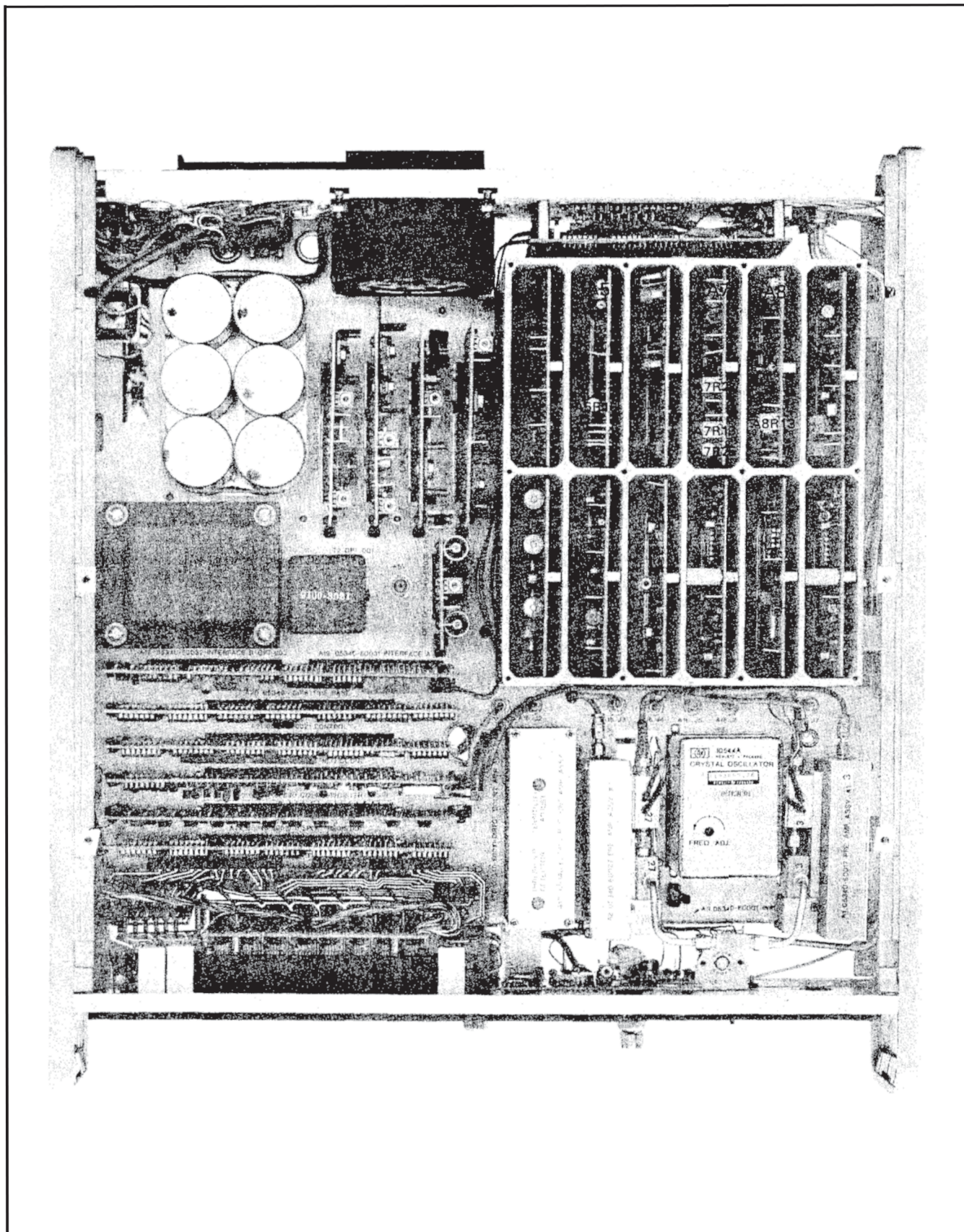


Figure 5-2. Adjustment Procedures (Continued)

8. QUAD DETECTOR ADJUSTMENT

- a. Set 5340A RANGE switch to 10 Hz to 18 GHz and the RESOLUTION switch to 100 Hz.
- b. Connect 608 Signal Generator to 50R Type N INPUT. Set generator to 280 MHz at -20 dBm.
- c. Set A13R31 fully counterclockwise.
- d. Measure voltage at XA4(8) (QUAD DET) and set A13R31 for $-450 \text{ mV} \pm 10 \text{ mV}$.
- e. Disconnect 280 MHz signal and connect 20 GHz at 0 dBm and observe a stable display. If the display is unstable, adjust A7R27 (GAIN) counterclockwise for a stable display. If this adjustment is made, it is necessary to readjust the input loop. Repeat step 7.

9. OSCILLATOR ADJUSTMENT — STANDARD OSCILLATOR

- a. Connect J3 OSC output, available on the 5340A rear panel to the input of a high resolution frequency counter such as a 5360A. Connect a suitable external frequency standard (such as HP 5061 Cesium Beam) to the external oscillator input of the 5360A.
- b. Remove the A18 05340-60036 Oscillator board from the 5340A and note the frequency marked on the label. Reinstall the board.
- c. Remove the screw covering the frequency adjustment.
- d. Use an insulated tuning tool to adjust the oscillator for a 5360A display of the frequency noted in step b.

10. OSCILLATOR ADJUSTMENT — OPTION 001

NOTE

The 5340A must have primary power applied for at least 24 hours to allow the oscillator temperature to stabilize.

- a. Set controls on oscilloscope as follows:
CHANNEL A 0.2 V/cm; DC coupled + up
SWEEP $0.05 \mu\text{sec/cm}$
TRIGGER; EXT, + slope, ACF
MODE to NORM
DISPLAY to CHANNEL A
- b. Connect a suitable 1 MHz, 5 MHz or 10 MHz frequency standard (such as an HP Cesium Beam) to the EXT Input on oscilloscope.
- c. Connect Oscilloscope Channel A to 10 MHz output (53) available on 5340A rear panel.
- d. Adjust oscillator FREQUENCY ADJ for minimum sideways movement of the oscillator signal.

Figure 5-2. Adjustment Procedures (Continued)

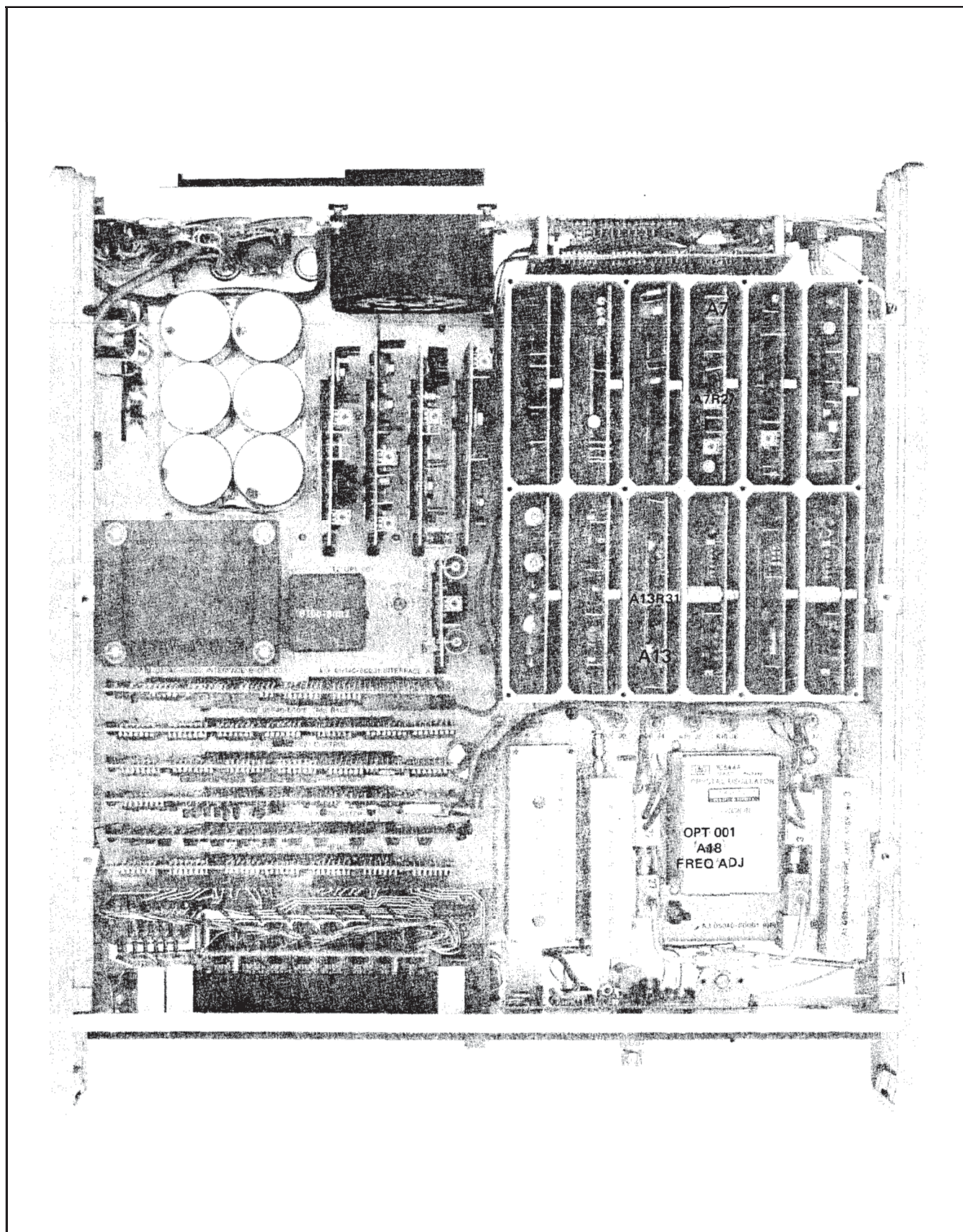


Figure 5-2. Adjustment Procedures (Continued)

11. A22R52 ADJUSTMENT

NOTE

This adjustment is set and sealed at the factory for optimal sensitivity and should be adjusted only if A22U9 is replaced or if the 5340A will not meet the sensitivity test in step 3.

- a. Install the board on an extender board. Disconnect the cable connected to A22J1. Remove A17A1 (05340-60038).
- b. Connect a suitable BNC to SMB push-on adaptor (such as Sealectro 51-077-6801 HP P/N 1250-1236) to the A22J1 direct count input on A22.
- c. Install a BNC T to the output BNC of a 608 generator.
- d. Using a BNC to BNC cable, carefully connect the 608 to the adaptor on A22J1.
- e. Connect the BNC end of a BNC to alligator cable to the T on the 608. Connect the shield (black) alligator clip to the positive terminal of a 0-20V variable power supply.
- f. Connect one end of a 1K ohm 1/4 watt resistor to the negative terminal of the power supply.
- g. Connect the center conductor (red) alligator clip to the other end of the resistor.
- h. Adjust the power supply to 10 volts and set the 608 to 300 MHz at -100 dBm (2.2 microvolts rms).
 1. Set A22R52 to center of adjustment.
- j. Set the 5340A RANGE switch to 10 Hz to 18 GHz and measure voltage across A22R30 using DVM. Adjust power supply until DMV reads 0 ± 2 mV.
- k. Set 608 to 12 MHz at -10 dBm (70 mV rms) and adjust A22R52 for a stable reading on the 5340A display.
 - l. Continue to decrease the 608 signal amplitude and adjust A22R52 for maximum sensitivity.
- m. Repeat test using 110 MHz and 250 MHz signals.
- n. Disconnect test set-up and again perform the 50Q Direct Count Adjustment (step 3).

Table 5-3. In-Cabinet Performance Check

1. On rear panel of 5340A, set SELECTOR switch to correspond with the line voltage to be used (115V or 230V). Install correct line fuse, connect counter to power source.
2. Set 5340A controls as follows:
 - LINE switch to ON
 - RESOLUTION switch to 1 Hz
 - SAMPLE RATE control fully counterclockwise
 - RANGE switch to CHK
 - INT-EXT switch (rear panel) to INT.
3. Check that counter displays the following:
 - 10.000 000 MHz ± 1 count
 - DIR (direct) annunciator lighted
 - GATE light flashing
4. Push RESET switch, display should initially be all zeros, then display 10 MHz.
5. Slide RESOLUTION switch through all positions to 1 MHz, noting that one fewer digit is displayed for each step of the switch.
6. With RESOLUTION switch set to 1 MHz, check that display is .010 GHz ± 1 count with the GATE lamp flashing.
7. Set RESOLUTION switch to 10 Hz. Rotate SAMPLE RATE control clockwise, check that gate lamp off time increases. The gate lamp off time should be at least 5 seconds with the SAMPLE RATE control fully clockwise.
8. Rotate SAMPLE RATE control to HOLD. Check that gate lamp stops flashing and display is held indefinitely. Rotate SAMPLE RATE control to mid-position.
9. Set RANGE switch to 10 Hz to 250 MHz position. Connect appropriate signal generators to INPUT BNC connector and vary frequency input from 10 Hz to 250 MHz. Maintain the input level at 50 mV rms (142 mV p-p). Check that counter displays the correct frequency for the entire range.

NOTE

When making high frequency sensitivity checks, it is important to recognize that cable losses can be appreciable. Amplitude differences as high as 20 dB can exist between the generator output jack and the cable end connected to the 5340A. When determining sensitivity using generators with a calibrated output meter, include cable loss. A preferred method is to measure actual signal strength at the cable end (properly terminated) using a power meter capable of measuring the signal of interest.

CAUTION

Do not exceed 1 watt of input power (+30 dBm) under any circumstances. Extensive internal damage may occur. See Paragraph 3-22 for a complete explanation of input levels.

10. Set RANGE switch to 10 Hz to 18 GHz position. Connect appropriate signal generator to 50R Type I INPUT and vary frequency input from 10 Hz to 500 MHz. Maintain the input level at -30 dBm. Check that counter displays correct frequency for the entire range.
11. Select signal generators to cover the 500 MHz to 10 GHz range. Connect generators to 50R N connector. Maintain the input level at -35 dBm (3.98 mV rms) and vary the input frequency from 500 MHz to 10 GHz. Check that counter displays correct frequency for the entire range.
12. Repeat step 11 for the 10.0 GHz to 18 GHz range maintaining the input level at -25 dBm (12.6 mV rms).
13. Set RANGE switch to 250 MHz to 18 GHz and repeat steps 11 and 12.
14. On 5340A rear panel, set INT-EXT switch to EXT. Connect a 10 MHz signal at 1.5V p-p to 10 MHz INPUT BNC connector. Check that 5340A operates properly. Disconnect the 10 MHz signal, and set INT-EXT switch to INT.
15. On 5340A rear panel, measure signal at 10 MHz OUTPUT connector using 10:1 divider probe on an oscilloscope. Check that oscilloscope displays a 10 MHz signal with at least a 2.4V p-p amplitude.

5-16. PROGRAM CONTROL FLOW DIAGRAMS

5-17. Figures 5-3 and 5-4 are flow diagrams showing the sequence of actions required in making a measurement. Figure 5-3 is a simplified version of Figure 5-4. The A21 Control Board theory explains how decisions are made in the flow diagram. See Paragraph 4-236.

5-18. Figure 5-4 lists three sets of numbers: the program address, the selected test number, and selected action number.

5-19. The program address is the 5-bit binary number placed to the right of the rectangle and diamond symbols in the diagram. These 5 bits are the inputs to ROM's A21U3 and A21U4. When an HP 10528A Logic Clip is installed on A21U4, the program address appears on pins 10 through 14. Note that the logic clip diagram shown on Figure 5-4 uses circles to designate these pins.

5-20. Inside each rectangle is a decimal number that indicates what action is required and this corresponds to the action of A21U13. This number can be read in binary on pins 5, 6, 7, and 9 of A21U4. These pins have binary weights 1, 2, 4, and 8, respectively. To determine the required action, add the binary weights of the pins activated.

5-21. For example, if A21U4 pins 5, 6, and 7 were TTL High (indicated by a lit LED), the required action is $(1 + 2 + 4) = 7$. Note that the four pins designating action data are diagrammed as rectangles in the logic clip diagram to correspond with the rectangles of the flow diagram.

5-22. Decision points are indicated by diamonds and the associated decimal number indicates the test required. This number, which corresponds to the number in A21U12, can similarly be read on the logic clip on the pins designated with diamonds in the diagram. Note that this corresponds to the diamond shapes on the flow chart.

5-23. It may be possible to single step the 5340A through the flow diagram to check for proper branching. Refer to A21 Troubleshooting.

Figure 5-3. Simplified Flow Diagram of 5340A Program Control

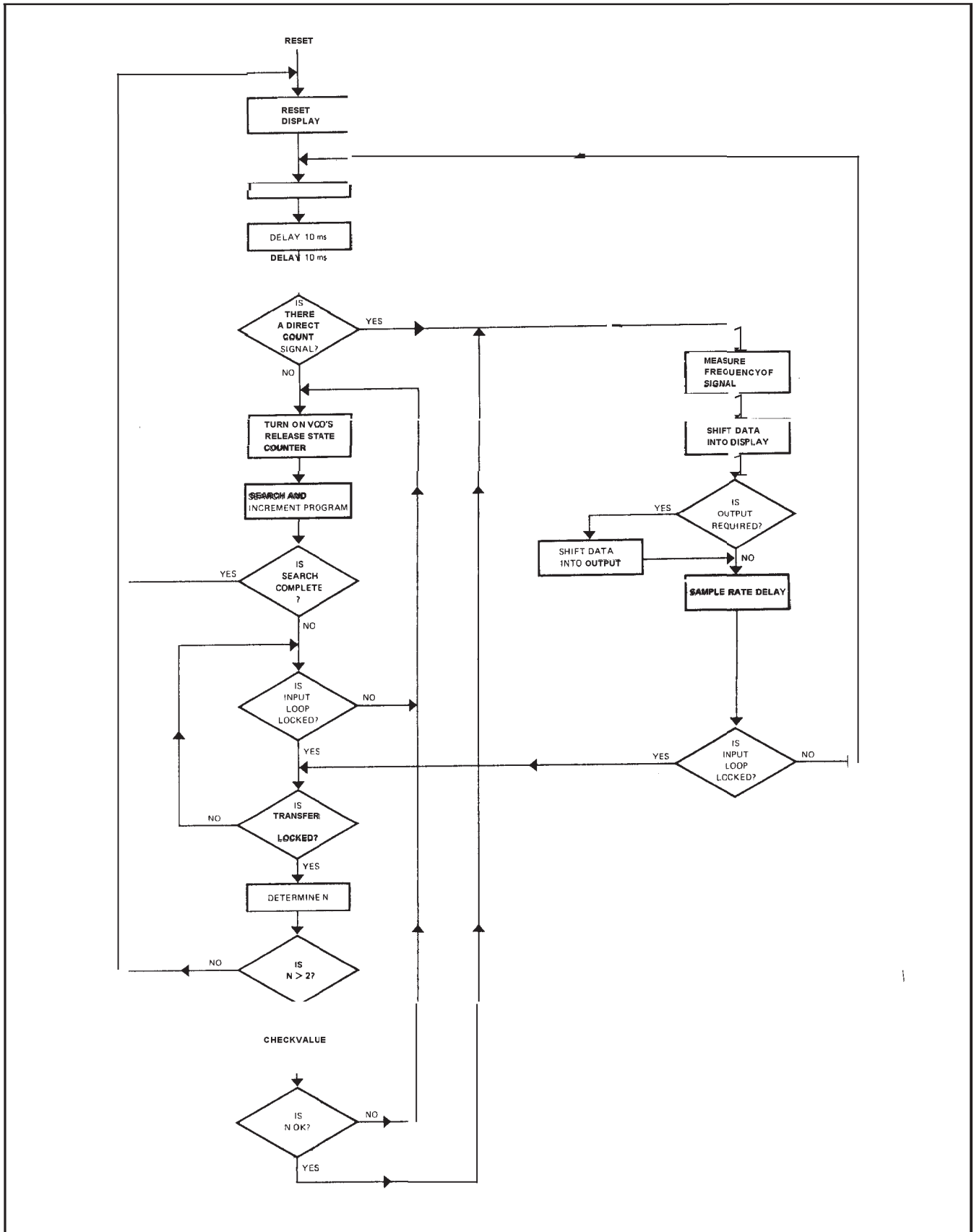
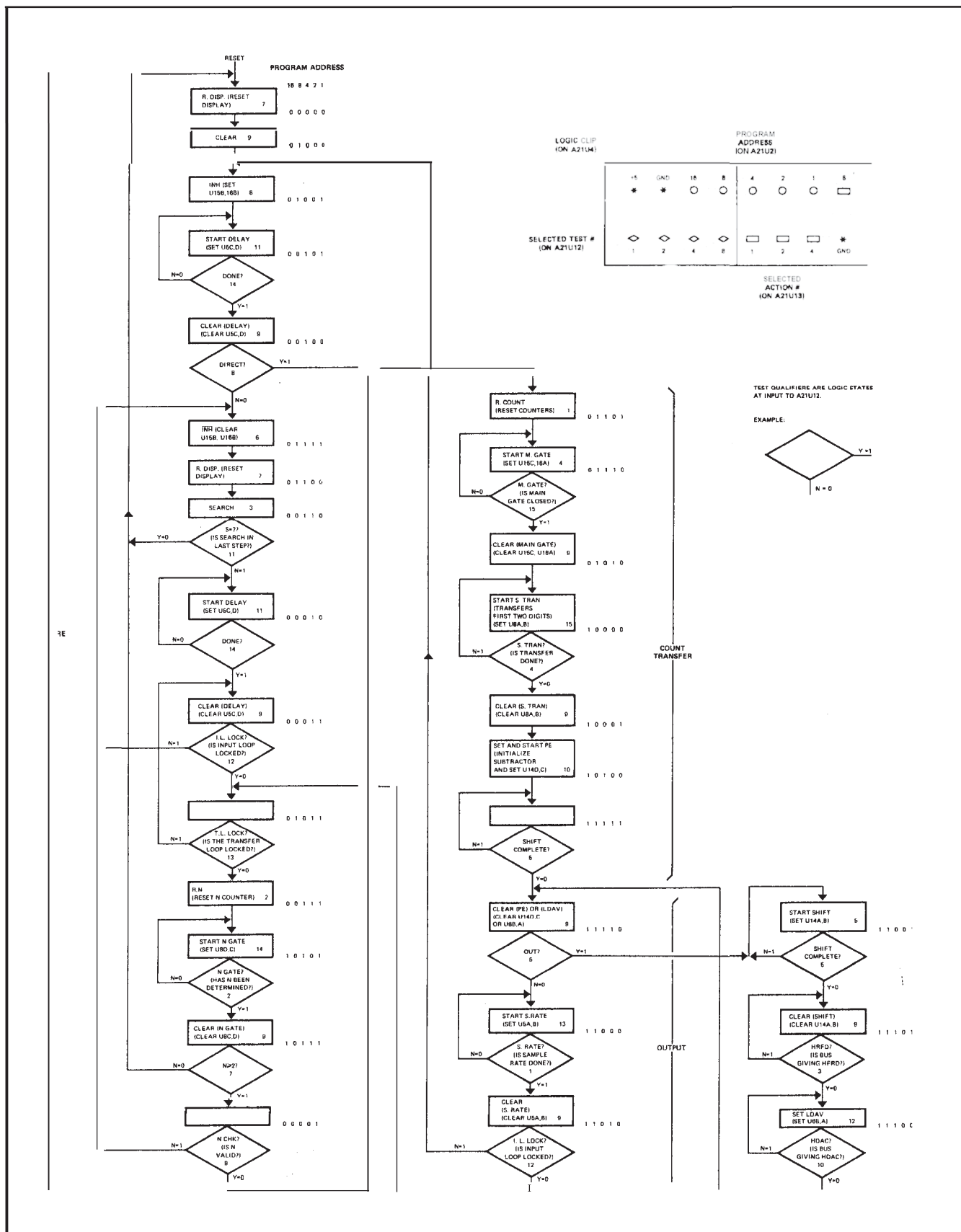


Figure 5-4. Troubleshooting Flow Diagram with HP Logic Clip



PERFORMANCE CHECK TEST CARD

HEWLETT-PACKARD MODEL 5340A FREQUENCY COUNTER		<i>Test Performed by</i> _____ <i>Date</i> _____
DESCRIPTION	CHECK	
3. SELF-CHECK	_____	Counter displays 10.000 000 MHz ±1 count.
	_____	DIR annunciator lights.
	_____	GATE light flashes.
4. RESET	_____	Resets to zero.
5. RESOLUTION	_____	Proper significant digits displayed for each setting of RESOLUTION switch.
7. SAMPLE RATE	_____	Sample rate variable to 5 seconds.
8. SAMPLE RATE HOLD	_____	Display is held.
9. FREQUENCY RANGE 10 Hz-250 MHz (Hi-Z INPUT)	_____	10 Hz to 250 MHz at 50 mV sensitivity.
10. FREQUENCY RANGE 10 Hz-500 MHz (500 INPUT)	_____	10 Hz to 500 MHz at -30 dBm sensitivity.
11. FREQUENCY RANGE 500 MHz-10 GHz (500 INPUT)	_____	500 MHz to 10 GHz at -35 dBm sensitivity.
12. FREQUENCY RANGE 10 GHz-18 GHz (500 INPUT)	_____	10 GHz to 18 GHz at -25 dBm sensitivity.
14. 10 MHz INPUT BNC (Rear Panel)	_____	Proper external time base operation.
15. 10 MHz OUTPUT (Rear Panel)	_____	10 MHz at >2.4V p-p.

5-24. OVERALL TROUBLESHOOTING

5-25. Proceed with these tests in the order listed.

- a. Set 5340A controls as follows:

RESOLUTION to 1K
SAMPLE RATE to max ccw
RANGE to CHK
OSC (rear panel) to INT
115/230 V Selector (rear panel) to match line voltage being used.
LINE (front panel) to ON
Check that the GATE lamp flashes. The display should be 10.000 MHz ± 1 count.
Check that DIRect lamp flashes. Move the RESOLUTION switch through all of its positions and observe the display.

Resolution	Display ± 1 Count
1	10.000000 MHz
10	10.00000 MHz
100	10.0000 MHz
1 K	10.000 MHz
10 K	10.00 MHz
100 K	10.0 MHz
1 M	.010 GHz

If the 5340A fails any of these tests, go to Troubleshooting Chart #1 of Figure 5-5.

- b. Connect a 220 MHz signal at 0 dBm (644 mV p-p) to the 1 MR input using a 50R feedthru termination. Move RANGE switch to "10 Hz to 250 MHz" and RESOLUTION to 1 K.

The GATE lamp should flash, the DIRect lamp should be lit and the counter should display the correct frequency for all positions of the RESOLUTION switch.

If the 5340A fails any of the above, go to Troubleshooting Chart #2 of Figure 5-5.

- c. Connect the signal to the 50R INPUT, move RANGE switch to "10 Hz to 18 GHz", RESOLUTION switch to 1 kHz. The GATE lamp should flash, the DIRect lamp should be lit and the counter should display the correct frequency for all positions of the RESOLUTION switch.
- d. Change input frequency to 280 MHz 0 dBm. Move the RANGE switch to the "250 MHz to 18 GHz" position. The LOCK lamp should now light, the GATE lamp should continue to flash and the counter should display the correct frequency (280 MHz) for all positions of the RESOLUTION switch.

If this test is failed, go to Troubleshooting Chart #4 (Figure 5-5).

- e. For each position of the RESOLUTION switch, move the RANGE switch between "250 MHz to 18 GHz" and "10 Hz to 18 GHz". The display frequencies should agree within 1 count.

If this test fails, determine which frequency is incorrect and use Troubleshooting Chart #3 or #4 (Figure 5-5).

5-26. A20 N Checker Troubleshooting

5-27. Remove A5 05340-60003 from 5340A and place A20 on an extender. Short A21(22) to chassis. Unsolder the wire connected to XA20(W).

5-28. Connect the output of an HP Model 651A signal generator to the external trigger input of an HP Model 222A pulse generator. Disconnect the harmonic frequency cable connected to A16J2. Use suitable push-on to BNC (such as Sealectro 50-074-6800, HP P/N 1250-0831) and connect the cable to the output of the pulse generator.

5-29. Set 651A frequency to 40 kHz at 0.8V rms

222A pulse polarity to +
222A rep rate to man/ext +
222A pulse delay to .1
222A pulse width to .03 - .05
vernier to mid-position
222A pulse amplitude to 5
vernier to mid-position
5340A RANGE switch to 250 MHz - 18 GHz
5340A RESOLUTION switch to 10 K

Signal Generator Frequency	N	Range No.	XA19B(S) Binary 4	XA19B(R) Binary 2	XA19B(P) Binary 1	5340A Display
20 kHz	1	6			x	all zeros
40 kHz	2	6			x	some number
80 kHz	4	6			x	some number
100 kHz	5	6			x	all zeros
60 kHz	3	5		x		all zeros
80 kHz	4	5		x		some number
160 kHz	8	5		x		some number
180 kHz	9	5		x		all zeros
140 kHz	7	4		x	x	all zeros
160 kHz	8	4		x	x	some number
320 kHz	16	4		x	x	some number
340 kHz	17	4		x	x	all zeros
300 kHz	15	3	x			all zeros
320 kHz	16	3	x			some number
640 kHz	32	3	x			some number
660 kHz	33	3	x			all zeros
620 kHz	31	2	x		x	all zeros
640 kHz	32	2	x		x	some number
1.28 MHz	64	2	x		x	some number
1.30 MHz	65	2	x		x	all zeros
1.26 MHz	63	1	x	x		all zeros
1.28 MHz	64	1	x	x		some number
2.56 MHz	128	1	x	x		some number
5.10 MHz	255	1	x	x		all zeros

5-30. In this test the various possible values of N will be simulated by varying the signal generator frequency as shown in the table below. The range will be simulated by jumpering three connections to chassis. Note that there are six groups of four measurements. The first checks that N is outside the lower limit; the fourth checks that N is outside the upper limit. The second and third check that N is within limits.

5-31. There will be two types of test results: The 5340A will display all zeros or it will display some number. For the first and fourth test in each group, the 5340A should display all zeros. The second and third test should cause a number to be displayed, which is approximately N times 150 MHz. The exact value of the display is not important; it is important to note if the display is all zeros or some number.

5-32. To simulate the RANGE setting, connect to chassis pin connections XA19B(S), XA19B(R), XA19B(P) when designated by an X. These pins, which have binary weights 4, 2, and 1, respectively, are positive true. Thus to simulate Range #6, do not short cut Binary 4 and Binary 2.

5-33. If any test fails, first check the action of the range binary to decimal decoder, which should output a TTL Low for the selected range. For example, when XA19B(P) is shorted to chassis (selecting Range #6) the 6 output (pin 7) of the IC should be TTL Low. All others should be TTL High. The decoder is U27 on A20 05340-60018 and U28 on A20 05340-60067. If the first test in a group fails, check the action of the lower limit comparators. This is U19 and U20 on both 05340-60018 and 05340-60067. If the fourth test fails, check the action of the upper limit comparators (U25 and U26 on 05340-60018 and U26 and U27 on 05340-60067). If the second or third test fails, check both sets. These can easily be tested using a logic comparator.

5-34. Check also the output of the binary N counters for agreement with the value of N listed in the table. This is U12 and U21 on 05340-60018 and U6 and U7 on 05340-60067. Check also the associated inverters.

5-35. A21 Troubleshooting

5-36. Disconnect jumper W2 on A20 and install logic clip on A21 U4. Push front panel RESET pushbutton.

5-37. Use HP 10526T Pulser on A21U2(9) and step through the program. Check for proper branching per Figure 5-4. If the program address will not increment, (locked in a loop) determine from Figure 5-4 which test or action is not being completed. Then check A21U12 or U13 to verify that proper selection is taking place there. If that is OK, trace the circuit to find the cause of the failure.

5-38. If incorrect branching is occurring, a test is giving incorrect results or the A21 circuitry is interpreting it incorrectly. Check the input of A21U12 for proper test logic levels, as noted in Figure 5-4.

5-39. Power Supply Troubleshooting

- a. Determine which power supplies are regulating at an incorrect voltage by measuring the output voltage.
- b. If any supply is at or near zero volts, the supply could be current limiting. Disconnect the output leads for that supply at the A30 power supply motherboard.
- c. Again measure the voltage. If the output is still bad, the failure exists in the power supply circuit. Use the typical voltage charts shown to isolate the defective components.
- d. If the output obtained in step 3 is now good, there could be a short circuit in the instrument, or the supply could be current-limiting improperly. Substitute a resistive load for the supply under test as listed on the next page.
- e. If the output is still good, an excessive load exists somewhere in the instrument. Connect an ohmmeter between ground and on the feeder line in question (which is still disconnected from its power supply). Start removing the plug-in PC boards until a significant change is observed on the ohmmeter. Then isolate the excessive load. Check also for shorted wires.
- f. If the output obtained in step 4 is bad, the power supply is not able to provide the necessary current. Use the typical voltage charts to isolate to the defective component. **Look** especially for the same voltage on any two leads of a transistor, indicating a shorted transistor.

	Resistance	Wattage
+5V loop	15 Ω	2W
-5V digital	20 Ω	2W
-5V loop	28 Ω	1W
+5V digital	7.5 Ω	4W
+15	75 Ω	5W
-15	75 Ω	5W
+175	7.5K	3W
+11V (Option 001)	500 Ω	1/8W

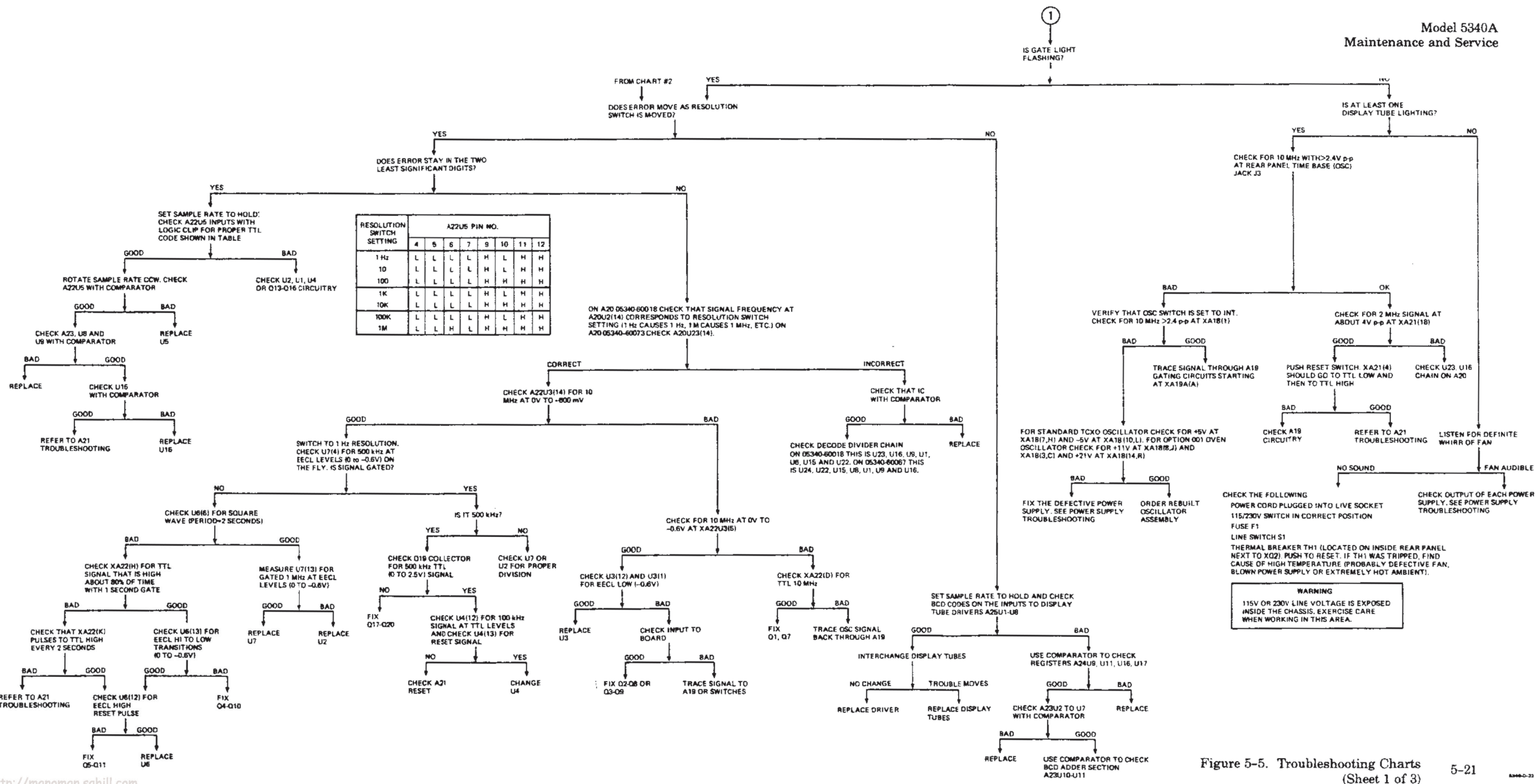


Figure 5-5. Troubleshooting Charts
(Sheet 1 of 3)

2

DISCONNECT GENERATOR FROM HI Z INPUT. CONNECT BNC CABLE TO REAR PANEL TIME BASE (OSC) JACK. CONNECT OTHER END TO HI Z INPUT. DOES THE COUNTER NOW DISPLAY 10 MHz?

VERIFY GENERATOR IS OUTPUTTING AT LEAST 50 mVrms (143 mVp-p). SEE IF MALFUNCTION IS FREQUENCY DEPENDENT. TRACE SIGNAL THROUGH A3 AND A22 USING TROUBLESHOOTING TREE BELOW. USING A OSCILLOSCOPE OR SPECTRUM ANALYZER CAPABLE OF MEASURING THE FREQUENCY OF INTEREST. IF THE COUNTER OPERATES PROPERLY AT ONE OR MORE SETTINGS OF THE RESOLUTION SWITCH, USE THE LEFT BRANCH OF TROUBLESHOOTING TREE #1.

MEASURE OUTPUT OF A3. SHOULD BE 10 MHz AT ABOUT 800 mV p-p

NO

DISCONNECT CABLE AT 1 MΩ INPUT. MEASURE SIGNAL AT CABLE. SHOULD BE 10 MHz >2.4V p-p

NO

REPLACE CABLE OR TRACE OSCILLATOR SIGNAL BACK THROUGH A18

OK

RECONNECT SIGNAL AND TRACE THROUGH A3

OK

MEASURE SIGNAL AT A22U8(6). SHOULD BE 10 MHz AT 100 mV p-p

NO

MEASURE SIGNAL AT XA22(21). SHOULD BE 10 MHz AT 800 mV p-p

YES

MEASURE LOGIC LEVEL AT A22U8(12). SHOULD BE EECL LOW (-0.6V)

NO

MEASURE LOGIC LEVEL AT XA22(51). SHOULD BE TTL LOW (0-0.4V)

YES

FIX OZ-2

NO

REPLACE CABLE FROM A3 TO A22

OK

MEASURE SIGNAL AT A22U3(2). SHOULD BE 10 MHz AT 800 mV p-p

YES

MEASURE SIGNAL AT A22U3(14). SHOULD BE 10 MHz AT 800 mV p-p

NO

MEASURE LOGIC LEVEL AT A22U3(1). SHOULD BE EECL HIGH (0V)

NO

CHECK LOGIC LEVEL AT XA22(1). SHOULD BE TTL H (2.4-5V)

YES

FIX Q3-Q9 CIRCUITRY

NO

REPLACE

TRACE THROUGH GATING CIRCUITS A22U6, ETC

YES

REPLACE U3

MEASURE FOR TTL LOGIC LEVELS SHOWN BELOW

RANGE	XA19A(13)	XA19A(14)	XA19A(10)
10 Hz TO 250 MHz	L	L	H
CHK	H	L	L
250 MHz TO 18 GHz	H	H	L
10 Hz TO 18 GHz	H	H	H

BAD

FIX RANGE SWITCH S4

OK

TRACE THROUGH A19

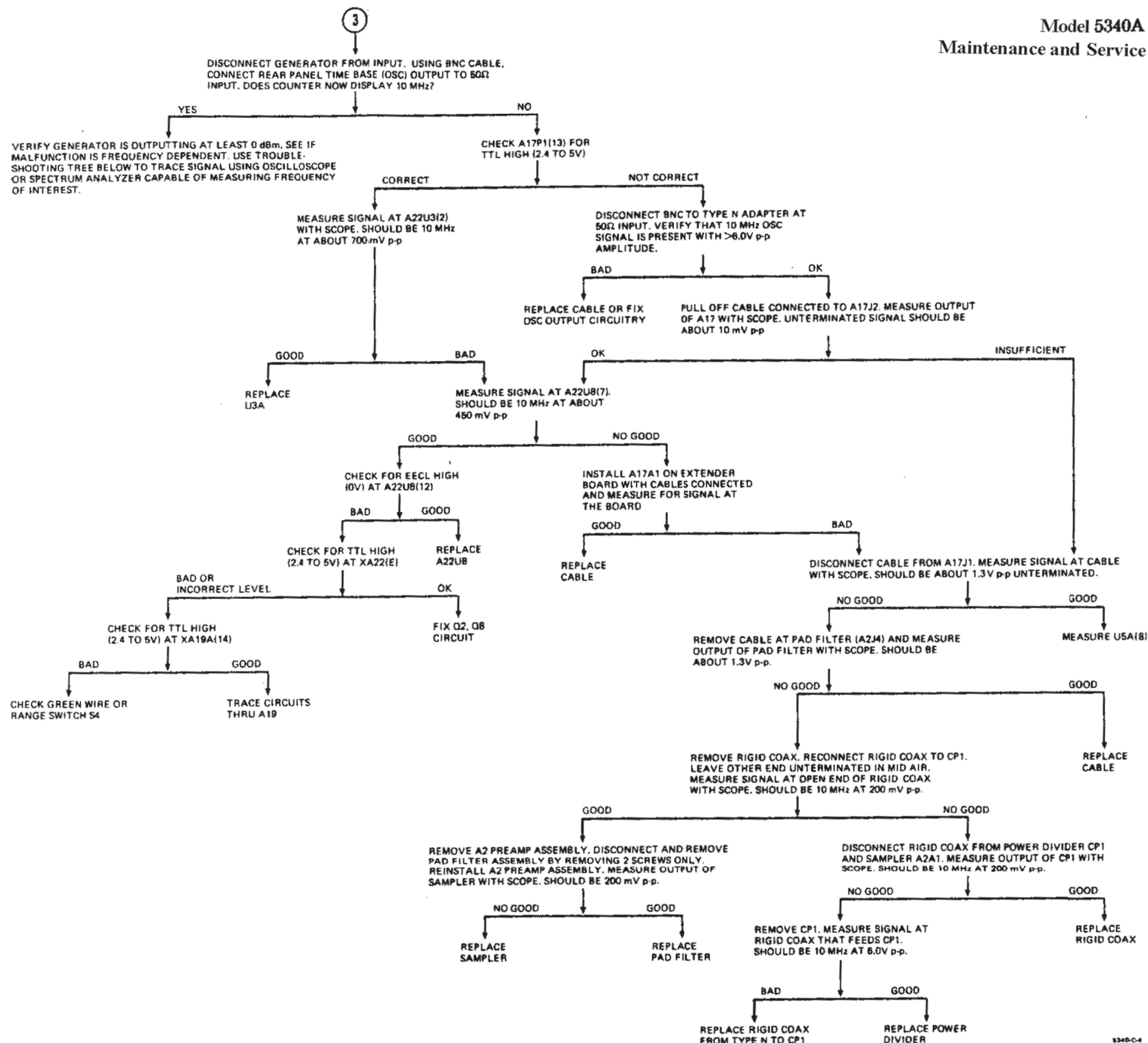


Figure 5-5. Troubleshooting Charts
(Sheet 2 of 3)

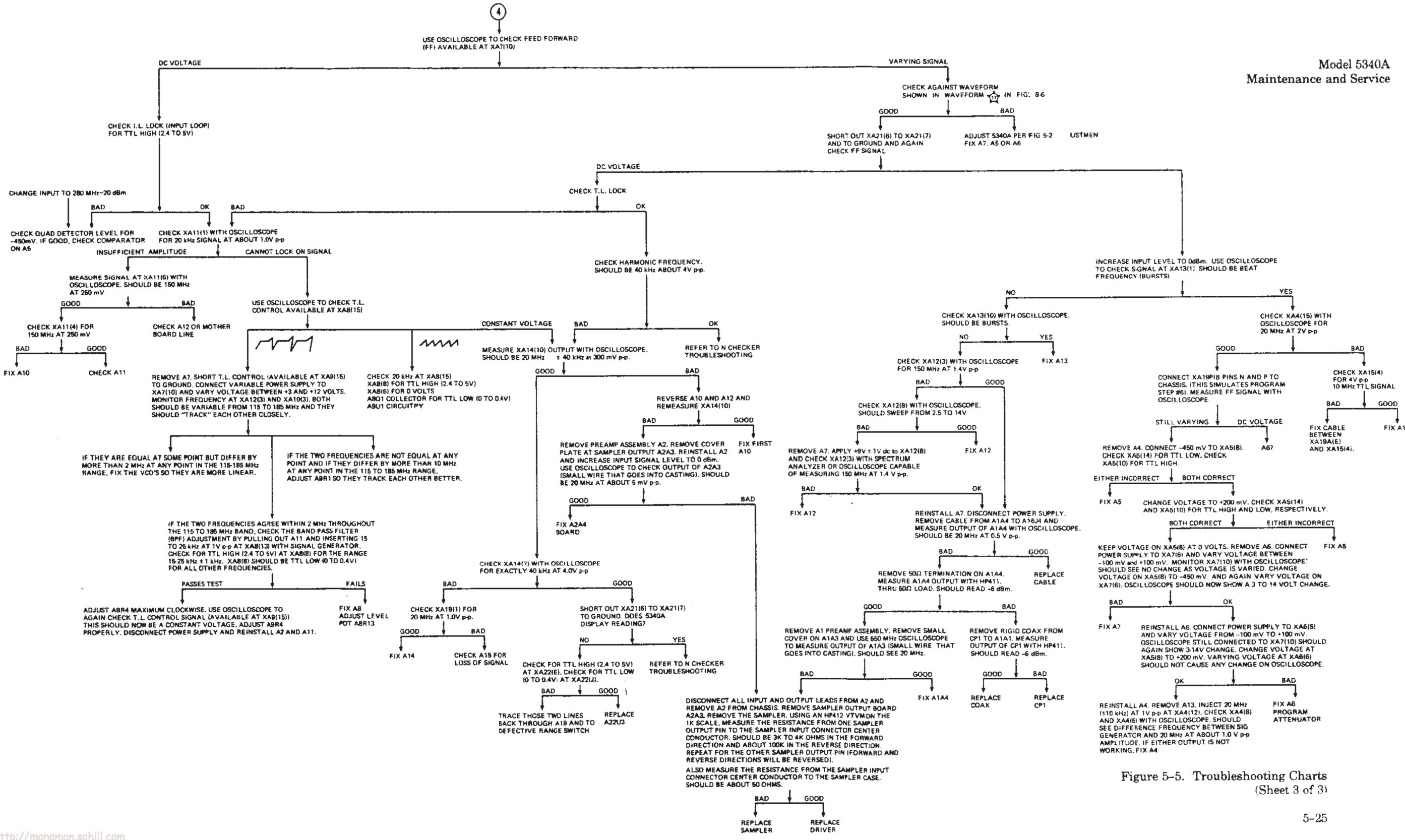


Figure 5-5. Troubleshooting Charts
(Sheet 3 of 3)

SECTION VI

REPLACEABLE PARTS

6-1. INTRODUCTION

6-2. This section contains information for ordering replaceable parts. Table 6-1 lists replaceable parts for the standard instrument without options. Tables 6-3 through 6-5 list replaceable parts for Options 001, 002, and 003, respectively. Table 6-2 and Figure 6-1 cover the mechanical parts. Table 6-6 contains a list of manufacturers and their codes.

6-3. Parts are listed in alpha-numerical order of their reference designator starting with A1 and ending with chassis and miscellaneous parts. The replaceable parts tables include the following information.

- Reference designator (when applicable).
- HP part number.
- Total quantity (Qty) used in the instrument. The quantity appears in the Qty column the first time that the part is listed. Table 6-1 gives Qty for the standard instrument only. To tabulate a parts list for an instrument with options, add and delete the parts as directed in the Option tables.
- Description of the part (see abbreviations below).

REFERENCE DESIGNATIONS

A	= assembly	E	= miscellaneous elec- trical part	P	= electrical connector (movable portion); plug	U	= integrated circuit; microcircuit
AT	= attenuator; isolator; termination	F	= fuse	Q	= transistor SCR; triode thyristor	V	= electron tube
B	= fan; motor	FL	= filter	R	= resistor	VR	= voltage regulator; breakdown diode
BT	battery	H	= hardware	RT	= thermistor	W	= cable; transmission path wire
C	= capacitor	HY	= circulator	S	= switch	X	= socket
CP	= coupler	J	= electrical connector (stationary portion); jack	T	= transformer	Y	= crystal unit-piezo- electric
CR	= diode; diode thyristor; varactor	K	= relay	TB	= terminal board	Z	= tuned cavity, tuned circuit
DC	= directional coupler	L	= coil, inductor	TC	= thermocouple		
DL	= delay line	M	= meter	TP	= test point		
DS	= annunciator; signal- ing device (audible or visual); lamp; LED	MP	= miscellaneous mechanical part				

ABBREVIATIONS

A	= ampere	avg	= average	CHAN	= channel	dc	= direct current
ac	= alternating current	AWG	= American wire gauge	cm	= centimeter	deg	= degree (temperature interval or difference)
ACCESS	= accessory	RAL	= balance	CMO	= cabinet mount only		= degree (plane angle)
ADJ	= adjustment	RCD	= binary coded decimal	COAX	= coaxial	°C	= degree Celsius (centigrade)
A/D	= analog-to digital	BD	= board	COEF	= coefficient	°F	= degree Fahrenheit
AF	= audio frequency	RE CU	= beryllium copper	COM	= common	°K	= degree Kelvin
AFC	= automatic fre- quency control	BFO	= beat frequency oscillator	COMP	= composition	DEPC	= deposited carbon
AGC	= automatic gain control	BH	= binder head	COMPL	= complete	DET	= detector
AL	= aluminum	BKDN	= breakdown	CONN	= connector	diam	= diameter
ALC	= automatic level control	BP	= bandpass	CP	= cadmium plate	DIA	= diameter (used in parts list)
AM	= amplitude modula- tion	RPF	= bandpass filter	CRT	= cathode-ray tube		
AMPL	= amplifier	BRS	= brass	CTL	= complementary transistor logic	DIFF	= differential amplifier
APC	= automatic phase control	BWO	= backward-wave oscillator	CW	= continuous wave	AMPL div	= division
ASSY	= assembly	CAL	= calibrate	cm	= centimeter	DPDT	= double-pole, double- throw
AUX	= auxiliary	ccw	= counterclockwise	D/A	= digital-to-analog	DR	= drive
		CER	= ceramic	dB	= decibel		
				dBm	= decibel referred to 1 mW		

Model 5340A Replaceable Parts

ABBREVIATIONS

DSB	= double sideband	MFR	= manufacturer	PIV	= peak inverse voltage	TFT	= thin-film transistor
DTL	= diode transistor logic	mg	= milligram	pk	= peak	TGL	= toggle
DVM	= digital voltmeter	MHz	= megahertz	PL	= phase lock	THD	= thread
ECL	= emitter coupled logic	mH	= millihenry	PL/O	= phase lock oscillator	THRU	= through
EMF	= electromotive force	mho	= mho	PM	= phase modulation	TI	= titanium
EDP	= electronic data processing	MIN	= minimum	PNP	= positive-negative	TOL	= tolerance
ELECT	= electrolytic	min	= minute (time)		positive	TRIM	= trimmer
ENCAP	= encapsulated		= minute (plane angle)	P/O	= part of	TSTR	= transistor
EXT	= external	MINAT	= miniature	POLY	= polystyrene	TTL	= transistor-transistor logic
F	= farad	mm	= millimeter	PORC	= porcelain	TV	= television
FET	= field-effect transistor	MOD	= modulator	POS	= positive; position(s) (used in parts list)	TVI	= television interference
F/F	= flip-flop	MOM	= momentary	POSN	= position	TWT	= traveling wave tube
FIL, H	= filar head	MOS	= metal-oxide semiconductor	POT	= potentiometer	U	= micro (10 ⁻⁶) (used in parts list)
FM	= frequency modulation	mu	= millisecond	P.P	= peak-to-peak (used in parts list)	UF	= microfarad (used in parts list)
FP	= front panel	MTG	= mounting	PP	= peak-to-peak (used in parts list)	IJHF	= ultrahigh frequency
FREQ	= frequency	MTR	= meter (indicating device)	PPM	= pulse-position modulation	IJNREG	= unregulated
FXD	= fixed	mV	= millivolt	PREAMPL	= preamplifier	V	= volt
g	= gram	mVac	= millivolt, ac	PRF	= pulse-repetition frequency	VA	= voltampere
GE	= germanium	mVdc	= millivolt, dc	PRR	= pulse repetition rate	Var	= volta, ac
GHZ	= gigahertz	mVpk	= millivolt, peak	ps	= picosecond	VAR	= variable
GL	= glass	mV p-p	= millivolt, peak-to-peak	PT	= point	VCO	= voltage-controlled oscillator
GNID	= ground(ed)	mVrms	= millivolt, rms	PTM	= pulse-time modulation	Vdc	= volts, dc
H	= henry	mW	= milliwatt	PWM	= pulse-width modulation	VDCW	= volts, dc, working (used in parts list)
h	= hour	MUX	= multiplex	PWV	= peak working voltage	V(F)	= volts, filtered
HET	= heterodyne	MY	= mylar	RC	= resistance	VFO	= variable-frequency oscillator
HEX	= hexagonal	μA	= microampere	RECT	= rectifier	VHF	= very-high frequency
HD	= head	μF	= microfarad	REF	= reference	Vpk	= volts, peak
HDW	= hardware	μH	= microhenry	REG	= regulated	Vp-p	= volta, peak-to-peak
HF	= high frequency	μmho	= micromho	REPL	= replaceable	Vrms	= volts, rms
HG	= mercury	μs	= microsecond	RF	= radio frequency	VSWR	= voltage standing wave ratio
HI	= high	μV	= microvolt	RFI	= radio frequency interference	VTO	= voltage-tuned oscillator
HP	= Hewlett-Packard	μVac	= microvolt, ac	RH	= round head; right hand	VTVM	= vacuum-tube voltmeter
HPF	= high pass filter	μVdc	= microvolt, dc	RLC	= resistance-inductance-capacitance	V(X)	= volt, switched
HK	= hour (used in parts list)	μVpk	= microvolt, peak-to-peak	RMO	= rack mount only	W	= watt
HV	= high voltage	μVrms	= microvolt, rms	rms	= root-mean-square	W/	= with
HZ	= Hertz	nA	= nanoampere	RND	= round	WIV	= working inverse voltage
IC	= integrated circuit	NC	= no connection	ROM	= read-only memory	WW	= wirewound
ID	= inside diameter	N/C	= normally closed	R&P	= rack and panel	W/O	= without
IF	= intermediate frequency	NE	= neon	RWV	= reverse working voltage	YIG	= yttrium-iron-garnet
TMFG	= impregnated	NEG	= negative	S	= scattering parameter	Zo	= characteristic impedance
in	= inch	nF	= nanofarad	s	= second (time)		
INC	= incandescent	NI PL	= nickel plate	S-B	= second (plane angle)		
INCL	= include(s)	N/O	= normally open	SCR	= silicon controlled rectifier		
INP	= input	NORM	= nominal	SE	= selenium		
INS	= insulation	NPN	= negative-positive	SECT	= sections		
INT	= internal	NPO	= negative-positive	SEMICON	= semiconductor		
kg	= kilogram	NRFR	= not recommended for field replacement	SHF	= superhigh frequency		
kH7	= kilohertz	NSR	= not separately replaceable	SI	= silicon		
kΩ	= kilohm	ns	= nanosecond	SIL	= silver		
kV	= kilovolt	nW	= nanowatt	SL	= slide		
lb	= pound	OB	= order by description	SNR	= signal-to-noise ratio		
LC	= inductance-capacitance	OD	= outside diameter	SPDT	= single-pole, double throw		
LED	= light-emitting diode	OH	= oval head	SPG	= spring		
LF	= low frequency	OP AMPL	= operational amplifier	SR	= split ring		
LG	= long	OSC	= oscillator	SPST	= singlepole, single-throw		
LH	= left hand	OX	= oxide	SSB	= single sideband		
LJM	= limit	oz	= ounce	SST	= stainless steel		
LJN	= linear taper (used in parts list)	Ω	= ohm	STL	= steel		
lin	= linear	P	= peak (used in parts list)	SQ	= square		
LK	= lock washer	PAM	= pulseamplitude modulation	SWR	= standing-wave ratio		
WASH	= low: local oscillator	PC	= printed circuit	SYNC	= synchronize		
LO	= logarithmic taper (used in parts list)	PCM	= pulse-code modulation; pulse-count modulation	T	= timed (slow-blow fuse)		
LOG	= logarithm	PDM	= pulse-duration modulation	TA	= tantalum		
log	= logarithmic	pF	= picofarad	TC	= temperature compensating		
LPF	= low pass filter	PH BRZ	= phosphor bronze	TD	= time delay		
LV	= low voltage	PHI	= Phillips	TERM	= terminal		
m	= meter (distance)	PIN	= positive-intrinsic-negative				
mA	= milliampere						
MAX	= maximum						
MΩ	= megohm						
MEG	= meg (10 ⁶) (used in parts list)						
MET FILM	= metal film						
MET OX	= metal oxide						
MF	= medium frequency; microfarad (used in parts list)						

NOTE

All abbreviations in the parts list will be in upper case.

MULTIPLIERS

Abbreviation	Prefix	Multiple
T	tera	10 ¹²
G	giga	10 ⁹
M	mega	10 ⁶
k	kilo	10 ³
da	deka	10
d	deci	10 ⁻¹
c	centi	10 ⁻²
m	milli	10 ⁻³
μ	micro	10 ⁻⁶
n	nano	10 ⁻⁹
p	pico	10 ⁻¹²
f	femto	10 ⁻¹⁵
a	atto	10 ⁻¹⁸

- e. Typical manufacturer of the part in a five-digit code; see list of manufacturers in Table 6-6.
- f. Manufacturer's part number.

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 number.

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.

6-7. HP PART NUMBER ORGANIZATION

6-8. Following is a general description of the HP part number system.

6-9. Component Parts and Materials

6-10. Generally, the prefix of HP part numbers identifies the type of device. Eight digit part numbers are used, where the four digit prefix identifies the type of component, part, or material and the four digit suffix indicates the specific type. Following is a list of some of the more commonly used prefixes for component parts. The list includes HP manufactured parts and purchased parts.

Prefix	Component/Part/Material
0121-	Capacitors, Variable (mechanical)
0122-	Capacitors, Voltage Variable (semiconductor)
0140-	Capacitors, Fixed
0150-	Capacitors, Fixed Non-Electrolytic
0160-	Capacitors, Fixed
0180-	Capacitors, Fixed Electrolytic
0330-	Insulating Materials
0340-	Insulators, Formed
0370-	Knobs, Control
0380-	Spacers and Standoffs
0410-	Crystals
0470-	Adhesives
0490-	Relays
0510-	Fasteners
0674- thru 0778-	Resistors, Fixed (non wire wound)
0811- thru 0831-	Resistors (wire wound)
1200-	Sockets for components
1205-	Heat Sinks
1250-	Connectors (RF and related parts)
1251-	Connectors (non RF and related parts)
1410-	Bearings and Bushings
1420-	Batteries
1820-	Monolithic Digital Integrated Circuits
1826-	Monolithic Linear Integrated Circuits
1850-	Transistors, Germanium PNP
1851-	Transistors, Germanium NPN
1853-	Transistors, Silicon PNP

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Prefix	Component/Part/Material
1854-	Transistors, Silicon NPN
1855-	Field-Effect-Transistors
1900- thru 1912-	Diodes
1920- thru 1952-	Vacuum Tubes
1990-	Semiconductor Photosensitive and Light-Emitting Diodes
3100- thru 3106-	Switches
8120-	Cables
9100-	Transformers, Coils, Chokes, Inductors, and Filters

For example, 1854-0037, 1854-0221, and 1851-0192 are all NPN transistors. The first two are silicon and the last is germanium.

6-12. General Usage Parts

6-13. The following list gives the prefixes for HP manufactured parts used in several instruments, e.g., side frames, feet, top and bottom covers, etc. These are eight-digit part numbers with the four digit prefix identifying the type of parts as shown below:

Type of Part	Prefix
Sheet Metal	5000- to 5019-
Machined	5020- to 5039-
Molded	5040- to 5059-
Assemblies	5060- to 5079-
Components	5080- to 5099-

For example, power splitter 5088-7003 is a component and pc board support 5040-0170 is a molded part.

6-14. Specific Instrument Parts

6-15. These are HP manufactured parts for use in individual instruments or series of instruments. For these parts, the prefix indicates the instrument and the suffix indicates the type of part. For example, 05340-60001 is an assembly used in the 5340A. Following is a list of suffixes commonly used.

Type of Part	P/N Suffix
Sheet Metal	-00000 to -00499
Machined	-20000 to -20499
Molded	-40000 to -40499
Assembly	-60000 to -60499
Component	-80000 to -80299
Documentation	-90000 to -90249

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1	05340-60017 05340-00009 05340-00012 05340-00017 05340-00019 05340-20033	1 1 3 3 2 1	BOARD ASSEMBLY, PREAMPLIFIER #1 PLATE, SAUPLER SHIELD, SIMPLER COVER, PREAMPLIFIER PLATE, SAMPLER HOUSING	28460 28480 28480 28480 28480 28480	05340 60017 05340-00009 05340-20012 05340 00017 05340-20018 05340 20033
A1C1	0160 0204	5	CAPACITOR-FXO 5500PF200WVDC CER	01121	SMFB-A2
A1C2	0160-0204		CAPACITOR-FXO 5500PF200WVDC CER	01121	SMFB-A2
A1R1	1810 0118	1	TERMINATION:COAX SYA 50 OHU 1W	28480	1810 0118
A1A1*	5088 7004	2	THIN FILM SAMPLER ASSEMBLY *PART OF A1, NOT SEPARATELY REPLACEABLE	28480	5088 7004
A1A2*	5088-7035	2	SAMPLER DRIVE ASSEMBLY *PART OF A1, NOT SEPARATELY REPLACEABLE	23480	5088-7005
A1A3*	05340-60042	1	SAMPLER WTPUT BOARD ASSEMBLY (LOADED ON 05340 20042 BLANK BOARD) *PART OF A1, NOT SEPARATELY REPLACEABLE	28480	05340-60042
A1A3C1	0160-3277	85	CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160 3277
A1A3C2	0160 3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277
A1A3L1	9100-2256	2	COIL FXO MOLEO RF CHOKE .56UH 10%	24226	101560
A1A3R1	0757-0963	1	RESISTOR 43K 2% .125W F TC=0+ 100	24566	C4 118 TO 4302 G
A1A4	05340 65014	1	PREAMPLIFIER BOARD ASSEMBLY (SERIES 1220 (LOADED ON 05340-20014 BLANK BOARD)	28480	05340 60014
A1A4C1	0160-3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277
A1A4C2	0160-3277		CAPACITOR FXO .01UF + 20% 50WVDC CER	28480	0160 3277
A1A4C3	0160-2238	1	CAPACITOR FXO 1.5PF + .25PF 500WVDC CER	28480	0160 2238
A1A4C4	0160-3284	1	CAPACITOR-FXO 22PF +-10% 100WVDC CER	28480	0160-3284
A1A4C5	0160-3028	1	CAPACITOR FXO 10PF + 10% 100WVDC CER	28480	0160 3028
A1A4C6	0160-3277		CAPACITOR FXD .01UF + 20% 50WVDC CER	28480	0160 3277
A1A4C7	0160-3277		CAPACITOR FXO .01UF + 20% 50WVDC CER	28480	0160 3277
A1A4C8	0180-0197	32	CAPACITOR FXD; 2.2UF+ 10% 20VDC TA	56289	1500225X9020A2
A1A4C9	0160-2198	2	CAPACITOR FXO 20PF + 5% 300WVDC MICA	28480	0160 2198
A1A4C10	0140-0224	1	CAPACITOR FXO 260PF + 10% 300WVDC UICA	72136	0M15F281F0300WV1C
A1A4C11	0160-2150	2	CAPACITOR FXD 33PF + 5% 300WVDC MICA	28480	0160 2150
A1A4C12	0140-0217	1	CAPACITOR FXO 140PF + 2% 300WVDC MICA	72136	0M15F141G0300WV1C
A1A4C13	0160-2150		CAPACITOR FXO 33PF + 5% 300WVDC UICA	28480	0160 2150
A1A4C14	0180-0197		CAPACITOR FXO 2.2UF+ 10% 20VDC TA	56289	1500225X9020A2
A1A4C15	0160-2198		CAPACITOR FXD 20PF + 5% 300WVDC MICA	28480	0160 2198
A1A4C16	0160-3277		CAPACITOR FXO .01UF + 20% 50WVDC CER	28480	0160 3277
A1A4C17	0160-3277		CAPACITOR FXO .01UF + 20% 50WVDC CER	28480	0160 3277
A1A4C18	0160-3277		CAPACITOR FXO .01UF + 20% 50WVDC CER	28480	0160 3277
A1A4C19	0160-3277		CAPACITOR FXD .01UF + 20% 50WVDC CER	28480	0160 3277
A1A4C20	0160-3277		CAPACITOR FXO .01UF + 20% 50WVDC CER	28480	0160 3277
A1A4C21	0160-3277		CAPACITOR FXD .01UF + 20% 50WVDC CER	28480	0160 3277
A1A4C22	0160-3277		CAPACITOR FXO .01UF + 20% 50WVDC CER	28480	0160 3277
A1A4C23	0160-3277		CAPACITOR FXO .01UF + 20% 50WVDC CER	28480	0160 3277
A1A4C24	0160-2743	1	CAPACITOR FXD 33PF + 10% 200WVDC CER	28490	3140 2743
A1A4L1	9100-2247	7	COIL FXO MOLDED RF CHOKE .1UH 10%	24226	10/100
A1A4L2	9100-2265	11	COIL FXO MOLDED RF CHOKE 10UH 10%	24226	10/102
A1A4L3	9100-0368	11	COIL FXD MOLEO RF CHOKE .33UH 10%	24226	10/330
A1A4L4	9100-0368		COIL FXO MOLDED RF CHOKE .33UH 10%	24226	10/330
A1A4L5	9100-2265		COIL FXO MOLDED RF CHOKE 10UH 10%	24226	10/102
A1A4L6	9100-0368		COIL FXO MOLDED RF CHOKE .33UH 10%	24226	10/330
A1A4L7	9100-0368		COIL FXD MOLDED RF CHOKE .33UH 10%	24226	101330
A1A4L8	9100-0368		COIL FXO MOLDED RF CHOKE .33UH 10%	24226	101330
A1A4L9	9100-2247		COIL FXO MOLEO RF CHOKE .1UH 10%	24226	101100
A1A4Q1	1854-0345	6	TRANSISTOR NPN 2N5179 SI TO 72 PD=200MW	04713	2N5179
A1A4Q2	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A1A4R1	0698-6242	2	RESISTOR 1.2K 5% .125W CC TC=+882	01121	161225
A1A4R2	0698 5182	2	RESISTOR 3.9K 5% .125W CC TC=0+882	01121	183925
A1A4R3	0698-3374	4	RESISTOR 20 5% .125W CC TC=0+588	01121	182005
A1A4R4	0698-5174	11	RESISTOR 200 5% .125W CC TC=0+882	01121	182015
A1A4R5	0698-3380	3	RESISTOR 75 OHM 5% .125W COMP	28480	1698-3380
A1A4R6	0698 6283	1	RESISTOR 10 5% .125W CC TC=0+588	01121	181005
A1A4R7	0698-5178	1	RESISTOR 1.5K 5% .125W CC TC=0+882	01121	181525
A1A4R8	0698-5181	1	RESISTOR 3.6K 5% .125W CC TC=0+882	01121	183625
A1A4R9	0698-3374		RESISTOR 20 5% .125W CC TC=0+588	01121	182005
A1A4R10	0698-8128	3	RESISTOR 220 5% .125W CC TC=0+882	01121	82215
A1A4R11	0698 3380		RESISTOR 75 OHM 5% .125W COMP	28480	1698 3380
A1A4R12	1698-3380		RESISTOR 75 OHM 5% .125W COMP	28480	1698 3380
A1A4R13	0698-8128		RESISTOR 220 5% .125W CC TC=0+882	31121	82215
A1A4R14	0698-8128		RESISTOR 220 5% .125W CC TC=0+882	31121	82215
A1A4R15	1698-5426	2	RESISTOR 10K 10% .125W CC TC=0+882	31121	B1031

See introduction to this section for ordering information

Model 5340A
Replaceable Parts

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1A4R16	0698 7102	2	RESISTOR 5.1K 5% .125W CC TC=0+882	01121	885125
A1A4R17	0698-5103	2	RESISTOR 430 5% .125W CC TC=0+882	01121	804315
A1A4R18	0698-8127	1	RESISTOR 22 5% .125W CC TC=0+588	31121	882205
A1A4R19	0698-3374		RESISTOR 20 5% .125W CC TC=0+588	01121	862005
A1A4R20	0698-5174		RESISTOR 200 5% .125W CC TC=0+882	31121	882015
A1A4R21	0698 5174		RESISTOR 200 5% .125W CC TC=0+832	01121	882015
A1A4R22	0698-5174		RESISTOR 200 5% .125W CC TC=0+882	01121	882015
A1A4R23	0698-5174		RESISTOR 200 5% .125W CC TC=0+882	01121	882015
A1A4R24	0698-5174		RESISTOR 200 5% .125W CC TC=0+882	01121	882015
A1A4R25	0698-5426		RESISTOR 10K 10% .125W CC TC=0+882	01121	881031
A1A4R26	0698 7152		RESISTOR 5.1K 5% .125W CC TC=0+882	01171	885125
A1A4R27	0698-3374		RESISTOR 20 5% .125W CC TC=0+588	01121	882005
A1A4R28	0698-5103		RESISTOR 430 5% .125W CC TC=0+882	01121	884315
A1A4R29	0674-2405	1	RESISTOR 24 5% .125W CC TC=0+588	01121	862405
A1A4R30	0698-5174		RESISTOR 200 5% .125W CC TC=0+882	01121	882015
A1A4R31	0698 3378	4	RESISTOR 51 5% .125W CC TC=0+588	51121	885105
A1A4U1	1858 0004	5	IC C43049 AMPL	02735	C43049
A1A5	05340-60077	1	FILTER ASSEMBLY #1	28480	C5340-60077
	C5340-20074	2	HOUSING, FILTER	28480	05340 20074
	05340 00030	1	COVER, HOUSING	28480	05340-00030
A1A5A1	05340-60075	1	BOARD, FILTER #1 SERIES 1344A (LOADED ON 05340-20075 BLANK BOARD)	28480	C5340-60075
A1A5A1C1	0180-1745	6	CAPACITOR-FXD 1.5UF+-10% 20VDC TP	56289	1500155X9020A2
A1A5A1C2	0180 1745		CAPACITOR-FXD: 1.5UF+-10% 20VDC TP	56289	1500155X9020A2
A1A5A1C3	0160 3879	15	CAPACITOR-FXO .01UF +-20% 100WVDC CER	28480	0160-3875
A1A5A1C4	0160-3879		CAPACITOR FXO .01UF + 20% 100WVDC CER	28480	0160 3075
A1A5A1L1	9100-1620	4	COIL FXO MOLDED RF CHOKE 15UH 102	24226	15/151
A1A5A1L2	9100-1620		COIL FXO MOLDED RF CHOKE 15UH 10%	24226	15/152
A1A5A1L3	9100-2272	5	COIL FXO MOLOFO RF CHOKE 47UH 102	24226	10/472
A1A5A1L4	9100-2272		COIL FXD MOLDED RF CHOKE 47UH 10%	24226	101472
A2	05340-60027	1	PREAMPLIFIER ASSEMBLY #2	28480	05340 60027
	05340 00012		SHIELD, DMPIFIER	28480	05340-00012
	05340-00017		COVER, PREAMPLIFIER	28480	05340-00017
	05340 00018		PLATE, SAMPLER	28480	05340 00018
	05340-20035	1	HOUSING, PREAMPLIFIER #2	28480	C5340-20035
A2C1	0160 0204		CAPACITOR-FXD 5500PF200WVDC CLR	01121	SMFB-A2
A2C2	G16P-0204		CAPACITOR-FXO 5500PF200WVDC CER	01121	SMFB-A2
A2C3	0160 0204		CAPACITOR-FXC 5500PF200WVDC CER	01121	SHFR A2
A2FL1	5088-7006	1	FILTER:450 MHZ	28480	5088-7006
A2A1*	5088 7004		THIN FILM SAMPLER ASSEMBLY *PART OF A2, NOT SEPARATELY REPLACEABLE	28480	5088 7004
A2A2*	5088-7005		SAMPLER ORIVF ASSEMBLY *PART OF A2, NOT SEPARATELY REPLACEABLE	28480	5088 7005
A2A3*	05340-60043	1	SAMPLER OUTPUT BOARD ASSEMBLY (LOADED ON 05340 20043 BLANK BOARD) *PART OF A21 NOT SEPARATELY REPLACEABLE	28480	C5340-60043
A2A3C1	0160-3277		CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160 3277
A2A3C2	0160-3277		CAPACITOR-FXC .01UF +-20% 50WVDC CER	28480	0160-3277
A2A3R1	0683-4745	10	RESISTOR 470K 5% .25W FC TC= 800/+900 (THIS CHANGE WAS MADE ON INSTRUMENTS WITH SERIAL NO. 1440A02474 & UP).	01121	C64745
A2A4	05340-60040	1	PREAMPLIFIER BOARD ASSEMBLY (SERIES 1532A) (LOADED ON 05340-20040 BLANK BOARD)	28480	05340- 60045
A2A4C1	0121-0060	1	CAPACITOR- V TRMP-CER 2/8PF 350V PC-MTG	00865	304322 2/8PF NP0
A2A4C2	0180-1743	6	CAPACITOR-FXD: .1UF+-10% 35VDC TA-SOLID	56289	1500104X9035A2
A2A4C3	0140 0201	1	CAPACITOR-FXC 12PF +-5% 500WVDC MICA	72136	DM15C120J0500WV1CR
A2A4C4	0180-0197		CAPACITOR FXD: 2.2UF+ 10% 20VDC TA	56289	1500225X9020A2
A2A4C5	0160-2327	2	CAPACITOR FXO 1000PF + 20% 100WVDC CER	28480	0160 2327
A2A4C6	0160-2262	2	CAPACITOR-FXD 16PF + 5% 500WVDC CER	28480	0160- 2262
A2A4C7	0160 2262		CAPACITOR FXO 16PF + 5% 500WVDC CER	28480	0160 2262
A2A4C8	0160-3277		CAPACITOR FXD .01UF + 20% 50WVDC CER	28480	0160 3271
A2A4C9	0160-3277		CAPACITOR FXO .01UF + 20% 50WVDC CER	28480	0160 3277
A2A4C10	0180-0197		CAPACITOR. FXO: 2.2UF+ 10% 20VDC TA	56289	1500225X9020A2
A2A4C11	0160-3277		CAPACITOR FXO .01UF + 20% 50WVDC CER	28480	0160 3277
A2A4C12	0160-3277		CAPACITOR FXD .01UF + 20% 50WVDC CER	28480	0160 3277
A2A4C13	0160-3277		CAPACITOR-FXO .01UF + 20% 50WVDC CER	28480	0160 3271
A2A4C14	0160-2241	1	CAPACITOR FXO 2.2PF + .25PF 500WVDC CFC	28480	0160 2241
A2A4C15	0180-0197		CAPACITOR-FXD: 2.2UF+-10% 20VDC TA	56289	1500225X9020A2

