

00702C PROGRAM DESCRIPTION I

Page 1 of 9

Program Title GEAR FREQUENCIES

Contributor's Name JAMES C. MOREHEAD, III

Address P.O. BOX 356, 916 MERCHANT ST.

City AMBRIDGE State/Country PA / USA Zip Code 15003

Program Description, Equations, Variables EVALUATION OF TYPICAL FREQUENCIES
GENERATED BY GEAR 1 & GEAR 2.

INPUTS: $N1$ = SPEED OF GEAR 1 (REV/SEC, OR REV/MIN)

$T1$ = NUMBER OF TEETH ON GEAR 1

$T2$ = NUMBER OF TEETH ON GEAR 2

OUTPUTS: $N2$ = SPEED OF GEAR 2 (REV/SEC OR REV/MIN),

FGM = FREQUENCY OF GEAR MESH (REV/SEC OR REV/MIN)

SHAFT ROTATION HARMONICS UP TO $5 * N1, 5 * N2$,

$GEAR RATIO * N1, 2 * GEAR RATIO * N1, N2 / GEAR RATIO,$

$2 * N2 / GEAR RATIO$ [WHERE $GEAR RATIO = T2 / T1$]

HARMONICS & SIDEBANDS OF FGM UP TO $4 * FGM$

$I = 1, 2, 3, 4; K = 1, 2, 3$ $FGM * I \pm K * N1$

AND $FGM * I \pm K * N2$

Necessary Accessories PRINTER - HP82143A

Operating Limits and Warnings 45 REGISTERS REQUIRED FOR PROGRAM, &
11 REGISTERS REQUIRED FOR DATA.

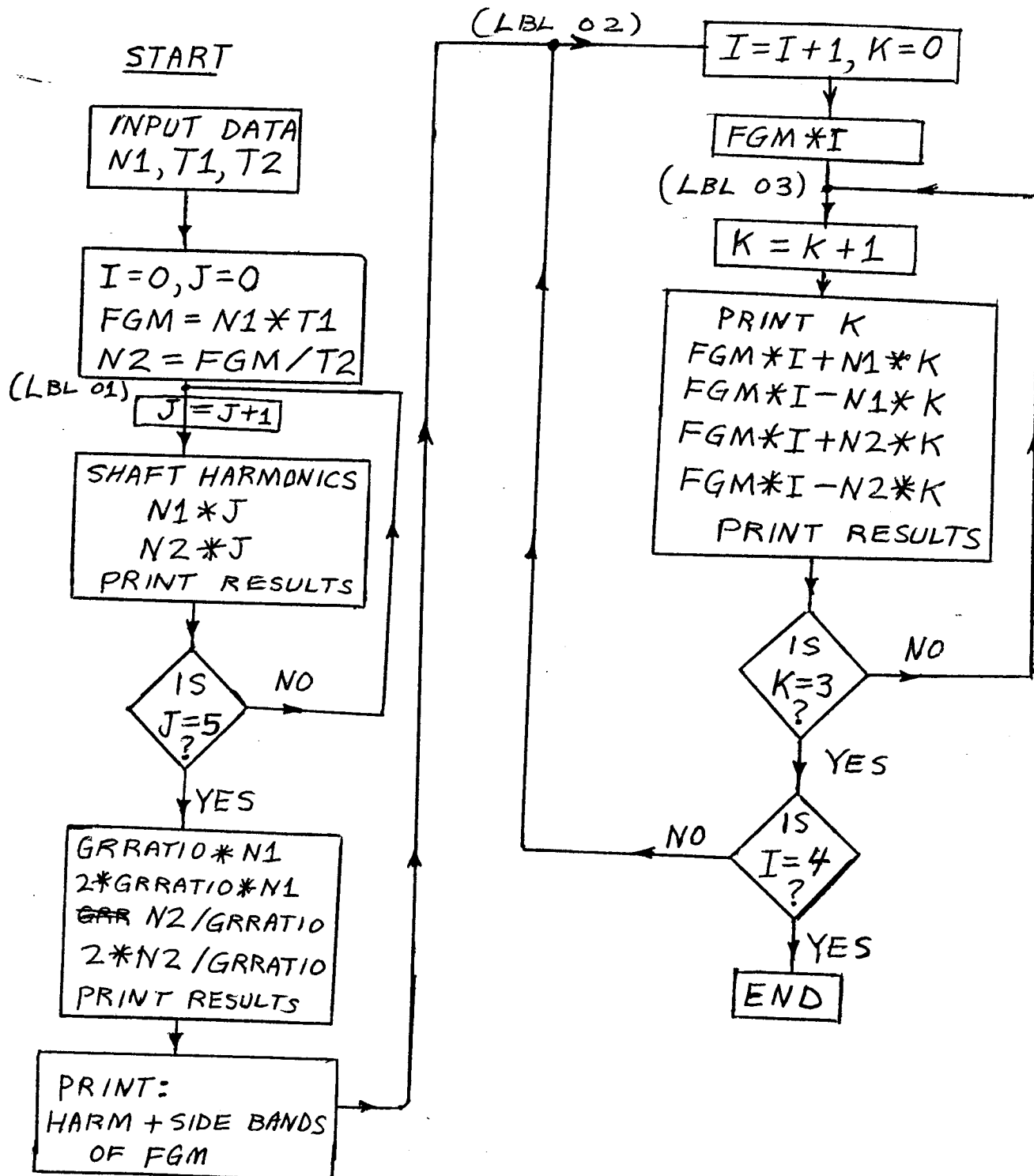
Reference(s) "A PRACTICAL VIBRATION PRIMER" PART 8:
VIBRATION SEVERITY BY CHARLES JACKSON
(REPRINTED FROM HYDROCARBON PROCESSING, 1978)
(SEE FIGURE 8, ESPECIALLY)

