MANUAL UPDATING CHANGES

CHANGE DATE: April 25, 1985

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* * * * MANUAL UPDATING COVERAGE* * * *
*                                       *
* This supplement adapts your manual    *
* to instruments with serial numbers    *
* prefixed through 2520.                 *
*                                       *
* * * * * * * * * * * * * * * * * * *
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* * * * MANUAL IDENTIFICATION * * * *
*                                       *
* Instrument:        HP 5335A           *
*          Universal Frequency Counter  *
*          Operating & Service Manual    *
*                                       *
*                                       *
* Manual Part No:      05335-90021      *
* Manual Microfiche:   05335-90022      *
* Manual Print Date:   March 1983       *
* * * * * * * * * * * * * * * * * * *
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ABOUT THIS SUPPLEMENT

The information in this supplement is provided to correct manual errors and to adapt the manual to instruments containing changes after the manual print date.

Change and correction information in this supplement is itemized by page numbers corresponding to the original manual pages. The pages in this supplement are organized in numerical order by manual page number.

Manual updating supplements are revised as often as necessary to keep manuals as accurate as possible. Hewlett-Packard recommends that you periodically request the latest edition of this supplement. Free copies are available from all HP offices. When requesting copies quote the model number, print date, and part number listed at the top of this page.

HOW TO USE THIS SUPPLEMENT

Insert this title page in front of the title page in your manual.

Perform all changes specified for "All Serials", and all changes through the Series Prefix of your instrument or board.

Insert any complete replacement pages provided into your manual in the proper location.

If your manual has been updated according to the last edition of this supplement, you need only perform those changes pertaining to the new series prefix. See List of Effective Pages on the reverse side of this page. New information affecting "All Serials" will be indicated by a "#" in the left margin.

HEWLETT PACKARD

1

LIST OF EFFECTIVE PAGES

SERIAL PREFIX OR SERIES NUMBER	PAGES CHANGED

All Serials
Title Page, 1-3, 1-6, 2-4, 2-5, 3-4, 3-18, 3-19, 3-20, 3-31, 3-32, 3-33, 3-34, 4-15, 4-18, 4-40, 4-51, 5-2, 5-3, 5-5, 5-9, 5-11, 5-12, 5-13, 6-5, 6-13, 6-18, 6-19, 6-31, 8-47, 8-70, 8-101, 8-107, 8-127

2250
6-3, 6-16, 8-105, 8-117

2302
6-30, 8-121

2319
6-3, 6-5, 6-6, 6-33, 6-35, 8-105, 8-107, 8-127

2323
6-16

2336
2-5, 2-5, 5-3, 5-7, 5-9, 5-11
6-3, 6-7, 6-10, 6-26, 6-36
8-3, 8-59, 8-66, 8-92, 8-105, 8-109, 8-129

2412
6-14, 8-113

2416
6-3, 6-17, 8-105

2424
3-30a thru 3-30e, plus addendum

2448
6-7/6-9, 6-15, 6-17/6-18, 6-28/6-29, 6-36/6-39, 8-109, 8-115, 8-129

2510
1-5, 6-18

The following Series 2510 instruments also have changes indicated for Series 2520.
> 2510A07731
> 2510A07732
> 2510A07733
> 2510A07734
> 2510A07735
> 2510A07831 and above

2520
6-3, 8-105

(5335A)2250A=14184/2302A=14236,13574,14343/2319A=13612,13614,14830,15301
13600/2323A=15018/2319A04586,2336A=15359,15757/2412=15948/2416=16295/2424=
15903/2448A=16301,16322,16681,16987/2510A=16735/2520A=17195

MANUAL CHANGES MODEL 5335A (05335-90021)

SERIAL PREFIX OR
 SERIES NUMBER   CHANGES

Page 1-3, Table 1-1. Model 5335A Specifications (Continued):

   All Serials   TIME BASE, Temperature:
                     >Change Temperature from <4 X 10^{-6}, 0 to 50°C, to
                        +-5 X 10^{-6}, 0 to 50°C (ref to 25°C.

Page 1-5, General Information:

   2510A   Table 1-3. Accessories Available:
                     >Change Rack Mount with Handles removed (Opt 908) from
                        5061-0077 to 5061-9677 (Metric).

Page 1-6, Table 1-4. Recommended Test Equipment:

   All Serials   >Add the following line to the end of the table:

Instrument	Quant	Rec'd Model	Use
A13 Service Aid Board	1	05335-60013	T

Page 2-4, Paragraph 2-30, Step h:

   All Serials   >Change step to read "Install DVM board into connector of
                      Amplifier Support board; A2XA8 for A2, A11J6 for A11
                      (refer to assembly locators, Figures 8-105 and 8-106).
                      Secure A8 assembly with two pozidrive screws (HP P/N
                      2360-0115) to the sideframe."

Page 2-5 Table 2-1. Field Installable Options:

   All Serials   >Add the following line to the parts included with OPTION
                      020; 6-32 x 5/16 screws, P/N 2360-0115, QTY 2.

                   >Add the following lines to the parts included with OPTION
                      030:
                      Gold Lockwasher, P/N 2190-0124, Qty 1.
                      Nut/Sensitivity Pot, P/N 2950-0072, Qty 1.
                      Washer/Sensitivity Pot, P/N 2190-0060, Qty 1.
                      6-32 x 5/16 screw, P/N 2360-0115, Qty 1.
                      Sensitivity Knob, P/N 0370-1005, Qty 1.

                   >Change Paragraph 2-32, Step g to read:
                      "Install Sensitivity cable assembly A9W2 (HP P/N
                      05335-60106) with washer (2190-0060) through the upper
                      hole of Channel C front panel and secure with 5/16 hex
                      nut (2950-0072). Install the Channel C sensitivity
                      control knob (0370-1005). Connect the unsecured end of
                      A9W2 cable to A9J1."

SERIAL PREFIX OR
  SERIES NUMBER   CHANGES

Page 2-5, Table 2-1. Field Installable Options (Cont'd):

   All Serials   >Change Paragraph 2-32, Step h to read:
"Install A9 Channel C board into connector of Amplifier Support board; A2XA9 for A2, A11J3 for A11 (Refer to assembly locators, Figures 8-105 and 8-106). Secure A9 assembly with a pozidrive screw (HP P/N 2360-0115) to the sideframe."

