LICEUL DE MATEMATICA-FIZICA Nr.1-TIMISOARA

INSTRUIRE ASISTATA DE CALCULATOR

INSTITUTUL DE CERCETARE ŞTIINŢIFICA ŞI INGINERIE TEHNOLOGICA
PENTRU TEHNICA DE CALCUL ŞI INFORMATICA

LICEUL DE MATEMATICA-FIZICA Nr.1-TIMISOARA

INSTRUIRE ASISTATA DE CALCULATOR

INSTITUTUL DE CERCETARE ȘTIINȚIFICA ȘI INGINERIE TEHNOLOGICA
PENTRU TEHNICA DE CALCUL SI INFORMATICA

Autorii şi contribuţia lor:

profesorii : Serban Marinel (2.1,5.1,6.1,9.2.5,9.2.8,9.2.11)
Mânz Dorin (1.2,9.2.5)
Simulescu Adriana (9.2.4,9.2.7)

elevii : Sandor Ovidiu (5.2,7.1,9.2.1,9.2.2,9.2.8)
Mărgineanţu Dragoş (1.1,2.2,3.1,4.1)
Ilcău Gheorghe (9.2.3,9.2.6,9.2.7,9.2.9,9.2.10)
Kleitsch Călin (1.1,2.2,4.1)
Singer Harald (9.1)
Doboşan Costin (8.1)

Au mai participat la elaborarea lucrării:

profesorii : Bratu Rodica, Costin Lia, Ilea Lucia, Pantaziu Hedviga, Furca Donata, Mărgineanţu Dorina, Miheţ Dorel, Munteanu Angela, Pigli Traian, Pocinog Anisia, Doboşan Lia

absolvenţi : Graure Marius , Lungu Daniel, Manea Titus, Topa Adrian, Brata Florian, Stroiţa Simona

elevii : Hilote Daciana, Păcurar Mihai, Serban Mihaela, Dumitrescu Adrian, Ilea Sebastian

COORDONATOR SERIE: Badea Nicolae - dir. adj. şt. I.T.C.I.

COORDONATOR VOLUM: dr.ing.Jurca Ioan
dr.mat.Niculescu Stelian

Lucrarea a fost avizată de inspectoratul şcolar al judeţului Timiş şi de colectivul de avizare din I.T.C.I., constituit din directorii liceelor de informatică, şefii catedrelor de informatică din aceste licee şi de specialişti din I.T.C.I.

CUVINT INAINTE

Tineretul si copii au vibrat intotdeauna fara complexe la nou. Acelasi lucru constatam si astazi, cind noua revolutie tehnico-stiintifica, declansata si impulsionata de microelectronica si informatica, gaseste tinerii in primele rinduri. Elevii din liceele de informatica, din numeroase scoli de cultura generala, medii si profesionale, cuprinsi sau nu in numeroasele cercuri de informatica, sint receptivi, indrazneti, creativi si competenti in raport cu introducerea programarii calculatoarelor. Predarea informaticii, organizarea cercurilor si a olimpiadelor de informatica au dobindit o frumoasa si apreciata traditie. Pentru prima oara alaturi de elevii liceelor de informatica (in total 48), participa 52 elevi din alte unitati scolare intr-o olimpiada a utilizatorilor. Noutatile aduse de progresele cercetarii stiintifice impreuna cu nevoile economiei nationale de programe informatice au modernizat continuu pregatirea in informatica, asigurindu-i in acelasi timp o baza realista. Evolutia continua a procesului educational din liceele de matematica-fizica cu profil de informatica confirma aceasta caracteristica comuna a invatamintului românesc. Programarea calculatoarelor personale este cunoscuta de numerosi elevi si pionieri, de membri cercurilor de informatica organizate de Casele pionierilor ale Consiliului National al Organizatiei Pionierilor, de Institutul pentru Tehnica de Calcul si Informatica, in cadrul proiectului MINICOMP si chiar reprezentanti ai grupei mari din cadrul Gradinitei nr. 52 a institutului nostru.

Invatarea informaticii in scoli nu este insa un scop in sine, ci un proces complex pentru pregatirea tinerilor de astazi pentru a face fata profesiunilor viitorului. De aceea, informatica trebuie sa fie in egala masura o noua disciplina didactica, dar si un instrument de predare. Sistemele de instruire asistata pot fi un sprijin esential in predarea si verificarea nu numai a cunostintelor de informatica, ci si pentru fizica, chimie, matematica, geografie, limba romana si limbi straine, muzica desen. Productia de calculatoare personale va creste substantial in perioada urmatoare, de asemenea a perifericelor si a limbajelor de programare. Sa ne gindim ca in lume sint instalate citeva milioane de calculatoare, iar programele pentru ele au facut deja saltul de la programe simple la medii integrate de programare. Calculatoarele personale si profesionale se pot conecta unele cu altele si pot comunica in acelasi timp cu

calculatoarele centrale, asigurind suportul necesar prelucrarii distribuite. In jurul lor se creeaza statii de lucru informatizate pentru diferite activitati individuale si colective din industrie, agricultura, transporturi, constructii, cercetare si proiectare, invatamint, medicina, servicii publice s.a. Un numar tot mai insemnat de calculatoare sint instalate la domiciliu si pot fi conectate, asemeni telefonului, la reteaua publica, prin intermediul careia pot comunica intre ele, sau cu sisteme de calcul foarte puternice. Pe fondul acestor mutatii a aparut si este pe cale sa devina consacrata microinformatica. Calculatoarele pe care le folositi si care sint destinate educatiei in informatica sint, in general, construite din aceleasi elemente: o tastatura, o unitate centrala, un ecran independent (sau un televizor), o imprimanta. Cele mai performante calculatoare profesionale pot avea insa o memorie interna de la 640 ko la 64 Mo, un disc Winchester de la 10 Mo pina la 115 Mo, procesoare specializate, display grafic color cu 640 x 480 pina la 1028 x 1028 pixeli, procesoare specializate, discuri flexibile, unitati de banda sau caseta magnetica, interfete pentru retele si un sistem de operare foarte performant. Posibilitatile de programare sint multiple folosind limbajele FORTRAN, C, PASCAL, PROLOG, LOGO, LISP si permit inclusiv implementarea de sisteme expert bazate pe metode ale inteligentei artificiale. Intr-un viitor apropiat ele vor permite comunicarea si recunoasterea prin voce si vor conecta la periferic videodiscul care va permite stocarea nu numai de date, ci si de imagini si grafice.

Integrind solutiile cele mai performante din microelectronica, tehnica de calcul si informatica, multe modele, deja comerciale, avind o viteza de peste 7 milioane de instructiuni pe secunda, se vor imbunatati substantial, astfel incit dorinta voastra de a obtine performante cit mai ridicate sa nu fie o simpla aventura a cunoasterii. Numerosi specialisti din cercetare, productie si invatamint sint antrenati in acest proces. Sint convins ca peste citiva ani multi dintre absolventii liceelor de informatica se vor inscrie cu toata competenta si entuziasmul in dezvoltarea noilor tehnologii informatice. Cei care isi vor alege alte meserii nu vor regreta apropierea de informatica, investitia de efort si creatie din acesti ani ii va ajuta sa nu aiba complexe in viitoarea confruntare cu calculatorul prezent in aproape toate locurile de munca.

O confruntare precoce cu tehnologia informatica face posibila obtinerea de cunostinte armonioase, formeaza gindirea algoritmica, stimuleaza creativitatea, permite abordarea multidisciplinara a stiintelor.

Programele informatice si calculatorul sint, de cele mai multe ori, o legatura directa cu imaginatia, potenteaza capacitatea creativa a omului, il sprijina direct in cunoasterea si stapinirea fenomenelor tehnice si naturale.

Directivele cu privire la dezvoltarea economico-sociala a Romaniei in cincinalul 1986-1990 si orientarile de perspectiva pina in anul 2000, aprobate la cel de al XIII-lea congres al PCR, Programul-directiva de cercetare stiintifica, dezvoltare tehnologica si introducere a progresului tehnic in perioada 1981-1990 si directiile principale pina in anul 2000 acorda un rol determinant pregatirii fortei de munca in concordanta cu directiile noii revolutii tehnico-stiintifice si cu cerintele dezvoltarii intensive a economiei. De aici, necesitatea implicarii mai puternice a tehnologiei informatice in triunghiul cercetare-productie-invatamint, calculatorul fiind un element de legatura de o deosebita finete si cu o eficienta remarcabila.

Realizarea, intretinerea si utilizarea cit mai eficienta a echipamentelor, mereu mai perfectionate, presupun o pregatire temeinica, bazata pe dobindirea unei gindiri algoritmice, asociata cu o logica avansata, asa cum o cer calculatoarele electronice. Trebuie ca in scoala sa invatam a invata, pentru ca numai astfel ne vom putea descurca in conditiile exploziei informationale actuale, cind informatia este considerata ca o resursa de mare pret. Procesul de instruire se afla intr-o dinamica permanenta.

Relatia profesor-elev nu trebuie lasata in afara calculatorului ca mijoc de invatamint, patrunderea calculatorului in invatamint vizind atit latura cantitativa, cit si, mai ales, pe cea calitativa.

Materialul de fata constituie o colectie de lectii prin care se doreste a se dovedi avantajele ce le ofera calculatorul in proiectarea scolara pentru diverse discipline.

Publicarea si difuzarea ca material didactic a prezentei culegeri este bine venita, cel putin din urmatoarele trei motive:

- este o argumentare autorizata pentru introducerea calculatorului in invatamintul preuniversitar si un ghid util privind modul in care se poate folosi calculatorul, oferind modele pentru diferite discipline scolare;

- dezvaluie posibilitati de utilizare creatoare a calculatoarelor de productie romaneasca;

- sint prezentate o serie de programe utilitare create de autorii culegerii (LPRINT ET, COMPACT SCREEN$, 64 COL, WINDOW), menite sa extinda posibilitatile de programare.

Demn de mentionat este faptul ca elevii si-au adus o contributie remarcabila in realizarea prezentului material si ce este mai de pret decit sa faci pe cei ce invata sa fie creatori inca de pe bancile scolii ?

Prezentul material inaugureaza o serie de volume pe care institutul nostru le va elabora in colaborare cu unitati de invatamint in sprijinul introducerii informaticii in invatamintul preuniversitar, in cadrul programelor coordonate de Ministerul Educatiei si Invatamintului.

Nu putem incheia fara a felicita pe toti cei ce au contribuit la elaborarea prezentului volum si conducerea liceului pentru eforturile depuse in asigurarea unei pregatiri de ridicat nivel a elevilor Liceului de matematica-fizica nr.1 din Timisoara.

Colaborarea continua a liceelor cu profil de informatica cu cercetatorii sectiei de sisteme informatice pentru instruire, din Institutul de Tehnica de Calcul si Informatica, orientarea metodologica atenta din partea compartimentelor de resort din Ministerul Educatiei si Invatamintului, creeaza cadrul oportun de valorificare a potentialului existent de experimentare si generalizare a rezultatelor obtinute, de introducere a informaticii in stricta concordanta cu necesitatile invatamintului.

Nicolae Badea

dir.adj.stiintific al ICSIT-TCI

INTRODUCERE

Cartea contine o culegere de lectii in care calculatorul este folosit ca auxiliar pentru predare , fixarea cunostintelor si examinare .

Publicarea si difuzarea acestei culegeri o consideram necesara din urmatoarele motive :

- Este o pledoarie pentru introducerea calculatorului in invat intul mediu si un ghid practic asupra modului in care se poate folosi calculatorul , oferind modele pentru majoritatea disciplinelor predate in invatamintul mediu . Se demonstreaza posibilitatea folosirii calculatorului practic la toate disciplinele de invatamint . Exemple : limba romana , biologie , limbi moderne , geografie , pe linga disciplinele considerate mai strins legate de informatica : matematica , fizica , chimie.
- Dezvaluie posibilitati de utilizare creatoare a calculatorului personal fabricat in tara noastra din seria TIM-S , HC-85 .
- Programele prezentate sint complete , pot fi imediat folosite , sint insotite de explicatiile necesare pentru utilizator . Sint cuprinse listingurile programelor in limbajul BASIC , rutinele in cod-masina (limbaj de asamblare) , imagini de ecran din timpul rularii programelor .
- Sint incluse o serie de programe utilitare , create de autori , cum ar fi: LPRINT ET , COMPACT SCREEN$, 64 COL , WINDOW , care extind posibilitatile calculatorului si faciliteaza dezvoltarea de programe noi , performante .
- Autorii principali ai programelor sint elevii , indrumati de profesorii lor , cartea costituind si o demonstratie a interesului pentru tehnica de calcul si a capacitatii lor creatoare .
- Sta la indemina fiecarui liceu sa-si procure tehnica de calcul necesara pentru utilizarea programelor descrise in carte .
- Cartea se adreseaza unei categorii largi de cititori , de care depinde viitorul informaticii in tara noastra . Cartea nu este numai pentru specialisti ci in primul rind pentru beneficiarii calculatoarelor .
- Reprezinta un model de lucru in echipa profesor-elev .
- Programele sint realizate la un inalt nivel profesional

ideile de realizare putind fi luate ca model pentru noi programe.

- Se deschide calea unei serii de carti destinate invatamintului asistat de catre calculator , care sa contribuie la un salt calitativ in procesul instructiv-educativ .
- Utilitatea lucrarii creste si datorita faptului ca se prevede introducerea informaticii in toate scolile , incepind cu nivelul gimnazial .
- Liceele de informatica au si menirea de a fi "statii-pilot" in acest domeniu .
- Un singur capitol este destinat unor probleme "pure" de informatica , translatarea programelor dintr-un limbaj in altul , restul capitolelor fiind destinate utilizarii calculatoarelor in diferite domenii .

CAPITOLUL 1

MATEMATICA

1.1. ALGEBRA

FUNCTIA DE GRADUL II CU UN PARAMETRU REAL

Programul FUNCTIA DE GRADUL II CU UN PARAMETRU REAL a fost conceput in scopul folosirii sale de catre profesori si elevi in cadrul orelor de matamatica in care se studiaza familii de functii de gradul II.

Trasarea graficelor cu ajutorul calculatorului prezinta urmatoarele avantaje:precizie sporita,posibilitatea trasarii graficelor la orice scara,calcularea rapida a unor caracteristici.

Dupa incarcarea programului este afisat un meniu cuprinzind urmatoarele optiuni:

1-Exemple
2-Grafice
3-Probleme

1.1.1.Exemple

Alegerea optiunii 1 duce la afisarea unui alt meniu care permite alegerea unor familii de functii cu diferite caracteristici (graficele nu au nici un punct comun,graficele au unul sau doua puncte comune,virfurile graficelor sint pe o dreapta sau sint pe o parabola).In urma alegerii uneia din optiunile afisate se trasează 6 gafice din familia respectiva de functii si sint afisate coordonatele punctelor comune sau ecuatia dreptei ce uneste virfuriie parabolelor daca este cazul.

In timpul trasarii graficelor,pe ultima linie a ecranului,s

sint afisate coordonatele virfului si valoarea parametrului m.

1.1.2. Grafice

In cazul in care se doreste trasarea graficelor unei familii de functii introduse de utilizator se alege optiunea 2 si apoi se introduc coeficientii A,B,C ca functii de m.

Se introduc valorile intre care variaza parametrul m si parametrul t in functie de care se alege scara la care se traseaza graficele.

Dupa ce se traseaza 6 graficeesint afisate,atunci cind este cazul,coordonatele punctelor comune si ecuatia dreptei sau parabolei care uneste virfurile graficelor.

1.1.3. Probleme

In cadrul optiunii 3 sint afisate enunturile si rezolvarile a 3 probleme precum si graficele functiilor.

Sint propuse spre rezolvare enunturile a 3 probleme.

In cazul in care apare o eroare sau a fost oprita executia programului acesta se poate relansa cu GO to 5000.

Programul poate fi imbunatatit sau modificat in scopul realizarii unui program care sa cuprinda alte proprietati ale functiei de gradul II.

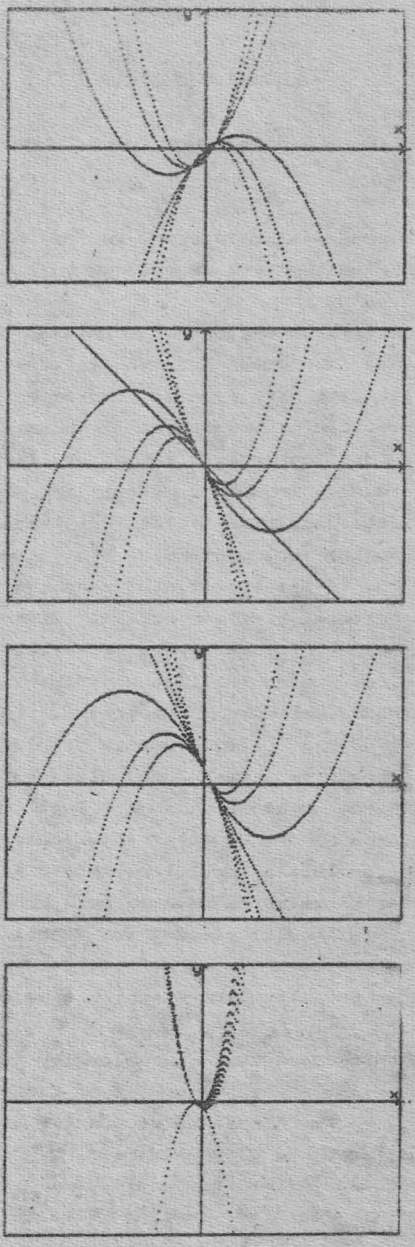
```
  1 REM  FUNCTIA DE GRADUL II
  2 REM  autori: elev DRAGOS MARGINEANTU
  3 REM          elev CALIN KLEITSCH
  4 REM
  5 INPUT "t=";t: LET sw=0
 10 REM Trasare grafice
 20 BORDER 4: PAPER 6: INK 0
 30 CLS
 40 LET i=0
 50 PLOT 0,87: DRAW 255,0: PLOT 127,0: DRAW 0,175
 55 PLOT 254,86: PLOT 253,85: PLOT 252,84: PLOT 254,88: PLOT 253,89: PLOT 252,9
0: PRINT AT 9,31;"x": PLOT 128,174: PLOT 129,173: PLOT 130,172: PLOT 126,174: PL
OT 125,173: PLOT 124,172: PRINT AT 0,14;"y"
 60 FOR m=v TO w STEP (w-v)/6
 70 IF INT (100*VAL m$)=0 THEN  GO TO 150
 80 GO TO 240
 85 LET q=INT (100*m)/100
 87 PRINT #0;AT 0,24;"m=";q
 90 FOR x=-127/t TO 127/t STEP 1/t
100 LET x1=x*t
110 LET y=VAL (f$)
120 IF y*t<-87 OR y*t>87 THEN  GO TO 140
130 PLOT x1+127,y*t+87
140 NEXT x
150 NEXT m
160 PRINT #0;AT 0,0;"Tastati orice    "; PAUSE 0: GO TO 320
200 INPUT "A="; LINE m$;" B="; LINE n$;" C="; LINE p$: LET f$="("+m$+")*x*x+("+
n$+")*x+"+p$
210 INPUT "Valorile intre care variaza m         min=";v;" max=";w
220 GO TO 5
240 LET aa=VAL m$: LET bb=VAL n$: LET cc=VAL p$: LET d=bb*bb-4*(aa*cc): PRINT #
0;AT 0,0;"V(";(INT ((-bb/(2*aa))*100))/100;",";(INT ((-d/(4*aa))*100))/100;")
"
250 LET i=i+1
260 LET w(1,i)=-bb/(2*aa): LET w(2,i)=-d/(4*aa)
270 GO TO 85
280 IF sw=1 THEN- PAUSE 0: GO TO 7200
287 PRINT AT 21,0;"Continuam ?  (D/N)"
290 IF INKEY$="D" OR INKEY$="d" THEN  GO TO 5000
300 IF INKEY$="N" OR INKEY$="n" THEN  GO TO 630
310 GO TO 290
315 REM Mem SCREEN$ ,calc caract
320 PRINT #0;AT 0,0;"                                        ": RANDOMIZE USR 50100
330 CLS
340 LET m=v: LET a=VAL m$: LET b=VAL n$: LET c=VAL p$: LET m=m+(w-v)/6: LET a1=
VAL m$: LET b1=VAL n$: LET c1=VAL p$
350 LET d1=(b-b1)*(b-b1)-4*(a-a1)*(c-c1)
360 IF INT (d1*100)=0 OR INT (d1*100)+1=0 THEN  GO TO 420
370 IF d1<0 THEN  GO TO 470
372 LET swcirc=0
375 IF a=a1 AND b<>b1 THEN  LET x1=(c1-c)/(b-b1): LET x2=x1: GO TO 430
380 LET x1=(b1-b+SQR (d1))/(2*(a-a1)): LET x2=(b1-b-SQR (d1))/(2*(a-a1))
390 PRINT "    Graficele au doua puncte co-aunar"
400 LET x=x1: PRINT "        A(";x;",";VAL f$;")": LET x=x2: PRINT "        B(";x
;",";VAL f$;")"
410 GO TO 480
420 LET x2=(b1-b)/(2*(a-a1)): LET x1=x2
430 PRINT "    Graficele au un punct comun: "
440 LET x=x1
450 PRINT "     A(";x;",";VAL f$;")"
460 GO TO 480
470 LET swcirc=1: PRINT "   Graficele nu au puncte comune"
480 IF w(1,1)-w(1,2)=0 THEN  GO TO 750
485 LET i=(w(2,1)-w(2,2))/(w(1,1)-w(1,2)): LET j=w(2,1)-i*w(1,1)
490 FOR f=1 TO 6: IF w(1,f)=0 AND w(2,f)=0 THEN  GO TO 510
500 IF i*w(1,f)+j<w(2,f)-.08 OR i*w(1,f)+j>w(2,f)+.08 THEN  GO TO 540
503 NEXT f
510 LET i=(INT (i*100))/100: LET j=(INT (j*100))/100
520 PRINT "   Virfurile parabolelor sint pe dreapta a carei ecuatie este:
    (";i;")x+(";j;")=y"
530 LET h$="i*x+j": PAUSE 0: GO TO 660
540 IF w(1,1)*w(1,1)-w(1,2)*w(1,2)+(w(1,1)*w(1,1)-w(1,3)*w(1,3))*(w(1,1)-w(1,2)
)=0 THEN  GO TO 750
542 LET q=(((w(1,1)*w(1,1)-w(1,2)*w(1,2))*(w(1,1)-w(1,3)))-((w(1,1)*w(1,1)-w(1,
3)*w(1,3))*(w(1,1)-w(1,2))))
543 LET s=(((w(1,1)-w(1,3))*(w(2,1)-w(2,2)))-((w(1,1)-w(1,2))*(w(2,1)-w(2,3))))
544 LET i=s/q
545 IF w(1,1)-w(1,2)=0 THEN  GO TO 750
547 LET j=(w(2,1)-w(2,2)-i*(w(1,1)*w(1,1)-w(1,2)*w(1,2)))/(w(1,1)-w(1,2))
553 LET k=w(2,1)-i*w(1,1)*w(1,1)-j*w(1,1)
```

```
370 FOR f=1 TO 6: IF w(1,f)=0 AND w(2,f)=0 THEN  GO TO 390

380 IF i*w(1,f)*w(1,f)+j*w(1,f)+k(w(2,f)-.25 OR i*w(1,f)*w(1,f)+j*w(1,f)+k)w(2,
f)+.25 THEN  GO TO 750
390 NEXT f: LET j=(INT (j*10))/10: LET j=(INT (j*10))/10: LET k=(INT (k*10))/10
400 PRINT "   Virfurile parabolelor sint pso parabola a carei ecuatie este:
    ("ii;")x +("j;")x+("ik;")=y"
410 LET h$="i*x*x+j*x+k"
420 PAUSE 0: GO TO 660
430 IF INKEY$="D" OR INKEY$="d" THEN  STOP
440 IF INKEY$="n" OR INKEY$="N" THEN  PAUSE 0: CLS : GO TO 5000
450 GO TO 430
460 RANDOMIZE USR 50112
470 IF swcirc=1 THEN  GO TO 700
480 LET x=x1: PLOT  INK 2;x+127,87+VAL f$
490 LET x=x2: PLOT  INK 2;x+127,87+VAL f$
700 FOR x=-127/t TO 127/t STEP 1/t
710 LET y=VAL h$
720 IF y*t<-87 OR y*t>87 THEN  GO TO 740
730 PLOT  INK 2; x*t+127,y*t+87
740 NEXT x: PAUSE 0: GO TO 280
750 RANDOMIZE USR 50112
780 GO TO 280
785 REM INCEPUT.idir;def UD6.Meniu
786 FOR f=50100 TO 50123: READ b: POKE f,b: NEXT f
789 DATA 17,0,167,33,0,64,1,0,27,237,176,201,17,0,64,33,0,167,1,0,27,237,176,20
1
799 CLS : FOR f=0 TO 55: READ b: POKE 65368+f,b: NEXT f: RESTORE
800 DATA BIN 1110000,BIN 10010000,BIN 100000,BIN 1000000,BIN 11111000,0,0,0,0,0
,0,0,0,BIN 11111000,BIN 10101000,BIN 10101000
803 DATA BIN 10000,BIN 110000,BIN 1110000,BIN 11111000,BIN 11001100,BIN 1000011
0,BIN 11,BIN 11,BIN 11,BIN 11,BIN 10000110,BIN 11001100,BIN 11111000,BIN 1110000
,BIN 110000,BIN 10000
805 DATA BIN 1,BIN 10,BIN 100,BIN 11111111,BIN 10000,BIN 11111111,BIN 1000000,B
IN 10000000,0,BIN 11110,BIN 110000,BIN 1000000,BIN 1111110,BIN 1000000,BIN 11000
0,BIN 11110
806 DATA 0,0,BIN 1100110,BIN 10011001,BIN 10011001,BIN 10010110,BIN 1100000,0
5000 PAPER 6: INK 1: BORDER 4: CLS
5005 PRINT AT 1,11;"OPTIUNI"
5010 PRINT AT 5,1;"1 - Exemple"
5015 PRINT AT 7,1;"2 - Grafice"
5017 PRINT AT 9,1;"3 - Probleme"
5020 IF INKEY$="3" THEN  GO TO 7000
5030 IF INKEY$="2" THEN  GO TO 5500
5040 IF INKEY$="1" THEN  GO TO 6000
5050 GO TO 5020
5500 CLS : GO TO 200
6000 CLS : PRINT AT 2,1;"1 - Graficele nu au puncte        comune";AT 5,1;"2 -
 Graficele au un punct comun";AT 7,1;"3 - Graficele au doua puncte        comune
";AT 10,1;"4 - Graficele au virfurile pe o        dreapta ";AT 13,1;"5 - Graficele
 au virfurile pe o        parabola".
6005 PRINT AT 16,1;"ENTER  - Meniu"
6010 IF INKEY$="1" THEN  GO TO 6500
6020 IF INKEY$="2" THEN  GO TO 6600
6030 IF INKEY$="3" THEN  GO TO 6700
6040 IF INKEY$="4" THEN  GO TO 6800
6050 IF INKEY$="5" THEN  GO TO 6900
6055 IF INKEY$=CHR$ 13 THEN  GO TO 5000
6080 GO TO 6010
6500 LET m$="m": LET n$="2": LET p$="2*m": GO TO 6605
6600 LET m$="m*(m-1)": LET n$="m-2": LET p$="3"
6605 LET t=3
6606 LET f$="("+m$+")*x*x+("+n$+")*x+"+p$: CLS : PRINT AT 8,0;" A=";m$: PRINT "
 B=";n$: PRINT "  C=";p$: LET v=-0.2: LET w=.2: PRINT AT 12,3;"f (x)=";m$;"x +"
;n$;"x+";p$: LET sw=0: PAUSE 0: GO TO 10
6700 LET m$="m": LET n$="m+1": LET p$="-1-6*m": LET t=3: LET v=-.2: LET w=.2: PA
USE 0: GO TO 6605
6800 LET m$="m": LET n$="2*(m-1)": LET p$="m-1": GO TO 6605
6900 LET m$="(m+1)/2": LET n$="2*m": LET p$="(m-1)/(m+1)": LET t=10
6905 GO TO 6605
7000 CLS
7010 PRINT AT 5,1;"1 - Rezolvate"
7012 PRINT AT 7,1;"2 - Propuse spre rezolvare"
7015 PRINT AT 9,1;"ENTER  - Meniu"
```

-8-

```
680 570)FOR f=1TO s:IF m(1,f)=0AND m(2,f)=0THEN GO TO 590
 580 IF i*m(1,f)*m(1,f)+j*m(1,f)+k<m(2,f)-.25 OR i*m(1,f)*m(1,f)+j*m(1,f)+k>m(2,
f)+.25 THEN  GO TO 750
 590 NEXT f: LET i=(INT (i*10))/10: LET j=(INT (j*10))/10: LET k=(INT (k*10))/10
 600 PRINT "    Virfurile parabolelor sint pe o parabola a carei ecuatie este:
     (";i;")x +(";j;")x+(";k;")=y"
 610 LET h$="i*x*x+j*x+k"
 620 PAUSE 0: GO TO 660
 630 IF INKEY$="D" OR INKEY$="d" THEN  STOP
 640 IF INKEY$="m" OR INKEY$="M" THEN  PAUSE 0: CLS : GO TO 5000
 650 GO TO 630
 660 RANDOMIZE USR 50112
 670 IF swcirc=1 THEN  GO TO 700
 680 LET x=x1: PLOT  INK 2;x+127,87+VAL f$
 690 LET x=x2: PLOT  INK 2;x+127,87+VAL f$
 700 FOR x=-127/t TO 127/t STEP 1/t
 710 LET y=VAL h$
 720 IF y*t<-87 OR y*t>87 THEN  GO TO 740
 730 PLOT  INK 2; x*t+127,y*t+87
 740 NEXT x: PAUSE 0: GO TO 280
 750 RANDOMIZE USR 50112
 780 GO TO 280
 785 REM INCEPUT.1dir;def UDG.Meniu
 786 FOR f=50100 TO 50123: READ b: POKE f,b: NEXT f
 789 DATA 17,0,167,33,0,64,1,0,27,237,176,201,17,0,64,33,0,167,1,0,27,237,176,20
1
 799 CLS : FOR f=0 TO 55: READ b: POKE 65368+f,b: NEXT f: RESTORE
 800 DATA BIN 1110000,BIN 10010000,BIN 100000,BIN 1000000,BIN 11111000,0,0,0,0,0
,0,0,0,BIN 11111000,BIN 10101000,BIN 10101000
 803 DATA BIN 10000,BIN 110000,BIN 1110000,BIN 11111000,BIN 11001100,BIN 1000011
0,BIN 11,BIN 11,BIN 11,BIN 11,BIN 10000110,BIN 11001100,BIN 11111000,BIN 1110000
,BIN 110000,BIN 10000
 805 DATA BIN 1,BIN 10,BIN 100,BIN 11111111,BIN 10000,BIN 11111111,BIN 1000000,B
IN 10000000,0,BIN 11110,BIN 110000,BIN 1000000,BIN 1111110,BIN 1000000,BIN 11000
0,BIN 11110
 806 DATA 0,0,BIN 1100110,BIN 10011001,BIN 10011001,BIN 10010110,BIN 1100000,0
5000 PAPER 6: INK 1: BORDER 4: CLS
5005 PRINT AT 1,11;"OPTIUNI"
5010 PRINT AT 5,1;"1 - Exemple"
5015 PRINT AT 7,1;"2 - Grafice"
5017 PRINT AT 9,1;"3 - Probleme"
5020 IF INKEY$="3" THEN  GO TO 7000
5030 IF INKEY$="2" THEN  GO TO 5500
5040 IF INKEY$="1" THEN  GO TO 6000
5050 GO TO 5020
5500 CLS : GO TO 200
6000 CLS : PRINT AT 2,1;"1 - Graficele nu au puncte          comune";AT 5,1;"2 -
 Graficele au un punct comun";AT 7,1;"3 - Graficele au doua puncte          comune
";AT 10,1;"4 - Graficele au virfurile pe o      dreapta ";AT 13,1;"5 - Graficele
au virfurile pe o      parabola"
6005 PRINT AT 16,1;"ENTER  - Meniu"
6010 IF INKEY$="1" THEN  GO TO 6500
6020 IF INKEY$="2" THEN  GO TO 6600
6030 IF INKEY$="3" THEN  GO TO 6700
6040 IF INKEY$="4" THEN  GO TO 6800
6050 IF INKEY$="5" THEN  GO TO 6900
6055 IF INKEY$=CHR$ 13 THEN  GO TO 5000
6060 GO TO 6010
6500 LET m$="m": LET n$="2": LET p$="2*m": GO TO 6605
6600 LET m$="m*(m-1)": LET n$="m-2": LET p$="3"
6605 LET t=3
6606 LET f$="("+m$+")*x*x+("+n$+")*x+"+p$: CLS : PRINT AT 8,0;"  A=";m$: PRINT "
  B=";n$: PRINT "  C=";p$: LET v=-0.2: LET w=.2: PRINT AT 12,3;"f (x)=";m$;"x +"
;n$;"x+";p$: LET sw=0: PAUSE 0: GO TO 10
6700 LET m$="m": LET n$="m+1": LET p$="-1-6*m": LET t=3: LET v=-.2: LET w=.2: PA
USE 0: GO TO 6605
6800 LET m$="m": LET n$="2*(m-1)": LET p$="m-1": GO TO 6605
6900 LET m$="(m+1)/2": LET n$="2*m": LET p$="(m-1)/(m+1)": LET t=10
6905 GO TO 6605
7000 CLS
7010 PRINT AT 5,1;"1 - Rezolvate"
7012 PRINT AT 7,1;"2 - Propuse spre rezolvare"
```

```
7015 PRINT AT 9,1;"ENTER  - Meniu"
7020 IF INKEY$="1" THEN  GO TO 7100
7025 IF INKEY$="2" THEN  GO TO 8000
7027 IF INKEY$=CHR$ 13 THEN  GO TO 5000
7030 GO TO 7020
7100 PAPER 5: INK 1: BORDER 5: CLS
7110 FOR u=1 TO 3: CLS
7115 PRINT x$(u, TO ): LET a$=v$(u, TO ): LET n$=u$(u, TO ): LET p$=w$(u, TO ):
LET sw=1: LET f$=a$+"+x+x+"+n$+"+x+"+p$
7120 LET t=3: LET v=-.3: LET w=.3: PAUSE 0: BEEP .1,29: GO TO 10
7200 CLS : PRINT r$(u, TO ): PAUSE 0
7300 PRINT #0;AT 0,0;"Treceti la urmatoarea problema ?          (D/N)"
7350 IF INKEY$="D" OR INKEY$="d" THEN  NEXT u
7375 IF INKEY$="N" OR INKEY$="n" THEN  GO TO 7000
7400 GO TO 7350
8000 PAPER 5: INK 1: BORDER 5: CLS
8010 FOR u=1 TO 3: CLS
8015 PRINT u;" - ";y$(u, TO )
8020 PRINT #0;"Tastati orice": PAUSE 0: BEEP .1,29
8030 NEXT u
8040 GO TO 5000
```



1.2. GEOMETRIE

LOCURI GEOMETRICE

Tema lectiei:Determinarea unor locuri geometrice de baza

In categoria programelor-instrumente de pret la indemina profesorilor de matematica,se constituie si programul "LOCURI-GEOM".

Programul trateaza un set de 6 probleme din manualul de geometrie de clasa a IX-a. Rezolvarea acestor probleme cu ajutorul calculatorului este nu numai indicata dar si absolut necesara pentru invatamintul modern. Problemele rezolvate in acest mod sint din categoria celor de locuri geometrice. Intuirea formei locului geometric cerut in enuntul problemei este foarte dificila daca s-ar folosi mijloace de invatamint traditionale. Aportul calculatorului la acest domeniu al geometriei este foarte eficient tinind seama de faptul ca prin program se calculeaza efectiv pozitia fiecarui punct care apartine locului geometric. Calculele se bazeaza pe elemente de geometrie analitica. Pentru facilitarea intuirii formei locului geometric inainte de generarea completa a locului geometric respectiv se calculeaza citeva puncte izolate care apartin locului si se ploteaza pe ecran. Dupa afisarea fiecarui punct se trece la generarea urmatorului punct. Dupa calculul citorva puncte programul se deruleaza fara interventia utilizatorului pina la afisarea completa a locului geometric respectiv.In final dupa apasarea unei taste se afiseaza pe ecran un text care expliciteaza forma locului geometric cerut de problema respectiva. Locul geometric care rezulta prin calcule se genereaza pe ecran cu alta culoare pentru a se deduce mai usor si vizual forma.

Dam in cele ce urmeaza textul problemelor rezolvate:

1. Fie AB un diametru fix al unui cerc C(o,r) iar M un punct variabil pe cerc. Se ia pe raza OM un punct P astfel OP=d(M,AB). Sa se afle locul geometric al punctului P.

2. Fie AB o coarda fixa al unui cerc iar PQ o coarda variabila ca pozitie dar de lungime fixa.Sa se afle locul

geometric al punctelor AP intersectat cu BQ si AQ intersectat cu BP.

3. AB fiind o coarda fixa iar M un punct variabil al unui cerc,sa se afle locul geometric al punctului P astfel incit M apartine lui AP si MP=MB.

4. Se considera un cerc,o coarda fixa AB si un punct M variabil pe cerc. Sa se determine locul geometric al ortocentrului triunghiului AMB.

5. Se considera un cerc,o coarda fixa AB si un punct M variabil pe cerc. Sa se determine locul geometric al centrului de greutate al triunghiului AMB.

6. Fie A un punct fix iar P un punct variabil al unui cerc. Sa se afle locul geometric al punctului M de intersectie a bisectoarei unghiului POA cu cercul circumscris triunghiului POA

Programul nu are un caracter interactiv cu exceptia rezolvarii problemei a doua cind se cere utilizatorului sa aleaga intre doua marimi pentru lungimea coardei variabile.Acest lucru este determinat de dificultatea incadrarii in ecran pentru vizualizarea solutiei.La marimi alese arbitrar ar putea exista posibilitatea neaparitiei figurii sau locului pe ecran cu toate ca programul lucreaza. Exista posibilitatea reintoarcerii la oricare problema pe baza unui meniu care se afiseaza la terminarea rezolvarii fiecarei probleme. De asemenea la revenirea intr-o problema se afiseaza la inceput textul problemei asemenea unei masini de scris dupa care la apasarea unei taste se deruleaza construirea locului geometric cerut prin problema respectiva.

Programul apartine unui ciclu de programe pentru locuri geometrice care rezolva in intregime acest domeniu din geometria clasei a IX-A.

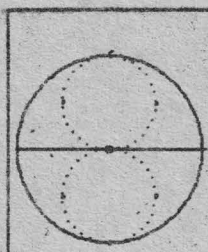
```
  1 REM  LOCURI GEOMETRICE
  2 REM  AUTORI:prof. DORIN MANZ
  3 REM         prof. DOREL MINET
 10 PAPER 0: BORDER 0: INK 7: CLS
 15 LET t$=""
 30 CLS
 40 PRINT AT 2,3;"AUTORI: prof. MANZ DORIN";AT 3,11;"prof. MINET DOREL";AT 5,10
;"Tema lectiei: ";AT 7,6;"Determinarea unor locuri                geometrice de baza"
 50 PRINT AT 12,5;"Programul realizeaza:";AT 14,7;"-trasare locuri"
 60 PAUSE 0: CLS : PRINT AT 1,14;"OPTIUNI";AT 4,7;"1 -loc geometric 1";AT 6,7;"
2 -loc geometric 2";AT 8,7;"3 -loc geometric 3";AT 10,7;"4 -loc geometric 4";AT
12,7;"5 -loc geometric 5";AT 14,7;"6 -loc geometric 6"
 65 LET a$=INKEY$
 70 PRINT @0;AT 0,6;"Alegeti optiunea!"
 80 IF CODE a$<49 OR CODE a$>54 THEN  GO TO 65
 90 PRINT AT 2+VAL a$+2,7; FLASH 1;VAL a$
100 GO SUB VAL a$+1000
110 PAUSE 0: CLS : INPUT @0;"Doriti alta problema?";b$
130 IF CODE b$=100 OR CODE b$=68 THEN  GO TO 60
150 STOP
1000 DIM a$(250): PAPER 1: INK 7: BORDER 3: CLS
1030 LET a$=" Fie [AB] un diametru fix al    unui cerc C(O,r) iar M un punct var
iabil pe cerc. Se ia pe raza [OM] un punct P astfel incit    [OP]= sa fie egala
 cu distanta de la M la dreapta AB.Sa se afle locul geometric al punctului P."
1040 PRINT : PRINT : PRINT : PRINT : PRINT : FOR i=1 TO LEN a$: PRINT a$
(i);: BEEP .01,10: NEXT i: PAUSE 0: CLS
1050 GO SUB 7000: LET xc=65: LET yc=85: LET r=60
1060 CIRCLE xc,yc,r: CIRCLE xc,yc,2: PLOT xc-r,yc: DRAW 2*r,0
1070 FOR a=PI/4 TO 2*PI STEP PI/4
1080 LET xa=xc+r*COS a: LET ya=yc+r*SIN a
1090 PLOT xa,ya: DRAW 0,yc-ya
1100 PLOT xc,yc: DRAW xa-xc,ya-yc
1110 LET xp=xc+ABS (ya-yc)*COS a: LET yp=yc+ABS (ya-yc)*SIN a
1120 INK 3: PLOT xc,yc: DRAW xp-xc,yp-yc: PLOT xa,ya: DRAW 0,yc-ya
1130 CIRCLE xp,yp,1
1140 PAUSE 0: INK 7
1150 IF ABS (xp-xa)<.01 AND ABS (yp-ya)<.01 THEN  PLOT xc,yc: DRAW  OVER 1;xa-xc
,ya-yc: GO TO 1170
1160 GO SUB 1250
1170 IF a-PI<.1 THEN  PLOT xc,yc: DRAW -r,0
1180 NEXT a
1190 FOR a=0 TO 2*PI STEP .1
1200 LET xa=xc+r*COS a: LET ya=yc+r*SIN a
1210 LET xp=xc+ABS (ya-yc)*COS a: LET yp=yc+ABS (ya-yc)*SIN a
1220 PLOT xp,yp
1230 NEXT a
1231 LET c$="Locul geometric este format din doua cercuri tangente in O  de raze
 R/2 si de centre situate pe diametrul    cercului dat.
1232 LET l=1: LET h=12: LET pas=12: LET deunde=5: LET pinaunde=14: LET unde=19
1235 GO S_B 1300
1240 PAUSE 0: RETURN
1250 PLOT xa,ya: DRAW  OVER 1;0,yc-ya: PLOT xc,yc: DRAW  OVER 1;xa-xc,ya-yc
1260 RETURN
1300 LET l1=l: LET h1=h: PAPER 6: FOR i=deunde TO pinaunde: PRINT AT i,unde;t$(l
1 TO h1): NEXT i
1315 INK 1: FOR i=deunde TO pinaunde: PRINT AT i,unde;c$(l TO h): LET l=l+pas: L
ET h=h+pas: NEXT i
1350 PAPER 1: INK 6: RETURN
2000 PAPER 1: BORDER 3: INK 7: CLS
2010 DIM a$(160)
2020 RESTORE 2020: FOR i=0 TO 7: READ x: POKE USR " "+i,x: NEXT i: DATA 0,60,66,
66,66,66,66,66
2030 LET a$=" Fie [AB] o coarda fixa a unui   cerc,iar [PQ] o coarda variabi- la
 ca pozitie dar de lungime    fixa.Sa se afle locul geometric al punctelor AP SO
 si AQ BP."
2040 PRINT : PRINT : PRINT : PRINT : PRINT : PRINT : PRINT : FOR i=1 TO LEN a$:
PRINT a$(i);: BEEP .05,-30: NEXT i
2050 PAUSE 0: CLS
2060 GO SUB 7000: DIM a(300): DIM b(300)
2070 LET i=0: LET r=40: INPUT "Dati lg.coardei var.(20=d,d=70)";d
2080 IF d>=r THEN  LET xc=200: LET yc=60: GO TO 2110
2090 GO SUB 7000: LET xc=60
```

```
2100 LET yc=90
2110 LET xa=xc-r: LET ya=yc: LET xb=xa+r/2: LET yb=yc+SQR (r^2-ABS (xc-xb)^2)
2120 CIRCLE xc,yc,2: CIRCLE xc,yc,r
2130 PLOT xa,ya: DRAW xb-xa,yb-ya
2140 GO SUB 2310
2150 PAUSE 0
2160 FOR b=0 TO 2*PI STEP .1
2170 LET a=b+2*ASN (d/(2*r))
2180 LET xp=xc+r*COS a: LET yp=yc+r*SIN a: LET xq=xc+r*COS b: LET yq=yc+r*SIN b
2190 PLOT xp,yp: DRAW xq-xp,yq-yp
2200 GO SUB 2450
2210 LET z=yq: LET yq=yp: LET yp=z: LET t=xq: LET xq=xp: LET xp=t: GO SUB 2450:
LET yp=yq: LET yq=z: LET xp=xq: LET xq=t: GO SUB 2580
2220 NEXT b
2230 INK 5: PLOT xa,ya: DRAW xb-xa,yb-ya: INK 3: CIRCLE xc,yc,r
2240 FOR j=1 TO i: IF j/2=INT (j/2) THEN  INK 7: GO TO 2260
2250 INK 7
2260 PLOT a(j),b(j)
2270 NEXT j
2285 LET c$=" Locul  geometric:doua cercuri secante care au corda AB fixa ,coonu
na.
2290 LET l=1: LET h=9: LET pas=9: LET deunde=5: LET pinaunde=14: LET unde=22
2291 IF d=70 THEN  LET unde=1
2295 PAUSE 0: GO SUB 1300
2300 RETURN
2310 FOR a=PI/8 TO 5*PI/8 STEP PI/8: LET b=a-2*ASN (d/(2*r)): LET xp=xc+r*COS b:
 LET yp=yc+r*SIN b: LET xq=xc+r*COS a: LET yq=yc+r*SIN a: PLOT xp,yp: DRAW xq-xp
,yq-yp
2320 PLOT xp,yp: DRAW xb-xp,yb-yp: PLOT xq,yq: DRAW xa-xq,ya-yq: PAUSE 0
2330 GO SUB 2410
2340 PAUSE 0
2350 LET z=yq: LET yq=yp: LET yp=z: LET t=xq: LET xq=xp: LET xp=t: GO SUB 2450:
IF xa>=1 AND xa<=254 AND ya>=1 AND ya<=174 THEN  PLOT  OVER 1;xa,ya
2360 IF d>=r THEN  DRAW xp-xa,yp-ya: PLOT xa,ya: DRAW xq-xa,yq-ya: PAUSE 0: GO S
UB 2430: PAUSE 0: GO TO 2380
2370 IF xa>=1 AND xa<=254 AND ya>=1 AND ya<=174 THEN  DRAW xa-xa,ya-ya: PLOT xa,
ya: DRAW xb-xa,yb-ya: PAUSE 0: LET z=xp: LET xp=xa: LET xa=z: LET t=yp: LET yp=y
a: LET ya=t: LET u=xq: LET xq=xb: LET xb=u: LET v=yq: LET yq=yb: LET yb=v: GO SU
B 2430: LET xa=xp: LET ya=yp: LET xb=xq: LET yb=yq: GO TO 2390
2380 LET z=yp: LET yp=yq: LET yq=z: LET t=xp: LET xp=xq: LET xq=t: GO SUB 2580
2390 NEXT a
2400 RETURN
2410 PLOT xp,yp: DRAW  OVER 1;xb-xp,yb-yp: PLOT xq,yq: DRAW  OVER 1;xa-xq,ya-yq
2420 RETURN
2430 PLOT xa,ya: DRAW  OVER 1;xp-xa,yp-ya: PLOT xa,ya: DRAW  OVER 1;xq-xa,yq-ya
2440 RETURN
2450 IF xq=xa THEN  GO TO 2570
2460 LET m1=(yq-ya)/(xq-xa)
2470 IF xp=xb THEN  GO TO 2570
2480 LET m2=(yp-yb)/(xp-xb)
2490 IF m1=m2 THEN  GO TO 2570
2500 LET xm=(ya-yb-m1*xa+m2*xb)/(m2-m1): LET ym=m1*xm+ya-m1*xa
2510 IF xm>=1 AND xm<=254 AND ym>=1 AND ym<=174 THEN  LET i=i+1: LET a(i)=xm: LE
T b(i)=ym: GO TO 2530
2520 GO TO 2570
2530 IF i/2=INT (i/2) THEN  BEEP .01,20: INK 3: GO TO 2560
2540 INK 7
2550 BEEP .01,40
2560 PLOT xm,ym
2570 RETURN
2580 INK 5: PLOT xp,yp: DRAW  OVER 1;xq-xp,yq-yp
2800 RETURN
3000 PAPER 1: BORDER 3: INK 7: CLS
3010 RESTORE 3010: FOR i=0 TO 7: READ x: POKE USR " "+i,x: NEXT i: DATA 24,32,64
,64,120,64,32,24
3020 DIM a$(150)
3030 LET a$=" !AB! fiind o coarda fixa,iar M  un punct variabil al unui cerc, sa
 se afle locul geometric al  punctului P astfel incit  !AP! si !MP!=!MB!."
```

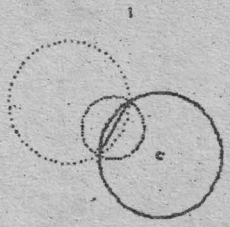
```
3040>PRINT :PRINT :PRINT :PRINT :PRINT :PRINT :FOR i=1TO LEN a$:PRINT a$(i);:BEE
P .05,-20:NEXT i
3050 PAUSE 0: CLS
3060 GO SUB 7000: LET r=30
3070 LET xc=100: LET yc=80
3080 LET xa=xc-r: LET ya=yc
3090 LET xb=xc+r/2: LET yb=yc+SQR (r^2-ABS (xb-xc)^2)
3100 CIRCLE xc,yc,r: PLOT xa,ya: DRAW xb-xa,yb-ya
3110 GO SUB 3240: GO SUB 3350
3120 FOR a=0 TO 2*PI STEP .1
3130 LET xm=xc+r*COS a: LET ym=yc+r*SIN a
3140 CIRCLE xm,ym,1
3150 LET d=SQR (ABS (xm-xb)^2+ABS (ym-yb)^2)
3160 LET d1=SQR (ABS (xm-xa)^2+ABS (ym-ya)^2)
3170 LET d2=d+d1
3180 LET b=ATN ((ym-yc)/(xm-xa))
3190 LET xp=xa+d2*COS b: LET yp=yc+d2*SIN b
3200 BEEP .05,-20: PLOT xp,yp
3210 NEXT a
3220 PLOT xa,10: DRAW 0,150: PRINT AT 2,xa/8-2;"t"
3222 LET c$="  Locul  geometric:doua portiuni de cercuri secante limitate de tan
gente in A la cerc care au corda AB fixa ,comuna.
3225 LET i=1: LET h=9: LET pas=9: LET deunde=5: LET pinaunde=17: LET unde=22
3226 PAUSE 0: GO SUB 1300
3230 RETURN
3240 FOR a=0 TO 2*PI STEP PI/4
3250 LET xm=xc+r*COS a: LET ym=yc+r*SIN a
3260 LET d=SQR (ABS (xm-xb)^2+ABS (ym-yb)^2)
3270 LET d1=SQR (ABS (xm-xa)^2+ABS (ym-ya)^2)
3280 LET d2=d+d1
3290 IF xm=xa THEN  GO TO 3340
3300 LET b=ATN ((ym-yc)/(xm-xa))
3310 LET xp=xa+d2*COS b: LET yp=yc+d2*SIN b
3320 INK 3: PLOT xm,ym: DRAW xb-xm,yb-ym: INK 7: PLOT xa,ya: DRAW xm-xa,ym-ya: I
NK 3: DRAW xp-xm,yp-ym: PAUSE 0
3330 GO SUB 3350: BEEP .05,-20: CIRCLE xp,yp,1: INK 7
3340 NEXT a
3350 INK 3: PLOT xa,ya: DRAW  OVER 1;xb-xa,yb-ya: INK 7: PLOT xa,ya: DRAW  OVER
1;xm-xa,ym-ya: INK 3: DRAW  OVER 1;xp-xm,yp-ym
3360 RETURN
4000 PAPER 1: BORDER 3: INK 7: CLS
4010 DIM a$(150)
4020 LET a$="  Se considera un cerc,o coarda  fixa AB si un punct M variabil  p
e cerc.Sa se determine locul  geometric al ortocentrului  triunghiului AMB.

4030 PRINT : PRINT : PRINT : PRINT : PRINT : PRINT : PRINT : FOR i=1 TO LEN a$:
PRINT a$(i);: BEEP .05,-30: NEXT i
4040 PAUSE 0: CLS
4050 GO SUB 7000: LET xc=120: LET yc=110: LET r=40
4060 LET xa=90: LET ya=yc-SQR (r^2-ABS (xc-xa)^2): LET xb=150: LET yb=ya: CIRCLE
 xc,yc,r: PLOT xa,ya: DRAW xb-xa,yb-ya
4070 GO SUB 4170
4080 PAUSE 0
4090 FOR a=0 TO 2*PI STEP .1
4100 LET xm=xc+r*COS a: LET ym=yc+r*SIN a: CIRCLE xm,ym,1
4110 IF ym=yb THEN  PRINT AT 0,0;"da": GO TO 4150
4120 LET m=(xb-xm)/(ym-yb)
4130 LET xh=xm: LET yh=ya+m*(xm-xa)
4140 BEEP .01,20: INK 3: PLOT xh,yh: INK 7
4150 NEXT a
4152 LET c$="  Locul  geometric:un cerc simetric cu cercul dat fatada coarda dat
a.
4155 LET i=1: LET h=9: LET pas=9: LET deunde=5: LET pinaunde=12: LET unde=22
4157 PAUSE 0: GO SUB 1300
4160 RETURN
4170 FOR a=0 TO 5*PI/3 STEP 2*PI/9
4180 LET xm=xc+r*COS a: LET ym=yc+r*SIN a: LET m=(xb-xm)/(ym-yb): LET xh=xm: LET
```

```
yb=ya+xa*(xa-xa)
4190 CIRCLE xa,ya,1: PLOT xa,ya: DRAW xa-xa,ya-ya: DRAW xb-xa,yb-ya: CIRCLE xh,y
h,1: BEEP .1,20: PAUSE 0: LET xha=xh: LET yha=yh: LET xaa=xa: LET yaa=ya: INK 3:
 CIRCLE xaa,yaa,1: CIRCLE xha,yha,1
4200 GO SUB 4230: INK 7
4210 NEXT a
4220 RETURN
4230 PLOT xa,ya: DRAW .OVER 1;xa-xa,ya-ya: DRAW  OVER 1;xb-xa,yb-ya
4240 RETURN
5000 PAPER 1: BORDER 3: INK 7: CLS
5010 DIM a$(160)
5020 LET a$=" Se considera un cerc,o coarda  fixa AB si un punct M variabil  p
e cerc.Sa se determine locul  geometric al centrului de gra- utate al triunghiu
lui AMB."
5030 PRINT : PRINT : PRINT : PRINT : PRINT : PRINT : PRINT : FOR i=1 TO LEN a$:
PRINT a$(i);: BEEP .05,-30: NEXT i
5040 PAUSE 0: CLS
5050 GO SUB 7000: LET xc=90: LET yc=100: LET r=60
5060 LET xa=50: LET ya=yc-SQR (r^2-ABS (xc-xa)^2): LET xb=130: LET yb=ya: CIRCLE
xc,yc,r: PLOT xa,ya: DRAW xb-xa,yb-ya
5070 GO SUB 5170
5080 PAUSE 0
5090 FOR a=0 TO 2*PI STEP .1
5100 LET xm=xc+r*COS a: LET ym=yc+r*SIN a: CIRCLE xm,ym,1
5110 IF ym=yb THEN  PRINT AT 0,0;"da": GO TO 5150
5120 LET m=(xb-xm)/(ym-yb)
5130 LET xh=(xa+xb+xm)/3: LET yh=(ya+yb+ym)/3
5140 BEEP .01,20: INK 3: PLOT xh,yh: INK 7
5150 NEXT a
5151 LET c$=" Locul  geometric:un cerc cucentrul lajumatatea distantei dintre
centrul cercului dat si coarda data si de  raza 1/3 din raza  cercului  dat.

5152 LET i=1: LET h=10: LET pas=10: LET deunde=5: LET pinaunde=19: LET unde=20
5153 PAUSE 0: GO SUB 1300
5160 RETURN
5170 FOR a=0 TO 5*PI/3 STEP 2*PI/9
5180 LET xm=xc+r*COS a: LET ym=yc+r*SIN a: LET m=(xb-xa)/(ya-yb): LET xh=(xa+xb+
xm)/3: LET yh=(ya+yb+ym)/3
5190 CIRCLE xa,ya,1: PLOT xa,ya: DRAW xa-xa,ya-ya: DRAW xb-xa,yb-ya: CIRCLE xh,y
h,1: BEEP .01,20: PAUSE 0: LET xha=xh: LET yha=yh: LET xaa=xa: LET yaa=ya: INK 3
: CIRCLE xaa,yaa,1: CIRCLE xha,yha,1
5200 GO SUB 5230: INK 7
5210 NEXT a
5220 RETURN
5230 PLOT xa,ya: DRAW  OVER 1;xa-xa,ya-ya: DRAW  OVER 1;xb-xa,yb-ya
5240 RETURN
6000 PAPER 1: BORDER 3: INK 7: CLS
6010 DIM a$(200)
6020 LET a$=" Fie A un punct fix,iar P un  punct variabil al unui cerc.  Sa
se afle locul geometric al  punctului M de intersectie a  bisectoarei unghiu
lui POA cu  cercul circumscris triunghiului POA."
6030 PRINT : PRINT : PRINT : PRINT : PRINT : PRINT : PRINT : FOR i=1 TO LEN a$:
PRINT a$(i);: BEEP .05,-20: NEXT i
6040 PAUSE 0: CLS
6050 GO SUB 7000: LET xc=60: LET yc=80: LET r=40: LET xa=140: LET ya=yc: CIRCLE
xa,ya,1: PLOT xc,yc: DRAW xa-xc,ya-yc
6060 FOR a=.6 TO 1.9 STEP .2
6070 CIRCLE xc,yc,r
6080 LET xp=xc+r*COS a: LET yp=yc+r*SIN a: CIRCLE xp,yp,1
6090 PLOT xc,yc: DRAW xp-xc,yp-yc: DRAW xa-xp,ya-yp
6100 LET m=-1/TAN a: LET c=(xc+xp)/2: LET b=(yc+yp)/2: LET xr=(xc+xa)/2: LET yr=
b+m*(xr-c)
6110 LET r1=SQR (ABS (xr-xa)^2+ABS (yr-ya)^2)
6120 CIRCLE xr,yr,r1
```

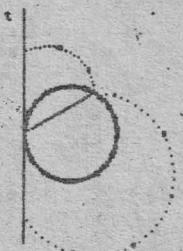
```
6130 LET d1=(xa+r-xc)/2: LET xa=xc+d1: LET ya=yc+d1*TAN (a/2): PLOT xc,yc: DRAW
xa-xc,ya-yc: INK 3: CIRCLE xa,ya,1: BEEP .05,20: INK 7
6140 PAUSE 0
6150 PLOT xc,yc: DRAW  INVERSE 1;xa-xc,ya-yc: CIRCLE  OVER 1;xr,yr,r1: PLOT xa,y
a: DRAW  INVERSE 1;xp-xa,yp-ya: DRAW  INVERSE 1;xc-xp,yc-yp: CIRCLE xa,ya,1: PAU
SE 0: CIRCLE xa,ya,1
6160 NEXT a
6170 PAUSE 0
6180 FOR a=-PI/2+.1 TO PI/2+.3 STEP .1
6190 LET xp=xc+r*COS a: LET yp=yc+r*SIN a
6200 LET m=-1/TAN a: LET c=(xc+xp)/2: LET b=(yc+yp)/2: LET xr=(xc+xa)/2: LET yr=
b+m*(xr-c)
6210 LET r1=SQR (ABS (xr-xa)^2+ABS (yr-ya)^2)
6220 LET d1=(xa+r-xc)/2: LET xa=xc+d1: LET ya=yc+d1*TAN (a/2): CIRCLE xp,yp,1: I
NK 3: CIRCLE xa,ya,1: BEEP .02,20: INK 7
6230 NEXT a
6235 LET c$=" Locul  geometric:mediatoarea segmentului exterior cercului.

6240 LET l=1: LET h=9: LET pas=9: LET deunde=5: LET pinaunde=12: LET unde=20
6245 PAUSE 0: GO SUB 1300
6300 RETURN
7000 PLOT 0,0: DRAW 255,0: DRAW 0,175: DRAW -255,0: DRAW 0,-175
7010 RETURN
```



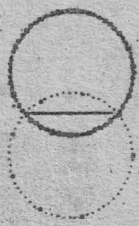
Locul geometric este format din două cercuri tangente în O de rază R/2 și de centre situate pe diametrul cercului dat



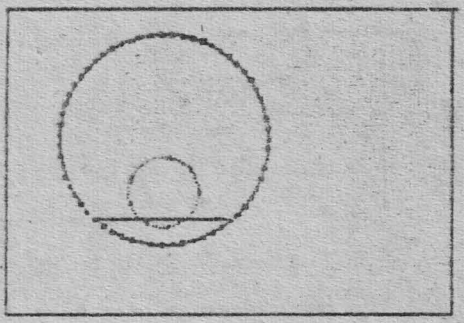
Locul geometric :două cercuri secante care au coarda AB fixă , comună.

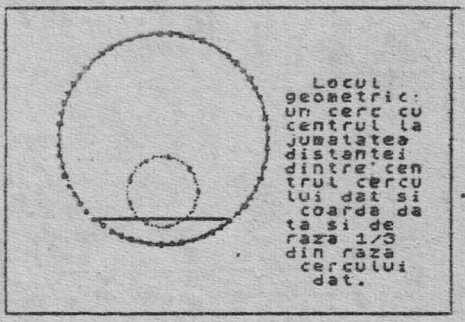


Locul geometric :două porțiuni de cercuri secante limitate de tangenta în A la cerc care au coarda AB fixă ,comună.

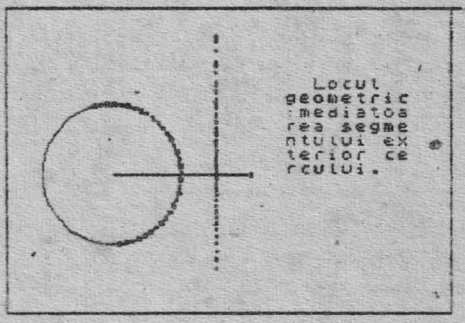


Locul geometric :un cerc simetric cu cercul dat față de coarda dată.





Locul geometric: un cerc cu centrul la jumatatea distantei dintre centrul cercului dat si coarda data si de raza 1/3 din raza cercului dat.



Locul geometric: mediatoarea segmentului exterior cercului.

CAPITOLUL 2
FIZICA

2.1. OSCILATII

In acest capitol ne propunem sa aratam modul in care poate fi utilizat calculatorul personal in cadrul orelor de fizica, capitolul OSCILATII.

Au fost elaborate 5 programe pentru aceasta tema, aici fiind prezentate primele 4 indicindu-se modul lor de utilizare in cadrul lectiilor.

*** OSCILATII1 ***

Lectia incepe cu punerea in evidenta a miscarii unui pendul gravitational si a unui pendul elastic. Se trece apoi la utilizarea programului OSCILATII1.

PAGINA 1

Se vizualizeaza pe monitor un oscilator in pozitia de echilibru (PE). Se atrage atentia elevului ca el va fi pus in miscare sub actiunea unei forte exterioare. Apasind o tasta incepe miscarea de oscilatie a oscilatorului. Elevii observa ca miscarea este simetrica fata de PE si ca este periodica. S e d e f i n e s t e m i s c a r e a o s c i l a t o r i e.

PAGINA 2

Oscilatorul in pozitie de echilibru si prin apasarea unei taste, trece intr-o pozitie oarecare. Pozitia oscilatorului fata de PE este indicata cu ajutorul vectorului de pozitie y. S e d e f i n e s t e e l o n g a t i a. Apasind o tasta oscilatorul isi modifica pozitia si simultan pe monitor apare vectorul elongatie corespunzator. Tinind apasata o tasta oscilatorul va efectua 6 oscilatii.

PAGINA 3

Se aduce oscilatorul la distanta maxima fata de PE. S e d e f i n e s t e a m p l i t u d i n e a. Se apasa o tasta si se aduce oscilatorul la distanta maxima de PE, dar dedesubtul ei.

PAGINA 4

Se urmareste de catre elevi miscarea simultana a doi oscilatori cu amplitudini diferite.

PAGINA 5

Defineste oscilatia completa. Se urmareste de catre elevi

miscarea oscilatorului din PE pina la revenire in PE. S e d e f i n e s t e o s c i l a t i a c o m p l e t a. Se atrage atentia ca o oscilatie completa poate incepe din orice pozitie a oscilatorului. Se apasa o tasta si se vizualizeaza inca o oscilatie completa.

PAGINA 6

Defineste perioada si frecventa. Pe monitor se inregistreaza durata si numarul de oscilatii complete. Se solicita elevilor sa calculeze durata unei oscilatii complete si s e d e f i n e s t e p e r i o a d a. Se cere sa se calculeze numarul de oscilatii complete din unitatea de timp, s e d e f i n e s t e f r e c v e n t a si se stabileste relatia dintre ele.

PAGINA 7

Prezinta miscarea simultana a doi oscilatori cu frecvente diferite.

PAGINA 8

Prezinta miscarea unui oscilator a carui frecventa poate fi modificata de la valoarea 0,la 20,respectiv 30.

*** OSCILATII2 ***

Se reactualizeaza notiunea de lege de miscare, elongatie, amplitudine. Se trece apoi la utilizarea programului OSCILATII2.

PAGINA 1

Se vizualizeaza pe monitor o miscare circulara uniforma a unui mobil, simultan su miscarea oscilatorie a proiectiei sale pe axa Oy. Apasind succesiv tastele se vizualizeaza elongatia y ca proiectie a vectorului de pozitie a mobilului ce se misca circular.

PAGINA 2

In timp ce mobilul se misca circular se urmareste variatia vectorului elongatie a oscilatorului.

PAGINA 3

Stabileste relatia dintre y si r (y proiectie a lui r).

PAGINA 4

Realizeaza reprezentarea grafica a lui y=f(t). Se insista asupra faptului ca modulul vectorului y elongatie se poate obtine la orice moment din reprezentarea grafica.

PAGINA 5

La momentul initial oscilatorul nu se gaseste in pozitia de echilibru. Se cere elevilor sa determine valoarea elongatiei la momentul initial. Apasind o tasta relatiile apar pe monitor.

La un moment ulterior oscilatorul ocupa alta pozitie (prin apasarea unei taste. Se cere elevilor sa determine modulul lui y la acest moment ulterior. Se deduce legea de miscare.

PAGINA 6

Verifica raspunsurile date de elevi. La apasarea unei taste oscilatorul revine in pozitia initiala, iar la o noua apasare el oscileaza si simultan se reprezinta grafic legea de miscare.

PAGINA 7

Defineste faza miscarii. Oscilatorul este in pozitie de echilibru iar la un moment ulterior (apasind o tasta) ajunge in pozitia y=A/2. Se cere elevilor sa indice valoarea argumentului functiei sinus din ecuatia de miscare. Argumentul functiei sinus din ecuatia de miscare este PI/6. Se defineste faza miscarii.

Apasind o tasta apar relatiile necesare. Se cere elevilor sa indice pozitia oscilatorului daca faza este PI/2 rad.

PAGINA 8

Indica pozitia oscilatorului la acest moment. Se cere elevilor sa indice pozitia oscilatorului daca faza este 5PI/6 rad.

PAGINA 9

Indica pozitia oscilatorului la acest moment.

PAGINA 10

Ilustreaza miscarea oscilatorului cind faza variaza de la:

0	-	PI/2
PI/2	-	PI
PI	-	3PI/2
3PI/2	-	2PI

Profesorul defineste pulsatia miscarii oscilatorii.

PAGINA 11

Evalueaza gradul de asimilare a notiunii de pulsatie.

*** OSCILATII3 ***

Se reactualizează notiunea de lege a vitezei. Se trece apoi la utilizarea programului OSCILATII3.

PAGINA 1

Stabileste legatura dintre viteza oscilatorului si componenta pe axa Oy a vitezei mobilului ce se misca circular.

PAGINA 2

Deduce expresia vitezei oscilatorului in functie de timp. Imaginea de pe monitor se trece in caietele elevilor, iar profe-

acrul deduce impreuna cu elevii legea vitezei.

PAGINA 3

Prin apasari succesive de taste se ajunge la stabilirea legii acceleratiei. Profesorul va dirija prin intrebari rationamentul elevilor.

PAGINA 4

Vizualizeaza orientarea vectorilor a,v si v prin apasari succesive de taste.

*** OSCILATII4 ***

Se revad notiunile de energie cinetica, energie potentiala, energie totala si expresiile lor matematice. Se scoate in evidenta transformarea reciproca a energiei potentiale in cineti ca si invers, in timpul miscarii de oscilatie. Se trece la utili zarea programului OSCILATII4.

SECVENTA 1

Oscilator armonic (pendul elastic) scos din pozitia de echilibru.

SECVENTA 2

Prin apasarea succesiva a unei taste se vizualizeaza miscarea oscilatorului si valorile energiilor potentiala, cinetica si totala la diferite momente. La apasarea tastei SPACE, oscilatorul se deplaseaza din pozitia initiala si simultan se reprezinta grafic dependenta energiei potentiale si cinetice de elongatie.

La apasarea unei taste se realizeaza suma:

$$Ec + Ep = Et = const.$$

Lectia continua cu deducerea de catre elevi a expresiilor energiei cinetice, potentiale si totale a oscilatorului si cu

```
 10 CLS : PRINT  FLASH 1;AT 21,6;"OPRESTE CASETOFONUL": PAUSE 0: CLS : PAPER 6:
BRIGHT 1: CLS : GO SUB 9000
 49 LET t$=""
 50 GO SUB 9200: PRINT AT 1,2: PAPER 5;t$;t$(2 TO ); FOR i=2 TO 20: PRINT AT i,
1; PAPER 7;t$;t$(2 TO );AT i-1,30; PAPER 5;" ": NEXT i
 55 PRINT  PAPER 7;AT 3,11;"INSTITUTUL";AT 4,6;"DE TEHNICA DE CALCUL";AT 5,15;"
SI";AT 6,10;"INFORMATICA";AT 7,7;"B U C U R E S T I"
 60 PRINT AT 9,9; PAPER 2; INK 6;"                ";AT 10,9;" OSCILATII1 ";AT 11,9;
"
 65 PRINT  PAPER 7;AT 13,2;"REALIZATOR";AT 14,3;"Sectia sisteme si programe";AT
 15,3;"informatica pentru invata-";AT 16,3;"mint si instruire in cola-";AT 17,3;
"borare cu";AT 18,2;"LICEUL DE MATEMATICA-FIZICA";AT 19,13;"NR.1";AT 20,7;"T I M
I S O A R A"
 69 GO SUB  9280
 70 IF CODE (INKEY$)=7 THEN  GO SUB 9500
 80 FOR i=2 TO 20: PRINT AT i,1; PAPER 7;t$;t$(2 TO ): NEXT i
 85 PRINT AT 1,2; PAPER 5;t$;t$(2 TO ): FOR i=2 TO 20: PRINT AT i,1; PAPER 7;t$
;t$(2 TO );AT i-1,30; PAPER 5;" ": NEXT i
 90 PRINT AT 4,10; PAPER 7;"TEMA LECTIEI";AT 6,5;" MISCAREA OSCILATORIE "
100 PRINT  PAPER 7;AT 11,2;"DEFINESTE NOTIUNILE:";AT 12,5;"-miscare oscilatorie
";AT 13,5;"-oscilatie completa";AT 14,5;"-elongatie";AT 15,5;"-amplitudine";AT 1
6,5;"-perioada";AT 17,5;"-frecventa"
102 GO SUB 9280
105 IF CODE (INKEY$)=7 THEN  GO SUB 9500
149 CLS : BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13
150 LET ali=0
170 CLS : PLOT 0,0: DRAW 255,0: DRAW 0,175: DRAW -255,0: DRAW 0,-175
180 PRINT  PAPER 5; INK 1; BRIGHT 1;AT 1,30;"1";AT 10,1;"PE ";AT 20,13;"OSCILAT
IE MECANICA"
181 PLOT 48,160: DRAW 11,0: PLOT 48,92: DRAW 11,0: PLOT 48,23: DRAW 11,0: PLOT
54,160: DRAW 0,-137: PLOT 54,160: DRAW -3,-4: PLOT 54,160: DRAW 3,-4: PLOT 51,96
: DRAW 6,-8: PLOT 57,96: DRAW -6,-8: PLOT 54,23: DRAW -3,4: PLOT 54,23: DRAW 3,4
183 PRINT AT 6,7;"d/2";AT 14,7;"d/2": PRINT  INK 2;AT 10,4;" ": PRINT #0;AT 0,1
0;"Apasa o tasta": PAUSE 0: PRINT #0;AT 0,10;"
185 FOR l=13 TO 11 STEP -1
186 PRINT AT l,4;" ";AT l+1,4;" ": PAUSE 7
187 NEXT l
188 PRINT AT 11,4;" "
190 PRINT #0;AT 0,0;"Pentru continuare apasa o tasta"
200 FOR l=10 TO 2 STEP -1
202 PRINT  INK 2;AT l,4;" ";AT l+1,4;" "
203 PAUSE 4
210 NEXT l
211 FOR l=3 TO 18
213 PRINT  INK 2;AT l,4;" ";AT l-1,4;" "
218 IF INKEY$<>"" THEN  GO TO 230
219 PAUSE 4
220 NEXT l
221 FOR l=17 TO 2 STEP -1
223 PRINT  INK 2;AT l,4;" ";AT l+1,4;" "
225 IF INKEY$<>"" THEN  GO TO 230
226 PAUSE 4
227 NEXT l
229 IF INKEY$="" THEN  GO TO 211
230 IF ali=1 THEN  GO TO 1232
232 CLS : BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13: PLOT 0,0: DRAW 255,0: DRAW 0
,175: DRAW -255,0: DRAW 0,-175: PRINT AT 4,3;"OPTIUNI:";AT 6,5;"1.-Reluare";AT 7
,5;"2. Continuare": PLOT 0,100: DRAW 255,0: PRINT #0;AT 0,0;"Ce doriti? (1/2)"
233 IF INKEY$="1" THEN  GO TO 170
235 IF INKEY$="2" THEN  GO TO 240
236 IF CODE (INKEY$)=7 THEN  GO SUB 9500: CLS : GO TO 232
237 GO TO 233
240 CLS : BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13
250 PLOT 0,0: DRAW 255,0: DRAW 0,175: DRAW -255,0: DRAW 0,-175
260 PRINT  INK 1; PAPER 5; BRIGHT 1;AT 1,30;"2";AT 10,1;"PE ";AT 20,15;"ELONGAT
IA y": PRINT  INK 1;AT 19,25;" "
263 PRINT #0;AT 0,10;"Apasa o tasta"
265 PRINT  INK 2;AT 10,4;" ": PAUSE 0
300 FOR l=10 TO 2 STEP -1
301 IF l=6 THEN  GO TO 305
302 IF l=4 THEN  GO TO 310
303 IF l=2 THEN  GO TO 320
304 PRINT  INK 2;AT l,4;" ";AT l+1,4;" ": GO TO 350
305 PRINT  INK 2;AT l,4;" ";AT l+1,4;" ": PLOT 36,92: DRAW 0,27: DRAW -3,-4: PL
OT 36,119: DRAW 3,-4
306 PRINT AT 9,5;"y";AT 8,5;" ": PAUSE 0: PRINT AT 10,4;" ";AT 9,4;" ";AT 8,4;"
";AT 7,4;" ";AT 9,5;" ";AT 8,5;" ": GO TO 350
```

```
310 PRINT  INK 2;AT 1,4;" ";AT 1+1,4;" ": PLOT 36,92: DRAW 0,43: DRAW -3,-4: PL
OT 36,135: DRAW 3,-4
311 PRINT AT 7,5;"y";AT 6,5;" ": PAUSE 0: FOR i=10 TO 3 STEP -1: PRINT AT i,4;"
": NEXT i: PRINT AT 7,5;" ";AT 6,5;" ": GO TO 350
320 PRINT  INK 2;AT 1,4;" ";AT 1+1,4;" ": PLOT 36,92: DRAW 0,59: DRAW -3,-4: PL
OT 36,151: DRAW 3,-4
321 PRINT AT 5,5;"ymax";AT 4,5;" ": PAUSE 0: FOR i=10 TO 2 STEP -1: PRINT AT i,
4;" ": NEXT i: PRINT AT 5,5;"     ";AT 4,5;" ": GO TO 350
350 NEXT l
351 FOR k=0 TO 5
352 FOR l=2 TO 10
355 PRINT  INK 2;AT l,4;" ";AT l-1,4;" "
356 IF l=9 OR l=10 THEN  GO TO 360
357 PLOT 36,92: DRAW 0,67-8*l: PRINT AT l+1,4;" "
358 PAUSE 0
359 PRINT AT l+1,4;" "
360 NEXT l
370 FOR l=11 TO 17
371 PRINT  INK 2;AT l,4;" ";AT l-1,4;" "
372 IF l=11 THEN  GO TO 380
373 PLOT 36,92: DRAW 0,8*(11-l): PRINT AT l-1,4;" "
374 PAUSE 0
375 PRINT AT l-1,4;" "
380 NEXT l
390 FOR l=18 TO 10 STEP -1
392 PRINT  INK 2;AT l,4;" ";AT l+1,4;" ": IF l=11 OR l=10 THEN  GO TO 400
393 PLOT 36,92: DRAW 0,8*(11-l): PRINT AT l-1,4;" "
394 PAUSE 0
395 PRINT AT l+1,4;" "
400 NEXT l
410 FOR l=10 TO 3 STEP -1
412 PRINT  INK 2;AT l,4;" ";AT l+1,4;" "
413 IF l=10 OR l=9 THEN  GO TO 420
414 PLOT 36,92: DRAW 0,8*(9-l): PRINT AT l+1,4;" "
416 PAUSE 0
418 PRINT AT l+1,4;" "
420 NEXT l
421 NEXT k
425 IF ali=1 THEN  GO TO 1232
440 CLS : BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13: PLOT 0,0: DRAW 255,0: DRAW 0
,175: DRAW -255,0: DRAW 0,-175: PRINT AT 4,3;"OPTIUNI:";AT 6,5;"1. Reluare";AT 7
,5;"2. Continuare": PLOT 0,100: DRAW 255,0: PRINT #0;AT 0,0;"Ce doriti? (1/2)"
445 IF INKEY$="1" THEN  GO TO 240
450 IF INKEY$="2" THEN  GO TO 460
455 IF CODE (INKEY$)=7 THEN  GO SUB 9500: CLS : GO TO 440
456 GO TO 445
460 CLS : BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13
462 PLOT 0,0: DRAW 255,0: DRAW 0,175: DRAW -255,0: DRAW 0,-175
465 PRINT  INK 1; PAPER 5; BRIGHT 1;AT 1,30;"3";AT 10,1;"PE ";AT 20,18;"AMPLITU
DINEA"
470 FOR l=10 TO 2 STEP -1
472 PRINT  INK 2;AT l,4;" ";AT l+1,4;" "
474 IF l<>2 THEN  GO TO 477
475 PLOT 36,92: DRAW 0,59: BEEP 0.1,20: PRINT AT 3,4;" ";AT 6,6;"ymax =A";AT 5,
6;" ": PLOT 45,120: DRAW 0,7: PLOT 82,120: DRAW 0,7
476 PRINT #0;AT 0,10;"Apasa o tasta": PAUSE 0: PRINT #0;AT 0,10;"
": FOR i=10 TO 2 STEP -1: PRINT AT i,4;" ": NEXT i: PRINT AT 6,5;"          ";AT 5
,6;" "
477 PAUSE 4
480 NEXT l
482 FOR l=3 TO 18
484 PRINT  INK 2;AT l,4;" ";AT l-1,4;" "
485 IF l<>18 THEN  GO TO 488
486 PLOT 36,92: DRAW 0,-59: BEEP 0.1,20: PRINT AT 17,4;" ";AT 14,6;"ymax =A";AT
13,6;" ": PLOT 45,56: DRAW 0,7: PLOT 82,56: DRAW 0,7
487 PRINT #0;AT 0,10;"Apasa o tasta": PAUSE 0: PRINT #0;AT 0,10;"
": FOR i=3 TO 18: PRINT AT i,4;" ": NEXT i: PRINT AT 14,5;"          ";AT 13,6;" "
488 PAUSE 4
489 NEXT l
492 CLS : BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13: PLOT 0,0: DRAW 255,0: DRAW 0
,175: DRAW -255,0: DRAW 0,-175
494 PRINT  PAPER 5; INK 1; BRIGHT 1;AT 1,30;"4";AT 20,10;"AMPLITUDINI DIFERITE"
;AT 10,1;"PE ";AT 10,11;"PE ";AT 12,2;"1";AT 12,12;"2": PRINT  INK 1; PAPER 5;AT
6,20;"          ";AT 7,20;" A1<A2 ";AT 8,20;"
```

```
495 FOR a=0 TO 9
501 LET 11=9: LET 12=9: LET sw=0: LET a=1
502 PRINT  INK 2;AT 11,4;" ";AT 11+a,4;" "
504 PRINT  INK 2;AT 12,14;" ";AT 12+a,14;" ": PAUSE 2
506 PRINT  INK 2;AT 12-a,14;" ";AT 12,14;" ": PAUSE 2
510 IF sw=0 THEN  GO TO 520
511 IF sw=1 THEN  GO TO 530
512 IF sw=2 THEN  GO TO 540
520 IF 11=6 THEN  GO TO 525
522 LET 11=11-a: LET 12=12-2*a
524 GO TO 502
525 LET sw=1: LET a=-1: LET 11=7: LET 12=3
527 GO TO 502
530 IF 11=14 THEN  GO TO 535
532 GO TO 522
535 LET sw=2: LET a=1: LET 11=13: LET 12=17
537 GO TO 502
540 IF 11=10 THEN  GO TO 550
542 GO TO 522
550 NEXT n
556 PRINT #0;AT 0,10;"Apasa o tasta": PAUSE 0: CLS
557 IF ali=1 THEN  GO TO 1232
560 CLS : BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13: PLOT 0,0: DRAW 255,0: DRAW 0
,175: DRAW -255,0: DRAW 0,-175: PRINT AT 4,3;"OPTIUNI:";AT 6,5;"1. Reluare";AT 7
,5;"2. Continuare": PLOT 0,100: DRAW 255,0: PRINT #0;AT 0,0;"Ce doriti? (1/2)"
561 IF INKEY$="1" THEN  GO TO 460
563 IF INKEY$="2" THEN  GO TO 570
565 IF CODE (INKEY$)=7 THEN  GO SUB 9500: CLS : GO TO 560
566 GO TO 561
570 CLS : BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13
572 PLOT 0,0: DRAW 255,0: DRAW 0,175: DRAW -255,0: DRAW 0,-175
573 PRINT  INK 1; PAPER 5; BRIGHT 1;AT 1,30;"S";AT 10,1;"PE ";AT 12,2;"1";AT 20
,13;"OSCILATIE COMPLETA"
574 PAUSE 20: BEEP 0.1,10: BEEP 0.1,20
575 FOR 1=10 TO 2 STEP -1
577 PRINT  INK 2;AT 1,4;" ";AT 1+1,4;" "
578 IF 1=2 THEN  GO TO 580
579 PLOT 56,92+8*(10-1): DRAW 0,8: GO TO 585
580 PLOT 56,92+8*(10-1): DRAW 8,0,-PI: GO TO 590
585 PAUSE 4
590 NEXT 1
600 FOR 1=2 TO 18
602 PRINT  INK 2;AT 1,4;" ";AT 1-1,4;" "
604 IF 1=18 THEN  GO TO 606
605 PLOT 64,156-8*(1-2): DRAW 0,-8: GO TO 608
606 PLOT 64,156-8*(1-2): DRAW -8,0,-PI: PAUSE 2: GO TO 610
608 PAUSE 4
610 NEXT 1
620 FOR 1=18 TO 10 STEP -1
622 PRINT  INK 2;AT 1,4;" ";AT 1+1,4;" "
624 IF 1=10 THEN  GO TO 630
625 PLOT 56,29+8*(18-1): DRAW 0,8: GO TO 635
630 PLOT 56,92: DRAW -2,-2: PLOT 56,92: DRAW 2,-2: BEEP 0.1,10: BEEP 0.1,20: GO
TO 640
635 PAUSE 4
640 NEXT 1
645 PRINT #0;AT 0,10;"Apasa o tasta": PAUSE 0: PRINT #0;AT 0,10;"
"
650 PRINT  INK 1; BRIGHT 1; PAPER 5;AT 10,11;"PE ";AT 12,12;"2": PAUSE 50
651 BEEP 0.1,10
652 FOR 1=6 TO 2 STEP -1
654 PRINT  INK 2;AT 1,14;" ";AT 1+1,14;" "
655 IF 1=2 THEN  GO TO 658
656 PLOT 128,124+8*(6-1): DRAW 0,8: GO TO 660
658 PLOT 128,124+8*(6-1): DRAW 8,0,-PI: GO TO 665
660 PAUSE 4
665 NEXT 1
670 FOR 1=2 TO 18
672 PRINT  INK 2;AT 1,14;" ";AT 1-1,14;" "
674 IF 1=18 THEN  GO TO 676
675 PLOT 136,156-8*(1-2): DRAW 0,-8: GO TO 678
676 PLOT 136,156-8*(1-2): DRAW -8,0,-PI: PAUSE 2: GO TO 680
678 PAUSE 4
680 NEXT 1
690 FOR 1=18 TO 6 STEP -1
692 PRINT  INK 2;AT 1,14;" ";AT 1+1,14;" "
694 IF 1=6 THEN  GO TO 700
695 PLOT 128,29+8*(18-1): DRAW 0,8: GO TO 705
700 PLOT 128,124: DRAW -2,-2: PLOT 128,124: DRAW 2,-2: BEEP 0.1,10: GO TO 710
```

```
705 PAUSE 4
710 NEXT i
720 PRINT #0;AT 0,10;"Apasa o tasta": PAUSE 0: CLS
721 IF a1=1 THEN  GO TO 1232
722 CLS : BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13
724 PLOT 0,0: DRAW 255,0: DRAW 0,175: DRAW -255,0: DRAW 0,-175
725 PRINT AT 4,3;"OPTIUNI:";AT 6,5;"1. Reluare";AT 7,5;"2. Continuare": PLOT 0,
100: DRAW 255,0
726 PRINT #0;AT 0,0;"Ce doriti? (1/2)"
730 IF INKEY$="1" THEN  GO TO 570
734 IF INKEY$="2" THEN  GO TO 738
735 IF CODE (INKEY$)=7 THEN  GO SUB 9500: CLS : GO TO 722
736 GO TO 730
738 CLS : BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13
740 PLOT 0,0: DRAW 255,0: DRAW 0,175: DRAW -255,0: DRAW 0,-175
750 PRINT  INK 1; PAPER 5;AT 1,30;"6";AT 10,1;"PE ";AT 20,10;"PERIOADA SI FRECV
ENTA";AT 4,7;"Nr. de oscilatii(n):";AT 6,17;"Durata(t):": PRINT AT 6,30;"s"
752 LET t=0: LET n=0: PRINT AT 4,27;n;AT 6,27;t
757 FOR i=0 TO 5
760 FOR i=9 TO 2 STEP -1
763 PRINT  INK 2;AT 1,4;" ";AT 1+1,4;" "
764 PAUSE 4
770 NEXT i
780 FOR i=3 TO 18
781 PRINT  INK 2;AT 1,4;" ";AT 1-1,4;" "
782 IF i<>10 THEN  GO TO 787
784 LET t=t+1: PRINT AT 6,27;t
787 PAUSE 4
790 NEXT i
800 FOR i=17 TO 10 STEP -1
801 PRINT  INK 2;AT 1,4;" ";AT 1+1,4;" "
802 IF i<>10 THEN  GO TO 805
803 LET t=t+1: LET n=n+1: PRINT AT 4,27;n;AT 6,27;t: BEEP 0.01,10: GO TO 810
805 PAUSE 4
810 NEXT i
820 NEXT 4
830 PRINT #0;AT 0,10;"Apasa o tasta"
831 PAUSE 0
833 FOR k=9 TO 17: PRINT  PAPER 7;AT k,11;"                    ": NEXT k
841 PRINT #0;AT 0,10;"
850 PRINT  PAPER 7;AT 10,12;"T=t/n=12s/6=2s"
851 FOR i=0 TO 20: NEXT i: PRINT #0;AT 0,10;"Apasa o tasta"
852 PAUSE 0
853 PRINT #0;AT 0,10;"                    "
854 PRINT  PAPER 7;AT 12,12;" =n/t=6/12s=0.5s "
855 FOR i=0 TO 20: NEXT i: PRINT #0;AT 0,10;"Apasa o tasta"
856 PAUSE 0
857 PRINT #0;AT 0,10;"                ": PRINT  PAPER 7;AT 16,12;"=>   *T=1"
858 FOR i=0 TO 20: NEXT i: PRINT #0;AT 0,0;"Pentru continuare apasa o tasta": P
AUSE 0
859 IF a1=1 THEN  GO TO 1232
860 CLS : BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13: PLOT 0,0: DRAW 255,0: DRAW 0
,175: DRAW -255,0: DRAW 0,-175: PRINT AT 4,3;"OPTIUNI:";AT 6,5;"1. Reluare";AT 7
,5;"2. Continuare": PLOT 0,100: DRAW 255,0: PRINT #0;AT 0,0;"Ce doriti? (1/2)"
861 IF INKEY$="1" THEN  GO TO 738
863 IF INKEY$="2" THEN  GO TO 866
864 IF CODE (INKEY$)=7 THEN  GO SUB 9500: CLS : GO TO 860
865 GO TO 861
866 CLS : BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13: PLOT 0,0: DRAW 255,0: DRAW 0
,175: DRAW -255,0: DRAW 0,-175
870 PRINT  INK 1; PAPER 5;AT 1,30;"7";AT 20,8;"FRECVENTE DIFERITE (1)";AT 10,1;
"PE ";AT 10,11;"PE ";AT 12,2;"1";AT 12,12;"2": FOR k=6 TO 13: PRINT  PAPER 7;AT
k,19;"                ": NEXT k: PRINT  PAPER 7; INK 1;AT 7,20;" i< 2";AT 10,20;"n1=";AT
12,20;"n2="
877 LET n1=0: LET n2=0: PRINT  PAPER 7;AT 10,23;n1;AT 12,23;n2
878 FOR n=0 TO 6
880 LET i1=10: LET i2=10: LET sw=0: LET a1=1: LET a2=1
890 PRINT  INK 2;AT 11,4;" ";AT 11+a1,4;" "
892 PRINT  INK 2;AT 12,14;" ";AT 12+a2,14;" ": PAUSE 2
894 PRINT  INK 2;AT 12-a2,14;" ";AT 12,14;" ": PAUSE 2
900 IF sw=0 THEN  GO TO 920
902 IF sw=1 THEN  GO TO 940
904 IF sw=2 THEN  GO TO 960
906 IF sw=3 THEN  GO TO 980
907 IF sw=4 THEN  GO TO 1000
```

```
 908 IF sw=5 THEN  GO TO 1020
 910 IF sw=6 THEN  GO TO 1040
 912 IF sw=7 THEN  GO TO 1060
 920 IF l2=2 THEN  GO TO 925
 923 LET l1=l1-a1: LET l2=l2-2*a2
 924 GO TO 890
 925 LET l1=5: LET sw=1: LET a2=-1: LET l2=2
 927 GO TO 890
 940 IF l2=10 THEN  GO TO 943
 942 GO TO 923
 943 LET l2=12: LET sw=2: LET a1=-1: LET l1=2
 945 GO TO 890
 960 IF l2=18 THEN  GO TO 963
 961 GO TO 923
 963 LET l1=6: LET sw=3: LET l2=18: LET a2=1
 965 GO TO 890
 980 IF l2=12 THEN  GO TO 985
 982 GO TO 923
 985 LET n2=n2+1: PRINT  PAPER 7;AT 12,23;n2: LET l2=10: LET sw=4: LET a1=-1: LE
T l1=10
 987 GO TO 890
1000 IF l2=2 THEN  GO TO 1005
1001 GO TO 923
1005 LET sw=5: LET a2=-1: LET l2=2: LET l1=15
1007 GO TO 890
1020 IF l2=10 THEN  GO TO 1024
1022 GO TO 923
1024 LET sw=6: LET l2=12: LET a1=1: LET l1=18
1025 GO TO 890
1040 IF l2=18 THEN  GO TO 1045
1042 GO TO 923
1045 LET sw=7: LET l1=14: LET l2=18: LET a2=1
1046 GO TO 890
1060 IF l2=12 THEN  GO TO 1080
1061 GO TO 923
1080 LET n1=n1+1: LET n2=n2+1: PRINT  PAPER 7;AT 10,23;n1;AT 12,23;n2: NEXT n
1090 PRINT  INK 2;AT 10,4;"  ";AT 10,14;"  ";AT 11,4;"  ";AT 11,14;"
1091 PRINT #0;AT 0,0;"Pentru continuare apasa o tasta": PAUSE 0
1100 IF ali=1 THEN  GO TO 1232
1101 CLS : BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13
1102 PLOT 0,0: DRAW 255,0: DRAW 0,175: DRAW -255,0: DRAW 0,-175
1103 PRINT AT 4,3;"OPTIUNI:";AT 6,5;"1. Reluare";AT 7,5;"2. Continuare": PLOT 0,
100: DRAW 255,0
1104 PRINT #0;AT 0,0;"Ce doriti? (1/2)"
1105 IF INKEY$="1" THEN  GO TO 866
1107 IF INKEY$="2" THEN  GO TO 1110
1108 IF CODE (INKEY$)=7 THEN  GO SUB 9500: CLS : GO TO 1101
1109 GO TO 1105
1110 CLS : BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13
1112 PLOT 0,0: DRAW 255,0: DRAW 0,175: DRAW -255,0: DRAW 0,-175
1120 PRINT  INK 1; PAPER 5;AT 1,30;"8";AT 10,1;"PE ";AT 20,9;"FRECVENTE DIFERITE
(2)"
1122 FOR k=4 TO 10: PRINT  PAPER 7;AT k,16;"          ": NEXT k
1125 LET n=9
1126 PRINT  PAPER 7;AT 5,17;" 1"
1128 FOR p=0 TO 2
1130 FOR l=9 TO 2 STEP -1
1132 PRINT  INK 2;AT 1,4;" ";AT 1+1,4;" "
1134 PAUSE n
1140 NEXT l
1150 FOR l=3 TO 18
1152 PRINT  INK 2;AT 1,4;" ";AT 1-1,4;" "
1154 PAUSE n
1160 NEXT l
1170 FOR l=17 TO 10 STEP -1
1172 PRINT  INK 2;AT 1,4;" ";AT 1+1,4;" "
1174 PAUSE n
1180 NEXT l
1190 NEXT p
1201 IF n=1 THEN  GO TO 1220
1210 PRINT #0;AT 0,10;"Apasa o tasta": PAUSE 0: PRINT #0;AT 0,10;"
: BEEP 0.1,10: LET n=n-4
1211 IF n=5 THEN  GO TO 1214
1212 IF n=1 THEN  GO TO 1215
1214 PRINT  PAPER 7;AT 7,17;" 2=2* 1": GO TO 1128
1215 PRINT  PAPER 7;AT 9,17;" 3=3* 1": GO TO 1128
1220 PRINT #0;AT 0,0;"Pentru continuare apasa o tasta": PAUSE 0: CLS : BEEP 0.01
,7: BEEP 0.01,24: BEEP 0.05,13
```

```
1221 PLOT 0,0: DRAW 255,0: DRAW 0,175: DRAW -255,0: DRAW 0,-175
1222 PRINT AT 4,3;"OPTIUNI:";AT 6,5;"1. Reluare";AT 7,5;"2. Continuare": PLOT 0,
100: DRAW 255,0
1223 PRINT #0;AT 0,0;"Ce doriti? (1/2)"
1224 IF INKEY$="1" THEN  GO TO 1110
1225 IF INKEY$="2" THEN  GO TO 1232
1226 IF CODE (INKEY$)=7 THEN  GO SUB 9500: CLS : GO TO 1221
1230 GO TO 1224
1232 LET a1=1: CLS : BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13
1234 PLOT 0,0: DRAW 255,0: DRAW 0,175: DRAW -255,0: DRAW 0,-175
1236 PRINT AT 4,3;"OPTIUNI:";AT 6,5;"1. Oscilatie mecanica";AT 7,5;"2. Elongatia
";AT 8,5;"3. Amplitudinea";AT 9,5;"4. Oscilatie completa";AT 10,5;"5. Perioada s
i frecventa";AT 11,5;"6. Frecvente diferite(1)";AT 12,5;"7. Frecvente diferite(2
)";AT 13,5;"8. Reluare program"
1240 PRINT #0;AT 0,0;"Ce doriti? (1-8)"
1241 IF INKEY$="1" THEN  GO TO 170
1242 IF INKEY$="2" THEN  GO TO 240
1243 IF INKEY$="3" THEN  GO TO 460
1244 IF INKEY$="4" THEN  GO TO 570
1245 IF INKEY$="5" THEN  GO TO 738
1246 IF INKEY$="6" THEN  GO TO 866
1247 IF INKEY$="7" THEN  GO TO 1110
1248 IF INKEY$="8" THEN  GO TO 49
1249 IF CODE (INKEY$)=7 THEN  GO SUB 9500: CLS : GO TO 1232
1251 GO TO 1241
7000 LOAD ""CODE 60899: LET B=7500
7010 POKE 60952,B-256*INT (B/256): POKE 60953,INT (B/256): RANDOMIZE USR 60899:
GO TO 10
7500 GO SUB 9500: PAUSE 100: PRINT AT 20,1; PAPER 7;"PAROLA:"
7510 INPUT  LINE P$
7520 IF P$="DODI" THEN  STOP
7530 PRINT AT 20,8; PAPER 0; INK 7;"NU!!!": PAUSE 50: GO TO 1232
8999 STOP
9000 RESTORE 9040: FOR z=1 TO 8: READ z$
9010 FOR y=0 TO 7
9020 READ w: POKE USR z$+y,w
9030 NEXT y
9031 NEXT z
9040 DATA " ",BIN 00111100,BIN 01111110,BIN 11111111,BIN 11011111,BIN 11011111,B
IN 11111111,BIN 01111110,BIN 00111100
9041 DATA " ",BIN 00001000,BIN 00001100,BIN 01111110,BIN 01111111,BIN 01111110,B
IN 00001100,BIN 00001000,0
9042 DATA " ",BIN 00010000,BIN 00101000,BIN 01000100,BIN 10000010,BIN 01000100,B
IN 01000100,BIN 01000100,BIN 01111100
9043 DATA " ",0,0,0,0,0,BIN 00000010,BIN 11111111,BIN 00000010
9044 DATA " ",BIN 00001000,BIN 00011100,BIN 00101010,BIN 00001000,BIN 00001000,B
IN 00001000,BIN 00001000,BIN 00001000
9045 DATA " ",BIN 00001000,BIN 00001000,BIN 00001000,BIN 00001000,BIN 00001000,B
IN 00101010,BIN 00011100,BIN 00001000
9046 DATA " ",BIN 00010000,BIN 00001000,BIN 01000100,BIN 00100100,BIN 00010100,B
IN 00010100,BIN 00001000,0
9047 DATA " ",BIN 00001000,BIN 11001000,BIN 00001000,0,0,0,0,0
9050 RETURN
9200 CLS : PAPER 6: BRIGHT 1: INK 0: BORDER 7: CLS : PLOT 0,0: DRAW 255,0: DRAW
0,175: DRAW -255,0: DRAW 0,-175: RETURN
9280 BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13: PRINT #0;AT 0,10;"Apasa o tasta":
PAUSE 0: PRINT #0;AT 0,10;"                ": RETURN
9500 GO SUB 9200: PRINT AT 1,2; PAPER 5;t$;t$(2 TO ): FOR i=2 TO 20: PRINT AT i,
1; PAPER 7;t$;t$(2 TO );AT i-1,30; PAPER 5;" ": NEXT i
9510 PRINT AT 8,5; PAPER 2; INK 6;"                    ";AT 9,5;" MISCAREA OSC
ILATORIE  ";AT 10,5;"                    "
9520 PRINT AT 3,2; PAPER 7;"LICEUL DE MATEMATICA FIZICA";AT 4,13;"NR.1";AT 5,7;"
T I M I S O A R A"
9530 PRINT AT 13,2;; PAPER 7;"REALIZATORI:";AT 15,5;"prof.LUCIA ILEA";AT 16,15;"
fizica";AT 17,5;"elev SEBASTIAN ILEA";AT 18,15;"programare": GO SUB 9280: RETURN

9999 CLEAR : SAVE "OSCILATII" LINE 7000: SAVE "BREAK"CODE 60899,72: PRINT AT 10
,10;"REBOBINEAZA!": VERIFY "OSCILATII": VERIFY "BREAK"CODE
```

```
  5 DEF FN f(i)=(A(i,6) AND i<9)+(A(i+1,6) AND (i>8 AND i<15))+(A(i,6) AND (i>1
4 AND i<23))+(A(i+1,6) AND i>22)
 10 DEF FN T$(k,i)=((STR$ k+"T") AND i=28)+((STR$ (k-1)+"T+") AND k<>1 AND i<>2
8)+("T/4" AND i=7)+("T/2" AND i=14)+("3T/4" AND i=21)
 15 DEF FN s$(i)=(" " AND i<15)+(" " AND i>15)
 20 DEF FN b$(i)=(" " AND i=7)+(" " AND i=21)
 25 DEF FN s(i)=(A(i,1) AND i<7) OR ((A(i,1)+2) AND (i=7 OR i=8 OR i=9))
 30 DEF FN t(i)=(i=7 OR i=14 OR i=21 OR i=28)
 31 DEF FN u(i)=48*COS ((i-1)*PI/13.3)
 32 DEF FN v(i)=48*SIN ((i-1)*PI/13.3)
 35 LET t$="
 40 GO SUB 9060: GO SUB 9100
 50 OVER 0: GO SUB 9000: PRINT AT 1,2; PAPER 5;t$;t$(2 TO ): FOR i=2 TO 20: PRI
NT AT i,1; PAPER 7;t$;t$(2 TO );AT i-1,30; PAPER 5;" ": NEXT i
 55 PAPER 7: PRINT AT 3,11;"INSTITUTUL";AT 4,6;"DE TEHNICA DE CALCUL";AT 5,15;"
SI";AT 6,10;"INFORMATICA";AT 7,7;"B U C U R E S T I"
 60 PRINT AT 9,9; PAPER 2; INK 6;"                ";AT 10,9;" OSCILATII2 ";AT 11,9;
"

 65 PRINT AT 13,2;"REALIZATOR";AT 14,3;"Sectia sisteme si programe";AT 15,3;"in
formatice pentru invata-";AT 16,3;"mint si instruire in cola-";AT 17,3;"borare c
u";AT 18,2;"LICEUL DE MATEMATICA-FIZICA";AT 19,13;"NR.1";AT 20,7;"T I M I S O A
R A"
 69 GO SUB 9080
 70 IF CODE (INKEY$)=7 THEN  GO SUB 5555
 75 PRINT AT 1,2; PAPER 5;t$;t$(2 TO ): FOR i=2 TO 20: PRINT AT i,1; PAPER 7;t$
;t$(2 TO );AT i-1,30; PAPER 5;" ": NEXT i
 76 PAPER 7: PRINT AT 3,10;"TEMA LECTIEI";AT 5,13;"Legea";AT 6,5;"miscarii osci
latorului";AT 7,9;"armonic liniar"
 77 PRINT AT 10,2;"- Deducerea legii miscarii";AT 11,7;"oscilatorului armonic";
AT 12,7;"liniar"
 78 PRINT AT 14,2;"- Definirea fazei miscarii";AT 15,7;"oscilatorii armonice"
 79 PRINT AT 17,2;"- Definirea pulsatiei mis-";AT 18,7;"carii oscilatorii ar-";
AT 19,7;"monice"
 99 GO SUB 9080
 100 LET unde=1: OVER 0: GO SUB 9000: PRINT AT 1,1; PAPER 5; INK 1;" LEGEA MISCA
RII ";AT 1,30;"1": GO SUB 9080: GO SUB 9040: GO SUB 9030: GO SUB 9080: GO SUB 90
15: GO SUB 9080: GO SUB 9020: GO SUB 9010: GO SUB 9080
 110 OVER 1: FOR k=1 TO 5: FOR i=1 TO 28: PRINT AT A(i,1),7; INK 2;" ";AT A(i+1,
1),7;" ";AT A(i,1),A(i,2); INK 0;" ";AT A(i+1,1),A(i+1,2);" "
 120 REM  IF FN t(i)=1 THEN  GO SUB 9050
 130 NEXT i: PRINT AT 20,4; OVER 0;k;"T": NEXT k: OVER 0: PRINT AT 20,1;" t=";ST
R$ (k-1);"T      ": OVER 1: GO SUB 9080
 140 PRINT AT 20,1; OVER 0;"                ": FOR i=1 TO 3: PRINT AT A(i,1),A(i,2); INK 0
;" ";AT A(i+1,1),A(i+1,2);" ";AT A(i,1),7;" ";AT A(i+1,1),7; INK 2;" ": NEXT i:
GO SUB 9080
 150 OVER 0: PLOT  INK 0;59,92: DRAW  INK 0;0,A(4,6)-1: PRINT AT A(i-1,1),7;" ":
PRINT AT 8,6;" ": GO SUB 9080
 160 PLOT 59,91: DRAW A(i,5)+4,A(i,6)+3: PRINT AT 8,9;" ": PLOT 78,91: DRAW -2,9
,PI/4: PRINT AT 9,10;" ": GO SUB 9080
 170 GO SUB 9090: PRINT AT 1,30; PAPER 5; INK 1;"2": GO SUB 9040: GO SUB 9030
 180 PLOT 59,91: DRAW A(1,5),A(1,6): PRINT AT 10,12;" ";AT 9,10;" ": GO SUB 9020
: GO SUB 9015: GO SUB 9010: GO SUB 9080: PRINT AT 10,12; OVER 1;" ";AT 9,10;" ";
AT 20,1; OVER 0;"                "
 190 OVER 1: FOR i=1 TO 28: PRINT AT A(i,1),A(i,2); OVER 1; INK 0;" ";AT A(i+1,1
),A(i+1,2);" ";AT A(i,1),7; INK 2;" ";AT A(i+1,1),7;" ": PLOT 59,91: DRAW u(i),v
(i)
 200 PLOT 59,91: DRAW 0,FN f(i): PRINT AT A(i,3),7;FN s$(i): PAUSE 10: PLOT 59,9
1: DRAW 0,FN f(i): PRINT AT A(i,3),7;FN s$(i)
 205 IF FN t(i)=1 THEN  PRINT AT A(i+1,1),A(i+1,2); INK 0;FN b$(i): BEEP 0.01,15
: PRINT AT A(i+1,1),A(i+1,2); INK 0;FN b$(i)
 206 PLOT 59,91: DRAW u(i),v(i): NEXT i
 210 OVER 0: GO SUB 9035: PRINT AT 10,7; INK 2;" ": OVER 1: PLOT 64,91: FOR i=0
TO 36 STEP 3: PLOT  INK 0;64+i,91: PLOT 65+i,91: NEXT i: GO SUB 9080
 211 PRINT AT 20,1; OVER 0;"                ";AT 1,30; PAPER 5; INK 1;"3": FOR i=1 TO 3: P
RINT AT A(i,1),A(i,2); OVER 1; INK 0;" ";AT A(i+1,1),A(i+1,2);" ";AT A(i,1),7;"
";AT A(i+1,1),7; INK 2;" ": NEXT i
 212 OVER 0: PLOT  INK 0;59,92: DRAW  INK 0;0,A(4,6)-1: PRINT AT A(i-1,1),7;" ":
PRINT AT 8,6;" "
 213 PLOT 59,91: DRAW A(i,5)+4,A(i,6)+3: PRINT AT 8,9;" ": PLOT 78,91: DRAW -2,9
,PI/4: PRINT AT 9,10;" ": GO SUB 9080
 220 GO SUB 9160
 230 PAPER 7: INK 0: PRINT AT 4,20;"FORMULE": PAUSE 50: PRINT AT 7,17;"y=rsin ":
 PAUSE 50: PRINT AT 9,17;"r=A": PAUSE 50: PRINT AT 11,17;" = t": PAUSE 50: PRINT
```

```
AT 15,17;">";: PAPER 2: INK 6;" y=Asin t ";AT 14,19;"                ";AT 16,19;"
";: GO SUB 9080
250 GO SUB 9000: PRINT AT 1,3: PAPER 5; INK 1;"4";AT 1,1;" LEGEA MISCARII ": G
O SUB 9040: GO SUB 9015: GO SUB 9080: GO SUB 9020: GO SUB 9010: GO SUB 9080
260 FOR k=1 TO 5: FOR i=1 TO 28: PRINT AT A(i,1),7; INK 2; OVER 1;" ";AT A(i+1,
1),7;" ";AT A(i,1),A(i,2); INK 0;" ";AT A(i+1,1),A(i+1,2);" "
270 NEXT i: NEXT k: PRINT AT 20,1;" t=";STR$ (k-1);"T      ": GO SUB 9080: PRIN
T AT 20,1; OVER 0;"
280 PLOT  INK 0;121,91: DRAW 128,0: DRAW -2,2: DRAW 0,-4: DRAW 2,2: PLOT 135,43
: DRAW 0,96: DRAW -2,-2: DRAW 4,0: DRAW -2,2: PRINT AT 4,16;"y";AT 11,31; OVER 1
;"x": LET x=136: LET y=0
284 PRINT AT 17,18; PAPER 2; INK 6;"                ";AT 18,18;" y=Asin( t) ";AT 19
,18;"
290 FOR i=1 TO 28: PRINT AT A(i,1),7; INK 2; OVER 1;" ";AT A(i+1,1),7;" ";AT A(
i,1),A(i,2); INK 0;" ";AT A(i+1,1),A(i+1,2);"
295 PLOT 59,91: DRAW 0,s(i)
296 IF i<15 THEN  DRAW -1,-1: DRAW 2,0: GO TO 300
297 DRAW -1,1: DRAW 2,0
300 IF i<28 THEN  PLOT  INK 2;x,91+48*SIN y: PLOT  INK 2;x,91: DRAW  INK 2;0,48
*SIN y-2*SGN (48*SIN y)
305 IF i<15 THEN  DRAW  INK 2;-1,-1: DRAW  INK 2;2,0: GO TO 310
306 IF i>14 THEN  DRAW  INK 2;-1,1: DRAW  INK 2;2,0
310 LET x=x+4: LET y=y+PI/13.3
316 PAUSE 30
317 PLOT  OVER 1;59,91: DRAW  OVER 1;0,s(i)
318 IF i<15 THEN  DRAW  INVERSE 1;-1,-1: DRAW  INVERSE 1;2,0: GO TO 320
319 DRAW  INVERSE 1;-1,1: DRAW  INVERSE 1;2,0
320 NEXT i: PRINT AT 10,7; INK 2;" ": GO SUB 9080
330 LET adr=100: LET cont=340: GO SUB 9110
340 OVER 0: GO SUB 9000: PRINT AT 1,1; PAPER 5; INK 1;" LEGEA MISCARII ";AT 1,3
0;"5": GO SUB 9040: GO SUB 9030: GO SUB 9015: GO SUB 9020: GO SUB 9010: PRINT AT
20,1; OVER 0;"
350 FOR i=1 TO 3: PRINT AT A(i,1),A(i,2); OVER 1; INK 0;" ";AT A(i+1,1),A(i+1,2
);" ";AT A(i,1),7;" ";AT A(i+1,1),7;" ";AT A(i+1,1),A(i+1,2);" t=0";AT 7
,13;"M": GO SUB 9080
360 PLOT  INK 0;59,92: DRAW  INK 0;0,A(4,6)-1: PRINT AT A(i-1,1),7;" ": PRINT A
T 8,5;"
370 PLOT 59,91: DRAW A(i,5)+4,A(i,6)+3: PRINT AT 8,9;" ": PLOT 78,91: DRAW -2,9
,PI/4: PRINT AT 9,10;"  ": GO SUB 9080
380 GO SUB 9160
390 PAPER 7: PRINT AT 4,20;"FORMULE": PAUSE 50: PRINT AT 7,17;"y = rsin  ": PAU
SE 50: PRINT AT 9,17;"r = A": PAUSE 50: PRINT AT 15,17;"=> y = Asin  ": PAPER 6:
GO SUB 9080
400 PRINT AT 5,10; OVER 1; INK 0;" ";AT 4,10;"M ";AT 5,7; INK 2;" ";AT 20,1; OV
ER 0;"          ";AT 1,30; PAPER 5; INK 1;"6"
410 OVER 1: PLOT 64,91: DRAW 0,35: DRAW -1,-1: DRAW 2,0: PRINT AT 7,8;" ": PLOT
59,91: DRAW 22,36: GO SUB 9080
420 LET unde=0: LET t$=t$+" ": GO SUB 9160: LET t$=t$(2 TO )
430 PAPER 7: PRINT AT 4,19;"FORMULE": PAUSE 50: PRINT AT 7,16;"y=rsin( t+  )": 
PAUSE 50: PRINT AT 9,16;"r=A": PAUSE 50: PRINT AT 11,16; PAPER 2; INK 6;" y=Asin
( t+  )";AT 10,16;"                ";AT 12,16;"                ": PAUSE 50: PRINT AT
13,16;"  ";CHR$ 8; OVER 1;"-faza initiala": PAUSE 50: PRINT AT 16,16;"t=0=>y =
Asin  ": PAPER 6: GO SUB 9080
435 PRINT AT 5,10; OVER 1; INK 0;" ";AT 4,10;"M ";AT 5,7; INK 2;" "
436 OVER 1: PLOT 64,91: DRAW 0,35: DRAW -1,-1: DRAW 2,0: PRINT AT 7,8; OVER 1;"
": PLOT 59,91: DRAW 22,36: GO SUB 9080
437 GO SUB 440: GO TO 450
440 OVER 0: FOR i=3 TO 17: PRINT AT i,15; PAPER 6;t$+" ": NEXT i: LET unde=1: R
ETURN
450 PLOT  INK 0;121,91: DRAW 128,0: DRAW -2,2: DRAW 0,-4: DRAW 2,2: PLOT 139,43
: DRAW 0,96: DRAW -2,-2: DRAW 4,0: DRAW -2,2: PRINT AT 4,16;"y";AT 11,31; OVER 1
;"x": LET x=140: LET y=2*PI/13.3
454 PRINT AT 17,16; PAPER 2; INK 6;"                ";AT 18,16;" y=Asin( t+  ) "
;AT 19,16;"
460 FOR i=4 TO 28: PRINT AT A(i,1),7; INK 2; OVER 1;" ";AT A(i+1,1),7;" ";AT A(
i,1),A(i,2); INK 0;" ";AT A(i+1,1),A(i+1,2);"
470 PLOT  INK 0;x,91+48*SIN y
480 LET x=x+4: LET y=y+PI/13.3
490 PAUSE 30: NEXT i
500 FOR i=1 TO 3: PRINT AT A(i,1),7; INK 2; OVER 1;" ";AT A(i+1,1),7;" ";AT A(i
,1),A(i,2); INK 0;" ";AT A(i+1,1),A(i+1,2);"
505 IF i=3 THEN  GO TO 520
510 PLOT  INK 0;x,91+48*SIN y
520 LET x=x+4: LET y=y+PI/13.3
530 PAUSE 30: NEXT i
540 LET adr=340: LET cont=550: GO SUB 9110
550 OVER 0: GO SUB 9000: PRINT AT 1,1; PAPER 5; INK 1;" FAZA MISCARII ";AT 1,30
;"7": GO SUB 9040: GO SUB 9030: GO SUB 9020: GO SUB 9010
560 PRINT AT 3,7; OVER 1;" "; OVER 0;"A";AT 17,7;" A": GO SUB 9080
570 FOR i=1 TO 3: PRINT AT A(i,1),7; INK 2; OVER 1;" ";AT A(i+1,1),7;" ": NEXT
```

```
580 PLOT  INK 0;39,92: DRAW  INK 0;0,A(4,6)-1: PLOT  INK 1;59,121: DRAW  INK 1;
0,16: DRAW  INK 1;-1,-1: DRAW  INK 1;2,0: PRINT AT A(i-1,1),7;" ": PRINT AT 9,6;
" ";AT 5,8; INK 1;" a": GO SUB 9080
590 PRINT AT 8,7;" ": PLOT 59,91: DRAW A(i,5)+8,A(i,6)+6: DRAW -2,0: DRAW 1,-2:
DRAW 1,1: PLOT 70,91: DRAW -2,9,PI/4: PRINT AT 9,10;" = /6": GO SUB 9080
591 GO SUB 9160: PRINT AT 4,20; PAPER 7;"FORMULE";AT 7,17;"y=Asin t";AT 8,17; P
APER 2; INK 6;"                ";AT 9,17;"  t= = /6 ";AT 10,17;"                ";AT 11,17;
PAPER 7; INK 0;"y=Asin ";AT 13,17;"y=Asin( /6)";AT 15,17;"y=A/2": GO SUB 9080
600 GO SUB 9090: GO SUB 440: PRINT AT 1,30; PAPER 5; INK 1;"8": GO SUB 9040: GO
SUB 9030: GO SUB 9020: GO SUB 9010
610 PRINT AT 3,7; OVER 1;" "; OVER 0;"A";AT 17,7;" A": GO SUB 9080
620 FOR i=1 TO 7: PRINT AT A(i,1),7; INK 2; OVER 1;" ";AT A(i+1,1),7;" ": NEXT
i
630 PLOT  INK 0;59,92: DRAW 0,43: DRAW -1,-1: DRAW 2,0: OVER 1: PRINT AT 7,6;"
= "; PAUSE 50: PLOT 70,91: DRAW -11,11,PI/4: PRINT AT 9,9;" = /2": OVER 0: GO SU
B 9080
635 GO SUB 9160: PRINT AT 4,20; PAPER 7;"FORMULE";AT 7,17;"y=Asin t";AT 8,17; P
APER 2; INK 6;"                ";AT 9,17;"  t= = /2 ";AT 10,17;"                ";AT 11,17;
PAPER 7; INK 0;"y=Asin ";AT 13,17;"y=Asin( /2)=A": GO SUB 9080
640 GO SUB 440: OVER 1: PLOT  INK 0;59,92: DRAW 0,43: DRAW -1,-1: DRAW 2,0: PRI
NT AT 7,6;" = ": PLOT 70,91: DRAW -11,11,PI/4: PRINT AT 9,9;" = /2": OVER 0: GO
SUB 9035: PRINT AT 4,7; OVER 1; INK 2;" ";AT 4,7;" ";AT 3,7; INK 0;"_"; OVER 0;"
A": GO SUB 9080
650 FOR i=7 TO 11: PRINT AT A(i,1),7; INK 2; OVER 1;" ";AT A(i+1,1),7;" ": NEXT
i
660 PRINT AT 1,30; PAPER 5; INK 1;"9": PLOT  INK 0;59,92: DRAW  INK 0;0,A(4,6)-
1: PRINT AT 8,6; INK 1;" ": PLOT  INK 1;54,112: DRAW  INK 1;0,-16: DRAW  INK 1;-
1,1: DRAW  INK 1;2,0: PRINT AT 8,7;" ": PRINT AT 8,8;" "
665 GO SUB 9080
670 OVER 1: PLOT  INK 0;59,92: DRAW -A(4,5)-8,A(4,6)+4: OVER 0: DRAW 2,0: DRAW
-1,-2: DRAW 1,2: OVER 1: PLOT 68,91: DRAW -21,10,PI/2: PRINT AT 9,9;" =5 /6": OV
ER 0
671 GO SUB 9160: PRINT AT 4,20; PAPER 7;"FORMULE";AT 7,17;"y=Asin t";AT 8,17; P
APER 2; INK 6;"                ";AT 9,17;"  t= =5 /6 ";AT 10,17;"                ";AT 11,1
7; PAPER 7; INK 0;"y=Asin ";AT 13,17;"y=Asin(5 /6)";AT 15,17;"y=A/2": GO SUB 908
0
680 GO SUB 9090: GO SUB 440: PRINT AT 1,29; PAPER 5; INK 1;"10": GO SUB 9040: G
O SUB 9030: GO SUB 9020: GO SUB 9010: PRINT AT 20,1;"                ": GO SUB 9080
690 FOR i=1 TO 7: PRINT AT A(i,1),7; INK 2; OVER 1;" ";AT A(i+1,1),7;" ": PAUSE
5: NEXT i: GO SUB 9080
700 PLOT 59,91: DRAW 48,0: DRAW -2,2: DRAW 0,-4: DRAW 2,2
710 PRINT AT 7,9;"I";AT 7,15;"I    0      /2": FOR i=2 TO 7: PLOT 59,92: DRAW
FN u(i),FN v(i): PAUSE 10: OVER 1: PLOT 59,92: DRAW FN u(i),FN v(i): NEXT i: PRI
NT AT 4,7; INK 2;" ";AT 4,7;" ": OVER 0: GO SUB 9080
720 FOR i=7 TO 14: PRINT AT A(i,1),7; INK 2; OVER 1;" ";AT A(i+1,1),7;" ": PAUS
E 5: NEXT i: GO SUB 9080
730 PRINT AT 7,4;"II";AT 9,15;"II    /2      ": OVER 1: FOR i=8 TO 14: PLOT 59,9
2: DRAW FN u(i),FN v(i): PAUSE 10: PLOT 59,92: DRAW FN u(i),FN v(i): NEXT i: PRI
NT AT 10,7; INK 2;" ";AT 10,7;" ": OVER 0: GO SUB 9080
740 FOR i=15 TO 21: PRINT AT A(i,1),7; INK 2; OVER 1;" ";AT A(i+1,1),7;" ": PAU
SE 5: NEXT i
750 PRINT AT 13,4;"III";AT 11,15;"III        3 /2": OVER 1: FOR i=15 TO 21: PL
OT 59,92: DRAW FN u(i),FN v(i): PAUSE 10: PLOT 59,92: DRAW FN u(i),FN v(i): NEXT
i: PRINT AT 10,7; INK 2;" ";AT 10,7;" ": OVER 0: GO SUB 9080
760 FOR i=22 TO 28: PRINT AT A(i,1),7; INK 2; OVER 1;" ";AT A(i+1,1),7;" ": PAU
SE 5: NEXT i
770 PRINT AT 13,9;"IV";AT 13,15;"IV 3 /2      2 ": OVER 1: FOR i=22 TO 27: PLOT
59,92: DRAW FN u(i),FN v(i): PAUSE 10: PLOT 59,92: DRAW FN u(i),FN v(i): NEXT i:
PRINT AT 10,7; INK 2;" ";AT 10,7;" ": OVER 0: GO SUB 9080
780 LET adr=550: LET cont=790: GO SUB 9110
790 OVER 0: GO SUB 9000: PRINT AT 1,1; PAPER 5; INK 1;" PULSATIA MISCARII ";AT
1,29;"11": GO SUB 9040: GO SUB 9030: GO SUB 9020: GO SUB 9010: PRINT AT 20,1;"
800 PLOT 64,91: DRAW 43,0: DRAW -2,2: DRAW 0,-4: DRAW 2,2
810 PRINT AT 9,10;" ";AT 3,7; OVER 1;"_"; OVER 0;"A": GO SUB 9080
820 GO SUB 9160
821 DIM a$(7,15)
830 LET a=1: LET a$(1, TO )=" Daca pulsatia ": LET r=4: GO SUB 9200
831 LET a=2: LET a$(2, TO )=" oscilatorului ": LET r=6: GO SUB 9200
832 LET a=3: LET a$(3, TO )=" este  /2rad/s ": LET r=8: GO SUB 9200
833 LET a=4: LET a$(4, TO )=" care va fi po ": LET r=10: GO SUB 9200
834  LET a=5: LET a$(5, TO )=" zitia oscila- ": LET r=12: GO SUB 9200
835 LET a=6: LET a$(6, TO )=" torului la    ": LET r=14: GO SUB 9200
836 LET a=7: LET a$(7, TO )="     t=1s ?    ": LET r=16: GO SUB 9200
840 GO SUB 9080
850 OVER 1: FOR i=1 TO 7: PRINT AT A(i,1),7; INK 2;" ": PLOT 59,92: DRAW FN u(i
),FN v(i): PRINT AT A(i+1,1),7; INK 2;" ": PAUSE 20: PLOT 59,92: DRAW FN u(i),FN
```

```
v(i): NEXT i: PLOT 59,91: DRAW 0,44: DRAW -2,-2: DRAW 4,0: DRAW -2,2: PRINT AT
4,7; INK 2;" ";AT 4,7;" ": GO SUB 9080
860 PLOT 59,91: DRAW 0,44: DRAW -2,-2: DRAW 4,0: DRAW -2,2
870 FOR i=7 TO 14: PRINT AT A(i,1),7; INK 2; OVER 1;" ";AT A(i+1,1),7;" ": NEXT
i: GO SUB 9160
880 OVER 0: LET a$(7,8)="2": FOR a=1 TO 7: LET r=4+(a-1)*2: GO SUB 9200: NEXT a
: GO SUB 9080
890 OVER 1: FOR i=1 TO 14: PRINT AT A(i,1),7; INK 2;" ": PLOT 59,92: DRAW FN u(
i),FN v(i): PRINT AT A(i+1,1),7; INK 2;" ": PAUSE 20: PLOT 59,92: DRAW FN u(i),F
N v(i): NEXT i: PLOT 59,91: DRAW -48,0: DRAW 2,-2: DRAW 0,4: DRAW -2,-2: PRINT A
T 10,7; INK 2;" ";AT 10,7;" ": GO SUB 9080
900 PLOT 59,91: DRAW -48,0: DRAW 2,-2: DRAW 0,4: DRAW -2,-2: PRINT AT 10,7; INK
2;" ";AT 10,7;" ": GO SUB 9160
910 OVER 0: LET a$(7,8)="1": LET a$(3, TO 9)=" e 5 /2  ": FOR a=1 TO 7: LET r=4
+(a-1)*2: GO SUB 9200: NEXT a: GO SUB 9080
915 OVER 1: FOR i=1 TO 28
920 PRINT AT A(i,1),7; INK 2;" ";AT A(i+1,1),7;" "
921 IF i<28 THEN  PLOT 59,92: DRAW FN u(i),FN v(i): PAUSE 20: PLOT 59,92: DRAW
FN u(i),FN v(i)
922 NEXT i
930 OVER 1: FOR i=1 TO 7: PRINT AT A(i,1),7; INK 2;" ": PLOT 59,92: DRAW FN u(i
),FN v(i): PRINT AT A(i+1,1),7; INK 2;" ": PAUSE 20: PLOT 59,92: DRAW FN u(i),FN
v(i): NEXT i: PLOT 59,91: DRAW 0,44: DRAW -2,-2: DRAW 4,0: DRAW -2,2: PRINT AT
4,7; INK 2;" ";AT 4,7;" ": GO SUB 9080
934 PLOT 59,91: DRAW 0,44: DRAW -2,-2: DRAW 4,0: DRAW -2,2
935 FOR i=7 TO 14: PRINT AT A(i,1),7; INK 2; OVER 1;" ";AT A(i+1,1),7;" ": NEXT
i
940 GO SUB 9160: LET a$(1)="  Doriti alte  ": LET a$(2)=" date ? (D/N)     ": LE
T a$(3)=" Dati pulsatia ": LET a$(4)=" in n ( /2) si ": LET a$(5)=" timpul in se
c  ": LET a$(6)=" PULSATIA:      ": LET a$(7)=" TIMPUL:
941 FOR a=1 TO 2: LET r=4+2*(a-1): GO SUB 9200: NEXT a
942 PAUSE 0: IF INKEY$="N" THEN  GO TO 1000
943 IF INKEY$="D" THEN  GO TO 945
944 GO TO 942
945 FOR a=3 TO 6: LET r=4+2*(a-1): GO SUB 9200: NEXT a: PRINT AT 14,26;: GO SUB
946: GO TO 970
946 PAPER 7: DIM n$(3): LET n=0: LET n$=""
947 PAUSE 0: LET h$=INKEY$
948 IF CODE h$=13 AND n<>0 THEN  PRINT " ": RETURN
949 IF CODE h$=12 THEN  IF n>0 THEN  PRINT CHR$ 8;"  ";CHR$ 8;CHR$ 8;: LET n=n-
1: LET n$=n$( TO n): GO TO 947
950 IF CODE h$=12 THEN  IF n=0 THEN  GO TO 947
951 IF CODE h$(48 OR CODE h$)57 THEN  GO TO 947
952 PRINT h$;" ";CHR$ 8;: LET n=n+1: LET n$(n)=h$
953 IF n=3 THEN  PRINT " ": RETURN
954 GO TO 947
970 LET p=VAL n$( TO n)
971 LET a=7: LET r=4+2*(a-1): GO SUB 9200: PRINT AT 16,24;: GO SUB 946
972 PAPER 6: LET t=VAL n$( TO n): LET tp=t*p: LET k=INT (tp/4): LET r=tp-4*k
973 IF k=0 THEN  GO TO 980
974 FOR l=1 TO k: OVER 1: FOR i=1 TO 28: PRINT AT A(i,1),7; INK 2;" ";AT A(i+1,
1),7;" "
975 IF i<28 THEN  PLOT 59,92: DRAW FN u(i),FN v(i): PLOT 59,92: DRAW FN u(i),FN
v(i)
976 NEXT i
979 NEXT l
980 IF r=0 THEN  GO TO 940
981 FOR i=1 TO 7*r
982 OVER 1: PRINT AT A(i,1),7; INK 2;" ": PLOT 59,92: DRAW FN u(i),FN v(i): PRI
NT AT A(i+1,1),7; INK 2;" ": PLOT 59,92: DRAW FN u(i),FN v(i): NEXT i
990 PLOT 59,91
991 IF r=1 THEN  DRAW 0,43: DRAW -2,-2: DRAW 4,0: DRAW -2,2: GO TO 995
992 IF r=2 THEN  DRAW -48,0: DRAW 2,-2: DRAW 0,4: DRAW -2,-2: GO TO 995
993 IF r=3 THEN  DRAW 0,-43: DRAW -2,2: DRAW 4,0: DRAW -2,-2: GO TO 995
995 GO SUB 9080: PLOT 59,91
996 IF r=1 THEN  DRAW 0,43: DRAW -2,-2: DRAW 4,0: DRAW -2,2: PRINT AT 4,7; INK
2;" ";AT 10,7;" ": GO TO 999
997 IF r=2 THEN  DRAW -48,0: DRAW 2,-2: DRAW 0,4: DRAW -2,-2: PRINT AT 10,7; IN
K 2;" ";AT 10,7;" ": GO TO 999
998 IF r=3 THEN  DRAW 0,-43: DRAW -2,2: DRAW 4,0: DRAW -2,-2: PRINT AT 16,7; IN
K 2;" ";AT 10,7;" "
999 GO TO 940
1000 GO SUB 9000
1010 PRINT #0;AT 0,12;"Reluaa?";AT 1,12; FLASH 1;" 1-4/N ": FLASH 0
```

```
1011 PRINT AT 3,3;"1 - LEGEA MISCARII I";AT 7,5;"2 - LEGEA MISCARII II";AT 9,5;"
3 - FAZA MISCARII";AT 11,5;"4 - PULSATIA MISCARII"
1015 PAUSE 0
1020 IF INKEY$="n" OR INKEY$="N" THEN  GO SUB 5555: PAUSE 0: GO TO 50
1030 IF INKEY$="1" THEN  GO TO 100
1040 IF INKEY$="2" THEN  GO TO 340
1050 IF INKEY$="3" THEN  GO TO 550
1060 IF INKEY$="4" THEN  GO TO 790
1065 IF CODE (INKEY$)=7 THEN  GO SUB 5555: GO TO 1000
1070 GO TO 1015
5555 GO SUB 9000
5560 PRINT AT 1,2; PAPER 5;t$;t$(2 TO ): FOR i=2 TO 20: PRINT AT i,1; PAPER 7;t$
;t$(2 TO );AT i-1,30; PAPER 5;" ": NEXT i
5565 PRINT AT 8,7; PAPER 2; INK 6;"                    ";AT 9,7;" LEGILE MISCARII "
;AT 10,7;"
   0 PRINT AT 3,2; PAPER 7;"LICEUL DE MATEMATICA-FIZICA";AT 4,13;"NR.1";AT 5,7;"
T I M I S O A R A"
5570 PRINT AT 13,2; PAPER 7;"REALIZATORI";AT 15,5;"prof.LUCIA ILEA";AT 16,15;"fi
z:ca";AT 17,5;"prof.MARINEL SERBAN";AT 18,15;"programare": GO SUB 9080: RETURN
7000 LOAD ""CODE 55000: LOAD ""CODE 60899
7010 LET u=55000: LET b=7500: POKE 23675,u-256*INT (u/256): POKE 23676,INT (u/25
6): POKE 60952,b-256*INT (b/256): POKE 60953,INT (b/256): RANDOMIZE USR 60899: G
O TO 5
7500 GO SUB 5555: PAUSE 100: PRINT AT 20,1; PAPER 7;"PAROLA:"
7510 INPUT  LINE p$
   0 IF p$="PAUL" THEN  STOP
7530 PRINT AT 20,8; PAPER 0; INK 7;"NU!!!": PAUSE 50: GO TO 1000
8010 DATA 10,9,8,7,6,5,4,4,4,5,6,7,8,9,10,11,12,13,14,15,16,16,16,15,14,13,12,11
,10
8030 DATA 13,13,13,12,11,10,8,7,6,4,3,2,1,1,1,1,1,2,3,4,6,7,8,10,11,12,13,13,13
8050 DATA 10,9,8,7,6,5,5,5,6,7,8,9,10,10,9,11,12,13,14,15,15,15,14,13,12,11,10,1
0,10
8070 DATA 100,102,102,104,104,104,104,104,104,104,104,104,104,102,102,100,98,98,95,9
5,95,95,95,95,95,95,98,98,100
8090 DATA 42,42,42,32,26,17,8,0,-8,-17,-26,-32,-42,-42,-42,-42,-42,-32,-26,-17,-
8,0,8,17,26,32,42,42,42
8110 DATA 0,7,14,20,27,34,42,42,42,34,27,19,10,4,0,-4,-14,-20,-27,-34,-42,-42,-4
2,-34,-24,-15,-7,-5,0
8200 DATA 4,12,20,28,36,44,43,44,36,28,20,12,4,0,-3,-11,-19,-27,-35,-43,-42,-43,
-35,-27,-19,-11,-3,0,0
8300 DATA 46,46,38,30,22,10,0,-10,-22,-30,-38,-46,-46,-46,-46,-46,-38,-30,-22,-1
0,0,10,22,30,38,46,46,46,0
8400 DATA 6,14,22,30,38,46,43,46,38,30,22,14,6,0,-6,-14,-22,-30,-38,-46,-43,-46,
-38,-30,-22,-14,-6,0,0
8999 STOP
9000 CLS : PAPER 6: BRIGHT 1: INK 0: BORDER 7: CLS : PLOT 0,0: DRAW 0,175: DRAW
255,0: DRAW 0,-175: DRAW -255,0: RETURN
9010 PRINT AT 10,4; PAPER 5; INK 1;"PE"; PAPER 6;" ": RETURN
9015 PRINT AT 10,13; INK 0; OVER 1;" ";AT 20,1;" t=0": RETURN
9020 PRINT AT 10,7; INK 2; OVER 1;" ": RETURN
9030 FOR I=13 TO 108 STEP 3: PLOT I,91: NEXT I: PRINT AT 10,14;" ";AT 11,14;"x"
9035 FOR I=43 TO 140 STEP 3: PLOT  INK 0;59,I: NEXT I: PRINT AT 3,7; INK 0;" ";A
T 3,8;"y": RETURN
9040 FOR i=0 TO 2*PI STEP PI/45: PLOT 59+48*COS i,91+48*SIN i: NEXT i: RETURN
9050 OVER 0: PRINT AT 20,1;" t=";FN T$(k,i);"          ": OVER 1: PRINT AT A(i+1,1)
,A(i+1,2); INK 0;FN b$(i): BEEP 0.01,15: PRINT AT A(i+1,1),A(i+1,2); INK 0;FN b$
(i): RETURN
9060 DIM A(29,6): RESTORE 8000: FOR i=1 TO 29: READ A(i,1): NEXT i: RESTORE 8020
: FOR i=1 TO 29: READ A(i,2): NEXT i: RESTORE 8040: FOR i=1 TO 29: READ A(i,3):
NEXT i
9070 RESTORE 8060: FOR i=1 TO 29: READ A(i,4): NEXT i: RESTORE 8080: FOR i=1 TO
29: READ A(i,5): NEXT i: RESTORE 8100: FOR i=1 TO 29: READ A(i,6): NEXT i: RETUR
N
9080 BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13: PRINT #0;AT 0,10;"Apasa o tasta":
PAUSE 0: PRINT #0;AT 0,10; OVER 1;"Apasa o tasta": RETURN
9090 FOR i=2 TO 17: PRINT AT i,1; PAPER 6;t$: NEXT i: RETURN
9100 DIM s(29): RESTORE 8200: FOR i=1 TO 29: READ s(i): NEXT i
9101 RESTORE 8300: DIM u(29): FOR i=1 TO 29: READ u(i): NEXT i
9102 RESTORE 8400: DIM v(29): FOR i=1 TO 29: READ v(i): NEXT i: RETURN
9110 PRINT #0;AT 0,9;"Reluam secventa?";AT 1,14; FLASH 1;" D/N "; FLASH 0
9120 PAUSE 0
9130 IF INKEY$="D" OR INKEY$="d" THEN  GO TO adr
9140 IF INKEY$="N" OR INKEY$="n" THEN  GO TO cont
9145 IF CODE (INKEY$)=7 THEN  GO SUB 5555: GO TO 9110
9150 GO TO 9120
9160 FOR i=3 TO 17: PRINT AT i,15+unde: OVER 0; PAPER 7;t$: NEXT i: RETURN
9200 PAPER 7: OVER 0: FOR i=1 TO 14: PRINT AT r,15+i;a$(a,i);" ";CHR$ 8: BEEP 0.
002,0: NEXT i: PRINT AT r,15+i;"  ": PAPER 6: RETURN
9999 CLEAR : SAVE "OSCILATII2" LINE 7000: SAVE "UDG"CODE 55000,168: SAVE "BREAK"
CODE 60899,72: PRINT AT 10,10;"REBOBINEAZA!": VERIFY "OSCILATII2": PRINT "OK - B
ASIC": VERIFY "UDG"CODE : VERIFY "BREAK"CODE : PRINT "OK - Bytes"
```

```
 1 REM *** OSCILATIIJ ***
 2 REM autori: ** LUCIA ILEA - fizica * MARINEL SERBAN - programare *
 3 GO TO 7000
 4 REM
 35 LET t$="                "
 40 GO SUB 9060: GO SUB 9100
 50 OVER 0: GO SUB 9000: PRINT AT 1,2; PAPER 5;t$;t$(2 TO ): FOR i=2 TO 20: PRI
NT AT i-1,1; PAPER 7;t$;t$(2 TO );AT i-1,30; PAPER 5;" ": NEXT i
 55 PAPER 7: PRINT AT 3,11;"INSTITUTUL";AT 4,6;"DE TEHNICA DE CALCUL";AT 5,15;"
SI";AT 6,10;"INFORMATICA";AT 7,7;"B U C U R E S T I"
 60 PRINT AT 9,9; PAPER 2; INK 6;"                ";AT 10,9;" OSCILATIIJ ";AT 11,9;
"
 65 PRINT AT 13,2;"REALIZATOR";AT 14,3;"Sectia sisteme si programe";AT 15,3;"in
formatice pentru invata-";AT 16,3;"mint si instruire in cola-";AT 17,3;"borare c
u";AT 18,2;"LICEUL DE MATEMATICA-FIZICA";AT 19,13;"NR.1";AT 20,7;"T I M I S O A
R A"
 69 GO SUB 9080
 70 IF CODE (INKEY$)=7 THEN  GO SUB 5555
 75 RANDOMIZE USR 23296: GO SUB 9000: PRINT AT 1,2; PAPER 5;t$;t$(2 TO ): FOR i
=2 TO 20: PRINT AT i-1,1; PAPER 7;t$;t$(2 TO );AT i-1,30; PAPER 5;" ": NEXT i
 76 PAPER 7: PRINT AT 3,10;"TEMA LECTIEI";AT 5,5;"Viteza si acceleratia";AT 6,9
;"oscilatorului";AT 7,8;"armonic  liniar"
 77 PRINT AT 10,2;"- Deducerea legii  vitezei";AT 11,7;"oscilatorului armonic";
AT 12,7;"liniar"
 78 PRINT AT 14,2;"- Deducerea legii accelera";AT 15,7;"tiei oscilatorului";AT
16,7;"armonic liniar"
 99 GO SUB 9080
 100 RANDOMIZE USR 23296: LET unde=1: OVER 0: GO SUB 9000: PRINT AT 1,1; PAPER 5
; INK 1;" LEGEA VITEZEI ";AT 1,30;"1": GO SUB 9040: GO SUB 9030: GO SUB 9015: GO
 SUB 9020: GO SUB 9010: PRINT AT 11,12; INK 0;"M";AT 11,6; INK 2;"P": GO SUB 908
0
 110 OVER 1: INK 0: PLOT 108,92: DRAW 0,20: GO SUB 9400: PLOT 108,112: PRINT AT
 9,14;"  ": INK 2: PLOT 59,92: DRAW 0,20: GO SUB 9400: PRINT AT 9,6;"  ": INK 0:
GO SUB 9080
 120 INK 0: PLOT 108,92: DRAW 0,20: GO SUB 9400: PLOT 108,112: PRINT AT 9,14;"
": INK 2: PLOT 59,92: DRAW 0,20: GO SUB 9400: PRINT AT 9,6;"  ": INK 0: GO SUB 9
080
 130 PRINT AT 11,12; INK 0;"M";AT 11,6; INK 2;"P";AT 20,1; OVER 0; PAPER 6;"
"
 140 FOR i=1 TO 3: PRINT AT A(i,1),A(i,2); INK 0;" ";AT A(i+1,1),A(i+1,2);" ";AT
 A(i,1),7; INK 2;" ";AT A(i+1,1),7;" ": NEXT i: PRINT AT 8,5; INK 2;"P";AT 8,10
; INK 0;"M": INK 2: PLOT 100,120: DRAW 0,16: GO SUB 9400: PLOT 100,136
 150 PRINT AT 6,13;" ": INK 0: PRINT AT 4,11;"
 160 PLOT 100,115: DRAW -15,0: DRAW 2,-2: DRAW 0,1: PLOT 87,116: DRAW 0,1: DRAW
-1,-1: PLOT 97,120: DRAW -12,16: DRAW 0,-2: PLOT 86,136: DRAW 1,-1: GO SUB 9080
 170 OVER 1: INK 2: PLOT 59,116: DRAW 0,20: GO SUB 9400: PRINT AT 6,8;" ": INK 0
: GO SUB 9080
 180 PRINT AT 8,5; INK 2;"P";AT 8,10; INK 0;"M": INK 2: PLOT 100,120: DRAW 0,1
6: GO SUB 9400: PLOT 100,136
 190 INK 0: PRINT AT 6,13;" ";AT 4,11;" ": PLOT 100,115: DRAW -15,0: DRAW 2,-2:
DRAW 0,1: PLOT 87,116: DRAW 0,1: DRAW -1,-1: PLOT 97,120: DRAW -12,16: DRAW 0,-2
: PLOT 86,136: DRAW 1,-1
 200 INK 2: PLOT 59,116: DRAW 0,20: GO SUB 9400: PRINT AT 6,8;" ": INK 0: GO SUB
 9080
 210 FOR i=4 TO 11: PRINT AT A(i,1),7; INK 2;" ";AT A(i+1,1),7;" ";AT A(i,1),A(i
,2); INK 0;" ";AT A(i+1,1),A(i+1,2);" ": NEXT i
 220 INK 2: PLOT 59,111: DRAW 0,-16: DRAW -2,2: DRAW 4,0: DRAW -2,-1: PRINT AT 8
,8;" ";AT 7,8;"P": INK 0: PLOT 19,111: DRAW 0,-16: DRAW -2,2: DRAW 4,0: DRAW -2
,-1: PRINT AT 8,3;" ";AT 6,1;"M"
 230 PLOT 14,115: DRAW -10,0: DRAW 2,-2: DRAW 0,4: DRAW -1,-1: PLOT 16,113: DRAW
 -12,-18: DRAW 0,3: PLOT 3,92: DRAW 1,0: GO SUB 9080
 240 RANDOMIZE USR 23296: LET unde=1: OVER 0: GO SUB 9000: PRINT AT 1,1; PAPER 5
; INK 1;" LEGEA VITEZEI ";AT 1,30;"2": GO SUB 9040: GO SUB 9030: GO SUB 9015: GO
 SUB 9020: GO SUB 9010: PRINT AT 11,12; INK 0;"M";AT 11,6; INK 2;"P": GO SUB 908
0
 250 OVER 1: INK 0: PLOT 108,92: DRAW 0,20: GO SUB 9400: PLOT 108,112: PRINT AT
 9,14;"  ": INK 2: PLOT 59,92: DRAW 0,20: GO SUB 9400: PRINT AT 9,6;"  ": INK 0:
GO SUB 9080
 260 INK 0: PLOT 108,92: DRAW 0,20: GO SUB 9400: PLOT 108,112: PRINT AT 9,14;"
": INK 2: PLOT 59,92: DRAW 0,20: GO SUB 9400: PRINT AT 9,6;"  ": INK 0: PRINT AT
 20,1; OVER 0; PAPER 6;"                ": GO SUB 9080
 270 PRINT AT 11,12; INK 0;"M";AT 11,6; INK 2;"P"
 280 FOR i=1 TO 3: PRINT AT A(i,1),A(i,2); INK 0;" ";AT A(i+1,1),A(i+1,2);" ";AT
 A(i,1),7; INK 2;" ";AT A(i+1,1),7;" ": NEXT i: PRINT AT 8,5; INK 2;"P";AT 7,13
; INK 0;"M": INK 2: PLOT 100,120: DRAW 0,16: GO SUB 9400: PLOT 100,136
 290 PRINT AT 6,13;" ": INK 0: PRINT AT 4,11;"
 300 PLOT 100,115: DRAW -15,0: DRAW 2,-2: DRAW 0,1: PLOT 87,116: DRAW 0,1: DRAW
-1,-1: PLOT 97,120: DRAW -12,16: DRAW 0,-2: PLOT 86,136: DRAW 1,-1: GO SUB 9080
 310 OVER 1: INK 2: PLOT 59,116: DRAW 0,20: GO SUB 9400: PRINT AT 6,8;" ": INK 0
: GO SUB 9080
 330 OVER 0: INK 2: PLOT 59,91: DRAW u(i-1)-2,v(i-1)
```

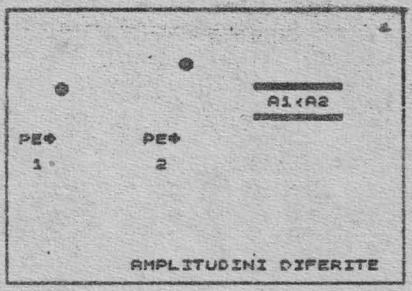
```
340 INK 2: FOR i=0 TO PI/6 STEP PI/50: PLOT 59,91: DRAW 15*COS i,15*SIN i: NEXT
i
350 INK 0: FOR i=PI/2 TO 2.15*PI/3 STEP PI/50: PLOT 100,115: DRAW 12*COS i,12*S
IN i: NEXT i: GO SUB 9080
351 PRINT AT 9,10; INK 2;" ": PAUSE 50: GO SUB 9160
352 PAPER 7: PRINT AT 4,20;"FORMULE";AT 7,17;"  =  r =  A";AT 11,17;"  =  t";AT
9,17;"v =  cos ";AT 13,17; PAPER 2; INK 6;"                ";AT 14,17;" v= Acos( t
) ";AT 15,17;"
359 LET cont=360: LET adr=100: GO SUB 9110
360 RANDOMIZE USR 23296: LET unde=1: OVER 0: GO SUB 9000: PRINT AT 1,1; PAPER 5
; INK 1;" LEGEA ACCELERATIEI ";AT 1,30;"3": GO SUB 9040: GO SUB 9015: GO SUB 902
0: GO SUB 9010: PRINT AT 11,12; INK 0;"M";AT 11,6; INK 2;"P": GO SUB 9080
370 OVER 1: PLOT 103,91: DRAW -20,0: DRAW 2,-2: DRAW 0,1: PLOT 84,92: DRAW 1,0:
DRAW 0,1: PRINT AT 9,11;" ": GO SUB 9080
380 PRINT AT 11,12; INK 0;"M";AT 11,6; INK 2;"P";AT 20,1; OVER 0; INK 6;"
390 PLOT 103,91: DRAW -20,0: DRAW 2,-2: DRAW 0,1: PLOT 84,92: DRAW 1,0: DRAW 0,
1: PRINT AT 9,11;" ": GO SUB 9080
400 FOR i=1 TO 3: PRINT AT A(i,1),A(i,2); INK 0;" ";AT A(i+1,1),A(i+1,2);" ";AT
A(i,1),7; INK 2;" ";AT A(i+1,1),7;" ": NEXT i
410 INK 0: OVER 0: PLOT 100,115: DRAW -20,-12: DRAW 2,0: DRAW -2,2: DRAW 0,-1:
PRINT AT 9,11;" ": GO SUB 9080
420 PLOT 100,115: DRAW -20,0: DRAW 2,-2: DRAW 0,4: DRAW -2,-2
430 INK 2: PLOT 100,111: DRAW 0,-8: DRAW -2,2: DRAW 4,0: DRAW -2,-2: PLOT 59,11
1: DRAW 0,-8: DRAW -2,2: DRAW 4,0: DRAW -2,-2: PRINT AT 8,6;" ": GO SUB 9080
450 GO SUB 9036: GO SUB 9010: PLOT 59,91: DRAW 20,12
460 INK 2: FOR i=0 TO PI/6 STEP PI/50: PLOT 59,91: DRAW 15*COS i,15*SIN i: NEXT
i
470 INK 0: FOR i=PI TO 7*PI/6 STEP PI/50: PLOT 100,115: DRAW 14*COS i,14*SIN i:
NEXT i: GO SUB 9080
480 PLOT  INK 2;66,91: DRAW  INK 2;0,12: DRAW  INK 0;0,11: DRAW -2,-2: DRAW 4,0
: DRAW -2,2: PRINT AT 8,9; OVER 1;" ": GO SUB 9080
481 GO SUB 9160: PAPER 7: PRINT AT 4,20;"FORMULE";AT 6,17;"  =  r=  A";AT 7,17;"
a=- sin ";AT 8,17;" = t";AT 9,17;"a=-  Asin( t)";AT 10,17;"y=Asin( t)";AT 12,17;
PAPER 2; INK 6;"                ";AT 13,17;" a=-  y  ";AT 14,17;" a=-  Asin t
";AT 15,17;"  =-              ";AT 16,17;": GO SUB 9080
490 RANDOMIZE USR 23296: LET unde=1: OVER 0: GO SUB 9000: PRINT AT 1,1; PAPER 5
; INK 1;" 'LEGEA ACCELERATIEI ";AT 1,30;"4": GO SUB 9040: GO SUB 9030: GO SUB 901
5: GO SUB 9020: GO SUB 9010: PRINT AT 11,12; INK 0;"M";AT 11,6; INK 2;"P"
500 OVER 1: PAUSE 50: PRINT AT 11,12; INK 0;"M";AT 11,6; INK 2;"P";AT 20,1; OVE
R 0; INK 6;"
510 FOR i=1 TO 11: PRINT AT A(i,1),A(i,2); INK 0;" ";AT A(i+1,1),A(i+1,2);" ";A
T A(i,1),7; INK 2;" ";AT A(i+1,1),7;" ": NEXT i
520 INK 2: OVER 0: PLOT 59,111: DRAW 0,-8: DRAW -2,2: DRAW 4,0: DRAW -2,-2: PRI
NT AT 8,6;"
530 INK 0: PLOT 66,91: DRAW 0,12: DRAW 0,11: DRAW -2,-2: DRAW 4,0: DRAW -2,2: P
RINT AT 8,9; OVER 1;" ": GO SUB 9080
540 OVER 1: PRINT AT 7,7; INK 2;"
550 FOR i=12 TO 17: PRINT AT A(i,1),A(i,2); INK 0;" ";AT A(i+1,1),A(i+1,2);" ";
AT A(i,1),7; INK 2;" ";AT A(i+1,1),7;" ": NEXT i: GO SUB 9080
560 OVER 0: PRINT AT 11,3;" ": PLOT 17,66: DRAW 6,-13: DRAW -2,0: DRAW 3,2: DRA
W -1,-2: PLOT 23,70: DRAW 14,9: DRAW -2,0: DRAW 1,-2: DRAW 1,2: INK 2: PLOT 59,7
2: DRAW 0,8: DRAW -2,-2: DRAW 4,0: DRAW -2,2: PRINT AT 12,6;"
570 GO SUB 9080: INK 4: PLOT 59,63: DRAW 0,-10: DRAW -2,2: DRAW 4,0: DRAW -2,-2
: INK 0: PLOT 66,90: DRAW 0,-22: DRAW -2,2: DRAW 4,0: DRAW -2,-2: PRINT AT 12,9;
" ";AT 14,8; INK 4;" ": INK 0: GO SUB 9080
1000 RANDOMIZE USR 23296: GO SUB 9000
1010 PRINT #0;AT 0,12;"Reluam?";AT 1,12; FLASH 1;" 1/2/N "; FLASH 0
1011 PRINT AT 8,5;"1 - LEGEA VITEZEI";AT 10,5;"2 - LEGEA ACCELERATIEI"
1015 PAUSE 0
1020 IF INKEY$="n" OR INKEY$="N" THEN  GO SUB 5555: PAUSE 0: GO TO 1000
1030 IF INKEY$="1" THEN  GO TO 100
1040 IF INKEY$="2" THEN  GO TO 360
1065 IF CODE (INKEY$)=7 THEN  GO SUB 5555: GO TO 1000
1070 GO TO 1015
5555 RANDOMIZE USR 23296: GO SUB 9000
5560 PRINT AT i,2; PAPER 5;t$;t$(2 TO ): FOR i=2 TO 20: PRINT AT i,1; PAPER 7;t$
;t$(2 TO );AT i-1,30; PAPER 5;"  ": NEXT i
5565 PRINT AT 8,8; PAPER 2; INK 6;"                ";AT 9,8;" LEGEA VITEZEI ";AT
10,8;"
5568 PRINT AT 3,2; PAPER 7;"LICEUL DE MATEMATICA-FIZICA";AT 4,13;"NR.1";AT 5,7;"
T I M I S O A R A"
5569 PRINT AT 13,2; PAPER 7;"REALIZATORI";AT 15,5;"prof.LUCIA ILEA";AT 16,15;"fi
zica";AT 17,5;"prof.MARINEL SERBAN";AT 18,15;"programare": GO SUB 9080: RETURN
   0>PRINT AT 13,2;PAPER 7;"REALIZATORI";AT 15,5;"prof.LUCIA ILEA";AT 16,15;"fiz
ica";AT 17,5;"prof.MARINEL SERBAN";AT 18,15;"programare";GO SUB 9080:RETURN
7000 PAPER 0: INK 0: BORDER 0: CLS : LOAD ""CODE 55000: LOAD ""CODE 23296: LOAD
""CODE 60899
7005 LET u=55000: LET b=7500
7010 POKE 23675,u-256*INT (u/256): POKE 23676,INT (u/256): POKE 60952,b-256*INT
```

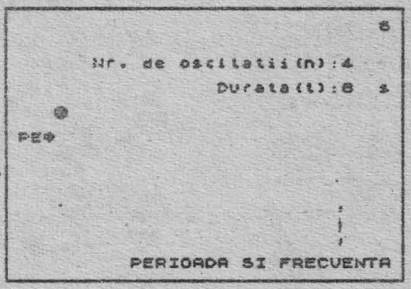
```
7010 POKE 23675,b-256*INT (b/256): POKE 23676,INT (b/256): POKE 60952,b-256*INT (b
/256): POKE 60953,INT (b/256): RANDOMIZE USR 60899: GO TO 5
7500 GO SUB 5555: PAUSE 100: PRINT AT 20,1; PAPER 7;"PAROLA:"
7510 INPUT  LINE p$
7520 IF p$="PAUL" THEN  STOP
7530 PRINT AT 20,8; PAPER 0; INK 7;"NU!!!": PAUSE 50: GO TO 1000
8010 DATA 10,9,8,7,6,5,4,4,4,5,6,7,8,9,10,11,12,13,14,15,16,16,16,15,14,13,12,11
,10
8030 DATA 13,13,13,12,11,10,8,7,6,4,3,2,1,1,1,1,1,2,3,4,6,7,8,10,11,12,13,13,13
8050 DATA 10,9,8,7,6,5,5,5,6,7,8,9,10,10,9,11,12,13,14,15,15,15,14,13,12,11,10,1
0,10
8070 DATA 100,102,102,104,104,104,104,104,104,104,104,104,102,102,100,98,98,95,9
5,95,95,95,95,95,95,98,98,100
8090 DATA 42,42,42,32,26,17,8,0,-8,-17,-26,-32,-42,-42,-42,-42,-42,-32,-26,-17,-
8,0,8,17,26,32,42,42,42
8110 DATA 0,7,14,20,27,34,42,42,42,34,27,19,10,4,0,-4,-14,-20,-27,-34,-42,-42,-4
2,-34,-24,-15,-7,-5,0
8300 DATA 46,46,38,30,22,10,0,-10,-22,-30,-38,-46,-46,-46,-46,-46,-38,-30,-22,-1
0,0,10,22,30,38,46,46,46,0
8400 DATA 6,14,22,30,38,46,43,46,38,30,22,14,6,0,-6,-14,-22,-30,-38,-46,-43,-46,
-38,-30,-22,-14,-6,0,0
9999 STOP
9000 CLS : PAPER 6: BRIGHT 1: INK 0: BORDER 7: CLS : PLOT 0,0: DRAW 0,175: DRAW
255,0: DRAW 0,-175: DRAW -255,0: RETURN
9010 PRINT AT 19,4; PAPER 5; INK 1;"PE"; PAPER 6;" "; RETURN
9015 PRINT AT 16,13; INK 0; OVER 1;" ";AT 20,1;" t=0"; RETURN
9020 PRINT AT 10,7; INK 2; OVER 1;" "; RETURN
9030 FOR I=13 TO 108 STEP 3: PLOT I,91: NEXT I: PRINT AT 10,14;" ";AT 11,14;"x"
9035 FOR I=43 TO 140 STEP 3: PLOT  INK 0;59,I: NEXT I: PRINT AT 3,7; INK 0;" ";A
T 3,8;"y": RETURN
9036 FOR I=13 TO 108 STEP 3: PLOT  INK 0;I,91: NEXT I: PRINT AT 10,14; INK 0;" "
;AT 11,14;"x"
9037 FOR I=43 TO 140 STEP 3: PLOT 59,I: NEXT I: PRINT AT 3,7; INK 0;" ";AT 3,8;"
y": RETURN
9040 FOR i=0 TO 2*PI STEP PI/45: PLOT 59+48*COS i,91+48*SIN i: NEXT i: RETURN
9060 DIM A(29,6): RESTORE 8000: FOR i=1 TO 29: READ A(i,1): NEXT i: RESTORE 8020
: FOR i=1 TO 29: READ A(i,2): NEXT i: RESTORE 8040: FOR i=1 TO 29: READ A(i,3):
NEXT i
9070 RESTORE 8060: FOR i=1 TO 29: READ A(i,4): NEXT i: RESTORE 8080: FOR i=1 TO
29: READ A(i,5): NEXT i: RESTORE 8100: FOR i=1 TO 29: READ A(i,6): NEXT i: RETUR
N
9080 BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13: PRINT #0;AT 0,10;"Apasa o tasta":
PAUSE 0: PRINT #0;AT 0,10; OVER 1;"Apasa o tasta": RETURN
9090 FOR i=2 TO 17: PRINT AT i,1; PAPER 6;t$: NEXT i: RETURN
9100 RESTORE 8300: DIM u(29): FOR i=1 TO 29: READ u(i): NEXT i
9102 RESTORE 8400: DIM v(29): FOR i=1 TO 29: READ v(i): NEXT i: RETURN
9110 PRINT #0;AT 0,9;"Reluam secventa?";AT 1,14; FLASH 1;" D/N "; FLASH 0
9120 PAUSE 0
9130 IF INKEY$="D" OR INKEY$="d" THEN  GO TO adr
9140 IF INKEY$="N" OR INKEY$="n" THEN  GO TO cont
9145 IF CODE (INKEY$)=7 THEN  GO SUB 5555: GO TO 9110
9150 GO TO 9120
9160 FOR i=3 TO 17: PRINT AT i,15+unde; OVER 0; PAPER 7;t$: NEXT i: RETURN
9400 DRAW -2,-2: DRAW 4,0: DRAW -2,2: RETURN
9999 CLEAR : SAVE "OSCILATII3" LINE 1: SAVE "UD6"CODE 55000,168: SAVE "STERG"COD
E 23296,45: SAVE "BREAK"CODE 60899,72: PRINT AT 10,10;"REBOBINEAZA!": VERIFY "OS
CILATII3": PRINT "OK - BASIC": VERIFY "UD6"CODE : PRINT "OK - UD6": VERIFY "STER
G"CODE : VERIFY "BREAK"CODE : PRINT "OK - Bytes"
```

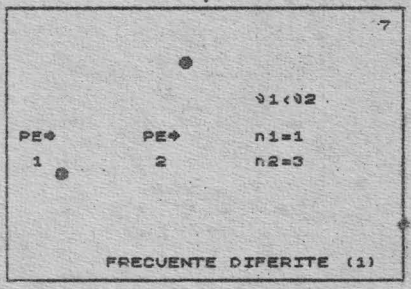
```
   1 LOAD ""CODE 60899: POKE 60952,6666-256*INT (6666/256): POKE 60953,INT (6666
/256): RANDOMIZE USR 60899: GO SUB 9000
   3 OVER 0: INVERSE 0: GO SUB 9900
   4 LET q$="                                                  "
   5 LET sw=0
  10 PAPER 7: INK 3: BRIGHT 1: CLS
  20 PLOT 0,0: DRAW 0,175: DRAW 255,0: DRAW 0,-175: DRAW -255,0
  30 PRINT AT 1,5;"ENERGIA OSCILATORULUI";AT 3,12;"ARMONIC"
  40 PLOT 35,170: DRAW 212-35,0: DRAW 0,-30: DRAW -212+35,0: DRAW 0,30
  50 GO SUB 9990
  60 PRINT  OVER 1;AT 7,6;"_";AT 8,7; INK 0;"     "; INK 2;" "
  70 PLOT 103,72: DRAW 7*13+6,0: DRAW 0,-17: DRAW -7*13-6,0: DRAW 0,17: PRINT AT
 13,27;" "
  80 PLOT 103,48: DRAW 7*13+6,0: DRAW 0,-17: DRAW -7*13-6,0: DRAW 0,17: PRINT AT
 16,27;" "
  90 PLOT 103,24: DRAW 7*13+6,0: DRAW 0,-17: DRAW -7*13-6,0: DRAW 0,17: PRINT AT
 19,27;" "
 110 PRINT  OVER 1; INK 4; PAPER 6;AT 9,8;"                    ": PLOT 64,103: D
RAW 160,0
 120 LET X=108: FOR Y=94 TO 80 STEP -1.5: PLOT X,Y: NEXT Y
 130 LET X=203: FOR Y=94 TO 80 STEP -1.5: PLOT X,Y: NEXT Y
 160 FOR X=108 TO 203 STEP 1.5: PLOT X,80: NEXT X
 170 PLOT 108,80: DRAW 5,-5: PLOT 108,80: DRAW 5,5
 180 PLOT 203,80: DRAW -5,5: PLOT 203,80: DRAW -5,-5
 190 PRINT AT 11,19;"d"
 192 LET YY=25
 195 PRINT #0;AT 0,0;                    " Apasati o tasta pentru a vizua-  liza m
iscarea corpului"
 200: FOR N=1 TO 13: PAUSE 0: GO SUB 5000: LET sw=1
 210 GO SUB 6000
 215 GO SUB 7000: GO SUB 8000: GO SUB 7500
 216 IF INKEY$=" " THEN  LET N=14: NEXT N: GO TO 500
 220 NEXT N
 230 FOR N=12 TO 2 STEP -1: LET sw=-1: PAUSE 0: GO SUB 5000: GO SUB 6000: GO SUB
 7000: GO SUB 8000: GO SUB 7600: IF INKEY$=" " THEN  LET N=1: NEXT N: GO TO 500
 240 NEXT N: GO TO 200
 500 PRINT AT 0,1;"                              ";AT 4,1;"
  ": PLOT 0,175: DRAW  INK 3;255,0: PRINT AT 1,1;"                              ";
AT 2,1;"                              ";AT 3,1;"                              ": PRINT
AT 5,7;"                   ";AT 6,7;"                   ": INPUT "m": PRI
NT AT 8,7;"                   ": FOR i=13 TO 20: PRINT AT i,1;"
         ": NEXT i
 501 PLOT 5,82: DRAW 10*8+4,0: DRAW 0,3*(-8)-4: DRAW -10*8-4,0: DRAW 0,3*8+4: PR
INT AT 12,1;" =(kY^2)/2";AT 14,1;" = - ": INVERSE 1: PLOT 102,72: DRAW 8*13+1,0:
 PLOT 102,24: DRAW 8*13+1,0: INVERSE 0
 502 PRINT AT 20,27;"Y";AT 13,21;"E": INVERSE 1: PLOT 102,24-17: DRAW 13*8+1,0:
INVERSE 0
 503 PLOT 110,10: DRAW 100,0: DRAW -5,5: PLOT 210,10: DRAW -5,-5: PLOT 158,10: D
RAW 0,60
 504 PLOT 158,70: DRAW -5,-5: PLOT 158,70: DRAW 5,-5
 505 INK 3: PLOT 103,175-7: DRAW 7*13+6,0: DRAW 0,-17: DRAW -7*13-6,0: DRAW 0,17
: PRINT AT 1,11;" "
 510 LET x=110: LET sss=1/100: LET n=1: FOR i=1 TO 99
 520 LET Y=10+ABS (14*(1/2-I*SSS))^2: PLOT  INK 2;X,Y+1
 521 LET YY=10+58-Y: PLOT  INK 1;X,YY
 525 LET X=X+1
 526 IF I=70 THEN  PRINT AT 15,20;" ";AT 19,20;" "
 530 IF INT (I/8)=I/8 THEN  LET N=N+1: GO SUB 5000: GO SUB 7800
 540 NEXT I
 600 PRINT #0;AT 0,10;"Apasa o tasta": PAUSE 0
 610 INPUT " "
 620 INK 0: LET Y=59: FOR X=110 TO 100+108 STEP 1.25: BEEP .003,1: PLOT X,Y: NEX
T X: PRINT AT 13,26;" "
 700 PRINT #0;"APASATI O TASTA PT. CONTINUARE. ": PAUSE 0: CLS
 710 PLOT 0,0: DRAW 0,175: DRAW 255,0: DRAW 0,-175: DRAW -255,0: LET A$=
"                                    OPTIUNI:
           1.RELUARE   PROG.                2.TERMINARE PROG.                 3.SAL
VARE   PROG.               4.REPREZENT.BILA
                                                                  ": GO SUB 8500
 720 PAUSE 0: LET A$=INKEY$: IF A$<"1" OR A$>"4" THEN  BEEP .1,1: GO TO 720
 730 IF A$="1" THEN  RUN
 740 IF A$="2" THEN  BEEP .1,0: BEEP .1,4: BEEP .1,7: BEEP .1,12: GO SUB 770: GO
 TO 710
 750 IF A$="3" THEN  SAVE "OSCILATII4" LINE 1: SAVE "BREAK"CODE 60899,72: BEEP .
1,0: BEEP .1,4: BEEP .1,7: BEEP .1,12: GO TO 720
 760 IF A$="4" THEN  GO TO 10
 770 CLS : PLOT 0,0: DRAW 0,175: DRAW 255,0: DRAW 0,-175: DRAW -255,0: LET A$=
"                                                   PROFESOR COORDONATOR:
                 ILEA LUCIA                         ELEV:
 SINGER HARALD                                       LICEUL de MATEMATICA-FIZICA
           nr.1                                                    Timisoara
                           Noiembrie 1987
```

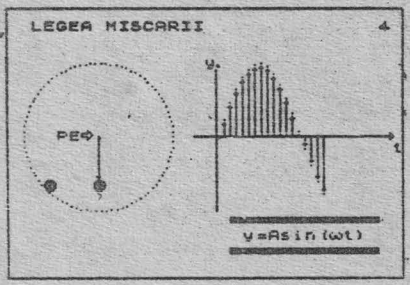
```
  VA MULTUMIN PENTRU ATENTIE": GO SUB 5500: PAUSE 0
 770 RETURN
5000 IF N<=2 THEN  GO TO 5100
5001 IF N>8 THEN  GO TO 5200
5002 LET A$="          ": FOR J=1 TO N: LET A$=A$+" ": NEXT J: PRINT AT 8,6; INK 4;A
$; INK 2;"    ": GO TO 5300
5100 LET A$="          ": FOR J=1 TO N: LET A$=A$+" ": NEXT J: PRINT AT 8,6; INK 4;A
$;" INK 2;"    ": GO TO 5300
5200 LET A$="          ": FOR J=1 TO N: LET A$=A$+" ": NEXT J: PRINT AT 8,6; INK 4;A
$; INK 2;"    ": GO TO 5300
5300 RETURN
6000 INK 2: LET B=2*ABS (7-N): LET A$="": PRINT AT 13,13;"                ": PRINT A
T 14,13;"                ": LET a$=q$(1 TO q): PRINT AT 13,13;A$: PRINT AT 14,13;A$:
 RETURN
6666 GO SUB 770: PRINT AT 20,1;"PAROLA:"
6667 INPUT  LINE P$
6668 IF P$="HARRY" THEN  STOP
6669 PRINT AT 20,8;"NU!!!": PAUSE 50: CLS : GO TO 710
7000 INK 1: LET P=12-Q: LET B$="": PRINT AT 16,13;"                ": PRINT AT 17,13
;"                ": LET b$=q$(1 TO p): PRINT AT 16,13;B$;AT 17,13;B$; RETURN
7500 LET l=4*p+sw: PRINT AT 6,7;"                ": PRINT AT 5,7;"
                ": PRINT AT 5,12+n;"V"
7510 PLOT n*8+100,127: DRAW L,0: DRAW -3,3: DRAW 3,-3: DRAW -3,-3: RETURN
7600 LET l=4*p+sw: PRINT AT 6,7;"                ";AT 5,7;"
                ": PRINT AT 5,12+n;"V": PLOT n*8+100,127: DRAW 1,0: DRAW 3,-3: DRAW -3,3:
DRAW 3,3: RETURN
7800 LET q=2*ABS (7-n): LET a$=q$(1 TO q): LET p=12-q: LET b$=q$(  TO p): PRINT
AT 1,13; INK 2;a$; INK 1;b$;AT 2,13; INK 2;a$; INK 1;b$: RETURN
8000 PRINT AT 19,13; INK 2;A$; INK 1;B$;AT 20,13; INK 2;A$; INK 1;B$: RETURN
8500 OVER 1: FOR i=1 TO LEN a$: BEEP .003,1: PRINT a$(i TO i);: NEXT i: OVER 0:
RETURN
8999 STOP
9000 PAPER 6: BRIGHT 1: CLS : LET t$="                "
9050 GO SUB 9200: PRINT AT 1,2; PAPER 5;t$;t$(2 TO ); FOR i=2 TO 20: PRINT AT i,
1; PAPER 7;t$;t$(2 TO );AT i-1,30; PAPER 5;" ": NEXT i
9055 PRINT  PAPER 7;AT 3,11;"INSTITUTUL";AT 4,6;"DE TEHNICA DE CALCUL";AT 5,15;"
SI";AT 6,10;"INFORMATICA";AT 7,7;"B U C U R E S T I"
9060 PRINT AT 9,10; PAPER 2; INK 6;"                ";AT 10,10;" OSCILATII4 ";AT 11,
10;"
9065 PRINT  PAPER 7;AT 13,2;"REALIZATOR";AT 14,3;"Sectia sisteme si programe";AT
 15,3;"informatice pentru invata-";AT 16,3;"mint si instruire in cola-";AT 17,3;
"borare cu";AT 18,2;"LICEUL DE MATEMATICA-FIZICA";AT 19,13;"NR.1";AT 20,7;"T I M
 I S O A R A"
9069 GO SUB 9300
9070 IF CODE (INKEY$)=7 THEN  GO SUB 770
9150 GO SUB 9200: PRINT AT 1,2; PAPER 5;t$;t$(2 TO ): FOR i=2 TO 20: PRINT AT i,
1; PAPER 7;t$;t$(2 TO );AT i-1,30; PAPER 5;" ": NEXT i
9160 PRINT AT 3,10; PAPER 7; INK 0;"TEMA LECTIEI";AT 5,5;"ENERGIA OSCILATORULUI
";AT 6,8;"ARMONIC LINIAR"
9165 PRINT  PAPER 7;AT 9,2;"-Ilustreaza  transformarea";AT 10,2;"reciproca a en
ergiei poten-";AT 11,2;"tiale in  energie  cinetica";AT 12,2;"in miscarea de osc
ilatie.
9166 PRINT  PAPER 7;AT 15,2;"-Reprezinta  grafic  depen-";AT 16,2;"denta de  elo
ngatie a ener-";AT 17,2;"giei potentiale,cinetice si";AT 18,2;"totale a  oscilat
orului ar-";AT 19,2;"monic liniar."
9170 GO SUB 9300
9171 IF CODE (INKEY$)=7 THEN  GO SUB 770
9172 RETURN
9200 CLS : PAPER 6: BRIGHT 1: INK 0: BORDER 7: CLS : PLOT 0,0: DRAW 255,0: DRAW
0,175: DRAW -255,0: DRAW 0,-175: RETURN
9300 BEEP 0.01,7: BEEP 0.01,24: BEEP 0.05,13: PRINT #0;AT 0,10;"Apasa o tasta":
PAUSE 0: PRINT #0;AT 0,10;"                ": RETURN
9900 POKE USR "h"+0,BIN 10001000
9901 POKE USR "h"+1,BIN 10011001
9902 POKE USR "h"+2,BIN 10011001
9903 POKE USR "h"+3,BIN 10101010
9904 POKE USR "h"+4,BIN 10101010
9905 POKE USR "h"+5,BIN 11001100
9906 POKE USR "h"+6,BIN 11001100
9907 POKE USR "h"+7,BIN 10001000
9908 POKE USR "I"+0,BIN 01001001
9909 POKE USR "I"+1,BIN 10010010
9910 POKE USR "I"+2,BIN 00100100
9911 POKE USR "I"+3,BIN 01001001
9912 POKE USR "I"+4,BIN 10010010
9913 POKE USR "I"+5,BIN 00100100
9914 POKE USR "I"+6,BIN 01001001
9915 POKE USR "I"+7,BIN 10010010
9916 POKE USR "J"+0,BIN 00111100
9917 POKE USR "J"+1,BIN 01111110
9918 POKE USR "J"+2,BIN 11011111
```

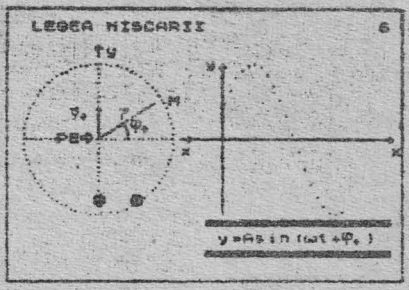
```
9919 POKE USR "J"+3,BIN 11011111
9920 POKE USR "J"+4,BIN 11011111
9921 POKE USR "J"+5,BIN 11111111
9922 POKE USR "J"+6,BIN 01111110
9923 POKE USR "J"+7,BIN 00111100
9924 POKE USR "C"+0,BIN 11111100
9925 POKE USR "C"+1,128
9926 POKE USR "C"+2,128
9927 POKE USR "C"+3,BIN 11110011
9928 POKE USR "C"+4,BIN 10000100
9929 POKE USR "C"+5,BIN 10000100
9930 POKE USR "C"+6,BIN 10000100
9931 POKE USR "C"+7,BIN 11110011
9932 POKE USR "P"+0,BIN 11111100
9933 POKE USR "P"+1,128
9934 POKE USR "P"+2,128
9935 POKE USR "P"+3,BIN 11110111
9936 POKE USR "P"+4,BIN 10000101
9937 POKE USR "P"+5,BIN 10000111
9938 POKE USR "P"+6,BIN 10000100
9939 POKE USR "P"+7,BIN 11110100
9940 POKE USR "T"+0,BIN 11111100
9941 POKE USR "T"+1,128
9942 POKE USR "T"+2,128
9943 POKE USR "T"+3,BIN 11110111
9944 POKE USR "T"+4,BIN 10000010
9945 POKE USR "T"+5,BIN 10000010
9946 POKE USR "T"+6,BIN 10000010
9947 POKE USR "T"+7,BIN 11110010
9948 LET P=BIN 10101010
9949 FOR I=0 TO 5: POKE USR "Q"+I,P: NEXT I: POKE USR "Q"+6,255: POKE USR "Q"+7,
P
9950 POKE USR "Q"+0,P
9951 POKE USR "D"+0,BIN 10000001
9952 POKE USR "D"+1,BIN 10000010
9953 POKE USR "D"+2,BIN 10000100
9954 POKE USR "D"+3,BIN 10001000
9955 POKE USR "D"+4,BIN 10010000
9956 POKE USR "D"+5,BIN 10100000
9957 POKE USR "D"+6,BIN 11000000
9958 POKE USR "D"+7,BIN 10000000
9989 RETURN
9990 INK 0: PLOT 39,128: DRAW 9,0: DRAW 0,-33: DRAW -9,0: DRAW 0,33: PRINT AT 6,
5;" ";AT 7,5;" ";AT 8,5;" ";AT 9,5;" ": INK 3: RETURN
```

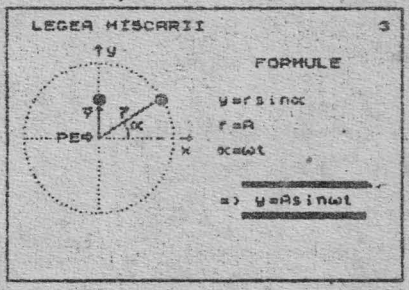

4
A1<A2
PE
1
PE
2
AMPLITUDINI DIFERITE

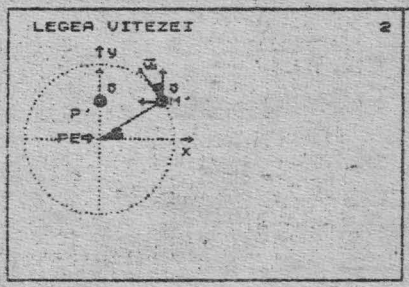

6
Nr. de oscilatii(n):4
Durata(t):8 s
PE
PERIOADA SI FRECVENTA

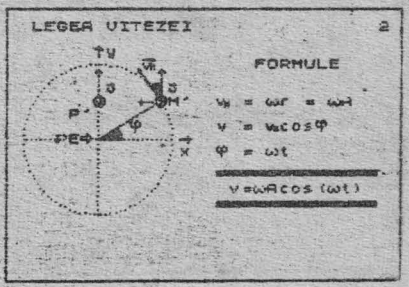

7
ν1<ν2
PE
1
PE
2
n1=1
n2=3
FRECVENTE DIFERITE (1)

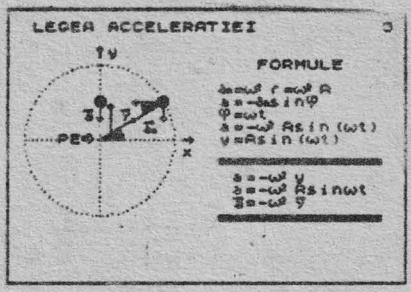

LEGEA MISCARII
4
PE
y
t
y=Asin(ωt)

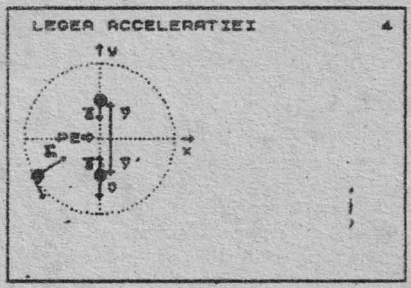

LEGEA MISCARII
6
y
M
PE
x
y=Asin(ωt+φ0)

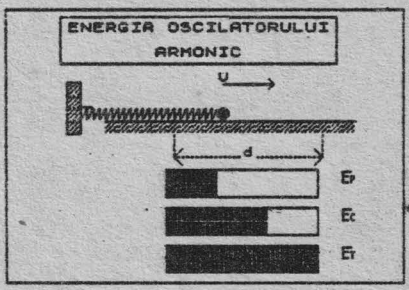

LEGEA MISCARII
3
y
FORMULE
PE
x
y=rsinα
r=A
α=ωt
=> y=Asinωt

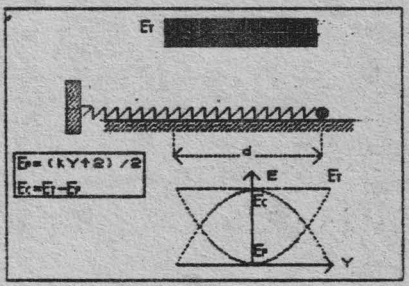

LEGEA VITEZEI
2
y
P'
PE
x

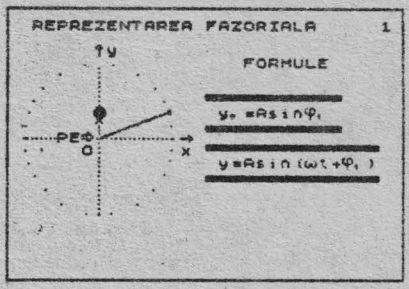

LEGEA VITEZEI
2
y
FORMULE
P'
PE
x
v=ωAcos(ωt)

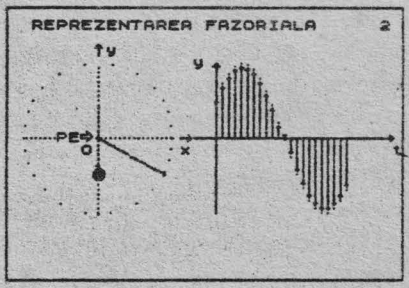

LEGEA ACCELERATIEI
3
FORMULE

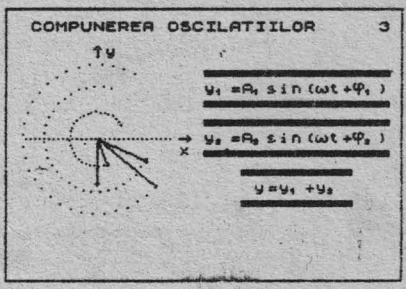

LEGEA ACCELERATIEI
4

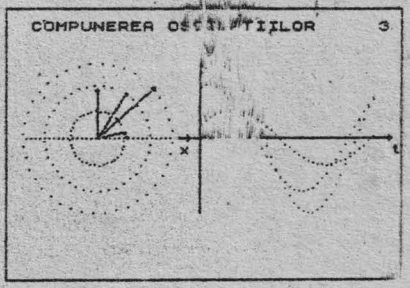

ENERGIA OSCILATORULUI
ARMONIC




REPREZENTAREA FAZORIALA 1
y
FORMULE
PE
O
x
$y_0 = A \sin \varphi_i$
$y = A \sin (\omega t + \varphi_i)$


REPREZENTAREA FAZORIALA 2
y
PE
O
x
t


COMPUNEREA OSCILATIILOR 3
y
x
$y_1 = A_1 \sin (\omega t + \varphi_1)$
$y_2 = A_2 \sin (\omega t + \varphi_2)$
$y = y_1 + y_2$


COMPUNEREA OSCILATIILOR 3
y
x
t

2.2. EMISIA ELECTRONICA

Fenomenele fizice care se produc la nivel de atomi sau de electroni deoarece nu sint vizibile sint mai greu de inteles si de asimilat de catre elevi. De aceea am incercat sa creem modele animate cu ajutorul calculatorului prin intermediul carora , elevul sa inteleaga mai bine aceste fenomene si notiuni de baza din fizica de liceu .