This program has been verified only with respect to the numerical example given in Program Description II. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

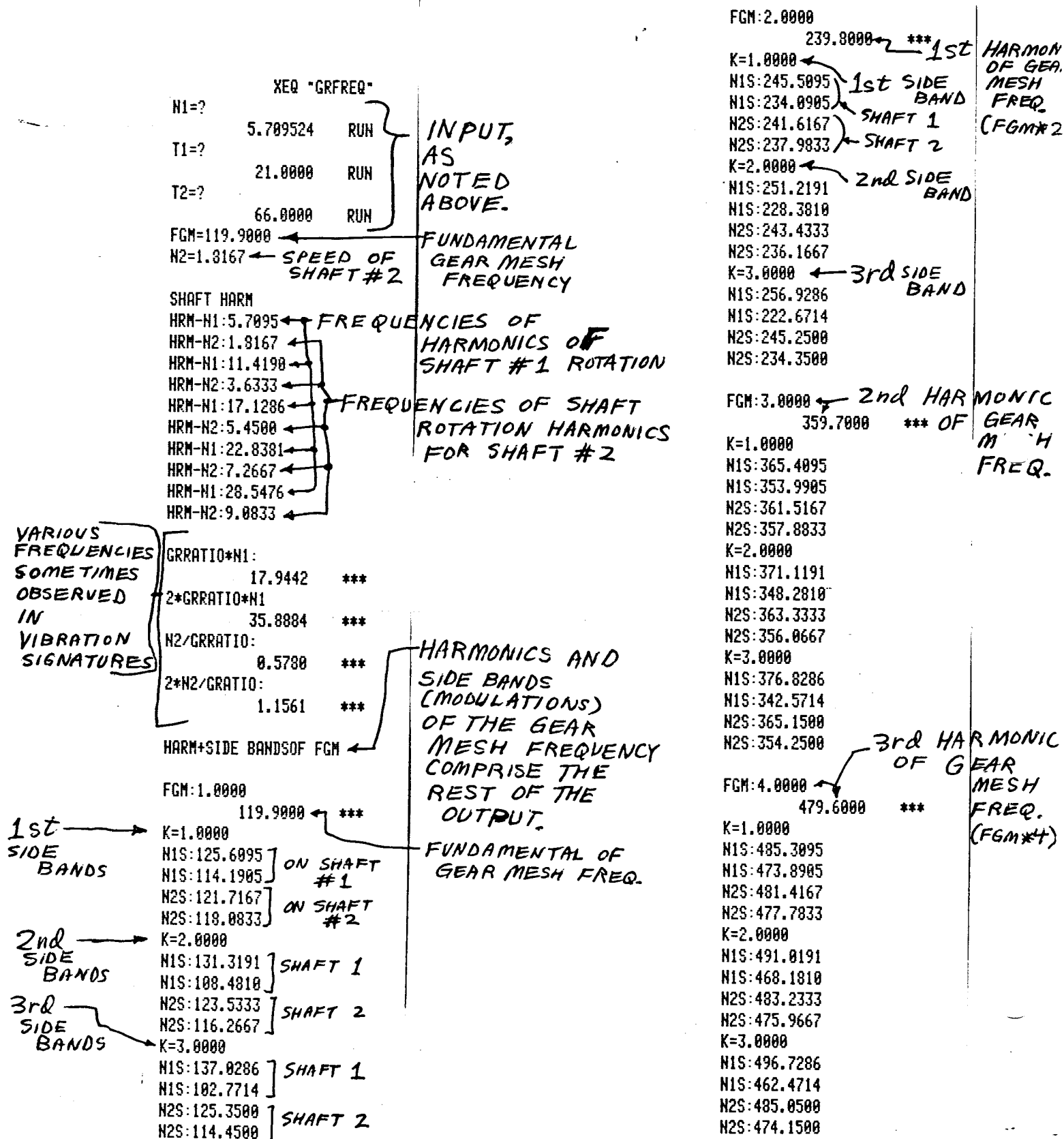
NEITHER HP NOR THE CONTRIBUTOR MAKES ANY EXPRESS OR IMPLIED WARRANTY OF ANY KIND WITH REGARD TO THIS PROGRAM MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NEITHER HP NOR THE CONTRIBUTOR SHALL BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH OR ARISING OUT OF THE FURNISHING, USE OR PERFORMANCE OF THIS PROGRAM MATERIAL.

