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01475C **HP 41C PROGRAM SUBMITTAL FORM**

PROGRAMMFORMBLATT/DOCUMENTATION DU PROGRAMME/GENERALITÀ SUL PROGRAMMA

1C

Program Title
Programmtitel / Titre du programme / Titolo del programma: INTERCHANGEABLE SOLUTIONS (IMPORTANT SUBROUTINE)

Category No. Kategorie Nr. / Catégorie N° / Categoria N°: 460
Name Rubrik / Rubrique / Nome della categoria: COMPUTER SCIENCE

No. of program lines Anzahl Programmzeilen / Nombre de lignes de programme / N° di linee di programma: 174

No. of data registers Anzahl des benötigten Datenspeicher / Nombre de registres de données / N° di registri utilizzati: 006

Recommended HP 41C System configuration
Empfohlene System-Konfiguration / Configuration recommandée / Configurazione raccomandata
Port #1: MEMORY MODULE Port #2:
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:

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

Program Name: Programm: / Nom du programme: / Programma:

Program Abstract Kurzbeschreibung / Résumé / Breve descrizione del programma:

THIS SET GIVES TWO PROGRAMS THAT RESOLVE THE FOLLOWING PROBLEM: YOU HAVE N VARIABLES THAT ARE RELATED TO EACH OTHER BY SOME FORMULAS; FOR INSTANCE: VAR 1 = F(VAR 2, VAR 7); K VARIABLES ARE GIVEN AS DATA, YOU WANT TO COMPUTE THE VALUES OF THE N-K REMAINING VARIABLES. THE FIRST PROGRAM USES A SO CALLED "DESCENDING" METHOD, WHICH IS VERY "INTELLIGENT", AND THE LAST A SO-CALLED "ASCENDING" METHOD, VERY POWERFUL AND RAPID. EXTENSIVE DOCUMENTATION. TOTAL NUMBER OF PROGRAM LINES: 1200.

PROGRAM SIZE: 283 BYTES

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10-20-81

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

THE ALGORITHM IS RATHER SIMPLE.
THE USER ORDERS THE PROGRAM TO COMPUTE A VARIABLE. AT THIS PURPOSE, THE PROGRAM CHOOSES A FORMULA TO BE EVALUATED THAT DOES NOT NEED A NON COMPUTABLE VARIABLE. IF THERE ARE NO SUCH FORMULAS, THE PROGRAM DISPLAYS AN ERROR MESSAGE. ELSE IF THIS FORMULA HAS NO UNKNOWNS, THE PROGRAM COMPUTES THE VARIABLE IN EVALUATING IT. ELSE THE PROGRAM ATTEMPTS TO COMPUTE ONE UNKNOWN VARIABLE OF THAT FORMULA, BY CHOOSING A FORMULA THAT DOES NOT NEED A NON COMPUTABLE VARIABLE OR A VARIABLE WHOSE COMPUTATION IS PENDING. THIS SECOND CONDITION IS USED TO AVOID AN INFINITE LOOPING. IF NO SUCH FORMULA EXISTS, THE PROGRAM RETURNS TO THE COMPUTATION OF THE VARIABLE THAT REQUIRED THE COMPUTATION OF THIS VARIABLE. ELSE IF THE FORMULA HAS NO UNKNOWNS, THE PROGRAM COMPUTES THE VARIABLE IN EVALUATING IT; IT THEN RETURNS TO THE COMPUTATION OF THE VARIABLE THAT REQUIRED THE COMPUTATION OF THIS VARIABLE AND RESUMES ITS ACTIVITY. ELSE THE PROGRAM ATTEMPTS TO COMPUTE ONE UNKNOWN VARIABLE OF THAT FORMULA. AND SO ON.

DEFINITIONS (1) A VARIABLE IS NON COMPUTABLE IF AND ONLY IF THE PROGRAM FOUND OUT THAT ALL ITS FORMULAS CONTAIN AT LEAST ONE NON COMPUTABLE VARIABLE OR ONE VARIABLE WHOSE COMPUTATION IS PENDING.

(2) A VARIABLE WHOSE COMPUTATION IS PENDING IS A VARIABLE WHOSE COMPUTATION WAS ABANDONNED IN ORDER TO COMPUTE A VARIABLE THAT IT REQUIRED.

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DESCENDING METHOD
– PROGRAM NO1

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

Operating limits and Warnings
Grenzen und Einschränkungen
Limites et restrictions
Limiti operativi e avvertenze

(1) IF THE COMPUTATION OF ANY VARIABLE INVOLVES AN IMPROPER OPERATION, THE PROGRAM WILL STOP AND DISPLAY THE REGULAR ERROR MESSAGE.

(2) THIS PROGRAM DOES NOT SUPPORT MATERIALLY MORE THAN 9 PENDING COMPUTATIONS OF VARS. IF THE CAPACITY IS EXCEEDED, AN ENDLESS LOOP COULD BE THE RESULT, OR THE DISPLAYED VA MAY NOT BE THE EXPECTED ONE (HOWEVER, ITS VALUE WILL NEVER BE FALSE)

(3) IF NOT ENOUGH DATA WAS GIVEN IN ORDER TO COMPUTE THE MAIN VAR, THE PROGRAM DISPLAYS "NOT ENOUGH DATA".

(4) THE MAXIMAL NUMBER OF VARIABLES IS 32

(5) *

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.
WEDER HP NOCH DER EINSENDER DES PROGRAMMS ÜBERNEHMEN FÜR DAS PROGRAMMATERIAL EINE IRGENDWIE GEARTETE GEWÄHRLEISTUNG ODER HAFTUNG, INSBESONDERE NICHT FÜR SEINE VERKÄUFLICHKEIT ODER SEINE VERWENDBARKEIT FÜR EINEN BESTIMMTEN ZWECK. HP UND DER EINSENDER HAFTEN AUCH NICHT FÜR INDIREKTE ODER FOLGESCHÄDEN.

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.
HP ET LE FOURNISSEUR NE DONNENT AUCUNE GARANTIE, EXPRESSE OU IMPLICITE CONCERNANT LE PRÉSENT PROGRAMME, NOTAMMENT DE COMMERCIALISATION ET D'ADAPTATION À UN USAGE PARTICULIER. HP ET LE FOURNISSEUR N'ASSUMENT AUCUNE RESPONSABILITÉ EN CE QUI CONCERNE LES DOMMAGES INDIRECTS NÉS DE LA FOURNITURE, DE L'UTILISATION OU DU FONCTIONNEMENT DU PRÉSENT PROGRAMME.

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.
NÉ LA SOCIETÀ NÉ L'AUTORE DANNO ALCUNA GARANZIA IMPLICITA O ESPLICITA CONCERNENTE IL PRESENTE PROGRAMMA, IN SPECIAL MODO RIGUARDO ALLA SUA COMMERCIALIZZAZIONE O ADATTABILITÀ AD UN USO PARTICOLARE. NE LA SOCIETÀ HP NE L'AUTORE ASSUMONO ALCUNA RESPONSABILITÀ PER DANNI IMMEDIATI O MEDIATI CAUSATI DALLA FORNITURA, UTILIZZAZIONE O FUNZIONAMENTO DEL PRESENTE PROGRAMMA.

*(5) MOREOVER, THIS PROGRAM HAS BEEN FURNISHED AT A DOCUMENTARY PURPOSE, SINCE THE

ALGORITHM

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SUBDIVISIONS COMPUTATION OF THE VARIABLE WHOSE VALUE HAS BEEN ASKED FOR BY THE USER} EACH OF THESE SUBDIVISIONS IS NAMED FROM THE NAME OF EACH VARIABLE; THEY HAVE THE FORM OF PROGRAMS }

BEGIN INITIALIZE ALL THE COMPUTATIONS;

SUBDIVISIONS UNCOMMON PART {FOR THE COMPUTATION OF THE VARIABLES AT ANY LEVEL, MAIN OR SECONDARY.

{EACH OF THESE SUBDIVISIONS IS NAMED FROM THE NUMBER OF EACH VARIABLE; THEY HAVE THE FORM OF SUBROUTINES}

BEGIN EXECUTE ALL THE OPERATIONS WHICH ARE NOT COMMON AMONG THE VARIABLES (STORAGE OF THE DECLARATIONS OF THE FORMULAS, STORAGE OF THE NUMBER OF THE VARIABLE IN THE FILE OF THE VARIABLE WHOSE COMPUTATION IS ON HAND)

SUBDIVISION COMMON PART

SUBDIVISION DISPLAY

BEGIN IF THE VALUE OF THE VARIABLE IS KNOWN

THEN DISPLAY IT

END {DISPLAY}

SUBdivision EXAMINATION OF THE FORMULA AND DEDUCTION OF THE FORMULA THAT HAS TO BE USED.

{USE OF THE HEURISTIC: THE FORMULA THAT HAS THE LEAST UNKNOWN VARIABLES IS THE BEST}

BEGIN WHILE THERE ARE STILL FORMULAS IN THE SET THAT WAS TRANSMITTED BY THE SUBDIVISIONS UNCOMMON PART

DO

BEGIN {EXAMINATION OF ONE FORMULA AND COMPARISON OF ITS NUMBER OF UNKNOWNS WITH THE NUMBER OF UNKNOWNS OF THE PRECEDENT FORMULA}

WHILE THERE ARE STILL VARIABLES IN THE SET OF VARIABLES THE FORMULA WES

DO {LOOP THAT EXAMINES THE VARIABLES OF THE FORMULA}

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```
BEGIN TAKE A VARIABLE;
    IF THIS VARIABLE IS UNKNOWN THEN
        BEGIN IF THE COMPUTATION OF THE VAR IS PENDING
            OR IF THE COMPUTATION OF THE VARIABLE HAS ALREADY
                PERFORMED WITHOUT SUCCESS THEN
                    BEGIN ELIMINATE THE FORMULA; EXIT FROM
                        THE LOOP THAT EXAMINES THE VARS OF THE
                                                    FORMULA
                    END ;INCREASE THE COUNTER OF UNKNOWNS BY:
        END
    END;
    IF NUMBER OF UNKNOWNS OF THE ACTUAL FORMULA < NUMBER OF
        UNKNOWNS OF THE PRECEDENT ONE THEN
            BEGIN ELIMINATE THE PRECEDENT FORMULA; CHOOSE ACTUAL FORMU
            END
    END {EXAMINATION OF ONE FORMULA}
END {SUBDIVISION EXAMINATION OF THE FORMULAS}
SUBDIVISION TRIVIAL CASE Nº 1 OF THE RECURSION
BEGIN IF NUMBER OF POSSIBLE FORMULAS = 0 THEN
        BEGIN IF THE VALUE OF THE VARIABLE THAT IS ACTUALLY
            BEING COMPUTED WAS ASKED FOR BY THE USER THEN
            DISPLAY "NOT ENOUGH DATA" ELSE

