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HP 41 PROGRAM SUBMITTAL FORM
PROGRAMMFORMBLATT/DOCUMENTATION DU PROGRAMME/GENERALITÀ SUL PROGRAMMA

Program Title
Programmtitel / Titre du programme / Titolo del programma: WEIGHED LINEAR REGRESSION

Category No. Kategorie Nr. / Catégorie N° / Categoria N°: 304
Name Rubrik / Rubrique / Nome della categoria: Curvefitting/correlation/regression

No. of program lines Anzahl Programmzeilen / Nombre de lignes de programme / N° di linee di programma: 413
No. of data registers Anzahl des benötigten Datenspeicher / Nombre de registres de données / N° di registri utilizzati: 028

Recommended HP 41 System configuration Empfohlene System-Konfiguration / Configuration recommandée / Configurazione raccomandata
Port # 1: RAM Port # 2: RAM
Port # 3: Port # 4:

This program requires the following programs as subroutines: Dieses Programm benutzt folgende Programme als Unterprogramme: / Ce programme utilise les programmes suivants comme sous-programmes: / Questo programma usa i seguenti programmi come subroutines:
Program Name: Programm: / Nom du programme: / Programma:

HP Applications ROM HP Applikations ROM / ROM d'application HP / ROM di applicazione HP

Program Abstract Kurzbeschreibung / Résumé / Breve descrizione del programma

This program takes in account that both x and y are not errorfree. In standard linear regression x is assumed to be errorfree, which is normally not true and thus gives false results.

The next quantities are calculated: covariances Sx.x, Sy.y and Sx.y, standarddeviation of x and y, weighfactor λ, correlation, slope and intercept weighed and unweighed with their standarddeviations, S^2_{yx}, S_{yx}, standarddeviation of x and y around the line, t-test, F-test. Datacorrection is possible.

Program Size: 111

Name Name / Nom / Nome: Ed Nieuwenhuys

Address Strasse / Adresse / Indirizzo: Langsom 39

Country Land / Pays / Paese: Netherlands
Postal Code Postleitzahl / Code postal / C.A.P.: 1066 GC
City Ort / Localité / Città: Amsterdam

ACKNOWLEDGMENT AND AGREEMENT
Erklärung und Ermächtigung / Déclaration et Autorisation / Dichiarazione e Autorizzazione

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Date Datum / Date / Data: 30-10-82
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PROGRAM DESCRIPTION I

PROGRAMMBESCHREIBUNG I
DESCRIPTION DU PROGRAMME I
DESCRIZIONE DEL PROGRAMMA I

Application, Equations, Variables
Anwendung, Gleichungen, Veränderliche
Application, Equations, Variables
Applicazione, Equazioni, Variabili

$$S_{y.y} = \sum_i (y_i - \bar{y})^2 = \sum y_i^2 - \frac{(\sum y_i)^2}{n} \quad (1)$$

$$S_{x.x} = \sum_i (x_i - \bar{x})^2 \quad (2)$$

covariance
$$S_{x.y} = \sum_i (x_i - \bar{x})(y_i - \bar{y}) = \sum x_i y_i - \frac{\sum x_i \sum y_i}{n} \quad (3)$$

correlation
$$R = \frac{S_{x.y}}{\sqrt{S_{x.x} S_{y.y}}} \quad (4)$$

t-test
$$T = \left| \frac{R\sqrt{n-2}}{\sqrt{1-R^2}} \right| \qquad DF = n-2 \quad (5)$$

weighed slope
$$aG = \frac{\lambda S_{y.y} - S_{x.x} + \sqrt{(S_{x.x} - \lambda S_{y.y})^2 + 4\lambda S_{x.y}^2}}{2\lambda S_{x.y}} \quad (6)$$

weighed intercept
$$bG = \bar{y} - aG\,\bar{x} \quad (7)$$

weigh factor
$$\lambda = \frac{\sigma_x^2}{\sigma_y^2}, \quad \sigma_x^2 = \frac{\sum_i s_x^2}{n}; \quad \sigma_y^2 = \frac{\sum_i s_y^2}{n} \quad (8)$$

slope
$$a = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sum (x_i - x)^2} = \frac{n\sum x_i y_i - \sum y_i \sum x_i}{S_{x.x}\, n} \quad (9)$$

intercept
$$b = \bar{y} - a\bar{x} \quad (10)$$

residual variance
$$S_{yx}^2 = \frac{S_{y.y} - 2aS_{x.y} + a^2 S_{x.x}}{n-2} \quad (11)$$

a= slope

b= intercept

$$S_{yx}^2 = \frac{\sum y_i^2 - b\sum y_i - a\sum x_i y_i}{n-2}$$

$$SDEV\ a = \sqrt{\frac{S_{yx}^2}{\sum (x_i - \bar{x})^2}}; \quad SDEV\ b = \sqrt{\frac{S_{yx}^2}{n}\left[1 + \frac{n\bar{x}^2}{\sum (x_i - \bar{x})^2}\right]} \quad (12)$$

$$S_x EXP = \hat{S}_x = \sqrt{\frac{\lambda}{1+a^2} S_{yx}^2}; \quad S_y EXP = \hat{S}_y = \sqrt{\frac{1}{1+a^2} S_{yx}^2} \quad (13)$$

$$F_x\,(n-2, k-1) = \frac{\hat{S}_x^2}{S_x^2}; \quad F_y\,(n-2, k-1) = \frac{\hat{S}_y^2}{S_y^2} \quad (\ )$$