Programul a fost conceput prntru calculatorul Spectrum 128K deoarece a necesitat un spatiu mai mare de memorie .

Conform definitiei emisia electronica este fenomenul de expulzare al electronilor din metale sub influenta unor factori externi ; programul isi propune sa "explice" fenomenele de emisie termo- si fotoelectronica .

In studiul emisiei electronice din metale ne-am limitat la studiul (si implicit desenul) benzii de conductie.

Dupa incarcarea programului va aparea un meniu :

1. Termoemisia electronica
2. Fotoemisia electronica
3. Emisia prin efect de camp
4. Emisia autoelectronica
5. Emisia secundara
6. Dioda. Trioda.
7. Tetroda.

Optiunea 1 : Termoemisia electronica

Pentru inceput am considerat necesara simularea miscarii haotice a electronilor in reteaua metalica , in jurul ionilor pozitivi . Daca aplicam asupra metalului un camp electric de intensitate E , atunci vectorul viteza al unui electron din retea va fi compusul dintre viteza initiala a electronului si viteza generata de E . Toate acestea au fost realizate prin animatie astfel fiind mai bine insusita lectia decatre elev . In continuare se va trece la fenomenul propriu-zis de termoemisie electronica .

In acest subcapitol am considerat necesara descrierea starii electronilor in metale la 0 K , stare in care, in absenta unor agenti exteriori , acesti electroni nu pot parasi metalul deoarece gazul elecronic in asemenea conditii nu participa la miscarea de agitatie termica . Imaginea prezinta variatia energiei electronului cu distanta in directia normala la suprafata metalului la T=0K , de asemenea sint ilustrati spinii electronilor (opusi pe fiecare banda energetica conform principiului de excluziune al lui Pauli) , iar electronii pina la nivelul Fermi (nivelul cu cea mai mare energie. La studiul cazului in care T>0K se va observa cum un numar de electroni parasesc metalul , deci suprafata metalului va ramine incarcata pozitiv ,intre electronii iesiti si suprafata metalului va aparea o forta electrostatica care ii va atrage pe electroni si acestia se vor intoarce inapoi deci se stabileste un echilibru dinamic (numarul electronilor ce ies din metal in unitatea de timp este egal cu numarul de electroni ce intra in metal in unitatea de timp) ; la suprafata metalului se formeaza o pelicula de forma suprafetei exterioare , care va forma un "condensator" impreuna cu suprafata metalului ,incarcata pozitiv Cimpul electric astfel format va actiona asupra electronilor cu o forta orientata din exterior spre interior. Variatia energiei potentiale a electronilor este de asemenea ilustrata prin curbarea gropii de potential . Se observa de asemenea foarte clar cum la T>0K ,un numar de electroni de pe nivele situate sub nivelul Fermi cistiga energie termica si trec pe nivele superioare nivelului Fermi. In partea superioara a ecranului este desenat tot timpul o bucata de metal la care se poate observa in mare emisia termoelectronica .

Optiunea 2 : Emisia fotoelectronica

Foarte spectaculoasa din punct de vedere al fenomenului ce se produce la nivel electronic , emisia de electroni cind asupra metalului este aplicata o raza luminoasa de o anumita intensitate prezinta o importanta practica deosebita (fotodioda de exemplu).

De aceea am incercat sa prezentam principalele faze ale emisiei fotoelectronice , precum si desfasurarea acestui fenomen in diferite coditii (tensiune aplicata electrozilor de

astele numuri precum si diferenta diferentei de potential intre electrozi).

In timpul rularii in partea stinga a ecranului sint expuse tuburile electronice la diferite tensiuni aplicate electrozilor tubului in partea stinga urmatoarele grafice : caracteristica tubului electronic , dependenta energiei cinetice a electronilor de frecventa radiatiei incidente , dependenta energiei cinetice a electronilor de frecvente radiatiilor incidente pentru catozi din diferite (no1,no2,no3 sint frecventele de prag ; M1,M2,M3 sint codificari date la trei metale). Se asemenea in partea de jos sint afisate cele patru legi ale fotoefectului sub forma de concluzii . Deoarece spatiul ecran nu permite vizionarea tuturor graficelor si a tuturor concluziilor programul a fost conceput in ase fel incit in orice moment sa poata fi vizionate orice grafic si orice lege a fotoefectului cu ajutorul unui meniu, ce se afla in partea de jos a ecranului.

Optiunea 3 : Emisia prin efect de cimp

Acest subcapitol a fost conceput in sprijinul celor pasionati care doresc sa se initieze in aceste parte a fizicii si pentru cercurile de elevi , deoarece emisia prin efect de cimp nu se studiaza in liceu .

Daca aplicam la suprafata unui metal un cimp electric , acesta determina o micsorare a lucrului mecanic de extractie , deci cu cit intensitatea cimpului electric exterior E este mai mare cu atit densitatea curentului termoelectronic emis datorita incalzirii metalului este mai mare .

Marim intensitatea cimpului electric extern pina cind va avea modulul egal cu modulul lui Es . In acest caz la suprafata metalului cimpul electric rezultant este nul , si electronii parasesc mai usor metalul . In imagine am reprezentat aceasta printr-o curba la nivelul V=0 .

Crestem in continuare cimpul electric extern si lucrul mecanic de extractie se micsoreaza iar intensitatea curentului creste peste valoarea normala a curentului de saturatie (electronii parasesc metalul chiar la excitari termice mici). Acest efect de cimp se numeste efect Schottky si reprezinta o corectie la emisia termoelectronica .

Am pastrat acelasi aranjament in ecran ca la emisia

termoelectronica (in stinga simularea fenomenului la nivelul benzii de conductie iar in dreapta comentarii)

Optiunea 4 : Emisia autoelectronica

Denumita si emisia la rece , emisia autoelectronica , are loc numai sub actiunea cimpului electric extern , si se datoreaza scaderii grosimii barierei de potential ca urmare a actiunii cimpului electric (cu cit cimpul este mai puternic , cu atit bariera de potential devine mai ingusta) . Deci bariera de potential devine suficient de 'transparenta ' pentru a fi strabatuta de electronii din banda de conductie . In imagine am figurat curba care delimiteaza bariera de potential .

Si aici am pastrat acelasi aranjament in ecran ca la emisia termoelectronica si emisia prin efect de cimp .

Optiunea 5 : Emisia secundara

Denumita si efectul dinatron , emisia electronica secundara consta in emiterea de electroni din suprafata unui metal sub actiunea 'bombardarii' lui cu electroni care au energie cinetica mare . Am simulat acest fenomen prin reprezentarea suprafetei unui metal care este 'bombardata' de un electron cu energie cinetica mare care va scoate din metal alti electroni .

In partea stinga a ecranului am simulat fenomenul iar in partea dreapta a ecranului explicarea pe scurt a efectului .

Optiunea 6 : Dioda. Trioda.

In cadrul acestei parti am incercat sa explicam functionarea principalelor componente electronice care functioneaza pe baza efectului de emisie termoelectronica .

La dioda am studiat functionarea pentru diferite tensiuni anodice ; in partea stinga a ecranului in timpul executiei sint afisate caracteristica teoretica si reala a diodei ; in partea dreapta apare o sectiune prin dioda cu ajutorul careia se va putea urmari functionarea diodei pentru diferite tensiuni anodice . De asemenea in timpul executiei sint afisate scurte comentarii .

La trioda am studiat functionarea pentru diferite tensiuni

de grila , aranjamentul in ecran este acelasi ca la digda .

Optiunea 7 : Tetroda.

O aplicatie la fenomenul de emisie electronica secundara o constituie tubul electronic tetroda .

Am studiat functionarea unei tetrode pentru diferite tensiuni anodice , dar avind tensiunea de grila si tensiunea de ecran constante . In timpul rularii programului au fost explicate toate fenomenele care apar . Am insistat asupra portiunii din caracteristica intre punctele de maxim si minim local unde fenomenul de emisie secundara se poate intelege mai bine .

In timpul rularii , in partea dreapta a ecranului se poate viziona simularea comportarii electronilor intre ecran si anod iar in partea stinga , in timpul simularii , sint trasate caracteristicile anodice ale tubului electronic si descrierea pe scurt in cuvinte a fenomenelor simulate .

Pentru scriere pe 64 de caractere am folosit subrutinele in cod masina ale programului 'WINDOWS' .

```
  1 REM    LOADER
  2 REM    autori:
  3 REM     Dragos MARGINEANTU
  4 REM     Calin KLEITSCH
  5 REM     Liana AVRAM
  6 REM
 10 SAVE !"load" LINE 25
 20 LOAD "i.f.d."
 25 ERASE !"load": SAVE !"load" LINE 35
 30 LOAD "i.f.d."
 35 ERASE !"load": SAVE !"load" LINE 45
 40 LOAD "teros"
 45 ERASE !"load": SAVE !"load" LINE 55
 50 LOAD "cpos"
 55 ERASE !"load": SAVE !"load" LINE 65
 60 LOAD "turos"
 65 ERASE !"load": SAVE !"load" LINE 75
 70 LOAD "secos"
 75 ERASE !"load": SAVE !"load" LINE 85
 80 LOAD "tetrod"
 90 CLEAR 42999: LOAD "tot1"CODE
 95 SAVE !"tot1"CODE 43000,12000
100 CLEAR 36399: LOAD "tot2"CODE
105 SAVE !"tot2"CODE 36400,4100
110 CLEAR 43699: LOAD "tot3"CODE
115 SAVE !"tot3"CODE 43700,7700
120 CLEAR 31799: LOAD "tot4"CODE
125 SAVE !"tot4"CODE 31800,21200
130 CLEAR 31799: LOAD "tot5"CODE
135 SAVE !"tot5"CODE 31800,2100
140 LOAD "fer"CODE
145 LOAD "64"CODE
155 CLEAR 42999: LOAD !"zx1"
```

```
  1 REM  EMISIA 1
  2 REM     autori:
  3 REM      Dragos MARGINEANTU
  4 REM      Calin KLEITSCH
  5 REM      Liana AVRAM
  6 REM
3005 CLEAR 36399: LOAD !"tot2"CODE 36400
3010 PAPER 5: INK 1: BRIGHT 1: CLS
3045 RANDOMIZE USR 57500: REM 5: FORMAT 7,0,25,1: PAPER 7: INK 1: CLS : PRINT "
 PURTATORII DE SARCINA IN METALE"
3049 RANDOMIZE USR 57500: REM 6: FORMAT 1,1,31,8: PAPER 2: INK 6: CLS : PRINT "
                                                        Comportarea electro
nilor liberi in metale este analoaga   comportarii moleculelor unui gaz ideal"
3051 RANDOMIZE USR 57500: REM 7: FORMAT 3,16,29,21: PAPER 1: INK 6: CLS : PRINT
"                                                       Orientarea vectorului vi
teza al  electronilor      retelei metalice est aleatoare"
3055 RANDOMIZE USR 57500: REM 5: FORMAT 8,20,22,21: PAPER 6: INK 1: CLS : PRINT
"     TASTATI ENTER"
3100 FOR f=1 TO 3: LET p=37000+832*(f-1): POKE 36901,p-256*INT (p/256): POKE 369
02,INT (p/256): RANDOMIZE USR 36900
3110 LET t$=INKEY$: IF CODE t$<>13 THEN PAUSE 5: NEXT f
3112 LET t$=INKEY$: IF CODE t$<>13 THEN PAUSE 5: GO TO 3100
3200 CLS
3245 RANDOMIZE USR 57500: REM 5: FORMAT 7,0,23,1: PAPER 7: INK 1: CLS : PRINT "
     APLICAM UN CIMP ELECTRIC"
3249 RANDOMIZE USR 57500: REM 6: FORMAT 1,1,31,6: PAPER 2: INK 6: CLS : PRINT "
                                                        Asupra electronilor
 va actiona si o 'viteza de drift' "
3250 PLOT 100,115: DRAW 40,0: DRAW -2,2: PLOT 140,115: DRAW -2,-2: PLOT 88,122:
DRAW 7,0: DRAW -2,-2: PLOT 95,122: DRAW -2,2
3252 PLOT 62,78: DRAW 8,0: PLOT 176,78: DRAW 8,0
3253 PRINT AT 11,7;"+": PRINT AT 11,23;"-"
3255 PRINT AT 7,11;"E"
3257 RANDOMIZE USR 57500: REM 5: FORMAT 9,20,22,21: PAPER 6: INK 1: CLS : PRINT
"     TASTATI ENTER"
3260 FOR f=1 TO 4 STEP 3: LET p=37000+832*(f-1): POKE 36901,p-256*INT (p/256): P
OKE 36902,INT (p/256): RANDOMIZE USR 36900
3270 LET t$=INKEY$: IF CODE t$<>13 THEN PAUSE 5: NEXT f
3275 LET t$=INKEY$: IF CODE t$<>13 THEN PAUSE 5: GO TO 3260
3490 LOAD !"teros"
7025 SAVE !"zx2" LINE 3000
7030 LOAD !"load"
```

```
  1 REM  emisia 2
  2 REM    autori:
  3 REM      Dragos MARSINEANTU
  4 REM      Calin KLEITSCH
  5 REM      Liana AVRAM
  6 REM
298 LOAD !"toti"CODE 43000
300 PAPER 5: INK 1: BRIGHT 1: BORDER 4: CLS
301 BRIGHT 0
302 LET k=USR 57500: REM 10: FORMAT 0,0,22,21: PAPER 5: INK 0: CLS
303 RANDOMIZE USR 57500 : REM 5: FORMAT 0,10,22,11: PAPER 6: INK 1: CLS : PRINT
"  Caracteristica reala a diodei cu vid"
305 LET k=USR 57500: REM 11: FORMAT 0,0,22,1: PAPER 6: INK 1: CLS : PRINT "  Ca
racteristica teoretica a diodei cu vid"
307 RANDOMIZE USR 57500: REM 15: FORMAT 3,3,5,4: PAPER 5: INK 1: CLS : PRINT "I
a"
308 RANDOMIZE USR 57500: REM 15: FORMAT 3,14,5,15: INK 1: PAPER 5: CLS : PRINT
"Ie"
309 RANDOMIZE USR 57500: REM 16: FORMAT 6,8,9,9: INK 1: PAPER 5: CLS : PRINT "U
aa"
310 RANDOMIZE USR 57500: REM 16: FORMAT 6,19,9,20: INK 1: PAPER 5: CLS : PRINT
"Uas"
311 PLOT 3,114: DRAW 115,0: DRAW -2,2: PLOT 117,114: DRAW -2,-2: PLOT 32,105: D
RAW 0,60: DRAW -2,-2: PLOT 32,165: DRAW 2,-2
312 PLOT 3,27: DRAW 115,0: DRAW -2,2: PLOT 117,27: DRAW -2,-2: PLOT 32,20: DRAW
0,60: DRAW -2,-2: PLOT 32,80: DRAW 2,-2
313 PLOT 3,114: DRAW 115,0: DRAW -2,2: PLOT 117,114: DRAW -2,-2: PLOT 32,105: D
RAW 0,60: DRAW -2,-2: PLOT 32,165: DRAW 2,-2
314 PLOT 1,175: DRAW 0,-168: DRAW 6,-6,10*PI/13: DRAW 241,0: DRAW 6,6,10*PI/13:
DRAW 0,168: DRAW -14,0: PLOT 151,175: DRAW -150,0
315 PLOT 0,175: DRAW 0,-168: DRAW 7,-7,10*PI/13: DRAW 241,0: DRAW 7,7,10*PI/13:
DRAW 0,168: DRAW -253,0
316 LET k=USR 57500: REM 12: FORMAT 22,0,31,4: INK 6: PAPER 1: CLS
317 LET k=USR 57500: REM 12: FORMAT 22,0,31,4: INK 6: PAPER 1: CLS
318 RANDOMIZE USR 57500: REM 12: PRINT " Functionarea      diodei pentru di- fa
rite tensiuni   anodice"
325 LET k=USR 57500: REM 13: FORMAT 22,16,31,21: INK 2: PAPER 6: CLS : PRINT "
          Miscare de agita-tie a electronilor"
330 BRIGHT 1: LET k=USR 57500: REM 4: FORMAT 11,20,20,21: PAPER 5: INK 1: CLS
331 RANDOMIZE USR 57500: REM 4: PRINT " TASTATI ENTER"
333 BRIGHT 0: LET k=USR 57500: REM 18: FORMAT 13,4,22,5: PAPER 2: INK 6: CLS
334 RANDOMIZE USR 57500: REM 18: FORMAT 13,4,21,5: PRINT " Ua=0 Ia=0"
335 BRIGHT 0: LET k=USR 57500: REM 19: FORMAT 13,15,22,16: PAPER 2: INK 6: CLS
336 RANDOMIZE USR 57500: REM 19: PRINT " Ua<0 Ia>0"
338 PLOT 27,27: PLOT 29,29: PLOT 31,31
339 PLOT 200,111: DRAW 0,5: DRAW 25,0: DRAW 2,2: DRAW 2,-2: DRAW -2,-2: DRAW -2
,2
340 FOR f=1 TO 2: LET p=51000+448*(f-1): POKE 50601,p-256*INT (p/256): POKE 506
02,INT (p/256): RANDOMIZE USR 50600: PAUSE 5: NEXT f
343 LET t$=INKEY$: IF CODE t$<>13 THEN GO TO 340
347 RANDOMIZE USR 57500: REM 18: CLS : PRINT " Ua<Uas Ia<Ie"
348 RANDOMIZE USR 57500: REM 19: CLS : PRINT " Ua<Uas Ia<Ie"
350 PLOT 227,110: DRAW 0,7
352 RANDOMIZE USR 57500: REM 13: CLS : PRINT "
                  dioda functioneaza      "
353 PLOT 37,42: PLOT 38,45: PLOT 39,48: PLOT 40,51: PLOT 41,54: PLOT 42,57: PLO
T 43,59: PLOT 45,61: PLOT 47,62
354 PLOT 41,120: PLOT 43,122
355 PLOT 44,124: PLOT 45,126: PLOT 46,129: PLOT 47,132: PLOT 48,135: PLOT 49,13
8: PLOT 50,142: PLOT 51,146
357 PLOT 33,115: PLOT 35,116: PLOT 37,117: PLOT 39,118
359 PLOT 33,35: PLOT 34,37: PLOT 35,39
360 FOR f=3 TO 4: LET p=51000+448*(f-1): POKE 50601,p-256*INT (p/256): POKE 506
02,INT (p/256): RANDOMIZE USR 50600: PAUSE 5: NEXT f
363 LET t$=INKEY$: IF CODE t$<>13 THEN GO TO 360
367 RANDOMIZE USR 57500: REM 18: CLS : PRINT " Ua>Uas Ia=Ie"
368 RANDOMIZE USR 57500: REM 19: CLS : PRINT " Ua>Uas Ia>Ie"
370 RANDOMIZE USR 57500: REM 13: CLS : PRINT "
  Toti electronii   emisi de catod      ajung la anod"
377 PLOT 50,64: LET k1=65: FOR f=52 TO 72 STEP 4: PLOT f,k1: LET k1=k1+1: NEXT
f
379 PLOT 52,147: FOR f=52 TO 75 STEP 3: PLOT f,147: NEXT f
380 FOR f=5 TO 6: LET p=51000+448*(f-1): POKE 50601,p-256*INT (p/256): POKE 506
02,INT (p/256): RANDOMIZE USR 50600: PAUSE 5: NEXT f
```

```
383 LET t$=INKEY$: IF CODE t$<>13 THEN GO TO 380
800 BRIGHT 0: PAPER 5: INK 1: BORDER 4: CLS
900 LET k=USR 57500: REM 10: FORMAT 0,0,19,2: PAPER 6: INK 1: CLS
910 RANDOMIZE USR 57500: REM 10: PRINT " Caracteristicile de grila la trioda"
1020 LET k=USR 57500: REM 7: FORMAT 3,7,5,16: PAPER 5: INK 1: CLS : PRINT "16  1
4  12  10   8   6   4   2";
1023 LET k=USR 57500: REM 8: FORMAT 0,16,17,18: PAPER 5: INK 1: CLS : PRINT "-8-
6-4-2 0 2 4 6 8 10 12";
1030 PLOT 3,48: DRAW 115,0: DRAW -2,2: PLOT 117,48: DRAW -2,-2: PLOT 32,36: DRAW
 0,90: DRAW -2,-2: PLOT 32,126: DRAW 2,-2
1035 RANDOMIZE USR 57500: REM 1: FORMAT 13,16,17,17: INK 1: PAPER 5: CLS : PRINT
 "Ug(V)"
1036 RANDOMIZE USR 57500: REM 2: FORMAT 2,5,10,6: INK 1: PAPER 5: CLS : PRINT "I
a,Ig(mA)"
1039 LET a$="   16    14    12    10     8     6     4     2 "
1050 RANDOMIZE USR 43900
1060 LET k=USR 57500: REM 11: FORMAT 19,0,30,4: PAPER 1: INK 5: CLS
1070 RANDOMIZE USR 57500: REM 11: PRINT " Circulatia electronilor emisi de cat
od la diferite tensiuni de grila"
1090 PLOT 1,175: DRAW 0,-168: DRAW 6,-6,10*PI/13: DRAW 241,0: DRAW 6,6,10*PI/13:
 DRAW 0,168: DRAW -14,0: PLOT 151,175: DRAW -150,0
1091 PLOT 0,175: DRAW 0,-168: DRAW 7,-7,10*PI/13: DRAW 241,0: DRAW 7,7,10*PI/13:
 DRAW 0,168
1100 LET k=USR 57500: REM 4: FORMAT 1,19,9,20: PAPER 6: INK 1: CLS
1103 RANDOMIZE USR 57500: REM 4: PRINT " TASTATI ENTER"
1106 LET k=USR 57500: REM 5: FORMAT 27,6,31,7: PAPER 5: INK 1: CLS
1107 RANDOMIZE USR 57500: REM 5: PRINT "Ia=0"
1108 LET k=USR 57500: REM 6: FORMAT 20,20,26,21: PAPER 7: INK 1: CLS
1109 RANDOMIZE USR 57500: REM 6: PRINT "  - -8V +"
1110 FOR f=1 TO 2: LET p=44000+(f-1)*384
1120 POKE 43804,p-256*INT (p/256): POKE 43805,INT (p/256): RANDOMIZE USR 43800
1130 PAUSE 5: NEXT f
1140 LET t$=INKEY$: IF CODE t$<>13 THEN GO TO 1110
1142 PLOT 0,49: PLOT 2,50: PLOT 4,51: PLOT 6,53: PLOT 8,56: PLOT 10,59: PLOT 12,
63: PLOT 14,67
1150 LET p=44768
1160 POKE 43804,p-256*INT (p/256): POKE 43805,INT (p/256): RANDOMIZE USR 43800
1170 PAUSE 15
1175 RANDOMIZE USR 57500: REM 5: CLS : PRINT "Ia=3"
1177 RANDOMIZE USR 57500: REM 6: CLS : PRINT "  - -4V +""
1180 FOR f=4 TO 5: LET p=44000+(f-1)*384
1190 POKE 43704,p-256*INT (p/256): POKE 43705,INT (p/256): RANDOMIZE USR 43700
1200 PAUSE 5: NEXT f
1210 LET t$=INKEY$: IF CODE t$<>13 THEN GO TO 1180
1215 PLOT 16,70: PLOT 18,73: PLOT 20,76: PLOT 22,79: PLOT 24,81: PLOT 26,83: PLO
T 28,85
1216 PLOT 31,88: PLOT 31,49: PLOT 34,91: PLOT 34,50: PLOT 37,94: PLOT 37,51: PLO
T 40,97: PLOT 40,52: PLOT 42,98: PLOT 43,53
1217 RANDOMIZE USR 57500: REM 8: FORMAT 25,18,29,19: INK 1: PAPER 5: CLS : PRINT
 "Ic=12"
1218 RANDOMIZE USR 57500: REM 5: CLS : PRINT "Ia=11"
1219 RANDOMIZE USR 57500: REM 6: CLS : PRINT "  + +2V -"
1220 FOR f=6 TO 7: LET p=44000+(f-1)*384
1225 POKE 43704,p-256*INT (p/256): POKE 43705,INT (p/256): RANDOMIZE USR 43700
1230 PAUSE 5: NEXT f
1237 LET t$=INKEY$: IF CODE t$<>13 THEN GO TO 1220
1239 RANDOMIZE USR 57500: REM 6: CLS : PRINT "  + +6V -""
1240 FOR g=1 TO 2
1242 LET lk=54: FOR y=45 TO 57 STEP 3: PLOT y,99: PLOT y,lk: LET lk=lk+1: NEXT y
1243 RANDOMIZE USR 57500: REM 5: CLS : PRINT "Ia=14"
1245 RANDOMIZE USR 57500: REM 8: CLS : PRINT "Ic=15"
1246 FOR f=8 TO 9: LET p=44000+(f-1)*384
1250 POKE 43704,p-256*INT (p/256): POKE 43705,INT (p/256): RANDOMIZE USR 43700
1260 PAUSE 5: NEXT f
1270 LET t$=INKEY$: IF CODE t$<>13 THEN GO TO 1246
1275 LET lk=54: FOR y=45 TO 57 STEP 3: PLOT y,99: PLOT y,lk: LET lk=lk+1: NEXT y
1280 PLOT 57,99: PLOT 59,60: PLOT 60,99: PLOT 61,61: PLOT 63,99: PLOT 63,63: PLO
T 66,99: PLOT 66,65: PLOT 68,97: PLOT 68,67: PLOT 70,95: PLOT 70,69: LET k1=71:
LET lk=93: FOR y=72 TO 90 STEP 2: PLOT y,lk: PLOT y,k1: LET k1=k1+2: LET lk=lk-2
: NEXT y
1286 RANDOMIZE USR 57500: REM 6: CLS : PRINT "  + +12V-""
1299 NEXT g
3000 GO TO 9500
4505 LOAD ""tot3"CODE 43700
4510 PAPER 5: INK 1: BRIGHT 0: BORDER 4: CLS
4512 LET gw=1: LET a$="     ": LET gw=5: LET gw=1: BRIGHT 1
4515 RANDOMIZE USR 57500: REM 2: FORMAT 0,0,17,17: PAPER 6: INK 1: CLS
4520 POKE 43804,224: POKE 43805,171: RANDOMIZE USR 43800
```

```
4530 RANDOMIZE USR 57500: REM 1: FORMAT 18,0,31,21: PAPER 5: INK 1: CLS
4532 RANDOMIZE USR 57500: REM 4: FORMAT 0,0,31,3: PAPER 2: INK 1: CLS
4533 RANDOMIZE USR 57500: REM 3: FORMAT 9,0,22,1: PAPER 7: INK 0: CLS : PRINT "
 EMISIA FOTOELECTRONICA"
4534 BRIGHT 0
4535 RANDOMIZE USR 57500: REM 4: FORMAT 1,2,16,4: PAPER 5: INK 0: CLS : PRINT "
 Simularea fenomenului Fizic""
4536 RANDOMIZE USR 57500: REM 4: FORMAT 18,2,30,4: PAPER 5: INK 0: CLS : PRINT "
 Caracteristica tubului          electronic
4550 PLOT 144,40: DRAW 96,0: DRAW -2,-2: PLOT 240,40: DRAW -2,2: PLOT 157,35: DR
AW 0,90: DRAW -2,-2: PLOT 157,125: DRAW 2,-2
4553 BRIGHT 1
4555 RANDOMIZE USR 57500: REM 5: FORMAT 20,6,22,7: PAPER 5: INK 1: CLS : PRINT "
I"
4556 RANDOMIZE USR 57500: REM 5: FORMAT 30,17,31,19: PAPER 5: INK 1: CLS : PRINT
 "U"
4557 RANDOMIZE USR 57500: REM 5: FORMAT 18,17,19,19: PAPER 5: INK 1: CLS : PRINT
 "Us"
4559 PLOT 143,41: PLOT 146,43: PLOT 148,45: PLOT 150,47: PLOT 152,49: PLOT 153,5
1: PLOT 154,53: PLOT 155,55: PLOT 156,57
4561 PLOT 158,61: PLOT 159,63: PLOT 160,65: PLOT 161,67: PLOT 162,69: PLOT 163,7
1: PLOT 164,73: PLOT 165,75: PLOT 166,77: PLOT 167,79: PLOT 169,81: PLOT 171,83
4562 PLOT 173,85: PLOT 175,87: PLOT 178,89: PLOT 181,91: PLOT 184,92: FOR f=187
TO 215 STEP 3: PLOT f,93: NEXT f:
4563 RANDOMIZE USR 57500: REM 7: FORMAT 25,13,26,15: PAPER 5: INK 1: CLS : PRINT
 "Is"
4564 PLOT 197,93: DRAW 0,-53: DRAW 2,2: PLOT 197,40: DRAW -2,2: PLOT 197,93: DRA
W -2,-2: PLOT 197,93: DRAW 2,-2
4565 PLOT 3,50: DRAW 0,-3: DRAW -2,-2: DRAW 2,-2: DRAW 2,2: DRAW -2,2
4566 PLOT 120,50: DRAW 0,-3: DRAW -2,-2: DRAW 2,-2: DRAW 2,2: DRAW -2,2: PLOT IN
K 2;91,110: DRAW INK 2;2,3: PRINT AT 16,1;"-";AT 16,14;"+"
4570 RANDOMIZE USR 57500: REM 7: FORMAT 10,7,13,8: PAPER 6: INK 1: CLS : PRINT "
F A"
4575 PLOT 0,175: DRAW 0,-161: DRAW 6,-6,10*PI/13: DRAW 243,0: DRAW 6,',10*PI/13:
 DRAW 0,161: DRAW -79,0: PLOT 71,175: DRAW -71,0
4577 BRIGHT 0
4580 RANDOMIZE USR 57500: REM 8: FORMAT 0,17,7,18: PAPER 1: INK 6: CLS : PRINT "
 Concluzii:"
4591 RANDOMIZE USR 57500: REM 9: FORMAT 1,18,31,21: PAPER 6: INK 1: CLS : PRINT
 a$
4593 RANDOMIZE USR 57500: REM 6: FORMAT 1,6,14,7: INK 6: PAPER 2: CLS : PRINT "
 Va > Vc"
4595 PRINT #0;" [M]eniu [C]oncluzii [G]rafice"
4598 LET lin=4597: LET linen=4900
4600 FOR f=2 TO 3: LET p=44000+(f-1)*1024: POKE 43804,p-256*INT (p/256): POKE 43
805,INT (p/256): RANDOMIZE USR 43800: PAUSE pau
4601 LET t=CODE INKEY$
4603 IF t=13 THEN GO TO linen
4604 IF t=99 THEN GO TO 4650
4605 IF t=103 THEN GO TO 4700
4606 IF t=109 THEN GO TO 9500
4610 NEXT f: GO TO lin
4655 IF qw<>1 THEN GO TO 4660
4656 LET a$="Legea I:Intensitatea curentului fotoelectric de saturatie e aproxim
ativ egala cu fluxul radiatiei electromagnetice incidente  cind frecventa e con
stanta"
4657 RANDOMIZE USR 57500: REM 9: CLS : PRINT a$
4658 LET qw=qw+1: GO TO lin
4665 IF qw<>2 THEN GO TO 4670
4666 LET a$="Legea II : Energia cinetica a fotoelectronilor emisi creste liniar
cu frecventa radiatiilor electromagnetice si nu depinde defluxul acestora"
4667 RANDOMIZE USR 57500: REM 9: CLS : PRINT a$
4668 LET qw=qw+1: GO TO lin
4675 IF qw<>3 THEN GO TO 4680
4676 LET a$="Legea III: Efectul fotoelectric extern se produce numai dacafrecven
ta radiatiei incidente este mai mare sau egala  cu  o valoare minima specifica f
iecarei substante"
4677 RANDOMIZE USR 57500: REM 9: CLS : PRINT a$
4678 LET qw=qw+1: GO TO lin
4686 LET a$=" Legea IV : Efectul  fotoelectric  se  produce  practic
       instantaneu"
4687 RANDOMIZE USR 57500: REM 9: CLS : PRINT a$
4688 LET qw=1: GO TO lin
4705 BRIGHT 1
```

```
4707 RANDOMIZE USR 57500: REM 6: FORMAT 17,4,31,18: PAPER 5: INK 1: CLS
4710 IF sw<>1 THEN GO TO 4750
4712 RANDOMIZE USR 57500: REM 5: FORMAT 29,17,31,18: PAPER 5: INK 1: CLS : PRINT
 "U"
4713 RANDOMIZE USR 57500: REM 5: FORMAT 17,17,19,18: PAPER 5: INK 1: CLS : PRINT
 "Us"
4715 PLOT 144,40: DRAW 96,0: DRAW -2,-2: PLOT 240,40: DRAW -2,2: PLOT 157,35: DR
AW 0,90: DRAW -2,-2: PLOT 157,125: DRAW 2,-2
4717 BRIGHT 1
4720 RANDOMIZE USR 57500: REM 5: FORMAT 20,6,22,7: PAPER 5: INK 1: CLS : PRINT "
I"
4724 PLOT 143,41: PLOT 146,43: PLOT 148,45: PLOT 150,47: PLOT 152,49: PLOT 153,5
1: PLOT 154,53: PLOT 155,55: PLOT 156,57
4726 RANDOMIZE USR 57500: REM 7: FORMAT 18,14,19,16: PAPER 5: INK 1: CLS : PRINT
 "Io"
4729 PLOT 158,61: PLOT 159,63: PLOT 160,65: PLOT 161,67: PLOT 162,69: PLOT 163,7
1: PLOT 164,73: PLOT 165,75: PLOT 166,77: PLOT 167,79: PLOT 169,81: PLOT 171,83
4730 PLOT 173,85: PLOT 175,87: PLOT 178,89: PLOT 181,91: PLOT 184,92: FOR f=187
TO 215 STEP 3: PLOT f,93: NEXT f:
4735 RANDOMIZE USR 57500: REM 7: FORMAT 25,13,26,15: PAPER 5: INK 1: CLS : PRINT
 "Is"
4739 PLOT 197,93: DRAW 0,-53: DRAW 2,2: PLOT 197,40: DRAW -2,2: PLOT 197,93: DRA
W -2,-2: PLOT 197,93: DRAW 2,-2
4745 LET sw=-1: LET pau=5
4749 GO TO lin
4750 IF sw<>-1 THEN GO TO 4800
4755 LET pau=2
4757 RANDOMIZE USR 57500: REM 5: FORMAT 29,17,31,18: PAPER 5: INK 1: CLS : PRINT
 "n"
4758 RANDOMIZE USR 57500: REM 5: FORMAT 21,17,23,18: PAPER 5: INK 1: CLS : PRINT
 "no"
4760 PLOT 144,40: DRAW 96,0: DRAW -2,-2: PLOT 240,40: DRAW -2,2: PLOT 157,35: DR
AW 0,90: DRAW -2,-2: PLOT 157,125: DRAW 2,-2: BRIGHT 1
4762 RANDOMIZE USR 57500: REM 5: FORMAT 20,6,26,7: PAPER 5: INK 1: CLS : PRINT "
Ec max"
4770 PLOT 170,40: DRAW 20,70
4790 LET sw=0
4799 GO TO lin
4807 RANDOMIZE USR 57500: REM 5: FORMAT 29,17,31,18: PAPER 5: INK 1: CLS : PRINT
 "n"
4810 PLOT 144,40: DRAW 96,0: DRAW -2,-2: PLOT 240,40: DRAW -2,2: PLOT 157,35: DR
AW 0,90: DRAW -2,-2: PLOT 157,125: DRAW 2,-2: BRIGHT 1
4815 RANDOMIZE USR 57500: REM 5: FORMAT 20,6,26,7: PAPER 5: INK 1: CLS : PRINT "
Ec max"
4825 RANDOMIZE USR 57500: REM 5: FORMAT 21,17,29,18: PAPER 5: INK 1: CLS : PRINT
 "no1  no2  no3"
4828 RANDOMIZE USR 57500: REM 5: FORMAT 22,13,30,14: PAPER 5: INK 1: CLS : PRINT
 "M1   M2   M3"
4830 PLOT 170,52: DRAW 12,27: PLOT 190,52: DRAW 12,27: PLOT 210,52: DRAW 12,27
4849 LET sw=1: GO TO lin
4909 BRIGHT 1
4910 RANDOMIZE USR 57500: REM 7: FORMAT 0,4,17,17: INK 1: PAPER 6: CLS
4915 RANDOMIZE USR 57500: REM 6: FORMAT 1,6,14,7: INK 6: PAPER 2: CLS : PRINT "
     Va = Vc"
4918 LET lin=4917: LET linen=4950
4920 FOR f=4 TO 5: LET p=44000+(f-1)*1024: POKE 43804,p-256*INT (p/256): POKE 43
805,INT (p/256): RANDOMIZE USR 43800: PAUSE 5
4922 GO TO 4601
4954 BRIGHT 1
4955 RANDOMIZE USR 57500: REM 7: FORMAT 0,4,17,17: INK 1: PAPER 6: CLS
4957 PLOT 3,50: DRAW 0,-3: DRAW -2,-2: DRAW 2,-2: DRAW 2,2: DRAW -2,2
4958 PLOT 120,50: DRAW 0,-3: DRAW -2,-2: DRAW 2,-2: DRAW 2,2: DRAW -2,2: PLOT IN
K 2;91,110: DRAW INK 2;2,3: PRINT AT 16,1;"+";AT 16,14;"-"
4960 RANDOMIZE USR 57500: REM 6: FORMAT 1,6,14,7: INK 6: PAPER 2: CLS : PRINT "
     Va < Vc"
4966 LET lin=4965: LET linen=9500
4970 FOR f=7 TO 6 STEP -1: LET p=44000+(f-1)*1024: POKE 43804,p-256*INT (p/256):
 POKE 43805,INT (p/256): RANDOMIZE USR 43800: PAUSE 5
4980 GO TO 4601
8999 STOP
9500 RANDOMIZE USR 57500: REM 1: FORMAT 0,0,31,21: INK 1: PAPER 1: CLS
9501 BRIGHT 1: INK 6: PAPER 1: BORDER 4: CLS
9503 RANDOMIZE USR 57500: REM 1: FORMAT 0,0,31,21: INK 1: PAPER 1: CLS
9510 RANDOMIZE USR 57500: REM 1: FORMAT 4,6,31,21: INK 1: PAPER 7: CLS
9515 RANDOMIZE USR 57500: REM 1: FORMAT 9,12,31,21: INK 1: PAPER 2: CLS
9519 RANDOMIZE USR 57500: REM 1: FORMAT 6,3,25,19: INK 1: PAPER 6: CLS
9520 RANDOMIZE USR 57500: REM 1: FORMAT 7,1,24,17: INK 1: PAPER 4: CLS : PRINT "
                              EMISIA ELECTRONICA
                    1. Emisia termoelectronica
```

```
        2. Emisia fotoelectronica"
9523 RANDOMIZE USR 57500: REM 2: FORMAT 7,8,24,17: PAPER 4: INK 1: CLS : PRINT "
 3. Emisia prin efect de cimp"
9524 RANDOMIZE USR 57500: REM 2: FORMAT 7,10,24,17: PAPER 4: INK 1: CLS : PRINT
" 4. Emisia autoelectronica""
9526 RANDOMIZE USR 57500: REM 2: FORMAT 7,12,24,18: PAPER 4: INK 1: CLS : PRINT
" 5. Emisia secundara"
9527 RANDOMIZE USR 57500: REM 2: FORMAT 7,14,24,18: PAPER 4: INK 1: CLS : PRINT
" 6. Dioda. Trioda."
9528 RANDOMIZE USR 57500: REM 2: FORMAT 7,16,24,18: PAPER 4: INK 1: CLS : PRINT
" 7. Tetroda."
9537 RANDOMIZE USR 57500: REM 1: FORMAT 19,16,30,21: INK 1: PAPER 3: CLS
9538 RANDOMIZE USR 57500: REM 1: FORMAT 19,17,30,21: INK 1: PAPER 3: CLS : PRINT
"    Autori:                       Drago$ M.               Liana A.                C
alin K."
9540 LET t$=INKEY$: IF t$="1" THEN LOAD !"zx2"
9542 IF t$="2" THEN GO TO 4500
9544 IF t$="3" THEN LOAD !"cpos"
9546 IF t$="4" THEN LOAD !"tunos"
9548 IF t$="5" THEN LOAD !"secos"
9550 IF t$="6" THEN GO TO 298
9552 IF t$="7" THEN LOAD !"tetrod"
9560 GO TO 9540
9900 SAVE ! "zx1" LINE 9500
9905 LOAD !"load"
```

```
  1 REM  EMISIA 3
  2 REM     autori:
  3 REM      Dragos MARBINEANTU
  4 REM      Calin KLEITSCH
  5 REM      Liana AVRAM
  6 REM
1002 CLEAR 31799: LOAD !"tot4"CODE 31800
1006 PAPER 5: INK 1: BORDER 4: BRIGHT 0: CLS
1009 RANDOMIZE USR 57500: REM 3: FORMAT 0,0,13,21: PAPER 6: INK 1: CLS
1050 RANDOMIZE USR 57500: REM 2: FORMAT 14,0,31,2: INK 6: PAPER 2: CLS : PRINT "
    EMISIA TERMOELECTRONICA "
1060 RANDOMIZE USR 57500: REM 4: FORMAT 14,6,31,21: PAPER 5: INK 1: CLS : PRINT
" Metalul este rece si asupra lui nu se actioneaza din exterior
                                        Ef= nivel Fermi       Eo= nivel de ener
gie minima"
1065 RANDOMIZE USR 57500: REM 4: FORMAT 0,17,13,21: PAPER 5: INK 1: CLS
1070 PRINT AT 21,0; INK 6; PAPER 1;"Tastati ENTER"
1090 LET p=32000: POKE 31901,p-256*INT (p/256): POKE 31902,INT (p/256): POKE 319
27,220: POKE 31928,205: RANDOMIZE USR 31900
1095 LET t$=INKEY$: IF CODE t$<>13 THEN GO TO 1095
1220 RANDOMIZE USR 57500: REM 5: FORMAT 14,6,31,21: PAPER 5: INK 1: CLS : PRINT
" Metalul este incalzit , deci electronii primesc energie ter-mica ; in f
unctie de energia pri- mita , electronii pot invinge bariera de poten- tial
eVa"
1223 RANDOMIZE USR 57500: REM 4: FORMAT 0,17,13,21: PAPER 5: INK 1: CLS : PRINT
"  Es = Campul electric de-       terminat de sarcina       spatiala"
1300 FOR f=2 TO 7: LET p=32000+1280*(f-1): POKE 31901,p-256*INT (p/256): POKE 31
902,INT (p/256): POKE 31927,20: POKE 31928,205: RANDOMIZE USR 31900: PAUSE 5
1310 LET t$=INKEY$: IF CODE t$<>13 THEN NEXT f
1315 LET t$=INKEY$: IF CODE t$<>13 THEN GO TO 1300
1320 CLEAR 42999: LOAD !"zx1"
2300 SAVE !"teros" LINE 1000
2303 LOAD !"load"
```

```
  1 REM  EMISIA 4
  2 REM    autori:
  3 REM      Dragos HARBINEANTU
  4 REM      Calin KLEITSCH
  5 REM      Liana AVRAM
  6 REM
1000 CLEAR 31799: LOAD !"tot4"CODE 31800
1005 PAPER 3: INK 1: BORDER 4: BRIGHT 0: CLS
1009 RANDOMIZE USR 57500: REM 3: FORMAT 0,0,13,21: PAPER 6: INK 1: CLS
1050 RANDOMIZE USR 57500: REM 2: FORMAT 14,0,31,2: INK 6: PAPER 2: CLS : PRINT "
    EMISIA PRIN EFECT DE CIMP"
1060 RANDOMIZE USR 57500: REM 4: FORMAT 14,6,31,21: PAPER 5: INK 1: CLS : PRINT
"  Asupra metalului incalzit actio-nez cu  un  cimp  electric de sensopus lui Es
 si  egal  in modul  cuacesta"
1061 RANDOMIZE USR 57500: REM 1: FORMAT 17,13,31,21: INK 1: PAPER 5: CLS : PRINT
" E = Es"
1062 RANDOMIZE USR 57500: REM 1: FORMAT 14,15,31,21: INK 1: PAPER 5: CLS : PRINT
"  Curba  din  imagine  reprezinta schematic  cimpul electric nul de la suprafa
ta metalului"
1063 RANDOMIZE USR 57500: REM 4: FORMAT 0,17,13,21: PAPER 5: INK 1: CLS : PRINT
"  Es = Cimpul electric de-          terminat de sarcina          spatiala"
1070 PRINT AT 21,0; INK 6; PAPER 1;"Tastati ENTER"
1090 FOR f=8 TO 10: LET p=32000+(f-1)*1280: POKE 31901,p-256*INT (p/256): POKE 3
1902,INT (p/256): POKE 31927,20: POKE 31928,205: RANDOMIZE USR 31900
1095 PAUSE 8: LET t$=INKEY$: IF CODE t$<>13 THEN NEXT f
1097 LET t$=INKEY$: IF CODE t$<>13 THEN GO TO 1090
1220 RANDOMIZE USR 57500: REM 4: FORMAT 14,6,31,21: PAPER 5: INK 1: CLS : PRINT
"  Marim  intensitatea  cimpului electric astfel incit E > Es ; se micsoreaza
bariera de potential . Electronii  pot  parasi  metalul  chiar daca primesc ener
gie termica mai mica "
1223 RANDOMIZE USR 57500: REM 4: FORMAT 0,17,13,21: PAPER 5: INK 1: CLS : PRINT
"  Es = Cimpul electric de-          terminat de sarcina          spatiala"
1300 FOR f=11 TO 13: LET p=32000+1280*(f-1): POKE 31901,p-256*INT (p/256): POKE
31902,INT (p/256): POKE 31927,20: POKE 31928,205: RANDOMIZE USR 31900: PAUSE 5
1310 LET t$=INKEY$: IF CODE t$<>13 THEN NEXT f
1315 LET t$=INKEY$: IF CODE t$<>13 THEN GO TO 1300
1400 CLEAR 42999: LOAD !"zx1"
2300 SAVE !"cpus" LINE 1000
2303 LOAD ! "load"
```

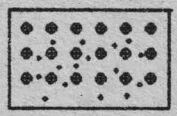
```
  1 REM  EMISIA5
  2 REM     autori:
  3 REM       Dragos MARGINEANTU
  4 REM       Calin KLEITSCH
  5 REM       Liana AVRAM
  6 REM
1000 CLEAR 31799: LOAD !"tot4"CODE 31800
1005 PAPER 5: INK 1: BORDER 4: BRIGHT 0: CLS
1009 RANDOMIZE USR 57500: REM 3: FORMAT 0,0,13,21: PAPER 6: INK 1: CLS
1050 RANDOMIZE USR 57500: REM 2: FORMAT 14,0,31,2: INK 6: PAPER 2: CLS : PRINT "
     EMISIA   AUTOELECTRONICA"
1060 RANDOMIZE USR 57500: REM 4: FORMAT 14,6,31,21: PAPER 5: INK 1: CLS : PRINT
" Asupra metalului rece actioneaa cu un cimp electric foarte puternic "
1061 RANDOMIZE USR 57500: REM 1: FORMAT 14,10,31,21: INK 1: PAPER 5: CLS : PRINT
  "Bariera de potential se micsorea-za si electronii  strabat  aceastabariera pr
in efect tunell    ( de transparenta )"
1062 RANDOMIZE USR 57500: REM 1: FORMAT 14,15,31,21: INK 1: PAPER 5: CLS : PRINT
  "   Curba  din  ieagine  reprezinta schematic  cimpul electric negativde la supr
afata metalului"
1070 RANDOMIZE USR 57500: REM 4: FORMAT 0,20,13,21: PAPER 1: INK 5: CLS : PRINT
"      TASTATI ENTER"
1090 FOR f=14 TO 16: LET p=32000+(f-1)*1280: POKE 31901,p-256*INT (p/256): POKE
31902,INT (p/256): POKE 31927,220: POKE 31928,205: RANDOMIZE USR 31900
1095 PAUSE 8: LET t$=INKEY$: IF CODE t$<>13 THEN NEXT f
1097 LET t$=INKEY$: IF CODE t$<>13 THEN GO TO 1090
1100 CLEAR 42999: LOAD !"zx1"
2300 SAVE !"tunos" LINE 1000
2305 LOAD !"load"
```

```
  1 REM  EMISIA 6
  2 REM     autori:
  3 REM      Dragos MARGINEANTU
  4 REM      Calin KLEITSCH
  5 REM      Liana AVRAM
  6 REM
 10 DATA 0,0,24,36,36,24,0,0,126,0,126,64,124,64,126,0
100 RESTORE 10: FOR f=65368 TO 65383: READ b: POKE f,b: NEXT f
300 PAPER 6: INK 1: BRIGHT 1: CLS
307 RANDOMIZE USR 57500: REM 4: FORMAT 0,0,31,1: INK 2: PAPER 7: CLS : PRINT "
  EMISIA  ELECTRONICA  SECUNDARA"
309 BRIGHT 0
310 RANDOMIZE USR 57500: REM 3: FORMAT 21,0,31,21: INK 1: PAPER 5: CLS
311 BRIGHT 1
315 RANDOMIZE USR 57500: REM 3: FORMAT 22,4,30,21: INK 1: PAPER 5: CLS : PRINT
" Emisia electro-nica   secundarade la  suprafataunui  metal  areloc sub actiune
a  'bombardarii  metalului     cu electroni     cu energie cineticamare "
1000 REM ***EM SEC***
1003 PLOT 0,175: DRAW 0,-175: DRAW 255,0: DRAW 0,175
1004 PLOT 120,95: DRAW 0,55: DRAW 2,-2: PLOT 120,150: DRAW -2,-2
1005 PRINT AT 3,16;"?"
1015 PLOT 0,175: DRAW 0,-175
1050 FOR f=01 TO 13: FOR g=12 TO 15: PRINT AT g,f; INK 1;"?": NEXT g: NEXT f
1100 LET f=6: FOR g=4 TO 12 STEP 2: PRINT AT g,f; OVER 1;"?": PRINT AT g-2,f;" "
: PAUSE 10: NEXT g
1190 LET l=11: LET k=11: LET j=k: LET h=l: LET g=k: LET p=7: LET o=p: LET i=o: L
ET u=5: LET y=u
1195 LET lv=11: LET kv=11: LET jv=kv: LET hv=lv: LET gv=kv: LET pv=7: LET ov=pv:
 LET iv=ov: LET uv=5: LET yv=uv
1197 PRINT AT 12,6; INK 1;"?"
1200 FOR f=1 TO 6
1210 PRINT AT lv,pv;" ";AT kv,ov;" ";AT jv,iv;" ";AT hv,uv;" ";AT gv,yv;" "
1220 PRINT AT l,p;"?";AT k,o;"?";AT j,i;"?";AT h,u;"?";AT g,y;"?"
1225 LET lv=l: LET kv=k: LET jv=j: LET hv=h
1230 LET l=l-1: LET k=k-2: LET j=j-2: LET h=h-1
1235 LET pv=p: LET ov=o: LET uv=u: LET yv=y
1240 LET p=p+1: LET o=o+1: LET u=u-1: LET y=y-1
1250 NEXT f
1255 PRINT AT 12,6; INK 1;"?"
1260 PRINT AT lv,pv;" ";AT kv,ov;" ";AT jv,iv;" ";AT hv,uv;" ";AT gv,yv;" "
1270 IF CODE INKEY$<>13 THEN GO TO 1010
1275 CLEAR 42999: LOAD !"zx1"
1300 SAVE !"secos" LINE 1
1305 LOAD !"load"
```

```
  1 REM  EMISIA 7
  2 REM     autori:
  3 REM       Dragos MARGINEANTU
  4 REM       Calin KLEITSCH
  5 REM       Liana AVRAM
  6 REM
1000 CLEAR 31799: LOAD !"tot5"CODE 31800
1005 PAPER 6: INK 1: BRIGHT 0: CLS
1010 RANDOMIZE USR 57500: REM 4: FORMAT 0,0,21,21: INK 1: PAPER 5: CLS
1020 RANDOMIZE USR 57500: REM 3: FORMAT 0,0,31,1: INK 6: PAPER 2: CLS : PRINT "
CARACTERISTICILE ANODICE ALE TETRODEI"
1024 PRINT AT 0,31; PAPER 7;" "
1025 RANDOMIZE USR 57500: REM 3: FORMAT 21,0,31,1: INK 1: PAPER 7: CLS : PRINT "
      TETRODA "
1030 PLOT 5,54: DRAW 0,100: DRAW 2,-2: PLOT 5,154: DRAW -2,-2: PLOT 3,64: DRAW 1
60,0: DRAW -2,2: PLOT 163,64: DRAW -2,-2
1035 RANDOMIZE USR 57500: REM 5: FORMAT 1,14,20,15: PAPER 5: INK 1: CLS : PRINT
"0   50   100   150   200   250   300"
1038 RANDOMIZE USR 57500: REM 8: FORMAT 17,3,21,6: PAPER 5: INK 1: CLS : PRINT "
Ug=-2V  Ua=100V"
1040 RANDOMIZE USR 57500: REM 6: FORMAT 0,15,21,21: PAPER 7: INK 2: CLS : PRINT
"                                        Tensiunea anodica este zero , deci
 cu-  rentul anodic este nul"
1045 PLOT 0,175: DRAW 0,-175: DRAW 255,0: DRAW 0,175
1046 PLOT 207,77: DRAW 40,0
1050 POKE 31901,0: POKE 31902,125: RANDOMIZE USR 31900
1055 RANDOMIZE USR 57500: REM 4: FORMAT 22,6,31,7: PAPER 6: INK 1: CLS : PRINT "
ecran anod"
1060 RANDOMIZE USR 57500: REM 6: FORMAT 26,11,31,12: PAPER 6: INK 1: CLS : PRINT
"  Ua=0V"
1070 PAUSE 0;
1090 RANDOMIZE USR 57500: REM 6: FORMAT 26,11,31,12: PAPER 6: INK 1: CLS : PRINT
"  Ua=50V"
1100 RANDOMIZE USR 57500: REM 7: FORMAT 0,16,21,21: PAPER 7: INK 2: CLS : PRINT
"   Numarul electronilor captati de anod    creste si odata cu acesta creste cur
entul anodic"
1111 PLOT 0,175: DRAW 0,-175: DRAW 255,0: DRAW 0,175
1115 LET g=64: FOR f=6 TO 16 STEP 2: PLOT f,g: PLOT f,185-g: LET g=g+4: NEXT f:
PLOT 19,86: PLOT 19,99: PLOT 22,88: PLOT 22,97: PLOT 25,88: PLOT 25,97
1120 FOR f=1 TO 3: LET p=32000+(f-1)*256: POKE 31901,p-256*INT (p/256): POKE 319
02,INT (p/256): RANDOMIZE USR 31900
1123 IF CODE INKEY$=13 THEN GO TO 1150
1125 PAUSE 7: NEXT f
1128 IF CODE INKEY$<>13 THEN GO TO 1120
1150 RANDOMIZE USR 57500: REM 6: FORMAT 26,11,31,12: PAPER 6: INK 1: CLS : PRINT
"  Ua=100V"
1160 RANDOMIZE USR 57500: REM 7: FORMAT 0,15,21,21: PAPER 7: INK 2: CLS : PRINT
"    Pentru Ua  intre  50 si 100 V  la catod se produce fenomenul de  emisie secu
ndara caci electronii au energie suficienta  ca prin lovirea anodului sa scoata
 alti elec troni din anod care sint atrasi de ecran"
1170 PLOT 0,175: DRAW 0,-175: DRAW 255,0: DRAW 0,175
1180 PLOT 28,84: PLOT 28,99: PLOT 31,102: PLOT 31,83: PLOT 34,80: PLOT 34,105: P
LOT 37,77: PLOT 37,108: PLOT 40,75: PLOT 40,110: PLOT 44,73: PLOT 44,112: PLOT 4
7,72: PLOT 47,113
1200 FOR f=1 TO 6
1201 IF f=4 THEN LET f=6
1202 LET p=32000+(f-1)*256: POKE 31901,p-256*INT (p/256): POKE 31902,INT (p/256)
: RANDOMIZE USR 31900
1203 IF CODE INKEY$=13 THEN GO TO 1250
1205 PAUSE 7: NEXT f
1208 IF CODE INKEY$<>13 THEN GO TO 1200
1250 RANDOMIZE USR 57500: REM 6: FORMAT 26,11,31,12: PAPER 6: INK 1: CLS : PRINT
"  Ua=200V"
1259 RANDOMIZE USR 57500: REM 8: FORMAT 0,15,21,21: PAPER 7: INK 2: CLS : PRINT
"    Pentru Ua  mai mare decit  tensiunea de ecran , atractia anodului este mai p
uter- nica decit a ecranului  si electronii se- cundari se reintorc pe anod , ac
est efect se numeste efect dinatron"
1265 PLOT 0,175: DRAW 0,-175: DRAW 255,0: DRAW 0,175
1270 PLOT 50,73: PLOT 50,110: PLOT 52,76: PLOT 52,109: PLOT 54,80: PLOT 54,105:
PLOT 56,83: PLOT 56,102: PLOT 59,87: PLOT 59,98: PLOT 62,91: PLOT 62,94: PLOT 65
,95: PLOT 65,90: PLOT 68,99: PLOT 68,86: PLOT 71,103: PLOT 71,82
1271 PLOT 74,106: PLOT 74,79: PLOT 77,109: PLOT 77,76: PLOT 80,111: PLOT 80,74:
PLOT 83,113: PLOT 83,72: PLOT 86,114: PLOT 86,71: PLOT 90,115: PLOT 90,70: PLOT
95,116: PLOT 95,69: PLOT 101,117: PLOT 101,68: PLOT 108,118: PLOT 108,67: PLOT 1
15,66: PLOT 115,119: PLOT 123,120: PLOT 123,65: PLOT 132,121: PLOT 132,65: PLOT
142,122: PLOT 142,5
1275 FOR f=1 TO 5: LET p=32000+(f-1)*256: POKE 31901,p-256*INT (p/256): POKE 319
02,INT (p/256): RANDOMIZE USR 31900
1278 IF CODE INKEY$=13 THEN GO TO 1300
1280 PAUSE 7: NEXT f
1282 IF CODE INKEY$<>13 THEN GO TO 1275
1300 CLEAR 42999: LOAD !"zx1"
1400 SAVE !"tetrod" LINE 1
1405 LOAD !"load"
```

PROPRIETATILE DE CONDUCTIE ALE METALELOR

Comportarea electronilor liberi in metale este analoaga comportarii moleculelor unui gaz ideal

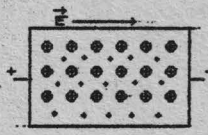


Orientarea vectorului viteza al electronilor retelei metalice este aleatoare

TASTATI ENTER

APLICAM UN CAMP ELECTRIC

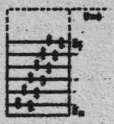
Asupra electronilor va actiona si o 'viteza de drift'



TASTATI ENTER

METAL RECE

EMISIA TERMOELECTRONICA



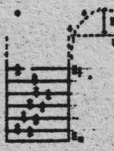
Metalul este rece si asupra lui nu se actioneaza din exterior

Ef= nivel Fermi
Eo= nivel de energie minim

Tastati ENTER

METAL CALD

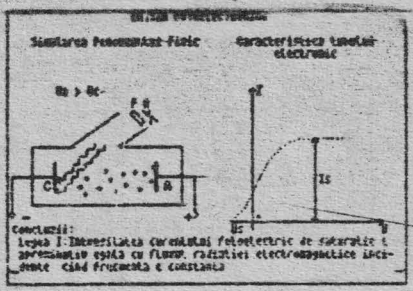
EMISIA TERMOELECTRONICA

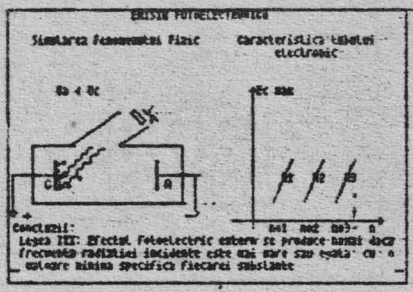


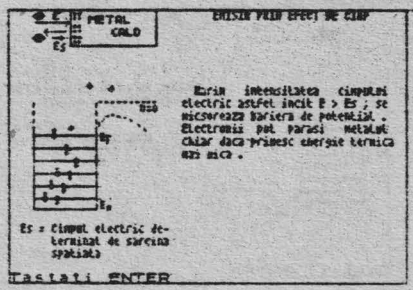
Metalul este incalzit , deci electronii primesc energie termica ; in functie de energia primita , electronii pot invinge bariera de potential a lui

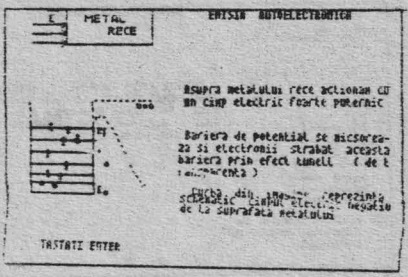
Es = campul electric determinat de sarcina spatiala

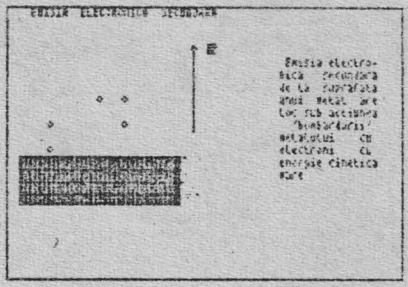
Tastati ENTER

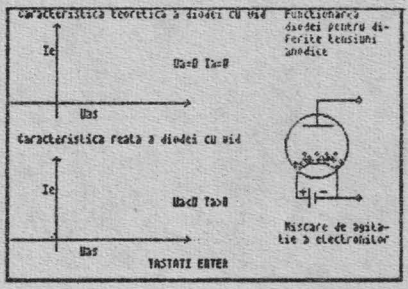

Simularea Fenomenului Fizic
Caracteristica tubului electronic
Conclurii:

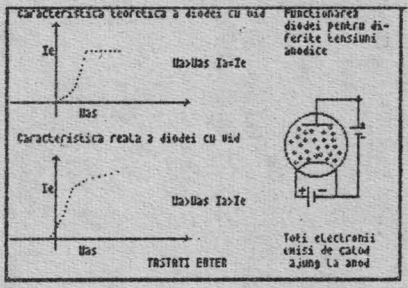

EMISIA FOTOELECTRONICA
Simularea Fenomenului Fizic
Caracteristica tubului electronic
Conclurii:

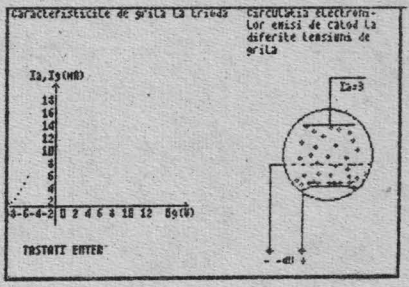

METAL CALD
EMISIA PRIN EFECT DE CIMP
Tastati ENTER

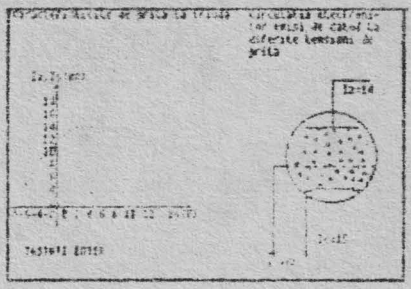

METAL RECE
EMISIA AUTOELECTRONICA
TASTATI ENTER

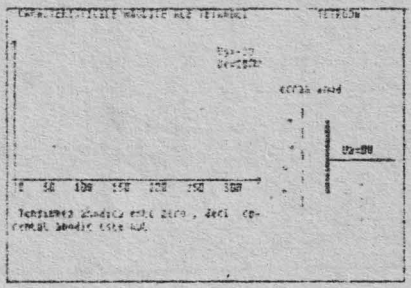

EMISIA ELECTRONICA SECUNDARA
E
Emisia electronică secundară de la suprafaţa unui metal are loc sub acţiunea "bombardării" metalului cu electroni cu energie cinetică mare

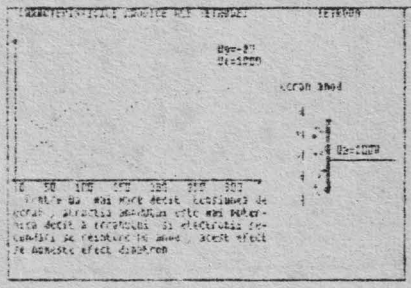

Caracteristica teoretică a diodei cu vid
Ie
Ua=0 Ia=0
Uas
Caracteristica reală a diodei cu vid
Ie
Ua<0 Ia>0
Uas
TASTATI ENTER
Funcţionarea diodei pentru diferite tensiuni anodice
Mişcare de agitaţie a electronilor


Caracteristica teoretică a diodei cu vid
Ie
Ua>Uas Ia=Ie
Uas
Caracteristica reală a diodei cu vid
Ie
Ua>Uas Ia>Ie
Uas
TASTATI ENTER
Funcţionarea diodei pentru diferite tensiuni anodice
Toţi electronii emişi de catod ajung la anod


Caracteristicile de grilă ale triodei
Ia,Ig(mA)
18
16
14
12
10
8
6
4
2
-8-6-4-2 0 2 4 6 8 10 12 Ug(V)
TASTATI ENTER
Circulaţia electronilor emişi de catod la diferite tensiuni de grilă
Ia=0







CAPITOLUL 3

CHIMIE

In acest capitol am avut ca scop demonstrarea utilitatii calculatorului in simularea reactiilor chimice , sau in simularea unor procese chimice tehnologice .

Astfel am realizat un program care , prin modul cum a fost conceput poate fi folosit atit in scop de autoinstruire cit si in scop didactic .

3.1. ZAHARUL

Produsul program se refera la obtinerea zaharului, prezentind structura sa si schema instalatiei de fabricare industriala . Fiind un program didactic este adresat elevilor, dovedindu-se util in predarea acestor notiuni. Conform programei de chimie, zaharul se studiaza in cadrul chimiei organice, capitolul din care face parte fiind "Substante naturale cu importanta fiziologica". Avind o importanta deosebita, zaharidele, cu reprezentantul lor cel mai de seama, zaharul, au o structura mai complexa comparativ cu substantele intilnite pina atunci. De aceea, la primul contact cu acestea, uneori, elevului ii este mai greu sa-si insuseasca formulele lor structurale. Scopul acestui program este de a veni in ajutorul elevilor si implicit al profesorilor, in predare.

Prima parte a programului contine reprezentarea zaharozei cu ajutorul formulelor ciclice. Ne-am oprit asupra zaharozei, ea fiind cea mai raspindita dintre zaharide si pentru ca aratind obtinerea ei, includem si structurile celor doua monozaharide din care se sintetizeaza, glucoza (anomerul .) si fructoza (anomerul .).

Pentru monozaharide se pot scrie formulele aciclice care reprezinta multumitor structura celor doua molecule (glucoza si fructoza) dar nu explica o serie de proprietati chimice, de exemplu : absenta in unele cazuri, a reactiilor specifice gruparii carbonil, prezenta, in anumite conditii a unei grupari hidroxil cu reactivitate mult marita fata de a celorlalte. etc.

In consecinta, pentru a rezolva asemenea neconcordante, s-au adoptat structurile ciclice. Ele rezulta din interactia gruparii carbonilice cu una din gruparile hidrohil ale hexozei respective. In cazul glucozei, la ciclizare pot participa gruparile hidroxil din pozitia 4 sau 5, iar la fructoza gruparile din pozitia 5 sau 6. Corespunzator vom avea formele furanozice si piranozice. Ca urmare a ciclizarii la atomul de carbon carbonilic apare o noua grupare hidroxil, cu proprietati privilegiate, numita hidroxil glicozidic (morcat in formularile din lucrare cu alta culoare). Pentru ca legaturile care s-au atribuit oxigenului in formularile ciclice sint anormal de lungi si deci incorecte, s-a recurs la reprezentarea ciclului sub forma unui hexagon regulat pentru glucoza (pentagon pentru fructoza). Acesta are o configuratie plana, cu substituientii atomilor de carbon dispusi de o parte si de alta a sa. Atomul de carbon care are hidroxilul glicozidic (atomul de carbon a fostei grupari carbonil) determina aparitia a doua forme denumite anomere (notate cu . si .). Ele difera una fata de alta prin pozitia gruparii hidroxil glicozidic.

Ne-am oprit doar la reprezentarea anomerului . al glucozei si a anomerului . al fructozei, celelalte forme avind o dispozitie spatiala asamanatoare. Prin apropierea celor doua monozaharide, am simulat eliminrea apei si formarea legaturii dicrbonilice, dtorita careia, zaharoza nu are proprietati reducatoare.

Dupa ce elevul si-a format o imagine clara asupra structurii zaharozei, poate apela la ce-a de-a doua parte a programului. Aceasta parte prezinta un model, binenteles mai simplificat, al instalatiei de obtinere industriala a zaharului. Programul descrie animat trecerea succesiva a solutiei diluate de zahar prin corpurile instalatiei. Sint specificate substantele si agentii fizici carora le sint supusi taiteii de sfecla de zahar.