                BEGIN DEFINE THE VARIABLE NOT COMPUTABLE; DEPILE THE
                NUMBER OF THE VARIABLE FROM THE PILE OF THE VARIABLES
                WHOSE VALUE IS ACTUALLY BEING COMPUTED; RETURN TO THE
                LAST RECURSIVE CALL WITH AN INDICATOR OF FAILOR.
                END
        END
END {SUBDIVISION TRIVIAL CASE Nº 1 OF THE RECURSION}
SUBDIVISION TRIVIAL CASE Nº 2 OF THE RECURSION
BEGIN IF NUMBER OF UNKNOWN VARIABLES (CHOSEN FORMULA) = 0 THEN
        BEGIN SET THE FLAG THAT INDICATES THAT THE COMPUTATION
            OF THE VAR WAS A SUCCESS; COMPUTE ITS VALUE; DEPIL
            THE NUMBER OF THE VARIABLE FROM THE PILE OF THE
```

IF THIS VAR IS THE ONE WHOSE VALUE WAS ASKED FOR BY THE USER, THEN
DISPLAY THE VAR AND ITS VALUE
ELSE BEGIN PUT AT ZERO THE SET OF THE NON COMPUTABLE VARS ; RETURN TO
THE LAST RECURSIVE CALL.
END
END
END { SUBDIVISION TRIVIAL CASE NO 2 OF THE RECURSION }
SUBDIVISION COMPUTATION OF A Variable FROM THE CHOSEN FORMULA
BEGIN FIND ONE UNKNOWN VARIABLE IN THE FORMULA ; EXECUTE RECURSIVELY ITS
COMPUTATION THROUGH THE SUBROUTINE " UNCOMMON PART " WHOSE NA
IS ITS NO ; DEPILE THE NUMBER OF THE VAR WHOSE VALUE WAS SOUGHT AT
THIS LEVEL ; GO TO THE SUBDIVISION THAT COMPUTES ITS VALUE { THE PROGR
RESUMES ITS ACTIVITY }
END { SUBDIVISION COMPUTATION OF A VAR FROM THE CHOSEN FORMULA }
END { SUBDIVISION " COMMON PART " }
END { SUBDIVISIONS " UNCOMMON PARTS " }
END { SUBDIVISION COMPUTATION OF THE VAR WHOSE VALUE HAS BEEN ASKED FOR BY
THE USER }

DESCENDING METHOD

PROGRAM DESCRIPTION II

PROGRAMMBESCHREIBUNG II
DESCRIPTION DU PROGRAMME II
DESCRIZIONE DEL PROGRAMMA II

— PROGRAM NO 01475 C

Example / Beispiel / Exemple / Esempio

- SOLVE THE FOLLOWING PROBLEM:

- A MARBLE OF MASS M_1 = 100 GRAMS HITS WITH A SPEED S_1 OF 12 M/S ANOTHER MARBLE, THAT IS MOTIONLESS, OF MASS M_2 = 200 GRAMS.

- THE SPEED S_1 FORMS AN ANGLE α OF 60° WITH THE LINE THAT PASSES THROUGH BOTH CENTERS. THE SHOCK IS "ELASTIC". COMPUTE

(1) THE ANGLE β OF DEPARTURE, OF THE FIRST MARBLE, WITH THE LINE OF CENTERS.

(2) THE SPEED S_1 // , OF THE FIRST MARBLE, BEFORE THE SHOCK, PARALLELY TO THE LINE OF CENTERS.

(3) THE SPEED S_1 ⊥ , OF THE FIRST MARBLE, BEFORE THE SHOCK, PERPENDICULARLY TO THE LINE OF CENTERS.

(4) THE SPEED S_1' // , OF THE FIRST MARBLE, AFTER THE SHOCK, PARALELY TO THE LINE OF CENTERS.

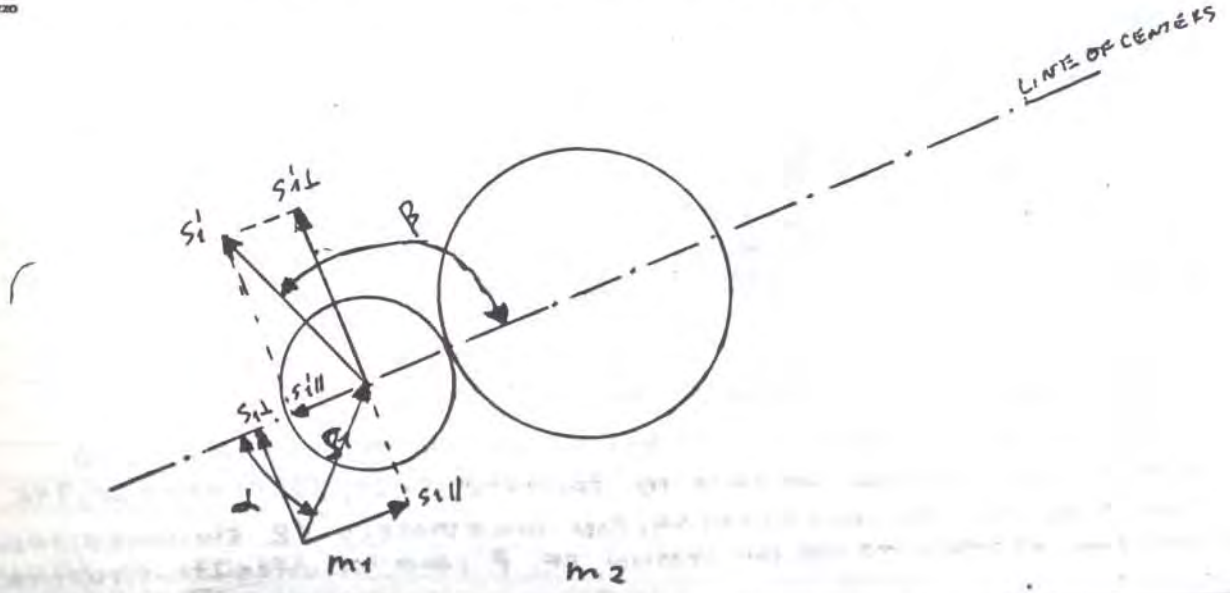
(5) THE SPEED S_1', OF THE FIRST MARBLE, AFTER THE SHOCK,

AND (6) THE SPEED S_2', OF THE SECOND MARBLE, AFTER THE SHOCK.

USE THE FOLLOWING FORMULAS THAT YOU WILL INPUT TO THE MACHINE IN THE FORM OF SUBROUTINES NUMBERED Like this:

Sketch / Skizze / Croquis / Schizzo

COLLISION (AND VARIABLES THAT INTERVENE)



DESCENDING METHOD - - PROGRAM NO 01475 C

PROGRAM DESCRIPTION II

PROGRAMMBESCHREIBUNG II
DESCRIPTION DU PROGRAMME II
DESCRIZIONE DEL PROGRAMMA II

Example FORMULAS THAT INTERVENE IN THE EXAMPLE OF ELASTIC OBLIQUE SHOCK
Beispiel
Exemple
Esempio AND NUMBERS OF THE SUBROUTINES THAT CORRESPOND:

(11) $S_1'' = \frac{m_1 - m_2}{m_1 + m_2} \cdot S_1''$

(12) $V_2' = \frac{m_1 \cdot 2}{m_1 + m_2} \cdot S_1''$

(13) $S_1 = \sqrt{S_1''^2 + S_1^{2}}$

(14) $S_1' = \sqrt{(S_1'')^2 + S_1'^2}$

(15) $S_1 = \frac{S_1''}{\cos\alpha}$

(16) $S_1'' = S_1 \cos\alpha$

(17) $\alpha = \text{ARCCOS} \frac{S_1''}{S_1}$

(18) $S_1 = \frac{S_1 \perp}{\sin\alpha}$

(19) $S_1 \perp = S_1 \sin\alpha$

(20) $\alpha = \text{ARC SIN} \frac{S_1 \perp}{S_1}$

(21) $S_1' = \frac{S_1''}{\cos\beta}$

(22) $S_1'' = S_1' \cos\beta$

(23) $\beta = \text{ARCCOS} \frac{S_1''}{S_1'}$

(24) $S_1' = \frac{S_1 \perp}{\sin\beta}$

(25) $S_1 \perp = S_1' \sin\beta$

(26) $\beta = \text{ARC SIN} \frac{S_1 \perp}{S_1'}$

(27) $S_1'' = S_2' - S_1''$

(28) $S_2' = S_1'' + S_1''$

(29) $S_1'' = S_2' - S_1''$

(30) $S_1'' = \frac{m_1 + m_2}{m_1 - m_2} S_1''$

(31) $m_1 = m_2 \frac{S_1'' + S_1''}{S_1'' - S_1''}$

(32) $m_2 = m_1 \frac{S_1'' - S_1''}{S_1'' + S_1''}$

(33) $S_1'' = \frac{m_1 + m_2}{2 m_1} S_2'$

(34) $m_1 = m_2 \frac{S_2'}{2 S_1'' - S_2'}$

(35) $m_2 = m_1 \frac{2 S_1'' - S_2'}{S_2'}$

(36) $S_2' = \sqrt{\frac{m_1}{m_2} (S_1^2 - S_1'^2)}$

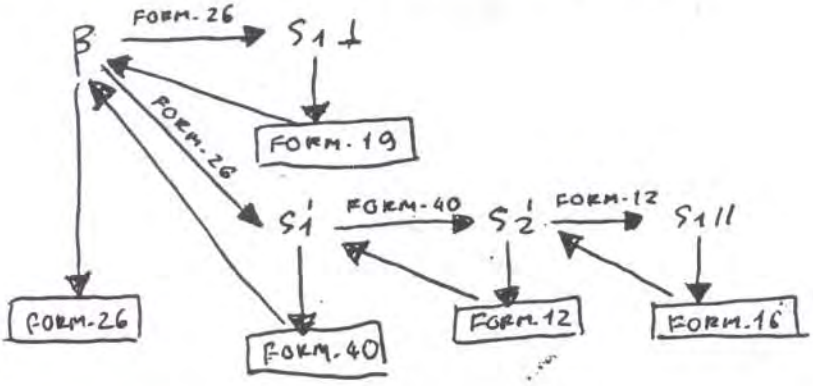
(37) $m_1 = m_2 \frac{S_2'^2}{S_1^2 - S_1'^2}$

(38) $m_2 = m_1 \frac{S_1^2 - S_1'^2}{S_2'^2}$

(39) $S_1 = \sqrt{\frac{m_2}{m_1} S_2'^2 + S_1'^2}$

(40) $S_1' = \sqrt{S_1^2 - \frac{m_2}{m_1} S_2'^2}$

Sketch OF HOW THE PROGRAM I COMPUTED β
Skizze
Croquis
Schizzo



THE BEGINNING OF THIS DIAGRAM MEANS:
TO COMPUTE β, THE PROGRAM DECIDES TO USE THE FORMULA NO 26; TO EVALUATE IT, THE PROGRAM ATTEMPT TO COMPUTE $S_1 \perp$; TO COMPUTE IT, THE PROGRAM EVALUATES FORMULA NO 19, WHO CAN IMMEDIATELY BE EVALUATED; THEN THE PROGRAM RETURNS TO THE COMPUTATION OF β, AND RESUMES ITS SITUATION.

PROGRAM DESCRIPTION III

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

PROGRAMMBESCHREIBUNG III
DESCRIPTION DU PROGRAMME III
DESCRIZIONE DEL PROGRAMMA III

01475C

	Data Input Dateneingabe Données Dati	Keystrokes Tasten Touches Tasti	Result Resultat Résultat Risultato	Comments Kommentare Commentaires Commenti
1.				ENTER THE PROGRAM "INTSOL 1" BY MEANS OF THE CARDS MARKED INTSOL (1)
2.				ENTER THE PROGRAM "USER" OF THE EXAMPLE BY MEANS OF THE CARDS MARKED USER (1)
3.		XEQ "DEG"		PUT IN DEGREES
4.		FIX 9		
5		SIZE 026		
6	10	XEQ "INCAL1" R/S	"N?" 10.	INITIALIZE THE PROGRAM ENTER THE NUMBER OF VARIABLES
7	.1	XEQ "M_1"	"M_1 = STORED"	ENTER M_1
8	.2	XEQ "M_2"	"M_2 = STORED"	ENTER M_2
9	12	XEQ "S_1"	"S_1 = STORED"	ENTER S_1
10	60	XEQ "AG"	"AG = STORED"	ENTER α (ITS NAME IS "AG" FOR THE PROGRAM)
11	["AG = STORED"]	XEQ "BG"	"BG = 79,106..."	COMPUTE β (ITS NAME IS "BG" FOR THE PROGRAM)
12.	["BG = 79,106..."]	XEQ "S_1="	"S_1 = 6.00..."	COMPUTE S_1 II (ITS NAME IS "S1" FOR THE PROGRAM)
13	["S_1 = 6,00..."]	XEQ "S1T"	"S_1T = 10,392..."	COMPUTE S_1 T (ITS NAME IS S_1T FOR THE PROGRAM)
14.	["S_1T = 10,392..."]	XEQ "S_1P="	"S_1P = -2,00..."	COMPUTE S_1' II
15	["S_1P = -2,00..."]	XEQ "S_1P"	"S_1P = 10,583."	COMPUTE S_1'
16.	["S_1P = 10,583."]	XEQ "S_2P"	"S_2P = 4,00..."	COMPUTE S_2'

REMARK : THE REAL VALUE OF β IS NOT 79,106°, BUT 100,89°. — INDEED, THE VALUE OF β WHEN COMPUTED BY FORMULA NO 426, PRESENTS AN INCERTITUDE AND MAY PROVE TO BE $(\pi - \beta)$ IF S_1' II < 0. THIS OCCURS BECAUSE OF THE ARCSIN FUNCTION.

DESCENDING METHOD
– PROGRAM NO1 014750

PROGRAM LISTING
PROGRAMMAUFLISTUNG
LISTAGE DU PROGRAMME
LISTATO DI PROGRAMMA

Line Zeile Ligne Linea	Keystrokes Tastenfolge Touches Tasti	Comments Kommentar Commentaires Commenti
01	*LBL"USER"	
	GTOINDX	
	*LBL"M1"	PROCEDURES
	SF00	THAT COMPUTE
05	*LBL01	THE VARIABLE
	"M1"	WHOSE VALUE
	SF02	THE USER
	31,021008	ASKED FOR,
	34,020708	ALPHANUMERICALLY
10	XEQ"ST"	LABELED BY
	-37,020706	THE NAME OF
	XEQ"ST"	THE VARIABLE
	1	
	GTO00	
15	*LBL"M2"	
	SF00	UNCOMMON PARTS
	*LBL02	FOR THE
	"M2"	COMPUTATION
	SF02	OF THE VARIABLES
20	32,010810	AT ANY LEVEL
	35,010708	(MAIN OR
	XEQ"ST"	SECONDARY)
	-38,01050607	
	XEQ"ST"	
25	2	
	GTO00	
	*LBL"AG"	THESE TWO
	SF00	GROUPES
	*LBL03	CONTAIN THE
30	"AG"	DECLARATIONS
	SF02	OF FORMULAS
	17,0805	AND OF THE
	20,0905	NAMES OF THE
	XEQ"ST"	VARIABLES.
35	3	
	GTO00	
	*LBL"BG"	
	SF00	
	*LBL04	
40	"BG"	
	SF02	
	23,1006	
	26,0906	
	XEQ"ST"	
45	4	
	GTO00	
	*LBL"S1"	
	SF00	
	*LBL05	
50	"S1"	

Line Zeile Ligne Linea	Key pressed Tastenfolge Touches Tasti	Comments Kommentar Commentaires Commenti
51	SF02	
	13,0809	
	15,0803	
	XEQ"ST"	
55	18,0903	
	39,01020607	
	XEQ"ST"	
	5	
	GTO00	
60	*LBL"S1P"	
	SF00	
	*LBL06	
	"S1P"	
	SF02	
65	14,0910	
	21,0410	
	XEQ"ST"	
	24,0409	
	40,01020507	
70	XEQ"ST"	
	6	
	GTO00	
	*LBL"S2P"	
	SF00	
75	*LBL07	
	"S2P"	
	SF02	
	12,010208	
	28,0810	
80	XEQ"ST"	
	-36,01020506	
	XEQ"ST"	
	7	
	GTO00	
85	*LBL"S1="	
	SF00	
	*LBL08	
	"S1="	
	SF02	
90	16,0503	
	27,0710	
	XEQ"ST"	
	33,010207	
	30,010710	
95	XEQ"ST"	
	8	
	GTO00	
	*LBL"S1T"	
	SF00	
100	*LBL09	

Please use paper glue to attach listings. Adhesive tape may affect print!
Bitte Listings mit Papierleim einkleben. Klebestreifen können Druck bleichen!
S.V.P. utiliser 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 può alterare la stampata!

PROGRAM LISTING
PROGRAMMAUFLISTUNG
LISTAGE DU PROGRAMME
LISTATO DI PROGRAMMA

DESCENDING METHOD
—PROGRAM NO 1 01475C

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
101	"ST"		151	* LBL 14	
	SF02			RCL 20	
	19.0503			X↑2	
	25.0604			RCL 19	
105	XEQ"ST"		155	X↑2	
	9			+	
	GTO 00			SQRT	
	*LBL"S1P="			RTN	
	SF00			* LBL 15	
110	*LBL 10		160	RCL 18	
	"S1P="			RCL 13	
	SF02			COS	
	11.010208			%	
	22.0604			RTN	
115	XEQ "ST"		165	* LBL 16	
	-29.0708			RCL 15	
	XEQ"ST"			RCL 13	
	10			COS	
	*LBL00			*	
120	GTO"INTSOL9"		170	RTN	
	* LBL 11	SUBROUTINES		* LBL 17	
	RCL 11	THAT		RCL 18	
	RCL 12	EVALUATE		RCL 15	
	-	THE FORMULA		%	
125	RCL 11	WHOSE NUMBER	175	ACOS	
	RCL 12	IS THEIR		RTN	
	+	LABEL		* LBL 18	
	%			RCL 19	
	RCL 18			RCL 13	
130	*		180	SIN	
	RTN			%	
	* LBL 12			RTN	
	RCL 11			* LBL 19	
	2			RCL 15	
135	**		185	RCL 13	
	RCL 11			SIN	
	RCL 12			*	
	+			RTN	
	%			* LBL 20	
140	RCL 18		190	RCL 19	
	*			RCL 15	
	RTN			%	
	* LBL 13			ASIN	
	RCL 18			RTN	
145	X↑2		195	* LBL 21	
	RCL 19			RCL 20	
	X↑2			RCL 14	
	+			COS	
	SQRT			%	
50	RTN		200	RTN	

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

S.V.P. utiliser de la colle à papier pour fixer les listings. Les rubans adhesifs peuvent altérer l'impression!
Per favore usare la colla per fissare i listati. Il nastro adesivo può alterare la stampa!

DECENDING METHOD
- PROGRAM NO1 01475C

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
201	* LBL 22		251	RCL 12	
	RCL 16			-	
	RCL 14			-/-	
	COS			RCL 20	
205	*		255	*	
	RTN			RTN	
	* LBL 23			* LBL 31	
	RCL 20			RCL 20	
	RCL 16			RCL 18	
210	-/-		260	+	
	ACOS			RCL 18	
	RTN			RCL 20	
	* LBL 24			-	
	RCL 19			-/-	
215	RCL 14		265	RCL 12	
	SIN			*	
	-/-			RTN	
	RTN			* LBL 32	
	* LBL 25			RCL 18	
220	RCL 16		270	RCL 20	
	RCL 14			-	
	SIN			RCL 18	
	*			RCL 20	
	RTN			+	
225	* LBL 26		275	-/-	
	RCL 19			RCL 11	
	RCL 16			*	
	-/-			RTN	
	ASIN			* LBL 33	
230	RTN		280	RCL 11	
	* LBL 27			RCL 12	
	RCL 17			+	
	RCL 20			RCL 11	
	-			2	
235	RTN		285	*	
	* LBL 28			-/-	
	RCL 18			RCL 17	
	RCL 20			*	
	+			RTN	
240	RTN		290	* LBL 34	
	* LBL 29			RCL 12	
	RCL 17			RCL 17	
	RCL 18			*	
	-			RCL 18	
245	RTN		295	2	
	* LBL 30			*	
	RCL 11			RCL 17	
	RCL 12			-	
	+			-/-	
250	RCL 11		300	RTN	

Please use paper glue to attach listings. Adhesive tape may affect print!
Bitte benutzen Sie Papierkleber zum Einkleben. Klebestreifen können Druck beeinflussen!
S.V.P. utilisez de la colle à papier pour fixer les listings. Les rubans adhésifs peuvent affecter l'impression!
Per favore usare la colla per attaccare i listati. Il nastro adesivo potrebbe influenzare la stampa!

DESCENDING METHOD
- PROGRAM NO 1

PROGRAM LISTING
PROGRAMMAUFLISTUNG
LISTAGE DU PROGRAMME
LISTATO DI PROGRAMMA

0i475C

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
