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Errata

Title & Document Type: **5335A Universal Frequency Counter Operating and Service Manual**

Manual Part Number: **05335-90021**

Revision Date: **July 1993**

About this Manual

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

HP References in this Manual

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

Support for Your Product

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www.agilent.com

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

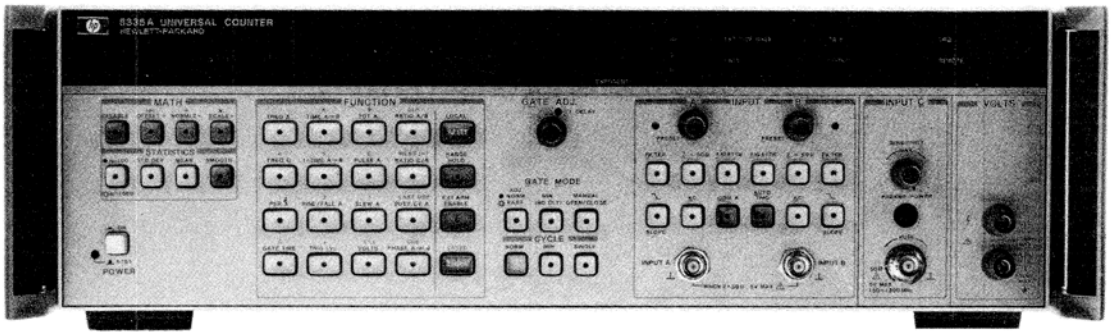
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OPERATING AND SERVICE MANUAL

ADDENDUM

5335A UNIVERSAL FREQUENCY COUNTER



ADDENDUM TO:
5335A OPERATING AND SERVICE MANUAL
HP PART NUMBER: 05335-90021

HEWLETT PACKARD

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CHANGES AND ENHANCEMENTS

TO

HP 5335A UNIVERSAL FREQUENCY COUNTERS

WITH

FIRMWARE REVISION 1.1

IMPORTANT

Instruments with Serial Number 2424A06001 and above have a new firmware revision installed. The majority of the changes are totally transparent to the user. Those changes are reflected in faster processing speed and more efficient memory usage. The changes that are visible to the user will be explained in this document.

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NOTE

THE FOLLOWING INFORMATION DESCRIBES THE OPERATING AND PROGRAMMING DIFFERENCES BETWEEN HP 5335A INTERNAL FIRMWARE REVISION 1.0 AND REVISION 1.1. REVISION 1.1 WAS RELEASED IN JUNE OF 1984, AND PROVIDES SOME MINOR PROGRAMMING ENHANCEMENTS AS WELL AS THE REMOVAL OF PREVIOUSLY KNOWN PROGRAMMING ANOMALIES. THE PROGRAMMABILITY OF THESE TWO FIRMWARE REVISIONS IS NOT 100% COMPATIBLE. FOR THE CONVENIENCE OF EXISTING CUSTOMERS, BOTH REVISIONS 1.0 AND 1.1 ARE AVAILABLE.

DETERMINING WHICH FIRMWARE REVISION IS INSTALLED

TO DETERMINE WHICH FIRMWARE REVISION IS INSTALLED IN ANY HP 5335A, OBSERVE THE DISPLAY AS THE INSTRUMENT IS POWERED UP. REVISION 1.0 FIRMWARE WILL DISPLAY: "HP-IB Addr XX" DURING THE POWER-UP CYCLE . REVISION 1.1 WILL DISPLAY "HP-IB Addr.XX" DURING THE POWER-UP CYCLE. THE DECIMAL POINT PROVIDES A MEANS OF IDENTIFYING THE REVISION WITHOUT REMOVING THE TOP COVER.

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NOTE

THE FOLLOWING IS A SUMMARY OF FIRMWARE CHANGES THAT ARE EITHER VISIBLE TO THE USER OR WILL AFFECT THE USER'S SOFTWARE ROUTINES. INFORMATION PERTAINING TO REVISION 1.1 IS UNDERLINED IN THE TEXT BELOW. REFER TO THE CHANGE LETTER FOLLOWING EACH DESCRIPTION FOR FURTHER INSTRUCTIONS.