   2336   Table 2-1, Field Installable Options:
>Change part number of OPTION 040 Programmable Input (A12 Assembly) from 05335-60012 to 05335 60032.

Page 2-6, Paragraph 2-35:

   2336   >Add the following warning:

WARNING

Installation of Option 040 in some instruments (serial numbers 2319A04585 and lower) requires modification of A1 Power Supply assembly (and possibly A2 Amplifier Support assembly). Failure to modify these board(s) will degrade or prevent proper operation of the A12 (05335-60032) Amplifier board. Changes listed for series 2336 in this manual change sheet describe the electrical differences. For specific information on identification of boards and modification instructions, refer to Service Note 5335A-17.

Page 3-4, Paragraph 3-36:

   All Serials   >Change TIME A→B to "TIME B→A".

Page 3-18, Operation and Programming:

   All Serials   >Add the following NOTE to paragraphs 3-143, 3-145, and 3-156:

NOTE

Allow 3 seconds of settling time after selecting the function or changing the value to ensure accuracy of the measurement.

4

MANUAL CHANGES MODEL 5335A (05335-90021)

SERIAL PREFIX OR
 SERIES NUMBER   CHANGES

Page 3-20. Operation and Programming:

    All Serials   Figure 3-32, Waveform Phase Relationships:
                  >Change "-90" to "+90" in the third waveform from the top.
                   Change "+90" to "-90" in the bottom waveform.

Page 3-31. Operation and Programming:

    All Serials   >Add the following note to paragraph 3-193:

NOTE
GO and GC must be sent in separate command strings;
otherwise, they will be ignored.

Page 3-32. Operation and Programming:

    All Serials   Table 3-7. Status Bits Usage with SRQ:
                  >Change the second column of information as follows:

FROM: TO:

SR Status Bits	SR Status Bits
Bit 1 (LSB)	Bit 0 (LSB)
Bit 2	Bit 1
Bit 3	Bit 2
Bit 4	Bit 3
Bit 5	Bit 4
Bit 6	Bit 5
Bit 7	Bit 6
Bit 8	Bit 7

    All Serials   Paragraph 3-204:
                  >Add a reference to the attached pages entitled "Learn
                   String Content."

Page 3-33, Paragraph 3-214. Measurement Data Field:

    All Serials   >Change "or" to "of" in fourth line.

5

MANUAL CHANGES MODEL 5335A (05335-90021)

SERIAL PREFIX OR
SERIES NUMBER   CHANGES

Page 3-34. Operation and Programming:

    All Serials   Paragraph 3-222:
                    >Delete the last two sentences beginning with "However, the
                     TRIG LVL function...".
                    >Add the following sentence:
                     "Note that the HP-IB output of trigger levels requires a
                     'WA1' command to prevent the data from Channel A from
                     being output twice."

Page 4-15. Performance Tests:

    All Serials   Paragraph 4-72. DESCRIPTION:
                    >Change Function Generator to Pulse Generator in the
                     first line.

    All Serials   Paragraph 4-73, Step a:
                    >Change "3325A Synthesizer/Function Generator" to "8082"
                     Pulse Generator.

Page 4-18. Performance Tests:

    All Serials   Paragraph 4-89, step c:
                    >Change expected answer to read: " ...displays OV $\pm$600
uV.

Page 4-40, Figure 4-21. 5335A HP-IB Verification Set-up (HP 85A Controller):

    All Serials   >Change the HP-IB Interface part number from 82437A to
                 82937A.

Page 4-51. Performance Tests:

    All Serials   Section XIII DVM TEST:
                    >Change expected answer for "Shorted input:" to read:
                     "OV $\pm$ 600 uV.

Page 5-1, Paragraph 6-12:
    All Serials   >Change A1U4(1) to A1U4(**2**) in step a.

6

LEARN STRING CONTENT

INTRODUCTION

The Learn String consists of 30 8-bit bytes of data that contain
information concerning the state of the 5335A front panel. This
information can be used by a controller to determine a present
state for purposes of saving it for future use, or to alter the
information for sending back to the 5335A.

For the purposes of this explanation, the bytes will be numbered
1 through 30, with Byte 1 being the first 8 bits of binary data
received or sent in the Learn String.

GENERAL INFORMATION

Bytes 1 through 6 carry the following information:

    Byte 1 - GENERAL FUNCTIONS
    Byte 2 - MATH FUNCTIONS
    Byte 3 - GATE/CYCLE/RANGE/EXTERNAL ARMING
    Byte 4 - CHANNEL A SETUP (OPTION 040 ONLY)
    Byte 5 - CHANNEL B SETUP (OPTION 040 ONLY)
    Byte 6 - SLOPE ARMING/REMOTE TRIGGER/EXTERNAL TIME BASE

Note that Bytes 4 and 5 have no meaning if Option 040 is not
installed in the 5335A.

Bytes 7 through 30 are organized into three groups of eight bytes
to a group. Each group is a digital representation of a value
expressed in scientific notation. The groups give the value for
the following:

    Bytes 7 through 14 - Value of OFFSET
    Bytes 15 through 22 - Value of NORMLZ
    Bytes 23 through 30 - Value of SCALE

DETAILED INFORMATION (BYTES 1 THROUGH 6)

For Bytes 1 through 6, Table 3-6a below illustrates the purpose
of each bit. The headings are defined as:

    BYTE NUMBER - Location of the byte in the 30-byte Learn
                  String.
    BIT USAGE -   The bit used for each item is indicated by
                  a "0". This bit can take on a value of either
                  "1" or "0" as stated in the description
                  column. The other bits not used are indicated
                  by "x".
    DESCRIPTION - Gives detailed information on each item.