301	* LBL 35		51	RCL 12	
	RCL 18			*	
	2			RCL 11	
	*			-/-	
305	RCL 17		55	RCL 16	
	-			X↑2	
	RCL 11			+	
	*			SQRT	
	RCL 17			RTN	
310	-/-		60	* LBL 40	
	RTN			RCL 15	
	* LBL 36			X↑2	
	RCL 11			RCL 17	
	RCL 12			X↑2	
315	-/-		65	RCL 12	
	RCL 15			*	
	X↑2			RCL 11	
	RCL 16			-/-	
	X↑2			-	
320	-		70	SQRT	
	*			END	
	SQRT				
	RTN				
	* LBL 37		75		
325	RCL 12				
	RCL 17			PROGRAM SIZE: 857 BYTES	
	X↑2				
	*			→ 3 MEMORY MODULES	
	RCL 15			TO RUN THE EXAMPLE	
330	X↑2		80		
	RCL 16				
	X↑2				
	-				
	-/-				
335	RTN		85		
	* LBL 38				
	RCL 15				
	X↑2				
	RCL 16				
340	X↑2		90		
	-				
	RCL 17				
	X↑2				
	-/-				
345	RCL 11		95		
	*				
	RTN				
	* LBL 39				
	RCL 17				
350	X↑2		00		

Use tape, glue to attach listings. Adhesive tape may affect print.
Verwenden Sie Papierkleber zum Befestigen der Listen. Klebestreifen können Druck bleichen.

S.V.P. utilisez de la colle à papier pour fixer les listings. Les rubans adhésifs peuvent effacer l'impression.
Per favore usare la colla per fissare i listati. Il nastro adesivo può sbiadire la stampa.

USER INSTRUCTIONS I

PROGRAMMABLAUF I
INSTRUCTIONS D'EMPLOI I
NORME OPERATIVE I

DESCENDING METHOD
- PROGRAM NO1 01475C

Step Schritt Pas Passo	Instructions Operation Instructions Istruzioni	Variables Dateneingabe Données Dati	Function(s) Taste(n) Touche(s) Tasti	Result Resultat Résultat Risultato
1	ENTER THE PROGRAM INTSOL 1			
	USE THE CARDS MARKED INTSOL 1			
2.	~~ENTER THE "USER" PROGRAM~~			
	THIS PROGRAM REQUIRES AS DATA :			
	• THE NAMES AND THE NOS OF THE VARS.			
	• THE SUBROUTINES THAT EVALUATE THE FORMULAS (ONE LABEL PER FORMULA); THE VALUES OF THE VARS USED TO EVALUATE THE FORMULA ARE SUPPOSED TO BE STORED IN REGISTERS, VAR N°1 IN REGISTER 11, .. VAR N°N IN REGISTER 10+N. THE VALUE OF THE FORMULA, THAT IS TO SAY, THE VALUE OF THE VAR THAT THE FORMULA EVALUATES, SHOULD BE IN THE X-REGISTER WHEN CONTROL RETURNS TO THE MAIN PROGRAM.			
	EX: LBL 11 RCL 11 RCL 12 − RCL 11 RCL 12 + % RCL 18 * RTN } $\frac{VAR1 - VAR2}{VAR1 + VAR2} \cdot VAR8$			
	• THE DECLARATIONS OF THE FORMULAS THAT EVALUATE EACH VAR, USING SOME OTHER VARS. THE FORM OF A DECLARATION SHOULD BE: THE LABEL OF THE SUBROUTINE THAT EVALUATES THE FORMULA SHOULD BE AT THE LEFT OF THE .. -DECIMAL POINT AS A TWO-DIGIT NUMBER; THEN THERE SHOULD BE A CHAIN OF NOS FOR the VARS THAT ARE USED IN THE FORMULA, AT THE RIGHT OF THE DECIMAL POINT, AND AS TWO-DIGIT NUMBERS:			
	EX. 11, 010208 FOR THE PREVIOUS FORMULA			
	IF THE FORMULA USES MORE VARS THAN FOUR, THE DECLARATION CAN SPAN ON ONE MORE LINE: THE ADDITIONNAL LINE	CAN BE CALLED THE "TAIL" OF THE DECLARATION, AND THE FIRST LINE, THE "HEAD".		
	EX: 12.0103050 4 .1809			

DESCENDING METHOD
~ PROGRAM N°1

01475C

Step Schritt Pas Passo	Instructions Operation Instructions Istruzioni	Variables Dateneingabe Données Dati	Function(s) Taste(n) Touche(s) Tasti	Result Resultat Résultat Risultatu
	THESE DATA ARE ENTERED IN THE FORM OF A PROGRAM TITLED "USER" AND APART FROM THE PROGRAM INTSOL 1. THIS PROGRAM HAS THE FOLLOWING GENERAL FORM:			
	IT STARTS BY:			
	LBL "USER"			
	GTO INDX			
	NEXT FOLLOW SOME BLOCKS THAT ALL HAVE THE SAME STRUCTURE.			
	THEY BEGIN BY:			
	LBL"....." (ALPHA NAME OF A VAR)			
	SF00			
	LBL NN (NO THAT CORRESPONDS TO THE VAR)			
	"....." (ALPHA NAME OF THE VAR)			
	SF02			
	NEXT, THESE BLOCKS INCLUDE ; WITH SAME GENERAL STRUCTURE:			
	FIRST, ONE OR TWO DECLARATIONS OF FORMULAS ; THREE POSSIBILITIES:			
	1) ONE DECLARATION THAT SPANS ON TWO LINES			
	EX: 12,01030504			
	.1809			
	2) ONE DECLARATION THAT SPANS ON ONE LINE; THIS MUST THEN BE SPECIFIED BY A NEGATIVE SIGN (-)			
	EX: -11,010208			
	3) TWO DECLARATIONS THAT SPAN EACH ON ONE LINE:			
	EX: 11,010208			
	13,04020903			
	AT THE END OF THIS DECLARATION-BLOCK IS THE ROUTINE THAT STORES THE DECLARATION:			
	XEQ "ST"			
	EXAMPLE OF DECLARATION-BLOCK:			
	11.010208			
	13.04020903			
	XEQ "ST"			
	THE BLOCKS THAT BEGIN BY THE ALPHA LABEL (ALPHA-BLOCKS) FINISH BY:			
	NN (N° OF THE VAR)			
	GTO 00			

DESCENDING METHOD
- PROGRAM NO1 01475C

USER INSTRUCTIONS II

PROGRAMMABLAUF II
INSTRUCTIONS D'EMPLOI II
NORME OPERATIVE II

Step Schritt Pas Passo	Instructions Operation Instructions Istruzioni	Variables Dateneingabe Données Dati	Function(s) Taste(n) Touche(s) Tasti	Result Resultat Résultat Risultato
	EXAMPLE OF ALPHA-BLOCK:			
	LBL "M1"			
	SF00			
	LBL 01			
	"M1"			
	SF02			
	31.021008			
	34.020708			
	XEQ "ST"			
	-37.020706			
	XEQ "ST"			
	1			
	GTO 00			
	THE LIST OF ALPHA-BLOCKS ENDS WITH:			
	LBL 00			
	GTO "INTSOL1"			
	THEN COMES THE LIST OF SUBROUTINES THAT EVALUATE FORMULAS; AND THE "END"			
	Ex: LBL 11			
	RCL 11			
	RCL 12			
	−			
	RCL 11			
	RCL 12			
	+			
	%			
	RCL 18			
	*			
	RTN			
	LBL 12			
	RCL 11			
	2			
	*			
	END			
	FOR EXAMPLE OF "USER" PROGRAM, SEE EXAMPLE FOR ELASTIC SHOCKS			
3.	INITIALIZE THE PROGRAM		XEQ "INCAL1"	"N?"
4.	INTRODUCE THE NUMBER OF VARS	N	R/S	N
5	SET THE CALCULATOR TO THE DISPLAY FORMAT AND ANGLE MODE YOU WANT			
6	ALLOCATE THE PROPER NUMBER OF DATA STORAGE REGISTERS		SIZE (12+N+k·M)	
	N: NUMBER OF VARS OF THE PROBLEM			
	M: MAXIMAL NUMBER OF FORMULAS PER VAR		? k, M; MAJORANT OF THE NUMBER OF LINES TO DECLARE A VAR	
	K: MEAN NUMBER OF LINES TO DECLARE A FORMULA			
7.	CLEAR THE INDICATOR OF MODE SUBROUTINE		CF 01	
5				
8.	ENTER ALL THE DATA YOU WANT	VALUE OF A VAR	XEQ "(NAME OF VAR)"	"(NAME OF VAR= STORED)"

DESCENDING METHOD
– PROGRAM N°1

01475C

PROGRAMMABLAUF II
INSTRUCTIONS D'EMPLOI II
NORME OPERATIVE II

Step Schritt Pas Passo	Instructions Operation Instructions Istruzioni	Variables Dateneingabe Données Dati	Function(s) Taste(n) Touche(s) Tasti	Result Resultat Résultat Risultato
	BY ENTERING THE VALUE OF A VAR AND			
	EXECUTING THE ROUTINE TITLED WITH ITS			
	NAME			
6.	WHEN YOU HAVE FINISHED TO INTRODUCE		XEQ " (NAME OF VAR)"	
	ALL THE DATA, COMPUTE OR RECALL THE			
	VALUE OF THE VAR YOU WANT BY EXECUTING			
	THE ROUTINE TITLED WITH ITS NAME			
	(WITHOUT ENTERING ANYTHING)			
7.	THERE ARE NOW TWO POSSIBLE DISPLAYS:			
	a) THERE WAS ENOUGH DATA :			" (NAME OF VAR) = ... "
	b) THERE WAS NOT ENOUGH DATA :			" NOT ENOUGH DATA "
	IF YOU HAVE MORE DATA TO INTRODUCE, GO TO STEP 5			
8.	IF YOU WANT TO SOLVE ANOTHER PROBLEM WITH DIFFERENT VALUES OF VARS, GO TO STEP 3 ELSE IF YOU WANT TO COMPUTE ANOTHER VAR, GO TO STEP 6			
9.	IF YOU WANT TO SEE IF THE VALUE OF A VAR IS KNOWN OR UNKNOWN, INTRODUCE THE N° OF THE VAR AND EXECUTE " VERF↑"	N° OF VAR	XEQ "VERF↑"	0 (IF VAR IS UNKNOWN) OR 1 (IF VAR IS KNOW

GENERAL REMARKS

1. NO NUMBER OF A VAR SHOULD BE EQUAL TO 0.
2. NO LABEL OF A SUBROUTINE THAT EVALUATES A FORMULA SHOULD BE EQUAL TO THE N° OF A VAR
3. NO VARS OR NO LABELS OF SUBROUTINES SHOULD HAVE THE SAME NAME (OR NUMBER)
4. THE REGISTERS 1, 4, 5, 8, 9, 10 CAN BE USED AS INTERMEDIATE REGISTERS BY THE SUBROUTINES THAT EVALUATE THE FORMULAS
5. YOU CANNOT CALL FROM A SUBROUTINE THAT EVALUATES A FORMULA THIS PROGRAM AS A SUBROUTINE (OF NEXT PAGE); INDEED, THIS PROGRAM, HAVING BEEN FORMATED AT A DOCUMENTARY PURPOSE, DOES NOT PROVIDE SUCH FACILITIES.

DESCENDING METHOD
-PROGRAM NO1 01475C

PROGRAMMABLAUF II
INSTRUCTIONS D'EMPLOI II
NORME OPERATIVE II

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Step Schritt Pas Passo	Instructions Operation Instructions Istruzioni	Variables Dateneingabe Données Dati	Function(s) Taste(n) Touche(s) Tasti	Result Resultat Résultat Risultato
	USING THE PROGRAM AS A SUBROUTINE			
	THIS PROGRAM HAS BEEN WRITTEN IN SUCH			
	A WAY AS TO EASE ITS USE AS A SUBROUTINE.			
	JUST PERFORM THE FOLLOWING STEPS TO			
	CALL IT.			
BEFORE	EACH NEW SET OF FORMULAS:			
1.	STORE THE PROGRAM "INTSOL1" AND "USER"			
	AS BEFORE.			
2.	STORE THE NUMBER OF VARS IN R0		N	
			STO 00	
BEFORE	EACH PROBLEM WITH NEW DATA:		0	
1.	STORE 0 IN R_C		STO 06	
2.	SET FLAG 1 (INDICATOR OF MODE SUBROUTINE)		SF 01	
	IN THE MODE SUBROUTINE, THE EXECUTION			
	WILL NEVER STOP			
3.	ENTER THE DATA AS BEFORE, EXCEPT THAT YOU SHOULD DO SF 22 BEFORE EACH ENTRY			
4.	COMPUTE THE VAR YOU WISH AS BEFORE		XEQ "(NAME OF	
			VAR)"	
5-	WHEN EXECUTION RETURNS TO THE			
	MAIN PROGRAM, THE FLAG 1 IS SET, STILL			
	AND THERE ARE TWO POSSIBILITIES:			
	a) THERE WAS ENOUGH DATA TO			
	COMPUTE THE VAR WHOSE VALUE			
	HAS BEEN ASKED FOR; THEN			
	THE FLAG 2 IS NOT SET AND THE			
	VALUE OF THE VAR IS IN THE			
	X-REGISTER.			
	b) THERE WAS NOT ENOUGH DATA			
	TO COMPUTE THE VAR; THEN THE			
	FLAG 2 IS SET.			
	YOU CAN INTRODUCE MORE DATA			
	IF YOU HAVE SOME.			

DESCENDING METHOD - PROGRAM N°1

PROGRAMMING HIGHLIGHTS

01475C

(1) - THE FLAGS THAT INDICATE WHETHER A VAR IS KNOWN OR UNKNOWN ARE FITTED IN ONLY ONE REGISTER, R_6. TO UNDERSTAND HOW, CONSIDER THAT THE CONTENT OF THAT REGISTER IS IN BASE TWO AND IS AN INTEGER.

- THERE ARE THEREFORE K DIGITS WORTH 1 OR 0. THEY REPRESENT THE STATUSES OF K-1 FLAGS, IN THE CASE YOU DO NOT USE THE DIGIT OF THE UNITS, BEING AT THAT YOU DEFINE AS THE POSITION NUMBER 0 FROM THE RIGHT.
- YOU CAN NOW SAY THAT THE DIGIT AT THE POSITION NUMBER P REPRESENTS THE STATUS (KNOWN OR UNKNOWN) OF THE VARIABLE NUMBER P.
- TO EXTRACT ITS VALUE FROM R_6, SHIFT THE NUMBER P POSITIONS TOWARDS THE RIGHT, TAKE ITS INTEGER PORTION, AND SEE IF THE LAST DIGIT OF THE NUMBER OBTAINED IS 1 OR 0.
- HOWEVER, SHIFTING A BINARY NUMBER P POSITIONS TOWARDS THE RIGHT IS THE SAME THING AS DIVIDING IT P TIMES BY 2, THAT IS TO SAY, BY 2^P. TO SEE IF THE LAST DIGIT IS 1 OR 0, PERFORM THE TRANSFORMED NUMBER MODULO 2.
- TO SET THE FLAG CORRESPONDING TO A VAR N° P, ADD TRIVIALLY 2^P TO R_6

(2) - THE REGISTERS 1 AND 2 FORM TOGETHER THE STACK OF THE VARIABLES WHOSE COMPUTATION IS ACTUALLY PENDING OR ON HAND.

- THIS STACK IS CONSTITUTED AS FOLLOWS:
  - R_1 CONTAINS A MAXIMUM OF 5 N°S OF VARIABLES OF TWO DIGITS IN FORM OF A NUMBER THAT IS SMALLER THAN
    EX: .01 04 02 07 03
    - THE NUMBER AT THE EXTREME RIGHT IS THE MAIN VARIABLE, AND THE NEXT ONE LEFT IS A VARIABLE WHOSE COMPUTATION WAS REQUIRED FOR THAT OF THE MAIN VARIABLE, AND SO ON.
  - IN R_2 ARE STORED, IN THE SAME WAY, N°S OF VARIABLES WHOSE COMPUTATION HAD BEEN REQUIRED AFTER THAT R_1 HAD BEEN FILLED.
- LIKEWISE, REGISTERS 3 AND 4 BUILD THE LIST OF NON COMPUTABLE VARIABLES

(3) THE INDICATOR OF END OF FILE OF DECLARATIONS IS A (-2) AFTER THE LAST ONE.

DESCENDING METHOD
— PROGRAM N°1
0i475C

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 "INTSOLV"	HAS A VAR	51	RCL00	
	FS?C 22	BEEN ENTERED?		STO08	
	GTO 01			RCL07	
	STO 07	STORE THE N°		XEQ 05	
05	FC?C 00	OF THE VAR.	55	x≠0?	IF THE VAR IS
	GTO 02			GTO 16	ALREADY KNOWN, DISPLAY IT.
	0	IF THE VAR IS		* LBL 06	BEGINNING OF A
	STO 02	THE MAIN ONE,		RCLIND 01	LOOP. IT EXAMINES TH
	STO 03	INITIALIZE THE		STO 07	FORMULAS ONE BY ON STARTING BY THE
10	STO 04	REGISTERS FOR	60	FC?00	HEAD
	STO 05	THE COMPUTATION		GTO 06	HEAD BEING EXAMINATED?
	CF 02	OF THE MAIN VAR		ABS	
