```
'
'Ce programme permet de simuler la propagation d'ondes en milieu rigide
'Il doit etre place dans le repertoire original car il utilse certains
fichiers
'une machine de type Pentium 4 et 3Go de Ram est nécessaire pour un bon
fonctionnement

'Code compilé sous freebasic avec les options :
'           fbc -r -arch 686 -t 65536 -s gui ws2dv32.bas
'           au lieu de "<$fbc>" "<$file>"

'version 3.2 finalisee en 02.2009
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'------------------------- declare variables ----------------------------
-------

dim as string*4 version = "3.3"
const sizemilieuh as integer = (1280+1)*8
const sizemilieuv as integer = (768+1)*8
const sizeecranh as integer = 1280
const sizeecranv as integer = 768
const largzoneaff as integer = 1067
const hautzoneaff as integer = 694
const largzoneaffsur2 as integer = int(largzoneaff/2)
const hautzoneaffsur2 as integer = int(hautzoneaff/2)
const milieuzoneaffx as integer = 211+largzoneaffsur2
const milieuzoneaffy as integer = 53+hautzoneaffsur2

const pi as single =4*atn(1)
const pisur2 as single =pi/2
const deuxpi as single =2*pi
const pisur360 as single =pi/360
const deuxpisur360 as single =deuxpi/360
dim as single si,co
dim valeurvide as single =1.e-024
dim float16 as single =16
dim floatm60 as single =-60

const sizemilieuhm1 as integer = sizemilieuh-1
const sizemilieuvm1 as integer = sizemilieuv-1
const imax as integer = sizemilieuhm1'-2
const jmax as integer = sizemilieuvm1'-2
const imaxm2 as integer = imax-2
const jmaxm2 as integer = jmax-2
const imaxsur2 as integer = imax/2
const jmaxsur2 as integer = jmax/2

dim sizemilieuhversion as integer = (sizemilieuh/1024)*1000
dim sizemilieuvversion as integer = (sizemilieuv/1024)*1000
dim ptla(0 to sizemilieuvm1,0 to sizemilieuhm1) as single      'ptl X
trame A
dim ptlb(0 to sizemilieuvm1,0 to sizemilieuhm1) as single      'ptl X
trame B
```

```
dim attenuation(0 to sizemilieuvm1,0 to sizemilieuhm1) as single
dim indicereac(0 to sizemilieuvm1,0 to sizemilieuhm1) as single

dim as integer captlignecol(0 to imaxm2-2)',captlignecolx2(0 to imaxm2*2)

dim memobmp(800,800) as single
dim memoreac(largzoneaff*hautzoneaff+1) as integer
Dim about(600*340+1) as integer
Dim observa(256*96+1) as integer

dim as single attenbord(0 to 63),attenuationbordure

const numelementmax as integer =1022
dim as string*32 elementnom(0 to 1023),elementtype(0 to 1023)
dim  as integer nbrinfosmax(0 to 1023),elementselect(0 to 1023)
dim as single elementinfo(0 to 31,0 to 1023)

dim  as single
coefreacbase,coefreac,coefattenuation,sensibilite,rigidite,t,deltat,temps
debut,seuilbas,seuilhaut,now
dim as single itracedecal,jtracedecal,difmousex,difmousey
dim as integer ton,xecran,itracedecalint,jtracedecalint      ' laisser
sinon erreure lors d'appel asm

dim texttemp as string
dim keyb as string

dim as integer sourcememox(25),sourcememoy(25)
dim lambda as single
dim lambdab as single
dim freq as single
dim omega as single
dim amplitude as single
dim eold as single
dim enew as single
dim edif as single
dim edifb as single
dim edifmem as single
dim isource as single
dim jsource as single
dim isourceb as single
dim jsourceb as single
dim isourcedif as single
dim jsourcedif as single
dim ijsourcedif as single
dim offset as single
dim lambdamodul as single
dim freqmodul as single
dim omegamodul as single
dim tauxmodul as single
dim amplitudemin as single
dim amplitudemax as single
dim lambdamin as single
dim lambdamax as single
dim freqmin as single
dim freqmax as single
dim deltaf as single
dim lambdarotat as single
dim freqrotat as single
dim omegarotat as single
dim angle as single
dim secteurangul as single
dim isourcecentre as single
dim jsourcecentre as single
dim rayonx as single
dim rayony as single
dim dephasage as single
dim sourcelarg as single
dim sourcelargsur2 as single
dim sourcelargcpt as single
dim sourceinclin as single
dim nbrsources as single
dim speedtranslatx as single
dim speedtranslaty as single
dim inclin as single
dim dureeemit as single

dim objcentrei as single
dim objcentrej as single
dim objrayoni as single
dim objrayonj as single
dim objinclin as single
dim objindiceint as single
dim objindiceext as single
dim objindiceunecouche as single
dim objncouchemax as single
dim objcoucheintfixe as single
dim objnumcouche as single
dim objindice as single
dim objrayonmin as single
dim objrayonmax as single
dim objepaisseurtoutescouches as single
dim objepaisseurunecouche as single
dim objrayoncouchei as single
dim objrayoncouchej as single
dim objperim as single
dim objanglestep as single
dim objangle as single
dim objpi as single
dim objpj as single
dim objpjsi as single
dim objpjco as single
dim objpib as single
dim objpjb as single
dim objperimin(0 to jmax) as integer
dim objperimax(0 to jmax) as integer
dim objperiminb(0 to jmax) as integer
dim objperimaxb(0 to jmax) as integer
dim objlargeur as single
dim objhauteur as single
dim objlargsur2 as single
dim objhautsur2 as single
dim objlargeurmin as single
dim objlarg as single
dim coefreacobjet as single
dim objindicedif as single

dim as string message,messagea,messageb,messagec,oldmessage
dim entreeclav as string
dim saisichaineold as string

dim as string fichiersdisk,fichiernom,fichierbmp,fichierobj,captfichier
dim as single bmpcptx,bmpcpty,bmpimin,bmpimax,bmpjmin,bmpjmax

dim v2 as ushort                            'variable pour entete capture
ecran

dim as single dopplerc,dopplerv,dopplervsurc,dopplercpt