DESCRIPTION OF REVISION	MAKE THESE CHANGES
SERIAL POLL	
Firmware Revision 1.0 does not allow continuous serial polling with fast controllers like the Series 200 or Series 1000 controllers. Firmware Revision 1.1 allows continuous serial polling with all controllers.	None
HP-IB OUTPUT STRING	
Firmware Revision 1.1 will routinely output a double alpha character at the beginning of the HP-IB output string instead of a single alpha character. To detect and ignore the excess character, extra programming is required to adapt existing software. Also, the string variable must be dimensioned one character longer for Revision 1.1 than for Revision 1.0.	See change A
GATING	
1. In using the HP-IB command "GA", the longest possible gate time is 1 second. Additionally, the counter cannot be interrupted from the front panel once the Gate is opened. Firmware Revision 1.1 allows programmable gate times of up to 30 seconds, along with the capability of interrupting the counter from the front panel while the Gate is open.	See change B
2. The programmed gate time using the HP-IB command "GA" has an added offset of 1.5 msec due to internal processing time. This results, for example, in a 1.0 msec gate time actually being 2.5 msec. Firmware Revision 1.1 has reduced this offset to 0.2 msec, resulting in greater accuracy of the programmed gate time. Measurement accuracy is not affected.	See change B

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DESCRIPTION OF REVISION	MAKE THESE CHANGES
GATING (CONT'D)	
3. Firmware Revision 1.0 makes no distinction between the HP-IB commands "GO" and "GC". Both commands operate in a toggle mode. Either can be used to open and close the Gate under external control. Firmware Revision 1.1 makes a distinction between these commands. "GO" will only open the Gate, and "GC" will only close the Gate. This change may require reprogramming of existing software.	See change B
4. The HP-IB commands "GO" and "GC" require a minimum of 400 msec of wait time between subsequent commands. Firmware Revision 1.1 requires as little as 10 msec of wait time between the commands. Since the MANUAL gating mode works best in SINGLE CYCLE mode, the 5335A also defaults to SINGLE CYCLE mode whenever MANUAL Gate is selected.	See change B
TOTALIZE	
1. In TOT A mode, firmware Revision 1.0 does not set the CYCLE mode to SINGLE (HP-IB command "CY3"). This results in a count error during TOTALIZE. With firmware Revision 1.1, TOT A defaults to SINGLE CYCLE.	See change C
2. Firmware Revision 1.0 will not allow totalizing when there are no zero crossings in the input signal. This results in the HP-IB bus "hanging up" when there is no input. Firmware Revision 1.1 can TOTALIZE zero events over the HP-IB bus. This may require reprogramming of existing software.	None
3. With firmware Revision 1.0, there are display resolution discrepancies when setting the SCALE function to >1 in TOTALIZE mode. The display shows the LSB rounded off so that the digit grouping feature is inconsistent with all other measurements. Firmware Revision 1.1 allows SCALE values >1 with no display inconsistencies.	None

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DESCRIPTION OF REVISION	MAKE THESE CHANGES
AUTO TRIGGER (OPTION 040)	
Firmware Revision 1.0 does not allow the AUTO TRIGGER function "AU1" to be enabled directly after activating REMOTE TRIGGER LEVEL mode "TR1". Sending the "AU1" command will turn on the AUTO TRIGGER lamp but will not actually invoke the AUTO TRIGGER function. The command "TR0" needs to be sent before the "AU1" command is enabled. Firmware Revision 1.1 allows the "AU1" command to operate independently of the TRIGGER LEVEL mode. This change may require reprogramming of existing software.	See change D
STATUS BYTE	
Two of the bits in the Status Byte SR represent GATE OPEN/CLOSED (Bit 5) and MEASUREMENT DONE (Bit 0). When in the fast GATE mode "GM1", firmware Revision 1.0 will finish a measurement with these two bits indicating GATE OPEN and MEASUREMENT DONE. The GATE bit should be set LOW upon measurement completion. This inconsistency occurs in all types of measurements. Firmware Revision 1.1 removes this inconsistency in all measurements except TIME A->B and 1/TIME A->B. In these measurements, it is suggested that only the MEASUREMENT DONE bit (Bit 0) be used to check if the measurement is completed. This may require reprogramming of existing software.	See change E
REMOTE DISPLAY	
With firmware Revision 1.0, it is necessary to send an "FN" command in the output string after the "IN" and "DR1" commands. This is the only way that the counter can be activated in the REMOTE DISPLAY mode. Firmware Revision 1.1 removes the necessity of sending the extra "FN" command.	See change F
RATIO C/A	
Firmware Revision 1.0 indicates one extra digit of resolution (both in the display and over the HP-IB bus) while in RATIO C/A mode. Firmware Revision 1.1 now indicates the correct resolution.	None