	* LBL 02			1	
	RCL 02	ENTER THE N°		ST+02	
15	1E8	OF THE VAR	65	x<=Y?	IS THE AWAITHED
	*	CORRECTLY IN THE		GTO 11	TAIL A HEAD?
	FRC	STACK OF THE VARS		CF 02	
	x≠0?	THAT ARE BEEN COMPUTED:		RDN	
	GTO 03	IN R_3 IF R_2		* LBL 06	
20	RCL 07	IS FULL	70	x<0?	IS THE LIST OF DECL
	ST+02			GTO 04	OF FORMULAS TO AN EN
	100			* LBL 07	BEGINNING OF A LOOP
	ST/02			RCL 07	THAT EXAMINES ONE
	GTO 04			FRC	BY ONE THE VARS A
25	* LBL 01		75	100	FORMULA USES
	2	IF A VAR HAS		*	
	RCL Y	BEEN ENTERED		STO 07	
	Y↑X	STORE IT PROPERLY		INT	THE PROGRAM SETS A FAC A VAR
	ST+06	AND SET ITS BINARY		x=0?	IS ONE FINISHED WITH
30	CLX	INDICATOR THAT	80	GTO 11	THE EXAMINATION OF TH HEAD OR THE TAIL?
	10	IS ASSOCIATED		XEQ 05	
	+	WITH R_6		x≠0?	IS THE VALUE OF THE VAR KNOWN.
	x<>Y	(CF P.99)		GTO 07	
	STOINDY			CLX	
35	"+=STOREG"		85	2.005	INITIALIZATION FOR THE NEXT LOOP
	FS?01	MODE SBR?		STO 10	
	RTN	IF YES, RETURN		* LBL 15	BEGINNING OF A LOOP THAT EXAMINES
	PROMPT	TO THE MAIN PROGRAM		CLX	THE SETS OF NON
	* LBL 03			RCLIND 10	COMPUTABLE AND PRESENTLY COMPUTED
40	RCL 07		90	X↑2	VARS, REGISTER BY REGISTER.
	ST+03			* LBL 09	
	100			CLX	BEGINNING OF A LOOP THAT EXAMINES VAR.
	ST/03			LASTX	BY VAR. A REGISTER
	* LBL 04			FRC	THAT IS A SET OF VARS
45	11		95	100	
	RCL 00	INITIALIZE SOME		*	
	+	REGISTERS FOR		INT	ONE SETS APART A W
	STO 01	THE FOLLOWING		x=y?	IS THE VAR THE SAME
	0	LOOP		GTO 10	AS THAT OF THE FORMULA
50	STO 09		100	x≠0?	IS THE VALUE OF THE VAR KNOWN?

DESCENDING METHOD
- PROGRAM 1
01475C

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
101	GTO 09		148	ST-01	
	ISG 10	THE UNKNOWN VAR		SF00	
	GTO 15	IS NEITHER NOT	150	* LBL 12	
	.1	COMPUTABLE NOR		FC?C00	INVERSION OF
105	ST+01	PRESENTLY COMPUTED:		SF00	STATUS OF FLAG C
	GTO07	THEREFORE BE PROPER.		1	PASS ON THE NEXT
	* LBL10	THE FORMULA CONTAINS		ST+01	FORMULA OR PART
	RCL01	A NOT COMPUTABLE 155		GTO06	OF FORMULA.
	INT	OR PRESENTLY COMPUTED VAR;		* LBL13	
110	1	IT IS THEREFORE		CLX	SUBROUTINE TO
	+	IMPROPER AND HAS TO		RCL01	CONSECRATE THE
	ST001	BE SKIPPED		1	SUPERIORITY OF
	FS?C00	WAS THE TAIL BEING 160		-	A FORMULA ON
	GTO06	EXAMINATED? IF YES, EXAMINE NEXT FORM		100	ANOTHER
115	RCLINO01			%	
	1	IS THE SUPPOSED TAIL		+	
	X>Y?	DESIGNATED BY R1		STO08	
	ST+01	A TAIL? IF YES, SKIP IT	165	RTN	
	GTO06	EXAMINE NEXT		* LBL"VERF1"	
		FORMULA		* LBL05	SUBROUTINE
				RCL06	OF ACCESS TO
				2	THE STATUS
120	* LBL16	ROUTINE THAT	170	RCL7	(KNOWN OR
	RCL07	DISPLAYS THE		Y↑X	UNKNOWN) OF
	10	VALUE OF A VAR.		%	A VAR.
	+	IF THE PROGRAM		INT	
	RCLINOX	IS NOT IN MODE		2	
125	"F=	SUBROUTINE	175	MOD	
	ARCLX			RTN	
	FS?01			* LBL04	ALL THE FORMUL
	RTN			RCL09	WERE EXAMINED
	PROMPT			X≠0?	IS THE NUMBER O
130	* LBL11	ROUTINE SERVING TO PASS		GTO14	POSSIBLE FORMULAS
	FC?00	FROM REGISTER TO REG. 180		RCL02	IF NO, THE PROGRAM
	GTO12	WHILE EXAMINATING THE FORMULAS		100	FAILED
	1	HEAD WAS JUST EXAMINATED?		*1	Y WAS THERE
	ST+09			FRC	JUST ONE VAR IN
135	RCL01		185	X=0?	THE SET OF PRESE
	FRC	WHICH FORMULA		GTO10	COMPUTED VARS, A
	10	HAS MORE UNKNOWNS?		RCL03	WE TRYING NOW
	*	THE PRESENTLY		X=0?	COMPUTE THE MA
	RCL08	EXAMINED OR THE		RCL02	VAR?
140	X>Y?	PREVIOUS ONE?	190	100	IF YES, DISPLAY AN
	XEQ13	IF IT IS THE PREVIOUS ONE,		*1	ERROR MESSAGE
	RCL01	REPLACE IT BY THE OTHER ONE.		INT	SET APART THE VA
	INT			RCL04	WHOSE COMPUTAT
	STO01			168	CAUSED THE FAI
145	FC?C02	WAS THERE A	195	*1	OF THE PROGRAM
	GTO12	TAIL AND A HEAD		FRC	AND ADD IT TO
147	1	IN THE FORMULA?	197	X≠0?	THE SET OF NOT
					COMPUTABLE VARS,
					IN R4 OR R5, DEP
					DING ON THE SPA

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

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Per favore usare la colla per fissare i listati. Il nastro adesivo può alterare la stampa!

DESCENDING METHOD
– PROGRAM 1 –
01475C

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
198	GTO 01		248	GTO 16	IF YES, DISPLAY
	RDN			0	
200	ST+04		250	STO04	
	100			STO05	
	ST/04			* LBL 19	ROUTINE THAT
	GTO 19			CF00	TAKES THE
	* LBL 01			RCL03	LAST VAR THAT
205	RDN		255	X=0?	WAS ENTERED
	ST+05			SF00	AWAY FROM THE STACK
	100			X=0?	OF PRESENTLY
	ST/05			RCL02	COMPUTED VARS
	GTO 19			100	
210	* LBL 10		260	*	
	"NOT ENOUGH DATA"	DISPLAY		ERR	
	SF02	ERROR MESSAGE		FS?00	
	FS?01	AND SET		0	
	RTN	FLAG 2,		STO03	
215	PROMPT	(FAIL INDICATOR)	265	RDN	
	* LBL 14			FS?C00	
	RCL08	IF NUMBER OF UNKNOWNS		STO02	
	INT	(CHOOSED FORMULA)		GTO 12	RETURN TO THE
	X≠0?	≠0, THEN ATTEMPT		* LBL 14	LAST VAR THAT WAS BEING COMPUTED
220	GTO 14	TO COMPUTE ONE	270	RCL08	RECALL THE FORMULA
	RCL03	OF THEM. ELSE, SET APART		ERC	AND ITS COHORT
	X=0?	THE VAR WHOSE		100	OF VARS.
	RCL02	COMPUTATION IS		*	
	100	A SUCCESS		STO01	
225	*		275	RCLIND01	
	INT			STO07	
	STO07			* LBL 18	BEGINNING OF A LOOP
	2	SET THE INDICATOR		RCL07	THAT FINDS ONE UNKNOWN VAR
	X≷Y	ASSOCIATED WITH R_6		ERC	IN THE FORMULA.
230	Y↑X		280	X=0?	IS ONE FINISHED
	ST+06			GTO 14	WITH THE HEAD OF
	RCL08			100	THE FORMULA?
	ERC			*	IF YES, TAKE NEXT ONE
	100	SET APART AND		STO07	ELSE GET APART
235	*	EVALUATE THE	285	INT	A VAR.
	RCLINDX	FORMULA		XEQ05	
	XEQ 00			X≠0?	IS ITS VALUE KNOWN?
	RCL07			GTO 18	IF YES, TAKE NEXT ONE
	10	STORE THE		RDN	ELSE COMPUTE IT
240	+	VALUE OF THE	290	GTO00	
	XC>Y	VAR IN THE		* LBL 14	
	STOINDY	PROPER REGISTER		1	ONE PASSES TO
	RCL02	HAVE WE		ST+01	THE NEXT REGISTER
	100	JUST COMPUTED		RCLIND01	OF THE FORMULA,
245	*	THE MAIN VAR?	295	STO07	TO THE TAIL
	ERC			GTO 18	
249	X=0?		297	* LBL 12	DID ONE TAKE

DESCENDING METHOD
- PROGRAM 1 01475C

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
298	FS?C02	THE VAR AWAY FROM	51		
	GTO 12	THE STACK OF PRESENTLY COMPUTED VARS?			
300	SF02	IF YES TRY AGAIN TO COMPUTE IT: RESULTS THE SITUATION			
	GTO 19	ELSE TAKE IT AWAY FROM			
	* LBL 12	THE STACK	55		
	LASTX				
	* LBL 00	ROUTINE TO COMPUTE			
305	BTO"USER"	A VAR WHOSE NUMBER IS IN THE X-REGISTER.			
	* LBL "INCAL 1"				
	0	INITIALIZATION	60		
	STO06	OF THE PROGRAM			
	"N?"	BEFORE ANY			
310	PROMPT	INTRODUCTION OF DATA			
	STO00				
	RTN	ROUTINE TO STORE	65		
	* LBL"ST"	DECLARATIONS OF VARS.			
	FC?C02	HAS THERE ALREADY BEEN AN INTRODUCTION			
315	GTO12	OF FORMULAS?			
	RCL00	IF NO, INITIALIZE			
	STO01	R_1 FOR THE INTRODUCTION			
	CLX	OF FORMULAS			
	11				
320	ST+01				
	RDN				
	* LBL 12		75		
	X<0?	DOES THE FORMULA HAVE NO TAIL			
	GTO12	AND IS IT ALONE?			
325	X<>Y	IF NO, STORE THE			
	STOIND01	HEAD, OR THE			
	1	FIRST FORMULA.	80		
	ST+01				
	RDN				
330	RDN				
	* LBL 12				
	ABS	STORE THE TAIL,	85		
	STOIND01	OR THE HEAD, IF THE FORMULA			
	1	HAS NO TAIL AND IS			
335	ST+01	ALONE, OR THE SECOND FORMULA			
	-2	STORE THE INDICATOR			
	STOIND01	OF END OF FILE.	90		
	RT				
	END				
340					
45			95		
511			111		

REGISTERS, STATUS, FLAGS

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

Oi 475C

Registers Datenspeicher / Registres de données / Registri

00	NUMBER OF VARS=N	17
01	COUNTER FOR FILE OF FORMS	18
02	REGISTERS FOR THE STACK OF VARS	19
03	WHOSE COMPUTATION IS PRESENTLY PENDING OR ON HAND	20
04	REGISTERS FOR THE SET	
05	OF NOT COMPUTABLE VARS	
06	SET OF FLAGS FOR THE STATUS (KNOWN OR UNKNOWN) OF THE VARS	
07	INTERMEDIATE REGISTER	
08	CONTAINS THE N°OF UNKNOWN VARS(AA) AND THE ADDRESS IN MEMORY (BB) OF THE FORMULA WITH THE LEAST UNKNOWN VARS IN THE FORM AA;BB	
09	NUMBER OF FORMULAS WITHOUT NOT COMPUTABLE VARS OR VARS WHOSE COMPUTATION IS PENDING OR ON HAND	
10	COUNTER	
$R_m \rightarrow R_{(10+n)}$:	REGISTERS FOR THE VALUES OF THE VARS	
$R_{(11+n)} \rightarrow R_{(10+n+k\cdot m+1)}$:	REGISTERS FOR THE DECLARATIONS OF FORMULAS	
	m: MAXIMAL NUMBER OF FORMULAS	
12	k: MEAN NUMBER OF LINES FOR THE DECLARATION OF A FORMULA.	
13		
14		
15		
16		

Status Betriebsart / Modes opératoires / Modi operativi

INTSOL 1 : 571 BYTES

Size $10+N+k\cdot M+2$ Total Reg. $10+N+k\cdot M+2+$ BIBLIOTECA

User Mode: On ☐ Off ☐

Eng ☐ Fix ☐ Sci ☐

Deg ☐ Rad ☐ Grad ☐

Purpose		SET	CLEAR	Flags
	INTERMEDIATE USE ALSO			
10	ALPHA LABEL BELONGING TO THE CATEGORY UNCOMMON PART HAS JUST BEEN EXECUTED	X	X	NUMERICAL LBL BELONGING TO THE CATEGORY UNCOMMON PART HAS JUST BEEN EXECUTED
	LINE 60: HEAD HAS BEEN EXAMINED; TAIL IS BEING EXAMINED	X	X	LINE 60: THE HEAD IS BEING EXAMINED
01	THE PROGRAM HAS BEEN CALLED AS A SUBROUTINE BY ANOTHER PROGRAM	X	X	THE USER HAS DIRECTLY CALLED THE PROGRAM
	LINE 298: AFTER THE RETURN FROM A COMPUTATION OF A VAR, ONE HAS TAKEN THE NEXT VAR IN LINE AWAY FROM THE STACK OF PRESENTLY COMPUTED VARS	X	X	LINE 298: ONE HAS NOT TAKEN THE VAR AWAY FROM THE STACK
02	THE FIRST DECLARATION OF FORMULA HAS NOT YET BEEN ENTERED (IN LBL "ST")	X	X	THE FIRST DECLARATION OF FORMULA HAS BEEN ENTERED (IN LBL "ST")
	Printer Enable			
22	Number Input			
23	Alpha Input			
24	Range Ignore			
25	Error Ignore			
26	Audio Enable			
27	User Mode			
28	Decimal Point			
29	Digit Grouping			

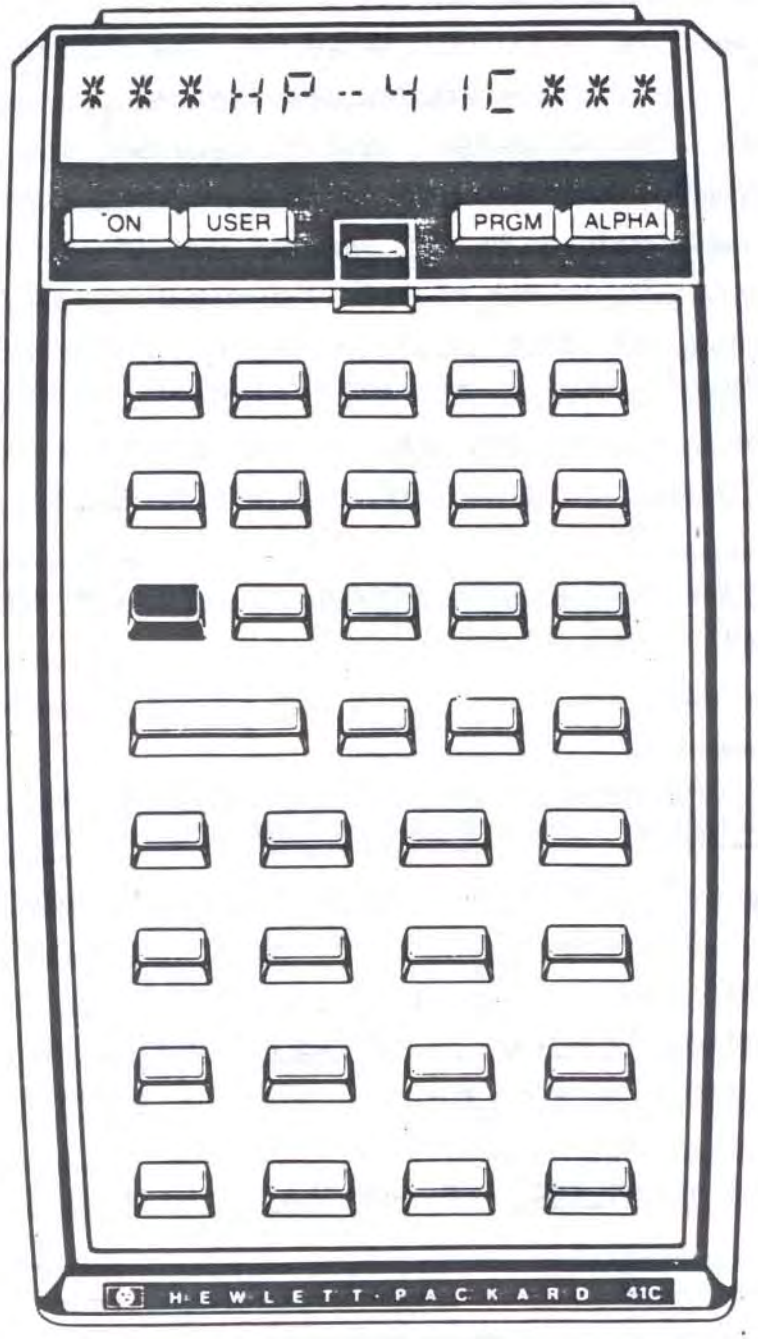
Assignments
Tastenbelegung / Assignations / Assegnamenti

Function	Key	Function	Key
REMARK: IT MAY BE USEFUL TO ASSIGN THE NAME OF EACH VAR THAT IS USED IN THE PROGRAM TO A KEY			

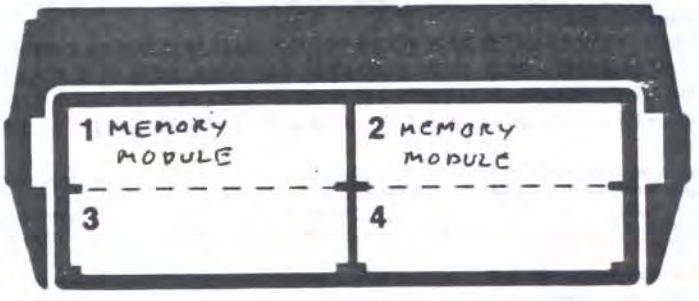
DESCRIPTION
– PROGRAM 1

0i475C

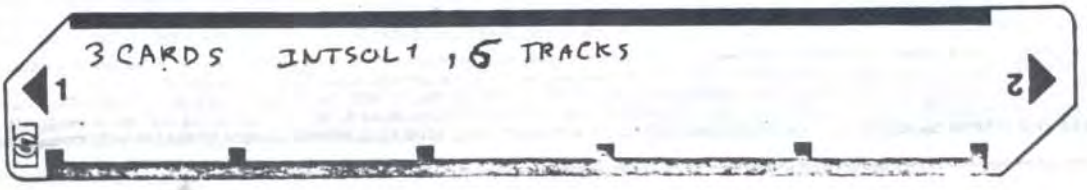
SYSTEM CONFIGURATION
CONFIGURAZIONE DEL SISTEMA



Assignments
Belegungen
Assignations
Assegnamenti



Configuration
Belegung
Configuration
Configurazione



Magnetic card
Magnetkarte
Carte magnétique
Scheda magnetica

01475C

ASCENDING METHOD
— PROGRAM II —

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

THE ALGORITHM IS SIMPLE AND POWERFUL.
IN MEMORY ARE THE DECLARATIONS OF FORMULAS *
THE PROGRAM SCANS THE SEQUENCE FROM THE BEGINNING AND SEEKS A FORMULA IMMEDIATELY EVALUABLE, WHEN IT FINDS ONE, IT EVALUATES IT AND PUTS ITS VALUE IN THE REGISTER CORRESPONDING TO THE VARIABLE THAT THIS FORMULA COMPUTES; THEN IT GOES TO THE BEGINNING OF THE SEQUENCE AND RESUMES ITS ACTIVITY.
EACH TIME IT SCANS THE FILE, IT ELIMINATES A DECLARATION WHEN ITS CORRESPONDING FORMULA COMPUTES AN ALREADY KNOWN VARIABLE.
WHEN THE PROGRAM ATTAINS THE END OF THE SEQUENCE, EXECUTION STOPS AND THE PROGRAM DISPLAYS THE VALUE OF THE VARIABLE THE USER WANTED TO COMPUTE.

SEE NEXT PAGE FOR A MORE FORMALISTIC DESCRIPTION OF THE PROCESS IN AN ALGORITHMIC NOTATION.

* A DECLARATION OF A FORMULA IS THE UNION OF THE N° OF THAT FORMULA, THE N° OF THE VAR IT COMPUTES AND THE NOS OF THE VARS IT USES.

Operating limits and Warnings
Grenzen und Einschränkungen
Limites et restrictions
Limiti operativi e avvertenze

- IF THE USER DID NOT FURNISH ENOUGH DATA TO COMPUTE THE VALUE OF THE SOUGHT VAR, PROGRAM EXECUTION WILL STOP AND THE CALCULATOR WILL DISPLAY "NOT ENOUGH DATA"
- IF THE EVALUATION OF A FORMULA CAUSES THE CALCULATOR TO PERFORM AN IMPROPER OPERATION, EXECUTION WILL STOP AND THE REGULAR ERROR MESSAGE WILL BE DISPLAYED
- THE UPPER LIMIT FOR THE NUMBER OF VARS IS 32.

ASCENDING METHOD

-PROGRAM 2 0i475C

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