See introduction to this section for ordering information

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2A4C16 A2A4C17 A2A4C18 A2A4C19 A2A4C20	0160-3277 0163-3277 0160-3277 0160-3272 0140-0195	2	CAPACITOR-FXD .01UF +-20% 51 UVCC OFF CAPACITOR-FXC .01UF + 20% 50WVDC CER CAPACITOR FXD .01UF + 20% 50WVDC CER CAPACITOR FXD .01UF + 20% 50WVDC CER CAPACITOR FXD 130PF 300WVDC MICA	28480 28480 28480 28480 28480	0160-3277 0160 3277 0160 3277 0160 3277 0140-0195
A2A4C21 A2A4C22	0160-2198 0140-0193	1	CAPACITOR FXD 20PF +5% 300WVDC MICA CAPACITOR FXD 82PF +5% 300WVDC MICA	20480 72136	0160-2198 DM15E820J0300WV1CR
A2A4L1* A2A4L2 A2A4L3 A2A4L4 A2A4L5	9140-0143 9100-2265 9140-0142 9100-2265 9100-2257	1 1 1 2	COIL FXD MOLDED RF CHOKE 3.3UH 10% COIL FXD MOLDED RF CHOKE 10UH 10% COIL FXD MOLDED RF CHOKE 2.2UH 10% COIL FXD MOLDED RF CHOKE 10UH 10% COIL FXD MOLDED RF CHOKE .82UH 10%	24226 24226 24226 24226 24226	101331 101102 101221 101102 101820
A2A4L6 A2A4L7 A2A4L8 A2A4L9 A2A4L10	9100-2256 9100-2265 9100-2256 9140-0158 9100-2256	23	COIL FXD MOLDED RF CHOKE .56UH 10% COIL FXD MOLDED RF CHOKE 10UH 10% COIL FXD MOLDED RF CHOKE .56UH 10% COIL FXD MOLDED RF CHOKE 3.3UH 10% COIL FXD MOLDED RF CHOKE .56UH 10%	24226 24226 13019 28480 13019	101560 101102 09-4426-3K 9140-0158 09-4426-3K
A2A4Q1 A2A4Q2	1855-0081 1053-0015	1 1	TRANSISTOR J FET 215245 N CHAN 0 MODE S1 TRANSISTOR PNP Si PD=200MHZ FT=500MHZ	01255 28480	2N5245 1853-0015
A2A4R1 A2A4R2 A2A4R3 A2A4R4 A2A4R5	0757-0384 0757-0920 0757-0921 0757-0382 0757-0917	13 3 1 1 4	RESISTOR 20 12 .125W F TC=0+ 100 RESISTOR 680 22 .125W F TC=0+ 100 RESISTOR 750 22 .125W F TC=0+ 100 RESISTOR 16.2 1% .125W F TC=0+ 100 RESISTOR 510 2% .125W F TC=0+ 100	19701 24546 24546 19701 24546	MF4C1/8 TO 20R0 F C4-1/8-TO-581-G C4 1/8 TO 751 G MF4C1/8 TO 16R2 F C4 1/8 TO 511 G
A2A4R6 A2A4R7 A2A4R8 A2A4R9 A2A4R10	0757 0917 0757-0917 0757-0948 0757-0384 0757-0941	20	RESISTOR 510 2% .125W F TC=0+ 100 RESISTOR 510 2% .125W F TC=0+ 100 RESISTOR 10K 21 .125W F TC=0+ 100 RESISTOR 20 12 .125W F TC=0+ 100 RESISTOR 5.1K 21 .125W F TC=0+ 100	24546 24546 24546 19701 24546	C4 118 TO 511 G C4 118 TO 511 G C4 1/8 TO 1002 G MF4C1/8 TO 20R0 F C4 118 TO 5101 G
A2A4R11 A2A4R12 A2A4R13 A2A4R14 A2A4R15	0757 0915 0757-0384 0757-0915 0757-0908 0757-0904	8 1 4 1	RESISTOR 430 22 .125W F TC=0+ 100 RESISTOR 20 11 .125W F TC=0+ 100 RESISTOR 430 2% .125W F TC=0+ 100 RESISTOR 220 22 .125W F TC=0+ 130 RESISTOR 150 21 .125W F TC=0+ 100	24546 19701 24546 24546 24546	C4-118 TO 431 G MF4C1/8 TO 20R0 F C4 1/8 TO 431 G C4 1/8 TO 221 G C4 118 TO 151 G
A2A4R16 A2A4R17 A2A4R18 A2A4R19 A2A4R20	0757 0908 0757-0948 0757-0941 0757-0915 0757-0384	20	RESISTOR 220 21 .125W F TC=0+ 100 RESISTOR 10K 21 .125W F TC=0+ 100 RESISTOR 5.1K 21 .125W F TC=0+ 100 RESISTOR 430 22 .125W F TC=0+ 100 RESISTOR 20 1% .125W F TC=0+ 100	24546 24546 24546 24546 19701	C4 1/8 TO 221 G C4 1/8 TO 1002 G C4 1/8 TO 5101 G C4 1/8 TO 431 G MF4C1/8 TO 20R0 F
A2A4R21 A2A4R22	0757 0907 0757-0384	20	RESISTOR 200 21 .125W F TC=0+ 100 RESISTOR 20 1% .125W F TC=0+ 100	24546 19701	C4 118 TO 201 G MF4C1/8 TO 20R0 F
A2A4U1	1858 0004		IC CA3049 AMPL	02735	CA3049
A2A5	05340-60078 05340 20074 05340-00031	1 1	FILTER ASSEMBLY, #2 HOUSING, FILTER COVER, HOUSING	28480 28480 28480	05340-60.78 05340-20074 05340-00031
A2A5A1	05340 60076	1	BOARD, FILTER ASSEMBLY, #2 (SERIES1344A) (LOADED ON 05340-20076 BLANK BOARD)	28480	05340 60076
A2A5A1C1 A2A5A1C2 A2A5A1C3 A2A5A1C4	0180-1745 0180-1745 0160-3879 0160-3879		CAPACITOR FXD: 1.5UF+ 10% 20VDC TA CAPACITOR-FXD: 1.5UF+ 10% 20VDC TA CAPACITOR FXD .01UF + 20% 100WVDC CER CAPACITOR FXD .01UF + 20% 100WVDC CER	56289 56289 28480 28480	1500155X9020A2 1500155X9020A2 0160 3879 0160 3879
A2A5A1L1 A2A5A1L2 A2A5A1L3 A2A5A1L4	9100-1620 9100-1620 9100-2272 9100-2272		COIL FXD MOLDED RF CHOKE 15UH 10% COIL-FXD MOLDED RF CHOKE 15UH 10% COIL FXD MOLDED RF CHOKE 47UH 10% COIL FXD MOLDED RF CHOKE 47UH 10%	24226 24226 24226 24226	151152 151152 101472 101472
A3	05340-60001	1	HI-Z INPUT ACPLIFIER ASSEMBLY (SERIES 1348A) (LOADED ON 05340-20001 BLANK BOARD)	28480	05340 60001
A3C1 A3C2 A3C3 A3C4 A3C5	0180 0106 0180-0374 0180-0106 0170-0022 0180-0374	21 20 2	CAPACITOR FXD: 60UF+-20% 6VDC TA SOLID CAPACITOR-FXD: 10UF+ 10% 20VDC TA SOLID CAPACITOR FXD: 60UF+ 20% 6VDC TA SOLID CAPACITOR FXD .1UF + 20% 600WVDC PDLYF CAPACITOR-FXD: 10UF+-10% 20VDC TA SOLID	56289 56289 56289 28480 56289	1500606X0006B2 1500106X9020B2 1500606X0006B2 0170-0022 1500106X9020B2
A3C6 A3C7 A3C8 A3C9 A3C10	0160-0179 0160-3277 0160-3277 0160-3277 0140-0196	1 1 1	CAPACITOR-FXD 33PF + 5% 300WVDC MICA CAPACITOR-FXD .01UF + 20% 50WVDC CER CAPACITOR-FXD .01UF + 20% 50WVDC CER CAPACITOR-FXD .01UF + 20% 50WVDC CER CAPACITOR-FXD 150PF + 5% 300WVDC MICA	28580 28480 28480 28480 72136	0160 0179 0160-3277 0160-3277 0160 3277 DM15F151J0300WV1CR
A3C11 A3C12 A3C13 A3C14 A3C15	0160-3277 0160-3277 0160-3277 0160-2327 0180-0197		CAPACITOR-FXD .01UF + 20% 50WVDC CER CAPACITOR-FXD .01UF + 20% 50WVDC CER CAPACITOR-FXD .01UF + 20% 50WVDC CER CAPACITOR-FXD 1000PF + 20% 100WVDC CER CAPACITOR-FXD: 2.2UF+ 10% 20VDC TA	28480 28480 28480 28480 56289	0160-3277 0160-3277 0160-3277 0160-2327 1500225X9020A2

*FACTORY SELECTED VALUE

See introduction to this section for ordering information

Model 5340A
Replaceable Parts

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3C16 A3C17 A3C18	0180-0197 0180-0116 0180-0116	3	CAPACITOR-FXD; 2.2UF+ 10% 20VDC TA CAPACITOR-FXD; 6.8UF+ 10% 35VDC TA CAPACITOR-FXD; 6.8UF+ 10% 35VDC TA	56289 56289 56289	150D225X9020A2 150D685X9035B2 1500685K9035B2
A3CR1 A3CR2 A3CR3 A3CR4 A3CR5	1901-0040 1901-0040 1901-0040 1901-0040 1901-0376	36 2	DIODE-SWITCHING 30V 50NA 2NS DO-35 DIODE-SWITCHING 30V 50NA 2NS DO-35 DIODE-SWITCHING 30V 50NA 2NS DO-35 DIODE-SWITCHING 30V 50NA 2NS DO-35 DIODE-GEN PRP 35V 50NA 00-7	28480 28480 28480 28400 28480	1901-0040 1901-0040 1901-0040 1901-0040 1901-0376
A3CR6 A3CR7 A3CR8 A3CR9 A3CR10	1901-0376 1902-0025 1902-0025 1901-0535 1901-0535	10 7	DIODE-GEN PRP 35V 50NA DO-7 DIODE-ZNR 10V 5% DO-7 PD=.4W TC=+.06% DIODE-ZNR 10V 5% DO-7 PD=.4W TC=+.06% DIODE-SCHOTTKY DIODE-SCHOTTKY	28480 04713 04713 28480 28480	1901-0376 SZ 10939-182 SZ 10939-182 1901-0535 1901-0535
A3E1 A3E2	9170-ti029 9170-0029	4	CORE-SHIELDING BEAD CORE-SHIELDING BEAD	02114 02114	56-590-65A2/4A 56-590-65A2/4A
A3L1 A3L2 A3L3 A3L4	9140-0114 9140-0114 9140-0114 9140-0114	4	COIL-FXO MOLDED RF CHOKE 10UH 10% COIL-ZXO MOLDED RF CHOKE 10UH 10% COIL-FXO MOLEO RF CHOKE 10UH 101 COIL-FXO MOLDED RF CHOKE 10UH 10%	24226 24226 24226 24226	15/102 151102 151102 151102
A3Q1 A3Q2 A3Q3	1855-0334 1853-0036 1854-0215	2 6 10	TSTR:SI FET DUAL N-CHANNEL TRANSISTOR PNP SIL PD=310MW FT=2507HZ TRANSISTOR NPN SI PD=350MW FT=300MHZ	17856 04713 04713	DN377 SPS-3612 SPS-3611
A3R1 A3R2 A3R3 A3R4 A3R5	0683-1035 0757-0908 0683-1055 0751-0920 0757-0920	3 3 3 3 3	RESISTOR 10K 52 .25W FC TC=-400/+700 RESISTOR 220 2% .125W F TC=0+ 100 RESISTOR 1M 5% .25W FC TC=-800/+900 RESISTOR 680 2% .125W F TC=0+ 100 RESISTOR 680 2% .125W F TC=0+ 100	01121 24546 01121 24546 24546	CR1035 C4-118-T0-221-G CR1055 C4-1/8-T0-681-G C4-1/8-T0-681-G
A3R6 A3R7 A3R8 A3R9 A3R10	0683-1015 0757-0908 0698-3446 0757-0913 2100-2520	7 3 3 1 1	RESISTOR 100 51 .25W FC TC=-400/+500 RESISTOR 220 21 .125W F TC=0+ 100 RESISTOR 383 11 .125W F TC=0+ 100 RESISTOR 360 21 .125W F TC=0+ 100 RESISTOR-TWRW 50 20% C SIDE-ADJ 1 TURN	01121 24546 16299 24546 30983	CR1015 C4-118-T0-221-G C4-1/8-T0-383R-F C4-118-T0-361-G ET50X500
A3R11 A3R12 A3R13 A3R14 A3R15	0757-0932 0683-1025 0683-5105 0157-0917 0757-0925	3 8 9 1 1	RESISTOR 2.2K 21 .125W F TC=0+ 100 RESISTOR 1K 5% .25W FC TC=-400/+600 RESISTOR 51 51 .25W FC TC=-400/+500 RESISTOR 510 2% .125W F TC=0+ 100 RESISTOR 1.1K 21 .125W F TC=0+ 100	24546 01121 01121 24546 24546	C4-1/8-T0-2201-G CR1025 CR5105 C4-1/8-T0-511-G C4-1/8-T0-1101-G
A3R16 A3R17 A3R18 A3R19 A3R20	0683-6815 0683-3945 0683-3945 0683-1135 0683-3345	2 2 2 2 3	RESISTOR 680 52 .25W FC TC=-400/+600 RESISTOR 390K 5% .25W FE TC=-800/+900 RESISTOR 390K 5% .25W FC TC=-800/+900 RESISTOR 11K 51 .25W FC TC=-400/+800 RESISTOR 330K 51 .25W FC TC=-800/+900	01121 01121 01121 01121 01121	CR6815 CR3945 CR3945 CR1135 CR3345
A3R21 A3R22 A3R23 A3R24	0683-3345 0683-1135 0757-0944	2	RESISTOR 330K 5% .25W FC TC=-800/+900 NOT ASSIGNED RESISTOR 11K 5% .25W FC TC=-400/+800 RESISTOR 6.8K 21 .125W F TC=0+ 100	01121 24546	CR1135 C4-1/8-T0-6801-G
A3U1 A3XU1	1820-0754 1200-0475	2 7	I C AMPL CONNECTOR;1-CONT SKT .016 OIA	28480 22526	1820-0754 75060-005
A4	05340-60002	1	PHASE/QUAD DETECTOR ASSEMBLY (SERIES 1532A) (LOADED ON 05340-20002 BLANK BOARD)	28480	05340-60002
A4C1 A4C2 A4C3 A4C4 A4C5	0150-0093 0150-0093 0150-0093 0150-0093 0160-2255	6 1	CAPACITOR-FXD .01UF +80-20% 100WVDC CER CAPACITOR-FXD .01UF +80-20% 100WVDC CER CAPACITOR-FXD .01UF +80-20% 100WVDC CER CAPACITOR-FXD .01UF +80-20% 100WVDC CER CAPACITOR-FXD 8.2PF +- .25PF 500WVDC CER	28480 28480 28480 28480 28480	0150-0093 0150-0093 0150-0093 0150-0093 0160-2255
A4C6 A4C7 A4C8 A4C9 A4C10	0150-0093 0140-0191 0160-2307 0150-0093 0160-2307	3 4	CAPACITOR-FXD .01UF +80-20% 100WVDC CER CAPACITOR-FXD 56PF +-5% 300WVDC MICA CAPACITOR-FXD 47PF +-5% 300WVDC MICA CAPACITOR-FXD .01UF +80-20% 100WVDC CER CAPACITOR-FXD 47PF +-5% 300WVDC MICA	28480 72136 28480 28480 28480	0150-0093 DM15E560J0300WV1CR 0160-2307 0150-0093 0160-2307
A4C11 A4C12 A4C13 A4C14 A4C15	0160-2199 0140-0176 0140-0145 0160-2307 0160-0155	1 4 1 2	CAPACITOR-FXD 30PF +-51 300WVDC MICA CAPACITOR-FXD 100PF +-2% 300WVDC MICA CAPACITOR-FXD 22PF +-5% 500WVDC MICA CAPACITOR-FXD 47PF +-5% 300WVDC MICA CAPACITOR-FXD 3300PF +-10% 200WVDC POLYE	28400 72136 72136 28480 56289	0160-2199 DM15F101G0300WV1CR DM15C220J0500WV1CR 0160-2307 292P33292
A4C16	0160-2307		CAPACITOR-FXD 47PF +-51 300WVDC MICA	28480	0160-2307
A4CR1 A4CR2 A4CR3 A4CR4 A4UR5	1901-0179 1901-0179 1901-0179 1901-0179 1901-0022	8 2	DIODE-SWITCHING 15V 50NA 750PS DO-7 DIODE-SWITCHING 15V 50NA 750PS DO-7 DIODE-SWITCHING 15V 50NA 750PS DO-7 DIODE-SWITCHING 15V 50NA 750PS DO-7 DIODE-STABISOR 10V 250NA	28480 28480 28480 28480 28480	1901-0179 1901-0179 1901-0179 1901-0179 1901-0022

See introduction to this section for ordering information

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A4CR6	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A4CR7	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A4CR8	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A4CR9	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A4CR10	1901-0022		DIODE-STABISITOR 10V 250NA	28480	1901-0022
A4L 1	9140-0106	1	COIL-FXD MOLDED RF CHOKE 8.2UH 10%	24226	151821
A4L 2	9100-2257		COIL-FXD MOLDED RF CHOKE .82UH 10%	24226	101820
A4L 3	9140-0098	1	COIL-FXD MOLDED RF CHOKE 2.2UH 10%	24226	151221
A4L 4	9100-2260	1	COIL-FXD MOLDED RF CHOKE 1.8UH 10%	76493	9230-26
A491	1854-0071	27	TRANSISTOR NPN SI PD=300MHZ FT=200MHZ	28480	1854-0071
A402	1854-0071		TRANSISTOR NPN SI PD=300MHZ FT=200MHZ	28480	1854-0071
A4Q3	1854-0071		TRANSISTOR NPN SI PD=300MHZ FT=200MHZ	28480	1854-0071
A494	1854-0073	8	TRANSISTOR NPN SI TO-72 PD=200MHZ	28480	1854-0073
A405	1854-0073		TRANSISTOR NPN SI TO-72 PD=200MHZ	28480	1854-0073
A4Q6	1854-0073		TRANSISTOR NPN SI TO-72 PD=200MHZ	28480	1854-0073
A4R 1	0698-3440	4	RESISTOR 196 1% .125W F TC=0+-100	16299	C4-1/8-T0-196R-F
A4R 2	0698-3440		RESISTOR 196 1% .125W F TC=0+-100	16299	C4-1/8-T0-196R-F
A4R 3	0698-3155	4	RESISTOR 4.64K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4641-F
A4R 4	0757-0438	4	RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A4R 5	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A4R 6	0757-0401	1	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101 F
A4R 7	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101 F
A4R 8	0698-0083	2	RESISTOR 1.96K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1961-F
A4R 9	0698-3443	2	RESISTOR 287 1% .125W F TC=0+-100	16299	C4-1/8-T0-287R-F
A4R 10	0757-0924	18	RESISTOR 1K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1001-G
A4R 11	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1961-F
A4R 12	0698-3443		RESISTOR 287 1% .125W F TC=0+-100	16299	C4-1/8-T0-287R-F
A4R 13	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101 F
A4R 14	0757-0421	2	RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A4R 15	0698-3154	4	RESISTOR 4.22K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4221-F
A4R 16	0698-3154		RESISTOR 4.22K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4221-F
A4R 17	0757-0416	5	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A4R 18	0757-0199	3	RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A4R 19	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1001-G
A4R 20	0757-0199		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A4R 21	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101 F
A4R 22	0757-0930		RESISTOR 1.8K 2% .125W F TC=0+-100	28480	0757-0930
A4R 23	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1001-G
A4R 24	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101 F
A4R 25	0698-3439	3	RESISTOR 178 1% .125W F TC=0+-100	16299	C4-1/8-T0-178R-F
A4R 26	0698-3154		RESISTOR 4.22K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4221-F
A4R 27	0698-3154		RESISTOR 4.22K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4221-F
A4R 28	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A4R 29	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A4R 30	0698-3437	1	RESISTOR 133 1% .125W F TC=0+-100	16299	C4-1/8-T0-133R-F
A4R 31	0698-3157	1	RESISTOR 19.6K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1962-F
A5	05340-60003	1	SEARCH ASSEMBLY (SERIES 1220A) (LOADED ON 05340-20003 BLANK BOARD)	28480	05340-60003
A5C1	0180-0228	7	CAPACITOR-FXD; 22UF+-10% 15VDC TA- SOLID	56289	1500226X901582
A5C2	0180-0228		CAPACITOR-FXD; 22UF+-10% 15VDC TA- SOLID	56289	1500226X901582
A5C3	0180-0228		CAPACITOR-FXD; 22UF+-10% 15VDC TA- SOLID	56289	1500226X901582
A5C4	0160-3277		CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160-3277
A5C5	0160-3277		CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160-3277
A5C6	0160-3277		CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160-3277
A5C7	0180-0376	1	CAPACITOR-FXD .47UF+-10% 35VDC TA	56289	1500474X9035A2
A5C8	0160-3060	14	CAPACITOR-FXD .1UF +-20% 25WVDC CER	28480	0160-3060
A5CR1	1902-0041	2	DIODE-ZNR 5.11V 5% DO-7 PD=.4W TC=-.009%	04713	SZ 10939-98
A5CR2	1902-0041		DIODE-ZNR 5.11V 5% DO-7 PD=.4W TC=-.009%	04713	SZ 10939-98
A5CR3	1901-0025	8	OIWP CEN PRP 100V ZOONA W-7	28480	1901-0025
A5CR4	1901-0025		DIODE-GEN PRP 100V ZOONA DO-7	28480	1901-0025
A5CR5	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0043
A5L 1	9140-0137	7	COIL-FXD MOLDED RF CHOKE 1MH 5%	24226	19104
A5L 2	9140-0137		COIL-FXD MOLDED RF CHOKE 1MH 5%	24226	191104
A5L 3	9140-0137		COIL-FXD MOLDED RF CHOKE 1MH 5%	24226	19104
A591	1855-0052	1	TRANSISTOR MOSFET P-CHAN D-MODE TO-92 SI	07263	2N4360
A5Q2	1854-0215		TRANSISTOR NPN SI PD=350MHZ FT=300MHZ	04713	SPS 3611
A5Q3	1854-0215		TRANSISTOR NPN SI PD=350MHZ FT=300MHZ	04713	SPS 3611
A5R1	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1002-G
A5R2	0757-0902	2	RESISTOR 120 2% .125W F TC=0+-100	24546	C4-1/8-T0-121-G
A5R3	0757-0902		RESISTOR 120 2% .125W F TC=0+-100	24546	C4-1/8-T0-121-G
A5R4	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1002-G
A5R5	0757-0941		RESISTOR 5.1K 2% .125W F TC=0+-100	24546	C4-1/8-T0-5101-G

*FACTORY SELECTED VALUE

See introduction to this section for ordering information

**Model 5340A
Replaceable Parts**

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A5R6 A5R7 A5R8 A5R9 A5R10	0757-0941 0757-0948 0757-0927 0757-0931 0757-0931	24	RESISTOR 5.1K 2% .125W F TC=0+-100 RESISTOR 10K 2% .125W F TC=0+-100 RESISTOR 1.3K 2% .125W F TC=0+-100 RESISTOR 2K 2% .125W F TC=0+-100 RESISTOR 2K 2% .125W F TC=0+-100	24546 24546 24546 24546 24546	C4-118-TO-5101-G C4-1/8-TO-1002-G C4-1/8-TO-1301-G C4-118-TO-2001-G C4-1/8-TO-2001-G
A5R11 A5R12 A5R13 A5R14 A5R15	0757-0940 0757-0465 0757-0966 0757-0465 2100-2514	3 4 1 2 1	RESISTOR 4.7K 22 .125W F TC=0+-100 RESISTOR 100K 1% .125W F TC=0+-100 RESISTOR 56K 2% .125W F TC=0+-100 RESISTOR 100K 1% .125W F TC=0+-100 RESISTOR-TRMR 20K 10% C SIDE-ADJ 1-TURN	24546 24546 24546 24546 30983	C4-1/8-TO-4701-G C4-1/8-TO-1003-F C4-118-TO-5602-G C4-1/8-TO-1003-F ET50W203
A5R16 A5R17 A5R18 A5R19 A5R20	0757-0950 0757-0948 0757-0465 0757-0924 0757-0465	2	RESISTOR 12K 2% .125W F TC=0+-100 RESISTOR 10K 2% .125W F TC=0+-100 RESISTOR 100K 1% .125W F TC=0+-100 RESISTOR 1K 2% .125W F TC=0+-100 RESISTOR 100K 1% .125W F TC=0+-100	24546 24546 24546 24546 24546	C4-1/8-TO-1202-G C4-1/8-TO-1002-G C4-1/8-TO-1003-F C4-1/8-TO-1001-G C4-118-TO-1003-F
A5U1 A5U2 A5U3 A5U4 A5U5	1826-0073 1826-0073 1826-0073 1826-0073 1820-0537	9 2	IC: LINEAR IC: LINEAR IC: LINEAR IC: LINEAR IC SN74 13 N SCHMITT	28480 28480 28480 28480 01295	1826-0073 1826-0073 1826-0073 1826-0073 SN7413N
A6	05340-60004	1	SEARCH PROGRAMMER ASSEMBLY (SERIES 1344A) (LOADED ON 05340-20004 BLANK BOARD)	28480	05340-60004
A6C1 A6C2 A6C3 A6C4 A6C5	0180-0291 0180-1743 0180-1743 0180-1743 0180-0197	2	CAPACITOR-FXO; 1UF+-10% 35VDC TA-SOLID CAPACITOR-FXO; .1UF+-10% 35VDC TA-SOLID CAPACITOR-FXO; .1UF+-10% 35VDC TA-SOLID CAPACITOR-FXO; .1UF+-10% 35VDC TA-SOLID CAPACITOR-FXO; 2.2UF+-10% 20VDC TA	56289 56289 56289 56289 56289	150D105X9035A2 150D104X9035A2 150D104X9035A2 150D104X9035A2 150D225X9020A2
A6C6 A6C7 A6C8 A6C9 A6C10	0180-0197 0180-0197 0180-0197 0180-0197 0180-0197		CAPACITOR-FXO; 2.2UF+-10% ZOVOC TA CAPACITOR-FXD; 2.2UF+-10% ZOVOC TA CAPACITOR-FXO; 2.2UF+-10% ZOVOC TA CAPACITOR-FXO; 2.2UF+-10% ZOVOC TA CAPACITOR-FXO; 2.2UF+-10% ZOVOC TA	56289 56289 56289 56289 56289	150D225X9020A2 150D225X9020A2 150D225X9020A2 150D225X9020A2 150D225X9020A2
A6CR1 A6CR2 A6CR3 A6CR4 A6CR5	1901-0040 1901-0040 1901-0040 1901-0040 1901-0040		DIODE-SWITCHING 30V 50NA 2NS 00-35 OIWE-SWITCHING 30V 50NA 2NS 00-35 DIODE-SWITCHING 30V 50NA 2NS 00-35 OIOE-SWITCHING 30V 50NA 2NS 00-35 OIOE-SWITCHING 30V 50NA 2NS 00-35	28480 28480 28480 28480 28480	1901-0040 1901-0040 1901-0040 1901-0040 1901-0040
A6CR6 A6CR7 A6CR8 A6CR9 A6CR10	1901-0040 1901-0040 1901-0040 1901-0040 1901-0040		OIOE-SWITCHING 30V 50NA 2NS 00-35 DIODE-SWITCHING 30V 50NA 2NS 00-35 DIODE-SWITCHING 30V 50NA 2NS 00-35 DIODE-SWITCHING 30V 50NA 2NS 00-35 DIODE-SWITCHING 30V 50NA 2NS 00-35	28480 28480 28480 28480 28480	1901-0040 1901-0040 1901-0040 1901-0040 1901-0040
A6CR11 A6CR12 A6CR13 A6CR14 A6CR15	1901-0040 1901-0040 1902-0025 1902-0025 1902-0025		DIODE-SWITCHING 30V 50NA 2NS 00-35 DIODE-SWITCHING 30V 50NA 2NS 00-35 OIOE-ZNR 10V 51 00-7 PD=.4W TC=+.06% OIOE-ZNR 10V 51 00-7 PD=.4W TC=+.06% OIOE-ZNR 10V 5% 00-7 PD=.4W TC=+.06%	28480 28480 04713 04713 04713	1901-0040 1901-0040 SZ 10939-182 SZ 10939-182 SZ 10939-182
A6CR16 A6CR17 A6CR18 A6CR19	1902-0025 1902-0025 1902-0025 1901-0040		OIOE-ZNR 10V 51 00-7 PD=.4W TC=+.06% DIODE-ZNR 10V 5% 00-7 PD=.4W TC=+.06% OIOE-ZNR 10V 52 00-7 PD=.4W TC=+.06% OIOE-SWITCHING 30V 50NA 2NS 00-35	04713 04713 04713 28480	SZ 10939-182 SZ 10939-182 SZ 10939-182 1901-0040
A6L1	9140-0210	3	COIL-FXD MOLDED RF CHOKE 100UH 5%	24226	151103
A691 A692 A693 A694 A695	1855-0020 1855-0020 1855-0020 1855-0020 1855-0020	12	TRANSISTOR CFET N-CHAN D-MODE TO-18 SI TRANSISTOR J-FET N-CHAN 0-MODE TO-18 SI TRANSISTOR J-FET N-CHAN 0-MODE TO-18 SI TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI TRANSISTOR J-FET N-CHAN 0-MODE TO-18 SI	28480 28480 28480 28480 28480	1855-0020 1855-0020 1855-0020 1855-0020 1855-0020
A696 A697 A698 A699 A6910	1855-0020 1855-0020 1855-0020 1855-0020 1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI TRANSISTOR J-FET N-CHAN 0-MODE TO-18 SI TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI TRANSISTOR J-FET N-CHAN 0-MODE TO-18 SI TRANSISTOR J-FET N-CHAN 0-MODE TO-18 SI	28480 28480 28480 28480 28480	1855-0020 1855-0020 1855-0020 1855-0020 1855-0020
A6Q11 A6912	1855-0020 1855-0020		TRANSISTOR CFET N-CHAN D-MODE TO-18 SI TRANSISTOR J-FET N-CHAN 0-MODE TO-18 SI	28480 28480	1855-0020 1855-0020
A6R1 A6R2 A6R3 A6R4 A6R5	0698-34M 0698-3444 0757-0955 0698-7185 0757-0907	2 3 12	RESISTOR 316 1% .125W F TC=0+-100 RESISTOR 316 1% .125W F TC=0+-100 RESISTOR 20K 2% .125W F TC=0+-100 RESISTOR 220K 5% .125W CC TC=0+1176 RESISTOR 200 2% .125W F TC=0+-100	16299 16299 24546 01121 24546	C4-1/8-TO-316R-F C4-118-TO-316R-F C4-1/8-TO-2002-G 882245 C4-1/8-TO-201-6
A6R6 A6R7 A6R8 A6R9 A6R10	0698-7185 0757-0916 0698-7185 0757-0924 0698-7185	5	RESISTOR 220K 5% .125W CC TC=0+1176 RESISTOR 470 21 .125W F TC=0+-100 RESISTOR 220K 5% .125W CC TC=0+1176 RESISTOR 1K 21 .125W F TC=0+-100 RESISTOR 220K 5% .125W C TC=0+1176	01121 24546 01121 24546 01121	882245 C4-118-TO-471-G 882245 C4-1/8-TO-1001-G 882245

See introduction to this section for ordering information

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A6R11 A6R12 A6R13	0757-0931 0698-7185 0757-0935	1	RESISTOR 2K 21 .125W F TC=0+-100 RESISTOR 220K 51 .125W CC TC=0+1176 RESISTW 3K 2% .125W F TC=0+-100 FACTORY SELECTED PART	24546 01121 24546	C4-1/8-T0-2001-G 082245 C4-1/8-T0-3001-6
A6R14	06987185		RESISTOR 220K 51 .125W CC TC=0+1176	01121	002245
A6R15	0757-0942	1	RESISTOR 5.6K 2% .125W F TC=0+-100 FACTORY SELECTED PART	24546	C4-1/8-T0-5601-G
A6R16 A6R17 A6R18	0698-3376 0698-3376 0698-3376	6	RESISTOR 43 51 .125W CC TC=0+588 RESISTOR 43 51 .125W CC TC=0+588 RESISTOR 43 51 .125W CC TC=0+588	01121 01121 01121	884305 884305 884305
A6R19 A6R20 A6R21 A6R22 A6R23	0698-3376 0698-3376 0698-3376 0698-8072 0698-5182	1	RESISTOR 43 51 .125W CC TC=0+588 RESISTOR 43 51 .125W CC TC=0+588 RESISTOR 43 51 .125W CC TC=0+588 RESISTOR 39K 51 .125W CC TC=0+-850 RESISTOR 3.9K 51 .125W CC TC=0+882	01121 01121 01121 01121 01121	884305 884305 884305 883935 683925
A6R24 A6R25 A6R26 A6R27 A6R28	0698-6242 0698-5996 0698-5175 0698-5174 0698-7185	1 1	RESISTOR 1.2K 51 .125W CC TC=0+882 RESISTOR 560 5% .125W CC TC=0+882 RESISTOR 360 5% .125W CC TC=0+882 RESISTOR 200 51 .125W CC TC=0+882 RESISTOR 220K 5% .125W CC TC=0+1176	01121 01121 01121 01121 01121	881225 885615 883615 882015 882245
A6R29 A6R30 A6R31 A6R32 A6R33	0698-7185 0698-7185 0698-7185 0698-7185 0696-7185		RESISTOR 220K 51 .125W CC TC=0+1176 RESISTOR 220K 51 .125W CC TC=0+1176 RESISTOR 220K 51 .125W CC TC=0+1176 RESISTOR 220K 51 .125W CC TC=0+1176 RESISTOR 220K 51 .125W CC TC=0+1176	01121 01121 01121 01121 01121	882245 882245 882245 882245 862245
A6R34 A6R35 A6R36 A6R37 A6R38	0698-6294 0698-6294 0698-6294 0698-6294 0698-6294	6	RESISTOR 47K 5f .125W CC TC=0+882 RESISTOR 47K 52 .125W CC TC=0+882 RESISTOR 47K 51 .125W CC TC=0+882 RESISTOR 47K 51 .125W CC TC=0+882 RESISTOR 47K 52 .125W CC TC=0+882	01121 01121 01121 01121 01121	864735 864735 884735 884735 884735
A6R39 A6R40 A6R41 A6R42 A6R43	0698-6294 0698-5999 0698-5999 0698-5999 0698-5999	6	RESISTW 47K 52 .125W CC TC=0+882 RESISTOR 4.7K 5% .125W CC TC=0+882 RESISTOR 4.7K 51 .125W CC TC=0+882 RESISTOR 4.7K 51 .125W CC TC=0+882 RESISTOR 4.7K 5% .125W CC TC=0+882	01121 01121 01121 01121 01121	884735 864725 864725 864725 884725
A6R44 A6R45	0698-5999 0698-5999		RESISTOR 4.7K 51 .125W CC TC=0+882 RESISTOR 4.7K 5% .125W CC TC=0+882	01121 01121	884725 864725
A6U1 A6U2 A6U3 A6U4 A6U5	1820-0577 1820-0214 1820-0054 1820-0765 1820-0207	1 2 16 1 1	IC: SN7416N, INVERTER IC: TTL BCD-TO-DECIMAL DECODER IC: SN7400N IC SN74 197 N COUNTER IC MV	01295 01295 01295 01295 07263	SN7416N SN7442N SN7400N SN74197N 9601PC
A7	05340-60005	1	OC AMPLIFIER/COMPENSATOR NO. 1 ASSEMBLY (SERIES 1220A) (LOADED ON 05340-20005 BLANK BOARD)	26480	05340-60005
A7C1 A7C2 A7C3 A7C4 A7C5	0160-0205 0180-0106 0180-0160 0180-0160 0160-2230	1 2 2 1	CAPACITOR-FXD 10PF +-5% 500WVDC MICA CAPACITOR-FXO: 60UF+-20% 6VDC TA-SOLID CAPACITOR-FXO: 22UF+-20% 35VDC TA-SOLID CAPACITOR-FXO: 22UF+-20% 35VDC TA-SOLID CAPACITOR-FXD 3300PF +-5% 300WVDC MICA	28480 56289 56289 56289 28480	0160-0205 1500606X0006B2 1500226X0035R2 1500226X0035R2 0160-2230
A7C6 A7C7 A7C8 A7C9 A7C10	0140-0177 0160-2055 0160-2055 0160-2055 0160-2055	1 16	CAPACITOR-FXD 400PF +-1% 300WVDC MICA CAPACITOR-FXD .01UF +80-20% 100WVDC CER CAPACITOR-FXO .01UF +80-20% 100WVDC CER CAPACITOR-FXO .01UF +80-20% 100WVDC CER CAPACITOR-FXD .01UF +80-20% 100WVDC CER	72136 28480 28480 28480 28480	DM15F401F0300WV1CR 0160-2055 0160-2055 0160-2055 0160-2055
A7C11 A7C12 A7C13 A7C14	0180-0117 0180-0374 0160-0138 0180-1743	1 1	CAPACITOR-FXO: 2.7UF+-10% 35VDC TA CAPACITOR-FXO: 10UF+-10% 20VDC TA-SOLID CAPACITOR-FXO .047UF +-10% 200WVDC POLYE CAPACITOR-FXD: .1UF+-10% 35VDC TA-SOLID	56289 56289 28480 56289	1500275X9035B2 1500106X9020B2 0160-0138 1500104X9035A2
A7CR1 A7CR2 A7CR3 A7CR4 A7CR5	1901-0040 1901-0040 1901-0025 1901-0025 1901-0025		DIODE-SWITCHING 30V 50NA 2NS DO-35 DIODE-SWITCHING 30V 50NA 2NS DO-35 DIODE-GEN PRP 100V 200NA W-7 DIODE-GEN PRP 100V ZOONA DO-7 DIODE-GEN PRP 100V ZOONA DO-7	28480 28480 28480 28480 28480	1901-0040 1901-0040 1901-0025 1901-0025 1901-0025
A7CR6 A7CR7 A7CR8	1901-0025 1901-0025 1901-0025		DIODE-GEN PRP 100V ZOONA DO-7 DIODE-GEN PRP 100V ZOONA W-7 DIODE-GEN PRP 100V ZOONA W-7	28480 28480 28480	1901-0025 1901-0025 1901-0025
A7L1 A7L2 A7L3 A7L4	9140-0096 9140-0096 9140-0096 9100-2249	6 1	COIL-FXD UOLOEO RF CHOKE 1UH 101 COIL-FXO UOLOEO RF CHOKE 1UH 101 COIL-FXO UOLOEO RF CHOKE 1UH 101 COIL-FXO UOLOEO RF CHOKE .15UH 101	24226 24226 24226 24226	151101 151101 151101 101150
A7Q1 A7Q2 A7Q3 A7Q4 A7Q5	1853-0020 1853-0020 1853-0036 1854-0215 1854-0215	9	TRANSISTOR PNP SI PD=300MHZ FT=150MHZ TRANSISTOR PNP SI PD=300MHZ FT=150MHZ TRANSISTOR PNP SIL PD=310MHZ FT=250THZ TRANSISTOR NPN SI PD=350MHZ FT=300MHZ TRANSISTOR NPN SI PD=350MHZ FT=300MHZ	28480 28480 04713 04713 04713	1853-0020 1853-0020 SPS-3612 SPS 3611 SPS 3611

See introduction to this section for ordering information

Model 5340A
Replaceable Parts

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A7Q6 A7Q7 A7Q8 A7Q9	1854-0215 1854-0215 1854-0215 1853-0036		TRANSISTOR NPN SI PD=350MW FT=300MHZ TRANSISTOR NPN SI PD=350MW FT=300MHZ TRANSISTOR NPN SI PD=350MW FT=300MHZ TRANSISTOR PNP SIL PD=310MW FT=2507HZ	04713 04713 04713 04713	SPS 3611 SPS 3611 SPS 3611 SPS 3612
A7R 1 A7R 2 A7R 3 A7R 4 A7R 5	0698-3451 0757-0924 0757-0416 0757-0931 0757-0948	1	RESISTOR 133K 1% .125W F TC=0+-100 RESISTOR 1K 2% .125W F TC=0+-100 RESISTOR 511 1% .125W F TC=0+-100 RESISTOR 2K 2% .125W F TC=0+-100 RESISTOR 10K 2% .125W F TC=0+-100	16299 24546 24546 24546 24546	C4-118-TO-1333-F C4-118-TO-1001 G C4-118 TO-511R F C4-1/8 TO-2001-G C4-1/8-TO-1002-G
A7R 6 A7R 7 A7R 8 A7R 9 A7R 10	0698-3260 0757-0932 0683-2005 0757-0316 0757-0421	1 1 2	RESISTOR 464K 1% .125W F TC=0+-100 RESISTOR 2.2K 2% .125W F TC=0+-100 RESISTOR 20 52 .25W FC TC=-400/+500 RESISTOR 42.2 1% .125W F TC=0+-100 RESISTOR 825 1% .125W F TC=0+-100	03888 24546 01121 24546 24546	PME55S C4-1/8-TO-2201-G CB2005 C4-1/8-TO-42R2-F C4-1/8-TO-825R-F
A7R 11 A7R 12 A7R 13 A7R 14 A7R 15	0757-0952 0757-0952 2100-2574 0757-0931 0757-0931	4 5	RESISTOR 15K 22 .125W F TC=0+-100 RESISTOR 15K 2% .125W F TC=0+-100 RESISTOR-TRMR 500 10% C SIDE-AGJ 1-TURN RESISTOR 2K 22 .125W F TC=0+-100 RESISTOR 2K 22 .125W F TC=0+-100	24546 24546 30983 24546 24546	C4-1/8-TO-1502 G C4-1/8-TO-1502-G ET50X501 C4-1/8 TO-2001-G C4-1/8-TO-2001-G
A7R 16 A7R 17 A7R 18 A7R 19 A7R 20	0757-0931 0757-0931 0757-0949 0757-0941 0757-0931	1	RESISTOR 2K 2% .125W F TC=0+-100 RESISTOR 2K 2% .125W F TC=0+-100 RESISTOR 11K 2% .125W F TC=0+-100 RESISTOR 5.1K 22 .125W F TC=0+-100 RESISTOR 2K 22 .125W F TC=0+-100	24546 24546 24546 24546 24546	C4-1/8-TO-2001-G C4-1/8-TO-2001-G C4-118-TO-1102-G C4-1/8-TO-5101-G C4-1/8-TO-2001-G
A7R 21 A7R 22 A7R 23 A7R 24 A7R 25	0683-0685 0757-0924 0757-0952 0757-0316 2100-2517	3 2	RESISTOR 68 5X .25W FC TC=-400/+500 RESISTOR 1K 22 .125W F TC=0+-100 RESISTOR 15K 22 .125W F TC=0+-100 RESISTOR 42.2 1% .125W F TC=0+-100 RESISTOR-TRMR 50K 101C SIDE-ADJ 1-TURN	01121 24546 24546 24546 30983	C868G5 C4-118-TO-1001-G C4-1/8-TO-1502-G C4-1/8-TO-42R2-F ET50X503
A7R 26 A7R 27 A7R 28 A7R 29 A7R 30	0757-0931 2100-2632 0757-0941 0757-0923 0757-0948	2 1	RESISTOR 2K 2% .125W F TC=0+-100 RESISTOR-TRHR 100 10% C SIDE-AOJ 1-TURN RESISTOR 5.1K 22 .125W F TC=0+-100 RESISTOR 910 2X .125W F TC=0+-100 RESISTOR 10K 2% .125W F TC=0+-100	24546 30983 24546 24546 24546	C4-1/8-TO-2001-G ET50X101 C4-1/8-TO-5101-G C4-1/8-TO-9111-G C4-1/8-TO-1002-G
A7R 31 A7R 32 A7R 33 A7R 34 A7R 35	0757-0924 0757-0378 0683-0685 0757-0931 0757-0941	1	RESISTOR 1K 22 .125W F TC=0+-100 RESISTOR 11 1% .125W F TC=0+-100 RESISTOR 68 5% .25W FC TC=-400/+500 RESISTOR 2K 22 .125W F TC=0+-100 RESISTOR 5.1K 22 .125W F TC=0+-100	24546 19701 01121 24546 24546	C4-1/8-TO-1001-G MF4C1/8-TO 11R0 F C868G5 C4-1/8-TO-2001-G C4-1/8-TO-5101-G
A7TP1 A7TP2 A7TP3 A7TP4 A7TP5	0360-0124 0360-0124 0360-0124 0360-0124 0360-0124	19	TERMINAL-STUD SPCL PRESS MTG TERMINAL-STUO SPCL PRESS MTG TERMINAL-STUO SPCL PRESS MTG TERMINAL-STUD SPCL PRESS MTG TERMINAL-STUD SPCL PRESS MTG	28480 28480 28480 28480 28480	0360-0124 0360-0124 0360-0124 0360-0124 0360-0124
A7TP6 A7TP7	0360-0124 0360-0124		TERMINAL-STUO SPCL PRESS MTG TERMINAL-STUD SPCL PRESS HTG	28480 28480	0360-0124 0360-0124
A7U1	1826-0021	2	IC VOLTAGE FOLLOWER	27014	LM310H
A8	05340-60006	1	BANDPASS FILTER/PHASE DETECTOR ASSEMBLY (SERIES 1220A) (LOADED ON 05340-20006 BLANK BOARD)	28480	05340-60006
A8C1 A8C2 A8C3 A8C4 A8C5	0160-2227 0180-0374 0180-0374 0180-0374 0180-0374	1	CAPACITOR-FXO 2400PF +-52 300WVDC MICA CAPACITOR-FXO: 10UF+-10% ZOVOC TA-SOLID CAPACITOR-FXO: 10UF+-10% 20VDC TA-SOLID CAPACITOR-FXO: 10UF+-10% ZOVOC TA-SOLID CAPACITOR-FXO: 10UF+-10% ZOVOC TA-SOLID	28480 56289 56289 56289 56289	0160-2227 1500106X902082 1500106X902082 1500106X902082 1500106X902082
A8C6 A8C7 A8C8 A8C9 A8C10	0160-3060 0160-3060 0160-3060 0160-3060 0160-0161	3	CAPACITOR-FXO .1UF +-20% 25WVDC CER CAPACITOR-FXO .1UF +-20% 25WVDC CER CAPACITOR-FXO .1UF +-20% 25WVDC CER CAPACITOR-FXO .1UF +-20% 25WVDC CER CAPACITOR-FXD .01UF +-10% 200WVDC POLYE	28480 28480 28480 28480 56289	0160-3060 0160-3060 0160-3060 0160-3060 292P10392
A8C11 A8C12 A8C13 A8C14 A8C15	0140-0221 0160-0161 0160-3060 0160-0161 0160-2220	1	CAPACITOR-FXO 220PF +-1% 300WVDC MICA CAPACITOR-FXD .01UF +-10% 200WVDC POLYE CAPACITOR-FXO .1UF +-20% 25WVDC CER CAPACITOR-FXD .01UF +-10% 200WVDC POLYE CAPACITOR-FXO 1200PF +-52 300WVDC MICA	72136 56289 28480 56289 28480	DM15F221F0300WV1C 292P10392 0160-3060 292P10392 0160-2220
A8C16 A8C17 A8C18 A8C19 A8C20	0160-3060 0160-3060 0140-0234 0160-0174 0160-3060	1 1	CAPACITOR-FXO .1UF +-20% 25WVDC CER CAPACITOR-FXO .1UF +-20% 25WVDC CER CAPACITOR-FXO 500PF +-1% 300WVDC MICA CAPACITOR-FXO .47UF +-80% 20% 25WVDC CER CAPACITOR-FXO .1UF +-20% 25WVDC CER	28480 28480 72136 56289 28480	0160-3060 0160-3060 DM15F501F0300WV1C 5C1187-CML 0160-3060
A8C21 A8C22 A8C23	0160-3060 0180-0228 0180-0210	3	CAPACITOR-FXO .1UF +-20% 25WVDC CER CAPACITOR-FXD: 22UF+-10% 15VDC TA-SOLID CAPACITOR-FXO: 3.3UF+-20% 15VDC TA	28480 56289 56289	0160-3060 1500228X901582 1500335X0015A2

See introduction to this section for ordering information

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A8CR1 A8CR2 A8CR3	1902-3182 1902-0025 1902-0025	2	DIODE-ZNP 12-1V 5% DO-7 PD=.4W TC=+.064% DIODE-ZNR 10V 5X 00-7 PD=.4W TC=+.06% DIODE-ZNR 10V 5 1 00-7 PD=.4W TC=+.06%	04713 04713 04713	SZ 10939,206 SZ 10939-182 SZ 10939, 182
A8L1 A8L2 A8L3 A8L4	9140-0118 9140-0118 9140-0118 9140-0118	4	COIL-FXD MOLDED RF CHOKE 500UH 5X COIL-FXD HDLCED RF CHOKE 500UH 5 1 COIL-FXD MOLDED RF CHOKE 500UH 5X COIL-FXD MOLDED RF CHOKE 500UH 5 1	24226 24226 24226 24226	19/503 19/503 19/503 19/503
A8Q1 A8Q2	1855-0334 1855-0380	1	TSTR:SI FET WAL N-CHANNEL TRANSISTOR HCSFET 2N4351 N-CHAN E-MODE	17856 04713	DN377 2N4351
A8R1 A8R2 A8R3 A8R4 A8R5	0698-3150 0757-0934 0698-3433 0698-3155 0757-0424	3 7 2 2 2	RESISTOR 2.37K 1% .125W F TC=0+-100 RESISTOR 2.7K 2% .125W F TC=0+-100 RESISTOR 28.7 1% .125W F TC=0+-100 RESISTOR 4.64K 1% .125W F TC=0+-100 RESISTOR 1.1K 1% .125W F TC=0+-100	16299 24546 03888 16299 24546	C4-1/8-T0-2371-F C4-1/8-T0-2701-G PME55-1/8-T0 28R7-F C4-118-T0-4641-F C4-1/8-T0-1101-F
A8R6 A8R7 A8R8 A8R9 A8R10	0757-0911 0757-0385 0698-3132 0757-0424 0757-0948	3 1 1 1 1	RESISTOR 300 2% .125W F TC=0+-100 RESISTOR 22.1 1% .125W F TC=0+-100 RESISTOR 261 1% .125W F TC=0+-100 RESISTOR 1.1K 1% .125W F TC=0+-100 RESISTOR 10K 2% .125W F TC=0+-100	24546 19701 16299 24546 24546	C4-1/8-T0-301-G MF4C1/8-T0-22R1-F C4-1/8-T0-2610-F C4-1/8-T0-1101-F C4-1/8-T0-1002-G
A8R11 A8R12 A8R13 A8R14 A8R15	0698-3433 0757-0924 2100-2574 0683-1055 0757-0931		RESISTOR 28.7 1% .125W F TC=0+-100 RESISTOR 1K 2% .125W F TC=0+-100 RESISTOR-TRWR 500 10% C SIDE-ADJ 1-TURN RESISTOR 1M 5% .25W FC TC=-800/+900 RESISTOR 2K 2% .125W F TC=0+-100	03888 24546 30983 01121 24546	PME55-1/8-T0 28R7-F C4-1/8-T0-1001-G ET50X501 CB1055 C4-1/8-T0-2001-G
A8R16 A8R17 A8R18 A8R19 A8R20	0757-0938 0757-0940 0757-0940 0683-1055 0757-0948	1 1 1 1 1	RESISTOR 3.9K 2% .125W F TC=0+-100 RESISTOR 4.7K 2% .125W F TC=0+-100 RESISTOR 4.7K 2% .125W F TC=0+-100 RESISTOR 1M 5% .25W FC TC=-800/+900 RESISTOR 10K 2% .125W F TC=0+-100	24546 24546 24546 01121 24546	C4-1/8-T0-3901-G C4-1/8-T0-4701-G C4-1/8-T0-4701-G CB1055 C4-1/8-T0-1002-G
A8R21 A8R22 A8R23 A8R24	0757-0922 0757-0922 0698-3446 0698-3446	5 5 5 5	RESISTOR 820 2% .125W F TC=0+-100 RESISTOR 820 2% .125W F TC=0+-100 RESISTOR 383 1% .125W F TC=0+-100 RESISTOR 383 1% .125W F TC=0+-100	24546 24546 16299 16299	C4-1/8-T0-821-G C4-118-T0-821-G C4-1/8-T0-383R-F C4-1/8-T0-383R-F
A8U1 A8U2 A8U3	1826-0073 1820-0475 1820-0515	2 2 3	IC:LINEAR IC LM306H COHPTR IC MV	28480 27014 07263	1826-0073 LM306H 9602PC
A9	05340-60007	1	DC AMPLIFIER/COMPENSATOR NO. 2 ASSEMBLY (SERIES 1220A) (LOADED CN 05340-20007 BLANK BOARD)	28480	05340-60007
A9C1 A9C2 A9C3 A9C4 A9C5	0180-0197 0180-0197 0180-0197 0160-0153 0180-0228	1 1 1 1 1	CAPACITOR-FXD; 2.2UF+-10% ZOVC TA CAPACITOR-FXD; 2.2UF+-10% ZOVC TA CAPACITOR-FXD; 2.2UF+-10% ZOVC TA CAPACITOR-FXD 1000PF+-10% 200WVDC PDLYE CAPACITOR-FXD; 22UF+-10% 15VDC TA-SOLID	56289 56289 56289 56289 56289	1500225X9020AZ 1500225X9020AZ 1500225X9020AZ 292P10292 1500225X9015B2
A9C6 A9C7 A9C8 A9C9 A9C10	0180-0230 0180-0228 0170-0022 0160-0362 0180-0230	3 3 3 2 2	CAPACITOR-FXD; 1UF+-20% 50VDC TA-SOLID CAPACITOR-FXD; 22UF+-10% 15VDC TA-SOLID CAPACITOR-FXD .1UF+-20% 600WVDC PDLYE CAPACITOR-FXD 510PF+-5% 300WVDC MICA CAPACITOR-FXD; 1UF+-20% 50VDC TA-SOLID	56289 56289 28480 28480 56289	1500105X0050A2 1500225X9015B2 0170-0022 0160-0362 1500105X0050A2
A9C11 A9C12 A9C13	0160-0362 0180-0197 0180-0197		CAPACITOR-FXD 510PF+-5% 300WVDC MICA CAPACITOR-FXD; 2.2UF+-10% ZOVC TA CAPACITOR-FXD; 2.2UF+-10% ZOVC TA	28480 56289 56289	0160-0362 1500225X9020A2 1500225X9020A2
A9CR1 A9CR2	1901-0040 1901-0040		DIODE-SWITCHING 30V 50NA 2N5 00-35 DIODE-SWITCHING 30V 50NA 2N5 00-35	28480 28480	1901-0040 1901-0040
A9L1 A9L2 A9L3 A9L4	9140-0096 9140-0096 9140-0096 9100-2288	1 1 1 1	COIL-FXD MOLEO RF CHOKE 1UH 10% COIL-FXD MOLDED RF CHOKE 1UH 10% COIL-FXD MOLDED RF CHOKE 1UH 10% COIL-FXD MOLDED RF CHOKE 1MH 10%	24226 24226 24226 06560	15/101 15/101 151101 09-A102K
A9Q1 A9Q2 A9Q3	1854-0215 1854-0215 1853-0036		TRANSISTOR NPN SI PD=350MW FT=300MHZ TRANSISTOR NPN SI PD=350MW FT=300MHZ TRANSISTOR PNP SIL PD=310MW FT=2507HZ	04713 04713 04713	SPS 3611 SPS 3611 SPS-3612
A9R1 A9R2 A9R3 A9R4 A9R5	2100-1661 0757-0931 0683-2745 2100-2517 0757-0924	1 1 1 1 1	RESISTOR-TRHR 20K 5% WM SIDE-ADJ RESISTOR 2K 2% .125W F TC=0+-100 RESISTOR 270K 5% .25W FC TC=-800/+900 RESISTOR-TRMR 50K 10% C SIDE-ADJ 1-TURN RESISTOR 1K 2% .125W F TC=0+-100	32997 24546 01121 30983 24546	3057P-1-203 C4-1/8-T0-2001-G CB2745 ET50X503 C4-1/8-T0-1001-G
A9R6 A9R7 A9R8 A9R9 A9R10	0757-0948 0757-0948 3757-0985 3757-0931 1757-0924	3 3 3 3 3	RESISTOR 10K 2% .125W F TC=0+-100 RESISTOR 10K 2% .125W F TC=0+-100 RESISTOR 51K 2% .125W F TC=0+-100 RESISTOR 2K 2% .125W F TC=0+-100 RESISTOR 1K 2% .125W F TC=0+-100	24546 24546 24546 24546 24546	C4-1/8-T0-1002-G C4-1/8-T0-1002-G C4-1/8-T0-5102-G C4-1/8-T0-2001-G C4-1/8-T0-1001-G

See introduction to this section for ordering information

Model **5340A**
Replaceable Parts

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A9R11	0698-6681	1	RESISTOR 91 5% .125W CC TC=0+850	01121	B591G5
A9R12	0683-5145	2	RESISTOR 510K 5% .25W FC TC=-800/+900	01121	C85145
A9R13	0757-0965		RESISTOR 51K 2% .125W F TC=0+ 100	24546	C4-1/8-T0-5102-G
A9R14	0757-0948		RESISTOR 10K 2% .125W F TC=0+ 100	24546	C4-1/8-T0-1002-G
A9R15	0757-0948		RESISTOR 10K 2% .125W F TC=0+ 100	24546	C4-1/8-T0-1002-G
A9R16	0757-0907		RESISTOR 200 21 .125W F TC=0+ 100	24546	C4-1/8 T0-201-G
A9R17	0757-0955		RESISTOR 20K 2% .125W F TC=0+ 100	24546	C4-1/8-T0-2002-G
A9R18	0757-0948		RESISTOR 10K 2% .125W F TC=0+ 100	24546	C4-1/8-T0-1002-G
A9R19	0757-0924		RESISTOR 1K 2% .125W F TC=0+ 100	24546	C4-1/8-T0-1001-G
A9R20	0757-0965		RESISTOR 51K 2% .125W F TC=0+ 100	24546	C4-1/8-T0-5102-G
A9TP1	0360-0124		TERMINAL-STUO SPCL PRESS MTG	28480	0360 0124
A9TP2	0360-0124		TERMINAL-STUO SPCL PRESS MTG	28480	0360-0124
A9TP3	0360-0124		TERMINAL-STUC SPCL PRESS MTG	28480	0360-0124
A9TP4	0360-0124		TERMINAL-STUC SPCL PRESS WTG	28480	0360-0124
A9U1	1826-0073		ICXLINEAR	28480	1826-0073
A9U2	1826-0073		ICXLINEAR	28480	1826-0073
A9U3	1826-0026	2	IC LM311H COMPT	27014	LM311H
A9U4	1826-0021		IC LM310H FOLR	27014	LM310H
A9U5	1826-0068	4	IC SN7410N	01295	SN7410N
A9U6	1820-0515		IC MV	07263	9602PC
A10	05340-60008	3	VCO NO. 2 ASSEMBLY (SERIES 1328A) (LOADED ON 05340-20008 BLANK BOARD)	28480	05340-60008
A10C1	0180-0197		CAPACITOR-FXO: 2.2UF+-10% 20VDC TA	56283	1500225X9020A2
A10C2	0160-3789	25	CAPACITOR-FXO 560PF +-20% 50WVDC CER	28480	0160-3789
A10C3	0160-2291	2	CAPACITOR-FXO .18UF + 10% 80WVDC POLVE	56289	292P1849R8
A10C4	0180-0405	2	CAPACITOR-FXOI 1.8UF+-10% ZOVOC TA	56289	1500185X9020A2
A10C5	0180-0197		CAPACITOR-FXD: 2.2UF+-10% ZOVOC TA	56289	1500225X9020A2
A10C6	0160-3789		CAPACITOR-FXO 560PF + 20% 50WVDC CER	28480	0160-3789
A10C7	0180-1745		CAPACITOR-FXO: 1.5UF+ 10% ZOVOC TA	56289	1500155X9020A2
A10C8	0180-0197		CAPACITOR-FXD: 2.2UF+-10% ZOVOC TA	56289	1500225X9020A2
A10C9	0160-3789		CAPACITOR-FXO 560PF +-20% 50WVDC CER	28480	0160-3789
A10C10	0160-2263	4	CAPACITOR-FXO 18PF +-5% 500WVDC CER	28480	0160-2263
A10C11	0160-3789		CAPACITOR-FXO 560PF +-20% 50WVDC CER	28480	0160-3789
A10C12	0160-2263		CAPACITOR-FXC 18PF +-51 500WVDC CER	28480	0160-2263
A10C13	0160-3789		CAPACITOR-FXO 560PF +-20% 50WVDC CER	28480	0160-3789
A10C14	0160-3789		CAPACITOR-FXO 560PF +-20% 50WVDC CER	28480	0160-3789
A10C15	0140-0173	2	CAPACITOR-FXD 305PF +-1% 100WVDC MICA	72136	0M19E305RF0100WV1CR
A10C16	0160-3789		CAPACITOR-FXO 560PF +-20X 50WVDC CER	28480	0160-3789
A10CR1	1901-0040		OIOOE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A10CR2	1901-0040		OIOOE-SWITCHING 30V 50NA 2NS OO-35	28480	1901-0040
A10CR3			NOT ASSIGNED		
A10CR4	05340-80005	SET OF DIODE!	DIODE, MATCHED QUAD	28480	05340-80005
A10CR5					
A10L1	9140-0158		COIL-FXO WOLOEO RF CHOKE 1UH 10%	24226	101101
A10L2	9140-0158		COIL-FXO MOLDED RF CHOKE 1UH 10%	24226	101101
A10L3	9100-2275	2	COIL-FXO MOLOEO RF CHOKE 82UH 10%	24226	101822
A10L4	9140-0145	2	COIL-FXO WOLOEO RF CHOKE 8.2UH 10%	24226	101821
A10L5	9100-2265		COIL-FXD MOLDED RF CHOKE 10UH 10%	24226	10/102
A10L6	9140-0158		COIL-FXO WOLOEO RF CHOKE 1UH 10%	24226	101101
A10L7	9140-0158		COIL-FXO MOLOEO RF CHOKE 1UH 10%	24226	101101
A10L8	9140-0158		COIL-FXO MOLOEO RF CHOKE 1UH 10%	24226	101101
A10L9	9140-0158		COIL-FXO MOLDED RF CHOKE 1UH 10%	24226	101101
A10L10	9140-0158		COIL-FXO MOLOEO RF CHOKE 1UH 10%	24226	10/101
A10MP1	05340-20041		SPACER BOARD	28480	05340-20041
A10Q1	1853-0036		TRANSISTOR PNP SIL PD=310MW FT=2507HZ	04713	SPS-3612
A10Q2	1854-0073		TRANSISTOR NPN SI 10-72 PD=200MW	28480	1854-0073
A10Q3	1854-0583	2	TRANSISTOR NPN SI TO-92 PD=310MW	04713	MP5-A 8
A10Q4	1854-0005	2	TRANSISTOR NPN 2N708 SI TO-18 PD=360MW	28480	1854-0005
A10Q5	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A10Q6	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PO-ZOOMY	04713	2N5179
A10R1	0757-0278	5	RESISTOR 1.78K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1781-F
A10R2	0698-3439		RESISTOR 178 1% .125W F TC=0+-100	16299	C4-1/8-T0-178R-F
A10R3	0757-0442	2	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A10R4	0683-2725	31	RESISTOR 2.7K 5% .25W FC TC=-400/+700	01121	C82725
A10R5	0757-0123	3	RESISTOR 34.8K 1% .125W F TC=0+-100	24546	C5-1/4-T0-3482-F
A10R6	0698-3136	2	RESISTOR 17.8K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1782-F
A10R7	0757-0278		RESISTOR 1.78K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1781-F
A10R8	0757-0283	2	RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A10R9	0698-3450	2	RESISTOR 42.2K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4222-F
A10R10			NOT ASSIGNED		

10CR4, A10CR5, A12CR4
E A MATCHED SET. IF
REPLACED, ALL FOUR

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ST BE REPLACED.

See introduction to this section for ordering information

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A10R11			NOT ASSIGNED		
A10R12	0698-0084	2	RESISTOR 2.15K 1% .125W F TC=0+/-100	16295	C4-118-TO-2151-F
A10R13	0698-3441	2	RESISTOR 215 1% .125W F TC=0+/-100	16295	C4-1/8-TO-215R-F
A10R14	0698-3447	2	RESISTOR 422 1% .125W F TC=0+/-100	16295	C4-1/8-TO-422R-F
A10R15	0683-1015		RESISTOR 100 52 .25W FC TC=-400/+500	01121	C81015
A10R16	0683-5125	4	RESISTOR 5.1K 5% .25W FC TC=-400/+700	01121	C85125
A10R17	0698-6000	2	RESISTOR 2.7K 5% .125W CC TC=0+882	01121	882725
A10R18	0683-7515	2	RESISTOR 750 52 .25W FC TC=-400/+600	01121	C87515
A10R19	0698-3378		RESISTOR 51 52 .125W CC TC=0+588	01121	885105
A10R20	0683-1025		RESISTOR 1K 5% .25W FC TC=-400/+600	01121	C81025
A10R21	0698-5174		RESISTOR 200 5% .125W CC TC=0+882	01121	882015
A10R22	0757-0288	2	RESISTOR 9.09K 1% .125W F TC=0+/-100	19701	MF4C1/8-TO-9091-F
A10R23	0698-3113	5	RESISTOR 100 5% .125W CC TC=0+588	01121	881015
A10R24	0698-3151	2	RESISTOR 2.87K 1% .125W F TC=0+/-100	16295	C4-1/8-TO-2871-F
A10R25	2100-2413	4	RESISTOR-TRMR 200 10% C SIDE-ADJ 1-TURN	30981	ET50X201
A10T1	08553-6012	2	TRANSFORMER, RF (CODE = BLUE)	28480	08553-6012
A10TP1	0360-0124		TERMINAL-STUD SPCL PRESS MTG	28480	0360-0124
A10U1	1820-1179	2	IC, TTL DIGITAL	28480	1820-1179
A10Z1	9100-1788	10	COIL; FXD; NON-MOLDED RF CHOKE; .75UH	02114	VK200-20/48
A11	05340-60009	1	MIXER ASSEMBLY (SERIES 1220A) (LOADED ON 05340-20009 BLANK BOARD)	28480	05340-60009
A11C1	0180-0374		CAPACITOR-FXO; 10UF+-10% 20VDC TA-SOLID	56289	1500106X902082
A11C2	0180-0374		CAPACITOR-FXO; 10UF+-10% 20VDC TA-SOLID	56289	1500106X902082
A11C3	0160-3789		CAPACITOR-FXO 560PF +-20% 50WVDC CER	28480	0160-3789
A11C4	0160-3789		CAPACITOR-FXO 560PF +-20% 50WVDC CER	28480	0160-3789
A11C5	0180-0374		CAPACITOR-FXO; 10UF+-10% 20VDC TA-SOLID	56289	1500106X902082
A11C6	0180-0374		CAPACITOR-FXO; 10UF+-10% 20VDC TA-SOLID	56289	1500106X902082
A11C7	0160-2055		CAPACITOR-FXO .01UF +-80-20% 100WVDC CER	28480	0160-2055
A11C8	0160-2055		CAPACITOR-FXO .01UF +-80-20% 100WVDC CER	28480	0160-2055
A11C9	0160-3060		CAPACITOR-FXO .1UF +-20% 25WVDC CER	28480	0160-3060
A11C10	0160-3060		CAPACITOR-FXO .1UF +-20% 25WVDC CER	28480	0160-3060
A11C11	0160-0155		CAPACITOR-FXD 3300PF +-10% 200WVDC POLVE	56289	292P33292
A11C12	0160-3060		CAPACITOR-FXO .1UF +-20% 25WVDC CER	28480	0160-3060
A11L1	9140-0210		COIL-FXO MOLDED RF CHOKE 100UH 5%	24226	151103
A11L2	9140-0210		COIL-FXO MOLDED RF CHOKE 100UH 5%	24226	151103
A11R1	0757-0928	1	RESISTOR 1.5K 2% .125W F TC=0+/-100	24546	C4-118-TO-1501-G
A11R2	0757-0927		RESISTOR 1.3K 2% .125W F TC=0+/-100	24546	C4-1/8-TO-1301-G
A11R3	0757-0931		RESISTOR 2K 21 .125W F TC=0+/-100	24546	C4-1/8-TO-2001-G
A11R4	0757-0950		RESISTOR 12K 21 .125W F TC=0+/-100	24546	C4-1/8-TO-1202-G
A11R5	0757-0924		RESISTOR 1K 2X .125W F TC=0+/-100	24546	C4-1/8-TO-1001-G
A11R6	0757-0931		RESISTOR 2K 2% .125W F TC=0+/-100	24546	C4-118-TO-2001-G
A11R7	0757-0922		RESISTOR 820 2% .125W F TC=0+/-100	24546	C4-1/8-TO-821-G
A11R8	0757-0954	1	RESISTOR 18K 2% .125W F TC=0+/-100 FACTORY SELECTED PART	24546	C4-1/8-TO-1802-G
A11R9	0757-0910	1	RESISTOR 270 2% .125W F TC=0+/-100	24546	C4-118-TO-2714
A11U1	1826-0073		IC-LINEAR	28480	1826-0073
A11U2	1858-0018	1	IC	28480	1858-0018
A12	05340-60008		VCO NO. 1 ASSEMBLY SAME AS A10; USE PREFIX A12	28480	05340-60308
A13	05340-60010	1	LIMITWAMPLIFIER ASSEMBLY (SERIES 1408A REV. 8) (LOADED ON 05340-20010 BLANK BOARD)	28480	05340-60010
A13C1	0180-0106		CAPACITOR-FXO; 60UF+-20% 6VDC TA-SOLID	56289	1500606X000682
A13C2	0180-0197		CAPACITOR-FXO; 2.2UF+-10% 20VDC TA	56289	1500225X9020A2
A13C3	0160-3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277
A13C4	0160-3277		CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160-3277
A13C5	0160-3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277
A13C6	0160-3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277
A13C7	0160-3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277
A13C8	0160-3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277
A13C9	0160-3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277
A13C10	0160-3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277
A13C11	0160-3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277
A13C12	0160-3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277
A13C13	0160-3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277
A13C14	0160-3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277

See introduction to this section for ordering information

Model 5340A
Replaceable Parts

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A13C15	0160-3277	1	CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160-3277
A13C16	0160-3277		CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160-3277
A13C17	0160-3277		CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160-3277
A13L1	9100-2265		COIL-FXD MOLDED RF CHOKE 10UH 10%	24226	101102
A13L2	9100-2265		COIL-FXD MOLDED RF CHOKE 10UH 10%	24226	101102
A13L3	9140-0158		COIL-FXD MOLEO RF CHOKE 1UH 10%	24226	101101
A13L4	9100-0368		COIL-FXD MOLEO RF CHOKE .33UH 10%	24226	101330
A13L5	9100-0368		COIL-FXD MOLEO RF CHOKE .33UH 10%	24226	101330
A13L6	9100-0368		COIL-FXD MOLEO RF CHOKE .33UH 10%	24226	101330
A13L7	9100-0368		COIL-FXD MOLEO RF CHOKE .33UH 10%	24226	101330
A13L8	9100-0368		COIL-FXD MOLEO RF CHOKE .33UH 10%	24226	101330
A13L9	9100-0368		COIL-FXD MOLEO RF CHOKE .33UH 10%	24226	101330
A13R1	0757-0907	1	RESISTOR 200 2% .125W F TC=0+-100	24546	C4-1/8-T0-201-G
A13R2	0757-0907		RESISTOR 200 2% .125W F TC=0+-100	24546	C4-1/8-T0-201-G
A13R3	0757-0403		RESISTOR 121 1% .125W F TC=0+-100	24546	C4-118-T0-121R-F
A13R4	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	24546	C4-118-T0-1002-G
A13R5	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1002-G
A13R6	0757-0941		RESISTOR 5.1K 2% .125W F TC=0+-100	24546	C4-118-T0-5101-G
A13R7	0757-0941		RESISTOR 5.1K 2% .125W F TC=0+-100	24546	C4-1/8-T0-5101-G
A13R8	0757-0915		RESISTOR 430 2% .125W F TC=0+-100	24546	C4-1/8-T0-431-G
A13R9	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A13R10	0757-0915		RESISTOR 430 2% .125W F TC=0+-100	24546	C4-1/8-T0-431-G
A13R11	0757-0384	1	RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A13R12	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A13R13	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A13R14	0757-0901		RESISTOR 200 2% .125W F TC=0+-100	24546	C4-1/8-T0-201-G
A13R15	0757-0907		RESISTOR 200 2% .125W F TC=0+-100	24546	C4-1/8-T0-201-G
A13R16	0757-0907		RESISTOR 200 2% .125W F TC=0+-100	24546	C4-1/8-T0-201-G
A13R17	0757-0907		RESISTOR 200 2% .125W F TC=0+-100	24546	C4-1/8-T0-201-G
A13R18	0757-0907		RESISTOR 200 2% .125W F TC=0+-100	24546	C4-1/8-T0-201-G
A13R19	0757-0907		RESISTOR 200 2% .125W F TC=0+-100	24546	C4-1/8-T0-201-G
A13R20	0757-0907		RESISTOR 200 2% .125W F TC=0+-100	24546	C4-1/8-T0-201-G
A13R21	0757-0907	1	RESISTOR 200 2% .125W F TC=0+-100	24546	C4-118-T0-201-G
A13R22	0757-0907		RESISTOR 200 2% .125W F TC=0+-100	24546	C4-1/8-T0-201-G
A13R23	0757-0907		RESISTOR 200 2% .125W F TC=0+-100	24546	C4-1/8-T0-201-G
A13R24	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	24546	C4-118-T0-1002-G
A13R25	0757-0948		RESISTOR 10K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1002-G
A13R26	0757-0941		RESISTOR 5.1K 2% .125W F TC=0+-100	24546	C4-118-T0-5101-G
A13R27	0757-0941		RESISTOR 5.1K 2% .125W F TC=0+-100	24546	C4-1/8-T0-5101-G
A13R28	0757-0915		RESISTOR 430 2% .125W F TC=0+-100	24546	C4-118-T0-431-G
A13R29	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A13R30	0757-0911		RESISTOR 300 2% .125W F TC=0+-100	24546	C4-1/8-T0-301-G
A13R31	2100-2574	1	RESISTOR-TRMR 500 10% C SIDE-ADJ 1-TURN	30983	ET50X501
A13R32	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A13R33	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A13R34	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A13R35	0757-0907		RESISTOR 200 2% .125W F TC=0+-100	24546	C4-118-T0-201-G
A13R36	0757-0907		RESISTOR 200 2% .125W F TC=0+-100	24546	C4-1/8-T0-201-G
A13R37	0757-0907		RESISTOR 200 2% .125W F TC=0+-100	24546	C4-1/8-T0-201-G
A13R38	0757-0907		RESISTOR 200 2% .125W F TC=0+-100	24546	C4-1/8-T0-201-G
A13R39	2100-2632		RESISTOR-TRMR 100 10% C SIDE-ADJ 1-TURN	30983	ET50X101
A13U1	1858-0004		IC CA3049 AMPL	02735	CA3049
A13U2	1858-0004		IC CA3049 AHPL	02735	CA3049
A14	05340-60011	1	LIMITER/AMPLIFIER/MIXER ASSEMBLY (SERIES 1532A) (LOADED ON 05340-20011 BLANK BOARD)	28480	05340-60011
A14C1	0160-2055	1	CAPACITOR-FXD .01UF +-80-20% 100WVDC CER	28480	0160-2055
A14C2	0160-3277		CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160-3277
A14C3	0160-3277		CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160-3277
A14C4	0160-3277		CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160-3277
A14C5	0160-3277		CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160-3277
A14C6	0180-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	1500225X9020A2
A14C7	0180-0197		CAPACITOR-FXD 2.2UF+-10% ZOVOC TA	56289	1500225X9020A2
A14C8	0180-0197		CAPACITOR-FXD 2.2UF+-10% ZOVOC TA	56289	1500225X9020A2
A14C9	0180-0197		CAPACITOR-FXD 2.2UF+-10% ZOVOC TA	56289	1500225X9020A2
A14C10	0160-2055		CAPACITOR-FXD .01UF +-80-20% 100WVDC CER	28480	0160-2055
A14C11	0160-2053	1	CAPACITOR-FXD .01UF +-80-20% 100WVDC CER	28480	0160-2055
A14C12	0160-3277		CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160-3277
A14C13	0140-0205		CAPACITOR-FXD 62PF +-5% 300WVDC MICA	72136	DM15E62QJ0300WV1CR
A14C14	0160-3277		CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160-3277
A14C15	0160-3277		CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160-3277
A14C16	0160-3277		CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160-3277
A14C17	0140-0194		CAPACITOR-FXD 110PF +-5% 300WVDC MICA	72136	DM15F111J0300WV1CR
A14C18	0140-0194		CAPACITOR-FXD 110PF +-5% 300WVDC MICA	72136	DM15F111J0300WV1CR
A14C19	0140-0192		CAPACITOR-FXD 68PF +-5% 300WVDC MICA	72136	DM15E68QJ0300WV1CR
A14C20	0140-0192		CAPACITOR-FXD 68PF +-5% 300WVDC MICA	72136	DM15E68QJ0300WV1CR