dim as single infosave(0 to 127)
dim as string*256
fichiersave1,fichiersave2,fichiersave3,fichiersave4,fichiersave5

dim as byte cravi,cgavi,cbavi
dim nndb as uinteger =&H62643030
type AVI_INDEX_LIST
  idx1Chunk             as uinteger
  idx1Size              as uinteger
end type
dim as AVI_INDEX_LIST ail
type AVI_INDEX_ENTRY
  chunkid               as uinteger
  dwAVIIF_              as uinteger
  dwChunkOffset         as uinteger
  dwChunkLength         as uinteger
end type
dim as AVI_INDEX_ENTRY aie
dim avifichier as string
dim aviligne(800*3-1) as ubyte
dim avicptlim as integer =1

dim as single seuildeclenche,debutdeclenche,tmtdeclenche
dim as single tdeclenche(0 to 511,0 to 1023)

dim as single
obsvitx,obsvity,obsi,obsj,obstmem,obst,obstold,obslambda,obstamplitude,ob
samplitude,obsniveaumin,obsniveaumax
dim obsmem(0 to 255) as single

dim hauteurobs as single

dim distxy as single
dim repartnormale2D(-2 to 2,-2 to 2) as single
dim repartnormale(0 to 200) as single
dim coefcompenslambda(512) as single
dim coefcompens as single

dim as integer colenergie(256*64)
dim as integer colamplitude(-2047 to 2048)
dim as single
contraste0,contraste1,contraste2,contraste3,contraste4,contraste5,contras
te,contrasteb
dim as single colr,colv,colb
const noir as integer =&h000000
const blanc as integer =&HFFFFFF
const rouge as integer =&hFF0000
const vert as integer =&h00FF00
const bleu as integer =&h0000FF
CONST unitrouge as integer =&H010000
CONST unitvert as integer =&H000100
CONST unitbleu as integer =&H000001
CONST unitviolet as integer =&H010001
CONST unitjaune as integer =&H010100
CONST unitcyan as integer =&h000101
CONST unitblanc as integer =&h010101
CONST quarblanc as integer =&H404040
CONST quarrouge as integer =&H400000
const quarbleu as integer =&h000040
CONST moitrouge as integer =&H800000
CONST moitvert as integer =&H008000
CONST moitbleu as integer =&H000080
CONST moitviolet as integer =&H800080
CONST moitjaune as integer =&H808000
CONST moitcyan as integer =&H008080
CONST moitblanc as integer =&H808080
const griscreme as integer =212*&h010000+208*&h000100+200
const rougefond as integer =rgb(100,0,0)
const antirouge as integer =(not unitrouge) and &h010101
const antivert as integer =(not unitvert) and &h010101
const antibleu as integer =(not unitbleu) and &h010101
const antijaune as integer =(not unitjaune) and &h010101
const anticyan as integer =(not unitcyan) and &h010101
const antiviolet as integer =(not unitviolet) and &h010101
const bleufonce as integer =rgb(0,28,56)
const vertfond1 as integer =rgb(51,105,57)
const vertfond2 as integer =rgb(33,65,49)
const bleufond1 as integer =rgb(26,27,58)
const bleufond2 as integer =rgb(56,57,88)
const colsel as integer =&hA07070
const vertobserv as integer =rgb(12,37,25)
const vertclair as integer =&h00FF00
const rosemask as integer =&hFF00FF

'variables pour les librairies -----------------------------------------
-------
```

```
#include "bouton.bi"
#include "saisie.bi"
#include "choixliste.bi"
dim as integer nbouton
dim as integer
boutonposx(100),boutonposy(100),boutonsel(100),boutonactif(100)
dim as string boutonfile(100),boutonhelp(100)
dim as integer nsaisi,saisistatus,saisiposcursmem
dim as integer
saisiposx(100),saisiposy(100),saisincar(100),saisisel(100),saisiactif(100
)
dim as string saisichaine(100),saisitampon
dim as integer
choixposx(100),choixposy(100),choixncar(100),choixchoix(100),choixnmax(10
0)
dim as integer choixsel(100),choixactif(100)
dim as zstring*32 choixliste(100,16)









'------------------------------- debut ---------------------------------
-------

screenres sizeecranh,sizeecranv,32,3',1
gosub initbmpobserv
gosub initabout
screenset 0,0:bload exepath+"\datas\fnd1.bmm":gosub afficheentete
gosub initboutons
gosub initsaisie

gosub initvariables:gosub inittableaux:gosub initbordure:gosub
initlimitescalcul:gosub tracemenu
message$="intro":gosub chargeshunt
goto boucleprincipale

initabout:'-----------------------------------------------------------
-------

screenset 2,visiblepage
'bload exepath+"\datas\about.bmp":get (0,0)-(599,339),about(0)
adr=varptr(about(0)):bload exepath+"\datas\about.bml",adr
return

afficheabout:'--------------------------------------------------------
-------
```

```
'adr=varptr(about(0)):size=600*340*4+4:bsave
exepath+"\datas\about.bml",adr,size
Put (211+largzoneaffsur2-600*.5,53+hautzoneaffsur2-
340*.5),about(0),alpha, 128
return

afficheentete:'-----------------------------------------------------------
-------

COLOR blanc, bleufond1
locate 2*1,2:?space(110);
message$="WS2D "+version$+"
"+str$(sizemilieuhversion)+"x"+str$(sizemilieuvversion)
locate 2*1,2:?message$;
WindowTitle message$
return

initbmpobserv:'-----------------------------------------------------------
-------

screenset 2,visiblepage
color 0,&h103020
cls
get (0,0)-(255,95),observa(0)
return









initvariables:'-----------------------------------------------------------
-------

FOR objrempj=2 TO jmaxm2
 objperimin(objrempj)=10000000:objperimax(objrempj)=-10000000
 objperiminb(objrempj)=10000000:objperimaxb(objrempj)=-10000000
NEXT
FOR distbord=0 TO 63
 attenbord(distbord)=SQR(sin(pisur2*distbord/63))
next
for n=0 to 1023
 elementnom$(n)=""
 elementtype$(n)=""
 elementselect(n)=0
next
numoldrectangleinfoselect=-1
```

```
numelementselect=0
numelementselectold=-1
numdernierelement=0

itracedecal=cint((imaxm2-largzoneaffsur2)/2)
jtracedecal=cint((jmaxm2-hautzoneaffsur2)/2)
elementnom$(0)=""