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.
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Dieses Programm wurde lediglich anhand des in der Programmbeschreibung II enthaltenen Zahlenbeispiels überprüft. Der Benutzer erhält und benutzt das Programmaterial auf eigenes Risiko hin; er hat es deshalb – gleichgültig, ob es bereits anderweitig präsentiert oder beschrieben wurde – selbst zu untersuchen.
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Le présent programme n'a été vérifié qu'en ce qui concerne l'exemple numérique indiqué dans la description du programme II. L'utilisateur accepte et utilise le présent programme À SES PROPRES RISQUES et doit se fier uniquement à sa propre inspection dudit programme sans se référer à toute autre déclaration et description.
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Questo programma è stato verificato soltanto per quanto concerne l'esempio numerico indicato nella Descrizione del Programma II. L'utilizzatore accetta e utilizzerà il presente programma A SUO INTERO RISCHIO, fidandosi unicamente della propria verifica del programma e non basandosi su altre dichiarazioni o descrizioni.
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Linear regression is often used to compare two methods which eachother. The slope, the intercept and the correlation are then the parameters for the goodness of fit.
By using unweighed linear regression it is often forgotten that it is assumed that the x-value is errorfree, which is often not true. This program takes the error in both observation in account.
The correlation coefficient has the disadvantage that it is dependent of the range and the quantity of observations.

There are three possibilities to start the program:

1) Using it unweighed by entering SDEV x= SDEV y when asked.
2) By doing the test multiphorous. The program DUPLO, TRIPLO or higher should be used then. The choice of the program depends on how many times one sample is tested in one method. The standarddeviation is calculated from these data and the mean standarddeviation is used to determine the weighfactor λ. It is also possible to enter the standarddeviation calculated for 3) by pressing "B".
3) By testing samples independently and determing the intraassay standarddeviation. The program MEAN should be used then, which gives the possibility to enter the standarddeviation of x and y.
   This last method is the most recommended one.

The meaning of the results.

1) SDEV X and SDEV Y are the calculated standarddeviations from the multiphorous data.
2) Lambda (λ) is the weighing factor which is determined by the variances of method x and y, who are calculated at 1). (8)
3) $S_{y.y}$, $S_{x.x}$, $S_{x.y}$ are the covariances (1)(2)(3)
4) Correlationcoefficient R. (4)
5) Student's t-distribution is used to test if the observed correlation is significantly different from zero.
   DF is degrees of freedom. (5)

6) MEAN X and MEAN Y are the mean of all entered x and y data.
7) N is the number of groups of samples
8) Y/X is the forced slope of the line through the origin.
9) S^2_{yx} is the residual variance, which is a quantity to see how good the pairs of observations are fitted to the regressionline. This quantity is used to calculate the standarddeviation of the slope and the intercept and the experimental deviations. (11)
10) aG and Bg are the weighed slope and intercept (6)(7)
11) a and b are the unweighed slope and intercept, which are derived from the assumption that x is without error.(9)(10)
12) ±.. is the standarddeviation of the slope and intercept.(12)
13) S_xEXP, S_yEXP are the experimental standarddeviations around the regressionline. These quantities are also estimated in the multiphorous data entered.(13)
14) With aid of the F-test of Fisher we can test whether the standarddeviation derived experimentelly and from the data are significantly different from eachother or not. If so then there is a systematic error between the x and y method.(14)
If F<1.0 you have to perform 1/X and to change the degrees of freedom n-2 and k-1, to read an upper percentage point table.
n= number of samples used for S^2_x, S^2_y.(Df given at t-test is already n-2)
k= number of samples used for S^2_x, S^2_y.(When program TRIPLO is used k=3, when program sixfold k=6)

(..) refers to the formulas at page 2.

PROGRAM DESCRIPTION II

PROGRAMMBESCHREIBUNG II
DESCRIPTION DU PROGRAMME II
DESCRIZIONE DEL PROGRAMMA II

Example
Beispiel
Exemple
Esempio

Ten samples are tested in duplo in test x and y.