Pentru comentarile din timpul rularii am folosit scrierea pe 64 de coloane,in ferestre, subrutine din programul WINDOWS.

```
  9 CLS : BRIGHT 1: PAPER 6: INK 0: BORDER 7: CLS
 10 PLOT 0,0: DRAW 255,0: DRAW 0,175: DRAW -255,0: DRAW 0,-175
 20 FOR i=0 TO 111: READ x: POKE 65408+i,x: NEXT i
 25 DATA 0,0,0,0,240,0,0,0
 35 DATA 0,0,0,0,240,16,16,16
 45 DATA 16,16,16,16,240,0,0,0
 55 DATA 16,16,16,16,16,16,16,16
 65 DATA 0,0,0,0,255,0,0,0
 75 DATA 128,64,32,16,8,4,2,1
 85 DATA 1,2,4,8,16,32,64,128
 86 DATA 100,148,132,132,135,132,148,100
 87 DATA 129,130,130,186,138,186,162,185
 88 DATA 146,82,82,82,94,82,82,146
 89 DATA 0,192,32,32,32,32,192,0
 90 DATA 0,3,4,4,4,4,3,0
 92 DATA 0,0,0,0,31,16,16,16
 95 DATA 16,16,16,16,31,0,0,0
100 REM GLUCOZA
110 PRINT AT 3,5;"C": FOR i=4 TO 12 STEP 2: PRINT AT i,5;"!": PAUSE 7: PRINT AT
 i+1,5;"C": PAUSE 7: NEXT i
115 PAUSE 7
120 PRINT AT 3,6;"H=O": FOR i=5 TO 11 STEP 2: IF i=7 THEN  GO TO 125
123 PRINT AT i,4;"-": PAUSE 5: PRINT AT i,3;"H": PAUSE 5: PRINT AT i,6;"-": PAU
SE 5: PRINT AT i,7;"OH": PAUSE 5: NEXT i
125 PRINT AT 7,4;"-": PAUSE 5: PRINT AT 7,2;"HO": PAUSE 10: PRINT AT 7,6;"-": P
AUSE 5: PRINT AT 7,7;"H": PAUSE 10: NEXT i
130 PRINT AT 13,5;"  "
140 RANDOMIZE USR 57500: REM 3: FORMAT 1,14,31,21: PAPER 5: INK 6: CLS
142 LET a$=" GLUCOZA-FORMULA ACICLICA": GO SUB 1500
144 BRIGHT 1: PAUSE 0
145 BEEP 1/10,10: PRINT AT 3,5; INK 4;"C": PRINT AT 11,5; INK 4;"C"
150 PAUSE 10: PRINT AT 11,6;"- OH": PAUSE 10: PRINT AT 11,6;"-  OH": PAUSE 10:
PRINT AT 11,6;"-   O";AT 11,6;"     O";AT 10,11;"!": PRINT AT 9,11;"H": PAUSE 10

155 FOR i=10 TO 7 STEP -1: PRINT AT i+1,11;" ": PRINT AT 11,11;" ": PRINT AT i,
11;"O": PRINT AT i-1,11;" ": PRINT AT i-2,11;"H": PAUSE 10: NEXT i
160 PRINT AT 5,11;" ": PRINT AT 4,11;"H": PAUSE 10: PRINT AT 4,11;" ": PRINT AT
 3,11;"H": PAUSE 10: PRINT AT 3,11;"  ": FOR f=10 TO 7 STEP -1: PRINT AT 3,f;" ":
 PAUSE 10: NEXT f
165 PRINT AT 2,4;"\ /": PRINT AT 1,3;"H": BEEP 1/10,10: PRINT AT 1,7; INK 2;"OH
": PRINT AT 3,6;" "
170 LET a$="    GLUCOZA CU CICLU 1-5          ( forma piranozica )"
173 GO SUB 1600
174 BRIGHT 1: PAUSE 0
175 PRINT AT 2,4;"   ": PRINT AT 1,3;"      "
180 PRINT AT 11,3;"  ": PRINT AT 12,4;"/ \": PRINT AT 13,3;"H       ": PRINT AT
13,7; INK 2;"OH"
200 PAUSE 0: REM STRUC HEXAG 6
210 REM FAZA1          "
215 PRINT AT 1,5;"    ": PRINT AT 2,5;"    ": PRINT AT 3,3;"      ": PRINT AT 4,
5;" ": PAUSE 10: PRINT AT 4,6;" ": PAUSE 10: PRINT AT 3,7; INK 4;"C": PAUSE 10:
PRINT AT 2,7;"!": PAUSE 10: PRINT AT 1,7;"  "
217 PAUSE 10: PRINT AT 3,6;"-": PAUSE 10: PRINT AT 3,5;"H"
220 PAUSE 15: PRINT AT 10,5;" ": PRINT AT 11,5;"   ": PRINT AT 12,4;"   ": PRIN
T AT 13,3;"      ": PAUSE 10: PRINT AT 10,6;" ": PAUSE 10: PRINT AT 11,7; INK 4;
"C": PAUSE 10: PRINT AT 12,6;"/": PAUSE 5: PRINT AT 13,5;"H": PAUSE 10: PRINT AT
 12,8;" ": PAUSE 5: PRINT AT 13,9; INK 2;"OH"                    i
230 PAUSE 0: REM FAZA2
235 FOR i=8 TO 13: PRINT AT i,3;"          ": NEXT i
240 PRINT AT 8,6;" ": PAUSE 5: PRINT AT 9,7;"C": PAUSE 5: PRINT AT 9,8;"-": PRI
NT AT 9,9; INK 4;"C": PAUSE 5: PRINT AT 9,10;" ": PAUSE 5:: PRINT AT 9,11;" ": P
AUSE 5: PRINT AT 8,11;" ": PAUSE 5
245 PRINT AT 9,6;"-": PAUSE 5: PRINT AT 9,5;"H": PAUSE 5: PRINT AT 10,7;"!": PA
USE 5: PRINT AT 11,7;"OH": PAUSE 5: PRINT AT 8,9;"!": PAUSE 5: PRINT AT 7,9;"H":
 PAUSE 5: PRINT AT 10,9;"!": PAUSE 5: PRINT AT 11,9; INK 2;"OH"
260 LET a$="   Formarea structurii          hexagonale a GLUCOZEI": GO SUB 1500
262 BRIGHT 1: PAUSE 0
263 PRINT AT 6,5;" "
265 FOR i=7 TO 11: PRINT AT i,2;"          ": NEXT i
267 FOR w=7 TO 3 STEP -1: PRINT AT w,11;" ": NEXT w: PAUSE 5
270 PRINT AT 6,6;" ": PAUSE 5: PRINT AT 7,7;" ": PAUSE 5: PRINT AT 8,8;"C": PAU
SE 5: PRINT AT 8,9;" ": PAUSE 5: PRINT AT 8,10;" ": PAUSE 5: PRINT AT 8,11;"C":
PAUSE 5: PRINT AT 8,12;" ": PAUSE 5: PRINT AT 8,13;" ": PAUSE 5: PRINT AT 8,14;
INK 4;"C": PAUSE 5
275 PRINT AT 8,15;" ": PAUSE 5: FOR y=7 TO 4 STEP -1: PRINT AT y,16;" ": PAUSE
 5: NEXT y: PRINT AT 5,16;"O": PAUSE 5: PRINT AT 3,16;" ": PAUSE 5
280 FOR i=15 TO 10 STEP -1: PRINT AT 3,i;" ": PAUSE 5: NEXT i
290 PRINT AT 3,5;"  ": PRINT AT 6,5;" ": PRINT AT 5,3;"  C  "
300 PRINT AT 4,7;"!": PAUSE 5: PRINT AT 5,7;"H": PAUSE 5
305 PRINT AT 4,5;"!": PAUSE 5: PRINT AT 3,5;"H": PAUSE 5: PRINT AT 6,5;"!": PAU
```

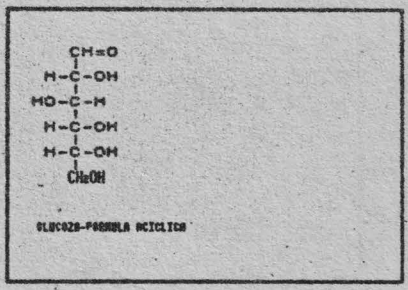
```
BE 5: PRINT AT 7,4;"HO": PAUSE 5
 310 PRINT AT 7,8;" ": PAUSE 5: PRINT AT 6,8;"OH": PAUSE 5: PRINT AT 9,8;"!": PA
USE 5: PRINT AT 10,8;"H": PAUSE 5
 315 PRINT AT 7,11;"!": PAUSE 5: PRINT AT 6,11;"H": PAUSE 5: PRINT AT 9,11;"!":
PAUSE 5: PRINT AT 10,11;"OH": PAUSE 5
 320 PRINT AT 7,14;"!": PAUSE 5: PRINT AT 6,14;"H": PAUSE 5: PRINT AT 9,14;"!":
PAUSE 5: PRINT AT 10,14; INK 2;"OH": PAUSE 5
 330 PAUSE 0: REM FAZA4
 340 PRINT AT 8,15;" ": PAUSE 10: PRINT AT 8,16;" ": PAUSE 10: FOR i=7 TO 3 STEP
 -1: PRINT AT i,16;" ": PAUSE 10: NEXT i
 345 FOR i=15 TO 8 STEP -1: PRINT AT 3,i;" ": PAUSE 10: NEXT i
 347 PRINT AT 8,12;" ": FOR i=6 TO 10: PRINT AT i,13;"   ": NEXT i
 350 PRINT AT 7,12;" ": PAUSE 10: PRINT AT 6,13; INK 4;"C": PAUSE 10
 360 PRINT AT 5,13;"!": PAUSE 10: PRINT AT 4,13;"H": PAUSE 10: PRINT AT 7,13;"!"
: PAUSE 10: PRINT AT 8,13; INK 2;"OH": PAUSE 10
 365 PRINT AT 5,12;" ": PAUSE 10: PRINT AT 4,11;" ": PAUSE 10: PRINT AT 3,10;"O"
: PAUSE 10: PRINT AT 3,9;" ": PAUSE 10: PRINT AT 3,8;" ": PAUSE 10
 400 PLOT 49,127: DRAW 14,-14: PLOT 72,108: DRAW 15,0: PLOT 96,113: DRAW 7,7
 410 PLOT 48,126: DRAW 14,-14: PLOT 72,106: DRAW 15,0: PLOT 97,112: DRAW 7,7
 500 LET a$=" Formula de perspectiva a    GLUCOZEI - anomer alfa": GO SUB 1500
 510 PLOT  INK 7;127,55: DRAW  INK 7;0,-40
 520 BRIGHT 1: PAUSE 0
 600 REM FRUCTOZA
 605 LET c=25
 610 PRINT AT 3,c;"   ": FOR i=5 TO 13 STEP 2: PAUSE 10
 620 PRINT AT i,c;"C"
 625 PRINT AT i-1,c;"!"
 630 NEXT i: PRINT AT 13,c;"   "
 640 PRINT AT 5,c+1;"=O": PAUSE 10: PRINT AT 7,c-1;"-": PAUSE 5: PRINT AT 7,c-3;
"HO": PAUSE 10: PRINT AT 7,c+1;"-": PAUSE 5: PRINT AT 7,c+2;"H": PAUSE 10: FOR i
=9 TO 11 STEP 2: PRINT AT i,c-1;"-": PAUSE 5: PRINT AT i,c-2;"H": PAUSE 10: PRIN
T AT i,c+1;"-": PAUSE 5: PRINT AT i,c+2;"OH": PAUSE 10: NEXT i
 650 LET a$=" FRUCTOZA FORMULA ACICLICA": GO SUB 1700
 652 BRIGHT 1: PAUSE 0:
 653 BEEP 1/10,10: PRINT AT 5,c; INK 4;"C": PRINT AT 11,c; INK 4;"C": PAUSE 10
 655 PRINT AT 11,c+1;"- OH": PAUSE 10: PRINT AT 11,c+1;"-  OH": PAUSE 10: PRINT
AT 11,c+1;"-  OH": PAUSE 10: PRINT AT 11,c+1;"    O": PRINT AT 10,c+5;"H": PAUSE
 10: PRINT AT 10,c+5;"!": PRINT AT 9,c+5;"H": PAUSE 10
 660 PRINT AT 11,c+5;" ": FOR i=10 TO 9 STEP -1: PRINT AT i,c+5;"O": PRINT AT i-
1,c+5;" ": PRINT AT i-2,c+5;"H": PRINT AT 10,c+5;" ": PAUSE 10: NEXT i: PAUSE 10

 665 FOR i=7 TO 5 STEP -1: PRINT AT i+1,c+5;" ": PRINT AT i,c+5;"H": PAUSE 10: N
EXT i
 670 FOR i=c+4 TO c+1 STEP -1: PRINT AT 5,i;"H": PRINT AT 5,i+1;" ": PRINT AT 5,
c+5;" ": PAUSE 10: NEXT i
 675 PRINT AT 5,c+1;" ": PAUSE 10: BEEP 1/10,10: PRINT AT 5,c-1;"-": PAUSE 5: PR
INT AT 5,c-3; INK 2;"HO"
 680 LET a$="    FRUCTOZA CU CICLU 2-5         ( forma furanozica )": GO SUB 180
0
 684 BRIGHT 1: PAUSE 0
 685 FOR i=22 TO 30: FOR j=3 TO 13: PRINT AT j,i;" ": NEXT j: NEXT i
 690 RESTORE 695: FOR i=3 TO 13: READ a$: PRINT AT i,28;a$: NEXT i
 695 DATA "  ","!","C","!","C","!","C","!","C","!",""
 700 FOR i=5 TO 11: READ b$: PRINT AT i,23;b$: NEXT i
 705 DATA "     C-H"," "," H-C-OH"," ","O HO-C-H"," "," "     C-OH"
 710 PRINT AT 5,28; INK 4;"C": PRINT AT 11,28; INK 4;"C": PRINT AT 11,30; INK 2;
"OH"
 730 PAUSE 0
 732 REM FAZAFR1
 735 PRINT AT 12,28;" ": PRINT AT 13,28;"   ": PAUSE 10
 740 PRINT AT 12,27;" ": PAUSE 5: PRINT AT 13,26;"   ": PAUSE 10
 750 LET a$="    Formarea structurii          pentagonale a FRUCTOZEI": GO SUB 170
0
 753 BRIGHT 1: PAUSE 0
 755 PRINT AT 13,26;"   ": PRINT AT 12,27;" ": PRINT AT 11,23;"          ": PRINT
 AT 10,28;" ": PAUSE 10
 760 PRINT AT 10,27;" ": PAUSE 5: PRINT AT 11,26;" ": PAUSE 5: PRINT AT 12,25; I
NK 4;"C": PAUSE 5: PRINT AT 11,24;" ": PRINT AT 10,23;"!": PAUSE 10
 765 PRINT AT 12,24;"-": PAUSE 5: PRINT AT 12,21;"   ": PAUSE 10: PRINT AT 12,26
;"-": PAUSE 5: PRINT AT 12,27; INK 2;"OH": PAUSE 10
 770 PAUSE 0: REM FAZAFR3
 775 FOR i=8 TO 12: PRINT AT i,21;"           ": NEXT i
 777 FOR y=7 TO 5 STEP -1: PRINT AT y,23;" ": NEXT y
 780 PRINT AT 8,27;" ": PAUSE 5: PRINT AT 9,26;" ": PAUSE 5: PRINT AT 10,25;"C":
 PAUSE 5: PRINT AT 10,24;" ": PAUSE 5: PRINT AT 10,23;" ": PAUSE 5: PRINT AT 10,
22; INK 4;"C": PAUSE 5
 785 FOR y=9 TO 6 STEP -1: PRINT AT y,22;" ": PAUSE 5: NEXT y: PRINT AT 5,22;"O"
: PAUSE 5: PRINT AT 5,23;" ": PAUSE 10
 790 PRINT AT 9,25;"!": PAUSE 5: PRINT AT 8,25;"H": PAUSE 5: PRINT AT 11,25;"!":
 PAUSE 5: PRINT AT 12,25;"OH": PAUSE 5: PRINT AT 11,22;"!": PAUSE 10: PRINT AT 1
```

```
2,22; INK 2;"OH": PAUSE 5: PRINT AT 10,21;"-": PAUSE 5: PRINT AT 10,18;"   ": PA
USE 10
 800 PAUSE 0: REM FAZAFR4
 810 PRINT AT 6,27;"  ": PRINT AT 7,26;"      ": PAUSE 10: PRINT AT 8,22;"C  C
": PAUSE 10: FOR i=9 TO 12: PRINT AT i,18;"                ": NEXT i: PAUSE 10
 815 FOR i=27 TO 22 STEP -1: PRINT AT 5,i;" ": NEXT i: FOR y=6 TO 7: PRINT AT y,
22;" ": NEXT y: PAUSE 10
 820 PRINT AT 7,21;" ": PAUSE 5: PRINT AT 6,20;" ": PAUSE 5: PRINT AT 5,19; INK
4;"C": PAUSE 5
 825 PRINT AT 2,23;"  ": PAUSE 20: PLOT 160,136: DRAW 24,16: PLOT 223,136: DRAW
-24,16
 830 PRINT AT 5,29;"  ": PRINT AT 3,28;"   ": PAUSE 5: PRINT AT 6,28;"I": PAUSE
5: PRINT AT 7,28;"   ": PAUSE 5: PRINT AT 3,28;"H": PAUSE 10
 835 PRINT AT 7,25;"I": PAUSE 5: PRINT AT 8,24;"HO": PAUSE 5: PRINT AT 9,25;"I":
 PAUSE 5: PRINT AT 10,23;"H": PAUSE 5
 840 PRINT AT 7,22;"I": PAUSE 5: PRINT AT 6,22;"H": PAUSE 5: PRINT AT 9,22;"I":
PAUSE 5: PRINT AT 10,22;"HO": PAUSE 5
 845 PRINT AT 4,19;" ": PRINT AT 3,19;" ": PAUSE 5: PRINT AT 2,19;"   ": PAUSE 5
: PRINT AT 6,19;" ": PRINT AT 7,19;" ": PAUSE 5: PRINT AT 8,18; INK 2;"HO"
 855 PLOT 161,127: DRAW 14,-14: PLOT 160,126: DRAW 14,-14: PLOT 184,108: DRAW 15
,0: PLOT 184,106: DRAW 15,0: PLOT 208,113: DRAW 14,14: PLOT 209,112: DRAW 14,14
 900 LET a$="  Formula de perspectiva  a   FRUCTOZEI - anomer beta": GO SUB 1700

 907 BRIGHT 1: PAUSE 0
 910 PRINT AT 8,13;"       ": PRINT AT 8,14: INK 2;"OH HO"
 915 PAUSE 40: PRINT AT 8,13;"       ": PRINT AT 8,15; INK 2;"  ": PRINT AT 9,15
; INK 5;"HOH"
 920 FOR i=11 TO 13: PRINT AT i-1,15;"   ": PRINT AT 9,15;"   ": PRINT AT i,15;
INK 2;"HOH": PAUSE 25: NEXT i
 923 PAUSE 10
 925 PRINT AT 13,15;"  "
 927 RANDOMIZE USR 57500: REM 3: FORMAT 1,14,31,21: PAPER 7: INK 6: CLS
 930 PRINT AT 17,11; INK 2;"ZAHAROZA"
1000 PAUSE 0: GO TO 9010
1510 BRIGHT 0: RANDOMIZE USR 57500: REM 4: FORMAT 2,15,16,20: PAPER 5: INK 1: CL
S
1520 BRIGHT 0: RANDOMIZE USR 57500: REM 4: FORMAT 2,17,16,20: PAPER 5: INK 1: CL
S : PRINT a$
1550 RETURN
1610 BRIGHT 0: RANDOMIZE USR 57500: REM 4: FORMAT 2,15,16,20: PAPER 5: INK 1: CL
S : PRINT a$
1620 BRIGHT 0: RANDOMIZE USR 57500: REM 4: FORMAT 2,18,16,20: PAPER 5: INK 2: CL
S : PRINT "  OH"
1630 PRINT AT 18,2; INK 0; PAPER 5; BRIGHT 0;"-"
1640 BRIGHT 0: RANDOMIZE USR 57500: REM 4: FORMAT 4,18,16,20: PAPER 5: INK 1: CL
S : PRINT ": HIDROXIL GLICOZIDIC"
1650 RETURN
1710 BRIGHT 0: RANDOMIZE USR 57500: REM 4: FORMAT 16,15,30,20: PAPER 5: INK 1: C
LS
1720 BRIGHT 0: RANDOMIZE USR 57500: REM 4: FORMAT 16,17,30,20: PAPER 5: INK 1: C
LS : PRINT a$
1750 RETURN
1810 BRIGHT 0: RANDOMIZE USR 57500: REM 4: FORMAT 16,15,30,20: PAPER 5: INK 1: C
LS : PRINT a$
1820 BRIGHT 0: RANDOMIZE USR 57500: REM 4: FORMAT 16,18,30,20: PAPER 5: INK 2: C
LS : PRINT "  OH"
1830 PRINT AT 18,16; INK 0; PAPER 5; BRIGHT 0;"-"
1840 BRIGHT 0: RANDOMIZE USR 57500: REM 4: FORMAT 18,18,30,20: PAPER 5: INK 1: C
LS : PRINT ": HIDROXIL GLICOZIDIC"
1850 RETURN
5000 GO SUB 9600
5005 BORDER 6: PAPER 7: BRIGHT 1: CLS
5007 PLOT 0,175: DRAW 0,-175: DRAW 255,0: DRAW 0,175: DRAW -175,0
5010 RANDOMIZE USR 57500: REM 7: FORMAT 1,0,31,1: PAPER 5: INK 1: CLS
5020 RANDOMIZE USR 57500: REM 7: FORMAT 7,0,31,1: PAPER 5: INK 1: CLS : PRINT "P
RODUCEREA INDUSTRIALA A ZAHARULUI"
5499 LET sw=0: BRIGHT 1
5500 REM INSTALATIE
5510 PLOT 15,63: DRAW -8,0: DRAW 0,57: DRAW 8,0: DRAW  INVERSE 1,9,0: DRAW 8,0:
DRAW 0,-32: DRAW  INVERSE 1,0,-9: DRAW 0,-16: DRAW -17,0
5520 PLOT 15,120: DRAW 0,8: DRAW -15,15: DRAW  INVERSE 1,40,0: DRAW -15,-15: DRA
W 0,-8
5530 PLOT 32,79: GO SUB 5600
5540 PLOT 72,79: GO SUB 5600
5550 PLOT 112,79: GO SUB 5600
5560 PLOT 151,88: DRAW 0,48: DRAW 33,0,-PI/2: DRAW 0,-65: DRAW -16,0: DRAW 0,-7:
 DRAW 23,0: DRAW 0,56
5563 DRAW 33,0,-PI/2: DRAW 0,-32: DRAW 8,0: DRAW 15,15: DRAW  INVERSE 1,0,-40: D
RAW -15,15: DRAW -8,0: DRAW 0,-24: DRAW -8,0: DRAW 0,-8: DRAW 15,-15
5565 DRAW  INVERSE 1,-40,0: DRAW 15,15: DRAW 0,8: DRAW -22,0: DRAW 0,-8: DRAW -3
```

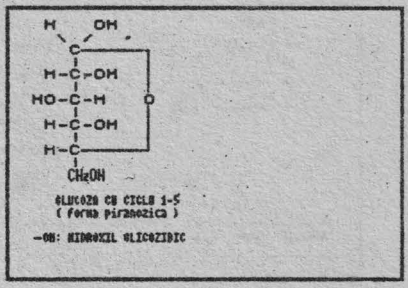
```
3,0,-PI/2: DRAW 0,18: DRAW 8,0: DRAW 0,7: DRAW -8,0: DRAW 0,8
5570 PLOT 224,111: DRAW 16,0: DRAW 0,25: DRAW -56,0: PLOT 208,136: DRAW 3,2: DRA
W -3,-2: DRAW 3,-2
5580 LET x=71: LET y=71: GO SUB 5610: LET x=111: LET y=71: GO SUB 5610
5582 INK 1: PRINT AT 3,21;" ";AT 4,21;" ": INK 0
5585 GO TO 5650
5595 REM corpsic
5600 DRAW 7,0: DRAW 0,-8: DRAW 25,0: DRAW 0,8: DRAW 7,0: DRAW  INVERSE 1,0,9: DR
AW -7,0: DRAW 0,24: DRAW -8,0: DRAW 0,9: DRAW 7,7: DRAW  INVERSE 1,-23,0: DRAW 7
,-7: DRAW 0,-9: DRAW -8,0: DRAW 0,-24: DRAW -8,0: RETURN
5610 PLOT x,y: DRAW 0,41: DRAW 1,0: DRAW 0,-41: RETURN
5620 DRAW 0,-16: DRAW -7,-7: DRAW  INVERSE 1,23,0: DRAW -7,7: DRAW 0,16: RETURN

5850 LET c$="   APA ": GO SUB 8700
5900 LET yjos=13: LET ysus=7: LET loc=2: LET cul=5: GO SUB 8500: PAUSE 5
5905 PAUSE 5: RANDOMIZE USR 57500: REM 7: FORMAT 1,16,16,20: INK 1: PAPER 6: CLS

5910 PAUSE 5: RANDOMIZE USR 57500: REM 7: FORMAT 3,17,16,20: INK 1: PAPER 6: CLS
: PRINT " In apa sint introdusi    TAITEI DE SFECLA DE ZAHAR"
5970 PLOT 0,151: DRAW 8,-4,PI/4: DRAW 8,-4,-PI/3: PLOT 0,162: DRAW 16,-2: DRAW 9
,-8,-PI/2: DRAW 0,-8
6020 FOR f=4 TO 1 STEP -1: PAPER 7: PRINT AT 2,0;" ": PAUSE 5: PRINT AT 2,1;" ":
 PRINT AT 2,0;" ": PAUSE 5: PRINT AT 3,2;" ": PRINT AT 2,1;" ": PAUSE 5: FOR d=4
 TO 6: PRINT AT d,2;" ": PRINT AT d-1,2;" ": PAUSE 5: NEXT d
6023 PRINT AT 6,2;" ": PAPER 5: PRINT AT 7,2;" ": PAUSE 9: FOR d=8 TO 9+f: PRINT
 AT d,2;" ": PRINT AT d-1,2;" ": PAUSE 9: NEXT d: NEXT f
6040 LET i1=0: LET i2=7: LET i3=2: LET i$="impuritati solubile   ": LET k$="mole
cule nesolubile  ": LET j$=" ": GO SUB 8800
6050 PAPER 7: DIM x(6): DIM y(6): LET x(1)=2: LET x(2)=2: LET x(3)=2: LET x(4)=2
: LET y(1)=10: LET y(2)=11: LET y(3)=12: LET y(4)=13
6055 LET xma=3: LET xmi=1: LET yma=13: LET ymi=7: LET pap=5: GO SUB 8000
6056 PRINT AT 1,0; PAPER 7;"
6058 LET c$=" LAPTE DE VAR": GO SUB 8700
6060 LET yjos=12: LET ysus=8: LET loc=6: LET cul=6: GO SUB 8500: PAUSE 5
6065 LET i1=0: LET i2=2: LET i3=5: LET i$="impuritati solubile ": LET j$="molecu
le nesolubile ": LET k$="molecule de apa ": GO SUB 8800
6075 LET x(1)=5: LET x(2)=6: LET x(3)=5: LET x(4)=6: LET x(5)=5: LET x(6)=6: LET
 y(1)=9: LET y(2)=9: LET y(3)=10: LET y(4)=10: LET y(5)=11: LET y(6)=11
6080 LET xma=7: LET xmi=5: LET yma=12: LET ymi=8: LET pap=6: GO SUB 8200
6082 LET c$="DIOXID DE CARBON": GO SUB 8700
6083 LET loc=11: LET cul=4: GO SUB 8500: PAUSE 5
6084 LET i1=0: LET i2=2: LET i3=7: GO SUB 8800
6085 LET x(1)=10: LET x(2)=11: LET x(3)=10: LET x(4)=11: LET x(5)=10: LET x(6)=1
1: LET y(1)=9: LET y(2)=9: LET y(3)=10: LET y(4)=10: LET y(5)=11: LET y(6)=11
6090 LET xma=12: LET xmi=10: LET yma=12: LET ymi=8: LET pap=4: GO SUB 8200
6092 LET c$="  DIOXID DE SULF": GO SUB 8700
6093 PAUSE 5: LET loc=16: LET cul=3: GO SUB 8500
6094 GO SUB 8800
6095 LET x(1)=15: LET x(2)=16: LET x(3)=15: LET x(4)=16: LET x(5)=15: LET x(6)=1
6: LET y(1)=9: LET y(2)=9: LET y(3)=10: LET y(4)=10: LET y(5)=11: LET y(6)=11
6100 LET xma=17: LET xmi=15: LET yma=12: LET ymi=8: LET pap=3: GO SUB 8200
6110 LET x(1)=19: LET x(2)=19: LET x(3)=21: LET x(4)=21: LET x(5)=19: LET x(6)=1
9: LET y(1)=8: LET y(2)=10: LET y(3)=10: LET y(4)=9: LET y(5)=11: LET y(6)=12
6115 PLOT  INK 2;171,136: DRAW  INK 2;0,12
6120 LET i2=5: LET sw=1: LET xma=22: LET xmi=19: LET yma=12: LET ymi=5: LET pap=
7: PRINT AT yma-1,xmi; PAPER pap;"    ";AT yma,xmi; PAPER pap;"  ": GO SUB 8200
6130 LET i$=" Melasa  este  supusa  lapresiuni  ridicate  pentru purificare": GO
 SUB 8800
6135 PAUSE 0: FOR f=20 TO 23: PRINT AT 14,f; INK 6;"    ";AT 14,f-1; BRIGHT 1;"
": PAUSE 10: NEXT f
6140 PRINT AT 15,19; BRIGHT 1;"    ";AT 14,20; INK 6; BRIGHT 0;"    "
6150 LET h=20: FOR f=15 TO 21: PRINT AT f,26; INK 6; PAPER 7;" ": PRINT AT 14,h;
 BRIGHT 1;" ": FOR g=19 TO 21: PRINT AT g,26; BRIGHT 1;" ": NEXT g: PAUSE 7: LET
 h=h+1
6155 IF INT (f/2)=f/2 THEN  PRINT AT 11,28; INK 5; PAPER 7; BRIGHT 1;" ";AT 12,2
6; BRIGHT 1;" "
6160 IF INT (f/2)<>f/2 THEN  PRINT AT 12,26; INK 5; PAPER 7; BRIGHT 1;" ";AT 11,
28; BRIGHT 1;" "
6170 PAUSE 8: NEXT f
7999 PAUSE 0: GO TO 9010
8000 REM eiscmol2
8010 LET ink=i1: LET f=1
8020 IF f>4 THEN  GO TO 8010
8030 LET a=SGN (2*RND-1)+x(f)
8040 IF f>1 AND f<=4 THEN  LET ink=i3
8050 IF a>xma OR a<xmi THEN  LET f=f+1: GO TO 8020
8060 LET b=SGN (2*RND-1)+y(f)
8070 IF b>yma OR b<ymi THEN  LET f=f+1: GO TO 8020
8080 PRINT AT y(f),x(f); PAPER 5;" ": LET x(f)=a: LET y(f)=b: PRINT AT y(f),x(f)
; PAPER pap; INK ink;"
```

```
8090 PAUSE 5: LET t$=INKEY$: IF CODE (t$)<>13 THEN  LET f=f+1: GO TO 8020
8100 PRINT AT y(1),x(1); PAPER pap;" ";AT y(2),x(2); PAPER pap;" "
8110 PLOT 8*(xma-1)-1,175-8*(yma+1): DRAW -8,-8,-PI/2: PLOT 8*xma+1,175-8*(yma+1
): DRAW 8,-8,PI/2: PRINT AT yma+1,xma-1; PAPER 7; INK 0;" "
8112 PRINT AT y(3),x(3); PAPER pap;" ";AT y(4),x(4); PAPER pap;" "
8115 FOR f=xma-1 TO xma+2: PRINT AT 11,f; INK 2; PAPER pap;"  ";AT 11,f-1; PAPE
R pap;" ": PAUSE 5: NEXT f
8116 PRINT AT 11,xma+1; PAPER 7;" "
8120 RETURN
8200 REM miscmol3
8210 LET ink=i1: LET f=1
8220 IF f>6 THEN  GO TO 8210
8230 LET a=SGN (2*RND-1)*x(f)
8240 IF f>1 AND f<=4 THEN  LET ink=i2
8244 IF f>4 AND f<=6 THEN  LET ink=i3
8250 IF a>xma OR a<xmi THEN  LET f=f+1: GO TO 8220
8260 LET b=SGN (2*RND-1)*y(f)
8270 IF b>yma OR b<ymi THEN  LET f=f+1: GO TO 8220
8280 PRINT AT y(f),x(f); PAPER pap;" ": LET x(f)=a: LET y(f)=b: PRINT AT y(f),x(
f); PAPER pap; INK ink;" "
8290 PAUSE 5: LET t$=INKEY$: IF CODE (t$)<>13 THEN  LET f=f+1: GO TO 8220
8300 PRINT AT y(1),x(1); PAPER pap;" ";AT y(2),x(2); PAPER pap;" "
8305 IF sw=1 THEN  GO TO 8400
8310 PLOT 8*(xma-1)-1,175-8*(yma+1): DRAW -8,-8,-PI/2: PLOT 8*xma+1,175-8*(yma+1
): DRAW 8,-8,PI/2: PRINT AT yma+1,xma-1; PAPER 7; INK 0;" "
8312 PRINT AT y(3),x(3); PAPER pap;" ";AT y(4),x(4); PAPER pap;" ";AT y(5),x(5);
 PAPER pap;" ";AT y(6),x(6); PAPER pap;" "
8315 FOR f=xma-2 TO xma+2: PRINT AT 11,f; INK 2; PAPER pap;"  ";AT 11,f+2; PAPER
 pap; INK 1;"  ";AT 11,f-1; PAPER pap;"  ";AT 11,xma-3; PAPER 7;" ": PAUSE 4: NEX
T f: PRINT AT yma,xma+3; PAPER pap; INK 2;" "
8316 PRINT AT 11,xma+1; PAPER 7;" "
8320 RETURN
8405 FOR f=10 TO 12: FOR g=19 TO 22: PRINT AT f,g; BRIGHT 0; INK 6; PAPER 7;" ":
 PAUSE 2: NEXT g: NEXT f: PRINT AT 12,19; BRIGHT 0; INK 6;
8406 LET i$=" La  temperaturi  mari  seobtine  un  lichid  viscosnumit MELASA":
GO SUB 8800
8407 PAUSE 0
8410 PAUSE 5: PRINT AT 13,20;" "
8415 PRINT AT 10,19; BRIGHT 1;"  ": FOR f=11 TO 12: FOR g=19 TO 22 STEP 2: PRI
NT AT f,g; BRIGHT 1; PAPER 7;"  ": PAUSE 2: PRINT AT f+3,g; BRIGHT 0; INK 6;"
": NEXT g: NEXT f: PRINT AT 13,20; BRIGHT 1;" "
8420 RETURN
8499 STOP
8500 REM miscstic
8510 PAPER 7: INK 1: PRINT AT 2,0;" ";AT 3,0;" ": FOR f=1 TO loc: PRINT AT 2,f;"
 ";AT 3,f;" ": PRINT AT 2,f-1;" ";AT 3,f-1;" ": PAUSE 5
8515 NEXT f
8517 PRINT AT 2,loc;" ";AT 3,loc;" "
8520 PRINT AT 3,loc-1;" ";AT 3,loc;" "
8522 FOR h=yjos TO ysus STEP -1
8525 PRINT AT 4,loc; INK cul;" ": FOR f=5 TO h: PRINT AT f,loc; INK cul;" ";AT f
-1,loc;" ": PAUSE 3: NEXT f
8530 PRINT AT h,loc-1; PAPER cul;"  ": BEEP .1,19: NEXT h
8535 PRINT AT 3,loc-1; PAPER 7;"
8540 RETURN
8700 REM contstic
8705 RANDOMIZE USR 57500: REM 6: FORMAT 1,16,18,21: PAPER 7: INK 4: CLS
8707 PRINT AT 21,1; PAPER 7;"
8710 RANDOMIZE USR 57500: REM 3: FORMAT 1,16,12,17: INK 1: PAPER 5: CLS : PRINT
" Continutul sticlei"
8715 RANDOMIZE USR 57500: REM 7: FORMAT 1,17,12,20: INK 1: PAPER 6: CLS
8720 RANDOMIZE USR 57500: REM 4: FORMAT 3,18,11,20: INK 1: PAPER 6: CLS : PRINT
c$
8725 PLOT 0,0: DRAW 255,0: RETURN
8805 BRIGHT 0
8810 RANDOMIZE USR 57500: REM 6: FORMAT 1,16,18,21: PAPER 5: INK 4: CLS
8815 PRINT AT 21,1; PAPER 5;"
8820 RANDOMIZE USR 57500: REM 8: FORMAT 2,17,17,21: PAPER 7: INK 1: CLS
8821 IF sw=1 THEN  GO TO 8850
8823 RANDOMIZE USR 57500: REM 8: FORMAT 4,17,16,18: PAPER 7: INK 1: CLS : PRINT
i$
8825 RANDOMIZE USR 57500: REM 8: FORMAT 4,18,16,19: PAPER 7: INK 1: CLS : PRINT
j$
8827 RANDOMIZE USR 57500: REM 8: FORMAT 4,19,16,20: PAPER 7: INK 1: CLS : PRINT
k$
8830 PAPER 7: PRINT AT 17,3; INK i1;" ";AT 18,3; INK i2;" ";AT 19,3; INK 5;" "
8839 BRIGHT 1
8840 PLOT 0,0: DRAW 255,0: RETURN
8855 RANDOMIZE USR 57500: REM 8: FORMAT 3,17,16,21: PAPER 7: INK 1: CLS : PRINT
i$
```

```
8890 RETURN
9000 CLEAR 57340: LOAD "fer"CODE : LOAD "64"CODE
9010 CLS : RANDOMIZE USR 57500: REM 1: FORMAT 0,0,31,21: PAPER 7: INK 1: CLS
9020 RANDOMIZE USR 57500: REM 2: FORMAT 0,0,27,16: PAPER 6: INK 1: CLS
9022 RANDOMIZE USR 57500: REM 2: FORMAT 5,5,31,21: PAPER 1: INK 1: CLS
9025 BRIGHT 1
9030 RANDOMIZE USR 57500: REM 2: FORMAT 5,5,27,16: PAPER 4: INK 1: CLS
9035 PRINT AT 5,11: PAPER 6: INK 0: BRIGHT 1;" ZAHARUL "
9040 RANDOMIZE USR 57500: REM 2: FORMat 6,7,27,16: PAPER 4: INK 1: CLS : PRINT
 OPTIUNI :"
9042 RANDOMIZE USR 57500: REM 2: FORMAT 11,9,27,16: PAPER 4: INK 1: CLS : PRINT
"1 FORMAREA MOLECULEI DE ZAHAR"
9043 RANDOMIZE USR 57500: REM 2: FORMAT 11,12,27,16: PAPER 4: INK 1: CLS : PRINT
 "2 PRODUCEREA INDUSTRIALA"
9060 IF INKEY$="2" THEN  GO TO 5000
9065 IF INKEY$="1" THEN  RUN
9070 GO TO 9060
9600 RESTORE 9900: FOR f=0 TO 39: READ a: POKE 65368+f,a: NEXT f
9610 FOR f=0 TO 63: READ a: POKE 65408+f,a: NEXT f
9900 DATA 0,60,126,126,126,126,60,0,0,0,24,60,60
9901 DATA 24,0,0,0,0,0,24,24,0,0,0,0,0,126,0,0,126,0,126
9902 DATA 0,126,0,0,126,0,126,126
9905 DATA 0,64,64,48,8,8,8,0
9909 DATA 0,24,24,24,36,66,66,66,66,66,66,66,66,126,0,0
9910 DATA 0,224,16,14,14,16,224,0,0,63,32,32,32,32,63,0
9912 DATA 0,56,68,68,68,68,68,68,196,68,70,68,56,56,56,56
9913 DATA 0,0,0,126,0,0,0,126
9920 RETURN
9999 SAVE "ZAHARUL" LINE 9000: SAVE "fer"CODE 57341,1500: SAVE "64"CODE 63833,16
00
```

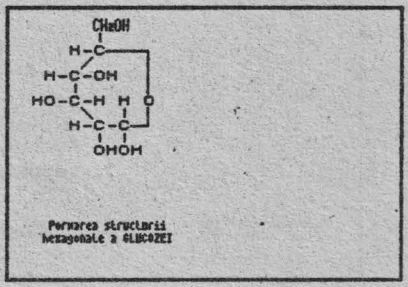


GLUCOZA-FORMULA ACICLICA

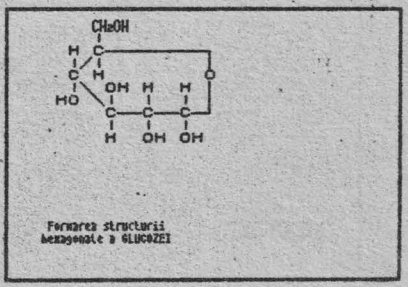


GLUCOZA CU CICLU 1-5
(forma piranozică)

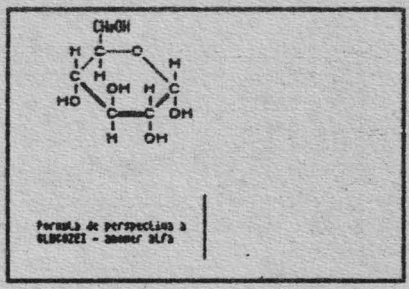
-OH: HIDROXIL GLICOZIDIC



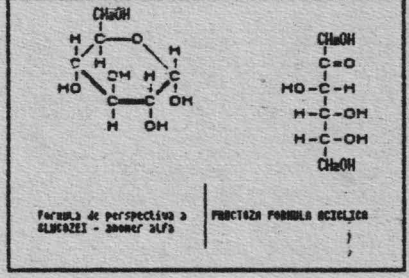
Formarea structurii
hexagonale a GLUCOZEI



Formarea structurii
hexagonale a GLUCOZEI

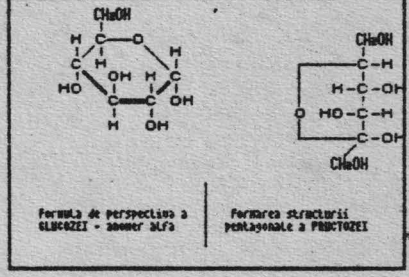


Formula de perspectiva a GLUCOZEI - anomer alfa



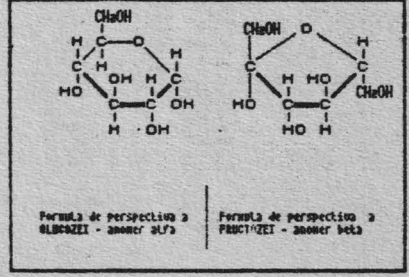
Formula de perspectiva a GLUCOZEI - anomer alfa

FRUCTOZA FORMULA ACICLICA



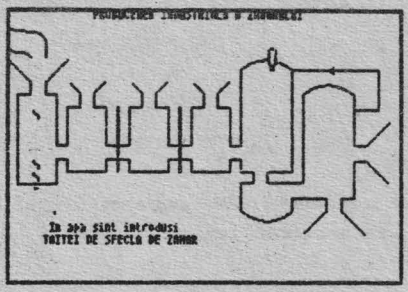
Formula de perspectiva a GLUCOZEI - anomer alfa

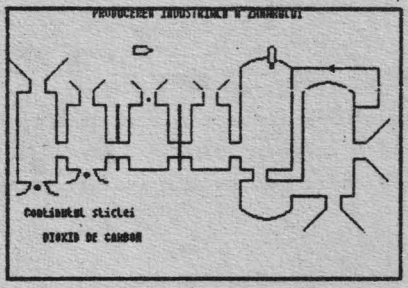
Formarea structurii pentagonale a FRUCTOZEI

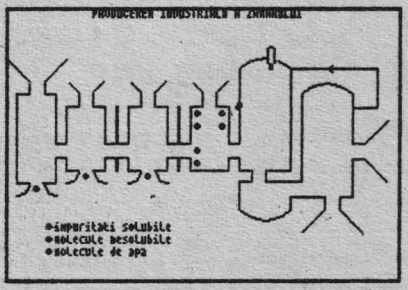


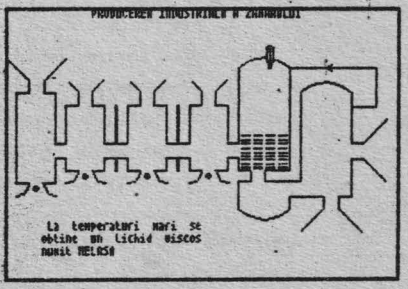
Formula de perspectiva a GLUCOZEI - anomer alfa

Formula de perspectiva a FRUCTOZEI - anomer beta


PRODUCEREA INDUSTRIALĂ A ZAHĂRULUI
În apă sînt introduși
TĂIȚEI DE SFECLĂ DE ZAHĂR


PRODUCEREA INDUSTRIALĂ A ZAHĂRULUI
Conținutul sticlei
DIOXID DE CARBON


PRODUCEREA INDUSTRIALĂ A ZAHĂRULUI
•impurități solubile
•molecule nesolubile
•molecule de apă


PRODUCEREA INDUSTRIALĂ A ZAHĂRULUI
La temperaturi mari se
obține un lichid vîscos
numit MELASĂ

CAPITOLUL 4

LIMBA ROMANA

Folosirea calculatorului este eficienta , nu doar in lectiile la stiintele exacte ,ci si in cadrul lectiilor de limba romana , istorie etc.

4.1. SINTAXA FRAZEI

Pentru exemplificare am conceput un program care are ca scop testarea cunostintelor de sintaxa frazei a elevilor de clasa a VIII-a program care a fost folosit cu rezultate foarte bune ,la scara mai restrinsa , in unele scoli generale din Timisoara .

Dupa incarcare apare un meniu:

1-Executie
2-Instructiuni

Alegerea optiunii 2 are ca efect listarea tuturor comenzilor si abrevierilor folosite.

Comenzi :

CAPS SHIFT+5	cursor stinga
CAPS SHIFT+8	cursor dreapta
q	pozitionare cursor stinga sus
p	subliniere predicat
e	element de legatura
s	delimitarea propozitiilor
EDIT	terminarea delimitarii in propozitii

Abrevieri :

Pp	Propozitie principala
Sb	Subordonata subiectiva
Pr	Subordonata predicativa

Cd Subordonata circumstantiala directa
Ci Subordonata circumstantiala indirecta
Cl Subordonata circumstantiala de loc
Ct Subordonata circumstantiala de timp
Cm Subordonata circumstantiala de mod
Cs Subordonata circumstantiala finala (de scop)
Cc Subordonata circumstantiala de cauza
Co Subordonata conditionala
Cn Subordonata consecutiva
Cv Subordonata concesiva

Dependenta propozitiilor se introduce sub forma unui sir de numere de doua cifre in ordine crescatoare.

Exemplu :

pentru o propozitie legata de propozitiile 5,6,2,9,11 se va introduce urmatorul sir : 0205060911

Verificarea corectitudinii analizei se face in doua etape :

-se verifica corectitudinea impartirii in propozitii
-se verifica corectitudinea analizei

In cazul in care in una din cele doua etape se gasesc greseli se afiseaza analiza corecta.

Dupa alegerea optiunii 1 se alege setul de fraze si se porneste casetofonul.

Dupa afisarea frazei apare un cursor in coltul din stinga sus si se asteapta introducerea comenzilor.

Alaturi de programul de baza a fost conceput un program auxiliar pe care il va folosi examinatorul pentru crearea de seturi de teste . Si in cadrul acestui program sint afisate instructiunile pentru a fi la indemina utilizatorului .

Ambele produse program au fost realizate pentru ca sa poata fi utilizate si de persoane care nu cunosc informatica .

Daca totusi se doreste oprirea programului in timpul executiei , se va tasta simplu BREAK iar relansarea se va face cu GOTO 30 (daca dati RUN se vor sterge seturile de date cu

fraze) , iar daca doriti incarcarea unui nou set de date dati GOTO 9000 (sau RUN 9000)

Trebuie sa amintim utilizatorului ca testarea se va face in functie de datele introduse prin programul de creare a seturilor de fraze , iar daca aceasta analiza este gresita din punct de vedere gramatic atunci si testarile facute cu elevii vor da rezultate gresite , caci testarile se fac in functie de analiza facuta de cel care a format setul de fraze cu programul auxiliar .

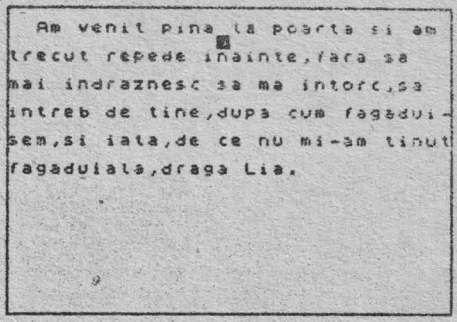
Pentru incrcarea programului de testare se va da LOAD "sYNTAx" , iar pentru incrcare programului auxiliar de formare a seturilor de date se va da LOAD "Fraz-form" .

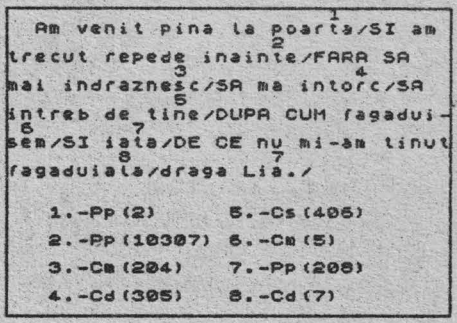
```
  1 REM  TESTARE
  2 REM    autori:
  3 REM     Dragos MARGINEANTU
  4 REM     Calin KLEITSCH
  5 REM
110 CLS : GO SUB 6000
120 LET i=0: LET f=0
130 PRINT AT i,f; FLASH 1;">"
140 LET t$=INKEY$
150 IF CODE (t$)=9 THEN GO TO 6500
155 IF CODE (t$)=8 THEN GO TO 6515
160 IF CODE (t$)=112 THEN GO TO 6520
165 IF CODE (t$)=113 THEN GO TO 1000
170 IF CODE (t$)=101 THEN GO TO 7000
180 IF CODE (t$)=115 THEN GO TO 8000
190 IF CODE (t$)=7 THEN GO TO 8500
200 GO TO 140
1000 PRINT AT i,f;" "; PRINT AT 0,0;">"; LET i=0: LET f=0: GO TO 130
6000 FOR g=1 TO 19 STEP 2: FOR f=0 TO 31
6010 PRINT AT g,f;a$(j,f+1+16*(g-1))
6020 NEXT f: NEXT g
6030 RETURN
6500 LET t=f: LET y=i: LET f=f+1: IF f>31 THEN LET f=0: LET i=i+2: IF i>18 THEN
PRINT AT 18,31;" "; BEEP .05,12: GO TO 120
6510 PRINT AT y,t;" "; BEEP .05,12: GO TO 130
6515 LET f=f-1: IF f>=0 THEN PRINT AT i,f+1;" "; GO TO 130
6517 LET f=f+1: GO TO 140
6520 LET k=i+1: LET e=f
6521 IF e<=31 THEN GO TO 6523
6522 GO TO 6540
6523 IF SCREEN$ (k,e)=" " THEN GO TO 140
6530 IF SCREEN$ (k,e)<="z" THEN IF SCREEN$ (k,e)>="A" THEN LET r$=SCREEN$ (k,e):
 PRINT AT k,e; INK 6; PAPER 1;r$: LET e=e+1: GO TO 6525
6540 LET e=f-1
6550 IF SCREEN$ (k,e)<="z" THEN IF SCREEN$ (k,e)>="A" THEN LET r$=SCREEN$ (k,e):
 PRINT AT k,e; INK 6; PAPER 1;r$: LET e=e-1: GO TO 6550
6555 GO TO 140
7000 LET k=i+1: LET e=f
7001 IF e<=31 THEN GO TO 7009
7002 GO TO 7020
7009 IF SCREEN$ (k,e)=" " THEN GO TO 140
7010 IF SCREEN$ (k,e)<="z" THEN IF SCREEN$ (k,e)>="a" THEN LET r=CODE (SCREEN$ (
k,e))-32: PRINT AT k,e;CHR$ r: LET e=e+1: GO TO 7010
7020 LET e=f-1
7025 IF SCREEN$ (k,e)<="z" THEN IF SCREEN$ (k,e)>="a" THEN LET r=CODE (SCREEN$ (
k,e))-32: PRINT AT k,e;CHR$ r: LET e=e-1: GO TO 7025
7030 GO TO 140
8000 LET Q=CODE (SCREEN$ (i+1,f))
8002 IF Q=32 OR Q=44 OR Q=5 OR Q=47 THEN PRINT AT i+1,f;"/": INPUT "Introduceti
numarul propozitiei";n: PRINT AT i,f-2;n
8010 GO TO 140
8501 PRINT @0;"ASTEPTATI": PRINT AT i,f;" ": LET w=0: FOR g=1 TO 19 STEP 2: FOR
f=1 TO 32: LET r=ATTR (g,f-1): IF b$(j,f+16*(g-1))<>SCREEN$ (g,f-1) OR t(j,f+16*
(g-1))<>r THEN LET w=1
8510 NEXT f: NEXT g
8511 IF w=1 THEN GO TO 8530
8515 FOR g=0 TO 18 STEP 2: FOR f=1 TO 32: IF SCREEN$ (g,f-1)<>c$(j,f+16*g) THEN
LET w=1
8520 NEXT f: NEXT g
8525 IF w=1 THEN GO TO 8530
8527 GO TO 8570
8530 PRINT AT 18,6;"ATI GRESIT!!!": PRINT " Va aparea analiza corecta "
8541 FOR g=1 TO 19 STEP 2: FOR f=1 TO 32: IF t(j,f+16*(g-1))=14 THEN PRINT AT g,
f-1; INK 6; PAPER 1;b$(j,f+32*(g-1)/2): PRINT AT g-1,f-1;c$(j,f+16*(g-1)): GO TO
 8550
8543 PRINT AT g,f-1;b$(j,f+32*(g-1)/2): PRINT AT g-1,f-1;c$(j,f+32*(g-1)/2)
8550 NEXT f: NEXT g
8551 POKE 64001,56000-256*INT (56000/256): POKE 64002,INT (56000/256): RANDOMIZE
 USR 64000
8570 PRINT AT 16,2;"Introduceti analiza frazei :"
8575 LET sw=0
8580 FOR f=2 TO 2*d(j,21) STEP 2: PRINT TAB 1;f/2;: INPUT "Felul propozitiei "in
$;"   De ce propozitii se leaga ? "sn: PRINT TAB 2;".- "sn$;"("sn;")": IF n<>d(j
,f/2) THEN LET sw=1
8585 IF n$<>d$(j,f-1 TO f) THEN LET sw=1
```

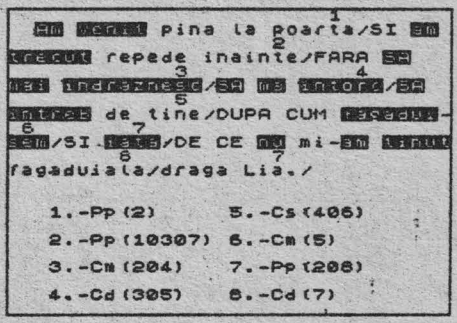
```
8590 NEXT f
8600 IF sw=1 THEN PRINT #0;"ATI GRESIT!!!": PAUSE 20: GO TO 8603
8602 GO TO 8610
8603 POKE 64101,56000-256*INT (56000/256): POKE 64102,INT (56000/256): RANDOMIZE
 USR 64100: FOR f=2 TO 2*d(j,21) STEP 2: PRINT TAB 1;f/2;". ";d$(j,f-1 TO f);" (
";d(j,f/2);")": NEXT f
8610 LET j=j+1: IF j>5 THEN GO TO 9000
8620 PAUSE 100: PRINT #0; "Continuam?  (D/N)"
8630 IF INKEY$="d" OR INKEY$="D" THEN CLS : GO TO 110
8640 IF INKEY$="n" OR INKEY$="N" THEN GO TO 9000
8645 GO TO 8630
9003 INK 5: PAPER 5: CLS
9010 PRINT AT 19,0;""
9020 RESTORE 9994: FOR f=64000 TO 64011: READ o: POKE f,o: NEXT f
9030 FOR f=64100 TO 64124: READ o: POKE f,o: NEXT f
9100 PAPER 7: INK 1: BORDER 4: CLS
9110 PRINT AT 7,2;"1 - Executie";AT 12,2;"2 - Instructiuni"
9115 IF INKEY$="1" THEN GO TO 9150
9120 IF INKEY$="2" THEN GO TO 9200
9125 GO TO 9115
9150 CLS : PRINT AT 5,0;" Numele setului de date          (pentru primul care urm
eaza      tastati ENTER"
9155 INPUT n$: IF LEN n$>8 THEN GO TO 9155
9157 GO TO 9900
9200 CLS : PRINT AT 6,0; "CS+5,CS+8 - Deplasare cursor (>)": PRINT : PRINT "  p
- Predicat": PRINT : PRINT "  e - Elemente de legatura": PRINT : PRINT "  s - De
limitare propozitie": PRINT : PRINT "  EDIT - Terminat delimitare"
9205 PAUSE 0: CLS
9210 PRINT AT 4,1; " Pp-principala                        Cd-completiva directa
     Ci-completiva indirecta         Ct-temporala                Cs-finala
                    Sb-subiectiva                  Pr-predicativa
     Cc-cauzala                      Cl-circumstantiala de loc        Cv-concesiv
a                   Co-conditionala"
9213 PRINT " At-atributiva                          Cm-circumstantiala de mod      Cn-
consecutiva"
9214 PAUSE 0: CLS
9215 PRINT AT 7,0; "   Numerotarea propozitiilor se face in ordinea aparitiei pr
edi-catelor.Numarul propozitiei se  introduce sub forma de numar de doua cifre i
ar la legatura din- tre propozitii se introduce in  ordine crescatoare(01020304.
..)"
9220 PAUSE 0: GO TO 9100
9902 LET k$="d1"+n$: IF n$="" THEN LET k$=""
9903 LOAD k$ DATA a$()
9904 LET k$="d2"+n$: IF n$="" THEN LET k$=""
9905 LOAD k$ DATA b$()
9906 LET k$="d3"+n$: IF n$="" THEN LET k$=""
9907 LOAD k$ DATA c$()
9908 LET k$="d4"+n$: IF n$="" THEN LET k$=""
9909 LOAD k$ DATA d$()
9910 LET k$="d5"+n$: IF n$="" THEN LET k$=""
9911 LOAD k$ DATA d()
9912 LET k$="d6"+n$: IF n$="" THEN LET k$=""
9913 LOAD k$ DATA t()
9920 LET j=1: CLS : PRINT AT 11,8;"OPRITI CASETOFONUL": PAUSE 0: GO TO 100
9994 DATA 17,192,218,33,0,64,1,0,27,237,176,201,17,192,218,33,0,64,6,27,197,6,0,
126,245,26,119,241,18,35,19,16,246,193,16,240,201
9999 PRINT #0;"ASTEPTATI": PRINT AT i,f;" ": LET w=0: FOR g=1 TO 19 STEP 2: FOR
f=1 TO 32: LET r=ATTR (g,f-1): LET c$(j,f+16*(g-1))=SCREEN$ (g-1,f-1): LET b$(j,
f+16*(g-1))=SCREEN$ (g,f-1): LET t(j,f+16*(g-1))=r
```

```
  1 REM  FORMARE TESTE
  2 REM     asteriz
  3 REM       Dregos HARBINEANTU
  4 REM       Calin KLEITSCH
  5 REM
  8 DIM a$(5,320): DIM b$(5,320): DIM c$(5,320): DIM d$(5,40): DIM d(5,21): DIM
t(5,320)
  9 FOR f=1 TO 5
 10 PRINT AT 0,0;"Introduceti fraza  numarul ";f;"     neanalizata :"
 11 PRINT AT 7,1;"pentru sfirsit  gata"                 (maxim = 5 fraze)"
 12 INPUT a$(f, TO ): IF a$(f,1 TO 4)="gata" THEN LET max=f-1: GO TO 30
 15 NEXT f
 30 CLS : LET j=0
105 LET j=j+1: LET w=j
110 GO SUB 6000
120 LET i=0: LET f=0
130 PRINT AT i,f; FLASH 1;">"
140 LET t$=INKEY$
150 IF CODE (t$)=9 THEN GO TO 6500
155 IF CODE (t$)=8 THEN GO TO 6515
160 IF CODE (t$)=112 THEN GO TO 6520
165 IF CODE (t$)=113 THEN GO TO 1000
170 IF CODE (t$)=101 THEN GO TO 7000
180 IF CODE (t$)=115 THEN GO TO 8000
190 IF CODE (t$)=7 THEN GO TO 8500
200 GO TO 140
1000 PRINT AT i,f;" "; PRINT AT 0,0;">"; LET i=0: LET f=0: GO TO 130
6000 FOR g=1 TO 19 STEP 2: FOR f=0 TO 31
6010 PRINT AT g,f;a$(j,f+1+16*(g-1))
6020 NEXT f: NEXT g
6030 RETURN
6500 LET t=f: LET y=i: LET f=f+1: IF f>31 THEN LET f=0: LET i=i+2: IF i>18 THEN
PRINT AT 18,31;" ": BEEP .05,12: GO TO 120
6510 PRINT AT y,t;" ": BEEP .05,12: GO TO 130
6515 LET f=f-1: IF f>=0 THEN PRINT AT i,f+1;" ": GO TO 130
6517 LET f=f+1: GO TO 140
6520 LET k=i+1: LET e=f
6521 IF e<=31 THEN GO TO 6523
6522 GO TO 6540
6523 IF SCREEN$ (k,e)=" " THEN GO TO 140
6530 IF SCREEN$ (k,e)<="z" THEN IF SCREEN$ (k,e)>="A" THEN LET r$=SCREEN$ (k,e):
 PRINT AT k,e; INK 6; PAPER 1;r$: LET e=e+1: GO TO 6525
6540 LET e=f-1
6550 IF SCREEN$ (k,e)<="z" THEN IF SCREEN$ (k,e)>="A" THEN LET r$=SCREEN$ (k,e):
 PRINT AT k,e; INK 6; PAPER 1;r$: LET e=e-1: GO TO 6550
6555 GO TO 140
7000 LET k=i+1: LET e=f
7001 IF e<=31 THEN GO TO 7009
7002 GO TO 7020
7009 IF SCREEN$ (k,e)=" " THEN GO TO 140
7010 IF SCREEN$ (k,e)<="z" THEN IF SCREEN$ (k,e)>="a" THEN LET r=CODE (SCREEN$ (
k,e))-32: PRINT AT k,e;CHR$ r: LET e=e+1: GO TO 7010
7020 LET e=f-1
7025 IF SCREEN$ (k,e)<="z" THEN IF SCREEN$ (k,e)>="a" THEN LET r=CODE (SCREEN$ (
k,e))-32: PRINT AT k,e;CHR$ r: LET e=e-1: GO TO 7025
7030 GO TO 140
8000 LET Q=CODE (SCREEN$ (i+1,f))
8002 IF Q=32 OR Q=44 OR Q=5 OR Q=47 THEN PRINT AT i+1,f;"/": INPUT "Introduceti
numarul propozitiei";n: PRINT AT i,f-2;n
8010 INPUT "Felul propozitiei n:";d$(j,2*n-1 TO 2*n)
8020 INPUT "De ce propozitii se leaga";d(j,n)
8100 GO TO 140
8501 PRINT #0;"ASTEPTATI": PRINT AT i,f;" ": FOR g=1 TO 19 STEP 2: FOR f=1 TO 32
: LET t(j,f+16*(g-1))=ATTR (g,f-1): LET b$(j,f+16*(g-1))=SCREEN$ (g,f-1)
8510 NEXT f: NEXT g
8515 FOR g=0 TO 18 STEP 2: FOR f=1 TO 32: LET c$(j,f+16*g)=SCREEN$ (g,f-1)
8520 NEXT f: NEXT g
8527 INPUT "Introduceti atent numarul total de propozitii existente:";d(j,21)
8530 LET w=w+1: IF w<=max THEN GO TO 105
8540 PRINT #0;"Doriti sa faceti modificari?    (D/N)"
8545 LET t$=INKEY$
8547 IF t$="d" THEN INPUT "Introduceti numarul frazei ";j: LET w=5: GO TO 110
8548 IF t$="n" THEN GO TO 8600
8550 GO TO 8545
8600 INPUT "Introduceti numele setului ce vafi salvat( max 8 chr)";n$
8610 IF LEN n$>8 THEN GO TO 8600
8700 SAVE "d1"+n$ DATA a$()
8710 SAVE "d2"+n$ DATA b$(): SAVE "d3"+n$ DATA c$(): SAVE "d4"+n$ DATA d$(): SAV
E "d5"+n$ DATA d(): SAVE "d6"+n$ DATA t()
9000 CLS
9110 PRINT AT 7,2;"1 - Executie";AT 12,2;"2 - Instructiuni"
```

```
9115 IF INKEY$="1" THEN CLS : GO TO 1
9120 IF INKEY$="2" THEN GO TO 9200
9125 GO TO 9115
9200 CLS : PRINT AT 5,0;"CS+5,CS+8 - Deplasare cursor (>)": PRINT : PRINT "  p -
 Predicat": PRINT : PRINT "  e - Elemente de legatura": PRINT : PRINT "  s - Del
imitare propozitie": PRINT : PRINT " EDIT - Terminat delimitare": PRINT
9210 PAUSE 0: CLS : PRINT AT 2,0;" Pp-principala                          Cd-completiva
 directa          Ci-completiva indirecta          Ct-temporala
  Cs-finala                      Sb-subiectiva                         Pr-predicativ
a                 Cc-cauzala                  Cl-circumstantiala de loc
  Cv-concesiva                   Co-conditionala"
9213 PRINT " At-atributiva                          Cm-circumstantiala de mod       Cn-
consecutiva"
9215 PAUSE 0: CLS : PRINT AT 7,0;"   Numerotarea propozitiilor se face in ordine
a aparitiei predi-catelor.Numarul propozitiei se  introduce sub forma de numar d
e doua cifre iar la legatura din- tre propozitii se introduce in  ordine crescat
oare(01020304...)"
9220 PAUSE 0: CLS : GO TO 9110
9999 FOR f=1 TO 400: PRINT f;"   ";d(1,f): NEXT f
```


Am venit pina la poarta si am
trecut repede inainte,fara sa
mai indraznesc sa ma intorc,sa
intreb de tine,dupa cum fagadui-
sem,si iata,de ce nu mi-am tinut
fagaduiala,draga Lia.


Am venit pina la poarta/SI am
trecut repede inainte/FARA SA
mai indraznesc/SA ma intorc/SA
intreb de tine/DUPA CUM fagadui-
sem/SI iata/DE CE nu mi-am tinut
fagaduiala/draga Lia./
1.-Pp(2) 5.-Cs(406)
2.-Pp(10307) 6.-Cm(5)
3.-Cm(204) 7.-Pp(208)
4.-Cd(305) 8.-Cd(7)


Am venit pina la poarta/SI am
trecut repede inainte/FARA SA
mai indraznesc/SA ma intorc/SA
intreb de tine/DUPA CUM fagadui-
sem/SI iata/DE CE nu mi-am tinut
fagaduiala/draga Lia./
1.-Pp(2) 5.-Cs(406)
2.-Pp(10307) 6.-Cm(5)
3.-Cm(204) 7.-Pp(208)
4.-Cd(305) 8.-Cd(7)

CAPITOLUL 5
LIMBI MODERNE

5.1. LIMBA ENGLEZA

INDIRECT SPEECH

In zilele noastre calculatorul personal a devenit un instrument folosit pe scara larga in procesul de instruire si in special in invatarea limbilor straine.

Avantajele oferite de tehnica de calcul sint legate in primul rind de posibilitatea individualizarii instruirii in functie de elev si a autoinstruirii ghidate de program. La acestea se adauga sporul de atractivitate datorat imaginilor animate, muzicii sintetizate si faptului ca partenerul de dialog este o masina.

Lucrarea isi propune sa exemplifice printr-o lectie programata de gramatica citeva din avantajele oferite de folosirea calculatorului personal.

Utilizarea calculatorului in orele de limba engleza a luat proportii din ce in ce mai mari de citiva ani. Lucrarea "The Indirect Speech" trateaza problema trecerii propozitiilor din vorbirea directa in vorbirea indirecta. Ea poate fi folosita in clasa a IX-a, cind engleza este studiata ca a doua limba, sau in clasa a VIII-a, cind este studiata ca prima limba. Lucrarea a fost conceputa pentru a veni cit mai mult in sprijinul elevului, ea putind fi utilizata nu numai in munca profesorului cu o clasa sau o grupa de elevi, ci si individual, intr-o invatare autonoma. Dorind sa vina in sprijinul atit al elevului cit si al profesorului, lucrarea incearca sa faca cit mai usoara si placuta invatarea limbii engleze.

Dupa incarcare programul se lanseaza automat in executie. Prin apasarea sagetilor (sus,jos) si apoi ENTER se poate alege o optiune din meniu.

Meniu

STATEMENTS
THEORY

EXERCISES
SAVE

Partea intii, "STATEMENTS", prezinta in limba engleza citeva informatii despre program si posibilitatile lui.

Partea a doua, "THEORY", ofera din nou posibilitatea de a alege dintr-un submeniu:

THEORY1
THEORY2

THEORY1 reprezinta regulile de trecere din vorbirea directa in vorbirea indirecta atunci cind verbul introductiv este la timpul prezent. Pentru ca elevul sa invete cit mai usor, mai repede, alaturi de exemple apar si desene. Astfel, alaturi de exemplul:

Peter: "I've lost my hat!"
"What is Peter saying?"
He is saying he's lost his hat.

apare si un desen corespunzator, in care un baiat (Peter) ii spune unei fete (Mary) ca si-a pierdut palaria. Prin acest mod atractiv de invatare, elevul retine cu mai multa placere teoria. Apar subliniate in exemple pronumele, adverbele si verbele, care prezinta schimbari la trecerea in vorbirea indirecta. In cadrul primei teorii apar patru exemple complete (desene si explicatii).

THEORY2 reprezinta regulile de trecere din vorbirea directa in vorbirea indirecta atunci cind verbul introductiv este la timpul trecut. Si aici, explicatiile sint insotite de desene cit mai sugestive si, pe cit posibil, amuzante. Astfel, pentru exemplul:

Jane: "We're going to have a party tonight."
"... and Jane said that they were going to
have a party that evening."

apar in partea stinga a ecranului doua fete stind de vorba (vorbire directa), iar in partea dreapta a ecranului o fata povestindu-i alteia (vorbire indirecta). La THEORY2 apar patru exemple (desene si explicatii), care incearca sa faca cit mai clara aceasta dificila problema a trecerii din vorbirea directa in vorbirea indirecta.

La sfirsitul fiecarei teorii se afla cite doua tabele, cu verbe si cu adverbe, care sintetizeaza cunostintele invatate anterior.

Exemplu: tabelul al doilea de la THEORY1.

DIRECT SPEECH	INDIRECT SPEECH
HERE	THERE
TODAY	THAT DAY
YESTERDAY	THE DAY BEFORE
AGO	BEFORE
TOMORROW	THE NEXT DAY
NOW	THEN

Dupa ce elevul s-a familiarizat cu problema trecerii din vorbirea directa in vorbirea indirecta in ambele cazuri (cind verbul introductiv e la timpul prezent si cind verbul introductiv e la timpul trecut), el poate trece la rezolvarea exercitiilor, partea a treia.

Exista doua seturi de exercitii, iar alegerea setului dorit (1 sau 2) se face prin apasarea tastei 1 sau 2 apoi ENTER. Se cere numele utilizatorului, apoi se trece la rezolvarea exercitiilor. Fiecare set contine patru exercitii, a cite patru propozitii fiecare. Pentru fiecare propozitie din vorbirea directa se prezinta trei variante in vorbirea indirecta, iar pentru alegerea variantei corecte elevul trebuie sa apese 1,2 sau 3 apoi ENTER. Daca raspunsul dat nu este corect, pe ecran apare mesajul: "NO!!!COME BACK TO THEORY!" apoi, prin apasarea unei taste, pe ecran apar tabelele de la sfirsitul teoriei. Dupa ce elevul revede tabelele, prin apasarea unei taste ecranul se sterge si se revine la exercitiu de acolo de unde a fost lasat.

Primele doua exercitii ale fiecarui set folosesc cunostintele de la THEORY1, adica trecerea propozitiilor din

vorbirea directa in vorbirea indirecta atunci cind verbul introductiv e la timpul prezent, iar celelalte doua exercitii folosesc cunostintele de la THEORY2, adica trecerea propozitiilor din vorbirea directa in vorbirea indirecta atunci cind verbul introductiv e la timpul trecut. Cind elevul se afla la rezolvarea exercitiului 1 sau 2, daca greseste, trimiterea se face la tabelele de la THEORY1, iar cind elevul se afla la rezolvarea exercitiului 3 sau 4, daca greseste, trimiterea se face la tabelele de la THEORY2. Daca elevul da un raspuns corect din prima incercare primeste doua puncte; daca raspunsul e corect din a doua incercare primeste un punct, iar daca a facut doua incercari si nu a dat raspunsul corect, calculatorul ii indica raspunsul iar elevul nu primeste nici un punct, trecindu-se la rezolvarea propozitiei urmatoare. Indicarea raspunsului dat se face prin incadrarea intr-o culoare a acestuia.

Dupa ce elevul rezolva exercitiile se prezinta o situatie conform careia apare nota primita de elev (32 de puncte reprezinta nota 10).

RESULTS

NAME	POINTS	MARK
MIHAELA	30	9.31
PAUL	32	10

Exercitiile pot fi rezolvate de 10 elevi, eventual alternind seturile, iar daca numarul lor depaseste 10 se reinitializeaza tabelul cu rezultate.

Cele doua seturi de exercitii se afla in memorie, dar, cu mici modificari, se pot adauga si seturi care sa se poata incarca dupa dorinta de pe caseta. De asemenea, daca se dispune de o retea de calculatoare personale, cu mici modificari ale programului, acesta poate fi folosit pentru verificarea simultana a unei grupe de elevi. In acest caz timpul afectat de catre profesor verificarii va fi simtitor diminuat.

Asa cum am aratat mai sus, fiecarei propozitii in vorbire directa ii sint atasate trei variante in vorbire indirecta (una corecta, doua incorecte). Am optat pentru varianta alegerii

propozitiei corecte (1,2,3) deoarece programul se adreseaza nu numai persoanelor obisnuite cu utilizarea tastaturii unui calculator. In acest fel, orice persoana, urmind indicatiile de pe monitor, poate utiliza programul.

In orice situatie, cind calculatorul se afla in asteptare si pe ecran nu apare nici un mesaj explicit, ca de exemplu :"Press a key to CONTINUE ", programul se continua prin apasarea unei taste la alegere.

In orice situatie de oprire cu BREAK programul nu se relanseaza cu RUN ci cu GO TO 10, iar pentru reinitializarea tabelului cu rezultate cu GO TO 6.

In concluzie, se poate spune ca lucrarea aduce noutate in ceea ce priveste invatarea limbii engleze pentru ca da posibilitatea evaluarii si mai ales autoevaluarii elevului, pentru ca se include in profilul de cercetare al cercului de limba engleza si informatica al liceului, pentru ca da posibilitatea abordarii interdisciplinare a temei alese (limba engleza <=> informatica).

Conceptia de ansamblu a lucrarii imi apartine: impartirea in capitole si subcapitole. Propozitiile din set de exercitii au fost selectate din bibliografie, iar al doilea set de exercitii a fost conceput in intregime de mine. De asemenea am realizat singura intreaga parte de grafica a programului.

Lucrarea face parte din conceptia de azi privitoare la invatarea si predarea limbii engleze, iar profilul liceului faci liteara abordarea interdisciplinara a temei.

```
  1 REM   THE INDIRECT SPEECH
  2 REM   autori: prof. ANGELA MUNTEANU
  3 REM           prof. MARINEL SERBAN
  4 REM           ELEV  MIHAELA SERBAN
  5 LOAD "SET64"CODE : LOAD "setgrot"CODE : LOAD "UDG"CODE : POKE VAL "23675",V
AL "23296"-VAL "256"*INT (VAL "23296"/VAL "256"): POKE VAL "23676",INT (VAL "232
96"/VAL "256")
  6 GO SUB VAL "7": GO TO VAL "10"
  7 LET p=NOT PI: DIM n$(VAL "10",VAL "20"): DIM p(VAL "10",VAL "2"): FOR i=VAL
 "1" TO VAL "10": LET p(i,VAL "1")=NOT PI: LET p(i,VAL "2")=NOT PI: NEXT i: RETU
RN
 10 BORDER VAL "5": PAPER VAL "6": BRIGHT VAL "1": CLS : LET da=1
 20 DIM a$(VAL "7",VAL "10")
 30 LET A$(VAL "1", TO )="": LET a$(VAL "2", TO )="STATEMENTS": LET A$(VAL "3",
 TO )="THEORY": LET A$(VAL "4", TO )="EXERCISES": LET A$(VAL "5", TO )="SAVE"
 35 LET A$(VAL "6", TO )="": LET A$(VAL "7", TO )=""
 38 PLOT INK VAL "1";NOT PI,NOT PI: DRAW INK VAL "1";VAL "255",NOT PI: DRAW INK
 VAL "1";NOT PI,VAL "175": DRAW INK VAL "1";-VAL "255",NOT PI: DRAW INK VAL "1";
NOT PI,-VAL "175"
 40 LET j=VAL "1": INK VAL "2": PLOT VAL "71",VAL "112": DRAW VAL "106",NOT PI:
 DRAW NOT PI,-VAL "40": DRAW -VAL "106",NOT PI: DRAW NOT PI,VAL "40"
 41 LET b$="                ": FOR j=VAL "8" TO VAL "12": PRINT AT j,VAL "9"; OVER
 VAL "1"; PAPER VAL "5";b$: NEXT j
 42 INK VAL "1": PLOT VAL "23",VAL "168": DRAW VAL "210",NOT PI: DRAW NOT PI,-V
AL "25": DRAW -VAL "210",NOT PI: DRAW NOT PI,VAL "25": INK VAL "2"
 43 LET b$="                ": FOR j=VAL "1" TO VAL "3": PRINT AT j,V
AL "3"; PAPER VAL "5"; OVER VAL "1";b$: NEXT j
 45 PAPER VAL "5": PRINT AT VAL "2",VAL "4";: LET b$=" Press ": GO SUB VAL "950
0": PRINT "?";: LET b$="  or  ": GO SUB VAL "9500": PRINT "?";: LET b$="  for op
tion  then E N T E R": GO SUB VAL "9500"
 46 PRINT AT VAL "14",VAL "3";"          ";AT VAL "15",VAL "3";"          ";AT
 VAL "16",VAL "
 47 PRINT AT VAL "18",VAL "10";"          ";AT VAL "19",VAL "10";"          ";AT V
AL "20",VAL "10";
 48 PAPER VAL "6": INK VAL "1": LET b$="prof.A. MUNTEANU   elev MIHAELA SERBAN
 prof.M. SERBAN": PRINT AT 21,2;: GO SUB 9500
 50 PRINT AT VAL "10",VAL "11"; PAPER VAL "5"; INK VAL "1";A$(1+VAL "1");AT VAL
 "9",VAL "11"; INK VAL "7";A$(1);AT VAL "11",VAL "11";A$(1+VAL "2")
 60 PAUSE NOT PI: LET T$=INKEY$
 65 IF CODE T$<>VAL "10" AND CODE T$<>VAL "11" AND CODE T$<>VAL "13" THEN GO TO
 VAL "60"
 70 IF CODE T$=VAL "11" THEN LET I=1+VAL "1": IF I>VAL "4" THEN LET I=VAL "4":
GO TO VAL "100"
 80 IF CODE T$=VAL "10" THEN LET I=1-VAL "1": IF I<VAL "1" THEN LET I=VAL "1":
GO TO VAL "100"
 90 IF CODE T$=VAL "13" THEN GO TO VAL "110"
100 GO TO VAL "50"
110 IF i=VAL "1" THEN GO TO VAL "1000"
120 IF i=VAL "2" THEN GO TO VAL "2000"
130 IF I=VAL "3" THEN GO TO VAL "3000"
140 GO TO VAL "9999"
1000 REM ***rutina STATEMENTS***
1010 CLS : BORDER VAL "5": GO SUB VAL "2006"
1020 POKE VAL "23607",VAL "243": PRINT AT VAL "2",VAL "11"; INK 1;" STATEMENTS":
 POKE VAL "23607",VAL "60"
1030 LET b$=" This programme studies and shows you how to change the": PRIN
T AT VAL "4",VAL "1";: GO SUB VAL "9500"
1035 LET b$="sentences from Direct into Indirect Speech. The programme is": PRIN
T AT VAL "5",VAL "1";: GO SUB VAL "9500"
1040 LET b$="divided into four parts. Part one is ""STATEMENTS""; part two,": PR
INT AT VAL "6",VAL "1";: GO SUB VAL "9500"
1045 LET b$="""THEORY"" is also divided into two parts: THEORY 1, when the": PR
INT AT VAL "7",VAL "1";: GO SUB 9500
1050 LET b$="reporting verb is in Present Tense, and THEORY 2, when the": PRIN
T AT VAL "8",VAL "1";: GO SUB VAL "9500"
1055 LET b$="reporting verb is in Past Tense. At the end of each theory": PRIN
T AT VAL "9",VAL "1";: GO SUB VAL "9500"
1060 LET b$="there are two tabels, which synthetizes the knowledgements": PRIN
T AT VAL "10",VAL "1";: GO SUB VAL "9500"
1065 LET b$="learned before. The third part of programme is ""EXERCISES"",": PR
INT AT VAL "11",VAL "1";: GO SUB VAL "9500"
1070 LET b$="which contains four exercises. Each exercise contains four": PRIN
T AT VAL "12",VAL "1";: GO SUB VAL "9500"
1075 LET b$="sentences in Direct Speech, and for each sentence there are": PRIN
T AT VAL "13",VAL "1";: GO SUB VAL "9500"
1080 LET b$="three possible variants in Indirect Speech. The pupil must": PRIN
T AT VAL "14",VAL "1";: GO SUB VAL "9500"
1085 LET b$="choose the correct one.": PRINT AT VAL "15",VAL "1";: GO SUB VAL "9
500"
1090 LET b$=" The progr amme saves and verifies, too.": PRINT AT VAL "16",VAL "1"
;: GO SUB VAL "9500": PAUSE VAL "200": GO SUB VAL "2145"
1999 GO TO VAL "10"
```

```
2000 REM ***rutine THEORY***
2005 GO SUB VAL "2006": GO TO VAL "2010"
2006 BRIGHT 0: BORDER 5: PAPER 6: INK 2: CLS : PLOT 15,0: DRAW 225,0: DRAW 15,15
: DRAW 0,145: DRAW -15,15: DRAW -225,0: DRAW -15,-15: DRAW 0,-145: DRAW 15,-15:
DRAW 0,15: DRAW -15,0: PLOT 255,15: DRAW -15,0: DRAW 0,-15: PLOT 255,160: DRAW -
15,0: DRAW 0,15: PLOT 0,160: DRAW 15,0: DRAW 0,15
2007 PRINT AT NOT PI,NOT PI; OVER VAL "1"; PAPER VAL "5";"  ";AT NOT PI,VAL "30"
;"  ";AT VAL "1",NOT PI;"  ";AT VAL "1",VAL "30";"  ";AT VAL "20",NOT PI;"  ";AT
 VAL "20",VAL "30";"  ";AT VAL "21",NOT PI;"  ";AT VAL "21",VAL "30";"  ": RETUR
N
2008 BRIGHT NOT PI: BORDER VAL "5": PAPER VAL "6": INK VAL "2": CLS : PLOT VAL "
7",NOT PI: DRAW VAL "241",NOT PI: DRAW VAL "7",VAL "7": DRAW NOT PI,VAL "161": D
RAW -VAL "7",VAL "7": DRAW -VAL "241",NOT PI: DRAW -VAL "7",-VAL "7": DRAW NOT P
I,-VAL "161": DRAW VAL "7",-VAL "7": DRAW NOT PI,VAL "7": DRAW -VAL "7",NOT PI:
PLOT VAL "255",VAL "7": DRAW -VAL "7",NOT PI: DRAW NOT PI,-VAL "7": PLOT VAL "25
5",VAL "168": DRAW -VAL "7",NOT PI: DRAW NOT PI,VAL "7": PLOT NOT PI,VAL "168":
DRAW VAL "7",NOT PI: DRAW NOT PI,VAL "7"
2009 PRINT AT NOT PI,NOT PI; OVER VAL "1"; PAPER VAL "5";" ";AT NOT PI,VAL "31";
" ";AT VAL "21",NOT PI;" ";AT VAL "21",VAL "31";" ";AT VAL "21",NOT PI;" ": RETU
RN
2015 PLOT VAL "87",VAL "112": DRAW VAL "82",NOT PI: DRAW NOT PI,-VAL "33": DRAW
-VAL "82",NOT PI: DRAW NOT PI,VAL "33": LET b$="                ": FOR j=VAL "8" TO VA
L "11": PRINT AT j,VAL "11"; OVER VAL "1"; PAPER VAL "5";b$: NEXT j
2016 PAPER VAL "6": PRINT AT VAL "18",VAL "4";: LET b$=" Press ": GO SUB VAL "95
00": PRINT "?";: LET b$="  or  ": GO SUB VAL "9500": PRINT "?";: LET b$="  for c
tion  then E N T E R": GO SUB VAL "9500"
2017 PRINT AT VAL "19",VAL "11";: LET b$="SPACE   to   OPTIONS": GO SUB VAL "950
0"
2020 PRINT AT VAL "9",VAL "12"; PAPER VAL "5"; INK VAL "1";"THEORY 1";AT VAL "10
",VAL "12"; INK VAL "7";"THEORY 2": LET i=VAL "1"
2025 PAUSE NOT PI: LET t$=INKEY$
2026 IF CODE t$=VAL "32" THEN GO TO VAL "10"
2030 IF CODE t$=VAL "13" THEN GO TO VAL "2040"
2032 IF CODE t$=VAL "11" THEN GO TO VAL "2020"
2034 IF CODE t$=VAL "10" THEN LET i=VAL "2": PRINT AT VAL "9",VAL "12"; PAPER VA
L "5"; INK VAL "7";"THEORY 1";AT VAL "10",VAL "12"; INK VAL "1";"THEORY 2": GO T
O VAL "2025"
2036 GO TO VAL "2025"
2040 IF i=VAL "1" THEN GO SUB VAL "2100": GO TO VAL "2000"
2045 GO SUB VAL "2500": GO TO VAL "2000"
2100 CLS : GO SUB VAL "2006": POKE VAL "23607",VAL "243": PRINT AT VAL "1",VAL "
7";"Elementary THEORY 1": POKE VAL "23607",VAL "60": LET cx=VAL "22": LET cy=VAL
 "120": GO SUB VAL "2105": GO TO VAL "2110"
2105 GO SUB VAL "9101": PLOT cx,cy-VAL "13": DRAW VAL "18",NOT PI: PLOT cx,cy-VA
L "13": DRAW VAL "15",VAL "9": PLOT cx-VAL "3",cy-VAL "43": DRAW NOT PI,-VAL "15
": DRAW VAL "3",-VAL "3": PLOT cx+VAL "3",cy-VAL "43": DRAW NOT PI,-VAL "15": DR
AW VAL "3",-VAL "3": RETURN
2110 LET b$="When the reporting verb, such as say or tell, is": PRINT AT VAL "5"
,VAL "6";: GO SUB VAL "9500": LET b$="in the Present, Present Perfect or Future
 Tense,": PRINT AT VAL "6",VAL "6";: GO SUB VAL "9500"
2115 LET b$="there is no change of tense in the indirect sta-": PRINT AT VAL "7"
,VAL "6";: GO SUB VAL "9500": LET b$="tement.": PRINT AT VAL "8",VAL "6";: GO SU
B VAL "9500"
2116 PLOT VAL "47",VAL "100": DRAW VAL "192",NOT PI: DRAW VAL "4",VAL "4",PI: DR
AW NOT PI,VAL "32": DRAW -VAL "4",VAL "4",PI: DRAW -VAL "192",NOT PI: DRAW -VAL
"4",-VAL "4",PI: DRAW NOT PI,-VAL "32": DRAW VAL "4",-VAL "4",PI
2117 PRINT AT VAL "5",VAL "22"; OVER VAL "1"; PAPER VAL "5"; INK VAL "1";"
";AT VAL "7",VAL "10";"  "
2120 LET b$="Press a key for  EXAMPLES": POKE VAL "23607",VAL "243": PRINT AT VA
L "18",VAL "4"; INK VAL "1";b$: POKE VAL "23607",VAL "60": PAUSE NOT PI
2121 GO SUB VAL "2125": GO TO VAL "2130"
2125 LET b$="                                ": FOR i=2 TO 18: PRINT AT i,1; PAPER
 2; OVER 1; INK 7;b$: NEXT i: FOR i=18 TO 2 STEP -1: PRINT AT i,1; PAPER 6;b$: N
EXT i: RETURN
2126 LET b$="                                ": FOR i=1 TO 20: PRINT AT i,1; PAPE
R 2; OVER 1; INK 7;b$: NEXT i: FOR i=20 TO 1 STEP -1: PRINT AT i,1; PAPER 6;b$:
NEXT i: RETURN
2127 LET b$="                                ": FOR i=0 TO 21: PRINT AT i,2; PAPER 2
; OVER 1; INK 7;b$: NEXT i: FOR i=21 TO 0 STEP -1: PRINT AT i,2; PAPER 6;b$: NEX
T i: RETURN
2130 GO SUB VAL "9100": PLOT cx,cy-VAL "13": DRAW VAL "7",-VAL "7": DRAW VAL "7"
,VAL "4": PLOT cx,cy-VAL "13": DRAW -VAL "7",-VAL "7": DRAW NOT PI,-VAL "7": PLO
T cx-VAL "3",cy-VAL "43": DRAW -VAL "3",-VAL "15": DRAW VAL "3",-VAL "2": PLOT c
x+VAL "3",cy-VAL "43": DRAW NOT PI,-VAL "15": DRAW VAL "3",VAL "2"
2135 PLOT cx+VAL "42",cy-VAL "28": DRAW -VAL "15",-VAL "30": DRAW -VAL "3",VAL "
3": PLOT cx+VAL "42",cy-VAL "28": DRAW VAL "15",-VAL "30": DRAW -VAL "3",-VAL "3
": PLOT cx+VAL "42",cy-VAL "13": DRAW VAL "15",VAL "6": DRAW -VAL "4",VAL "15":
DRAW -VAL "2",-VAL "2": PLOT cx+VAL "42",cy-VAL "13": DRAW -VAL "15",-VAL "2": D
RAW -VAL "4",VAL "7"
2140 LET b$=" I've lost  my  hat!": PRINT AT VAL "4",VAL "2";: GO SUB VAL "9500
": LET b$="What is PETER saying?": PRINT AT VAL "6",VAL "14";: GO SUB VAL "9500"
```

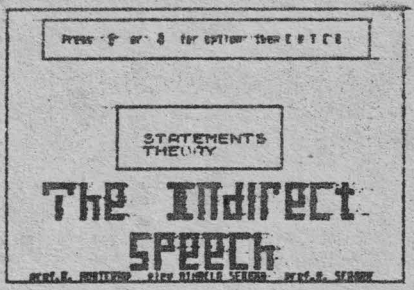
```
; LET b$="He is saying  he  has lost  his  hat.": PRINT AT VAL "8",VAL "12";: GO
 SUB VAL "9500"
2141 PRINT AT VAL "4",VAL "2"; OVER VAL "1"; PAPER VAL "5"; INK VAL "1";"  ";AT
 VAL "4",VAL "8";"  ";AT VAL "8",VAL "18";"  ";AT VAL "8",VAL "23";"  "; GO SUB
 VAL "2145": GO TO VAL "2150"
2145 LET b$="Press a key to CONTINUE": POKE VAL "23607",VAL "243": PRINT AT VAL
 "18",VAL "5"; INK VAL "1";b$: POKE VAL "23607",VAL "60": PAUSE NOT PI: GO SUB VA
L "2125": RETURN
2146 LET b$="Press ENTER to CONTINUE": POKE VAL "23607",VAL "243": PRINT AT VAL
 "21",VAL "5": INK VAL "1"; OVER VAL "1";b$: POKE VAL "23607",VAL "60": PAUSE NOT
 PI: GO SUB VAL "2126": RETURN
2150 GO SUB VAL "9100": GO SUB VAL "2105"
2155 PLOT cx+VAL "42",cy-VAL "13": DRAW -VAL "13",VAL "7": PLOT cx+VAL "42",cy-V
AL "13": DRAW -VAL "13",-VAL "5": PLOT cx+VAL "42",cy-VAL "28": DRAW VAL "5",-VA
L "30": DRAW -VAL "2",-VAL "2": PLOT cx+VAL "42",cy-VAL "28": DRAW -VAL "5",-VAL
 "15": DRAW VAL "3",-VAL "15": DRAW -VAL "2",-VAL "2"
2156 PLOT cx+VAL "15",cy-VAL "1": DRAW VAL "4",-VAL "14": DRAW -VAL "1",VAL "2":
 DRAW -VAL "2",VAL "10",PI: DRAW VAL "2",-VAL "10",-VAL "2.8": DRAW -VAL "2",VAL
 "10",VAL "2.2": DRAW VAL "2",-VAL "10",-VAL "1.6": DRAW -VAL "2",VAL "10",VAL
 1
2160 LET b$=" I've found  your  hat!": PRINT AT VAL "4",VAL "2";: GO SUB VAL "
9500": LET b$="What has MARY just told PETER?": PRINT AT VAL "6",VAL "13";: GO S
UB VAL "9500": LET b$="She has just told him  she's found": PRINT AT VAL "8",VA
L "12";: GO SUB VAL "9500": LET b$=" his  hat.": PRINT AT VAL "9",VAL "12";: GO
 SUB VAL "9500"
2165 PRINT AT VAL "4",VAL "2"; OVER VAL "1"; PAPER VAL "5"; INK VAL "1";"  ";AT
 VAL "4",VAL "8";"  ";AT VAL "8",VAL "23";"  ";AT VAL "9",VAL "12";"  "; GO SU
B VAL "2145"
2170 GO SUB VAL "9100": PLOT cx-VAL "3",cy-VAL "43": DRAW NOT PI,-VAL "15": DRAW
 VAL "3",VAL "3": PLOT cx+VAL "3",cy-VAL "43": DRAW NOT PI,-VAL "15": DRAW VAL "
3",VAL "3": PLOT VAL "11",cy-VAL "15": DRAW VAL "40",NOT PI: DRAW NOT PI,VAL "30
": DRAW -VAL "40",NOT PI: DRAW NOT PI,-VAL "30": PLOT VAL "10",cy-VAL "16": DRAW
 VAL "42",NOT PI: DRAW NOT PI,VAL "32": DRAW -VAL "42",NOT PI: DRAW NOT PI,-VAL
 "32"
2171 PLOT VAL "32",cy-VAL "15": DRAW NOT PI,VAL "30": PLOT VAL "51",cy-VAL "15":
 DRAW -VAL "8",-VAL "8": DRAW NOT PI,VAL "30": DRAW VAL "8",VAL "8": PLOT cx,cy-
VAL "18": DRAW -VAL "8",-VAL "4": DRAW -VAL "5",VAL "7": PLOT cx,cy-VAL "18": DR
AW VAL "8",-VAL "4": DRAW VAL "5",VAL "8"
2172 PLOT cx+VAL "42",cy-VAL "13": DRAW -VAL "13",VAL "7": PLOT cx+VAL "42",cy-V
AL "13": DRAW -VAL "13",-VAL "5": PLOT cx+VAL "42",cy-VAL "28": DRAW VAL "5",-VA
L "30": DRAW -VAL "2",-VAL "2": PLOT cx+VAL "42",cy-VAL "28": DRAW -VAL "5",-VAL
 "15": DRAW VAL "3",-VAL "15": DRAW -VAL "2",-VAL "2"
2173 FOR i=VAL "1" TO VAL "20" STEP VAL "3": FOR j=VAL "1" TO VAL "32" STEP VAL
 "4": PLOT VAL "33"+i,cy-VAL "17"+j: NEXT j: NEXT i
2175 LET b$="I'm looking for  my  umbrella.": PRINT AT VAL "3",VAL "2";: GO SUB
 VAL "9500": LET b$="What was that?": PRINT AT VAL "6",VAL "12";: GO SUB VAL "95
00": LET b$="MARY says she's looking for  her umbrella.": PRINT AT VAL "8",VAL "
10";: GO SUB VAL "9500"
2176 PRINT AT VAL "3",VAL "2"; OVER VAL "1"; PAPER VAL "5"; INK VAL "1";"  ";AT V
AL "3",VAL "10";"  ";AT VAL "8",VAL "15";"  ";AT VAL "8",VAL "24";"  "; GO SUB
 VAL "2145"
2190 GO SUB VAL "9100": PLOT cx-VAL "3",cy-VAL "43": DRAW -VAL "3",-VAL "15": DR
AW VAL "3",-VAL "3": PLOT cx+VAL "3",cy-VAL "43": DRAW NOT PI,-VAL "15": DRAW VA
L "3",-VAL "3"
2191 PLOT cx,cy-VAL "13": DRAW VAL "7",-VAL "10": DRAW -VAL "4",NOT PI: PLOT cx,
cy-VAL "13": DRAW -VAL "7",-VAL "10": DRAW NOT PI,-VAL "5"
2192 PLOT cx+VAL "42",cy-VAL "13": DRAW -VAL "7",-VAL "7": DRAW -VAL "5",VAL "5"
: PLOT cx+VAL "42",cy-VAL "13": DRAW VAL "7",-VAL "7": DRAW NOT PI,-VAL "5": PLO
T cx+VAL "42",cy-VAL "28": DRAW VAL "5",-VAL "30": DRAW -VAL "3",-VAL "3": PLOT
 cx+VAL "42",cy-VAL "28": DRAW -VAL "4",-VAL "30": DRAW -VAL "3",NOT PI
2195 LET b$="I  gave my book to  you .": PRINT AT VAL "4",VAL "2";: GO SUB VAL "
9500": LET b$="What is JOHN telling MARY?": PRINT AT VAL "6",VAL "12";: GO SUB V
AL "9500": LET b$="He is telling her he gave it to  her .": PRINT AT VAL "8",VAL
 "11";: GO SUB VAL "9500"
2196 PRINT AT VAL "4",VAL "2"; OVER VAL "1"; PAPER VAL "5"; INK VAL "1";"  ";AT V
AL "4",VAL "12";"  ";AT VAL "8",VAL "20";"  ";AT VAL "8",VAL "27";"  "; GO SUB VA
L "2145"
2197 GO SUB 2198: GO TO 2000
2198 GO SUB VAL "9000": POKE VAL "23607",VAL "243": PRINT AT VAL "1",VAL "7";"El
ementary theory 1";AT VAL "10",VAL "3";"PRESENT"
2200 PRINT AT VAL "6",VAL "22";"PRESENT";AT VAL "7",VAL "22";"SIMPLE";AT VAL "9"
,VAL "22";"PRESENT";AT VAL "10",VAL "22";"CONTINUOS";AT VAL "12",VAL "22";"PRESE
NT";AT VAL "13",VAL "22";"PERFECT";AT VAL "15",VAL "22";"PAST";AT VAL "16",VAL "
22";"SIMPLE";AT VAL "18",VAL "22";"FUTURE"
2210 GO SUB VAL "2146"
2220 GO SUB VAL "9009": POKE VAL "23607",VAL "243": PRINT AT NOT PI,VAL "7"; OVE
R VAL "1";"Elementary theory 1": POKE VAL "23607",VAL "60": PAUSE NOT PI: GO SUB
```