See introduction to this section for ordering information

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A14C21	0180-1743		CAPACITOR-FXD: .01UF+-10% 35VM TA-SOLID	56289	1500104X9035A2
A14C22	0160-3060		CAPACITOR-FXD .01UF +-20% 25WVDC CER	28480	0160-3060
A14C23	0160-2055		CAPACITOR-FXO .01UF +80-20% 100WVDC CER	28480	0160-2055
A14C24	0160-3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277
A14C25	0180-0210		CAPACITOR-FXD; 3.3UF+-20% 15VDC TA	56289	1500335X0015A2
A14C26	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A14C27	0180-0210		CAPACITOR-FXD: 3.3UF+-20% 15VDC TA	56289	1500335X0015A2
A14CR1	1901-0050	4	DIOODESYITCHING 80V ZOONA 2NS 00-7	28480	1901-0050
A14CR2	1901-0050		DIODE-SNITCHING 80V ZOONA 2NS 00-7	28480	1901-0050
A14CR3	1901-0050		DIODE-SWITCHING 80V ZOONA 2NS 00-7	28480	1901-0050
A14CR4	1901-0050		DIOODESWITCHING 80V ZOONA 2NS 00-7	28480	1901-0050
A14CR5	1902-3182		DIOOE-ZNR 12.1V 5% 00-7 PD=.4W TC=+.064%	04713	SZ 10939-201
A14L1	9140-0137		COIL-FXO MOLDED RF CHOKE 1MH 51	24226	19/104
A14L2	9140-0137		COIL-FXO MOLDED RF CHOKE 1MH 51	24226	191104
A14L3	9140-0137		COIL-FXD MOLDED RF CHOKE 1MH 51	24226	19/104
A14L4	9140-0137		COIL-FXD MOLDED RF CHOKE 1MH 51	24226	19/104
A14L5	9100-2265		COIL-FXD MOLDED RF CHOKE 10UH 101	24226	10/102
A14L6	9100-2265		COIL-FXD MOLDED RF CHOKE 10UH 10%	24226	101102
A14L7	9140-0158		COIL-FXD MOLDED RF CHOKE 1UH 10%	24226	101101
A14L8	9100-2272		COIL-FXO MOLDED RF CHOKE 47UH 10%	24226	10/472
A1401	1854-0073		TRANSISTOR NPN SI TO-72 PD=200MW	28480	1854-0073
A1402	1854-0073		TRANSISTOR NPN SI TO-72 PD=200MW	28480	1854-0073
A1403	1854-0073		TRANSISTOR NPN SI TO-72 PD=200MW	28480	1854-0073
A14R1	0757-0907	2	RESISTOR 2002% .125W F TC=0+-100	28480	07576907
A14R2	0757-0907		RESISTOR 200 2% .125W F TC=0+-100	28480	0757-0907
A14R4	0757-0900	8	RESISTOR 100 2% .125W F TC=0+-100	24546	C4-1/8-T0-101-G
A14R5	0757-0916		RESISTOR 470 21 .125W F TC=0+-100	24546	C4-1/8-T0-471-G
A14R6	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1001-G
A14R7	0757-0924		RESISTOR 1K 21 .125W F TC=0+-100	24546	C4-1/8-T0-1001-G
A14R8	0757-0915		RESISTOR 430 2% .125W F TC=0+-100	24546	C4-1/8-T0-431-G
A14R9	0757-0900		RESISTOR 100 2% .125W F TC=0+-100	24546	C4-1/8-T0-101-G
A14R10	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1001-G
A14R11	0757-0916		RESISTOR 470 22 .125W F TC=0+-100	24546	C4-118-T0-571-G
A14R12	0757-0924		RESISTOR 1K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1001-G
A14R13	0757-0926	4	RESISTOR 1.2K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1201-G
A14R14	0757-0926		RESISTOR 1.2K 21 .125W F TC=0+-100	24546	C4-1/8-T0-1201-G
A14R15	0757-0900		RESISTOR 100 2% .125W F TC=0+-100	24546	C4-1/8-T0-101-G
A14R16	0757-0926		RESISTOR 1.2K 2% .125W F TC=0+-100	24546	C4-1/8-T0-1201-G
A14R17	0757-0916		RESISTOR 470 2% .125W F TC=0+-100	24546	C4-1/8-T0-471-G
A14R18	0757-0911		RESISTOR 300 21 .125W F TC=0+-100	24546	C4-1/8-T0-301-C
A14R19	0757-0955		RESISTOR 20K 2% .125W F TC=0+-100	24546	C4-118-T0-2002-G
A14R20	0757-0926		RESISTOR 1.2K 21 .125W F TC=0+-100	24546	C4-1/8-T0-1201-G
A14R21	0698-3156	1	RESISTOR 14.7K 1% .125W F TC=0+-100	10299	C4-1/8-T0-1472-F
A14R22	0757-0941		RESISTOR 5.1K 21 .125W F TC=0+-100	24546	C4-1/8-T0-5101-G
A14R23	0757-0915		RESISTOR 430 21 .125W F TC=0+-100	24546	C4-1/8-T0-431-G
A14R24	0757-0948		RESISTOR 10K 21 .125W F TC=0+-100	24546	C4-1/8-T0-1002-G
A14U1	1820-0270	1	I C AMPL	07263	733HC
A14U2	1820-0475		I C LM306H COMPTN	27014	LM306H
A15	05340-60012	1	10 MHZ OOBLEER ASSEMBLY (SERIES 1220A) (LOADED ON 05340-20012 BLANK BOARD)	28480	05340-60012
A15C1	0160-2259	1	CAPACITOR-FXD 12PF +-5% 500WVDC CER	28480	0160-2259
A15C2	0160-2203	1	CAPACITOR-FXO 91PF 4-51 300WVDC MICA	28480	0160-2203
A15C3	0121-0180	1	CAPACITOR-V TRMR-CER 15/60PF 200V PC-MTG	00865	304324 15/60PF N1500
A15C4	0160-2261	1	CAPACITOR-FXO 15PF +-5% 500WVDC CER	28480	0160-2261
A15C5	0160-2055		CAPACITOR-FXO .01UF +80-20% 100WVDC CER	28480	0160-2055
A15C6	0160-2055		CAPACITOR-FXO .01UF +80-20% 100WVDC CER	28480	0160-2055
A15C7	0160-2055		CAPACITOR-FXO .01UF +80-20% 100WVDC CER	28480	0160-2055
A15C8	0160-2055		CAPACITOR-FXO .01UF +80-20% 100WVDC CER	28480	0160-2055
A15C9	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A15C10	0140-0191		CAPACITOR-FXO 56PF +-5% 300WVDC MICA	72136	0M15E560J0300WV1CR
A15C11	3121-0105	2	CAPACITOR-V TRMR-CER 9/35PF 200V PC-MTG	00865	304324 9/35PF N650
A15C12	0140-0191		CAPACITOR-FXD 56PF +-5% 300WVDC MICA	72136	0M15E560J0300WV1CR
A15C13	3121-0105		CAPACITOR-V TRMR-CER 9/35PF 200V PC-MTG	00865	304324 9/35PF N650
A15C14	0160-2249	2	CAPACITOR-FXD 4.7PF +-25PF 500WVDC CER	28480	0160-2249
A15C15	0160-2249		CAPACITOR-FXO 4.7PF +-25PF 500WVDC CER	28480	0160-2249
A15CR1	1901-0535		DIODE-SCHOTTKY	28480	1901-0535
A15CR2	1901-0535		DIODE-SCHOTTKY	28480	1901-0535
A15L1	9100-1616	1	COIL-FXD MOLDED RF CHOKE 1.5UH 10%	24226	15/151
A15L2	9100-2274	3	COIL-FXO MOLDED RF CHOKE 68UH 10%	24226	101682
A15L3	9100-2274		COIL-FXO MOLDED RF CHOKE 68UH 10%	24226	10/682
A15L4	9100-2274		COIL-FXD MOLDED RF CHOKE 68UH 10%	24226	101682
A15L5	9100-1614	2	COIL-FXD MOLDED RF CHOKE .82UH 10%	24226	151820

See introduction to this section for ordering information

Model 5340A
Replaceable Parts

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A15L6	9100-1614		COIL-FXO HOLCEO RF CHOKE .82UH 101	24226	15/820
A15R1	0757-0916		RESISTOR 470 2% .125W F TC=0+-100	24546	C4-1/8-T0-471-G
A15R2	0698-3440		RESISTOR 196 1% .125W F TC=0+-100	16299	C4-1/8-T0-196R-F
A15R3	0698-3440		RESISTOR 196 1% .125W F TC=0+-100	16299	C4-1/8-T0-196R-F
A15R4	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A15R5	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A15R6	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A15R7	0698-3158	3	RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A15R8	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A15R9	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A15R10	0757-0278		RESISTOR 1.78K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1781-F
A15R11	0757-0912	1	RESISTOR 330 2% .125W F TC=0+-100	24546	C4-1/8-T0-331-G
A15R12	0757-0441	1	RESISTOR 8.25K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8251-F
A15R13	0757-0199		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A15R14	0757-0428	1	RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A15U1	1858-0004		IC CA3049 AMPL	02735	CA3049
A16	05340-60015	1	MOTHER BOARD ASSEMBLY (SERIES 1220A) (LOADED ON 05340-20015 BLANK BOARD)	28480	05340-60015
A16C1	0160-3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277
A16C2	0160-3277		CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160-3277
A16C3	0160-3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277
A16C4	0160-3277		CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160-3277
A16C5	0160-3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277
A16C6	0160-3277		CAPACITOR-FXD .01UF +-20% 50WVDC CER	28480	0160-3277
A16C7	0160-3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277
A16C8	0160-3277		CAPACITOR-FXO .01UF +-20% 50WVDC CER	28480	0160-3277
A16J1	1250-0257	9	CONNECTOR-RF SMB H PC	28480	1250-0257
A16J2	1250-0257		CONNECTOR-RF SMB H PC	28480	1250-0257
A16J3	1250-0257		CONNECTOR-RF SMB H PC	28480	1250-0257
A16J4	1250-0257		CONNECTOR-RF SMB M PC	28480	1250-0257
A16J5	1250-0257		CONNECTOR-RF SHR H PC	28480	1250-0257
A16J6	1250-0257		CONNECTOR-RF SMB M PC	28480	1250-0257
A16J7	1250-0257		CONNECTOR-RF SMB M PC	28480	1250-0257
XA4	1251-1668	12	CONNECTOR:RT ANG MOUNT	28480	1251-1668
XA5	1251-1668		CONNECTOR:RT ANG MOUNT	28480	1251-1668
XA6	1251-1668		CONNECTOR:RT ANG MOUNT	28480	1251-1668
XA7	1251-1668		CONNECTOR:RT-ANGLE MOUNT	28480	1251-1668
XA8	1251-1668		CONNECTOR:RT-ANGLE MOUNT	28480	1251-1668
XA9	1251-1668		CONNECTOR:RT-ANGLE MOUNT	28480	1251-1668
XA10	1251-1668		CONNECTOR:RT-ANGLE MOUNT	28480	1251-1668
XA11	1251-1668		CONNECTOR:RT-ANGLE MOUNT	28480	1251-1668
XA12	1251-1668		CONNECTOR:RT-ANGLE MOUNT	28480	1251-1668
XA13	1251-1668		CONNECTOR:RT-ANGLE MOUNT	28480	1251-1668
XA14	1251-1668		CONNECTOR:RT-ANGLE MOUNT	28480	1251-1668
XA15	1251-1668		CONNECTOR:RT-ANGLE MOUNT	28480	1251-1668
A17	05340-60041	1	DIRECT COUNT AMPLIFIER ASSEMBLY	28480	05340-60041
	05340-00019	1	COVER, HOUSING	28480	05340-00019
	05340-20034	1	HOUSING, OC AMPLIFIER	28480	05340-20034
	05340-20041	6	SPACER BOARD	28480	05340-20041
A17W1	05340-60046	1	CABLE ASSEMBLY, DIRECT COUNT	28480	05340-60046
A17A1	05340-60038	1	DIRECT COUNT AMPLIFIER BOARD ASSEMBLY (SERIES 1416A REV. 81 (LOADED ON 05342-20038 BLANK BOARD)	28480	05340-60038
A17A1C1	0180-0106		CAPACITOR-FXOI 60UF+-20% 6VDC TA-SOLID	56289	1500606X000682
A17A1C2	0180-0106		CAPACITOR-FXD 60UF+-20% 6VDC TA-SOLID	56289	1500606X000682
A17A1C3	0160-3789		CAPACITOR-FXD 560PF +-20% 50WVDC CER	28480	0160-3789
A17A1C4	0160-3789		CAPACITOR-FXD 560PF +-20% 50WVDC CER	28480	0160-3789
A17A1C5	0180-0155	3	CAPACITOR-FXOI 2.2UF+-20% 20VDC TA	56289	1500225X0020A2
A17A1C6	0180-0155		CAPACITOR-FXD 2.2UF+-20% 20VDC TA	56289	1500225X0020A2
A17A1C7	0180-0155		CAPACITOR-FXD 2.2UF+-20% 20VDC TA	56289	1500225X0020A2
A17A1C8	0160-3789		CAPACITOR-FXOI 560PF +-20% 50WVDC CER	28480	0160-3789
A17A1C9	0160-3789		CAPACITOR-FXOI 560PF +-20% 50WVDC CER	28480	0160-3789
A17A1C10	0160-3789		CAPACITOR-FXOI 560PF +-20% 50WVDC CER	28480	0160-3789
A17A1C11	0180-0197		CAPACITOR-FXOI 2.2UF+-10% 20VDC TA	56289	1500225X9020A2
A17A1C12	0180-0197		CAPACITOR-FXOI 2.2UF+-10% 20VDC TA	56289	1500225X9020A2
A17A1C13	0180-0106		CAPACITOR-FXOI 60UF+-20% 6VDC TA-SOLID	56289	1500606X000682
A17A1C14	0180-0106		CAPACITOR-FXOI 60UF+-20% 6VDC TA-SOLID	56289	1500606X000682
A17A1C15	0160-3789		CAPACITOR-FXD 560PF +-20% 50WVDC CER	28480	0160-3789

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Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A17A1C16 A17A1C17 A17A1C18 A17A1C19 A17A1C20	0160-2248 0160-3789 0180-0106 0180-1746	1 2	CAPACITOR-FXD 4.3PF +- .25PF 500WVDC CER NOT ASSIGNED CAPACITOR-FXD 560PF + 201 50WVDC CER CAPACITOR-FXD; 60UF+-20% 6VDC TA-SOLID CAPACITOR-FXD; 15UF+-10% 20VDC TA-SOLID	2848C 2848C 56289 56289	0160-2248 0160-3789 1500606X0006B2 1500156X9020B2
A17A1C21 A17A1C22 A17A1C23	0160-3789 0160-3789		NOT ASSIGNED CAPACITOR-FXD 560PF +-20% 50WVDC CER CAPACITOR-FXD 560PF +- 20% 50WVDC CER	28480 28480	0160-3789 0160-3789
A17A1CR1 A17A1CR2 A17A1CR3 A17A1CR4 A17A1CR5	1901-0535 1901-0535 1901-0040 05340-80006	1	DIODE-SCHOTTKY DIODE-SCHOTTKY DIODE-SWITCHING 30V 50NA 2NS DO-35 DIODE, MATCHED QUAD	28480 2848C 28480 28480	1901-0535 1901-0535 1901-0040 05340-80006
A17A1E1 A17A1E2 A17A1E3	9170-0029 9170-0029		NOT ASSIGNED CORE-SHIELDING BEAD CORE-SHIELDING BEAD	02114 02114	56-590-65A2/4A 56-590-65A2/4A
A17A1J1 A17A1J2	1250-0257 1250-0257		CONNECTOR-RF SMB H PC CONNECTOR-RF SMB H PC	28480 28480	1250-0257 1250-0257
A17A1L1 A17A1L2 A17A1L3 A17A1L4 A17A1L5	9140-0158 9140-0158 9140-0158 9140-0158 9100-2252	1	COIL-FXD MOLDED RF CHOKE 1UH 10% COIL-FXD MOLDED RF CHOKE 1UH 10% COIL-FXD HOLOEO RF CHOKE 1UH 10% COIL-FXD MOLDED RF CHOKE 1UH 10% COIL-FXD MOLDED RF CHOKE .27UH 10%	2422b 2422b 24226 24226 24226	10/101 10/101 10/101 10/101 101270
A17A1L6 A17A1L7	9100-2247 9100-2247		COIL-FXD HOLOEO RF CHOKE .1UH 101 COIL-FXD HOLOEO RF CHOKE .1UH 101	24226 24226	10/100 10/100
A17A1R1 A17A1R2 A17A1R3 A17A1R4 A17A1R5	0698-5180 0698-3113 0698-3113 0683-2035	1 2	RESISTOR 2K 51 .125W CC TC=0+882 RESISTOR 100 51 .125W CC TC=0+882 RESISTOR 100 5% .125W CC TC=0+882 RESISTOR 20K 5X .25W FC TC=-400/+800 NOT ASSIGNED	01121 01121 01121 01121	882025 881015 881015 CB2035
A17A1R6 A17A1R7 A17A1R8 A17A1R9 A17A1R10	0683-2035 0683-2015	1	NOT ASSIGNED RESISTOR 20K 51 .25W FC TC=-400/+800 NOT ASSIGNED NOT ASSIGNED RESISTOR 200 5% .25W FC TC=-400/+600	01121 01121	CB2035 CB2015
A17A1R11 A17A1R12 A17A1R13 A17A1R14 A17A1R15	2100-1757 0683-7525 0698-3113 0698-5177 0675-1021	1 1 1 1 1	RESISTOR-TMR 500 51 WW SIDE-ADJ 1-TURN RESISTOR 7.5K 51 .25W FC TC=-400/+700 RESISTOR 100 51 .125W CC TC=0+882 RESISTOR 820 51 .125W CC TC=0+882 RESISTOR 1K 10% .125W CC TC=0+882	GB027 01121 01121 01121 01121	CT-106-4 CB7525 881015 888215 881021
A17A1R16 A17A1R17 A17A1R18 A17A1R19 A17A1R20	0698-3378 0698-3381 0698-3114 0683-5145	1 1 1	RESISTOR 51 5% .125W CC TC=0+882 RESISTOR 150 51 .125W CC TC=0+882 RESISTOR 300 51 .125W CC TC=0+882 NOT ASSIGNED RESISTOR 510K 51 .25W FC TC=-800/+900	01121 01121 01121 01121	885105 881515 883015 CB5145
A17A1R21 A17A1R22 A17A1R23	0683-3345 2100-1759 0698-5174	1	RESISTOR 330K 5% .25W FC TC=-800/+900 RESISTOR-TMR 2K 5% WW SIDE-ADJ 1-TURN RESISTOR 200 5% .125W CC TC=0+882	01121 GB027 01121	CB3345 CT-106-4 882015
A17A1TP1	0360-0124		TERMINAL-STUD SPCL PRESS HTG	28480	0360-0124
A17A1U1 A17A1U2 A17A1U3 A17A1U4 A17A1U5	1826-0073 1826-0026 1820-0754 1820-0753	1	IC-LINEAR IC LM311H COHPTR IC AHPL NOT ASSIGNED IC GATE	28480 27014 28480 28480	1826-0073 LM311H 1820-0754 1820-0753
	05340-20041		A17A1 MISCELLANEOUS PARTS SPACER BOARD	28480	05340-20041
A18	05340-60036	1	10 MHZ OSCILLATOR ASSEMBLY (SERIES 1220A) STANOARO (LOADED ON 05340-20036 BLANK BOARD)	28480	05340-60036
	0960-0153	1	OSCILLATOR TEMP. COMPENSATOR 10 MHZ	28480	0960-0153
A18C1 A18C2	0160-2143 0160-2143	2	CAPACITOR-FXD 2000PF +80-20% 1000WVDC CAPACITOR-FXD 2000PF +80-20% 1000WVDC	28480 28480	0160-2143 0160-2143
A18L1 A18L2	9140-0179 9140-0179	2	COIL-FXD MOLDED RF CHOKE 22UH 10% COIL-FXD MOLOEO RF CHOKE 22UH 101	24226 24226	15/222 15/222
A19	05340-60031	1	INTERFACE A ASSEMBLY(STD. INSTRUMENT) (SERIES 1220A) (LOADED ON 05340-20031 BLANK BOARD)	28480	05340-60031
A19C1 A19C2 A19C3 A19C4 A19C5	(3180-0374) 0160-3879 0180-0106 0160-3879 0180-0106		CAPACITOR-FXD; 10UF+-10% 20VDC TA-SOLID CAPACITOR-FXD .01UF + 20% 100WVDC CER CAPACITOR-FXD; 60UF+-20% 6VDC TA-SOLID CAPACITOR-FXD .01UF +-20% 100WVDC CER CAPACITOR-FXD; 60UF+-20% 6VDC TA-SOLID	56289 28480 56289 28480 56289	1500106X9020B2 0160-3879 1500606X0006B2 0160-3879 1500606X0006B2

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Model 5340A
Replaceable Parts

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A19C6	0160-3879		CAPACITOR-FXO .01UF +-20% 100WVDC CER	28480	0160-3879
A19CR1	1901-0040		DIODE SWITCHING 30V 50MA 2NS 00-35	28480	1901-0040
A19L1			NOT ASSIGNED		
A19L2	9100-2247		COIL-FXO MOLDED RF CHOKE .1UH 101	24226	101100
A19L3	9140-0158		COIL-FXO MOLDED RF CHOKE 1UH 101	24226	101101
A1901	1854-0560	1	TRANSISTOR NPN SI DARL PD=310MW	04713	SPS6740
A19R1	1810-0041	3	NETWORK RES 9-PIN-SIP .15-PIN-SPCG	28480	1810-0041
A19R2	0683-2725		RESISTOR 2.7K 5% .25W FC TC=-400/+700	01121	CB2725
A19R3	0683-1025		RESISTOR 1K 5% .5W FC C=	01121	CB1025
A19R4	0683-1025		RESISTOR 1K 5% .5W FC C=	01121	CB1025
A19R5	06831015		RESISTOR 100 5% .25W FC TC	01121	CB1015
A19R6	0683-2725		RESISTOR 2.7K 5% .25W FC TC=-400/+700	01121	CB2725
A19R7	0683-2715	2	RESISTOR 270 51 .25W FC TC=-400/+600	01121	CB2715
A19R8	0683-2715		RESISTOR 270 51 .25W FC TC=-400/+600	01121	CB2715
A19R9	0683-4715	7	RESISTOR 470 5% .25W FC TC=-400/+600	01121	CB4715
A19R10	0683-2725		RESISTOR 2.7K 51 .25W FC TC=-400/+700	01121	CB2725
A19R11	0683-2025	2	RESISTOR 2K 5% .25W FC TC=-400/+700	01121	CB2025
A19R12	0683-2025		RESISTOR 2K 5% .25W FC TC=-400/+700	01121	CB2025
A19R13	0683-2725		RESISTOR 2.7K 5% .25W FC TC=-400/+700	01121	CB2725
A19R14	06832725		RESISTOR 2.7K 51 .25W FC TC=-400/+700	01121	CB2725
A19U1	1820-0537		IC SN74 13 N SCHMITT	01295	SN7413N
A19U2	1820-0174	6	IC:TTL HEX INVERTER	01295	SN7404N
A19U3	1820-0068		IC:SN7410N	01295	SN7410N
A19U4	1820-0716	3	IC SN74 161 N COUNTER	01295	SN74161N
A19U5	1820-0054		IC:SN7400N	01295	SN7400N
A19U6	1820-0054		IC:SN7400N	01295	SN7400N
A19U7	1820-0706	1	IC COMPTR	01263	93L24DC
A1921	9100-1788		COIL; FXO; NON-MOLDED RF CHOKE; .75UH	02114	VK200-20/48
A20	05340.60073	1	TIME BASE 8CARD ASSEMBLY (SERIES 1348A) (LOADED ON 05340-20018 BLANK BOARD)	28480	05340-60073
A20C1	0180-0106		CAPACITOR-FXD: 60UF+-20% 6VDC TA-SOLID	56289	150D606X000682
A20C2	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A20C3	0160-0196	1	CAPACITOR-FXC 24PF +-5% 300WVDC MICA	28480	0160-0196
A20R1	0683-2725		RESISTOR 2.7K 51 .25W FC TC=-400/+700	01121	CB2725
A20R2	0683-2725		RESISTOR 2.7K 52 .25W FC TC=-400/+700	01121	CB2725
A20R3	0683-2725		RESISTOR 2.7K 5% .25W FC TC=-400/+700	01121	CB2725
A20R4	0683-1215	1	RESISTOR 120 5% .25W FC TC=-400/+600	01121	CB1215
A20U1	1820-0055	7	IC:SN7490N	01295	SN7490N
A20U2	1820-0054		IC:SN7400N	01295	SN7400N
A20U3	1820-0077	7	IC:TTL QUAL D FLIP/FLOP	01295	SN7474N
A20U4	1820-0054		IC:SN7400N	01295	SN7400N
A20U5	1820-0099	3	IC:SN7493N	01295	SN7493N
A20U6	1820-0099		IC:SN7493N	01295	SN7493N
A20U7	1820-0099		IC:SN7493N	01295	SN7493N
A20U8	1820-0055		IC:SN7490N	01295	SN7490N
A20U9	1820-0055		IC:SN7490N	01295	SN7490N
A20U10	1820-0077		IC:TTL DUAL D FLIP/FLOP	01295	SN7474N
A20U11	1820-0077		IC:TTL QUAL D FLIP/FLOP	01295	SN7474N
A20U12	1820-0055		IC:SN7490N	01295	SN7490N
A20U13	1820-0174		IC:TTL HEX INVERTER	01295	SN7404N
A20U14	1820-0174		IC:TTL HEX INVERTER	01295	SN7404N
A20U15	1820-0055		IC:SN7490N	01295	SN7490N
A20U16	1820-0055		IC:SN7490N	01295	SN7490N
A20U17	1820-0069	3	IC:SN7420N	01295	SN7420N
A20U18	1820-0716		IC SN74 161 N COUNTER	01294	SN74161N
A20U19	1820-0904	4	IC COMPTR	07263	93L24DC
A20U20	1820-0904		IC COMPTR	07263	93L24DC
A20U21	1820-0716		IC SN74 161 N COUNTER	01295	SN74161N
A20U22	1820-0055		IC:SN7490N	01295	SN7490N
A20U23	1820-0615	1	IC MC 8312P CUXR	04713	MC8312P
A20U24	1820-1096	1	IC SN54 196 J	01295	SN54196J
A20U25	1820-0261	1	IC:TTL MULTIVIBRATOR	01295	SN74121N
A20U26	1820-0904		IC COMPTR	07263	93L24DC
A20U27	1820-0904		IC COMPTR	07263	93L24DC
A20U28	1820-0214		IC:TTL BCD-TO-DECIMAL DECODER	01295	SN7442N
A20Z1	9100-1788		COIL; FXD; NON-MOLDED RF CHOKE; .75UH	02114	VK200-20/48

See introduction to this section for ordering information

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A21	05340-60021	1	CONTROL BOARD ASSEMBLY (SERIES 12521 {LOADED ON 05340-20021 BLANK BOARD})	28480	05340-60021
A21C1	0180-0106		CAPACITOR-FXO; 60UF+-20% 6VDC TA-SOLID	56289	1500606X000682
A21C2	0160-3879		CAPACITOR-FXC; .01UF +-20% 100WVDC CER	28480	0160-3879
A21C3	0180-0197		CAPACITOR-FXD; 2.2UF+-10% 20VDC TA	56289	1500225X0020A2
A21C4	0180-0230		CAPACITOR-FXO; 1UF+-20% 50VDC TA SOLID	56289	1500105X0050A2
A21CR1	1901-0040		DIODE-SWITCHING 30V 50NA ZNS 00 35	28480	1901-0040
A21CR2	1901-0040		DIODE-SWITCHING 30V 50NA 2NS 00-35	28480	1901-0040
A21R1	0683-2725		RESISTOR 2.7K 5% .25W FC TC=-400/+700	01121	C82725
A21R2	0683-2725		RESISTOR 2.7K 5% .25W FC TC=-400/+700	01121	C82725
A21R3	1810-0041		NETWORK-RES 9-PIN-SIP .15-PIN-SPCG	28480	1810-0041
A21R4	1810-0041		NETWORK-RES 9-PIN-SIP .15-PIN-SPCG	28480	1810-0041
A21R5	0683-2725		RESISTOR 2.7K 5% .25W FC TC=-400/+700	01121	C82725
A21R6	0757-0956	1	RESISTOR 22K 2% .125W F TC=0+-100	24546	C4-1/8 TO-2202-G
A21R7	0757-0957	1	RESISTOR 24K 2% .125W F TC=0+-100	24546	C4-1/8 TO-2402-G
A21U1	1820-0616	2	IC HUXR	07263	93220C
A21U2	1820-0788	1	IC SN74 174 N FLIP-FLOP	01295	SN74174N
A21U3	1816-0003	1	IC ROM BIPOLAR 256-BIT	28480	1816-0003
A21U4	1816-0004	1	IC ROM BIPOLAR OUTPUT & QUALIFIER	28480	1816-0004
A21U5	1820-0054		IC SN7400N	01295	SN7400N
A21U6	1820-0054		IC SN7400N	01295	SN7400N
A21U7	1820-0054		IC SN7400N	01295	SN7400N
A21U8	1820-0054		IC SN7400N	01295	SN7400N
A21U9	1820-0515		IC MV	07263	9602PC
A21U10	1820-0077		IC TTL DUAL D FLIP/FLOP	01295	SN7474N
A21U11	1820-0174		IC TTL HEX INVERTER	01295	SN7404N
A21U12	1820-0640	1	IC SN74 150 N HUXR	01295	SN74150N
A21U13	1820-0495	1	IC OCOOER	07263	93110C
A21U14	1820-0054		IC SN7400N	01295	SN7400N
A21U15	1820-0054		IC SN7400N	01295	SN7400N
A21U16	1820-0068		IC SN7410N	01295	SN7410N
A2121	9100;1788		COIL; FXO; NON-MOUNTED RF CHOKE; .75UH	02114	VK200-20/48
A22	05340-60016	1	HIGH FREQUENCY CWNTER ASSEMBLY (SERIES 1328A) {LOADED ON 05340-20016 BLANK BOARD}	28480	05340-60016
A22C1	0180-0106		CAPACITOR-FXD; 60UF+-20% 6VDC TA-SOLID	56289	1500606X000682
A22C2	0160-3879		CAPACITOR-FXO; .01UF +-20% 100WVDC CER	28480	0160-3879
A22C3	0140-0176		CAPACITOR-FXO 100PF +-2% 300WVDC MICA	72136	DM15F101G0300WV1CR
A22C4			NOT ASSIGNED		
A22C5			NOT ASSIGNED		
A22C6			NOT ASSIGNED		
A22C7	0140-0176		CAPACITOR-FXO 100PF +-2% 300WVDC MICA	72136	DM15F101G0300WV1CR
A22C8	0140-0176		CAPACITOR-FXO 100PF +-2% 300WVDC MICA	72136	101G0300WV1CR
A22C9	0180-0106		CAPACITOR-FXO; 60UF+-20% 6VDC TA-SOLID	56289	1500606X000682
A22C10	0160-3879		CAPACITOR-FXO; .01UF +-20% 100WVDC CER	28480	0160-3879
A22C11	0160-3879		CAPACITOR-FXO; .01UF +-20% 100WVDC CER	20480	0160-3879
A22C12	0160-3878		CAPACITOR-FXO 100PF +-20% 100WVDC CER	28480	0160-3878
A22C13	0180-0106	2	CAPACITOR-FXD; 60UF+-20% 6VDC TA-SOLID	56289	1500606X000682
A22C14	0160-3878		CAPACITOR-FXO 1000PF + 20% 100WVDC CER	28480	0160-3878
A22C15	0180-0106		CAPACITOR-FXO; 60UF+-20% 6VDC TA-SOLID	56289	1500606X000682
A22CR1	1901-0535		DIODE SCHOTTKY	28480	1901-0535
A22J1	1250-1368	1	CONNECTOR-RF SMB M PC	28480	1250-
A22L1	9140-0158		COIL-FXD RF CHOKE 1UH 101	24226	10/101
A2201	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A2202	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A2203	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A2204	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A2205	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A2206	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A2207	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A2208	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A2209	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A22010	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A22011	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A22012	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A22013	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A22014	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A22015	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071

See introduction to this section for ordering information

Model 5340A
Replaceable Parts

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A22916 A22917 A22918 A22919 A22920	1854-0071 1854-0071 1854-0092 1854-0009 1854-0092	2 1	TRANSISTOR NPN SI D 300MW FT=200MHZ TRANSISTOR NPN SI D 300 FT 2004HZ TRANSISTOR NPN SI 300 FT 2004HZ TRANSISTOR NPN 2N [®] SI TC 18 D=300MW TRANSISTOR NPN SI 41 FT 500MHZ	28480 20480 28480 28480 28480	1854-0071 1854-0071 1854-0092 1854-0009 1854-0092
A22921	1854-0071		TRANSISTOR NPN SI PD=300MW 200 ⁺	28480	1854-0071
A22R1 A22R2 A22R3 A22R4 A22R5	0683-5105 0683-1015 0683-5105 0757-0931 0757-0931		RESISTOR 51 52 251 FC TC=-400/+500 RESISTOR 100 51 .25W FC 00/ RESISTOR 51 52 25W C T 0 0/+ RESISTOR 2K 22 .125W F T =0+100 RESISTOR 2 22 .125W F T 100	01121 01121 01121 24546 24546	C85105 C81015 C85105 C4 1/8-T0-2001-G C4 1/8-T0-2001-G
A22R6 A22R7 A22R8 A22R9 A22R10	0757-0931 0757-0931 0757-0931 0757-0931 0757-0934		RESISTOR 2K 22 .125W F TC=0+100 RESISTOR 2K 22 .125W F TC=0+100 2 2K 22 .25W F TC=0+100 2 2K 22 .25W F TC=0+100 2 K 1 .125W F TC 1	24546 24546 24546 24546 24546	C4 1/8-T0-2001-G C4 1/8-T0-2001-G C4 1/8-T0-2001-G C4 1/8-T0-2001-G C4 1/8-T0-2701-G
A22R11 A22R12 A22R13 A22R14 A22R15	0683-5115 0757-0934 0683-5115 0757-0934 0683-5115	7	RESISTOR 510 5 5W F TC=-400/+600 RESISTOR 2.7K 22 .125W F TC=0+100 RESISTOR 510 52 .25W FC TC=-400/+600 RESISTOR 2.7K 22 .125W F TC=0+100 RESISTOR 510 51 .25W FC TC=-400/+600	01121 24546 01121 24546 01121	C85115 C4 1/8-T0-2701-G C85115 C4 1/8-T0-2701-G C85115
A22R16 A22R17 A22R18 A22R19 A22R20	0757-0934 0683-5115 0757-0934 0683-5115 0757-0934		RESISTOR 2.7K 21 .125W F TC=0+100 RESISTOR 510 52 .25W FC TC=-400/+600 RESISTOR 2.7K 21 .125W F TC=0+100 RESISTOR 510 52 .25W FC TC=-400/+600 RESISTOR 2.7K 21 .125W F TC=0+100	24546 01121 24546 01121 24546	C4 1/8-T0-2701-G C85115 C4 1/8-T0-2701-G C85115 C4 1/8-T0-2701-G
A22R21 A22R22 A22R23 A22R24 A22R25	0683-5115 0683-1515 0683-1515 0683-1515 0683-1515	b	RESISTOR 510 52 .25W FC TC=-400/+600 RESISTOR 150 52 .25W FC TC=-400/+600 RESISTOR 150 52 .25W FC TC=-400/+600 RESISTOR 150 52 .25W FC TC=-400/+600 RESISTOR 150 52 .25W FC TC=-400/+600	01121 01121 01121 01121 01121	C85115 C81515 C81515 C81515 C81515
A22R26 A22R27 A22R28 A22R29 A22R30	0683-1515 0683-1515 0757-0900 0757-0909 0683-5105	1	RESISTOR 150 52 .25W FC TC=-400/+600 RESISTOR 150 52 .25W FC TC=-400/+600 RESISTOR 100 21 .125W F TC=0+100 RESISTOR 240 22 .125W F TC=0+100 RESISTOR 51 51 .25W FC TC=-400/+500	01121 01121 24546 24546 01121	C81515 C81515 C4 1/8-T0-101-G C4 1/8-T0-241-G C85105
A22R31 A22132 A22133 A22R34 A22R35	0683-4715 0683-4715 0683-4715 0683-4715 0683-5105		RESISTOR 470 52 .25W FC TC=-400/+600 RESISTOR 470 51 .25W FC TC=-400/+600 RESISTOR 470 51 .25W FC TC=-400/+600 RESISTOR 470 51 .25W FC TC=-400/+600 RESISTOR 51 51 .25W FC TC=-400/+500	01121 01121 01121 01121 01121	C84715 C84715 C84715 C84715 C85105
A22R36 A22R37 A22R38 A22R39 A22R40	0683-2725 0683-2725 0683-2725 0683-2725 0683-5105		RESISTOR 2.7K 52 .25W FC TC=-400/+700 RESISTOR 2.7K 52 .25W FC TC=-400/+700 RESISTOR 2.7K 51 .25W FC TC=-400/+700 RESISTOR 2.7K 51 .25W FC TC=-400/+700 RESISTOR 51 52 .25W FC TC=-400/+500	01121 01121 01121 01121 01121	C82725 C82725 C82725 C82725 C85105
A22R41 A22R42 A22R43 A22R44 A22R45	0683-4725 0683-4715 0683-5105 0683-1025 0683-1015	1	RESISTOR 4.7K 52 .25W FC TC=-400/+700 RESISTOR 470 52 .25W FC TC=-400/+600 RESISTOR 51 51 .25W FC TC=-400/+500 RESISTOR 1K 52 .25W FC TC=-400/+600 RESISTOR 100 52 .25W FC TC=-400/+500	01121 01121 01121 01121 01121	C84725 C84715 C85105 C81025 C81015
A22R46 A22R47 A22R48 A22R49 A22R50	0683-6815 0683-4715 0683-3915 0683-1015 0683-5625	1 1 1 1 1	RESISTOR 680 51 .25W FC TC=-400/+600 RESISTOR 470 52 .25W FC TC=-400/+600 RESISTOR 390 52 .25W FC TC=-400/+600 RESISTOR 100 52 .25W FC TC=-400/+500 RESISTOR 5.6K 52 .25W FC TC=-400/+700	01121 01121 01121 01121 01121	C86815 C84715 C83915 C81015 C85625
A22R51 A22R52 A22R53 A22R54 A22R55	0683-1225 2100-1738 0683-1225 0757-0907 0757-0936	2 1 1 1 3	RESISTOR 1.2K 52 .25W FC TC=-400/+700 RESISTOR-TRYR 10K 10% C TOP-AOJ 1-TURN RESISTOR 1.2K 51 .25W FC TC=-400/+700 RESISTOR 200 29 .125W F TC=0+100 RESISTOR 3.3K 21 .125W F TC=0+100	01121 30983 01121 24546 24546	C81225 ET50WJ03 C81225 C4 1/8-T0-201-G C4 1/8-T0-3301-G
A22U1 A22U2 A22U3 A22U4 A22U5	1820-0275 1820-1019 1820-0560 1820-0751 1820-0610	1 1 2 1 1	IC MC 1039P XLTR-LGC IC COUNTER IC DIGITAL IC SN74196 N COUNTER IC MC 8309P MUXR	04713 28480 28480 01295 04713	MC1039P 1820-1019 1820-0560 SN74196N MC8309P
A22U6 A22U7 A22U8 A22U9	1820-0557 1820-0557 1820-0560 5086-7089	2 1 1 1	IC FLIP-FLOP IC FLIP-FLOP IC DIGITAL TRIGGER AMPLIFIER	28480 28480 28480 28480	1820-0557 1820-0557 1820-0560 5086-7089
A22XU2 A22XU3 A22XU6 A22XU7 A22XU8	1200-0475 1200-0475 1200-0475 1200-0475 1200-0475		CONNECTOR:1-CONT SKT .016 DIA CONNECTOR:1-CONT SKT .016 DIA CONNECTOR:1-CONT SKT .016 DIA CONNECTOR:1-CONT SKT .016 DIA CONNECTOR:1-CONT SKT .016 DIA	22526 22526 22526 22526 22526	75060-005 75060-005 75060-005 75060-005 75060-005

See introduction to this section for ordering information

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A22XU9	1200-0475		CONNECTOR; 1-CONT SKT .016 DIA	2252	75060-005
A22Z1	9100-1788		COIL; FXD; NON-MOLDED RF CHOKE; .75UH	02114	VK200-20/48
A22Z2	9100-1788		COIL; FXD; NON-MOLDED RF CHOKE; .75UH	02114	VK200-20/48
A23	05340-60030	1	COUNT REGISTER ASSEMBLY (SERIES 1220A) (LOADED ON 05340-20030 BLANK BOARD)	28480	05340-40033
A23C1	0160-3879		CAPACITOR-FXD; .01UF +-20% 100WVDC CER	28480	0160-3879
A23C2	0160-0106		CAPACITOR-FXD; 60UF+-20% 6VDC TA-SOLID	56289	150D606X00068
A23R1	0683-2725		RESISTOR 2.71 5% .25W PC TC=-400/+700	01121	C82725
A23U1	1820-0596	1	IC DM74L 74N FLIP-FLOP	27014	DM74L74N
A23U2	1820-0986	6	IC DM86L 75N COUNTER	27014	DM86L75N
A23U3	1820-0986		IC DM86L 75h COUNTER	27014	DM86L75N
A23U4	1820-0986		IC DM86L 75N COUNTER	27014	DM86L75N
A23U5	1820-0986		IC DM86L 75N COUNTER	27014	DM86L75N
A23U6	1820-0986		IC DM86L 75N COUNTER	27014	DM86L75N
A23U7	1820-0986		IC DM86L 75N COUNTER	27014	DM86L75N
A23U8	1820-0659	2	IC RGTR	07263	93L000C
A23U9	1820-0659		IC RGTR	07263	93L000C
A23U10	1820-0910	2	IC SN74LS 83 N ADDER	01295	SN74LS83N
A23U11	1820-0910		IC SN74LS 83 N ADDER	01295	SN74LS83N
A23U12	1820-0583	2	IC DM74L 00N GATE	27014	DM74L00N
A23U13	1820-0588	1	IC DM74L 20N GATE	27014	DM74L20N
A23U14	1820-0054		IC:SN7400N	01295	SN7400N
A23U15	1820-0054		IC:SN7400N	01295	SN7400N
A23U16	1820-0077		IC:TTL DUAL D FLIP/FLOP	01295	SN7474N
A23U17	1820-0077		IC:TTL DUAL D FLIP/FLOP	01295	SN7474N
A23U18	1820-0054		IC:SN7400N	01295	SN7400N
A23U19	1820-0077		IC:TTL DUAL D FLIP/FLOP	01295	SN7474N
A23U20	1820-0282	1	IC SN74 86 N GATE	01295	SN7486N
A23U21	1820-0068		IC:SN7410N	01295	SN7410N
A23Z1	9100-1788		COIL; FXD; NON-MOLDED RF CHOKE; .75UH	02114	VK200-20/48
A24	05340-60019	1	DISPLAY REGISTER ASSEMBLY (SERIES 1236A) (LOADED ON 05340-20019 BLANK BOARD)	28480	05340-60019
A24C1	0160-0106		CAPACITOR-FXD; 60UF+-20% 6VDC TA-SOLID	56289	150D606X00068
A24C2	0160-3879		CAPACITOR-FXD; .01UF +-20% 100WVDC CER	28480	0160-3879
A24J1A	1251-2035	2	CONNECTOR-PC EDGE CONT/ROW 2-ROWS	71705	252-15-3 P 300
A24J1B	1251-2035		CONNECTOR-PC EDGE CONT/ROW 2-ROWS	71705	252-15-30-300
A24U1	1820-0294	5	IC:TTL 8-BIT SHIFT REGISTER	27014	DM8570N
A24U2	1820-0657	1	IC ENCODEP	07263	93180C
A24U3	1820-0174		IC:TTL HEX INVERTER	01295	SN7404N
A24U4	1820-0616		IC MUXR	07263	93220C
A24U5	1820-0069		IC:SN7420N	01295	SN7420N
A24U6	1820-0587	2	IC DM74L 10N GATE	27014	DM74L10N
A24U7	1820-0583		IC DM74L 00N GATE	27014	DM74L00N
A24U8	1820-0054		IC:SN7400N	01295	SN7400N
A24U9	1820-0294		IC:TTL 8-BIT SHIFT REGISTER	27014	DM8570N
A24U10	1820-0069		IC:SN7420N	01295	SN7420N
A24U11	1820-0294		IC:TTL 8-BIT SHIFT REGISTER	27014	DM8570N
A24U12	1820-0589	1	IC DM74L 30N GATE	27014	DM74L30N
A24U13	1820-0054		IC:SN7400N	01295	SN7400N
A24U14	1820-0174		IC:TTL HEX INVERTER	01295	SN7404N
A24U15	1820-0587		IC DM74L 10N GATE	27014	DM74L10N
A24U16	1820-0294		IC:TTL 8-BIT SHIFT REGISTER	27014	DM8570N
A24U17	1820-0294		IC:TTL 8-BIT SHIFT REGISTER	27014	DM8570N
A24U18	1820-1047	1	IC SN74L 42AN DECODER	27014	DM74L42AN
A24Z1	9100-1788		COIL; FXD; NON-MOLDED RF CHOKE; .75UH	02114	VK200-20/48
A24Z2	9100-1788		COIL; FXD; NON-MOLDED RF CHOKE; .75UH	02114	VK200-20/48
L25	05340-60020	1	DISPLAY ASSEMBLY (SERIES 1236A) (LOADED ON 05340-20020 BLANK BOARD)	28480	05340-60020
A25C1	0160-0106		CAPACITOR-FXD; 60UF+-20% 6VDC TA-SOLID	56289	150D606X00068
A25C2	0160-3879		CAPACITOR-FXD; .01UF +-20% 100WVDC CER	28480	0160-3879
A25CR1	1902-3301	1	0100E-ZNR 34.8V 52 DO-7 PD=-4W TC=-.078%	34713	SZ 10939 338
A25DS1	1970-0054	8	TUBE ELCTRN 858705 INO-ALPHANUMERIC	28480	1970-0054
A25DS2	1200-0405	8	SOCKET-TUBE 14-CONT NIXIE-PKG	93781	ITS-44
A25DS3	1970-0054		TUBE ELCTRN 858705 INO-ALPHANUMERIC	28480	1970-0054
A25DS4	1200-0405		SOCKET-TUBE 14-CONT NIXIE-PKG	33781	ITS-44
A25DS5	1970-0054		TUBE ELCTRN 858705 IND-ALPHANUMERIC	28480	1970-0054
A25DS6	1200-0405		SOCKET-TUBE 14-CONT NIXIE-PKG	33781	ITS-44

See introduction to this section for ordering information

Model 5340A
Replaceable Parts

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Coder	Mfr Part Number
A250S4 A25XDS4 A25DS5 A25XDS5 A25DS6 A25XDS6	1970-0054 1200-0405 1970-0054 1200-0405 1970-0054 1200-0405		TUBE ELCTRN 858705 INO-ALPHANUMERIC SOCKET-TUBE 14-CONT NIXIE-PKG TUBE FLCTRN 858705 IND-ALPHANUMERIC SOCKET-TUBE 14-CONT NIXIE-PKG TUBE FLCTRN 858705 IND-ALPHANUMERIC SOCKET-TUBE 14-CONT NIXIE-PKG	28480 83781 28480 83781 28480 83781	1970-0054 RTS-44 1970-0054 RTS-44 1970-0054 RTS-44
A25DS7 A25XDS7 A25DS8 A25XDS8 A25DS9 A25XDS9	1970-0054 1200-0405 1970-0054 1200-0405 2140-0313 2140-0313	9	TUBE ELCTRN 858705 IND-ALPHANUMERIC SOCKET-TUBE 14-CONT NIXIE-PKG TUBE ELCTRN 858705 INO-ALPHANUMERIC SOCKET-TUBE 14-CONT NIXIE-PKG LAUP-GLOW T-2 BULB 58V	28480 83781 28480 83781 74276	1970-0055 RTS-44 1970-0054 RTS-44 NCZH FROSTED
A25DS10 A25XDS10 A25DS11 A25XDS11 A25DS12 A25XDS12 A25DS13 A25XDS13 A25DS14 A25XDS14	2140-0313 2140-0313 2140-0313 2140-0313 2140-0313 2140-0313 2140-0313 2140-0313 2140-0313 2140-0313		LAMP-GLOW T-2 BULB 58V LAUP-GLOW T-2 BULB 58V LAMP-GLOW T-2 BULB 58V LAMP-GLOW T-2 BULB 58V LAMP-GLOW T-2 BULB 58V LAMP-GLOW T-2 BULB 58V	74276 74276 74276 74276 74276 74276	NEZH FROSTED NEZH FROSTED NEZH FROSTED NEZH FROSTED NEZH FROSTED NEZH FROSTED
A25DS15 A25XDS15 A25DS16 A25XDS16 A25DS17 A25XDS17	2140-0313 2140-0313 2140-0313 2140-0313 2140-0313 2140-0313		CAMP-GLOW T-2 BULB 58V LAUP-GLOW T-2 BULB 58V LAMP-GLOW T-2 BULB 58V	74276 74276 74276	NEZH FROSTED NEZH FROSTED NEZH FROSTED
A2591 A2592 A2593 A2594 A2595	1854-0533 1854-0533 1854-0533 1854-0533 1854-0533	12	TRANSISTOR NPN SI PD=625MHZ FT=100MHZ TRANSISTOR NPN SI PD=625MHZ FT=100MHZ TRANSISTOR NPN SI PD=625MHZ FT=100MHZ TRANSISTOR NPN SI PD=625MHZ FT=100MHZ TRANSISTOR NPN SI PD=625MHZ FT=100MHZ	28480 28480 28480 28480 28480	1854-0533 1854-0533 1854-0533 1854-0533 1854-0533
A2596 A2597	1854-0533 1854-0071		TRANSISTOR NPN SI FT=100MHZ TRANSISTOR NPN SI PD=300MHZ FT=200MHZ	28480 28480	1854-0533 1854-0071
A25R1 A25R2 A25R3 A25R4 A25R5	0683-4735 0683-4735 0683-4735 0683-4735 0757-0543	7	RESISTOR 47K 5% .25W FC TC=-400/+800 RESISTOR 47K 5% .25W FC TC=-400/+800 RESISTOR 47K 5% .25W FC TC=-400/+800 RESISTOR 47K 5% .25W FC TC=-400/+800 RESISTOR 6.2K 2% .125W F TC=0/+100	01121 01121 01121 01121 24546	C84735 C84735 C84735 C84735 C4-1/8-T0-6201-G
A25R6 A25R7 A25R8 A25R9 A25R10	0683-4735 0757-0943 0683-4735 0757-0943 0683-4735	9	RESISTOR 47K 5% .25W FC TC=-400/+800 RESISTOR 6.2K 2% .125W F TC=0/+100 RESISTOR 47K 5% .25W FC TC=-400/+800 RESISTOR 6.2K 2% .125W F TC=0/+100 RESISTOR 47K 5% .25W FC TC=-400/+800	01121 24546 01121 24546 01121	C84735 C4-1/8-T0-6201-G C84735 C4-1/8-T0-6201-G C84735
A25R11 A25R12 A25R13 A25R14 A25R15	0683-2045 0683-2735 0683-2725 0683-2735 0683-2725	1 8	RESISTOR 200K 5% .25W FC TC=-800/+900 RESISTOR 27K 5% .25W FC TC=-400/+800 RESISTOR 2.7K 5% .25W FC TC=-400/+700 RESISTOR 27K 5% .25W FC TC=-400/+800 RESISTOR 2.7K 5% .25W FC TC=-400/+700	01121 01121 01121 01121 01121	C82045 C82735 C82725 C82735 C82725
A25R16 A25R17 A25R18 A25R19 A25R20	0683-2735 0683-2725 0683-2735 0683-2725 0683-2735		RESISTOR 27K 1% .25W F TC=-400/+800 RESISTOR 2.7K 5% .25W C TC=-400/+700 RESISTOR 27K 1% .25W F TC=-400/+800 RESISTOR 2.7K 5% .25W FC TC=-400/+700 RESISTOR 27K 5% .25W FC TC=-400/+800	01121 01121 01121 01121 01121	C82735 C82725 C82735 C82725 C82735
A25R21 A25R22 A25R23 A25R24 A25R25	0683-2725 0683-2735 0683-2725 0683-2425 0683-2725	1	RESISTOR 2.7K 5% .25W FC TC=-400/+700 RESISTOR 27K 5% .25W FC TC=-400/+800 RESISTOR 2.7K 5% .25W FC TC=-400/+700 RESISTOR 2.4K 5% .25W FC TC=-400/+700 RESISTOR 2.7K 5% .25W FC TC=-400/+700	01121 01121 01121 01121 01121	C82725 C82735 C82725 C82425 C82725
A25R26 A25R27	0683-5125 0683-2735		RESISTOR 5.1K 5% .25W FC TC=-400/+700 RESISTOR 27K 5% .25W FC TC=-400/+800	01121 01121	C85125 C82735
A25U1 A25U2 A25U3 A25U4 A25U5	1820-1161 1820-1161 1820-1161 1820-1161 1820-1161	10	IC DECODER IC DECODER IC DECODER IC DECODER IC DECODER	28480 28480 28480 28480 28480	1820-1161 1820-1161 1820-1161 1820-1161 1820-1161
A25U6 A25U7 A25U8 A25U9 A25U10	1820-1161 1820-1161 1820-1161 1820-1161 1820-1161		IC DECODER IC DECODER IC DECODER IC DECODER IC DECODER	28480 28480 28480 28480 28480	1820-1161 1820-1161 1820-1161 1820-1161 1820-1161
A25 MISCELLANEOUS					
	05330-00027 05330-40002 05340-00006 05340-00007 05340-60057	1 3 1 1 1	RETAINER, RIGHT (SINGLE BRACKET) BLOCK, ANNUNCIATOR SHIELD, NIXIE BRACKET, ANNUNCIATOR (DOUBLE BRACKET) CABLE ASSEMBLY, DISPLAY BLANKING	28480 28480 28480 28480 28480	05330-00027 05330-40002 05340-00006 05340-00007 05340-60057
	05340-80001 05340-80002 05340-80003	1 1 1	INDICATOR, OF LO, LOCK, GATE INDICATOR, GHZ, MHZ, KHZ INDICATOR, RPT, DIR, ***	28480 28480 28480	05340-80001 05340-80002 05340-80003

See introduction to this section for ordering information

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A26	05340-60037	1	BLANKING ASSEMBLY (SERIES 1236A) (LOADED ON 05340-20037 BLANK BOARD)	28480	05340-60037
A26Q1	1854-0533		TRANSISTOR NPN SI PD=625MW FT=100MHZ	28480	1854-0533
A26Q2	1854-0533		TRANSISTOR NPN SI PD=625MW FT=100MHZ	28480	1854-0533
A26Q3	1854-0533		TRANSISTOR NPN SI PD=625MW FT=100MHZ	28480	1854-0533
A26Q4	1854-0533		TRANSISTOR NPN SI PD=625MW FT=100MHZ	28480	1854-0533
A26Q5	1854-0533		TRANSISTOR NPN SI PD=625MW FT=100MHZ	28480	1854-0533
A26Q6	1853-0317		TRANSISTOR PNP SI PD=625MW FT=100MHZ	28480	1853-0317
A26Q7	1853-0317		TRANSISTOR PNP SI PD=625MW FT=100MHZ	28480	1853-0317
A26Q8	1853-0317		TRANSISTOR PNP SI PD=625MW FT=100MHZ	28480	1853-0317
A26Q9	1853-0317		TRANSISTOR PNP SI PD=625MW FT=100MHZ	28480	1853-0317
A26Q10	1853-0317		TRANSISTOR PNP SI PD=625MW FT=100MHZ	28480	1853-0317
A26R1	0683-2725		RESISTOR 2.7K 5% .25W FC TC=-400/+700	01121	C82725
A26R2	0683-2725		RESISTOR 2.7K 5% .25W FC TC=-400/+700	01121	C82725
A26R3	0683-2725		RESISTOR 2.7K 5% .25W FC TC=-400/+700	01121	C82725
A26R4	0683-2725		RESISTOR 2.7K 5% .25W FC TC=-400/+700	01121	C82725
A26R5	0683-2725		RESISTOR 2.7K 5% .25W FC TC=-400/+700	01121	C82725
A26R6	0684-2245		RESISTOR 220K 5% .25W FC TC=-800/+900	01121	C82245
A26R7	0683-2245		RESISTOR 220K 5% .25W FC TC=-800/+900	01121	C82245
A26R8	0683-2245		RESISTOR 220K 5% .25W FC TC=-800/+900	01121	C82245
A26R9	0683-2245		RESISTOR 220K 5% .25W FC TC=-800/+900	01121	C82245
A26R10	0683-2245		RESISTOR 220K 5% .25W FC TC=-800/+900	01121	C82245
A26R11	0683-3325		RESISTOR 3.3K 5% .25W FC TC=-400/+700	01121	C83325
A26R12	0683-3325		RESISTOR 3.3K 5% .25W FC TC=-400/+700	01121	C83325
A26R13	0683-3325		RESISTOR 3.3K 5% .25W FC TC=-400/+700	01121	C83325
A26R14	0683-3325		RESISTOR 3.3K 5% .25W FC TC=-400/+700	01121	C83325
A26R15	0683-3325		RESISTOR 3.3K 5% .25W FC TC=-400/+700	01121	C83325
A26R16	0757-0943		RESISTOR 6.2K 2% .125W F TC=0/+100	24546	C4-1/8-T0-6201-G
A26R17	0757-0943		RESISTOR 6.2K 2% .125W F TC=0/+100	24546	C4-1/8-T0-6201-G
A26R18	0757-0943		RESISTOR 6.2K 2% .125W F TC=0/+100	24546	C4-1/8-T0-6201-G
A26R19	0757-0943		RESISTOR 6.2K 2% .125W F TC=0/+100	24546	C4-1/8-T0-6201-G
A26R20	0757-0943		RESISTOR 6.2K 2% .125W F TC=0/+100	24546	C4-1/8-T0-6201-G
A27	05340-60026 05340-60045 5020-3440	1 1 1	RESOLUTION SWITCH ASSEMBLY (SERIES 1236A) SLICE ASSEMBLY SPRING, DETENT	28480 28480 28480	05340-60026 05340-60045 5020-3440
A28	05340-60022	1	REGULATORS ASSEMBLY, -15 AND +175V (SERIES 1220A) (LOADED ON 05340-20022 BLANK BOARD)	28480	05340-60022
A28C1	0160-2141		CAPACITOR-FXO 680PF +-20% 1000WVDC CER	28480	0160-2141
A28C2	0180-0374		CAPACITOR-FXO: 10UF+-10% 20VDC TA-SOLID	56289	1500106X902082
A28C3	0180-0374		CAPACITOR-FXO: 10UF+-10% 20VDC TA-SOLID	56289	1500106X902082
A28C4	0160-2141		CAPACITOR-FXO 680PF +-20% 1000WVDC CER	28480	0160-2141
A28C5	0160-2141		CAPACITOR-FXO 680PF +-20% 1000WVDC CER	28480	0160-2141
A28C6	0180-0106		CAPACITOR-FXD: 60UF+-20% 6VDC TA-SOLID	56289	150D606X000682
A28C7	0180-0374		CAPACITOR-FXO: 10UF+-10% 20VDC TA-SOLID	56289	150D106X902082
A28CR1	1902-0049	1	OIOOE-ZNR 6.19V 5% 00-7 PD=.4W TC=+.022%	04113	SZ 10939-122
A28CR2	1902-3234	2	DIODE-ZNR 19.6V 5% 00-7 PD=.4W TC=+.073%	04713	SZ 10939-266
A28CR3	1902-3428	1	DIODE-ZNR 100V 5% 00-7 PD=.4W TC=+.083%	04713	SZ 10939-470
A28CR4	1902-3393	1	DIODE-ZNR 75V 5% 00-7 PD=.4W TC=+.077%	04713	SZ 10939-434
A28Q1	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A28Q2	1853-0240		TRANSISTOR PNP SI TO-39 PD=1W	28480	1853-0240
A28Q3	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A28Q4	1854-0232	1	TRANSISTOR NPN SI TO-39 PD=1W FT=15MHZ	28480	1854-0232
A28Q5	1853-0254	2	TRANSISTOR PNP SI PD=30U FT=3MHZ	28480	1853-0254
FOR A28Q5	1205-0219	4	HEAT-OISSIPATOR SGL SHUNT PKG	28480	1205-0219
A28Q6	1854-0330		TRANSISTOR NPN SI PD=21W FT=10MHZ	28480	1854-0330
FOR A28Q6	1205-0219		HEAT-OISSIPATOR SGL SHUNT PKG	28480	1205-0219
A28Q7	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A28Q8	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A28Q9	1854-0533		TRANSISTOR NPN SI PD=625MW FT=100MHZ	28480	1854-0533
A28Q10	1854-0039	3	TRANSISTOR NPN 2N3053 SI TO-5 PD=1W	04113	2N3053
FOR A28Q10	1205-0033	3	HEAT-OISSIPATOR SGL TO-5/T0-39 PKG	28480	1205-0033
A28R1	0683-4705	1	RESISTOR 47 5% .25W FC TC=-400/+500	01121	C84705
A28R2	0683-2735		RESISTOR 27K 5% .25W FC TC=-400/+800	01121	C82735
A28R3	0683-1035		RESISTOR 10K 5% .25W FC TC=-400/+700	01121	C81035
A28R4	0686-1345	1	RESISTOR 130K 5% .5W CC TC=0+882	01121	E81345
A28R5	0757-0933	3	RESISTOR 2.4K 2% .125W F TC=0/+100	24546	C4-1/8-T0-2401-G
A28R6	0698-4471	1	RESISTOR 7.15K 1% .125W F TC=0/+100	24546	C4-1/8-T0-7151-F
A28R7	2100-2633	2	RESISTOR-TRHR 1K 10% C SIDE-AOJ 1-TURN	30983	ET50X102
A28R8	0683-1845	1	RESISTOR 180K 5% .25W FC TC=-800/+900	01121	C81845
A28R9	0683-5125		RESISTOR 5.1K 5% .25W FC TC=-400/+700	01121	C85125
A28R10	0683-5115		RESISTOR 510 5% .25W FC TC=-400/+600	01121	C85115

See introduction to this section for ordering information

Model 5340A
Replaceable Parts

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A28R11 A28R12 A28R13 A28R14 A28R15	0757-0900 0757-0900 0757-0924 0757-0952 0698-5841	1	RESISTOR 100 22 .125W F TC=0+ 100 RESISTOR 100 2% .125W F TC=0+ 100 RESISTOR 1K 2% .125W F TC=0+ 100 RESISTOR 15K 21 .125W F TC=0+ 100 RESISTOR 11 51 .25W FC TC=-400/+500	24546 24546 24546 24544 01121	C4-1/8-T0-101-G C4-1/8-T0-101-G C4-1/8-T0-1001-G C4-1/8-T0-1502-G C81105
A28R16	0811-1672	1	RESISTOR 33 51 2W PW TC=0+400	75042	BWH2-3R3-J
A28T1 A28T2	0360-0124 0360-0124		TERMINAL-STUD SPCL PRESS HTG TERMINAL-STUD SPCL PRESS MTG	28480 28480	0360-0124 0360-0124
A28U1	1826-0016	3	IC LM204H RGLTR	21014	LM204H
A29	05340-60025	1	REGULATOR ASSEMBLY, +15 V. (SERIES 1220A) (LOADED ON 05340-20025 BLANK BOARD)	28480	05340-60025
A29C1 A29C2 A29C3 A29C4	0180-0116 0180-0374 0150-0050 0180-0374	3	CAPACITOR-FXG: 6.8UF+-10% 35VDC TA CAPACITOR-FXO: 10UF+-10% 20VDC TI- SOLID CAPACITOR-FXO 1000PF +-80-20% 1000WVDC CAPACITOR-FXO: 10UF+-10% 20VDC TA- SOLID	56285 56289 28480 56289	1500685X9035B2 1500106X9020B2 0150-0050 1500106X9020B2
A29CR1 A29CR2 A29CR3	1901-0040 1901-0040 1902-3234		DIODE-SWITCHING 30V 50NA 2NS DO 35 DIODE-SWITCHING 30V 50NA 2NS DO-35 DIODE-ZNR 19.6V 51 00-7 PD=.4W TC=+.073%	28490 28480 04713	1901-0040 1901-0040 SZ 10939-266
A29Q1 A29Q2 FOR A29Q2 A29Q3 FOR A29Q3	1853-0020 1854-0420 1205-0219 1854-0039 1205-0033	1	TRANSISTOR PNP SI PD=300MW FT=150MHZ TRANSISTOR NPN SI PD=40W FT=3MHZ HEAT- DISSIPATOR SGL SHUNT PKG TRANSISTOR NPN 2N3053 SI T0-5 PD=1W HEAT- DISSIPATOR SGL T0-5/T0-39 PKG	28480 28480 28480 04713 28480	1853-0020 1854-0420 1205-0219 2N3053 1205-0033
A29R1 A29R2 A29R3 A29R4 A29R5	0683-2725 0683-6805 0757-0936 0757-0943 2100-2633	1	RESISTOR 2.7K 5X .25W FC TC=-400/+700 RESISTOR 68 51 .25W FC TC=-400/+500 RESISTOR 3.3K 2% .125W F TC=0+100 RESISTOR 6.2K 2% .125W F TC=0+100 RESISTOR-TRMR 1K 10% C SIDE-ADJ 1 TURN	01121 01121 24546 24546 30983	C82725 C86805 C4-1/8-T0-3301-G C4-118-T0-6201-G E750X102
A29R6 A29R7 A29R8 A29R9 A29R10	0757-0123 0683-0335 0757-0944 0757-0280 0683-0335	2 3	RESISTOR 34.8K 1% .125W F TC=0+ 100 RESISTOR 3.3 5% .25W FC TC=-400/+500 RESISTOR 6.8K 22 .125W F TC=0+100 RESISTOR 1K 1% .125W F TC=0+100 RESISTOR 33 5% .25W FC TC=-400/+500	24546 01121 24546 24546 01121	C5-1/4-T0-3482-F C83365 C4-1/8-T0-6801-G C4-1/8-T0-1001-F C83365
A29U1	1826-0010	3	IC REGULATOR	07263	723HM
A30	05340-60029	1	POWER SUPPLY MOTHER BOARD ASSEMBLY (SERIES 1220A) (LOADED ON 05340-20029 BLANK BOARD)	28480	05340-60029
A30C1 A30C2 A30C3 A30C4 A30C5	0180-2387 0180-2387 0180-2386 0180-2386 0180-2385	2 2	CAPACITOR-FXO: 2200UF+75-10% 30VDC AL CAPACITOR-FXO: 2200UF+75-10% 30VDC AL CAPACITOR-FXO: 2800UF+75-10% 20VDC AL CAPACITOR-FXO: 2800UF+75-10% 20VDC AL CAPACITOR-FXO: 4000UF+75-10% 15VDC AL	56289 56289 56289 56289 56289	6020222G030AA2A 6 A2A 6 A2A 6 A2A 6020402G015AA2A
A30C6	0180-2385		CAPACITOR-FXO: 4000UF+75-10% 15VDC AL	56289	6020402G015AA2A
A30CR1 A30CR2 A30CR3	1906-0027 1906-0027 1906-0027	3	DIODE-MULT FULL WAVE BRIDGE RECTIFIER DIODE-MULT FULL WAVE BRIDGE RECTIFIER DIODE-MULT FULL WAVE BRIDGE RECTIFIER	04713 04713 04713	MDA922-6 MDA922-6 MDA922-6
XA28 XA29 XA31 XA32	1251-1886 1251-1886 1251-1886 1251-1886	4	EDGE 15-CONT/ROW 2-ROWS CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	71785 71785 71785 71785	252-15-3A-340 252-15-3A-340 252-15-3A-340 252-15-3D-340
A31	05340-60024	1	REGULATOR ASSEMBLY, -5 V. (SERIES 1220A) (LOADED ON 05340-20024 BLANK BOARD)	28480	05340-60024
A31C1 A31C2 A31C3 A31C4 A31C5	0180-0374 0180-0374 3180-0229 0160-2141 3160-2141	7	CAPACITOR-FXG: 10UF+-10% 20VDC TA-SOLID CAPACITOR-FXO: 10UF+-10% 20VDC TI- SOLID CAPACITOR-FXO: 33UF+-10% 10VDC TA-SOLID CAPACITOR-FXO 680PF +-202 1000WVDC CER CAPACITOR-FXO 680PF +-201 1000WVDC CEP	56289 56289 56289 28480 28480	1500106X9020B2 1500106X9020B2 1500336X9010B2 0160-2141 0160-2141
A31C6 A31C7	0180-0229 1180-0229		CAPACITOR-FXO: 33UF+-10% 10VDC TA-SOLID CAPACITOR-FXO: 33UF+-10% 10VDC TA-SOLID	56289 56289	1500336X9010B2 1500336X9010B2
A31CR1	1902-3149	1	DIODE-ZNR 9.09V 51 00-7 PD=.4W TC=+.057%	04713	S 10939-170
A31Q1 A31Q2 A31Q3 FOR A31Q3 A31Q4	1854-0071 1854-0071 1853-0254 1205-0219 1853-0020		TRANSISTOR NPN SI PD=300MW FT=200MHZ TRANSISTOR NPN SI PD=300MW FT=200MHZ TRANSISTOR PNP SI PD=30W FT=3MHZ HEAT- DISSIPATOR SGL SHUNT PKG TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480 28480 28480 28480 28480	1854-0071 1854-0071 1853-0254 1205-0219 1853-0020

See introduction to this section for ordering information

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A31Q5 A31Q6 A31Q7 A31Q8 FOR A31Q8	1853-0020 1853-0012 18530020 1854-0039 1205-0033	2	TRANSISTOR PNP S1 PD=300MW FT=150MHZ TRANSISTOR PNP 2N2904A S1 TO-5 PD=600MW TRANSISTOR PNP S1 PD=300MW FT=150MHZ TRANSISTOR NPN 2N3053 S1 TO-5 PD=1W HEAT-DISSIPATOR SGL TO-5/TO-39 PKG	28480 C1295 28480 04713 28480	1853-0020 2N2904A 1853-0020 213053 1205-0033
A31R1 A31R2 A31R3 A31R4 A31R5	0757-0896 2100-2574 0683-1035 0698-3150 0757-0933	1	RESISTOR 68 2% .125W F TC=0+ 100 RESISTOR-TRMR 500 10% C SIDE-AOJ 1 TURN RESISTOR 10K 5% .25W FC TC=-400/+700 RESISTOR 2.37K 1% .125W F TC=0+ 100 RESISTOR 2.4K 2% .125W F TC=0+-100	24546 30983 01121 16299 24546	C4-1/8-TO-68R0-G ET50X501 C81035 C4-1/8-TO-2371-F C4-1/8-TO-2401-G
A31R6 A31R7 A31R8 A31R9 A31R10	0698-3150 0757-0933 06835105 2100-2574 0683-5105		RESISTOR 2.37K 1% .125W F TC=0+ 100 RESISTOR 2.4K 2% .125W F TC=0+-100 RESISTOR 51 5% .25W FC TC=-400/+500 RESISTOR-TRMR 500 10% C SIDE-ADJ 1-TURN RESISTOR 51 5% .25W FC TC=-400/+500	16299 24546 01121 30983 01121	C4-1/8-TO-2371-F C4-1/8-TO-2401-G C85105 ET50X501 C85105
A31R11 A31R12 A31R13 A31R14 A31R15	0757-0900 0757-0900 0757-0919 0757-0941 0757-0927	1	RESISTOR 100 2% .125W F TC=0+ 100 RESISTOR 100 2% .125W F TC=0+ 100 RESISTOR 620 2% .125W F TC=0+ 100 RESISTOR 5.1K 2% .125W F TC=0+ 100 RESISTOR 1.3K 2% .125W F TC=0+-100	24546 24546 24546 24546 24546	C4-1/8-TO-101-G C4-1/8-TO-101-G C4-1/8-TO-621-G C4-1/8-TO-5101-G C4-1/8-TO-1301-G
A31R16 A31R17 A31R18 A31R19 A31R20	0757-0941 0811-1671 0811-1732 0683-1025 0683-1025	1	RESISTOR 5.1K 2% .125W F TC=0+-100 RESISTOR 2.7 5% 2W PW TC=0+-400 RESISTOR 1 5% 3W PW TC=0+-50 RESISTOR 1K 5% .25W FC TC=-400/+600 RESISTOR 1K 5% .25W FC TC=-400/+600	24546 75042 56209 01121 01121	C4-1/8-TO-5101-G BWH2-2R7-J 242E1R05 C81025 C81025
A31TP1 A31TP2 A31TP3	0360-0124 0360-0124 0360-0124		TERMINAL-STUO SPCL PRESS MTG TERMINAL-STUC SPCL PRESS MTG TERMINAL-STUD SPCL PRESS MTG	28480 28480 28480	0360-0124 0360-0124 0360-0124
A31U1 A31U2	1826-0016 1826-0016		IC LM204H RGLTR IC LM204H RGLTR	27014 27014	LM204H LM204H
A32	05340-60023	1	REGULATOR ASSEMBLY. +5V. (SERIES 1220A) ILOAOEO Oh 05340- 20023 BLANK BOARDI	28480	05340-60023
A32C1 A32C2 A32C3 A32C4 A32C5	0180-0291 0180-0374 0180-0229 0180-1746 0150-0050		CAPACITOR-FXD; 1UF+-10% 35VDC TA SOLID CAPACITOR-FXD; 10UF+-10% 20VDC TA= SOLID CAPACITOR-FXD; 33UF+-10% 10VDC TA= SOLID CAPACITOR-FXD; 15UF+-10% 20VDC TI= SOLID CAPACITOR-FXD 1000PF +80-20% 1000WVDC	56289 56289 56289 56289 28480	150D105X9035A2 150D106X9020B2 150D336X9010B2 150D156X9020B2 0150-0050
A32C6 A32C7 A32C8 A32C9 A32C10	0150-0050 0180-0229 0180-0229 0180-0228 0180-0229		CAPACITOR-FXD 1000PF +80-20% 1000WVDC CAPACITOR-FXD; 33UF+-10% 10VDC TA= SOLID CAPACITOR-FXD; 33UF+-10% 10VDC TA= SOLID CAPACITOR-FXD; 22UF+-10% 15VDC TA= SOLID CAPACITOR-FXD; 33UF+-10% 10VDC TA= SOLID	28480 56289 56289 56289 56289	0150-0050 150D336X9010B2 150D336X9010B2 150D226X9015B2 150D336X9010B2
A32CR1 A32CR2 A32CR3 A32CR4 A32CR5	1901-0040 1901-0040 1901-0040 1902-3171 1901-0040	1	DIODE-SWITCHING 30V 50NA 2NS DO-35 DIODE-SWITCHING 30V 50NA 2NS DO-35 DIODE-SWITCHING 30V 50NA 2NS DO-35 DIODE-ZNR 11V 5% DO-7 PD=.4W TC=+.062% DIODE-SWITCHING 30V 50NA 2NS DO 35	28480 28480 28480 04713 28460	1901-0040 1901-034) 1901-0040 SZ0100B04194
A32CR6	1902-3139	1	DIODE-ZNR 8.25V 5% DO-7 PD=.4W TC=+.053%	04713	SZ 15939-158
A32Q1 A32Q2 A32Q3 A32Q4 A32Q5	1853-0020 1854-0558 1853-0012 1854-0071 1854-0300	1	TRANSISTOR PNP S1 PD=300MW FT=150MHZ TRANSISTOR NPN S1 DARL PD=70W FT=1MHZ TRANSISTOR PNP 2N2904A S1 TO 5 PD=600MW TRANSISTOR NPN S1 PD=300MW FT=200MHZ TRANSISTOR NPN S1 PD=25W FT=4MHZ	28480 28480 01295 28480 28480	1853-0020 1854-0558 2N2904A 1854-0071 1854-0300
A32R1 A32R2 A32R3 A32R4 A32R5	0757-0906 0683-1335 2100-2413 0757-0931 0757-0922	1	RESISTOR 180 2% .125W F TC=0+-100 RESISTOR 13K 5% .25W FC TC=-400/+800 RESISTOR-TRMR 200 10% C SIDE-ADJ 1 TURN RESISTOR 2K 2% .125W F TC=0+ 100 RESISTOR 820 2% .125W F TC=0+ 100	24546 01121 30983 24546 24546	C4-1/8 TO-181 G C81335 ET50X201 C4-1/8-TO-2001 G C4-1/8 TO-821-G
A32R6 A32R7 A32R8 A32R9 A32R10	2100 2413 0757-0931 0757-0922 0757-0914 0683-0685	1	RESISTOR-TPMR 200 10% C SIDE ACJ 1-TURN RESISTOR 2K 2% .125W F TC=0+ 100 RESISTDR 820 2% .125W F TC=0+ 100 RESISTOR 390 2% .125W F TC=0+ 100 RESISTOR 6.8 5% .25W FC TC=-400/+500	30983 24546 24546 24546 01121	ET50X201 C4 1/8 TO 2001 G C4-1/8 TO-821 G C4-1/8 TO-391 G C868G5
A32R11 A32R12 A32R13 A32R14 A32R15	0757 0280 0698-3158 0811-1552 0757-0936 0812-0045	1	RESISTOR 1K 1% .125W F TC=0+-100 RESISTOR 23.7K 1% .125W F TC=0+ 100 RESISTOR .56 5% 2W PW TC=0+ 800 RESISTOR 3.3K 2% .125W F TC=0+-100 RESISTOR .15 5% 3W PU TC=0+-90	24546 16299 75042 24546 07088	C 41/8-TO-1001-F C4 118-TO-2372 F BWH2-9/16-J C4-1/8-TO-3301-G KM-300
A32R16 A32R17 A32R18	0698 3158 0811-1665 0757-0280	1	RESISTOR 23.7K 1% .125W F TC=0+ 100 RESISTOR .82 5% 2W PW TC=0+-800 RESISTOR 1K 1% .125W F TC=0+ 100	16299 75042 24546	C4-1/8 TO-2372 F BWH2 82/100-J C4 1/8 TO-1001-F

See introduction to this section for ordering information

Model 5340A
Replaceable Parts

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A32U1 A32U2	1826-0010 1826-0010 05340-00020	1	IC REGULATOR IC REGULATOR A32 MISCELLANEOUS HEAT OXSSIPATOR	07263 07263 28480	723HM 723HM 05340-00020

See introduction to this section for ordering information

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
		1	5340A CHASSIS PARTS		
B1	3160-0209	1	FAN-TBAX 45-CFM 115V 50/60-HZ 1.5-THK	28480	3160-0209
C1	0160-3043	1	CAPACITOR-FXC 5000PF/5000PF +-20%	28480	0160-3043
C2	0180-0228	1	CAPACITOR-FXD; 22UF+-10% 15VDC TA- SOLID	56289	1500226X9015A2
C3	0160-3036	5	CAPACITOR-FXC 5000PF +80-20% 200WVDC CER	28480	0160-3036
C4	0160-3036		CAPACITOR-FXC 5000PF +80-20% 200WVDC CER	28480	0160-3036
C5	0160-3036		CAPACITOR-FXC 5000PF +80-20% 200WVDC CER	28480	0160-3036
C6	0160-3036		CAPACITOR-FXD 5000PF +80-20% 200WVDC CER	28480	0160-3036
C7	0160-3036		CAPACITOR-FXC 5000PF +80-20% 200WVDC CER	28480	0160-3036
C8	0180-1743	1	CAPACITOR-FXC: .1UF+-10% 35VDC TA SOLID	56289	1500104X9035A2
CP1	5088-7003	1	POWER SPLITTER ASSEMBLY	28480	5088-7003
CR1	1906-0038	1	DIODE-MULT FULL WAVE BRIDGE RECTIFIER	28480	1906-0038
CR2	1901-0028	1	DIODE-PWR RECT 400V 750MA DO-29	04713	5R1358-9
E1	0340-0037	1	TERMINAL-STUC D9L TURRET PRESS MTG	28480	0340-0037
F1	2110-0002	1	FUSE 2A 250V 1.25X.25 UL IEC (FOR 115V OPERATION)	71400	AGC-2
F1	2110-0001	1	FUSE 1A 250V NORM-BLO 1.25X.25 UL IEC (FOR 230V OPERATION)	71400	AGC-1
J1			(PART OF W2, FRONT-PANEL N CONNECTOR)		
J2			PART OF OPTION 0021 SEE TABLE 6-4		
J3	1250-1083	3	CONNECTOR-RF BNC FEM SGL HOLE FR (REAR PANEL TIME BASE OUTPUT)	24931	28JR-130-1
J4	1250-0186	1	CONNECTOR-RF BNC FEM SGL HOLE FR (FRONT PANEL DIRECT COUNT INPUT)	90949	31-22-1-1024
J5	1250-0083		CONNECTOR-RF BNC FEM SGL HOLE FR (REAR PANEL OSC)	24931	28JR-130-1
J6	1251-2357	1	CONNECTOR-AC PWR HP-9 MALE FLG MTG	28480	1251-2357
J7	1250-0083		CONNECTOR-RF BNC FEM SGL HOLE FR (+5V, CHASSIS)	24931	28JR-130-1
J8			PART OF OPT 002, SEE TABLE 6-4 (REAR PANEL DIRECT COUNT INPUT)		
J9			PART OF OPT 003, SEE TABLE 6-5 (REAR PANEL DIGITAL INPUT/OUTPUT)		
L1	9140-0096	1	COIL-FXO MOLDED RF CHOKE .1UH 10%	24226	151101
L2	9100-2247	5	COIL-FXO MOLDED RF CHOKE .1UH 10%	24226	101100
L3	9100-2247		COIL-FXO MOLDED RF CHOKE .1UH 10%	24226	101100
L4	9100-2247		COIL-FXD MOLDED RF CHOKE .1UH 10%	24226	101100
L5	9100-2247		COIL-FXO MOLDED RF CHOKE .1UH 10%	24226	101100
L6	9100-2247		COIL-FXO MOLDED RF CHOKE .1UH 10%	24226	101100
MP1	5000-0050	1	TRIM:SIDES	28480	5000-0050
MP2	05340-00014	1	COVER, LEFT SIDE	28480	05340-00014
MP3	05340-20068	1	FRAME, LEFT SIDE	28480	05340-20068
MP4	05340-00003	1	CHASSIS, MAIN	28480	05340-00003
MP5	05340-00010	1	COVER, TOP	28480	05340-00010
MP6	05340-00025	1	PANEL, REAR	28480	05340-00025
MP7	05340-20045	1	HEAT SINK, TRANSISTOR	20480	05340-20045
MP8	05340-00023	1	COVER, CONNECTOR	28480	05340-00023
MP9	05340-00011	1	COVER, BOTTOM	28480	05340-00011
MP10	05340-00013	1	INSULATOR, BOTTOM COVER	28480	05340-00013
MP11	5060-0767	5	FOOT ASSY:FEM	28480	5060-0767
MP12	5060-0730	1	FRAME ASSY:3 X 16	28480	5060-0730
MP13	5000-8593	1	COVER, RIGHT SIDE	28480	5000-8593
MP14	1440-0030	1	YIREFORM .187-OD SST	28480	1440-0030
MP15	05340-00001	1	PANEL, FRONT	28480	05340-00001
MP16	05340-00005	1	WINDOW, DISPLAY	28480	05340-00005
MP17	05340-00001	1	TRIM, FRONT PANEL(ISO INSTRUMENT)	28480	05340-00004
MP18			TRIM, FRONT PANEL(OPT 002, SEE TABLE 6-4)		
MP19	5040-0170	13	GUIDE: PLUG-IN PC BOARD	28480	5040-0170
MP20	05340-00008	1	COVER, HOUSING	28480	05340-00008
FOR MP20	0340-0486	2	INSULATOR-CCOVER TO-3 .33-THK	0011J	622-2003
MP21	05340-00019	1	COVER, HOUSING	28480	05340-00019
MP22	05340-20027	1	HOUSING	28480	05340-20027
Q1	1854-0063	2	TRANSISTOR NPN 2N3055 SI TO-3 PD=115W	28480	1854-0063
FOR Q1	1200-0043		INSULATOR-XSTR TO-3 .02-THK	76530	322047
FOR Q1	1200-0456	2	SOCKET-XSTR 2-CONT TO-3-PKG	28480	1200-0456
Q2	1854-0063		TRANSISTOR NPN 2N3055 SI TO-3 PD=115W	28480	1854-0063
FOR Q2	1200-0043		INSULATOR-XSTR TO-3 .02-THK	76530	322047
FOR Q2	1200-0456		SOCKET-XSTR 2-CONT TO-3-PKG	28480	1200-0456