		Method Y		Method X	
Sample	1	25	28	30	35
	2	100	107	120	145
	3	125	118	125	144
	4	27	30	18	25
	5	250	265	265	278
	6	77	80	85	98
	7	110	108	125	128
	8	380	400	435	407
	9	425	424	470	478
	10	184	186	185	198

ketch
kizze
Croquis
Schizzo

(Example continued)
(Beispiel Fortsetzung)
(Exemple, suite)
(Esempio)

PROGRAM DESCRIPTION III

PROGRAMMBESCHREIBUNG III
DESCRIPTION DU PROGRAMME III
DESCRIZIONE DEL PROGRAMMA III

Data Input Dateneingabe Données Dati	Keystrokes Tasten Touches Tasti	Result Resultat Résultat Risultato	Comments Kommentare Commentaires Commenti
	XEQ "GRGR"	INPUT?	If you know the standarddeviation
		MEAN=1	of x and y, enter 1
		DUPLO=2	If the test is done in duplo
		TRIPLO=3	enter 2, if in fivefold, 5
	(and so on)	ASO	
2	R/S	↑Y	
25	R/S	1	
28	R/S	↑X	
30	R/S	1	
35	R/S	↑Y	
100	R/S	1	
198	R/S	↑Y	
	R/S	SDEV X=11.01	
	R/S	SDEV Y=6.16	
		LAMBDA=3.19	
		Sx.y=196105	
		Sx.x=213980	
		Sy.y=180474	
		R=0.9979	
		T=43.758 DF=8	
		MEAN x=189.7	
		MEAN y=172.5	
		N=10	
		Y/X=0.909	
		Sy.x↑2=94.1	
		Sy.x=9.7	
		aG=0.919±0.021	
		bG=-1.933±5.023	
		a=0.916±0.021	
		b=-1.403±5.023	
		Sx EXP=12.760	
		Sy EXP=1.999	
		Fx=1.3435	(Df= 10 - 2, 2 - 1) =(8,1)
		Fy=0.1053	If you want to perform 1/X;
			USER OFF, 1/X, X<>Y, 1/X
	B	SDEV x?	
10	R/S	SDEV y?	
1	R/S	LAMBDA=100.00	
		Sy.x↑2=94.2	The results not
		aG=0.920±0.021	written down here
		bG=-2.121±5.027	are the same.
		Sx EXP=71.435	
		Sy EXP=0.845	
		Fx=510.2897	
		Fy=7.1435	(Df= (10 - 2, 10 - 1) = (8,9)
Here samples are tested in method x and y.			
The standarddeviation in method x is 10, in y 1.			

USER INSTRUCTIONS I

PROGRAMMABLAUF I
INSTRUCTIONS D'EMPLOI I
NORME OPERATIVE I

Step Schritt Pas Passo	Instructions Operation Instructions Istruzioni	Variables Dateneingabe Données Dati	Function(s) Taste(n) Touche(s) Tasti	Result Resultat Résultat Risultato
	If you want to make corrections			
	Than there are two possibilities			
			A	LAST↑=1
1)	If you are in the x or y			
	modus, which means that you			
	are still entering x or y			
	values, you can enter 1.	1	R/S	↑X or ↑Y
	You have to start again with			
	the data of the x or y multi-	1	R/S	1.0000
	phorous group.	9	R/S	2.0000
	If you want to delete say a	(wrong)	A	LAST↑=1
	y-value and ↑X already appeared	1	R/S	↑Y or ↑X
	in the display, than use the	1	R/S	1.0000
	other correction procedure.	3	R/S	2.0000
		a.s.o.		
2)	If you detect your mistake			
	later or if you want to delete			
	a group of data		A	LAST↑=1
			R/S	↑FALSE↑
				↑Y
		Enter the X and Yvalues to delete		
		starting with the y values		
	If you want to add data:		C	↑Y ↑X
		Add the new data		

PROGRAM LISTING
PROGRAMMAUFLISTUNG
LISTAGE DU PROGRAMME
LISTATO DI PROGRAMMA

Line Zeile Ligne Linea	Keystrokes Tastenfolge Touches Tasti	Comments Kommentar Commentaires Commenti	Line Zeile Ligne Linea	Key pressed Tastenfolge Touches Tasti	Comments Kommentar Commentaires Commenti
01	◊ LBL GRGR		51	ΣREG 17	
	ΣREG 11			CLΣ	
	CLRG			↑Y	
	CLST			• CF 22	
05	INPUT?		55	PROMPT	
	AVIEW			• FC? 22	
	MEAN=1			GO TO 36 →	
	AVIEW			◊ LBL 31	
	DUPLO=2			Σ+	
10	AVIEW		60	RCL 23	
	TRIPLO=3			RCL 22	
	AVIEW			X=Y?	
	ASO			GO TO 32 →	
	AVIEW			STOP	
15	STOP		65	GO TO 31 →	
	STO 23			◊ LBL 32	
	◊ LBL C			MEAN	
	GO TO 30 →			• FC? 01	
	◊ LBL 01			STO 24	
20	RCL 16		70	• FS? 01	
	1			STO 26	
	+			SDEV	
	CLA			X↑2	
	FIX 0			• FS? 02	
25	ARCL X		75	GO TO 61 →	
	↑↑Y ↑X			• FC? 01	
	• CF 22			ST+ 25	
	PROMPT			• FS? 01	
	FIX 2			ST+27	
30	• FC? 22		80	• FS?C 01	
	GO TO 11 →			GO TO 35 →	
	STOP			◊ LBL 33	
	• FC? 02			CLΣ	
	Σ+			• SF 01	
35	• FS?C 02		85	↑X	
	←-			PROMPT	
	GO TO 01 →			GO TO 31 →	
	◊ LBL A			◊ LBL 35	
	CLST			ΣREG 11	
40	LAST↑=1		90	RCL 24	
	PROMPT			RCL 26	
	X=Y?			Σ+	
	GO TO 60 →			GO TO 30 →	
	• FS? 01			◊ LBL 60	
45	GO TO 33 →		95	↑FALSE↑	
	◊ LBL 30			AVIEW	
	RCL 23			• CF 01	
	1			• SF 02	
	X=Y?			GO TO 30 →	
50	GO TO 01 →		100	◊ LBL 61	