elementinfo(0,0)=itracedecal+largzoneaffsur2
elementinfo(1,0)=jtracedecal+hautzoneaffsur2

seuilbas=-1.e-03
seuilhaut=1.e-03
gosub initrepartnormale
gosub initcoefcompenslambda
coefreacbase=1/48
coefreac=coefreacbase
coefattenuation=1
deltat=1
t=0

contraste0=800
contraste1=2000
contraste2=2000
contraste3=20000
contraste4=20000
contraste5=80000
paletteencours=5
gosub rafrechepalette
colgrillegris=noir
colgrilleamplitude=moitblanc
colgrilleenergiea=moitblanc
unitcol=unitrouge
unitcolbar=antirouge

hauteurobs=60
aboutonoff=0
grilleon=0
zoom=-1
tracecontourson=0
speedrafrecheon=0
intervrafrechmouse=255
dopplerv=0
dopplervsurc=0
dopplercpt=0
captureafaire=0
intervalcapture=1000000
decalecranpas=128
modepauseon=0
numtrame=0
obsactif=0
tempsdebut=timer
return
```

```
initlimitescalcul:'-----------------------------------------------------
-------

dopplercpt=0
limitecalculimin=100000:limitecalculimax=-
100000:limitecalculjmin=100000:limitecalculjmax=-100000
testlimitescalculon=1
for t=0 to 100 step deltat:gosub litsources:next
testlimitescalculon=0
if limitecalculimin=100000 then icmin=imaxm2/2-32 else
icmin=limitecalculimin-128
if limitecalculimax=-100000 then icmax=imaxm2/2+32 else
icmax=limitecalculimax+128
if limitecalculjmin=100000 then jcmin=jmaxm2/2-32 else
jcmin=limitecalculjmin-128
if limitecalculjmax=-100000 then jcmax=jmaxm2/2+32 else
jcmax=limitecalculjmax+128
t=0

rafrechilimitescalcul:

icminmem=icmin+32:icmaxmem=icmax-32:jcminmem=jcmin+32:jcmaxmem=jcmax-32

jc=jcminmem
for ic=icminmem to icmaxmem
 if (ptla(jc,ic)<seuilbas) then jcmin=jcminmem-64
 if (ptla(jc,ic)>seuilhaut) then jcmin=jcminmem-64
next
jc=jcmaxmem
for ic=icminmem to icmaxmem
```

```
 if (ptla(jc,ic)<seuilbas) then jcmax=jcmaxmem+64
 if (ptla(jc,ic)>seuilhaut) then jcmax=jcmaxmem+64
next
ic=icminmem
for jc=jcminmem to jcmaxmem
 if (ptla(jc,ic)<seuilbas) then icmin=icminmem-64
 if (ptla(jc,ic)>seuilhaut) then icmin=icminmem-64
next
ic=icmaxmem
for jc=jcminmem to jcmaxmem
 if (ptla(jc,ic)<seuilbas) then icmax=icmaxmem+64
 if (ptla(jc,ic)>seuilhaut) then icmax=icmaxmem+64
next
if icmin<3 then icmin=3
if icmax>(imax-3) then icmax=imax-3
if jcmin<3 then jcmin=3
if jcmax>(jmax-3) then jcmax=jmax-3
return
```

```
defliminitzonetotale:'---------------------------------------------------
-------

jinitmin=0:jinitmax=jmaxm2
iinitmin=0:iinitmax=imaxm2
return

defliminitzonecalcul:'---------------------------------------------------
-------

jinitmin=jcmin:jinitmax=jcmax
iinitmin=icmin:iinitmax=icmax
gosub testsijinithorslimites
return

defliminitzoneecran:'----------------------------------------------------
-------
```

```
iinitmin=itracedecal
jinitmin=jtracedecal
select case zoom
case -1
 jinitmax=jtracedecal+hautzoneaff*2
 iinitmax=itracedecal+(largzoneaff-2)*2
case 0
 jinitmax=jtracedecal+hautzoneaff
 iinitmax=itracedecal+(largzoneaff-2)
case 1
 jinitmax=jtracedecal+hautzoneaffsur2
 iinitmax=itracedecal+(largzoneaff-2)*.5
end select
gosub testsijinithorslimites
return

testsijinithorslimites:'-------------------------------------------------
-------

if iinitmin<2 then iinitmin=2
if jinitmin<2 then jinitmin=2
if iinitmax>imaxm2 then iinitmax=imaxm2
if jinitmax>jmaxm2 then jinitmax=jmaxm2
return

initptls:'---------------------------------------------------------------
-

gosub defliminitzonetotale
gosub boucleinitptls
gosub initdeclenche
return

initptlszoneecran:'------------------------------------------------------

gosub defliminitzoneecran
gosub boucleinitptls
gosub initdeclenche
return

initptlszonecalcul:'-----------------------------------------------------
-

gosub defliminitzonecalcul
gosub boucleinitptls
gosub initdeclenche
return

initindicesreac:'--------------------------------------------------------
-------

gosub defliminitzonetotale
gosub boucleinitindicesreac
return
```

```
initindicesreaczonecalcul:'----------------------------------------------
-------

gosub defliminitzonecalcul
gosub boucleinitindicesreac
return

initindicesreaczoneecran:'-----------------------------------------------
-------

gosub defliminitzoneecran
gosub boucleinitindicesreac
return

initatten:'--------------------------------------------------------------
--------

gosub defliminitzonetotale
gosub boucleinitatten
return

initattenzonecalcul:'----------------------------------------------------
--------

gosub defliminitzonecalcul
gosub boucleinitatten
return

initattenzoneecran:'-----------------------------------------------------
--------

gosub defliminitzoneecran
gosub boucleinitatten
return

initindicesreacplusatten:'-----------------------------------------------
--------

gosub defliminitzonetotale
gosub boucleinitindicesreacplusatten
return

initindicesreacplusattenzoneecran:'--------------------------------------
--------

gosub defliminitzoneecran
gosub boucleinitindicesreacplusatten
return

boucleinitptls:'---------------------------------------------------------
-

for jinit=jinitmin to jinitmax
 for iinit=iinitmin to iinitmax step 32
  asm
   mov eax, dword ptr [JINIT]
   imul eax, sizemilieuh
   add eax, dword ptr [IINIT]
   imul eax, 4

   mov ecx,dword ptr [valeurvide]
   push ecx
   pop dword ptr [ptlA+eax]
   push ecx
   pop dword ptr [ptlA+eax+4]
   push ecx
   pop dword ptr [ptlA+eax+8]
   push ecx
   pop dword ptr [ptlA+eax+12]
   push ecx
   pop dword ptr [ptlA+eax+16]
   push ecx
   pop dword ptr [ptlA+eax+20]
   push ecx
   pop dword ptr [ptlA+eax+24]
   push ecx