See introduction to this section for ordering information

Model 5340A
Replaceable Parts

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
R1 SAMPLE RATE	2100-3171	1	RESISTOR-VAR W/SW 1M 30% 10CW SPST-NC (SAYPLE RATE)	28480	2100-3171
FOR R1	0370-1099	1	KNOB-RASE PTR .5 IN JGK SGI-DECAL	28480	0370-1099
R2	0683-1025	1	RESISTOR 1K 5% .25W FC TC=+400/+500	11121	C81025
R3	0683-2725	1	RESISTOR 2.7K 5% .25W FC TC=+400/+700	01121	C82725
R4			PART OF OPT 002, SEE TABLE 6-4.		
S1	3101-1694	1	SWITCH-TGL SUBMIN DPDT NS 2A 250VAC IAC ON/OFF	09353	U318-PHI
S2	3101-1216	1	SWITCH-PB SPST NO MOM 25A (RESET)	28480	3101-1216
S3			PART OF R1		
S4	3100-2935	1	SWITCH:ROTARY, LEVER (RANGE)	28480	3100-2935
FOR S4	0370-0432	1	KNOB:LEVER, OLIVE BLACK, OPT X95	28480	0370-0432
S5 (INT-EXT)	3101-0070	1	SWITCH-SL OPOT-NS MINTR .5A 125VAC/DC	19727	GF-126-0000
S6 (115V-230V)	3101-1272	1	SWITCH-SL 4PDT-NS STD 1.5A 250VAC SLOR	28480	3101-1272
S7			PART OF OPT 003, SEE TABLE 6-5.		
S8			PART OF OPT 003, SEE TABLE 6-5.		
S9			PART OF OPT 003, SEE TABLE 6-5.		
S10			PART OF OPT 003, SEE TABLE 6-5.		
S11			PART OF OPT 003, SEE TABLE 6-5.		
S12			PART OF OPT 003, SEE TABLE 6-5.		
T1	9100-3019	1	TRANSFORMER: POWER	28480	9100-3019
T2			PART OF OPT 001, SEE TABLE 6-3		
TH1	3103-0022	1	SWITCH:FXD THERMAL	28480	3103-0022
W1	05505-60019	1	CABLE AC LINE	28480	05505-60019
W2	05340-60028	1	CABLE ASSEMBLY, 18 GHZ INPUT	28480	05340-60028
W3	05340-60033	1	CABLE ASSEMBLY, SAMPLER #1	28480	05340-60033
W4	05340-60034	1	CABLE ASSEMBLY, A3 OUTPUT	28480	05340-60034
W5	05340-60013	1	CABLE ASSEMBLY, SAMPLER #2	28480	05340-60013
W6	05340-60035	1	CABLE ASSEMBLY, A1 OUTPUT	28480	05340-60035
W7	05340-60044	1	CABLE ASSEMBLY, VCO 1/A1A2	28480	05340-60044
W8	8120-1378	1	CABLE ASSEMBLY, AC POWER CORD	28480	8120-1378
W9	05340-60048	1	CABLE ASSEMBLY, A2 OUTPUT	28480	05340-60048
W10	05340-60049	1	CABLE ASSEMBLY, A2FL1 INPUT	28480	05340-60049
W11	05340-60050	1	CABLE ASSEMBLY, DIRECT COUNT OUTPUT	28480	05340-60050
W12	05340-60051	1	CABLE ASSEMBLY, 10 MHZ DOUBLER	28480	05340-60051
W13	05340-60052	1	CABLE ASSEMBLY, VCO 1/A22	28480	05340-60052
W14	05340-60053	1	CABLE ASSEMBLY, VCO 2/A2A2	28480	05340-60053
W15	05340-60054	1	CABLE ASSEMBLY, HARM FREQ. A14/A20	28480	05340-60054
W16	05340-60065	1	CABLE ASSEMBLY, CHASSIS	28480	05340-60065
W17			PART OF OPT. 002, SEE TABLE 6-4.		
W18			PART OF OPT-002, SEE TABLE 6-4.		
W19			PART OF OPT-003, SEE TABLE 6-5.		
W20			PART OF OPT. 003, SEE TABLE 6-5.		
W21			PART OF OPT. 003, SEE TABLE 6-5.		
XA1			NOT ASSIGNED		
XA2			NOT ASSIGNED		
XA3			NOT ASSIGNED		
XA4			PART OF A16 (SEE LISTING FOR)		
XA5			PART OF A16 (SEE LISTING FOR)		
XA6			PART OF A16 (SEE LISTING FOR)		
XA7			PART OF A16 (SEE LISTING FOR)		
XA8			PART OF A16 (SEE LISTING FOR)		
XA9			PART OF A16 (SEE LISTING FOR)		
XA10			PART OF A16 (SEE LISTING FOR)		
XA11			PART OF A16 (SEE LISTING FOR)		
XA12			PART OF A16 (SEE LISTING FOR)		
XA13			PART OF A16 (SEE LISTING FOR)		
XA14			PART OF A16 (SEE LISTING FOR)		
XA15			PART OF A16 (SEE LISTING FOR)		
XA16			NOT ASSIGNED		
XA17	1251-0160	1	CONNECTOR-PC EDGE 15-CONT/ROW 1-ROWS	71785	250-15-30-210
XA18	1251-0159	1	CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	71785	251-15-30-261
XA19A	1251-0159	3	CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	71785	251-15-30-261
XA19B	1251-0159	3	CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	71785	251-15-30-261
XA20	1251-0233	5	CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	71785	251-22-30-261
XA21	1251-0233	5	CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	71785	251-22-30-261
XA22	1251-0233	5	CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	71785	251-22-30-261
XA23	1251-0233	5	CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	71785	251-22-30-261
XA24	1251-0233	5	CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	71785	251-22-30-261

See introduction to this section for ordering information

Table 6-1. Replaceable Parts, 5340A Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
XA25 XA26 XA27 XA28 XA29			NOT ASSIGNED NOT ASSIGNED NOT ASSIGNED PART OF A30 (SEE LISTING FOR) PART OF A30 (SEE LISTING FOR)		
XA30 XA31 XA32 XA33 XA34	1251-0198	1	NOT ASSIGNED PART OF A30 (SEE LISTING FOR) PART OF A30 (SEE LISTING FOR) CONNECTOR-PC EDGE 6-CONT/ROW 2-ROWS NOT ASSIGNED	71785	251-06-30-261
XFI	1400-0084	1	FUSEHOLDER-EXTR POST 15A 250V UL	28480	1400-0084
			MISCELLANEOUS PARTS		
	0340-0039	1	TERMINAL BUSHING - TEFLON MOUNTS IN	28480	0340-0039
	0380-0310	2	STANDOFF-RVT-ON .75LG 6-32THD .250D 8RS	00866	19218
	0380-0974	4	STANDOFF-RNC .438LG .115ID .1880D 8RS NI	06540	9212-8115
	0590-0765	1	NUT-KNURLED R 114-40-THD .078-THK	95146	MODEL N-1A
	1400-0776	1	CABLE TIE .19-IN-WD NYL	06383	SST 4
	00692-210	1	PIN KEY	28480	00692-210
	05340-20041	1	SPACER BOARD	28480	05340-20041
	05340-00016	1	STRIP GROUND	28480	05340-00016
	08131-21C	1	NUT LOCK RF CONNECTOR	28480	08731-210
	6960-0046	1	PLUG-HOLE FL-HO .688-DIA 8RS	57771	D-3047-8
	6960-0002	1	PLUG-HOLE FL-HO .5-DIA STL	57771	D-2733 LCS
	05340-00027	1	SHIELD SWITCH	28480	05340-00027
	05340-00028	1	BRACKET CAPACITOR MOUNT	28480	05340-00028
	05340-00029	1	BRACKET CHASSIS	28480	05340-00029
	8120-1378	2	CABLE ASSY 3-COND 18-AWG (AC POWER CORD)	28480	8120-1378
			RACK MOUNT KIT		
	05326-60046	1	KIT, RACK MOUNT CONSISTING OF ITEMS A THRU E	28480	05326-60046
RACK MOUNT KIT	ITEM A	3	SCREW-MACH 6-32 .25-IN-LG 100 DEG FL-HO	28480	2370-0012
	ITEM B	4	SCREW-WCH 8-32 .438-IN-LG PAN-HO	28480	2510-0047
	ITEM C	1	BRACKET, LEFT MOUNTING	28480	5020-7619
	ITEM D	1	BRACKET, RIGHT MOUNTING	28480	5020-7620
	ITEM E	1	STRIP, FILLER	28480	05326-40003

See introduction to this section for ordering information

Figure 6-1. 5340A Mechanical Parts

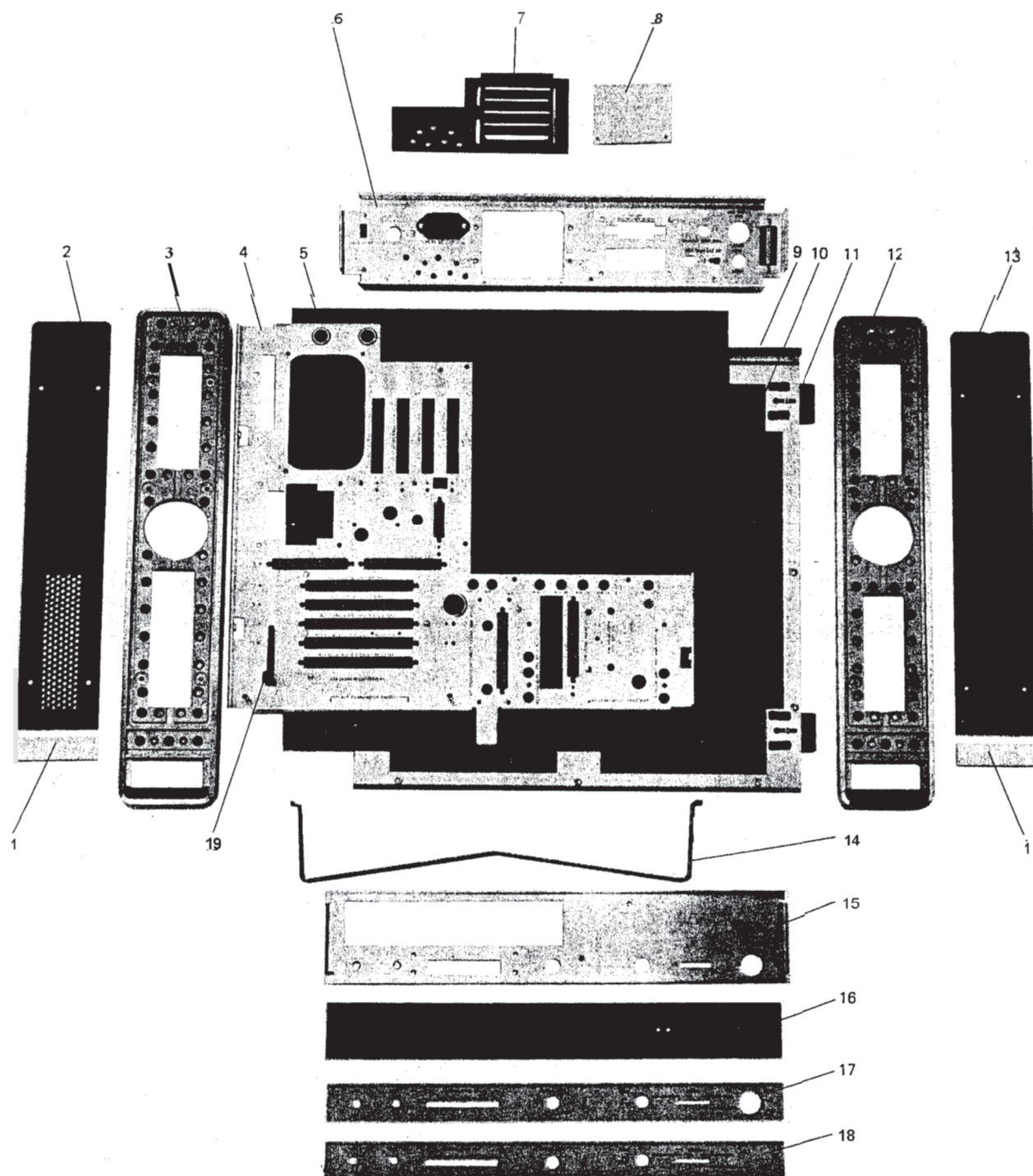


Table 6-2. 5340A Mechanical Parts

MP Number	Description	Qty. Used	HP Part Number
1	Plate, Fluted Aluminum	2	5000-0050
2	Cover, Left Side	1	05340-00014
3 (Note A)	Frame, Left Side	1	05340-20068
4	Chassis, Main	1	05340-00003
5	Cover, Top	1	05340-00010
6	Panel, Rear	1	05340-00025
7	Heat Sink, Transistor	1	05340-20045
8	Cover, Connector	1	05340-00023
9	Cover, Bottom	1	05340-00011
10	Insulator, Bottom Cover	1	05340-00013
11	Foot Assy, Full Module	5	5060-0767
12 (Note A)	Frame, Right Side	1	5060-0730
13	Cover, Right Side	1	5000-8593
14	Tilt Stand	1	1490-0030
15	Panel, Front	1	05340-00001
16	Window, Display	1	05340-00005
17	Trim, Front Panel	1	05340-00004
18	Trim, Front Panel	1 (Opt. 002)	05340-00024
19	Guide, PC Board	13	5040-0170
Note A: The left sideframe MP3 is machined for additional airflow clearance. Note the difference with MP12.			

Model 5340A
Replaceable Parts

Table 6-3. Replaceable Parts, Option 001

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
			OPTION 001, HIGH STABILITY OSCILLATOR DELETE A18 (05340-60080). ADD THE FOLLOWING PARTS:		
A18	10544A	1	OSCILLATOR ASSEMBLY NOT RECOMMENDED FOR FIELD REPAIR, FOR REPLACEMENT OR REPAIR ORDER REBUILT 10544A PART NO. 10544-60511	28480	105446
	10544-60511	1		28480	10544-60511
A33	05340-60080	1	OPTIONAL OSCILLATOR POWER SUPPLY (SERIES 1236A) {LOADED ON 05340-20080 BLANK BOARD}	28480	05340-60080
A33C1	0180-2373	2	CAPACITOR-FXD; 580UF+150-10% 35VDC AL	28480	0180-2373
A33C2	0180-2373	1	CAPACITOR-FXOI 580UF+150-10% 35VDC AL	28480	0180-2373
A33C3	0180-0230	1	CAPACITOR-FXOI 1UF+-20% 50VDC TA-SOLID	56209	1500105X0050A2
A33C4	0180-1746	1	CAPACITOR-FXOI 150UF+-10% 20VDC TA-SOLID	56289	1500156X9020B2
A33C5	0150-0050	1	CAPACITOR-FXO 1000PF +-80-20% 1000WVDC	28480	0150-0050
A33C6	0150-0073	1	CAPACITOR-FXD 100PF +-10% 1000WVDC CEF	56256	C0280102F101K527-CDH
A33C7	0180-0116	1	CAPACITOR-FXD; 6.8UF+-10% 35VDC TA	56289	1S0D685X9035B2
A33CR1	1906-0021	1	DIODE ASSEMBLY, BRIDGE	04713	MDA922-6
A33CR2			NOT ASSIGNED		
A33CR3			NOT ASSIGNED		
A33CR4			NOT ASSIGNED		
A33CR5	1901-3182	1		28400	1901-3182
A33Q1	1854-0071	1	TRANSISTOR NPN SI PD=300MW FT=200MHZ	20480	1854-0071
A33R1*	0683-7515	1	RESISTOR 750.5% .25W FCTC=-400/+600 *FACTORY SELECTED PART	01121	CB7515
A33R2	0757-0317	1	RESISTOR 1.33K 1% .125W F TC=0+ 100	24546	C4-1/8-T0-1331-F
A33R3	0757-0940	1	RESISTOR 4.7K 2% .125W F TC=0+ 100	24546	C4-1/8-T0-4701-G
A33R4	0757-0950	1	RESISTOR 12K 2% .125W F TC=0+ 100	24546	C4-1/8-T0-1202-G
A33R5	0757-0416	1	RESISTOR 511 1% .125W F TC=0+ 100	24546	C4 1/8-T0-511R-F
A33R6	0683-1205	1	RESISTOR 12 5% .25W FCTC=-400/+500	01121	CB1205
A33R7	0757-1094	1	RESISTOR 1.47K 1% .125W F TC=0+ 100	24546	C4-1/8-T0-1471-F
A33R8	2100-2633	1	RESISTOR-TRMR 1K 10% C SIDE-ADJ 1-TURN	30983	ET50X102
A33R9	0757-0279	1	RESISTOR 3.16K 1% .125W F TC=0+ 100	24546	C4-1/8-T0-3161-F
A33T1			NOT ASSIGNED		
A33T2	9100-3049	1	TRANSFORMER, POYER	28480	9100-3049
A33U1	1826-0010	1	IC REGULATOR	07263	723HM
	1205-0033	1	HEAT-DISSIPATOR SGL T0=5/T0=39 PKG	28480	1205 0033
			MISCELLANEOUS		
	05340-20014	2	SPACER, OSCILLATOR	28480	05340-20044
	2360-0115	2	SCREW-MACH 6-32 .312-IN-LG PAN-HO	28480	2360-0115
	3050-0066	2	WASHER-FL UTLC NO. 6 .147 IN ID .375 IN	28480	3050-0066
	2420-0001	2	NUT-HEX-W/LKWR 6-32-THD .109-THK	28480	2420-0001

See introduction to this section for ordering information

Table 6-4. Replaceable Parts, Option 002

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
			OPTION 002. REAR PANEL CONNECTORS. DELETE MP17 FRONT PANEL TRIM (05340-00004) AND W2 INPUT CABLE ASSY 105340-600281. ADD THE FOLLOWING PARTS:		
J2 FOR J2 J8	00692-210 1250-0102	2 1	PART OF W18 PIN, KEY CONNECTOR-RF BNC FER SGL HOLE FR	28480 28480	00692-210
MP18	05340-00024	1	TRIM, FRONT PANEL	28480	05340-00024
R4	11593A	1	TERMINATION, 50 OHM	28480	11593A
W17 W18	05260-b034 05340-60060	1 1 1	CABLE ASSEMBLY, LOW FREQUENCY INPUT RIGID COAX CABLE, 18 GHL	28480 28480 28480	05260-6034 05340-60060 68731-201

See introduction to this section for ordering information

Model 5340A
Replaceable Parts

Table 6-5. Replaceable Parts, Option 011

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
			OPTION 011. REMOTE PROGRAMMING AND DIGITAL OUTPUT, OLETF MPS COVER CONY. (C5340-00023) AND A19 INTERFACE A ASSY. (05340-60031). ADD THE FOLLOWING PARTS:		
A19	05340-60032	1	INTERFACE "B" ASSEMBLY (SERIES 1236A) (LOADED ON 05340-20032 BLANK BOARD)	28480	05340 60032
A19C1	0180-0106	3	CAPACITOR, FXD: 60UF+-20% 6VDC TP SOLID	56289	1500606X0006B2
A19C2	0160-3879	4	CAPACITOR FXD .01UF + 20% 100WVDC CER	28480	0160 3879
A19C3	0160-3879		CAPACITOR-FXD .01UF + 20% 100WVDC CER	28480	0160-3879
A19C4	0160-3879		CAPACITOR-FXD .01UF + 20% 100WVDC CER	28480	0160-3879
A19C5	0180-0106		CAPACITOR-FXD: 60UF+-20% 6VDC TA- SOLID	56289	1500606X0006B2
A19C6	0180-0374	1	CAPACITOR, FXD; 10UF+-10% 20VDC TA SOLID	56289	1500106X9020B2
A19CR1	1901-0040	5	DIODE-SWITCHING 30V 50NA 2NS DO 35	28480	1901 0040
A19L1	9100-2247	1	COIL-FXO MOLDED RF CHOKE .1UH 10%	24226	10/100
A19L2	9140-0158	1	COIL-FXD MOLDED RF CHOKE 1UH 10%	24226	101101
A19Q1	1854-0560	1	TRANSISTOR NPN SI OARL PD=310MW	04713	SPS 6740
A19R1	1810-0041	5	NETWORK RES 9-PIN-SIP .15-PIN-SPCG	28480	1810-0041
A19R2	1810-0041		NETWORK-RES 9-PIN-SIP .15-PIN-SPCG	28480	1810-0041
A19R3	1810-0041		NETWORK-RES 9-PIN-SIP .15 PIN SPCG	28480	1810 0041
A19R4	0698-8354	2	RESISTOR 270 52 .125W CC TC=0+-850	01121	882715
A19R5	0698-8354		RESISTOR 270 51 .125W CC TC=0+-850	01121	882715
A19R6	0675-1021	2	RESISTOR 1K 10% .125W CC TC=0+882	01121	881021
A19R7	0675-1021		RESISTOR 1K 102 .125W CC TC=0+882	01121	881021
A19R8	0698-5180	2	RESISTOR 2K 5% .125W CC TC=0+882	01121	882025
A19R9	0698-5180		RESISTOR 2K 5% .125W CC TC=0+882	01121	882025
A19R10	0698-3113	1	RESISTOR 100 51 .125W CC TC=0+588	01121	881015
A19R11	0698-6984	1	RESISTOR 470 51 .125W CC TC=0+882	01121	884715
A19R12	1810-0041		NETWORK-RES 9-PIN-SIP .15 PIN SPCG	28480	1810-0041
A19U1	1820-0054	5	IC:SN7400N	01295	SN7400N
A19U2	1820 1056	3	IC SN74 132 N COUNTER	01295	SN74132N
A19U3	1820-0716	1	IC SN74 161 N COUNTER	01295	SN74161N
A19U4	1820-C587	1	IC DM74L 10N GATE	27014	DM74L10N
A19U5	1820-0710	2	IC MUXR	07263	93L220C
A19U6	1820-0710		IC MUXR	07263	93L220C
A19U7	1816-0185	1	IC:DIGITAL	28480	1816-0185
A19U8	1820-0077	1	IC:TTL DUAL D FLIP/FLOP	01295	SN7474N
A19U9	1820-0782	1	IC SN74 27 N GATE	01295	SN7427N
A19U10	1820-0174	2	IC:TTL HEX INVERTER	01295	SN7404N
A19U11	1820-0839	4	IC SN74 175 N FLIP-FLOP	01295	SN74175N
A19U12	1820-0765	1	IC SN74 197 N COUNTER	01295	SN74197N
A19U13	1820-C583	1	IC DM74L 00N GATE	27014	DM74L00N
A19U14	1820-0054		IC SN7400N	01295	SN7400N
A19U15	1820-0706	2	IC COMPTN	07263	93240C
A19U16	1820-0054		IC:SN7400N	01295	SN7400N
A19U17	1820-0616	2	IC MUXR	07263	93220C
A19U18	1820-0839		IC SN74 175 N FLIP-FLOP	01295	SN74175N
A19U19	1820-0839		IC SN74 175 N FLIP-FLOP	01295	SN74175N
A19U20	1820-0174		IC:TTL HEX INVERTER	01295	SN7404N
A19U21	1820-0706		IC COMPTN	07263	93240C
A19U22	1820-0596	1	IC DM74L 74N FLIP-FLOP	27014	DM74L74N
A19U23	1820-0616		IC MUXR	07263	93220C
A19U24	1820 0839		IC SN74 175 N FLIP-FLOP	01295	SN74175N
A19U25	1816-0184	1	IC MEMORY	28480	1816-0184
A19U26	1820-0328	1	IC:TTL QUAD 2-INPUT NOR GATE	12955	N7402N
A19Z1	9100-1788	2	COIL: FXD; NON MOLDED RF CHOKE .75UH	02114	VK200 20/48
A34	05340-60067	1	BUS COMMUNICATOR ASSEMBLY (SERIES 1252) (LOADED ON 05340-20067 BLANK BOARD)	28480	05340-60067
A34C1	0160-0162	1	CAPACITOR-FXO .022UF +-10% 200WVDC POLYE	56289	292P22392
A34C2	0160-0157	3	CAPACITOR-FXD 4700PF +-10% 200WVDC POLYE	56289	292P47292
A34C3	0160-0157		CAPACITOR-FXO 4700PF +-10% 200WVDC POLYE	56289	292P47292
A34C4	0180-0106		CAPACITOR-FXD; 60UF+-20% 6VDC TA-SOLID	56289	1500606X0006B2
A34C5	0160-3879		CAPACITOR-FXO .01UF +-20% 100WVDC CER	28480	0160-3879
A34C6	0160-0157		CAPACITOR-FXD 4700PF + 10% 200WVDC POLYE	56289	292P47292

See introduction to this section for ordering information

Table 6-5. Replaceable Parts, Option 011

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A34CR1 A34CR2 A34CR3 A34CR4	1901-0040 1901-0040 1901-0040 1901-0040		DIODESWITCHING 30V 50NA 2NS OC 35 DIODE-SWITCHING 30V 50NA 2NS 00-35 DIODE-SWITCHING 30V 50NA 2NS 00 35 DIODE-SWITCHING 30V 50NA 2NS 00-35	28480 28400 28480 28480	1901-0040 1901-0040 1901-0040 1901-0040
A3451	1251-1626	1	CONNECTOR-PC EDGE 12-CONTIROW 2-ROWS	71785	252-12-30-300
A34R1 A34R2 A34R3 A34R4 A34R5	0757-0902 1810-0136 1810-0136 0757-0902 0757-0902	4 2	RESISTOR 120 2Z .125W F TC=0+-100 NETWORK-RES 10-PIN-SIP .1 PIN SPCG NETWORK-RES 10-PIN-SIP .1-PIN-SPCG RESISTOR 120 2Z .125W F TC=0+-100 RESISTOR 120 2Z .125W F TC=0+-100	24546 28480 28480 24546 24546	C4-1/8 TO-121-G 1810-0136 1810-0136 C4-1/8-T0-121-G C4-1/8-T0-121-G
A34R6 A34R7 A34R8	1810-0041 0757-0902		NETWORK-RES 9-PIN-SIP .15-PIN-SPCG NOT ASSIGNEE RESISTOR 120 2Z .125W F TC=0+-100	28480 24546	1810-0041 C4-1/8-T0-121-G
A34U1 A34U2 A34U3 A34U4 A34U5	1820-1056 1820-0621 1820-0621 1820-0054 1820-0580	3	IC SN74 132 N COUNTER IC SN74 38 N BUFFER IC SN74 38 N BUFFER IC:SN7400N IC DM74L 20N GATE	01295 01295 01295 01295 27014	SN74132N SN7438N SN7438N SN7400N DM74L20N
A34U6 A34U7 A34U8 A34U9 A34U10	1820-0065 1820-0065 1820-1053 1820-1053 1820-0621	2 2	IC:TTL OUPLE J-K FLIP FLOP IC:TTL DUAL J-K FLIP FLOP IC SN74 14 N SCHMITT IC SN74 14 N SCHMITT IC SN74 38 N BUFFER	01295 01295 01295 01295 01295	SN7470N SN7470N SN7414N SN7414N SN7438N
A34U11 A34U12 A34U13 A34U14 A34U15	1820-0054 1820-0586 1820-1056 1820-0904 1820-0589	1 1 1 1	IC:SN7400N IC DM74L 04N INV IC SN74 132 N COUNTER IC COMPTF IC DM74L 30N GATE	01295 27014 01295 07263 27014	SN7400N DM74L04N SN74132N 93L24DC DM74L30N
A34XU1	1200-0475	1	CONNECTOR:1-CONT SKT .016 DIA	22526	75060-005
A34Z1	9100-1788		COIL: FXO; NON-MOLDED RF CHOKE; .75UH	02114	VK200-20/48
A35 A35A1	05340-6006 05340-00022	1	CONNECTOR ASSEMBLY CONNECTOR-BOARD SUBASSEMBLY CONSISTING OF A35J1 AND INTERCONNECTING BOARD FOR REPLACEMENT ORDER BY DESCRIPTION (05340-20066 AND 1251-3283 ASSEMBLY).	28480 28480	05340-60068 05340-00022
A35MP1 A35MP2 A35MP3	0380-1036 2190-0017 05340-00022	2 2 1	SPACER-HEX .255LG 6-32THD .312A/F STL NI WASHER-LK HLCL NO. 8 .168 IN ID .31 IN PLATE, CONNECTOR	28480 28480 28480	0380-1036 2190-0017 05340-00022
A3551 A3552 A3553 A3554 A3555	3101-1787 3101-1787 3101-1787 3101-1787 3101-1787	5	SWITCH-SL OPOT-NS SUBHIN .5A 125VAC/DC SWITCH-SL CPOT-NS SUBMIN .5A 125VAC/DC SWITCH-SL OPOT-NS SUBHIN .5A 125VAC/DC SWITCH-SL DPCT-NS SUBMIN .5A 125VAC/DC SWITCH-SL DPCT-NS SUBHIN .5A 125VAC/DC	28480 28480 28480 28480 28480	3101-1787 3101-1787 3101-1787 3101-1707 3101-1787
A3556	3101-1788	1	SWITCH-SL OPST-NS SUBMIN .5A 125VAC/DC	28480	3101-1788
OPTION 003 CHASSIS PARTS					
Y19 W20 W21	8120-0520 8120-0520 8120-1833	2 1	CABLE ASSY 14-COND 26-AWG CABLE ASSY 14-COND 26-AWG CABLE ASSY 24-COND 24-AWG	28480 28480 28480	8120-0520 8120-0520 8120-1833

See introduction to this section for ordering information

Table 6-6. Manufacturers Code List

MFR NO.	MANUFACTURER NAME	ADDRESS	ZIP CODE
GB027	NO M/F DESCRIPTION FOR THIS MFG NUMBER		
0011J	JERMYN INDUSTRIES		
0086S	STETTNER-TRUSH INC	CAZENOVIA NY	13035
00866	GOE ENGINEERING CO INC	CITY OF INDUSTRY CA	91746
01121	ALLEN BRADLEY CO	MILWAUKEE WI	53212
01295	TEXAS INSTR INC SEMICONDUCTOR DIV	DALLAS TX	75231
02114	FEPROXCUBE CORP	SAUGERTIES NY	12477
02735	RCA CORP SOLID STATE DIV	SOMMERVILLE YJ	08876
03888	PYRDFILM CDRP	WHIPPANY NJ	07981
04713	MOTOROLA SEMICONDUCTOR PRODUCTS	PHOENIX AZ	85008
06383	PANDUIT CORP	TINLEY PARK IL	60477
06540	AMATOM ELFK HARDWARE DIV OF MITE	NEW ROCHELLE NY	10802
06560	AIRCO SPEER ELFK OIV AIP ROCN CO	NOGALES AZ	85621
07088	KELVIN ELECTRIC CO	VAN NUYS CA	91401
07263	FAIRCHILD SEMICONDUCTOR DIV	MOUNTAIN VIEW CA	94040
09353	C AND K COMPONENTS INC	WATERTOWN MA	02172
12955	NO M/F DESCRIPTION FOR THIS MFG NUMBER		
16299	CORNING GL WK ELEC CMPNT DIV	RALEIGH NC	27604
17856	SILICONIX INC	SANTA CLARA CA	95050
19701	MEPCO/ELECTRA CORP	MINERAL WELLS TX	76067
22526	BERG ELECTRONIC INC	CUYLERLAND PA	17070
24226	GOWANDA ELECTRONICS CORP	GOWANDA NY	14070
24546	CORNING GLASS WORKS (BRADFORD)	BRADFORD PA	16701
24931	SPECIALTY CONNECTOR CO INC	INDIANAPOLIS IN	46227
27014	NATIONAL SEMICONDUCTOR CORP	SANTA CLARA CA	95051
28400	HEWLETT-PACKARD CO CORPORATE HQ	PALO ALTO CA	94304
30903	MEPCO/ELECTRA CORP	SAN DIEGO CA	92121
32997	BOURNS INC TRIMMOT PROD OIV	RIVERSIDE CA	92507
56256	NO M/F DESCRIPTION FOR THIS MFG NUMBER		
56289	SPRAGUE ELECTRIC CO	NORTH ADAMS MA	01247
57771	STIMPSON EDWIN B CO INC	BROOKLYN NY	11205
71400	BUSSMAN MFG DIV OF MCGRAW-EDISON CO	ST LOUIS MO	63017
71785	TRW ELEK COMPONENTS CINCH DIV	ELK GROVE VILLAGE IL	60007
72136	ELECTRO MOTIVE MFG CO INC	WILLIMANTIC CT	06226
74276	SIGNALITE INC	NEPTUNE NJ	07753
75042	TRW INC PHILADELPHIA DIV	PHILADELPHIA PA	19108
76493	BELL INDUSTRIES IMC MILLER JU OIV	COMPTON CA	90224
76530	TRW ELEK CMPNT CINCH-MONADNOCK DIV	CITY OF INDUSTRY CA	91747
79727	C-W INDUSTRIES	WAPMINSTER PA	19974
83781	NATIONAL ELECTRONICS INC	GENEVA IL	60134
90949	AMPHENOL SALES DIV OF BUNKER-RAMO	HAZLEWOOD MO	63042
95146	ALCO ELECTRONIC PRODUCTS INC	LAWRENCE MA	01843

SECTION VII

MANUAL CHANGES AND OPTIONS

7-1. INTRODUCTION

7-2. This section contains information necessary to adapt this manual to older instruments. Also included is information for available options. Options are covered starting with paragraph 7-9. Field installation of options are covered in paragraph 7-19. Refer to Section II for ASCII remote programming information.

7-3. MANUAL CHANGES

7-4. This manual applies directly to Model 5340A with serial prefix 1532A. See paragraph 1-4 for serial number identification.

7-5. Newer Instruments

7-6. As changes are made, newer instruments may have serial prefixes that are not listed in this manual. The manual for these instruments are supplied with a manual change sheet which contains the required updating information. If this sheet is missing, contact the nearest Hewlett-Packard Sales and Service Office listed at the back of this manual.

7-7. Older Instruments

7-8. To adapt this manual to instruments having serial prefixes below 1532A, refer to Table 7-1 for backdating that applies to your instrument serial prefix.

Table 7-1. Manual Backdating

If Your Instrument Has Serial Prefix	Make the Following Changes to Your Manual
1440A	1
1416A	1,2
1408A	1,2,3
1348A	1,2,3,4
1344A	1,2,3,4,5
1328A	1,2,3,4,5,6
1324A	1,2,3,4,5,6,7
1320A	1,2,3,4,5,6,7,8
1312A	1,2,3,4,5,6,7,8,9
1252A	1,2,3,4,5,6,7,8,9,10
1248A	1,2,3,4,5,6,7,8,9,10,11
1244A	1,2,3,4,5,6,7,8,9,10,11,12
1236A	1,2,3,4,5,6,7,8,9,10,11,12,13

CHANGE 1

Table 6-1, A2A4 Replaceable Parts:

Change **series** number for 05340-60040 (A2A4) from 1532 to 1344A.

Change A2A4C20 and A2A4C22 to 0160-0363 C:FXD MICA 620PF 5%, 28480, 0160-0363.

Change A2A4C21 to 0160-2202 C:FXD MICA 75PF 5%, 28480, 0160-2202.

Change A2A4L8 and A2A4L10 to 9100-2244 COIL:FXD RF 0.1UH 10%, 28480, 9100-2247

Change A2A4L9 to 9140-0158 1UH 10%, 99800, 1025-20.

Table 6-1, A2 Parts List:

Delete C8 and description.

Table 6-1, A4 Replaceable Parts:

Change **series** number for 05340-60002 (A4) to 1220A.

Change A4R22 to 0757-0932 R:FXD MET FLM 2.2K OHM 2% 1/8W, 28480, 0757-0932 (Note that some A4 boards with series 1220A may have 1800 ohm resistors installed).

Table 6-1, A14 Replaceable Parts:

- Change series number for 05340-60011 (A14) to Series 1236A.
- Change A14R1 and A14R2 to 0757-0893 RFXD FLM 51 OHM 2% 1/8W, 28480, 0757-0893.

Page 8-13, Figure 8-8, A2 Schematic Diagram:

- Change A2A4C20 and A2A4C22 to 620PF.
- Change A2A4C21 to 74PF.
- Change A2A4L8 and A2A4L10 to 0.1UH.
- Change A2A4L9 to 1UH.
- Change series number at top of schematic for A2A4 to Series 1220A.
- Delete C8.

Page 8-17, Figure 8-10, A4 Schematic Diagram:

- Change A4R22 to 2200 OHMS.
- Change series number at top of schematic to Series 1220A.

Page 8-37, Figure 8-20, A14 Schematic Diagram:

- Change A14R1 and A14R2 to 51 OHMS.
- Change series number at top of schematic to Series 1236A.

CHANGE 2

Page 6-6, A2A3 Parts List:

- Change A2A3R1 to 0757-0963 RFXD FLM 43K OHM, 2%, 1/8W, 28480, 0757-0963.

Page 8-13, Figure 8-8:

- Change A2A3R1 to 43K.

Page 6-32, A33 Parts List:

- Change A33CR1 to 1901-0027, Diode: Silicon 0.75A 400PIV, 04713, SR1358-9.
- Add A33CR2, CR3, CR4; 1901-0027, Diode: Silicon 0.75A 400PIV, 04713, SR1358-9.
- Change part number of T2 to 9100-3021.

Page 8-77, Figure 8-35, A33 Power Supply:

- Replace schematic and component locator with Figure 7-9 and 7-10.

CHANGE 3

Table 6-1, A17 Replaceable Parts:

- Change A17A1C1 and C2 to 0180-0228, Capacitor; FXD 22 UF $\pm 10\%$ 15VDC TA-SOLID, 56289, 150D226X9015B2.
- Change A17A1C5 through C7, C11, C12 to 0180-0197, Capacitor; FXD 2.2 UF $\pm 10\%$ 20VDC TA, 56289, 150D225X9020A2.
- Change A17A1L3 to 9140-0158, Coil, FXD, Molded RF Choke, 1 UH 10%, 24226, 10/101.
- Change A17A1R1 to 0698-5426, Resistor 10K 10%, .125W CC Tubular, 01121, BB1031.
- Change A17A1R14 to 0698-5996, Resistor 560 OHM 5%.125W CC Tubular, 01121, BB5615.
- Add A17A1E1, E3, 9170-0029, Core Magnetic, Shielding Bead, .138OD .047, 02114, 56-590-65A2/4A.
- Change A17A1 board series number to Series 1320A.

Figure 8-23, A17 Schematic Diagram:

- Change A17A1C1 and C2 to 22 UFD.
- Add A17A1C21 2.2 PF from U5B pin 11 to ground.
- Change A17A1R1 to 10K ohms.
- Change A17A1R14 to 560 ohms.
- Delete C22 and C23.
- Change A17A1 board series number to 1320A.

CHANGE 4

Table 6-1, A13 Replaceable Parts:

- Change A13 board series number to 1220A.
- Delete A13R39 and description.
- Change A13R3 to 0757-0824 R:FXD FLM 56 ohm 2% 1/8W 28480 0757-0894.

Figure 8-19, A13 Schematic Diagram:

- Change A13R3 to 56 ohms.
- Delete A13R39, connect C4 directly to U1A pin 1.

CHANGE 5

Table 6-1, Replaceable Parts:

- Change A3CR5 and CR6 to 1901-0535, Diode:Hybrid Hot Carrier, 28480, 1901-0535.
- Change A20C3 to 0140-0209 C:FXD Mica 5 pfd 5%, 500VDCW, 28480, 0140-0209.

Figure 8-27, A20 Schematic Diagram:

- Change A20C3 to 5 pfd.

CHANGE 6

Table 6-1, Replaceable Parts:

- Delete listing for A1A5 (05340-6007) Filter Assy and all associated parts (A1A5A1, etc.).
- Delete listing for A2A5 (05340-60078) Filter Assy and all associated parts (A2A5A1, etc.).

Figure 8-7, A1 Schematic Diagram:

- Delete A1A5 and A1A5A1 from schematic. Show + and -5 volt lines connected directly to A1A2.

Figure 8-8, A2 Schematic Diagram:

- Delete A2A5 and A2A5A1 from schematic. Show + and -5 volt lines connected directly to A2A2.

Table 6-1, A6 Replaceable Parts:

- Change A6 series number 1236A.
- Change A6R13 to 0757-0938 R:FXD FLM 3.9K ohm 2% 1/8W, 28480, 0757-0938.
- Change A6R15 to 0757-0946 RFXD FLM 8.2K ohm 2% 1/8W, 28480, 0757-0946.
- Change A6R26 to 0698-8128 RFXD COMP 220 ohm 5% 1/8W, 01121, BB2215.
- Change A6R27 to 0698-5075 R:FXD COMP 130 ohm 5% 1/8W, 28480, 0698-5075.

Figure 8-12, A6 Schematic Diagram:

- Change A6R13 to 3900 ohms, A6R15 to 5600 ohms, A6R26 to 220 ohms, and A6R27 to 130 ohms.

Table 6-1, A2 Replaceable Parts:

- Change A2A4C3 to 0160-2150, C:FXD MICA 33 PF 5%, 28480, 0160-2150.
- Change A2A4R4 to 0757-0180, RFXD MET FLM 31.6 ohm 1% 1/8W, 28480, 0757-0180.
- Change A2A4 board series number to 1220A.

CHANGE 7

Table 6-1, A10 (05340-60008) Parts List

- Change Series No. to 1252A
- Change A10R8 to 0698-4433 RFXD 2260 OHM 1% 1/8W, 28480, 0698-4433
- Delete A10R25 and description

Table 6-1, A22 (05340-60016) Parts List

- Change Series No. to 1236A
- Change A22Q13 to Q16 to 1854-0009
- Change A22R36 to R39 to 0683-6215 620 ohms
- Change A22R30 to 0683-3305 R:FXD COMP 330 OHM 5% 1/4W, 01121, CB33056
- Change A22Q17 to 1854-0092
- Delete A22Q21, A22R54, and A22R55 and their descriptions
- Change A22U9 to 5088-7001

Figures 8-16 and 8-18 A10 and A12 (05340-60008) schematics:

- Change A10R8 to 2260 ohms.
- Change A10R25 200 ohm potentiometer (L2, C5, and R8 are tied together).

Figure 8-29, A22 Schematic Diagram:

- Change series no. to 1236A
- Change A22R30 to 33 ohms
- Change A22R36 to R39 to 2700 ohms
- Replace component locator with Figure 7-1
- Delete A22Q21, A22R54, and R55

CHANGE 8

Table 6-1, A10 Replaceable Parts:

- Change A10C3 to 0160-2671, C:FXD MYLAR 0.1μF 5% 80VDCW, 56289, 192P1045R8-PTS
- Change A10L3 to 9100-2278, COIL:FXD MOLDED 150μH 10%, 82142, 09-A151K

Change A10R1 to 0698-3151 RFXD MET FLM 2.87K OHM 1% $\frac{1}{8}$ W, 28480,0698-3151
Change A10R6 to 0698-3449, R:FXD MET FLM 28.7K OHM 1% $\frac{1}{8}$ W, 28480,0698-3449

Figures 8-16 and 8-18, A10 and A12 Schematics:

Change A10C3 to 0.1 μ F
Change A10L3 to 150 μ H
Change A10R1 to 2870 OHMS
Change A10R6 to 28.7K OHMS

CHANGE 9

Table 6-1, A17 Replaceable Parts:

Add A17A1C17, 0180-0197, C:FXD ELECT 2.2 μ F 10% 20VDCW, 56289, 150D225X9020A2-DYS
Add A17A1C21, 0160-2327, C:FXD .001 μ F
Add Terminal Post 0360-0474 (2 each)
Add A17A1R6, 8, 9,0698-3378 R:FXD 51 OHM $\frac{1}{8}$ W, 28480,0698-3378
Add A17A1R5, 0698-5177 R:FXD 820 OHM $\frac{1}{8}$ W, 28480,0698-5177
Add A17A1R19, 0757-0404 R:FXD FLM 130 OHM 1% $\frac{1}{8}$ W, 28480,0757-0404
Add A17A1U4, 1820-0753 IC:TTL DIGITAL, 28480,1820-0753
Change A17A1R10 to 0683-4715, R:FXD COMP 200 OHM 5% $\frac{1}{4}$ W, 01121, CB4715
Change A17A1R13 to 0698-3378, R:FXD COMP 100 OHM $\frac{1}{8}$ W, 28480,0698-3378
Change A17A1R14 to 0674-3315, RFXD COMP 330 OHM 5% $\frac{1}{8}$ W, 28480, 0674-3315
Delete A17A1E1,2,3, 9170-0029 Bead:Ferrite
Delete A17A1R23 and description
Delete A17A1C21 and description

Figure 8-23, A17A1 Schematic and Component Locator:

Replace schematic diagram with Figure 7-2 (A17A1 schematic series 1220A). Replace component locator with Figure 7-3.

CHANGE 10

Page 5-2, Table 5-1:

Change A20 part number to 05340-60018

Table 6-1, A20 assembly:

Replace parts list with Table 7-2.

Figure 8-27, A20 Schematic Diagram:

Replace schematic diagram with Figure 7-4. Replace component locator with Figure 7-5.

Figure 8-6, 5340A Block Diagram:

Change part number of A20 to 05340-60018.

Table 6-1, A22 Parts List

Change part number of A22Q13 thru Q16 to "1854-0009".

Change part number of A22R36 thru R39 to "0683-6215,620 ohms.

Table 6-1, Chassis Parts:

Delete C3 through C7
Delete L2 thru L6

Figure 8-23, A17 Schematic Diagram:

Delete C3 thru C6 and L2 thru L5.

Figure 7-2, A17 Schematic Diagram:

Add A17A1C21 0.001 μ F, connected from junction of A17A1R19 and C17 to ground.

Table 6-1, A17 Parts List:

Change A17A1C21 0160-2327, C:FXD CER 0.001 μ F 20%100VDCW

Page 4-47, Paragraph 4-229:

Change A20 part number to 05340-60018

CHANGE 11

- a. Replace A10 schematic diagram (Figure 8-16) with Figure 7-6 (series 1220A). Replace A12 schematic diagram (Figure 8-18) with Figure 7-7 (series 1220A). Replace A10 and A12 component locators with Figure 7-8.

- b. In Table 6-1, change parts lists for A10 as follows:

Change series 1252A to 1220A.

Change A10C4 to "0180-0291 C:FXD ELECT 1.0 UF 10%35VDCW, Mfr Code 56289, Mfr part number 150D105X9035A2-DYS."

Add "A10CR3 1901-0040 DIODE:SILICON 50MA 30WV, Mfr code 07263, Mfr part number FDG1088."

Change A10CR4 and A10CR5 to "0122-0057 C:VAR 20PF/.4V, Mfr code 28480, Mfr part number 0122-0057." Add "Note: A10CR4, A10CR5, A12CR4, and A12CR5 are a matched set. If any one diode is replaced all four diodes must be replaced."

Change A10L4 to "9100-2266 COIL/INDUCTOR: FXD 8.2UF 10%, Mfr code 82142, Mfr part number 09-1316-2K."

Change A10R2 to "0698-3443 RFXD MET FLM 287 OHM 1%1/8W, Mfr code 28480, Mfr part number 0698-3443."

Change A10R5 to "0698-3158 RFXD MET FLM 23.7K OHM 1%1/8W, Mfr code 28480, Mfr part number 0698-3158."

Change A10R7 to "0698-3151 R:FXD MET FLM 2.87K OHM 1%1/8W, Mfr code 28480, Mfr part number 0698-3151."

Change A10R8 to "0698-0084 R:FXD MET FLM 2.15K OHM 1%1/8W, Mfr code 28480, Mfr part number 0698-0084."

Change A10R9 to "0698-3157 RFXD MET FLM 19.6K OHM 1%1/8W, Mfr code 28480, Mfr part number 0698-3157."

Add "A10R10 0757-0443 RFXD MET FLM 11.0K OHM 1%1/8W, Mfr code 28480, Mfr part number 0757-0443."

Add "A10R11 0757-0439 R:FXD MET FLM 6.81K OHM 1%1/8W, Mfr code 28480, Mfr part number 0757-0439."

Change A10R24 to "0757-0283 R:FXD MET FLM 2.00K OHM 1%1/8W, Mfr code 28480, Mfr part number 0757-0283."

CHANGE 12

- a. On Figure 8-34 and 8-35, change F1 to "2.5 amp slow-blow 115V operation." For instruments with serial prefix 1244A, 2.5 amp fuses were installed, for replacement see Table 6-1.
- b. In Table 6-1, change F1 to "2110-0015 FUSE:CARTRIDGE 2.5 AMP 125 V MAX SLOW-BLOW."

Change part number of MP6 to "05340-00002."

Change part number of MP7 to "05340-20028."

- c. On Figure 8-22, delete pin W and connecting wire to XA19B. This wire was added to accommodate future changes.
- d. On Figure 2-2 and Figure 3-4, change item 1 (10 MHz OUTPUT) to "TIME BASE OUTPUT." Change item 3 (10 MHz INPUT) to "OSC" only.

CHANGE 13

This instrument configurations for series 1244A and series 1236A are identical.

Table 7-1. A20 Time Base Board Assy (Series 1236A), Replaceable Parts

A20	05340-60018	1	TIME BASE BOARD ASSV (SERIES 1236A) ILOAOEO ON 05340-20018 BLANK BOARD) C:FXD ELECT 60 UF 20% 6VDCW	28480	05340-60018
A20C1	0180-0106			28480	0180-0106
A20C2	0160-3879		C:FXD CER 0.01 UF 20% 100VDCW	72982	8121-8112-X7R-103M
A20C3	0140-0209	1	C:FXD MICA 5.0 PF 10%	28480	084070805
A20R1	0683-2725		R:FXD COMP 2700 OHM 5% 1/4W	01121	
A20R2	0683-2725		R:FXD COMP 2700 OHM 5% 1/4W	01121	CB 2725
A20R3	0683-2725		R:FXD COMP 2700 OHM 5% 1/4W	01121	CB 2725
A20U1	1820-0055	6	IC:TTL DECADE COUNTER 10 MHZ MIN.	01295	SN7490N
A20U2	1820-0615	1	IC:TTL 8-INPT MULTIPLEXER W/COM. ENABLE	04713	FAIR 5312
A20U3	1820-0099	3	IC:TTL 4-BIT BINARY COUNTER	01295	SN7493N
A20U4	1820-0054		IC:TTL QUAD 2-INPT NAND GATE	01295	SN7400N
A20U5	1820-0069	3	IC:TTL DUAL 4-INPT POS NAND GATE	01295	SN7420N
A20U6	1820-0716		IC:TTL SYNC PRESET 4-BIT BINARY COUNTER	01295	SN74161N
A20U7	1820-0716		IC:TTL SYNC PRESET 4-BIT BINARY COUNTER	01295	SN74161N
A20U8	1820-0055		IC:TTL DECADE COUNTER 10 MHZ MIN.	01295	SN7490N
A20U9	1820-0055		IC:TTL OECAOE COUNTER 10 MHZ MIN.	01295	SN7490N
A20U10	1820-0077	7	IC:TTL DUAL 0 FIF	01295	SN7474N
A20U11	1820-0077		IC:TTL DUAL C F/F	01295	SN7474N
A20U12	1820-0099		IC:TTL 4-BIT BINARY COUNTER	01295	SN7493N
A20U13	1820-0174		IC:TTL HEX INVERTER	01295	SN7404N
A20U14	1820-0174		IC:TTL HEX INVERTER	01295	SN7404N
A20U15	1820-0055		IC:TTL OECAOE COUNTER 10 MHZ MIN.	01295	SN7490N
A20U16	1820-0055		IC:TTL DECADE COUNTER 10 MHZ MIN.	01295	SN7490N
A20U17	1820-0077		IC:TTL DUAL 0 FIF	01295	SN7474N
A20U18	1820-0054		IC:TTL QUAD 2-INPT NAND GATE	01295	SN7400N
A20U19	1820-0904	4	IC:TTL LP 5-BIT COMPARATOR	07263	U7893L2459X
A20U20	1820-0904		IC:TTL LP 5-BIT COMPARATOR	07263	U7893L2459X
A20U21	1820-0099		IC: TTL 4-BIT BINARY COUNTER	01295	SN7493N
A20U22	18200055		IC: TTL DECADE COUNTER 10 MHZ MIN.	01295	SN7490N
A20U23	1820-0751	2	IC: TTL PRESETTABLE DECADE COUNTER (50 MHZ)	01295	SN74196N
A20U24	18200261 or 1820-1096 or (preferred pan)	1	IC: TTL MONO-STABLE MULTIVIBRATOR	01295	SN74121N
A20U25	1820-0904		IC: TTL LP 5-BIT COMPARATOR	07263	U7893L2459X
A20U26	1820-0904		IC: TTL LP 5-BIT COMPARATOR	07263	U7893L2459X
A20U27	1820-0214		IC: TTL BCD TO DEC. DECODER	01295	SN7442N
A20Z1	9100-1788		COIL: CHOKE	02114	VK200-10/4B

Figure 7-1. A2 Component Locator Series 1236A

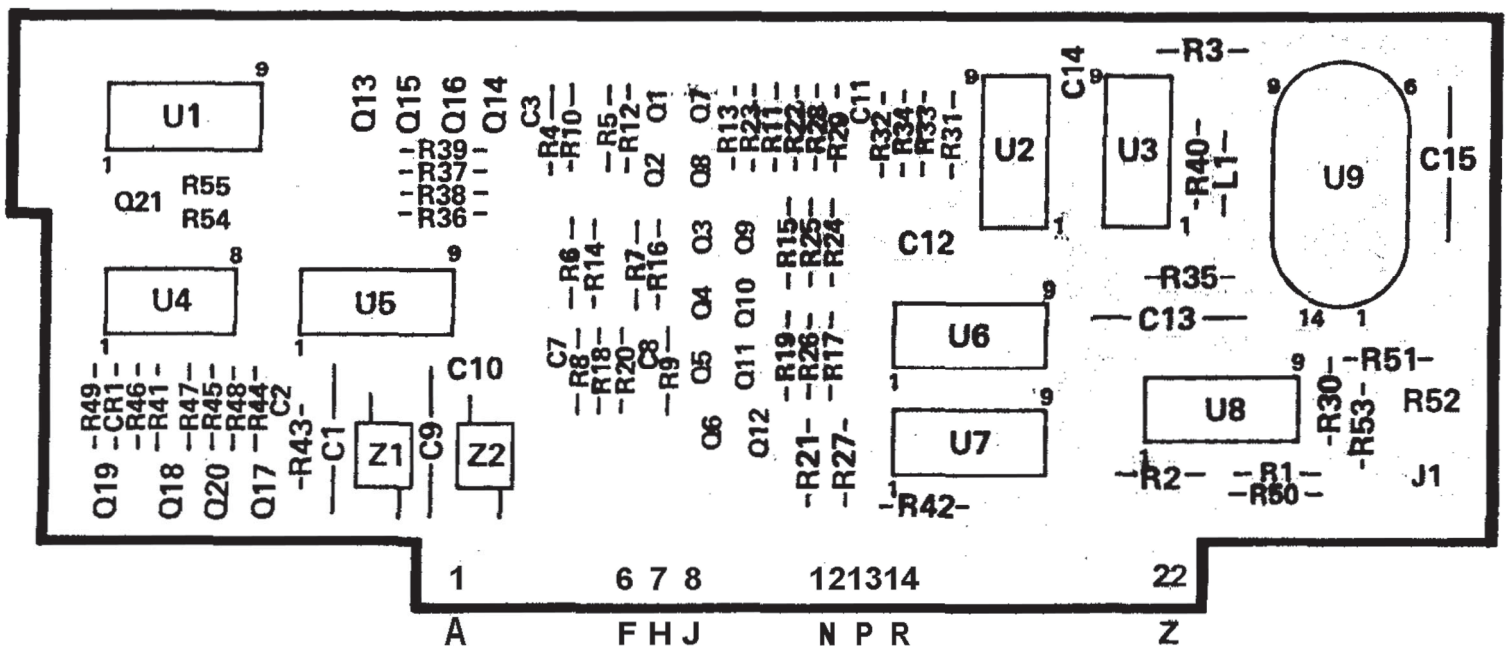


Figure 7-2. A17 Direct Count Amplifier Assembly (Series 1220A)

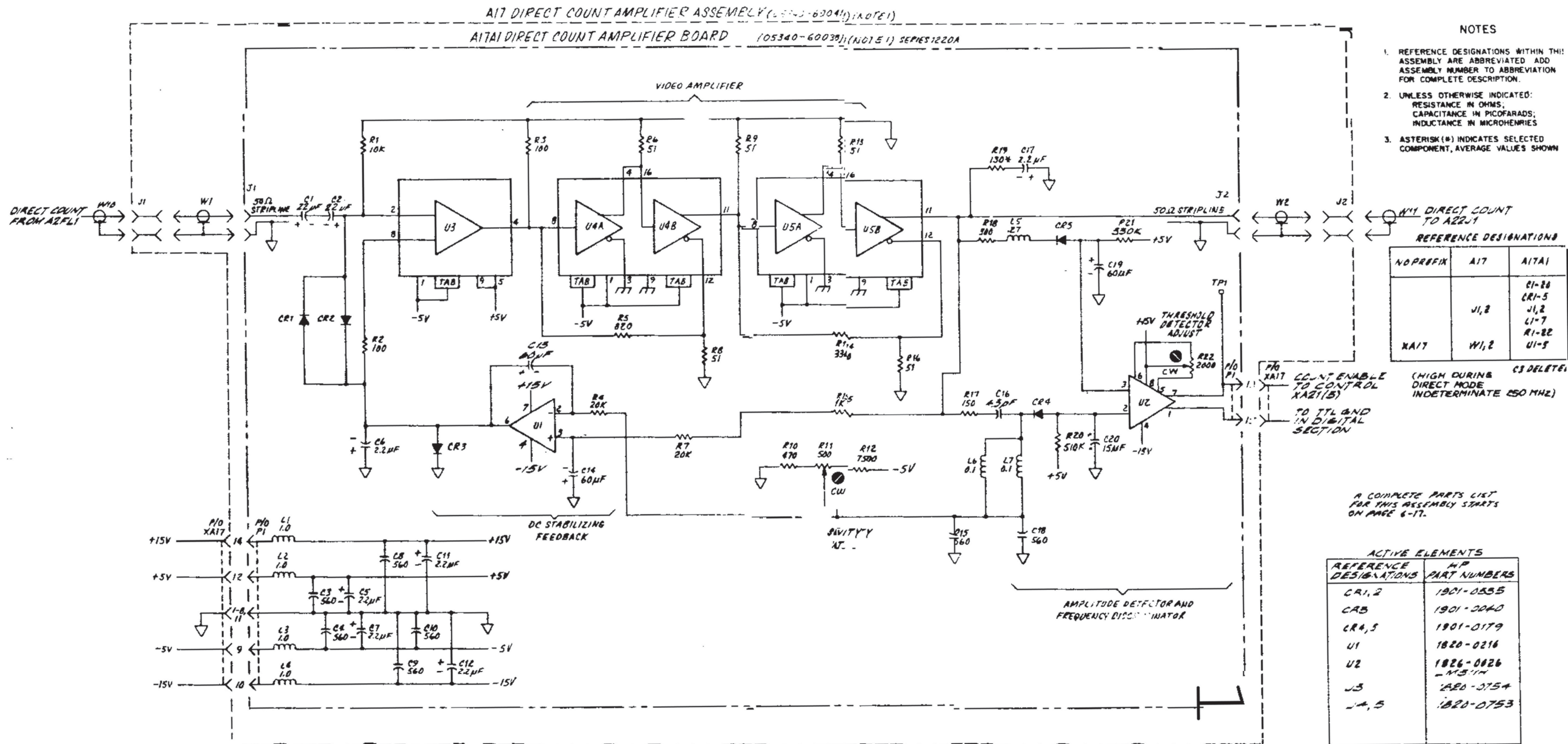


Figure 7-3. A17A1 Direct Count Amplifier Assembly (Series 1220A)

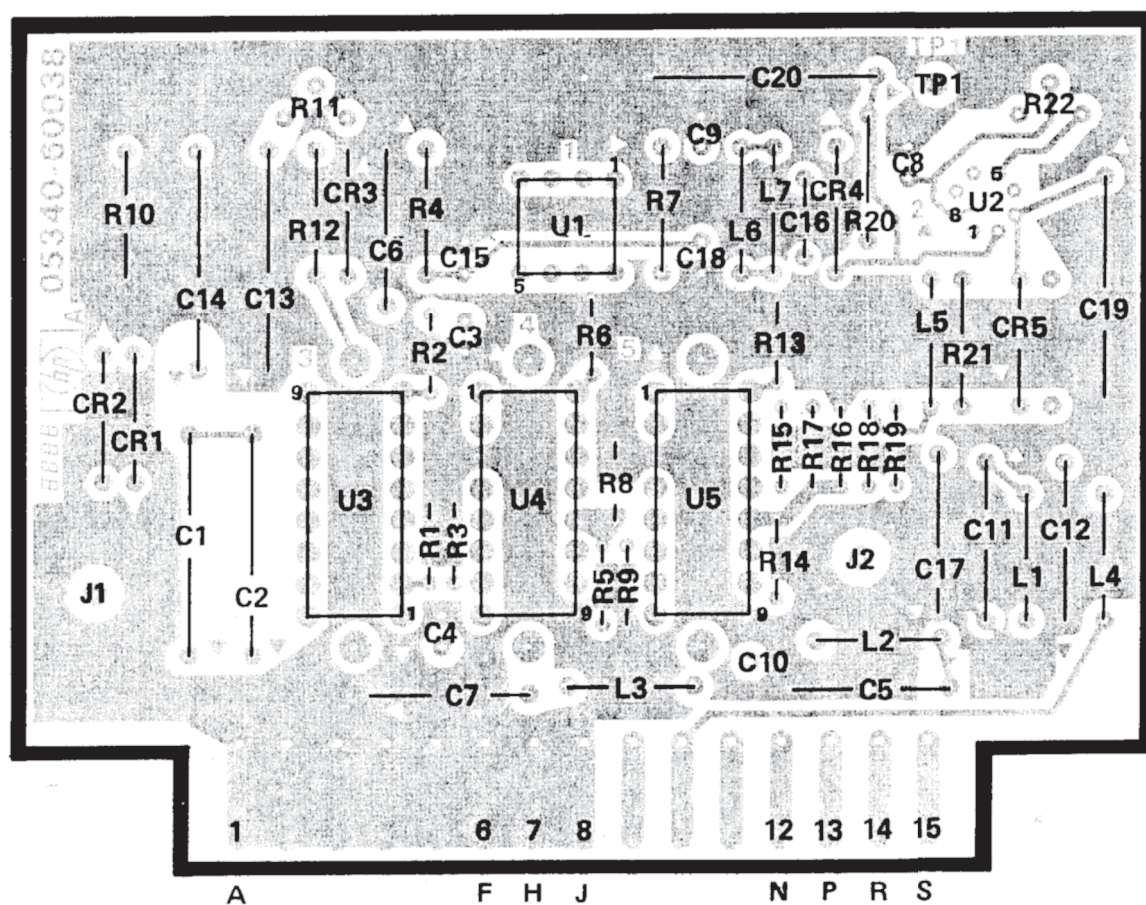


Figure 7-4. A20 Time Base Assembly

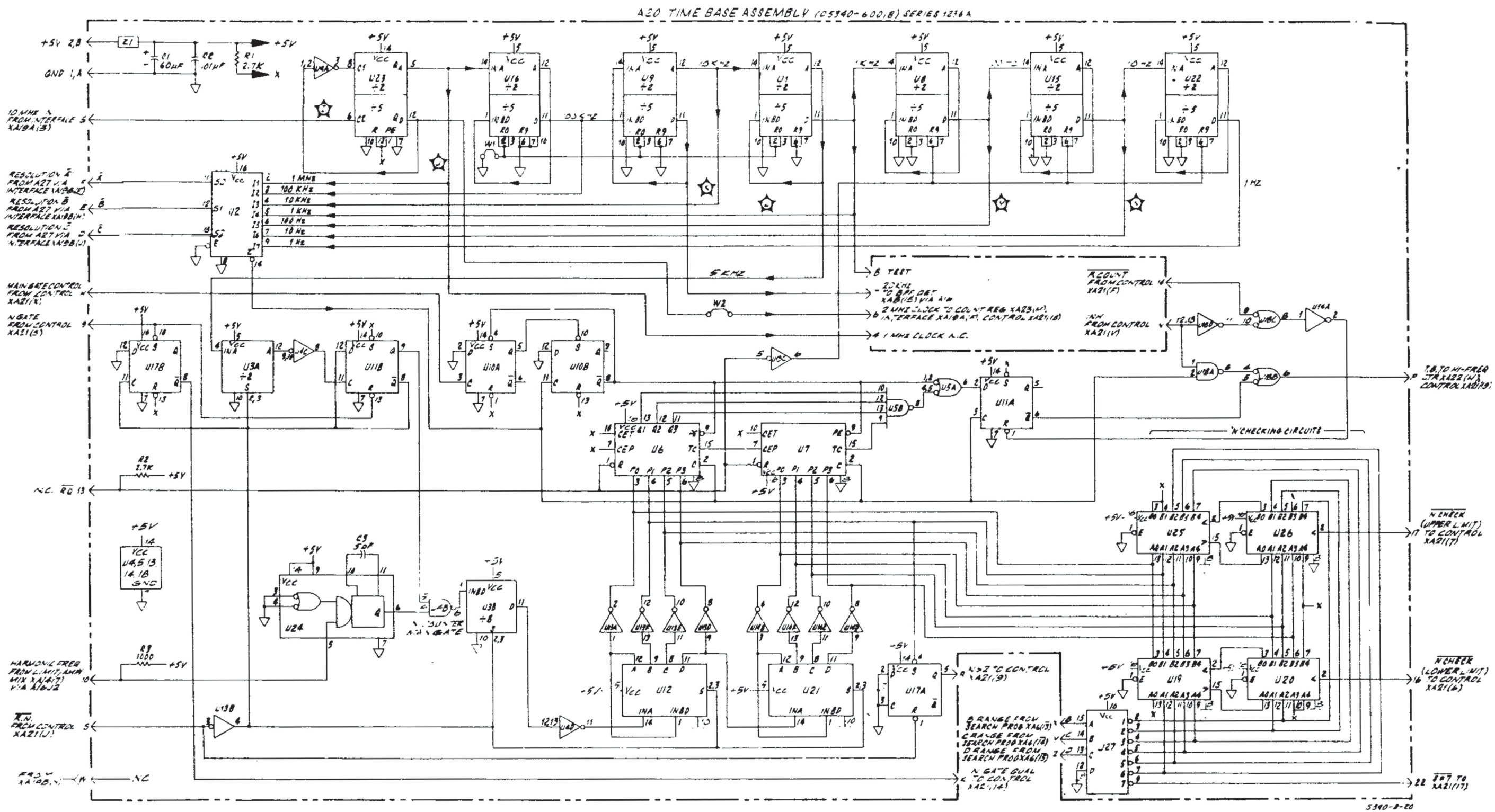
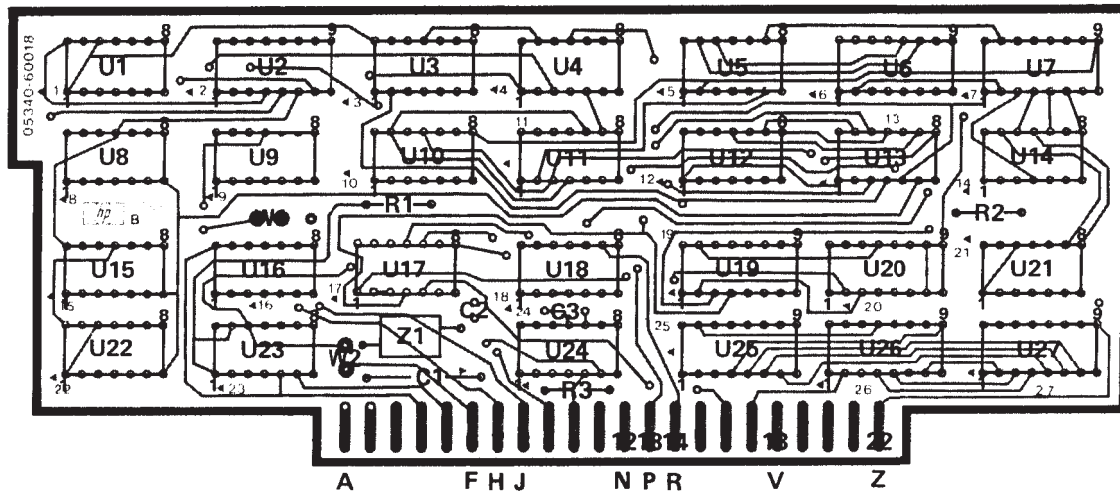


Figure 7-5. A20 Component Locator (Series 1236A)



ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
U1, 8, 9, 15 16, 22	1820-0055 SN7490N
U2	1820-0615 9312
U3, 12, 21	1820-0099 SN7493N
U4, 18	1820-0054 SN7400N
U5	1820-0069 SN7420N
U6, 7	1820-0716 SN74161N
U10, 11, 17	1820-0077 SN7474N
U13, 14	1820-0174 SN7409N
U19, 20, 25, 26	1820-0904 93L24
U23	1820-0751 SN74196N
U24	1820-0261 SN74121N
U27	1820-0214 SN7442N

NOTES

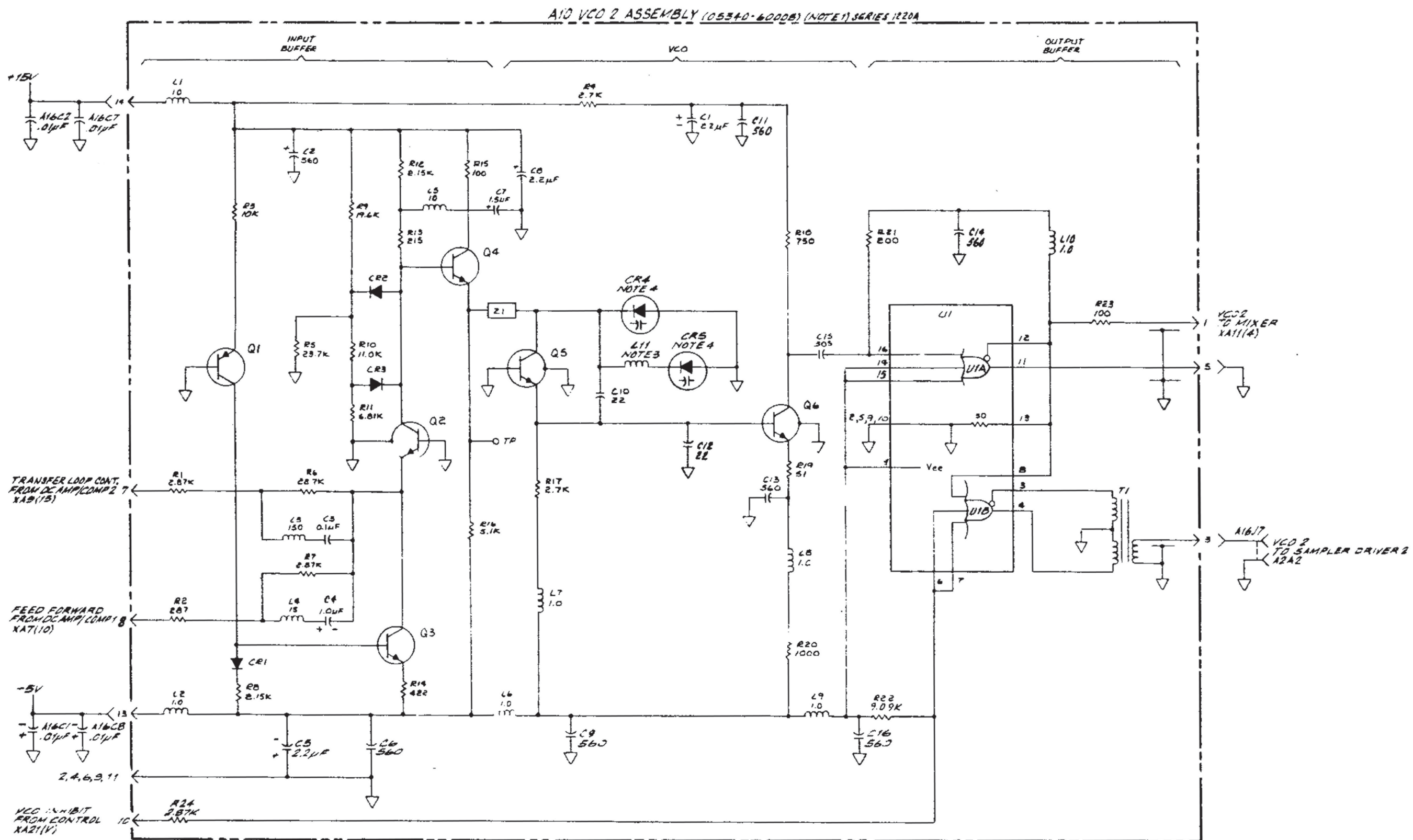
1. REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
2. UNLESS OTHERWISE INDICATED:
RESISTANCE IN OHMS;
CAPACITANCE IN PICOFARADS;
INDUCTANCE IN MICROHENRIES

REFERENCE DESIGNATIONS

A20
C1-3 R1-3 U1-27 Z1

A COMPLETE PARTS LIST
FOR THIS ASSEMBLY STARTS
ON PAGE 6-19.

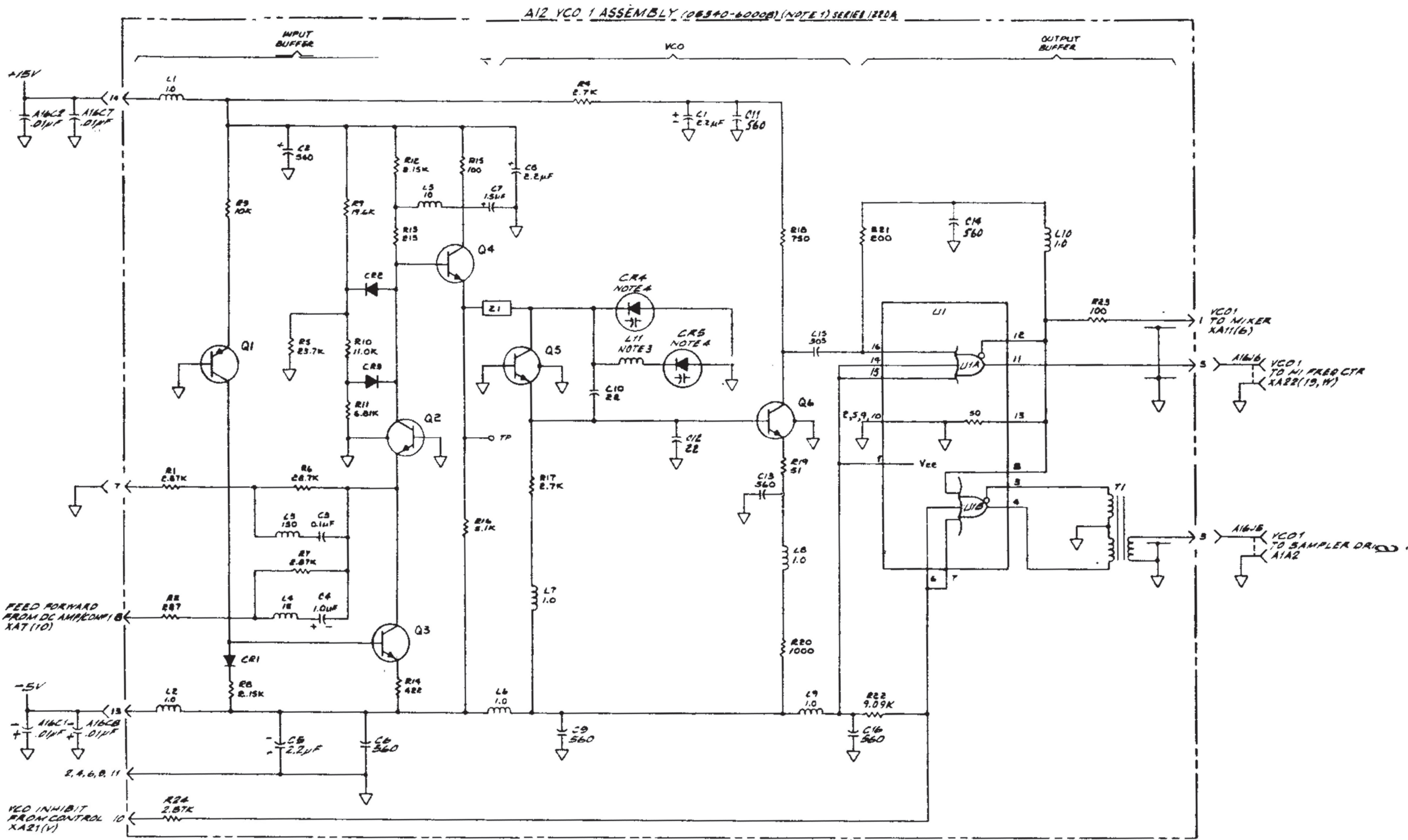
Figure 7-6. A10 VCO No. 2 Assembly (Series 1220A), Schematic Diagram



ACTIVE ELEMENTS	
REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1-3	1901-0040
CR4,5	0122-0057 (SEE NOTE 4.)
Q1	1853-0036 2N3906
Q2	1854-0073
Q3	1854-0583 MP3A-018
Q4	1854-0005 2N708
Q5,6	1854-0345 2N3179
U1	1820-0753

5340-0-12

Figure 7-7. A12 VCO No. 1 Assembly (Series 1220A), Schematic Diagram



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;
3. COIL IS PRINTED ON PC BOARD
4. A12CR5 & CR4 AND A12CR4 & CR5 MUST BE REPLACED AS A MATCHED SET, I.E. WHEN ANY ONE DIODE IS REPLACED, ALL FOUR MUST BE INSTALLED.