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Line Zeile Ligne Linea	Keystrokes Tastenfolge Touches Tasti	Comments Kommentar Commentaires Commenti	Line Zeile Ligne Linea	Key pressed Tastenfolge Touches Tasti	Comments Kommentar Commentaires Commenti
01	• FC? 01		51	X↑2	
	ST- 25			STO 25	
	• FS? 01			/	
	ST- 27			STO 01	
05	• FC? 01		55	GO TO 37 →	
	GO TO 33 →			Δ LBL 40	
	Δ LBL 63			• CF 09	
	RCL 24			RCL 15	
	RCL 26			RCL 11	
10	Δ LBL 62		60	RCL 13	
	Σ REG 11			*	
	Σ-			RCL 16	
	• CF 01			/	
	• CF 02			-	
15	GO TO 30 →		65	STO 02	
	Δ LBL 36			FIX 0	
	Σ REG 11			Sx.y=	
	RCL 27			ARCL 02	
	RCL 16			PROMPT	
20	/		70	RCL 12	
	SQRT			RCL 11	
	FIX 2			X↑2	
	SDEV X=			RCL 16	
	ARCL X			/	
25	PROMPT		75	-	
	RCL 25			STO 03	
	RCL 16			Sx.x=	
	/			ARCL 03	
	SQRT			PROMPT	
30	SDEV Y=		80	RCL 14	
	ARCL X			RCL 13	
	PROMPT			X↑2	
	RCL 27			RCL 16	
	RCL 25			/	
35	/		85	-	
	STO 01			STO 04	
	Δ LBL 37			Sy.y=	
	LAMBDA=			ARCL 04	
	FIX 2			PROMPT	
40	ARCL 01		90	RCL 02	
	PROMPT			RCL 03	
	GO TO 40 →			RCL 04	
	Δ LBL 11			*	
	LBL B			SQRT	
45	SDEV X=?		95	/	
	PROMPT			R=	
	X↑2			FIX 4	
	STO 27			ARCL X	
	SDEV Y =?			PROMPT	
50	PROMPT		200	STO Y	

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Line Zeile Ligne Linea	Keystrokes Tastenfolge Touches Tasti	Comments Kommentar Commentaires Commenti	Line Zeile Ligne Linea	Key pressed Tastenfolge Touches Tasti	Comments Kommentar Commentaires Commenti
001	RCL 16		51	RCL 02	
	2			X↑2	
	−			*	
	SQRT			+	
05	*		55	SQRT	
	X<>Y			RCL 04	
	X↑2			RCL 01	
	CHS			x	
	1			RCL 03	
10	+		60	−	
	SQRT			+	
	/			RCL 01	
	ABS			2	
	FIX 3			x	
15	T=		65	RCL 02	
	ARCL X			*	
	FIX 0			/	
	RCL 16			STO 05	
	2			MEAN	
20	−		70	RCL 05	
	├ DF=			*	
	ARCL X			CHS	
	PROMPT			+	
	FIX 1			STO 06	
25	RCL 11		75	FIX 2	
	RCL 16			RCL 15	
	/			RCL 16	
	MEAN X=			*	
	ARCL X			RCL 11	
30	PROMPT		80	RCL 13	
	RCL 13			*	
	RCL 16			−	
	/			RCL 03	
	MEAN Y=			RCL 16	
35	ARCL X		85	*	
	PROMPT			/	
	N=			STO 07	
	FIX 0			MEAN	
	ARCL 16			RCL 07	
40	PROMPT		90	*	
	FIX 3			CHS	
	RCL 03			+	
	RCL 04			STO 08	
	RCL 01			RCL 13	
45	*		95	RCL 11	
	−			/	
	X↑2			Y/X=	
	RCL 01			FIX 3	
	4			ARCL X	
50	*		100	PROMPT	