```
PROGRAM IN ALGORITHMIC NOTATION
PROGRAM ASCENDING METHOD)
BEGIN GO TO BEGINNING OF FILE OF DECLARATIONS OF FORMULAS; WHILE NOT END OF FILE DO
BEGIN IF VALUE (VAR.-FORMULA*(CURRENT FORMULA)) =KNOWN THEN
ELIMINATE THE DECLARATION OF THE FORMULA FROM THE F
ELSE BEGIN q:=TRUE; GO TO BEGINNING OF FILE OF VARS OF
THE FORMULA;
WHILE THERE ARE VARS AND q DO
BEGIN TAKE A VAR; IF VALUE (VAR.)= UNKNOWN
THEN q:= FALSE
END; IF q:= TRUE THEN
BEGIN COMPUTE THE VALUE OF THE VAR.-FORMULA*
BY EVALUATING THE FORMULA; ELIMINATE THE
DECLARATION OF THE FORMULA FROM THE FILE;
GO TO BEGINNING OF FILE OF DECLARATION
OF FORMULAS.
END ELSE TAKE THE NEXT DECLARATION IF
END;
END; IF VALUE( VAR. THAT THE USER WANTS )=KNOWN THEN
DISPLAY IT
ELSE DISPLAY "NOT ENOUGH DATA"
END
```

* VAR.-FORMULA: VAR. THAT THE FORMULA COMPUTES.

Example / Beispiel / Exemple / Esempio

SOLVE THE FOLLOWING PROBLEM:

- A MARBLE OF MASS M_1 = 100 GRAMS HITS WITH A SPEED S_1 OF 12 M/S ANOTHER MARBLE, THAT IS MOTIONLESS, OF MASS M_2 = 200 GRAMS.
- THE SPEED S_1 FORMS AN ANGLE α OF 60° WITH THE LINE THAT PASSES THROUGH BOTH CENTERS. THE SHOCK IS "ELASTIC". COMPUTE

(1) THE ANGLE β OF DEPARTURE, OF THE FIRST MARBLE, WITH THE LINE OF CENTERS.

(2) THE SPEED S_1 ||, OF THE FIRST MARBLE, BEFORE THE SHOCK, PARALLELY TO THE LINE OF CENTERS.

(3) THE SPEED S_1 ⊥, OF THE FIRST MARBLE, BEFORE THE SHOCK, PERPENDICULARELY TO THE LINE OF CENTERS.

(4) THE SPEED S_1'||, OF THE FIRST MARBLE, AFTER THE SHOCK, PARALELY TO THE LINE OF CENTERS.

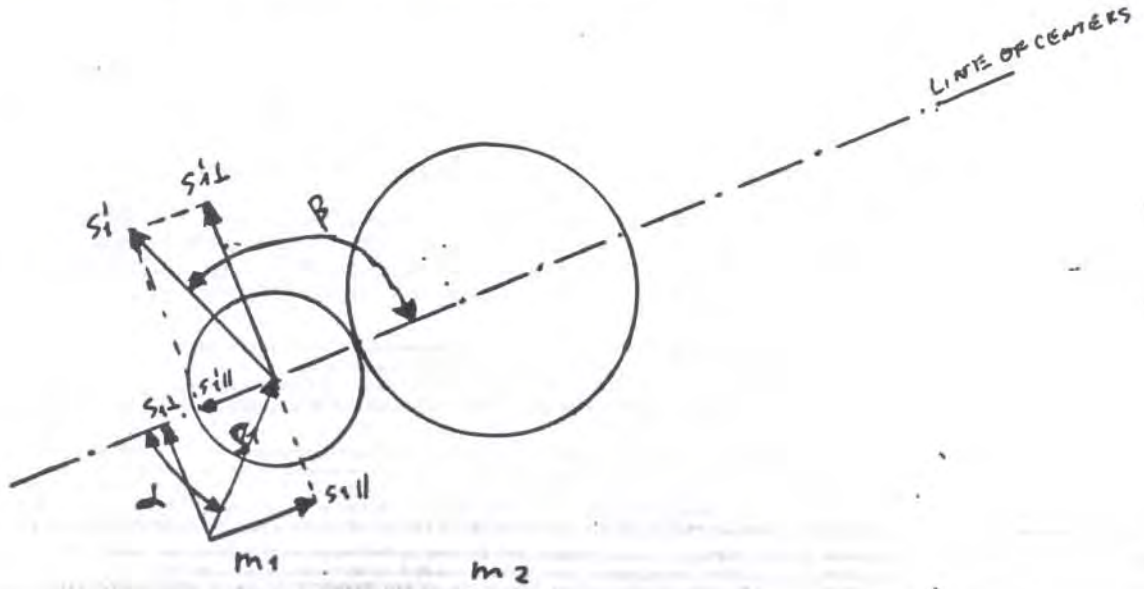
(5) THE SPEED S_1', OF THE FIRST MARBLE, AFTER THE SHOCK,

AND (6) THE SPEED S_2', OF THE SECOND MARBLE, AFTER THE SHOCK.

USE THE FOLLOWING FORMULAS THAT YOU WILL INPUT TO THE MACHINE IN THE FORM OF SUBROUTINES NUMBERED ~~LIKE THIS:~~.

Sketch / Skizze / Croquis / Schizzo

COLLISION (AND VARIABLES THAT INTERVENE)



DESCENDING METHOD -
- PROGRAM N° 01475 C

PROGRAM DESCRIPTION II

PROGRAMMBESCHREIBUNG II
DESCRIPTION DU PROGRAMME II
DESCRIZIONE DEL PROGRAMMA II

Example FORMULAS THAT INTERVENE IN THE 1 EXAMPLE OF ELASTIC OBLIQUE SHOCK
Beispiel
Exemple AND NUMBERS OF THE SUBROUTINES THAT CORRESPOND:
Esempio

(11) $S_1'' = \frac{m_1 - m_2}{m_1 + m_2} \cdot S_1''$

(12) $V_2' = \frac{m_1 \cdot 2}{m_1 + m_2} \cdot S_1''$

(13) $S_1 = \sqrt{S_1''^2 + S_1^{2\perp}}$

(14) $S_1' = \sqrt{(S_1'')^2 + S_1^{2\perp}}$

(15) $S_1 = \frac{S_1''}{\cos\alpha}$

(16) $S_1'' = S_1 \cos\alpha$

(17) $\alpha = \arccos \frac{S_1''}{S_1}$

(18) $S_1 = \frac{S_1^{\perp}}{\sin\alpha}$

(19) $S_1^{\perp} = S_1 \sin\alpha$

(20) $\alpha = \arcsin \frac{S_1^{\perp}}{S_1}$

(21) $S_1 = \frac{S_1''}{\cos\beta}$

(22) $S_1'' = S_1' \cos\beta$

(23) $\beta = \arccos \frac{S_1''}{S_1'}$

(24) $S_1' = \frac{S_1^{\perp}}{\sin\beta}$

(25) $S_1^{\perp} = S_1' \sin\beta$

(26) $\beta = \arccos(\mathrm{SGN}(S_1'') \cdot \cos(\arcsin \frac{S_1^{\perp}}{S_1'}))$

(27) $S_1'' = S_2' - S_1''$

(28) $S_2' = S_1'' + S_1''$

(29) $S_1'' = S_2' - S_1''$

(30) $S_1'' = \frac{m_1 + m_2}{m_1 - m_2} S_1''$

(31) $m_1 = m_2 \frac{S_1'' + S_1''}{S_1'' - S_1''}$

(32) $m_2 = m_1 \frac{S_1'' - S_1''}{S_1'' + S_1''}$

(33) $S_1'' = \frac{m_1 + m_2}{2 m_1} S_2'$

(34) $m_1 = m_2 \frac{S_2'}{2 S_1'' - S_2'}$

(35) $m_2 = m_1 \frac{2 S_1'' - S_2'}{S_2'}$

(36) $S_2' = \sqrt{\frac{m_1}{m_2} (S_1^2 - S_1'^2)}$

(37) $m_1 = m_2 \frac{S_2'^2}{S_1^2 - S_1'^2}$

(38) $m_2 = m_1 \frac{S_1^2 - S_1'^2}{S_2'^2}$

(39) $S_1 = \sqrt{\frac{m_2}{m_1} S_2'^2 + S_1'^2}$

(40) $S_1' = \sqrt{S_1^2 - \frac{m_2}{m_1} S_2'^2}$

Sketch
Skizze
Croquis
Schizzo

PROGRAM DESCRIPTION III

(Example continued) ASCENDING METHOD – PROGRAM 2
(Beispiel Fortsetzung)
(Exemple, suite)
(Esempio)

PROGRAMMBESCHREIBUNG III
DESCRIPTION DU PROGRAMME III
DESCRIZIONE DEL PROGRAMMA III

	Data Input Dateneingabe	Keystrokes Tasten	Result Resultat	Comments Kommentare Commentaires Commenti
0		SIZE 057		ALLOCATE THE PROPER AMOUNT OF DATA REGISTE
1				IF YOU WANT TO ENTER MANUALLY THE DATA FOR THIS
				SET OF FORMULAS; GO TO STEP 2. ELSE ENTER IN
		DATA FOR "INTSOL 2" [		STANDARD MODE THE CARDS MARKED "DATA
				FOR INTSOL 2"; GO TO STEP 174
2				ENTER THE CARDS MARKED "ININT 2";
3		XEQ ININT2	"N.-VAR.?"	EXECUTE THE INITIALIZATION ROUTINE
4	10	R/S	"ADR. OF VAR0?"	ENTER THE TOTAL NUMBER OF VARS IN THE PROBLEM
5	10	R/S	"NO OF SBR.?"	ENTER THE ADDRESS AT WHICH THE PROGRAM SHALL PUT THE VALUE OF A VAR NO 0 IF SUCH A VAR EXISTED. (I.E. (ADDRESS OF VAR 1) – 1)
6	11	R/S	"VAR.-FORM.?"	ENTER THE N° OF THE SUBROUTINE THAT COMPUTES A FORMULA
7	10	R/S	"VAR.?"	ENTER THE N° OF A VAR WHOSE VALUE THE FORMULA COMPUTES
8	1	R/S	"VAR.?"	ENTER THE N° OF A VAR WHOSE VALUE THE FORMULA REQUIRES IN ORDER TO BE EVALUATED
9	2	R/S	"VAR.?"	
10	8	R/S	"VAR.?"	
11	["VAR?"]	R/S	"NO OF SBR.?"	DON'T ENTER ANYTHING SINCE ALL THE VARS THE FORMULA REQUIRES HAVE BEEN ENTERED, AND PRESS ON R/S TO PASS ON TO THE NEXT FORMULA
12	12	R/S	"VAR.-FORM?"	
13	7	R/S	"VAR.?"	
14	1	R/S	"VAR.?"	
15	2	R/S	"VAR.?"	
16	8	R/S	"VAR.?"	
17	["VAR?"]	R/S	"NO OF SBR.?"	
18	13	R/S	"VAR.-FORM?"	
19	5	R/S	"VAR.?"	
20	8	R/S	"VAR.?"	
21	9	R/S	"VAR.?"	
22	["VAR"]	R/S	"NO OF SBR.?"	
23	14	R/S	"VAR.-FORM.?"	
24	6	R/S	"VAR.?"	
25	10	R/S	"VAR.?"	
26	9	R/S	"VAR.?"	
27	["VAR?"]	R/S	"NO OF SBR.?"	
28	15	R/S	"VAR.-FORM.?"	
29	5	R/S	"VAR.?"	
30	8	R/S	"VAR.?"	
31	3	R/S	"VAR.?"	
32	["VAR?"]	R/S	"NO OF SBR.?"	
33	16	R/S	"VAR.-FORM.?"	
34	8	R/S	"VAR.?	
35	5	R/S	"VAR.?	

PROGRAM DESCRIPTION III

(Example continued) ASCENDING METHOD – PROGRAM 2
(Beispiel Fortsetzung)
(Exemple, suite)
(Esempio)

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
36	3	R/S	"VAR ?"	
37	["VAR ?"]	R/S	"NO OF SBR. ?"	
38	17	R/S	"VAR. - FORM. ?"	
39	3	R/S	"VAR. ?"	
40	8	R/S	"VAR. ?"	
41	5	R/S	"VAR. ?"	
42	["VAR ?"]	R/S	"NO OF SBR. ?"	
43	18	R/S	"VAR. - FORM ?"	
44	5	R/S	"VAR. ?"	
45	9	R/S	"VAR. ?"	
46	3	R/S	"VAR. ?"	
47	["VAR ?"]	R/S	"NO OF SBR. ?"	
48	19	R/S	"VAR. - FORM. ?"	
49	9	R/S	"VAR. ?"	
50	5	R/S	"VAR. ?"	
51	3	R/S	"VAR. ?"	
52	["VAR ?"]	R/S	"NO OF SBR. ?"	
53	20	R/S	"VAR. - FORM ?"	
54	3	R/S	"VAR. ?"	
55	9	R/S	"VAR. ?"	
56	5	R/S	"VAR. ?"	
57	["VAR ?"]	R/S	"NO OF SBR. ?"	
58	21	R/S	"VAR. - FORM ?"	
59	6	R/S	"VAR. ?"	
60	10	R/S	"VAR. ?"	
61	4	R/S	"VAR. ?"	
62	["VAR ?"]	R/S	"NO OF SBR. ?"	
63	22	R/S	"VAR. - FORM. ?"	
64	10	R/S	"VAR. ?"	
65	6	R/S	"VAR. ?"	
66	4	R/S	"VAR. ?"	
67	["VAR ?"]	R/S	"NO OF SBR. ?"	
68	23	R/S	"VAR. - FORM. ?"	
69	4	R/S	"VAR. ?"	
70	10	R/S	"VAR. ?"	
71	6	R/S	"VAR. ?"	
72	["VAR ?"]	R/S	"NO OF SBR. ?"	
73	24	R/S	"VAR. - FORM ?"	
74	6	R/S	"VAR. ?"	
75	9	R/S	"VAR. ?"	
76	4	R/S	"VAR. ?"	
77	["VAR ?"]	R/S	"NO OF SBR. ?"	
78	25	R/S	"VAR. - FORM. ?"	
79	9	R/S	"VAR. ?"	
80	6	R/S	"VAR. ?"	
81	4	R/S	"VAR. ?"	
82	["VAR ?"]	R/S	"NO OF SBR. ?"	
83	26	R/S	"VAR. - FORM. ?"	
84	4	R/S	"VAR. ?"	
85	9	R/S	"VAR. ?"	

PROGRAM DESCRIPTION III

(Example continued) ASCENDING METHOD - PROGRAM 2
(Beispiel Fortsetzung)
(Exemple, suite)
(Esempio)

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
86	6	R/S	"VAR.?"	
87	["VAR.?"]	R/S	"NO OF SBR.?"	
88	27	R/S	"VAR.-FORM.?"	
89	8	R/S	"VAR.?"	
90	7	R/S	"VAR.?"	
91	10	R/S	"VAR.?"	
92	["VAR.?"]	R/S	"NO OF SBR.?"	
93	28	R/S	"VAR.-FORM.?"	
94	7	R/S	"VAR.?"	
95	8	R/S	"VAR.?"	
96	10	R/S	"VAR.?"	
97	["VAR.?"]	R/S	"NO OF SBR.?"	
98	29	R/S	"VAR.-FORM.?"	
99	10	R/S	"VAR.?"	
100	7	R/S	"VAR.?"	
101	8	R/S	"VAR.?"	
102	["VAR.?"]	R/S	"NO OF SBR.?"	
103	30	R/S	"VAR.-FORM.?"	
104	8	R/S	"VAR.?"	
105	1	R/S	"VAR.?"	
106	2	R/S	"VAR.?"	
107	10	R/S	"VAR.?"	
108	["VAR.?"]	R/S	"NO OF SBR.?"	
109	31	R/S	"VAR.-FORM.?"	
110	1	R/S	"VAR.?"	
111	2	R/S	"VAR.?"	
112	10	R/S	"VAR.?"	
113	8	R/S	"VAR.?"	
114	["VAR.?"]	R/S	"NO OF SBR.?"	
115	32	R/S	"VAR.-FORM.?"	
116	2	R/S	"VAR.?"	
117	1	R/S	"VAR.?"	
118	10	R/S	"VAR.?"	
119	8	R/S	"VAR.?"	
120	["VAR.?"]	R/S	"NO OF SBR.?"	
121	33	R/S	"VAR.-FORM.?"	
122	8	R/S	"VAR.?"	
123	1	R/S	"VAR.?"	
124	2	R/S	"VAR.?"	
125	7	R/S	"VAR.?"	
126	["VAR.?"]	R/S	"NO OF SBR.?"	
127	34	R/S	"VAR.-FORM.?"	
128	1	R/S	"VAR.?"	
129	2	R/S	"VAR.?"	
130	7	R/S	"VAR.?"	
131	8	R/S	"VAR.?"	
132	["VAR.?"]	R/S	"NO OF SBR.?"	
133	35	R/S	"VAR.-FORM.?"	
134	2	R/S	"VAR.?"	
135	1	R/S	"VAR.?"	

PROGRAM DESCRIPTION III

(Example continued) ASCENDING METHOD – PROGRAM 2
(Beispiel Fortsetzung)
(Exemple, suite)
(Esempio)

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
136	8	R/S	"VAR-2"	
137	7	R/S	"VAR-?"	
138	["VAR-2"]	R/S	"NO OF SBR-2"	
139	36	R/S	"VAR-FORM-?"	
140	7	R/S	"VAR-?"	
141	1	R/S	"VAR-?"	
142	2	R/S	"VAR-?"	
143	5	R/S	"VAR-?"	
144	6	R/S	"VAR-?"	
145	["VAR-?"]	R/S	"NO OF SBR-?"	
146	37	R/S	"VAR-FORM-?"	
147	1	R/S	"VAR-?"	
148	2	R/S	"VAR-?"	
149	7	R/S	"VAR-?"	
150	5	R/S	"VAR-?"	
151	6	R/S	"VAR-?"	
152	["VAR-2"]	R/S	"NO OF SBR-?"	
153	38	R/S	"VAR-FORM-?"	
154	2	R/S	"VAR-?"	
155	1	R/S	"VAR-?"	
156	5	R/S	"VAR-?"	
157	6	R/S	"VAR-?"	
158	7	R/S	"VAR-?"	
159	["VAR-2"]	R/S	"NO OF SBR-2"	
160	39	R/S	"VAR-FORM-?"	
161	5	R/S	"VAR-?"	
162	2	R/S	"VAR-?"	
163	1	R/S	"VAR-?"	
164	7	R/S	"VAR-?"	
165	6	R/S	"VAR-?"	
166	["VAR?"]	R/S	"NO OF SBR-?"	
167	40	R/S	"VAR-FORM-?"	
168	6	R/S	"VAR-?"	
169	5	R/S	"VAR-?"	
170	2	R/S	"VAR-?"	
171	1	R/S	"VAR-?"	
172	7	R/S	"VAR-?"	INTRODUCE THE LAST DATA
173	=	CLP "ININT2"		IF CLEAR PROGRAM "ININT2" SINCE IT HAS NOW BECOME USELESS
174				ENTER IN STANDARD MODE THE CARDS MARKED "USER (2)"
175				ENTER IN STANDARD MODE THE CARDS MARKED "INTSOL2"
176		DEG		SET CALCULATOR IN THESE MODES
177		FIX 2		FOR INSTANCE
178		CF 02 CF 01		MODE "INTRODUCE DATA" CLEAR MODE SUBROUTINE
179	.1	XEQ "M_1"	"M_1 = STORED"	INTRODUCE m_1
180	.2	XEQ "M_2"	"M_2 = STORED	" m_2
181	12	XEQ "S_1"	"S_1 = STORED"	" S_1
182	60	XEQ "AG"	"AG = STORED"	" α

01 41 30

PROGRAM DESCRIPTION III

(Example continued) ASCENDING METHOD – PROGRAM 2
(Beispiel Fortsetzung)
(Exemple, suite)
(Esempio)

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
183	["AG = STORED"]	XEQ "BG"	"BG = 100.89"	COMPUTE B
184	["BG = 100.89"]	XEQ "S_1 = "	"S_1 = = 6.00"	COMPUTE S_1 //