REFERENCE DESIGNATIONS

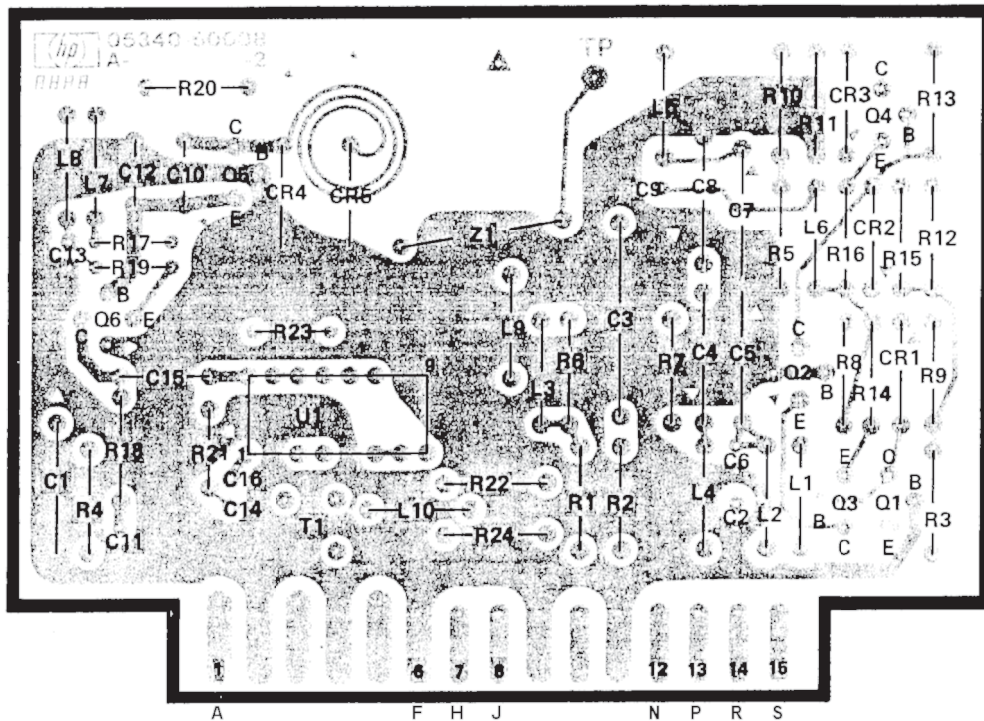
A12
C1-16
CR1-5
L1-10
Q1-6
R1-23
T1
U1

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1-3	1901-0343
CR4-5	0182-0057 (SEE NOTE 4)
Q1	1853-0536 EN3906
Q2	1854-0073
Q3	1854-0583 MPSA-018
Q4	1854-0005 EN706
Q5, Q6	1854-0849
U1	1883-0793

05340-0-14

Figure 7-8. A10, A12 VCO No. 1 and No. 2, Component Locator



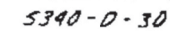
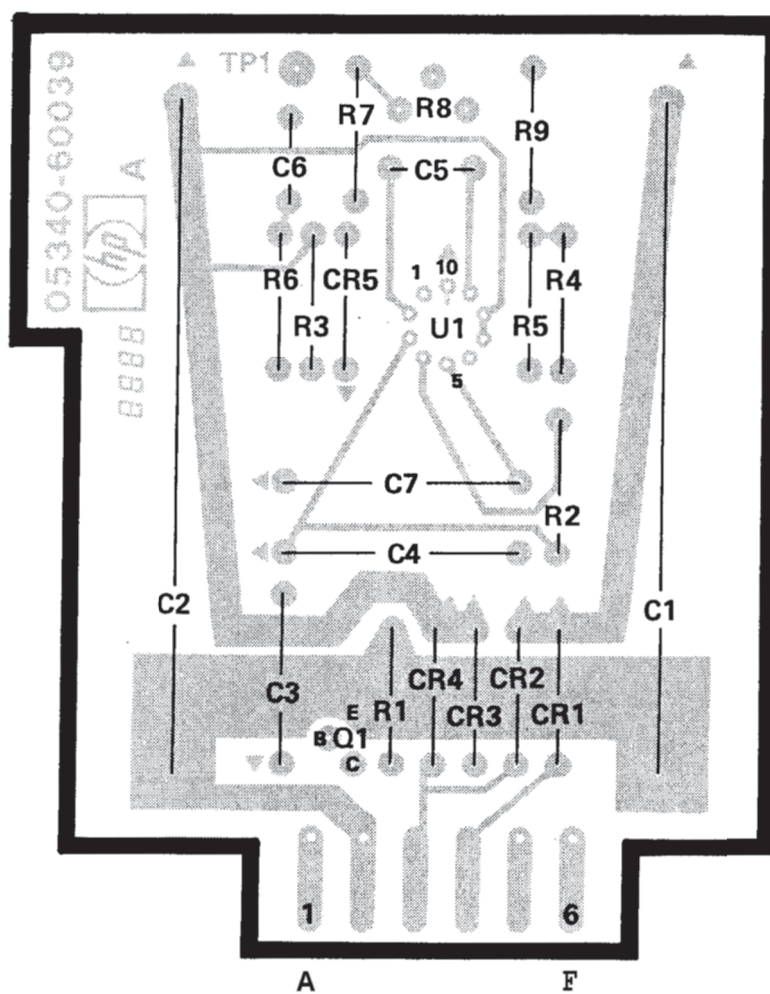


Figure 7-10. A33 Power Supply (Series 1236A), Component Locator



7-9. OPTIONS

7-10. Options 001, 002, and 011 are available for the 5340A. Following is a description of each option.

7-11. Option 001 High-Stability Oscillator

7-12. Specifications for Option 001 are listed in Table 1-3. This option consists of deleting the standard oscillator assembly (05340-60036) and adding the following assemblies and parts:

- a. A18 10544A oscillator assembly plugs into XA18 in place of the standard oscillator. The schematic diagram is shown in Figure 8-24. The parts list is given in Table 6-3.
- b. A33 Power Supply (plugs into XA33). The schematic diagram is shown in Figure 8-35 and the parts list is given in Table 6-3. Theory is contained in Section IV.
- c. Transformer T2. The schematic diagram is shown in Figures 8-33 through 8-35. The part number is listed in Table 6-3.

7-13. Option 002, Rear Panel Connectors

7-14. This option provides input connectors on the rear panel. Input 1 (10 Hz - 18 Hz Type N J2) is installed on the rear panel in place of J1 on the front panel. Input 2 (10 Hz - 250 MHz BNC J8) is installed on the rear panel in addition to J4 on the front panel. In addition, a 50-ohm termination is installed on the front panel BNC connector 54. The termination reduces the input impedance to 50-ohms. This ensures that the 5340A meets all specifications when Option 002 is installed. When the 5340A is equipped with this option, 10 Hz to 250 MHz direct count inputs can be connected to either the rear panel (58) or the front panel connector (54). When the input is connected to the front panel input, the termination is removed and installed on the rear panel BNC connector J8. Parts for Option 002 are listed in Table 6-4. See Figures 8-2, 8-4, and 8-5 for connector locations. The schematic diagram for the direct count input is shown in Figure 8-9. The wiring for the rear panel N connector is the same as the front panel configuration, see Figure 8-6.

7-15. Option 011, Remote Programming and Digital Output

7-16. Option 011 provides for remote programming and digital output. The digital output feature requires additional accessory equipment to interface with HP printers, computers, and calculators (see Table 1-2). Also, see Table 1-3 for specifications.

7-17. Option 011 consists of deleting assembly A19A and adding the parts listed in Table 6-5. Schematic diagrams are given in Figure 8-26 and 8-36.

7-18. Operation and programming information is given in Section 11. Theory of Operation for the assemblies associated with this option is given in Section IV.

7-19. FIELD INSTALLATION OF OPTIONS

7-20. Installation of Option 001, High-Stability Oscillator

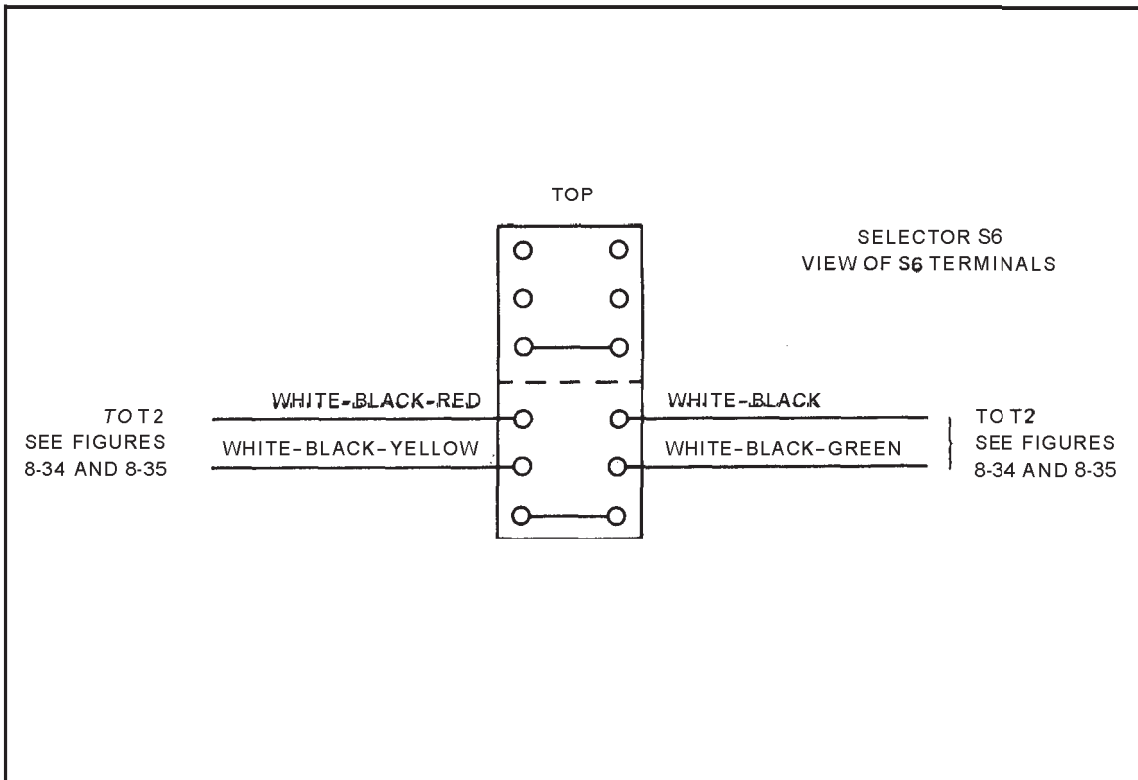
7-21. The following parts are required:

A18	5061 - 6001	Oscillator Assembly	1 ea.
A33	5340 - 60080	Oscillator Power Supply	1 ea.
T2	9100 - 3049	Transformer	1 ea.
	2420 - 0001	6-32 Snap Hex Nut	2 ea.
	5340 - 20044	Oscillator Spacer	2 ea.
	2360 - 0117	6-32 x 5/16 Pan Head Screw with lock washers	2 ea.
	3050 - 0066	Washer: Flat #6	2 ea.

7-22. To install Option 001, refer to Figures 8-2 and 8-3 for instrument photos and Figures 8-24, 8-34, and 8-35 for schematics. Remove top and bottom covers and proceed as follows:

- a. Remove A18 (05340-60036) and replace with High Stability Oscillator 10544A.
- b. On bottom of chassis, secure 10544A as follows:
 - (1) Place oscillator spacers over oscillator studs protruding through chassis.
 - (2) Using lockwashers, fasten the two 6-32 x 5/16 screws to the oscillator studs.
- c. Install transformer T2 into holes provided. Attach with 6-32 hex snapnuts.

d. Dress the group of striped wires from T2 toward T1 and through the cable clamp next to T1. Continue to dress the wires between the power supply motherboard A30 (05340-60029) and the left side frame and then toward the rear of the chassis. Route the striped wires through the hole nearest to the left side frame. (The hole next to the fan will have no wires running through it.) Cut, dress, and strip the striped wires and solder them to S6 as shown below. See Figures 8-34 and 8-35 for schematic diagrams.



- e. Cut, dress, strip, and solder the solid colored wires from T2 as follows:
 - Orange wire (either one) to XA33 pin 3.
 - Other orange wire to XA33 pin 4.
 - Both blue wires to XA33 pins 2 and B. (XA33 pins 2 and B are already connected to chassis through a black wire.)

- f. Install A33 (05340-60039) into XA33.

g. Apply ac power to counter and note that the * annunciator lights. The * should remain lit for approximately 20 minutes. Adjust power supply A33 as described in Table 5-3 step 1g. Adjust oscillator as described in Table 5-3, step 10.

7-23. Installation of Option 002, Rear Panel Connectors

7-24. The following parts are required:

R4	11593A	50-ohm termination	1 ea.
W17	05260-6034	Low Frequency Input Cable	1 ea.
W18	05340-60060	18 GHz Rigid Coax Assembly	1 ea.
58	1250-0102	BNC connector	1 ea.
For 58	08731-201	Nut	1 ea.
MP18	05340-00024	Front Panel Trim (not necessary for field modification. Has no cutout for J1. May be installed if desired to have field modification match factory installed option).	

7-25. To install Option 002, refer to Figures 6-1, 8-4, and 8-5 for instrument photos and proceed as follows:

- a. Remove right trim plate MP1, right side cover MP13, and right side frame MP12.
- b. Remove left trim plate MP1 and remove the two screws that fasten the front panel (MP15) to the left side frame (MP3).
- c. Remove nut that secures the front panel to the chassis (MP4).
- d. On CP1, loosen the coupling nut that secures the rigid coax line to J1.
- e. Loosen J1 and push it rearward out of the front panel. Save the nut that secures the N connector to the front panel. This will be used for the rear panel N connector. Also save the aligning pin from the front panel N connector.
- f. On rear panel, remove plugs in holes for 52 and 58. If original front trim panel is retained, insert plug into hole left after removal of J1.
- g. Install N connector of assembly 05340-60060 into rear panel hole marked 52. Dress rigid coax along the right side of chassis and through the two cable clamps. Use the nut from the front panel N connector and the aligning pin to orient and secure 52 to the rear panel. Do not overtighten the nut on 52.

CAUTION

DO NOT TIGHTEN THE FITTINGS ON CP1 TO MORE THAN 12 IN-LBS. DAMAGE TO FITTINGS MAY RESULT.

- h. Secure the rigid coax cable fitting to CP1.
- i. Secure cable W17 (05260-6034) to BNC connector (1251-0102). Push cable end through hole marked J8 on the rear panel. Use nut (08731-201) to secure connector. Route low frequency cable from rear panel along the right side of chassis through the two cable clamps.
- j. If desired to replace front panel trim (MP17), remove knobs and hardware for S1, S2, R1/S3, and S4. Also unsolder the capacitor lead that connects from A3 to 54. Remove 54 from front panel. Install new trim panel MP18.
- k. Solder the center conductor of the low frequency cable to the center pin of 54. Solder the shield to the ground post next to 54.
- l. Reassembly the front panel, side frames, and side covers.
- m. Install 50-ohm termination on J4.

7-26. Installation of Option 011, Digital Input/Output

7-27. The following parts are required:

A19	05340-60032	Interface B Assembly	1 ea.
A34	05340-60067	Bus Communicator Assembly	1 ea.
A35	05340-60068	Connector Assembly	1 ea.
W19, W20	8120-0520	ASCII Bus Cable	2 ea.
A20	05340-60073	Time Base Assembly (Required for instruments with serial prefix 1252A and below. The 05340-60018 board must be replaced with an 05340-60073 board.	
CR2	1901-0028	Diode	1 ea.
	05340-00026	Insulator	1 ea.
	2360-0197	Pozi-drive Screws 6-32 x 3/8	4 ea.
	2200-0103	Pozi-drive Screws 4-40 x 1/4	4 ea.
	2190-0017	Lockwashers for Standoff Stud Mount	2 ea.
		Solder Lug	1 ea.

7-28. Figure references that are useful during installation include Figures 8-2, 8-3, 8-5, 8-26, and 8-36. To install Option 011, proceed as follows:

- a. Remove A19A (05340-60031).
- b. On the rear panel, remove the blank plate by removing the four pozi-drive screws.
- c. On A19B (05340-60032) install cables W19 and W20 in sockets J1 and J2 located on the right edge of the board. See Figure 8-26 component locator. Pins 1 and 14 of both cable connectors should be oriented toward the top of the pc board. The white arrows on the connector will point toward the board. W19 will be the cable connected to the top most socket of A19B.
- d. Install A19B into XA19 and dress the cables past the casting assembly toward the rear of the instrument.
- e. Install 05340-60073 Time Base board into XA20 for instruments not so equipped.
- f. Locate A34 (05340-60067). Connect the plug from cable W19 to the socket on A34 that is closest to integrated circuit U3. Connect the plug from cable W20 to the socket adjacent to the large 24-pin Cinch connector. The white arrows on the connector will point toward the board.
- g. Install A34 behind the rear panel. Align the four standoffs on A34 toward the rear panel. The 24-pin Cinch connector on A34 should be aligned toward the bottom of the instrument. Use four 6-32 x 3/8" pozi-drive screws to secure A34 to the rear panel. Dress cables W19 and W20 along the casting assembly and away from the power supply boards. Install the insulator between the power supply boards and W19 and W20.

- h. Install A35A1 (05340-60066) and A35J1 (Digital Input-Output Type 57 connector) in the Option 011 plate (plate with the six slide switches). See Figure 8-5 for correct orientation of A35J1. Secure A35J1 using the standoff stud mount and split lock washers. Using four 4 x 40 x 1/4" posi-drive screws, secure the Option 011 plate to the outside rear panel. The pc interconnect board mates with A34J1. Except for the black wire, route the wires soldered to the slide switches toward the bottom of the chassis.
- i. Locate the black wire soldered to switch A35S6 (TALK-ALWAYS). Solder the other end of the black wire to the black wire already soldered to switch S5 (INT-EXT).
- j. Prepare a #22 or #24 gauge insulated wire (WHT-BLK-RED) approximately 30" long. Solder one end to XA24 (05340-60019) pin 4. A diode (HP part number 1901-0028) should be installed between XA24 pin 4 and pin 2 (see Figure 8-36). Connect cathode (marked end) to pin 4.
- k. Route the 30" wire along the front edge of the chassis past A1 on to the top of the chassis. Continue to route the wire along the right top of the chassis rearward toward the rear panel. Route the wire to the bottom of A34 and solder to the A34 eyelet marked +5 V on Figure 8-36 component locator.
- l. Solder the violet wire from A35S6 (TALK ALWAYS-ADDRESSABLE) to the A34 eyelet marked S6 on Figure 8-36.
- m. Solder the blue wire from A35S6 to the A34 eyelet marked "Shield" on Figure 8-36.
- n. Solder the green wire from A35S5 (switch A5) to the A34 eyelet marked S5 on Figure 8-36.
- o. Solder the yellow wire from A35S4 (switch A4) to the A34 eyelet marked S4 on Figure 8-36.
- p. Solder the orange wire from A35S3 (switch A3) to the A34 eyelet marked S3 on Figure 8-36.
- q. Solder the red wire from A35S2 (switch A2) to the A34 eyelet marked S2 on Figure 8-36.
- r. Solder the brown wire from A35S1 (switch A1) to the A34 eyelet marked S1 on Figure 8-36.
- s. This completes installation of Option 011 refer to Paragraph 7-15 for descriptions. See Section II for programming information.

SECTION VIII

SCHEMATIC DIAGRAMS

8-1. SCHEMATIC DIAGRAMS

8-2. This section contains schematic diagrams, assembly and chassis part locators, component locators, block diagrams, waveforms, test points, and troubleshooting information. The schematics are presented in assembly number order A1 through A35. The component, chassis, and assembly locators show the location by reference designator. The block diagrams give a simplified block of the corresponding schematic diagram. Test points, waveforms, and typical voltages are given as an aid in troubleshooting.

8-3. SCHEMATIC DIAGRAM NOTES, ASSEMBLY NUMBERS, AND REFERENCE DESIGNATORS

8-4. Figure 8-1 shows the symbols used on the schematic diagrams. At the bottom of Figure 8-1, the system for reference designators, assemblies, and subassemblies are shown.

8-5. Reference Designations

8-6. Assemblies such as printed circuit boards are assigned numbers in sequence, A1, A2, etc. As shown in Figure 8-1, subassemblies within an assembly are given a subordinate A number. For example, rectifier subassembly A1 has the complete designator of A25A1. For individual components, the complete designator is determined by adding the assembly number and subassembly number if any. For example CR1 on the rectifier assembly is designated A25A1CR1.

8-7. Identification Markings on Printed-Circuit Boards

8-8. HP printed circuit boards (see Figure 8-1) have four identification numbers; an assembly part number; a series number, a revision letter, and a production code.

8-9. The assembly part number has 10 digits (such as 05340-60037) and is the primary identification. All assemblies with the same part number are interchangeable. When a production change is made on an assembly that makes it incompatible with previous assemblies, a change in part number is required. The series number (such as 1248A) is used to document minor electrical changes. As changes are made, the series number is incremented. When replacement boards are ordered, you may receive a replacement with a different series number. If there is a difference between the series number marked on the board and the schematic in this manual, a minor electrical difference exists. If the number on the printed-circuit board is lower than that on the schematic, refer to Section VII for back dating information. If it is higher, refer to the loose leaf manual change sheets for this manual. If the manual change sheets are missing, contact your local Hewlett-Packard Sales and Service Office. See the listing on the back cover of this manual.

8-10. Revision letters (A, B, etc.) denote changes in printed circuit layout. For example, if a capacitor type is changed (electrical value may remain the same) and requires different spacing for its leads, the printed circuit board layout is changed and the revision letter is incremented to the next letter. When a revision letter changes, the series number is also usually changed. The production code is the four digit, seven segment number used for production purposes.

8-11. ASSEMBLY LOCATIONS AND COMPONENT LOCATORS

8-12. Figures 8-2 through 8-5 show the front, rear, top, and bottom views of the 5340A. Following these is an overall block diagram and schematic diagrams for the instrument. Component locators for each printed circuit assembly are located next to the schematics.

8-13. MNEMONICS AND ABBREVIATIONS

8-14. Table 8-1 lists mnemonics and abbreviations peculiar to the 5340A. Common abbreviations are given in Section VI.

Table 8-1. 5340A Mnemonics and Abbreviations

CHK	Check
CLK	Clock
CONT	Control
CTR	Counter
DAC	Data Accepted
DAV	Data Valid
DIO	Data Input Output
DIR CNT	Direct Count
DIR SW	Direct Switch
DISP REG	Display Register
D.P.	Decimal Point
IFC	Interface Clear
F.F.	Feed Forward
Fx	Input Frequency
HI-Z	High Impedance
I.L.	Input Loop
INH	Inhibit
INT	Internal
M. GATE	Main Gate
ATN	Attention
N.C.	No Connection
O'FLO	Overflow
PE	Parallel Enable
P/O	Part of
PROG	Program
P SHIFT	Parallel Shift
P TRAN Q	Parallel Transfer Qualifier
R COUNT	Reset Counter
R DISP	Reset Display
REMT	Remote
REN	Remote Enable
RES A	Resolution A
RES B	Resolution B
RFD	Ready For Data
R.N.	Reset N Counter
S=7	Search in Seventh Step
SEL	Select
S RATE	Sample Rate
S RATE Q	Sample Rate Qualifier
SRQ	Service Request
S TRAN	Serial Transfer
S TRAN QUAL	Serial Transfer Qualifier
SUB	Subtract
SW A	Switch A
SW B	Switch B
TB	Time Base
T.L.	Transfer Loop
TP	Test Point
VCO	Voltage Controlled Oscillator
+5V DG	+5V Power For Digital Circuits

Figure 8-1. Schematic Diagram Notes

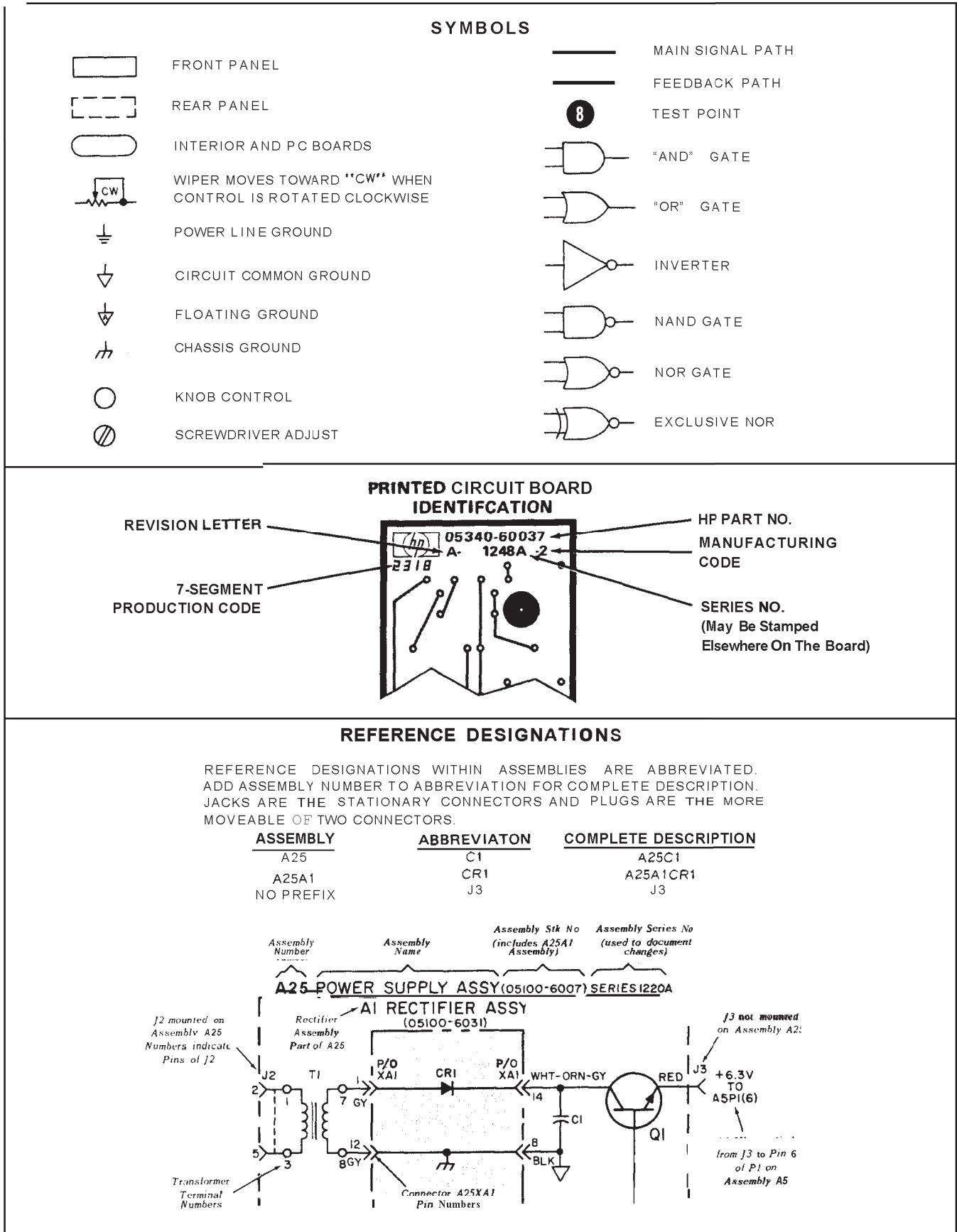


Figure 8-2. 5340A Top Internal View (with Options 001, 002, and 011 Installed)

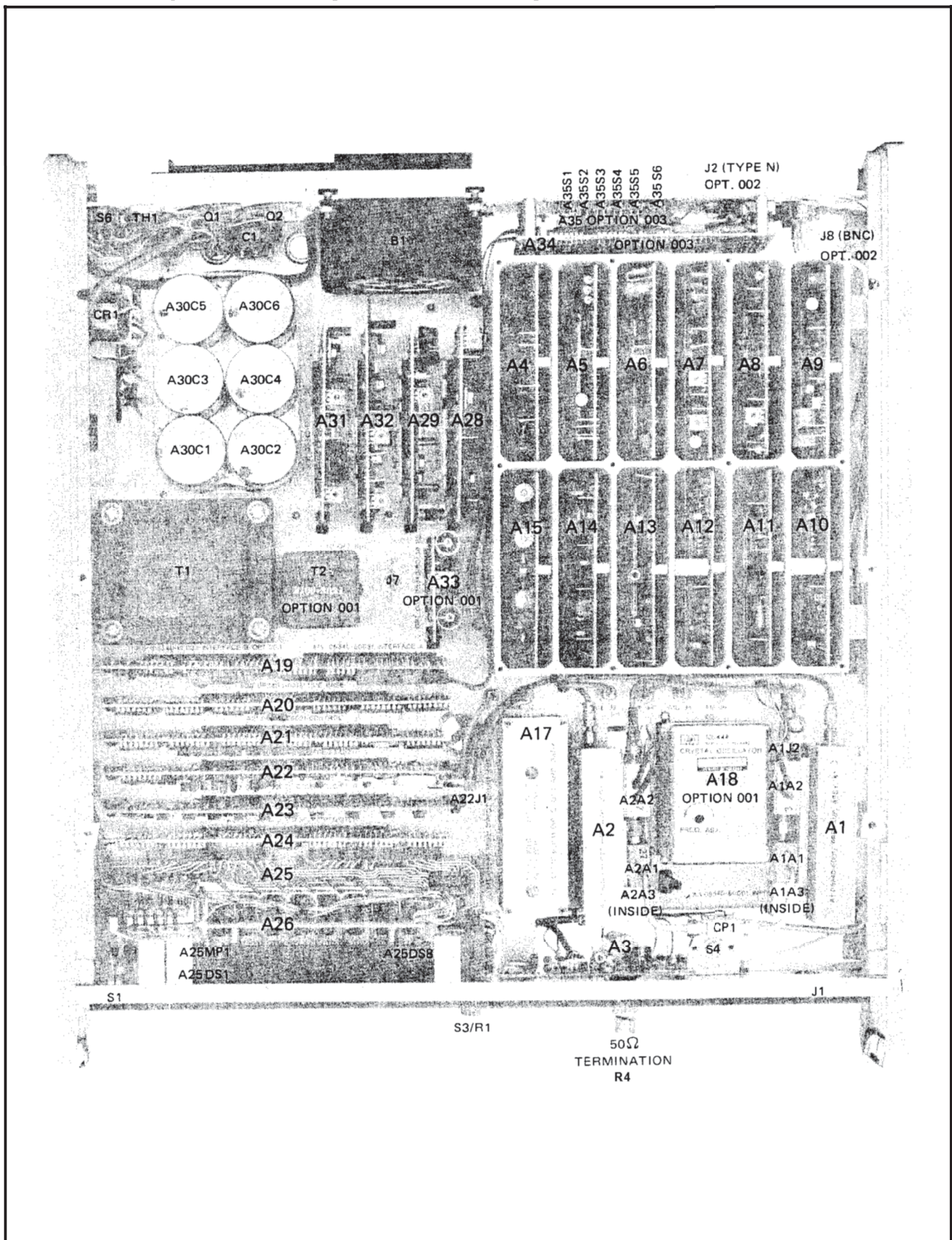


Figure 8-3. 5340A **Bottom** Internal View and Cable Numbers and Connections
(with Options 001, 002, and 011 Installed)

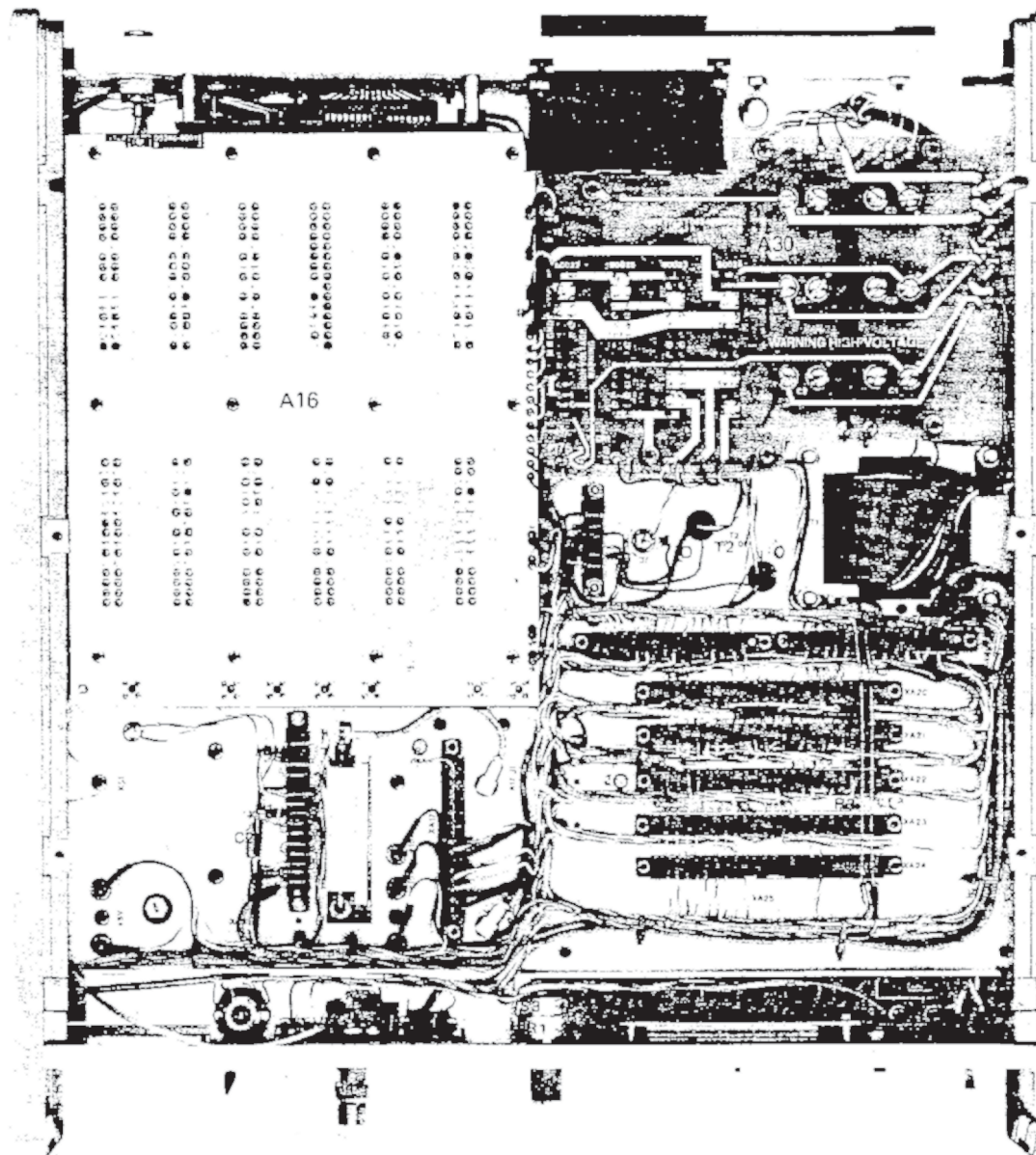
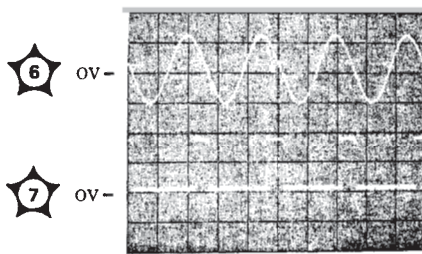
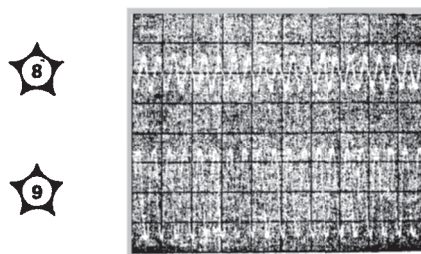


Figure 8-3. 5340A **Bottom** Internal View and Cable Numbers and Connections
(with Options 001,002, and 011 Installed)

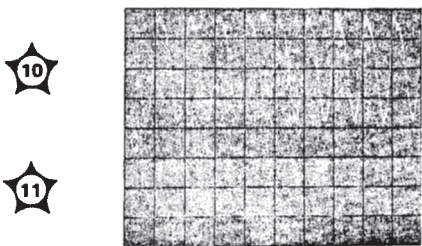
Cable No.	Cable Name	Connects		HP Part Number	Wiring Method
		From	TO		
W1	AC Line Switch	S1	S6	05505-60019	Soldered
W2	18GHz Input	J1	CP1	05340-60028	Connectors
w3	Sampler #1	CP1	A1J2	05340-60033	Connectors
w4	A3 Output	A3 Output	XA22(21)	05340-60034	Soldered
w5	Sampler #2	CP1	A2J2	05340-60013	Connectors
W6	A1 Output	A1J1	A16J4	05340-60035	Connectors
W7	VCO 1/A1A2	A1A2J1	A16J5	05340-60044	Connectors
W8	AC Line Cord	J6	115/230VAC	8120-1378	Connectors
W9	A2 output	A2J1	A16J3	05340-60048	Connectors
W10	A2FL1 Input	A17J1	A2FL1J4	05340-60049	Connectors
W11	Direct Count output	A17J2	A22J1	05340-60050	Connectors
W12	10MHz Double	A19A(E)	A16J1	05340-60051	19 End-Soldered 416 - Connectors
W13	VCO 1/A22	A16J6	A22(19)	05340-60052	22 End-Soldered 416 - Connectors
W14	VCO 2/A2A2	A2A2J1	A16J7	05340-60053	Connectors
W15	Harm Freq A14/A20	A16J2	A20(10)	05340-60054	20 End-Soldered 416 - Connectors
W16	Main Chassis	Primary Interconnect		05340-60065	---
W17	Low Freq Input Option 002	J8	J4	05260-6034	Soldered
W18	18GHz Input Option 002	J2	CP1	05340-60060	Connectors
W19	ASCII Bus	A19J1	A34P1	05340-60063	Connectors
W20	ASCII Bus	A19J2	A34P2	05340-60063	Connectors
W21	Remote Prog Digital output	A35J1	External Equipment	8120-1833	Connector



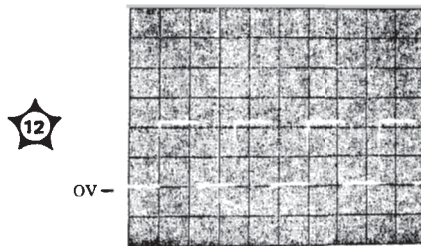
Top: .05V/div, dc
Bottom: .2V/div, dc
20 μ s/div



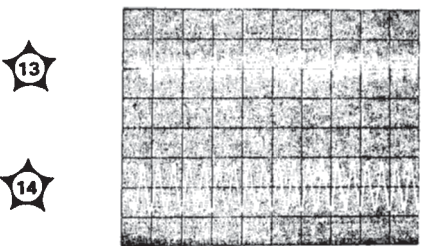
Top: .005V/div, ac
Bottom: .05V/div, ac
.1 μ s/div



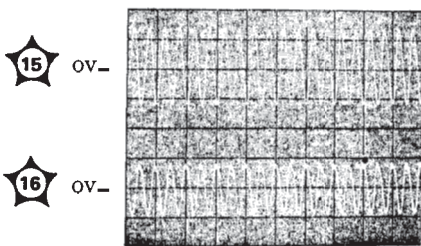
Top: .005V/div, ac
Bottom: .01V/div, ac
.05 μ s/div



.2 V/div dc
10 μ s/div

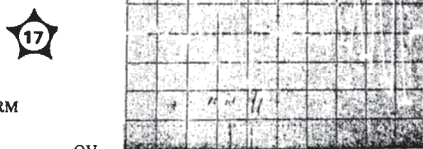


Top: .005V/div, ac
Bottom: .005V/div, ac
.1 μ s/div



Top: .1V/div, dc
Bottom: .1V/div, dc
.1 μ s/div

No Signal Input
to 5340A



Scope Sweep
Mode set to NORM

.2V/div, dc
20 ms/div

Except for , waveforms taken with 320 MHz input at -20 dBm.
Waveforms  through  taken with HP Model 180A Oscilloscope
with 1801A Vertical Amplifier and 1820B Time Base, 10:1 Divider
Probe was used.

Set Oscilloscope controls to:

SWEEP MODE		AUTO
SYNC SOURCE		INT
Vertical Polarity		+ UP
MODE		ALT

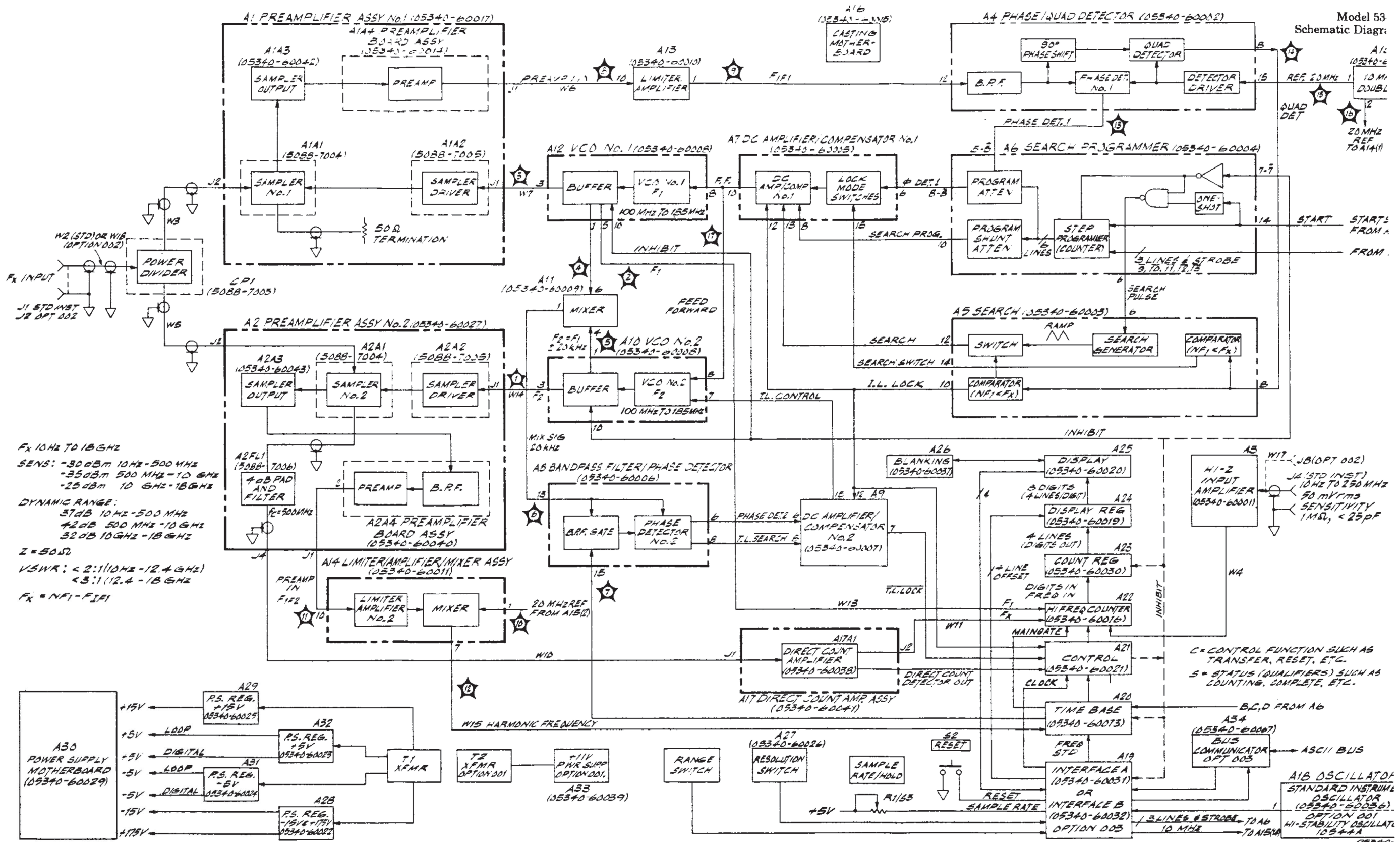


Figure 8-6. 5340A Block Diagram

Figure 8-4. 5340A Front Panel Reference Designations

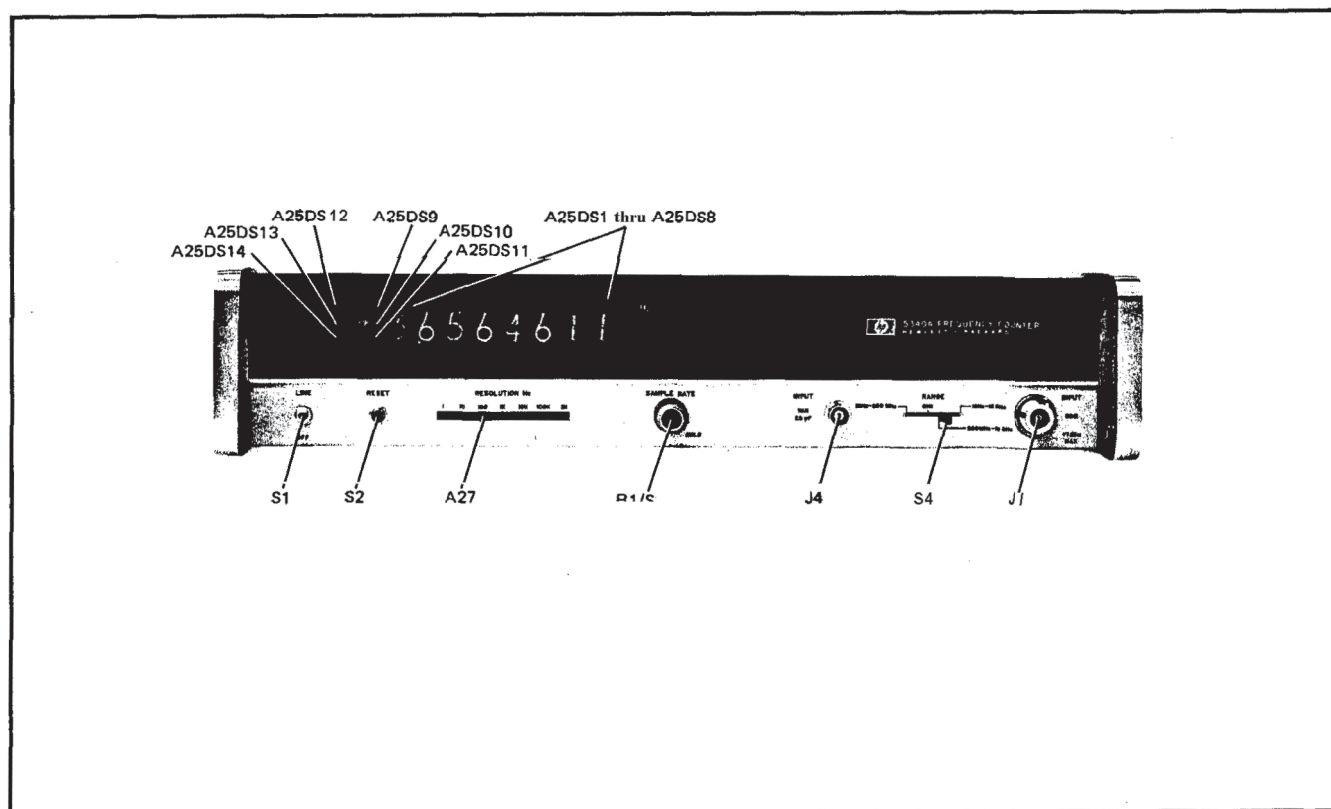
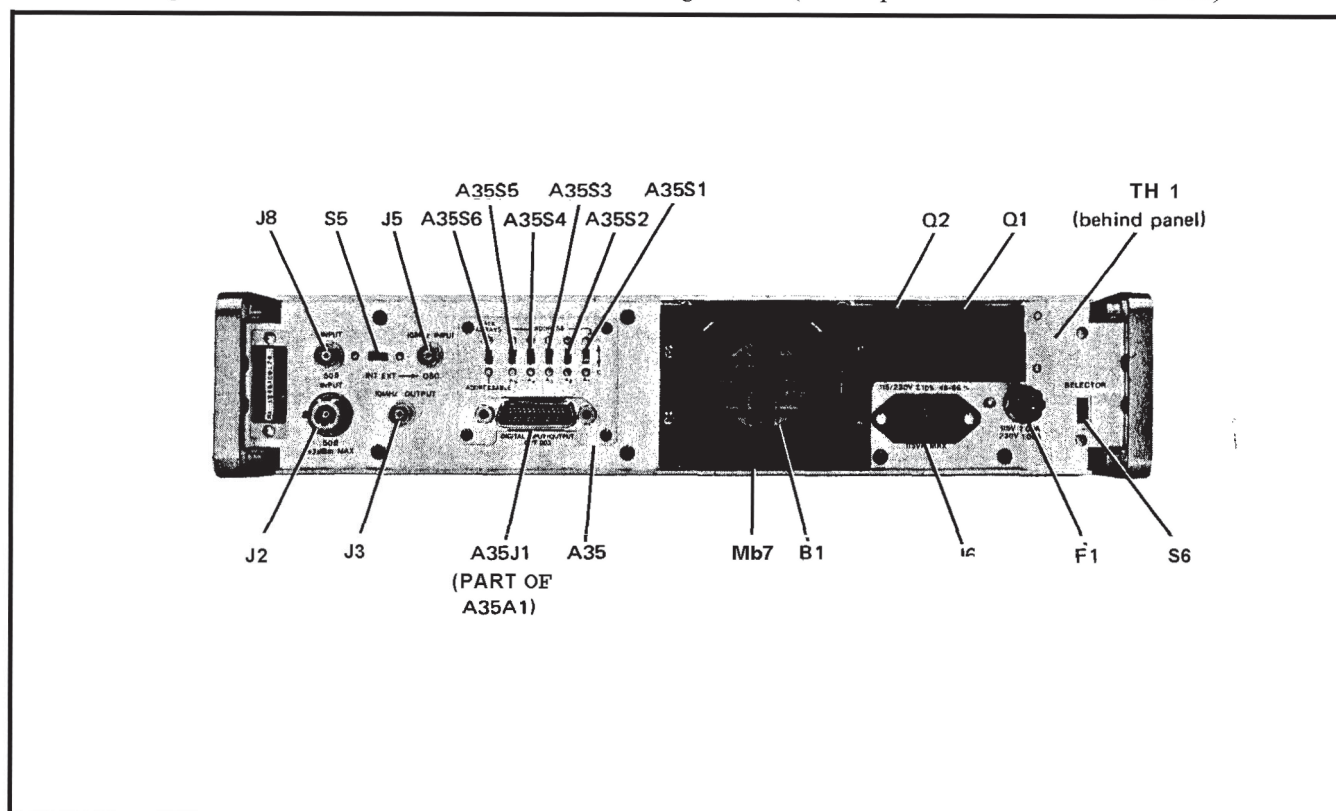
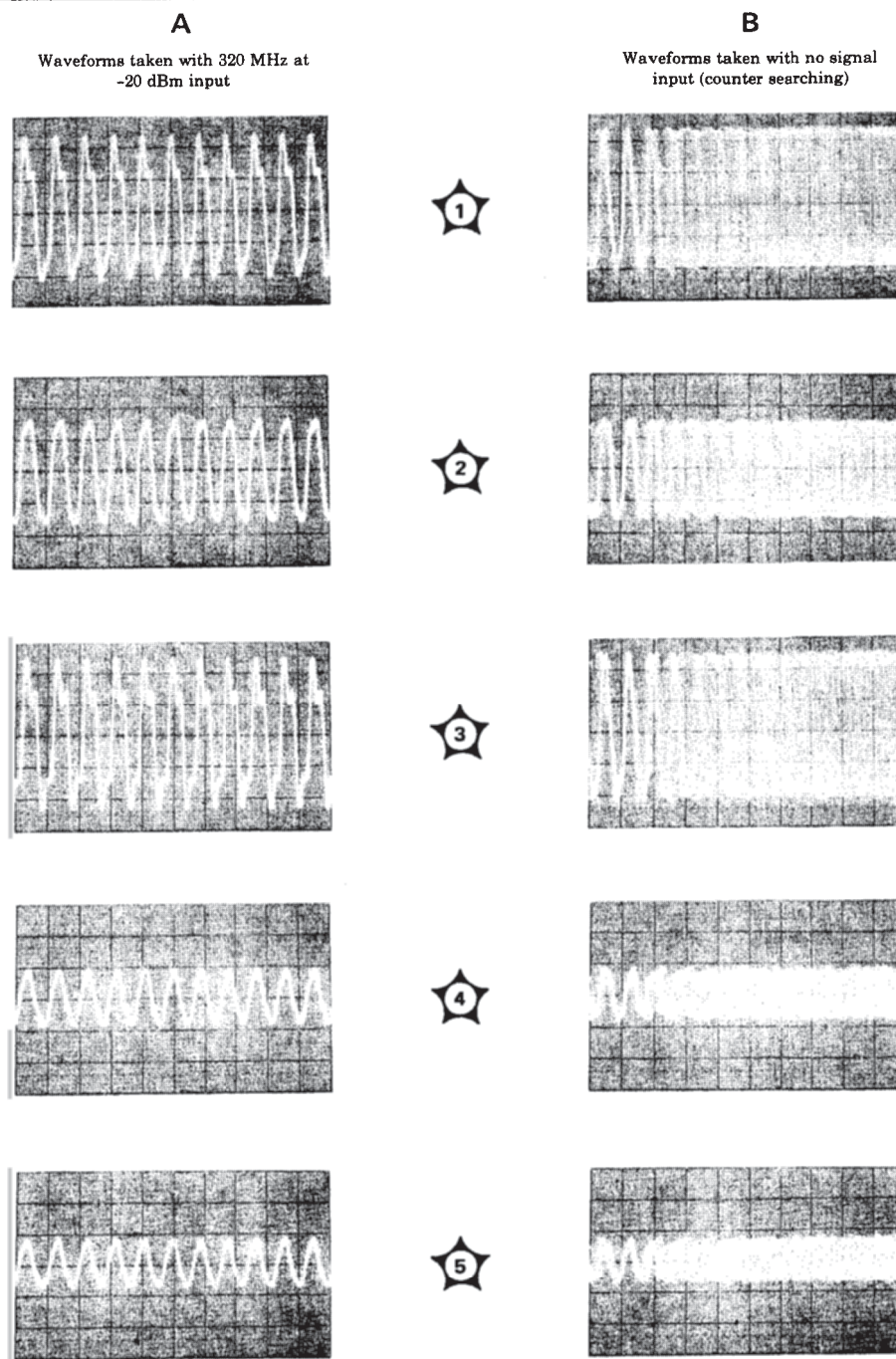


Figure 8-5. 5340A Rear Panel Reference Designations (with Options 002 and 011 Installed)



Part of Figure 8-6. 5340A Block Diagram



Waveforms ☆ through ☆ taken with an HP Model 183A Oscilloscope with HP 1830A Vertical Amplifier and 1840A Time Base. An HP Model 1120A 500 MHz Probe was used with its 10:1 divider probe.

Oscilloscope Controls Set to:

MODE CHANNEL A
CHANNEL A ON
CHANNEL B OFF
TRIGGER INT, DC, +1
MODE AUTO
SWEEP01 μ s/div
VERTICAL SENSITIVITY02 v/div

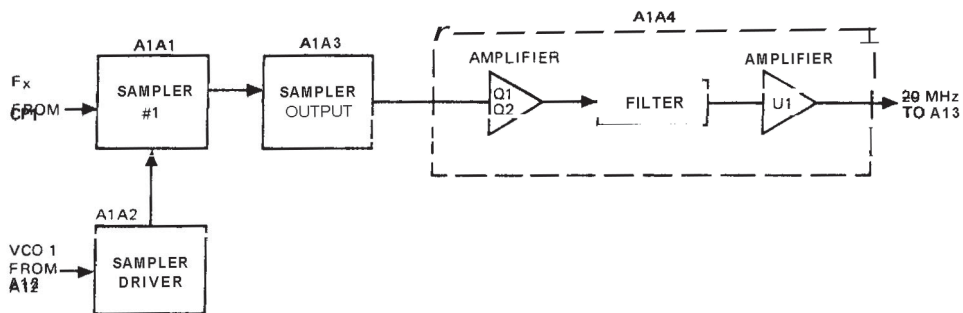
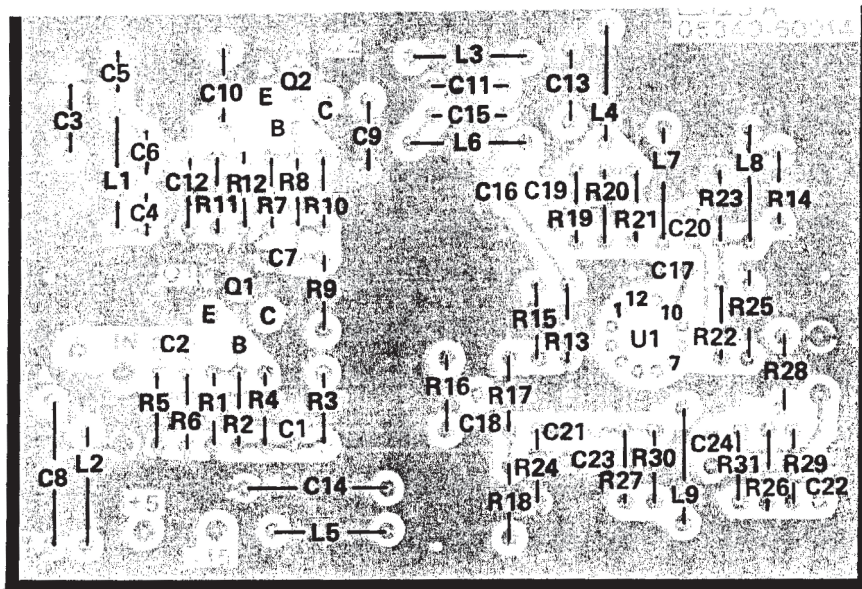
Probe Controls Set to:

COUPLING AC
OFFSET OFF

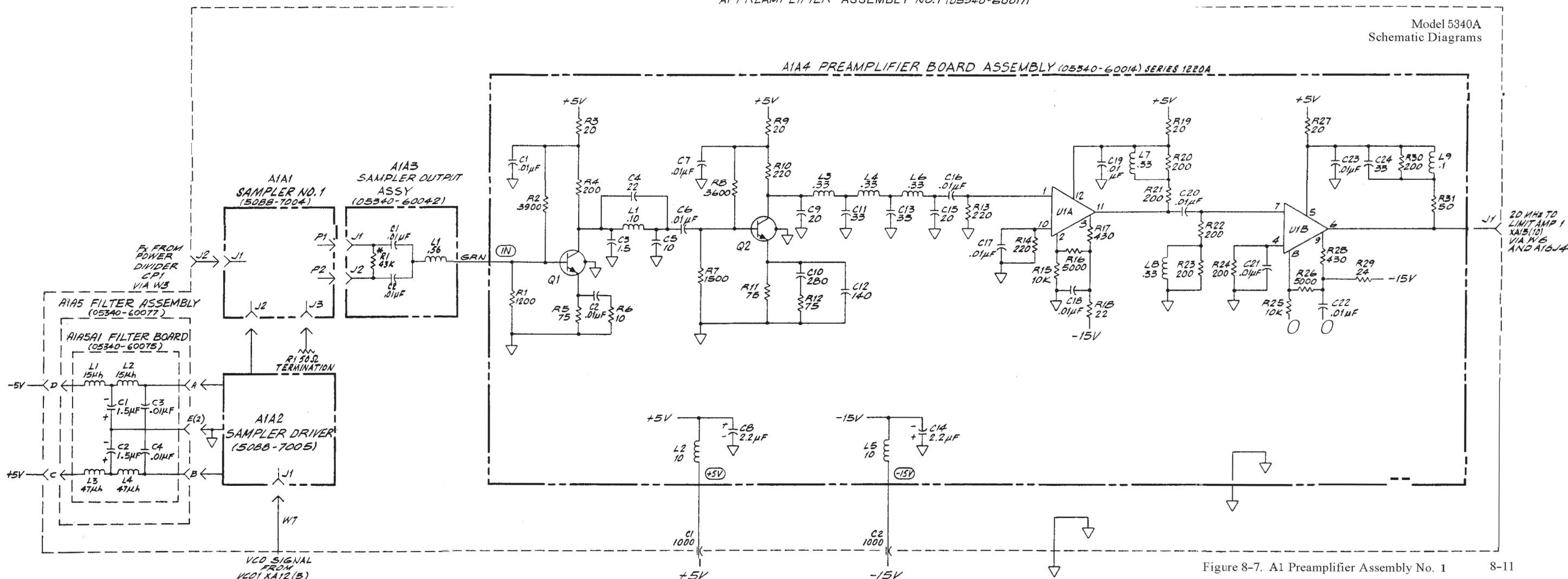
5340A Controls Set to:

RESOLUTION 100 Hz
RANGE 10 Hz - 18 GHz

Waveforms A were taken with an HP Model 608C Signal Generator connected to the 5340A 50-ohm input connector. Waveforms B taken with no input signal.



A1A4 PREAMPLIFIER BOARD ASSEMBLY (05340-60014) SERIES 1220A



8-11

NOTES

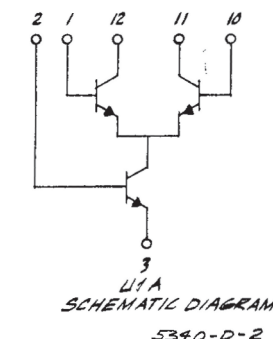
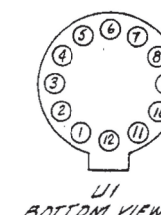
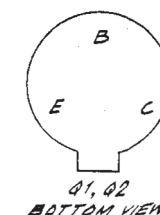
- REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
- UNLESS OTHERWISE INDICATED:
RESISTANCE IN OHMS;
CAPACITANCE IN PICO FARADS;
INDUCTANCE IN MICROHENRIES
- ASTERISK(*) INDICATES SELECTED COMPONENT. AVERAGE VALUES SHOW

REFERENCE DESIGNATIONS

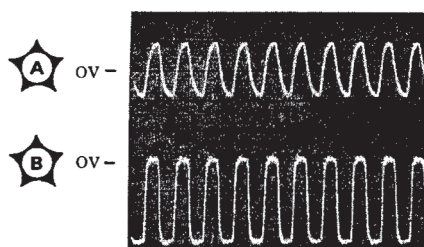
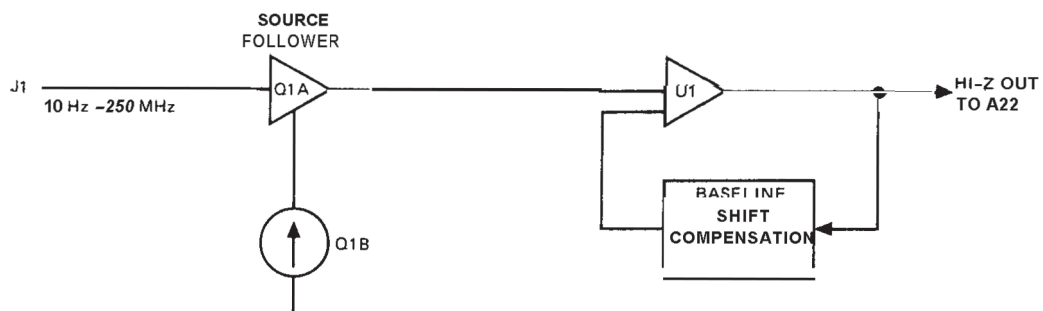
A1	A1A1	A1A2	A1A3	A1A4
C1,2 J1,2,3	J1,2 P1,2	J1	C1,2 J1,2 L1 R1	C1-24 J3 L1-9 Q1,2 R1-31 U1

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
Q1,2	1854-0345 2N5179
U1	1858-0004 CA3049

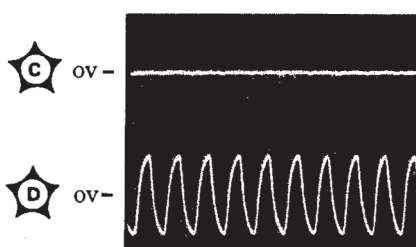


Part of Figure 8-9. A3 HI-Z Input Amplifier Assembly



☆ 10 MHz into 50Ω termination at J4
input oscilloscope A settings
- 1V/cm dc, .1 μs/div.

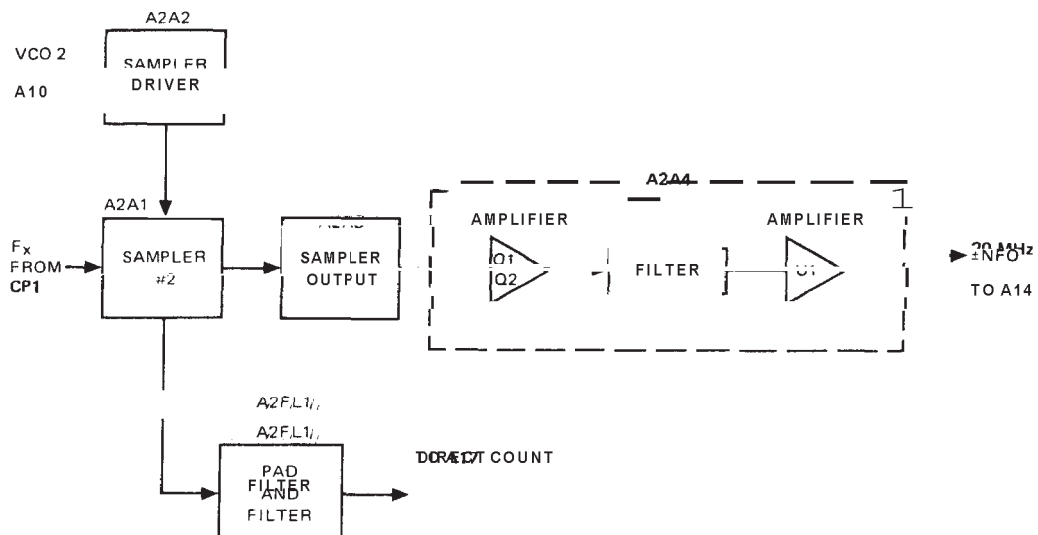
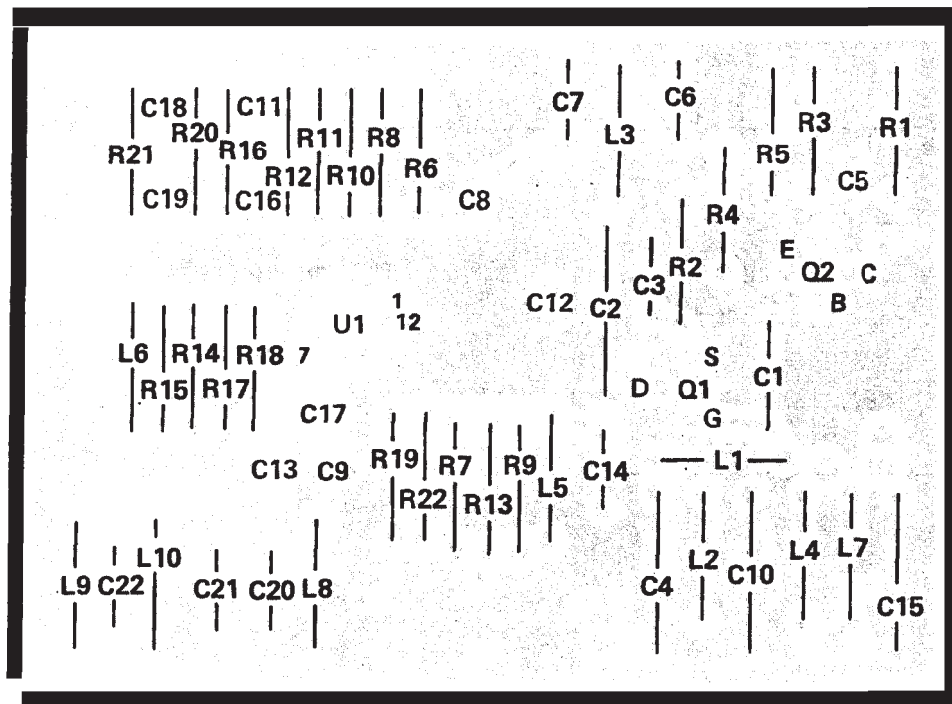
☆ A3U1(8) .05V/cm dc .1 μs/div



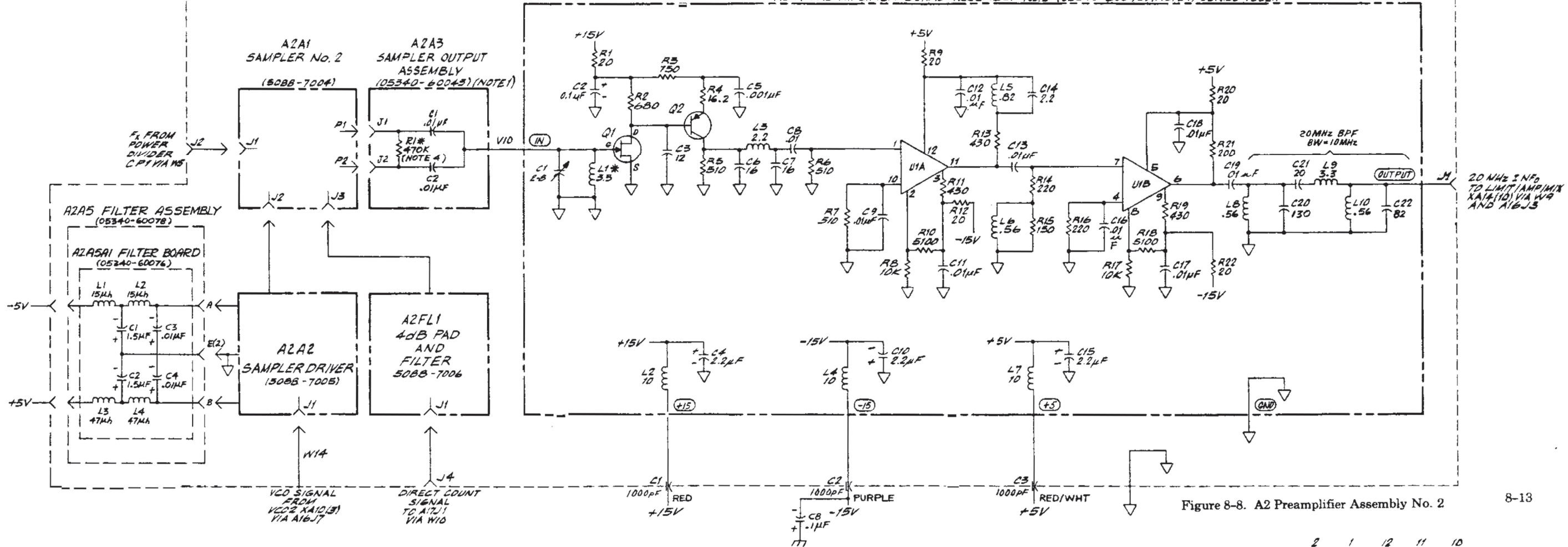
☆ A3 OUT. Oscilloscope B settings
- .02V/cm, .1 μs/div.

☆ A3U1(2) .05V/cm dc .1 μs/div.

Waveforms taken with 101 divider probe except ☆. Oscilloscope sync set to ac INT, SLOPE
to +, and DISPLAY to ALT.



A2A4 PREAMPLIFIER BOARD ASSEMBLY No.2 (05340-60040) (NOTE 1) SERIES 1532A



8-13

NOTES

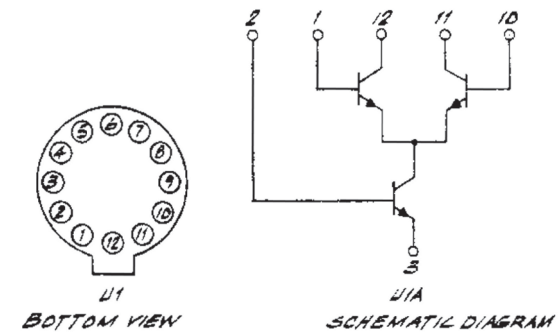
- REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
- UNLESS OTHERWISE INDICATED:
RESISTANCE IN OHMS;
CAPACITANCE IN PICOFARADS;
INDUCTANCE IN MICROHENRIES
- ASTERISK(*) INDICATES SELECTED COMPONENT, AVERAGE VALUES SHOWN
- R1 HAS CHANGED FROM 43K TO 470K IN INSTRUMENTS WITH SERIAL NUMBER 1440A02476 AND UP.

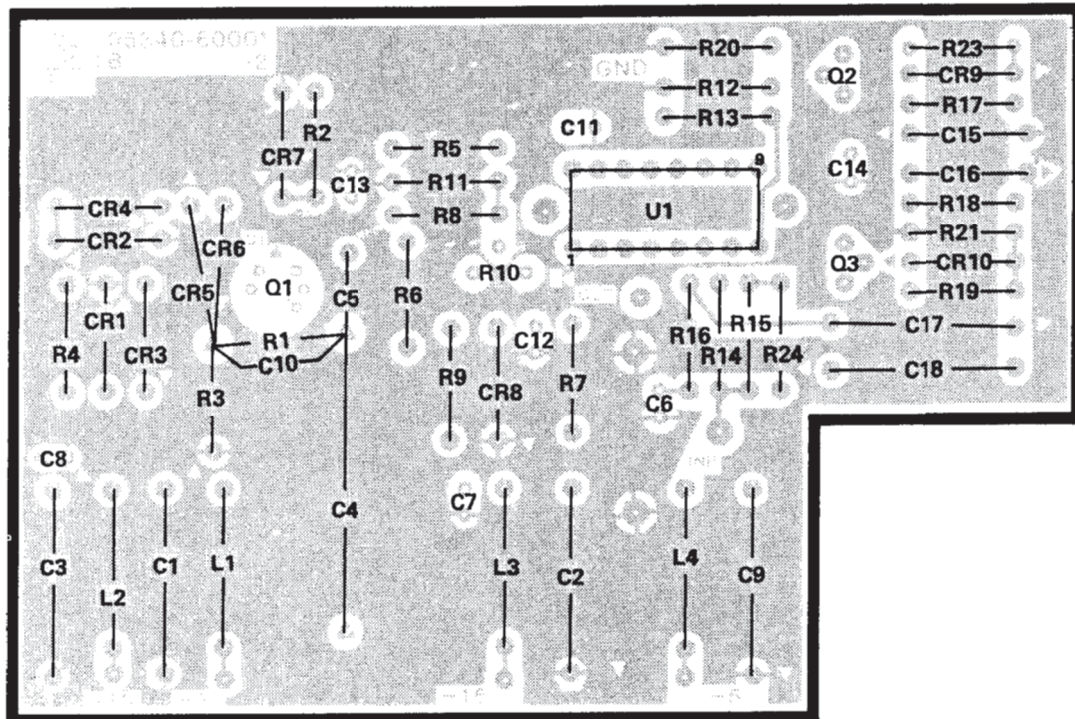
REFERENCE DESIGNATIONS

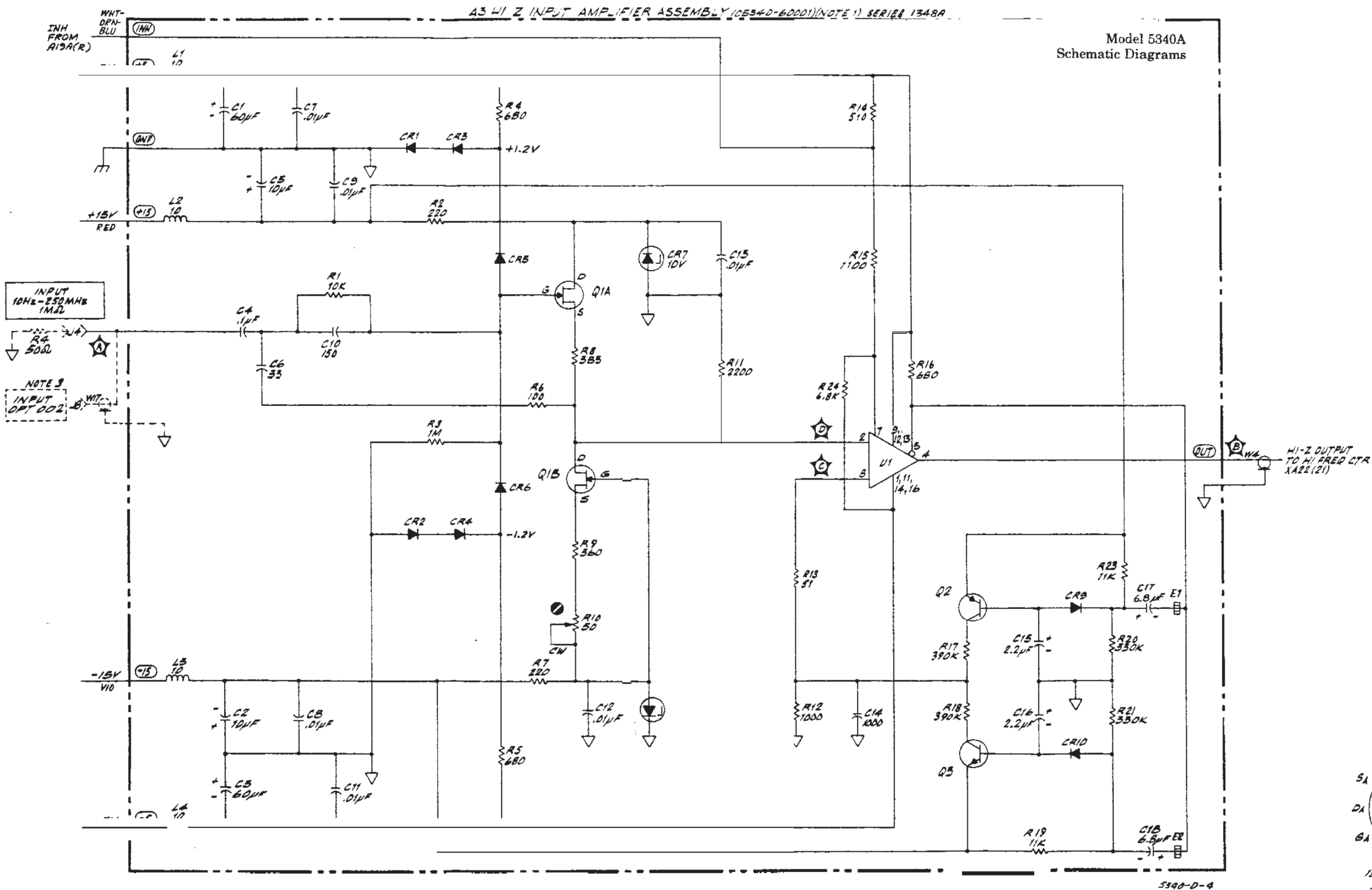
NO PREFIX	A2	A2A1	A2A2	A2A3	A2A4	A2FL1
CB	C1-3 FL1 J1	J1-3 P1,2	J1	C1,2 J1,2 R1	C1-22 L1-10 J1,2 R1-22 U1	J1

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
Q1	1855-0081 2N5245
Q2	1855-0015 2N3640
U1	1855-0004







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
- DOTTED LINES REPRESENT
OPTION 002 WIRING CIRCUIT.