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001	RCL 04			X<>Y	
	RCL 05		350	/	
	2			1	
	*			+	
005	RCL 02			RCL 09	
	*			RCL 16	
	-		355	/	
	RCL 05			*	
	X↑2			SQRT	
010	RCL 03			• FS? 09	
	*			b=	
	+		360	• FC? 09	
	RCL 16			bG=	
	2			• FS? 09	
015	-			ARCL 08	
	/			• FC? 09	
	STO 09		365	ARCL 06	
	FIX 1			ŀ±	
	Sy.x↑2=			ARCL X	
020	ARCL 09			PROMPT	
	PROMPT			• FS?C 09	
	SQRT		370	GO TO 43 →	
	Sy.x=			• SF 09	
	ARCL X			a=	
025	PROMPT			ARCL 07	
	△LBL 41			GO TO 41 →	
	FIX 3		375	△LBL 43	
	RCL 09			RCL 01	
	RCL 03			RCL 05	
				X↑2	
				1	
330	STO Z		380	+	
	/			/	
	SQRT			RCL 09	
	• FS? 09			x	
	GO TO 42 →			STO 10	
335	aG=		385	SQRT	
	ARCL 05			Sx EXP=	
	△LBL 42			ARCL X	
	ŀ±			PROMPT	
	ARCL X			RCL 01	
340	PROMPT		390	/	
	RCL Y			STO 00	
	FIX 3			SQRT	
	RCL 11			Sy EXP=	
	RCL 16			ARCL X	
345	/		395	PROMPT	
	X↑2			RCL 10	
	RCL 16			RCL 27	
	*			RCL 46	

Please use paper glue to attach listings. Adhesive tape may affect print!
Bitte Listings mit Papierleim einkleben. Klebefilme können Druck bleichen!

S.V.P. utilisez de la colle à papier pour fixer les listings. Les rubans adhésifs peuvent altérer l'impression!
Per favore usare la colla per fissare i listati. Il nastro adesivo puo alterare lo stampato!

PROGRAM LISTING
PROGRAMMAUFLISTUNG
LISTAGE DU PROGRAMME
LISTATO DI PROGRAMMA

Line Zeile Ligne Linea	Keystrokes Tastenfolge Touches Tasti	Comments Kommentar Commentaires Commenti	Line Zeile Ligne Linea	Key pressed Tastenfolge Touches Tasti	Comments Kommentar Commentaires Commenti
	[illegible]		51		
000	/				
001	FIX 4				
	Fx=				
	ARCL X		55		
	PROMPT				
006	RCL 00				
	RCL 25				
	~~RCL 46~~				
	[illegible]		60		
013	/				
014	Fy=				
	ARCL X				
	PROMPT				
019	END		65		
20			70		
25			75		
30			80		
35			85		
40			90		
45			95		
50			00		

Please use paper glue to attach listings. Adhesive tape may affect print!
Bitte Listings mit Papierleim einkleben. Klebefilme können Druck bleichen!