PROGRAM DESCRIPTION I

(CONTINUATION PAGE)

PROGRAM FLOWCHART

(CONT.)

EXAMPLE INPUT/OUTPUT:

USER INSTRUCTIONS

				SIZE: (HP-41C) 0/2
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1.	SET USER MODE, PRINTER → NORM			
2.	ENTER PROGRAM			
	• SIDES 1 THROUGH 4			
3.	START PROGRAM			
	• PRESS " Σ +" KEY		$\Sigma+$	GRFREQ
4.	PROGRAM PROMPTS FOR INPUTS:			
	a. SPEED OF GEAR 1,			$N1=?$
	ENTER VALUE (UNITS	$N1$	[R/S]	
	USED HERE DETERMINE			
	UNITS OF OUTPUT. IF			
	CY/SEC USED, OUTPUT			
	IS IN CY/SEC, ETC.)			
	b. NUMBER OF TEETH ON			$T1=?$
	GEAR 1 (INTEGER	$T1$	[R/S]	
	VALUE)			
	c. NUMBER OF TEETH ON			$T2=?$
	GEAR 2 (INTEGER	$T2$	[R/S]	
	VALUE)			
5.	RESULTS WILL BE PRINTED.			
6.	$T1 \geq T2$ OR $T2 \geq T1$			
	BOTH OKAY. THE ACCURACY			
	OF $N1$ SHOULD BE GOOD.			