3-30a

7

LEARN STRING CONTENT (CONT'D)

Table 3-6b. Details of Learn String Bytes 1 through 6

BYTE NUMBER	BIT USAGE 76543210	DESCRIPTION		
1	x0000000	The decimal equivalent of the 7 least significant bits indicates the selected FUNCTION.		

```
EXAMPLE:

x0010010 would
be: TIME B→A
```

1 - FREQ A		11 - SLEW A	
2 - TIME A→B		12 - DUTY CYC A	
3 - TOT A		13 - GATE TIME	
4 - RATIO A/B		14 - TRIG LVL	
5 - FREQ C		15 - VOLTS	
6 - 1/TIME A→B		16 - PHASE A	
7 - PULSE A		17 - FREQ B	
8 - RATIO C/A		18 - TIME B→A	
9 - PER A		19 - TOT A→B	
10 - RISE/FALL A		20 - PULSE B	
		99 - Diagnostics	

BYTE NUMBER	BIT USAGE	DESCRIPTION		
2	xxxxxxx0	MATH	0 = Disable	1 = Enable
	xxxxxx0x	Statistic Count (N)	0 = 100	1 = 1000
	xxxxx0xx	OFFSET	0 = Off	1 = On
	xxxx0xxx	STD DEV	0 = Off	1 = On
	xxx0xxxx	NORMLZ	0 = Off	1 = On
	xx0xxxxx	MEAN	0 = Off	1 = On
	x0xxxxxx	SCALE	0 = Off	1 = On
	0xxxxxxx	SMOOTH	0 = Off	1 = On
3	xxxxxx00	GATE MODE	00 = NORM	10 = MIN
			01 = FAST	11 = MANUAL
	xxxx00xx	CYCLE	00 = No meaning	10 = MIN
			01 = NORM	11 = SINGLE
	xxx0xxxx	RANGE HOLD	0 = Off	1 = On
	xx0xxxxx	EXTERNAL ARM ENABLE	0 = Disable	1 = Enable
4		CHANNEL A (OPT 040 ONLY)		
	xxxxxxx0	IMPEDANCE (Z)	0 = 1 Mohm	1 = 50 Ohm
	xxxxxx0x	AC Coupling	0 = Off	1 = On
	xxxxx0xx	FILTER	0 = Off	1 = On
	xxxx0xxx	X10 ATTN	0 = Off	1 = On
	xxx0xxxx	SLOPE	0 = POS +	1 = NEG -
	xx0xxxxx	TRIGGER PRESET	0 = Off	1 = On (Default)

3-30b

LEARN STRING CONTENT (CONT'D)

Table 3-6b. (cont'd)   Details of Learn String Bytes 1 through 6

BYTE NUMBER	BIT USAGE 76543210	DESCRIPTION		
5		CHANNEL B (OPT 040 ONLY)		
	xxxxxxx0	IMPEDANCE (Z)	0 = 1 Mohm	1 = 50 Ohm
	xxxxxx0x	AC Coupling	0 = Off	1 = On
	xxxxx0xx	FILTER	0 = Off	1 = On
	xxxx0xxx	X10 ATTN	0 = Off	1 = On
	xxx0xxxx	SLOPE	0 = POS +	1 = NEG −
	xx0xxxxx	TRIGGER PRESET	0 = Off	1 = On (Default)
6	xxxxxxx0	EXTERNAL ARM START POS		
	xxxxxx0x	EXTERNAL ARM START NEG		
	xxxxx0xx	EXTERNAL ARM STOP POS		
	xxxx0xxx	EXTERNAL ARM STOP NEG	0 = Off 1 = On	
	xxx0xxxx	TIME BASE	(all)	
	xx0xxxxx	Remote TRIGGER Level		
	x0xxxxxx	AUTO TRIG		
	0xxxxxxx	COM A		

3-30c

9

LEARN STRING CONTENT (CONT'D)

DETAILED INFORMATION (BYTES 7 THROUGH 30)

Bytes 7 through 30 are dedicated to representing floating point
numbers for OFFSET, NORMLZ, and SCALE. Each number requires 8
bytes to be fully represented. The format for all three numbers
is the same, and only the details for bytes 7 - 14 will be
discussed.

In a floating point number of the form:

$\pm$ <J digits>.<K digits> E $\pm$ LL ,

the Learn String will always encode it in the form:

$\pm$ J.KKKKKKKKKK E $\pm$ LL   .

That is, the exponent will be calculated so that the decimal
point is ALWAYS placed between the first and second digits. This
is not the convention used on the 5335A display. The 5335A will
always convert the displayed results into Engineering Notation;
the exponent will always be a multiple of ±3.

Tables 3-6b and 3-6c below illustrate the purpose of each byte
in representing floating point numbers.

Table 3-6b. Assignment of Learn String Bytes 7 through 30

FUNCTION	BYTE #	DESCRIPTION
OFFSET	7	$\pm$ Sign of Mantissa
	8	JK
	9	KK Mantissa. Broken
	10	KK down into 4 bits
	11	KK per digit. "x" is
	12	KK not used.
	13	Kx
	14	$\pm$ LL (Exponent)
NORMLZ	15 - 22	Same as above.
SCALE	23 - 30	Same as above.

10

LEARN STRING CONTENT (CONT'D)

Table 3-6c. Details of Learn String Bytes 7 through 14

```
-------------------------------------------------------------------------
BYTE       BIT USAGE
NUMBER     76543210    VALUE   DESCRIPTION
-------------------------------------------------------------------------
7          00000000      0     Positive Mantissa
           10010000     144    Negative Mantissa
-------------------------------------------------------------------------
8          jjjjkkkk     any    Each nibble (jjjj or kkkk) represents
9          kkkkkkkk     any    the binary equivalent of a decimal
10         kkkkkkkk     any    digit from 0 to 9.  The first nibble
11         kkkkkkkk     any    of Byte 8 (jjjj) is the digit to the
12         kkkkkkkk     any    left of the decimal point.  The second
13         kkkkxxxx     any    nibble of Byte 8 (kkkk) is the next
                               digit immediately following the decimal
                               point.  All other bytes carry each
                               successive digit with the exception of
                               the last nibble of Byte 13 (xxxx).
                               This nibble is not used.
-------------------------------------------------------------------------
14         11111111     see    The value of the exponent is rep-
                        table  resented by the following formulas:
                        below
```

For an exponent of E±n,

LL = 0 + (+n)   OR

LL = 256 + (-n) .

For positive exponents, the value
is found by adding it to "0". For
negative exponents, the value is
found by subtracting it from "256".