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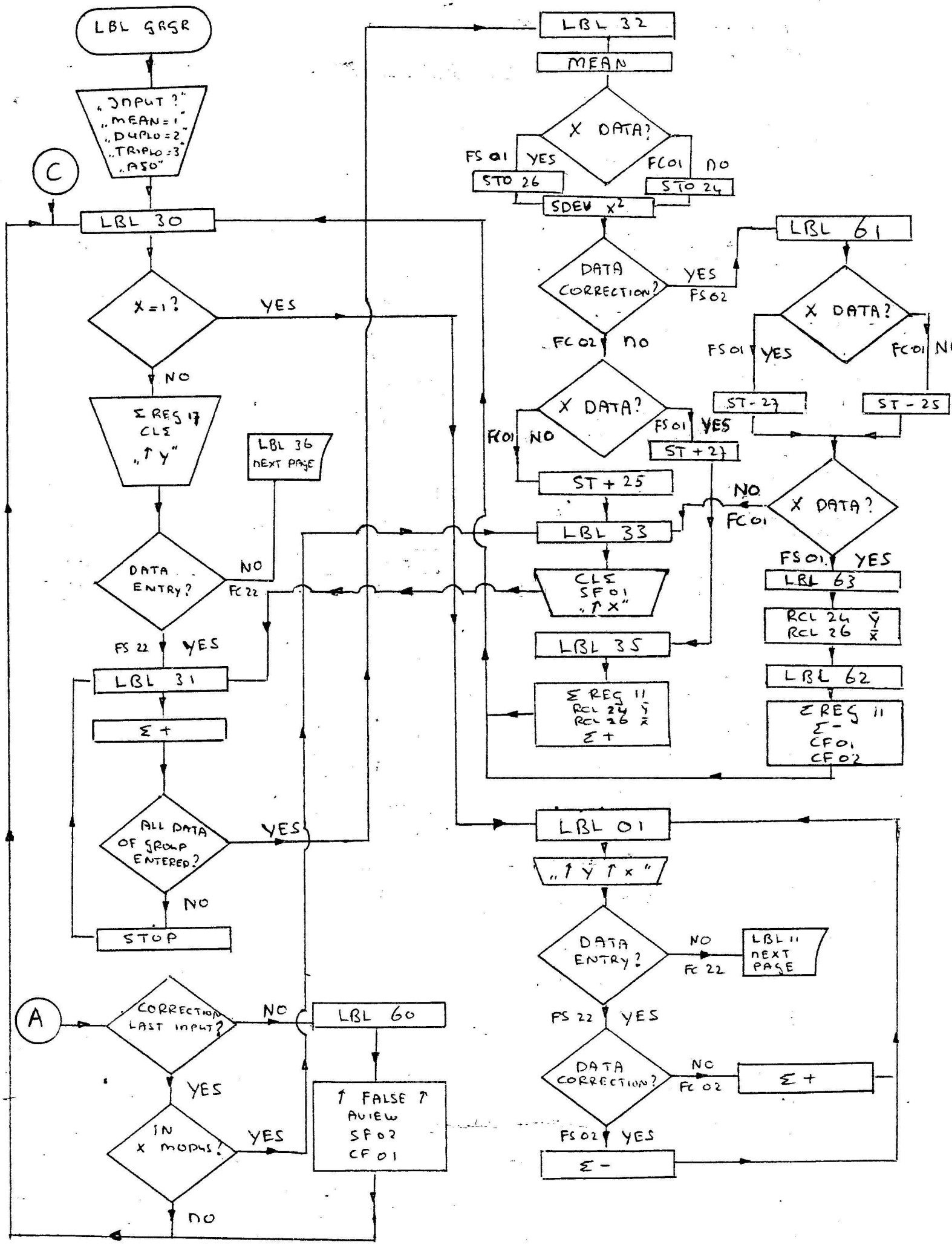
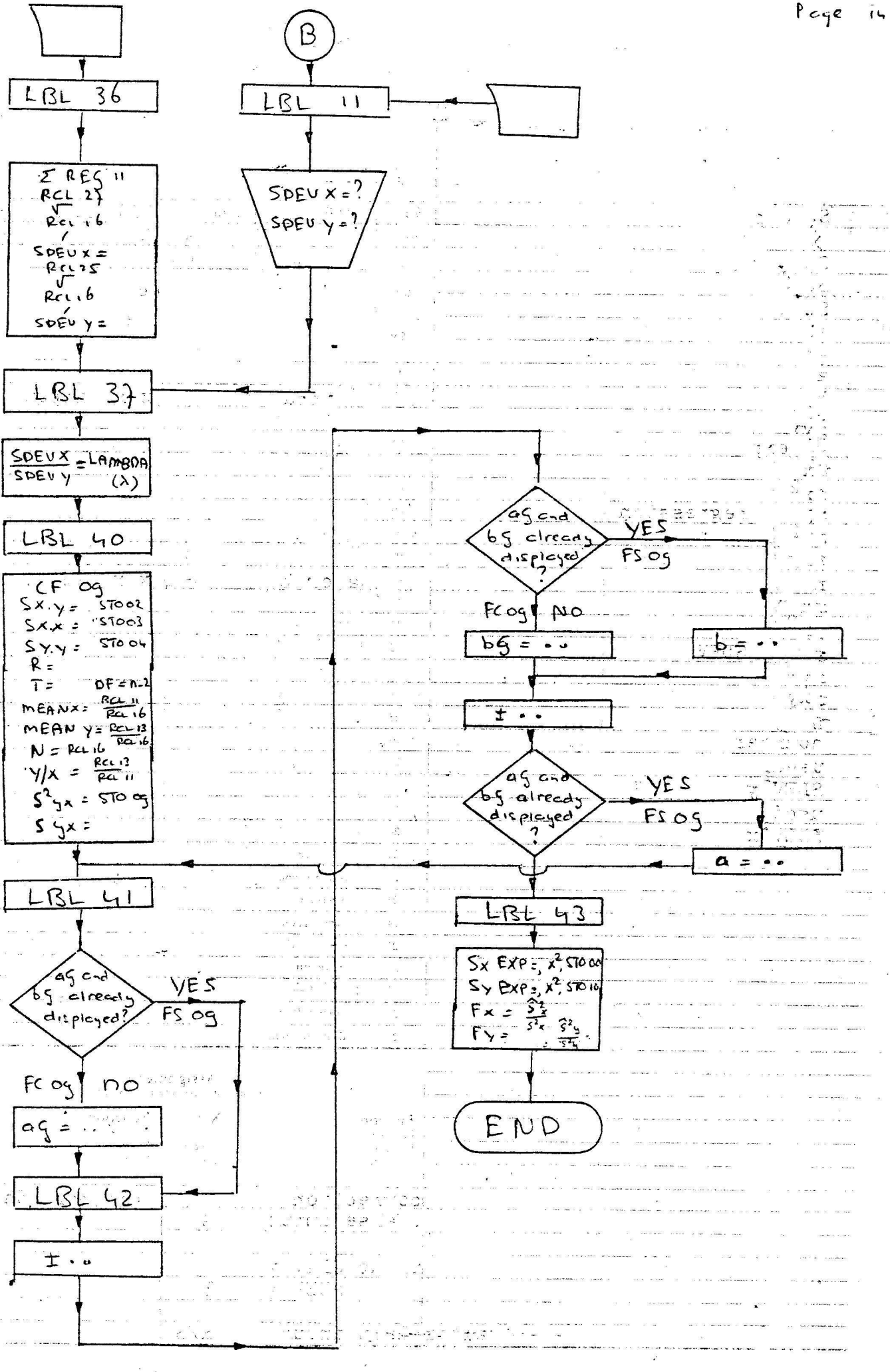
FLOWCHART