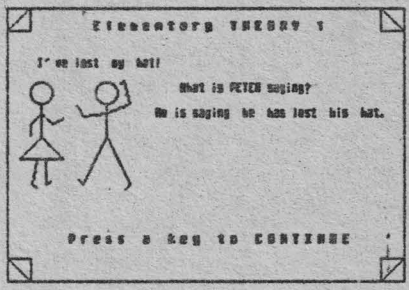
```
VAL "2127"
2499 RETURN
2500 LET cx=VAL "22": LET cy=VAL "120": CLS : GO SUB VAL "2006": POKE VAL "23607
",VAL "243": PRINT AT VAL "1",VAL "7";"Elementary theory 2": POKE VAL "23607",VA
L "60": GO SUB VAL "2103"
2510 LET b$="A reporting verb in the past tense is followed": PRINT AT VAL "5",
VAL "6";: GO SUB VAL "9500": LET b$="by a fairly regular pattern of tense change
s in": PRINT AT VAL "6",VAL "6";: GO SUB VAL "9500"
2515 LET b$="the reported statement:Present to  Past, Future": PRINT AT VAL "7",
VAL "6";: GO SUB VAL "9500": LET b$="to Future in the Past, Present Perfect and
Sim-": PRINT AT VAL "8",VAL "6";: GO SUB VAL "9500": LET b$="ple Past to Past Pe
rfect.": PRINT AT VAL "9",VAL "6";: GO SUB VAL "9500"
2516 PLOT VAL "47",VAL "92": DRAW VAL "190",NOT PI: DRAW VAL "4",VAL "4",PI: DRA
W NOT PI,VAL "38": DRAW -VAL "4",VAL "4",PI: DRAW -VAL "190",NOT PI: DRAW -VAL "
4",-VAL "4",PI: DRAW NOT PI,-VAL "38": DRAW VAL "4",-VAL "4",PI
2517 PRINT AT VAL "5",VAL "18"; OVER VAL "1"; PAPER VAL "5"; INK VAL "1";"
";AT VAL "7",VAL "23";"
";AT VAL "8",VAL "7";"
";AT VAL "9",VAL "12";"
": GO SUB VAL "2145"
2525 LET cy=VAL "100": GO SUB VAL "9101": PLOT cx,cy-VAL "13": DRAW VAL "7",-VAL
"5": DRAW VAL "5",VAL "7": DRAW VAL "3",-VAL "3": PLOT cx,cy-VAL "13": DRAW -VA
L "7",-VAL "5": DRAW -VAL "5",VAL "7": DRAW -VAL "2",-VAL "3"
2530 PLOT cx-VAL "3",cy-VAL "43": DRAW -VAL "3",-VAL "15": DRAW VAL "3",-VAL "3"
: PLOT cx+VAL "3",cy-VAL "43": DRAW VAL "3",-VAL "7": DRAW -VAL "3",-VAL "7": DR
AW VAL "3",-VAL "3"
2535 PLOT VAL "12",cy-VAL "20": DRAW VAL "6",NOT PI,-PI: PLOT VAL "10",cy-VAL "2
0": DRAW VAL "10",NOT PI: DRAW NOT PI,-VAL "3": DRAW -VAL "10",NOT PI: DRAW NOT
PI,VAL "3"
2540 LET cx=cx+VAL "35": GO SUB VAL "9101": PLOT cx,cy-VAL "13": DRAW -VAL "7",-
VAL "5": DRAW VAL "3",VAL "5": PLOT cx,cy-VAL "13": DRAW VAL "7",-VAL "5": DRAW
NOT PI,-VAL "5": PLOT cx+VAL "4",cy-VAL "26": DRAW VAL "6",NOT PI,-PI
2545 PLOT cx-VAL "3",cy-VAL "43": DRAW -VAL "3",-VAL "15": DRAW -VAL "3",-VAL "3
": PLOT cx+VAL "3",cy-VAL "43": DRAW VAL "3",-VAL "15": DRAW VAL "3",-VAL "3": P
LOT cx+VAL "3",cy-VAL "27": DRAW VAL "8",NOT PI: DRAW -VAL "2",-VAL "2": DRAW -V
AL "4",NOT PI: DRAW -VAL "2",VAL "2"
2550 LET cx=VAL "180": GO SUB VAL "9101": PLOT cx,cy-VAL "13": DRAW VAL "7",-VAL
"7": DRAW VAL "5",VAL "4": DRAW VAL "3",-VAL "1": PLOT cx,cy-VAL "13": DRAW -VA
L "7",-VAL "7": DRAW NOT PI,-VAL "6"
2555 PLOT cx-VAL "3",cy-VAL "43": DRAW NOT PI,-VAL "15": DRAW -VAL "3",-VAL "3":
PLOT cx+VAL "3",cy-VAL "43": DRAW VAL "3",-VAL "7": DRAW -VAL "3",-VAL "8": DRA
W VAL "3",-VAL "3"
2560 PLOT VAL "165",cy-VAL "56": DRAW VAL "6",NOT PI,-PI: PLOT VAL "163",cy-VAL
"56": DRAW VAL "10",NOT PI: DRAW -VAL "2",-VAL "2": DRAW -VAL "6",NOT PI: DRAW -
VAL "2",VAL "2"
2565 LET cx=VAL "230": LET cy=VAL "100": CIRCLE cx,cy,VAL "7": PLOT cx,cy-VAL "7
": DRAW VAL "6",-VAL "21": PLOT VAL "210",cy-VAL "28": DRAW VAL "30",NOT PI: DRA
W NOT PI,-VAL "30": DRAW -VAL "30",NOT PI: DRAW NOT PI,VAL "30"
2570 PLOT cx+VAL "2",cy-VAL "3": DRAW -VAL "5",-VAL "15": DRAW -VAL "2",VAL "13
": DRAW -VAL "2",NOT PI: DRAW -VAL "5",-VAL "13": DRAW VAL "14",VAL "15": PLOT V
AL "213",VAL "69": DRAW VAL "24",NOT PI: DRAW -VAL "24",-VAL "24": DRAW VAL "24"
,NOT PI: LET cx=VAL "22": LET cy=VAL "120"
2575 LET b$="We're going  to have": PRINT AT VAL "5",VAL "2";: GO SUB VAL "9500
": LET b$="a party tonight!": PRINT AT VAL "6",VAL "2";: GO SUB VAL "9500": LET
b$="... and JANE said that they": PRINT AT VAL "5",VAL "17";: GO SUB VAL "9500":
 LET b$="were going  to have a party": PRINT AT VAL "6",VAL "17";: GO SUB VAL "9
500": LET b$="that evening.": PRINT AT VAL "7",VAL "17";: GO SUB VAL "9500"
2580 PRINT AT VAL "5",VAL "3"; OVER VAL "1"; PAPER VAL "5"; INK VAL "1";"
";AT VAL "6",VAL "17";"
";AT VAL "7",VAL "17";"
": GO SUB VAL "2145"
2600 LET cx=VAL "22": LET cy=VAL "100": GO SUB VAL "9100": PLOT cx,cy-VAL "13":
DRAW VAL "13",NOT PI: PLOT cx,cy-VAL "13": DRAW VAL "12",-VAL "4": PLOT cx-VAL "
3",cy-VAL "43": DRAW -VAL "3",-VAL "15": DRAW VAL "3",-VAL "2": PLOT cx+VAL "3",
cy-VAL "43": DRAW VAL "3",-VAL "15": DRAW VAL "3",NOT PI
2605 PLOT cx+VAL "42",cy-VAL "13": DRAW -VAL "6",-VAL "14": PLOT cx+VAL "42",cy-
VAL "13": DRAW VAL "6",-VAL "14": PLOT cx+VAL "42",cy-VAL "28": DRAW -VAL "4",-V
AL "30": DRAW -VAL "3",NOT PI: PLOT cx+VAL "42",cy-VAL "28": DRAW VAL "4",-VAL "
30": DRAW VAL "3",NOT PI
2610 PLOT cx+VAL "13",cy-VAL "13": DRAW VAL "10",NOT PI: DRAW NOT PI,-VAL "4": D
RAW -VAL "10",NOT PI: DRAW NOT PI,VAL "4"
2615 LET cx=VAL "180": LET cy=VAL "100": GO SUB VAL "9100": PLOT cx,cy-VAL "13":
 DRAW VAL "7",-VAL "7": DRAW NOT PI,VAL "6": PLOT cx,cy-VAL "13": DRAW -VAL "7",
-VAL "7": DRAW NOT PI,-VAL "6"
2620 PLOT cx-VAL "3",cy-VAL "43": DRAW -VAL "4",-VAL "15": DRAW VAL "3",NOT PI:
PLOT cx+VAL "3",cy-VAL "43": DRAW VAL "4",-VAL "15": DRAW VAL "3",NOT PI
2625 PLOT cx+VAL "42",cy-VAL "13": DRAW -VAL "6",-VAL "7": DRAW -VAL "7",-VAL "3
": PLOT cx+VAL "42",cy-VAL "13": DRAW VAL "7",-VAL "7": DRAW -VAL "7",-VAL "4":
DRAW VAL "3",-VAL "3"
2630 PLOT cx+VAL "42",cy-VAL "28": DRAW -VAL "8",-VAL "10": DRAW VAL "14",-VAL "
18": DRAW -VAL "3",-VAL "3": DRAW -VAL "3",NOT PI: PLOT cx+VAL "42",cy-VAL "28":
 DRAW -VAL "5",-VAL "32": DRAW -VAL "3",NOT PI: LET cx=VAL "22": LET cy=VAL "120
```

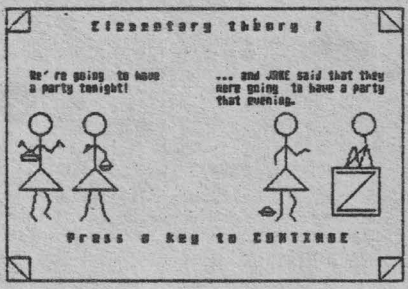
```
2635 LET b$="I  find this pencil box.": PRINT AT VAL "5",VAL "2";: GO SUB VAL "9
500": LET b$="Is it yours?": PRINT AT VAL "6",VAL "2";: GO SUB VAL "9500"
2640 LET b$="...and I told him I  found  ": PRINT AT VAL "5",VAL "17";: GO SUB V
AL "9500": LET b$="that pencil box.": PRINT AT VAL "6",VAL "17";: GO SUB VAL "95
00"
2645 PRINT AT VAL "5",VAL "3"; OVER VAL "1"; PAPER VAL "5"; INK VAL "1";"      ";
AT VAL "5",VAL "27";"      ";AT VAL "6",VAL "17";"      ": GO SUB VAL "2145"
2650 LET cx=VAL "22": LET cy=VAL "120": GO SUB VAL "9101": PLOT cx,cy-VAL "13":
DRAW VAL "7",VAL "5": DRAW NOT PI,VAL "7": PLOT cx,cy-VAL "13": DRAW -VAL "6",-V
AL "7": DRAW -VAL "3",-VAL "5"
2655 PLOT cx-VAL "3",cy-VAL "43": DRAW -VAL "4",-VAL "17": DRAW VAL "3",-VAL "3"
: PLOT cx+VAL "3",cy-VAL "43": DRAW VAL "5",-VAL "8": DRAW -VAL "6",-VAL "9": DR
AW VAL "3",-VAL "3"
2660 PLOT VAL "10",VAL "50": DRAW VAL "4",VAL "8": DRAW VAL "3",-VAL "3": DRAW V
AL "24",NOT PI: DRAW VAL "3",VAL "7": DRAW VAL "3",-VAL "5": DRAW VAL "4",VAL "8
": DRAW VAL "3",-VAL "3": DRAW VAL "24",NOT PI: DRAW VAL "6",VAL "30": DRAW VAL
"4",-VAL "3": DRAW VAL "6",VAL "15"
2665 LET cx=VAL "52": LET cy=VAL "123": CIRCLE cx,cy,VAL "7": PLOT cx,cy-VAL "7"
: DRAW VAL "5",-VAL "21": DRAW VAL "4",-VAL "15": DRAW -VAL "3",-VAL "15": DRAW
VAL "3",-VAL "3": PLOT cx+VAL "4",cy-VAL "28": DRAW -VAL "4",-VAL "17": DRAW -VA
L "3",-VAL "13": DRAW VAL "3",NOT PI
2670 PLOT cx+VAL "2",cy-VAL "13": DRAW VAL "8",-VAL "8": DRAW VAL "5",-VAL "5":
PLOT cx+VAL "2",cy-VAL "13": DRAW -VAL "8",-VAL "8": DRAW VAL "10",VAL "3": LET
cx=VAL "22": LET cy=VAL "120"
2675 LET b$="I feel rather ill.": PRINT AT VAL "4",VAL "2";: GO SUB VAL "9500":
LET b$="They had just begun to climb the": PRINT AT VAL "5",VAL "1";: GO SUB VA
L "9500": LET b$="mountain when Mary said that she": PRINT AT VAL "7",VAL "14";:
 GO SUB VAL "9500": LET b$="felt rather ill.": PRINT AT VAL "8",VAL "14";: GO SU
B VAL "9500"
2680 PRINT AT VAL "4",VAL "3"; OVER VAL "1"; PAPER VAL "5"; INK VAL "1";"  ";AT
VAL "8",VAL "14";"  ": GO SUB VAL "2145"
2700 LET cx=VAL "22": LET cy=VAL "120": GO SUB VAL "9101": PLOT cx,cy-VAL "13":
DRAW VAL "6",-VAL "9": DRAW VAL "6",VAL "9": PLOT cx,cy-VAL "13": DRAW -VAL "7",
-VAL "6": DRAW VAL "5",-VAL "6": DRAW -VAL "3",-VAL "3": PLOT cx-VAL "3",cy-VAL
"43": DRAW -VAL "4",-VAL "15": DRAW VAL "3",NOT PI: PLOT cx+VAL "3",cy-VAL "43":
 DRAW VAL "4",-VAL "15": DRAW VAL "3",NOT PI
2705 LET cx=cx+VAL "48": CIRCLE cx,cy,VAL "7": PLOT cx,cy-VAL "7": DRAW NOT PI,-
VAL "21": PLOT cx,cy-VAL "13": DRAW VAL "7",-VAL "8": DRAW NOT PI,-VAL "8": PLOT
 cx,cy-VAL "13": DRAW -VAL "7",-VAL "8": DRAW NOT PI,-VAL "8": PLOT cx,cy-VAL "2
8": DRAW VAL "6",-VAL "30": DRAW -VAL "3",-VAL "3": PLOT cx,cy-VAL "28": DRAW -V
AL "5",-VAL "28": DRAW -VAL "3",-VAL "3": LET cx=VAL "22": LET cy=VAL "120"
2710 PLOT cx+VAL "15",cy-VAL "58": DRAW VAL "20",NOT PI: DRAW NOT PI,VAL "10": D
RAW -VAL "20",NOT PI: DRAW NOT PI,-VAL "10": PLOT cx+VAL "15",cy-VAL "48": DRAW
VAL "4",VAL "4": DRAW VAL "20",NOT PI: DRAW -VAL "4",-VAL "4": PLOT cx+VAL "39",
cy-VAL "44": DRAW NOT PI,-VAL "10": DRAW -VAL "4",-VAL "4"
2715 PLOT cx+VAL "25",cy-VAL "46": DRAW VAL "6",NOT PI: DRAW NOT PI,VAL "3": DRA
W -VAL "6",NOT PI: DRAW NOT PI,-VAL "3"
2720 LET b$="I've just come back": PRINT AT VAL "3",VAL "2";: GO SUB VAL "9500":
 LET b$="from holiday.": PRINT AT VAL "4",VAL "2";: GO SUB VAL "9500": LET b$="W
hat did he say?": PRINT AT VAL "6",VAL "14";: GO SUB VAL "9500"
2725 LET b$="He said he had just come back": PRINT AT VAL "7",VAL "14";: GO SUB
VAL "9500": LET b$="from holiday.": PRINT AT VAL "8",VAL "14";: GO SUB VAL "9500
"
2730 PRINT AT VAL "3",VAL "3"; OVER VAL "1"; PAPER VAL "5"; INK VAL "1";" ";AT V
AL "3",VAL "7";"      ";AT VAL "7",VAL "19";"  ";AT VAL "7",VAL "24";"      ": GO
SUB VAL "2145"
2740 GO SUB 2750: GO TO 2000
2750 GO SUB VAL "9000": POKE VAL "23607",VAL "243": PRINT AT VAL "1",VAL "7";"El
ementary theory 2";AT VAL "10",VAL "3";"PAST"
2760 PRINT AT VAL "6",VAL "22";"PAST";AT VAL "7",VAL "22";"SIMPLE";AT VAL "9",VA
L "22";"PAST";AT VAL "10",VAL "22";"CONTINUOS"
2765 PRINT AT VAL "12",VAL "22";"PAST";AT VAL "13",VAL "22";"PERFECT";AT VAL "15
",VAL "22";"PAST";AT VAL "16",VAL "22";"PERFECT"
2767 PRINT AT VAL "18",VAL "22";"FUTURE IN";AT VAL "19",VAL "22";"THE PAST": GO
SUB VAL "2146"
2768 GO SUB VAL "9009": POKE VAL "23607",VAL "243": PRINT AT NOT PI,VAL "7"; OVE
R VAL "1";"Elementary theory 2": POKE VAL "23607",VAL "60": PAUSE NOT PI: GO SUB
VAL "2127"
2999  RETURN
3000 REM ***rutina EXERCISES***
3001 LET pct=0: LET k=VAL "1": LET l=VAL "1": LET a=VAL "1"
3002 GO SUB VAL "2006": POKE VAL "23607",VAL "243": INPUT "NAME:";a$
3003 PRINT AT 10,7;"SET 1    or    SET 2"
3004 PAUSE 0IN : LET t$=INKEY$
3005 IF t$="1" THEN LET set=1: GO TO 3008
3006 IF t$="2" THEN LET set=2: GO TO 3008
3007 GO TO 3004
3008 GO SUB VAL "2006": LET o=o+VAL "1": IF o>VAL "10" THEN GO SUB 7: LET o=VAL
"1": LET n$(o,19-LEN a$ TO )=a$
3009 LET n$(o,19-LEN a$ TO )=a$: PRINT 80;AT 0,0;"
  ": GO SUB 3900
3010 FOR k=VAL "1" TO VAL "4"
```

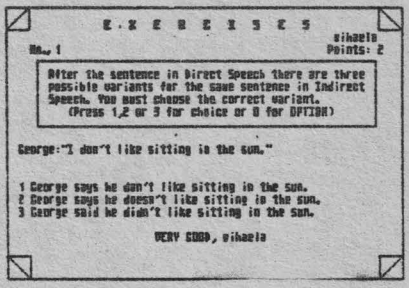
```
3011 IF k)=3 THEN LET da=0: LET b$=" REPORTING VERB in PAST TENSE ": PRINT AT 3,
8;: PAPER 1: INK 5: GO SUB 9500: LET da=1: PAPER 6: INK 1
3014 PRINT AT 3,4;" "; LET b$=STR$ k: PRINT AT 3,4;: GO SUB 9500
3015 FOR l=VAL "1" TO VAL "4"
3016 LET sw=NOT PI
3020 GO SUB VAL "3930"
3025 PAUSE NOT PI: LET t$=INKEY$
3030 IF (CODE t$<VAL "49" OR CODE t$>VAL "51") AND CODE t$<>VAL "79" THEN GO TO
VAL "3025"
3035 IF CODE t$=VAL "79" THEN GO TO VAL "10"
3036 PRINT AT 13+VAL t$,1; OVER 1; INK 1; PAPER 5;"
": PAUSE 100
3037 LET z$=(e$(k,1,1+VAL t$,1) AND set=1)+(f$(k,1,1+VAL t$,1) AND set=2)
3040 IF z$="1" THEN GO TO VAL "3100"
3045 LET sw=sw+VAL "1"
3050 IF sw=VAL "1" THEN GO TO VAL "3060"
3052 LET b$="The correct answer is:": PRINT AT VAL "18",VAL "4";: GO SUB VAL "95
00": GO SUB 3054: GO TO 3200
3054 FOR u=2 TO 4: IF (e$(k,1,u,1) AND set=1)+(f$(k,1,u,1) AND set=2)="1" THEN L
ET uu=u
3055 NEXT u: PRINT AT 12+uu,1; OVER 1; INK 6; PAPER 1;"
": PAUSE 0: RETURN
3060 POKE 23607,243: PRINT AT 19,4;"NO!!! Come back to THEORY": PAUSE 0: IF k=1
OR k=2 THEN GO SUB 2198: GO TO 3070
3065 GO SUB 2750
3070 CLS : GO SUB VAL "2006": GO SUB 3900: GO TO 3020
3100 IF sw=0 THEN LET p(o,1)=p(o,1)+2: GO TO 3110
3105 LET p(o,1)=p(o,1)+1
3110 PRINT AT 3,30;" "; LET b$=STR$ p(o,1): PRINT AT 3,30;: GO SUB 9500
3112 LET b$=("VERY " AND sw=0)+"GOOD, "+a$: PRINT AT 18,12;: GO SUB 9500: PAUSE
0
3115 LET p(o,2)=INT (100*(p(o,1)*10/32))/100
3200 LET b$="                                ": FOR i=11 TO 18: PRINT AT i,1; OVER
 1; PAPER 1; INK 6;b$: NEXT i: FOR i=18 TO 11 STEP -1: PRINT AT i,1; PAPER 6; IN
K 2;b$: NEXT i
3210 NEXT l
3220 NEXT k
3225 POKE 23607,243: PRINT AT 16,7; INK 0;"NO MORE EXERCISES !": POKE 23607,60:
PAUSE NOT PI
3230 CLS : GO SUB 2006
3235 POKE 23607,252: PRINT AT 1,9;"R E S U L T S": POKE 23607,60: LET b$="NAME
      POINTS          MARK": PRINT AT 4,7;: INK 1: GO SUB 9500: INK 2
3240 FOR t=1 TO o: LET b$=n$(k)+"                +STR$ p(k,1)+"                "+STR$ p(k
,2): PRINT AT 6+k,1;: GO SUB 9500: NEXT k: GO SUB 2145
3899 GO TO VAL "10"
3900 POKE VAL "23607",VAL "243": PRINT AT VAL "1",VAL "8"; INK VAL "1";"E X E R
C I S E S": POKE VAL "23607",VAL "60"
3905 LET b$="No. "+STR$ k: PRINT AT VAL "3",VAL "2";: GO SUB VAL "9500": LET b$=
n$(o): PRINT AT 2,21;: INK 0: GO SUB 9500: INK 2: LET b$="Points: "+STR$ p(o,1):
 PRINT AT VAL "3",VAL "26";: GO SUB VAL "9500"
3907 IF k)=3 THEN LET da=0: LET b$=" REPORTING VERB in PAST TENSE ": PRINT AT 3,
8;: PAPER 1: INK 5: GO SUB 9500: LET da=1: PAPER 6: INK 1
3910 LET b$=" After the sentence in Direct Speech there are three": PRINT AT VAL
 "5",VAL "3";: INK VAL "1": GO SUB VAL "9500"
3915 LET b$=" possible variants for the same sentence in Indirect": PRINT AT VAL
 "6",VAL "3";: GO SUB VAL "9500"
3920 LET b$=" Speech. You must choose the correct variant.": PRINT AT VAL "7",VA
L "3";: INK VAL "1": GO SUB VAL "9500"
3925 LET b$="(Press 1,2 or 3 for choice or 0 for OPTION)": PRINT AT VAL "8",VAL
"5";: GO SUB VAL "9500"
3926 PLOT VAL "20",VAL "98": DRAW VAL "218",NOT PI: DRAW NOT PI,VAL "42": DRAW -
VAL "218",NOT PI: DRAW NOT PI,-VAL "42": RETURN
3930 LET b$=(e$(k,1,VAL "1",VAL "2" TO ) AND set=1)+(f$(k,1,1,2 TO ) AND set=2):
 PRINT AT VAL "11",VAL "1";: INK NOT PI: GO SUB VAL "9500"
3935 INK VAL "2": FOR a=VAL "2" TO VAL "4": LET b$=STR$ (a-VAL "1")+" "+(e$(k,1,
a,VAL "2" TO ) AND set=1)+(f$(k,1,a,2 TO ) AND set=2): PRINT AT VAL "12"+a,VAL "
1";: GO SUB VAL "9500": NEXT a: INK VAL "1"
3998 RETURN
4005 FOR k=VAL "1" TO VAL "4": FOR l=VAL "1" TO VAL "4": FOR a=VAL "1" TO VAL "4
"
4006 INPUT "ex:";(k);" prop:";(l);" var:";(a);":";f$(k,1,a, TO ): NEXT a: NEXT l
: NEXT k: STOP
5000 FOR k=VAL "1" TO VAL "4"
5010 FOR l=VAL "1" TO VAL "4": CLS : FOR a=VAL "1" TO VAL "4"
5020 LET b$=(e$(k,1,a, TO ) AND set=1)+(f$(k,1,a, TO ) AND set=2): PRINT AT a,NO
T PI;: GO SUB VAL "9500"
5030 NEXT a: PAUSE NOT PI: NEXT l: PAUSE NOT PI: NEXT k: GO TO VAL "10"
9000 GO SUB VAL "2008": PLOT VAL "8",VAL "157": DRAW VAL "242",NOT PI: DRAW NOT
PI,-VAL "143": DRAW -VAL "242",NOT PI: DRAW NOT PI,VAL "143": PLOT VAL "10",VAL
"157": DRAW NOT PI,-VAL "143": PLOT VAL "170",VAL "157": DRAW NOT PI,-VAL "143":
 PLOT VAL "8",VAL "134": DRAW VAL "242",NOT PI: PLOT VAL "90",VAL "110": DRAW VA
L "158",NOT PI: PLOT VAL "90",VAL "86": DRAW VAL "158",NOT PI: PLOT VAL "90",VAL
```

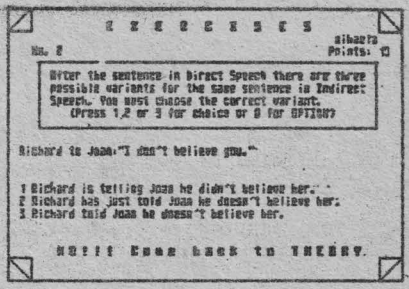
```
"62": DRAW VAL "158",NOT PI: PLOT VAL "90",VAL "38": DRAW VAL "158",NOT PI
9001 POKE VAL "23607",VAL "243": PRINT AT VAL "1",VAL "3";"TENSE";AT VAL "3",VA
L "2";"REPORTING";AT VAL "4",VAL "2";"VERB";AT VAL "3",VAL "12";"DIRECT";AT VAL
"4",VAL "12";"SPEECH": POKE VAL "23607",VAL "60"
9003 POKE VAL "23607",VAL "243": PRINT AT VAL "3",VAL "22";"INDIRECT";AT VAL "4"
,VAL "22";"SPEECH";AT VAL "6",VAL "12";"PRESENT";AT VAL "7",VAL "12";"SIMPLE": P
OKE VAL "23607",VAL "60"
9005 POKE VAL "23607",VAL "243": PRINT AT VAL "9",VAL "12";"PRESENT";AT VAL "10"
,VAL "12";"CONTINUOS";AT VAL "12",VAL "12";"PRESENT";AT VAL "13",VAL "12";"PERFE
CT": POKE VAL "23607",VAL "60"
9007 POKE VAL "23607",VAL "243": PRINT AT VAL "15",VAL "12";"PAST";AT VAL "16",V
AL "12";"SIMPLE";AT VAL "18",VAL "12";"FUTURE": POKE VAL "23607",VAL "60": RETUR
N
9009 GO SUB VAL "2006": POKE VAL "23607",VAL "243": PRINT AT VAL "19",VAL "5";"P
ress ENTER to CONTINUE": POKE VAL "23607",VAL "60"
9010 PLOT VAL "40",VAL "160": DRAW VAL "176",NOT PI: DRAW NOT PI,-VAL "128": DRA
W -VAL "1  ",NOT PI: DRAW NOT PI,VAL "128": PLOT VAL "128",VAL "160": DRAW NOT P
I,-VAL "1  ": PLOT VAL "40",VAL "142": DRAW VAL "176",NOT PI: PLOT VAL "40",VAL
"125": DRAW VAL "176",NOT PI: PLOT VAL "40",VAL "108": DRAW VAL "176",NOT PI: PL
OT VAL "40",VAL "84": DRAW VAL "176",NOT PI: PLOT VAL "40",VAL "67": DRAW VAL "1
76",NOT PI: PLOT VAL "40",VAL "50": DRAW VAL "176",NOT PI
9011 POKE VAL "23607",VAL "243": PRINT AT VAL "2",VAL "6";"DIRECT";AT VAL "2",VA
L "17";"INDIRECT";AT VAL "3",VAL "6";"SPEECH";AT VAL "3",VAL "17";"SPEECH": POKE
 VAL "23607",VAL "60"
9012 POKE VAL "23607",VAL "243": PRINT AT VAL "5",VAL "6";"HERE";AT VAL "7",VAL
"6";"TODAY";AT VAL "9",VAL "6";"YESTERDAY";AT VAL "12",VAL "6";"AGO";AT VAL "14"
,VAL "6";"TOMORROW";AT VAL "16",VAL "6";"NOW": POKE VAL "23607",VAL "60"
9013 POKE VAL "23607",VAL "243": PRINT AT VAL "5",VAL "17";"THERE";AT VAL "7",VA
L "17";"THAT DAY";AT VAL "9",VAL "17";"THE DAY";AT VAL "10",VAL "17";"BEFORE";AT
 VAL "12",VAL "17";"BEFORE";AT VAL "14",VAL "17";"NEXT DAY";AT VAL "16",VAL "17"
;"THEN": POKE VAL "23607",VAL "60": RETURN
9100 CIRCLE cx+VAL "42",cy,VAL "7": PLOT cx+VAL "42",cy-VAL "7": DRAW NOT PI,-VA
L "21"
9101 CIRCLE cx,cy,VAL "7": PLOT cx,cy-VAL "7": DRAW NOT PI,-VAL "21": DRAW VAL "
14",-VAL "14": DRAW -VAL "28",NOT PI: DRAW VAL "14",VAL "14"
9115 REM LET x=(175-cy)/8: REM LET y=cx/8: REM FOR i=x-1 TO x+7: REM PRINT AT i,
y-3; OVER 1; PAPER 5; INK 9;"      ": REM NEXT i
9120 RETURN
9500 REM rutina scriere rapida
9510 POKE 23606,0: FOR j=1 TO LEN b$-1 STEP 2
9520 POKE 23607,249: PRINT OVER da;b$(j);
9530 POKE 23607,252: PRINT CHR$ 8; OVER 1;b$(j+1);
9540 NEXT j
9550 IF LEN b$/2=INT (LEN b$/2) THEN POKE 23607,60: RETURN
9560 POKE 23607,249: PRINT OVER 1;b$(j);: POKE 23607,60: RETURN
9998 BORDER NOT PI: PAPER NOT PI: INK VAL "7": CLS : LIST
9999 CLS : PRINT AT NOT PI,NOT PI;" SAVE ": SAVE "DIRECT" LINE VAL "1": SAVE "SE
T64"CODE VAL "64000",VAL "1536": SAVE "setgros"CODE VAL "62464",VAL "768": SAVE
"UDG"CODE VAL "23296",VAL "168": PRINT AT NOT PI,NOT PI;"VERIFY ": VERIFY "DIREC
T": VERIFY "SET64"CODE : VERIFY "setgros"CODE : VERIFY "UDG"CODE : GO TO VAL "10
0"
```

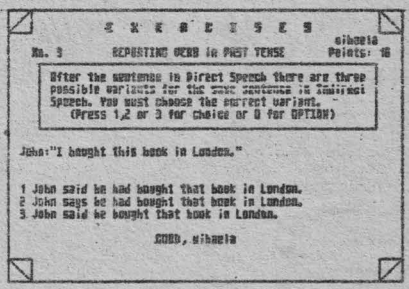

STATEMENTS
THEORY
The Indirect
Speech

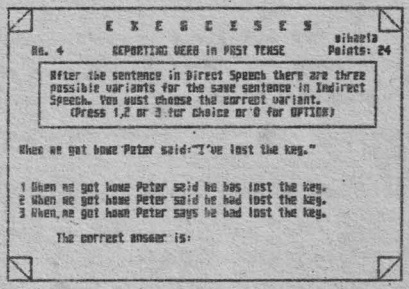

Elementary THEORY 1
I've lost my hat!
What is PETER saying?
He is saying he has lost his hat.
Press a key to CONTINUE

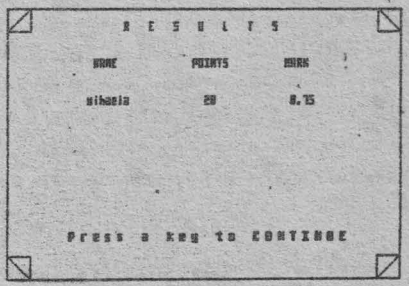

Elementary theory 2
We're going to have a party tonight!
... and JANE said that they were going to have a party that evening.
Press a key to CONTINUE


E.X.E.R.C.I.S.E.S
vihaela
No. 1
Points: 2
After the sentence in Direct Speech there are three possible variants for the same sentence in Indirect Speech. You must choose the correct variant.
(Press 1,2 or 3 for choice or 0 for OPTION)
George:"I don't like sitting in the sun."
1 George says he don't like sitting in the sun.
2 George says he doesn't like sitting in the sun.
3 George said he didn't like sitting in the sun.
VERY GOOD, vihaela


E X E R C I S E S
mihaela
No. 2
Points: 12
After the sentence in Direct Speech there are three possible variants for the same sentence in Indirect Speech. You must choose the correct variant.
(Press 1,2 or 3 for choice or 0 for OPTION?
Richard to Joan:"I don't believe you."
1 Richard is telling Joan he didn't believe her.
2 Richard has just told Joan he doesn't believe her.
3 Richard told Joan he doesn't believe her.
Wait! Come back to THEORY.


E X E R C I S E S
mihaela
No. 3
REPORTING VERB in PAST TENSE
Points: 16
After the sentence in Direct Speech there are three possible variants for the same sentence in Indirect Speech. You must choose the correct variant.
(Press 1,2 or 3 for choice or 0 for OPTION)
John:"I bought this book in London."
1 John said he had bought that book in London.
2 John says he had bought that book in London.
3 John said he bought that book in London.
GOOD, mihaela


E X E R C I S E S
mihaela
No. 4
REPORTING VERB in PAST TENSE
Points: 24
After the sentence in Direct Speech there are three possible variants for the same sentence in Indirect Speech. You must choose the correct variant.
(Press 1,2 or 3 for choice or 0 for OPTION)
When we got home Peter said:"I've lost the key."
1 When we got home Peter said he has lost the key.
2 When we got home Peter said he had lost the key.
3 When we got home Peter says he had lost the key.
The correct answer is:


R E S U L T S
NAME
POINTS
MARK
mihaela
20
8.75
Press a key to CONTINUE

5.2. LIMBA FRANCEZA

SI CONDITIONNEL

Am vazut in subcapitolul precedent cum INFORMATICA poate ajuta la predarea si verificarea cunostintelor si la orele de LIMBI STRAINE. Programul urmator este un alt astfel de exemplu, de data aceasta realizat pentru orele de LIMBA FRANCEZA.

Programul verifica, pe baza unui set mare de exerciti, cunostintele in ceea ce priveste folosirea celor trei reguli ale lui SI-conditionnel.

Dupa incarcarea programului pe ecran va apare urmatorul meniu:

1. Exemples
2. Regles
3. Exercices

Tastind "1" vom avea afisate exemple de propozitii in care se folosesc regulile amintite. Optiunea a doua contine un tabel sintetic a acestor reguli. Aceste prime doua parti a programului sint realizate pentru ca elevul sa poata revedea teoria inaintea inceperii exercitiilor.

Optiunea "3" reprezinta verificarea propriu-zisa a cunostintelor. Ea contine 5 exercitii. La primul exercitiu se dau cite 2 verbe care trebuie introduse pe rind la timpul potrivit, conform celor trei reguli , in niste propozitii date. Introducerea se realizeaza pe baza unor modele afisate pe ecran care sintetizeaza regulile. La al doilea exercitiu nu se mai da modelul ci numai regula. Se va folosi numai regula 1. Analog se folosesc regulile 2 si 3 la exercitiile 3 respectiv 4. La ultimul exercitiu nu se mai afiseaza nici modelul nici regula. deci elevul trebuie se decida singur ce regula sa foloseasca in fiecare propozitie.

Introducerea verbelor se realizeaza cu ajutorul unui cursor care se plimba printr-un alfabet al limbii franceze care apare

in partea de jos a ecranului. Tastele Q si P deplaseaza cursorul la stinga si respectiv la dreapta , iar O introduce litera curenta. Daca litera nu e corecta apare afisat , pentru citeva momente, numarul de greseli facute pina in acel moment. Daca timpul dintre introducerea a doua litere consecutive depaseste 20 de secunde acest lucru este luat tot ca o greseala. Daca elevul nu stie litera care trebuie sa urmeze, el poate cere ajutorul calculatorului, apasind tasta ENTER, care va introduce singur urmatoarea litera. In acelasi timp in coltul dreapta sus este afisat numarul de litere cerute, ca ajutor, de elev.

Dupa fiecare exercitiu apare un tabel cu rezultatele fiecarui elev : numarul de greseli si numarul de ajutoare , rezultate care ajuta profesorul la evaluarea notelor elevilor.

Programul poate fi folosit fie in cadrul orei in care se predau regulile lui SI-conditionnel, pentru a fixa cunostintele (exercitiile 1, 2, 3 si 4) sau in ora urmatoare, pentru verificarea pregatirii elevilor (exercitiile 2, 3, 4 si 5).

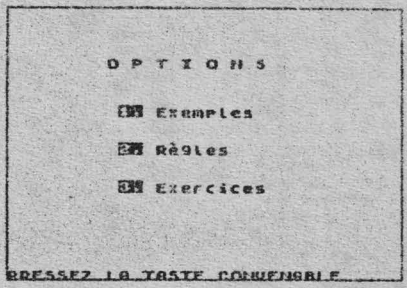
```
  1 REM  SI CONDITIONNEL
  2 REM      autor:
  3 REM     Adrian DUMITRESCU
  4 REM
  8 LOAD ""CODE 23296,40: LOAD ""CODE 65368,168: LOAD ""CODE 60000,168: LOAD ""
CODE 60168,768
  9 LET gresel$=0: POKE 23606,8: POKE 23607,234: LET k=-10: DIM F(40): LET K$="
                                  ": LET K$=K$+K$+K$+K$+K$+K$+K$+K$+K$+K$
 10 DIM a(40): FOR l=1 TO 40: LET A(l)=0: LET F(l)=0: LET help=0: LET sw=0: LET
 aj=0: INVERSE 0: BORDER 0: PAPER 0: INK 6: CLS : CLB
 19 LET num=1: GO SUB 6000
 20 GO SUB 5000: CLS
 21 INK 6: PRINT AT 4,8;"O P T I O N S :";AT 8,9;"1. Exemples ";AT 11,9;"2. R?g
les  ";AT 14,9;"3. Exercices "
 22 LET M$="PRESSEZ LA TASTE CONVENABLE": LET LM=21: LET CM=0: LET RETURN=0: GO
 SUB 9997: IF RETURN=1 THEN GO TO 24
 23 GO TO 22
 24 LET i$=INKEY$
 25 IF i$="1" THEN PRINT AT 8,9; FLASH 1; OVER 1;"  "; GO SUB 99
 26 IF i$="2" THEN PRINT AT 11,9; FLASH 1; OVER 1;"  "; GO SUB 200
 27 IF i$="3" THEN PRINT AT 14,9; FLASH 1; OVER 1;"  "; GO SUB 300
 28 GO TO 21
 98 STOP
 99 LET NUM=2: GO SUB 6000: GO SUB 5000: LET inalt=8: LET ycolt=167: LET latime
=239
 100 CLS : INK 6: PRINT AT 2,1;"R E M A R Q U E Z !";AT 4,1;"1.Si vous acceptez
 son invita-";AT 6,1;"tion , il sera heureux";AT 3,12; INK 2;"pr?sent";AT 5,17;"f
utur"
 102 PRINT AT 8,1;"S'il fait beau ce soir,je sors";AT 7,5; INK 2;"pr?sent";AT 7,
24;"pr?sent"
 103 PLOT 8,104: DRAW 0,8: DRAW 14,0: DRAW 0,-8: DRAW -14,0
 104 PRINT AT 10,1;"2.Elle   viendrait  te voir si";AT 12,1;"elle avait le temps
 ";AT 9,8; INK 2;"cond. pr?sent";AT 11,4;"imparfait"
 105 PLOT 230,88: DRAW 0,8: DRAW 16,0: DRAW 0,-8: DRAW -16,0
 106 PRINT AT 14,1;"3.Il     aurait    r?ussi s'il";AT 16,1;"avait ?t?pers?v?ran
t";AT 15,3; INK 2;"plus-que-parfait";AT 13,8;"cond. pass?"
 107 LET M$="PRESSEZ UNE TASTE": PLOT 215,55: DRAW 0,8: DRAW 16,0: DRAW 0,-8: DR
AW -16,0: LET return=0: GO SUB 9997: IF return=1 THEN LET NUM=1: GO SUB 6000: GO
 TO 199
 108 GO TO 107
 109 GO SUB 5000: RETURN
 200 LET num=2: GO SUB 6000: GO SUB 5000: CLS : INK 6
 201 PRINT AT 2,1;"R E G L E S";AT 1,3;"?";AT 4,26;"?"
 202 PRINT AT 5,1;"I.   FUTUR ou      SI    PRESENT";AT 7,6;"PRESENT";AT 6,8;"?"
 203 PRINT AT 10,1;"II. CONDITIONNEL SI  IMPARFAIT";AT 12,7;"PRESENT";AT 11,9;"?
"
 204 PRINT AT 15,1;"III.COND.  SI PLUS-QUE-PARFAIT";AT 17,5;"PASSE";AT 16,9;"?"
 205 PLOT 8,142: DRAW 239,0: DRAW 0,-33: DRAW -239,0: DRAW 0,33
 206 PLOT 40,109: DRAW 0,33: PLOT 130,109: DRAW 0,33: PLOT 180,109: DRAW 0,33
 207 PLOT 8,102: DRAW 239,0: DRAW 0,-33: DRAW -239,0: DRAW 0,33
 208 PLOT 40,69: DRAW 0,33: PLOT 137,69: DRAW 0,33: PLOT 175,69: DRAW 0,33
 209 PLOT 8,60: DRAW 239,0: DRAW 0,-33: DRAW -239,0: DRAW 0,33
 210 PLOT 40,27: DRAW 0,33: PLOT 90,27: DRAW 0,33: PLOT 117,27: DRAW 0,33
 211 LET m$="PRESSEZ UNE TASTE": LET return=0: GO SUB 9997: IF return=1 THEN LET
 NUM=1: GO SUB 6000: GO TO 213
 212 GO TO 211
 299 GO SUB 5000: RETURN
 300 LET switch=0: LET num=2: GO SUB 6000: GO SUB 5000: FOR H=1 TO 7: CLS : INK
 6: PRINT AT 1,1;"E X E R C I C E no.1";AT 3,1;"Suivez les trois exemples :";AT 5
,0; PAPER 5; INK 0;" Si je sors,j'aurai froid.

 301 PRINT AT 7,0; PAPER 5; INK 0;" Si je sortais,j'aurais froid.
                  ";AT 9,0;" Si j'?tais sorti,j'aurais eu    ";AT 10,0;"froid.

 302 PLOT 8,140: DRAW 200,0: PAUSE 0:
 499 LET res=9000+h: RESTORE res: READ t$: READ u$: PRINT AT 11,0; PAPER 6; INK
0;"                                ";AT 11,1;h;".";AT 11,3;t$;AT 11,31-LEN u$;u$
 500 RESTORE 9001+h*10: READ z$: PRINT AT 13,0;z$
 501 IF h=1 THEN PRINT #0;AT 1,0; PAPER 5; INK 0;" abcd???efghijklmnopqrstuvwxyz
 ";AT 1,0; PAPER 1; BRIGHT 1; OVER 1; INK 7;" "; GO SUB 5100
 502 LET liniei=5: LET linieii=5: GO SUB 8100
 510 RESTORE 9101+h*10: READ yi: READ xi: READ yj: READ xj: RESTORE 9001+h*10
 519 GO SUB 8000
 520 LET liniei=7: GO SUB 8100
 531 RESTORE 9002+h*10: READ z$: PRINT AT 16,0;z$
 532 RESTORE 9102+h*10: READ yi: READ xi: READ yj: READ xj: RESTORE 9002+h*10: G
O SUB 8000
 533 LET liniei=7: LET linieii=9: GO SUB 8100
 535 RESTORE 9003+h*10: READ z$: PRINT AT 19,0;z$
 536 RESTORE 9103+h*10: READ yi: READ xi: READ yj: READ xj: RESTORE 9003+h*10: G
O SUB 8000
 538 GO SUB 8200
 547
```

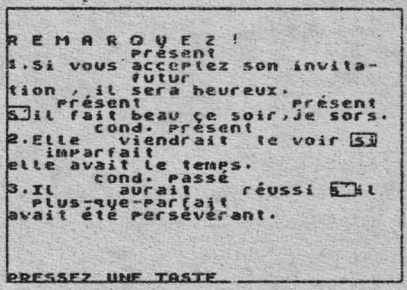
```
    PAUSE 0: PAUSE 0: FOR q=11 TO 21: PRINT AT q,0: PAPER 3: INK 7; OVER 1;"
                          ": NEXT q: FOR q=21 TO 11 STEP -1: PRINT AT q,0; PA
PER 0;"                          ": NEXT q
 548 LET K=K+10: GO SUB 6100: NEXT h
 550 FOR a=0 TO 3
 551 FOR w=1 TO 3: GO SUB 5000: CLS : INK 6: PRINT AT 1,0;" E X E R C I C E no."
;a+2
 600 PRINT INK 6;AT 3,0;"    Mettez le verbe entre    parenth?ses au temps co
nvenable:"
 601 GO SUB 700+a*10
 610 RESTORE 9200+a*10+w: READ w$,yi,xi,z$,yj,xj: PRINT AT 12,0;w$;AT 16,0;z$: R
ESTORE 9300+a*10+w: GO SUB 8000: PAUSE 0
 620 PAUSE 0: PAUSE 0: FOR i=12 TO 21: PRINT AT i,0; PAPER 0;"
                ": NEXT i
 625 LET k=k+10
 630 GO SUB 6100: NEXT w
 650 NEXT a
 660 PRINT #0;AT 1,0;"9 STOP statement,660:1": PAUSE 0: POKE 23618,2: POKE 23619
,0: POKE 23620,5
 700 PRINT AT 6,0; PAPER 1; INK 6;" Rappelez-vous:
                    FUTUR      SI      PRESENT

 701 PLOT 8,119: DRAW INK 6;239,0: DRAW INK 6;0,-24: DRAW INK 6;-239,0: DRAW INK
 6;0,24
 702 PLOT 95,119: DRAW INK 6;0,-24: PLOT 150,119: DRAW INK 6;0,-24
 703 PRINT AT 7,23; OVER 1; PAPER 1; INK 6;"?"
 704 PAUSE 0
 705 RETURN
 710: PRINT AT 5,0; PAPER 1; INK 6;" Rappelez-vous:
                    CONDITIONNEL                    ?       SI   IMPARFA
IT      PRESENT
 711 PLOT 8,127: DRAW 239,0: DRAW 0,-32: DRAW -239,0: DRAW 0,32:: PLOT 120,127:
DRAW 0,-32: PLOT 157,127: DRAW 0,-32::
 719 PAUSE 0: RETURN
 720: PRINT AT 5,0; PAPER 1; INK 6;" Rappelez-vous:
                    COND.                                   ?   SI  PLUS-QUE-PARFA
IT    PASSE
 721 PLOT 8,127: DRAW 239,0: DRAW 0,-32: DRAW -239,0: DRAW 0,32:: PLOT 70,127: D
RAW 0,-32: PLOT 107,127: DRAW 0,-32::
 729 PAUSE 0: RETURN
 730 RETURN
4000 INPUT "line=";lines;"  statement=";statement
4001 POKE 23618,lines-INT (lines/256)*256
4002 POKE 23619,INT (lines/256)
4003 POKE 23620,statement
4010 INPUT "LINE NR. ";LINENR
4015 LET LINENR1=-1
4020 PRINT "FOUND LINE NR. ";256*PEEK 23755+PEEK 23756
4025 FOR I=30500 TO 65535
4026 PRINT #0; INK 6;AT 0,0;I;TAB 7;"SEARCHING FOR LINE ";LINENR
4030 IF PEEK I=13 THEN LET LINENR1=256*PEEK (I+1)+PEEK (I+2)
4035 IF PEEK I=13 THEN PRINT "FOUND LINE NR. ";LINENR1
4040 IF LINENR1=LINENR THEN PRINT "ADDRESS OF LINE ";LINENR;" IS ";I+1
4045 IF LINENR1=LINENR THEN LET I=65536
4050 NEXT I
4055 INPUT "ADDRESS ";ADDRESS
4060 POKE ADDRESS+4,58
4061 POKE ADDRESS+5,58
4062 POKE ADDRESS+6,58
4063 POKE ADDRESS+7,58
4064 POKE ADDRESS+8,58
4065 POKE ADDRESS+9,58
4066 POKE ADDRESS+10,58
4070 RETURN
5000 RESTORE 5000: FOR I=0 TO 5: READ NR: POKE 23308,NR: RANDOMIZE USR 23300: NE
XT I: DATA BIN 1010101,BIN 10010010,BIN 10001000,BIN 1000,1,0
5001 RETURN
5010 LET out=0: FOR J=0 TO 1 STEP 0: FOR I=1 TO 6: PAUSE 5: POKE 23322,I: RANDOM
IZE USR 23321: IF INKEY$<>"" THEN LET I=7
5011 NEXT I: IF out=1 THEN RETURN
5015 FOR I=5 TO 2 STEP -1: PAUSE 5: POKE 23322,I: RANDOMIZE USR 23321: IF INKEY$
<>"" THEN LET I=1: LET j=2
5020 NEXT I: NEXT J: RETURN
5100 LET w$=" *** "+CHR$ 34+"P"+CHR$ 34+"-pour d?placer le courseur ? droite ***
 "+CHR$ 34+"Q"+CHR$ 34+"-pour d?placer le courseur ? gauche *** "+CHR$ 34+"O"+CH
R$ 34+"-pour ins?rer la lettre choisie *** "+CHR$ 34+"ENTER"+CHR$ 34+"-si vous a
vez besoin d'une aide"
5110 LET out1=0: PRINT AT 20,0;"PRESSEZ:"
5120 FOR z=1 TO 31: PAUSE 5: PRINT #0;AT 0,31-z; INK 6;w$(1 TO z+1): IF INKEY$<>
"" THEN LET out1=1: LET z=32
```

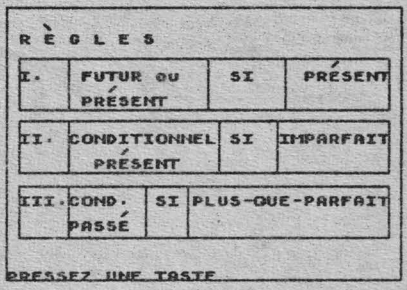
```
5125 NEXT z: IF out1=1 THEN GO TO 5160
5130 FOR z=2 TO 136: PAUSE 5: PRINT #0;AT 0,0; INK 6;w$(z TO z+31): IF INKEY$<>"
" THEN LET out1=1: LET z=137
5135 NEXT z: IF out1=1 THEN GO TO 5160
5140 FOR z=137 TO 168: PAUSE 5: PRINT #0;AT 0,0; INK 6;w$(z TO )+w$(1 TO z-137):
 IF INKEY$<>"" THEN LET z=170
5150 NEXT z
5160 PRINT AT 20,0;"                ";#0;AT 0,0;"                                "; RETU
RN
5200 LET cont=95: PRINT #0;AT 0,24;"TEMPS:00"
5210 FOR j=0 TO 1
5220 FOR i=96 TO 175: POKE 23675,88: POKE 23676,255: GO TO 7100
5225 POKE 23676,234: POKE 23675,i
5230 IF i>=168 THEN LET cont=cont+1: POKE 23675,cont: PRINT #0;AT 0,30;"?": POKE
 23675,i
5250 PRINT #0;AT 0,31;"?"
5260 NEXT i
5265 POKE 23675,cont+1: PRINT #0;AT 0,30;"?": POKE 23675,i
5266 NEXT j
5270 IF sw=1 THEN LET i$="0": GO TO 8004
5280 IF sw=2 THEN LET i$="0": GO TO 8011
5999 STOP
6000 RESTORE 6000+NUM: FOR I=1 TO 9: READ TIME,PITCH: BEEP TIME,PITCH: NEXT I:
6001 DATA .4,5,.4,7,.4,9,.4,5,.4,5,.4,7,.4,9,.4,5,0,0
6002 DATA .4,9,.4,10,.6,12,0,0,0,0,0,0,.4,9,.4,10,.6,12,0,0,0,0,0,0,0,0
6003 RETURN
6100 GO SUB 5000: CLS : LET SWIT=0: PRINT AT 21,0;"QUEL EST VOTRE NOM ? .....
.";
6101 LET F(K/10+1)=GRESEL1: LET A(K/10+1)=HELP: LET GRESEL1=0: LET HELP=0
6102 FOR I=1 TO 10
6103 IF SWIT=1 THEN GO TO 6105
6104 PAUSE 0: LET i$=INKEY$: IF (i$="" OR CODE i$<97) AND CODE i$<>12 AND CODE i
$<>13 THEN GO TO 6104
6105 IF CODE i$=12 AND i>1 THEN BEEP .01,30: PRINT AT 21,19+i;".": LET i=i-1: GO
 TO 6104
6106 IF CODE i$=13 THEN LET SWIT=1
6107 IF SWIT=1 THEN LET K$(I+K)=" ": GO TO 6120
6110 IF CODE i$>13 THEN LET K$(I+K)=CHR$ (CODE i$-32): IF K$(I+K)="" THEN GO TO
6105
6120 BEEP .01,30
6125 PRINT AT 21,20+I;K$(I+K)
6130 NEXT I
6131 IF swit=1 THEN GO TO 6133
6132 PAUSE 0: IF CODE INKEY$=12 AND i>1 THEN BEEP .01,30: PRINT AT 21,19+i;".":
LET i=i-1: GO TO 6104
6133 GO SUB 5000: PRINT AT 0,10;"?";AT 1,8;"R E S U L T A T S :": PRINT AT 3,0;"
NOM";TAB 15;"AIDES:";TAB 25;"FAUTES:": FOR I=1 TO 170 STEP 10: PRINT AT 5+I/10,0
;K$(I TO I+9);TAB 15;A(I/10+1);TAB 25;F(I/10+1): NEXT I
7000 PAUSE 0: PAUSE 0: GO SUB 5000: RETURN
7010 FOR i=1 TO 3: RESTORE 9000+i+h*10: READ z$: READ v$: READ w$: RESTORE 9100+
i+h*10: READ lin1: READ col1: READ no: READ lin2: READ col2: PRINT AT lin1,0;z$;
AT lin1,col1; INK 5;v$;AT lin2,col2;w$: NEXT i: RETURN
7100 REM  INKEY$  SIMULATOR
7110 LET q$=" abcd???efghijklmnopqrstuvwxyz  ": PRINT #0;AT 1,0; PAPER 5; INK 0;
q$
7112 GO SUB 7120: GO TO 7130
7120 PRINT #0;AT 1,aj; OVER 1; PAPER 1; INK 7; BRIGHT 1;" "
7124 RETURN
7125 PRINT #0;AT 1,aj; OVER 1; PAPER 5; INK 0;" "
7126 RETURN
7130 IF (INKEY$="P" OR INKEY$="p") AND aj<31 THEN GO SUB 7125: LET aj=aj+1: GO S
UB 7120
7140 IF (INKEY$="p" OR INKEY$="P") AND aj=31 THEN GO SUB 7125: LET aj=0: GO SUB
7120
7150 IF (INKEY$="q" OR INKEY$="Q") AND aj=0 THEN GO SUB 7125: LET aj=31: GO SUB
7120
7160 IF (INKEY$="q" OR INKEY$="Q") AND aj>0 THEN GO SUB 7125: LET aj=aj-1: GO SU
B 7120
7170 IF INKEY$="o" OR INKEY$="O" THEN LET i$=q$(aj+1): GO TO 7190
7175 IF (CODE INKEY$=13 OR CODE INKEY$=14) AND sw=1 THEN LET help=help+1: LET i$
=x$(r): PRINT AT 1,26-LEN STR$ help; PAPER 2; INK 7;"AIDES:";HELP: GO TO 7190
7176 IF (CODE INKEY$=13 OR CODE INKEY$=14) AND sw=2 THEN LET help=help+1: LET i$
=y$(r): PRINT AT 1,26-LEN STR$ help; PAPER 2; INK 7;"AIDES:";HELP: GO TO 7190
7180 GO TO 5225
7185 GO TO 7130
7190 IF sw=1 THEN GO TO 8004
7200 IF sw=2 THEN GO TO 8011
8000 LET x1=x1: LET x2=xj: READ x$: READ x$: READ y$
8001 FOR r=1 TO LEN x$
8002 PRINT AT y1,x1; PAPER 5; INK 1; FLASH 1
```

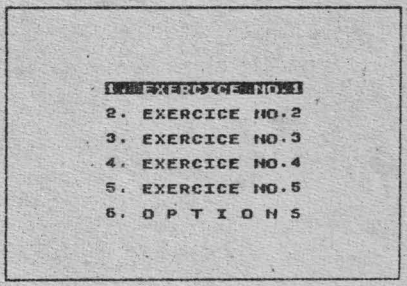
```
                                                    ;" ": IF x$(r)=" " THEN GO TO 8006
8003 LET sw=1: GO TO 5200
8004 BEEP .005,30
8005 IF i$<>x$(r) THEN BEEP .5,-20: LET greseli=greseli+1: PRINT #0;AT 1,0; INK
6; FLASH 1;"FAUTES:";greseli: PAUSE 50: PRINT #0; FLASH 0;AT 1,0; OVER 1;"
          "; GO TO 8002
8006 PRINT INK 5;AT yi,xi;x$(r): LET xi=xi+1: PRINT AT yi,xi; PAPER 5; INK 1; FL
ASH 1;" ": NEXT r
8007 PRINT AT yi,xi; PAPER 0;" ": PRINT AT yj,xj; PAPER 5; INK 1; FLASH 1;" ": F
OR r=1 TO LEN y$
8008 IF y$(r)=" " THEN GO TO 8017
8009 LET sw=2: GO TO 5200
8011 BEEP .005,30
8016 IF i$<>y$(r) THEN BEEP .5,-20: LET greseli=greseli+1: PRINT #0;AT 1,0; INK
6; FLASH 1;"FAUTES:";greseli: PAUSE 50: FLASH 0: PRINT #0;AT 1,0; OVER 1;"
          "; GO TO 8009
8017 PRINT INK 5;AT yj,xj;y$(r): LET xj=xj+1: PRINT AT yj,xj; PAPER 5; INK 1; FL
ASH 1;" ": NEXT r: PRINT AT yj,xj; PAPER 0;" ": RETURN
8100 PR  T AT liniei,0; PAPER 5; INK 0;" "; OVER 1;"

8110 PRINT AT linieii,0; PAPER 1; INK 7;">"; OVER 1;"

8120 RETURN
8200 PRINT AT linieii,0; PAPER 5; INK 0;" "; OVER 1;"

8210 RETURN
8998 STOP
9000 REM  DATA division/verbs
9001 DATA "soigner","?tre"
9002 DATA "tomber","entrer"
9003 DATA "faire","se porter"
9004 DATA "avoir","prendre"
9005 DATA "trouver","faire"
9006 DATA "courir","sauter"
9007 DATA "se d?shabiller","prendre"
9011 DATA "   Si elles ..... mieux leursdents,elles ..... plus jolies.","soi
gnent","seront"
9012 DATA " Si elles ..... mieux leursdents,elles ..... plus jolies","so
ignaient","seraient"
9013 DATA "  Si elles ..... ..... mieux leurs dents,elles ..... ... plus
jolies.","avaient soign?","auraient ?t?"
9021 DATA "Si tu ..... malade,tu ..... ? l'hopital.","tombes","entreras"
9022 DATA "  Si  tu  ..... malade , tu ..... ? l'hopital.","tombais","en
trerais"
9023 DATA "  Si tu ..... ..... malade , tu ..... ..... ? l'hopital.","?tais tom
b?","serais entr?"
9031 DATA "   S'il  ....  du  sport , il.. ..... mieux.","fait","se portera
"
9032 DATA "   S'il  ..... du sport, il.. ..... mieux.","faisait","se po
rterait"
9033 DATA "   S'il  ..... .... du sport,il.. ..... ..... mieux.","avait fait",
"se serait port?"
9041 DATA "Si elle . de la temp?rature,elle..... un m?dicament.","a","prendra"
9042 DATA "Si elle ..... de la t?mperature,elle ..... un m?dicament.","avait
","prendrait"
9043 DATA " Si elle ..... de la t?mpera-ture,elle ..... .... un m?dica-ment.
","avait eu","aurait pris"
9051 DATA " Si vous ..... un bon arbitre,nous  .....  une  partie  defootb
all.","trouvez","ferons"
9052 DATA "Si vous ..... un bon arbitre,nous  .....  une partie  defootb
all.","trouviez","ferions"
9053 DATA "  Si  vous  ..... ..... un  bonarbitre,nous ..... ....  uneparti
e de football.","aviez trouv?","aurions fait"
9061 DATA "  S'ils  .....  plus  vite,ils..... plus loin.","courent","saut
eront"
9062 DATA "   S'ils  ..... plus  vite,ils ..... plus loin.","couraien
t","sauteraient"
9063 DATA "S'ils  ..... ..... plus vite,ils ..... ..... plus loin.","avaie
nt couru","auraient saut?"
9071 DATA "Si  nous  nous  ..... enplein air,nous ..... froid.","d?s
habillons","prendrons"
9072 DATA "Si  nous nous  ..... enplein air,nous ..... froid.","d?
shabillions","prendrions"
9073 DATA "Si nous nous ..... ..... en plein air,nous ..... .... froid
.","?tions d?shabill?s","aurions pris"
9100 REM  DATA division/coordinates
9111 DATA 13,12,14,12
9112 DATA 16,10,17,12
9113 DATA 19,11,20,18
9121 DATA 13,6,13,23
9122 DATA 16,10,17,0
9123 DATA 19,8,20,6
```

```
9131 DATA 13,10,14,0
9132 DATA 16,10,17,0
9133 DATA 19,9,20,0
9141 DATA 13,8,14,0
9142 DATA 16,8,17,5
9143 DATA 19,9,20,10
9151 DATA 13,9,14,7
9152 DATA 16,8,17,7
9153 DATA 19,11,20,14
9161 DATA 13,9,14,0
9162 DATA 16,10,17,4
9163 DATA 19,7,20,4
9171 DATA 13,16,14,15
9172 DATA 16,15,17,15
9173 DATA 19,13,20,18
9200 REM  DATA division2/texts&coordinates
9201 DATA "1.S'il . soif,il boira de l'eau.(avoir)",12,7,"2.Il  .. .t.....  s'i
l  a  som-eeil.(se coucher)",16,6
9202 DATA "3.Si  tu  as  mal  au pied , tu.. ..... ..  courir. (ne pas pouvo
ir)",13,0,"4.Je sortirai  s'il .... beau cesoir.(faire)",16,20
9203 DATA "5.Si  tu  as  de  l'argent , tu ..... une voiture.(acheter)",13,0
,"6.Si tu .....nous  t'accompa- gnerons.(partir)",16,8
9211 DATA "1.Si elle ..... ,sa m?re la  consolerait.(pleurer)",12,10,"2.S'il
 r?ussissait , je ..... heureux.(?tre)",16,25
9212 DATA "3.Si le temps le permettait , jevous ..... (accompagner)",13
,5,"4.Je ..... le travail ce soir si l'on m'aidait.(finir)",16,5
9213 DATA "5.Nous irions au th??tre si nous..... des billets.(trouver)",13,0
,"6.  Si  j'avais  sommeil , je .. ..... (se coucher)",17,0
9221 DATA "1.J'aurais compris ces choses situ ..... .. la  patience  de  aeles e
xpliquer.(avoir)",13,3,"2.Si elle  ..... ..... pr?s demoi,j'aurais ?t? plus tr
anquille(rester). ",16,11
9222 DATA "3.La situation ..... ... tout autre si toutes les conditions avaie
nt ?t? r?alis?es.(?tre)",12,15,"4.J'aurais ?t? malheureux si  tu  ..... .....
ma  proposition.(refuser)",17,2
9223 DATA "5.Si tu ..... ..  la  jeune  ac-trice d?buter dans cette pi?ce, tu au
rais ?t? ?tonn?.(voir)",12,8,"6.  S'il  avait  insist?  , je..... .... plus t
?t.(venir)",17,0
9231 DATA "1. Il  ne  parviendra pas  ?  vivre  honorablement s'il  .. ..
..... ... (ne pas trava- iller). ",14,0,"2.Je ..... capable  de  faire cette
ascension difficile s'il  faisait beau. ",16,5
9232 DATA "2.Nous aurions ?t? moins s?v?ressi elle ..... ... la verit?.  (dire
)",13,8,"3.Si l'on m'aidait,je ........  le travail ce soir.(finir)",16,22
9233 DATA "5.Si vous ..... chez vos amis , il vous montreront leur apparte-ment.
(aller)",12,10,"6.Si mon ami avait pu m'accom-  pagner,j' ..... ..... mes va-
cances ? la campagne.(passer)",17,9
9300 REM DATA div.2/answers
9301 DATA "","a","se couchera"
9302 DATA "","ne pourras pas","fait"
9303 DATA "","ach?teras","partes"
9311 DATA "","pleurait","serais"
9312 DATA "","accompagnerais","finirais"
9313 DATA "","trouvions","se coucherais"
9321 DATA "","avais eu","?tait rest?e"
9322 DATA "","aurait ?t?","avais refus?"
9323 DATA "","?t? ?tonn?","serais venu"
9331 DATA "","ne travaille pas","?tre"
9332 DATA "","avait dit","finirais"
9333 DATA "","allez","aurais pass?"
9900 INVERSE 1: FOR x=87 TO 0 STEP -1: PLOT x,0: DRAW -x,x: PLOT x,175: DRAW -x,
-x: PLOT 255-x,0: DRAW x,x: PLOT 255-x,175: DRAW x,-x: NEXT x
9910 INVERSE 1: FOR x=127 TO 0 STEP -1: PLOT x,0: DRAW 0,175: PLOT 255-x,0: DRAW
 0,175: NEXT x:
9920 INVERSE 0: RETURN
9997 LET RETURN=0: FOR l=1 TO 6: PAUSE 5: PRINT AT LN,CM; INK 1;M$: IF INKEY$<>"
" THEN LET RETURN=1: GO TO 9999
9998 NEXT L
9999 RETURN : PRINT "FREE RAM: ";PEEK 23730+256*PEEK 23731-(PEEK 23653+256*PEEK
23654);" bytes": INPUT "NAME: "; LINE z$: SAVE z$ LINE 1: SAVE z$+"CODE "CODE 23
296,40: SAVE z$+"set6"CODE 65368,168: SAVE z$+"set9"CODE 60000,168: SAVE z$+"set
C"CODE 60168,768
```


OPTIONS
1 Exemples
2 Règles
3 Exercices
PRESSEZ LA TASTE CONVENABLE


REMARQUEZ !
présent
1.Si vous acceptez son invita-
futur
tion , il sera heureux.
présent présent
2.Il fait beau ce soir, je sors.
cond. présent
2.Elle viendrait te voir si
imparfait
elle avait le temps.
cond. passé
3.Il aurait réussi s'il
plus-que-parfait
avait été persévérant.
PRESSEZ UNE TASTE


RÈGLES
I. FUTUR ou PRÉSENT SI PRÉSENT
II. CONDITIONNEL PRÉSENT SI IMPARFAIT
III. COND. PASSÉ SI PLUS-QUE-PARFAIT
PRESSEZ UNE TASTE


1. EXERCICE NO.1
2. EXERCICE NO.2
3. EXERCICE NO.3
4. EXERCICE NO.4
5. EXERCICE NO.5
6. OPTIONS

E X E R C I C E no.1 AIDES:2

Suivez les trois exemples :

Si je sors,j'aurai froid.

Si je sortais,j'aurais froid.

>Si j'étais sorti,j'aurais eu froid.

1.soi9ner être

Si elles soi9nent mieux leurs dents,elles seront plus jolies.

Si elles soi9naient mieux leurs dents,elles seraient plus jolies

Si elles .... mieux leurs dents,elles .... plus jolies.

E X E R C I C E no.1 AIDES:1

Suivez les trois exemples :

Si je sors,j'aurai froid.

Si je sortais,j'aurais froid.

>Si j'étais sorti,j'aurais eu froid.

2.tomber entrer

Si tu tombes malade,tu entrerais à l'hôpital.

Si tu tombais malade , tu entrerais à l'hôpital.

Si tu é ... . malade , tu .... à l'hôpital.

CAPITOLUL 6
GEOGRAFIE

Este deosebit de important sa nu reducem folosirea calculatorului doar la materiile cu specific real ci sa incercam sa-l folosim si la materii de cultura generala. Un astfel de exemplu de utilizare a calculatorului il constitue programul "VULCANI".

Programul cuprinde intr-un mod sintetic intreaga materie de la capitolul respectiv din manualul clasei a IX-a de liceu. Mai mult, prin ceea ce cuprinde, programul depaseste cadrul manualului putind fi folosit si la cercurile de elevi pentru a prezenta intr-un mod nou si atractiv aceasta tema.

Programul este compus din doua mari parti care pot fi incarcate si rulate si separat, conform necesitatilor impuse de predarea temei respective: prima parte "FENOMENUL VULCANIC", a doua parte "VULCANII TEREI". Programul a fost conceput pentru calculatorul Spectrum 128K avind nevoie de memorie suplimentara destul de mare. A fost folosit in liceu la clasele a IX-a la orele recapitulative de la capitolul care trateaza aceasta tema. El poate fi folosit si individual de posesorii de astfel de calculatoare cu scopul de a se autoinstrui, de a-si reimprospata cunostintele sau de a capata noi cunostinte.

In incheierea acestei parti introductive am vrea sa remarcam ca utilizarea calculatorului in lectie nu inseamna "inlocuirea" profesorului,"subminarea" autoritatii lui de catre calculator. Profesorul a fost si va ramine profesor la clasa. Metodele de predare insa se vor schimba, si una din aceste schimbari este tocmai folosirea calculatorului in lectie.

6.1. FENOMENUL VULCANIC

Prima parte a programului se imparte si ea in doua: o parte teoretica care explica prin imagini sugestive fenomenul vulcanic si un joc in care sint utilizate majoritatea notiunilor noi intilnite in partea teoretica.Pentru incarcarea programului se tasteaza LOAD "" si se porneste casetofonul. In primul rind se va incarca programul "INCARC 1" care gestioneaza incarcarea apatru parti din primul program: un SCREEN$ care ramine pe ecran tot timpul incarcarii; apoi doua parti de BYTES numite "p1" si

"p2" care contin, concatenate, cite 4 SCREEN$-uri, deci fiecare are 6912 x 4 bytes; in final se incarca programul "BASIC 1" care se autolanseaza in executie aparind:

OPTIUNI

1 - structura interna a pamintului
2 - tectonica globala
3 - relieful si fenomenul vulcanic

---

4 - vulcanograf

In acest moment poate fi aleasa una din optiunile 1,2 sau 3.Daca se alege optiunea 4 atunci calculatorul intra in regim de incarcare (LOAD) pentru incarcarea primului joc (VULCANOGRIF).

OPTIUNEA 1 - structura interna a pamintului : apare schema structurii interne a pamintului cu elementele componente, iar in dreapta jos o lista de optiuni. In cele doua linii de jos ale ecranului se vor derula informatiile privind cele 4 parti componente ale pamintului: nucleul intern,nucleul extern,mantaua si scoarta (fig.1). Apasind C se va trece la urmatoarea secventa iar cu O se revine la OPTIUNI.

Secventa urmatoare cuprinde informatii despre *structura scoartei continentale si oceanice* (fig.2). Modul de lucru este indicat analog intr-o lista de optiuni din coltul din dreapta jos a ecranului.

OPTIUNEA 2 - tectonica globala: prezinta impartirea suprafetei globului terestru in placi tectonice (fig.3) si in continuare (optiunea C) ASTENOSFERA (fig.4).

OPTIUNEA 3 - relieful si fenomenul vulcanic: intr-o prima imagine este prezentat APARATUL VULCANIC cu elementele componente: VATRA VULCANULUI, COSUL, CRATERUL. Apasind succesiv o tasta oarecare sint indicate pe rind aceste elemente. Apasind tasta C se trece la o sinteza a activitatii vulcanice iar in continuare sint prezentate descompus FAZELE ERUPTIEI iar la alegerea optiunii M fazele sint prezentate animat. Miscarea poate fi oprita tastind E[xit]. Din acest punct se poate reveni la explicatii (X) sau la optiuni (O). Alegind:

OPTIUNEA 4 - apare mesajul "PORNESTE CASETOFONUL pentru

incarcarea jocului". Prin incarcarea jocului prima parte se distruge; poate fi revazuta doar prin reincarcarea programului de pe caseta.

6.1.2. VULCANGRIF

Jocul propune elevului care este in fata ecranului sa reconstitue o grila in care se afla cifre (0-9) si caractere speciale (+;-;,;/;*;.). Elevul trebuie sa inlocuiasca aceste cifre si caractere cu litere, obtinind astfel pe fiecare linie din grila cite un cuvint care a fost intilnit in prima parte teoretica iar in final pe verticala A-B se va obtine tot un cuvint din domeniul activitatii vulcanice (TECTONICA).

Pentru completarea grilei se poate proceda in doua moduri:
-studiind frcventa aparitiei vocalelor (se stie ca in limba romana cele mai frcvente litere sint A,E,I,...),sau
-pornind intuitiv (cel mai cunoscut fenomen legat de vulcani este ERUPTIA) deci se cauta cuvintul ERUPTIE.

Dupa completarea grilei la "Apasa o tasta" se trece la incarcarea partii a doua a programului:

6.2.1. VULCANII TERREI

La pornirea casetofonului se incarca un program incarcator numit "INCARC 2" care va gestiona incarcarea urmatoarelor parti: doua de bytes numite "p3" si "p4" continind ca si "p1" si "p2" cite 4 SCREEN$-uri si programul "BASIC 2" care gestioneaza aceste SCREEN$-uri. Acesta se autolanseaza dupa incarcare si apare o lista de

OPTIUNI

1 - America de sud
2 - America centrala
3 - America de nord
4 - Oceania
5 - Asia
6 - Africa
7 - Europa
8 - ROMANIA
9 - ZONE VULCANICE

0 - test geografic

Alegind una din optiunile 1-7 sint prezentate continentele respective, cu o lista de optiuni (O,C,sus,jos) iar in partea de jos, in ultimele doua rinduri apar: numele vulcanului indicat,tara,inaltimea,anul ultimei eruptii,daca este activ (A) sau stins (S).

OPTIUNEA 8 - prezinta fenomenul vulcanic in tara noastra: cele doua grupe vulcanice, de nord si de sud, precum si caracteristicile lor.

OPTIUNEA 9 (ZONE VULCANICE) - prezinta principalele zone vulcanice active de pe TERRA (se utilizeaza aceleasi optiuni deja prezentate).

6.2.2. TESTHT

OPTIUNEA 0 permite incarcarea ultimei parti a programului - un joc sub forma unui test geografic.

Programul se numeste TESTHT si are introdusa si o rutina de sintetizare a vocii. Cele 14 cuvinte de pe orizontala se pot deplasa stinga-dreapta folosind sagetile astfel incit pe verticala insemnata sa apara numele dorit. La apasarea tastei ENTER este considerat numele inscris in acest moment pe verticala. Sint permise maxim 5 incercari dupa care calculatorul arata el cele doua moduri de formare a numelui cautat. Si in cazul formarii corecte a numelui inaintea epuizarii celor 5 incercari permise,calculatorul arata cele doua moduri de formare a numelui,bineinteles neuitind sa-l felicite pe cel din fata ecranului.

Am incercat sa realizam prin acest program o apropiere intre geografie, si informatica. Avantajele folosirii calculatorului pe care am incercat sa le punem in evidenta sint: o prezentare sintetica a materiei respective, ilustrarea prin imagini atractive, posibilitatea de a revedea oricare din schemele prezentate,realizarea unor elemente de animatie, jocurile din finalul fiecarei parti care servesc la fixarea notiunilor nou introduse. Un alt mare avantaj este urmatorul: elevii interesati in studiul acestui capitol si care au acces la un calculator pot folosi acest program la studiu individual.

In scoala au fost realizate si alte programe care pot fi

folosite la orele de geografie sau in cadrul cercurilor de elevi. Astfel programul "EVOLUTIA CONTINENTELOR" prezinta repartizarea uscatului si a apei pe TERRA in evolutia lor impreuna cu etapele aparitiei vietii pe pamint; totul este prezentat prin elemente de animatie pe calculator. O alta lucrare numita "RELIEFUL CARSTIC " prezinta structura ,formarea, caracteristicile pesterilor. Are de asemenea o parte care prezinta statistic cele mai lungi pesteri din lume,cele mai adinci pesteri din lume,precum si citeva recorduri in domeniu.

Pentru programul "VULCANII" pot fi imaginate unele extensii si modificari care au ca scop imbunatatirea lui. Cele 16 SCREEN$-uri totalizeaza 16 x 6912 = 110592 bytes ,deci aproximativ 110 K memorie (foarte mult),ceea ce a necesitat impartirea programului in doua parti. Utilizind insa o rutina in cod masina pentru compactarea SCREEN$-urilor (vezi cap.10) si o alta pentru decompactarea pe ecran, se obtin economii substantiale de memorie (in medie economii de 35-40%) deci cele 16 SCREEN$-uri ar fi incaput pe aproximativ 70 K. In acest caz ar fi incaput in memorie si cele doua jocuri,fara sa fie nevoie de o incarcare de pe caseta in momentul utilizarii lor. De asemenea cele 4 programe BASIC 1,VULCANGRIF,BASIC 2 si TESTHT pot fi scurtate utilizind conventiile de reprezentare cunoscute:

10 ocupa 8 bytes ----> VAL "10" ocupa 5 bytes
deci o economie de 3 bytes

Analog se pot folosi :

0----> BIN
1----> SGN PI sau NOT BIN
3----> INT PI

Pot fi concepute pe aceeasi idee si alte jocuri,cu alti termeni care pot fi alese printr-un meniu. Ambelor jocuri li se poate atasa o rutina de contorizare a timpului si de punctare pentru a putea stabili o ierarhie intre diferiti jucatori.