Here is a list of the binary, decimal,
and exponent values for Byte 14:

BINARY	DEC	EXP	BINARY	DEC	EXP
00001001	9	E+9	11111111	255	E-1
00001000	8	E+8	11111110	254	E-2
00000111	7	E+7	11111101	253	E-3
00000110	6	E+6	11111100	252	E-4
00000101	5	E+5	11111011	251	E-5
00000100	4	E+4	11111010	250	E-6
00000011	3	E+3	11111001	249	E-7
00000010	2	E+2	11111000	248	E-8
00000001	1	E+1	11110111	247	E-9
00000000	0	E+0			

12

SERIAL PREFIX OR
SERIES NUMBER   CHANGES

Page 5-2, Figure 5-1. Input Amplifier Adjustment Setup:

    All Serials   >Mark out Top View photo; refer to photo on Page 5-10 for
                      parts location.
                >Change Top View photo callouts to:
                  "CONNECT PROBE TO JUNCTION OF:
                  "CHANNEL A....A2U11(7) and A2R39.
                  "CHANNEL B....A2U7(12) and A2R32.

Page 5-3. Adjustments:

    All Serials   Paragraph 5-14, step a:
                >Change second line to read:
                  "Refer to A3 Assembly Component Locator, in Figure 8-109".

    All Serials   Figure 5-2. Input Amplifier Adjust Waveform:
                >Change A and B Channel scope settings from "MV/cm" to
                  "V/cm".

    2336   Paragraph 5-12, step f,
                >Change adjustment for A1R15 from 15.70 Vdc to 15.0 Vdc
                  (+/- 100 mV).

                Paragraph 5-14, step a:
                >Change part number of A3 Input Amplifier Assembly from
                  05335-60003 to 05335-60033.

Page 5-5, Figure 5-3. Channel C Sensitivity Adjustment Setup:

    All Serials   >Change 1250-0780 Adapter description from "N-TO-BNC" to
                  "N(m)-TO-BNC(f)" on the output connections of 86603A.
                >Change adapter adjacent to power splitter from 1250-0082
                  to 1250-0780 ADAPTER, N(m)-TO-BNC(f).

13

MANUAL CHANGES MODEL 5335A (05335-90021)

SERIAL PREFIX OR
SERIES NUMBER   CHANGES

Page 5-7. Adjustments:

All Serials   Paragraph 5-24, Step c and Step g:
                 >Change the function generator output description from
                  "200 Hz squarewave at 500 mV p-p" to "30 Hz sinewave at
                  5 VOLTS p-p".

All Serials   Paragraph 5-24, Steps e, f, i, j, and NOTE:
                 >Change DVM display results from "+(-)240mV +/-5mV" to
                  "+(-)2.44 V +/-10mV.

2336   Paragraph 5-24, step a:
                  >Change part number of A3 from 05335-60003 to 05335-60033.

Page 5-9, Table 5-3. Option 040 Adjustments:

All Serials   >Add "R48, R53" to adjustments listed for Digital-to-Analog
                  Converter A11 Assembly.

                 >Change front panel control description to the following:

                         1Mohm/50ohm...... 50 ohm (LITE ON)
                         TRIGGER LEVEL ... PRESET
                         ATTN .... X1 (LITE OFF)
                         AC/DC .... DC (LITE OFF)
                         COM A .... OFF (LITE OFF)
                         AUTO TRIG .... OFF (LITE OFF)

2336   Paragraph 5-30, step a:
                 >Change part number of A12 Programmable Input Amplifier
                  Assembly from 05335-60012 to 05335-60032.

Page 5-11. Adjustments:

All Serials   Figure 5-8. Input Amplifier Adjustment Waveform:
                 >Change A and B Channel scope settings from "mV/cm" to
                  "V/cm".

All Serials   >Change front panel control description to the following:

                         1Mohm/50ohm .... 50 ohm (LITE ON)
                         ATTN .... X1 (LITE OFF)
                         AC/DC .... DC (LITE OFF)
                         COM A .... ON (LITE ON)
                         AUTO TRIG .... ON (LITE ON)

All Serials   Paragraph 5-32, step a:
                 >Change Programmable Input Amplifier Assembly designator
                  from A21 to A12.

14

SERIAL PREFIX OR
 SERIES NUMBER   CHANGES

Page 5-11. Adjustments:

                    Paragraph 5-32, step b:
                    >Change "Figure 5-8" to "Figure 5-11".

   All Serials   Paragraph 5-32, step d:
                    >Change the function generator output description from "200
                     Hz squarewave at 500 mV p-p" to "30 Hz sinewave at 5 VOLTS
                     p-p".

   All Serials   Paragraph 5-32, steps f, g, i:
                    >Change DVM display results from "+(-)240mV +/-5mV" to
                        "+(-)2.44 V +/-10mV".

                    Paragraph 5-32, step j, NOTE:
                    >Change DVM display results from "+(-)240mV +/-5mV" to
                        "+(-)2.44 V +/-10mV".

                    >Change the first line of the NOTE to read:
                    "If one Peak Detector cannot be adjusted to its indicated
                    level of (+/-) 240mV +/-5 mV, set adjustment as close as
                    possible and note the value. Then readjust the other Peak
                    Detector to the same magnitude (but opposite polarity) of
                    its counterpart, in order to maintain symmetry."

   All Serials   >Delete paragraphs 5-33/5-34 and replace with the following:

                                          NOTE
                        The following procedure has been changed to optimize
                        the CHAN-A Attenuator CAP (C-46) for the rise/fall
                        function. The CHAN-B Attenuator CAP (C30) is then
                        adjusted to the same attenuation "factor" as CHAN-A.
                        Now, rather than adjusting each channel attenuator as
                        close as possible to X10, we are now determining the
                        CHAN-A attenuation factor, then adjusting the CHAN-B
                        to "match". For measurement purposes (between
                        channels), the actual attenuation factor is not as
                        important as the difference between the CHAN-A and
                        CHAN-B factors.