LBL GRGR
„INPUT ?"
„MEAN=1"
„DUPLO=2"
„TRIPLO=3"
„ASO"
C
LBL 30
X=1?
YES
NO
Σ REG 17
CLΣ
„↑Y"
DATA ENTRY?
NO
FC 22
LBL 36
NEXT PAGE
FS 22
YES
LBL 31
Σ+
ALL DATA OF GROUP ENTERED?
YES
NO
STOP
A
CORRECTION LAST INPUT?
NO
YES
IN X MODUS?
YES
NO
LBL 60
↑ FALSE ↑
AVIEW
SF 02
CF 01
LBL 32
MEAN
X DATA?
FS 01
YES
FC 01
NO
STO 26
STO 24
SDEV x²
DATA CORRECTION?
YES
FS 02
FC 02
NO
LBL 61
X DATA?
FS 01
YES
FC 01
NO
ST-27
ST-25
X DATA?
FC 01
NO
FS 01
YES
ST+27
ST+25
LBL 33
CLΣ
SF 01
„↑X"
LBL 35
Σ REG 11
RCL 24 ȳ
RCL 26 x̄
Σ+
X DATA?
NO
FC 01
FS 01
YES
LBL 63
RCL 24 ȳ
RCL 26 x̄
LBL 62
Σ REG 11
Σ-
CF 01
CF 02
LBL 01
„↑Y↑X"
DATA ENTRY?
NO
FC 22
LBL 11
NEXT PAGE
FS 22
YES
DATA CORRECTION?
NO
FC 02
Σ+
FS 02
YES
Σ-


LBL 36
B
LBL 11
Σ REG 11
RCL 27
√
RCL 16
/
SDEV x =
RCL 25
√
RCL 16
/
SDEV y =
SDEV x = ?
SDEV y = ?
LBL 37
SDEV x / SDEV y = LAMBDA (λ)
LBL 40
CF 0g
Sx.y = STO 02
Sx.x = STO 03
Sy.y = STO 04
R =
T = DF = n-2
MEAN x = RCL 11 / RCL 16
MEAN y = RCL 13 / RCL 16
N = RCL 16
Y/X = RCL 13 / RCL 11
S²yx = STO 0g
Syx =
LBL 41
ag and bg already displayed?
YES
FS 0g
FC 0g
NO
ag = . .
LBL 42
I . .
ag and bg already displayed?
YES
FS 0g
FC 0g
NO
bg = . .
b = . .
I . .
ag and bg already displayed?
YES
FS 0g
a = . .
LBL 43
Sx EXP =, x², STO 00
Sy EXP =, x², STO 10
Fx = Ŝ²x / S²x
Fy = Ŝ²y / S²y
END

REGISTERS, STATUS, FLAGS

REGISTERBELEGUNG, FLAGS, BETRIEBSARTEN
REGISTRES, INDICATEURS, MODES OPÉRATOIRES
REGISTRI, MODI OPERATIVI, FLAGS

Registers Datenspeicher / Registres de données / Registri

00	$\hat{S}_y$ exp	50	
	λ		
	$S_{x.y}$		
	$S_{x.x}$		
	$S_{y.y}$		
05	aG	55	
	bG		
	a		
	b		
	S^2_{yx}		
10	$\hat{S}_x$ exp	60	
	Σx		
	Σx^2		
	Σy } regression		
	Σy^2		
15	Σxy	65	
	n		
	Σx		
	Σx^2		
	Σy } SDEV		
20	Σy^2	70	
	Σxy		
	n		
	counter		
	used		
25	SDEV y	75	
	used		
	SDEV x		
30		80	
35		85	
40		90	
45		95	
		99	after last input

Status Betriebsart / Modes opératoires / Modi operativi

Size	028	Total Reg.	111	User Mode
Eng ☐	Fix ☒	Sci ☐		On ☒
Deg ☐	Rad ☐	Grad ☐		Off ☐