Dezavantajul acestui set de programe il constituie faptul ca programele principale BASIC 1 si BASIC 2 sint concepute pentru varianta 128 K a calculatorului SPECTRUM ,deci nu pot fi folosite pe calculatoare TIM-S. Cu modificari putine si eventual cu inca o subimpartire a programelor acest lucru devine posibil. Jocurile VULCANGRIF si TESTHT pot fi incarcate si separat atit pe SPECTRUM 128 cit si pe TIM-S.

```
 1 REM   VULCANII 1
 2 REM   autori: prof. KARINEL SERBAN
 3 REM           elevi FLORIAN BRATA
 4 REM                 SIMONA STROITA
 5 CLEAR 37886
 6 PAPER 0: INK 0: CLS
10 LOAD ""SCREEN$
15 PAPER 7: INK 7: BRIGHT 1
20 LET s$="
30 PRINT AT 21,0;s$
40 PRINT AT 20,0;
50 LOAD "p1"CODE 37887,27648
60 SAVE !"e11"CODE 37887,6912
70 SAVE !"e12"CODE 44799,6912
80 SAVE !"e13"CODE 51711,6912
90 SAVE !"e14"CODE 58623,6912
100 PRINT AT 20,0;
110 LOAD "p2"CODE 37887,27648
120 SAVE !"e21"CODE 37887,6912
130 SAVE !"e22"CODE 44799,6912
140 SAVE !"e23"CODE 51711,6912
150 SAVE !"e24"CODE 58623,6912
170 PRINT AT 20,0;
180 LOAD "BASIC 1"
```

```
  1 REM   VULCANII 2
  5 SAVE ! "antet"SCREEN$
 10 CLS : DIM a$(17,32): GO SUB 180
 20 BORDER 5: PAPER 6: INK 1: BRIGHT 0: CLS
 30 FOR i=0 TO 31: PRINT AT 0,i; PAPER 1;" ";AT 21,31-i; PAPER 1;" ": NEXT i
 40 FOR i=0 TO 21: PRINT AT i,0; PAPER 1;" ";AT 21-i,31; PAPER 1;" ": NEXT i
 50 PRINT AT 2,12; PAPER 2; INK 6; BRIGHT 1;"OPTIUNI"
 60 PRINT AT 6,3;"1 - structura interna a";AT 7,8;"pamintului"
 70 PRINT AT 9,3;"2 - tectonica globala"
 80 PRINT AT 11,3;"3 - relieful si fenomenul";AT 12,8;"vulcanic"
 90 PRINT AT 14,3;"4 - vulcanografi"
100 LET s$="
110 FOR i= 5 TO 12: PRINT AT i,2; OVER 1; PAPER 7; BRIGHT 1;s$: NEXT i
111 FOR i= 13 TO 16: PRINT AT i,2; OVER 1; PAPER 6; BRIGHT 1;s$: NEXT i
120 PRINT #0;AT 0,8;"Alege optiunea"
130 LET t$=INKEY$
140 IF t$<"1" OR t$>"4" THEN GO TO 130
150 PRINT #0;AT 0,23; PAPER 0; INK 7;t$
160 PAUSE 100
170 GO TO VAL t$*200
180 FOR i=0 TO 7: READ c: POKE USR "s"+i,c: NEXT i
181 DATA 16,56,124,254,56,56,56,0
182 FOR i=0 TO 7: READ c: POKE USR "j"+i,c: NEXT i
183 DATA 56,56,56,254,124,56,16,0
184 FOR i=0 TO 7: READ c: POKE USR "q"+i,c: NEXT i
185 DATA 96,16,32,16,96,0,0,0
186 FOR i=0 TO 7: READ c: POKE USR "c"+i,c: NEXT i
187 DATA 64,166,169,72,8,9,6,0
188 RETURN
200 LOAD ! "e11"SCREEN$
201 GO SUB 202: GO TO 204
202 OVER 1: PRINT AT 18,23;"O-optiuni";AT 19,23;"C-cont    ";AT 20,23;"?-sus
;AT 21,23;"?-jos    ": OVER 0
203 RETURN
206 LET a$(1, TO )="NUCLEUL  Ni,Fe,silicati,13 g/cm?"
207 LET a$(2, TO )="        se roteste-degaja energie"
208 LET a$(3, TO )="Intern viteza de propagare mica"
209 LET a$(4, TO )="5000-6370 km  stare lichida"
210 LET a$(5, TO )="Extern viteza de propagare mare"
211 LET a$(6, TO )="2900-5000 km  stare viscoasa"
212 LET a$(7, TO )="MANTAUA separata de scoarta prin"
213 LET a$(8, TO )="        suprafata MOHOrovicic"
214 LET a$(9, TO )="Interna viteza propagare 8,2km/s"
215 LET a$(10, TO )="900-2900 km   Mg,Fe,silicati"
216 LET a$(11, TO )="Externe viteza propagare 7,1km/s"
217 LET a$(12, TO )="20-900km peridolit,magma,eclogit"
218 LET a$(13, TO )="50-100 km  Astenosfera"
219 LET a$(14, TO )="        orizont solid-lichid"
220 LET i=1: LET l=14: LET adr=300
221 PAUSE 0: IF INKEY$="C" THEN GO TO adr
222 IF INKEY$="O" THEN GO TO 20
224 IF CODE (INKEY$)=10 OR CODE (INKEY$)=11 THEN GO TO 226
225 GO TO 221
226 IF CODE (INKEY$)=10 THEN LET i=i-2: GO TO 230
227 LET i=i+2: IF i>(l-1) THEN LET i=l-1
228 GO TO 240
230 IF i<1 THEN LET i=1
240 PRINT #0;AT 0,0; PAPER 1; INK 6; BRIGHT 1;a$(i, TO )
241 PRINT #0;AT 1,0; PAPER 2; INK 7; BRIGHT 1;a$(i+1, TO )
242 GO TO 221
300 LOAD !"e12"SCREEN$
302 PRINT #0;AT 1,0;"          Apasa o tasta          "; PAUSE 0
304 PRINT AT 21,15; PAPER 3; INK 6; BRIGHT 1;"Optiuni(O,C,?,?)"
306 LET a$(1, TO )="SCOARTA O,Al,Si,Fe,Ca,Na,Mg,H"
307 LET a$(2, TO )="        minerale-roci magmatice"
308 LET a$(3, TO )="        sedimentare,metamorfice"
309 LET a$(4, TO )=""
310 LET a$(5, TO )="CRUSTA continentala 30-70 km"
311 LET a$(6, TO )=""
312 LET a$(7, TO )="  Strat sedimentar 10-15 km"
313 LET a$(8, TO )="        gresii,argile,calcar"
314 LET a$(9, TO )="  Strat granitic 30-40 km"
315 LET a$(10, TO )="  granite,granodiorite,graise"
316 LET a$(11, TO )="  Strat bazaltic 0-40 km"
317 LET a$(12, TO )="        roci magmatice-bazalte"
318 LET a$(13, TO )="CRUSTA oceanica 5-10 km"
319 LET a$(14, TO )="  Strat bazaltic"
320 LET i=1: LET l=14: LET adr=400: GO TO 221
400 LOAD !"e13"SCREEN$
401 LET s$="
402 FOR i=0 TO 21: PRINT AT i,0; OVER 1; PAPER 6; INK 2; BRIGHT 1;s$: NEXT i
405 PLOT 253,0: DRAW 0,175: DRAW 1,0: DRAW 0,-175
410 PRINT #0;AT 0,0;"    Optiuni O-OPTIUNI,C-cont
420 PAUSE 0
```

```
430 IF INKEY$="0" THEN GO TO 20
440 IF INKEY$="C" THEN GO TO 500
450 GO TO 420
500 LOAD !"e14"SCREEN$
501 PRINT #0;AT 1,0;"                Apasa o tasta          ": PAUSE 0
503 OVER 1: PRINT AT 5,22;"0-OPTIUNI";AT 6,22;"C-cont   ";AT 7,22;"?-sus    ";A
T 8,22;"?-jos     ": OVER 0
505 LET s$="                                    ": PRINT AT 21,0; PAPER 0;s$; PRINT
#0;AT 0,0; PAPER 0;s$
507 LET a$(1, TO )="                    PLACI"
508 LET a$(2, TO )="majore(10-12),medii,microplaci"
509 LET a$(3, TO )="      MISCARE => COLIZIUNI"
510 LET A$(4, TO )="  cutremure,eruptii,incretiri"
511 LET a$(5, TO )="                DEFINITII"
512 LET a$(6, TO )=""
513 LET a$(7, TO )="FOSE     gropi foreate prin"
514 LET a$(8, TO )="         subductia placilor"
515 LET a$(9, TO )="DORSALA lant muntos subacvatic"
516 LET a$(10, TO )="RIFT vale in dorsala oceanica"
517 LET a$(11, TO )="FALIE fisura in scoarta"
518 LET a$(12, TO )=""
520 LET i=1: LET l=12: LET adr=600: GO TO 221
600 LOAD !"e21"SCREEN$
601 PRINT #0;AT 1,0;"          Apasa o tasta          ": PAUSE 0
602 LET s$="
603 PRINT AT 21,0; PAPER 0;s$: PRINT #0;AT 0,0; PAPER 1;s$;AT 1,0; OVER 1; INK
7;s$
604 PRINT AT 21,0; PAPER 7; INK 0;"     C - cont  0 - OPTIUNI      "
605 LET t$=INKEY$
606 IF t$="C" THEN GO TO 609
607 IF t$="0" THEN GO TO 20
608 GO TO 605
609 PRINT AT 21,0;"                                    ": LET s$="
610 PRINT AT 2,12; FLASH 1; BRIGHT 1; OVER 1;s$
611 PRINT AT 3,12; FLASH 1; BRIGHT 1; OVER 1;s$
613 IF INKEY$="" THEN GO TO 613
615 PRINT AT 2,12; FLASH 0; BRIGHT 1; OVER 1;s$
616 PRINT AT 3,12; FLASH 0; BRIGHT 1; OVER 1;s$
617 PRINT AT 6,25; FLASH 1; BRIGHT 1; OVER 1;s$(4 TO )
618 PRINT AT 7,25; FLASH 1; BRIGHT 1; OVER 1;s$(4 TO )
620 IF INKEY$="" THEN GO TO 620
621 PRINT AT 6,25; FLASH 0; BRIGHT 1; OVER 1;s$(4 TO )
622 PRINT AT 7,25; FLASH 0; BRIGHT 1; OVER 1;s$(4 TO )
623 PRINT AT 16,17; FLASH 1; BRIGHT 1; OVER 1;s$(4 TO )
624 PRINT AT 17,17; FLASH 1; BRIGHT 1; OVER 1;s$(4 TO )
625 IF INKEY$="" THEN GO TO 625
626 PRINT AT 16,17; FLASH 0; BRIGHT 0; OVER 1;s$(4 TO )
627 PRINT AT 17,17; FLASH 0; BRIGHT 0; OVER 1;s$(4 TO )
628 PRINT AT 19,8; FLASH 1; OVER 1;s$(5 TO )
629 PRINT AT 20,8; FLASH 1; OVER 1;s$(5 TO )
630 PRINT AT 21,0; PAPER 7; INK 0;      C - cont   0 - OPTIUNI
631 IF INKEY$="C" THEN GO TO 700
632 IF INKEY$="0" THEN GO TO 20
633 GO TO 631
700 PAPER 7: CLS
701 LET s$="                                    "
705 PRINT AT 0,5;"ACTIVITATEA VULCANICA"
706 PRINT AT 0,0; PAPER 0; OVER 1; INK 9;s$: PAUSE 50
710 PRINT AT 2,0;" -succesiune de eruptii-liniare";AT 1,23;"/centrale";AT 3,23;
"\areale"
711 FOR i=1 TO 3: PRINT AT i,0; PAPER 2; OVER 1; INK 9;s$: NEXT i: PAUSE 50
715 PRINT AT 4,0;"Emanatii gazoase";AT 5,6;"fumarole  peste 200 ?";AT 6,6;"solf
atare 100-200 ?";AT 7,6;"nafete   sub 100 ?"
716 FOR i=4 TO 7: PRINT AT i,0; PAPER 1; BRIGHT 1; INK 6; OVER 1;s$: NEXT i: PA
USE 50
720 PRINT AT 10,0;"Curgeri";AT 10,21;"\acide";AT 9,7;"/lichide(lave)";AT 8,21;"
/bazice";AT 11,7;"\noroioase(LAHARI)";AT 9,22; INVERSE 1;"900-1350 ?"
721 FOR i=8 TO 11: PRINT AT i,0; OVER 1; BRIGHT 1; PAPER 5; INK 9;s$: NEXT i: P
AUSE 50
725 PRINT AT 14,0;"Produse solide";AT 12,15;"/blocuri";AT 13,14;"//bombe";AT 14
,14;"--lapilii";AT 15,14;"\\nisipuri";AT 16,15;"\cenusa"
726 FOR i=12 TO 16: PRINT AT i,0; OVER 1; BRIGHT 1; PAPER 6; INK 1;s$: NEXT i:
PAUSE 50
730 PRINT AT 17,0;"Alte manifestari";AT 18,4;"-TSUNAMI val marin";AT 19,4;"-nor
i arzatori"
731 FOR i=17 TO 19: PRINT AT i,0; OVER 1; PAPER 4; INK 0;s$: NEXT i: PAUSE 50
735 PRINT AT 20,0;"Activitate postvulcanica";AT 21,4;"-izvoare fierbinti,gheize
re"
736 FOR i=20 TO 21: PRINT AT i,0; OVER 1; PAPER 5; BRIGHT 1; INK 1;s$: NEXT i:
PAUSE 50
740 PRINT #0;AT 0,0; PAPER 2; INK 9;"     0 - OPTIUNI    C - cont    "
741 PRINT #0;AT 1,0; PAPER 7; INK 8; BRIGHT 1;"          Apasa o tasta
```

```
742 LET t$=INKEY$
744 IF t$="O" THEN GO TO 20
746 IF t$="C" THEN GO TO 750
748 GO TO 742
750 CLS : PRINT AT 9,12; FLASH 1;" FAZELE ";AT 11,12; INVERSE 1;"ERUPTIEI"
752 PRINT #0;AT 1,0; PAPER 1; INK 9;"      O - OPTIUNI    C - cont      "
754 LET t$=INKEY$
756 IF t$="O" THEN GO TO 20
758 IF t$="C" THEN GO TO 761
760 GO TO 754
761 LOAD !"e22"SCREEN$
762 GO SUB 795
763 LET adr=771
764 LET t$=INKEY$
765 IF t$="O" THEN GO TO 20
766 IF t$="X" THEN GO TO 700
767 IF t$="C" THEN GO TO adr
768 IF t$="M" THEN GO TO 785
769 GO TO 764
771 LOAD !"e23"SCREEN$
772 LET adr=775: GO SUB 795: GO TO 764
775 LOAD !"e24"SCREEN$
776 LET adr=780: GO SUB 795: GO TO 764
780 GO TO 761
785 CLS : PRINT AT 10,0; FLASH 1;"PENTRU INTRERUPERE APASA E [xit]"
786 PAUSE 200
787 LOAD !"e22"SCREEN$
788 LOAD !"e23"SCREEN$
789 LOAD !"e24"SCREEN$
790 IF INKEY$="E" THEN GO TO 761
791 GO TO 787
795 PRINT #0;AT 0,0; PAPER 7; INK 9;"O-OPTIUNI C-cont M-misc X-explic"
796 PRINT #0;AT 1,0; PAPER 2; INK 8;"          Apasa o tasta          "
797 RETURN
800 REM
805 BORDER 5: PAPER 6: INK 1: BRIGHT 0: CLS
810 FOR i=0 TO 31: PRINT AT 0,i; PAPER 1;" ";AT 21,31-i; PAPER 1;" ": NEXT i
820 FOR i=0 TO 21: PRINT AT i,0; PAPER 1;" ";AT 21-i,31; PAPER 1;" ": NEXT i
830 PRINT AT 8,6;"PORNESTE CASETOFONUL";AT 11,3;"pentru incarcarea jocului:"
840 LOAD ""
```

```
  1 REM   VULCANII 3
100 BORDER 0: PAPER 0: INK 7: CLS
110 DIM a(16): DIM a$(16): DIM b$(16)
111 POKE 23658,8
120 LET a$="BTECONIARUPFLSMV"
130 LET b$="0123456789.*+/-,"
135 PRINT PAPER 5; INK 1; BRIGHT 1;" VULCANOGRIF GEOGRAFIC
140 PRINT AT 4,1;"289:162"
150 PRINT AT 5,1;"*7+62"
160 PRINT AT 6,14;"/347817"
165 PRINT AT 8,14;"*4/2"
170 PRINT AT 7,12;"86*1"
180 PRINT AT 9,12;"1/957-6"
190 PRINT AT 10,12;"82+62*"
200 PRINT AT 11,12;".9+3756"
210 PRINT AT 12,11;"048/7+7"
220 PRINT AT 2,15; INVERSE 1;"A";AT 14,15;"B"
230 FOR i=3 TO 13: PRINT AT i,15; INVERSE 1; OVER 1;" ": NEXT i
231 LET S$=""
232 FOR I=4 TO 12: PRINT AT I,11; OVER 1; PAPER 2; INK 6;S$: NEXT I
240 PRINT : PRINT
250 PRINT " Inlocuind cifrele si caractere-le speciale (.*+/-,) cu  litere,veti
obtine pe verticala  A-B uncuvint  din domeniul activitatiivulcanice, iar pe or
izontal altiteseni din acelasi domeniu."
260 LET ii=0
270 BEEP 0.5,10: INPUT "Caracterul:";c$;" este litera:";l$
271 LET SW=0: FOR I=1 TO 16: IF c$=b$(i) THEN LET SW=1: LET care=I: LET I=16
272 NEXT i
273 IF SW=1 THEN GO TO 275
274 GO TO 270
275 IF l$=a$(care) THEN LET SW=0: GO TO 280
276 GO TO 270
280 FOR i=4 TO 12
290 FOR j=11 TO 20
300 IF SCREEN$ (i,j)=c$ THEN LET SW=1: PRINT AT i,j;l$: BEEP 0.05,20
302 NEXT j
304 NEXT i
310 IF SW=0 THEN PRINT #0;"Nu e bine": PAUSE 50: GO TO 400
320 LET ii=ii+1
400 IF ii=16 THEN GO TO 450
410 GO TO 270
450 FOR I=4 TO 12: PRINT AT I,15; OVER 1; INVERSE 1; BRIGHT 1;" "
455 NEXT I
460 PRINT #0;AT 0,0;"          Apasa o tasta          ": PAUSE 0
470 BORDER 7: PAPER 7: INK 0: BRIGHT 1: CLS
480 PRINT AT 9,5;" Porneste casetofonul";AT 11,3;"pentru incarcarea partii:";AT
14,7; FLASH 1;" VULCANII  TERREI "
490 LOAD "INCARC`2"
```

```
  1 REM   VULCANII 4
 10 CLEAR 37886
 11 ERASE !"antet": ERASE !"e11": ERASE !"e12": ERASE !"e13": ERASE !"e14": ERA
SE !"e21": ERASE !"e22": ERASE !"e23": ERASE !"e24"
 20 BORDER 0: PAPER 0: INK 0: CLS
 30 LOAD !""CODE 38887,6912
 40 SAVE !"word"CODE 38887,6912
 50 LOAD !"word"SCREEN$
 51 PAPER 5: INK 5: BRIGHT 1
 55 PAUSE 100
 60 LET s$=
 80 PRINT AT 0,0: PAPER 5: INK 5;
 90 LOAD "p3"CODE 37887,27648
100 SAVE !"e31"CODE 37887,6912
110 SAVE !"e32"CODE 44799,6912
120 SAVE !"e33"CODE 51711,6912
130 SAVE !"e34"CODE 58623,6912
140 PRINT AT 0,0: PAPER 5: INK 5;
150 LOAD "p4"CODE 37887,27648
160 SAVE !"e41"CODE 37887,6912
170 SAVE !"e42"CODE 44799,6912
180 SAVE !"e43"CODE 51711,6912
190 SAVE !"e44"CODE 58623,6912
200 PRINT AT 0,0: PAPER 5: INK 5;
205 CLEAR 50000
206 LOAD !"word"SCREEN$
207 PRINT AT 0,0: PAPER 5: INK 5;
210 LOAD "BASIC 2"
```

```
  1 REM   VULCANII 5
 10 POKE 23658,255
 20 CLS : DIM a$(19,32): GO SUB 200: DIM X(19): DIM Y(19)
 30 BORDER 5: PAPER 6: INK 1: BRIGHT 0: CLS
 40 FOR i=0 TO 31: PRINT AT 0,i; PAPER 1;" ";AT 21,31-i; PAPER 1;" ": NEXT i
 50 FOR i=0 TO 21: PRINT AT i,0; PAPER 1;" ";AT 21-i,31; PAPER 1;" ": NEXT i
 60 PRINT AT 2,12; PAPER 2; INK 6; BRIGHT 1;"OPTIUNI"
 70 PRINT AT 6,3;"1 - Americа de nord"
 73 PRINT AT 7,3;"2 - Americа centralа"
 76 PRINT AT 8,3;"3 - Americа de sud"
 80 PRINT AT 9,3;"4 - Oceania"
 83 PRINT AT 10,3;"5 - Asia"
 86 PRINT AT 11,3;"6 - Africa"
 90 PRINT AT 12,3;"7 - Europa"
 93 PRINT AT 13,3;"8 - ROMANIA"
100 PRINT AT 14,3;"9 - ZONE VULCANICE"
101 PRINT AT 15,3;"0 - test geografic"
110 LET s$=" "
120 FOR i= 5 TO 16: PRINT AT i,2; OVER 1; PAPER 7; BRIGHT 1;s$: NEXT i
140 PRINT #0;AT 0,8;"Alege optiunea"
150 LET t$=INKEY$
160 IF t$<"0" OR t$>"9" THEN GO TO 150
170 PRINT #0;AT 0,23; PAPER 0; INK 7;t$
180 PAUSE 100
185 BEEP 0.06,3+VAL (T$)
186 IF t$="0" THEN GO TO 5000
190 GO TO (VAL t$-1)*500+290
200 RESTORE 210: FOR i=0 TO 7: READ c: POKE USR "s"+i,c: NEXT i
210 DATA 16,56,124,254,56,56,56,0
220 RESTORE 230: FOR i=0 TO 7: READ c: POKE USR "j"+i,c: NEXT i
230 DATA 56,56,56,254,124,56,16,0
240 RESTORE 250: FOR i=0 TO 7: READ c: POKE USR "q"+i,c: NEXT i
250 DATA 96,16,32,16,96,0,0,0
260 RESTORE 270: FOR i=0 TO 7: READ c: POKE USR "c"+i,c: NEXT i
270 DATA 64,166,169,72,8,9,6,0
280 RETURN
290 BEEP 0.06,4: LOAD ! "e31"SCREEN$
300 GO SUB 310: GO TO 330
310 PRINT #0;AT 0,0; PAPER 0; INK 7; BRIGHT 1;"          Apasa o tasta
": PAUSE 0
311 PRINT #0;AT 0,0; PAPER 0; INK 0;s$: PAUSE 25
319 PRINT AT 18,23; INK 0;"O-optiuni";AT 19,23;"C-cont    ";AT 20,23;"?-sus
;AT 21,23;"?-jos
320 RETURN
330 LET a$(1, TO )="KATMAI-Alaska-2047m/1912       A"
340 LET a$(2, TO )="LASSEN PEAK-California-3187m   A"
350 LET a$(3, TO )="MAZAMA-M.Cascade-2486m         A"
360 LET a$(4, TO )="PARICUTIN-Mexic-2746m/1943-53  A"
370 LET a$(5, TO )="POPOCATEPETL-Mexic-5452m/1947  A"
380 LET a$(6, TO )="ST.HELENS-M.Cascade-2250m/1985 A"
385 LET a$(7, TO )="                               "
386 LET i=1: LET l=7: LET adr=790: LET r=390: LET r1=400
387 GO SUB 410: GO TO 480
390 DATA 10,50,50,89,91,60
400 DATA 134,90,94,18,11,93
410 RESTORE r: FOR C=1 TO l-1: READ X(C): NEXT C
420 RESTORE r1: FOR S=1 TO l-1: READ Y(S): NEXT S: RETURN
480 PAUSE 0
485 LET T$=INKEY$: IF T$ ="C" THEN GO TO adr
490 IF T$ ="O" THEN GO TO 30
495 INK 0: PLOT OVER 1; 0,0: DRAW OVER 1; X(i),Y(i): PLOT OVER 1; 0,175: DRAW O
VER 1; X(i),-(175-Y(i))
496 PLOT OVER 1; 0,0: DRAW OVER 1; X(i),Y(i): PLOT OVER 1; 0,175  DRAW OVER 1;
X(i),-(175-Y(i)): INK 6
500 IF CODE (T$ )=10 OR CODE ( T$)=11 THEN GO TO 520
510 GO TO 485
520 BEEP .01,10: BEEP .01,25: BEEP .01,17: IF CODE ( T$ )=10 THEN LET i=i-1: GO
TO 550
530 LET i=i+1: IF i>(l-1) THEN LET i=l-1
540 GO TO 560
550 IF i<1 THEN LET i=1
560 PRINT #0;AT 0,0; PAPER 1; INK 6; BRIGHT 1; FLASH 1;a$(i, TO )
570 PRINT #0;AT 1,0; PAPER 2; INK 7; BRIGHT 1;a$(i+1, TO )
580 GO TO 485
790 BEEP 0.06,8: LOAD ! "e32"SCREEN$
800 GO SUB 310
                                                10)LET a$(1, TO )="CERRO
NEGRO-Nicaragua/1971     A"
820 LET a$(2, TO )="EL FUEGO-Guatemala-3912m/1976  A"
830 LET a$(3, TO )="IRAZU-Costa Rica-3432m/1964    A"
840 LET a$(4, TO )="M.PELEE-I.Matinica-1463m/1902  A"
850 LET a$(5, TO )="PUCH-I.Saint Eustatius-594m    A"
860 LET a$(6, TO )="SAINT CATERINE-Grenada-840m    S"
```

```
870 LET a$(7, TO )="SAN SALVADOR-Salvador-1500m     S"
880 LET a$(8, TO )="SANTA MARIA-Guatemala-3758m     A"
890 LET a$(9, TO )="SOUFRIERE-I.St.Vincentiu-1234m A"
900 LET a$(10, TO )="                               "
910 LET i=10: LET i=1: LET adr=1290: LET r=940: LET r1=950
930 GO SUB 410: GO TO 480
940 DATA 42,34,53,228,212,225,43,30,211,0
950 DATA 66,76,60,85,88,78,66,56,83,0
1290 BEEP 0.06,12: LOAD ! "e33"SCREEN$
1300 GO SUB 310
1310 LET a$(1, TO )="ACONCAGUA-Chile-6959m          S"
1320 LET a$(2, TO )="CHIMBORAZO-Ecuador-6272m       S"
1330 LET a$(3, TO )="COTOPAXI-Ecuador-5897m/1949    A"
1340 LET a$(4, TO )="EL MISTI-Peru-5821m            A"
1350 LET a$(5, TO )="ILAMPU-Bolivia-6550m           S"
1360 LET a$(6, TO )="LLULLAILLACO-Chile-6723m  latent"
1370 LET a$(7, TO )="OSORNO-Chile-2660m/1960        A"
1380 LET a$(8, TO )="SANGAY-Ecuador-5323m           A"
1390 LET a$(9, TO )="                               "
1400 LET i=1: LET i=9: LET adr=1790: LET r=1420: LET r1=1430
1410 GO SUB 410: GO TO 480
1420 DATA 143,102,105,147,138,142,148,106,0
1430 DATA 53,132,136,97,101,54,55,136,0
1790 BEEP 0.06,16: LOAD ! "e34"SCREEN$
1800 PRINT #0;AT 0,0; BRIGHT 1; PAPER 0; INK 7;"          Apasa o tasta
": PAUSE 0
1801 PRINT #0;AT 0,0; PAPER 0; INK 0;s$: PAUSE 25
1802 PRINT AT 4,23; INK 0;"O-OPTIUNI";AT 5,23;"C-cont   ";AT 6,23;"?-sus    ";AT
7,23;"?-jos  "
1810 LET a$(1, TO )="BENBOW-I.Ambrym-1350m          A"
1820 LET a$(2, TO )="IASUR-I.Erromanga-900m         A"
1830 LET a$(3, TO )="KILAUEA-I.Hawaii-1247m/1984    A"
1840 LET a$(4, TO )="LAMINGTON-Papua-1795m/1951     A"
1850 LET a$(5, TO )="MATAVANU-I.Savaii-650m         A"
1860 LET a$(6, TO )="MAUNA KEA-I.Hawaii-4205m       S"
1870 LET a$(7, TO )="MAUNA LOA-I.Hawaii-4170m/1960  A"
1880 LET a$(8, TO )="MAUNGA SILISILI-I.Savaii-1858m A"
1890 LET a$(9, TO )="NIUAFOOU-I.Niuafoou-135m/1946  A"
1900 LET a$(10, TO )="RUAPEHU-I.N.Zeelanda-2800m     A"
1910 LET a$(11, TO )="TARAWERA-I.N.Zeelanda-1111m    A"
1920 LET a$(12, TO )="                               "
1930 LET i=1: LET i=12: LET adr=2290: LET r=1930: LET r1=196
1940 GO SUB 410: GO TO 480
1950 DATA 144,151,222,83,192,216,223,198,193,161,157,0
1960 DATA 95,89,18,114,102,22,16,101,79,19,17,0
2290 BEEP 0.06,20: LOAD ! "e41"SCREEN$
2300 GO SUB 310
2310 LET a$(1, TO )="ALAID-I.Atlasova-3300m/1981    A"
2320 LET a$(2, TO )="ARARAT-Turcia-5165m            S"
2330 LET a$(3, TO )="ASAMA-YAMA-I.Honshu-2542m/1981 A"
2340 LET a$(4, TO )="ASO-SAN-I.Kyushu-1592m         S"
2350 LET a$(5, TO )="BANDAI SAN-I.Honsu-1819m       A"
2360 LET a$(6, TO )="BATUR-I.Bali-1717m             A"
2370 LET a$(7, TO )="BEZIMIANII-Kamceatka-3085m     A"
2380 LET a$(8, TO )="BROMO-I.Java-2700m             A"
2390 LET a$(9, TO )="FUJI-YAMA-I.Honshu-3776m       S"
2400 LET a$(10, TO )="KLJUCEV-Kamceatka-4750m/1966   A"
2410 LET a$(11, TO )="KRAKATAU-I.Krakatau-813m/1883  A"
2420 LET a$(12, TO )="MAYON-I.Iluzion-2420m          A"
2430 LET a$(13, TO )="MERAPI-I.Java-2891m            A"
2440 LET a$(14, TO )="PAGAN-I.Mariane-220m/1982      A"
2450 LET a$(15, TO )="SEMERU-I.Java-3676m/1981       A"
2460 LET a$(16, TO )="TAAL-I.Luzon-300m/1976         A"
2470 LET a$(17, TO )="TAMBORA-I.Sumbawa-2851m/1815   A"
2480 LET a$(18, TO )="TOLBACIK-Kamceatka/1975        A"
2490 LET a$(19, TO )="                               "
2500 LET i=1: LET i=19: LET adr=2790: LET r=2520: LET r1=2530
2510 GO SUB 410: GO TO 480
2520 DATA 157,19,162,151,160,148,151,132,162,154,116,154,134,224,128,149,147,150
,0
2530 DATA 130,104,102,95,102,6,139,3,102,140,10,49,6,36,6,53,5,145,0
2790 BEEP 0.06,24: LOAD ! "e42"SCREEN$
2800 PRINT #0;AT 0,0; PAPER 0; BRIGHT 1; INK 7;"          Apasa o tasta
": PAUSE 0
2801 PRINT #0;AT 0,0; PAPER 0; INK 0;s$: PAUSE 25
2802 PRINT AT 0,23; INK 0;"O-OPTIUNI";AT 1,23;"C-cont   ";AT 2,23;"?-sus    ";AT
3,23;"?-jos  "
2810 LET a$(1, TO )="ARDOUKOBA-Djibouti/1978         A"
2820 LET a$(2, TO )="CAMERUN-Camerun-4070m           S"
2830 LET a$(3, TO )="FOGO-I.Capul Verde-2829m        A"
2840 LET a$(4, TO )="KENYA-Kenya-5199m               S"
2850 LET a$(5, TO )="LA FOURNAISE-I.Reunion-2631m    A"
```

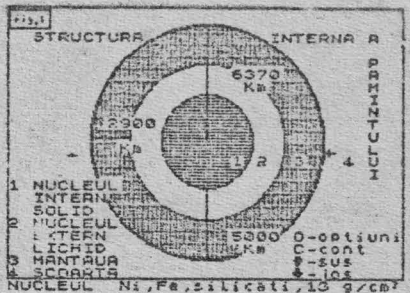
```
2860 LET a$(6, TO )="NGORONGORO-Tanzania-2730m      A"
2870 LET a$(7, TO )="NYIRAGONGO-Zair-3465m/1976     A"
2880 LET a$(8, TO )="PICO DE TEIDE-I.Tenerife-3718m A"
2890 LET a$(9, TO )="RUNGWE-Tanzania-3175m          S"
2900 LET a$(10, TO )="VIRUNGA-Zair-Masivul Rwanda    A"
2910 LET a$(11, TO )="KILIMANJARO-Tanzania-5895m     A"
2920 LET a$(12, TO )="                               "
2930 LET i=1: LET l=12: LET adr=3290: LET r=2950: LET r1=2960
2940 GO SUB 410: GO TO 480
2950 DATA 198,138,73,191,225,198,173,23,179,172,187,0
2960 DATA 108,93,116,72,23,82,83,150,50,78,67,0
3290 BEEP 0.06,28: LOAD ! "e43"SCREEN$
3300 PRINT AT 21,0; PAPER 0; INK 0;s$+"    "
3301 PRINT #0;AT 0,0; BRIGHT 1; INK 7; PAPER 0;"          Apasa o tasta
"; PAUSE 0
3302 PRINT #0;AT 0,0; PAPER 0; INK 0;s$; PAUSE 25
3303 PRINT AT 18,0; INK 0;"O-OPTIUNI";AT 19,0;"C-cont   ";AT 20,0;"?-sus    ";AT
 21,0;"?-jos"
3310 LET a$(1, TO )="ETNA-I.Sicilia-3340m/1983       A"
3320 LET a$(2, TO )="FAYAL-I.Fayal-200m/1957         A"
3330 LET a$(3, TO )="HEKLA-Islanda-1447m/1980        A"
3340 LET a$(4, TO )="STROMBOLI-I.Stromboli-926m      A"
3350 LET a$(5, TO )="VEZUVIU-Napoli-1277m/1944       A"
3360 LET a$(6, TO )="VULCANO-I.Vulcano-499m/1906     A"
3370 LET a$(7, TO )="SURTSEY-I.Surtsey-60m/1974      A"
3380 LET a$(8, TO )="                                "
3390 LET i=1: LET l=8: LET adr=3790: LET r=3410: LET r1=3420
3400 GO SUB 410: GO TO 480
3410 DATA 173,39,128,181,172,176,146,0
3420 DATA 28,43,140,24,47,49,140,0
3790 BEEP .06,28: LOAD !"e44"SCREEN$
3800 PRINT #0;AT 0,0; PAPER 2; BRIGHT 1; INK 7;"          Apasa o tasta
"
3810 PAUSE 0
3820 PRINT AT 0,23; INK 0; PAPER 6;"O-OPTIUNI";AT 1,23;"C-cont   ";AT 2,23;"?-su
s    ";AT 3,23;"?-jos"
3821 PAUSE 0
3830 LET a$(1, TO )="      GRUPA VULCANICA DE NORD     "
3840 LET a$(2, TO )="   Das  Gutii  Tibles 1447-1840m"
3850 LET a$(3, TO )="-roci vulcanice,sedimentare      "
3860 LET a$(4, TO )="-bogati in metale neferoase      "
3870 LET a$(5, TO )="-conuri fara craterе             "
3880 LET a$(6, TO )="                                "
3890 LET a$(7, TO )="      GRUPA VULCANICA DE SUD      "
3900 LET a$(8, TO )="   Caliman  Gurghiu  Harghita    "
3910 LET a$(9, TO )="-munti inalti-Pietrosul 2102m    "
3920 LET a$(10, TO )="-prezinta craterе               "
3930 LET a$(11, TO )="-L.Sf.Ana -craterul M.Ciomatu   "
3940 LET a$(12, TO )="-andezite dure,tufuri vulcanice"
3950 LET a$(13, TO )="-eoana CO2;izvoare minerale     "
3951 LET a$(14, TO )="                                "
3952 LET i=1 : LET l=14 : LET adr=4290
3953 GO SUB 3955: GO TO 4002
3955 FOR Y=9 TO 14: FOR X=2 TO 5: PRINT AT X,Y; OVER 1; PAPER 7; BRIGHT 1; INK 0
;" "; NEXT X: NEXT Y
3956 PAUSE 0: RETURN
3999 FOR Y=14 TO 9 STEP -1: FOR X=5 TO 2 STEP -1: PRINT AT X,Y; OVER 1; PAPER 7;
 BRIGHT 0; INK 0;" "; NEXT X: NEXT Y
4000 PAUSE 0: RETURN
4002 LET T$=INKEY$: IF T$="C" THEN GO SUB 4024: GO TO adr
4004 IF T$="O" THEN GO TO 30
4006 IF CODE (T$)=10 OR CODE (T$)=11 THEN GO TO 4010
4007 GO TO 4002
4010 BEEP .01,10: BEEP .01,25: BEEP .01,17: IF CODE (T$)=10 THEN LET i=i-1: GO T
O 4013
4012 LET i=i+1: IF i>(l-1) THEN LET i=l-1: GO TO 4017
4013 IF i=6 THEN GO SUB 4024: GO SUB 3955
4016 IF i<1 THEN LET i=1
4017 IF i=7 THEN GO SUB 3999: GO SUB 4022
4018 PRINT #0;AT 0,0; PAPER 1; INK 6; BRIGHT 1; FLASH 1;a$(i, TO )
4020 PRINT #0;AT 1,0; PAPER 2; INK 7; BRIGHT 1;a$(i+1, TO ); GO TO 4002
4022 FOR Y=15 TO 19: FOR X=6 TO 10: PRINT AT X,Y; OVER 1; PAPER 7; BRIGHT 1; INK
 0;" "; NEXT X: NEXT Y: RETURN
4024 FOR Y=19 TO 15 STEP -1: FOR X=10 TO 6 STEP -1: PRINT AT X,Y; OVER 1; PAPER
 7; INK 0; BRIGHT 0;" "; NEXT X: NEXT Y: RETURN
4290 BEEP .01,34: LOAD ! "word"SCREEN$
4295 PRINT #0;AT 0,0; PAPER 2; BRIGHT 1; INK 7;"          Apasa o tasta
"
4300 PAUSE 0
4305 PRINT AT 18,0; INK 0; PAPER 6;"O-OPTIUNI";
```

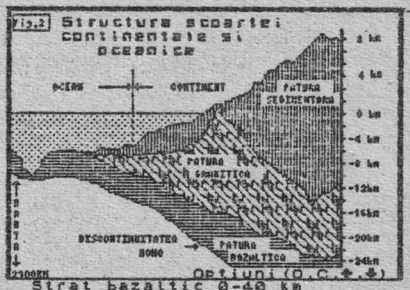
```
                                                    AT 19,0;"C-cont   ";AT 20,0;"?-su
s     ";AT 21,0;"?-jos
4310 PAUSE 0
4315 LET a$(1, TO )="  Pen.Kamceatka  Arh.Kurile      "
4320 LET a$(2, TO )="  Arh.Japonez                    "
4325 LET a$(3, TO )="  Arh.Indonezian                 "
4330 LET a$(4, TO )="  America Centrala               "
4335 LET a$(5, TO )="  America de Sud                 "
4340 LET a$(6, TO )="  Riftul Est African             "
4345 LET a$(7, TO )="  Zona Mediteraniana             "
4350 LET a$(8, TO )="                                 "
4355 LET i=1: LET l=8: LET adr=5000: LET r=4356: LET r1=4357
4356 DATA 9,11,13,12,15,14,10,0
4357 DATA 28,27,25,8,9,18,16,0
4358 DATA 6,6,6,3,4,1,6,7,5
4359 RESTORE 4358: DIM Z(8): FOR F=1 TO 8: READ Z(F): NEXT F
4360 GO SUB 410
4361 DATA 5,5,5,5,0,5,5,5,5
4362 RESTORE 4361: DIM K(8): FOR F=1 TO 8: READ K(F): NEXT F
4370 LET T$=INKEY$
4375 IF T$="C" THEN GO TO adr
4380 IF T$="0" THEN GO TO 30
4385 IF CODE (T$)=10 OR CODE (T$)=11 THEN GO TO 4395
4390 GO TO 4370
4395 BEEP .01,17: BEEP .01,25: BEEP .01,10
4400 IF CODE (T$)=10 THEN LET i=i-1: LET iv=i+1: GO TO 4420
4405 LET i=i+1: LET iv=i-1: IF i)(l-1) THEN LET i=l-1: GO TO 4422
4420 IF i<1 THEN LET i=1
4422 PRINT BO;AT 0,0; PAPER 1; INK 6; BRIGHT 1; FLASH 1;a$(i, TO )
4427 PRINT AT x(i),y(i); OVER 1; PAPER K(I); INK Z(I); BRIGHT 1; FLASH 1;" "
4428 REM  IF I=1 OR I=L-1 THEN GO TO 4430
4429 PRINT AT x(iv),y(iv); OVER 1; PAPER K(IV); INK Z(IV); BRIGHT 1; FLASH 0;" "
4430 PRINT BO;AT 1,0; PAPER 2; INK 7; BRIGHT 1;a$(i+1, TO ): GO TO 4370
5000 REM *INCARC HT*
5010 CLS
5020 FOR I=0 TO 21: PRINT AT I,0; PAPER 0;" ";AT 21-I,31;" ": NEXT I: FOR I=0 TO
 31: PRINT AT 0,I; PAPER 0;" ";AT 21,31-I;" ": NEXT I
5030 PRINT AT 8,6;"Porneste casetofonul";AT 10,9;"pentru "; INVERSE 1;" TEST "
5040 PRINT AT 18,2; INVERSE 1;"ATENTIE !!!";AT 19,3; INVERSE 0;" se distruge pro
gramul"
5050 PRINT AT 20,1;"Pentru anulare apasa "; FLASH 1;"0"
5060 PAUSE 0
5070 LET t$=INKEY$
5080 IF t$="" THEN GO TO 5070
5090 IF t$="0" THEN GO TO 1
5100 PRINT AT 11,1;
5110 LOAD "TESTHT"
```

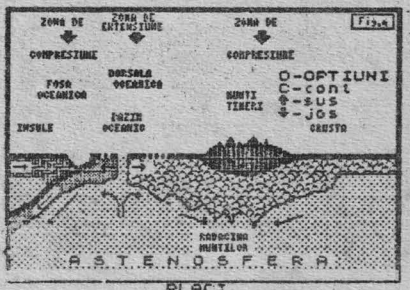
```
  1 REM   VULCANII 6
  2 CLEAR 59999: LOAD ""CODE
  3 BORDER 0: PAPER 0: INK 7: CLS
  4 LET sw=0: POKE 23658,8: POKE 60211,28
  5 PRINT AT 0,1; PAPER 4; INK 9;" MIC TEST "; BRIGHT 1;"CU"; BRIGHT 0;" SI ";
BRIGHT 1;"DESPRE"; BRIGHT 0;" VULCANI "
  6 LET B$="MIK TEST KU SI DESPRE VULKAN"
  7 GO SUB 9000
 10 DIM A$(14,11): DIM R$(14,9): DIM c(14)
 11 FOR i=1 TO 14: LET c(i)=11: NEXT i
 20 LET A$(1, TO )=" LAHARI "
 21 LET R$(1, TO )="LAHARI"
 30 LET A$(2, TO )=" VULCAN "
 31 LET R$(2, TO )="WULKAN"
 40 LET A$(3, TO )=" CRATER "
 41 LET R$(3, TO )="KRATER"
 50 LET A$(4, TO )=" CON "
 51 LET R$(4, TO )="KON"
 60 LET A$(5, TO )=" CRUSTA "
 61 LET R$(5, TO )="KRUSTA"
 70 LET A$(6, TO )=" TSUNAMI "
 71 LET R$(6, TO )="TSUNAMI"
 80 LET A$(7, TO )=" FUJI YAMA "
 81 LET R$(7, TO )="FUZI IAMA"
 90 LET A$(8, TO )=" VATRA "
 91 LET R$(8, TO )="WATRA"
100 LET A$(9, TO )=" MAGMA "
101 LET R$(9, TO )="MAGMA"
102 LET A$(10, TO )=" GHEIZER "
103 LET R$(10, TO )="GEYZER"
104 LET A$(11, TO )=" RELIEF "; LET R$(11, TO )="RELYEF"
105 LET A$(12, TO )=" CALDERE "; LET R$(12, TO )="KALDERE"
106 LET A$(13, TO )=" FOSA "; LET R$(13, TO )="FOSA"
108 LET A$(14, TO )=" RIFT "; LET R$(14, TO )="RIFT"
109 GO SUB 110: GO TO 115
110 FOR J=1 TO 14: LET B$=R$(J, TO ): PRINT AT J,11;A$(J, TO ): GO SUB 9000: NE
XT J
111 LET S$="                "
112 FOR I=1 TO 14: PRINT AT I,7; OVER 1; PAPER 2;S$: NEXT I
113 GO SUB 660: RETURN
115 LET B$="DEKALIND KORESPUNZATOR KUVINTELE PE ORIZONTALA  LA UN MOMENT DAT SE
 VA OBTIINE PE VERTIKALA NUMELE   DOUA KUVINTE   UNUI VESTIT VULKANOLOG   IL POT
I GASI"
120 PRINT " Decalind corespunzator cuvinte-le pe  orizontala, la un  momentdat
se va  obtine, pe verticala,numele (2 cuvinte)  unui  vestitvulcanolog.   Il pot
i gasi?"
121 GO SUB 9000: RESTORE 122: FOR I=0 TO 7: READ C: POKE USR "S"+I,C: NEXT I
122 DATA 16,56,124,254,56,56,56,0
123 RESTORE 124: FOR I=0 TO 7: READ C: POKE USR "J"+I,C: NEXT I
124 DATA 56,56,56,254,124,56,16,0
125 RESTORE 126: FOR I=0 TO 7: READ C: POKE USR "L"+I,C: NEXT I
126 DATA 16,48,126,254,126,48,16,0
127 RESTORE 128: FOR I=0 TO 7: READ C: POKE USR "R"+I,C: NEXT I
128 DATA 16,24,252,254,252,24,16,0
130 PRINT AT 21,14; FLASH 1;"AI"; INVERSE 1;" 5 "; INVERSE 0;"INCERCARI"
131 PRINT #0;AT 0,0; PAPER 2; INK 6; BRIGHT 1;"? - sus    ? - dreapta    ENTER
"; PAPER 3; INK 7;"? - jos    ? - stinga     numele"
132 LET B$="AI   CINC   INCERKARJ": GO SUB 9000
140 LET H$="HARDUN TAZIEFF"
145 LET T=1
150 DIM D(14)
160 DATA 2,0,3,3,2,1,0,2,0,0,1,0,4,2
161 FOR i=1 TO 14: READ D(i): NEXT i
165 GO TO 1000
180 DIM c$(14): LET c$="                ": FOR i=1 TO 14: LET c$(i)=c$(i)+SCREEN$
(i,16): NEXT i
190 PRINT AT 21,16; FLASH 1; INVERSE 1;" ";5-T;" "; INVERSE 0; FLASH 0;AT 21,31
; INVERSE 1;T
200 IF H$=c$ THEN GO TO 500
210 LET T=T+1
220 IF T<=5 THEN PRINT AT 21,0;"                ";AT 21,0; PAPER 5; INK 1; BRIGHT 1
;"MAI INCEARCA": LET B$="MAI INCEARKA": GO SUB 9000: FOR L=1 TO 10: BEEP 0.01,10
+L: BEEP 0.01,20-L: NEXT L: GO TO 1020
230 BEEP 0.5,15: PRINT AT 21,0; PAPER 6; INK 1;" IMI PARE RAU - ITI ARAT EU ":
LET B$="IMI PARE RAU   ITZI ARAT EU": GO SUB 9000: PAUSE 50
240 GO TO 600
500 BEEP 0.8,30: PRINT AT 21,0; PAPER 6; INK 0;"FELICITARI !!! ASA E! PRIVESTE
!": LET B$="FELICITARI  ASA E  PRIVESTE": GO SUB 9000: PAUSE 50
```

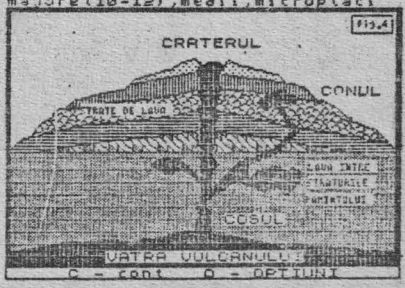
```
600 PRINT AT 20,0; PAPER 7; INK 0; BRIGHT 1;"Varianta 1": LET B$="VARIANTA UNU"
: GO SUB 9000
605 GO SUB 2000: GO SUB 110
606 FOR i=1 TO 14: PRINT AT i,6;" ": NEXT i
608 FOR i=1 TO 14
609 IF i=1 THEN PRINT AT i,6;">": GO TO 614
610 PRINT AT i-1,6;" ";AT i,6;">"
614 BEEP 0.1,15+i*2
615 IF B(I)<0 THEN GO TO 700
619 FOR J=0 TO B(I)
620 IF B(I)=0 THEN GO TO 650
630 PRINT AT I,11+J; PAPER 2;A$(I, TO )
631 GO SUB 660
632 BEEP 0.1,20
635 PAUSE 50
640 NEXT J
650 NEXT I
655 BEEP 0.9,0
656 FOR l=1 TO 14: PRINT AT l,16; PAPER 0; INK 7; OVER 1; BRIGHT 1;" ": NEXT l:
LET B$="HARUN TAZI'EF": GO SUB 9000: GO TO 670
660 FOR l=1 TO 14: PRINT AT l,16; PAPER 6; INK 1; OVER 1;" ": NEXT l
661 RETURN
670 PAUSE 200
671 IF sw=0 THEN GO TO 675
672 PAUSE 0: GO TO 5000
675 FOR i=1 TO 14: READ B(i): NEXT i
676 DATA 2,0,-1,3,2,1,0,2,3,0,1,-2,4,2
678 PRINT AT 20,22; PAPER 7; INK 0; BRIGHT 1;"Varianta 2": LET B$="VARIANTA DOI
": GO SUB 9000
680 LET sw=1: GO TO 601
700 FOR J=0 TO ABS (B(I))
710 PRINT AT I,11-J; PAPER 2;A$(I, TO )
720 BEEP 0.1,20
730 PAUSE 50
740 NEXT J
750 GO TO 650
900 STOP
1000 LET linie=1: LET coloana=11
1001 DIM c(14)
1002 FOR i=1 TO 14: LET c(i)=11: NEXT i
1010 PRINT AT linie,6;">"
1015 LET liniev=linie
1020 LET t$=INKEY$
1030 IF CODE t$=10 THEN LET linie=linie+1: GO SUB 1200
1040 IF CODE t$=11 THEN LET linie=linie-1: GO TO 1300
1050 IF CODE t$=9 THEN LET c(linie)=c(linie)+1: GO TO 1400
1060 IF CODE t$=8 THEN LET c(linie)=c(linie)-1: GO TO 1500
1065 IF CODE t$=13 THEN GO TO 180
1070 GO TO 1020
1080 PRINT AT linie,6;">"
1081 IF linie=liniev THEN GO TO 1088
1082 PRINT AT liniev,6;" ": LET liniev=linie
1083 BEEP 0.2,20
1087 IF CODE t$=10 OR CODE t$=11 THEN GO TO 1020
1088 PRINT AT linie,c(linie); PAPER 2;A$(linie, TO ): LET liniev=linie
1089 BEEP 0.2,25: GO SUB 660
1090 GO TO 1020
1200 IF linie>14 THEN LET linie=14
1201 PRINT AT 21,0;"                ": GO TO 1080
1300 IF linie<1 THEN LET linie=1
1301 PRINT AT 21,0;"                ": GO TO 1080
1400 IF c(linie)>15 THEN LET c(linie)=15
1401 PRINT AT 21,0;"                ": GO TO 1080
1500 IF c(linie)<7 THEN LET c(linie)=7
1501 PRINT AT 21,0;"                ": GO TO 1080
2000 FOR i=1 TO 14: PRINT AT i,7; PAPER 2;B$: NEXT i: RETURN
5000 CLS
5010 PRINT AT 7,3;"In speranta ca lucrarea";AT 9,6;"nu v-a dezamagit";AT 12,1; F
LASH 1;" VA MULTUMESC  PENTRU ATENTIE "
5020 PRINT AT 15,1;"prof.Serban Marinel";AT 16,1;"Brata Florian";AT 17,1;"Stroit
a Simona";AT 18,5;"elevi cl.XII-a A"
5025 PRINT AT 20,0;"LICEUL DE INFORMATICA  TIMISOARA"
5030 LET B$="IN SPERANTZA KA LUKRAREA NU WA DEZAMACIT     WA MULTZUMESK PENTRU A
TENTZIE": GO SUB 9000
5040 LET B$="PROFESOR  SERBAN MARINEL          BRATA FLORIAN   SIROITZA SIMONA  E
LEVI KLASA A DOUASPREZECEA  A'   LICEUL DE INFORMATIKA  TIMISOARA"
5050 GO SUB 9000
5060 PAUSE 1000: STOP
8000 LET B$=""
8010 INPUT LINE B$
8020 IF B$<>"" THEN GO SUB 9000
```

```
8030 GO TO 8000
9000 LET a=61024
9010 LET b$=b$+CHR$ 0
9020 FOR i=1 TO LEN b$
9030 POKE a+i-1,CODE b$(i TO i)
9040 NEXT i
9050 POKE a+i,0
9060 POKE 60214,96
9070 POKE 60215,238
9080 RANDOMIZE USR 60000
9090 POKE 60214,58
9100 POKE 60215,237
9110 RETURN
```

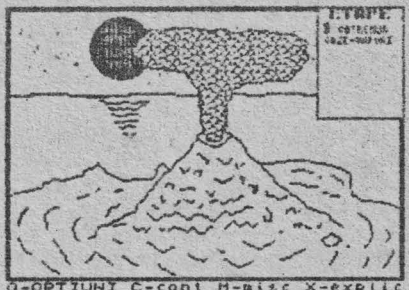




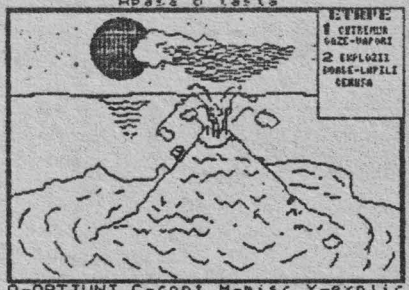




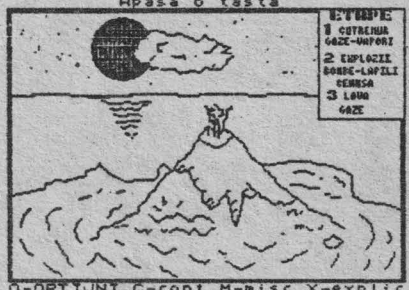
Apasa o tasta



O-OPTIUNI C-cont M-misc X-explic
Apasa o tasta



O-OPTIUNI C-cont M-misc X-explic
Apasa o tasta

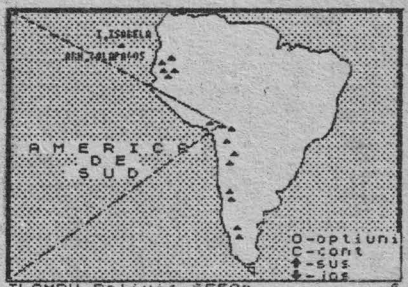


O-OPTIUNI C-cont M-misc X-explic
Apasa o tasta

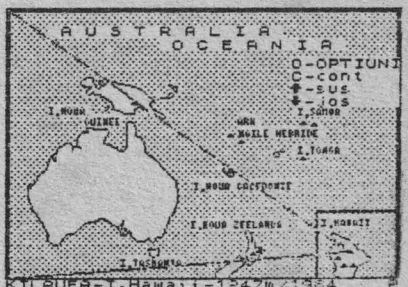
Optiuni O-OPTIUNI,C-cont

POPOCATEPETL-Mexic-5452m/1947 A
ST.HELENS-M.Cascade-2250m/1985 A

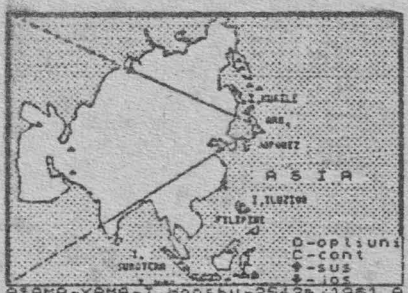
M.PELEE-I.Matinica-1463m/1902 A
PUCH-I.Saint Eustatius-594m A



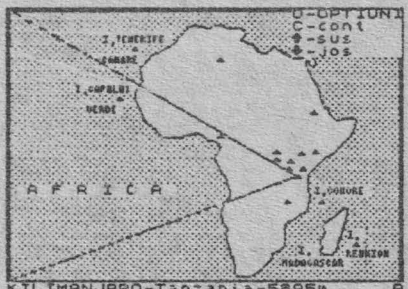
ILAMPU-Bolivia-5550m S
LLULLAILLACO-Chile-6723m latent



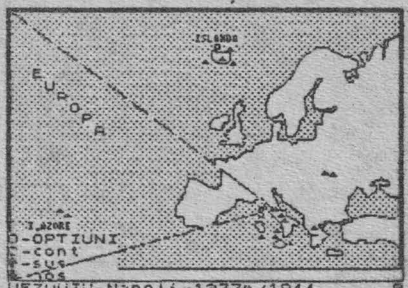
KILAUEA-I.Hawaii-1247m/1984
LAMINGTON-Papua-1795m/1951



ASAMA-YAMA-I.Honshu-2542m/1961 A
ASO-SAN-I.Kyushu-1592m S



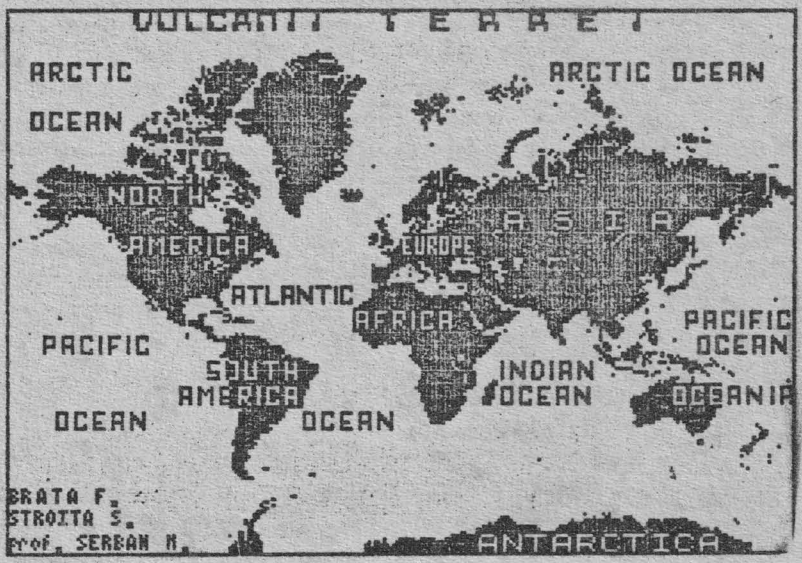
KILIMANJARO-Tanzania-5895m A



VEZUVIU-Napoli-1277m/1944 A
VULCANO-I.Vulcano-499m/1906 A

GRUPA VULCANICA DE NORD
Oas Gutii Tibles 1447-1840m


ARCTIC
OCEAN
ARCTIC OCEAN
NORTH
AMERICA
ATLANTIC
PACIFIC
OCEAN
SOUTH
AMERICA
INDIAN
OCEAN
OCEANIA
ANTARCTICA


ARCTIC
OCEAN
ARCTIC OCEAN
NORTH
AMERICA
EUROPE
ATLANTIC
AFRICA
PACIFIC
OCEAN
PACIFIC
OCEAN
SOUTH
AMERICA
INDIAN
OCEAN
OCEANIA
OCEAN
OCEAN
BRATA F.
STROITA S.
Prof. SERBAN M.
ANTARCTICA

CAPITOLUL 7
BIOLOGIE

7.1. CELULA VEGETALA

Am vazut in capitolele precedente cum INFORMATICA ajuta la predarea si fixarea cunostintelor din diferite stiinte.Dar dintre toate materiile de invatamint care se predau in liceu si in scolile generale, BIOLOGIA este unul din cele mai bune exemple in sensul observarii avantajelor aduse de calculator:autoinstruirea,autoverificarea,animarea unor procese etc.

In acest context am ales un program care urmareste doua dintre acest aspecte:verificarea si fixarea cunostintelor si predarea cu ajutorul calculatorului.

Prima parte a programului se refera la lectia STRUCTURA SI ULTRASTRUCTURA CELULEI VEGETALE din manualul de clasa a IX-a. Dupa ce profesorul a predat lectia el poate folosi acest program fie in cadrul aceleiasi ore,pentru a fixa elevilor termenii noi care apar,fie in ora urmatoare pentru a-i asculta pe elevi. Vom alege cazul al doilea si vom arata cum decurge o astfel de ora de biologie.

Dupa incarcarea programului,pe ecran va aparea ultrastructura celulei vegetale pe care se observa toti componentii acesteia:perete celular,membrana,nucleul,citoplasma,mitocondriile si altele(fig.1).Dupa apasarea unei taste vom avea afisat meniul (fig.2):

1 STRUCTURA CELULEI
2 DIVIZIUNEA MITOTICA

Prin apasarea tastei 1 ajungem la partea programului care ne intereseaza.Pe ecran avem din nou structura celulei iar intr-o parte apare prima intrebare.Fiecareintrebare are urmatoarea forma:se dau niste indicatii cu privire la rolul sau functiile in celula a componentului cautat;urmeaza trei raspunsuri posibile din care elevul trebuie sa-l aleaga pe cel corect.Prima intrebare are urmatorul enunt:

"CONSTITUENT FUNDAMENTAL AL CELULEI
CARE II CONFERA FORMA PROPRIE.

1 NUCLEUL

2 MEMBRANA

3 CITOPLASMA "

In acelasi timp o sageata indica pozitia componentului cautat pe imaginea celulei(fig.3).

Elevul trebuie sa tasteza 1,2 sau 3 alegind astfel unul din cele trei raspunsuri posibile.Calculatorul analizeaza raspunsul si afiseza in coltul din stinga sus daca elevul a stiut sau daca a gresit,indicind varianta corecta precum si numarul de raspunsuri corecte si gresite(fig.4 si fig.5).Apoi se trece la intrebarea urmatoare unde se lucreaza analog.

Programul contine noua intrebari dar numarul lor poate fi marit usor.Pentru fiecare raspuns corect elevul primeste un punct,plus un punct din oficiu,la sfirsitul setului de intrebari afisindu-se rezultatul final si nota obtinuta de elev pentru acest exercitiu.

Bine-nteles profesorul poate sa-l puna pe elev sa-si motiveze raspunsurile pentru a fi sigur ca acesta nu "ghiceste" solutiile,ca apoi,pe baza notei date de calculator si a celorlalte lamuriri date de elev,profesorul sa-i dea nota cuvenita.

Acesta parte a programului poate fi folosita de catre elev si fara ajutorul unui profesor,adica ca o autoverificare,dupa ce a invatat lectia.

A doua parte este un program de predare a biologiei pe calculator.A fost aleasa lectia "DIVIZIUNEA MITOTICA" din acelasi manual.

Cind calculatorul afiseaza meniul (fig.2) se apasa tasta 2. Pe ecran va aparea o celula la inceputul diviziunii precum si fazele acesteia(fig.6).Un cursor alb ne va spune ca sintem la interfaza.Apasind cite o tasta vom trece prin toate fazele diviziunii mitotice,forma celulei din stinga modificindu-se analo (fig.7 si fig.8).Tinind o tasta apasata in continuu obtinem o animatie care prezinta diviziunea celulei,trecind prin toate fazele,pina la formarea celulelor noi.Acesta este marele avantaj adus de calculator,animatia,deoarece nici unul din mijloacele actuale de predare nu poate reda miscarea (doar uneori un microscop dar pentru o experienta se pierde un timp pretios din cele 50 de minute ale orei).

Diviziunea poate fi vizionata de ori cite ori,profesorul fiind obligat sa insoteasca acesta trecere in revista a fazelor

prin explicatii exacte la fiecare din aceste momente.

Dupa cum apare afisat si pe ecran,apasind simultan tastele CAPS SHIFT si W programul se va reintoarce la meniu.

Aceasta parte poate fi folosita si de catre elev singur pentru a invata lectia, fara profesor (eventual cu un manual in mina),adica programul poate fi folosit pentru autoinstruire.

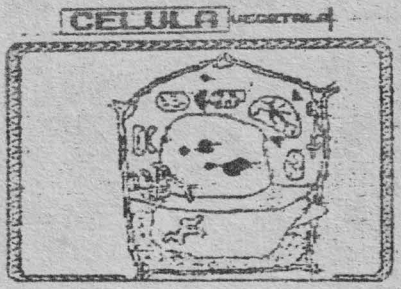
Dupa cum am mai precizat,programul poate fi imbunatatit sau completat dupa placul fiecaruia sau.pornind de la el,se pot realiza programe pentru alte lectii de biologie din manualele scolare.In acest sens consideram ideala colaborarea unui iubitor de biologie cu un elev pasionat de calculatoare (eventual membru al cercului de informatica din scoala).

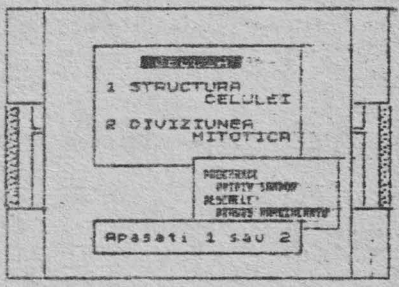
Speram ca acest program va va convinge ca informatica poate ajuta si la predarea sau verificarea cunostintelor de biologie si ca propriile dumneavoastra programe in acest domeniu sa impu-

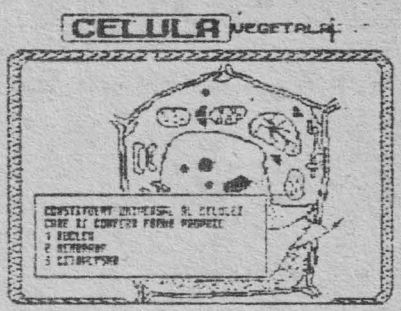
```
  1 REM    celula vegetala
  2 REM    autori: elevi OVIDIU SANDOR
  3 REM                  DRAGOS MARGINEANTU
 10 REM  INITIALIZARI
 12 BORDER 7: BRIGHT 0: PAPER 7: INK 7: CLS
 13 FOR i=0 TO 15: READ a: POKE USR "a"+i,a: NEXT i
 14 DATA 1,2,4,40,48,120,96,128,1,6,30,12,20,32,64,128
 15 RESTORE 15
 17 DIM s$(3,21)
 20 LET a$=""
 25 DIM x(11): DIM y(11)
 30 FOR i=1 TO 11: READ x(i),y(i): NEXT i
 35 DATA 174,4500,176,4500,178,4500,180,4500,182,4500,184,4500,186,4500,188,450
0,190,4500,192,4400,195,4400
 40 DIM a(9,8): DIM t$(9,64): DIM r$(9,3,21)
 45 FOR i=1 TO 9: READ a(i,8),a(i,1),a(i,2),a(i,3),a(i,4),a(i,5),a(i,6),a(i,7),
t$(i),r$(i,1)r$(i,2),r$(i,3): NEXT i
 50 DATA 1,15,2,21,20,17,26,2,"CONSTITUENT UNIVERSAL AL CELULEI  CARE II CONFER
A FORMA PROPRIE","NUCLEU","MEMBRANA","CITOPLASMA"
 51 DATA 2,5,16,12,29,18,8,3,"PRODUS AL CITOPLASMEI","MITOCONDRII","CLOROPLASTE
","PERETE CELULAR"
 52 DATA 1,14,2,21,17,6,18,2,"CONSTITUENT FUNDAMENTAL AL  CELULEI VII","APARATU
L GOLGI","CITOPLASMA","NUCLEOL"
 53 DATA 1,15,2,21,24,8,23,1,"CONSTITUENT CARE CONTINE ADN SI ARN","NUCLEUL","R
ETICUL ENDOPLASMATIC","MEMBRANA"
 54 DATA 2,5,2,12,17,10,20,3,"IN INTERIORUL NUCLEULUI","CITOPLASMA","CLOROPLAST
E","NUCLEOLUL"
 55 DATA 1,5,15,12,29,14,13,3,"SISTEM CARE ASIGURA TRANS-PORTUL INTRA SI INTERM
OLE-CULAR","MITOCONDRII","PERETE CELULAR","RETICUL ENDOPLASMATIC"
 56 DATA 1,14,15,21,29,11,12,2,"APARAT CU MULTIPLE FUNCTII","NUCLEU","APARATUL
GOLGI","CLOROPLASTE"
 57 DATA 1,14,2,21,16,7,18,1,"UZINA ENERGETICA A CELULEI","MITOCONDRII","NUCLEOL
","CITOPLASMA"
 58 DATA 2,5,16,12,29,10,12,2,"CONFERA CELULEI CULOAREA VERDE","NUCLEU","CLOROP
LASTE","MEMBRANA"
 60 DIM f(13,7)
 65 FOR i=1 TO 13: READ f(i,1),f(i,2),f(i,3),f(i,4),f(i,5),f(i,6),f(i,7): NEXT
i
 70 DATA 5,0,5,2,9,28,0,5,0,10,2,18,11,0,5,0,10,19,18,28,0,5,0,19,2,21,28,0
 71 DATA 7,2,6,5,18,25,1,7,2,0,0,7,7,1,7,2,0,23,7,30,1,2,7,16,0,21,7,1,2,7,16,2
3,21,30,1,2,7,0,3,21,27,1,6,1,3,7,12,23,1
 72 DATA 7,2,f(11,5),15,f(12,3)+5,26,1
 73 DATA 7,0,17,7,19,23,0
100 REM  MENIU
105 GO SUB 4300
110 PAUSE 0
115 FOR k=1 TO 13
120 PAPER f(k,1): INK f(k,2): BRIGHT f(k,7)
125 LET a1=f(k,3): LET b1=f(k,4): LET a2=f(k,5): LET b2=f(k,6)
130 GO SUB 4000
135 NEXT k
137 BRIGHT 1: PAPER 6: INK 0
140 PRINT AT f(11,3)+1,11; INVERSE 1;" CELULA   40>PRINT AT f(11,3)+1,11; INVER
SE 1;" CELULA                                   45>PRINT AT f(11,3)+3,8;" 1 STRU
CTURA";AT f(11,3)+4,16;"CELULEI";AT f(11,3)+6,8;"2 DIVIZIUNEA";AT f(11,3)+7,15;"
MITOTICA"
150 PAPER 7: INK 2
160 LET a1=f(12,3): LET b1=f(12,4): LET b2=f(12,6): BRIGHT 1: LET c$="PROGRAMUL
          OVIDIU SANDOR     DESENELE                DRAGOS MARGINEANTU": LET d=
1: LET l=(b2-b1-1)*2: GO SUB 4100
161 PRINT BRIGHT 0; INK 0;AT 18,8;"Apasati 1 sau 2"
165 IF INKEY$="1" THEN LET salt=1000: GO TO 185
170 IF INKEY$="2" THEN LET salt=2000: GO TO 185
175 IF INKEY$="5" THEN RUN 9800
180 GO TO 165
220 GO TO salt
999 STOP
1000 REM  CELULA
1005 BORDER 7: PAPER 7: INK 0: BRIGHT 0: CLS
1010 PAPER 5: INK 0: GO SUB 4300
1015 LET gres=0: PAUSE 1
1020 FOR k=1 TO 9
1025 LET a1=a(k,1): LET b1=a(k,2): LET a2=a(k,3): LET b2=a(k,4)
1030 LET corect=a(k,7): LET px=a(k,5): LET py=a(k,6): LET v$=t$(k): LET s$(1)=r$
(k,1): LET s$(2)=r$(k,2): LET s$(3)=r$(k,3)
1035 GO SUB 3000
1040 PAUSE 1: PAUSE 80
1045 GO SUB 4300
```

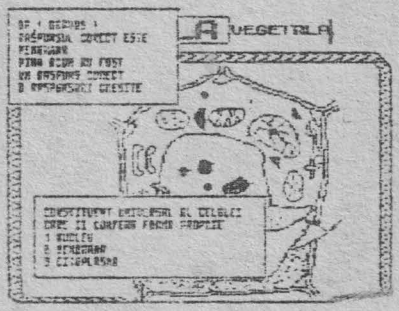
```
1054 REM *
1055 LET a1=16: LET b1=16: LET a2=21: LET b2=31: PAPER 7: BRIGHT 0: INK 0: GO SU
B 4000
1059 LET n$=STR$ ((9-gres)/9*100)+"    "
1060 LET c$="AI RASPUNS CORECT LA "+n$( TO 5)+"% DIN INTREBARI": LET d=1: LET l=
28: GO SUB 4100
1065 LET c$="PENTRU ACEST EXERCITIU AI   NOTA "+STR$ (10-gres): LET d=3: GO SUB
4100
1070 PAUSE 0
1075 GO TO 100
1999 STOP
2000 REM   DIN IVIZIUNEA
2001 PRINT #0;AT 0,0;"
     ": PAUSE 1
2005 PAPER 7: BRIGHT 1: INK 0: LET a1=0: LET b1=0: LET a2=21: LET b2=31: GO SUB
4000
2007 LET a1=1: LET b1=16: LET a2=16: LET b2=30: PAPER 2: INK 7: BRIGHT 1: GO SUB
4000
2010 RESTORE 2000
2015 PRINT AT 2,17;" DIVIZIUNEA ";AT 3,18;" MITOTICA "
2020 FOR i=1 TO 11: READ z$: PRINT AT 4+i,17;z$: NEXT i
2025 DATA "1  Interfaza ","2  Profaza-a ","3  Profaza-b ","4  Metafaza  ","5  An
afaza  ","6  Telofaza  ","7  Citofaza-a","8  Citofaza-b","9  Citofaza-c","10 Ci
tofaza-d","11 Celule noi"
2026 LET a1=17: LET b1=16: LET a2=20: LET b2=30: PAPER 5: INK 0: BRIGHT 1: GO SU
B 4000
2027 LET c$="  APASATI    PENTRU MENIU    ORICE PT  CONTINUARE": LET d=1: LET l=
26: GO SUB 4100: PRINT AT 18,22;"W": PAPER 2: INK 7
2030 GO SUB 4600
2040 FOR j=1 TO 11: PRINT AT 4+j,17; INVERSE 1(j: LET q=x(j): GO SUB y(j)
2045 PAUSE 0
2050 IF INKEY$="W" THEN GO TO 2070
2051 PAUSE 1
2055 PRINT AT 4+j,17;j
2060 NEXT j
2065 FOR i=1 TO 150: NEXT i: GO TO 2030
2070 GO TO 100
3000 REM  intreb (a1,b1,a2,b2,px,py,v$,corect,s$(1-3))
3005 LET l=(b2-b1-1)*2
3010 GO SUB 4000
3015 LET d=1: LET c$=v$
3020 GO SUB 4100
3025 LET d=d+INT (64/l)+1
3030 LET c$="1 "+s$(1): GO SUB 4100
3035 LET c$="2 "+s$(2): LET d=d+1: GO SUB 4100
3040 LET c$="3 "+s$(3): LET d=d+1: GO SUB 4100
3045 IF a(k,0)=1 THEN PRINT AT px,py; PAPER 7; BRIGHT 0; INK 2; FLASH 1;"?": GO
TO 3050
3047 PRINT AT px,py; PAPER 7; BRIGHT 0; INK 2; FLASH 1;"?"
3050 LET q$=INKEY$
3055 IF q$<"1" OR q$>"3" THEN GO TO 3050
3060 IF VAL q$=corect THEN LET c$="DA ! BRAVOS !": GO TO 3100
3065 LET gres=gres+1
3070 LET c$="NU !!! NU !!!"
3100 LET a1=0: LET b1=0: LET a2=7: LET b2=13: PAPER 1: INK 7: GO SUB 4000
3105 LET c$=c$+"          RASPUNSUL CORECT ESTE "+s$(corect)+" "+"PINA ACUM AU FO
ST": LET d=1: LET l=22: GO SUB 4100
3110 IF k-gres<>1 THEN LET d=5: LET c$=STR$ (k-gres)+" RASPUNSURI CORECTE": GO S
UB 4100: GO TO 3115
3112 LET d=5: LET c$="UN RASPUNS CORECT": GO SUB 4100
3115 IF gres<>1 THEN LET d=6: LET c$=STR$ (gres)+" RASPUNSURI GRESITE": GO SUB 4
100: GO TO 3120
3117 LET d=6: LET c$="UN RASPUNS GRESIT": GO SUB 4100
3120 PAPER 5: INK 0
3999 RETURN
4000 REM  window (a1,b1,a2,b2)
4005 LET x=b2-b1+1: LET y=a2-a1+1
4010 FOR i=1 TO y
4015 PRINT AT a1+i-1,b1;a$( TO x)
4020 NEXT i
4025 PLOT b1*8+1,175-a1*8-1: DRAW x*8-3,0: DRAW 0,-y*8+3: DRAW -x*8+3,0: DRAW 0,
y*8-3
4030 RETURN
4100 REM  print in window (a1,b1,d,1,c$)
4105 FOR j=0 TO INT (LEN c$/l)-1
4110 LET b$=c$(j*l+1 TO (j+1)*l)
```

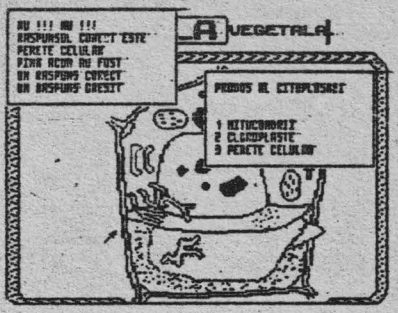
```
4115 PRINT AT ai+d+j,bi+1;
4120 GO SUB 4200
4125 NEXT j
4130 LET b$=c$(j+1 TO )
4135 PRINT AT ai+d+j,bi+1;
4140 GO SUB 4200
4145 RETURN
4200 REM  64 chrs (; b$)
4205 FOR i=1 TO LEN b$-1 STEP 2
4210 POKE 23607,227
4215 PRINT ; OVER 0;b$(i TO i);CHR$ 8;
4220 POKE 23607,230
4225 PRINT ; OVER 1;b$(i+1 TO i+1);
4230 NEXT i
4235 IF INT (LEN b$/2)*2=LEN b$ THEN GO TO 4250
4240 POKE 2 607,227
4245 PRINT    OVER 0;b$(LEN b$ TO );
4250 POKE 23607,60
4255 RETURN
4300 REM  sreen$ ()
4305 POKE 60308,27
4310 RANDOMIZE USR 60300
4315 RETURN
4400 REM  1-div screen$ (q)
4405 RESTORE 4400
4410 FOR i=1 TO 7: READ x,a: POKE 60100+x,a: NEXT i
4415 DATA 1,1,2,72,7,64,4,0,5,q,9,12,18,20
4420 RANDOMIZE USR 60100
4425 RETURN
4500 REM  2-div screen$ (q)
4505 RESTORE 4500
4510 FOR i=1 TO 7: READ x,a: POKE 60100+x,a: NEXT i
4515 DATA 1,3,2,72,7,64,4,0,5,q,9,8,18,24
4520 RANDOMIZE USR 60100
4525 RETURN
4600 REM  3-div screen$ (q)
4605 RESTORE 4600
4610 FOR i=1 TO 7: READ x,a: POKE 60100+x,a: NEXT i
4615 DATA 1,0,2,64,7,192,4,0,5,161,9,16,18,16
4620 RANDOMIZE USR 60100
4625 RETURN
9800 REM  salvare ()
9810 SAVE "CELULA" LINE 9900: SAVE "celulacod"CODE 41216,19200: RUN
9900 REM  incarcator
9910 CLEAR 41215: LOAD ""CODE : RUN
```

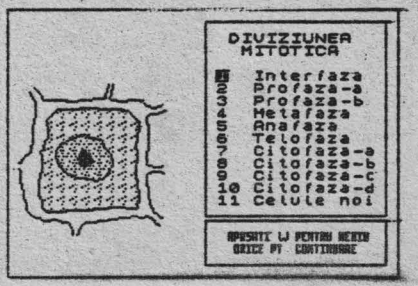

CELULA VEGETALĂ


1 STRUCTURA CELULEI
2 DIVIZIUNEA MITOTICA
Apasati 1 sau 2


CELULA VEGETALĂ


A VEGETALĂ


AU !!! AU !!!
RASPUNSUL CORECT ESTE
PEREIE CELULAR
PINA ACUM AU FOST
UN RASPUNS CORECT
UN RASPUNS GRESIT
A VEGETALA
PRIMUS IN CITOPLASMA
1 MITOCONDRII
2 CLOROPLASTE
3 PEREIE CELULAR


DIVIZIUNEA MITOTICA
1 Interfaza
2 Profaza-a
3 Profaza-b
4 Metafaza
5 Anafaza
6 Telofaza
7 Citofaza-a
8 Citofaza-b
9 Citofaza-c
10 Citofaza-d
11 Celule noi
APASATI U PENTRU NEXT
ORICE PT CONTINUARE

CAPITOLUL 8

P.D.E.F.

METROLOGIA DURITATII

Capitolul de fata prezinta un program de calcul al caracteristicilor metrologice ale mostrelor etalon de duritate.

Programul de calcul a fost solicitat de catre Institutul National de Metrologie - Laboratorul Duritati, dar poate fi folosit si in scop didactic la lectiile de Prelucrarea datelor experimentale in fizica sau la disciplinele de tehnica masurarii de la clasele de metrologie.

8.1. Duritatea - caracteristica de material

Introdusa din necesitati tehnologice,incercarea de duritate a devenit una dintre incercarile de materiale frecvent utilizate in industria constructoare de masini.

Duritatea reprezinta rezistenta opusa de materiaul la patrunderea unui corp de o anumita forma, numit penetrator, sub actiunea unei anumite forte,numita sarcina; si se determina pe baza amprentei ramase pe material ca urmare a deformarii plastice a materialului.

In functie de tipul penetratorului,marimea sarcinii de incercare si dimensiunea caracteristica a amprentei, in prezent se cunosc si se practica fiind standardizate, atit pe plan national cit si pe plan mondial, mai multe metode de incercare a duritatii cu mai multe scari de duritate. Acestea sint:

8.1.1.Incercarea de duritate Rockwell

Conform STAS 493-81 si STAS 10703-86 in tabelul

i sint prezentate scarile de duritate Rockwell cu elementele lor definitorii.

8.1.2. Incercarea de duritate superficiala Rockwell

Conform STAS 8525-84, elementele definitorii ale scarilor corespunzatoare acestei metode sint prezentate in tabelul 2.

8.1.3. Incercarea de duritate Brinell

Conform STAS 165-83 scarile de duritate Brinell uzuale si elementele lor definitorii sint prezentate in tabelul 3.

8.1.4. Incercarea de duritate Vickers

Conform STAS 492/1-85, STAS 492/2-85 si STAS 7057 -78 scarile de duritate Vickers cu elementele lor definitorii sint prezentate in tabelul 4.

Tabelul 1

Scara de duritate	Penetratorul	Sarcina de incercare F(N)		Dimensiunea caracteristica a amprentei
		initiala	totala	
RA	Con diamant natural unghi la virf 120 grade	98	588	Adincimea remanenta de patrundere
RC	Idem	98	1471	Idem
RB	Bila otel dur D=1,5875mm	98	980	Idem
RF	Idem	98	588	Idem
RG	Idem	98	1471	Idem

Tabelul 2

Scara de duritate	Penetratorul	Sarcina de incercare F(N)	Dimensiunea caracteristica a am-

		initiala	totala	prentei
R 15 N	Idem RA	29,42	147,1	Idem RA
R 30 N	Idem	29,42	284,2	Idem
R 45 N	Idem	29,42	441,3	Idem
R 15 T	Idem RB	29,42	147,1	Idem
R 30 T	Idem	29,42	284,2	Idem
R 45 T	Idem	29,42	441,3	Idem

Tabelul 3

Scara de duritate	Penetratorul	Sarcina de incercare F(kN)	Dimensiunea caracteristica a amprentei
B 10/3000	Bila otel dur D = 10 mm	29,42	Diametrul mediu al amprentei
B 10/1000	Idem	9,807	Idem
B 5/750	Idem D=5mm	7,355	Idem
B 5/250	Idem	2,452	Idem
B2,5/187,5	Idem D=2,5mm	1,839	Idem
B2,5/62,5	Idem	0,6129	Idem
B 2/120	Idem D=2mm	1,177	Idem

Tabelul 4

Scara de duritate	Penetratorul	Sarcina de incercare F(N)	Dimensiunea caracteristica a amprentei
V 5	Piramida dreapta cu baza patrata si unghiul la virf de 136 grade,din	49,03	Diagonala medie a amprentei

	diamant natural		
V 10	Idem	98,07	Idem
V 20	Idem	196,1	Idem
V 30	Idem	294,2	Idem
V 50	Idem	490,3	Idem
V 100	Idem	987,7	Idem
V 0,2	Idem	1,961	Idem
V 0,5	Idem	4,903	Idem
V 1	Idem	9,807	Idem
V 3	Idem	29,42	Idem
V 0,01	Idem	0,0981	Idem
V 0,03	Idem	0,2942	Idem
V 0,05	Idem	0,4903	Idem
V 0,1	Idem	0,9807	Idem

8.2.Mostre etalon de duritate

8.2.1.Domeniu de aplicare

Mostrele etalon de duritate sint destinate verificarii aparatelor pentru incercarea duritatii conform STAS 7169-82 si 9115-81.

8.2.2. Definitie

Mostrele etalon de duritate sint conform STAS 7170-87,masuri cu valoare unica prin care se materializeaza puncte ale scarilor de duritate standardizate. Ele se realizeaza din oteluri cu structura omogena si stabila. Duritatea nominala li se atribuie pe baza etalonarii cu aparate etalon corespunzatoare.

8.2.3.Caracteristicile metrologice

Definitiile,simbolurile si ecuatiile caracteristicilor metrologice sint prezentate in STAS 7170-87.

8.2.4.Conditii impuse

Mostrele de duritate se admit ca etaloane si se in-

cadreaza in clase de precizie conform tolerantelor impuse de STAS 7170-87.

6.3. Structura programului

La diferitele scari de duritate se poate ajunge prin intermediul unui meniu principal care apare la inceputul rularii programului.Programul este format din 8 subrutine principale.

Rezultatele pot fi afisate pe imprimanta Robotron K6313 si prezentate prin documente conform normelor metrologice in vigoare.

Programul bineinteles poate fi imbunatatit.De exemplu pentru extragerea datelor pe alte tipuri de imprimante.

```
 15 CLEAR 64999: LOAD ""CODE 65000
 16 RANDOMIZE USR 65000
 17 CLS : PRINT  FLASH 1;AT 12,10;"SCLEROMETRIE"; FLASH 1;AT 14,7;"by DOBOSAN C
OSTIN"
 20 PRINT AT 21,0;"Apasa o tasta"
 30 LET x$=INKEY$: IF x$="" THEN  GO TO 370
372 CLS
374 PRINT AT 5,5;"1.ROCWELL A": PRINT AT 6,5;"2.ROCWELL B,F,6": PRINT AT 7,5;"3
.ROCWELL C": PRINT AT 8,5;"6.BRINELL": PRINT AT 9,5;"7.VICKERS"
376 PRINT AT 10,5;"N.ROCKWELL N": PRINT AT 11,5;"T.ROCKWELL T": PRINT AT 12,5;"
P.POZITIONEREA AMPRENTELOR": PRINT AT 13,5;"E. STOP "
378 LET x$=INKEY$: IF x$="1" THEN  GO SUB 400
380 IF x$="2" THEN  GO SUB 500
382 IF x$="3" THEN  GO SUB 600
384 IF x$="6" THEN  GO SUB 900
386 IF  $="7" THEN  GO SUB 1000
388 IF  $="8" THEN  GO SUB 1100
390 IF  $="N" THEN  GO SUB 700
392 IF x$="T" THEN  GO SUB 800
394 IF x$="P" THEN  GO SUB 1200
396 IF x$="E" THEN  STOP
398 GO TO 374
400 CLS
401 PRINT AT 15,5; FLASH 1;"<ROCKWELL A  >": LPRINT "    <ROCKWELL A>": PRINT A
T 21,0;"Apasa o tasta": LET x$=INKEY$: IF x$="" THEN  GO TO 401
402 CLS
410 GO SUB 6000
415 LET kre=100-(med/2): PRINT "Duritatea medie H med=";kre: LPRINT "Duritatea
 medie H med=";kre
419 GO SUB 6200
420 INPUT "Determ.init.sau periodica(I-P)";x$
421 IF x$="I" THEN  GO TO 424
422 IF x$="P" THEN  GO TO 429
423 GO TO 420
424 PRINT "Determ.initiala": LPRINT "Determinare initiala": IF ef<=2 THEN  PRIN
T : PRINT "ETALON CLASA 1 PRECIZIE": LPRINT : LPRINT "    ETALON CLASA 1 PRECIZIE
": GO TO 427
425 IF ef<=3 THEN  PRINT : PRINT "ETALON CLASA 2 PRECIZIE": LPRINT : LPRINT "
    ETALON CLASA 2 PRECIZIE": GO TO 427
426 PRINT : PRINT "NOSTRA CE NU POATE FI CONSIDE-   RATA ETALON": LPRINT : LPRI
NT "NOSTRA CE NU POATE FI CONSIDERATA ETALON"
427 LET x$=INKEY$: IF x$="" THEN  GO TO 427
428 CLS : RETURN
429 PRINT "Determ.periodica": LPRINT "Determinare periodica": INPUT "Durit.nomi
nala N=";N: PRINT "Durit.nominala N=";N: LPRINT "Duritatea nominala N=";N
430 LET ghg=2*(100-N): LET ej=((med-ghg)/ghg)*100: PRINT "Eroarea de justete ej
=";ej;"%": LPRINT "Eroarea de justete ej=";ej"%"
431 IF ef<=0 AND ABS (ej)<=2 THEN  PRINT : PRINT "ETALON CLASA 1 PRECIZIE ADMIS
 CUDURITATEA NOMINALA": LPRINT : LPRINT "ETALON CLASA 1 PRECIZIE ADMIS CU DURITA
TEA NOMINALA": GO TO 436
432 IF ef<=3 AND ABS (ej)<=2 THEN  PRINT : PRINT "ETALON CLASA 2 PRECIZIE ADMIS
 CUDURITATEA NOMINALA": LPRINT : LPRINT "ETALON CLASA 2 PRECIZIE ADMIS CU DURITA
TEA NOMINALA": GO TO 436
433  IF ef<=2 AND ABS (ej)>2 THEN  PRINT : PRINT "ETLON CLASA 1 PRECIZIE ADMIS
CUDURITATEA MEDIE": LPRINT : LPRINT "ETALON CLASA 1 PRECIZIE ADMIS CU DURITATEA
 MEDIE": GO TO 436
434 IF ef<=3 AND ABS (ej)>2 THEN  PRINT : PRINT "ETALON CLASA 2 PRECIZIE ADMIS
CUDURITATEA MEDIE": LPRINT : LPRINT "ETALON CLASA 2 PRECIZIE ADMIS CU DURITATEA
 MEDIE": GO TO 436
435 PRINT : PRINT "NOSTRA CE NU POATE FI CONSIDE- RATA ETALON": LPRINT : LPRINT
 "NOSTRA CE NU POATE FI CONSIDERATA ETALON"
436 LET x$=INKEY$: IF x$="" THEN  GO TO 436
437 CLS : RETURN
500 CLS
501 PRINT AT 15,5; FLASH 1;"<ROCKWELL B,F,6  >": LPRINT "    ROCKWELL B,F,6": PR
INT AT 21,0;"Apasa o tasta": LET x$=INKEY$: IF x$="" THEN  GO TO 501
502 CLS
505 GO SUB 6000
515 LET kre=130-(med/2): PRINT "Duritatea medie H med=";kre: LPRINT "Duritatea
 medie H med=";kre
519 GO SUB 6200
520 INPUT "Determ.init.sau periodica(I-P)";x$
521 IF x$="I" THEN  GO TO 524
522 IF x$="P" THEN  GO TO 529
523 GO TO 520
524 PRINT "Determ.initiala": LPRINT "Determinare initiala": IF ef<=2 THEN  PRIN
T : PRINT "ETALON CLASA 1 PRECIZIE": LPRINT : LPRINT "ETALON CLASA 1 PRECIZIE":
GO TO 527
```

```
525 IF ef<=3 THEN  PRINT : PRINT "ETALON CLASA 2 PRECIZIE": LPRINT : LPRINT "ET
ALON CLASA 2 PRECIZIE": GO TO 527
526 PRINT : PRINT "MOSTRA CE NU POATE FI CONSIDE- RATA ETALON": LPRINT : LPRINT
"MOSTRA CE NU POATE FI CONSIDERATA ETALON"
527 LET x$=INKEY$: IF x$="" THEN  GO TO 527
528 CLS : RETURN
529 PRINT "Determ.periodica": LPRINT "Determinare periodica": INPUT "Durit.nomi
nala N=";N: PRINT "Durit.nominala N=";N: LPRINT "Duritatea nominala N=";N
530 LET z=2*(130-N): LET ej=((med-z)/z)*100: PRINT "Eroarea de justete ej=";ej;
"%": LPRINT "Eroarea de justete ej=";ej;"%"
531 IF ef<=2 AND ABS (ej)<=2 THEN  PRINT : PRINT "ETALON CLASA 1 PRECIZIE ADMIS
CUDURITATEA NOMINALA": LPRINT : LPRINT "ETALON CLASA 1 PRECIZIE ADMIS CU DURITA
TEA NOMINALA": GO TO 536
532 IF ef<=3 AND ABS (ej)<=2 THEN  PRINT : PRINT "ETALON CLASA 2 PRECIZIE ADMIS
CUDURITATEA NOMINALA": LPRINT : LPRINT "ETALON CLASA 2 PRECIZIE ADMIS CU DURITA
TEA NOMINALA": GO TO 536
533  IF ef<=2 AND ABS (ej)>2 THEN  PRINT : PRINT "ETALON CLASA 1 PRECIZIE ADMIS
CUDURITATEA MEDIE": LPRINT : LPRINT "ETALON CLASA 1 PRECIZIE ADMIS CU DURITATEA
MEDIE": GO TO 536
534 IF ef<=3 AND ABS (ej)>2 THEN  PRINT : PRINT "ETALON CLASA 2 PRECIZIE ADMIS
CUDURITATEA MEDIE": LPRINT : LPRINT "ETALON CLASA 2 PRECIZIE ADMIS CU DURITATEA
MEDIE": GO TO 536
535 PRINT : PRINT "MOSTRA CE NU POATE FI CONSIDE- RATA ETALON": LPRINT : LPRINT
"MOSTRA CE NU POATE FI CONSIDERATA ETALON"
536 LET x$=INKEY$: IF x$="" THEN  GO TO 536
537 CLS : RETURN
600 CLS
601 PRINT AT 15,5; FLASH 1;"<ROCKWELL C  >": LPRINT "       ROCKWELL C": PRINT A
T 21,0;"Apasa o tasta": LET x$=INKEY$: IF x$="" THEN  GO TO 601
602 CLS
605 GO SUB 6000
615 LET kre=100-(med/2): PRINT "Duritatea medie H med=";kre: LPRINT "Duritatea
medie H med=";kre
619 GO SUB 6200
620 INPUT "Determ.init.sau periodica(I-P)";x$
621 IF x$="I" THEN  GO TO 624
622 IF x$="P" THEN  GO TO 629
623 GO TO 620
624 PRINT "Determ.initiala": LPRINT "Determinare initiala": IF ef<=1 THEN  PRIN
T : PRINT "ETALON CLASA 1 PRECIZIE": LPRINT : LPRINT "ETALON CLASA 1 PRECIZIE":
GO TO 627
625 IF ef<=1.5 THEN  PRINT : PRINT "ETALON CLASA 2 PRECIZIE": LPRINT : LPRINT "
ETALON CLASA 2 PRECIZIE": GO TO 627
626 PRINT : PRINT "MOSTRA CE NU POATE FI CONSIDE- RATA ETALON": LPRINT : LPRINT
"MOSTRA CE NU POATE FI CONSIDERATA ETALON"
627 LET x$=INKEY$: IF x$="" THEN  GO TO 627
628 CLS : RETURN
629 PRINT "Determ.periodica": LPRINT "Determinare periodica": INPUT "Durit.nomi
nala N=";N: PRINT "Durit.nominala N=";N: LPRINT "Duritatea nominala N=";N
630 LET z=2*(100-N): LET ej=((med-z)/z)*100: PRINT "Eroarea de justete ej=";ej;
"%": LPRINT "Eroarea de justete ej=";ej;"%"
631 IF ef<=1 AND ABS (ej)<=1 THEN  PRINT : PRINT "ETALON CLASA 1 PRECIZIE ADMIS
CUDURITATEA NOMINALA": LPRINT : LPRINT "ETALON CLASA 1 PRECIZIE ADMIS CU DURITA
TEA NOMINALA": GO TO 636
632 IF ef<=1.5 AND ABS (ej)<=1 THEN  PRINT : PRINT "ETALON CLASA 2 PRECIZIE ADM
IS CUDURITATEA NOMINALA": LPRINT : LPRINT "ETALON CLASA 2 PRECIZIE ADMIS CU DURI
TATEA NOMINALA": GO TO 636
633  IF ef<=1 AND ABS (ej)>1 THEN  PRINT : PRINT "ETALON CLASA 1 PRECIZIE ADMIS
CUDURITATEA MEDIE": LPRINT : LPRINT "ETALON CLASA 1 PRECIZIE A MIS CU DURITATEA
MEDIE": GO TO 636
634 IF ef<=1.5 AND ABS (ej)>1 THEN  PRINT : PRINT "ETALON CLASA 2 PRECIZIE ADMI
S CUDURITATEA MEDIE": LPRINT : LPRINT "ETALON CLASA 2 PRECIZIE ADMIS CU DURITATE
A MEDIE": GO TO 636
635 PRINT : PRINT "MOSTRA CE NU POATE FI CONSIDE- RATA ETALON": LPRINT : LPRINT
"MOSTRA CE NU POATE FI CONSIDERATA ETALON"
636 LET x$=INKEY$: IF x$="" THEN  GO TO 636
637 CLS : RETURN
700 CLS
701 PRINT AT 15,5; FLASH 1;"<ROCKWELL N  >": LPRINT "       ROCKWELL N": PRINT
AT 21,0;"Apasa o tasta": LET x$=INKEY$: IF x$="" THEN  GO TO 701
702 CLS
705 GO SUB 6000
715 LET kre=100-med: PRINT "Duritatea medie H med=";kre: LPRINT "Duritatea medi
e H med=";kre
719 GO SUB 6200
```

```
720 INPUT "Detera.init.sau periodica(I-P)";x$
721 IF x$="I" THEN  GO TO 724
722 IF x$="P" THEN  GO TO 729
723 GO TO 720
724 PRINT "Detera.initiala": LPRINT "Determinare initiala": IF ef(=1.5 THEN  PR
INT : PRINT "ETALON CLASA 1 PRECIZIE": LPRINT : LPRINT "ETALON CLASA 1 PRECIZIE"
: GO TO 727
725 IF ef(=2 THEN  PRINT : PRINT "ETALON CLASA 2 PRECIZIE": LPRINT : LPRINT "ET
ALON CLASA 2 PRECIZIE": GO TO 727
726 PRINT : PRINT "MOSTRA CE NU POATE FI CONSIDE- RATA ETALON": LPRINT : LPRINT
"MOSTRA CE NU POATE FI CONSIDERATA ETALON"
727 LET x$=INKEY$: IF x$="" THEN  GO TO 727
728 CLS : RETURN
729 PRINT "Detera.periodica": LPRINT "Determinare periodica": INPUT "Durit.nomi
nala N=";N  PRINT "Durit.nominala N=";N: LPRINT "Duritatea nominala N=";N
730 LET z=100-N: LET ej=((med-z)/z)*100: PRINT "Eroarea de justete ej=";ej;"%":
LPRINT "Eroarea de justete ej=";ej;"%"
731 IF ef(=1.5 AND ABS (ej)(=1.5 THEN  PRINT : PRINT "ETALON CLASA 1 PRECIZIE A
DMIS CUDURITATEA NOMINALA": LPRINT : LPRINT "ETALON CLASA 1 PRECIZIE ADMIS CU DU
RITATEA NOMINALA": GO TO 736
732 IF ef(=2 AND ABS (ej)(=1.5 THEN  PRINT : PRINT "ETALON CLASA 2 PRECIZIE ADM
IS CUDURITATEA NOMINALA": LPRINT : LPRINT "ETALON CLASA 2 PRECIZIE ADMIS CU DURI
TATEA NOMINALA": GO TO 736
733  IF ef(=1.5 AND ABS (ej)>1.5 THEN  PRINT : LET v$="ETALON CLASA 1 PRECIZIE
ADMIS CUDURITATEA MEDIE": PRINT v$: LPRINT v$: GO TO 736
734 IF ef(=2 AND ABS (ej)>1.5 THEN  PRINT : LET v$="ETALON CLASA 2 PRECIZIE ADM
IS CUDURITATEA MEDIE": PRINT v$: LPRINT v$: GO TO 736
735 PRINT : LET v$="MOSTRA CE NU POATE FI CONSIDERATA ETALON": PRINT v$: LPRINT
v$
736 LET x$=INKEY$: IF x$="" THEN  GO TO 736
737 CLS : RETURN
800 CLS
801 PRINT AT 15,5; FLASH 1;"<ROCKWELL T  >": LPRINT "   <ROCKWELL T>": PRINT AT
21,0;"Apasa o tasta": LET x$=INKEY$: IF x$="" THEN  GO TO 801
802 CLS
805 GO SUB 6000
815 LET kre=100-med: LET v$="Duritatea medie H med=": PRINT v$;kre: LPRINT v$;k
re
819 GO SUB 6200
820 INPUT "Detera.init.sau periodica(I-P)";x$
821 IF x$="I" THEN  GO TO 824
822 IF x$="P" THEN  GO TO 829
823 GO TO 820
824 PRINT "Detera.initiala": LPRINT "Determinare initiala": IF ef(=2 THEN  PRIN
T : LET v$="ETALON CLASA 1 PRECIZIE": PRINT v$: LPRINT : LPRINT v$: GO TO 827
825 IF ef(=3 THEN  PRINT : LET v$="ETALON CLASA 2 PRECIZIE": PRINT v$: LPRINT :
LPRINT v$: GO TO 827
826 PRINT : LET v$="MOSTRA CE NU POATE FI CONSIDERATA ETALON": PRINT v$: LPRINT
: LPRINT v$
827 LET x$=INKEY$: IF x$="" THEN  GO TO 827
828 CLS : RETURN
829 PRINT "Detera.periodica": LPRINT "Determinare periodica": INPUT "Durit.nomi
nala N=";N: PRINT "Durit.nominala N=";N: LPRINT "Duritatea nominala N=";N
830 LET z=100-N: LET ej=((med-z)/z)*100: PRINT "Eroarea de justete ej=";ej;"%":
LPRINT "Eroarea de justete ej=";ej;"%"
831 IF ef(=2 AND ABS (ej)(=2 THEN  PRINT : LET v$="ETALON CLASA 1 PRECIZIE ADMI
S CU DURITATEA NOMINALA": PRINT v$: LPRINT : LPRINT v$: GO TO 836
832 IF ef(=3 AND ABS (ej)(=2 THEN  PRINT : LET v$="ETALON CLASA 2 PRECIZIE ADMI
S CU DURITATEA NOMINALA": PRINT v$: LPRINT : LPRINT v$: GO TO 836
833  IF ef(=2 AND ABS (ej)>2 THEN  PRINT : LET v$="ETALON CLASA 1 PRECIZIE ADMI
S CU DURITATEA MEDIE": PRINT v$: LPRINT : LPRINT v$: GO TO 836
834 IF ef(=3 AND ABS (ej)>2 THEN  PRINT : LET v$="ETALON CLASA 2 PRECIZIE ADMIS
CU DURITATEA MEDIE": PRINT v$: LPRINT : LPRINT v$: GO TO 836
835 PRINT : LET v$="MOSTRA CE NU POATE FI CONSIDERATA ETALON": PRINT v$: LPRINT
: LPRINT v$
836 LET x$=INKEY$: IF x$="" THEN  GO TO 836
837 CLS : RETURN
900 CLS
901 PRINT AT 10,10; FLASH 1;"<BRINELL  >": LPRINT : LPRINT : LPRINT "    <BRINE
LL>": PRINT AT 21,0;"Apasa o tasta"
902 LET x$=INKEY$: IF x$="" THEN  GO TO 902
903 DIM d(10)
904 INPUT "Nr.detera.n=";n
```