/5

SERIAL PREFIX OR
 SERIES NUMBER   CHANGES

Page 5-11. Adjustments:

5-33. A12C46 Adjustment Procedure:

a. Connect power cable to the 5335A; switch the line
power from STBY to ON.

b. Connect the HP3312A Function Generator to the 5335A
INPUT A.

c. Set the 5335A front panel controls as follows:

    FUNCTION .... RISE/FALL A
    GATE ADJ .... fully CCW
    INPUT (Chan A)
      1 Meg/50 ohm .... 50 ohm (ON)
      TRIGGER LEVEL .... PRESET
      X10/X1 ATTN .... X1 (OFF)
      AC/DC .... DC (OFF)
    FILTER .... (OFF)

d. Set the 3312A Function Generator to output a 50 Hz
squarewave at 5 volts p-p. Make a note of the measure-
ment value displayed by the 5335A.

e. Set the 5335A Channel A ATTENUATOR TO X10.

f. Locate variable capacitor A12 C46.

g. Adjust A12 C46 so that the 5335A display is the same
as the value noted in step "d", (+0/-3 nanoseconds).

5-34. A12C30 Adjustment Procedure

a. Switch the 5335A line power from ON to OFF, then back
to ON.

b. Connect the HP8654A Signal Generator to the 5335 INPUT
A, as shown in Figure 5-9.

16

SERIAL PREFIX OR
  SERIES NUMBER   CHANGES

Page 5–11. Adjustments:

    c. Set the 5335A front panel controls as follows:

```
FUNCTION ................... FREQ A
MATCH ...................... OFF (LEDS OFF)
STATISTICS ................. OFF (LEDS OFF)
GATE MODE .................. NORM
CYCLE ...................... NORM
GATE ADJ ................... fully CCW
INPUT (Chan A)
   1 Meg/50 ohm ............ 50 ohm (ON)
   TRIGGER LEVEL ........... PRESET
   X10/X1 ATTN ............. X1 (OFF)
   AC/DC ................... AC (ON)
FILTER ..................... (OFF)
COM ........................ (OFF)
```

    e. Set the 8654A Signal Generator to output a 100 MHz
sinewave at a minimum output level on the 30 mV range.
Increase the output level until the 5335A displays a
stable count of "100 MHz". Record this signal level as
"CHAN A, X1 = xx mV", and save for step "g".

    f. Set the 5335A Channel A ATTENUATOR to X10 (on).
Change the 8654A output range to the 300mV scale (10 times
output level of step "e"). Increase the output level until
the 5335A displays a stable count of "100 MHz". Record this
signal level as "CHAN A,X10 = xxx mV", and save for step
"g".

    g. Divide the value of recorded level from step "f" by
recorded level from step "e", to determine the actual atten-
uation factor of CHAN A. Result should be approximately
"10". Record this value as "CHAN A ATTN FACTOR= xx", and
save for step "1".

    h. Press: SCALE, SMOOTH, 1,7, ENTER. This will enable
special function FREQ B.

    i. Set the 5335A front panel controls as follows:

```
INPUT (Chan B)
   1 Meg/50 ohm ............... 50 ohm (ON)
   TRIGGER LEVEL ............. PRESET
   X10/X1 ATTN .............. X1 (OFF)
   AC/DC .................... AC (ON)
FILTER ...................... (OFF)
COM ......................... (OFF)
```

    j. Connect the 8654A Signal Generator to the 5335A INPUT
B, as shown in Figure 5-10.

17

SERIAL PREFIX OR
  SERIES NUMBER   CHANGES

Page 5-11. Adjustments:

      k. Set the 8654A Signal Generator to output a 100 MHz
sinewave at the minimum output level on the 30 mV range.
Increase the output level until the 5335A displays a stable
count of "100 MHz". Record the signal level as "CHAN B,
X1 = xx mV", and save for step "1".

      l. Multiply the value of recorded level from step "k"
by the factor determined in step "g".

      m. Set the 5335A Channel B ATTENUATOR to X10 (on). Change
the 8654A output range to the 300mV scale (10 times output
level of step "e"), and adjust the level as close as possi-
ble to the value determined in step "1".

      n. Locate variable capacitor A12 C30.

      o. Adjust A12 C30 so that the 5335A display just gives a
stable count of 100 MHz.

2336   Paragraph 5-32, step a:
>Change Part Number of A12 Programmable Input Amplifier
  Assembly from 05335-60012 to 05335-60032.

Page 5-13. Adjustments:

All Serials   Paragraph 5-36, step a:
>Add "R48 (A) and R53 (B)." to the list of variable
  resistors in step a.

Paragraph 5-36, step b:
>Delete the first sentence "Repeat step 5-32(e)" and
  replace with "Connect the HP3455A DVM positive input to
  A11 (ATL) test point and negative input to A11 (GAA) test
  point."

Paragraph 5-36, step f:
>Change step "f." to "g."
>Add step f:
  "All Level Shift resistors R48 and R53 are adjusted
  exactly as A2 Level Shift resistors A2R65 and R66. To
  adjust the A11 Level Shift resistors, follow the
  procedure listed in paragraph 5-21, substituting R53
  for R66 and R48 and R65 in the instructions."

18

MANUAL CHANGES MODEL 5335A (05335-90021)

SERIAL PREFIX OR
  SERIES NUMBER   CHANGES

Pages 6-3/6-4, Table 6-2. A1 Power Supply Board Replaceable Parts:

    2250   >Change A1 (05335-60001) SERIES to 2250.
                  >Change CR11 to 1906-0261 DIODE-CT-RECT 150V 16A.

    2319   >Change A1 (05335-60001) SERIES to 2319.
                  >Change CR6 from 1901-0731 to 1902-0632 DIODE-ZNR 1N5354B
                     17V 5% PD-5W TC=+75%.
                  >Add CR13 1901-0050 DIODE-SWITCHING 80V 200MA 2NS DO-35.
                  >Add CR14 1902-0049 DIODE-ZNR 6.19V 5% DO-35 PD=.4W.
                  >Add R17 0757-0280 RESISTOR 1K 1% .125W F TC=0+-100.

    2336   >Change A1 from 05335-60001 to 05335-60031, Series 2336.
                  >Change A1U6 from 1826-0607 to 1826-0147; IC REGULATOR
                     +12V.
                  >Change A1R16 from 0757-0421 to 0757-0422 RESISTOR 909 OHM.
                  >Change A1R15 from 2100-3383 to 2100-3212 RESISTOR-TRMR 200
                     OHM.
                  >Delete A1 CR12. Change description to NOT ASSIGNED.