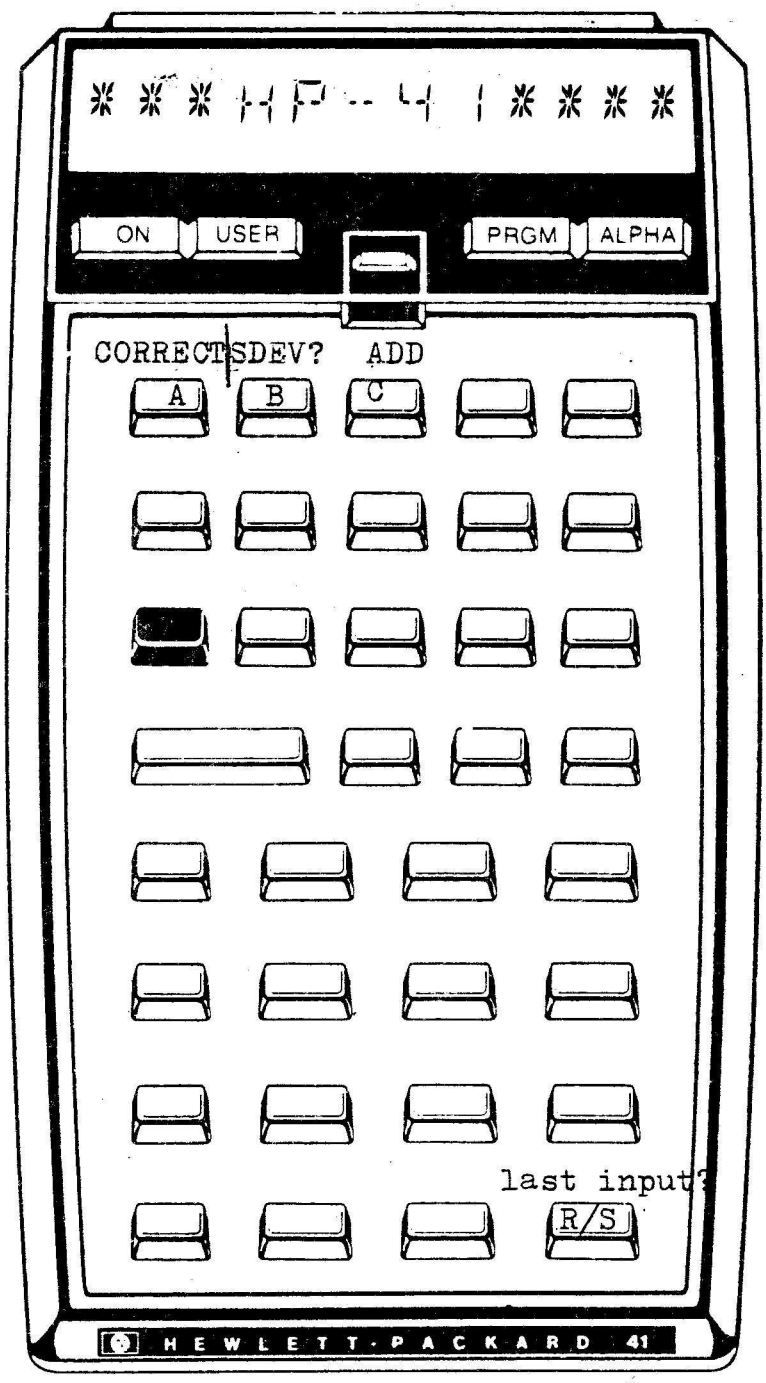
	Purpose (Bedeutung / Signification / Scopo)	Flags SET	Flags CLEAR	
00				
01	input x	x	x	input y
02				
03				
04				
05				
06				
07				
08				
09	a or b	x	x	aG or bG
10				
11	Audio execute			
12				
13				
14				
15				
16				
17				
18				
19				
20				
21	Printer Enable			
22	Number Input	used		
23	Alpha Input			
24	Range Ignore			
25	Error Ignore			
26	Audio Enable			
27	User Mode			
28	Decimal Point			
29	Digit Grouping			

Assignments
Tastenbelegung / Assignations / Assegnamenti

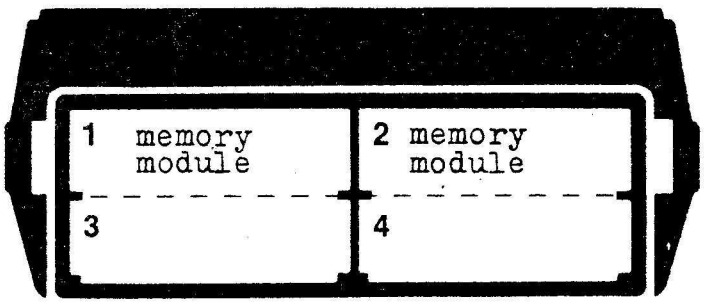
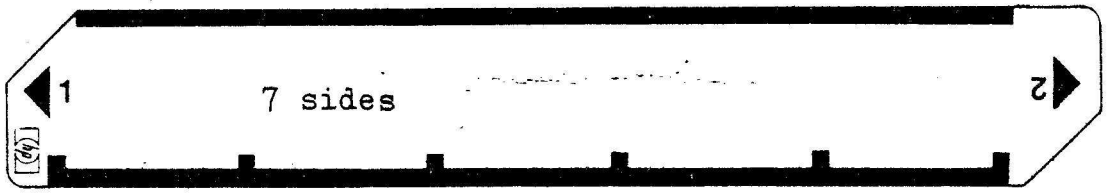
Function (Funktion / Fonction / Funzione)	Key (Taste / Touche / Tasto)	Function (Funktion / Fonction / Funzione)	Key (Taste / Touche / Tasto)
correction		Add more data	C
false input	A		
input SDEV x			
SDEV y	B		

SYSTEM CONFIGURATION
CONFIGURAZIONE DEL SISTEMA

Assignments
Belegungen
Assignations
Assegnamenti



Configuration
Belegung
Configuration
Configurazione



Magnetic card
Magnetkarte
Carte magnétique
Scheda magnetica