   pop dword ptr [ptlA+eax+28]
   push ecx
   pop dword ptr [ptlA+eax+32]
   push ecx
   pop dword ptr [ptlA+eax+36]
   push ecx
   pop dword ptr [ptlA+eax+40]
   push ecx
   pop dword ptr [ptlA+eax+44]
   push ecx
   pop dword ptr [ptlA+eax+48]
   push ecx
   pop dword ptr [ptlA+eax+52]
   push ecx
   pop dword ptr [ptlA+eax+56]
   push ecx
   pop dword ptr [ptlA+eax+60]
   push ecx
   pop dword ptr [ptlA+eax+64]
   push ecx
   pop dword ptr [ptlA+eax+68]
   push ecx
   pop dword ptr [ptlA+eax+72]
   push ecx
   pop dword ptr [ptlA+eax+76]
   push ecx
   pop dword ptr [ptlA+eax+80]
   push ecx
   pop dword ptr [ptlA+eax+84]
   push ecx
   pop dword ptr [ptlA+eax+88]
```

```
push ecx
pop dword ptr [ptlA+eax+92]
push ecx
pop dword ptr [ptlA+eax+96]
push ecx
pop dword ptr [ptlA+eax+100]
push ecx
pop dword ptr [ptlA+eax+104]
push ecx
pop dword ptr [ptlA+eax+108]
push ecx
pop dword ptr [ptlA+eax+112]
push ecx
pop dword ptr [ptlA+eax+116]
push ecx
pop dword ptr [ptlA+eax+120]
push ecx
pop dword ptr [ptlA+eax+124]

push ecx
pop dword ptr [ptlB+eax]
push ecx
pop dword ptr [ptlB+eax+4]
push ecx
pop dword ptr [ptlB+eax+8]
push ecx
pop dword ptr [ptlB+eax+12]
push ecx
pop dword ptr [ptlB+eax+16]
push ecx
pop dword ptr [ptlB+eax+20]
push ecx
pop dword ptr [ptlB+eax+24]
push ecx
pop dword ptr [ptlB+eax+28]
push ecx
pop dword ptr [ptlB+eax+32]
push ecx
pop dword ptr [ptlB+eax+36]
push ecx
pop dword ptr [ptlB+eax+40]
push ecx
pop dword ptr [ptlB+eax+44]
push ecx
pop dword ptr [ptlB+eax+48]
push ecx
pop dword ptr [ptlB+eax+52]
push ecx
pop dword ptr [ptlB+eax+56]
push ecx
pop dword ptr [ptlB+eax+60]
push ecx
pop dword ptr [ptlB+eax+64]
push ecx
```

```
   pop dword ptr [ptlB+eax+68]
   push ecx
   pop dword ptr [ptlB+eax+72]
   push ecx
   pop dword ptr [ptlB+eax+76]
   push ecx
   pop dword ptr [ptlB+eax+80]
   push ecx
   pop dword ptr [ptlB+eax+84]
   push ecx
   pop dword ptr [ptlB+eax+88]
   push ecx
   pop dword ptr [ptlB+eax+92]
   push ecx
   pop dword ptr [ptlB+eax+96]
   push ecx
   pop dword ptr [ptlB+eax+100]
   push ecx
   pop dword ptr [ptlB+eax+104]
   push ecx
   pop dword ptr [ptlB+eax+108]
   push ecx
   pop dword ptr [ptlB+eax+112]
   push ecx
   pop dword ptr [ptlB+eax+116]
   push ecx
   pop dword ptr [ptlB+eax+120]
   push ecx
   pop dword ptr [ptlB+eax+124]

  end asm
 next
next
t=0:numtrame=0:tempsdebut=timer
return

boucleinitindicesreac:'---------------------------------------------------
-------

for jinit=jinitmin to jinitmax
 for iinit=iinitmin to iinitmax step 32
  asm
   mov eax, dword ptr [JINIT]
   imul eax, sizemilieuh
   add eax, dword ptr [IINIT]
   imul eax, 4

   mov ecx,dword ptr [coefreac]
   push ecx
   pop dword ptr [indicereac+eax]
   push ecx
   pop dword ptr [indicereac+eax+4]
   push ecx
   pop dword ptr [indicereac+eax+8]
```

```
push ecx
pop dword ptr [indicereac+eax+12]
push ecx
pop dword ptr [indicereac+eax+16]
push ecx
pop dword ptr [indicereac+eax+20]
push ecx
pop dword ptr [indicereac+eax+24]
push ecx
pop dword ptr [indicereac+eax+28]
push ecx
pop dword ptr [indicereac+eax+32]
push ecx
pop dword ptr [indicereac+eax+36]
push ecx
pop dword ptr [indicereac+eax+40]
push ecx
pop dword ptr [indicereac+eax+44]
push ecx
pop dword ptr [indicereac+eax+48]
push ecx
pop dword ptr [indicereac+eax+52]
push ecx
pop dword ptr [indicereac+eax+56]
push ecx
pop dword ptr [indicereac+eax+60]
push ecx
pop dword ptr [indicereac+eax+64]
push ecx
pop dword ptr [indicereac+eax+68]
push ecx
pop dword ptr [indicereac+eax+72]
push ecx
pop dword ptr [indicereac+eax+76]
push ecx
pop dword ptr [indicereac+eax+80]
push ecx
pop dword ptr [indicereac+eax+84]
push ecx
pop dword ptr [indicereac+eax+88]
push ecx
pop dword ptr [indicereac+eax+92]
push ecx
pop dword ptr [indicereac+eax+96]
push ecx
pop dword ptr [indicereac+eax+100]
push ecx
pop dword ptr [indicereac+eax+104]
push ecx
pop dword ptr [indicereac+eax+108]
push ecx
pop dword ptr [indicereac+eax+112]
push ecx
pop dword ptr [indicereac+eax+116]
```

```
   push ecx
   pop dword ptr [indicereac+eax+120]
   push ecx
   pop dword ptr [indicereac+eax+124]

  end asm
 next
next
return

boucleinitatten:'--------------------------------------------------------
--------

for jinit=jinitmin to jinitmax
 for iinit=iinitmin to iinitmax step 32
  asm
  mov eax, dword ptr [JINIT]
  imul eax, sizemilieuh
  add eax, dword ptr [IINIT]
  imul eax, 4

   mov ecx,dword ptr [coefattenuation]
   push ecx
   pop dword ptr [attenuation+eax]
   push ecx
   pop dword ptr [attenuation+eax+4]
   push ecx
   pop dword ptr [attenuation+eax+8]
   push ecx
   pop dword ptr [attenuation+eax+12]
   push ecx
   pop dword ptr [attenuation+eax+16]
   push ecx
   pop dword ptr [attenuation+eax+20]
   push ecx
   pop dword ptr [attenuation+eax+24]
   push ecx
   pop dword ptr [attenuation+eax+28]
   push ecx
   pop dword ptr [attenuation+eax+32]
   push ecx
   pop dword ptr [attenuation+eax+36]
   push ecx
   pop dword ptr [attenuation+eax+40]
   push ecx
   pop dword ptr [attenuation+eax+44]
   push ecx
   pop dword ptr [attenuation+eax+48]
   push ecx
   pop dword ptr [attenuation+eax+52]
   push ecx
   pop dword ptr [attenuation+eax+56]
   push ecx
   pop dword ptr [attenuation+eax+60]
   push ecx
   pop dword ptr [attenuation+eax+64]
   push ecx
   pop dword ptr [attenuation+eax+68]
   push ecx
   pop dword ptr [attenuation+eax+72]
   push ecx
   pop dword ptr [attenuation+eax+76]
   push ecx
   pop dword ptr [attenuation+eax+80]
   push ecx