    2416   >Change A1 (05335-60031) SERIES to 2416.
                  >Delete A1 CR14.

    2520   >Change A1 (05335-60031) SERIES to 2520
                  >Add A1CR17 1902-0556 DIODE-ZENER 20V 5% PD=1W IR=5uA.

Pages 6-5/6-6, Table 6-2. A2 Amplifier Support Assembly Replaceable Parts:

    All Serials   >Change Mfr Part Number for A2L1/A2L4 from VK200 20/48 to
                     VK200 20/4B.

    2319   >Change A2 (05335-60002) SERIES from 2224 to 2319.
                  >Add CR9 1901-0731 DIODE-PWR RECT 400V 1A.
                  >Add R67, R68 0757-0280 RESISTOR 1K 1% .125W F TC=0+-100.
                  >Add R69, R70, R71 0757-1094 RESISTOR 1.47K 1% .125W F
                     TC=0+-100.

SERIAL PREFIX OR
SERIES NUMBER   CHANGES

Pages 6-7/6-10, Table 6-2. A3 Amplifier Buffer Board Replaceable Parts:

  2336   >Change A3 from 05335-60003 to 05335-60033, Series 2336.
                   >Delete A3CR3 and CR17. Change description to NOT ASSIGNED.
                   >Change A3R21 and R65 from 0698-7212 to 0698-7208 RESISTOR
                     68.1 OHM.
                   >Change A3R37 and R88 from 2100-1738 to 2100-2030 RESISTOR
                     TRMR 20K OHM.
                   >Change A3R103 and R105 from 0698-7209 to 0598-7205
                     RESISTOR-51.1 OHM.
                   >Change A3U2 and U5 from 1826-0570 to 1826-0999 IC-SCHMITT-
                     AMP.

  2448A   >Change A3 (05335-60003) SERIES to 2448.
                   >Change A3R2, R11, R90, R91 from 0699-0071 to 0699-0070
                     RESISTOR-5.6K 1% .1W F TC=0+-15.
                   >Add asterisks (*) to A3R2, R11, R90, R91 to indicate
                     factory-selected values.
                   >Change A3C23*, C37* (0160-3875) quantity from 2 to 0.
                     NOTE: 0160-3875 is an alternate part for 0160-4492.
                   >Add C23*, C37* to 0160-4492 CAPACITOR-FXD 18PF +-5% 200VDC
                     CER 0+-30.

Pages 6-11/6-13, Table 6-2. A4 Main Logic Board Assy Replaceable Parts:

  All Serials   >Change 5040-0201 to 5041-0202 CAP-PUSHBUTTON, CHALK WHITE.

Page 6-14, Table 6-2. A5 Display Board Replaceable Parts:

  2412   >Change A5 (05335-60005) SERIES from 2224 to 2412.
                   >Add R6 0698-0084 RESISTOR 2.15K 1% .125W T TC=0+-100.

Page 6-15, Table 6-2. A6 Rear Board Assembly Replaceable Parts:

  2448   >Change A6R8 from 0757-0280 (1Kohm) to 0698-5852 RESISTOR
                     500K 1% .125W F TC=0+-100.

NOTE

For Serial Numbers below 2448A06797 this change is
not incorporated. For serial numbers between
2448A06797 and 2448A07200 this change may or may
not be incorporated. All serial numbers 2448A07201
and above will have this change.

20

MANUAL CHANGES MODEL 5335A (05335-90021)

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SERIAL PREFIX OR
   SERIES NUMBER                           CHANGES
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Page 6-16, Table 6-2. Replaceable Parts:

    2302   >Change A14 from 05370-60005 to 05335-60014 Series 1928.
                 >Add 2190-0102 WSHR-LK-INTL T.
                 >Change A14J3 from 1251-3288 to 1252-0324 CONNECTOR, 24-PIN.

    2323   >Change 10544A to 10811A QUARTZ CRYSTAL OSCILLATOR.
                 >Delete 10544-60011.

Page 6-17, Table 6-3. Miscellaneous Chassis Parts:

    2416   >Change B1 from 3160-0209 to 3160-0450 FAN-24VDC, 36 CFM.

    2448   >Change quantity of 1400-0531 CLAMP-CABLE from 2 to 3.

Page 6-18, Table 6-3. Miscellaneous Replaceable Parts:

    All Serials   >Change MP13 from 5060-9110 to 5060-9910.
                 >Change MP16 from 5060-7219 to 5040-7219.

    2448   >Delete SHIELD-PROTECT, 05335-00009.

    2510   >Change MP7 from 5060-9899 to 5061-9499 SYSTEM II HANDLES
                   (Metric).
                 >Change MP9 from 2510-0195 to 0515-0896 SCREW-MACH M3.5 X
                   0.7, 1MM LG.
                 >Change MP11 from 5060-9833 to 5061-9433 COVER-TOP (Metric).
                 >Change MP12 from 5060-9845 to 5061-9445 COVER-BOTTOM (Metric).
                 >Change MP13 from 5060-9910 to 5061-9510 COVER-SIDE (Metric).
                 >Change MP16 from 5040-7219 to 5041-6819 STRAP-HANDLE CAP
                   FRONT (Metric)
                 >Change MP17 from 5040-7220 to 5041-6820 STRAP-HANDLE CAP
                   REAR (Metric)
                 >Change MP18 from 2680-0172 to 0515-1132 SCREW-MACH M5 X 0.8.
                 >Change MP29 from 5020-8803 to 5021-5803 FRAME-FRONT (Metric).
                 >Change MP30 from 5020-8804 to 5021-5804 FRAME-REAR (Metric).
                 >Change MP31 from 5020-8835 to 5021-5835 STRUT-CORNER (Metric).
                 >Add 0515-1331, Qty 8, SCREW M4 x 0.7 (for MP31).
                 >Add 0515-1055, Qty 8, SCREW-MACH M4 x 0.7 (for MP31).

NOTE
This changes the cabinet parts and hardware from
"inch" to "metric".

21

SERIAL PREFIX OR
  SERIES NUMBER   CHANGES

Page 6-19, Figure 6-1. Cabinet Parts:

   All Serials   >Change MP34 and MP35 to MP35 and MP34, respectively.