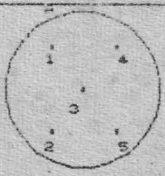
```
905 LET s=0
906 FOR i=1 TO n
907 INPUT "d"=";a1: INPUT "d1="";a2
908 LET d(i)=(a1+a2)/2: PRINT "Detera.d";i;"=";d(i): LPRINT "Determinarea d";i;
"=";d(i)
910 LET as=((a1-a2)/d(i))*100: PRINT "Simetr.de forma s%=";as: LPRINT "Simetria
de forma s%=";as
911 LET s=s+d(i)
912 NEXT i
913 LET med=s/n: PRINT "Diam.mediu d med=";med: LPRINT "Diametrul mediu d med="
;med
914 LET g=0
915 FOR i=1 TO n
916 LET g=g+((d(i)-med)*(d(i)-med))
917 NEXT i
918 LET ab=SQR (g/(n-1)): PRINT "Abat.medie patr.s=";ab: LPRINT "Abaterea medie
patratica s=";ab
919 LET t=3.747: LET d=(t*ab)/(SQR (n)): PRINT "Eroare lim.a d med=";d: LPRINT
"Eroarea limita a d med=";d
920 INPUT "Forta de incercare F=";F: PRINT "Forta de incercare F=";F: LPRINT "F
orta de incercare F=";F: INPUT "Diametrul bilei D=";hg: PRINT "Diametrul bilei D=
";hg: LPRINT "Diametrul bilei D=";hg
921 LET Hmed=(2*F)/((PI*hg*(hg-(SQR ((hg^2)-(med^2))))))
922 PRINT "Duritatea medie Hmed=";Hmed: LPRINT "Duritatea medie Hmed=";Hmed
923 LET s=med+d: LET n=med-d
924 LET H1=(2*F)/(PI*hg*(hg-(SQR ((hg^2)-(s*s)))))
925 LET H2=(2*F)/(PI*hg*(hg-(SQR ((hg^2)-(n*n)))))
926 LET I1=H1-Hmed: LET I2=H2-Hmed
927 GO SUB 990
928 GO SUB 995
929 PRINT "d max=";max,"d min=";min: LPRINT "d max=";max,"dmin=";min
930 PRINT "Incertitudinea I1=";I1: LPRINT "Incertitudinea I1=";I1: PRINT "Incer
titudinea I2=";I2: LPRINT "Incertitudinea I2=";I2
931 LET ef=((max-min)/med)*100: PRINT "Eroarea de fidelitate ef=";ef;"%": LPRIN
T "Eroarea de fidelitate ef=";ef;"%"
932 INPUT "Detera.init.sau periodica(I-P)";x$
933 IF x$="I" THEN  GO TO 936
934 IF x$="P" THEN  GO TO 942
935 GO TO 932
936 PRINT "Detera.initiala": LPRINT : LPRINT "Determinare initiala"
937 IF ABS (ef)<=1 THEN  PRINT : LET v$="ETALON CLASA 1 PRECIZIE": PRINT v$: LP
RINT : LPRINT v$: GO TO 940
938 IF ABS (ef)<=1.5 THEN  PRINT : LET v$="ETALON CLASA 2 PRECIZIE": PRINT v$:
LPRINT : LPRINT v$: GO TO 940
939 PRINT : LET v$="MOSTRA CE NU POATE FI CONSIDERATA ETALON": PRINT v$: LPRINT
: LPRINT v$
940 LET x$=INKEY$: IF x$="" THEN  GO TO 940
941 CLS : RETURN
942 PRINT "Determinare periodica": LPRINT "Determinare periodica"
943 INPUT "Duritatea nominala N=";tr: PRINT "Duritatea nominala N=";tr: LPRINT
"Duritatea nominala N=";tr
944 LET jh=SQR ((hg*hg)-((hg-((2*F)/(tr*PI*hg)))*(hg-((2*F)/(tr*PI*hg)))))
945 LET ej=((med-jh)/jh)*100: PRINT "Eroarea de justete ej=";ej;"%": LPRINT "Er
oarea de justete ej=";ej;"%"
946 IF ABS (ef)<=1 AND ABS (ej)<=1 THEN  PRINT : LET v$="ETALON CLASA 1 PRECIZI
E ADMIS CU  DURITATEA NOMINALA": PRINT v$: LPRINT : LPRINT v$: GO TO 951
947 IF ABS (ef)<=1.5 AND ABS (ej)<=1 THEN  PRINT : LET v$="ETALON CLASA 2 PRECI
ZIE ADMIS CU  DURITATEA NOMINALA": PRINT v$: LPRINT : LPRINT v$: GO TO 951
948 IF ABS (ef)<=1 AND ABS (ej)>1 THEN  PRINT : LET v$="ETALON CLASA 1 PRECIZIE
 ADMIS CU  DURITATEA MEDIE": PRINT v$: LPRINT : LPRINT v$: GO TO 951
949 IF ABS (ef)<=1.5 AND ABS (ej)>1 THEN  PRINT : LET v$="ETALON CLASA 2 PRECIZ
IE ADMIS CU  DURITATEA MEDIE": PRINT v$: LPRINT : LPRINT v$: GO TO 951
950 PRINT : LET v$="MOSTRA CE NU POATE FI CONSIDERATA ETALON": PRINT v$: LPRINT
: LPRINT v$
951 LET x$=INKEY$: IF x$="" THEN  GO TO 951
952 CLS : RETURN
990 LET max=d(1)
991 FOR i=1 TO (n-1)
992 IF d(i+1)>max THEN  LET max=d(i+1)
993 NEXT i
994 RETURN
995 LET min=d(1)
996 FOR i=1 TO (n-1)
997 IF d(i+1)<min THEN  LET min=d(i+1)
998 NEXT i
999 RETURN
1000 CLS
1001 PRINT AT 10,5; FLASH 1;"<VICKERS  >": LPRINT "      <VICKERS>": PRINT AT 21,
0;"Apasa o tasta"
```

```
1002 LET x$=INKEY$: IF x$="" THEN  GO TO 1002
1003 CLS : DIM h(10)
1004 INPUT "Nr.de determ.n=";n: PRINT "Nr.de determ.n=";n: LPRINT "Nr.de determ.
n=";n
1005 LET s=0
1006 FOR i=1 TO n
1007 INPUT "d.=";d1: INPUT "d=";d2
1008 LET d(i)=(d1+d2)/2: PRINT "Determinarea d";i;"=";d(i): LPRINT "Determinarea
 d";i;"=";d(i)
1009 LET s=s+d(i)
1010 NEXT i
1011 LET med=s/n: PRINT "d med=";med: LPRINT "d med=";med
1012 LET t=3.747: LET k=0
1013 FOR i=1 TO n
1014 LET k=k+(d(i)-med)*(d(i)-med)
1015 NEXT i
1016 LET ab=SQR (k/(n-1)): PRINT "Abaterea medie patratica s=";ab: LPRINT "Abate
rea medie patratica s=";ab
1017 INPUT "Forta F=";F: PRINT "Forta F=";F: LPRINT "Forta F=";F
1018 LET Hmed=(1.8544*F)/(med*med): PRINT "Duritatea medie Hmed=";Hmed: LPRINT "
Duritatea medie Hmed=";Hmed
1019 LET el=(t*ab)/(SQR (n))
1020 LET m=med+el: LET th=med-el
1021 LET H1=(1.8544*F)/(m*m): LET H2=(1.8544*F)/(th*th)
1022 LET I1=H1-Hmed: PRINT "Incertitudinea I1=";I1: LPRINT "Incertitudinea I1=";
I1
1023 LET I2=H2-Hmed: PRINT "Incertitudinea I2=";I2: LPRINT "Incertitudinea I2=";
I2
1024 GO SUB 1120
1025 GO SUB 1125
1026 PRINT "dmax=";max,"dmin=";min: LPRINT "dmax=";max,"dmin=";min
1027 LET ef=(max-min)/med: PRINT "Eroarea de fidelitate ef=";ef;"%": LPRINT "Ero
area de fidelitate ef=";ef;"%"
1028 IF F<5 THEN  GO TO 1068
1029 IF F<=100 THEN  GO TO 1030
1030 INPUT "Det.init.sau periodica (I-P)";x$
1032 IF x$="I" THEN  GO TO 1035
1033 IF x$="P" THEN  GO TO 1047
1034 GO TO 1030
1035 PRINT "Determ.initiala": LPRINT "Determinare initiala"
1036 IF Hmed<=225 AND ef<=1.5 THEN  PRINT : LET v$="ETALON CLASA 1 PRECIZIE": PR
INT v$: LPRINT : LPRINT v$: GO TO 1045
1037 IF Hmed<=225 AND ef<=2 THEN  PRINT : LET v$="ETALON CLASA 2 PRECIZIE": PRIN
T v$: LPRINT : LPRINT v$: GO TO 1045
1038 IF Hmed<=225 AND ef>2 THEN  PRINT : LET v$="MOSTRA CE NU POATE FI CONSIDERA
TA ETALON": PRINT v$: LPRINT : LPRINT v$: GO TO 1045
1039 IF Hmed<=400 AND ef<=0.5 THEN  PRINT : LET v$="ETALON CLASA 1 PRECIZIE": PR
INT v$: LPRINT : LPRINT v$: GO TO 1045
1040 IF Hmed<=400 AND ef<=1 THEN  PRINT : LET v$="ETALON CLASA 2 PRECIZIE": PRIN
T v$: LPRINT : LPRINT v$: GO TO 1045
1041 IF Hmed<=400 AND ef>1 THEN  PRINT : LET v$="MOSTRA CE NU POATE FI CONSIDERA
TA ETALON": PRINT v$: LPRINT : LPRINT v$: GO TO 1045
1042 IF Hmed>400 AND ef<=1 THEN  PRINT : LET v$="ETALON CLASA 1 PRECIZIE": PRINT
 v$: LPRINT : LPRINT v$: GO TO 1045
1043 IF Hmed>400 AND ef<=1.5 THEN  PRINT : LET v$="ETALON CLASA 2 PRECIZIE": PRI
NT v$: LPRINT : LPRINT v$: GO TO 1045
1044 IF Hmed>400 AND ef>1.5 THEN  PRINT : LET v$="MOSTRA CE NU POATE FI CONSIDER
ATA ETALON": PRINT v$: LPRINT : LPRINT v$: GO TO 1045
1045 LET x$=INKEY$: IF x$="" THEN  GO TO 1045
1046 CLS : RETURN
1047 PRINT "Determ.periodica": LPRINT "Determinare periodica"
1048 INPUT "Duritatea nominala N=";N
1049 LET nom=SQR (1.8544*(F/N))
1050 LET ej=((med-nom)/nom)*100: PRINT "Eroarea de justete ej=";ej;"%": LPRINT "
Eroarea de justete ej=";ej;"%"
1051 IF Hmed<=225 AND ef<=1.5 AND ABS (ej)<=1.5 THEN  PRINT : LET v$="ETALON CLA
SA 1 PRECIZIE ADMIS CUDURITATEA NOMINALA": PRINT v$: LPRINT : LPRINT v$: GO TO 1
066
1052 IF Hmed<=225 AND ef<=1.5 AND ABS (ej)>1.5 THEN  PRINT : LET v$="ETALON CLAS
A 1 PRECIZIE ADMIS CUDURITATEA MEDIE": PRINT v$: LPRINT : LPRINT v$: GO TO 1066
1053 IF Hmed<=225 AND ef<=2 AND ABS (ej)<=1.5 THEN  PRINT : LET v$="ETALON CLASA
```

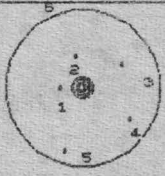
```
2 PRECIZIE ADMIS CUDURITATEA NOMINALA": PRINT v$: LPRINT : LPRINT v$: GO TO 106
6
1054 IF Hmed(=225 AND ef(=2 AND ABS (ej)>1.5 THEN  PRINT : LET v$="ETALON CLASA
2 PRECIZIE ADMIS CUDURITATEA MEDIE": PRINT v$: LPRINT : LPRINT v$: GO TO 1066
1055 IF Hmed(=225 AND ef)2 THEN  PRINT : LET v$="MOSTRA CE NU POATE FI CONSIDERA
TA ETALON": PRINT v$: LPRINT : LPRINT v$: GO TO 1066
1056 IF Hmed(=400 AND ef(=0.5 AND ABS (ej)(=0.5 THEN  PRINT : LET v$="ETALON CLA
SA 1 PRECIZIE ADMIS CU DURITATEA NOMINALA": PRINT v$: LPRINT : LPRINT v$: GO TO
1066
1057 IF Hmed(=400 AND ef(=0.5 AND ABS (ej)>0.5 THEN  PRINT : LET v$="ETALON CLAS
A 1 PRECIZIE ADMIS CUDURITATEA MEDIE": PRINT v$: LPRINT : LPRINT v$: GO TO 1066
1058 IF Hmed(=400 AND ef(=1 AND ABS (ej)(=0.5 THEN  PRINT : LET v$="ETALON CLASA
 2 PRECIZIE ADMIS CUDURITATEA NOMINALA": PRINT v$: LPRINT : LPRINT v$: GO TO 106
6
1059 IF Hmed(=400 AND ef(=1 AND ABS (ej)>0.5 THEN  PRINT : LET v$="ETALON CLASA
2 PRECIZIE ADMIS DUDURITATEA MEDIE": PRINT v$: LPRINT : LPRINT v$: GO TO 1066
1060 IF Hmed(=400 AND ef)1 THEN  PRINT : LET v$="MOSTRA CE NU POATE FI CONSIDERA
TA ETALON": PRINT v$: LPRINT : LPRINT v$: GO TO 1066
1061 IF Hmed)400 AND ef(=1 AND ABS (ej)(=1 THEN  PRINT : LET v$="ETALON CLASA 1
 PRECIZIE ADMIS CU  DURITATEA NOMINALA": PRINT v$: LPRINT : LPRINT v$: GO TO 1066
1062 IF Hmed)400 AND ef(=1 AND ABS (ej)>1 THEN  PRINT : LET v$="ETALON CLASA 1 P
RECIZIE ADMIS CU  DURITATEA MEDIE": PRINT v$: LPRINT : LPRINT v$: GO TO 1066
1063 IF Hmed)400 AND ef(=1.5 AND ABS (ej)(=1 THEN  PRINT : LET v$="ETALON CLASA
2 PRECIZIE ADMIS CU DURITATEA NOMINALA": PRINT v$: LPRINT : LPRINT v$: GO TO 106
6
1064 IF Hmed 400 AND ef(=1.5 AND ABS (ej)>1 THEN  PRINT : LET v$="ETALON CLASA 2
 PRECIZIE ADMIS CU  DURITATEA MEDIE": PRINT v$: LPRINT : LPRINT v$: GO TO 1066
1065 IF Hmed)400 AND ef)1.5 THEN  PRINT : LET v$="MOSTRA CE NU POATE FI CONSIDER
ATA ETALON": PRINT v$: LPRINT : LPRINT v$: GO TO 1066
1066 LET x$=INKEY$: IF x$="" THEN  GO TO 1066
1067 CLS : RETURN
1068 INPUT "Detere.init.sau periodica(I-P)";x$
1069 IF x$="I" THEN  GO TO 1072
1070 IF x$="P" THEN  GO TO 1084
1071 GO TO 1068
1072 PRINT "Detera.initiala": LPRINT "Determinare initiala"
1073 IF Hmed(=225 AND ef(=2 THEN  PRINT : LET v$="ETALON CLASA 1 PRECIZIE": PRIN
T v$: LPRINT : LPRINT v$: GO TO 1082
1074 IF Hmed(=225 AND ef(=3 THEN  PRINT : LET v$="ETALON CLASA 2 PRECIZIE": PRIN
T v$: LPRINT : LPRINT v$: GO TO 1082
1075 IF Hmed(=225 AND ef)3 THEN  PRINT : LET v$="MOSTRA CE NU POATE FI CONSIDERA
TA ETALON": PRINT v$: LPRINT : LPRINT v$: GO TO 1082
1076 IF Hmed(=400 AND ef(=1 THEN  PRINT : LET v$="ETALON CLASA 1 PRECIZIE": PRIN
T v$: LPRINT : LPRINT v$: GO TO 1082
1077 IF Hmed(=400 AND ef(=1.5 THEN  PRINT : LET v$="ETALON CLASA 2 PRECIZIE": PR
INT v$: LPRINT : LPRINT v$: GO TO 1082
1078 IF Hmed(=400 AND ef)1.5 THEN  PRINT : LET v$="MOSTRA CE NU POATE FI CONSIDE
RATA ETALON": PRINT v$: LPRINT : LPRINT v$: GO TO 1082
1079 IF Hmed)400 AND ef(=1.5 THEN  PRINT : LET v$="ETALON CLASA 1 PRECIZIE": LPR
INT : LPRINT v$: GO TO 1082
1080 IF Hmed)400 AND ef(=2 THEN  PRINT : LET v$="ETALON CLASA 2 PRECIZIE": PRINT
 v$: LPRINT : LPRINT v$: GO TO 1082
1081 PRINT : LET v$="MOSTRA CE NU POATE FI CONSIDERATA ETALON": PRINT v$: LPRINT
 : LPRINT v$
1082 LET x$=INKEY$: IF x$="" THEN  GO TO 1082
1083 CLS : RETURN
1084 PRINT "Detera.periodica": LPRINT "Determinare periodica"
1085 INPUT "Duritatea nominala N=";tr: PRINT "Duritatea nominala N=";tr: LPRINT
"Duritatea nominala N=";tr
1086 LET ct=SQR (1.6544*(F/tr)): LET ej=((med-ct)/ct)*100: PRINT "Eroarea de jus
tete ej=";ej;"%": LPRINT "Eroarea de justete ej=";ej;"%"
1087 IF Hmed(=225 AND ef(=2 AND ABS (ej)(=2 THEN  PRINT : LET v$="ETELON CLASA 1
 PRECIZIE ADMIS CU  DURITATEA NOMINALA": PRINT v$: LPRINT : LPRINT v$: GO TO 111
0
1088 IF Hmed(=225 AND ef(=3 AND ABS (ej)(=2 THEN  PRINT : LET v$="ETALON CLASA 2
 PRECIZIE ADMIS CU DURITATEA NOMINALA": PRINT v$: LPRINT : LPRINT v$: GO TO 1110
1089 IF Hmed(=225 AND ef(=2 AND ABS (ej)>2 THEN  PRINT : LET v$="ETALON CLASA 1
PRECIZIE ADMIS CU DURITATEA MEDIE": PRINT v$: LPRINT : LPRINT v$: GO TO 1110
1090 IF Hmed(=225 AND ef(=3 AND ABS (ej)>2 THEN  PRINT : LET v$="ETALON CLASA 2
PRECIZIE ADMIS CU DURITATEA MEDIE": PRINT v$: LPRINT : LPRINT v$: GO TO 1110
```

```
1091 IF Hmed<=225 AND ef>3 THEN  PRINT : LET v$="MOSTRA CE NU POATE FI CONSIDERA
TA ETALON": PRINT v$: LPRINT : LPRINT v$: GO TO 1110
1092 IF Hmed<=400 AND ef<=1 AND ABS (ej)<=1 THEN  PRINT : LET v$="ETALON CLASA 1
 PRECIZIE ADMIS CU DURITATEA NOMINALA": PRINT v$: LPRINT : LPRINT v$: GO TO 1110
1093 IF Hmed<=400 AND ef<=1.5 AND ABS (ej)<=1 THEN  PRINT : LET v$="ETALON CLASA
 2 PRECIZIE ADMIS CU DURITATEA NOMINALA": PRINT v$: LPRINT : LPRINT v$: GO TO 11
10
1094 IF Hmed<=400 ANT ef<=1 AND ABS (ej)>1 THEN  PRINT : LET v$="ETALON CLASA 1
PRECIZIE ADMIS CU  DURITATEA MEDIE": PRINT v$: LPRINT : LPRINT v$: GO TO 1110
1095 IF Hmed<=400 AND ef<=1.5 AND ABS (ej)>1 THEN  PRINT : LET v$="ETALON CLASA
2 PRECIZIE ADMIS CU   DURITATEA MEDIE": PRINT v$: LPRINT : LPRINT v$: GO TO 1110
1096 IF Hmed<=400-AND ef>1.5 THEN  PRINT : LET v$="MOSTRA CE NU POATE FI CONSIDE
RATA ETALON": PRINT v$: LPRINT : LPRINT v$: GO TO 1110
1097 IF Hmed>400 AND ef<=1.5 AND ABS (ej)<=1.5 THEN  PRINT : LET v$="ETALON CLAS
A 1 PRECIZIE ADMIS CU   DURITATEA NOMINALA": PRINT v$: LPRINT : LPRINT v$: GO TO
 1110
1098 IF Hmed>400 AND ef<=2 AND ABS (ej)<=1.5 THEN  PRINT : LET v$="ETALON CLASA
2 PRECIZIE ADMIS CU  DURITATEA NOMINALA": PRINT v$: LPRINT : LPRINT v$: GO TO 11
10
1099 IF Hmed>400 AND ef<=1.5 AND ABS (ej)>1.5 THEN  PRINT : LET v$="ETALON CLASA
 1 PRECIZIE ADMIS CU  DURITATEA MEDIE": PRINT v$: LPRINT : LPRINT v$: GO TO 1110
1100 IF Hmed>400 AND ef<=2 AND ABS (ej)>1.5 THEN  PRINT : LET v$="ETALON CLASA 2
 PRECIZIE ADMIS CU   DURITATEA MEDIE": PRINT v$: LPRINT : LPRINT v$: GO TO 1110
1101 IF Hmed>400 AND ef>2 THEN  PRINT : LET v$="MOSTRA CE NU POATE FI CONSIDERAT
A ETALON": PRINT v$: LPRINT : LPRINT v$
1110 LET x$=INKEY$: IF x$="" THEN  GO TO 1110
1111 CLS : RETURN
1120 LET max=d(1)
1121 FOR i=1 TO (n-1)
1122 IF d(i+1)>max THEN  LET max=d(i+1)
1123 NEXT i
1124 RETURN
1125 LET min=d(1)
1126 FOR i=1 TO (n-1)
1127 IF d(i+1)<min THEN  LET min=d(i+1)
1128 NEXT i
1129 RETURN
1200 CLS : PRINT AT 10,4; FLASH 1;"<POZITIONAREA AMPRENTELOR         PE MOSTRELE
ETALON  >": PRINT AT 21,0;"Apasa o tasta"
1201 LET x$=INKEY$: IF x$="" THEN  GO TO 1201
1203 CLS
1204 PRINT AT 10,5;"1.DESEN A": PRINT AT 11,5;"2.DESEN B": PRINT AT 12,5;"3.DESE
N C": PRINT AT 13,5;"4.DESEN D": PRINT AT 14,5;"5.DESEN E": PRINT AT 15,5;"6.RET
URN"
1205 LET x$=INKEY$: IF x$="1" THEN  GO TO 1250
1206 IF x$="2" THEN  GO TO 1254
1207 IF x$="3" THEN  GO TO 1262
1208 IF x$="4" THEN  GO TO 1268
1210 IF x$="5" THEN  GO TO 1274
1211 IF x$="6" THEN  CLS : RETURN
1212 GO TO 1205
1250 CLS : PRINT AT 0,5;"A": CIRCLE 65,120,50: PRINT AT 4,5;"1": CIRCLE 45,147,1
: PRINT AT 11,5;"2": CIRCLE 45,93,1: PRINT AT 8,7;"3": CIRCLE 65,120,1: PRINT AT
 4,11;"4": CIRCLE 87,147,1: PRINT AT 11,11;"5": CIRCLE 87,93,1
1251 PRINT AT 15,0;"DISTRIBUTIA AMPRENTELOR PE MOS- TRELE ETALON DE DURITATE DE
FOR-MA CIRCULARA FARA ORIFICIU              CENTRAL"
1252 LET x$=INKEY$: IF x$="" THEN  GO TO 1252
1253 CLS : GO TO 1203
1254 CLS : PRINT AT 0,5;"B"
1255 FOR I=1 TO 7
1256 CIRCLE 65,120,I
1257 NEXT I
1258 CIRCLE 65,120,50: PRINT AT 8,6;"1": CIRCLE 50,120,1: PRINT AT 5,7;"2": CIRC
LE 60,140,1: PRINT AT 6,13;"3": CIRCLE 90,135,1: PRINT AT 10,12;"4": CIRCLE 95,1
00,1: PRINT AT 12,8;"5": CIRCLE 53,80,1
1259 PRINT AT 15,0;"DISTRIBUTIA AMPRENTELOR PE MOS- TRELE ETALON DE DURITATE DE
FOR-MA CIRCULARA CU ORIFICIU              CENTRAL"
1260 LET X$=INKEY$: IF X$="" THEN  GO TO 1260
1261 GO TO 1203
1262 CLS : PRINT AT 1,5;"C"
1263 PLOT 15,75: DRAW 50,0: DRAW 0,70: DRAW -50,0: DRAW 0,-70
1264 PRINT AT 5,4;"1": CIRCLE 25,135,1: PRINT AT 10,4;"2": CIRCLE 25,87,1: PRINT
```

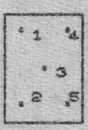
```
AT 8,6;"3": CIRCLE 40,110,1: PRINT AT 5,7;"4": CIRCLE 55,135,1: PRINT AT 10,7;"
5": CIRCLE 55,87,1
1265 PRINT AT 14,0;"DISTRIBUTIA AMPRENTELOR PE NOS- TRELE ETALON DE DURITATE DE
      FORMA DREPTUNGHIULARA"
1266 LET x$=INKEY$: IF x$="" THEN  GO TO 1266
1267 GO TO 1203
1268 CLS : PRINT AT 1,5;"D"
1269 PLOT 15,75: DRAW 70,0: DRAW 0,70: DRAW -70,0: DRAW 0,-70
1270 PRINT AT 5,4;"1": CIRCLE 25,135,1: PRINT AT 10,4;"2": CIRCLE 25,85,1: PRINT
AT 8,6;"3": CIRCLE 50,110,1: PRINT AT 5,9;"4": CIRCLE 75,135,1: PRINT AT 10,9;"
5": CIRCLE 75,85,1
1271 PRINT AT 14,0;"DISTRIBUTIA AMPRENTELOR PE NOS- TRELE ETALON DE DURITATE DE
      FORMA PATRATA"
1272 LET x$=INKEY$: IF x$="" THEN  GO TO 1272
1273 GO TO 1203
1274 CLS : PRINT AT 1,5;"E"
1275 PLOT 15,75: DRAW 70,0: DRAW -35,60: DRAW -35,-60
1276 PRINT AT 7,6;"1": CIRCLE 50,123,1: PRINT AT 9,6;"2": CIRCLE 50,105,1: PRINT
AT 11,6;"3": CIRCLE 50,90,1: PRINT AT 11,4;"4": CIRCLE 30,78,1: PRINT AT 11,9;"
5": CIRCLE 75,78,1
1277 PRINT AT 14,0;"DISTRIBUTIA AMPRENTELOR PE NOS- TRELE ETALON DE DURITATE DE
      FORMA TRIUNGHIULARA"
1278 LET x$=INKEY$: IF x$="" THEN  GO TO 1278
1279 GO TO 1203
6000 CLS : DIM h(10): INPUT "Nr.de determ.n=";n
6005 LET s=0
6010 FOR i=1 TO n
6015 INPUT "Determ.h";i;"=";h(i): PRINT "Determ.h";i;"=";h(i)
6016 LPRINT "Determ.h";i;"=";h(i)
6020 LET s=s+h(i)
6025 NEXT i
6026 LET med=s/n: PRINT "Adinc.med.de patr.h med=";med
6027 LPRINT "Adinc.med.de patr.h med=";med
6030 LET k=0
6035 FOR i=1 TO n
6040 LET k=k+((h(i)-med)*(h(i)-med))
6045 NEXT i
6050 LET mp=SQR (k/(n-1)): PRINT "Abat.medie patratica s=";mp
6051 LPRINT "Abat.medie patratica s=";mp
6055 LET t=3.747
6060 LET k=0
6070 FOR i=1 TO n
6080 LET k=k+((h(i)-med)*(h(i)-med))
6090 NEXT i
6110 LET h=((t*mp)/(SQR (n)): PRINT "Eroarea limita a adinc.med.h=";h
6111 LPRINT "Eroarea limita a adinc.med.h=";h
6120 RETURN
6200 LET H=h/2: PRINT "Int.de incredere al durit.med.  I=";H
6201 LPRINT "Int.de incredere al durit.med.  I=";H
6210 GO SUB 6300
6220 LET ef=((max-min)/med)*100: PRINT "Eroarea de fidelitate ef=";ef
6221 LPRINT "Eroarea de fidelitate ef=";ef
6230 RETURN
6300 LET max=h(1)
6310 FOR i=1 TO (n-1)
6320 IF h(i+1)>max THEN  LET max=h(i+1)
6330 NEXT i
6340 LET min=h(1)
6350 FOR i=1 TO (n-1)
6360 IF h(i+1)<min THEN  LET min=h(i+1)
6370 NEXT i
6380 PRINT "h max=";max,"h min=";min
6381 LPRINT "h max=";max,"h min=";min
6390 RETURN
9999 SAVE "dip-vol" LINE 15: SAVE "dip-vol" LINE 15
```



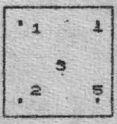
DISTRIBUTIA AMPRENTELOR PE MOSTRELE ETALON DE DURITATE DE FORMA CIRCULARA FARA ORIFICIU CENTRAL



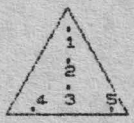
DISTRIBUTIA AMPRENTELOR PE MOSTRELE ETALON DE DURITATE DE FORMA CIRCULARA CU ORIFICIU CENTRAL



DISTRIBUTIA AMPRENTELOR PE MOSTRELE ETALON DE DURITATE DE FORMA DREPTUNGHIULARA



DISTRIBUTIA AMPRENTELOR PE MOSTRELE ETALON DE DURITATE DE FORMA PATRATA



DISTRIBUTIA AMPRENTELOR PE MOSTRELE ETALON DE DURITATE DE FORMA TRIUNGHIULARA

```
Determ.h1=40.1
Determ.h2=40.3
Determ.h3=40.5
Determ.h4=39.9
Determ.h5=40.4
Adinc.med.de patr.h med=40.24
Abat.medie patratica s=0.2408318
9
Eroarea limita a adinc.med.h=0.4
0356425
Duritatea medie H med=79.88
Int.de incredere al durit.med.
I=0.20178213
h max=40.5          h min=39.9
Eroarea de fidelitate ef=1,49105
37
Determ.initiala

ETALON CLASA 1 PRECIZIE
```

CAPITOLUL 9
INFORMATICA

9.1. TRANSLATOR BASIC-PASCAL

O importanta deosebita in informatica se acorda limbajelor de programare, element esential in construirea programelor de orice fel.

CALCULATORUL OPEREAZA CU DATE. In acest domeniu, aparitia limbajului COBOL este semnificativa, introducindu-se o diviziune explicita pentru descrierea datelor, paralel cu o diviziune de procedura. Pe linia facilitatilor de structurare a datelor se inscrie si limbajul PASCAL - ca si toate cele care se inspira de la el.

N.Wirth afirma ca limbajul PASCAL - al carui "inventator" este - are doua scopuri principale: in primul rind realizarea unui limbaj convenabil pentru predarea programarii ca o diciplina sistematica ,bazata pe anumite concepte clare si care sa rflecte in mod natural in limbaj;in al doilea rind realizarea unui limbaj a carui este fiabila si eficienta pe calculatoarele existente.

In contextul raspindirii acestui limbaj apare ca o necesitate fireasca marirea vitezei de rulare a programului.

Lucrarea ,referinduse la calculatoarele HC-85,TIM-S ,COBRA,ZX SPECTRUM si cele compatibile ,are drept scop traducerea programelor BASIC(cu mici restictii) si implicit marirea vitezei de executie de circa 60 de ori in fisiere ce reprezinta programe sursa PASCAL ce pot fi compilate cu programul HP4TM16 - compilatorul de PASCAL de pe aceste calculatoare.

Programul TRANSCODER a fost conceput pentru utilizare in mod special in invatamint astfel incit poate traduce o gama larga de instructiuni BASIC.Sint traduse si unele instructiuni grafice ca de exemplu PLOT,DRAW.Pentru marirea porcabilitatii au fost prevazute si instructiuni mai rar folosite ca de pilda BEEP,OUT, REM,POKE,COPY etc.

Modul de lucru:se tasteaza LOAD"TRANSCODER",dupa care un mic program BASIC se va incarca,autolansinduse si incarcind la rindul lui programul propriu-zis(in cod masina Z80).RAMTUP-ul se va fixa la valoarea 49999,raminind suficienta memorie si pentru

programe mai voluminoase.

Dupa incarcare programul curata prin NEW toata memoria pina la RAMTOP.Din acest moment controlul este redat utilizatorului pentru asi tasta sau incarca programul BASIC.

La terminarea operatiei se tasteaza RANDOMIZE USR 50000, prin aceasta apelindu-se translatorul care va raspunde printr-un mesaj si va incepe traducerea, mentionind si pasii pe care-i face:

"1.CHANGE IN UPPER CASE" - transforma toate comentariile si numele de variabile in litere mari, lucru fara importanta pentru programul BASIC dar esential pentru PASCAL din cauza faptului ca acesta trateaza variabilele omonime dar scrise cu litere mari si mici drept diferite.

"2.FORM VARIABLE TABLE" - formeaza tabelele de variabile necesare programului PASCAL pentru declaratii de tip VAR. Variabilele numerice sint considerate REALE, ca si in BASIC, variabilele simple de tip caracter sint formate dintr-o litera urmata de litera "S" (string) si sint declarate ca fiind ARRAY[1..64] OF CHAR;

Se vor afisa variabilele folosite de catre program.

"NAME OF PROGRAM ? " - este optiunea ceruta de catre translator , asteptind sa introduceti un nume de program (max.9 caractere) reprezentind numele programului PASCAL declarat prin instrunctiunea neexecutabila PROGRAM (nume);

Dupa aceasta se listeaza partea din programul sursa PASCAL reprezentind partea de declaratii. Interactivitatea se mentine prin intermediul optiunii:

"TRANSLATE GRAPHICS ?" - la care utilizatorul poate raspunde cu (Y/N)(Yes/No) insemnind includerea sau nu in textul sursa PASCAL a declaratiilor procedurilor PLOT,DRAW,CIRCLE.

La urmatoarea optiune:

"IGNORE NONSENSE?" - se poate raspunde in mod analog insemnind ignorarea sau nu la traducere a instructiunilor incoprehensibile (de pilda CLOSE #4). Ignorarea face ca la traducere fiecare instructiune de acest fel sa fie "sarita" cu urmari, desigur imprevizibile. In caz de eroare de sintaxa la care s-a cerut optiunea de oprire cursorul de editare se va opri pe linia care a cauzat eroarea.

In continuare, programul PASCAL este listat, dupa care se cere optiunea de salvare pe caseta. Odata salvat, programul poate fi

incarcat de catre HP4TM16 ca si cum ar fi fost un program salvat cu editorul compilatorului, compilat, rulat, listat, modificat etc.

Nota: In oricare faza a traducerii, programul poate fi oprit apasind tasta <STOP> cu ajutorul facilitatilor oferite de catre sistemul de intreruperi, modul 2.

In continuare dam unele echivalente in PASCAL a unor instructiuni si functii BASIC:

BASIC	PASCAL
BEEP a,b	BEEP (a,b)
CIRCLE a,b,c	CIRCLE (a,b,c)
OUT a,b	OUT (a,CHR(b))
STOP	HALT
NEW	USER(#11B7)
REM coment.	{ coment. }
FOR a=b TO c STEP d	a:=b;WHILE a*SGN(d)<=c*SGN(d)
:	DO BEGIN
:	:
NEXT a	a:=a+d END;
GO TO n	GO TO n
LET a=b	a:=b
PAUSE a	PAUSE (a)
POKE a,b	POK (a,b)
PLOT a,b	PLOT (a,b)
IF cond THEN...	IF cond THEN BEGIN ... END
CLS	PAGE
DRAW a,b	DRAW (a,b)
COPY	COPY
etc.	
RND	RND
INKEY$	INCH
SIN	SIN
ATN	ARCTAN
SQR	SQRT
SGN	SGN
PEEK	PEK
etc.	

Fie programul BASIC:

```
10 INPUT "N=";N
20 LET S=0 : LET I=0
30 IF I>N THEN STOP
40 LET S=S+I
50 PRINT S
60 LET I=I+1
70 REM INCHIDE BUCLA
80 GO TO 30
```

Acesta va genera urmatorul dialog:

```
RANDOMIZE USR 50000   <ENTER>

BASIC - PASCAL TRANSLATOR
(C) 1988 SINGER HARALD
TIMISOARA tel. 961/50395

1.CHANGE IN UPPER CASE
Ok
2.FORM VARIABLE TABLE
Ok

VARIABLES USED:
N   S   I

NAMES OF PROGRAM ?
>TEST  <ENTER>

10 PROGRAM TEST;
20 LABEL 1;
30 VAR N,S,I:REAL;
40 BEGIN
50 WRITE('N=');
60 READ (N);
70 S:=0;
80 I:=0;
90 1:IF I>N THEN BEGIN
100 HALT END;
```

```
110 S:=S+I;
120 WRITELN (S);
130 I:=I+1;
140 { INCHIDE BUCLA}
150 GO TO 1;
160 END.

SAVE PASCAL SOURCE ? YES.
START TAPE...

TRANSLATION COMPLETED
Ok

0 OK 80;1
```

Detalii de programare:

Programul este scris in limbaj Z80. Memoria (incepind de la adresa 50000), este ocupata astfel: translatorul incepe de la adresa 50000. Adresele tabelelor de variabile se gasesc in locatiile 65520, 65522, 65524 care joaca rolul de pointeri pentru zona de variabile, variabile sir, tablouri.

Textul PASCAL generat se afla la adresa continuta in locatiile 65516, 65517, de regula 58000.

Programul lucreaza cu modul de intrerupere 2, astfel ca poate fi oprit oricind.

Rutine importante:	Efect
PUTMEM	(DE):=A
PUTMEB	(HL):=A
	B:=B-1
	HL:=HL+1
	pina cind B=0
RST #10	tiparire caracter din reg.A
WRITET	A:=(HL)
	tipareste caracterul din reg.A
	B:=B-1
	HL:=HL+1
	pina cind B=0
RST #08	opreste programul cu

```
DEFB n                  eroarea BASIC n+1
JPSPAC                  sare peste spatiile
                        din programul BASIC
NEWLIN                  genereaza numarul de linie
                        pentru o noua linie PASCAL
EXPTRA                  traduce expresia de la adr.(HL)
LLIST                   listeaza programul PASCAL pina
                        la primul caracter = 255
```

In programul PASCAL cuvintele rezervate sint tokenizate (fiecarui cuvint cheie ii corespunde un cod ASCII).

Dam mai jos codurile pentru unele cuvinte rezervate:

BEGIN=152	CONST=131	DO=145	ELSE=146
END=144	FOR=150	FORWARD=157	FUNCTION=133
GO TO=154	IF=151	LABEL=161	PROGRAM=129
REPEAT=147	THEN=142	TO=140	TYPE=159
PROCEDURE=132	UNTIL=143	VAR=138	WHILE=149

Formarea tabelelor de variabilesi de etichete se face printr-o scanare a textului BASIC care incepe la adresa continuta in variabila sistem PROG (23635-23636) pina la adresa continuta in variabila sistem VARS (23627-23628). Odata cu aceasta se verifica si textul BASIC in ceea ce priveste translatabilitatea instructiunilor continute in program.

Instructiunea 'IF' fiind tradusa prin 'IF cond THEN BEGIN...END;' apare desigur problema imbricarii in cadrul programului BASIC a acestordeclaratii. Problema este solutionata de catre translator prin contorizarea numarului de instructiuni 'IF' ce apar in aceeasi linie. La intilnirea caracterului <CR> (CHR$(13)), translatorul genereaza suplimentar un numar de separatori 'END' egal cu numarul 'IF-urilor' imbricate.

Instructiunile PLOT si DRAW au echivalente in PASCAL:

```
PROCEDURE PLOT(X,Y:INTEGER);
  BEGIN INLINE (#FD,#21,#3A,#5C    (LD IY,#5C3A)
    ,#DD,#46,#02,#DD,#4E,#04,#CD   (LD B,(IX+2);LD C,(IX+4))
    ,#E5,#22);                     (CALL #22E5)
  END;                             (subrutina PLOT din ROM)
```

```
PROCEDURE DRAW(X,Y:INTEGER);
  VAR SGNX,SGNY:INTEGER;
  BEGIN
    IF X<0 THEN SGNX:=-1
           ELSE SGNX:=1;
    IF Y<0 THEN SGNY:=-1
           ELSE SGNY:=1;
    LINE (ABS(X),ABS(Y),SGNX,SGNY)
  END;

PROCEDURE LINE(X,Y,SX,SY:INTEGER);
  BEGIN INLINE (#FD,#21,#3A,#5C,  {LD IY,#5C3A)
    ,#DD,#56,#02,#DD,#5E,#04,#DD  {LD D,(IX+2);LD E,(IX+4))
    ,#46,#06,#DD,#4E,#08,#CD,#BA  {LD B,(IX+6);LD C,(IX+8))
    ,#24);                        {CALL #24BA)
END;                              {subrutina DRAW din ROM)
```

De asemenea si unele functii au trebuit sa fie definite:

```
FUNCTION RND (X:REAL):REAL;
  BEGIN
    RND:=(RANDOM/256)
END;

FUNCTION SGN (X:REAL):INTEGER;
  BEGIN
    IF X=0 THEN SGN:=0
           ELSE SG:=X/ABS(X);
END;

FUNCTION PEK (X:REAL):INTEGER;
  VAR ADR:INTEGER;
      AD :REAL;
  BEGIN
    IF ENTIER(X)>32767 THEN ADR:=ENTIER(X)-65536
                       ELSE ADR:=ENTIER(X);
    PEK:=ORD(PEEK(ADR,CHAR))
END;
```

```
FUNCTION IN (X:REAL):INTEGER;
  BEGIN
    IN:=ORD(INP(ENTIER(X)))
END;

PROCEDURE POK(X,Y:REAL);
  VAR I,J:INTEGER;
  BEGIN
    IF ENTIER(X)>32767 THEN I:=ENTIER(X)-65536
                       ELSE I:=ENTIER(X);
    POKE(I,CHR(ENTIER(Y)))
END;
```

```
*HISOFT GENS3M2 ASSEMBLER*
       ZX SPECTRUM

Copyright (C) HISOFT 1983,4
All rights reserved

Pass 1 errors: 00


                        10 ;
                        20 ;          TRANSCODER.
                        30 ;          translator
                        40 ;          BASIC-PASCAL
                        50 ;
                        60 ;            autor:
                        70 ;          HARALD SINGER
                        80 ;
98D0 CDADD8             90          CALL  #D8AD
98D3 CDD6DA            100          CALL  #DAD6
98D6 CD6B0D            110          CALL  #0D6B
98D9 C31699            120          JP    C1642
98DC                   130 MESAJ    DEFB  #16,#00,#00
98DF 424153            140          DEFB  "B","A","S"
98E2 494320            150          DEFB  "I","C"," "
98E5 504153            160          DEFB  "P","A","S"
98E8 43414C            170          DEFB  "C","A","L"
98EB 205452            180          DEFB  " ","T","R"
98EE 414E53            190          DEFB  "A","N","S"
98F1 4C4154            200          DEFB  "L","A","T"
98F4 4F520D            210          DEFB  "O","R",#0D
98F7 7F2031            220          DEFB  " "," ","1"
98FA 393838            230          DEFB  "9","8","A"
98FD 205349            240          DEFB  " ","S","I"
9900 474D41            250          DEFB  "G","M","A"
9903 534F46            260          DEFB  "S","O","F"
9906 540D0D            270          DEFB  "T",#0D,#0D
9909 0D312E            280          DEFB  #0D,"1","."
990C 434841            290          DEFB  "C","H","A"
990F 4E4745            300          DEFB  "N","G","E"
9912 20494E            310          DEFB  " ","I","N"
9915 205550            320          DEFB  " ","U","P"
9918 504552            330          DEFB  "P","E","R"
991B 204341            340          DEFB  " ","C","A"
991E 53450D            350          DEFB  "S","E",#0D
9921 4F6B0D            360 OK       DEFB  "O","k",#0D
9924 CD4216            370 C1642    CALL  #1642
9927 21CE98            380          LD    HL,MESAJ
992A 0644              390          LD    B,#44
992C CD13D1            400          CALL  #D113
992F 2A535C            410          LD    HL,(#5C53)
9932 23                420          INC   HL
9933 23                430          INC   HL
9934 23                440          INC   HL
9935 23                450          INC   HL
9936 ED5B4B5C          460          LD    DE,(#5C4B)
993A 1B                470          DEC   DE
993B E5                480          PUSH  HL
993C A7                490          AND   A
993D ED52              500          SBC   HL,DE
993F CA3799            510          JP    Z,EROR1
9942 DA3A99            520          JP    C,IA
9945 E1                530 EROR1    POP   HL
9946 CF                540          RST   8
9947 03                550          DEFB  #03
9948 E1                560 IA       POP   HL
9949 CD5199            570 LCF81    CALL  LCF97
994C 7E                580          LD    A,(HL)
994D D661              590          SUB   #61
994F DA3B99            600          JP    C,LCF81
9952 7E                610          LD    A,(HL)
9953 D67B              620          SUB   #7B
9955 D23B99            630          JP    NC,LCF81
9958 7E                640          LD    A,(HL)
9959 D620              650          SUB   #20
995B 77                660          LD    (HL),A
995C C33B99            670          JP    LCF81
995F 7E                680 LCF97    LD    A,(HL)
9960 D60E              690          SUB   #0E
9962 CA6099            700          JP    Z,LCFA6
9965 7E                710          LD    A,(HL)
```

```
9958 D60D       720          SUB   0DH
995A CA6199     730          JP    Z,LCFA7
995D C36599     740          JP    LCFAB
9960 23         750 LCFA6    INC   HL
9961 23         760 LCFA7    INC   HL
9962 23         770          INC   HL
9963 23         780          INC   HL
9964 23         790          INC   HL
9965 23         800 LCFAB    INC   HL
9966 E5         810          PUSH  HL
9967 ED52       820          SBC   HL,DE
9969 D26E99     830          JP    NC,LCFB4
996C E1         840          POP   HL
996D C9         850          RET
996E E1         860 LCFB4    POP   HL
996F E1         870          POP   HL
9970 211399     880          LD    HL,OK
9973 0603       890          LD    B,#03
9975 CD13D1     900          CALL  #D113
9978 C39199     910          JP    LCFD7
997B 322E46     920 LCFC1    DEFB  "2","."
997E 4F524D     930          DEFB  "O","R","M"
9981 205641     940          DEFB  " ","V","A"
9984 524941     950          DEFB  "R","I","A"
9987 424C45     960          DEFB  "B","L","E"
998A 205441     970          DEFB  " ","T","A"
998D 424C45     980          DEFB  "B","L","E"
9990 0D         990          DEFB  #0D
9991 217B99    1000 LCFD7    LD    HL,LCFC1
9994 0616      1010          LD    B,#16
9996 CD13D1    1020          CALL  #D113
9999 2A535C    1030          LD    HL,(#5C53)
999C 23        1040          INC   HL
999D 23        1050          INC   HL
999E 23        1060          INC   HL
999F 23        1070          INC   HL
99A0 E5        1080          PUSH  HL
99A1 C1        1090          POP   BC
99A2 CDDF99    1100 LCFE8    CALL  LD025
99A5 7E        1110          LD    A,(HL)
99A6 D641      1120          SUB   #41
99A8 DAA299    1130          JP    C,LCFE8
99AB 7E        1140          LD    A,(HL)
99AC D65B      1150          SUB   #5B
99AE D2A299    1160          JP    NC,LCFE8
99B1 E5        1170          PUSH  HL
99B2 C1        1180          POP   BC
99B3 CDB999    1190          CALL  LCFFF
99B6 C3A299    1200          JP    LCFE8
99B9 03        1210 LCFFF    INC   BC
99BA 0A        1220          LD    A,(BC)
99BB 0B        1230          DEC   BC
99BC D624      1240          SUB   #24
99BE CA189A    1250          JP    Z,LD05E
99C1 112CE2    1260          LD    DE,#E22C
99C4 1A        1270 LD00A    LD    A,(DE)
99C5 B7        1280          OR    A
99C6 CAD399    1290          JP    Z,LD019
99C9 C5        1300          PUSH  BC
99CA E1        1310          POP   HL
99CB 96        1320          SUB   (HL)
99CC CAD999    1330          JP    Z,LD01F
99CF 13        1340          INC   DE
99D0 C3C499    1350          JP    LD00A
99D3 0A        1360 LD019    LD    A,(BC)
99D4 12        1370          LD    (DE),A
99D5 CD19D1    1380          CALL  #D119
99D8 C9        1390 LD01E    RET
99D9 CD19D1    1400 LD01F    CALL  #D119
99DC C3D899    1410          JP    LD01E
99DF C5        1420 LD025    PUSH  BC
99E0 E1        1430          POP   HL
99E1 3A085C    1440 LD027    LD    A,(#5C08)
99E4 D630      1450          SUB   #30
99E6 C2EB99    1460          JP    NZ,LD031
99E9 CF        1470          RST   8
99EA 0E        1480          DEFB  #0E
99EB 7E        1490 LD031    LD    A,(HL)
99EC D60E      1500          SUB   #0E
99EE C2FA99    1510          JP    NZ,LD040
```

```
99F1 23          1520          INC   HL
99F2 23          1530          INC   HL
99F3 23          1540          INC   HL
99F4 23          1550          INC   HL
99F5 23          1560          INC   HL
99F6 23          1570          INC   HL
99F7 C3E199      1580          JP    LD027
99FA 7E          1590 LD048    LD    A,(HL)
99FB D60D        1600          SUB   #0D
99FD C2089A      1610          JP    NZ,LD04E
9A00 23          1620 LD046    INC   HL
9A01 23          1630          INC   HL
9A02 23          1640          INC   HL
9A03 23          1650          INC   HL
9A04 23          1660          INC   HL
9A05 C3E199      1670          JP    LD027
9A08 7E          1680 LD04E    LD    A,(HL)
9A09 D6EA        1690          SUB   #EA
9A0B C2389A      1700          JP    NZ,LD07E
9A0E 23          1710 LD054    INC   HL
9A0F 7E          1720          LD    A,(HL)
9A10 D60D        1730          SUB   #0D
9A12 CA009A      1740          JP    Z,LD046
9A15 C30E9A      1750          JP    LD054
9A18 114AE2      1760 LD05E    LD    DE,#E24A
9A1B 1A          1770 LD061    LD    A,(DE)
9A1C C5          1780          PUSH  BC
9A1D E1          1790          POP   HL
9A1E B7          1800          OR    A
9A1F CA2C9A      1810          JP    Z,LD072
9A22 96          1820          SUB   (HL)
9A23 C2349A      1830          JP    NZ,LD07A
9A26 CD19D1      1840          CALL  #D119
9A29 C3D899      1850          JP    LD01E
9A2C 7E          1860 LD072    LD    A,(HL)
9A2D 12          1870          LD    (DE),A
9A2E CD19D1      1880          CALL  #D119
9A31 C3D899      1890          JP    LD01E
9A34 13          1900 LD07A    INC   DE
9A35 C31B9A      1910          JP    LD061
9A38 7E          1920 LD07E    LD    A,(HL)
9A39 D622        1930          SUB   #22
9A3B C2459A      1940          JP    NZ,LD08B
9A3E 23          1950 LD084    INC   HL
9A3F 7E          1960          LD    A,(HL)
9A40 D622        1970          SUB   #22
9A42 C23E9A      1980          JP    NZ,LD084
9A45 23          1990 LD08B    INC   HL
9A46 E5          2000          PUSH  HL
9A47 D5          2010          PUSH  DE
9A48 ED5B4B5C    2020          LD    DE,(#5C4B)
9A4C A7          2030          AND   A
9A4D ED52        2040          SBC   HL,DE
9A4F D2579A      2050          JP    NC,LD09D
9A52 D1          2060          POP   DE
9A53 E1          2070          POP   HL
9A54 E5          2080          PUSH  HL
9A55 C1          2090          POP   BC
9A56 C9          2100          RET
9A57 3E4F        2110 LD09D    LD    A,#4F
9A59 D7          2120          RST   #10
9A5A 3E6B        2130          LD    A,#6B
9A5C D7          2140          RST   #10
9A5D 3E0D        2150          LD    A,#0D
9A5F D7          2160          RST   #10
9A60 CD22DB      2170          CALL  #DB22
9A63 C3779A      2180          JP    LD0BD
9A66 0D5641      2190 LD0AC    DEFB  #0D,"V","A"
9A69 524941      2200          DEFB  "R","I","A"
9A6C 424C45      2210          DEFB  "B","L","E"
9A6F 532055      2220          DEFB  "S"," ","U"
9A72 534544      2230          DEFB  "S","E","D"
9A75 3A0D        2240          DEFB  ":",#0D
9A77 21669A      2250 LD0BD    LD    HL,LD0AC
9A7A 0611        2260          LD    B,#11
9A7C CD13D1      2270          CALL  #D113
9A7F 3E0D        2280          LD    A,#0D
9A81 D7          2290          RST   #10
9A82 112CE2      2300          LD    DE,#E22C
9A85 1A          2310 LD0CB    LD    A,(DE)
```

```
9A86 B7          2320          OR    A
9A87 CA989A      2330          JP    Z,LD0DE
9A8A D7          2340          RST   #10
9A8B 3E20        2350          LD    A,#20
9A8D D7          2360          RST   #10
9A8E 3E20        2370          LD    A,#20
9A90 D7          2380          RST   #10
9A91 3E20        2390          LD    A,#20
9A93 D7          2400          RST   #10
9A94 13          2410          INC   DE
9A95 C3859A      2420          JP    LD0C3
9A98 3E0D        2430 LD0DE    LD    A,#0D
9A9A D7          2440          RST   #10
9A9B 3E0D        2450          LD    A,#0D
9A9D D7          2460          RST   #10
9A9E C3AF9A      2470          JP    LD0F5
9AA1 535452      2480 LD0E7    DEFB  "S","T","R"
9AA4 494E47      2490          DEFB  "I","N","G"
9AA7 532055      2500          DEFB  "S"," ","U"
9AAA 534544      2510          DEFB  "S","E","D"
9AAD 3A0D        2520          DEFB  ":",#0D
9AAF 21A19A      2530 LD0F5    LD    HL,LD0E7
9AB2 060E        2540          LD    B,#0E
9AB4 CD13D1      2550          CALL  #D113
9AB7 114AE2      2560          LD    DE,#E24A
9ABA 1A          2570          LD    A,(DE)
9ABB B7          2580          OR    A
9ABC CA10D1      2590          JP    Z,#D110
9ABF D7          2600          RST   #10
9AC0 3E24        2610          LD    A,#24
9AC2 D7          2620          RST   #10

Pass 2 errors: 00

Table used:    487  from    560
```


TRANSLATOR
BASIC-PASCAL
SINGER HARALD
(c)SIGMASOFT 1988
TEL. 961/50395
LICEUL DE
MATEMATICA-
FIZICA
NR.1
TIMISOARA
PROF.COORD.
MARINEL
SERBAN
Σ


TRANSLATOR
BASIC-PASCAL
SINGER HARALD
(c)SIGMASOFT 1988
TEL. 961/50395
LICEUL DE
MATEMATICA-
FIZICA
NR.1
TIMISOARA
PROF.COORD.
MARINEL
SERBAN
Σ

9.2. SUBRUTINE UTILITARE

In acest subcapitol doriu sa va prezentam citeva programe, fie in BASIC, fie in limbaj masina, care incearca sa imbunatateasca performantele calculatoarelor de tip TIM-S,HC-85. Ele pot fi folosite ca subrutine in propriile dumneavoastra programe.

In continuare va fi descrise fiecare subrutina in parte. Ele se refera, in special la scrierea pe 64 de coloane, la lucrul cu ferestre, la compactarea SCREEN-urilor sau la utilizarea diferitelor imprimante: ROMOM, ROBOTRON sau SCAMP.

9.2.1. LLIST ROMOM

In multe configuratii a calculatorului TIM-S intra si imprimanta paralela ROMOM. Se cunoste ca, din pacate, in mod obisnuit nu se pot folosi toate facilitatile acestei imprimante.

De aceea am conceput aceasta subrutina, in limbaj masina, simpla si usor de utilizat. Cu ajutorul ei la ROMOM se poate scrie cu trei seturi de caractere:normale, inclinate si ingrosate fiecare in trei marimi: 80, 100 sau 120 caractere pe rind.Deci se pot obtine 9 scrieri diferite.

Rutina se incarca la adresa 59998, are o lungime de 390 de octeti si NU este relocatabila. Se incarca prin instructiunea LOAD "" CODE iar apoi se lanseaza prin RANDOMIZE USR 60000 dar numai dupa ce sa pornit imprimanta. Aceasta lansare pozitioneaza capul de scriere la inceputul rindului urmator, seteaza setul american de caractere si se autodefineste ca subrutina pentru tiparirea caracterelor la imprimanta. Dupa lansare orice LPRINT sau LLIST va folosi aceasta subrutina.

Pentru a apela diferite tipuri de scris se vor folosi instructiunile PAPER si INK cu urmatoarele efecte:

INK 1 - 80 caractere pe rind

INK 2 -100 caractere pe rind
INK 3 -120 caractere pe rind

PAPER 1 -scris normal
PAPER 2 -scris inclinat
PAPER 3 -scris ingrosat

Deci pentru a obtine un text scris cu cu caractere inclinate cu 100 caractere pe rind tastati LPRINT PAPER 2; INK 2;"TEXT PENTRU TIPARIT". Toate scrierile la imprimanta care vor urma vor fi scrise cu acest fel de caractere pina cind se introduce din nou o astfel de instructiune.

Tipul de scris poate fi modificat (pentru listare) si in cadrul unei linii prin folosirea codurilor de culori:

EXTENDED MODE + o tasta de la 1 la 3 - INK c
EXTENDED MODE + CAPS + o tasta de la 1 la 3 - PAPER

De asamanea se poate controla lungimea liniei de tiparire. Se stie ca o linie la imprimanta are 600 de pixeli. Daca se doreste tiparirea pe "n" pixeli ("n"<600) se introduce valoarea "2*n" in locatiile 59998/59999. De exemplu pentru n=480 avem 2*n=960 deci tastati POKE 59998,192 si POKE 59999,3.

Subrutina poate fi folosita cu succes si in alte programe, cum ar fi de exemplu GENS, MONS ,PASCAL, BETA-BASIC, C, ZEUS etc. Acesta carte a fost pregatita cu ajutorul acestei subrutine cu ajutorul careia s-au listat programele BASIC, s-au listat textele sursa GENS si s-a tiparit teoria.

```
9300 5200
*HISOFT GENS3M2 ASSEMBLER*
       ZX SPECTRUM

Copyright (C) HISOFT 1983,4
All rights reserved

Pass 1 errors: 00

                    10 ;
                    20 ;              LPRINT-ROMOM
                    30 ;
                    40 ;                autor:
                    50 ;              OVIDIU SANDOR
                    60 ;
92FA B004           70 KL       DEFB  #B0,#04
92FC 212293         80          LD    HL,START
92FF 22C55C         90          LD    (#5CC5),HL
9302 CD6A94        100          CALL  MAMA
9305 0D0A1B        110          DEFB  #0D,#0A,#1B
9308 5200FF        120          DEFB  #52,#00,#FF
930B 3E03          130          LD    A,#03
930D 325994        140          LD    (MAR),A
9310 3E02          150          LD    A,#02
9312 325A94        160          LD    (CHR),A
9315 210000        170          LD    HL,#0000
9318 226894        180          LD    (LUNG),HL
931B CD1D94        190          CALL  INCLIN
931E CD4394        200          CALL  M120
9321 C9            210          RET
9322 F5            220 START    PUSH  AF
9323 FE7F          230          CP    #7F
9325 D28493        240          JP    NC,UDG
9328 FE1F          250          CP    #1F
932A DA8F93        260          JP    C,CONTR
932D CD4D94        270          CALL  CALC
9330 215B94        280          LD    HL,DATA
9333 5F            290          LD    E,A
9334 1600          300          LD    D,#00
9336 19            310          ADD   HL,DE
9337 4E            320          LD    C,(HL)
9338 0600          330          LD    B,#00
933A 2A6894        340          LD    HL,(LUNG)
933D 09            350          ADD   HL,BC
933E E5            360          PUSH  HL
933F C1            370          POP   BC
9340 ED5BFA92      380          LD    DE,(KL)
9344 ED52          390          SBC   HL,DE
9346 D25293        400          JP    NC,INAIN
9349 ED436894      410          LD    (LUNG),BC
934D F1            420          POP   AF
934E CD0F94        430          CALL  SUBU
9351 C9            440          RET
9352 CD6A94        450 INAIN    CALL  MAMA
9355 0D0AFF        460          DEFB  #0D,#0A,#FF
9358 3A5A94        470          LD    A,(CHR)
935B FE01          480          CP    #01
```

```
935D C26693      490        JP    NZ,W1
9360 CD1494      500        CALL  NORMAL
9363 C37993      510        JP    WW
9366 FE02        520 W1     CP    #02
9368 C27193      530        JP    NZ,W2
936B CD1D94      540        CALL  INCLIN
936E C37993      550        JP    WW
9371 FE03        560 W2     CP    #03
9373 C27993      570        JP    NZ,WW
9376 CD2694      580        CALL  BIG
9379 010000      590 WW     LD    BC,#0000
937C ED436894    600        LD    (LUNG),BC
9380 F1          610        POP   AF
9381 C32293      620        JP    START
9384 F1          630 UDG    POP   AF
9385 D6A5        640        SUB   #A5
9387 D2100C      650        JP    NC,#0C10
938A 3E20        660        LD    A,#20
938C C32293      670        JP    START
938F 3A5994      680 CONTR  LD    A,(MAR)
9392 FE00        690        CP    #00
9394 CAEA93      700        JP    Z,SCMAR
9397 3A5A94      710        LD    A,(CHR)
939A FE00        720        CP    #00
939C CABF93      730        JP    Z,SCCHR
939F F1          740        POP   AF
93A0 FE10        750        CP    #10
93A2 C2AB93      760        JP    NZ,U1
93A5 3E00        770        LD    A,#00
93A7 325A94      780        LD    (CHR),A
93AA C9          790        RET
93AB FE11        800 U1     CP    #11
93AD C2B693      810        JP    NZ,U2
93B0 3E00        820        LD    A,#00
93B2 325994      830        LD    (MAR),A
93B5 C9          840        RET
93B6 FE0D        850 U2     CP    #0D
93B8 C0          860        RET   NZ
93B9 3E00        870        LD    A,#00
93BB F5          880        PUSH  AF
93BC C35293      890        JP    INAIN
93BF F1          900 SCCHR  POP   AF
93C0 FE01        910        CP    #01
93C2 C2CE93      920        JP    NZ,M1
93C5 CD1494      930        CALL  NORMAL
93C8 3E01        940        LD    A,#01
93CA 325A94      950        LD    (CHR),A
93CD C9          960        RET
93CE FE02        970 M1     CP    #02
93D0 C2DC93      980        JP    NZ,M2
93D3 CD1D94      990 M3     CALL  INCLIN
93D6 3E02       1000        LD    A,#02
93D8 325A94     1010        LD    (CHR),A
93DB C9         1020        RET
93DC FE03       1030 M2     CP    #03
```

```
93DE C2D393     1040          JP    NZ,M3
93E1 CD2694     1050          CALL  BIB
93E4 3E03       1060          LD    A,03
93E6 325A94     1070          LD    (CHR),A
93E9 C9         1080          RET
93EA F1         1090 SCMAR    POP   AF
93EB FE01       1100          CP    01
93ED 2009       1110          JR    NZ,N1
93EF CD2F94     1120          CALL  M80
93F2 3E01       1130          LD    A,01
93F4 325994     1140          LD    (MAR),A
93F7 C9         1150          RET
93F8 FE02       1160 N1       CP    02
93FA C20694     1170          JP    NZ,N2
93FD CD3994     1180          CALL  M100
9400 3E02       1190          LD    A,02
9402 325994     1200          LD    (MAR),A
9405 C9         1210          RET
9406 CD4394     1220 N2       CALL  M120
9409 3E03       1230          LD    A,03
940B 325994     1240          LD    (MAR),A
940E C9         1250          RET
940F 2F         1260 SUBU     CPL
9410 CDD438     1270          CALL  38D4
9413 C9         1280          RET
9414 CD6A94     1290 NORMAL   CALL  MAMA
9417 1B5B30     1300          DEFB  1B,5B,30
941A 6DFF       1310          DEFB  6D,FF
941C C9         1320          RET
941D CD6A94     1330 INCLIN   CALL  MAMA
9420 1B5B33     1340          DEFB  1B,5B,33
9423 6DFF       1350          DEFB  6D,FF
9425 C9         1360          RET
9426 CD6A94     1370 BIB      CALL  MAMA
9429 1B5B31     1380          DEFB  1B,5B,31
942C 6DFF       1390          DEFB  6D,FF
942E C9         1400          RET
942F CD6A94     1410 M80      CALL  MAMA
9432 1B5B30     1420          DEFB  1B,5B,30
9435 2043FF     1430          DEFB  20,43,FF
9438 C9         1440          RET
9439 CD6A94     1450 M100     CALL  MAMA
943C 1B5B32     1460          DEFB  1B,5B,32
943F 2043FF     1470          DEFB  20,43,FF
9442 C9         1480          RET
9443 CD6A94     1490 M120     CALL  MAMA
9446 1B5B33     1500          DEFB  1B,5B,33
9449 2043FF     1510          DEFB  20,43,FF
944C C9         1520          RET
944D 3A5A94     1530 CALC     LD    A,(CHR)
9450 47         1540          LD    B,A
9451 80         1550          ADD   A,B
9452 80         1560          ADD   A,B
9453 47         1570          LD    B,A
9454 3A5994     1580          LD    A,(MAR)
9457 80         1590          ADD   A,B
9458 C9         1600          RET
9459 00         1610 MAR      DEFB  00
```

```
945A 00          1620 CHR     DEFB 000
945B 000000      1630 DATA    DEFB 000,000,000
945E 000F0C      1640         DEFB 000,00F,00C
9461 0A0F0C      1650         DEFB 00A,00F,00C
9464 0A1E18      1660         DEFB 00A,01E,018
9467 14          1670         DEFB 014
9468 0000        1680 LUNG    DEFB 000,000
946A E1          1690 MAMA    POP  HL
946B 7E          1700 MAMA1   LD   A,(HL)
946C 23          1710         INC  HL
946D FEFF        1720         CP   0FF
946F 2808        1730         JR   Z,AFA
9471 E5          1740         PUSH HL
9472 2F          1750         CPL
9473 CDD438      1760         CALL 038D4
9476 E1          1770         POP  HL
9477 18F2        1780         JR   MAMA1
9479 E9          1790 AFA     JP   (HL)

Pass 2 errors: 00

Table used:   347  from   395
```

9.2.2. LPRINT ET

Adesea avem nevoie de texte tiparite intr-un numar destul de mare de exemplare. Se stie ca cel mai indicat este folosirea unui editor de texte (TASSWORD, ET sau LAST WORD). Dar acestea nu au o subrutina adecvata pentru scrierea la imprimanta ROMOM. De aceea am realizat acest program care listeaza in forma dorita un fisier ET.

Dupa incarcarea programului cu LOAD "" se urmaresc instructiunile si optiunile de pe ecran. Programul foloseste pentru tiparire subrutina LLIST ROMOM (vezi 9.2.1.) si inca 4 mici subrutine limbaj masina listate alaturi. Programul permite alegerea formei caracterelor precum si a numarului de linii la care se va tiparii textul.

Programul poate fi modificat si pentru alte imprimante prin schimbarea subrutinei de tiparire.

```
  1 REM  LPRINT ET
  2 REM      autor:
  3 REM          Ovidiu SANDOR
  4 REM
 10 LET wdw=VAL "1000": LET pr=VAL "2000"
 11 LET q$="
 12 RANDOMIZE USR VAL "60400"
 20 PAPER VAL "5": INK VAL "1": BRIGHT VAL "1": CLS
100 LET w$="00000816161": GO SUB wdw
110 LET w$="00160816161": GO SUB wdw
115 LET w$="08001132701": GO SUB wdw
120 LET w$="19000316161": GO SUB wdw
130 LET w$="19160316161": GO SUB wdw
140 PRINT AT VAL "1",VAL "2";" LPRINT ET "
150 LET p$="03021 INCARCARE TEXT": GO SUB PR
160 LET p$="04022 TIPARIRE TEXT": GO SUB PR
170 LET p$="05023 SALVARE TEXT": GO SUB PR
190 LET p$="06024 INTRARE BASIC": GO SUB PR
200 LET p$="0217PROGRAM DE TIPARIRE LA O IM-": GO SUB PR
210 LET p$="0317PRIMANTA  ROMOM  A UNUI TEXT": GO SUB PR
220 LET p$="0417PREGATIT  DE  UN  EDITOR  DE": GO SUB PR
221 LET p$="05!77EXTE (TASSWORD, ET SAU LAST": GO SUB PR
222 LET p$="0617WORD).     SUCCES !!!": GO SUB PR
230 PRINT AT VAL "20",VAL "19";"7": LET p$="2020 1988 OVIDIU Sandor ": GO SUB P
R
240 LET p$="2004ALEGE O OPTIUNE": GO SUB PR
245 PAPER VAL "7": INK NOT PI
250 LET A$=INKEY$
260 IF A$="1" THEN GO TO VAL "4000"
270 IF A$="2" THEN GO TO VAL "3000"
280 IF A$="3" THEN GO TO VAL "5000"
290 IF A$="4" THEN LET p$="1305Pentru reintrare in program tastati GO TO 10": G
O SUB pr: STOP
300 GO TO VAL "250"
999 STOP
1000 REM   WDW
1010 PAPER VAL w$(9): INK VAL w$(10): BRIGHT VAL w$(11)
1020 LET a1=VAL w$( TO 2): LET b1=VAL w$(3 TO 4): LET y1=VAL w$(5 TO 6): LET x1=
VAL w$(7 TO 8)
1030 FOR i=1 TO y1
1040 PRINT AT a1+i-1,b1;q$( TO x1)
1050 NEXT i
1060 PLOT b1*8+1,174-a1*8: DRAW x1*8-3,0: DRAW 0,-y1*8+3: DRAW -x1*8+3,0: DRAW 0
,y1*8-3
1070 RETURN
1100 REM  CLWDW
1110 LET A1=VAL W$(1 TO 2): LET B1=VAL W$(3 TO 4): LET Y1=VAL W$(5 TO 6): LET X1
=VAL W$(7 TO 8): PAPER VAL W$(10): INK VAL W$(9): BRIGHT VAL W$(11)
1120 FOR O=1 TO Y1-2
1130 PRINT OVER 1;AT A1+O,B1+1;Q$( TO X1-2): NEXT O
1135 PAPER VAL W$(9): INK VAL W$(10)
1140 FOR O=Y1-2 TO 1 STEP -1
1150 PRINT OVER 0;AT A1+O,B1+1;Q$( TO X1-2): NEXT O
1160 RETURN
2000 REM   PRNDW
2010 PRINT AT VAL p$(1 TO 2),VAL p$(3 TO 4);: LET p$=p$(5 TO ): FOR p=1 TO LEN p
$-1 STEP 2
2020 POKE 23607,237: PRINT OVER 0;p$(p);CHR$ 8;
2030 POKE 23607,240: PRINT OVER 1;p$(p+1);
2040 NEXT p
2050 IF LEN p$/2=INT (LEN p$/2) THEN GO TO 2070
2060 POKE 23607,237: PRINT OVER 0;p$(LEN p$);
2070 POKE 23607,60
2080 RETURN
3000 REM  TIPA
3005 IF L=NOT PI THEN LET P$="1306MAGARULE ! NU E INCARCAT NICI UN TEXT !!!": GO
 SUB PR: GO TO VAL "7000"
3010 LET p$="1101CE SET DE CARACTERE DORESTI?(1-3)": GO SUB PR
3020 LET W$="09180513271": GO SUB WDW
3025 LET P$="10191-CARACTERE NORMALE": GO SUB PR
3026 LET P$="11192-CARACTERE INCLINATE": GO SUB PR
3027 LET P$="12193-CARACTERE MARETE": GO SUB PR
3029 LET C$=INKEY$
3030 IF C$<"1" OR C$>"3" THEN GO TO VAL "3029"
3032 LET set=VAL c$
3035 PAPER VAL "7": INK NOT PI
3040 LET p$="1201CE MARIME  DORESTI?(1-3)": GO SUB PR
3042 LET W$="10170512511": GO SUB WDW
3044 LET P$="11181-CARACTERE MARI": GO SUB PR
3046 LET P$="12182-CARACTERE MIJLOCII": GO SUB PR
3048 LET P$="13183-CARACTERE MICI": GO SUB PR
3050 LET c$=INKEY$
3052 IF c$<"1" OR c$>"3" THEN GO TO VAL "3050"
```

```
3052 IF c$<"1" OR c$>"3" THEN GO TO VAL "3050"
3053 LET mar=VAL c$
3054 PAPER VAL "7": INK NOT PI
3058 LET p$="1301TIPARIRE LA CITE RINDURI?": GO SUB PR
3060 LET p$="1402(pentru LAST WORD introdu 0)": GO SUB PR
3070 POKE VAL "23607",VAL "237": INPUT R: POKE VAL "23607",VAL "60"
3100 LET P$="1610PREGATESTE  IMPRIMANTA !": GO SUB PR
3110 LET P$="1711APOI APASA O TASTA !": GO SUB PR
3115 PAUSE VAL "1": PAUSE NOT PI
3200 RANDOMIZE USR VAL "60000"
3210 LPRINT CHR$ VAL "17"+CHR$ MAR+CHR$ VAL "16"+CHR$ (SET);
3220 POKE VAL "60607",R: POKE VAL "60601",NOT PI: POKE VAL "60602",VAL "125": RA
NDOMIZE L: POKE VAL "60604",PEEK VAL "23670": POKE VAL "60605",PEEK VAL "23671"
3230 RANDOMIZE USR VAL "60600"
3300 LET W$="12100512171": GO SUB WDW
3310 LET P$="1411TEXTUL E TIPARIT !!!": GO SUB PR
3999 GO TO VAL "7000"
4000 REM  INCARCARE
4020 LET p$="1101INTRODU NUMELE TEXTULUI": GO SUB PR
4030 LET p$="1201     (pentru urmatorul text doar ENTER)": GO SUB PR
4040 POKE VAL "23607",VAL "237": INPUT LINE A$: POKE VAL "23607",VAL "60"
4050 IF LEN A$>VAL "10" THEN LET A$=A$( TO VAL "10")
4055 IF A$="" THEN LET P$="1301CAUTAM URMATORUL TEXT": GO TO VAL "4070"
4060 LET P$="1301CAUTAM TEXTUL "+A$
4070 GO SUB PR
4080 OVER NOT PI: LET W$="14010322271": GO SUB WDW
4090 RANDOMIZE USR VAL "60500"
4091 PRINT AT VAL "15",VAL "2"; OVER NOT PI;"                    "
4092 LET z$="": FOR i=VAL "60551" TO VAL "60560"
4094 IF PEEK i<VAL "32" OR PEEK i>VAL "127" THEN LET z$=z$+"?": GO TO VAL "4098"
4096 LET z$=z$+CHR$ PEEK i
4098 NEXT i
4100 IF PEEK VAL "60550"<>VAL "3" OR PEEK VAL "60563"<>NOT PI OR PEEK VAL "60564
"<>VAL "125" THEN LET p$="1502Am gasit: "+z$+" mai caut": GO TO VAL "4150"
4110 IF A$="" THEN GO TO VAL "4130"
4115 LET a$=a$+" "
4120 IF a$( TO VAL "10")<>z$ THEN LET p$="1502Am gasit: "+z$+" mai caut": GO TO
VAL "4150"
4130 LET p$="1502Incarc: "+z$+" ai rabdare": GO SUB pr
4140 LET O=USR VAL "60525": GO TO VAL "4200"
4150 GO SUB pr: GO TO VAL "4090"
4200 IF O=NOT PI THEN GO TO VAL "4220"
4210 LET P$="1502TAPE LOADING ERROR  las' ca mai incerc": PRINT AT VAL "15",VAL
"2";"                    ": GO SUB PR: GO TO VAL "4090"
4220 LET w$="15030318621": GO SUB wdw: LET p$="1604TEXTUL "+Z$+" ESTE INCARCAT":
 GO SUB PR
4225 LET L=PEEK VAL "60561"+PEEK VAL "60562"*VAL "256"
4230 GO TO VAL "7000"
5000 REM  SALVARE
5010 IF L=NOT PI THEN LET P$="1306MAGARULE ! NU E INCARCAT NICI UN TEXT !!!": GO
 SUB PR: GO TO VAL "7000"
5030 LET p$="1201INTRODU NUMELE TEXTULUI": GO SUB PR
5040 POKE VAL "23607",VAL "237": INPUT LINE A$: POKE VAL "23607",VAL "60"
5050 IF A$="" THEN GO TO VAL "5040"
5060 IF LEN A$>VAL "10" THEN LET A$=A$( TO VAL "10")
5070 LET P$="1303SALVAM TEXTUL "+A$: GO SUB PR
5080 SAVE A$CODE VAL "32000",L
5090 LET W$="15070318271": GO SUB WDW: LET P$="1608TEXTUL "+A$+" A FOST SALVAT!"
: GO SUB PR
5499 GO TO VAL "7000"
7000 REM  GATA SUBU
7100 PAPER VAL "6": INK VAL "1": LET p$="2004                    ": GO SUB pr: PAPER
 VAL "1": INK VAL "6": LET P$="2004  APASA O TASTA ": GO SUB PR
7110 PAUSE VAL "1": PAUSE NOT PI
7120 LET W$="08001132701": GO SUB VAL "1100"
7130 PAPER VAL "6": INK VAL "1": LET p$="2004                    ": GO SUB pr: PAPER
VAL "1": INK VAL "6": GO TO VAL "240"
9495 GO TO VAL "7000"
9998 SAVE "LPRINT ET3" LINE VAL "9999": SAVE " LPRINT ovi3"CODE VAL "59998",VAL
"2466": BEEP VAL ".1",VAL "10": STOP
9999 LOAD ""CODE : RANDOMIZE USR VAL "60400": LET 1=NOT PI: GO TO VAL "10"
```

```
*HISOFT GENS3M2 ASSEMBLER*
       ZX SPECTRUM

Copyright (C) HISOFT 1983,4
All rights reserved

Pass 1 errors: 00

                    10 ;
                    20 ;     LOAD HEADER
                    30 ;
EC54                40          ORG   60500
EC54 111100         50 START    LD    DE,#0011
EC57 DD2186EC       60          LD    IX,#EC86
EC5B 3E00           70          LD    A,#00
EC5D 37             80          SCF
EC5E CD5605         90          CALL  #0556
EC61 30F1          100          JR    NC,START
EC63 C9            110          RET

Pass 2 errors: 00

Table used:     25  from   116
```

```
*HISOFT GENS3M2 ASSEMBLER*
       ZX SPECTRUM

Copyright (C) HISOFT 1983,4
All rights reserved

Pass 1 errors: 00

                    10 ;
                    20 ;          LOAD TEXT
                    30 ;
EC6D                40          ORG   60525
EC6D ED5B91EC       50          LD    DE,(#EC91)
EC71 DD21007D       60          LD    IX,#7D00
EC75 3EFF           70          LD    A,#FF
EC77 37             80          SCF
EC78 CD5605         90          CALL  #0556
EC7B 010000        100          LD    BC,#0000
EC7E D8            110          RET   C
EC7F 01FFFF        120          LD    BC,#FFFF
EC82 C9            130          RET

Pass 2 errors: 00

Table used:     13  from   119
```

```
*HISOFT GENS3M2 ASSEMBLER*
      ZX SPECTRUM

Copyright (C) HISOFT 1983,4
All rights reserved

Pass 1 errors: 00

                      10 ;
                      20 ;         LPRINT TEXT
                      30 ;
                      40 ;      autor:
                      50 ;        Ovidiu SANDOR
                      60 ;
ECB8                  70          ORG   60600
ECB8 21007D           80          LD    HL,#7D00
ECBB 116480           90          LD    DE,#0064
ECBE 0E01            100 AAA      LD    C,#01
ECC0 0600            110          LD    B,#00
ECC2 7E              120 BBB      LD    A,(HL)
ECC3 CD0FED          130          CALL  HHH
ECC6 7E              140          LD    A,(HL)
ECC7 FE20            150          CP    #20
ECC9 3827            160          JR    C,EEE
ECCB FE80            170          CP    #80
ECCD 381D            180          JR    C,DDD
ECCF FE90            190          CP    #90
ECD1 3019            200          JR    NC,DDD
ECD3 E5              210          PUSH  HL
ECD4 C5              220          PUSH  BC
ECD5 6F              230          LD    L,A
ECD6 2600            240          LD    H,#00
ECD8 018000          250          LD    BC,#0080
ECDB ED42            260          SBC   HL,BC
ECDD 0119ED          270          LD    BC,#ED19
ECE0 29              280          ADD   HL,HL
ECE1 29              290          ADD   HL,HL
ECE2 09              300          ADD   HL,BC
ECE3 0604            310          LD    B,#04
ECE5 7E              320 CCC      LD    A,(HL)
ECE6 23              330          INC   HL
ECE7 05              340          DEC   B
ECE8 20FB            350          JR    NZ,CCC
ECEA C1              360          POP   BC
ECEB E1              370          POP   HL
ECEC 04              380 DDD      INC   B
ECED 78              390          LD    A,B
ECEE FE40            400          CP    #40
ECF0 2808            410          JR    Z,FFF
ECF2 23              420 EEE      INC   HL
ECF3 1D              430          DEC   E
ECF4 20CC            440          JR    NZ,BBB
ECF6 15              450          DEC   D
ECF7 20C9            460          JR    NZ,BBB
ECF9 C9              470          RET
ECFA 79              480 FFF      LD    A,C
ECFB FE00            490          CP    #00
ECFD 2008            500          JR    NZ,666
```

```
ECFF 23          510          INC   HL
ED00 1D          520          DEC   E
ED01 20FB        530          JR    NZ,AAA
ED03 15          540          DEC   D
ED04 20F8        550          JR    NZ,AAA
ED06 C9          560          RET
ED07 3E0D        570 BBB      LD    A,0DH
ED09 CD0FED      580          CALL  HHH
ED0C 0D          590          DEC   C
ED0D 18EB        600          JR    FFF
ED0F E5          610 HHH      PUSH  HL
ED10 D5          620          PUSH  DE
ED11 C5          630          PUSH  BC
ED12 CD86EA      640          CALL  0EA86H
ED15 C1          650          POP   BC
ED16 D1          660          POP   DE
ED17 E1          670          POP   HL
ED18 C9          680          RET

Pass 2 errors: 00

Table used:     93  from   199
```

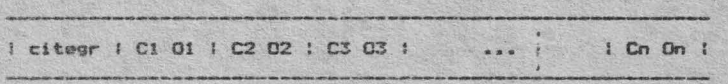
```
*HISOFT GENS3M2 ASSEMBLER*
       ZX SPECTRUM

Copyright (C) HISOFT 1983,4
All rights reserved

Pass 1 errors: 00

                    10 ;
                    20 ;            ON BREAK GOTO
                    30 ;
EBF0                40          ORG  60400
EBF0 CD7C00         50          CALL #007C
EBF3 3B             60          DEC  SP
EBF4 3B             70          DEC  SP
EBF5 E1             80          POP  HL
EBF6 010F00         90          LD   BC,#000F
EBF9 09            100          ADD  HL,BC
EBFA EB            110          EX   DE,HL
EBFB 2A3D5C        120          LD   HL,(#5C3D)
EBFE 73            130          LD   (HL),E
EBFF 23            140          INC  HL
EC00 72            150          LD   (HL),D
EC01 C9            160          RET
EC02 3B            170          DEC  SP
EC03 3B            180          DEC  SP
EC04 CD8E02        190 ZZZ      CALL #028E
EC07 7B            200          LD   A,E
EC08 FEFF          210          CP   #FF
EC0A 20F8          220          JR   NZ,ZZZ
EC0C 3A3A5C        230          LD   A,(#5C3A)
EC0F FEFF          240          CP   #FF
EC11 2821          250          JR   Z,XXX
EC13 FE07          260          CP   #07
EC15 281D          270          JR   Z,XXX
EC17 FE08          280          CP   #08
EC19 2819          290          JR   Z,XXX
EC1B 3C            300          INC  A
EC1C 32815C        310          LD   (#5C81),A
EC1F FD3600FF      320          LD   (IY+0),#FF
EC23 211725        330          LD   HL,#2517
EC26 22425C        340          LD   (#5C42),HL
EC29 AF            350          XOR  A
EC2A 32445C        360          LD   (#5C44),A
EC2D FDCB01FE      370          SET  7,(IY+1)
EC31 C37D1B        380          JP   #1B7D
EC34 33            390 XXX      INC  SP
EC35 33            400          INC  SP
EC36 C30313        410          JP   #1303

Pass 2 errors: 00

Table used:     73  from    163
```

9.2.I. COMPACT SCREEN$

Se stie ca un ecran complet (SCREEN$) ocupa 6912 baiti (6144 informatii + 768 atribute). De multe ori este necesar ca intr-un program sa existe mai multe SCREEN$-uri, pregatite din timp cu un produs adecvat (ART STUDIO, ARTIST, etc.). In acest caz insa spatiul de memorie ocupat de SCREEN$-uri ar fi prea mare; de ex. pentru 4 SCREEN$-uri 27648 baiti, ceea ce lasa doar aproximativ 13 K liberi pentru programul BASIC. Este necesara deci memorarea acestor SCREEN$-uri intr-o forma compactata.