   pop dword ptr [attenuation+eax+84]
   push ecx
   pop dword ptr [attenuation+eax+88]
   push ecx
   pop dword ptr [attenuation+eax+92]
   push ecx
   pop dword ptr [attenuation+eax+96]
   push ecx
   pop dword ptr [attenuation+eax+100]
   push ecx
   pop dword ptr [attenuation+eax+104]
   push ecx
   pop dword ptr [attenuation+eax+108]
   push ecx
   pop dword ptr [attenuation+eax+112]
   push ecx
   pop dword ptr [attenuation+eax+116]
   push ecx
   pop dword ptr [attenuation+eax+120]
   push ecx
   pop dword ptr [attenuation+eax+124]

  end asm
 next
next
return

boucleinitindicesreacplusatten:'------------------------------------------
--------

for jinit=jinitmin to jinitmax
 for iinit=iinitmin to iinitmax step 32
  asm
   mov eax, dword ptr [JINIT]
   imul eax, sizemilieuh
   add eax, dword ptr [IINIT]
   imul eax, 4

   mov ecx,dword ptr [coefreac]
   push ecx
   pop dword ptr [indicereac+eax]
   push ecx
   pop dword ptr [indicereac+eax+4]
```

```
push ecx
pop dword ptr [indicereac+eax+8]
push ecx
pop dword ptr [indicereac+eax+12]
push ecx
pop dword ptr [indicereac+eax+16]
push ecx
pop dword ptr [indicereac+eax+20]
push ecx
pop dword ptr [indicereac+eax+24]
push ecx
pop dword ptr [indicereac+eax+28]
push ecx
pop dword ptr [indicereac+eax+32]
push ecx
pop dword ptr [indicereac+eax+36]
push ecx
pop dword ptr [indicereac+eax+40]
push ecx
pop dword ptr [indicereac+eax+44]
push ecx
pop dword ptr [indicereac+eax+48]
push ecx
pop dword ptr [indicereac+eax+52]
push ecx
pop dword ptr [indicereac+eax+56]
push ecx
pop dword ptr [indicereac+eax+60]
push ecx
pop dword ptr [indicereac+eax+64]
push ecx
pop dword ptr [indicereac+eax+68]
push ecx
pop dword ptr [indicereac+eax+72]
push ecx
pop dword ptr [indicereac+eax+76]
push ecx
pop dword ptr [indicereac+eax+80]
push ecx
pop dword ptr [indicereac+eax+84]
push ecx
pop dword ptr [indicereac+eax+88]
push ecx
pop dword ptr [indicereac+eax+92]
push ecx
pop dword ptr [indicereac+eax+96]
push ecx
pop dword ptr [indicereac+eax+100]
push ecx
pop dword ptr [indicereac+eax+104]
push ecx
pop dword ptr [indicereac+eax+108]
push ecx
pop dword ptr [indicereac+eax+112]
```

```
push ecx
pop dword ptr [indicereac+eax+116]
push ecx
pop dword ptr [indicereac+eax+120]
push ecx
pop dword ptr [indicereac+eax+124]

mov ecx,dword ptr [coefattenuation]
push ecx
pop dword ptr [attenuation+eax]
push ecx
pop dword ptr [attenuation+eax+4]
push ecx
pop dword ptr [attenuation+eax+8]
push ecx
pop dword ptr [attenuation+eax+12]
push ecx
pop dword ptr [attenuation+eax+16]
push ecx
pop dword ptr [attenuation+eax+20]
push ecx
pop dword ptr [attenuation+eax+24]
push ecx
pop dword ptr [attenuation+eax+28]
push ecx
pop dword ptr [attenuation+eax+32]
push ecx
pop dword ptr [attenuation+eax+36]
push ecx
pop dword ptr [attenuation+eax+40]
push ecx
pop dword ptr [attenuation+eax+44]
push ecx
pop dword ptr [attenuation+eax+48]
push ecx
pop dword ptr [attenuation+eax+52]
push ecx
pop dword ptr [attenuation+eax+56]
push ecx
pop dword ptr [attenuation+eax+60]
push ecx
pop dword ptr [attenuation+eax+64]
push ecx
pop dword ptr [attenuation+eax+68]
push ecx
pop dword ptr [attenuation+eax+72]
push ecx
pop dword ptr [attenuation+eax+76]
push ecx
pop dword ptr [attenuation+eax+80]
push ecx
pop dword ptr [attenuation+eax+84]
push ecx
pop dword ptr [attenuation+eax+88]
```

```
   push ecx
   pop dword ptr [attenuation+eax+92]
   push ecx
   pop dword ptr [attenuation+eax+96]
   push ecx
   pop dword ptr [attenuation+eax+100]
   push ecx
   pop dword ptr [attenuation+eax+104]
   push ecx
   pop dword ptr [attenuation+eax+108]
   push ecx
   pop dword ptr [attenuation+eax+112]
   push ecx
   pop dword ptr [attenuation+eax+116]
   push ecx
   pop dword ptr [attenuation+eax+120]
   push ecx
   pop dword ptr [attenuation+eax+124]

  end asm
 next
next
return

inittableaux:'-----------------------------------------------------------
-------

gosub defliminitzonetotale

for jinit=jinitmin to jinitmax
 for iinit=iinitmin to iinitmax step 32
  asm
   mov eax, dword ptr [JINIT]
   imul eax, sizemilieuh
   add eax, dword ptr [IINIT]
   imul eax, 4

   mov ecx,dword ptr [valeurvide]
   push ecx
   pop dword ptr [ptlA+eax]
   push ecx
   pop dword ptr [ptlA+eax+4]
   push ecx
   pop dword ptr [ptlA+eax+8]
   push ecx
   pop dword ptr [ptlA+eax+12]
   push ecx
   pop dword ptr [ptlA+eax+16]
   push ecx
   pop dword ptr [ptlA+eax+20]
   push ecx
   pop dword ptr [ptlA+eax+24]
   push ecx
   pop dword ptr [ptlA+eax+28]
```

```
push ecx
pop dword ptr [ptlA+eax+32]
push ecx
pop dword ptr [ptlA+eax+36]
push ecx
pop dword ptr [ptlA+eax+40]
push ecx
pop dword ptr [ptlA+eax+44]
push ecx
pop dword ptr [ptlA+eax+48]
push ecx
pop dword ptr [ptlA+eax+52]
push ecx
pop dword ptr [ptlA+eax+56]
push ecx
pop dword ptr [ptlA+eax+60]
push ecx
pop dword ptr [ptlA+eax+64]
push ecx
pop dword ptr [ptlA+eax+68]
push ecx
pop dword ptr [ptlA+eax+72]
push ecx
pop dword ptr [ptlA+eax+76]
push ecx
pop dword ptr [ptlA+eax+80]
push ecx
pop dword ptr [ptlA+eax+84]
push ecx
pop dword ptr [ptlA+eax+88]
push ecx
pop dword ptr [ptlA+eax+92]
push ecx
pop dword ptr [ptlA+eax+96]
push ecx
pop dword ptr [ptlA+eax+100]
push ecx
pop dword ptr [ptlA+eax+104]
push ecx
pop dword ptr [ptlA+eax+108]
push ecx
pop dword ptr [ptlA+eax+112]
push ecx
pop dword ptr [ptlA+eax+116]
push ecx
pop dword ptr [ptlA+eax+120]
push ecx
pop dword ptr [ptlA+eax+124]

push ecx
pop dword ptr [ptlB+eax]
push ecx
pop dword ptr [ptlB+eax+4]
push ecx
```

```