REFERENCE DESIGNATIONS

A3
C1-18
CR1-10
E1
LT-4
Q1-3
R1-21,23,24
U1
R22 DELETED

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	H/P PART NUMBERS
CR1-4	1901-0040
CR5,6,9,10	1901-0535
CR7,8	1902-0025
Q1	1855-0334
Q2	2N377
Q3	1853-0036
Q4	2N3906
Q5	1854-0215
U1	2N3904
	1820-0754

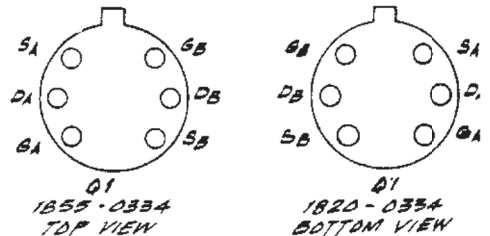
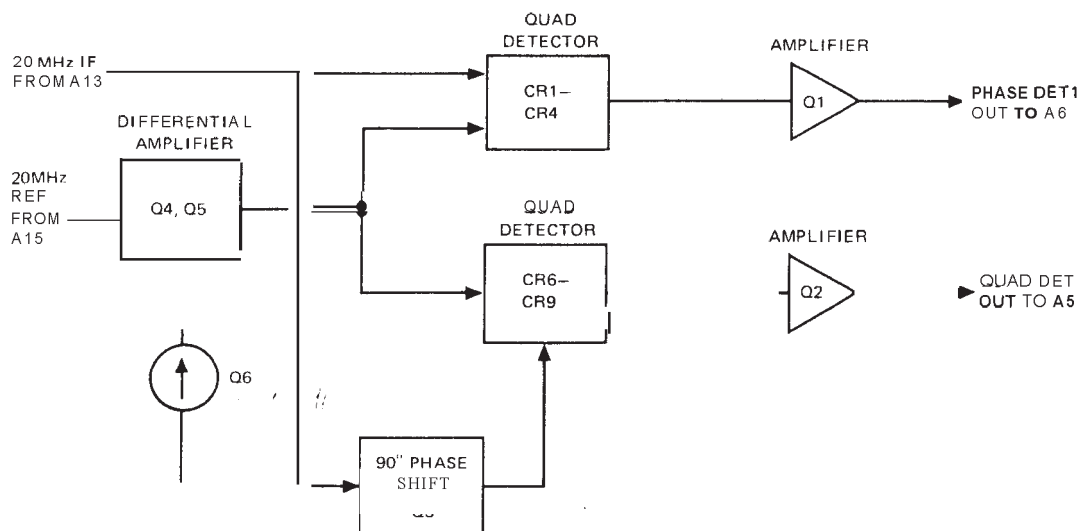
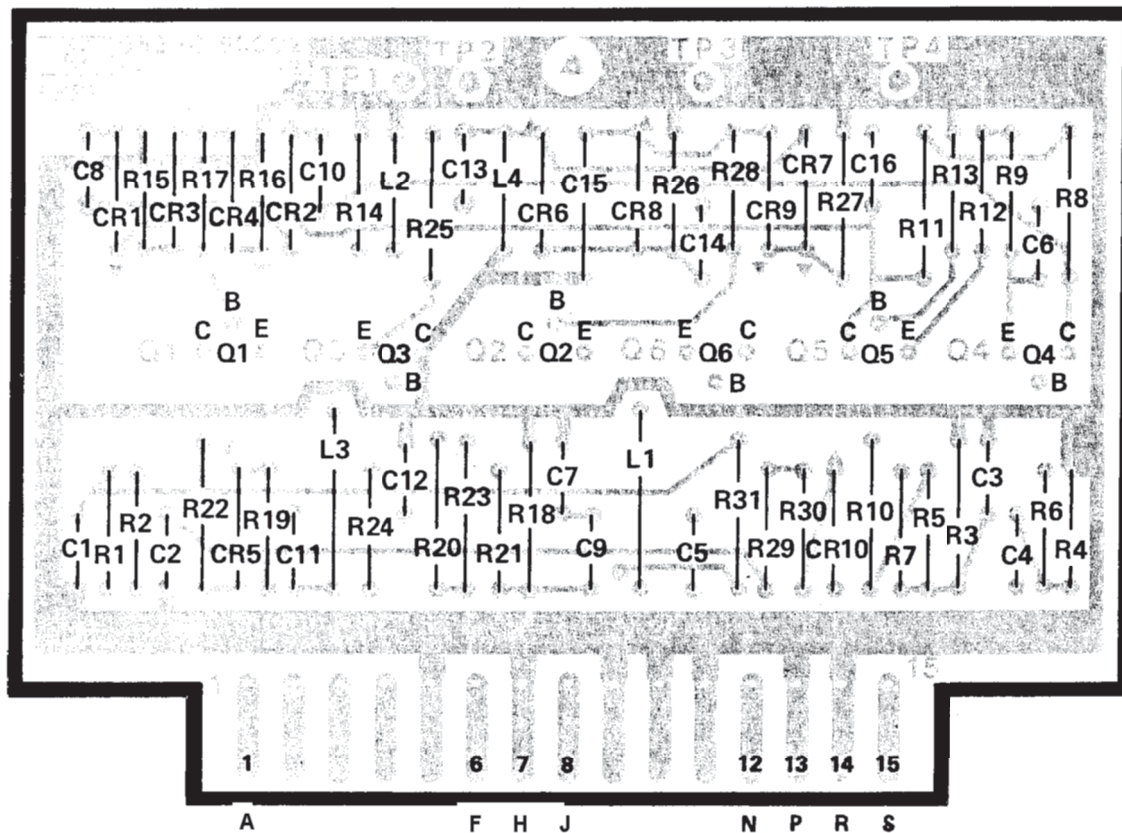


Figure 8-9. A3 HI-Z Input Amplifier Assembly



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. SOME CIRCUIT BOARDS PRIOR TO SERIES 1532A MAY HAVE 1800 OHM FOR R22.

REFERENCE DESIGNATIONS

A4
C1-16
CR1-10
L1-4
Q1-6
R1-31

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBER
CR1-4, 6-9	1901-0179
CR5,10	1901-0022
Q1-3	1854-0071 2N3704
Q4-6	1854-0073 2N2857

5340-D-5

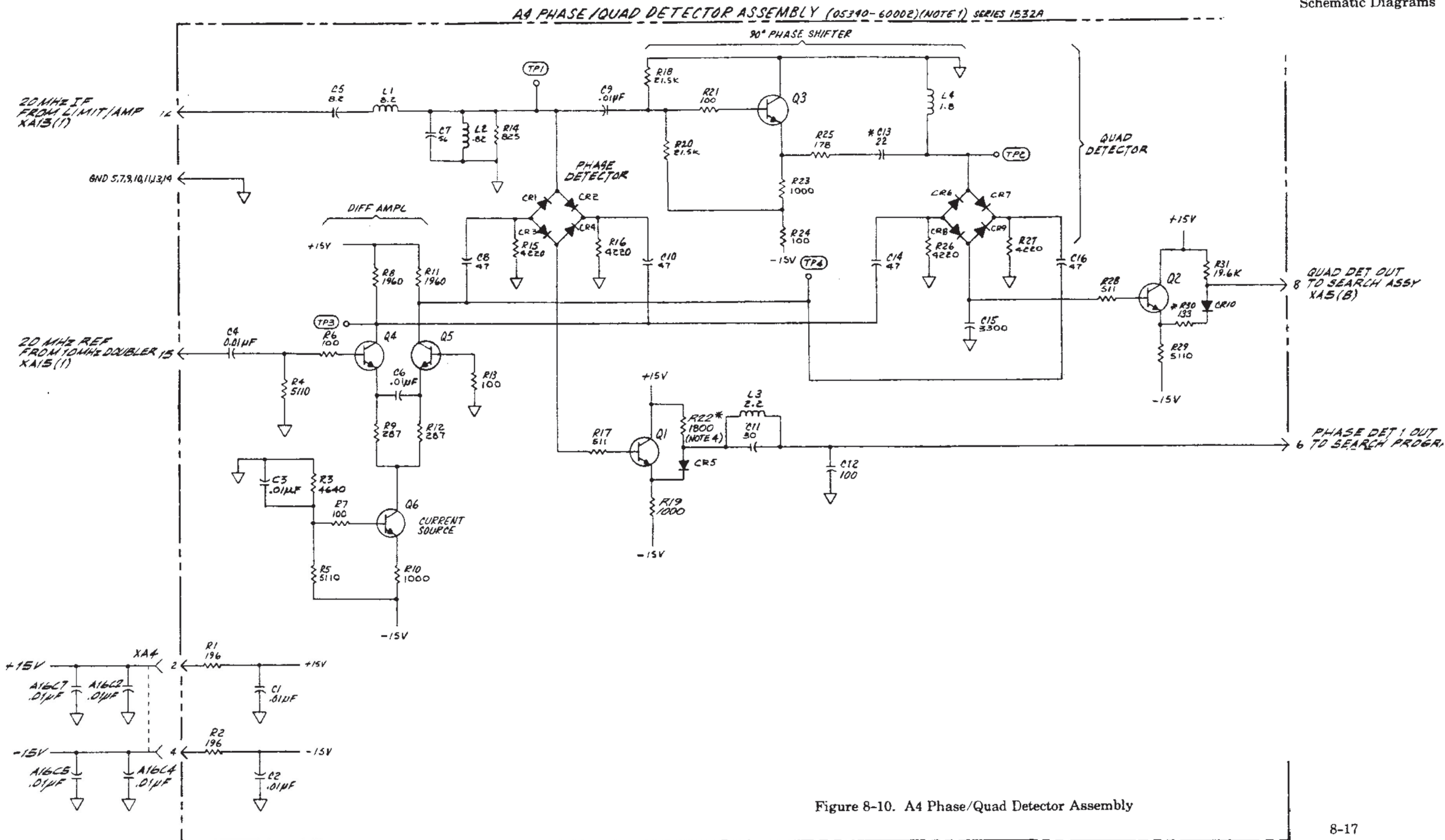
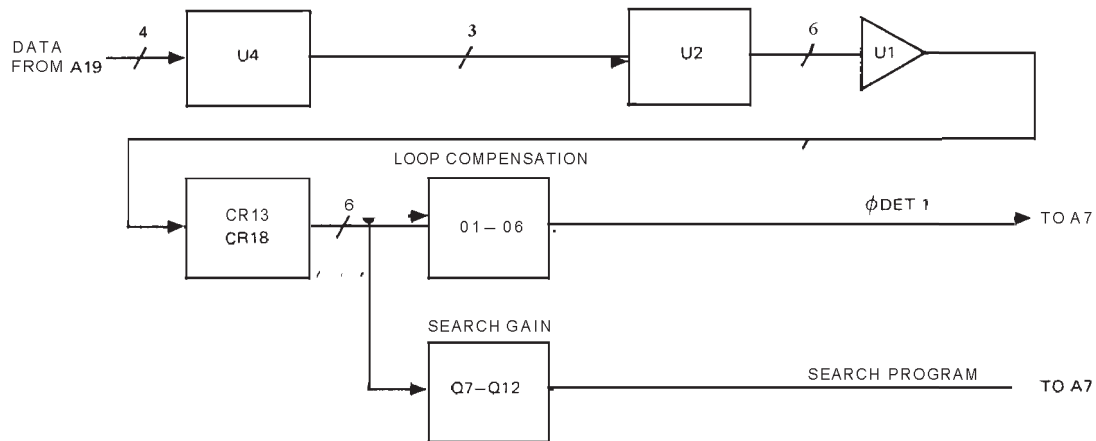
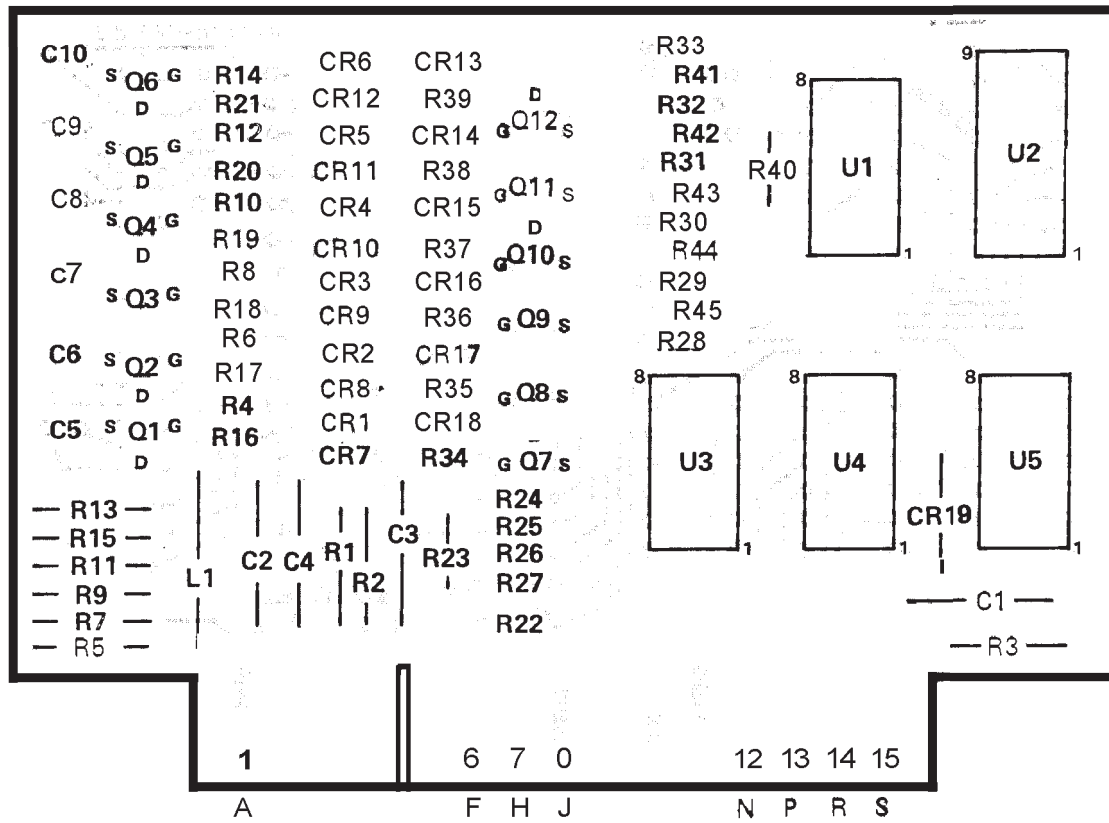


Figure 8-10. A4 Phase/Quad Detector Assembly

Part of Figure 8-12. A6 Search Programmer Assembly



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.

REFERENCE DESIGNATIONS

AB
C1-5
CR1-5
L1-3
Q1-5
R1-20
U1-5

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1,2	1902-0041
CR3,4	1901-0025
CR5	1901-0040
Q1	1855-0052
Q2,3	2N4360
	1854-0215
U1,2,3,4	2N3904
	1826-0073
U5	LM741
	1820-0537

5340-B

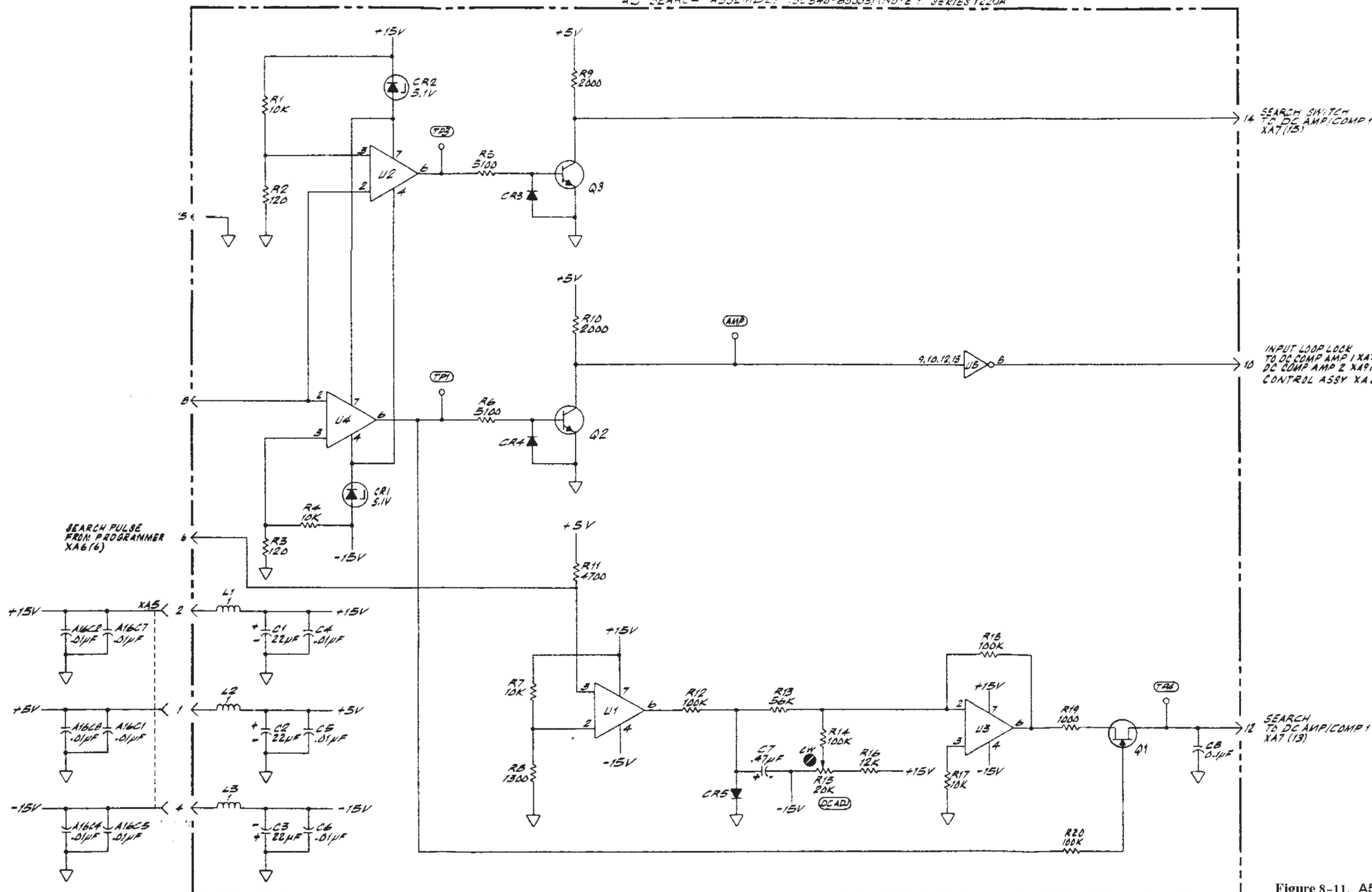
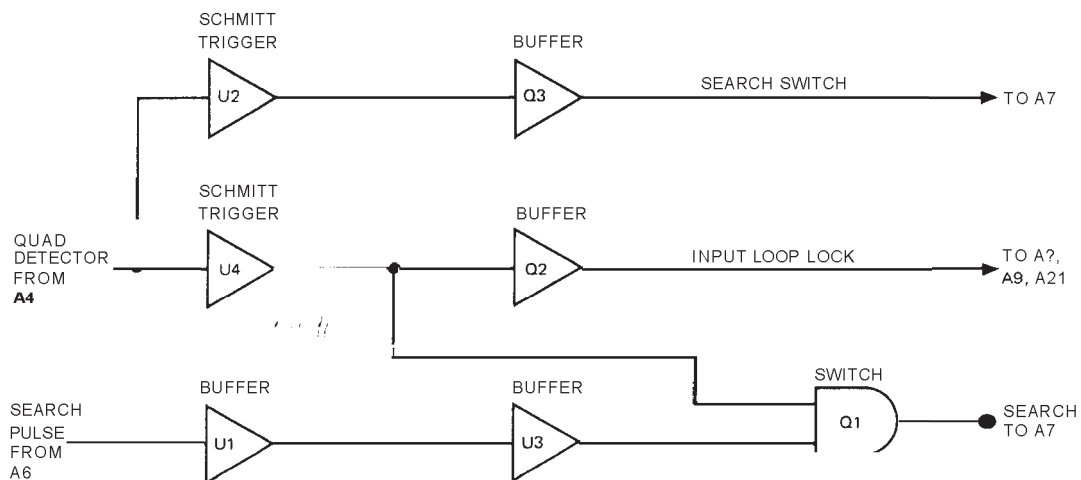
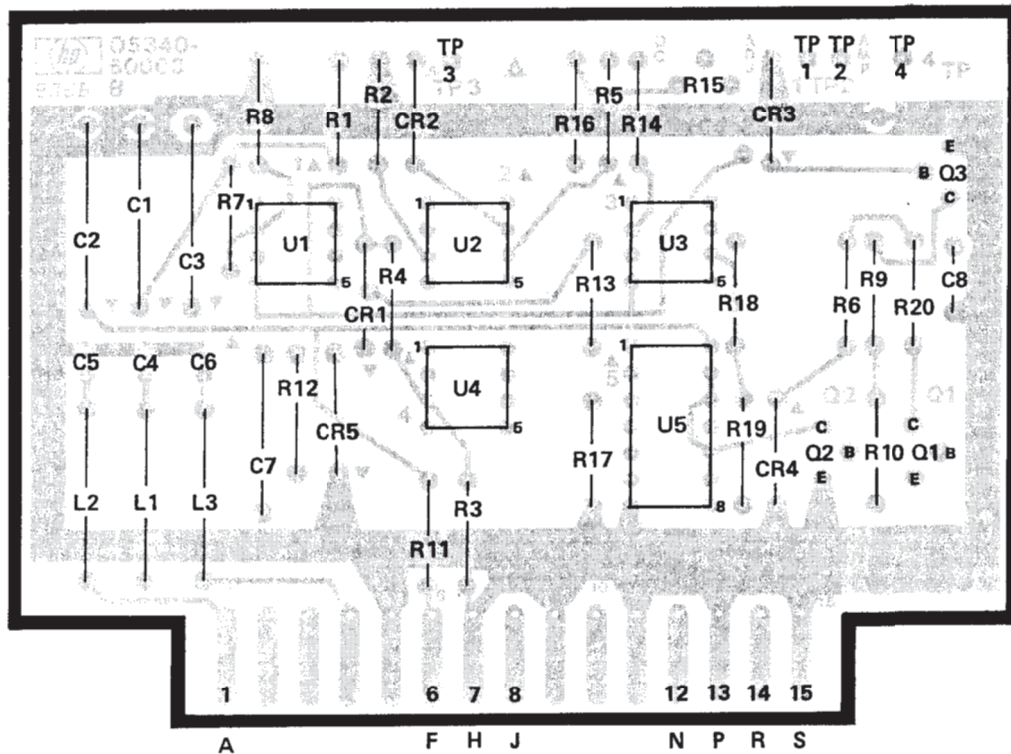


Figure 8-11. A5 Search Assembly



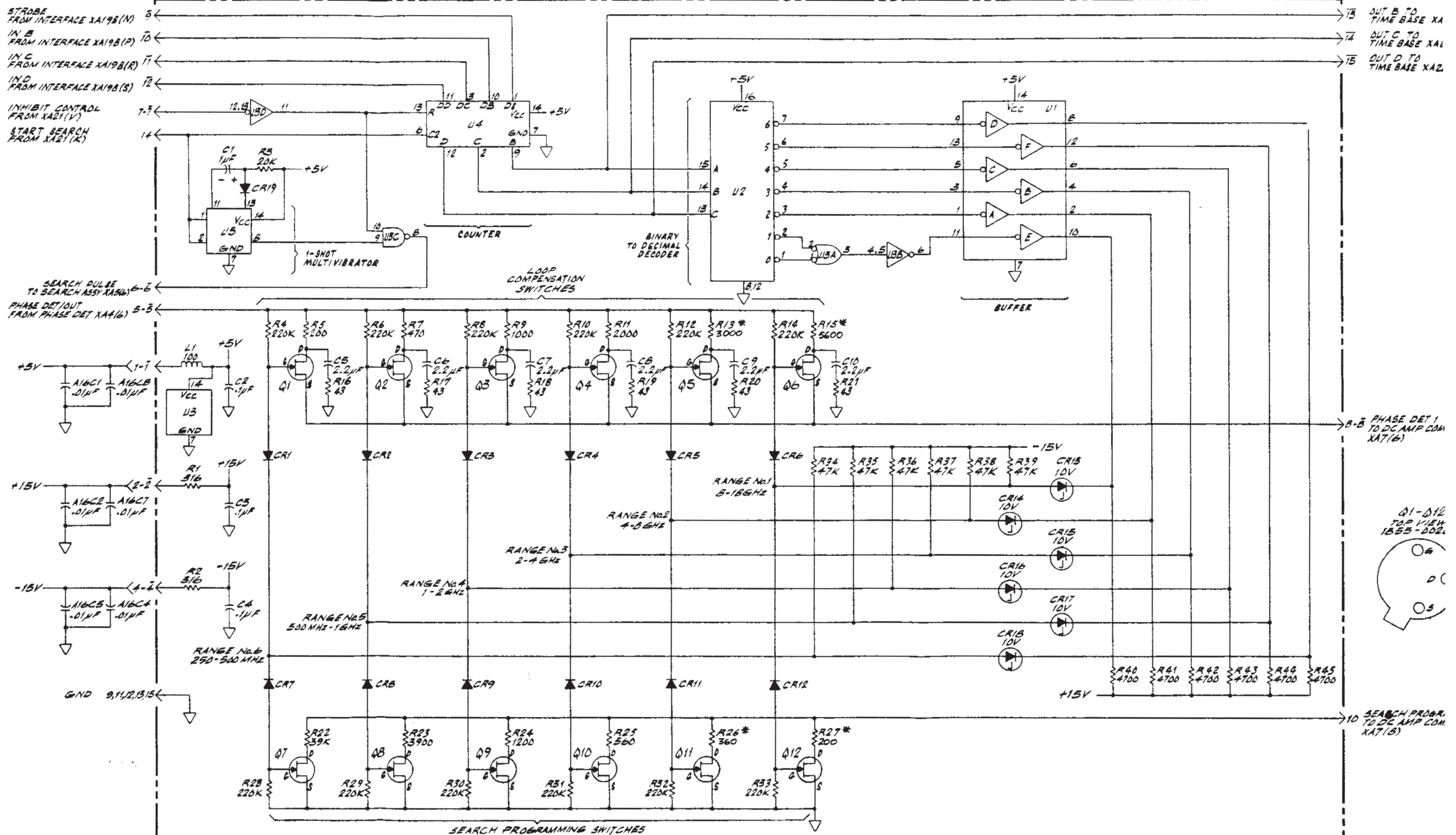


Figure 8-12. A6 Search Programmer Asse

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 PICO FARADS;
INDUCTANCE IN MICROHENRIES
3. ASTERISK (*) INDICATES SELECTED COMPONENT, AVERAGE VALUES SHOWN.

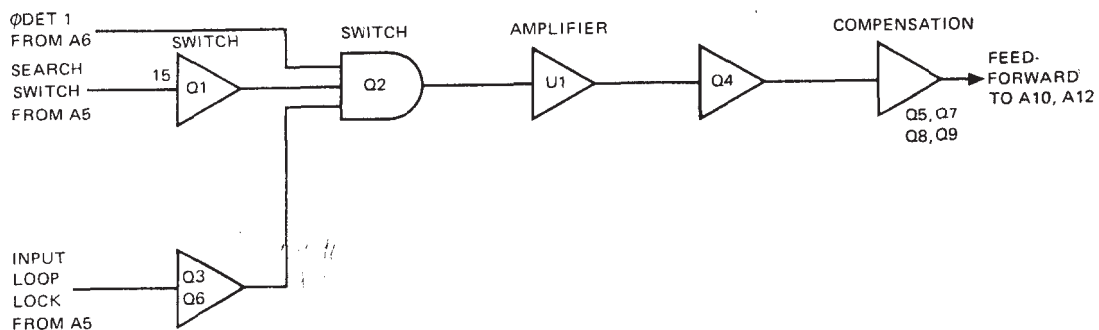
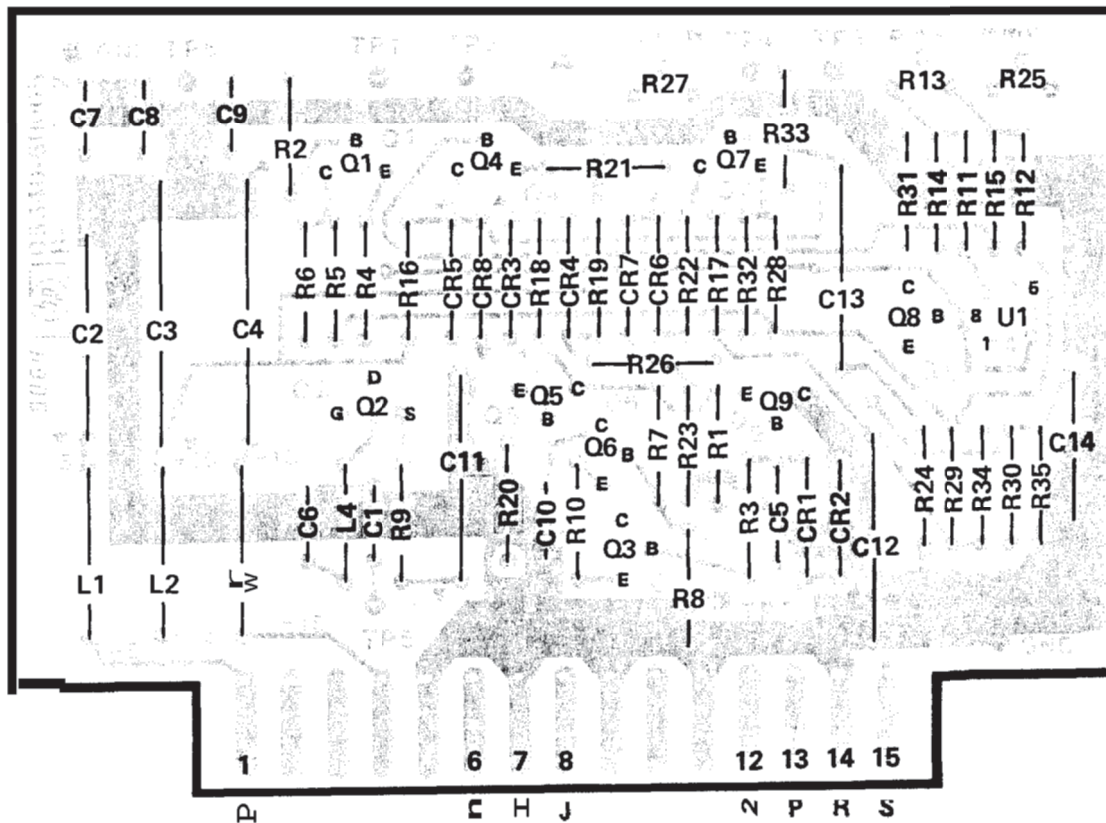
REFERENCE DESIGNATIONS

A16	A6
C1, 2, 4, 5, 7, 8	C1-10 CR1-19 C1 Q1-12 R1-45 U1-5

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1-12, 19	1901-0040
CR13-18	1902-0025
Q1-12	1855-0020
U1	1820-0577
U2	1820-0214 5N7442N
U3	1820-0054 5N7400N
U4	1820-0765 5N74197N
U5	1820-0207

5340-D-7



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

REFERENCE DESIGNATIONS

A7
C1-16
CR1-B
L1-4
Q1-9
R1-35
TP1-TP7
U1

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1,2	1901-0040
CR3-B	1901-0025
Q1	1853-0020
Q2	1855-0020
Q3,Q9	1853-0036 2N3906
Q4-8	1854-0215 2N3904
U1	1826-0021 LM310H

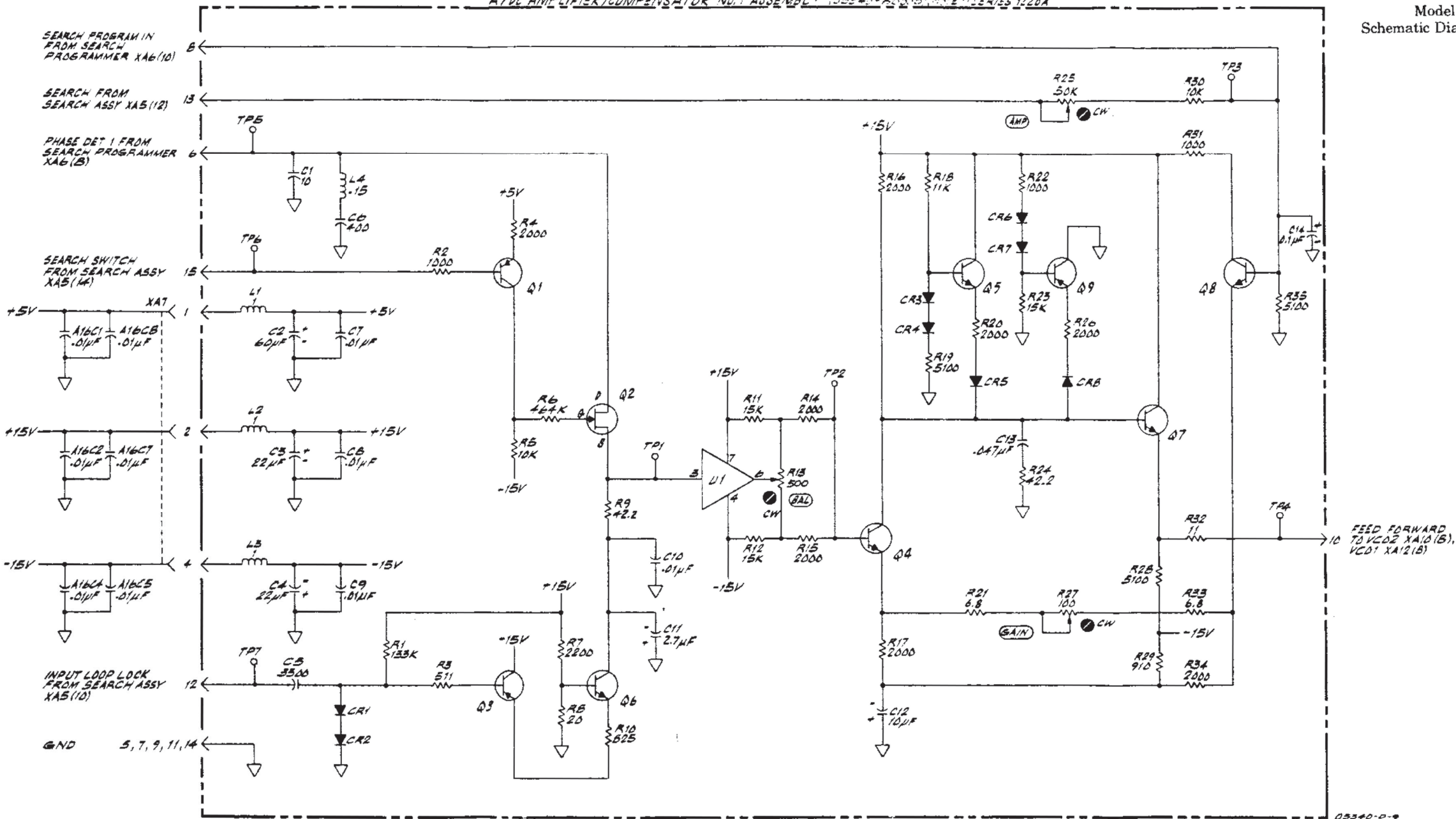
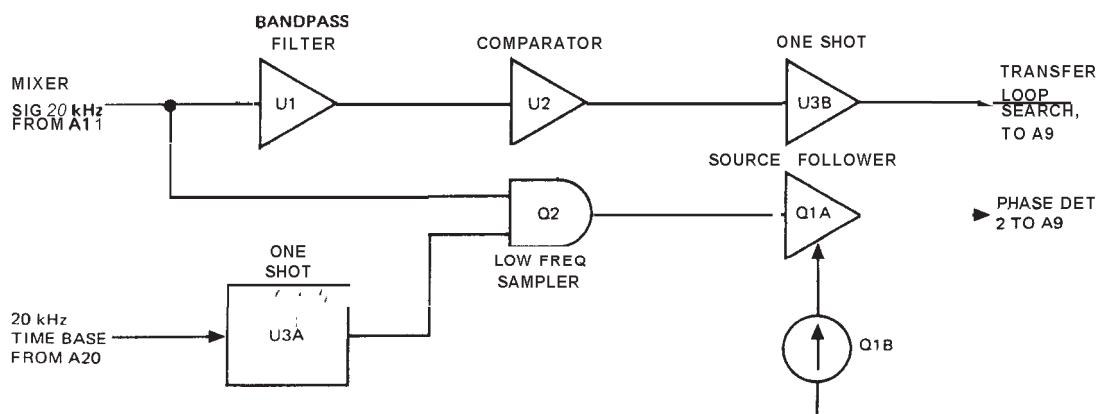
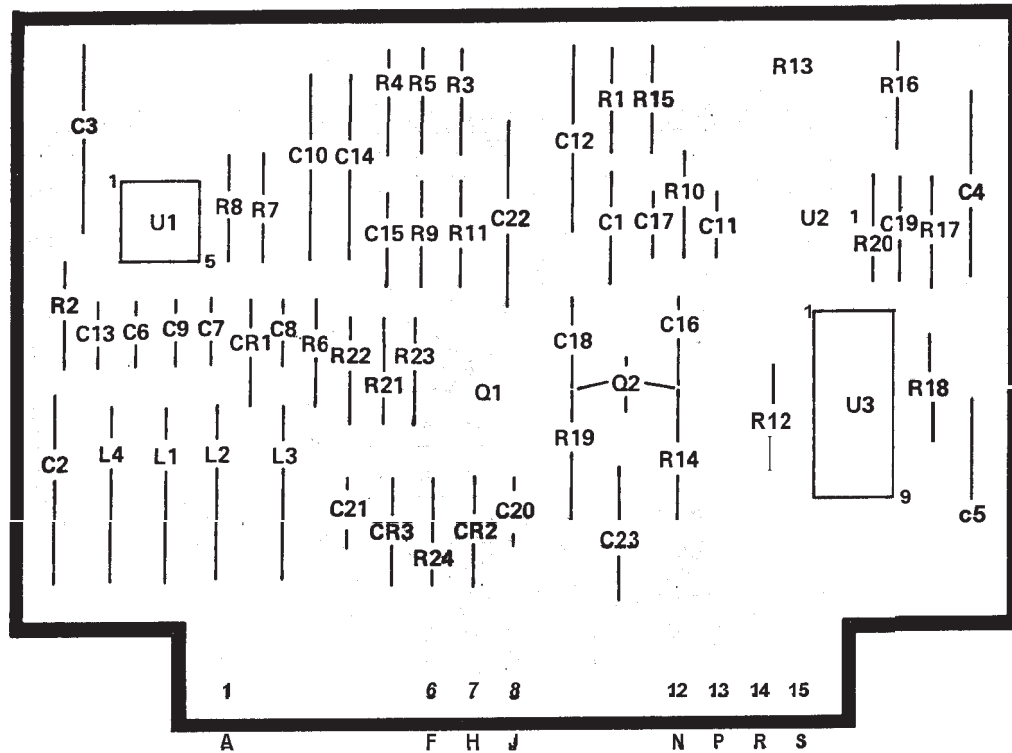


Figure 8-13. A7 DC Amplifier/Compensator No. 1 Assembly



AB BANDPASS FILTER/φ DETECTOR ASSEMBLY (05340-60006) (NOTE 1) SERIES 1220A

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;

REFERENCE DESIGNATIONS

REFERENCE DESIGNATIONS	HP PART NUMBERS
A8	
C1-23	
CR1-3	
L1-4	
Q1,2	
R1-24	
U1-3	

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1	1902-3182
CR2,3	1902-0025
Q1	1855-0334 DN377
Q2	1855-0380 2N4351
U1	1820-0073 LM741
U2	1820-0475 LM306H
U3	1820-0515 9602

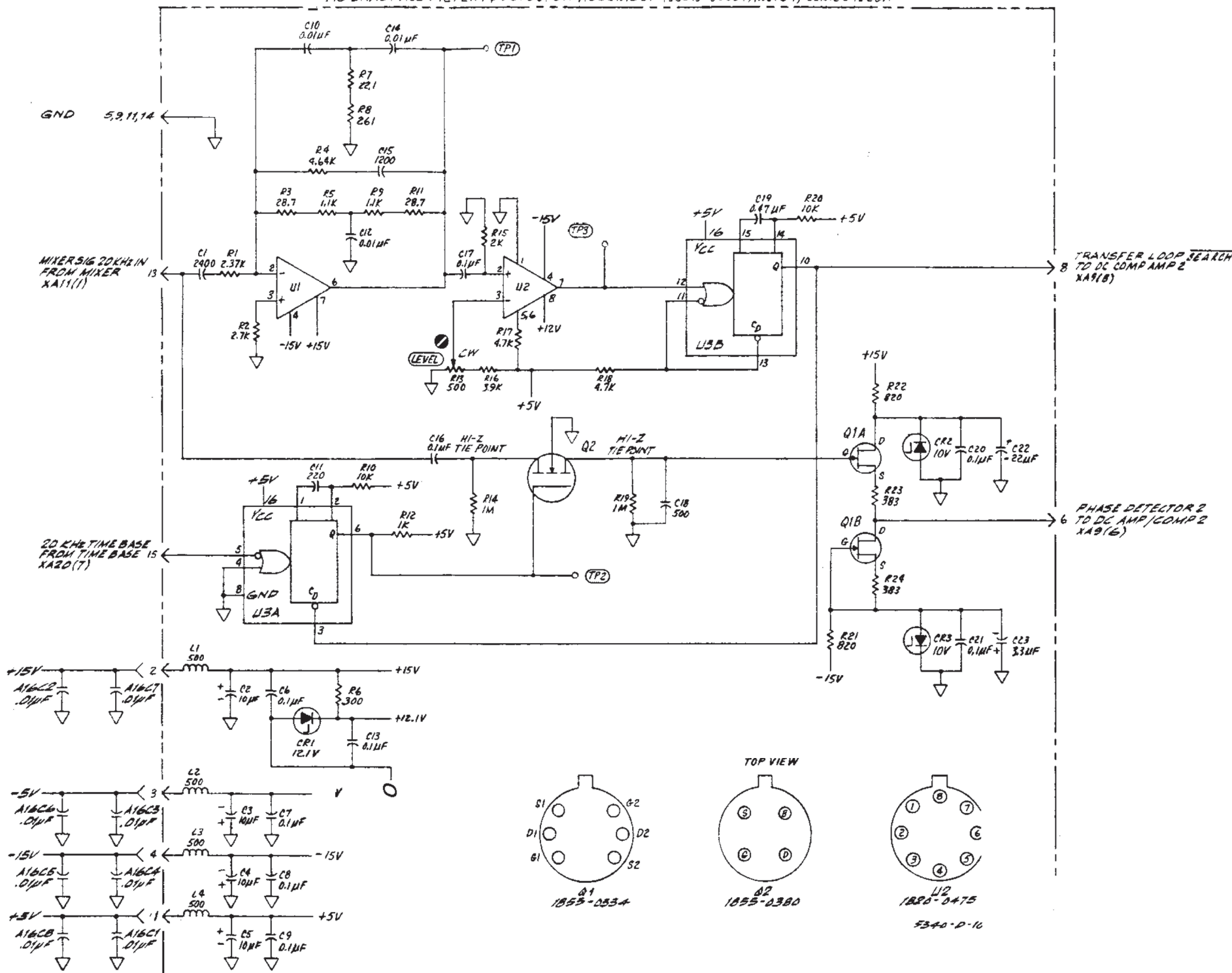
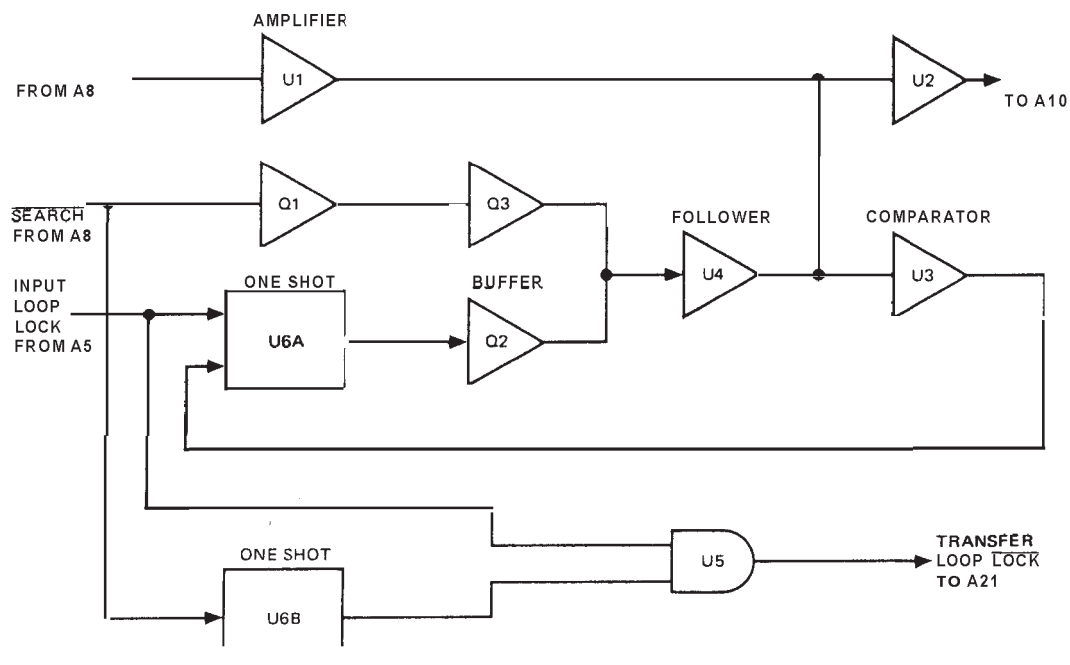
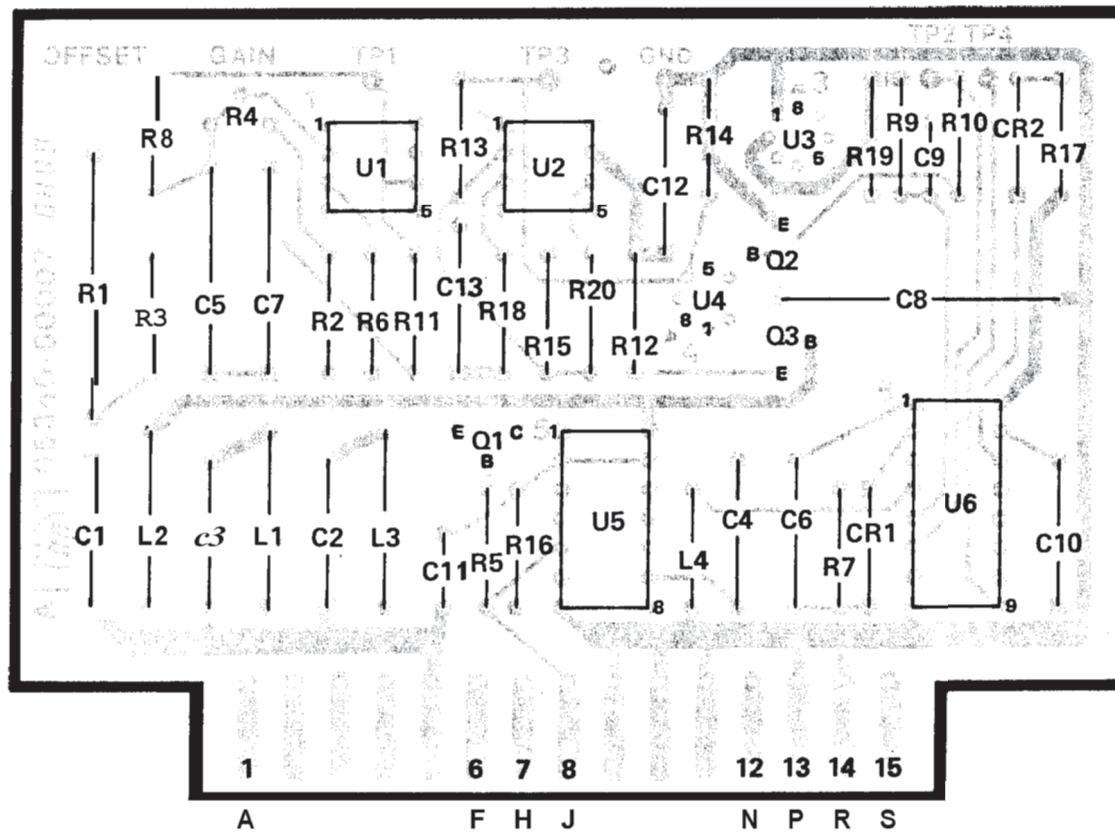


Figure 8-14. A8 Bandpass Filters/φ Detector Assembly



A9 DC AMPLIFIER COMPENSATOR NO. 2 ASSEMBLY (05340-60007) (NOTE 1) SERIES 1220A

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;

REFERENCE DESIGNATIONS

A9
C1-13
CR1,2
L1-4
Q1-3
R1-23
U1-6

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1,2	1901-0040
Q1,2	1854-0215 2N3904
Q3	1853-0036 2N3906
U1,2	1826-0073 LM741
U3	1826-0026 LM311N
U4	1826-0021 LM310N
U5	1820-0068 SN7410N
U6	1820-0515 9602

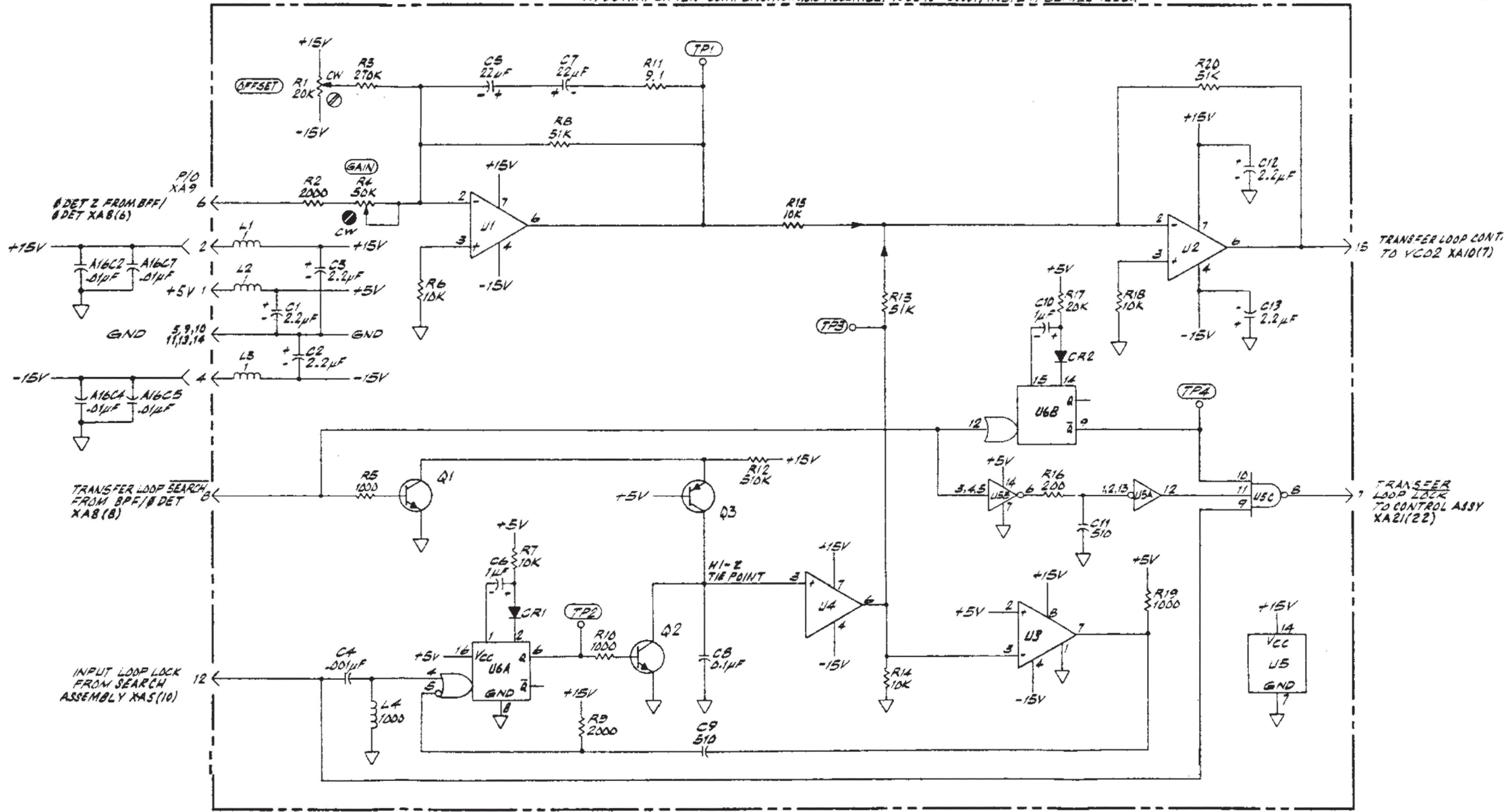
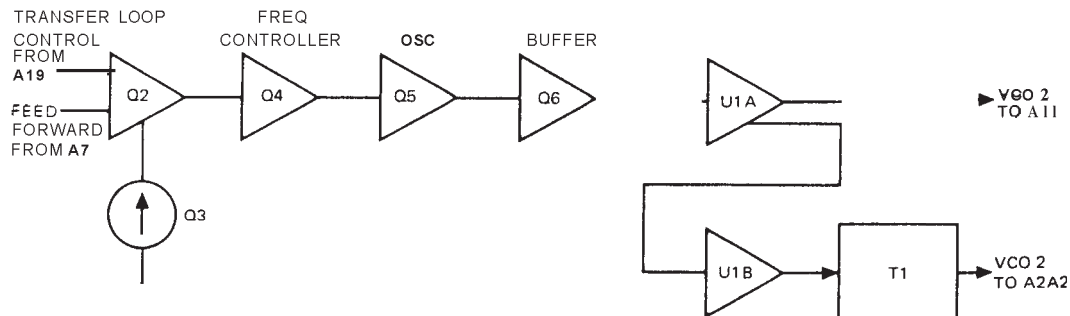
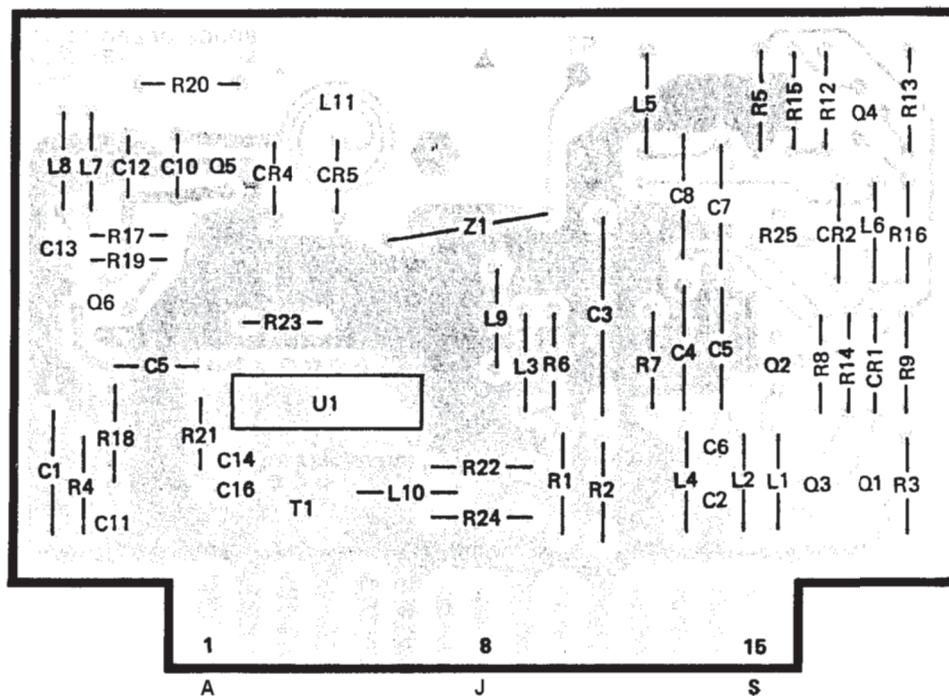


Figure 8-15. A9 DC Amplifier/Compensator No. 2 Assembly

5340-D-11



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. COIL IS PRINTED ON PC BOARD
4. A10CR4 & CR5 AND A10CR4 & CR5 MUST BE REPLACED AS A MATCHED QUAD SET I.E. WHEN ANY ONE DIODE IS REPLACED, ALL FOUR MUST BE INSTALLED.
5. ASTERISK (*) INDICATES SELECTED COMPONENT, AVERAGE VALUES SHOWN.
6. A10C10 AND A10C12 MUST BE EQUAL, $\geq 12\text{PF}$, $\leq 24\text{PF}$. SELECTION MATCHES VCO FREQUENCY RANGE TO VARACTOR CHARACTERISTICS.

REFERENCE DESIGNATIONS

A10
C1-16
CR1,2,4,5
L1-10
Q1-6
R1-9,12-25
T1
U1
Z1

CR3, R10, R11
DELETED

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1,2	1901-0040
CR4,5	05340-60005 (SEE NOTE 4)
Q1	1853-0036 2N3906
Q2	1854-0073
Q3	1854-0583 MPSA-018
Q4	1854-0005 2N708
Q5,6	1854-0345 2N5179
U1	1820-1179

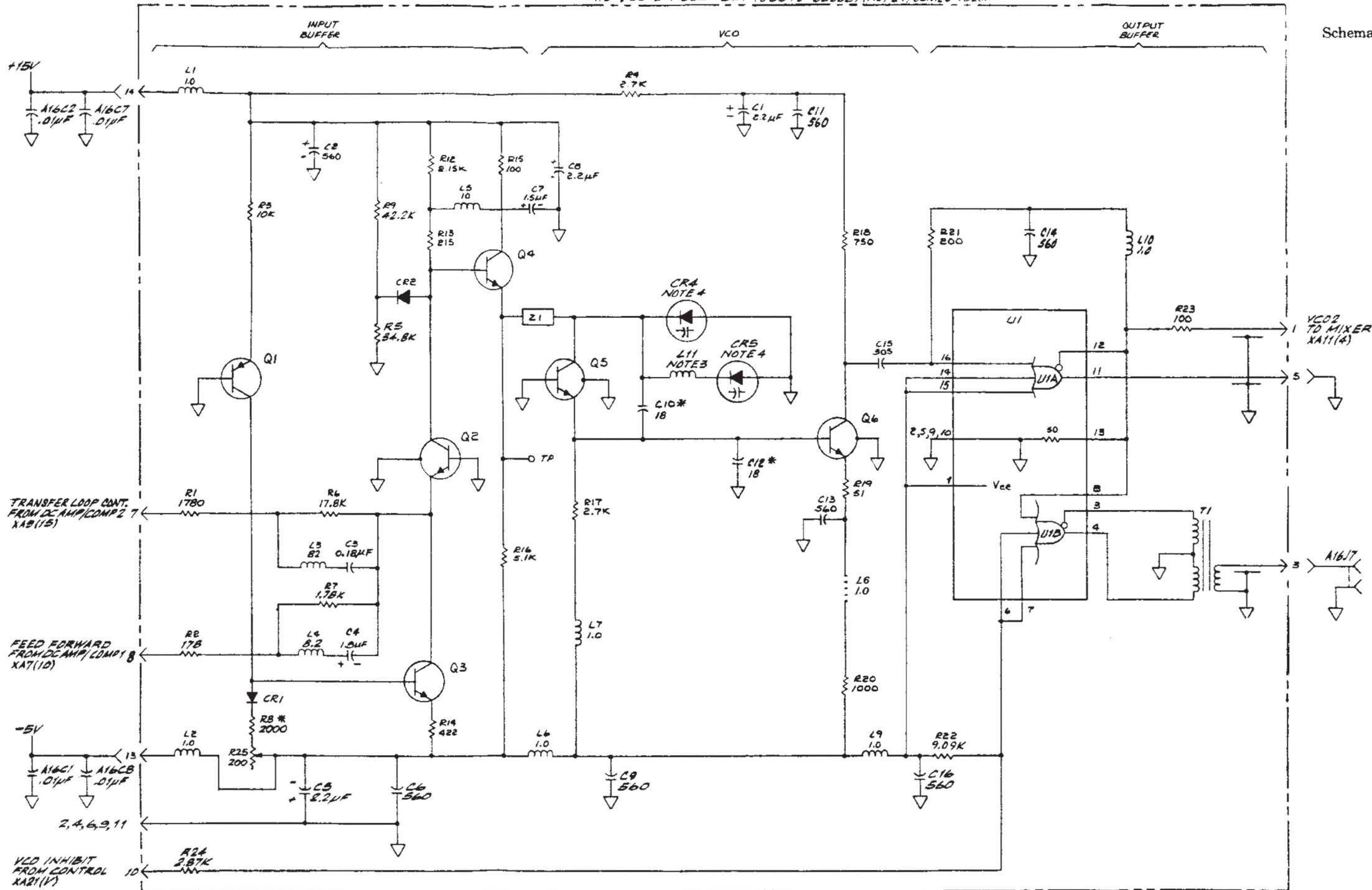
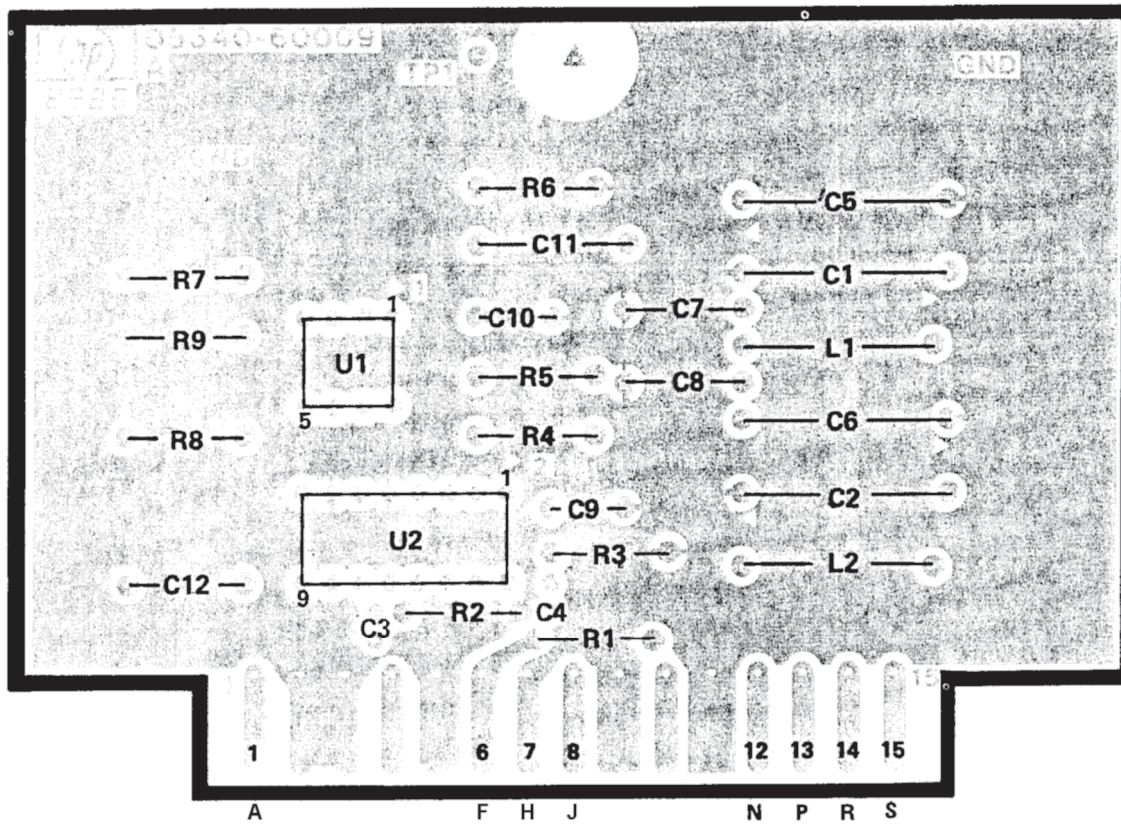


Figure 8-16. A10 VCO No. 2 Assembly



A11 MIXER ASSEMBLY (5340-60009) (NOTE 1) SERIES 1220A

Model 5340A Schematic Diagrams

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;
3. ASTERISK (*) INDICATES SELECTED COMPONENT, AVERAGE VALUE SHOWN.

REFERENCE DESIGNATIONS

A11
C1-12 L1,2 R1-9 U1,2

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
U1	1826-0073
U2	1858-0018

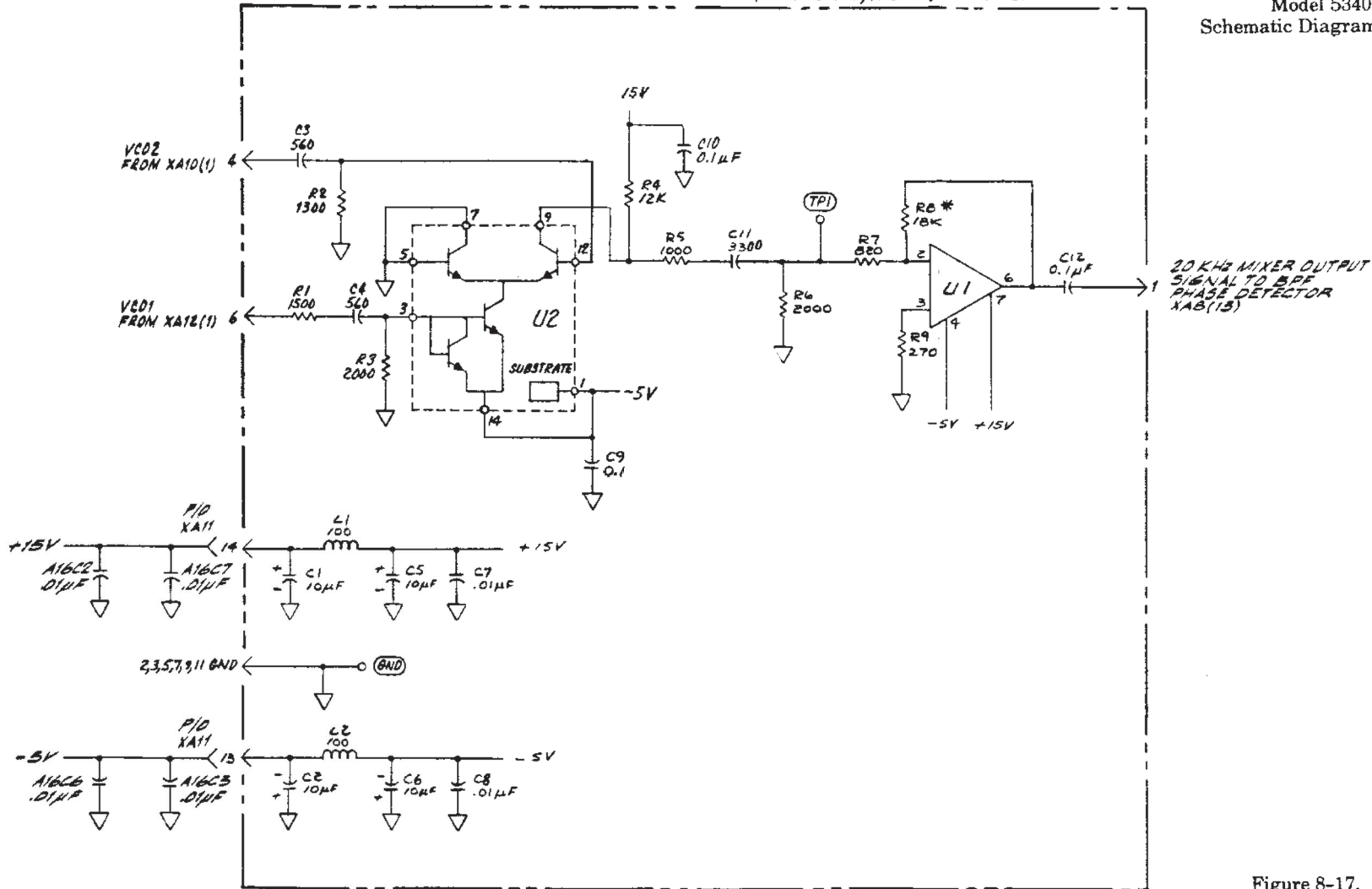
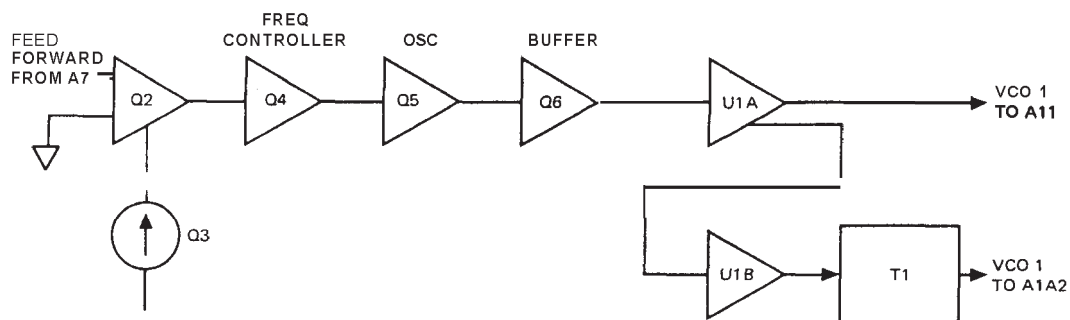
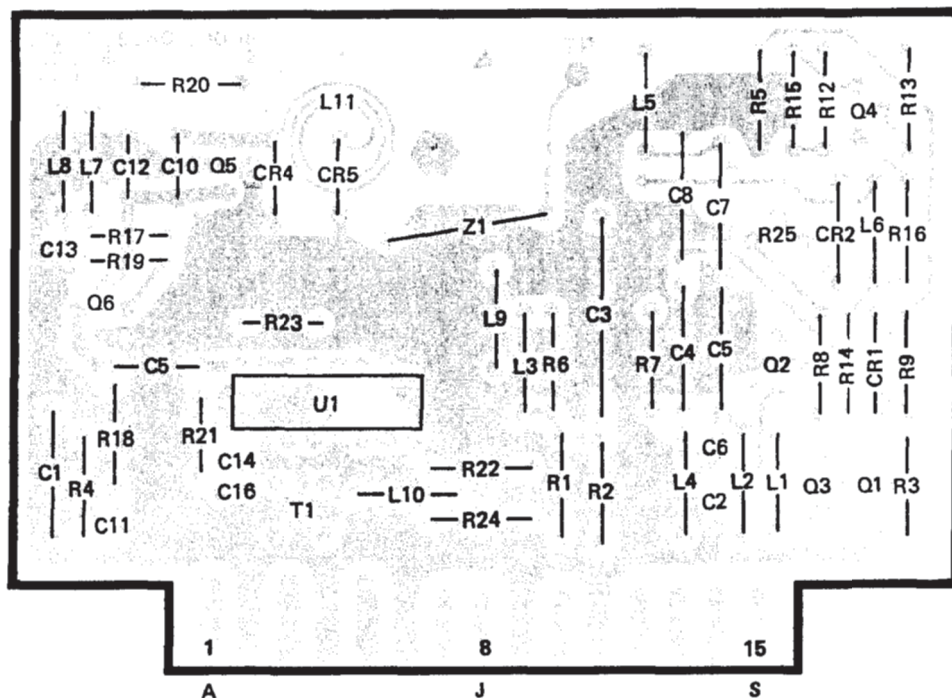
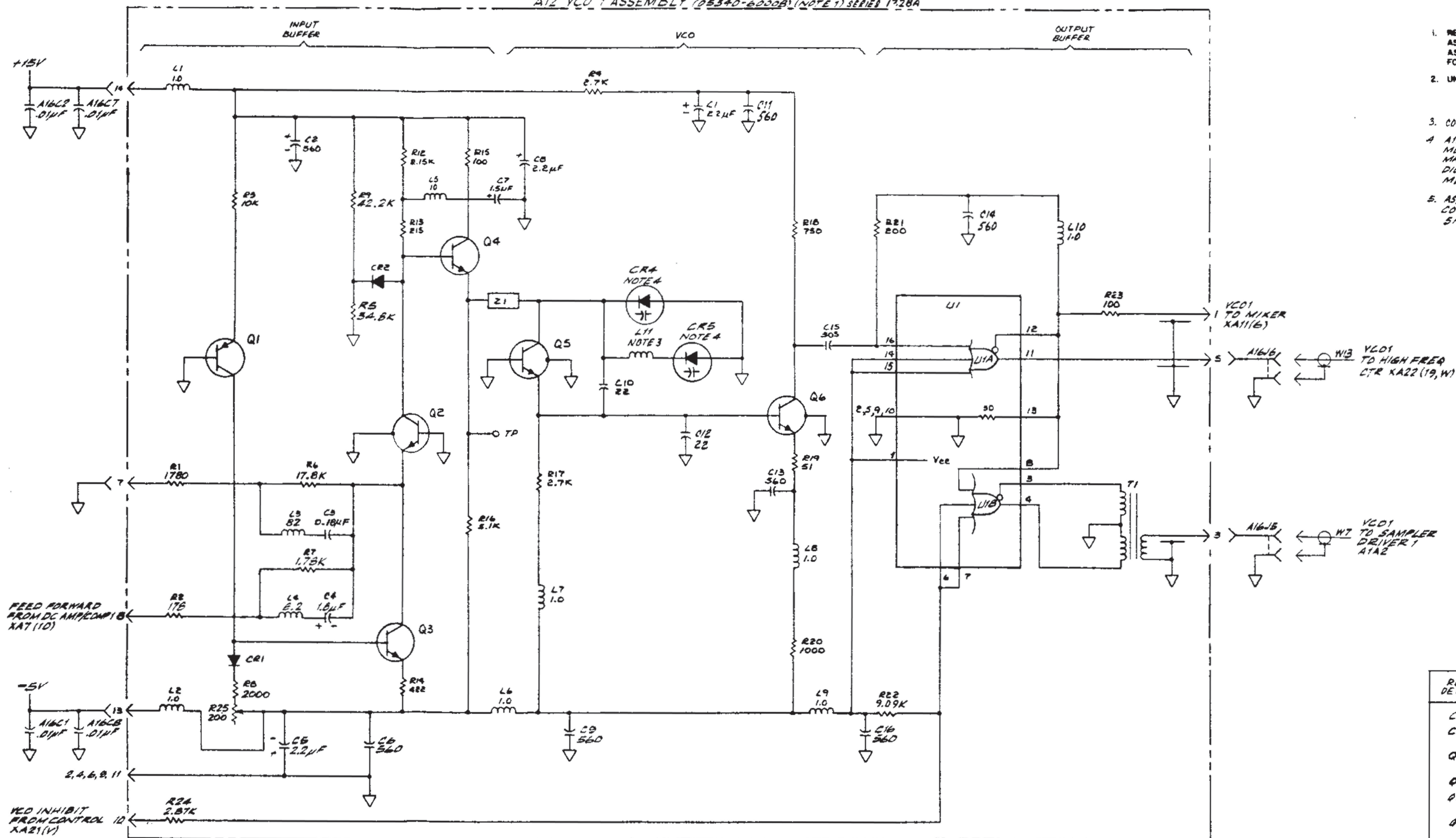


Figure 8-17.