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DESCRIPTION OF REVISION	MAKE THESE CHANGES
TIME INTERVAL B->A	
In TIME B->A, the setting of the front panel switches determines the trigger slopes for the measurement. When the switches are set to different slopes (e.g. A+ & B-), firmware Revision 1.0 outputs the measurement as though the switches are each set to the OPPOSITE slope (A- & B+). Firmware Revision 1.1 sends the correct measurement data. This may require reprogramming of existing software.	None
HP-IB OUTPUT FORMAT	
Firmware Revision 1.0 sends out real numbers over the HP-IB bus in a format that is incompatible with Pascal programs. Firmware Revision 1.1 outputs real numbers in a Pascal-compatible format. For example, Revision 1.0 would output a value as .001, whereas Revision 1.1 will output it as 0.001.	None
SIGNATURE ANALYSIS	
Firmware Revision 1.1 has different ROMs. These will give some different signatures when Signature Analysis (SA) is performed.	See change G
TEACH-LEARN	
The Teach-Learn string in Firmware Revision 1.0 contains 30 bytes. Firmware Revision 1.1 will intermittently output an extra byte over HP-IB in the Teach-Learn string which has been left over from a previous measurement. To detect and ignore the excess byte so that correct Teach-Learn information will be obtained, extra programming is required to adapt existing software. The anomaly is related to that mentioned on PAGE 3 of this Addendum regarding the double alpha character in the HP-IB output string.	See change H

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THIS SECTION GIVES DETAILED DESCRIPTIONS OF EACH CHANGE REFERENCED IN THE PREVIOUS SECTION. ANY CHANGES IN THE OPERATING AND SERVICE MANUAL WILL BE DESCRIBED FIRST. ANY ADDITIONAL INFORMATION CONCERNING PROGRAMMING SUGGESTIONS WILL FOLLOW THE CHANGE DETAILS.

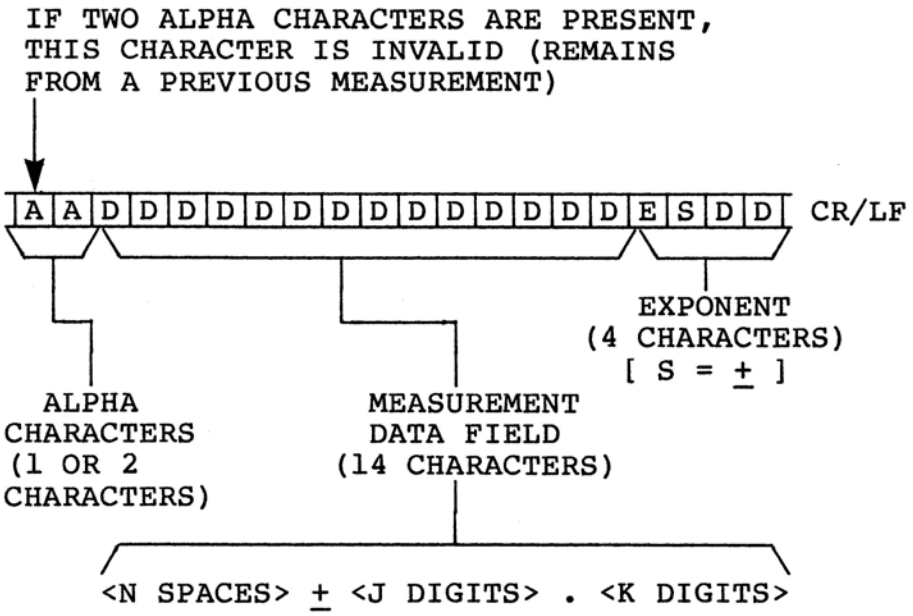
CH.#	PAGE#	DESCRIPTION AND SUGGESTIONS

A **3-32** Paragraph 3-212. Replace the paragraph and diagram with the following:

3-212. After a measurement, the 5335A outputs the data to the HP-IB. The output byte will contain 19 or 20 characters, followed by a "CR" and "LF" (carriage return and line feed) as shown in the diagram below:

NOTE

If firmware Revision 1.1 is installed, dimension output string variables one character longer than with firmware Revision 1.0 to allow for the double alpha output. Failure to do so may result in loss of data or controller error. Also note that the program examples on Pages 3-35 through 3-45 will need to be modified to work properly.