185	["S_1 = = 6.00"]	XEQ "S_1T"	"S_1T = 10.39"	COMPUTE S_1' //
186	["S_1T = 10.39"]	XEQ "S_1P"	"S_1P = -2.00"	COMPUTE S_1' //
187	["S_1P = ± -2.00"]	XEQ "S_1P"	"S_1P = 10,58"	COMPUTE S_1'
188	["S_1P = 10,58"]	XEQ S_2P	"S_2P = 4.00"	COMPUTE S_2'

ASCENDING METHOD
-PROGRAM 2 01475C

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 "USER"		51	-/-	
	GTO INDX	UNCOMMON PARIS		RCL 18	
M1	* LBL "M1"			*	
	"M1"	TO INTRODUCE		RTN	
05	1	OR TO COMMAND	55	* LBL 12	
	GTO 00	THE COMPUTATION		RCL 11	
M2	* LBL "M2"	OF VARS,		2	
	"M2"	TO TRANSLATE		*	
	2	THEIR NAMES		RCL 11	
10	GTO 00	IN NOS	60	RCL 12	
A	* LBL "AG"	AND TO PREPARE		+	
	"AG"	ALPHA REGISTER		-/-	
	3	FOR THE DISPLAY		RCL 18	
	GTO 00	ROUTING (I.E. TO		*	
15 B	* LBL "BG"	PUT THEIR NAME	65	RTN	
	"BG"	IN ALPHA REGISTER)		* LBL 13	
	4			RCL 18	
	GTO 00			X↑2	
S1	* LBL "S1"			RCL 19	
20	"S1"		70	X↑2	
	5			+	
	GTO 00			SQRT	
S1'	LBL "S1P"			RTN	
	"S1P"			LBL 14	
25	6		75	RCL 20	
	GTO 00			X↑2	
S2'	* LBL "S2P"			RCL 19	
	"S2P"			X↑2	
	7			+	
30	GTO 00		80	SQRT	
S1//	* LBL "S1="			RTN	
	"S1="			* LBL 15	
	8			RCL 18	
	GTO 00			RCL 13	
35 S1T	* LBL "S1T"		85	COS	
	"S1T"			-/-	
	9			RTN	
	GTO 00			* LBL 16	
S1//	* LBL "S1P="			RCL 15	
40	"S1P="		90	RCL 13	
	10			COS	
	* LBL 00			*	
	GTO "INTSOL2"			RTN	
	* LBL 11	SUBROUTINES		* LBL 17	
45	RCL 11	TO EVALUATE	95	RCL 18	
	RCL 12	THE FORMULAS,		RCL 15	
	-	ASSUMING THAT		-/-	
	RCL 11	ADDRESS OF VAR0		ACOS	
	RCL 12	= 10.		RTN	
50	+		100	* LBL 18	

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

S.V.P. utiliser 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 può alterare la stampa!

ASCENDING METHOD
- PROGRAM 2

PROGRAM LISTING
PROGRAMMAUFLISTUNG
LISTAGE DU PROGRAMME
LISTATO DI PROGRAMMA

01475C

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	RCL19		051	-/-	INCERTITUDE ON THE FUNCTION ASIN
	RCL13			ASIN	(ASIN(x)= β OR (π -
	SIN			GTO 04	THERE IS AN ADDITIONAL ROUTIN
	-/-			1	
005	RTN		055	xEQ02	
	* LBL19			x=0?	M_1 UNKNOWN?
	RCL15			GTO00	IF YES, TEST S'_{11}
	RCL13			2	
	SIN			xEQ02	
010	*		060	x=0?	M_2 UNKNOWN?
	RTN			GTO00	IF YES, TEST S'_{11}
	* LBL20			RCL11	IF M_1 AND M_2
	RCL19			RCL12	ARE KNOWN,
	RCL15			-	SIGN($M_1 - M_2$)
015	-/-		065	GTO01	= SIGN S'_{11} =
	ASIN			* LBL00	SIGN(cos β)
	RTN			10	
	* LBL21			xEQ02	
	RCL20			x=0?	S'_{11} UNKNOWN?
020	RCL14		070	SF02	IF YES, INSTRUCT
	COS			x=0?	MAIN PROGRAM TO
	-/-			RTN	SKIP THE CURRENT
	RTN			RCL20	FORMULA, SINCE
	* LBL22			* LBL01	INDETERMINATION REMAINS
025	RCL16		075	x<0?	IF SIGN(S'_{11})<0,
	RCL14			GTO01	THEN β:= π - β
	COS			RCL04	ELSE β:= β
	*			RTN	
	RTN			* LBL01	
030	* LBL23		080	-1	} π OR 180° OR
	RCL20			ACOS	} 200 GRAD
	RCL16			RCL04	
	-/-			-	
	ACOS			RTN	
035	RTN		085	* LBL02	
	* LBL24			GTO "VERI2"	
	RCL19			* LBL27	
	RCL14			RCL17	
	SIN			RCL20	
040	-/-		090	-	
	RTN			RTN	
	* LBL25			* LBL28	
	RCL16			RCL18	
	RCL14			RCL20	
045	SIN		095	+	
	*			RTN	
	RTN			* LBL29	
	* LBL26			RCL17	
	RCL19			RCL18	
050	RCL16	SINCE THERE IS AN 2(II)		-	

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ASCENDING METHOD
– PROGRAM 2

PROGRAM LISTING
PROGRAMMAUFLISTUNG
LISTAGE DU PROGRAMME
LISTATO DI PROGRAMMA

01475C

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
201	RTN		251	2	
	* LBL 30			*	
	RCL 11			RCL 17	
	RCL 12			–	
205	+		255	%	
	RCL 11			RTN	
	RCL 12			* LBL 35	
	–			RCL 18	
	%			2	
210	RCL 20		260	*	
	*			RCL 17	
	RTN			–	
	* LBL 31			RCL 11	
	RCL 20			*	
215	RCL 18		265	RCL 17	
	+			%	
	RCL 18			RTN	
	RCL 20			* LBL 36	
	–			RCL 11	
220	%		270	RCL 12	
	RCL 12			%	
	*			RCL 15	
	RTN			XT2	
	* LBL 32			RCL 16	
225	RCL 18		275	XT2	
	RCL 20			–	
	–			*	
	RCL 18			SQRT	
	RCL 20			RTN	
230	+		280	* LBL 37	
	%			RCL 12	
	RCL 11			RCL 17	
	*			XT2	
	RTN			*	
235	* LBL 37		285	RCL 15	
	RCL 11			XT2	
	RCL 12			RCL 16	
	+			XT2	
	RCL 11			–	
240	2		290	%	
	*			RTN	
	%			* LBL 38	
	RCL 17			RCL 15	
	*			XT2	
245	RTN		295	RCL 16	
	* LBL 34			XT2	
	RCL 12			–	
	RCL 17			RCL 17	
	*			XT2	
250	RCL 18		300	%	

ASCENDING METHOD
– PROGRAM 2

PROGRAM LISTING
PROGRAMMAUFLISTUNG
LISTAGE DU PROGRAMME
LISTATO DI PROGRAMMA

01475C

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
311	RCL11		51		
	*				
	RTN				
	* LBL39				
305	RCL17		55		
	XT2				
	RCL12				
	*				
	RCL11				
310	-/-		60		
	RCL16				
	XT2				
	+				
	SQRT				
315	RTN		65		
	* LBL40				
	RCL15				
	XT2				
	RCL17				
320	XT2		70		
	RCL12				
	*				
	RCL11				
	-/-				
325	-		75		
	SQRT				
	END				
30			80		
	PROGRAM SIZE = 532 BYTES				
	→ 2 MEMORY MODULES				
35			85		
40			90		
45			95		
50			00		

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ASCENDING METHOD
-PROGRAM 2 01475C

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
1	IN ORDER TO SOLVE A PROBLEM OF INTERCHANGEABLE SOLUTIONS, THIS PROGRAM REQUIRES AS DATA: • THE NAMES AND CORRESPONDING N^OS OF THE VARS; • SUBROUTINES THAT EVALUATE THE FORMULAS THAT CONNECT THE VARS.; IN THESE SUBROUTINES, THE NAMES OF THE VARS THAT APPEAR AT DETERMINED PLACES IN THE CORRESPONDING FORMULAS ARE REPLACED BY RCL nn, WHERE nn IS THE REGISTER IN WHICH IS STORED THE VAR THAT ONE REPLACES; nn IS OBTAINED BY REG(VAR 0)+n, WHERE REG(VAR 0) IS [(THE PLACE WHERE ONE CHOOSED TO LOCATE THE VAR n° 1)−1], IN OTHER WORDS, THE PLACE WHERE ONE WOULD HAVE LOCATED THE VAR n°0 IF SUCH A VAR. EXISTED. WHEN EXECUTION RETURNS TO MAIN PROGRAM WHEN ONE OF THESE SUBROUTINES HAS BEEN CALLED, THE VALUE OF THE FORMULA IT EVALUATES SHOULD BE IN THE X-REGISTER. THESE TWO CATEGORYS OF DATA ARE GIVEN TO THE PROGRAM VIA A PROGRAM NAMED "USER" OF FOLLOWING FORM: -THERE ARE TWO TYPES OF BLOCKS: a) THE BLOCKS OF THE FIRST GROUP, OF TYPE: LBL"...." (NAME OF A VAR) "...." (NAME OF THE VAR) N N° OF THE VAR. GTO 00 THE LAST BLOCK OF THAT GROUP IS: LBL 00 GTO "INTSOL 2" b) THE BLOCKS OF THE SECOND GROUP, SUBROUTINES THAT EVALUATE FORMULAS. FOR INSTANCE, THE SUBROUTINE THAT EVALUATES THE FORMULA OF THE EXAMPLE N° 11 WILLBE: $S_1'H = \frac{m_1 - m_2}{m_1 + m_2} \cdot S_1 H$			

ASCENDING METHOD
-PROGRAM 2

0 1 4 7 5 C

PROGRAMMABLAUF II
INSTRUCTIONS D'EMPLOI II
NORME OPERATIVE II

Step Schritt Pas Passo	Instructions Operation Instructions Istruzioni	Variables Dateneingabe Données Dati	Function(s) Taste(n) Touche(s) Tasti	Result Resultat Résultat Risultato
	LBL 11			
	RCL 11			
	RCL 12			
	−			
	RCL 11			
	RCL 12			
	+			
	y^x			
	RCL 18			
	*			
	RTN			
	(IF REG(VAR 0) = 10 AND			
	$N^o(m_1) = 1$, $N^o(m_2) = 2$, $N^o(S_1 11) = 8$)			
	FOR AN EXAMPLE OF "USER" PROGRAM,			
	SEE EXAMPLE			
	FOR EACH NEW SET OF VARS AND			
	FORMULAS, ONE HAS TO WRITE A			
	"USER" PROGRAM.			
	HOWEVER, IF ONE HAS TO SOLVE			
	MANY TIMES PROBLEMS WITH A			
	SAME SET OF VARS AND FORMULAS,			
	IT MAY BE VERY USEFUL TO			
	RECORD ONCE FOR ALL ON MAGNETIC			
	CARDS THE "USER" PROGRAM.			
	REMARKS :			
	(1) NO N° OF A VAR SHOULD BE			
	EQUAL TO 0.			
	(2) NO LABEL OF A SUBROUTINE			
	SHOULD BE EQUAL TO THE			
	N° OF A VAR			
	(3) NO LABELS OF SUBROUTINES			
	OR NO VARS SHOULD HAVE			
	THE SAME NAME			
	(4) THE SUBROUTINES THAT EVALUATE			
	THE FORMULAS CAN USE AS			
	INTERMEDIATE REGISTERS			
	R_4 AND R_6			
	(5) THE FLAG 02 IS CLEAR WHEN A			
	SUBROUTINE IS CALLED.			
	IF, WHEN CONTROL RETURNS TO			

USER INSTRUCTIONS II

PROGRAMMABLAUF II
INSTRUCTIONS D'EMPLOI II
NORME OPERATIVE II

ASCENDING METHOD
-PROGRAM 2 01475C

Step Schritt Pas Passo	Instructions Operation Instructions Istruzioni	Variables Dateneingabe Données Dati	Function(s) Taste(n) Touche(s) Tasti	Result Resultat Résultat Risultato
	MAIN PROGRAM FROM THOSE SUBROUTINES, THE PROGRAM WILL ASSUME THAT THERE ISN'T ENOUGH DATA, CURRENTLY, TO EVALUATE THE FORMULA; AND THEN IT CONTINUES ITS SEARCH FOR FORMULAS THAT CAN BE EVALUATED THEREFORE, FLAG 02 IS A MEDIUM BETWEEN MAIN PROGRAM AND SUBROUTINES.			
2	THIS PROGRAM REQUIRES ALSO AS DATA THE DECLARATIONS OF THE FORMULAS. EACH OF THESE IS THE UNION OF THE N° OF A FORMULA, THE N° OF THE VAR. IT COMPUTES AND THE N°S OF THE VARS. WHOSE VALUES ARE REQUIRED TO EVALUATE THE FORMULA (THE N° OF A FORMULA IS THE N° OF THE LABEL THAT BEGINS THE SUBROUTINE THAT EVALUATES IT) THESE DECLARATIONS OF FORMULAS HAVE TO BE PUT IN FOLLOWING FORM IN MEMORY REGISTERS: 1st LINE : $n_1 n_1, n_2 n_2 \; n_3 n_3 \ldots$ N° OF FORMULA — N° OF VAR-FORMULA — N° OF A VAR EVENTUALLY, EACH OF THESE DECLARATIONS CAN SPAN ON SEVERAL LINES (IE. ON SEVERAL REGISTERS): 2st LINE : $n_6 n_6 \; n_7 n_7 \; n_8 n_8 \ldots$ AND SO ON.			

ASCENDING METHOD
-PROGRAM 2

PROGRAMMABLAUF II
INSTRUCTIONS D'EMPLOI II
NORME OPERATIVE II

0.475C

Step Schritt Pas Passo	Instructions Operazioni Instructions Istruzioni	Variables Dateneingabe Données Dati	Function(s) Taste(n) Touche(s) Tasti	Result Resultat Resultat Risultato
	FOR INSTANCE, YOU SHOULD ENTER THE PRECEDENT FORMULA THIS WAY:			
	11.10010208			
	IF 10 IS THE N° OF THE VAR S_1' II			
	IN THE LAST REGISTER OF THE FILE OF FORMULAS SHOULD BE A 0. IN ORDER TO EASE THE STORAGE OF THE DECLARATIONS OF FORMULAS, A PROGRAM "ININT 2" IS FURNISHED. FOR ITS USE, FOLLOW THIS STEPS:			
2a	ALLOCATE THE PROPER NUMBER OF DATA REGISTERS	WHERE	SIZE(VAR.0+N+NF*MNL+2) VAR.0 = (ADDRESS OF VALUE OF VAR N°1)-1 N = NUMBER OF VARS NF = NUMBER OF FORMULAS MNL = MEAN N° OF LINES PER FORMULA	
2b	START PROGRAM "ININT 2"		XEQ "ININT 2"	"N.-VAR.?"
2c	ENTER THE : IN THE PROBLEM	N	R/S	"ADDRESS OF VAR 0?"
2d	ENTER THE ADDRESS AT WHICH YOU WOULD HAVE WANTED TO STORE THE VALUE OF VAR. N°0 IF SUCH A VAR EXISTED, SUPROSING THAT ADDRESS(VAR. N°K+1) = ADDRESS (N°K)+1	(ADDR. OF VAR1)-1	R/S	"N° OF SBR?"*
2e	ENTER THE N° OF A SUBROUTINE THAT EVALUATES A FORMULA	N° OF SUBROUTINE	R/S	"VAR.-FORM?"*
	NB: (1) IF YOU WANT TO REENTER THE LAST VAR OF THE PREVIOUS FORMULA, ENTER INSTEAD IN MODE ALPHA: A CARACTER, E FOR INSTANCE; R/S; AND GO TO STEP 2g	E	R/S	"VAR.?"