pop dword ptr [ptlB+eax+8]
push ecx
pop dword ptr [ptlB+eax+12]
push ecx
pop dword ptr [ptlB+eax+16]
push ecx
pop dword ptr [ptlB+eax+20]
push ecx
pop dword ptr [ptlB+eax+24]
push ecx
pop dword ptr [ptlB+eax+28]
push ecx
pop dword ptr [ptlB+eax+32]
push ecx
pop dword ptr [ptlB+eax+36]
push ecx
pop dword ptr [ptlB+eax+40]
push ecx
pop dword ptr [ptlB+eax+44]
push ecx
pop dword ptr [ptlB+eax+48]
push ecx
pop dword ptr [ptlB+eax+52]
push ecx
pop dword ptr [ptlB+eax+56]
push ecx
pop dword ptr [ptlB+eax+60]
push ecx
pop dword ptr [ptlB+eax+64]
push ecx
pop dword ptr [ptlB+eax+68]
push ecx
pop dword ptr [ptlB+eax+72]
push ecx
pop dword ptr [ptlB+eax+76]
push ecx
pop dword ptr [ptlB+eax+80]
push ecx
pop dword ptr [ptlB+eax+84]
push ecx
pop dword ptr [ptlB+eax+88]
push ecx
pop dword ptr [ptlB+eax+92]
push ecx
pop dword ptr [ptlB+eax+96]
push ecx
pop dword ptr [ptlB+eax+100]
push ecx
pop dword ptr [ptlB+eax+104]
push ecx
pop dword ptr [ptlB+eax+108]
push ecx
pop dword ptr [ptlB+eax+112]
push ecx
```

```
pop dword ptr [ptlB+eax+116]
push ecx
pop dword ptr [ptlB+eax+120]
push ecx
pop dword ptr [ptlB+eax+124]

mov ecx,dword ptr [coefreac]
push ecx
pop dword ptr [indicereac+eax]
push ecx
pop dword ptr [indicereac+eax+4]
push ecx
pop dword ptr [indicereac+eax+8]
push ecx
pop dword ptr [indicereac+eax+12]
push ecx
pop dword ptr [indicereac+eax+16]
push ecx
pop dword ptr [indicereac+eax+20]
push ecx
pop dword ptr [indicereac+eax+24]
push ecx
pop dword ptr [indicereac+eax+28]
push ecx
pop dword ptr [indicereac+eax+32]
push ecx
pop dword ptr [indicereac+eax+36]
push ecx
pop dword ptr [indicereac+eax+40]
push ecx
pop dword ptr [indicereac+eax+44]
push ecx
pop dword ptr [indicereac+eax+48]
push ecx
pop dword ptr [indicereac+eax+52]
push ecx
pop dword ptr [indicereac+eax+56]
push ecx
pop dword ptr [indicereac+eax+60]
push ecx
pop dword ptr [indicereac+eax+64]
push ecx
pop dword ptr [indicereac+eax+68]
push ecx
pop dword ptr [indicereac+eax+72]
push ecx
pop dword ptr [indicereac+eax+76]
push ecx
pop dword ptr [indicereac+eax+80]
push ecx
pop dword ptr [indicereac+eax+84]
push ecx
pop dword ptr [indicereac+eax+88]
push ecx
```

```
pop dword ptr [indicereac+eax+92]
push ecx
pop dword ptr [indicereac+eax+96]
push ecx
pop dword ptr [indicereac+eax+100]
push ecx
pop dword ptr [indicereac+eax+104]
push ecx
pop dword ptr [indicereac+eax+108]
push ecx
pop dword ptr [indicereac+eax+112]
push ecx
pop dword ptr [indicereac+eax+116]
push ecx
pop dword ptr [indicereac+eax+120]
push ecx
pop dword ptr [indicereac+eax+124]

mov ecx,dword ptr [coefattenuation]
push ecx
pop dword ptr [attenuation+eax]
push ecx
pop dword ptr [attenuation+eax+4]
push ecx
pop dword ptr [attenuation+eax+8]
push ecx
pop dword ptr [attenuation+eax+12]
push ecx
pop dword ptr [attenuation+eax+16]
push ecx
pop dword ptr [attenuation+eax+20]
push ecx
pop dword ptr [attenuation+eax+24]
push ecx
pop dword ptr [attenuation+eax+28]
push ecx
pop dword ptr [attenuation+eax+32]
push ecx
pop dword ptr [attenuation+eax+36]
push ecx
pop dword ptr [attenuation+eax+40]
push ecx
pop dword ptr [attenuation+eax+44]
push ecx
pop dword ptr [attenuation+eax+48]
push ecx
pop dword ptr [attenuation+eax+52]
push ecx
pop dword ptr [attenuation+eax+56]
push ecx
pop dword ptr [attenuation+eax+60]
push ecx
pop dword ptr [attenuation+eax+64]
push ecx
```

```
   pop dword ptr [attenuation+eax+68]
   push ecx
   pop dword ptr [attenuation+eax+72]
   push ecx
   pop dword ptr [attenuation+eax+76]
   push ecx
   pop dword ptr [attenuation+eax+80]
   push ecx
   pop dword ptr [attenuation+eax+84]
   push ecx
   pop dword ptr [attenuation+eax+88]
   push ecx
   pop dword ptr [attenuation+eax+92]
   push ecx
   pop dword ptr [attenuation+eax+96]
   push ecx
   pop dword ptr [attenuation+eax+100]
   push ecx
   pop dword ptr [attenuation+eax+104]
   push ecx
   pop dword ptr [attenuation+eax+108]
   push ecx
   pop dword ptr [attenuation+eax+112]
   push ecx
   pop dword ptr [attenuation+eax+116]
   push ecx
   pop dword ptr [attenuation+eax+120]
   push ecx
   pop dword ptr [attenuation+eax+124]

  end asm
 next
next
gosub inittdeclenche
t=0:numtrame=0:tempsdebut=timer
return

initbordure:'------------------------------------------------------------
-------

FOR distbord=0 TO 63
 attenuationbordure=attenbord(distbord)
 FOR bordcpt=2+distbord TO imaxm2-distbord
  attenuation(2+distbord,bordcpt)=attenuationbordure
  attenuation(jmaxm2-distbord,bordcpt)=attenuationbordure
 next
 FOR bordcpt=2+distbord TO jmaxm2-distbord
  attenuation(bordcpt,2+distbord)=attenuationbordure
  attenuation(bordcpt,imaxm2-distbord)=attenuationbordure
 next
next
return
```

```
modifiecoefreac:'--------------------------------------------------------
-------

message$="entrez un nouveau coefficient de r"+chr$(130)+"action entre
0.001 et 1"
gosub interrogemessage
coefreac=val(message$)
if coefreac<0.001 then coefreac=0.001
if coefreac>1 then coefreac=1
coefreac*=coefreacbase
gosub initindicesreac
gosub litobjets
return

modifiecoefattenuation:'-------------------------------------------------
--------

message$="entrez un nouveau coefficient d'att"+chr$(130)+"nuation entre 0
et 1"
gosub interrogemessage
coefattenuation=val(message$)
if coefattenuation<0 then coefattenuation=0
if coefattenuation>1 then coefattenuation=1
gosub initatten
return
```

```
boucleprincipale:'-------------------------------------------------------
-------

if modepauseon then gosub testmousesurecran:gosub tracecourbes:goto