NOTES

1. REFERENCE DESIGNATIONS WITHIN THE 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. COIL IS PRINTED ON PC BOARD
4. A12CR5 & CR4 AND A12CR4 & CR4 MUST BE REPLACED AS A MATCHED QUAD SET I.E. WHEN A1 DIODE IS REPLACED, ALL FOUR MUST BE INSTALLED.
5. ASTERISK (*) INDICATES SELECT COMPONENT, AVERAGE VALUE SHOWN.

REFERENCE DESIGNATIONS

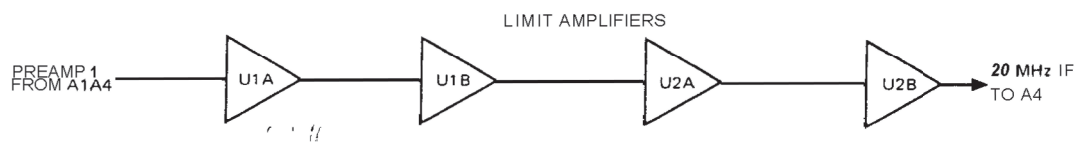
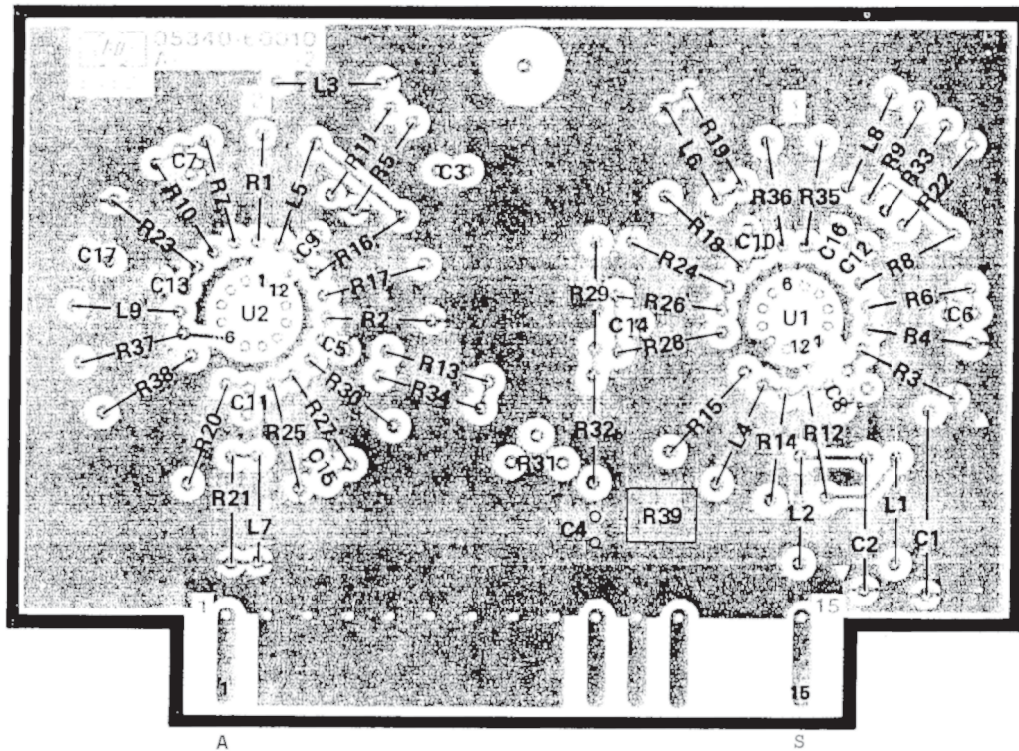
A12
M-16
CR1, 2, 4, 5
L1-10
Q1-6
R1-9, 12-25
T1
U1
Z1

CR3, R10, R11 DELETED

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBER
CR1, 2	1901-0040
CR4, 5	05340-800 (SEE NOTE 4)
Q1	1853-0036 2N3906
Q2	1854-0073
Q3	1854-0583 MPSA-018
Q4	1854-0005 2N708
Q5, Q6	1854-0341 2N5179
U1	1826-1179

Figure 8-18. A12 VCO No. 1



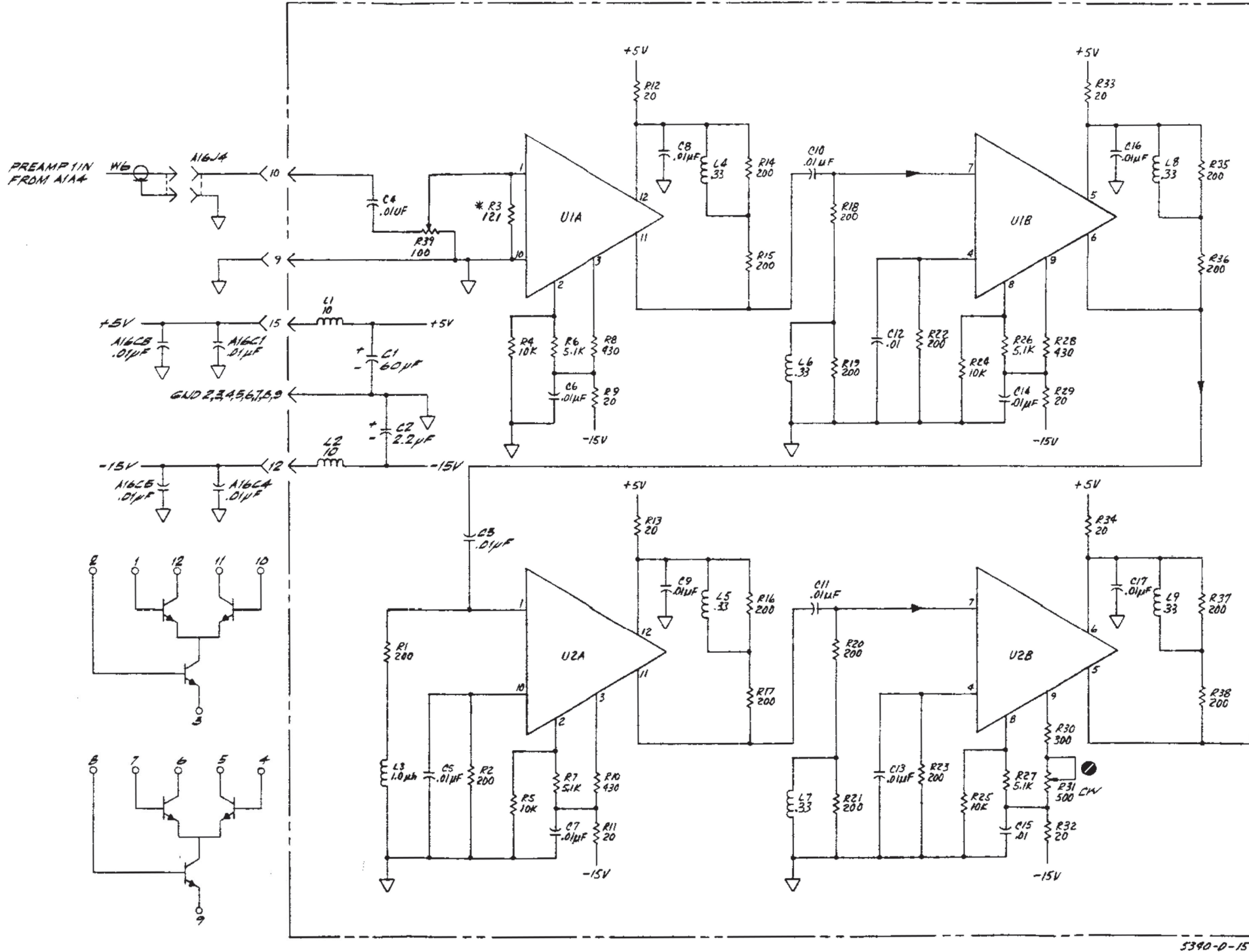
1. REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
2. UNLESS OTHERWISE INDICATED:
RESISTANCE IN OHMS;
CAPACITANCE IN PICOFARADS;
3. ASTERISK (*) INDICATES SELECTED COMPONENT, AVERAGE VALUE SHOWN.

REFERENCE DESIGNATIONS

A13
C1-17
L1-9
R1-38
U1,2

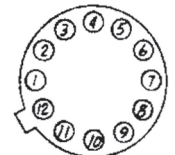
ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
U1,2	1858-0004

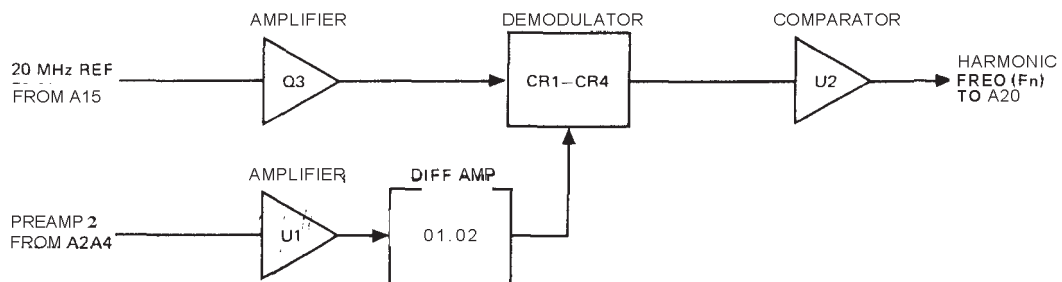
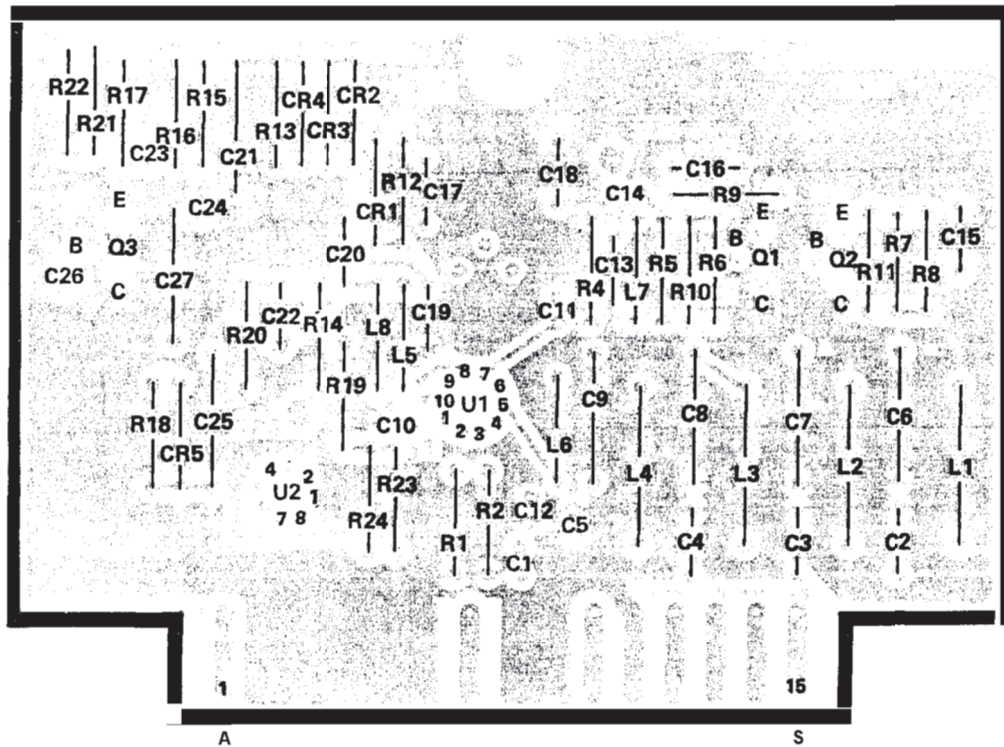


5340-0-15

Figure 8-19. A13 Limiter/Amplifier Assembly



BOTTOM VIEW



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 VALUE SHOWN.

REFERENCE DESIGNATIONS

A14
C1-27
CR1-5
L1-8
Q1-3
R1,2,4-24
U1,2

R3 DELETED

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1-4	1901-0050
CR5	1902-3182
Q1-3	1854-0073
U1	1820-0270
U2	1820-0475 LM306H



BOTTOM VIEW

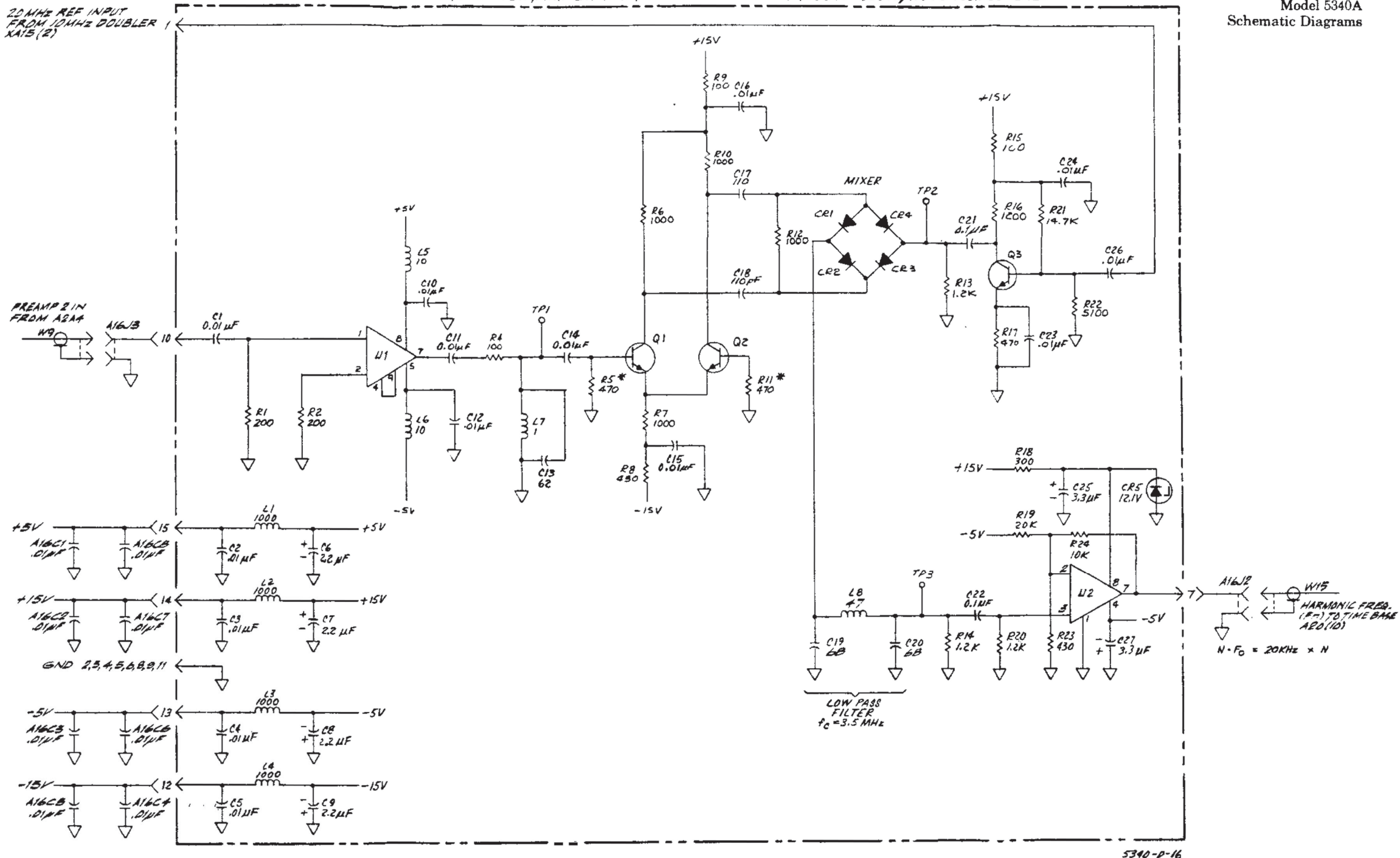
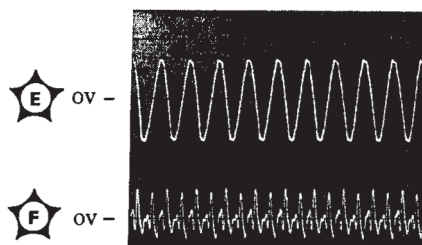
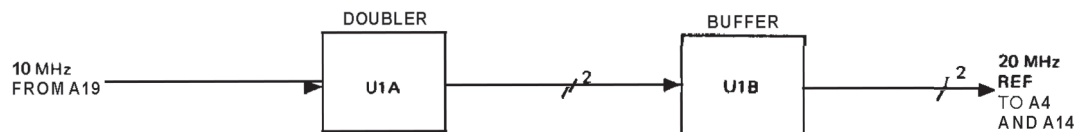


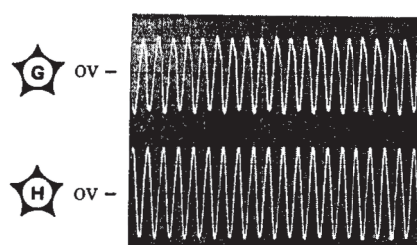
Figure 8-20. A14 Limiter/Amplifier/Mixer Assembly

Part of Figure 8-21. A15 10MHz Doubler Assembly



Star E A15C2 .1 V/cm, .1 μ s/div

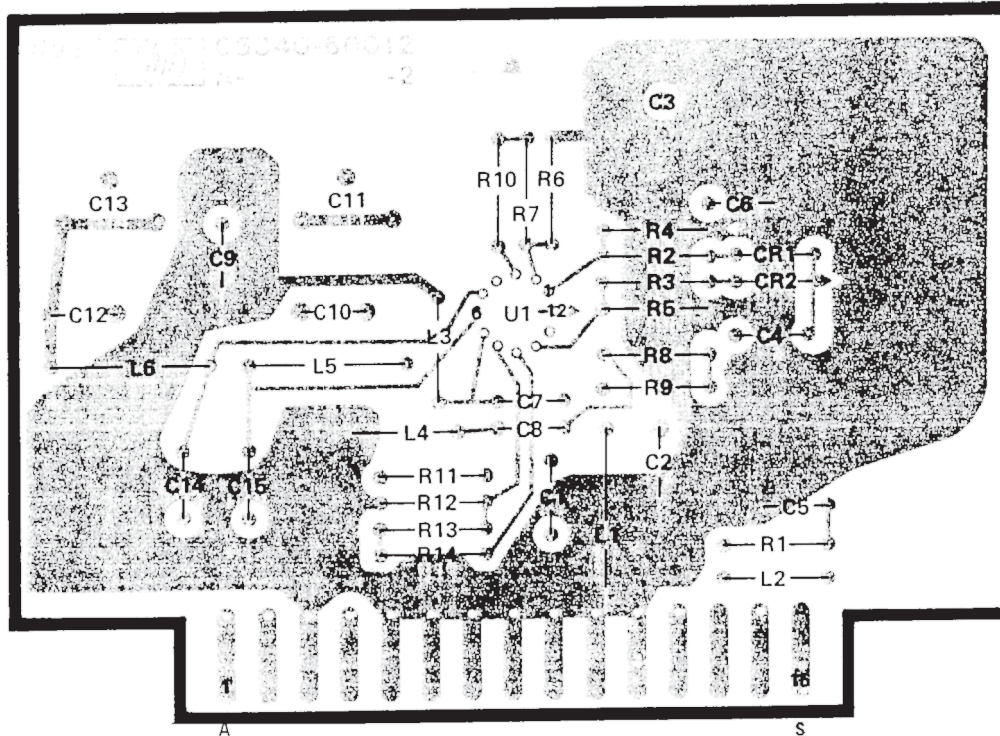
Star F A15U1(12) .05 V/cm, .1 μ s/div



Star G XA15(2) .05 V/cm, .1 μ s/div

Star H XA15(1) .05 V/cm, .1 μ s/div

Waveforms taken with oscilloscope 10:1 probes. Oscilloscope sync set to INT, SLOPE, to +, and DISPLAY to ALT.



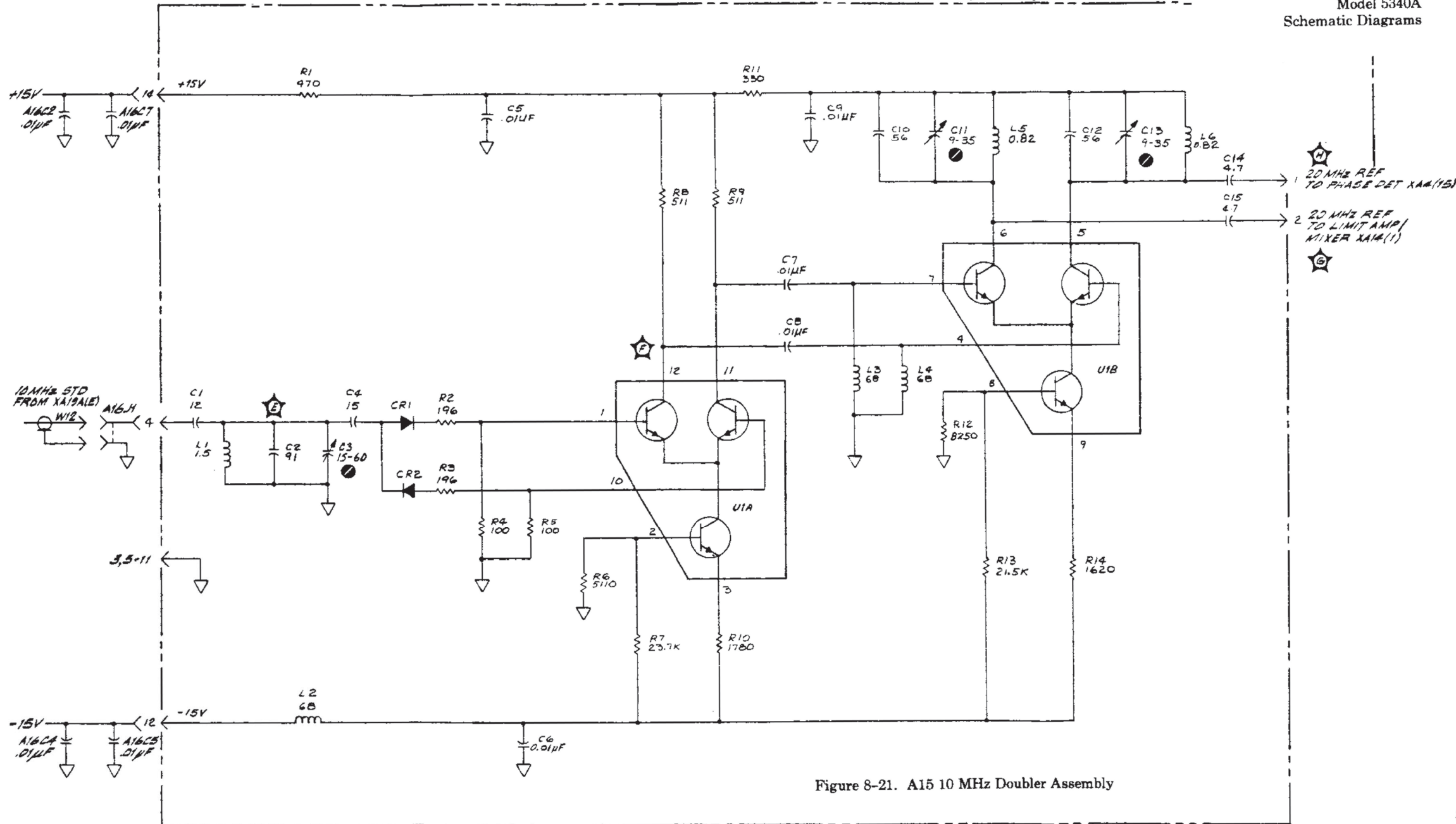
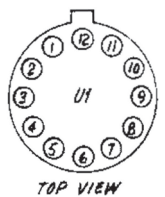
1. REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
2. UNLESS OTHERWISE INDICATED:
RESISTANCE IN OHMS;
CAPACITANCE IN PICOFARADS;
INDUCTANCE IN MICROHENRIES

REFERENCE DESIGNATIONS

A15
01-15
CR1,2
L1-6
R1-14
U1

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1,2	1901-0535
U1	1858-0004 CA3049



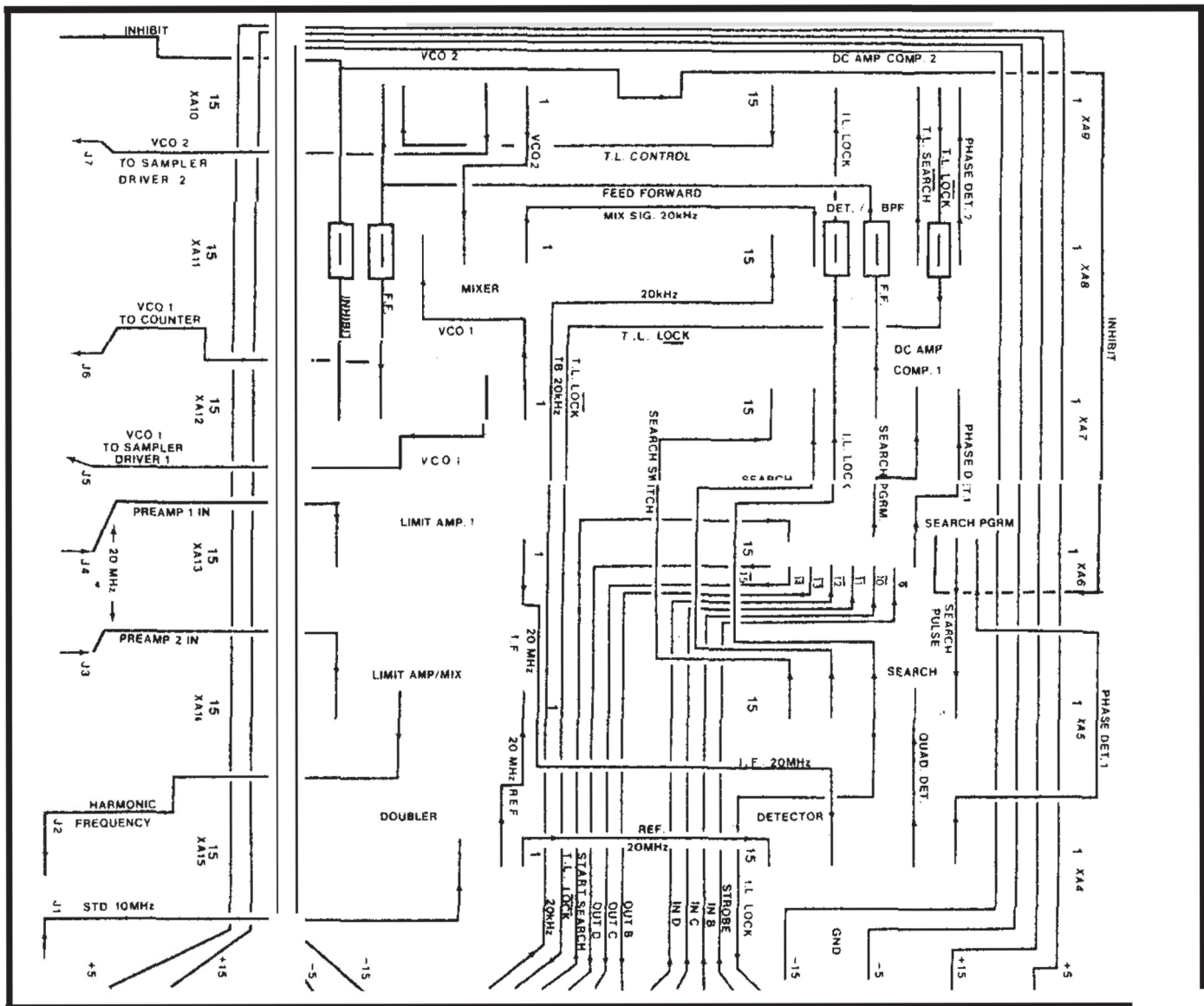
A16 CASTING MOTHERBOARD ASSEMBLY 05340-60015

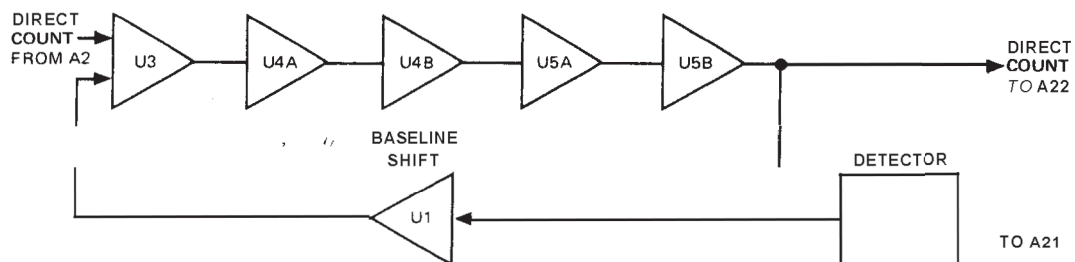
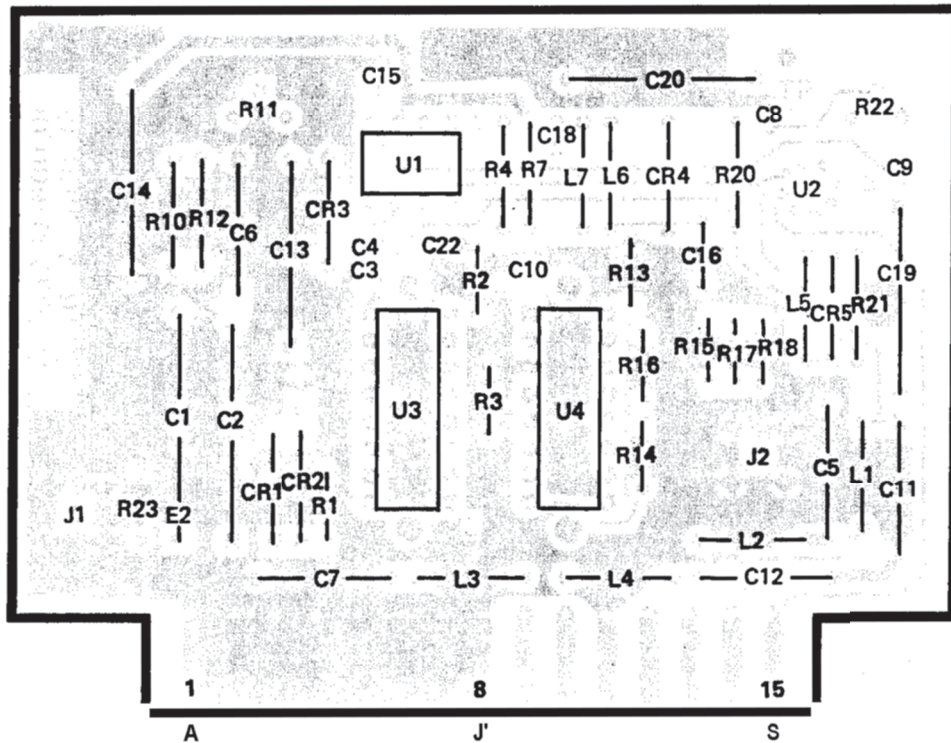
A16 is a six layer interconnect board used to interconnect assemblies A4 through A15 and also to provide connections to other points in the counter. The  symbol denotes a feedthrough point. For example, the inhibit signal connects to XA10(10), XA11(10), and XA12(10). The signal is used by A10 and A12. The connection at XA11(10) is for convenience only and is not used by A11.

Since multilayer construction is used for A16, extreme care should be used when unsoldering wires, connectors, and jacks. Use the minimum amount of heat necessary to unsolder parts. When replacing the printed-circuit connectors, clip off the connector from the top of the board, then unsolder each pin.

Care should be taken when connecting cables to J1 through J7. Use a straight on motion for mating the connectors.

Figure 8-22. A16 Casting Motherboard





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

REFERENCE DESIGNATIONS

NO PREFIX	A17	A17A1
C3-7		C1-23
L2-6		C1-5
	U1,2	J1,2
		L1-7
XA17	W1,2	R1-25
		U1-3,5
		E2

(HIGH DURING DIRECT MODE
INDETERMINATE R5, 6, 8, 9 DELE
250 MNE)

REFERENCE DESIGNATIONS	ACTIVE ELEMENTS HP PART NUMBERS
C1, 2	1901-0535
C3	1901-0040
C4, 5	05340-80006
U1	1826-0073
U2	1826-0026
U3	1820-0754
U5	1820-0753

5340-D-18

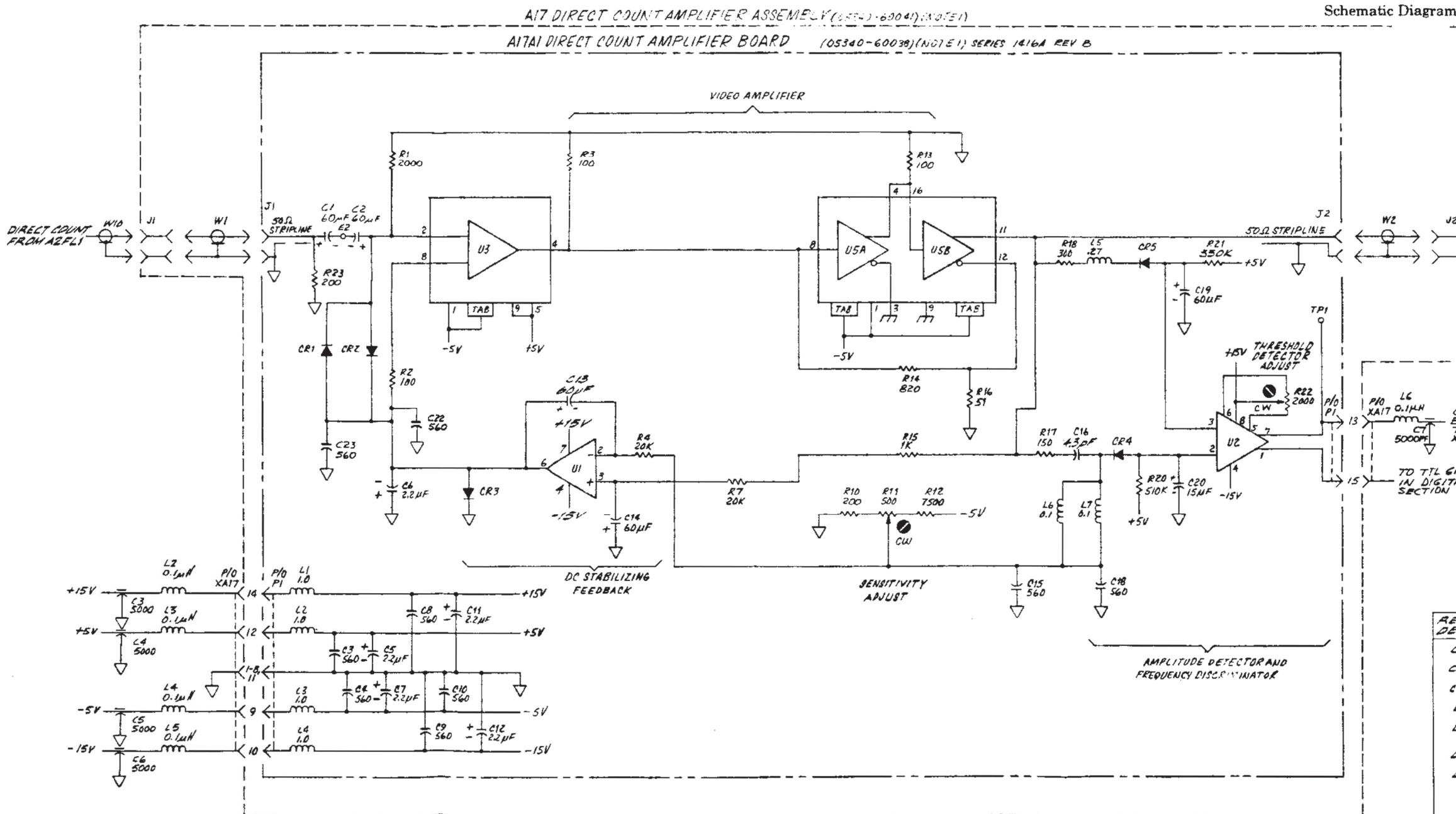
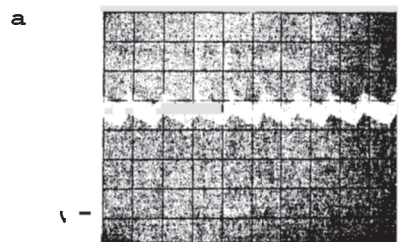


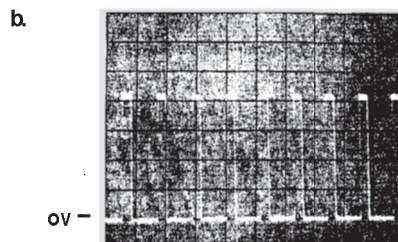
Figure 8-23. A17 Direct Count Amplifier Assembly

Part of Figure 8-24. A18 Standard 10 MHz Oscillator Assembly
A18 10 MHz Oscillator Assembly (Option 001)

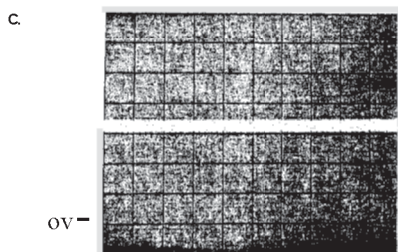
WAVEFORMS FOR TEST POINT



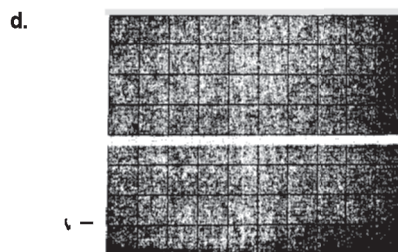
.01 V/div, dc
.1 ms/div
Oscillator warmed-up for 24 houn



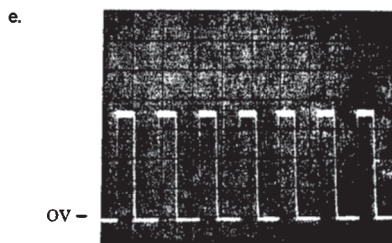
.5 V/div, dc
.1 ms/div
XA18 pin 11 with green wire to A33
disconnected (no load). Oscillator
warmed up for 24 houn



.02 V/div, dc
.1 ms/div
Oscillator off for at least
24 houn (cold)

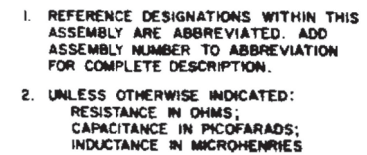


.5 V/div, dc
.1 ms/div
XA18 pin 11 with green wire
disconnected (no load). Oscillator off
for at least 24 houn (cold)

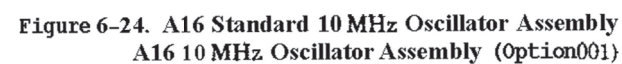


Same as d except oscillator is on
for 30 minutes from cold start

NOTES



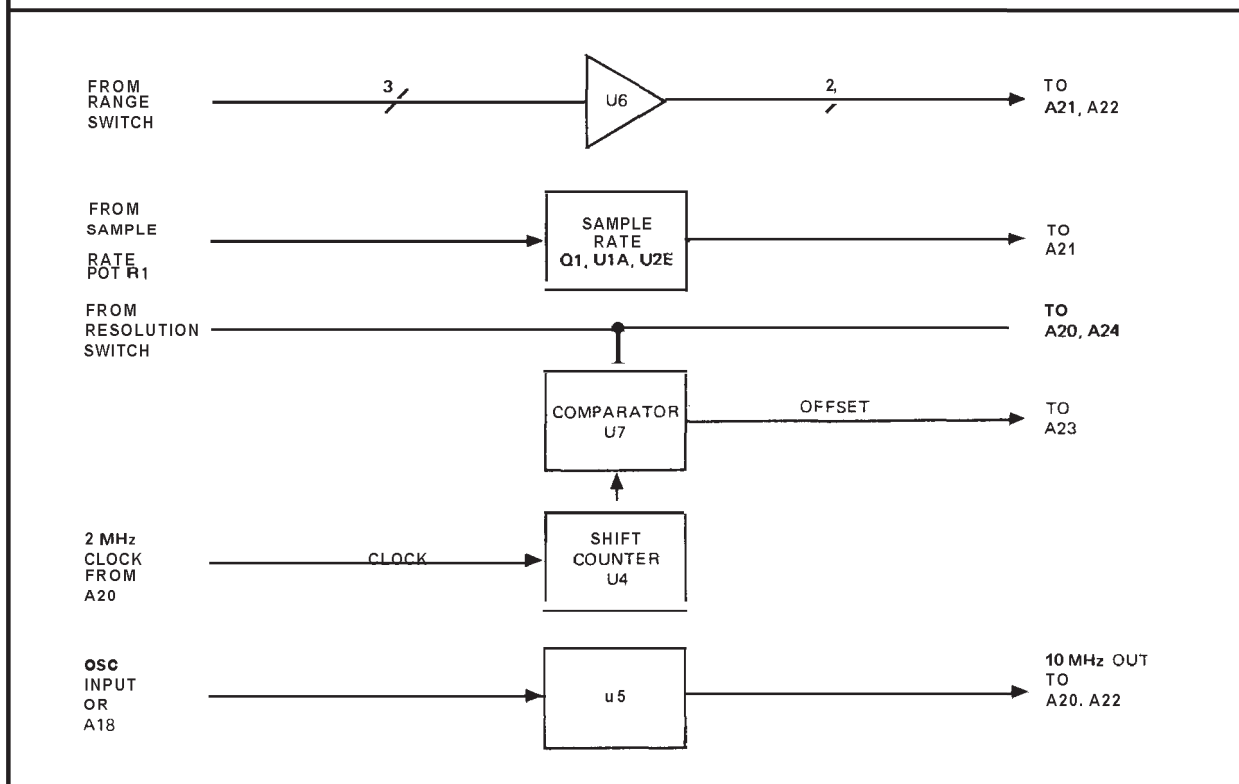
A COMPLETE PARTS LIST
FOR THIS ASSEMBLY STARTS
ON PAGE 6-18 AND 6-32.

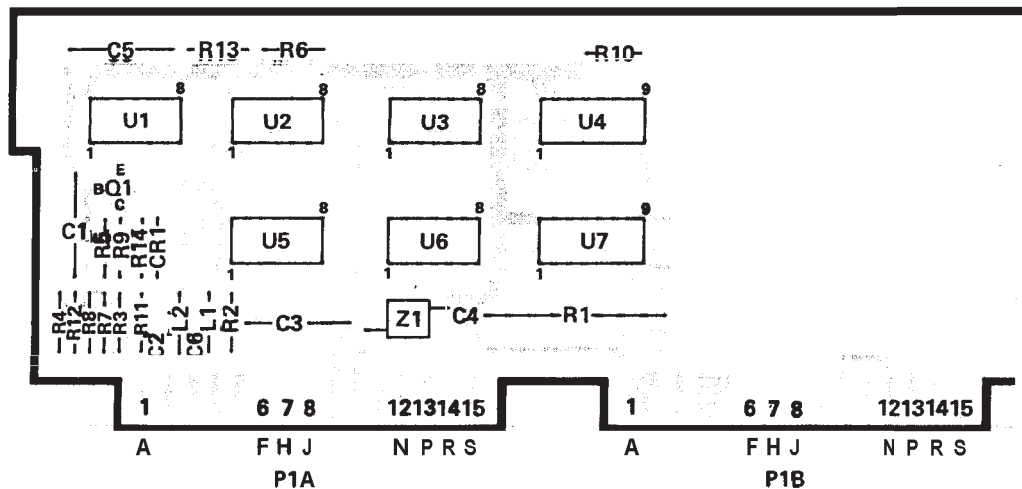


Part of Figure 8-25. A19 Interface A Assembly

RANGE	XA19 P1B(10)	XA19 P1A(13)	XA19 P1A(14)
10 Hz - 250 MHz	H	L	L
CHK	L	H	L
250 MHz - 18 GHz	L	H	H
10 Hz - 18 GHz	H	H	H

RESOLUTION (HZ)	XA19 P1B(6)	XA19 P1B(7)	XA19 P1B(8)
1	H	H	H
10	L	H	H
100	H	L	H
1K	L	L	H
10K	H	H	L
100K	L	H	L
1M	H	L	L





ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1	1901-0040
Q1	1854-0560
U1	1820-0537
U2	1820-0174 5N7404N
U3	1820-0068 5N7410N
U4	1820-0716 5N74161N
U5,6	1820-0054 5N7400N
U7	1820-0706 9324

5340-D-35

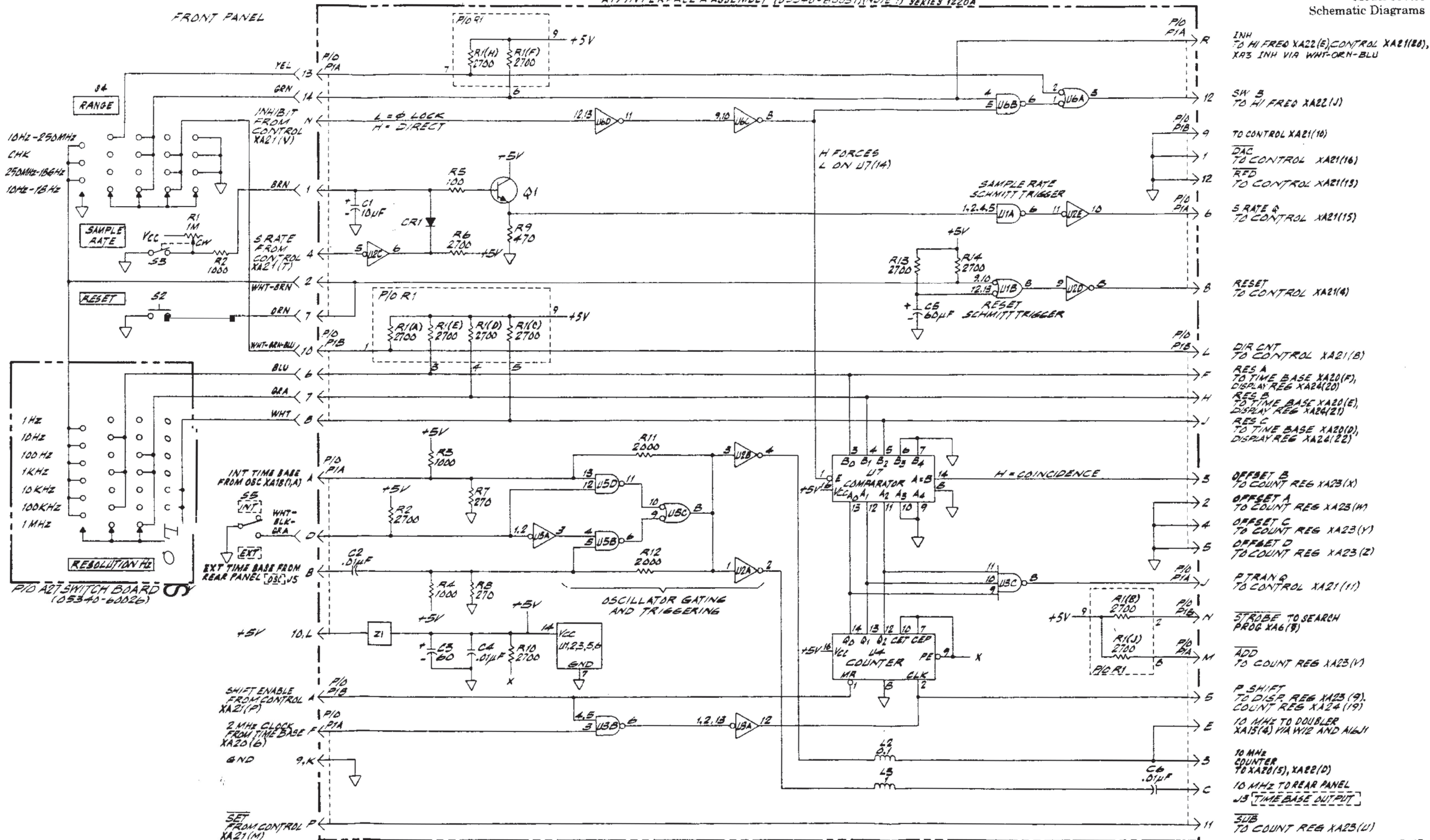
NOTES

- REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED, ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
- UNLESS OTHERWISE INDICATED:
RESISTANCE IN OHMS,
CAPACITANCE IN PICO FARADS,
INDUCTANCE IN MICROHENRIES.

REFERENCE DESIGNATIONS

NO PREFIX	A13
	C1-6
	CR1
	L1-3
	Q1
R1-2	R1-14
S2-5	U1-7

FRONT PANEL

Figure 8-25. A19 Interface A Assembly (Standard Instrument),
A27 Resolution Switch Assembly

5340-D-32

Model 5340A
Schematic Diagrams

U25 (1816-0184) ASCII Code Conversion Output Truth Table

OCTAL ADDRESS		BINARY ADDRESS! A ₄ ←A ₀	OUTPUTS							
			B ₇	B ₆	B ₅	B ₄	B ₃	B ₂	B ₁	B ₀
0	0	00000	0	1	1	1	1	0	1	1
0	1	00001	0	1	1	1	1	0	1	1
0	2	00010	0	1	1	1	1	0	1	1
0	3	00011	0	1	1	1	1	0	1	1
0	4	00100	0	1	1	1	0	1	1	1
0	5	00101	0	1	0	1	1	1	1	1
0	6	00110	0	1	1	0	1	1	1	1
0	7	00111	0	0	1	1	1	1	1	1
1	0	01000	0	1	1	1	1	1	0	1
1	1	01001	0	1	1	1	1	1	0	1
1	2	01010	0	1	1	1	1	1	0	1
1	3	01011	0	1	1	1	1	1	1	1
1	4	01100	0	1	1	1	1	1	1	1
1	5	01101	0	1	1	1	1	1	1	1
1	6	01110	0	1	1	1	1	1	1	1
1	7	01111	0	1	1	1	1	1	1	1
2	0	10000	0	1	1	1	1	1	1	1
2	1	10001	0	1	1	1	1	1	1	1
2	2	10010	0	1	1	1	1	1	1	1
2	3	10011	0	1	1	1	1	1	1	1
2	4	10100	0	1	1	1	1	1	1	1
2	5	10101	0	1	1	1	1	1	1	1
2	6	10110	0	1	1	1	1	1	1	1
2	7	10111	0	1	1	1	1	1	1	1
3	0	11000	0	1	1	1	1	1	1	0
3	1	11001	0	1	1	1	1	1	1	0
3	2	11010	0	1	1	1	1	1	1	0
3	3	11011	0	1	1	1	1	1	1	0
3	4	11100	0	1	1	1	1	1	1	1
3	5	11101	0	1	1	1	1	1	1	1
3	6	11110	0	1	1	1	1	1	1	1
3	7	11111	0	1	1	1	1	1	1	1



REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1	1901-0040
Q1	1854-0560
U1, 14, 16	1820-0054 3N7400N
U2	1820-1051 74-132
U3	1820-0716 3N74161N
U4	1820-0587 DN74L10N
U5, 6	1820-0710 93L22
U7	1816-0185
U8	1820-0077 3N7474N
U9	1820-0782 3N7427N
U10, 20	1820-0174 3N7404N
U11, 18, 19, 24	1820-0839 3N74175N
U12	1820-0765 3N74197N
U13	1820-0583 DM74L00N
U15, 21	1820-0706 93Z4
U17, 23	1820-0610 93Z2
U22	1820-0596 DM74L74N
U25	1816-0184
U26	1820-0328 DM7402N

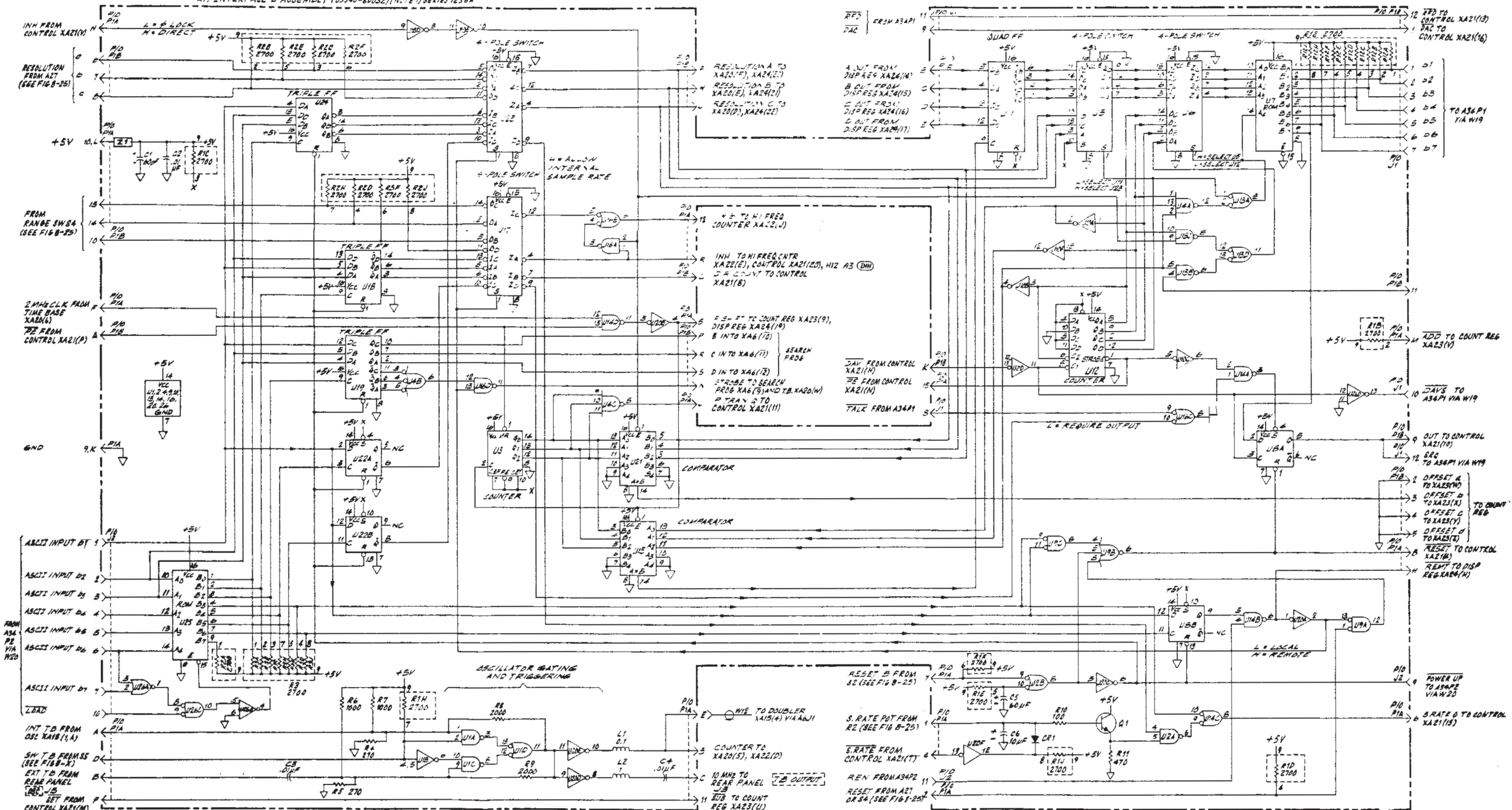
5340-D-3

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 PICO FARADS;
INDUCTANCE IN MICROHENRIES.

A19
CI-6
CRI
L1
Q1
R1-12
U1-26
Z1

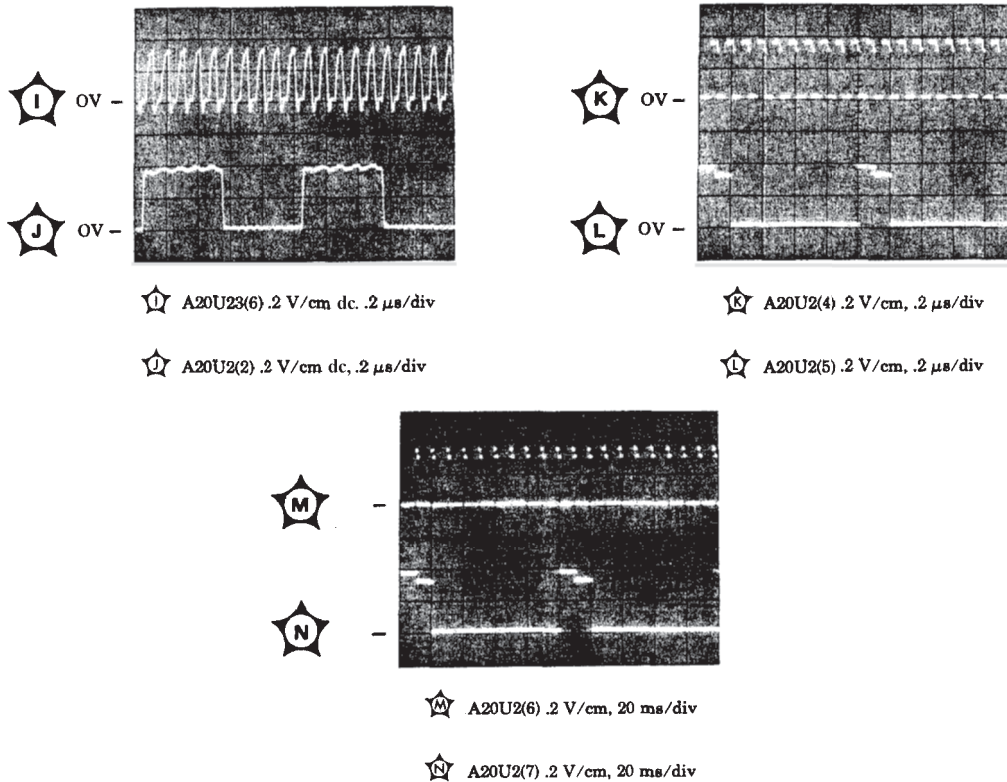
U17 (1816-0185)ASCII Code **Conversion** Output Truth **Table**

OCTAL ADDRESS		BINARY ADDRESS $A_4 \leftrightarrow A_0$	OUTPUTS							
			B_7	B_6	B_5	B_4	B_3	B_2	B_1	B_0
0	0	00000	1	1	0	0	0	1	0	1
0	1	00001	1	0	1	0	1	0	1	1
0	2	00010	0	0	0	0	0	0	0	0
0	3	00011	1	0	0	0	1	1	0	1
0	4	00100	0	0	0	0	1	0	1	0
0	5	00101	1	1	0	0	1	1	0	0
0	6	00110	1	1	0	0	1	1	1	1
0	7	00111	1	0	1	0	0	0	0	0
1	0	01000	1	1	0	0	0	1	0	1
1	1	01001	1	0	1	0	1	0	1	1
1	2	01010	1	0	0	0	0	0	0	0
1	3	01011	1	0	0	0	1	1	0	1
1	4	01100	0	0	0	0	1	0	1	0
1	5	01101	1	1	0	0	0	1	0	0
1	6	01110	1	0	1	0	0	0	0	0
1	7	01111	1	0	1	0	0	0	0	0
2	0	10000	0	0	0	0	0	0	0	0
2	1	10001	0	0	0	0	0	0	0	0
2	2	10010	0	0	0	0	0	0	0	0
2	3	10011	0	0	0	0	0	0	0	0
2	4	10100	0	0	0	0	0	0	0	0
2	5	10101	0	0	0	0	0	0	0	0
2	6	10110	1	0	1	1	1	0	0	1
2	7	10111	1	0	1	1	1	0	0	0
3	0	11000	1	0	1	1	0	1	1	1
3	1	11001	1	0	1	1	0	1	1	0
3	2	11010	1	0	1	1	0	1	0	1
3	3	11011	1	0	1	1	0	1	0	0
3	4	11100	1	0	1	1	0	0	1	1
3	5	11101	1	0	1	1	0	0	1	0
3	6	11110	1	0	1	1	0	0	0	1
3	7	11111	1	0	1	1	0	0	0	0



8-49

Part of Figure 8-27. A20 Time Base Assembly

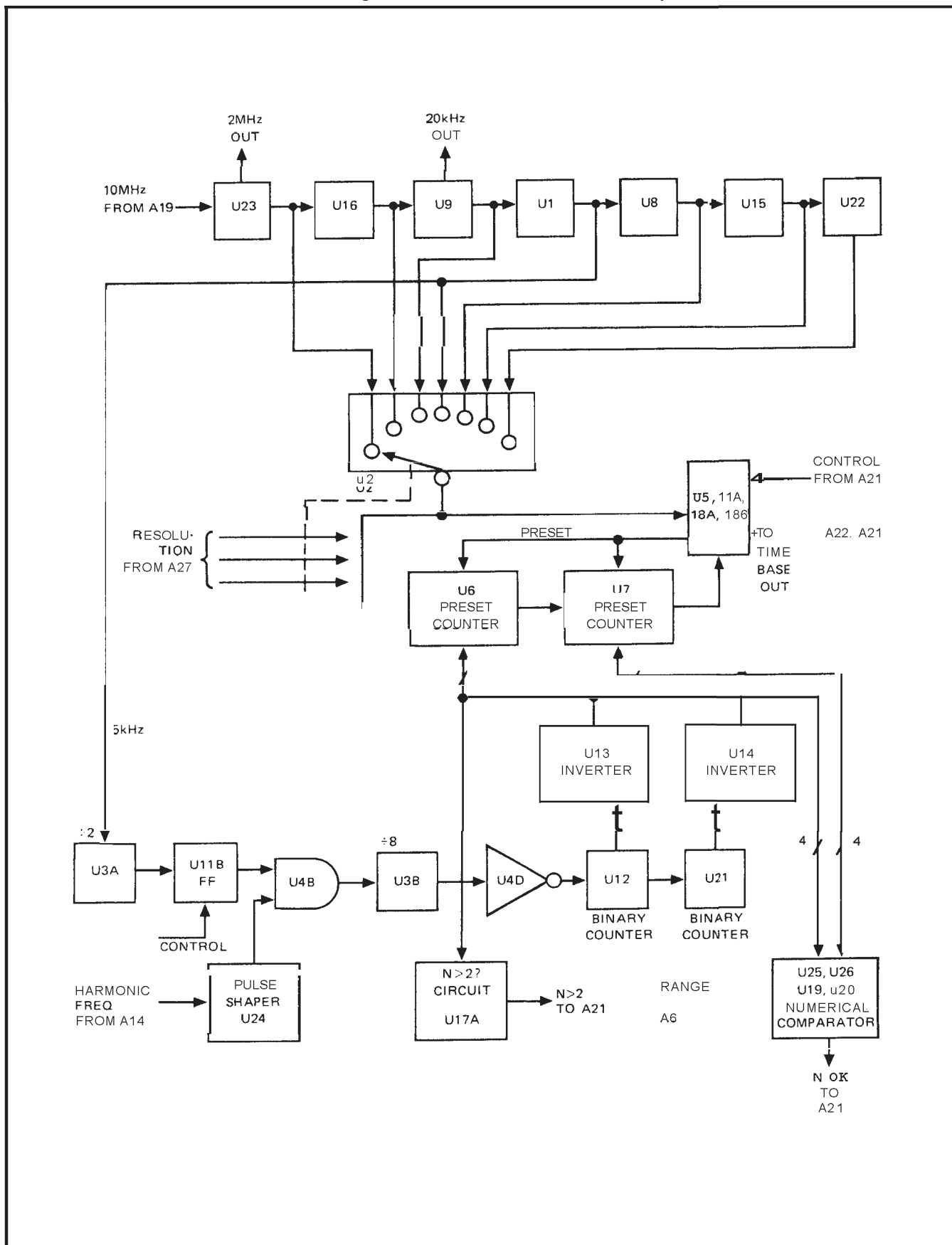


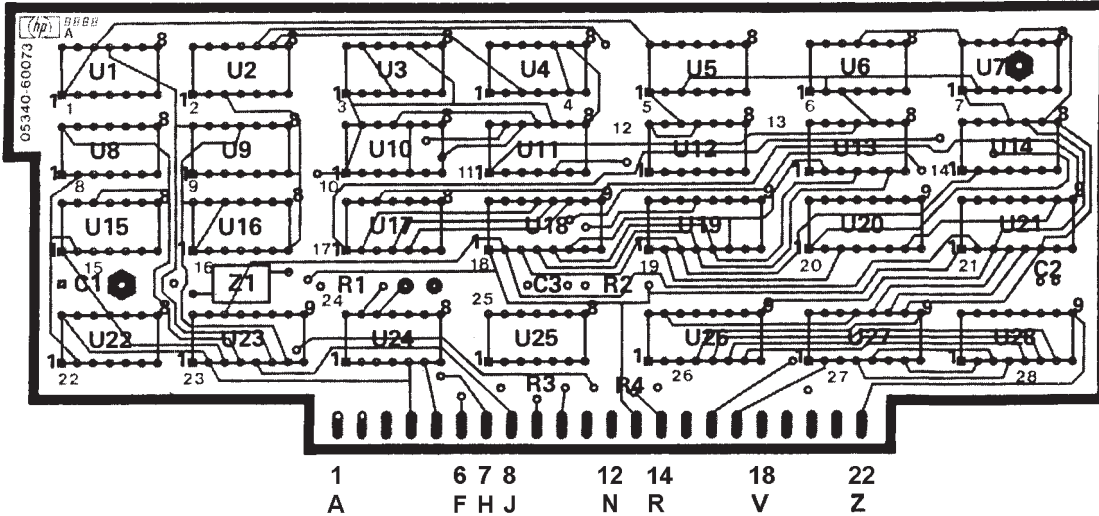
Waveforms taken with 101 oscilloscope probe. Counter controls set to CHECK, 1 Hz
RESOLUTION, SAMPLE RATE - fully ccw.

A20 Truth Table

RESOLUTION SWITCH SETTING	U23(13) BINARY WEIGHT = 4	U23(12) BINARY WEIGHT = 2	U23(11) BINARY WEIGHT = 1	EQUIVALENT INPUT	SELECTED SIGNAL
1	H	H	H	$4 + 2 + 1 = 7$	I ₇ 1 Hz pin 9
10	H	H	L	$4 + 2 = 6$	I ₆ 10 Hz pin 7
100	H	L	H	$4 + 1 = 5$	I ₅ 100 Hz pin 6
1K	H	L	L	4	I ₄ 1 kHz pin 5
10K	L	H	H	$2 + 1 = 3$	I ₃ 10 kHz pin 4
100K	L	H	L	2	I ₂ 100 kHz pin 3
1M	L	L	H	1	I ₁ 1 MHz pin 2

Part of Figure 8-27. A20 Time Base Assembly





ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
U1, 8, 9, 12, 15, 16, 22	1820-0055 SN7490N
U2, 4	1820-0054 SN7400N
U3, 10, 11	1820-0077 SN7474
U5, 6, 7	1820-0099 SN7493N
U13, 14	1820-0174 SN7404N
U17	1820-0069 SN7420N
U18, 21	1820-0716 SN74161N
U19, 20, 26, 27	1820-0904 93L24
U23	1820-0615 9312
U24	1820-1/47 SN5419
U25	1820-0261 SN74121N
U28	1820-0214 SN7442N

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;
INDUCTANCE IN MICROHENRIES
- ASTERISK (*) INDICATES SELECTED COMPONENT, AVERAGE VALUES SHOWN

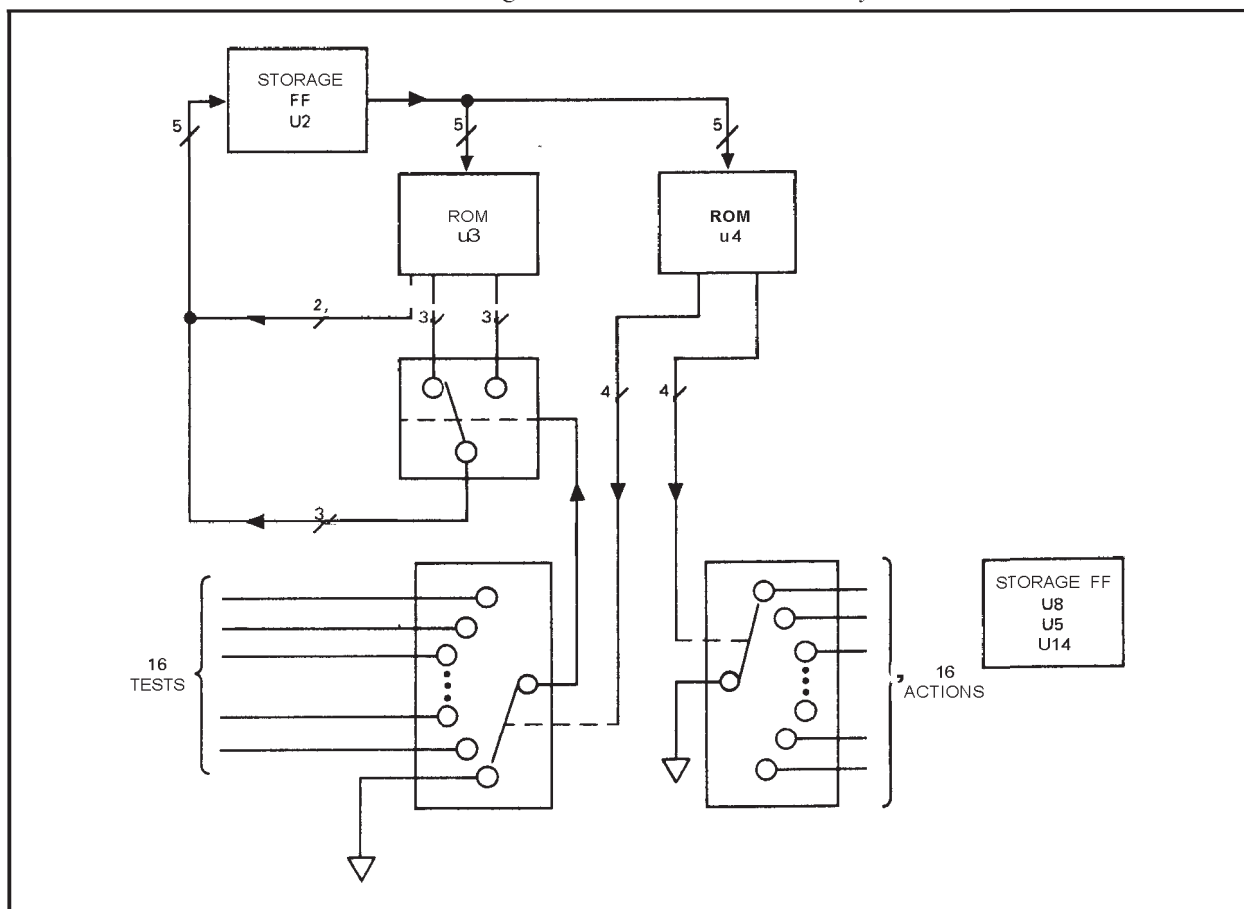
REFERENCE DESIGNATIONS

A20
C1-3
E1-3
U1-27
Z1

05340-D-19B



Part of Figure 8-28. A21 Control Assembly

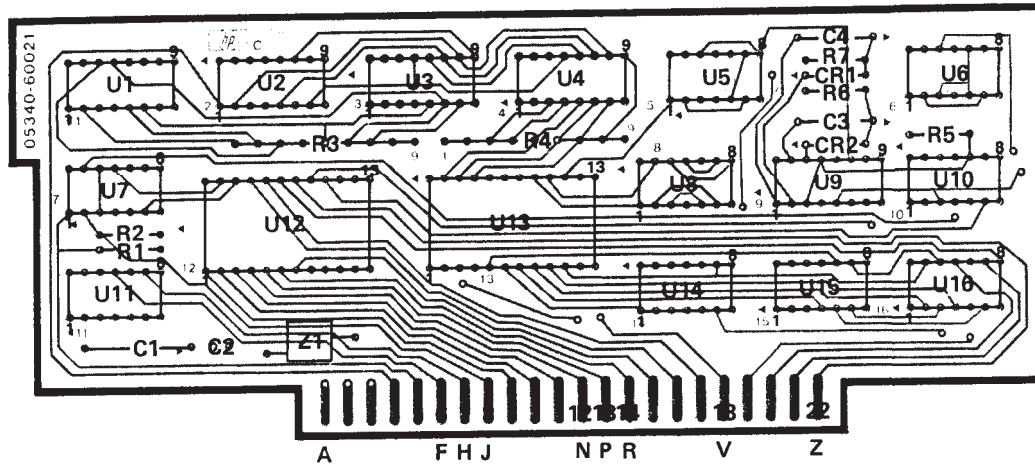


PRESENT-FUTURE ROM
U3 (1816-0003) Truth Table

ADDRESS PIN NO.	INPUTS					OUTPUTS							
	E	D	C	B	A	Y8	Y7	Y6	Y5	Y4	Y3	Y2	Y1
0	0	0	0	0	0	0	1	0	0	0	0	0	0
1	0	0	0	0	1	0	1	0	1	1	1	1	1
2	0	0	0	1	0	0	0	1	0	0	1	1	1
3	0	0	0	1	1	0	1	0	1	1	1	1	1
4	0	0	1	0	0	0	1	1	1	1	1	0	1
5	0	0	1	0	1	0	0	1	0	1	1	0	0
6	0	0	1	1	0	0	0	0	0	0	0	1	0
7	0	0	1	1	1	1	0	1	0	1	0	0	0
8	0	1	0	0	0	0	1	0	0	1	0	0	0
9	0	1	0	0	1	0	0	1	0	1	0	0	0
10	0	1	0	1	0	1	0	0	0	0	0	0	0
11	0	1	0	1	1	0	0	1	1	1	0	1	1
12	0	1	1	0	0	0	0	1	1	0	0	0	0
13	0	1	1	0	1	0	1	1	1	0	0	0	0
14	0	1	1	1	0	0	1	1	1	0	0	1	0
15	0	1	1	1	1	0	1	1	0	0	0	0	0
16	1	0	0	0	0	1	0	0	0	1	0	0	0
17	1	0	0	0	1	1	0	1	0	0	0	0	0
18	1	0	0	1	0	0	0	0	0	0	0	0	0
19	1	0	0	1	1	0	0	0	0	0	0	0	0
20	1	0	1	0	0	1	1	1	1	1	0	0	0
21	1	0	1	0	1	1	0	1	0	1	1	1	1
22	1	0	1	1	0	0	0	0	0	0	0	0	0
23	1	0	1	1	1	0	0	0	0	0	0	0	1
24	1	1	0	0	0	1	1	0	0	0	0	1	0
25	1	1	0	0	1	1	1	1	0	1	0	0	1
26	1	1	0	1	0	0	1	0	1	1	0	0	1
27	1	1	0	1	1	0	0	0	0	0	0	0	0
28	1	1	1	0	0	1	1	1	1	0	1	0	0
29	1	1	1	0	1	1	1	1	0	0	1	0	1
30	1	1	1	1	0	1	1	0	0	0	0	1	1
31	1	1	1	1	1	1	1	1	1	0	1	1	1
	DESTINATION					U1 "1" INPUTS				U1 "0" INPUTS			
						U2 "D" INPUTS							

ACTION-TEST ROM
U4 (1816-0004) Truth Table

ADDRESS PIN NO.	INPUTS					OUTPUTS							
	E	D	C	B	A	Y8	Y7	Y6	Y5	Y4	Y3	Y2	Y1
0	0	0	0	0	0	0	1	1	1	1	0	0	1
1	0	0	0	0	1	0	0	0	0	1	1	1	0
2	0	0	0	1	0	1	0	1	1	1	1	1	0
3	0	0	0	1	1	1	0	0	1	1	1	0	0
4	0	0	1	0	0	1	0	0	1	1	1	0	0
5	0	0	1	0	1	1	0	1	1	1	1	1	0
6	0	0	1	1	0	0	0	1	1	1	0	1	1
7	0	0	1	1	1	0	0	1	0	0	0	0	0
8	0	1	0	0	0	1	0	0	1	0	0	0	0
9	0	1	0	0	1	1	0	0	0	0	0	0	0
10	0	1	0	1	0	1	0	0	1	0	0	0	0
11	0	1	0	1	1	0	0	0	0	1	1	0	1
12	0	1	1	0	0	0	1	1	1	0	0	0	0
13	0	1	1	0	1	0	0	0	1	0	0	0	0
14	0	1	1	1	0	0	1	0	0	1	1	1	1
15	0	1	1	1	1	0	1	1	1	0	0	0	0
16	1	0	0	0	0	1	1	1	1	0	1	0	0
17	1	0	0	0	1	1	0	0	1	0	0	0	0
18	1	0	0	1	0	0	0	0	0	1	0	0	0
19	1	0	0	1	1	0	0	0	0	0	0	0	0
20	1	0	1	0	0	1	0	1	0	0	0	0	0
21	1	0	1	0	1	1	1	1	0	1	0	1	0
22	1	0	1	1	0	0	0	0	0	0	0	0	0
23	1	0	1	1	1	1	0	0	1	0	1	1	1
24	1	1	0	0	0	1	1	0	1	0	0	0	1
25	1	1	0	0	1	1	1	0	1	0	1	0	1
26	1	1	0	1	0	0	0	0	1	1	1	0	0
27	1	1	0	1	1	0	0	0	0	0	0	0	0
28	1	1	1	0	0	1	1	0	0	1	0	1	0
29	1	1	1	0	1	1	0	0	1	0	0	1	1
30	1	1	1	1	0	1	0	0	1	0	1	1	0
31	1	1	1	1	1	0	0	0	0	0	1	0	1
	DESTINATION					U13 ADDRESS				U12 ADDRESS			



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.