□ 67 □ 97 □ 41C

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS	STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
01	LBL "GRF REQ"			46	"HRM-N2: "		
02	"N1=?"			47	ARCL X		PRINT J*N2 (HARMONIC)
03	PROMPT			48	PRA		
04	STO 00		N1	49	ISG 07		
05	"T1=?"			50	GTO 01		
06	PROMPT			51	ADV		
07	STO 02		T1	52	"GRRATIO *N1:"		
08	"T2=?"			53	AVIEW		
09	PROMPT			54	RCL 03		
10	STO 03		T2	55	RCL 02		
11	1.00501		LOOP DEFINITIONS	56	/		
12	STO 07			57	RCL 00		
13	1.00401			58	*		
14	STO 08			59	PRX		(GEAR RATIO)*N1
15	CLX			60	"2*GRRAT IO*N1"		
16	STO 05		INITIALIZE I & J	61	AVIEW		
17	STO 06			62	2		
18	RCL 00			63	*		
19	RCL 02			64	PRX		2*(GEAR RATIO) *N1
20	*		FGM	65	"N2/GRRAT TIO:"		
21	STO 04			66	AVIEW		
22	RCL 03			67	RCL 02		
23	/		N2	68	RCL 03		
24	STO 01			69	/		
25	"FGM="			70	RCL 01		
26	ARCL 04		OUTPUT OF FGM, N2	71	*		
27	PRA			72	PRX		N2/GEAR RATIO
28	"N2="			73	"2*N2/GR ATIO:"		
29	ARCL 01			74	AVIEW		
30	PRA			75	2		
31	ADV			76	*		
32	"SHAFT H ARM"			77	PRX		2*N2/GEAR RATIO
33	PRA			78	ADV		
34	LBL 01		1st Loop	79	"HARM+SI DE BANDS"		
35	1		J=J+1	80	"EOF FGM "		
36	ST+ 05			81	ACA		
37	RCL 00			82	PRBUF		PRINT TITLE FOR REST OF OUTPUT
38	RCL 05			83	ADV		
39	*			84	LBL 02		2nd Loop
40	"HRM-N1: "			85	1		
41	ARCL X		PRINT J*N1 (HARMONIC)	86	ST+ 06		I=I+1
42	PRA						
43	RCL 01						
44	RCL 05						
45	*						

☐ 67 ☐ 97 ☒ 41C

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS	STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
87	"FGM:"			135	+ ← $N2 * K + FGM * I$		
88	ARCL 06			136	"N2S:"		
89	PRA		PRINT	137	ARCL X		
90	RCL 04		IDENTIFICATION	138	PRA ← PRINT		SIDE BAND
91	RCL 06		OF	139	ISG 09		
92	*		MESH	140	GTO 03		← END LOOP 3
93	STO 11		FREQ	141	ADV		
94	PRX ← $FGM * I$ (HARMONIC)			142	ISG 08		← END LOOP 2
95	CLX			143	GTO 02		
96	STO 10		INITIALIZE K	144	END		
97	1.00301						
98	STO 09		3RD LOOP DEFINITION				
99	LBL 03		3RD LOOP				
100	1		NESTED				
101	ST+ 10		INSIDE 2ND				
102	"K="		K = K + 1				
103	ARCL 10		LOOP				
104	PRA		IDENTIFY	70			
105	RCL 10		SIDE BANDS				
106	RCL 00						
107	*						
108	RCL 11						
109	+		$N1 * K + FGM * I$				
110	"N1S:"						
111	ARCL X						
112	PRA		PRINT SIDE BAND				
113	RCL 10						
114	RCL 00			80			
115	*						
116	CHS						
117	RCL 11						
118	+ ← $N1 * K + FGM * I$						
119	"N1S:"						
120	ARCL X						
121	PRA		PRINT SIDE BAND				
122	RCL 10						
123	RCL 01			90			
124	*						
125	RCL 11						
126	+ ← $N2 * K + FGM * I$						
127	"N2S:"						
128	ARCL X						
129	PRA		PRINT SIDE BAND				
130	RCL 10						
131	RCL 01						
132	*						
133	CHS			00			
134	RCL 11						