CONTINUED ON NEXT PAGE

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CH.# PAGE# DESCRIPTION AND SUGGESTIONS

A **3-32** (CONT'D)

PROGRAM EXAMPLES

If there is more than one alpha character, the first character is to be ignored. The following program examples will illustrate some simple techniques to detect and ignore any extra alpha characters:

NOTE

The double alpha character does not present any problems unless the output variable used is a string variable. If the variable used is a simple variable (sign and mantissa with exponent), there is no need to do any of the reprogramming explained in the next section.

HPL EXAMPLES	NOTES
EXAMPLE #1	
1 dim A$[22]	Dimension long string
2 wrt 703,"in,fnl,wal, srl"	Write to 5335A
3 red 703,A$	Read string
4 if num(A$[2,2])>90; gto 7	Test for second character in ASCII range of alpha variables
5 if num(A$[2,2])<65; gto 7	
6 A$[2,20]->A$	If alpha, redimension the string
7 dsp A$	Show the string
EXAMPLE #2	
1 dim A$[22]	Dimension long string
2 wrt 703,"in,fnl,wal, srl"	Write to 5335A
3 red 703,A$	Read string
4 if len(A$)=19;gto 6	Check length of string
5 A$[2,20]->A$	If long, redimension
6 dsp A$	Show string

MODIFY OR ADD LINES IN **BOLD** TEXT AS SHOWN.

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CH.# PAGE# DESCRIPTION AND SUGGESTIONS

A (CONT'D) 3-32 PROGRAM EXAMPLES (CONT'D)

BASIC EXAMPLES	NOTES
EXAMPLE #1	
10 DIM A$[22]	Dimension long string
20 OUTPUT 703; "IN,FN1, WA1,SR1"	Write to 5335A
30 ENTER 703; A$	Read string
40 IF NUM (A$[2,2])>90 THEN 70	Test for second character in ASCII range of alpha variables
50 IF NUM (A$[2,2])<65 THEN 70	
60 A$=A$[2,20]	If alpha, redimension string
70 DISP A$	Show string
EXAMPLE #2	
10 DIM A$[22]	Dimension long string
20 OUTPUT 703; "IN,FN1, WA1,SR1"	Write to 5335A
30 ENTER 703; A$	Read string
40 IF LEN (A$)>19 THEN A$=A$[2,20]	Check length of string If long, redimension
50 DISP A$	Show string

MODIFY OR ADD LINES IN **BOLD** TEXT AS SHOWN.

B 3-31 Paragraph 3-193. Change the entire paragraph to the following paragraph and NOTE:

3-193. The GA command is used to set the gate time remotely. The range of times is from about 1 msec to about 30 sec. Resolution of the setting is about 200 usec, and accuracy is about 0.2%, or +200 usec. For programming gate times greater than 30 seconds, use the GO and GC commands to open and close the Gate under program control.

NOTE

When using the commands GO and GC, there must be a minimum of 10 msec delay between the commands. This is accomplished using a "WAIT" statement in the program. Since the MANUAL GATE works best in the SINGLE CYCLE mode, the 5335A normally defaults to SINGLE CYCLE when set to MANUAL GATE.

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CH.#	PAGE#	DESCRIPTION AND SUGGESTIONS

C **3-16** Paragraph 3-123. Replace the paragraph with the following text and NOTE:

3-123. The TOT A mode will display the number of event(s) received in Channel A. When TOT A is selected, the 5335A will automatically shift the GATE MODE from NORM to MANUAL, close the GATE, and shift the CYCLE MODE from NORM to SINGLE. Pressing the MANUAL key opens the Gate and allows counts to accumulate. To stop counting, press the MANUAL key again. Pressing the MANUAL key once more allows counting to continue without resetting the previous total. To zero the count, press RESET at any time. To begin a new measurement, first close the Gate and then press RESET. RESET operates independently of the Gate.

NOTE

SMOOTH and MATH operations using "MEAS t-1" will not operate in manual totalize.

C **3-17** Paragraph 3-127. Edit the following sentence by deleting the underlined portion:

"To totalize on the fly put the counter in Totalize and set the GATE MODE to MANUAL and the CYCLE MODE to SINGLE."