	(2) IF YOU WANT TO KNOW WHICH WAS THE LAST VAR OF THE PREVIOUS FORMULA (I.E. WHICH VAR WAS ENTERED LAST), DO INSTEAD: AND GO TO STEP 2e.	(DON'T ENTER ANYTHING)	B XEQ 00	"LAST VAR.=.." "N° OF SBR?"*
	(3) SEE STEPS 2h AND 2i FOR OTHER OPTIONS			
2f	ENTER THE N° OF THE VAR THIS FORMULA COMPUTES ("VAR.-FORM ..")	VAR-FORMULA	R/S	"VAR.?"
	N.B. (1) IF YOU WANT TO REENTER THE N° OF THE SUBROUTINE OF THE FORMULA, ENTER INSTEAD IN MODE ALPHA A CARACTER, E FOR INSTANCE, DO R/S AND GO TO STEP 2e	E	R/S	"NO OF SBR?"*
	(2) SEE STEPS 2h AND 2i FOR OTHER OPTIONS			
2g	ENTER THE N° OF A VAR THE FORMULA REQUIRES TO BE EVALUATED. GO TO STEP 2g	N° OF VAR.	R/S	"VAR.?"
	N.B.: (1) IF YOU HAVE ALREADY ENTERED ALL			

* SBR = SUBROUTINE
FORM = FORMULA

ASCENDING METHOD
– PROGRAM 2 01475C

USER INSTRUCTIONS II
PROGRAMMABLAUF II
INSTRUCTIONS D'EMPLOI II
NORME OPERATIVE II

Step Schritt Pas Passo	Instructions Operation Instructions Istruzioni	Variables Dateneingabe Données Dati	Function(s) Taste(n) Touche(s) Tasti	Result Resultat Résultat Risultato
	THE VARS THE FORMULA REQUIRES, PRESS ON R/S TO PASS TO THE NEXT FORMULA AND GO TO STEP 2e		R/S	"N° OF S.BR.?"
	IF YOU HAVE FINISHED WITH ALL THE FORMULAS, PASS ON TO STEP 3	WITHOUT PRESSING ON R/S.		
	(2) IF YOU WISH TO REENTER THE LAST VAR YOU ENTERED (EVENTUALLY THE VAR.–FORMULA OF THE CURRENT FORMULA), ENTER INSTEAD, IN MODE ALPHA, A CARACTER, E FOR INSTANCE, AND PRESS ON R/S	E	R/S	"VAR?" OR "VAR–FORM."
	(3) IF YOU WANT TO KNOW WHICH WAS THE LAST VAR YOU ENTERED (EVENTUALLY THE VAR.–FORMULA), DO INSTEAD:	(DON'T ENTER ANYTHING)	B	"LAST VAR = .."
	GO TO STEP 2g AND CONTINUE AS IF YOU HAVEN'T DONE ANYTHING	(" ")	R/S	"VAR?"
	(4) FOR OTHER OPTIONS, SEE STEPS 2h AND 2i			
2h	IF AT ANY LEVEL YOU WANT TO NOW WHICH IS THE N° OF THE CURRENT FORMULA (THE N° OF THE LABEL OF THE SUBROUTINE THAT EVALUATES IT), DO:		A	"N° SBR?"
	IF YOU CALLED SUBROUTINE A WHEN LAST PROMPTING MESSAGE WAS "VAR?" DO, TO PUT YOURSELF IN THE PREVIOUS SITUATION:		R/S	"VAR?"
	ELSE IF PROMPTING MESSAGE WAS: "N° OF SBR?"		XEQ 00	"N° OF SBR?"
	ELSE IF PROMPTING MESSAGE WAS: "VAR.–FORM?"		XEQ 02	"VAR.–FORM?"
	N.B.: IF ROUTINE WAS EXECUTED WHEN LAST PROMPTING MESSAGE WAS "N° OF SUBROUTINE?", THEN THE RESULT WILL BE THE N° OF THE PRECEDENT FORMULA.			
2i	IF AT ANY LEVEL YOU WANT TO START AGAIN THE ENTRY OF THE CURRENT DECLARATION OF FORMULA, DO:		C	"N° OF SBR?"
	GO TO STEP 2e			
	N.B.: IF ROUTINE WAS EXECUTED WHEN			

Step Schritt Pas Passo	Instructions Operation Instructions Istruzioni	Variables Dateneingabe Données Dati	Function(s) Taste(n) Touche(s) Tasti	Result Resultat Résultat Risultato
	LAST PROMPTING MESSAGE WAS "N° OF SUBROUTINE?" THEN YOU WILL START AGAIN THE ENTRY OF THE PREVIOUS DECLARATION OF FORMULA.			
	REMARKS ON USER INSTRUCTIONS 1 AND 2			
	(1) ANY NUMERIC OR ALPHA DATA ENTRY BETWEEN THE PROMPTING OF A MESSAGE AND THE BEGINNING OF THE PROGRAM WILL BE INTERPRETED AS AN ALPHA OR NUMERIC ENTRY IN RESPONSE TO THE MESSAGE, UNLESS YOU CLEAR THE CORRESPONDING DATA ENTRY FLAG (22 OR 23). IF YOU HAVE MADE AN ALPHA AND NUMERIC ENTRY, THIS WILL BE INTERPRETED SOLELY AS AN ALPHA ENTRY. IN OTHER WORDS, IF, FOR INSTANCE, YOU ENTER AFTER A PROMPTING MESSAGE SOME CARACTERS IN THE ALPHA REGISTER WITHOUT INTENDING TO RESPOND TO THE QUESTION, AND YOU ENTER LATER A NUMBER AS RESPONSE, YOU MUST CLEAR FLAG 23 BEFORE PRESSING ON R/S, OR THE CALCULATOR WILL "THINK" YOU WANT TO REENTER THE LAST DATA ENTRY.			
	(2) YOU CAN USE SEVERAL TIMES AT ONCE THE MECHANISM ALPHA ENTRY - REENTRY OF THE LAST DATA AND THIS WAY GO SEVERAL ENTRYS BACKWARDS IN ORDER TO REENTER OLD DATA. HOWEVER, YOU WILL HAVE THEN TO ENTER ALL THE DATA SINCE THAT ERROR. MOREOVER, YOU CAN'T, ONCE YOU HAVE ENTERED THE VAR.-FORMULA, GO BACK WITH THIS MECHANISM TO DATA FOR THE PREVIOUS DECLARATION OF FORMULA; TRYING THIS WILL RESULT IN A HIDDEN ERROR.			
	(3) IT CAN BE VERY USEFUL TO RECORD ON CARDS THE PROGRAM "USER" AND THE DATA INTRODUCED BY "INIT 2", SO THAT YOU CAN SOLVE QUICKLY THE PROBLEMS DEALING WITH THE CORRESPONDING SET OF FORMULAS. IN THAT CASE, INTRODUCE THE RECORDED			

ASCENDING METHOD – PROGRAM 2

01475C

PROGRAMMABLAUF II
INSTRUCTIONS D'EMPLOI II
NORME OPERATIVE II

Step Schritt Pas Passo	Instructions Operation Instructions Istruzioni	Variables Dateneingabe Données Dati	Function(s) Taste(n) Touche(s) Tasti	Result Resultat Résultat Risultato
	CARDS AND GO DIRECTLY TO STEP 3.			
	(4) YOU CAN PRESS SEVERAL TIMES ON C TO GO SEVERAL FORMULAS BACK.			
3.	SET THE CALCULATOR AT THE DISPLAY FORMAT AND ANGLE MODE YOU WANT			
4.	CLEAR THE INDICATOR OF MODE SUBROUTINE (SEE LOWER)		CF 01	
5.	CLEAR FLAG 2		CF 02	
6.	ENTER THE VALUE OF A VAR	VALUE OF VAR	XEQ "(NAME OF VAR)"	"(NAME OF VAR) = STORED"
	N.B.: 1) IF YOU HAVE ENTERED A VAR AND LATER FIND OUT YOU SHOULN'T HAVE PERFORMED THIS OPERATION, ANNUL IT BY:		SF 02 XEQ "(NAME OF VAR)"	"(NAME OF VAR) ≠ ENTERED"
	FLAG 02 CLEARS ITSELF.			
	2) IF YOU ENTER TWO TIMES THE SAME VAR, THIS WOULD BE OF NO HARM: THE PROGRAM WILL TAKE ACCOUNT ONLY OF THE LAST VALUE			
7	IF YOU HAVE ANOTHER VAR WHOSE VALUE YOU DIDN'T YET ENTER, GO TO STEP 6			
8.	COMPUTE THE VALUE OF A VAR	(DON'T ENTER ANYTHING)	XEQ "(NAME OF VAR)"	
9.	THERE ARE NOW TWO POSSIBLE DISPLAYS:			
	a) THERE WAS ENOUGH DATA TO COMPUTE THE VAR			"(NAME OF VAR) = ..."
	b) THERE WASN'T ENOUGH DATA TO COMPUTE THE VAR; IF YOU HAVE MORE DATA THAT YOU DIDN'T ENTER, GO TO STEP 5			
10.	IF YOU WANT TO COMPUTE THE VALUE OF ANOTHER VAR, GO TO STEP 8 ELSE IF YOU WANT TO DO ANOTHER PROBLEM WITH DIFFERENT DATA VALUES, INITIALIZE THE PROGRAM: GO TO STEP 5		XEQ "INCAL2"	

USER INSTRUCTIONS II

PROGRAMMABLAUF II
INSTRUCTIONS D'EMPLOI II
NORME OPERATIVE II

ASCENDING METHOD
– PROGRAM 2 01475C

Step Schritt Pas Passo	Instructions Operation Instructions Istruzioni	Variables Dateneingabe Données Dati	Function(s) Taste(n) Touche(s) Tasti	Result Resultat Résultat Risultato
	USING THE PROGRAM AS A SUBROUTINE			
	THIS PROGRAM WAS DESIGNED TO BE EASILY USED AS A SUBROUTINE. TO CALL IT, FOLLOW THESE STEPS:			
	ENTER MANUALLY THE PROGRAM "INTSOL2", "USER" AND THE DATA. ONE CAN EVENTUALLY PROGRAM THIS IF THESE PROGRAMS AND DATA ARE STORED ON CARDS			
	BEFORE EACH PROBLEM WITH NEW DATA, DO:			
1.	INITIALIZE PROGRAM (DOESN'T NEED TO BE DONE THE FIRST TIME)		XEQ "INCAL 2"	
2.	SET THE CALCULATOR AT THE PROPER DISPLAY FORMAT AND ANGLE MODE			
3.	SET FLAG 01 (INDICATOR OF MODE SUBROUTINE). IN MODE SUBROUTINE, THE EXECUTION WILL NEVER STOP, UNLESS AN IMPROPER OPERATION IS PERFORMED.		SF 01	
4	CLEAR FLAG2		CF 02	
5	ENTER THE VALUE OF A VAR		SF 22	
		VALUE OF VAR.	XEQ "(NAME OF VAR)"	"(NAME OF VAR) = STORED"
	N.B. LIKE BEFORE			
6.	IF YOU HAVE ANOTHER VAR. WHOSE VALUE YOU DIDN'T YET ENTER, GO TO STEP 5			
7.	COMPUTE THE VALUE OF A VAR		XEQ "(NAME OF VAR)"	
8.	WHEN EXECUTION RETURNS TO THE MAIN PROGRAM, THE FLAG 1 IS STILL SET, AND THERE ARE TWO POSSIBILITIES: a) THERE WAS ENOUGH DATA TO COMPUTE THE VAR; THEN FLAG 2 IS NOT SET AND THE VALUE OF THE VAR IS IN THE X-REGISTER; IF YOU WANT TO COMPUTE ANOTHER VAR, GO TO STEP 7. b) THERE WASN'T ENOUGH DATA; THEN FLAG 2 IS SET; IF YOU HAVE MORE DATA YOU DIDN'T ENTER, GO TO STEP 4.			

01475C
PROGRAMMING HIGHLIGHTS

(1) - THE FLAGS THAT INDICATE WHETHER A VAR IS KNOWN OR UNKNOWN ARE FITTED IN ONLY ONE REGISTER, R6. TO UNDERSTAND HOW, CONSIDER THAT THE CONTENT OF THAT REGISTER IS IN BASE TWO AND IS AN INTEGER.

- THERE ARE THEREFORE K DIGITS WORTH 1 OR 0. THEY REPRESENT THE STATUSES OF K-1 FLAGS, IN THE CASE YOU DON'T USE THE DIGIT OF THE UNITS, THAT YOU DEFINE AS BEING AT THE POSITION NUMBER 0 FROM THE RIGHT.
- YOU CAN NOW SAY THAT THE DIGIT AT THE POSITION NUMBER P REPRESENTS THE STATUS (KNOWN OR UNKNOWN) OF THE VARIABLE NUMBER P.
- TO EXTRACT ITS VALUE FROM R6, SHIFT THE NUMBER P POSITIONS TOWARDS THE RIGHT, TAKE ITS INTEGER PORTION, AND SEE IF THE LAST DIGIT OF THE OBTAINED NUMBER IS 1 OR 0.
- HOWEVER, SHIFTING A BINARY NUMBER P POSITIONS TOWARDS THE RIGHT IS THE SAME AS DIVIDING IT P TIMES BY 2, THAT IS TO SAY, BY 2^P. TO SEE IF THE LAST DIGIT IS 1 OR 0, PERFORM THE TRANSFORMED NUMBER MODULO 2.
- TO SET THE FLAG CORRESPONDING TO A VAR NUMBER P, ADD TRIVIALLY 2^P TO R6

(2) - TO "ELIMINATE" A DECLARATION OF FORMULA, THE PROGRAM PUTS THE MINUS SIGN (-) ON IT, SINCE SUCH A FORMULA CAN'T NORMALLY OCCUR.

(3) - THE SUBROUTINE 01 PERFORMS MANY TASKS, DEPENDING ON THE VALUES OF ITS PARAMETERS, FLAG 00, FLAG 02, AND REGISTER 06

BASICALLY, THE SUBROUTINE 01 IS A LOOP THAT EXAMINES PARTS OF A FORMULA. THIS LOOP WILL BE EXECUTED UNTIL THE EXAMINED PART IS A HEAD OR UNTIL THE END OF THE LIST OF DECLARATIONS IS ATTAINED; EXECUTION WILL THEN CONTINUE AT THE LABEL SPECIFIED BY R6.

- MOREOVER, IF FLAG 02 IS SET, THE LOOP WILL BE EXECUTED ONLY ONCE AND EXECUTION WILL CONTINUE AT LABEL 03, UNLESS ONE OF THOSE PREVIOUS CONDITIONS IS REACHED.

01475C IF FLAG 00 IS CLEAR, EACH EXECUTION OF LOOP WILL ELIMINATE A PART OF A DECLARATION OF FORMULA.

SINCE WHEN FLAG 00 IS CLEAR, FLAG 02 IS ALWAYS ALSO CLEAR, AS IT APPEARS IN THE PROGRAM

WHEN FLAG 00 IS CLEAR, SUBROUTINE 01 WILL ELIMINATE ONE ENTIRE FORMULA AND THEN EXECUTION WILL CONTINUE AT THE LABEL SPECIFIED BY RG-

ASCENDING METHOD
– PROGRAM 2

PROGRAM LISTING
PROGRAMMAUFLISTUNG
LISTAGE DU PROGRAMME
LISTATO DI PROGRAMMA

01475C

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
			50	X<>Y	SUBROUTINE 01
01	*LBL "INTSCR"			XEQ 05	
	FS?C 02	IF ENTRY OF THE		X=0?	IF VAR IS UNKNOWN
	GTO 04	VARS WAS INCORRECT, ANNUL IT.		GTO 01	SKIP THE FORMULA
	FS?C 22	IF A VAR. WAS ENTERED,		GTO 03	
05	GTO 08	STORING ROUTINE	55	*LBL 04	
	STO 05			XEQ 05	
	XEQ 05			X=0?	
	X≠0?	IF VAR IS KNOWN,		GTO 04	
	GTO 09	DISPLAY IT		2	
10	*LBL 12		60	X<>Y	
	RCL 03	GO TO THE BEGINNING		4^X	
	RCL 00	OF THE FILE OF		ST-02	
	+	DECLARATIONS		LBL 04	
	STO 01			"I+ ENTERED"	
15	*LBL 00		65	GTO 13	
	2	INITIALIZE FOR		*LBL 08	ROUTINE THAT STORES
	STO 06	NEXT USE		XEQ 14	A VAR ENTERED BY
	CF 00	OF SUBROUTINE 01		"I+ = STORED"	THE USER