Page 6-26, Figure 6-8. Rear Panel Parts:

   2336   >Add 6960-0001 PLUG-HOLE 0.375", Qty 2.
          >Add 6960-0002 PLUG-HOLE 0.500", Qty 4.

Pages 6-28/6-29, Table 6-4. A8 DVM Assembly Replacement Parts:

   2448   >Change 0360-0124 CONNECTOR to 1251-5992 CONNECTOR-SGL
           CONT RIGHT-ANGLE-PIN.
          >Add Reference Designator MP1,MP2 for 0360-0124.

Page 6-30, Table 6-5. Option 030 Replaceable Parts:

   2302   >Change the A9 SERIES from 2121 to 2302.
          >Change R4 (261) from 0698-7222 to 0698-7215, 133 ohms.

Page 6-31, Table 6-5. Option 030 "C" Channel Replaceable Parts:

   All Serials   >Change line item following "A9W2R1" from 2950-0060 to
           2190-0060; Washer-lock 1/4" for sens-pot.
          >Add after line item "A9W2H32": 2950-0144; Nut-plastic for
           probe power connector".

Page 6-33, Table 6-6. A11 (05355-60011) Replaceable Parts:

   2323A   >Change the A11 SERIES from 2224 to 2323.
          >Add CR7 1901-0731 DIODE-PWR RECT 400V 1A.

Page 6-35, Table 6-6. A11 (05355-60011) Replaceable Parts:

   2323A   >Add R77, R78 0757-0280 RESISTOR 1K 1% .125W F TC=0+-100.
          >Add R79, R80, R81 0757-1094 RESISTOR 1.47K 1% .125W F
           TC=0+-100.

22

MANUAL CHANGES MODEL 5335A (05335-90021)

SERIAL PREFIX OR
  SERIES NUMBER   CHANGES

Pages 6-36 thru 6-39, Table 6-6. A12 Amplifier Replaceable Parts:

    2336
>Change A12 from 05335-60012 to 05335-60032, Series 2336.
>Delete A12CR1 and CR22. Change description to NOT ASSIGNED.
>Change A12R10 and R81 from 0698-7212 to 0698-7208 RESISTOR-
   68.1 OHM.
>Change A12R43 and R110 from 2100-1738 to 2100-2030
   RESISTOR-TRMR 20K OHM.
>Change A12R12 and R87 from 0698-7209 to 0698-7205 RESISTOR-
   51.1 OHM.
>Change A12U2 and U5 from 1826-0570 to 1826-0999 IC-SCHMITT-
   AMP.

    2448
>Change A12 SERIES to 2448.
>Change A12R8, R17, R106, R108 from 0699-0071 to 0699-0070
   RESISTOR- 5.6K 1% .1W F TC=0+-15.
>Add asterisks to A11R8, R17, R106, R108 to indicate
   factory-selected values.

Page 8-3, Table 8-1. Assemblies and Major Parts Usage:

    2336
>Change A1 from 05335-60001 to 05335-60031.
>Change A3 from 05335-60003 to 05335-60033.
>Change A12 (Part of OPTION 040) from 05335-60012 to
   05335-60032.

Page 8-59. Service:

    2336
Paragraph 8-339:
>Change A1 Power Supply part number from 05335-60001
   to 05335-60031.

Paragraph 8-340:
>Change supply voltage at end of second sentence from
   "+15.7V" to "+15.0V".

Power Supply Voltage Tests:
>Change first voltage listed from "+14.70" to "+15.00,
   (TOLERANCE) +/-0.10".

Paragraph 8-344, step a:
>Change "+15.7" in second line to "+15.0"
>Change "+/-0.2" in second line to "+/-0.10"

23

SERIAL PREFIX OR
  SERIES NUMBER   CHANGES

Page 8-66, Figure 8-68. Channel A Input Buffer DC Voltages:

   2336   >Change voltage labeled "+15.7V" at U4 Pin 7 to "15.0V".

Page 8-70, Table 8-16. A4 Signatures:

   All Serials   >Change U10, Pin 4 from "4534: to "5434".
                    >Change U11, Pins 5 and 6 to read "0000 (0003).
                    >Add note at bottom of table:
                      "= Arrow following signature indicates change of clock
                      polarity, for individual signature, for pos, v for neg."
                    >Change U12, Pin 9 from "01H7" to "0998".

Page 8-89, Figure 8-97. Trigger Level Block Diagram:

   All Serials   >Change reference designator of V to F Converter from "U9"
                        to "U10".
                    >Add reference designator "U9B" to unlabeled OP-AMP in
                        lower left corner of figure.

Page 8-92, Figure 8-99. Channel A Input Buffer DC Voltages:

   2336   Change voltage labeled "+15.7V" at U4 Pin 7 to "15.0V".

Page 8-101, Figure 8-105. Assembly and Cable Locator:

   All Serials   >Change designation of A2 connector "J1" (for A8 DVM) to
                        "A2XA8".
                    >Change designation of A2 connector "J3" (for A9 C Channel)
                        "A2XA9".

24

| SERIAL PREFIX OR SERIES NUMBER | CHANGES |

Page 8-105, Figure 8-107. A1 Power Supply Schematic Diagram/Component Locator:

2250
>Change A1 (05335-60001) SERIES from 2044 to 2250.
>Change A1CR11 from 1906-0213 to 1906-0261.

2319
>Change A1 (05335-60001) SERIES to 2319.
>Change the schematic illustration of Diode CR6 to Zener
  type (same as A1CR1) and add voltage notation "17V".
>Add Diode CR13 from A1U1 Pin 2 to ground. Connect Diode
  cathode to A1U1 Pin 2.
>Add Resistor R17, 1K, in series between A1U3 Pin 2 and the
  junction node of A1C4(+), A1U4 Pin 3, A1C2(+).

Reference Designator Table:
>Change A1CR12 to CR13.
>Change R16 to R17.

Table of Active Components:
>Change A1CR6 from 1901-0731 to 1902-0632.
>Add CR13 to A1CR7, CR12 (1901-0050).
>Change A1CR11 from 1906-0213 to 1906-0261.