boucleprincipale

numtrame+=1
trameaoub=trameaoub xor 1
t+=deltat
dopplercpt+=dopplerv
gosub litsources
if obsactif then gosub observateur
if trameaoub=0 then gosub calcula else gosub calculb
gosub testmousesurecran
if speedrafrecheon then
 gosub tracecourbes
else
 cptrafreche+=1
 if cptrafreche>=16 then cptrafreche=0:gosub tracecourbes
end if
gosub affichenumerotrame
if numtrame>=(numtramemem+intervalcapture) then captureafaire=1
if captureafaire then captureafaire=0:gosub captureversbmp
if aviopen then gosub writeavifile

if sauvegardeafaire then gosub sauvegarde
if chargeafaire then gosub charge
gosub rafrechilimitescalcul

goto boucleprincipale
```

```
calcula:'----------------------------------------------------------------
-------

'trameaoub=0

FOR jc=jcmin TO jcmax
```

```
 asm
 mov ecx, dword ptr [JC]
 imul ecx, sizemilieuh
 add ecx, dword ptr [icmin]
 imul ecx, 4
 lea esi,[ptla]
 add esi,ecx
 end asm

 FOR ic=icmin TO icmax step 4

  asm
  fld dword ptr [esi-sizemilieuh*4]      'pa4(y-)
  fadd dword ptr [esi-4]                'pa4(y-,x-)
  fld dword ptr [esi-sizemilieuh*4+4]    'pb4(y-)
pa4(y-,x-)
  fadd dword ptr [esi-4+4]              'pb4(y-,x-)
pa4(y-,x-)
  fld dword ptr [esi-sizemilieuh*4+8]    'pc4(y-)
pb4(y-,x-)                  pa4(y-,x-)
  fadd dword ptr [esi-4+8]              'pc4(y-,x-)
pb4(y-,x-)                  pa4(y-,x-)
  fld dword ptr [esi-sizemilieuh*4+12]   'pd4(y-)
pc4(y-,x-)                  pb4(y-,x-)                  pa4(y-,x-)
  fadd dword ptr [esi-4+12]             'pd4(y-,x-)
pc4(y-,x-)                  pb4(y-,x-)                  pa4(y-,x-)

   fxch st(3)                           'pa4(y-,x-)
pc4(y-,x-)                  pb4(y-,x-)                  pd4(y-,x-)
  fadd dword ptr [esi+4]                'pa4(y-,x+-)
pc4(y-,x-)                  pb4(y-,x-)                  pd4(y-,x-)
   fxch st(2)                           'pb4(y-,x-)
pc4(y-,x-)                  pa4(y-,x+-)                 pd4(y-,x-)
  fadd dword ptr [esi+4+4]              'pb4(y-,x+-)
pc4(y-,x-)                  pa4(y-,x+-)                 pd4(y-,x-)
   fxch st(1)                           'pc4(y-,x-)
pb4(y-,x+-)                 pa4(y-,x+-)                 pd4(y-,x-)
  fadd dword ptr [esi+4+8]              'pc4(y-,x+-)
pb4(y-,x+-)                 pa4(y-,x+-)                 pd4(y-,x-)
   fxch st(3)                           'pd4(y-,x-)
pb4(y-,x+-)                 pa4(y-,x+-)                 pc4(y-,x+-)
  fadd dword ptr [esi+4+12]             'pd4(y-,x+-)
pb4(y-,x+-)                 pa4(y-,x+-)                 pc4(y-,x+-)

   fxch st(2)                           'pa4(y-,x+-)
pb4(y-,x+-)                 pd4(y-,x+-)                 pc4(y-,x+-)
  fadd dword ptr [esi+sizemilieuh*4]     'pa4(y+-,x+-)
pb4(y-,x+-)                 pd4(y-,x+-)                 pc4(y-,x+-)
   fxch st(1)                           'pb4(y-,x+-)
pa4(y+-,x+-)                pd4(y-,x+-)                 pc4(y-,x+-)
  fadd dword ptr [esi+sizemilieuh*4+4]   'pb4(y+-,x+-)
pa4(y+-,x+-)                pd4(y-,x+-)                 pc4(y-,x+-)
   fxch st(3)                           'pc4(y-,x+-)
pa4(y+-,x+-)                pd4(y-,x+-)                 pb4(y+-,x+-)
```

```
  fadd dword ptr [esi+sizemilieuh*4+8]   'pc4(y+-,x+-)
pa4(y+-,x+-)                pd4(y-,x+-)                 pb4(y+-,x+-)
   fxch st(2)                           'pd4(y-,x+-)
pa4(y+-,x+-)                pc4(y+-,x+-)                pb4(y+-,x+-)
  fadd dword ptr [esi+sizemilieuh*4+12]  'pd4(y+-,x+-)
pa4(y+-,x+-)                pc4(y+-,x+-)                pb4(y+-,x+-)

   fxch st(1)                           'pa4(yx)
pd4(yx)                     pc4(yx)                     pb4(yx)
  fmul dword ptr [float16]              'pa4(yx)*16
pd4(yx)                     pc4(yx)                     pb4(yx)
   fxch st(3)                           'pb4(yx)
pd4(yx)                     pc4(yx)                     pa4(yx)*16
  fmul dword ptr [float16]              'pb4(yx)*16
pd4(yx)                     pc4(yx)                     pa4(yx)*16
   fxch st(2)                           'pc4(yx)
pd4(yx)                     pb4(yx)*16                  pa4(yx)*16
  fmul dword ptr [float16]              'pc4(yx)*16
pd4(yx)                     pb4(yx)*16                  pa4(yx)*16
   fxch st(1)                           'pd4(yx)
pc4(yx)*16                  pb4(yx)*16                  pa4(yx)*16
  fmul dword ptr [float16]              'pd4(yx)*16
pc4(yx)*16                  pb4(yx)*16                  pa4(yx)*16

   fxch st(3)                           'pa4(yx)*16
pc4(yx)*16                  pb4(yx)*16                  pd4(yx)*16
  fld dword ptr [esi]                   'pa(yx)
pa4(yx)*16                  pc4(yx)*16                  pb4(yx)*16
pd4(yx)*16
  fmul dword ptr [floatm60]             'pa(yx)*-60
pa4(yx)*16                  pc4(yx)*16                  pb4(yx)*16
pd4(yx)*16
  faddp st(1)                           'pa(yx)*-60+pa4(yx)*16
pc4(yx)*16                  pb4(yx)*16                  pd4(yx)*16

   fxch st(2)                           'pb4(yx)*16
pc4(yx)*16                  pa(yx)*-60+pa4(yx)*16       pd4(yx)*16
  fld dword ptr [esi+4]                 'pb(yx)
pb4(yx)*16                  pc4(yx)*16                  pa(yx)*-
60+pa4(yx)*16       pd4(yx)*16
  fmul dword ptr [floatm60]             'pb(yx)*-60
pb4(yx)*16                  pc4(yx)*16                  pa(yx)*-
60+pa4(yx)*16       pd4(yx)*16
  faddp st(1)                           'pb(yx)*-60+pb4(yx)*16