Page 8 of 9

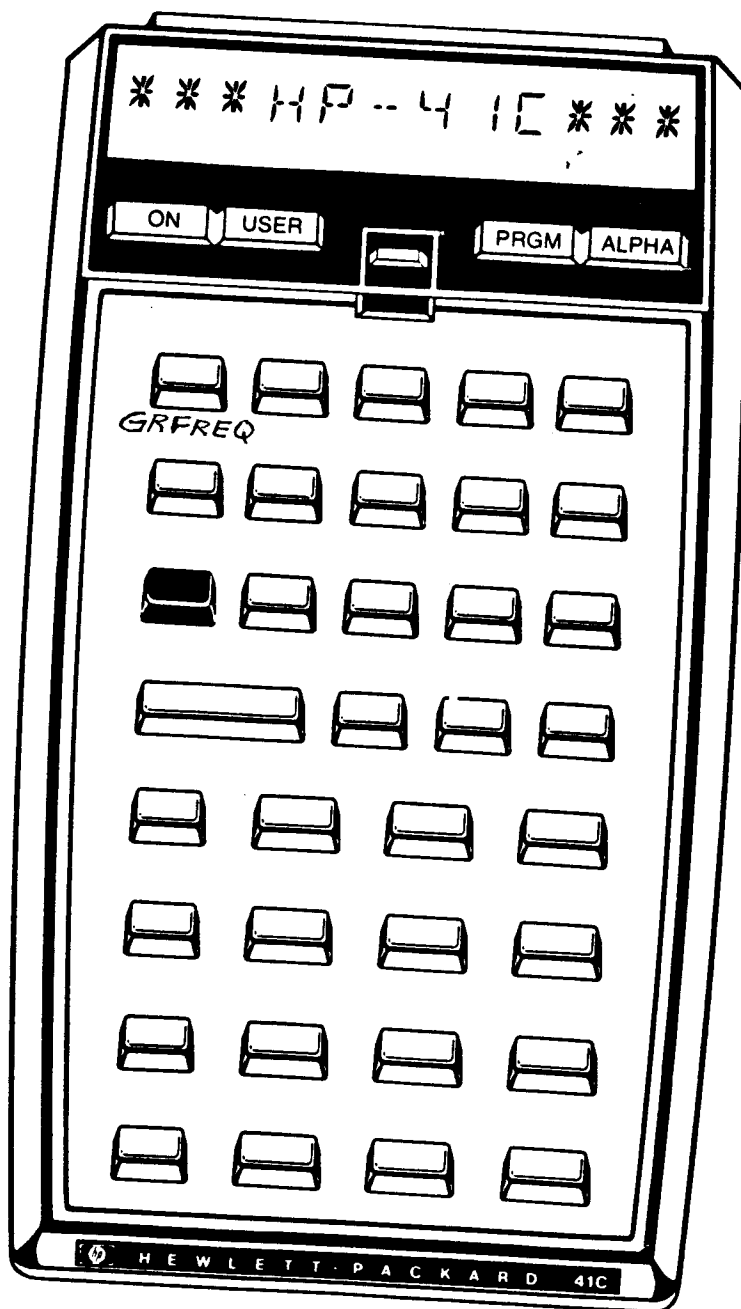
[illegible]

007045

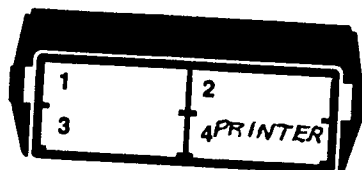
KEYBOARD CARD LABELING

Page 9 of 9

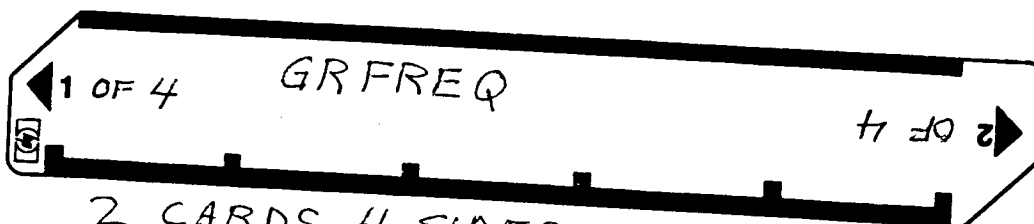
KEYBOARD



SYSTEM
CONFIGURATION



CARD



2 CARDS, 4 SIDES, REQUIRED

PROGRAM REGISTERS NEEDED: 49

ROW 1 (1 : 2)



ROW 2 (2 : 8)



ROW 3 (8 : 12)



ROW 4 (13 : 19)



ROW 5 (20 : 27)



ROW 6 (27 : 32)



ROW 7 (32 : 36)



ROW 8 (36 : 41)



ROW 9 (41 : 46)



ROW 10 (46 : 52)



ROW 11 (52 : 56)



ROW 12 (57 : 60)



ROW 13 (60 : 65)



ROW 14 (65 : 70)



ROW 15 (71 : 73)



ROW 16 (73 : 79)



ROW 17 (79 : 80)



ROW 18 (80 : 84)



ROW 19 (85 : 90)



ROW 20 (91 : 97)



ROW 21 (97 : 104)



ROW 22 (105 : 112)



ROW 23 (112 : 120)



ROW 24 (120 : 127)



ROW 25 (128 : 136)



ROW 26 (136 : 142)



ROW 27 (143 : 144)