Programul COMPACT SCREEN$ realizeaza aceasta compactare la nivel de octet, contorizind numarul de octeti consecutivi identici si memorind contorul respectiv si valoarea octetului. In final se memoreaza in primii doi octeti ai zonei numarul de grupe astfel realizat.

Imaginea unui SCREEN$ compactat in memorie:



50000 50002 50004 50006 50000+2*n

Forma de compactare permite restaurarea SCREEN$-ului pe acelasi cale. Schema logica a restaurarii SCREEN$-ului:

Corectitudinea algoritmilor de compactare si restaurare a fost testata prin realizarea programelor BASIC respective, compactarea si restaurarea decurgind lent, apoi au fost realizate rutinele respective in cod masina. Rutina de compactare are 160 baiti iar cea de restaurare 52 baiti, putind fi eventual scurtate. Prima a fost asamblata la adresa 65324 iar a doua la 65484.

Pentru realizarea restaurarii unui SCREEN$ compactat, incarcat la adresa ADR trebuie realizat:

```
POKE 65494,ADR+2-256*INT((ADR+2)/256)
POKE 65495,INT((ADR+2)/256)
POKE 65498,ADR-256*INT(ADR/256)
POKE 65499,INT(ADR/256)
```

apoi, normal:

```
RANDOMIZE USR 65484. (vezi programul "ex.decomp")
```

Obs. Exista SCREEN$-uri pentru care aceasta metoda de compactare nu da rezultate bune, zona ocupata de SCREEN$-ul compactat fiind mai mare de 6912 baiti. In acest caz, evident, se renunta la compactare.

```
   1 REM
   2 REM COMPACT SCREEN$
   3 REM
  10 CLEAR 65323: BORDER 1: PAPER 2: INK 6: CLS
  20 GO SUB 2000
  30 PRINT AT 1,0; INK 2;: LOAD ""CODE 65324
  40 CLS : GO SUB 2000: PRINT AT 4,0; INK 6;"Pregateste caseta cu SCREEN$ -ul"''
"        pentru compactat"
 100 LOAD ""SCREEN$
 120 RANDOMIZE USR 65324
 150 LET cit=PEEK 50000+256*PEEK 50001
 160 LET cit=cit*2+2
 170 CLS : GO SUB 2000: PRINT ''''"  Au fost ocupati:"; INVERSE 1;cit; INVERSE 0
;" octeti"''"          adica:"; INVERSE 1;cit/1024; INVERSE 0;" K": PAUSE 0
 175 IF cit>6912 THEN  GO TO 1000
 176 PRINT ''"      Restaurez SCREEN$ -ul?": PAUSE 0
 177 IF INKEY$="D" THEN  GO TO 200
 178 IF INKEY$="N" THEN  GO TO 189
 179 IF CODE (INKEY$)=7 THEN  LET adr=170: GO TO 600
 180 PAUSE 0: GO TO 177
 189 PRINT ''"Salvez SCREEN-ul compactat?(Y/N)": PAUSE 0
 190 IF INKEY$="Y" THEN  GO TO 400
 191 IF INKEY$="N" THEN  GO TO 500
 192 IF CODE (INKEY$)=7 THEN  LET adr=170: GO TO 600
 199 PAUSE 0: GO TO 190
 200 RANDOMIZE USR 65484
 210 PAUSE 0
 220 GO TO 170
 400 CLS : GO SUB 2000: PRINT ''''''''"Pregateste caseta pentru salvat"''"Bytes:
SCREEN$ COMPACT 50000,";cit
 410 SAVE "SCREEN$ COMPACT"CODE 50000,CIT
 500 CLS : GO SUB 2000
 510 PRINT ''''''"              Alt SCREEN$ ?"'"                 Y/N": PAUSE 0
 520 IF INKEY$="Y" THEN  GO TO 40
 530 IF INKEY$="N" THEN  STOP
 540 IF CODE (INKEY$)=7 THEN  LET adr=500: GO TO 600
 550 PAUSE 0: GO TO 520
 600 CLS : GO SUB 2000
 605 PRINT AT 5,8; PAPER 1;"                    "
 610 FOR i=6 TO 16: PRINT AT i,7; PAPER 6;"                    ";AT i-1,26; PAPER
 1;" ": NEXT i
 620 PRINT AT 7,9; INK 1; PAPER 6;"MARINEL SERBAN";AT 8,12;"profesor";AT 11,12;"
TIMISOARA";AT 12,8;"str.HEBE nr.38/B/7";AT 14,10;"tel.961/59964"
 630 PAUSE 0: CLS : GO TO adr
1000 CLS : PRINT ''''''"           DECOMPACTARE!!!"''"              ";cit;">6912": P
AUSE 0 : GO TO 50p
1999 PAUSE 0
2000 PRINT AT 0,8; PAPER 5; INK 1; BRIGHT 1;" COMPACT SCREEN$ ";AT 1,12; PAPER 7
; INK 1;"INFO-1987": RETURN
9999 SAVE "compact" LINE 1: SAVE "compactOBJ"CODE 65324,211: VERIFY "compact": V
ERIFY "compactOBJ"CODE
```

```
  1 REM
  2 REM  EXEMPLU DECOMPACTARE
  3 REM
  5 CLEAR 65458: LOAD "decomp"CODE 65484: LOAD "SCREEN$ comp"CODE 40000
 10 PAPER 6: BORDER 5: INK 2: CLS
 20 PRINT AT 4,10;"DECOMPACTARE"
 30 PRINT AT 6,2;"SCREEN$ -ul compactat la ADR"
 40 PRINT AT 8,0;"POKE 65494,ADR+2-256*INT((ADR+2)      /256)";AT 10,0;"POKE 654
95,INT((ADR+2)/256)";AT 11,0;"POKE 65498,ADR-256*INT(ADR/256)";AT 12,0;"POKE 654
99,INT(ADR/256)"
 50 PRINT AT 14,1;"Apelare cu RANDOMIZE USR 65484"
 60 PRINT AT 16,0;"EXEMPLU:";AT 17,6;"ADR=40000";AT 20,10;"Apasa o tasta": PAUS
E 0: LET adr=40000: GO SUB 1000
 70 RANDOMIZE USR 65484: PAUSE 0: GO TO 10
999 STOP
1000 POKE 65494,adr+2-256*INT ((adr+2)/256)
1010 POKE 65495,INT ((adr+2)/256)
1020 POKE 65498,adr-256*INT (adr/256)
1030 POKE 65499,INT (adr/256)
1040 RETURN
9999 SAVE "ex.decomp" LINE 1: SAVE "decomp"CODE 65484,52: SAVE "SCREEN$ comp"COD
E 40000,5500: PRINT AT 0,0: FLASH 1;" VERIFY ": VERIFY "ex.decomp": VERIFY "deco
mp"CODE : VERIFY "SCREEN$ comp"CODE
```

```
*HISOFT GENS3M2 ASSEMBLER*
       ZX SPECTRUM

Copyright (C) HISOFT 1983,4
All rights reserved

Pass 1 errors: 00

                    10 ;
                    20 ;     COMPACT SCREEN$
                    30 ;
                    40 ;       autor:
                    50 ;        MARINEL SERBAN
                    60 ;
FF2C                70          ORG  65324
FF2C DDE5           80          PUSH IX
FF2E FDE5           90          PUSH IY
FF30 F3            100          DI
FF31 FD2152C3      110          LD   IY,50002
FF35 DD210040      120          LD   IX,16384
FF39 110100        130          LD   DE,1
FF3C 210100        140          LD   HL,1
FF3F DD7E00        150          LD   A,(IX+0)
FF42 01FF1A        160          LD   BC,6911
FF45 DDBE01        170 ALT      CP   (IX+1)
FF48 2838          180          JR   Z,EGAL
FF4A F5            190 PUS      PUSH AF
FF4B 7A            200          LD   A,D
FF4C FE00          210          CP   0
FF4E 2816          220          JR   Z,MIC255
FF50 FD3600FF      230          LD   (IY+0),255
FF54 F1            240          POP  AF
FF55 FD7701        250          LD   (IY+1),A
FF58 FD23          260          INC  IY
FF5A FD23          270          INC  IY
FF5C C5            280          PUSH BC
FF5D 06FF          290          LD   B,255
FF5F 1B            300 B255     DEC  DE
FF60 10FD          310          DJNZ B255
FF62 C1            320          POP  BC
FF63 23            330          INC  HL
FF64 18E4          340          JR   PUS
FF66 7B            350 MIC255   LD   A,E
FF67 FE00          360          CP   0
FF69 280E          370          JR   Z,OCTV
FF6B F1            380          POP  AF
FF6C FD7300        390          LD   (IY+0),E
FF6F FD7701        400          LD   (IY+1),A
FF72 23            410          INC  HL
FF73 FD23          420          INC  IY
FF75 FD23          430          INC  IY
FF77 1801          440          JR   LDA
FF79 F1            450 OCTV     POP  AF
FF7A DD7E01        460 LDA      LD   A,(IX+1)
FF7D 110100        470          LD   DE,1
FF80 1801          480          JR   NEXTI
FF82 13            490 EGAL     INC  DE
FF83 DD23          500 NEXTI    INC  IX
```

```
FF85 0B          510          DEC   BC
FF86 F5          520          PUSH  AF
FF87 78          530          LD    A,B
FF88 B1          540          OR    C
FF89 FE00        550          CP    0
FF8B 2803        560          JR    Z,CONT
FF8D F1          570          POP   AF
FF8E 18B5        580          JR    ALT
FF90 7A          590 CONT     LD    A,D
FF91 FE00        600          CP    0
FF93 2817        610          JR    Z,MI255
FF95 FD3600FF    620          LD    (IY+0),255
FF99 F1          630          POP   AF
FF9A FD7701      640          LD    (IY+1),A
FF9D FD23        650          INC   IY
FF9F FD23        660          INC   IY
FFA1 C5          670          PUSH  BC
FFA2 06FF        680          LD    B,255
FFA4 1B          690 DECDE    DEC   DE
FFA5 10FD        700          DJNZ  DECDE
FFA7 C1          710          POP   BC
FFA8 23          720          INC   HL
FFA9 F5          730          PUSH  AF
FFAA 18E4        740          JR    CONT
FFAC 7B          750 MI255    LD    A,E
FFAD FE00        760          CP    0
FFAF 280A        770          JR    Z,OCTV1
FFB1 F1          780          POP   AF
FFB2 FD7300      790          LD    (IY+0),E
FFB5 FD7701      800          LD    (IY+1),A
FFB8 23          810          INC   HL
FFB9 1801        820          JR    LDA1
FFBB F1          830 OCTV1    POP   AF
FFBC DD2150C3    840 LDA1     LD    IX,50000
FFC0 DD7500      850          LD    (IX+0),L
FFC3 DD7401      860          LD    (IX+1),H
FFC6 FB          870          EI
FFC7 FDE1        880          POP   IY
FFC9 DDE1        890          POP   IX
FFCB C9          900          RET

Pass 2 errors: 00

Table used:    159  from   236
```

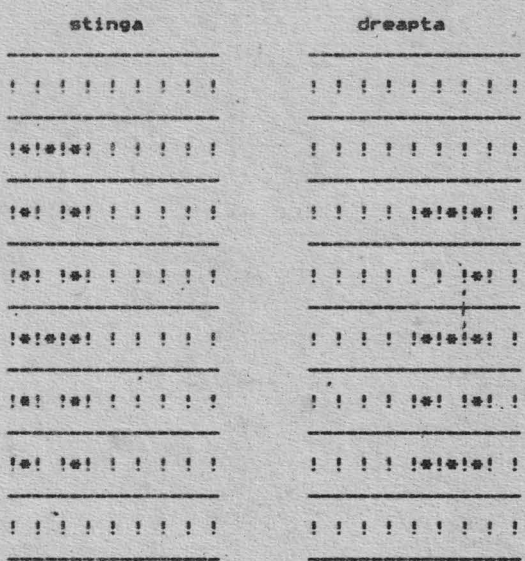
```
*HISOFT GENS3M2 ASSEMBLER*
      ZX SPECTRUM

Copyright (C) HISOFT 1983,4
All rights reserved

Pass 1 errors: 00

                      10 ;
                      20 ;        RESTAURARE
                      30 ;      SCREEN$ COMPACT
                      40 ;
                      50 ;         autor:
                      60 ;           MARINEL SERBAN
                      70 ;
FFCC                  80          ORG  65484
FFCC F5               90          PUSH AF
FFCD C5              100          PUSH BC
FFCE D5              110          PUSH DE
FFCF E5              120          PUSH HL
FFD0 DDE5            130          PUSH IX
FFD2 FDE5            140          PUSH IY
FFD4 DD2152C3        150          LD   IX,50002
FFD8 ED4B50C3        160          LD   BC,(50000)
FFDC 210040          170          LD   HL,16384
FFDF 0B              180          DEC  BC
FFE0 C5              190 INCA1    PUSH BC
FFE1 DD4600          200          LD   B,(IX+0)
FFE4 DD7E01          210          LD   A,(IX+1)
FFE7 77              220 INCA     LD   (HL),A
FFE8 23              230          INC  HL
FFE9 10FC            240          DJNZ INCA
FFEB C1              250          POP  BC
FFEC DD23            260          INC  IX
FFEE DD23            270          INC  IX
FFF0 0B              280          DEC  BC
FFF1 78              290          LD   A,B
FFF2 B1              300          OR   C
FFF3 20EB            310          JR   NZ,INCA1
FFF5 FDE1            320          POP  IY
FFF7 DDE1            330          POP  IX
FFF9 E1              340          POP  HL
FFFA D1              350          POP  DE
FFFB C1              360          POP  BC
FFFC F1              370          POP  AF
FFFD C9              380          RET

Pass 2 errors: 00

Table used:     36  from   159
```

9.2.4. 64coloane

Se poate realiza o scriere pe 64 coloane si fara a folosi produsele specializate (BETA BASIC, MEGA BASIC, etc.).

Acest lucru se realizeaza foarte usor prin generarea a doua seturi de caractere (stinga, dreapta), fiecare caracter ocupind in acest caz doar jumatate din caracterul normal BASIC Spectrum.

Exemplu:



Prin suprapunerea a doua astfel de caractere (par, impar), folosind OVER 1 se va realiza scrierea simpla pe 64 coloane. Cele doua seturi ocupa 1536 baiti (2*768).

Programul 64col64000 indica doua moduri de utilizare a acestor seturi avind acelasi efect:scrierea pe 64 coloane. In primul caz se calculeaza pentru fiecare caracter setul din care face parte si se realizeaza extragerea lui. Din cauza calculelor acest mod de scriere este mai lent. In cel de-al doilea caz scrierea se face mult mai rapid prin incarcarea celor doua seturi la adrese care necesita doar schimbarea continutului variabilei 23607, pe de o parte, iar pe de alta parte prin realizarea scrierii cu pasul 2 luind alternativ un caracter stinga, unul dreapta. Acest lucru necesita in final un test in plus pentru ultimul caracter.

In ambele cazuri se va transmite sub forma de sir de caractere informatia care trebuie scrisa.

Exemplu de apelare:

```
100 LET a$="Exemplu de scriere pe 64 coloane"
110 PRINT AT 10,20;:GOSUB 1000
```

Presupunind ca rutina de scriere se afla la linia 1000 (vezi programul 64col64000) pe ecran se va scrie incepind cu coloana 20 din linia 10.

Seturile de caractere inguste se pot realiza folosind unul din produsele specializate (ART STUDIO, ARTIST,etc.).

```
  1 REM
  2 REM SCRIERE PE 64 COLOANE IN BASIC
  3 REM
  4 DEF FN p(x)=x-256*INT (x/256)
  5 DEF FN q(x)=INT (x/256)
  9 CLEAR 63999
 10 LOAD "seturi"CODE 64000
 30 LET set1=63744: LET set2=64512
 99 CLS
 100 FOR l=0 TO 2: LET k=0: LET a$="*TEST scriere 64 coloane in BASIC M E R G E
deci se poate lucra*": GO SUB 500: NEXT l: PAUSE 0
 120 LET a$="ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz": CLS : LET l=
3: LET k=0: GO SUB 500: LET a$="! @ # $ % & ' ( ) _ < > ^ - + = : ` ? / * ; "" .
, ": LET l=6: GO SUB 500: PAUSE 0
 130 LET a$="0 1 2 3 4 5 6 7 8 9": LET l=10: LET k=7: GO SUB 500: PAUSE 0
 140 LET a$=" TEST scriere mai rapida si TRECERE pe linia urmatoare SETUL ALFABE
TIC:ABCDEFGHIJKLMNOPQRSTUVWXYZ - abcdefghijklmnopqrstuvwxyz - SETUL NUMERIC:0123
456789 - CARACTERE SPECIALE:!@#$%&'()_<>^-+=; ?/*.;"",~|\{}[]": CLS : PRINT AT 1
0,7;: GO SUB 1000: PAUSE 0
 199 POKE 23606,0: POKE 23607,60
 200 STOP
 499 REM rutina scriere lenta
 500 FOR j=1 TO LEN a$
 510 POKE 23606,(FN p(set1) AND j/2<>INT (j/2))+(FN p(set2) AND j/2=INT (j/2))
 520 POKE 23607,(FN q(set1) AND j/2<>INT (j/2))+(FN q(set2) AND j/2=INT (j/2))
 530 PRINT AT l,k+INT ((j-1)/2); OVER 1;a$(j);CHR$ 8;"_": NEXT j: RETURN
 999 REM rutina scriere rapida
1000 POKE 23606,0: FOR j=1 TO LEN a$-1 STEP 2
1010 POKE 23607,249: PRINT a$(j);
1020 POKE 23607,252: PRINT CHR$ 8; OVER 1;a$(j+1);
1030 NEXT j
1040 IF LEN a$/2=INT (LEN a$/2) THEN  RETURN
1050 POKE 23607,249: PRINT a$(j): RETURN
9999 SAVE "64col64000" LINE 1: SAVE "seturi"CODE 64000,1536: VERIFY "64col64000"
: VERIFY "seturi"CODE
```

9.2.5. WINDOWS

In practica muncii de programare exista dese situatii in care in care ecranul devine insuficient pentru afisarea tuturor datelor.De exemplu la lucrul interactiv cu utilizatorul pentru afisarea unor indicatii suplimentare in cazul aparitiei unor erori sau pentru a isarea meniurilor.

Pentru a putea rezolva aceste situatii se recurge la suprapunerea peste ecranul curent a unor ferestre in care se vor afisa diverse informatii.Dupa utilizare portiunea de ecran se reface cu vechile date.

Aceasta metoda este cunoscuta sub denumirea de "WINDOW TEHNIC"si s-a extins odata cu aparitia calculatoarelor personal-profesionale,de expemplu pe IBM PC,AMIGA,APPLE,ATARI 1040ST. Firma APPLE si ATARI au implementat aceasta metoda in sistemul de operare al produselor lor.

Pentru utilizarea acestei metode si pe calculatoarele compatibile SPECTRUM am creat o rutina de salvare si restaurare a portiunilor de ecran.

Programul este relocabil (ruleaza la orice adresa).Pentru utilizarea lui trebuiesc definite doua functii :

```
etic. DEF FN W(A,B,C,D)=USR adr.:DEF FN R()=USR adr.+10
```

unde adr. reprezinta adresa de incarcare a programului.

Prima functie salveaza iar a doua restaureaza portiuni de ecran Parametrii A,B,C,D au urmatoarele semnificatii:

-A coordonata y a coltului de sus (in caractere)

-B coordonata x a coltului de sus

-C numarul de linii

-D numarul de coloane

Apelurile succesive ale functiei FN W are ca efect salvarea ferestelor intr-o stiva de tip LIFO si deci functia FN R restaureaza ultima fereasta.Pentru descarcarea stivei se foloseste functia FN R in mod repetat (programul gestioneaza memoria eliberind utilizatorul de aceasta sarcina).Implicit se pot salva 7000 de octeti.In caz de depasire se genereaza eroarea

```
G No room for line
```

Marirea dimensiunii stivei se face inainte de prima lansare cu

```
POKE adr.+381,dim-INT(dim/256)*256 si
POKE adr.+382,INT(dim/256)
```

```
  1 REM
  2 REM WINDOW
  3 REM
  4 LET x$="                                        ": DEF FN w(a,b,c,d)=USR 50000: DEF
FN r()=USR 50010
  9 STOP
 10 LET i$="01011009171": GO SUB 9600: PAUSE 0
 15 LET a$="speram ca  mergeaza cum  este inacest     momentdeci sa vedem ceo f
ost in  stare9nita sa faca!!! ": GO SUB 9500
 20 PAUSE 0: LET i$="02031410611": GO SUB 9600: LET a$="fereastra A DOUA INCERC
AM CEVA": GO SUB 9500
 25 REM i$==)2c->col;2c->lin;2c->xlung;2c->ylung;1c->pap;1c->ink;1c->0-uita wi
ndow  <>0-pastreaza fereastra
 30 PAUSE 0: LET K=FN R()
 90 PAUSE 0
 99 LET K=FN R(): PAPER 7
100 STOP
9500 LET a1=2*(x1-2)-(LEN a$-INT (LEN a$/((x1-2)*2))*2*(x1-2)): LET a$=a$+x$( TO
 a1)
9502 LET j1=LEN a$/(2*(x1-2))
9504 FOR j=1 TO j1: LET i$=a$((j-1)*2*(x1-2)+1 TO j*2*(x1-2)): PRINT AT yo+j,xo+
1;
9506 FOR i=1 TO (x1-2)*2-1 STEP 2: POKE 23607,249: PRINT i$(i);: POKE 23607,252:
 PRINT CHR$ 8; OVER 1;i$(i+1);: NEXT i: NEXT j: POKE 23607,60
9599 RETURN
9600 LET xo=VAL i$(1 TO 2): LET yo=VAL i$(3 TO 4): LET x1=VAL i$(5 TO 6): LET y1
=VAL i$(7 TO 8)
9610 PAPER VAL i$(9): INK VAL i$(10)
9620 LET i=0: IF LEN i$>10 THEN  LET i=VAL i$(11)
9630 IF i THEN  LET x=FN w(xo,yo,x1,y1): PRINT AT 21,0;"x=";x: REM (x)=col;(x+1)
=lin[coltul stinga sus]
9632 LET I$=X$( TO x1): FOR i=yo TO yo+y1-1: PRINT AT i,xo;i$: NEXT i
9634 PLOT 8*xo+1,174-8*yo: DRAW 8*x1-3,0: DRAW 0,3-y1*8: DRAW 3-x1*8,0: DRAW 0,y
1*8-3
9699 RETURN
9998 CLEAR 49999: LOAD ""CODE : LOAD ""CODE : GO TO 1
9999 CLEAR : SAVE "WDW.bas" LINE 9998: SAVE "WDW.com"CODE 50000,250: SAVE "64col
"CODE 64000,1536: VERIFY "WDW.bas": VERIFY ""CODE : VERIFY ""CODE
```

```
*HISOFT GENS3M2 ASSEMBLER*
      ZX SPECTRUM

Copyright (C) HISOFT 1983,4
All rights reserved

Pass 1 errors: 00

                      10 ;
                      20 ;       WINDOW
                      30 ;
                      40 ;      autor:
                      50 ;   GHEORGHE ILCAU
                      60 ;
0000                  70           ORG   0
0000 F3               80           DI
0001 218301           90           LD    HL,BEGIN
0004 09              100           ADD   HL,BC
0005 ED73B05C        110           LD    (23728),SP
0009 F9              120           LD    SP,HL
000A E1              130 REL       POP   HL
000B 7C              140           LD    A,H
000C B5              150           OR    L
000D 280D            160           JR    Z,RELOUT
000F 09              170           ADD   HL,BC
0010 5E              180           LD    E,(HL)
0011 23              190           INC   HL
0012 56              200           LD    D,(HL)
0013 EB              210           EX    DE,HL
0014 09              220           ADD   HL,BC
0015 EB              230           EX    DE,HL
0016 2B              240           DEC   HL
0017 73              250           LD    (HL),E
0018 23              260           INC   HL
0019 72              270           LD    (HL),D
001A 18EE            280           JR    REL
001C ED7BB05C        290 RELOUT    LD    SP,(23728)
                     300
0020 3EC3            310           LD    A,#C3
0022 320000          320 R1        LD    (0),A
0025 320A00          330 R2        LD    (10),A
0028 215000          340 R3        LD    HL,SAVE
002B 220100          350 R4        LD    (1),HL
002E 21DE00          360 R5        LD    HL,LOAD
0031 220B00          370 R6        LD    (11),HL
0034 218301          380 R7        LD    HL,BEGIN
0037 227B01          390 R8        LD    (END),HL
003A ED4B7D01        400 R9        LD    BC,(COUNT)
003E FB              410           EI
003F 23              420           INC   HL
0040 09              430           ADD   HL,BC
0041 300D            440           JR    NC,SAVE
0043 B7              450           OR    A
0044 ED42            460           SBC   HL,BC
0046 EB              470           EX    DE,HL
0047 21FFFF          480           LD    HL,#FFFF
004A B7              490           OR    A
004B ED52            500           SBC   HL,DE
004D 227D01          510 R10       LD    (COUNT),HL
```

```
                        520
0050 DD2A0B5C   530 SAVE    LD    IX,(#5C0B)
0054 DD4604     540         LD    B,(IX+4)
0057 DD4E0C     550         LD    C,(IX+12)
005A C5         560         PUSH  BC
005B DD5614     570         LD    D,(IX+20)
005E DD5E1C     580         LD    E,(IX+28)
0061 D5         590         PUSH  DE
0062 CD5401     600 R19     CALL  MULT
0065 2A7D01     610 R11     LD    HL,(COUNT)
0068 B7         620         OR    A
0069 ED52       630         SBC   HL,DE
006B 3002       640         JR    NC,R12
006D CF         650         RST   #8
006E 0E         660         DEFB  14
006F 227D01     670 R12     LD    (COUNT),HL
0072 2A7B01     680 R0      LD    HL,(END)
0075 D1         690         POP   DE
0076 C1         700         POP   BC
0077 70         710         LD    (HL),B
0078 23         720         INC   HL
0079 71         730         LD    (HL),C
007A 23         740         INC   HL
007B 72         750         LD    (HL),D
007C 23         760         INC   HL
007D 73         770         LD    (HL),E
007E 23         780         INC   HL
007F E5         790         PUSH  HL
0080 DDE1       800         POP   IX
0082 CB00       810         RLC   B
0084 CB00       820         RLC   B
0086 CB00       830         RLC   B
0088 CB01       840         RLC   C
008A CB01       850         RLC   C
008C CB01       860         RLC   C
008E C5         870 EXT     PUSH  BC
008F D5         880         PUSH  DE
0090 78         890         LD    A,B
0091 CDB122     900         CALL  #22B1
0094 4B         910         LD    C,E
0095 0600       920         LD    B,0
0097 DDE5       930         PUSH  IX
0099 D1         940         POP   DE
009A CDC200     950 R13     CALL  SALINE
009D D5         960         PUSH  DE
009E DDE1       970         POP   IX
00A0 D1         980         POP   DE
00A1 C1         990         POP   BC
00A2 3E08      1000         LD    A,8
00A4 80        1010         ADD   A,B
00A5 47        1020         LD    B,A
00A6 15        1030         DEC   D
00A7 20E5      1040         JR    NZ,EXT
00A9 2A7901    1050 R14     LD    HL,(START)
00AC DD7500    1060         LD    (IX+0),L
00AF DD7401    1070         LD    (IX+1),H
00B2 DDE5      1080         PUSH  IX
00B4 2A7B01    1090 R15     LD    HL,(END)
```

```
00B7 227901     1100 R16    LD   (START),HL
00BA E3         1110        EX   (SP),HL
00BB 23         1120        INC  HL
00BC 23         1130        INC  HL
00BD 227B01     1140 R17    LD   (END),HL
00C0 C1         1150        POP  BC
00C1 C9         1160        RET
                1170
00C2 3E08       1180 SALINE LD   A,8
00C4 CDD300     1190 R18    CALL SAL1
00C7 25         1200        DEC  H
00C8 84         1210        ADD  A,H
00C9 1F         1220        RRA
00CA 1F         1230        RRA
00CB 1F         1240        RRA
00CC E603       1250        AND  3
00CE F658       1260        OR   #58
00D0 67         1270        LD   H,A
00D1 3E01       1280        LD   A,1
00D3 E5         1290 SAL1   PUSH HL
00D4 C5         1300        PUSH BC
00D5 EDB0       1310        LDIR
00D7 C1         1320        POP  BC
00D8 E1         1330        POP  HL
00D9 24         1340        INC  H
00DA 3D         1350        DEC  A
00DB 20F6       1360        JR   NZ,SAL1
00DD C9         1370        RET
                1380
00DE            1390 LOAD   EQU  $
00DE 2A7901     1400 R20    LD   HL,(START)
00E1 44         1410        LD   B,H
00E2 4D         1420        LD   C,L
00E3 7C         1430        LD   A,H
00E4 B1         1440        OR   C
00E5 C8         1450        RET  Z
00E6 46         1460        LD   B,(HL)
00E7 23         1470        INC  HL
00E8 4E         1480        LD   C,(HL)
00E9 23         1490        INC  HL
00EA 56         1500        LD   D,(HL)
00EB 23         1510        INC  HL
00EC 5E         1520        LD   E,(HL)
00ED 23         1530        INC  HL
00EE E5         1540        PUSH HL
00EF DDE1       1550        POP  IX
00F1 C5         1560        PUSH BC
00F2 D5         1570        PUSH DE
00F3 CD5401     1580 R21    CALL MULT
00F6 2A7D01     1590 R22    LD   HL,(COUNT)
00F9 19         1600        ADD  HL,DE
00FA 227D01     1610 R23    LD   (COUNT),HL
00FD D1         1620        POP  DE
00FE C1         1630        POP  BC
00FF CB00       1640        RLC  B
0101 CB00       1650        RLC  B
0103 CB00       1660        RLC  B
```

```
0105 CB01       1670          RLC  C
0107 CB01       1680          RLC  C
0109 CB01       1690          RLC  C
010B C5         1700 LEXT     PUSH BC
010C D5         1710          PUSH DE
010D 78         1720          LD   A,B
010E CDB122     1730          CALL #22B1
0111 4B         1740          LD   C,E
0112 0600       1750          LD   B,0
0114 EB         1760          EX   DE,HL
0115 DDE5       1770          PUSH IX
0117 E1         1780          POP  HL
0118 CD3801     1790 R24      CALL LOLINE
011B E5         1800          PUSH HL
011C DDE1       1810          POP  IX
011E D1         1820          POP  DE
011F C1         1830          POP  BC
0120 3E08       1840          LD   A,8
0122 80         1850          ADD  A,B
0123 47         1860          LD   B,A
0124 15         1870          DEC  D
0125 20E4       1880          JR   NZ.LEXT
0127 5E         1890          LD   E,(HL)
0128 23         1900          INC  HL
0129 56         1910          LD   D,(HL)
012A 23         1920          INC  HL
012B 2A7901     1930 R26      LD   HL,(START)
012E 227B01     1940 R27      LD   (END),HL
0131 EB         1950          EX   DE,HL
0132 227901     1960 R28      LD   (START),HL
0135 44         1970          LD   B,H
0136 4D         1980          LD   C,L
0137 C9         1990          RET
                2000
0138 3E08       2010 LOLINE   LD   A,8
013A CD4901     2020 R25      CALL LOL1
013D 15         2030          DEC  D
013E 82         2040          ADD  A,D
013F 1F         2050          RRA
0140 1F         2060          RRA
0141 1F         2070          RRA
0142 E603       2080          AND  3
0144 F658       2090          OR   #58
0146 57         2100          LD   D,A
0147 3E01       2110          LD   A,1
0149 D5         2120 LOL1     PUSH DE
014A C5         2130          PUSH BC
014B EDB0       2140          LDIR
014D C1         2150          POP  BC
014E D1         2160          POP  DE
014F 14         2170          INC  D
0150 3D         2180          DEC  A
0151 20F6       2190          JR   NZ,LOL1
0153 C9         2200          RET
```

```
                        2210
                        2220
0154 0605               2230 MULT   LD   B,5
0156 63                 2240        LD   L,E
0157 AF                 2250        XOR  A
0158 67                 2260        LD   H,A
0159 CB1A               2270 MULT1  RR   D
015B 3002               2280        JR   NC,MULT2
015D E5                 2290        PUSH HL
015E 3C                 2300        INC  A
015F 29                 2310 MULT2  ADD  HL,HL
0160 10F7               2320        DJNZ MULT1
0162 210000             2330        LD   HL,0
0165 B7                 2340        OR   A
0166 2805               2350        JR   Z,MULTE
0168 D1                 2360 MULT3  POP  DE
0169 19                 2370        ADD  HL,DE
016A 3D                 2380        DEC  A
016B 20FB               2390        JR   NZ,MULT3
016D 54                 2400 MULTE  LD   D,H
016E 5D                 2410        LD   E,L
016F 29                 2420        ADD  HL,HL
0170 29                 2430        ADD  HL,HL
0171 29                 2440        ADD  HL,HL
0172 19                 2450        ADD  HL,DE
0173 110600             2460        LD   DE,6
0176 19                 2470        ADD  HL,DE
0177 EB                 2480        EX   DE,HL
0178 C9                 2490        RET
                        2500
0179 0000               2510 START  DEFW 0
017B 0000               2520 END    DEFW 0
017D 581B               2530 COUNT  DEFW 7000
017F 0000               2540        DEFW 0
0181 0000               2550        DEFW 0
0183 7300               2560 BEGIN  DEFW R0+1
0185 2300               2570        DEFW R1+1
0187 2600               2580        DEFW R2+1
0189 2900               2590        DEFW R3+1
018B 2C00               2600        DEFW R4+1
018D 2F00               2610        DEFW R5+1
018F 3200               2620        DEFW R6+1
0191 3500               2630        DEFW R7+1
0193 3800               2640        DEFW R8+1
0195 3C00               2650        DEFW R9+2
0197 4E00               2660        DEFW R10+1
0199 6600               2670        DEFW R11+1
019B 7000               2680        DEFW R12+1
019D 9B00               2690        DEFW R13+1
019F AA00               2700        DEFW R14+1
01A1 B500               2710        DEFW R15+1
01A3 B800               2720        DEFW R16+1
01A5 BE00               2730        DEFW R17+1
01A7 C500               2740        DEFW R18+1
01A9 6300               2750        DEFW R19+1
01AB DF00               2760        DEFW R20+1
01AD F400               2770        DEFW R21+1
01AF F700               2780        DEFW R22+1
01B1 FB00               2790        DEFW R23+1
01B3 1901               2800        DEFW R24+1
01B5 3B01               2810        DEFW R25+1
01B7 2C01               2820        DEFW R26+1
01B9 2F01               2830        DEFW R27+1
01BB 3301               2840        DEFW R28+1
01BD 0000               2850        DEFW 0
01BF                    2860        ENT  $
```

9.2.6 64col-Z80

Pe calculatorul TIM-S si HC-85 caracterele se formeaza intr-o matrice de 8x8 puncte.Aceasta conduce la scrierea a 32 de caractere pe un rind.Marimea de 8x8 puncte a fost aleasa de catre firma datorita simplitatii algoritmului de afisare(se elimina multe calcule datorita conformatiei ecranului). Caracterele sint insa prea late si neestetice.Nu se respecta proportia standard de 6/10.

Unele programe folosesc rutine proprii de scriere de 5x8 puncte(microprint),deci 51 caractere pe rind.Algoritmul este mai lent dar caracterele sint mai estetice si lizibilitatea sporita.

Scrieare a 64 caractere pe un rind(un caracter pe 4x8 puncte) este un compromis intre viteza,lizibilitate si estetica. Acest mod de scriere este adecvat pentru cei care programeaza in Pascal sub compilatorul HP4TM,liniile sursa putinduse alinia mai spre interior existind posibilitatea evidentierii unor structuri imbricate.

Programul este scris in limbaj masina avind o lungime de 1100 octeti inclusiv setul de caractere.Se incarca implicit de la adresa 63760 si nu este relocabil.Nu distruge caracterele grafice definite de utilizator.Nu permite scrierea cu OVER,INK, INVERSE,PAPER,FLASH,BRIGHT deoarece toate verificarile facute cu prvire la instructiunile de mai sus duce la pierderea vitezei.

Mai jos se va prezenta modul de lansare sub HP4TM.

```
LOAD"HP4TM16"
-in HP4TM se raspunde la Top of RAM? cu 63760
-la aparitia cursorului ">" se tasteaza B (ENTER)
-din BASIC se,incarca rutina "64col-Z80"
    LOAD"64col-Z80"CODE  si
    RANDOMIZE USR 63770:RANDOMIZE USR 24603.
```

Programul poate fi folosit cu succes si in BASIC.La aparitia unei erori se reface canalul S si textul va aparea cu caracterele setului de 64(caracterele vor fi dublate).Pentru inlaturarea acestui neajuns se va inrtoduce POKE 23607,60 care comuta pe setul standard de caractere.Deci daca canalul K (canal de eroare si input in partea inferioara a ecranului) nu este

folosit se poate scrie pe 64 caractere si in BASIC dar numai in cadrul unui program nu si folosind comenzi directe. In continuare se prezinta secventa de utilizare a rutinei in BASIC:

```
etic. RANDOMIZE USR 63770:REM sciere pe 64 caractere
                .
                .
                .
etic. POKE 23607,60:REM revenire set standard inainte
                de terminarea programului
```

Programul poate fi completat prin includerea tratari instructiunilor de culoare.

```
*HISOFT GENS3M2 ASSEMBLER*
      ZX SPECTRUM

Copyright (C) HISOFT 1983,4
All rights reserved

Pass 1 errors: 00

                      10 ;
                      20 ;       64 COL
                      30 ;
                      40 ;       autor:
                      50 ;   GHEORGHE ILCAU
                      60 ;
F9FD                  70 POS     EQU  63997
F8D4                  80         ORG  63700
F8D4 210000           90         LD   HL,0
F8D7 22FDF9          100         LD   (POS),HL
F8DA 2100F9          110         LD   HL,63744
F8DD 22365C          120         LD   (23606),HL
F8E0 21E7F8          130         LD   HL,ENTRY
F8E3 22B95C          140         LD   (23739),HL
F8E6 C9              150         RET
F8E7 CD89F9          160 ENTRY  CALL  FETCH
F8EA FE20            170         CP   #20
F8EC 3052            180         JR   NC,ABLE
F8EE FE06            190         CP   6
F8F0 384C            200         JR   C,QUEST
F8F2 FE0E            210         CP   14
F8F4 3048            220         JR   NC,QUEST
F8F6 21FAF8          230         LD   HL,TABLE-6
F8F9 5F              240         LD   E,A
F8FA 1600            250         LD   D,0
F8FC 19              260         ADD  HL,DE
F8FD 5E              270         LD   E,(HL)
F8FE 19              280         ADD  HL,DE
F8FF E9              290         JP   (HL)
                     300
F900 08              310 TABLE  DEFB  TABLE1-$
F901 3D              320        DEFB  QUEST-$
F902 12              330        DEFB  LEFT2-$
F903 1B              340        DEFB  RIGT2-$
F904 1B              350        DEFB  DOWN2-$
F905 22              360        DEFB  UP2-$
F906 38              370        DEFB  QUEST-$
F907 28              380        DEFB  CRLF2-$
                     390
F908 79              400 TABLE1 LD    A,C
F909 E6F8            410        AND   %11111000
F90B 4F              420        LD    C,A
F90C 210800          430        LD    HL,8
F90F 09              440        ADD   HL,BC
F910 44              450        LD    B,H
F911 4D              460        LD    C,L
F912 0B              470        DEC   BC
F913 C9              480        RET
                     490
F914 0B              500 LEFT2  DEC   BC
F915 0B              510        DEC   BC
F916 3A16F9          520        LD    A,(SPOT)
F919 3D              530        DEC   A
```

```
F91A 3216F9      540         LD   (SPOT),A
F91D C9          550         RET
                 560
F91E C9          570 RIGT2   RET
                 580
F91F 214000      590 DOWN2   LD   HL,64
F922 09          600         ADD  HL,BC
F923 44          610         LD   B,H
F924 4D          620         LD   C,L
F925 0B          630         DEC  BC
F926 C9          640         RET
                 650
F927 C0FF        660 UP2     LD   HL,-64
F92A 09          670         ADD  HL,BC
F92B 44          680         LD   B,H
F92C 4D          690         LD   C,L
F92D 0B          700         DEC  BC
F92E C9          710         RET
                 720
F92F 79          730 CRLF2   LD   A,C
F930 E6C0        740         AND  192
F932 4F          750         LD   C,A
F933 213F00      760         LD   HL,63
F936 09          770         ADD  HL,BC
F937 44          780         LD   B,H
F938 4D          790         LD   C,L
F939 AF          800         XOR  A
F93A 3216F9      810         LD   (SPOT),A
F93D C9          820         RET
                 830
F93E 0B          840 QUEST   DEC  BC
F93F C9          850         RET
F940 FE80        860 ABLE    CP   128
F942 303B        870         JR   NC,UDG
F944 C5          880         PUSH BC
F945 6F          890         LD   L,A
F946 2600        900         LD   H,0
F948 29          910         ADD  HL,HL
F949 29          920         ADD  HL,HL
F94A 29          930         ADD  HL,HL
F94B ED5B365C    940         LD   DE,(23606)
F94F 19          950         ADD  HL,DE
F950 EB          960         EX   DE,HL
F951 CB38        970         SRL  B
F953 CB19        980         RR   C
F955 F5          990         PUSH AF
F956 78         1000         LD   A,B
F957 07         1010         RLCA
F958 07         1020         RLCA
F959 07         1030         RLCA
F95A 47         1040         LD   B,A
F95B 210040     1050         LD   HL,#4000
F95E 09         1060         ADD  HL,BC
F95F 0608       1070         LD   B,8
F961 F1         1080 LOOP    POP  AF
F962 F5         1090         PUSH AF
F963 1A         1100         LD   A,(DE)
F964 380A       1110         JR   C,INVERS
```

```
F966 E6F0       1120          AND   240
F968 4F         1130          LD    C,A
F969 7E         1140          LD    A,(HL)
F96A E60F       1150          AND   15
F96C B1         1160          OR    C
F96D 77         1170          LD    (HL),A
F96E 1808       1180          JR    CICLU
F970 E60F       1190 INVERS   AND   15
F972 4F         1200          LD    C,A
F973 7E         1210          LD    A,(HL)
F974 E6F0       1220          AND   240
F976 B1         1230          OR    C
F977 77         1240          LD    (HL),A
F978 24         1250 CICLU    INC   H
F979 13         1260          INC   DE
F97A 10E5       1270          DJNZ  LOOP
F97C F1         1280          POP   AF
F97D C1         1290          POP   BC
F97E C9         1300          RET
F97F D6A5       1310 UDG      SUB   165
F981 D2100C     1320          JP    NC,#C10
F984 3E3F       1330          LD    A,"?"
F986 C340F9     1340          JP    ABLE
                1350
                1360
F989 ED4BFDF9   1370 FETCH    LD    BC,(POS)
F98D 2192F9     1380          LD    HL,PUT
F990 E3         1390          EX    (SP),HL
F991 E9         1400          JP    (HL)
                1410
F992 03         1420 PUT      INC   BC
F993 21FF05     1430          LD    HL,1535
F996 B7         1440          OR    A
F997 ED42       1450          SBC   HL,BC
F999 300E       1460          JR    NC,NSCROL
F99B 29         1470          ADD   HL,HL
F99C 3805       1480          JR    C,SCR
F99E 010000     1490          LD    BC,0
F9A1 18D6       1500          JR    NSCROL
F9A3 CDFE0D     1510 SCR      CALL  #DFE
F9A6 01C005     1520          LD    BC,1472
F9A9 ED43FDF9   1530 NSCROL   LD    (POS),BC
F9AD C9         1540          RET

Pass 2.errors: 00

#WARNING# SPOT absent
Table used:    243  from    322
```

9.2.7. COPY ROMOM/ROBOTRON

Una din cele mai importante probleme in interfatarea calculatorului personal cu imprimanta este aceea a realizarii unei copii grafice a imaginii de pe monitor.

Calculatoarele personale compatibile Spectrum Tim-S si HC-85 au implementata instructiunea COPY dar ea nu poate fi utilizata decit fie pe imprimanta SCAMP 9335 (Tim-S), fie pe ZX Printer (Spectrum si HC). In plus la ambele exista un singur tip de COPY fara a permite listarea in format variabil.

Aceste limitari ale instructiunii COPY precum si faptul ca in scoala dispunem si de alte tipuri de imprimante (ROMOM/ROBOTRON 6313) au impus realizarea unor rutine care sa permita copierea grafica si cu format variabil:

- marime 1 - un pixel pe monitor=un punct la imprimanta
- marime 2 - un pixel pe monitor=patru puncte la imprimanta
- TRUE VIDEO
- INVERS VIDEO

Dupa incarcarea programului (BASIC +rutine) apare un meniu care solicita alegerea unei optiuni:

- incarcare SCREEN$ cu HEAD
- incarcare SCREEN$ fara HEAD
- salvare SCREEN$ (salvarea se face fara HEAD)
- tiparire SCREEN$

La alegerea ultimei optiuni se trece la alegerea formatului de tiparire.

Rutina pentru imprimanta ROBOTRON nu are implementata optiunea pentru TRUE/INVERS VIDEO) dar acest lucru se poate realiza foarte usor prin complementarea intregului ecran.

```
  1 REM  COPY ROMOM
  2 REM      autori
  3 REM      Marius GRAURE
  4 REM
 10 BORDER 0: PAPER 0: INK 7: CLS
 20 LOAD "copyROMOM"CODE 50000
 30 CLS : BEEP .05,7: BEEP .05,9
 40 PRINT AT 1,4; BRIGHT 1; PAPER 6; INK 1;"*** copyROMOM ? 1987 ***"
 50 PRINT AT 5,1; BRIGHT 1; PAPER 4; INK 0;"Optiuni:": PRINT AT 7,2; INK 4; PAP
ER 0;"l -incarcare SCREEN$ cu HEAD";AT 9,2;"j -incarcare SCREEN$ fara HEAD";AT 1
1,2;"s -salvare SCREEN$ ";AT 13,2;"p -tiparire SCREEN$ ";AT 15,2;"a - STOP
 60 IF INKEY$="" THEN GO TO 60
 70 LET o$=INKEY$: IF o$="l" THEN GO SUB 1000: GO TO 30
 80 LET o$=INKEY$: IF o$="j" THEN GO SUB 2000: GO TO 30
 90 LET o$=INKEY$: IF o$="s" THEN GO SUB 3000: GO TO 30
100 LET o$=INKEY$: IF o$="p" THEN GO SUB 4000: GO TO 30
110 LET o$=INKEY$: IF o$="a" THEN STOP
120 GO TO 60
1000 CLS : BEEP .05,4: BEEP .05,6: PRINT AT 21,0; FLASH 1;"Load SCREEN$ ...": RA
NDOMIZE USR 50350: PRINT #0; FLASH 1;"Press any key": PAUSE 0: RETURN
2000 CLS : BEEP .05,5: BEEP .05,7: PRINT AT 21,0; FLASH 1;"Load SCREEN$ ...": RA
NDOMIZE USR 50362: PRINT #0; FLASH 1;"Press any key": PAUSE 0: RETURN
3000 CLS : BEEP .05,10: BEEP .05,12: PRINT #0; FLASH 1;"Start tape then press an
y key...": PAUSE 0: CLS : RANDOMIZE USR 50375: RANDOMIZE USR 50387: RETURN
4000 CLS : BEEP .05,15: BEEP .05,17: INPUT #0;"Format ? (1,2)";f: IF (f<>1 AND f
<>2) THEN GO TO 4000
4005 POKE 50000,f
4010 BEEP .05,17: INPUT #0;"True video (0)                    Inv. video (255)";t:
 IF (t<>0 AND t<>255) THEN GO TO 4010
4015 POKE 50001,t
4020 BEEP .05,14: INPUT #0;"Nr. exemplare ?";n
4025 PRINT #0; FLASH 1;"Press a key if you are ready...": PAUSE 0: RANDOMIZE USR
 50375
4030 FOR i=1 TO n: RANDOMIZE USR 50003: NEXT i: RETURN
9000 SAVE "copyROMOM" LINE 1: SAVE "copyROMOM"CODE 50000,400
```

```
*HISOFT GENS3M2 ASSEMBLER*
       ZX SPECTRUM

Copyright (C) HISOFT 1983,4
All rights reserved

Pass 1 errors: 00

                    10 ;
                    20 ;       Routina HARDcopy
                    30 ;         pentru ROMOM
                    40 ;
                    50 ;          autor
                    60 ;           DANIEL LUNGU
                    70 ;
C350                80            ORG  50000
C350 01             90 NM         DEFB 1
C351 00            100 MV         DEFB 0
C352 01            110 NR         DEFB 1
C353 00            120 V          DEFB 0
C354 3A50C3        130 RUN        LD   A,(NM)
C357 47            140            LD   B,A
C358 3E06          150            LD   A,6
C35A 0E00          160            LD   C,0
C35C 0C            170 A1         INC  C
C35D 90            180            SUB  B
C35E 20FC          190            JR   NZ,A1
C360 79            200            LD   A,C
C361 3253C3        210            LD   (V),A
C364 1E00          220            LD   E,0
C366 0E00          230 A4         LD   C,0
C368 CD04C4        240            CALL CADR
C36B D5            250            PUSH DE
C36C 11005B        260            LD   DE,BUF
C36F 0E00          270            LD   C,0
C371 CD45C4        280 A8         CALL PRE8
C374 C5            290            PUSH BC
C375 CDDBC3        300            CALL CODIF
C378 C1            310            POP  BC
C379 0C            320            INC  C
C37A 3E20          330            LD   A,32
C37C B9            340            CP   C
C37D 20F2          350            JR   NZ,A8
C37F 3A52C3        360            LD   A,(NR)
C382 47            370            LD   B,A
C383 C5            380 A11        PUSH BC
C384 3E1B          390            LD   A,#1B
C386 CD92C4        400            CALL LO
C389 3E4B          410            LD   A,#4B
C38B CD92C4        420            CALL LO
C38E 3E00          430            LD   A,#00
C390 CD92C4        440            CALL LO
C393 3A50C3        450            LD   A,(NM)
C396 CD92C4        460            CALL LO
C399 11005B        470            LD   DE,BUF
C39C 0E00          480            LD   C,0
C39E 3A50C3        490 A6         LD   A,(NM)
```

```
C3A1 47          500          LD   B,A
C3A2 1A          510 A7       LD   A,(DE)
C3A3 CD92C4      520          CALL LO
C3A6 10FA        530          DJNZ A7
C3A8 13          540          INC  DE
C3A9 0D          550          DEC  C
C3AA 20F2        560          JR   NZ,A6
C3AC 0602        570          LD   B,2
C3AE 3E20        580 A12      LD   A," "
C3B0 CD92C4      590          CALL LO
C3B3 10F9        600          DJNZ A12
C3B5 C1          610          POP  BC
C3B6 10CB        620          DJNZ A11
C3B8 CD69C4      630          CALL SALT
C3BB D1          640          POP  DE
C3BC 3A53C3      650          LD   A,(V)
C3BF 83          660          ADD  A,E
C3C0 5F          670          LD   E,A
C3C1 3EC0        680          LD   A,192
C3C3 BB          690          CP   E
C3C4 20A0        700          JR   NZ,A4
C3C6 C9          710          RET
C3C7 0000        720          DEFW 0
C3C9 00000000    730 LINII    DEFW 0,0,0,0,0,0
C3D5 00000000    740 BUFL     DEFW 0,0,0
C3DB 0E08        750 CODIF    LD   C,8
C3DD 21D5C3      760 S5       LD   HL,BUFL
C3E0 3A53C3      770          LD   A,(V)
C3E3 47          780          LD   B,A
C3E4 C5          790 S6       PUSH BC
C3E5 3A50C3      800          LD   A,(NM)
C3E8 47          810          LD   B,A
C3E9 7E          820 S7       LD   A,(HL)
C3EA 07          830          RLCA
C3EB 1A          840          LD   A,(DE)
C3EC 17          850          RLA
C3ED 12          860          LD   (DE),A
C3EE 10F9        870          DJNZ S7
C3F0 CB06        880          RLC  (HL)
C3F2 C1          890          POP  BC
C3F3 23          900          INC  HL
C3F4 10EE        910          DJNZ S6
C3F6 3A51C3      920          LD   A,(MV)
C3F9 47          930          LD   B,A
C3FA 1A          940          LD   A,(DE)
C3FB A8          950          XOR  B
C3FC E63F        960          AND  #3F
C3FE 12          970          LD   (DE),A
C3FF 13          980          INC  DE
C400 0D          990          DEC  C
C401 20DA        1000         JR   NZ,S5
C403 C9          1010         RET
C404 DD21C9C3    1020 CADR    LD   IX,LINII
C408 79          1030 A5      LD   A,C
C409 83          1040         ADD  A,E
C40A DDE5        1050         PUSH IX
```

```
C40C E1          1060          POP   HL
C40D DD7701      1070          LD    (IX+1),A
C410 E6C0        1080          AND   #C0
C412 DD7700      1090          LD    (IX+0),A
C415 ED6F        1100          RLD
C417 CB27        1110          SLA   A
C419 DD7700      1120          LD    (IX+0),A
C41C 3E07        1130          LD    A,7
C41E DDA601      1140          AND   (IX+1)
C421 DDB600      1150          OR    (IX+0)
C424 E61F        1160          AND   #1F
C426 DD7700      1170          LD    (IX+0),A
C429 DDCB0126    1180          SLA   (IX+1)
C42D DDCB0126    1190          SLA   (IX+1)
C431 3EE0        1200          LD    A,#E0
C433 DDA601      1210          AND   (IX+1)
C436 DD7701      1220          LD    (IX+1),A
C439 DD23        1230          INC   IX
C43B DD23        1240          INC   IX
C43D 0C          1250          INC   C
C43E 3A53C3      1260          LD    A,(V)
C441 B9          1270          CP    C
C442 20C4        1280          JR    NZ,A5
C444 C9          1290          RET
C445 DD21C9C3    1300 PREG     LD    IX,LINII
C449 FD21D5C3    1310          LD    IY,BUFL
C44D 3A53C3      1320          LD    A,(V)
C450 47          1330          LD    B,A
C451 DD7E01      1340 A9       LD    A,(IX+1)
C454 81          1350          ADD   A,C
C455 6F          1360          LD    L,A
C456 DD7E00      1370          LD    A,(IX+0)
C459 CE40        1380          ADC   A,#40
C45B 67          1390          LD    H,A
C45C 7E          1400          LD    A,(HL)
C45D FD7700      1410          LD    (IY+0),A
C460 DD23        1420          INC   IX
C462 DD23        1430          INC   IX
C464 FD23        1440          INC   IY
C466 10E9        1450          DJNZ  A9
C468 C9          1460          RET
C469 3E1B        1470 SALT     LD    A,#1B
C46B CD92C4      1480          CALL  LO
C46E 3E5B        1490          LD    A,#5B
C470 CD92C4      1500          CALL  LO
C473 3E31        1510          LD    A,#31
C475 CD92C4      1520          CALL  LO
C478 3E65        1530          LD    A,#65
C47A CD92C4      1540          CALL  LO
C47D 3E1B        1550          LD    A,#1B
C47F CD92C4      1560          CALL  LO
C482 3E5B        1570          LD    A,#5B
C484 CD92C4      1580          CALL  LO
C487 3E30        1590          LD    A,#30
C489 CD92C4      1600          CALL  LO
C48C 3E60        1610          LD    A,#60
C48E CD92C4      1620          CALL  LO
C491 C9          1630          RET
```

```
C492 C5          1640 LD      PUSH BC
C493 2F          1650         CPL
C494 4F          1660         LD   C,A
C495 DBFE        1670 L1      IN   A,(#FE)
C497 CB7F        1680         BIT  7,A
C499 28FA        1690         JR   Z,L1
C49B 79          1700         LD   A,C
C49C CBBF        1710         RES  7,A
C49E D3E2        1720         OUT  (#E2),A
C4A0 CBFF        1730         SET  7,A
C4A2 D3E2        1740         OUT  (#E2),A
C4A4 CBBF        1750         RES  7,A
C4A6 D3E2        1760         OUT  (#E2),A
C4A8 C1          1770         POP  BC
C4A9 C9          1780         RET
5B00             1790 BUF     EQU  #5B00
C4AA             1800         END  RUN

Pass 2 errors: 00

Table used:   264  from   366
```

```
  1 REM
  2 REM COPY ROBOTRON 6313
  3 REM
 40 CLEAR 49990
 50 BORDER 0: PAPER 0: INK 7: CLS
 60 LOAD ""CODE 50000
 70 CLS : BEEP .05,7: BEEP .05,9
 80 PRINT AT 1,4; BRIGHT 1; PAPER 6; INK 1;"*** copyROBOTRON   1988  ***"
 90 PRINT AT 5,1; BRIGHT 1; PAPER 4; INK 0;"Optiuni:": PRINT AT 7,2; INK 4; PAP
ER 0;"l -incarcare SCREEN$ cu HEAD";AT 9,2;"j -incarcare SCREEN$ fara HEAD";AT 1
1,2;"s -salvare SCREEN$ ";AT 13,2;"p -tiparire SCREEN$ ";AT 15,2;"a - STOP "
100 IF INKEY$="" THEN  GO TO 100
110 LET o$=INKEY$: IF o$="l" THEN  GO SUB 170: GO TO 70
120 IF o$="j" THEN  GO SUB 180: GO TO 70
130 IF o$="s" THEN  GO SUB 190: GO TO 70
140 IF o$="p" THEN  GO SUB 200: GO TO 70
150 IF o$="a" THEN  STOP
160 GO TO 100
170 CLS : BEEP .05,4: BEEP .05,6: PRINT AT 21,0; FLASH 1;"Load SCREEN$ ...": RA
NDOMIZE USR 50350: PRINT #0; FLASH 1;"Press any key": PAUSE 0: RETURN
180 CLS : BEEP .05,5: BEEP .05,7: PRINT AT 21,0; FLASH 1;"Load SCREEN$ ...": RA
NDOMIZE USR 50362: PRINT #0; FLASH 1;"Press any key": PAUSE 0: RETURN
190 CLS : BEEP .05,10: BEEP .05,12: PRINT #0; FLASH 1;"Start tape then press an
y key...": PAUSE 0: CLS : RANDOMIZE USR 50375: RANDOMIZE USR 50387: RETURN
200 CLS : BEEP .05,15: BEEP .05,17: INPUT #0;"Format ? (1,2)";f: IF (f<>1 AND f
<>2) THEN  GO TO 200
210 POKE 23728,f-1
220 BEEP .05,14: INPUT #0;"Nr. exemplare ?";n
230 PRINT #0; FLASH 1;"Press a key if you are ready...": PAUSE 0: RANDOMIZE USR
50375
240 FOR i=1 TO n: RANDOMIZE USR 50000: NEXT i: RETURN
250 SAVE "copyK6313" LINE 10: SAVE "copyK6313"CODE 50000,400
```

```
*HISOFT BENS3M2 ASSEMBLER*
      ZX SPECTRUM

Copyright (C) HISOFT 1983,4
All rights reserved

Pass 1 errors: 00

                          1 ;
                          2 ;         COPY ROBOTRON
                          3 ;
                          4 ;           autor:
                          5 ;         GHEORGHE ILCAU
                          6 ;
C350                      7           ORG   50000
C350 CDEAC3              10 START     CALL  CONTR
C353 1B4108              20           DEFB  #1B,"A",#08
C356 FF                  30           DEFB  #FF
C357 210040              40           LD    HL,#4000
C35A CD75C3              50           CALL  BUC
C35D 210048              60           LD    HL,#4800
C360 CD75C3              70           CALL  BUC
C363 215050              80           LD    HL,#5000
C366 CD75C3              90           CALL  BUC
C369 CDEAC3             100           CALL  CONTR
C36C 1B410C             110           DEFB  #1B,"A",#0C
C36F 0D0A0A             120           DEFB  #0D,#0A,*0A
C372 0AFF               130           DEFB  #0A,#FF
C374 C9                 140           RET
C375 3AB05C             150 BUC       LD    A,(#5CB0)
C378 B7                 160           OR    A
C379 202A               170 LC379     JR    NZ,COPY2
C37B CDEAC3             180 COPY1     CALL  CONTR
C37E 0A0D1B             190           DEFB  #0A,#0D,#1B
C381 2A0500             200           DEFB  "*",#05,#00
C384 01FF               210           DEFB  #01,#FF
C386 0608               220 COL1      LD    B,#08
C388 3E01               230 ROW1      LD    A,#01
C38A E5                 240           PUSH  HL
C38B CB06               250 LOP1      RLC   (HL)
C38D CB17               260           RL    A
C38F 3803               270           JR    C,LC394
C391 24                 280           INC   H
C392 18F7               290           JR    LOP1
C394 CDF8C3             300 LC394     CALL  SERIE
C397 F3                 310           DI
C398 E1                 320           POP   HL
C399 10ED               330           DJNZ  ROW1
C39B 7D                 340           LD    A,L
C39C 2C                 350           INC   L
C39D C8                 360           RET   Z
C39E AD                 370           XOR   L
C39F E620               380           AND   #20
C3A1 28E3               390           JR    Z,COL1
C3A3 18D6               400           JR    COPY1
C3A5 E5                 410 COPY2     PUSH  HL
C3A6 CDEAC3             420 COL2      CALL  CONTR
C3A9 0D0A1B             430           DEFB  #0D,#0A,#1B
C3AC 2A0500             440           DEFB  "*",#05,#00
C3AF 02FF               450           DEFB  #02,#FF
C3B1 0608               460 ROW2      LD    B,#08
C3B3 3E01               470 LC3B3     LD    A,#01
C3B5 E5                 480           PUSH  HL
C3B6 CB06               490 LC3B6     RLC   (HL)
C3B8 CB17               500           RL    A
C3BA CB0E               510           RRC   (HL)
C3BC CB06               520           RLC   (HL)
C3BE CB17               530           RL    A
C3C0 3803               540           JR    C,LC3C5
C3C2 24                 550           INC   H
C3C3 18F1               560           JR    LC3B6
C3C5 4F                 570 LC3C5     LD    C,A
C3C6 CDF8C3             580           CALL  SERIE
C3C9 79                 590           LD    A,C
C3CA CDF8C3             600           CALL  SERIE
C3CD F3                 610           DI
C3CE E1                 620           POP   HL
C3CF 10E2               630           DJNZ  LC3B3
C3D1 7D                 640           LD    A,L
```

```
C3D2 2C          650          INC  L
C3D3 2003        660          JR   NZ,LC3D8
C3D5 CB54        670          BIT  2,H
C3D7 C0          680          RET  NZ
C3D8 AD          690 LC3D8    XOR  L
C3D9 E620        700          AND  #20
C3DB 28D4        710          JR   Z,ROW2
C3DD CB54        720          BIT  2,H
C3DF 2005        730          JR   NZ,LC3E6
C3E1 E1          740          POP  HL
C3E2 CBD4        750          SET  2,H
C3E4 18C0        760          JR   COL2
C3E6 CB94        770 LC3E6    RES  2,H
C3E8 18BB        780          JR   COPY2
C3EA E3          790 CONTR    EX   (SP),HL
C3EB 7E          800 LC3EB    LD   A,(HL)
C3EC 23          810          INC  HL
C3ED FEFF        820          CP   #FF
C3EF 2805        830          JR   Z,LC3F6
C3F1 CDF8C3      840          CALL SERIE
C3F4 18F5        850          JR   LC3EB
C3F6 E3          860 LC3F6    EX   (SP),HL
C3F7 C9          870          RET
C3F8 C5          880 SERIE    PUSH BC
C3F9 F5          890          PUSH AF
C3FA CD541F      900 LC3FA    CALL #1F54
C3FD 3015        910          JR   NC,LC414
C3FF DBFE        920          IN   A,(#FE)
C401 CB6F        930          BIT  5,A
C403 20F5        940          JR   NZ,LC3FA
C405 F3          950          DI
C406 F1          960          POP  AF
C407 0EF8        970          LD   C,#F8
C409 47          980          LD   B,A
C40A 79          990          LD   A,C
C40B D3E4       1000          OUT  (#E4),A
C40D CD8139     1010          CALL #3981
C410 78         1020          LD   A,B
C411 C3933B     1030          JP   #3B93
C414 FB         1040 LC414    EI
C415 CF         1050          RST  8
C416 0C         1060          DEFB #0C
C417 111100     1070 HEAD     LD   DE,17
C41A DD2101FA   1080          LD   IX,#FA01
C41E AF         1090          XOR  A
C41F 37         1100          SCF
C420 CD5605     1110          CALL #0556
C423 11001B     1120 LOAD     LD   DE,#1B00
C426 DD2144C5   1130          LD   IX,#C544
C42A 3EFF       1140          LD   A,#FF
C42C 37         1150          SCF
C42D CD5605     1160          CALL #0556
C430 01001B     1170 LDIR     LD   BC,#1B00
C433 110040     1180          LD   DE,#4000
C436 2144C5     1190          LD   HL,#C544
C439 EDB0       1200          LDIR
C43B C9         1210          RET
C43C 11001B     1220 SAVE     LD   DE,#1B00
C43F DD210040   1230          LD   IX,#4000
C443 3EFF       1240          LD   A,#FF
C445 CDC204     1250          CALL #04C2
C448 C9         1260          RET

Pass 2 errors: 00

Table used:    314 from  1000
```

9.2.8. COPY SCAMP

Pentru copierea imaginii de pe monitorul unui calculator SPECTRUM sau HC s-a realizat un program asemanator, ca mod de utilizare, cu programul COPY ROMOM (a se vedea 9.2.7.).

Deosebirile fata de celelalte rutine sint urmatoarele:

- permite si listarea la marime 3 - un pixel de pe monitor = 9 puncte la imprimanta
- optiunile sint altfel structurate
- iesirea spre imprimanta se face prin extensia cu care sint prevazute cele doua tipuri de calculatoare, printr-o interfata paralela

Rutina in cod masina a fost realizata de un colectiv de programatori din IASI, interfatarea rutina-utilizator fiind realizata de noi, in cadrul liceului.

```
  1 REM copySCAMPparalel
  2 POKE 23659,0: LOAD "copy"CODE : POKE 23659,2
 10 BORDER 0: INK 7: PAPER 0: CLS
 20 BEEP .05,10: PRINT AT 1,1; INVERSE 1;"*** copySCREEN$    1987-GM ***"
 30 PRINT AT 17,2;"Optiuni:";AT 17,10;" l-incarcare cu HEAD";AT 19,10;" h-incar
care fara HEAD"
 40 IF INKEY$="" THEN  GO TO 40
 42 LET o$=INKEY$: IF o$="l" THEN  GO TO 60
 45 LET o$=INKEY$: IF o$="h" THEN  GO TO 50
 47 GO TO 40
 50 PRINT AT 21,0; FLASH 1;"Load the screen...": RANDOMIZE USR 23304: GO TO 70
 60 PRINT AT 21,0; FLASH 1;"Load the screen...": RANDOMIZE USR 23492
 70 BEEP .05,10: PRINT #0; FLASH 1;"Press any key": PAUSE 0
 80 BEEP .05,5: BEEP .05,10: CLS : PRINT AT 15,2;"Optiuni:";AT 15,10;" p-tipari
re screen";AT 17,10;" s-salvare screen";AT 19,10;" l-incarc alt desen"
 90 IF INKEY$="" THEN  GO TO 90
100 LET m$=INKEY$: IF m$="l" THEN  GO TO 10
110 LET m$=INKEY$: IF m$="s" THEN  GO TO 1000
120 LET m$=INKEY$: IF m$="p" THEN  GO TO 200
130 GO TO 90
200 CLS : BEEP .05,15: BEEP .05,12: PRINT AT 19,0;"True Video (0)": PRINT AT 21
,0;"Inv. Video (63)"
210 INPUT #0;t
220 IF t=0 THEN  GO TO 250
230 IF t=63 THEN  GO TO 250
240 GO TO 200
250 POKE 23729,t
260 CLS : BEEP .05,8: PRINT AT 17,0;"Format: 1-normal";AT 19,8;"2-dublu";AT 21,
8;"3-triplu"
265 IF INKEY$="" THEN  GO TO 265
270 LET s$=INKEY$: IF (s$<>"1" AND s$<>"2" AND s$<>"3") THEN  GO TO 260
275 LET f=VAL s$
280 POKE 23728,f
290 CLS : BEEP .05,10: BEEP .05,5: PRINT #0; FLASH 1;"Press a key if you are re
ady...": PAUSE 0: RANDOMIZE USR 23517: RANDOMIZE USR 23296
295 BEEP .07,10
300 PRINT AT 21,0;"Alt format ? (d/n)": IF INKEY$="" THEN  GO TO 300
305 BEEP .05,25
310 LET f$=INKEY$: IF f$="d" THEN  GO TO 200
320 LET f$=INKEY$: IF f$="n" THEN  GO TO 345
330 GO TO 300
345 CLS
350 BEEP .07,5: PRINT AT 21,0;"Alt desen ? (d/n)"
355 IF INKEY$="" THEN  GO TO 355
360 LET d$=INKEY$: IF d$="d" THEN  GO TO 10
370 CLS : BEEP .05,5: BEEP .05,10: BEEP .05,15: PRINT AT 10,12;"So long...": PA
USE 150: NEW
900 STOP
1000 CLS : PRINT #0; FLASH 1;"Start tape then press a key": PAUSE 0: RANDOMIZE U
SR 23517: RANDOMIZE USR 23529
1010 GO TO 80
```

```
*HISOFT GENS3M2 ASSEMBLER*
      ZX SPECTRUM

Copyright (C) HISOFT 1983,4
All rights reserved

Pass 1 errors: 00

                          1 ;
                          2 ;            COPYSCAMP
                          3 ;
8FDD 3E1B                10            LD   A,#1B
8FDF CD8A90              20            CALL L5BAD
8FE2 3E47                30            LD   A,#47
8FE4 CD8A90              40            CALL L5BAD
8FE7 3E2F                50            LD   A,#2F
8FE9 CD8A90              60            CALL L5BAD
8FEC 210040              70            LD   HL,#4000
8FEF 3AB05C              80            LD   A,(#5CB0)
8FF2 F5                  90 L5B15      PUSH AF
8FF3 0620               100            LD   B,#20
8FF5 0E20               110 L5B18      LD   C,#20
8FF7 1608               120 L5B1A      LD   D,#08
8FF9 E5                 130 L5B1C      PUSH HL
8FFA 3AB05C             140            LD   A,(#5CB0)
8FFD FE02               150            CP   #02
8FFF 3E00               160            LD   A,#00
9001 284E               170            JR   Z,L5B74
9003 305E               180            JR   NC,L5B86
9005 1E06               190            LD   E,#06
9007 CB06               200 L5B2A      RLC  (HL)
9009 CE00               210            ADC  A,#00
900B 0F                 220            RRCA
900C CD7790             230            CALL L5B9A
900F 1D                 240            DEC  E
9010 20F5               250            JR   NZ,L5B2A
9012 CB3F               260 L5B35      SRL  A
9014 CB3F               270            SRL  A
9016 5F                 280            LD   E,A
9017 3AB15C             290            LD   A,(#5CB1)
901A AB                 300            XOR  E
901B F640               310            OR   #40
901D F5                 320            PUSH AF
901E 3AB05C             330            LD   A,(#5CB0)
9021 5F                 340            LD   E,A
9022 F1                 350            POP  AF
9023 CD8A90             360 L5B46      CALL L5BAD
9026 1D                 370            DEC  E
9027 20FA               380            JR   NZ,L5B46
9029 22A190             390            LD   (L5BC4),HL
902C E1                 400            POP  HL
902D 15                 410            DEC  D
902E 20C9               420            JR   NZ,L5B1C
9030 23                 430            INC  HL
9031 0D                 440            DEC  C
9032 20C3               450            JR   NZ,L5B1A
9034 2AA190             460            LD   HL,(L5BC4)
9037 7D                 470            LD   A,L
9038 D61F               480            SUB  #1F
903A 6F                 490            LD   L,A
903B 7C                 500            LD   A,H
903C DE00               510            SBC  A,#00
903E 67                 520            LD   H,A
903F 3E2F               530            LD   A,#2F
9041 CD8A90             540            CALL L5BAD
9044 05                 550            DEC  B
9045 20AE               560            JR   NZ,L5B18
9047 F1                 570            POP  AF
9048 3D                 580            DEC  A
9049 20A7               590            JR   NZ,L5B15
904B 3E2D               600            LD   A,#2D
904D CD8A90             610            CALL L5BAD
9050 C9                 620            RET
9051 1E03               630 L5B74      LD   E,#03
9053 CB06               640 L5B76      RLC  (HL)
9055 CE00               650            ADC  A,#00
9057 0F                 660            RRCA
9058 CB2F               670            SRA  A
905A CD7790             680            CALL L5B9A
```

```
905D 1D          690          DEC  E
905E 20F3        700          JR   NZ,L5B76
9060 C31290      710          JP   L5B35
9063 1E02        720 L5B86    LD   E,#02
9065 CB06        730 L5B88    RLC  (HL)
9067 CE00        740          ADC  A,#00
9069 0F          750          RRCA
906A CB2F        760          SRA  A
906C CB2F        770          SRA  A
906E CD7790      780          CALL L5B9A
9071 1D          790          DEC  E
9072 20F1        800          JR   NZ,L5B88
9074 C31290      810          JP   L5B35
9077 F5          820 L5B9A    PUSH AF
9078 24          830          INC  H
9079 7C          840          LD   A,H
907A E607        850          AND  #07
907C 200A        860          JR   NZ,L5BAB
907E 7D          870          LD   A,L
907F C620        880          ADD  A,#20
9081 6F          890          LD   L,A
9082 3F          900          CCF
9083 9F          910          SBC  A,A
9084 E6F8        920          AND  #F8
9086 84          930          ADD  A,H
9087 67          940          LD   H,A
9088 F1          950 L5BAB    POP  AF
9089 C9          960          RET
908A C5          970 L5BAD    PUSH BC
908B 4F          980          LD   C,A
908C DBBF        990 L5BAF    IN   A,(#BF)
908E CB7F       1000          BIT  7,A
9090 20FA       1010          JR   NZ,L5BAF
9092 79         1020          LD   A,C
9093 CBFF       1030          SET  7,A
9095 D37F       1040          OUT  (#7F),A
9097 CBBF       1050          RES  7,A
9099 D37F       1060          OUT  (#7F),A
909B CBFF       1070          SET  7,A
909D D37F       1080          OUT  (#7F),A
909F C1         1090          POP  BC
90A0 C9         1100          RET
90A1 1F         1110 L5BC4    RRA
90A2 58         1120          LD   E,B
90A3 00         1130          NOP
90A4 DD2101FA   1140          LD   IX,#FA01
90A8 AF         1150          XOR  A
90A9 37         1160          SCF
90AA CD5605     1170          CALL #0556
90AD 11001B     1180          LD   DE,#1B00
90B0 DD2150C3   1190          LD   IX,#C350
90B4 3EFF       1200          LD   A,#FF
90B6 37         1210          SCF
90B7 CD5605     1220          CALL #0556
90BA 01001B     1230          LD   BC,#1B00
90BD 110040     1240          LD   DE,#4000
90C0 2150C3     1250          LD   HL,#C350
90C3 EDB0       1260          LDIR
90C5 C9         1270          RET
90C6 11001B     1280          LD   DE,#1B00
90C9 DD210040   1290          LD   IX,#4000
90CD 3EFF       1300          LD   A,#FF
90CF CDC204     1310          CALL #04C2
90D2 C9         1320          RET

Pass 2 errors: 00

Table used:    205  from   307
```

9.2.9 LLIST ROM-ROB

In scopul pastrarii datelor si informatiilor pe un suport extern,cu posibilitatea de a fi citit de om,calculatorul TIM-S a fost prevazut cu o interfata seriala si una paralela.Datorita acestor interfete se pot conecta toate imprimantele care respecta standardele de transmisie seriala si paralela anume RS232 respectiv CENTRONICS.

Softul de comanda a acestor imprimante are insa unele neajunsuri.A fost proiectat sa pastreze formatul ecranului,adica 32 caractere pe un rind.Asta duce la o risipa imensa de hirtie, lungimeae unui rind imprimat la majoritatea imprimantelor depaseste 80 caractere.In plus se pierde din claritate si lizibilitate,un listing lung este mai greu de urmarit.

Pe linga setul standard de caractere ASCII unele imprimante accepta si o serie de caractere de control (ca de exempu schimbarea setului de caractere,schimbarea modului de tiparire, trecerea in mod grafic si multe altele).Aceste caractere de control nu se pot transmite direct la imprimanta,BASIC-ul filtreaza caracterele ce vor fi transmise(toate caracterele de control sint inlocuite cu semne de intrebare "?").

```
*HISOFT GENS3M2 ASSEMBLER*
       ZX SPECTRUM

Copyright (C) HISOFT 1983,4
All rights reserved

Pass 1 errors: 00

                        10 ;
                        20 ;       LLIST ROBOTRON
                        30 ;
                        40 ;         autor:
                        50 ;          ILCAU GHEORGHE
                        60 ;
D6D8                    70          ORG   55000
D6D8 210800             80          LD    HL,8
D6DB 09                 90          ADD   HL,BC
D6DC 22C55C            100          LD    (23749),HL
D6DF C9                110          RET
D6E0 FE1F              120 ENTRY    CP    31 ;cod ctrl?
D6E2 3808              130          JR    C,SPEC
D6E4 FE80              140          CP    128 ;TOKEN ?
D6E6 380F              150          JR    NC,UDG
D6E8 47                160 OUT      LD    B,A
D6E9 C37F3B            170          JP    #3B7F
D6EC FE0D              180 SPEC     CP    13 ;este CR ?
D6EE C0                190          RET   NZ
D6EF 47                200          LD    B,A
D6F0 CD7F3B            210          CALL  #3B7F
D6F3 3E0A              220          LD    A,10
D6F5 18F1              230          JR    OUT
D6F7 D6A5              240 UDG      SUB   165
D6F9 D2100C            250          JP    NC,#0C10 ;expand TOKEN
D6FC 3E20              260          LD    A,32
D6FE 18E8              270          JR    OUT

Pass 2 errors: 00

Table used:     56  from    147
```

9.2.10. 11TIM-S

O alta rutina folosita pentru listarea la imprimanta ROMOM a rezultatelor rularii este 11TIM-S.

Rutina se incarca de la adresa 60000 cu instructiunea LOAD "11TIM-S" CODE 60000 si se activeaza cu urmatoarea secventa de comenzi:

```
POKE 23749,96: POKE 23750,234
```

In continuare toate instructiunile LLIST si LPRINT vor fi directionate catre imprimanta ROMOM conform standardului de transmisie paralela CENTRONICS.

```
#HISOFT GENS3M2 ASSEMBLER#
      ZX SPECTRUM

Copyright (C) HISOFT 1983,4
All rights reserved

Pass 1 errors: 00

                        1 ;
                        2 ;       LLTIM-S
                        3 ;
                        4 ;         autor:
                        5 ;       GHEORGHE ILCAU
                        6 ;
EA60                    9         ORG   60000
EA60 FE0D              10         CP    #0D
EA62 2835              20         JR    Z,LEA99
EA64 FE20              30         CP    #20
EA66 D8                40         RET   C
EA67 FE7F              50         CP    #7F
EA69 3839              60         JR    C,LEAA4
EA6B FEA5              70         CP    #A5
EA6D D8                80         RET   C
EA6E D6A5              90         SUB   #A5
EA70 119500           100         LD    DE,#0095
EA73 F5               110         PUSH  AF
EA74 CD410C           120         CALL  #0C41
EA77 3805             130         JR    C,LEA7E
EA79 3E20             140         LD    A,#20
EA7B CDA4EA           150         CALL  LEAA4
EA7E 1A               160 LEA7E   LD    A,(DE)
EA7F CDA4EA           170         CALL  LEAA4
EA82 1A               180         LD    A,(DE)
EA83 13               190         INC   DE
EA84 87               200         ADD   A,A
EA85 30F7             210         JR    NC,LEA7E
EA87 D1               220         POP   DE
EA88 FE48             230         CP    #48
EA8A 2803             240         JR    Z,LEA8F
EA8C FE82             250         CP    #82
EA8E D8               260         RET   C
EA8F 7A               270 LEA8F   LD    A,D
EA90 FE03             280         CP    #03
EA92 D8               290         RET   C
EA93 3E20             300         LD    A,#20
EA95 CDA4EA           310         CALL  LEAA4
EA98 C9               320         RET
EA99 3E0A             330 LEA99   LD    A,#0A
EA9B CDA4EA           340         CALL  LEAA4
EA9E 3E0D             350         LD    A,#0D
EAA0 CDA4EA           360         CALL  LEAA4
EAA3 C9               370         RET
EAA4 F5               380 LEAA4   PUSH  AF
EAA5 C5               390         PUSH  BC
EAA6 2F               400         CPL
EAA7 CDD438           410         CALL  #38D4
EAAA C1               420         POP   BC
EAAB F1               430         POP   AF
EAAC C9               440         RET
EAAD CBFF             450         SET   7,A
EAAF D37F             460         OUT   (#7F),A
EAB1 CBBF             470         RES   7,A
EAB3 D37F             480         OUT   (#7F),A
EAB5 CBFF             490         SET   7,A
EAB7 D37F             500         OUT   (#7F),A
EAB9 C9               510         RET
EABA 3A815C           520         LD    A,(#5C81)
EABD CDA4EA           530         CALL  LEAA4
EAC0 C9               540         RET

Pass 2 errors: 00

Table used:     61  from    190
```

9.2.11. LLIST SCAMP

Calculatoarele personale compatibile Spectrum (Tim-S si HC-85) permit listarea folosind instructiunile LLIST si LPRINT dar acest lucru provoaca doar scrierea la imprimanta doar pe 32 coloane (la Tim-S), lucru care bineinteles nu convine din mai multe puncte de vedere (listinguri lungi, risipa de hirtie).

In plus calculatoarele Spectrum dispun de o cupla de extensie care poate fi folosita daca se realizeaza interfata corespunzatoare. Acest lucru fiind realizat la noi in scoala ne-am propus si realizarea unei rutine care sa permita folosirea interfetei paralele a imprimantei SCAMP 9335.

Rutina nu este relocabila dar printr-o simpla reasamblare rutina poate fi incarcata la orice adresa. Pentru transmiterea unor caractere de control din BASIC rutina are prevazuta o parte care realizeaza acest lucru folosind locatia 23681.

Avind aceasta rutina precum si altele cu aceasi functie pentru imprimantele ROMOM si ROBOTRON, pot fi folosite si celelalte produse soft realizate de firma: HP4T, GENS, MONS, C, prin incarcarea rutinei la adresa dorita si transmiterea adresei unde a fost incarcata in locatiile 23749/50.

```
#HISOFT GENS3M2 ASSEMBLER#
       ZX SPECTRUM

Copyright (C) HISOFT 1983,4
All rights reserved

Pass 1 errors: 00

                    10 ;
                    20 ;      LLIST-SCAMP 9335
                    30 ;  autori:
                    40 ;      stud.TITUS MANEA
                    50 ;      ing. ADRIAN TOPA
                    60 ;      prof.MARIMEL SERBAN
                    70 ;      prof.DORIN MANZ
                    80 ;
D6D8                90          ORG   55000
D6D8 FE0D          100          CP    #0D ;este CR?
D6DA 283D          110          JR    Z,EOLN ;DA!
D6DC FE24          120          CP    36 ;este $?
D6DE 2004          130          JR    NZ,E40 ;NU!
D6E0 3EA4          140          LD    A,164 ;(A)=164
D6E2 1803          150          JR    ET2
D6E4 FE20          160 E40      CP    #20 ;mai mic
D6E6 D8            170          RET   C ;decit #20?
                   180 ;               DA! RETURN
D6E7 FE7F          190 ET2      CP    127 ;mai mic
D6E9 3839          200          JR    C,SCAMP ;<#7F
                   210 ;               DA! SCRIE
D6EB FEA5          220          CP    165 ;mai mic
D6ED D8            230          RET   C ;decit #A5
                   240 ;               DA! RETURN
D6EE D6A5          250          SUB   165
                   260 ;  in A nr. de ordine al
                   270 ;  TOKEN-ului in tabela -1
D6F0 119500        280          LD    DE,#95
                   290 ;  in DE adresa tabela
D6F3 F5            300          PUSH AF ;A in stiva
D6F4 CD410C        310          CALL #0C41
                   320 ;  in DE adresa TOKEN
D6F7 3805          330          JR    C,CONT
                   340 ;  C=1  TOKEN gasit->CONT
D6F9 3E20          350          LD    A,#20 ;SCRIE
D6FB CD24D7        360          CALL SCAMP ;spatiu
D6FE 1A            370 CONT     LD    A,(DE) ;SCRIE
D6FF CD24D7        380          CALL SCAMP ;TOKEN
D702 1A            390          LD    A,(DE)
D703 13            400          INC   DE
D704 87            410          ADD   A,A ;test end
D705 30F7          420          JR    NC,CONT ;TOKEN
D707 D1            430          POP   DE ;A in D
D708 FE48          440          CP    #48 ;TOKEN cu
                   450 ;  $ (ex. STR$)?
D70A 2803          460          JR    Z,DOLAR ;DA!
D70C FE82          470          CP    #82 ;mai mic
                   480 ;  decit 2*CODE("A")?
D70E D8            490          RET   C  ;DA! RETURN
D70F 7A            500 DOLAR    LD    A,D ;primele
```

```
D710 FE03       510         CP   3 ;3 TOKEN?
D712 D8         520         RET  C ;DA! RETURN
D713 3E20       530         LD   A,#20 ;SCRIE
D715 CD24D7     540         CALL SCAMP ;spatiu
D718 C9         550         RET
D719 3E0A       560 EOLN    LD   A,#0A ;SCRIE
D71B CD24D7     570         CALL SCAMP ;LF
D71E 3E0D       580         LD   A,#0D ;SCRIE
D720 CD24D7     590         CALL SCAMP ;CR
D723 C9         600         RET
D724 4F         610 SCAMP   LD   C,A ;A in C
D725 DBBF       620 WAIT    IN   A,(#BF) ;test
D727 CB7F       630         BIT  7,A ; SCAMP
D729 20FA       640         JR   NZ,WAIT ;stai
D72B 79         650         LD   A,C ;C in A
                660 ;
                670 ; protocol transmitere
                680 ;       caracter
                690 ;
D72C CBFF       700         SET  7,A
D72E D37F       710         OUT  (#7F),A
D730 CBBF       720         RES  7,A
D732 D37F       730         OUT  (#7F),A
D734 CBFF       740         SET  7,A
D736 D37F       750         OUT  (#7F),A
D738 C9         760         RET
                770 ; transmitere caracter
                780 ; din locatia 23681
                790 ; se pot transmite carac-
                800 ; de control
D739 3A815C     810         LD   A,(#5C81)
D73C CD24D7     820         CALL SCAMP
D73F C9         830         RET

Pass 2 errors: 00

Table used:     90  from   292
```

CUPRINS

Redactor responsabil - STELIAN NICULESCU
Tehnoredactor - GHEORGHE FLOREA

Data lansării comenzii: 14.02.1989. Bun de multiplicat 20.02.1989
INSTITUTUL DE CERCETARE STIINTIFICA SI INGINERIE TEHNOLOGICA
PENTRU TEHNICA DE CALCUL SI INFORMATICA
Bd. Miciurin nr. 8-10, sector 1, Bucureşti, telefon 65 60 60