	1	GET NEXT PART		GTO 13	
20	ST+01	OF DECLARATION IN	70	*LBL 07	
	RCL IND 01	THE FILE		CF 02	
	X=0?	IF THE FILE IS TO AN		1	FIND THE REGISTE
	GTO 10	END, EXIT DEFINITIVELY FROM LOOP.		ST-01	IN WHICH IS
	X<0?	IF THE PART OF DECLARATION		RCL IND 01	LOCALISED THE
25	GTO 00	IS ELIMINATED, GET NEXT ONE.		X<Y?	HEAD OF THE
	FRC			GTO 07	FORMULA
	100	SET APART		XEQ "USER"	INITIALIZE FOR
	*	THE VAR.—FORMULA		2	NEXT USE OF
	STO 04			STO 06	SUBROUTINE 01
30	INT		80	X<>Y	EVALUATE THE
	XEQ 05			FS?C 02	FORMULA; IF THIS IS
	X≠0?	IF IT IS KNOWN,		GTO 01	IMPOSSIBLE, SKIP IT
	GTO 01	ELIMINATE THE		RCL IND 01	
	*LBL 03	DECLARATION		FRC	SET APART THE
35	SF 00	INITIALIZE	85	100	N° OF THE VAR W
	1	FOR NEXT USE		*	VALUE WAS JUST
	STO 06	OF SUBROUTINE 01		INT	COMPUTED
	SF 02			XEQ 14	STORE IT
	RCL 04	IF THERE ARE NO		CF 00	INITIALIZE FOR NE
40	FRC	MORE VARS IN THIS	90	12	USE OF SUBROUTI
	X=0?	PART OF FORMULA,		STO 06	ELIMINATE THE FOR
	GTO 01	TAKE NEXT PART.		*LBL 01	SUBROUTINE 01
	100	FINISH TO SET		FS? 00	IF FLAG 0 IS CLEAR
	*	APART NEXT		GTO 02	ELIMINATES THE
45	STO 04	VAR	95	RCL IND 01	CURRENT PART OF
	INT			CHS	THE FORMULA
	CF 02			STO IND 01	
	2	INITIALIZE FOR		*LBL 02	POINTER ADVANCE
	STO 06	NEXT USE OF		1	TO NEXT PART OF

ASCENDING METHOD
– PROGRAM 2

PROGRAM LISTING
PROGRAMMAUFLISTUNG
LISTAGE DU PROGRAMME
LISTATO DI PROGRAMMA

01475C

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
100	ST+01	FORMULA (SKIPS		2	STATUS (KNOWN
	RCLIND01	THE CURRENT PART)		RCLZ	OR UNKNOWN) OF
	X≠0?	IF CURRENT PART		y↑x	A VAR WHOSE
	X>Y?	OF FORMULA IS		%	NUMBER IS ENTERED
105	GTOINDC6	EQUAL TO ZERO	155	INT	IN REGISTER X; THE
	FS?02	(END OF FILE) OR IS		2	ANSWER IS IN FCRT
	GTO03	A HEAD, GOTO LABEL		MOD	1 OR 0.
	GTO01	INDICATED BY R_6		RTN	
	* LBL02	ELSE IF FLAG 2 IS		* LBL "INCAL 2"	ROUTINE THAT
110	1	SET, EXAMINE CURRENT (60)		0	INITIALIZES PROGRAM
	ST-01	TAIL OF FORMULA		STO02	BEFORE EACH
	GTO00	ELSE APPLY SUBROUTINE N-1 TO IT		RCL00	CALCULATION WITH
	*LBL14	ROUTINE THAT		RCL03	NEW VALUES FOR THE
	RCL03	STORES THE VALUE		+	VARS
115	X<>Y	IN REGISTER Y	165	STO01	
	+	WHEN ROUTINE		* LBL11	
	RDN	IS CALLED OF THE VAR		1	REGENERATION
	STOINDT	WHOSE N° IS THEN IN X,		ST+01	OF FORMULAS
	LAST X	AND SETS THE FLAG		RCLIND01	THAT WERE
120	XEQ05	ASSOCIATED WITH	170	ABS	ELIMINATED
	X≠0?	THE VAR (SEE		STOINDO1	
	RTN	PROGRAM HIGH-		X≠0?	
	CLX	LIGHT N° 1)		GTO11	
	2	THIS ROUTINE		END	
125	X<>Y	DOESN'T SET	175		
	y^x	AGAIN A FLAG IF			
	ST+02	IT WAS ALREADY			
	RTN	SET.			
	* LBL10				
130	RCL05		180		
	XEQ05	IF THE VALUE (VAR			
	X≠0?	THAT THE USER			
	GTO09	ASKED FOR) IS KNOWN,			
	"NOT ENOUGH DATA"	DISPLAY IT			
135	SF02	ELSE DISPLAY	185		
	GTO13	"NOT ENOUGH DATA"			
	*LBL09	ROUTINE THAT			
	RCL05	DISPLAYS THE			
	RCL03	VALUE OF A VAR.			
140	+		190		
	RCLINDX				
	"r="				
	ARCLX				
	* LBL13				
145	FS?01		195		
	RTN				
	PROMPT				
	* LBL "VERF 2"				
	* LBL05	SUBROUTINE THAT			
150	RCL02	DETERMINES THE	200		

ASCENDING METHOD

—PROGRAM 2

PROGRAM LISTING

PROGRAMMAUFLISTUNG
LISTAGE DU PROGRAMME
LISTATO DI PROGRAMMA

01475C

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 "ININT 2"		51	100	
	FIX 0			*	
	0			"LAST VAR.= "	
	STO 02			ARCL X	
05	"N.-VAR?"		55	PROMPT	
	PROMPT			GTO 03	
	STO 00			* LBL A	ROUTINE TO SET
	"ADR. OF VAR 0?"			RCL 01	APART THE N°:
	PROMPT			1	OF THE SUBROUTIN
10	STO 03		60	+	OF ACURRENT
	+			STO 02	DECLARATION.
	STO 01			* LBL 01	THE PROGRAM
	CF 23			1	SETS APART
	CF 22			ST-02	THE HEAD
15	GTO 00		65	RCL IND 02	
	* LBL C	ROUTINE TO REENTER THE LAST FORMULA		X<Y?	
	RCL IND 01	ONE FINDS THE		GTO 01	
	1	N° OF THE REGISTER		INT	IT FINDS THE
	ST-01	THAT CONTAINS THE		"NO SBR.="	N° AND
20	X>Y?	LAST HEAD	70	ARCL X	DISPLAYS IT
	GTO C			0	
	GTO 00			STO 02	
	* LBL B	ROUTINE TO SET		PROMPT	
	RCL IND 01	APART THE LAST ENTERED VAR		GTO 03	
25	RCL 04		75	* LBL 05	IF ONE JUST PASSE
	1			RCL IND 01	TO ANOTHER REGIS
	-	IF ONE DIDN'T JUST		X≠0	SUBSTRACT 1
	X≠0?	PASS ON TO ANOTHER		GTO 00	FROM R1 SO THAT,
	GTO 09	REGISTER, END		1	WHEN THE PROGRA
30	RCL 01	WITH ROUTINE OF	80	ST-01	WILL ASK TO ENTER
	1	LBL 09		GTO 00	THE N° OF SUBROUTI
	-			* LBL 06	THE POINTER WILL
	1			RCL 01	ALWAYS BE ONE REGI
	RCL IND Y	IS THE PREVIOUS		1	BACK FROM THE REGI
35	X<Y?	REGISTER A TAIL?	85	+	AT WHICH IT SHOULD B
	GTO 10			0	PUT
	4			STO IND Y	INVERSE OF LBL 05
	GTO 09			RCL 04	AND CLEARING OF TH
	* LBL 10			1	REGISTER IN WHICH
40	5		90	X≠Y?	THERE COULD HAVE
	* LBL 09	ROUTINE TO SET		GTO 03	BEEN SOME
	1	APART THE VAR		ST+01	SUPERFLUOUS DATA
	-	IN (RX)ST POSITION		GTO 03	
	2	FROM THE PART OF		* LBL 00	
45	*	DECLARATION THAT	95	"N° OF SBR.?"	
	10	IS INRY WHEN		PROMPT	
	X<Y	ROUTINE IS CALLED		AOFF	
	Y↑X			FS? C23	IF THERE WAS ALPHA
	*			GTO 06	INPUT, INITIALIZE
50	FRC		100	1	BY BEFORE
					RETURNING TO LABE

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Per favore usare la colla per fissare i listati. Il nastro adesivo può alterare la stampa!

ASCENDING METHOD
-PROGRAM 2

PROGRAM LISTING
PROGRAMMAUFLISTUNG
LISTAGE DU PROGRAMME
LISTATO DI PROGRAMMA

0i475C

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
101	ST+01		151	STO 05	
	RDN			0	
	STO IND 01			STO IND 01	
	RCL 01			RCL 01	
105	1	CLEAR NEXT	155	1	STORAGE OF THE
	+	REGISTER, SO THAT,		+	INDICATOR OF
	0	IF THERE WASN'T		0	END OF FILE
	STO IND 4	ANYMORE DECLARATION AFTER THIS LINE,		STO IND 4	
	* LBL 02	THE INDICATOR OF		GTO 03	
110	"VAR.-FORM. ?"	END OF FILE WOULD	160	* LBL 04	ROUTINE FOR ALPHA
	PROMPT	EXIST		1	INPUT AT LINE 130
	AOFF			ST-04	
	1			RCL 04	
	ST-01			X≠0?	IS IT NOT JUST NOW
115	FS?C 23	IF THERE WAS	165	GTO 07	THAT ONE PASSED
	GTO 00	ALPHA INPUT, GO DIRECTLY TO LBL 00,		6	ON THE ANOTHER REGN
	ST+01	SINCE R1 IS		STO 05	REGISTER?
	CLX	ALREADY INITIALIZED		5	INITIALIZATION TO STORE THE NEXT VAR IN THE LAST POSITION
	100			STO 04	OF A TAIL
120	-/-		170	1	
	ST+ IND 01	STORAGE OF VAR-FORMULA.		ST-01	
	2	INITIALIZATION BEFORE REQUEST OF THE VARS THE FORMULA USES		RCL IND 01	IF THE PREVIOUS REGIST
	STO 04			X<4?	WAS A TAIL, END
	5			GTO 08	WITH ROUTINE OF LABEL 08
125	STO 05		175	5	ELSE INITIALIZE
	* LBL 03			STO 05	TO STORE THE NEXT
	"VAR.?"			4	VAR IN THE LAST POSITION
	PROMPT			STO 04	OF AHEAD.
	AOFF	IF THERE WAS ALPHA		GTO 08	
130	FS?C 23	INPUT, INITIALIZE	180	* LBL 07	
	GTO 04	R4, R5 AND R1 BEFORE GOING TO LBL 03 OR 02		X≠4?	WAS R4 ≠ 2?
	FC?C 22	IF THERE WASN'T ANY		GTO 08	
	GTO 05	INPUT, GO ON TO THE NEXT FORMULA		1	
	10			RCL IND 01	IF CURRENT REGISTER
135	RCL 04	STORAGE OF	185	X>4?	IS AHEAD,
	2	THE ENTERED		GTO 10	THE NEXT VAR THAT
	*	VAR IN (R4)ST POSITION		* LBL 08	GOING TO BE ENTER
	4 TX	OF THE CURRENT		10	IS THE VAR.-FORMUL
	Y.	REGISTER		RCL 04	ROUTINE TO CLEAR THE (R4)ST
140	ST+IND 01		190	1	POSITION OF THE
	1			-	CURRENT FORMULA
	ST+04			2	
	RCL 04			*	
	RCL 05	IF THE REGISTER IS		4↑X	
145	X≠4?	NOT ENTIRELY USED,	195	RCL X	
	GTO 03	PASS ON TO THE NEXT VAR,		RCL IND 01	
	1	ELSE INITIALIZE IN		*	
	STO 04	ORDER TO STORE VARS		INT	
	ST+01	IN THE NEXT REGISTER		X<>4	
150	6		200	Y.	

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ASCENDING METHOD
- PROGRAM 2

01475C

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
201	STO IND 01		51		
	GTO 03				
	*LBL 10				
	RCL IND 01	PREPARATION			
205	INT	FOR THE ENTRY	55		
	STO IND 01	OF A NEW			
	GTO 02	VAR. — FORMULA			
	END				
210			60		
15			65		
20			70		
25			75		
30			80		
35			85		
40			90		
45			95		
50			100		

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ASCENDING METHOD
- PROGRAM 2

REGISTERS, STATUS, FLAGS

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

01475C

Registers Datenspeicher / Registres de données / Registri

00	N° OF VARS = N	50
01	COUNTER FOR THE FILE OF DECLARATION OF FORMS	
02	ARRAY OF FLAGS FOR THE STATUS OF THE VARS	
03	(ADDRESS OF THE VALUE OF VAR1) − 1 [i.e. ADDRESS OF VAR 0]	55
04	INTSOL 2: INTERMEDIATE REGISTER	
	ININT 2: COUNTOR OF THE POSITION IN MEMORY OF N°S OF VARS	60
05	INTSOL 2: N° OF THE VAR THE USER WANTS TO COMPUTE.	65
	ININT 2: (MAX. NUMBER OF VARS THAT CAN BE PUT IN THE CURRENT REGISTER) + 1	70
06	INDIRECT REGISTER FOR EXIT FROM SUBROUTINE 01	
RVAR0+1 → RVAR0+N:		
	VALUES OF THE VARS	75
RVAR0+N+1 → RVAR0+N+NF*HNL:		
	DECLARATIONS OF THE FORMULAS, WHERE:	80
	NF = N° OF FORMULAS	
	HNL = MEAN N° OF LINES PER FORMULA	
	N = N° OF VARS	
	VAR0 = ADDRESS OF VAR NUMBER 0	85
		90
		95
		99

Status Betriebsart / Modes opératoires / Modi operativi

INTSOL 2 : 283 BYTES
ININT 2 : 356 BYTES

Size VAR0+N+NF* Total Reg. 41 + PROGRAM "USER" +SIZE (HNL+2)

User Mode: On ☐ Off ☐

Eng ☐ Fix ☐ Sci ☐ Deg ☐ Rad ☐ Grad ☐

Purpose	Flags	SET	CLEAR	
00	INTSOL 2: ONE DOESN'T WANT TO ELIMINATE THE CURRENT FORMULA (SUBROUTINE 01)	X	X	INTSOL 2: ONE WANTS TO ELIMINATE THE CURRENT FORMULA
01	THE PROGRAM WAS CALLED AS SUBROUTINE	X	X	THE PROGRAM WAS NOT CALLED AS SUBROUTINE
02	INTSOL 2: ONE EXIT FROM SUBROUTINE 01 SHOULD BE TOWARDS LBL 03 (Audio execute)	X	X	INTSOL 2: THERE SHOULD BE NO EXIT FROM SUBROUTINE TOWARDS LBL 03
	(2) THE ENTRY OF THE VAR WAS NOT CORRECT (LINE 02)	X	X	THE ENTRY OF THE VAR IS CORRECT (LINE 02)
	(3) THERE WASN'T ENOUGH DATA TO EVALUATE A FORMULA (LINE 81) OR TO COMPUTE A VAR (LINE 134)	X	X	(3) THERE WAS ENOUGH DATA TO COMPUTE A VAR (LINE 134) OR TO EVALUATE A FORMULA (LINE 81)
21	Printer Enable			
22	Number Input			
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

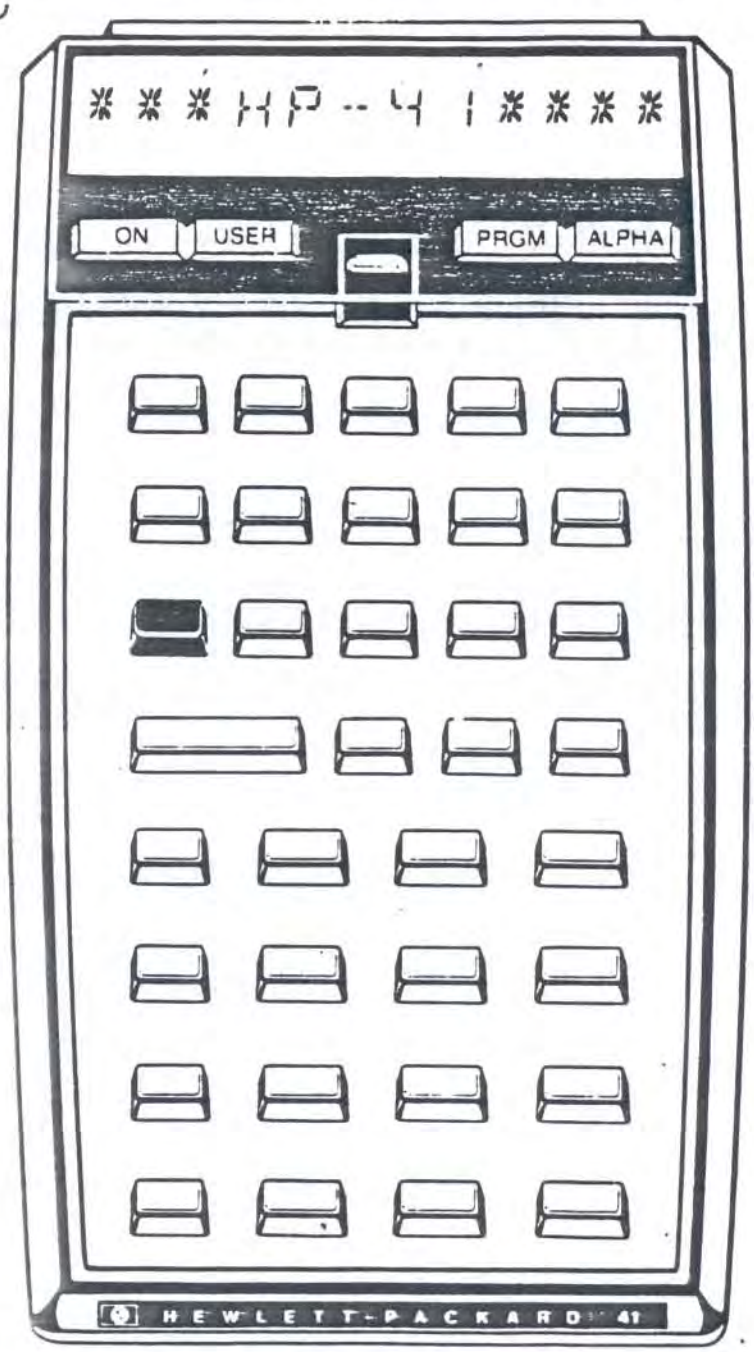
Function	Key	Function	Key
Funktion / Fonction / Funzione	Taste / Touche / Tasto	Funktion / Fonction / Funzione	Taste / Touche / Tasto

REMARK: IT WOULD BE USEFULL TO ASSIGN TO A KEY THE NAME OF EACH VARIABLE THAT IS USED

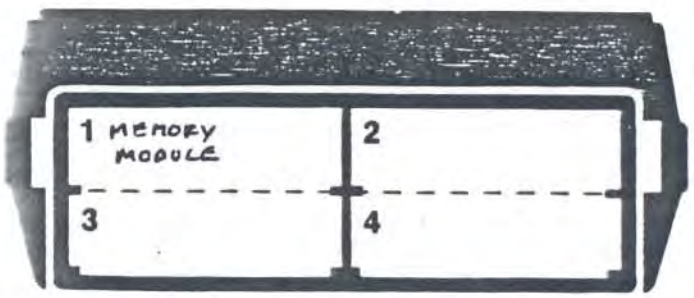
ASCENDING METHOD
- PROGRAM 2

01475C

SYSTEM CONFIGURATION
CONFIGURAZIONE DEL SISTEMA



Assignments
Belegungen
Assignations
Assegnamenti



Configuration
Belegung
Configuration
Configurazione

Magnetic card
Magnetkarte
Carte magnétique