D **3-34** Paragraph 3-227. Delete the paragraph that begins with "When programming Option 040,the use of...".

This programming anomaly no longer exists.

E **3-15** Paragraph 3-115. Add the following note:

NOTE

When programming TIME A->B over the HP-IB bus, Bit 5 (Gate OPEN) of the Status Byte SR is not a reliable indication that the measurement is done. Use Bit 0 (Measurement Done) to test for a completed measurement.

E **3-17** Paragraph 3-132. Add the following note:

NOTE

When programming 1/TIME A->B over the HP-IB bus, Bit 5 (Gate OPEN) of the Status Byte SR is not a reliable indication that the measurement is done. Use Bit 0 (Measurement Done) to test for a completed measurement.

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CH.#	PAGE#	DESCRIPTION AND SUGGESTIONS

E **3-32** Table 3-7. Add the following note below Table 3-7:

Note: Do not use Bit 5 when using either TIME A->B or 1/TIME A->B functions.

F **3-31** Paragraph 3-200. Delete **NOTE** that begins "Do not initialize ("IN") the counter..."

G **8-70** Table 8-17, A4U23 Signatures. Change the signatures on the pins as shown:

9 1C17
10 645A
11 5PF0
13 HP2P
14 HA68
15 9AP6
16 942C
17 3PH0

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CH.#	PAGE#	DESCRIPTION AND SUGGESTIONS
G	8-71	Table 8-18, A4U22 Signatures. Change the signatures on the pins as shown: 9 24P7 10 PH0U 11 8453 13 49PH 14 6509 15 C96U 16 685C 17 A2A5
H	3-39 3-40	The HPL and BASIC programming examples on the next two pages show how to account for the anomaly:

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HPL EXAMPLE FOR CHANGE H

```
0: dim A[30]
1: lcl 703
2: dsp "Manually set-up 5335A controls"
3: stp
4: "remote the HP-IB":rem 7
5: wrt 703,"pq"
6: for I=1 to 30
7: rdb(703)>A[I]
8: next I
9: "Check for end of record":if bit(0,rds(7));gto 13
10: "If not, read until end of record":
11: rdb(703)>X;if not bit(0,rds(7));gto +0
12: "Start over":lcl 703;wait 500;gto 4
13: beep
14: lcl 703
15: dsp "Now change the 5335A controls"
16: stp
17: ent "Do you need MATH functions ?",B
18: if B;gto "LONG"
19: wtb 703,"pb"
20: wtb 703,A[1],A[2],A[3],A[4],A[5],A[6],255
21: beep
22: wait 500
23: beep
24: gto 32
25: "LONG":wtb 703,"pb"
26: for I=1 to 30
27: wtb 703,A[I]
28: next I
29: beep
30: wait 500
31: beep
32: lcl 703
33: end
*19050
```

Note: Program lines 9 through 12 have been inserted to account for the anomaly.

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BASIC EXAMPLE FOR CHANGE H

```
10 DIM A$[30]
20 LOCAL 703
30 CLEAR @ DISP "MANUALLY SET-UP 5335A CONTROLS. PRESS 'CONT' WHEN READY."
40 PAUSE
50 OUTPUT 703 ;"pq"
60 ENTER 703 USING "#,A" ; A$
61 A=NUM(A$)
62 IF A>20 AND A<>99 OR A=0 THEN 50
63 ENTER 703 USING "#,29A" ; A$
64 A$=CHR$(A)&A$
65 LOCAL 703
70 BEEP
80 DISP "NOW, CHANGE THE 5335A CONTROLS. PRESS 'CONT' WHEN READY."
90 PAUSE
100 DISP "DO YOU NEED MATH FUNCTIONS      (Y=1 , N=0) ";
105 INPUT B
110 IF B<0 OR B>1 THEN 100
115 IF B THEN 170
120 OUTPUT 703 USING "#,2A,6A,B" ; "pb",A$,255
130 BEEP
140 WAIT 500
150 BEEP
160 GOTO 210
170 OUTPUT 703 USING "#,2A,30A" ; "pb",A$
180 BEEP
190 WAIT 500
200 BEEP
210 LOCAL 703
220 END
```

Note: Program lines 60 through 64 have been inserted to account for the anomaly.

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