REFERENCE DESIGNATIONS

A21
C1-4 CR1,2 R1-7 U1-16 Z1

ACTIVE ELEMENTS

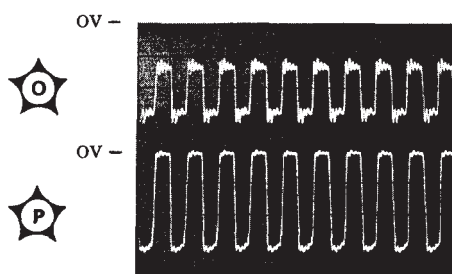
REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1,2	1901-0040
U1	1820-0616 9322
U2	1820-0788 SN55431
U3	1816-0003
U4	1816-0004
U5,6,7,8,14,15	1820-0054 SN7400N
U9	1820-0315 9602
U10	1820-0077 SN7474N
U11	1820-0174 SN7404N
U12	1820-0640 SN74150N
U13	1820-0495 SN74154N
U16	1820-0068 SN7410N

5340-D-36



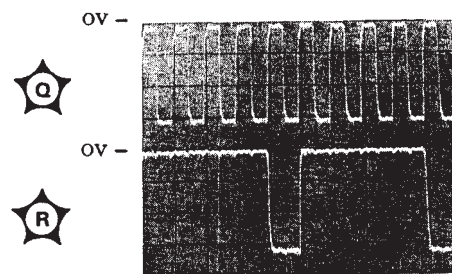
8-55

Part of Figure 8-29. A22 High Frequency Counter Assembly



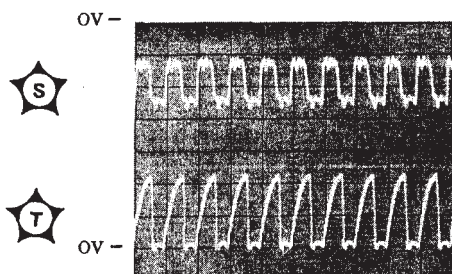
☆ A22U8(6) .005 V/cm dc, .1 μ s/div

☆ A22U2(5) .02 V/cm dc, .1 μ s/div



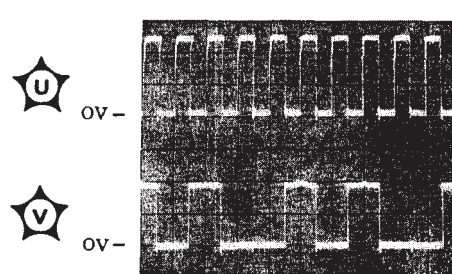
☆ A22U2(6) .02 V/cm, .2 μ s/div*

☆ A22U2(2) .02 V/cm dc, .2 μ s/div*



☆ A22U1(13) .05 V/cm dc, .2 μ s/div*

☆ A22U1(15) .2 V/cm dc, .2 μ s/div*



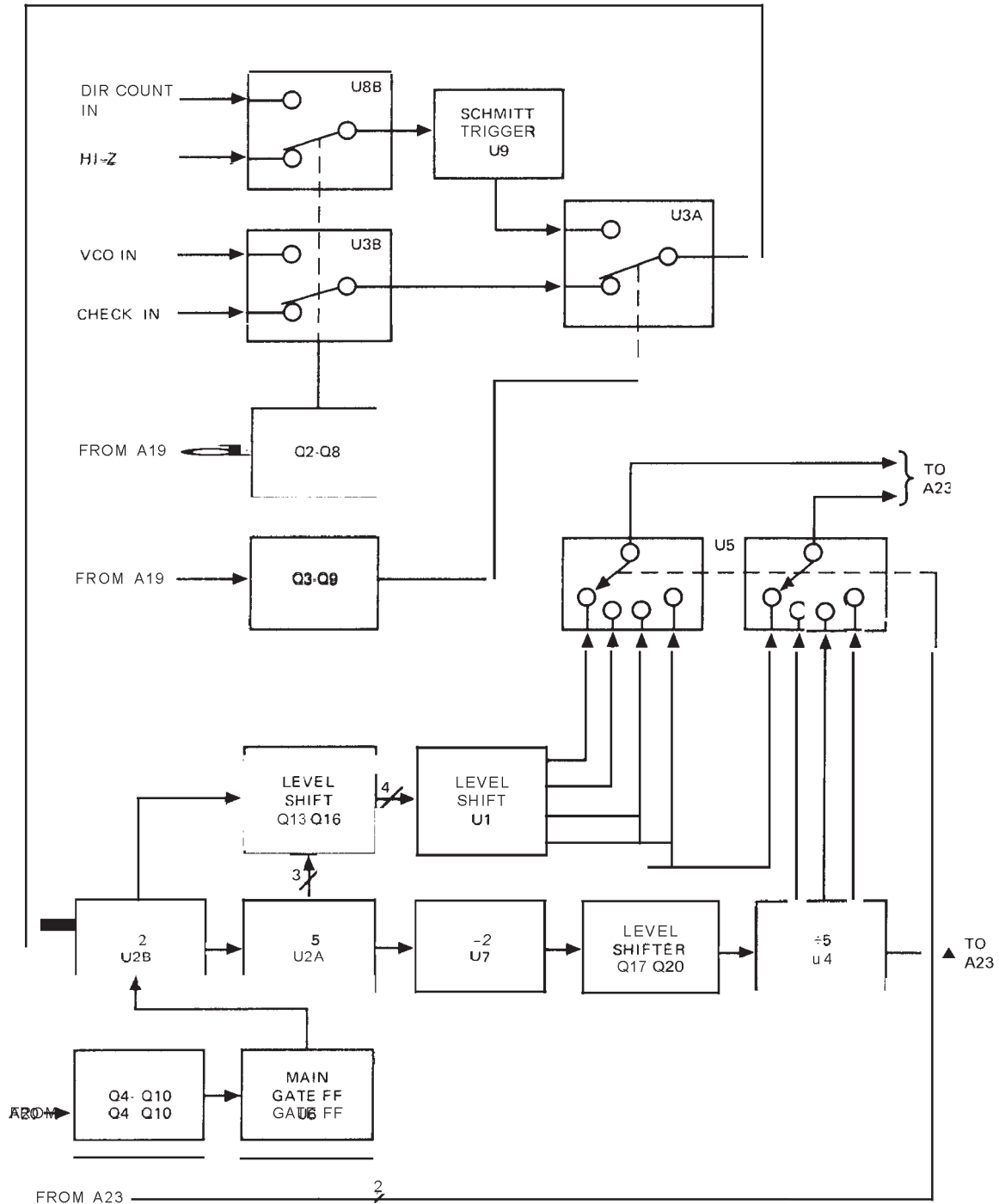
☆ A22U4(6) .2 V/cm dc, 2 μ s/div*

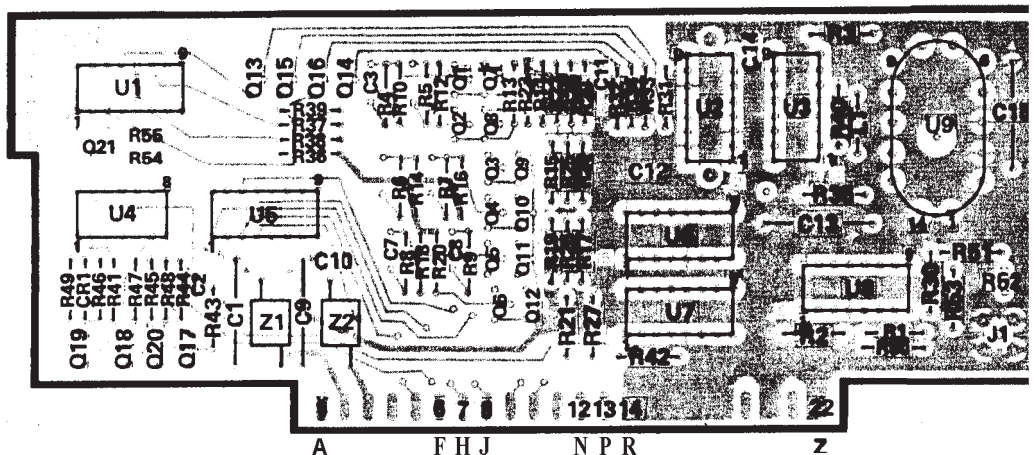
☆ A22U4(9) .2 V/cm dc, 2 μ s/div*

Waveforms taken with 1 MHz oscillator connected to J4 (10 Hz to 250 MHz input). Use 101 oscilloscope probes. Oscilloscope sync set to INT, SLOPE to +, and DISPLAY to ALT. Set Counter RESOLUTION switch to 1 Hz, SAMPLE RATE fully ccw. RANGE to 10 Hz to 250 MHz.

*Display is present for 1 sec while main gate is open.

Part of Figure 8-29. A22 High Frequency Counter Assembly





REFERENCE DESIGNATIONS

A22
C1-C3, C7-15
CR1
J1
L1
Q1-20
R1-53
U1-9
Z1, 2

C4-C6 DELETED

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

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	PART NUMBERS
CR1	1901-0535
Q1-17, 21	1854-0071
Q18, 20	1854-0092 2N3563
Q19	1854-0009 2N709
U1	1820-0275 MC1039P
U2	1820-1019
U3, 8	1820-0560
U4	1820-0751 5N74/96N
U5	1820-0610 9309
U6, 7	1820-0557
U9	5086-7089

5340-D-21

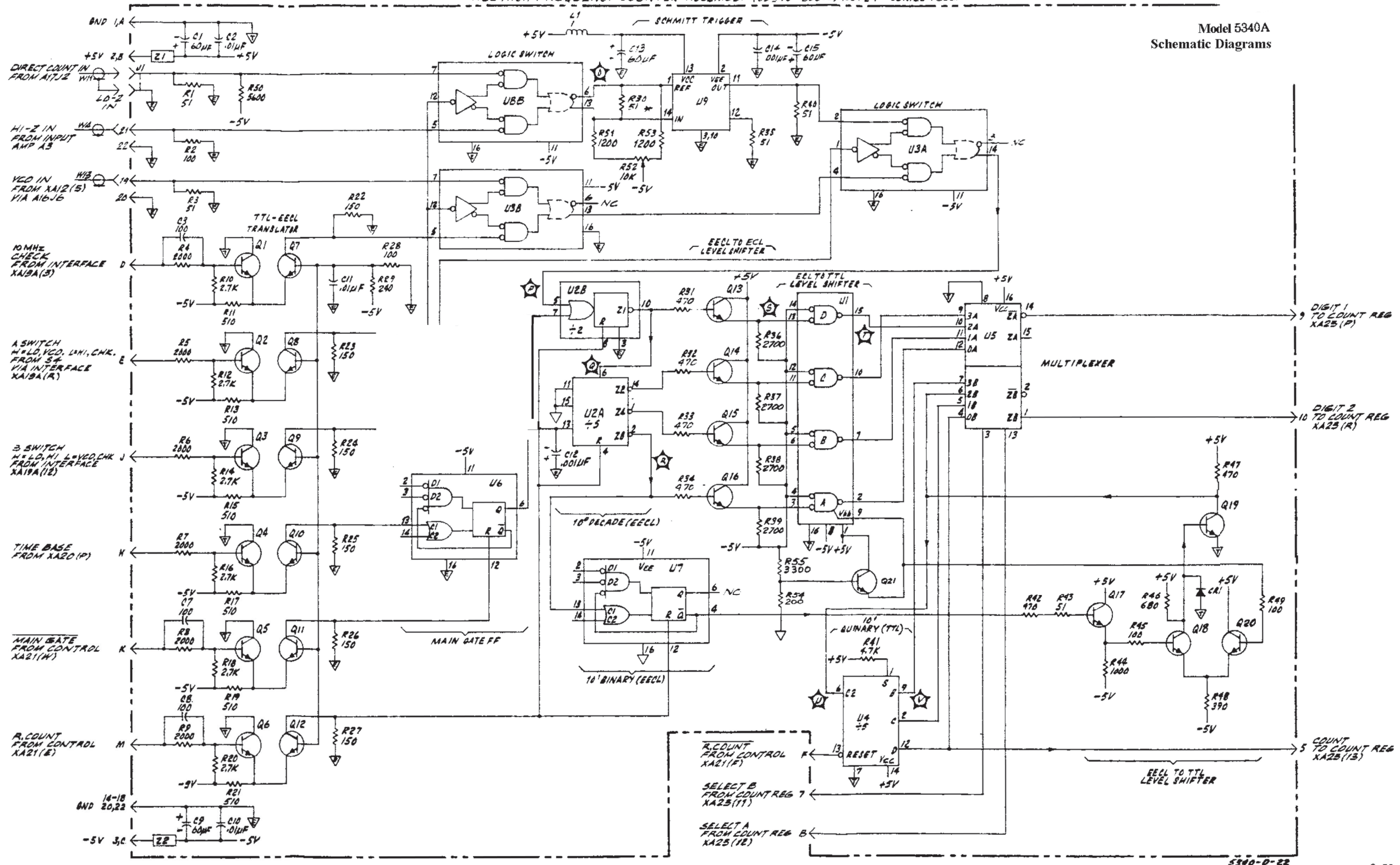
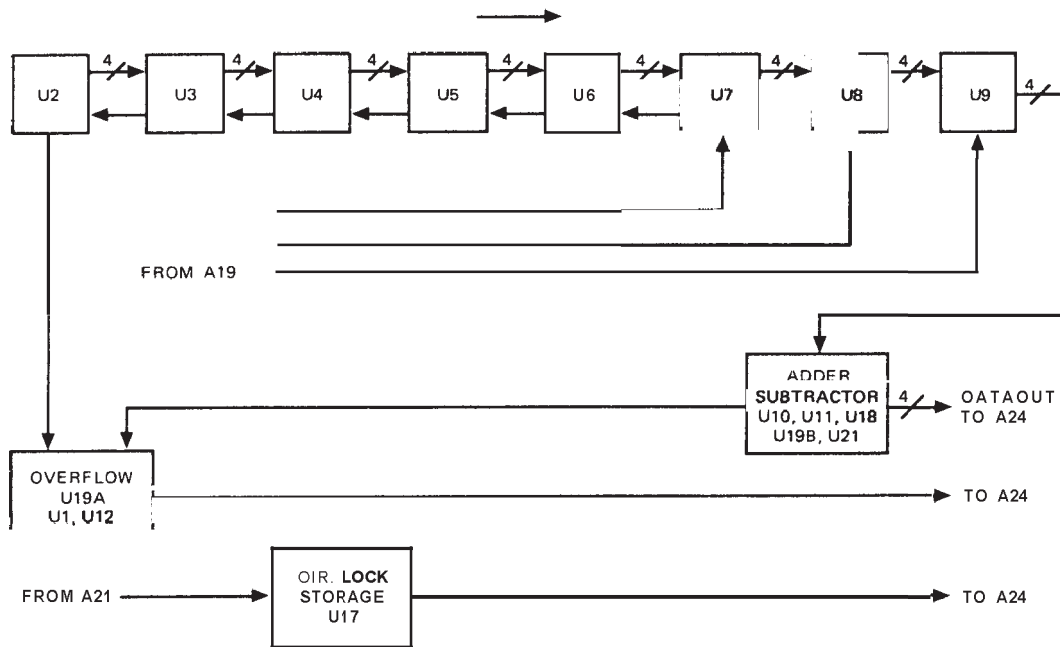
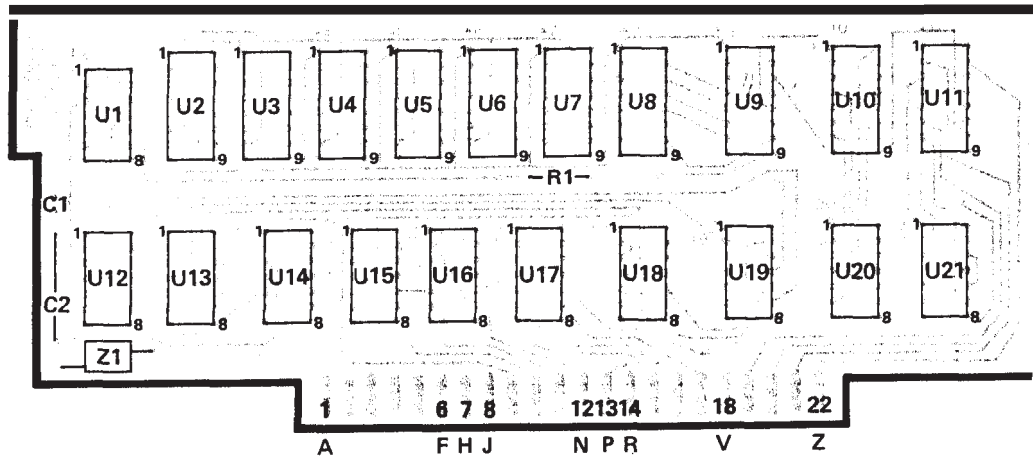


Figure 8-29. A22 High Frequency Counter Assembly

Part of Figure 8-30. A23 Count Register Assembly





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.

REFERENCE DESIGNATIONS

NO PREFIX	A23
	C1, 2
R3	R1
	U1-21
	Z1

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	H.P. PART NUMBERS
U1	1820-0596 DM74L74N
U2-7	1820-0986 86L75
U8, 9	1820-0659 5417145
U10, 11	1820-0910 5N74LS83N
U12	1820-0583 DM74L00N
U13	1820-0588 DM74L20N
U14, 15, 18	1820-0054 5N7400N
U16, 17, 19	1820-0077 5N7474N
U20	1820-0282 5N7486N
U21	1820-0068 5N7410N

5340-P-3E

A23 COUNT REGISTER ASSEMBLY (05340-60030)(NOTE 1) SERIES 1220A

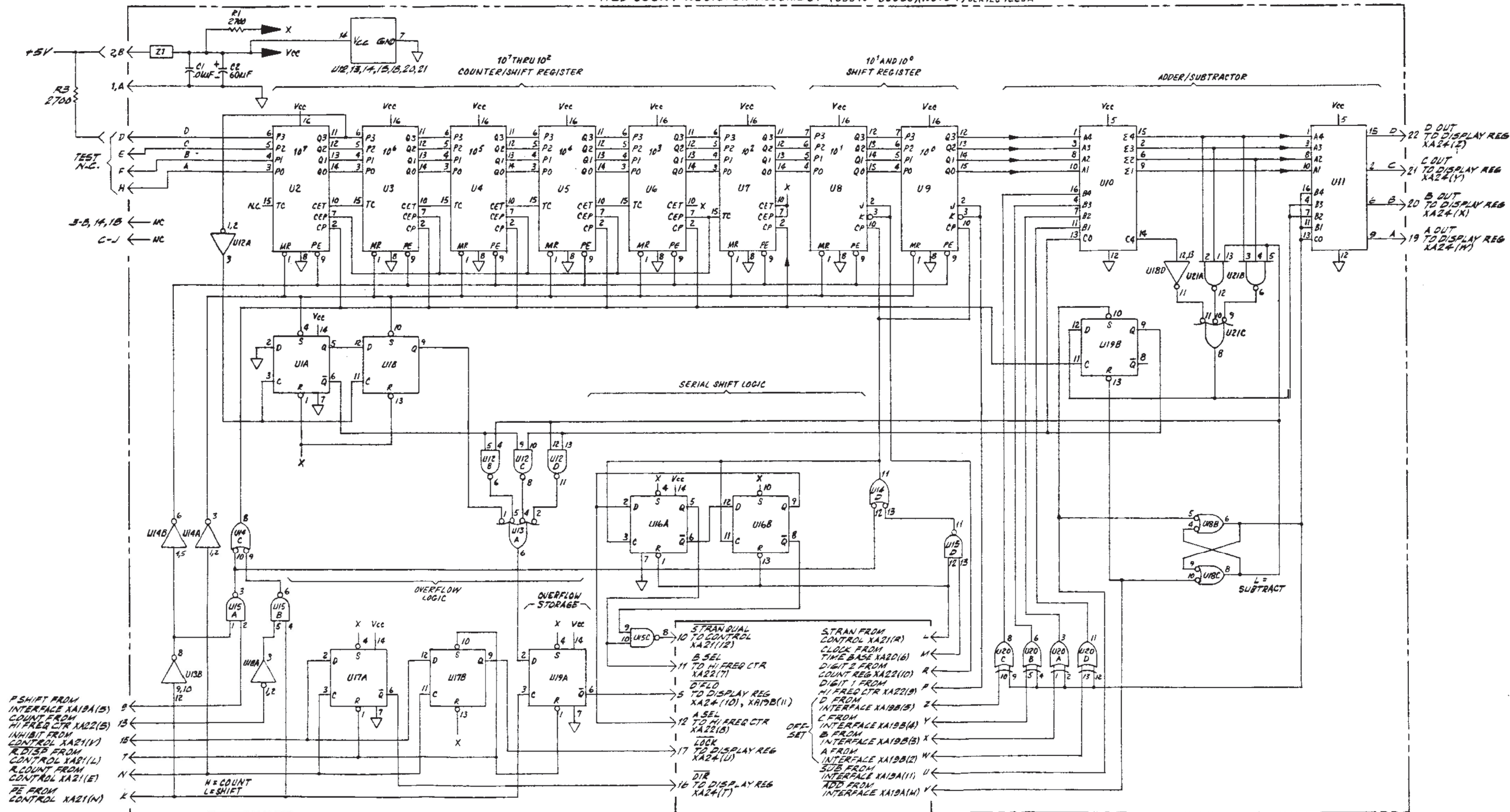
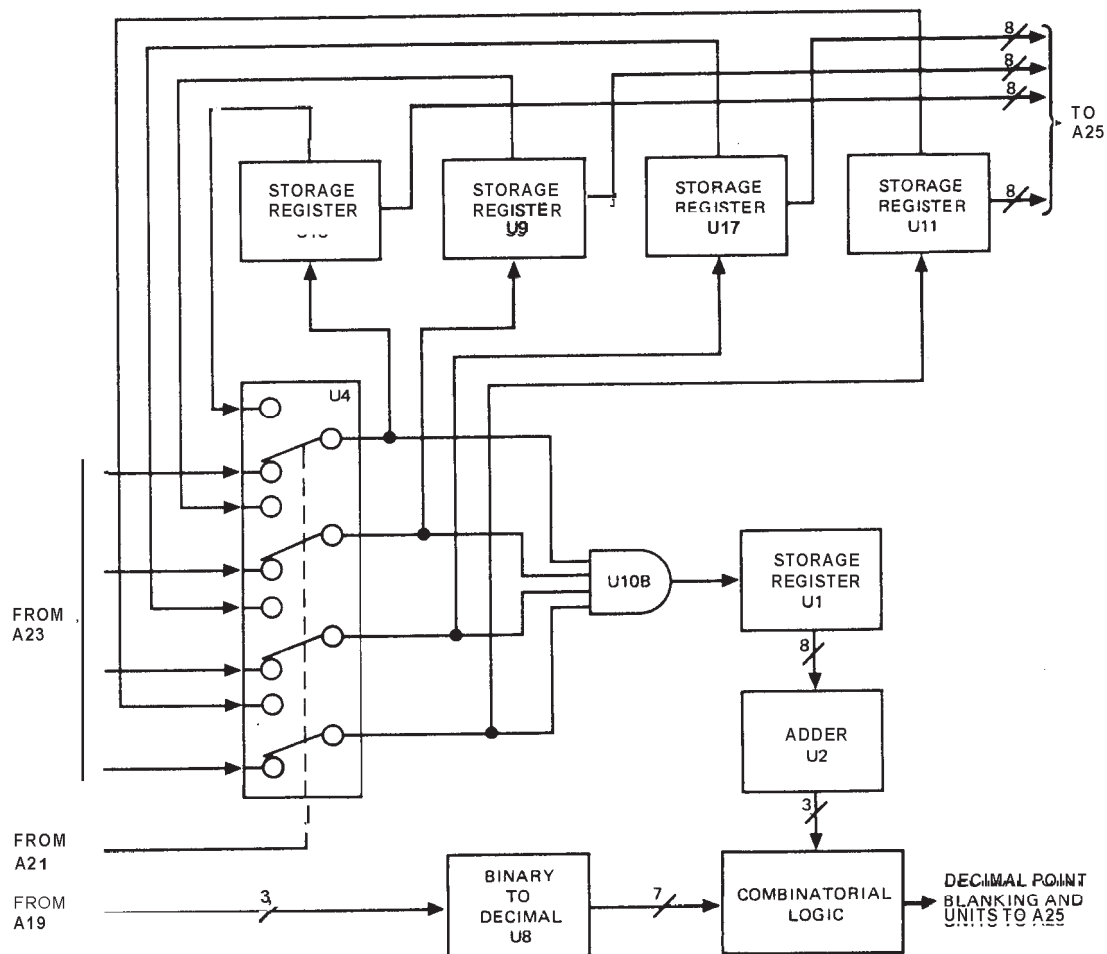


Figure 8-30. A23 Count Register Assembly

Part of Figure 8-31. A24 Display Register Assembly



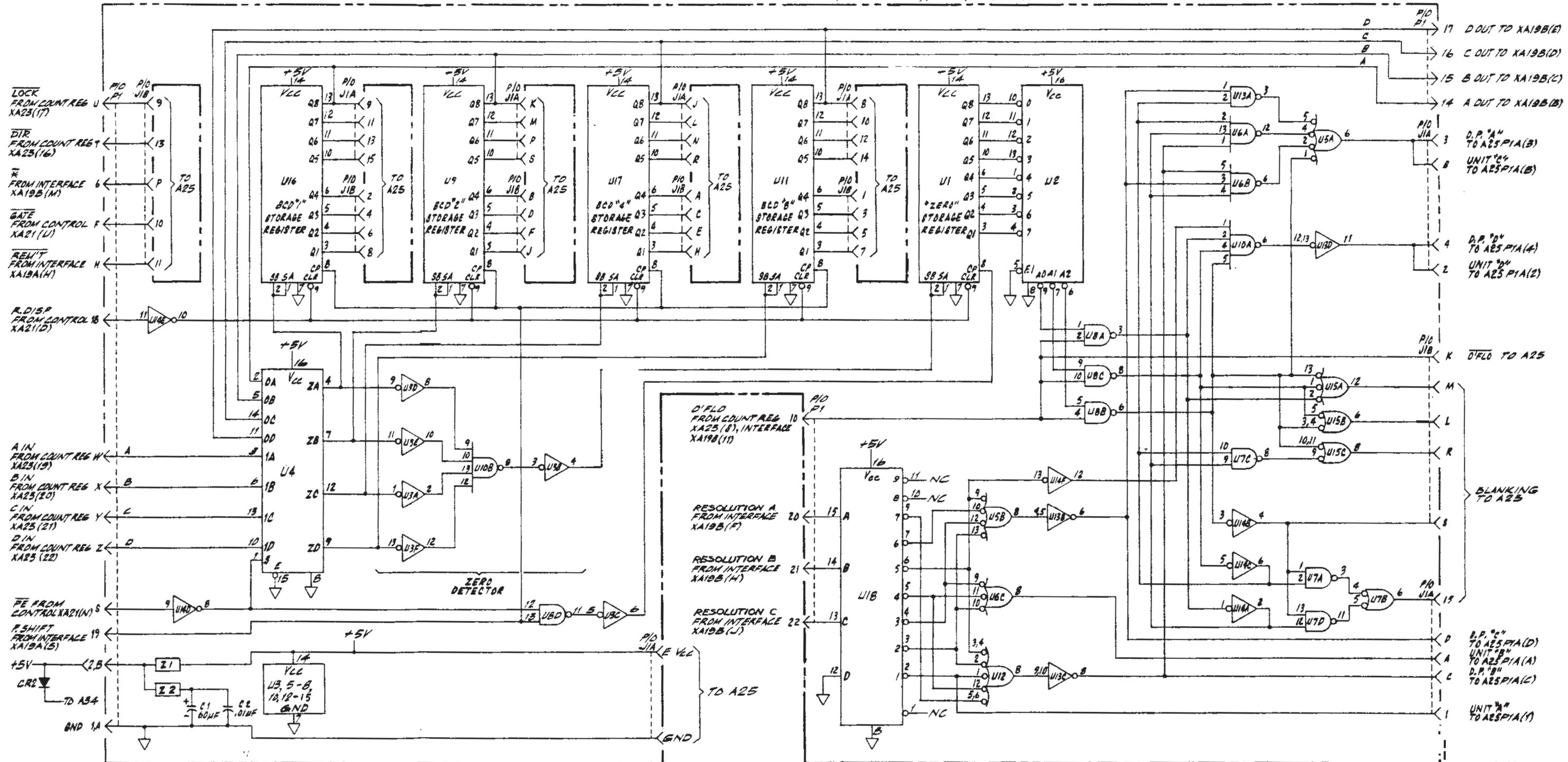
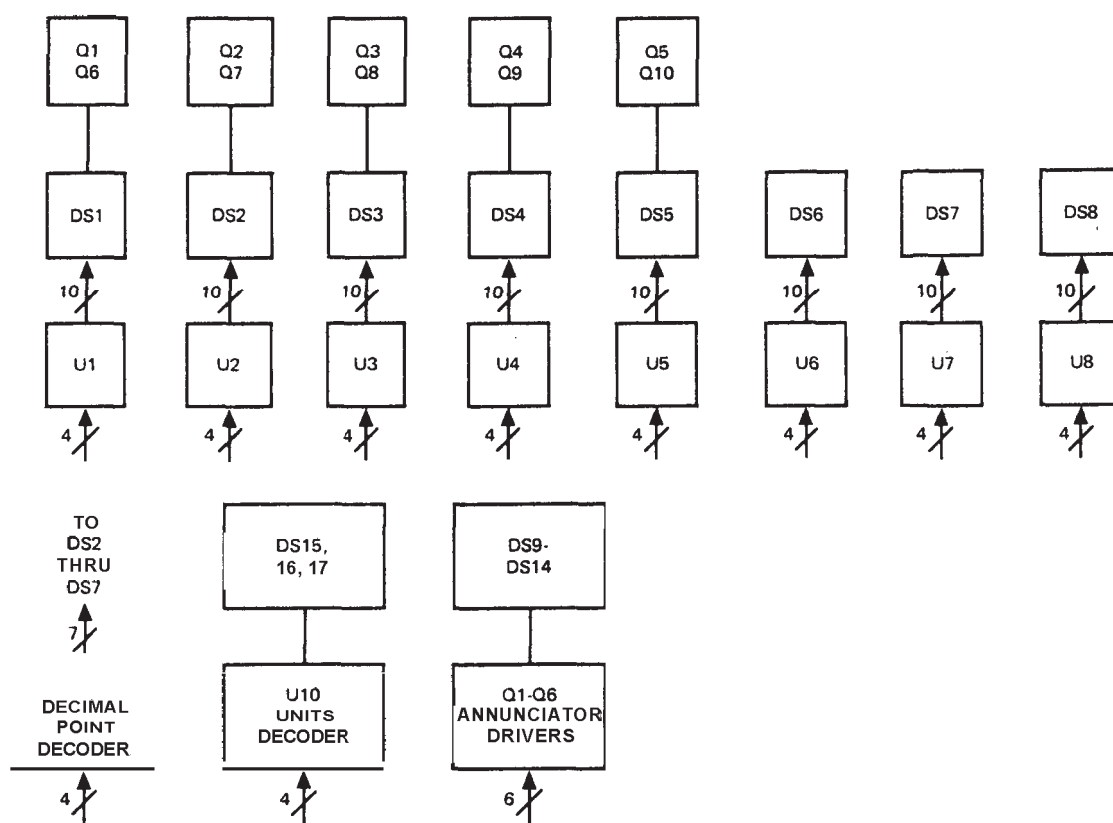
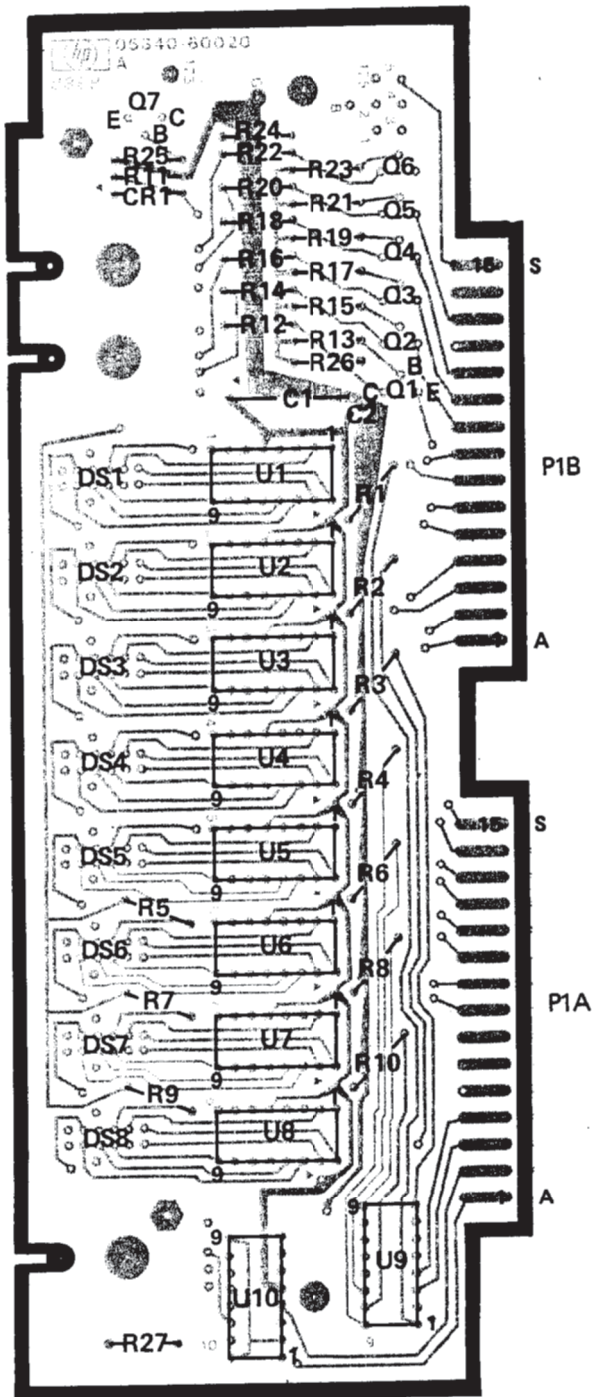


Figure 8-31. A24 Display Register Assembly

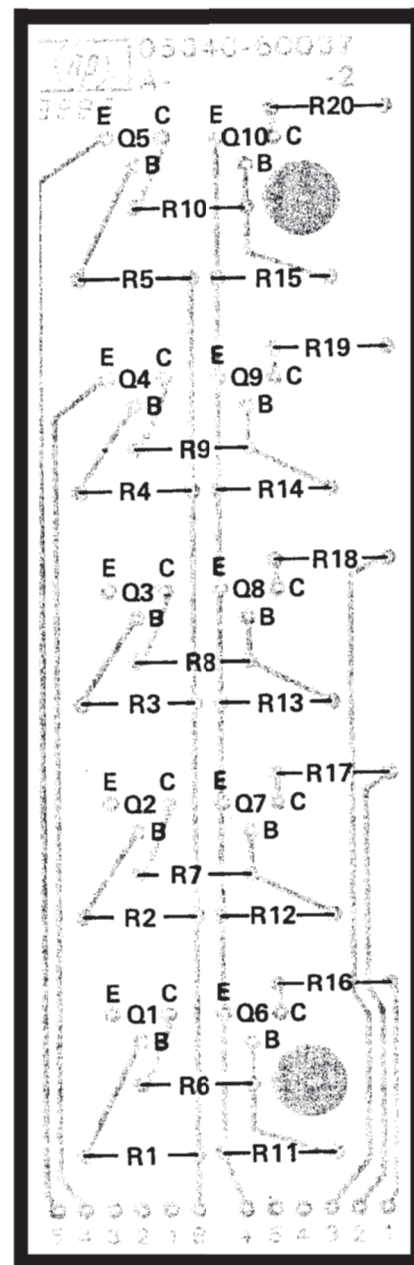
Part of Figure 8-32. A25 Display Assembly, A26 Blanking Assembly



A25



A26



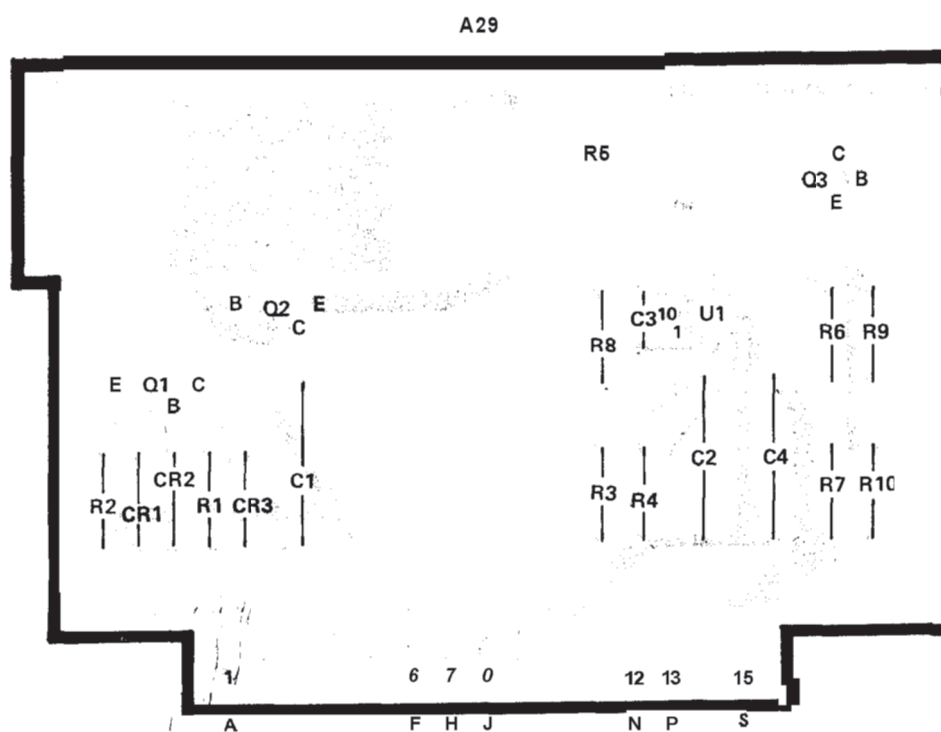
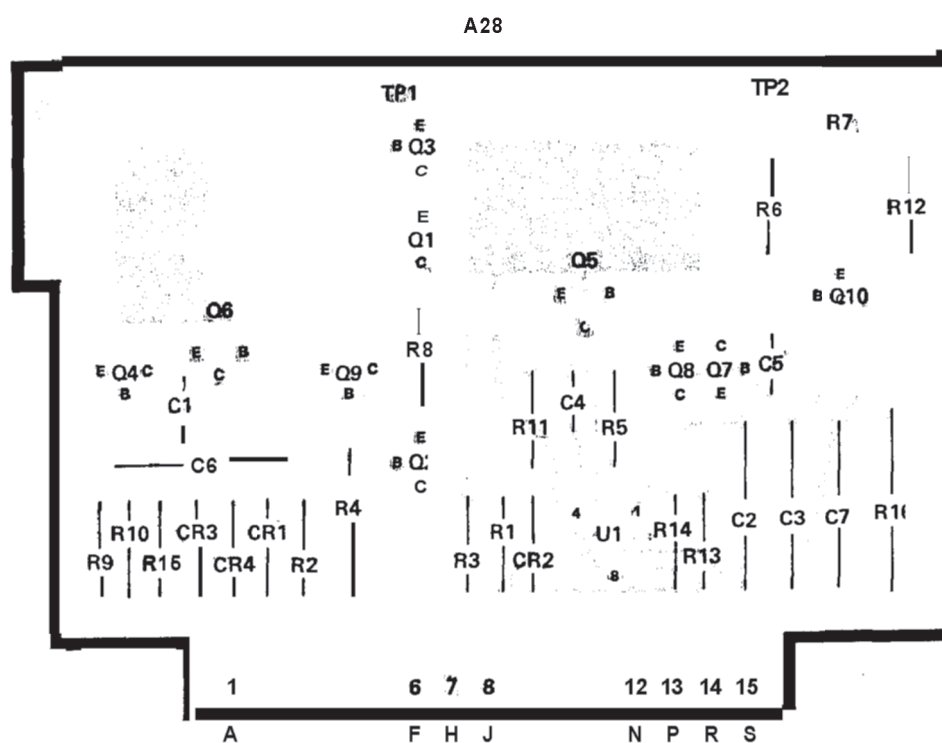
Part of Figure 8-33. A28, A29, and A30

A28 05340-60022 Typical Voltages

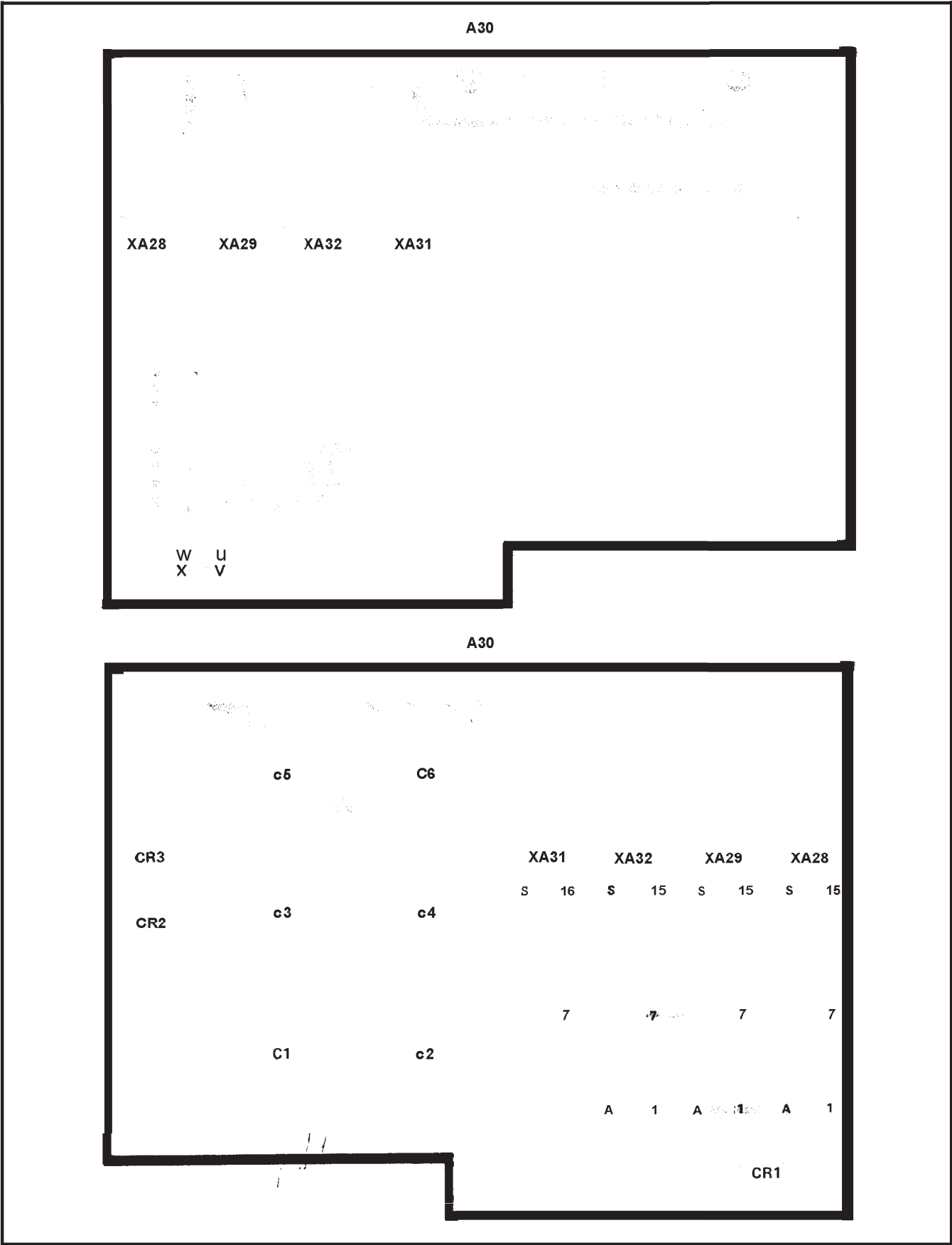
	Emitter			Base			Collector		
Q2	164.8			162			134.70		
Q4	135			134.70			167		
Q6	133.25			135			167		
Q9	133.05			133.36			134.70		
-15 Volt Power Supply									
	Emitter			Base			Collector		
Q1	-23.7			-23.0			-22.36		
Q3	-23.0			-22.36			-18.87		
Q5	-18.24			-18.87			-23.7		
Q7	-15.82			-16.53			-17.53		
Q8	-15.12			-15.49			-16.53		
Q10	-18.26			-17.53			-15.82		
U1	1 -7.53	2 -15.91	3 -18.25	4 -15.92	5 -18.25	6 -17.89	7 -16.55	8 -15.12	9 0
XA28(14,R)		-15.19							
TP1		-18.24							
TP2		-15.12							

	Emitter			Base			Collector		
Q1	22.8			22.16			18.92		
Q2	18.27			18.90			23.57		
Q3	15.52			16.23			18.31		
U1	1 15.16	2 7.16	3 7.17	4 7.18	5 0	6 16.23	7 18.31	8 18.31	9 17.40
XA29(14,R,15,S)		15.16							
TP1		18.31							
TP2		15.158							

Part of Figure 8-33. A28, A29, and A30



Part of Figure 8-33. A28, A29, and A30



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 PICO FARADS;
INDUCTANCE IN MICROHENRIES
3. S1 CONNECTED TO S6 VIA W1
4. THE +175V POWER SUPPLY WILL READ APPROX. 135V_{rms} ON MANY VOLTMETERS DUE TO ITS HIGH RIPPLE.
5. ASTERISK (*) INDICATES SELECTED COMPONENT, AVERAGE VALUE SHOWN.

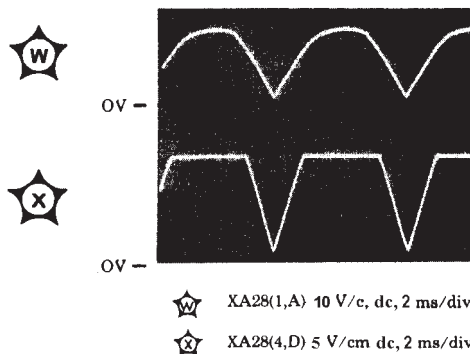
REFERENCE DESIGNATIONS

NO PREFIX	A28	A29	A30
B1	C1-7	C1-4	C1-6
C1	CR1-4	CR1-3	CR1-3
CR4	Q1-10	Q1-3	XA28,29
F1	R1-16	R1-10	
J6	TP1, 2	U1	
S1,6	U1		
T1			
TH1			

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
NO PREFIX	
CR4	1906-0038
Q1	1854-0072
	2N3054
Q2	1854-0063
	2N3055
A28	
CR1	1902-0049
CR2	1902-3234
CR3	1902-3428
CR4	1902-3399
Q1,3	1854-0071
Q2	1853-0240
Q4	1854-0232
Q5	1853-0254
Q6	1854-0330
Q7,8	1853-0020
Q9	1854-0533
Q10	1854-0039
	2N3055
U1	1826-0016
	LM204H
A29	
CR1,2	1901-0040
CR3	1902-3234
Q1	1853-0020
Q2	1854-0420
Q3	1854-0039
U1	1826-0010
A30	
CR1,2,3	1906-0027

5340-D-27



Waveforms taken with 101 divider probe, oscilloscope sync set to ac INT, SLOPE, to +, and DISPLAY to CHOP

Part of Figure 8-34. A30, A31, and A32

A31 05340-60024 Typical Voltages

-5 Volt RF Power Supply

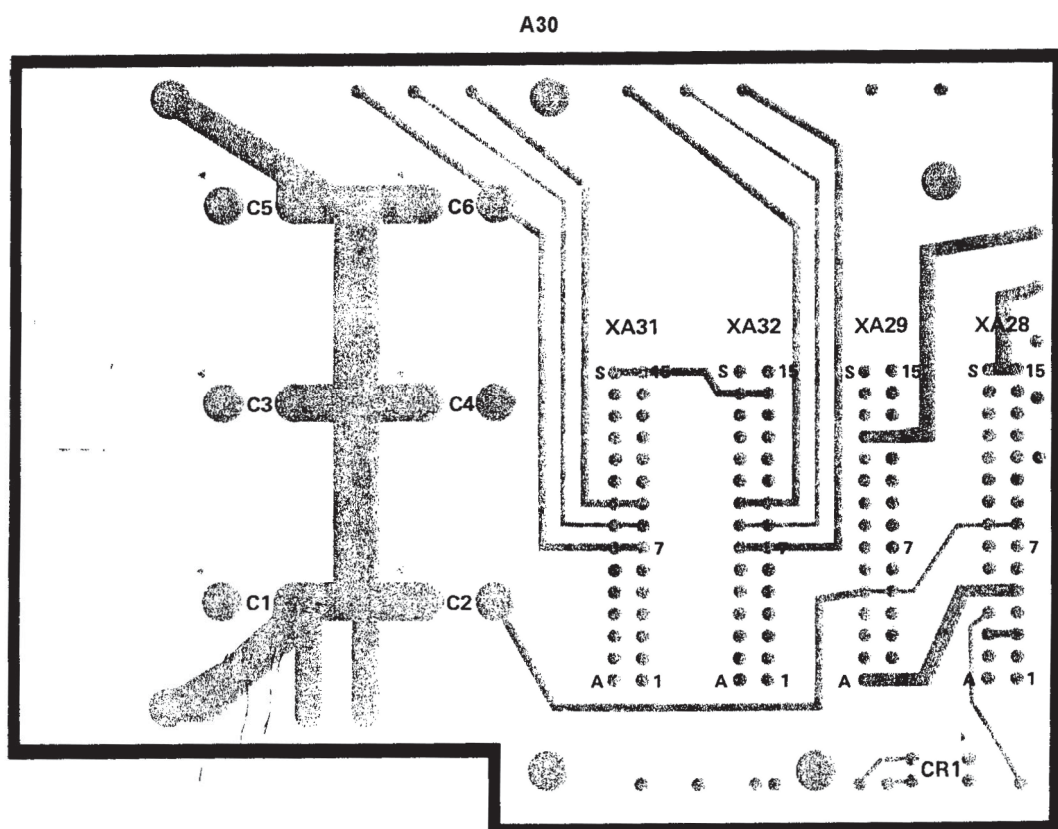
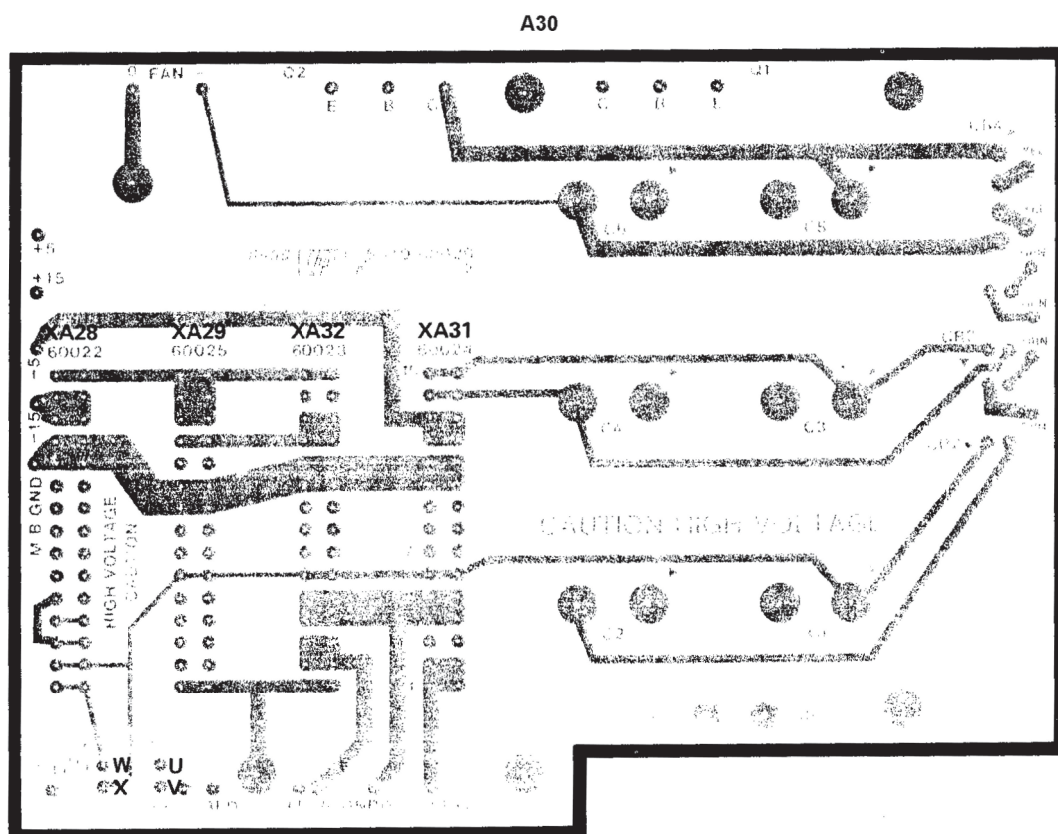
	Emitter			Base			Collector		
Q1	-15.95			-15.38			-14.76		
Q2	-15.38			-14.76			-8.74		
Q3	-8.10			-8.74			-15.95		
Q4	-5.52			-6.22			-7.39		
Q5	-5.02			-5.52			-6.22		
Q8	-8.10			-7.39			-5.52		
U1	1 -2.50	2 -5.76	3 -8.10	4 -5.92	5 -8.11	6 -7.93	7 -6.22	8 -5.03	9 0

-5 Volt Digital Power Supply

	Emitter			Base			Collector		
Q6	-5.87			-6.63			-11.23		
Q7	-5.01			-5.30			-6.63		
U1	1 -2.49	2 -9.63	3 -11.96	4 -9.78	5 -11.96	6 -11.77	7 -6.63	8 -5.01	9 0
TP3	-5.01								
XA31(9,K)	-5.88								
XA31(8,J)	-11.23								
XA31(7,H)	-11.91								
XA33(1,A)	-5.08								

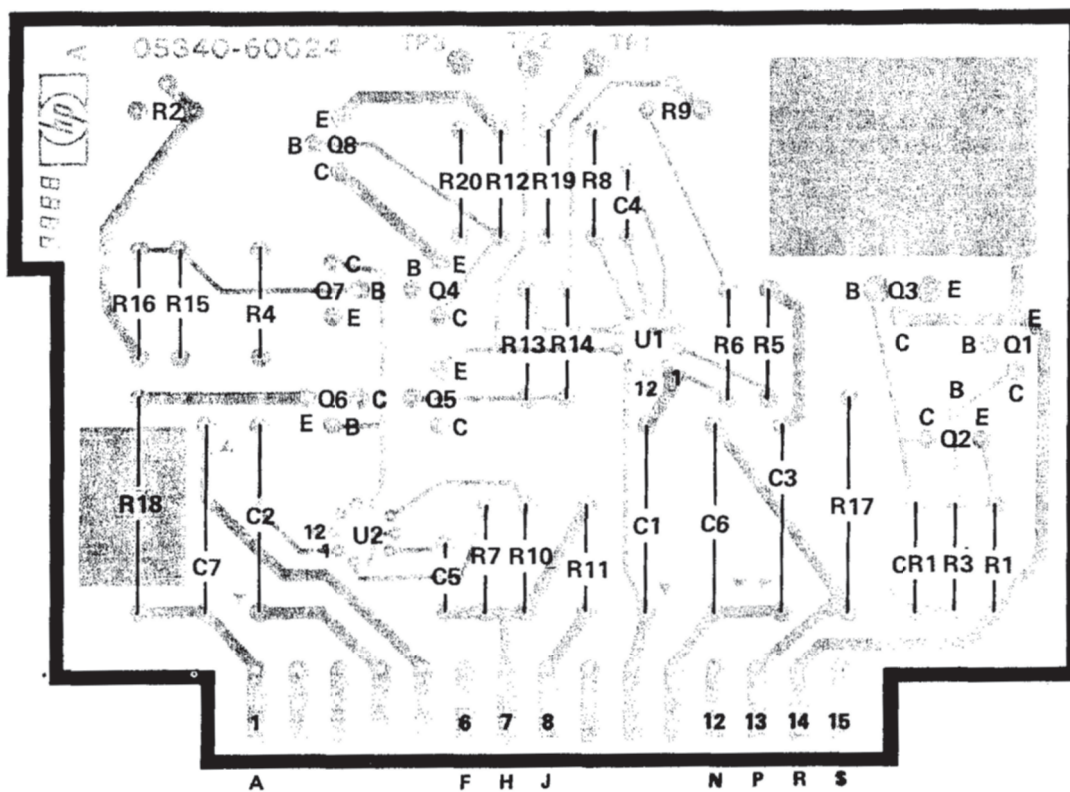
	Emitter				Base				Collector		
Q1	14.75				14.11				10.73		
Q2	9.59				10.73				15.27		
Q5	5.36				5.99				9.54		
U1	1 5.10	2 5.04	3 5.04	4 7.05	5 0	6 5.99	7 9.54	8 15.15	9 7.13	10 5.56	
TP1 XA32(13,P)		5.04 5.06									
+5 Volt Digital Power Supply											
	Emitter				Base				Collector		
Q3	10.97				10.33				6.44		
Q4	5.23				5.53				6.53		
u2	1 5.23	2 5.03	3 5.04	4 7.03	5 0	6 5.53	7 10.33	8 23.6	9 6.53	10 5.60	
TP2 XA32(2,B) XA32(7,H) XA32(8,J) XA32(9,K)		5.03 5.24 5.55 6.45 10.97									

Part of Figure 8-34. A30, A31, and A32

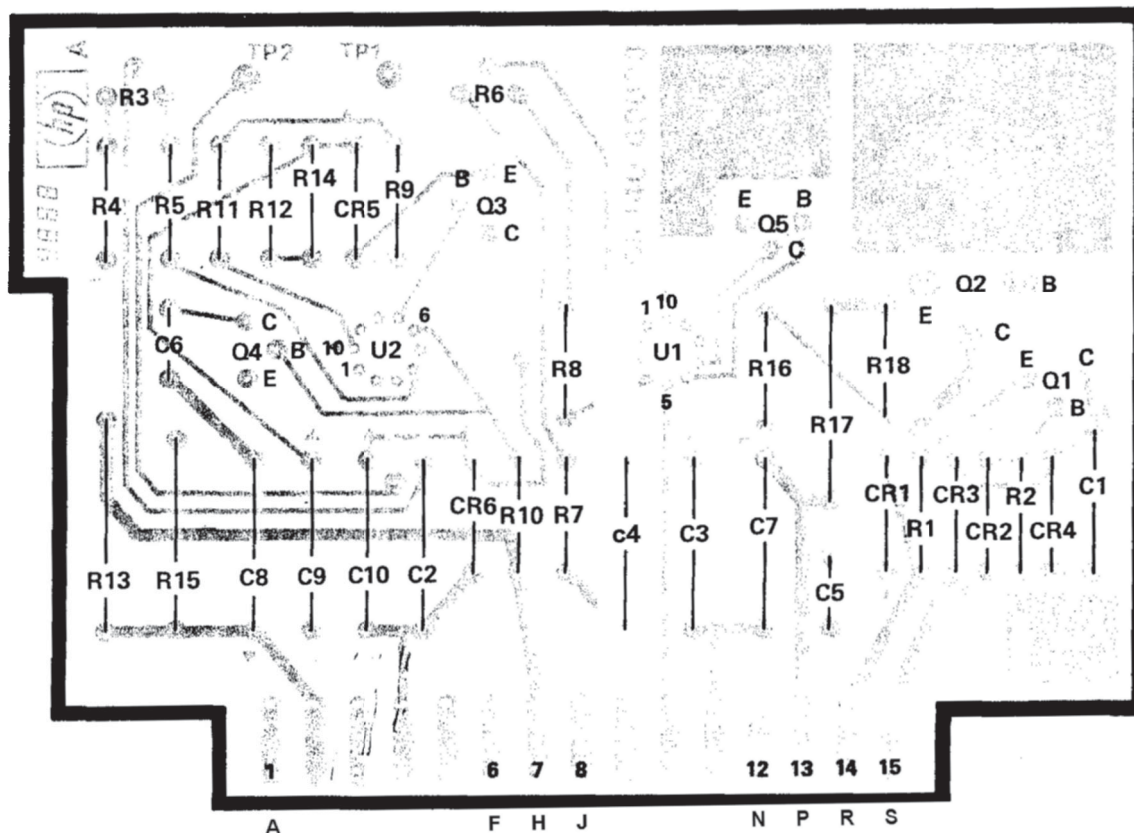


Part of Figure 8-34. A30, A31, and A32

A31



A32



NOTES

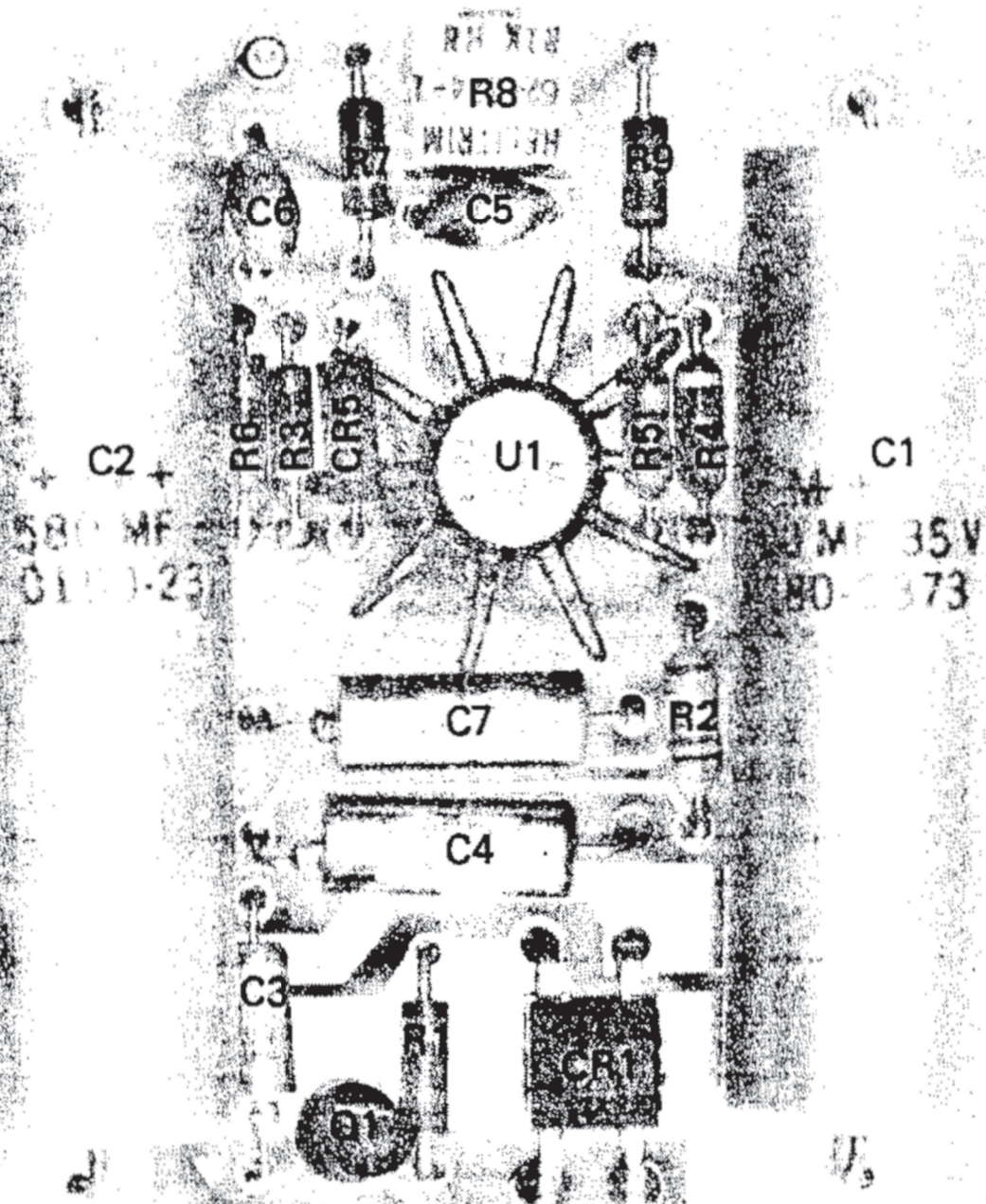
1. REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADO ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
2. UNLESS OTHERWISE INDICATED:
RESISTANCE IN OHMS;
CAPACITANCE IN PICO FARADS,
INDUCTANCE IN MICROHENRIES
3. S1 CONNECTED TO S6 VIA W1
4. ASTERISK (*) INDICATES SELECTED COMPONENT, AVERAGE VALUE SHOWN.

NO PREFIX	A30	A31	A32
B1	C1-6	C1-7	C1-10
C1	CR1-3	CR1	CR1-6
CR4	XA31,32	Q1-B	Q1-5
F1		R1-20	R1-18
J6		TP1-3	U1, 2
Q1,2		U1, 2	
S1,6			
T1			
TH1			

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
NO PREFIX	
CR1	1906-0038
Q1	1854-0072
	2N3054
Q2	1854-0063
	2N3055
A30	
CR1,2,3	1906-0027
A31	
CR1	1902-3149
Q1,2	1854-0071
Q3	1853-0254
Q4,5,7	1853-0020
Q6	1853-0012
	2N2904A
QB	1854-0039
	2N3053
U1, 2	1826-0016
	LM204H
A32	
CR1,2,3,5	1901-0040
CR4	1902-3171
CR6	1902-3139
Q1	1853-0020
Q2	1854-0558
Q3	1853-0012
	2N2904A
Q4	1854-0071
Q5	1854-0300
U1, 2	1826-0010

5340-D-27



1

6

A

F

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

REFERENCE DESIGNATIONS

NO PREFIX	A33
	C1-7 CR1,5 Q1 R1-9 U1
T2	

CR2 THRU CR4 DELETED

ACTIVE ELEMENTS

REFERENCE DESIGNATIONS	HP PART NUMBERS
CR1	1901-0027
CR5	1902-3182
Q1	1854-0071
U1	1826-0010

5340-D-39

A33 OPTIONAL OSCILLATOR POWER SUPPLY (05340-60080)(NOTE 1) SERIES 144-0A

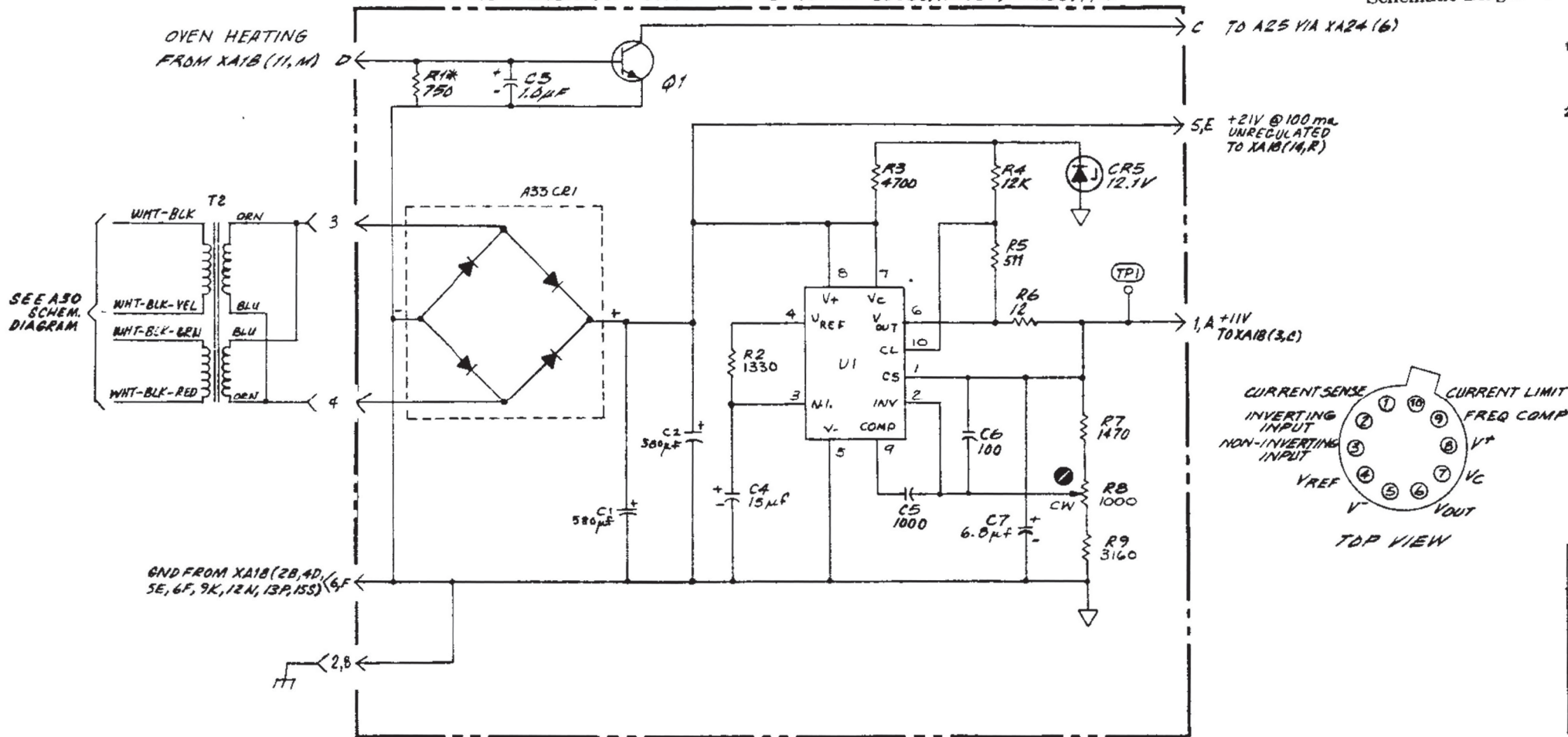
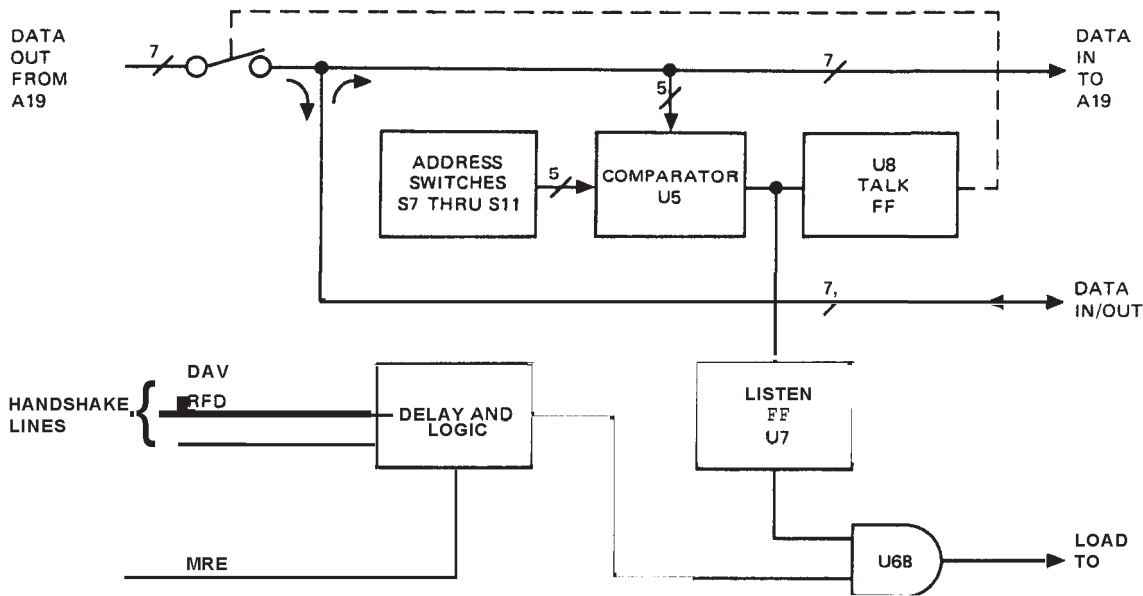
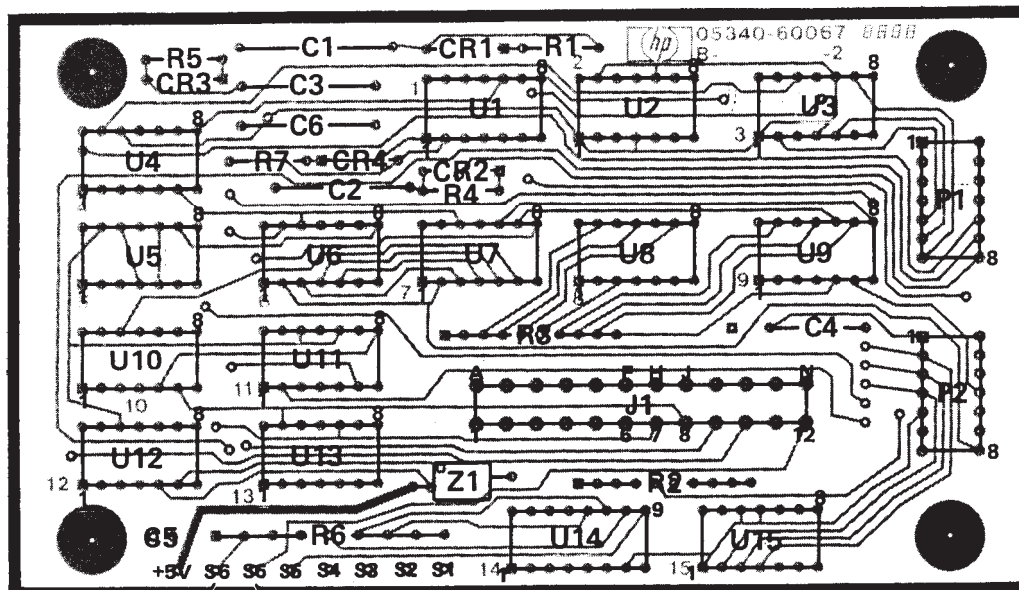


Figure 8-35. A33 Time Base Power Supply (Part f Option 001)

Part of Figure 8-36. A34 Bus Communicator Assembly,
A35 Connector Assembly (Part of Option 011)





TALK ALWAYS
SHIELD

REFERENCE DESIGNATIONS	ACTIVE ELEMENTS HP PART NUMBERS
CR1-4	1901-0040
U1, 13	1820-1056 5N74132
U2, 3, 10	1820-0621 5N7435N
U4, 11	1820-0054 5N7400N
U5	1820-0588 DM74L20N
U6, 7	1820-0065 5N7470N
U8, 9	1820-1053 5N7414N
U12	1820-0586 DM74L04N
U14	1820-0904 93L24
U15	1820-0589 DM74L30N

5340-D-37

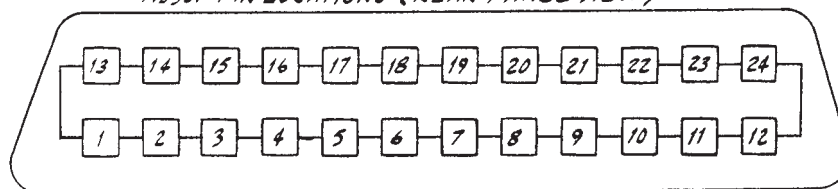
NOTES

- REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
- UNLESS OTHERWISE INDICATED:
RESISTANCE IN OHMS;
CAPACITANCE IN PICO FARADS
- A34R2A, C, E, G, J, L, N, R EACH 3000 OHM
A34R3A, C, E, G, J, L, N, R EACH 3000 OHM
A34R2B, D, F, H, K, M, P, S EACH 6200 OHM
A34R3B, D, F, H, K, M, P, S EACH 6200 OHM

REFERENCE DESIGNATIONS

A34	A35
C1-6 CR1-4	
R1-8	J1
U1-16	S1-6

A35J1 PIN LOCATIONS (REAR PANEL VIEW)



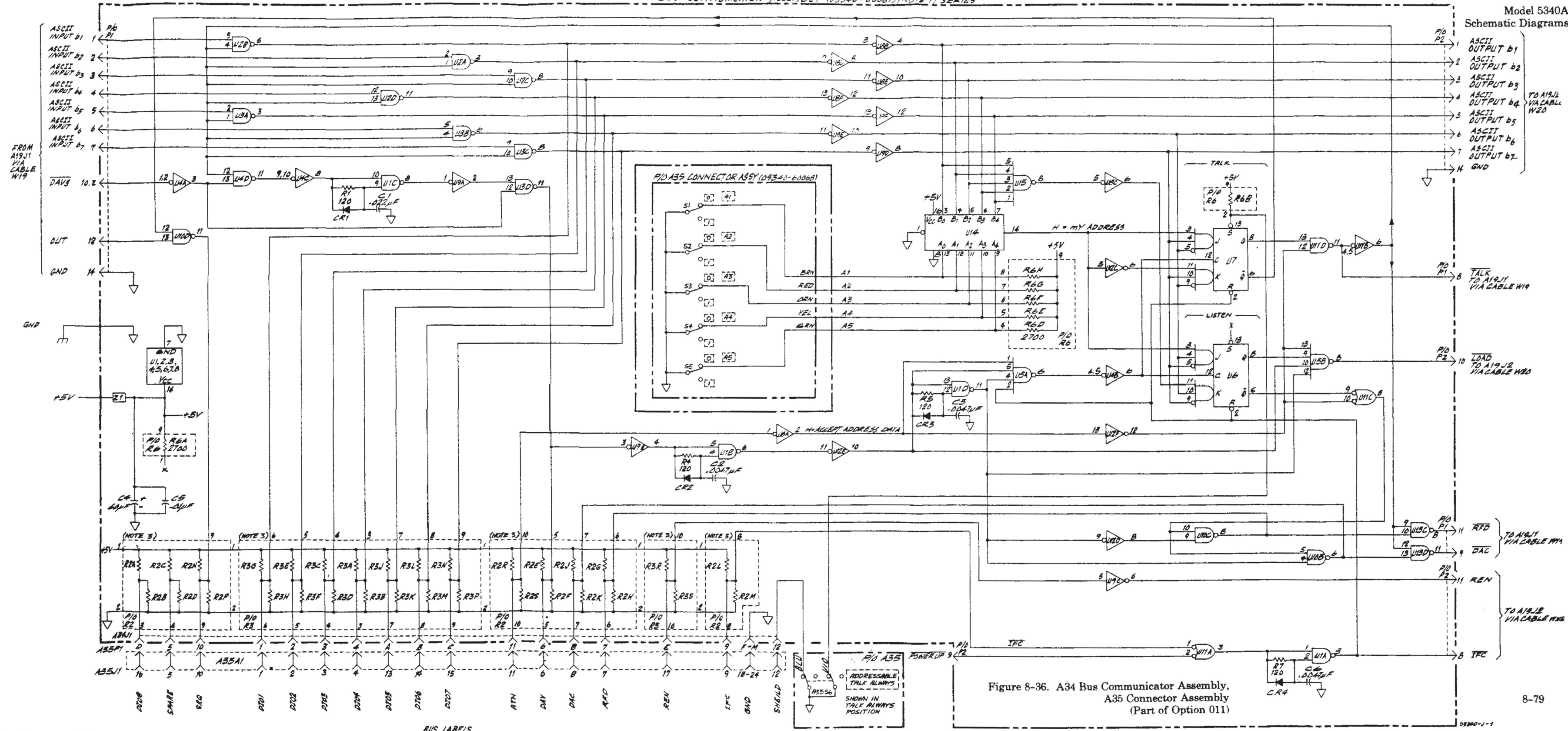


Figure 8-36. A34 Bus Communicator Assembly, A35 Connector Assembly (Part of Option 011)