2336
>Change A1 from 05335-60001 to 05335-60031, Series 2336.
>Change A1U6 labeling from "+15V" to "+12" REG.
>Change R16 value from 825 to 909.
>Change R15 value from 50 to 200.
>Change labeled value on U6 in 3 output from "+15.7" to
  "+15.0V +/-0.10V".
>Delete A1CR12 and replace with jumper wire.

Active Components Table:
>Change CR12 to NOT ASSIGNED.
>Change A1U6 from 1826-0607 to 1826-0147.

2416
>Change A1 (05335-60031) SERIES to 2416.
>Delete CR14

2520
>Change A1 (05335-60031) SERIES to 2520.
>Add CR17 20V Zener Diode in parallel with U7, cathode to
  input of U7 and anode to output.

25

SERIAL PREFIX OR
  SERIES NUMBER   CHANGES

Page 8-107, Figure 8-108. A2 Amplifier Support Assembly Schematic Diagram:

All Serials	>Change U10 V-F Conv in center of schematic to U9.
2319	>Change A2 SERIES from 2224 to 2319.

>Add Diode CR9 from -15 Volts (U4 Pin 3) to ground.
  Connect diode cathode to ground. Connect U4 Pin 9 to
  ground and delete the "NC" notation.
>Add R67 1.00K Resistor in series between U4 Pin 6 and +5V.
>Add R68 1.00K Resistor in series between U4 Pin 12 and +3V.
>Add R69 1.47K Resistor in series between U2 Pin 2 and +5V.
>Add R70 1.47K Resistor in series between U4 Pin 2 and +5V.
>Connect U5B Pin 2 and U10 Pin 2 together. Add R71 1.47K
  Resistor in series between the junction of U5B Pin 2/U10
  Pin 2 and +5V.
>Connect U2 Pin 5 to U2 Pin 6.
>Connect U10 Pin 5 to U10 Pin 6.

A2 Reference Designator Table:
>Change CR8 to CR9.
>Change R66 to R71.

A2 Active Components Table:
>Add A2CR9 1901-0731.

Page 8-109, Figure 8-109. A3 Amplifier Buffer Assembly Schematic Diagram:

2336   >Change A3 from 05335-60003 to 60033, Series 2336.
          >Change A3CR3 and CR17 (Pin 17 or U2 and U5) and replace
            with jumper wires.
          >Change value of R88 and R37 (Pin 3 of U5 and U2) from
            10K to 20K.
          >Change value of R65 and R21 (Pin 18 of U5 and U2) from 100
            to 68.1.
          >Change value of R103 and R105 (Pin 19 of U5 and U2) from
            75 to 51.1.

          Table of Active Components:
          >Change CR17 to NOT ASSIGNED.
          >Change A3U2 and U5 from 1826-0570 to 1826-0999.

          A3U2 and U5 Top/Bottom View:
          >Change part number on Top View illustration from 1826-0570
            to 1826-0999.

2448   >Change A3 SERIES to 2448.
          >Change values of A3R2, R11, R90, R91 from 4.64M to 3.16M.
          >Add asterisks to A3R2, R11, R90, R91 to indicate factory-
            selected values.

26

SERIAL PREFIX OR SERIES NUMBER	CHANGES

Page 8-113, Figure 8-111. A5 Keyboard and Display Assembly:

2412
>Change A5 SERIES from 2224 to 2412.
>Add R6 2.15K Fixed Resistor between Pin 1 and +5V, Pin 16.

Reference Designators:
>Change A5R1-5 to A5R1-R6.

Page 8-115, Figure 8-112. A6 Rear Panel Assembly:

2448
>Change A6R8 value from 1Kohm to 500 ohm.

Page 8-117, Figure 8-113. A7 HP-IB Logic Assembly and A14 HP-IB Connector:

2302
>Change A14 HP-IB Connector Assembly part number from 05370-60005 to 05370-60014 Series 1928.

Page 8-121, Figure 8-115. A9 Channel C Assembly Schematic Diagram:

2302
>Change A9 SERIES from 2121 to 2304.
>Change the value of R4 (U2, Pin 1) from 261 to 133.

Page 8-127, Figure 8-117. A11 Amplifier Support (Opt 040) Assembly Schematic:

All Serials
>Connect U4 Pin 9 to U4 Pin 10 and eliminate the NC designation.
>Change designation of "R523" (near U6B Pin 8-R28-R52) to "R53".
>Change J1 Pin 1 mnemonic (TP 10) from "GND" to "BND".
>Change U2 input pin number "7" (X7-R7-R23) to "9".

2323
>Change A11 SERIES from 2224 to 2323.
>Add CR7 Diode from -15 Volts (U11 Pin 3) to ground. Connect diode cathode to ground.
>Add R77 1.00K Resistor in series between U4 Pin 12 and +3V.
>Add R78 1.00K Resistor in series between U4 Pin 6 and +5V.
>Add R79 1.47K Resistor in series between U2 Pin 2 and +5V.
>Connect U11 Pin 2 and U5 Pin 2 together. Add R81 1.47K resistor in series between the junction of U11 Pin 2/U5 Pin 2 and +5.

A11 Reference Designators Table:
>Change CR6 to CR7.
>Change R76 to R81.

Table of Active Components:
>Add A11CR7 1901-0731.

27

SERIAL PREFIX OR
  SERIES NUMBER   CHANGES

Page 8-129, Figure 8-118. A12 Programmable Input Amplifier Schematic Diagram:

2336
>Change A12 from 05335-60012 to 05335-60032, Series 2336.
>Delete A12CR22 and CR1 (Pin 17 of U5 and U2) and replace with jumper wires.
>Change value of R110 and R43 (Pin 3 of U5 and U2) from 10K to 20K.
>Change value of R81 and R10 (pin 18 of U5 and U2) from 100 to 68.1.
>Change value of R87 and R12 (Pin 19 of U5 and U2) from 75 to 51.1.

Option 040 Active Components Table:
>Change CR17 to NOT ASSIGNED.
>Change A12U2 and U5 from 1826-0570 to 1826-0999.

U2 and U5 Top/Bottom View:
>Change part number on Top View from 1826-0570 to 1826-0999.

2448
>Change A12 SERIES to 2448.
>Change values of A12R8, R17, R106, R108 from 4.64M to 3.16M.
>Add asterisks to A12R8, R17, R106, R108 to indicate factory-selected values.

28