pc4(yx)*16                  pa(yx)*-60+pa4(yx)*16       pd4(yx)*16

   fxch st(1)                           'pc4(yx)*16
pb(yx)*-60+pb4(yx)*16       pa(yx)*-60+pa4(yx)*16       pd4(yx)*16
  fld dword ptr [esi+8]                 'pc(yx)
pc4(yx)*16                  pb(yx)*-60+pb4(yx)*16       pa(yx)*-
60+pa4(yx)*16       pd4(yx)*16
  fmul dword ptr [floatm60]             'pc(yx)*-60
pc4(yx)*16                  pb(yx)*-60+pb4(yx)*16       pa(yx)*-
60+pa4(yx)*16       pd4(yx)*16
```

```
  faddp st(1)                           'pc(yx)*-60+pc4(yx)*16
pb(yx)*-60+pb4(yx)*16       pa(yx)*-60+pa4(yx)*16       pd4(yx)*16

   fxch st(3)                           'pd4(yx)*16
pb(yx)*-60+pb4(yx)*16       pa(yx)*-60+pa4(yx)*16       pc(yx)*-
60+pc4(yx)*16
  fld dword ptr [esi+12]                'pd(yx)
pd4(yx)*16                  pb(yx)*-60+pb4(yx)*16       pa(yx)*-
60+pa4(yx)*16       pc(yx)*-60+pc4(yx)*16
  fmul dword ptr [floatm60]             'pd(yx)*-60
pd4(yx)*16                  pb(yx)*-60+pb4(yx)*16       pa(yx)*-
60+pa4(yx)*16       pc(yx)*-60+pc4(yx)*16
  faddp st(1)                           'pd(yx)*-60+pd4(yx)*16
pb(yx)*-60+pb4(yx)*16       pa(yx)*-60+pa4(yx)*16       pc(yx)*-
60+pc4(yx)*16

   fxch st(2)                           'pa                         pb
pd                          pc
  fsub dword ptr [esi-sizemilieuh*8]     'pa-pa8(y-)                 pb
pd                          pc
   fxch st(1)                           'pb                         pa-
pa8(y-)                  pd                          pc
  fsub dword ptr [esi-sizemilieuh*8+4]   'pb-pb8(y-)                 pa-
pa8(y-)                  pd                          pc
   fxch st(3)                           'pc                         pa-
pa8(y-)                  pd                          pb-pb8(y-)
  fsub dword ptr [esi-sizemilieuh*8+8]   'pc-pc8(y-)                 pa-
pa8(y-)                  pd                          pb-pb8(y-)
   fxch st(2)                           'pd                         pa-
pa8(y-)                  pc-pc8(y-)                  pb-pb8(y-)
  fsub dword ptr [esi-sizemilieuh*8+12]  'pd-pd8(y-)                 pa-
pa8(y-)                  pc-pc8(y-)                  pb-pb8(y-)

   fxch st(1)                           'pa-pa8(y-)                 pd-
pd8(y-)                  pc-pc8(y-)                  pb-pb8(y-)
  fsub dword ptr [esi-8]                'pa-pa8(y-,x-)              pd-
pd8(y-)                  pc-pc8(y-)                  pb-pb8(y-)
   fxch st(3)                           'pb-pb8(y-)                 pd-
pd8(y-)                  pc-pc8(y-)                  pa-pa8(y-,x-)
  fsub dword ptr [esi-8+4]              'pb-pb8(y-,x-)              pd-
pd8(y-)                  pc-pc8(y-)                  pa-pa8(y-,x-)
   fxch st(2)                           'pc-pc8(y-)                 pd-
pd8(y-)                  pb-pb8(y-,x-)               pa-pa8(y-,x-)
  fsub dword ptr [esi-8+8]              'pc-pc8(y-,x-)              pd-
pd8(y-)                  pb-pb8(y-,x-)               pa-pa8(y-,x-)
   fxch st(1)                           'pd-pd8(y-)                 pc-
pc8(y-,x-)               pb-pb8(y-,x-)               pa-pa8(y-,x-)
  fsub dword ptr [esi-8+12]             'pd-pd8(y-,x-)              pc-
pc8(y-,x-)               pb-pb8(y-,x-)               pa-pa8(y-,x-)

   fxch st(3)                           'pa-pa8(y-,x-)              pc-
pc8(y-,x-)               pb-pb8(y-,x-)               pd-pd8(y-,x-)
  fsub dword ptr [esi+8]                'pa-pa8(y-,x+-)             pc-
pc8(y-,x-)               pb-pb8(y-,x-)               pd-pd8(y-,x-)
```

```
   fxch st(2)                           'pb-pb8(y-,x-)              pc-
pc8(y-,x-)               pa-pa8(y-,x+-)              pd-pd8(y-,x-)
  fsub dword ptr [esi+8+4]              'pb-pb8(y-,x+-)             pc-
pc8(y-,x-)               pa-pa8(y-,x+-)              pd-pd8(y-,x-)
   fxch st(1)                           'pc-pc8(y-,x-)              pb-
pb8(y-,x+-)              pa-pa8(y-,x+-)              pd-pd8(y-,x-)
  fsub dword ptr [esi+8+8]              'pc-pc8(y-,x+-)             pb-
pb8(y-,x+-)              pa-pa8(y-,x+-)              pd-pd8(y-,x-)
   fxch st(3)                           'pd-pd8(y-,x-)              pb-
pb8(y-,x+-)              pa-pa8(y-,x+-)              pc-pc8(y-,x+-)
  fsub dword ptr [esi+8+12]             'pd-pd8(y-,x+-)             pb-
pb8(y-,x+-)              pa-pa8(y-,x+-)              pc-pc8(y-,x+-)

   fxch st(2)                           'pa-pa8(y-,x+-)             pb-
pb8(y-,x+-)              pd-pd8(y-,x+-)              pc-pc8(y-,x+-)
  fsub dword ptr [esi+sizemilieuh*8]     'pa-pa8(y+-,x+-)            pb-
pb8(y-,x+-)              pd-pd8(y-,x+-)              pc-pc8(y-,x+-)
   fxch st(1)                           'pb-pb8(y-,x+-)             pa-
pa8(y+-,x+-)             pd-pd8(y-,x+-)              pc-pc8(y-,x+-)
  fsub dword ptr [esi+sizemilieuh*8+4]   'pb-pb8(y+-,x+-)            pa-
pa8(y+-,x+-)             pd-pd8(y-,x+-)              pc-pc8(y-,x+-)
   fxch st(3)                           'pc-pc8(y-,x+-)             pa-
pa8(y+-,x+-)             pd-pd8(y-,x+-)              pb-pb8(y+-,x+-)
  fsub dword ptr [esi+sizemilieuh*8+8]   'pc-pc8(y+-,x+-)            pa-
pa8(y+-,x+-)             pd-pd8(y-,x+-)              pb-pb8(y+-,x+-)
   fxch st(2)                           'pd-pd8(y-,x+-)             pa-
pa8(y+-,x+-)             pc-pc8(y+-,x+-)             pb-pb8(y+-,x+-)
  fsub dword ptr [esi+sizemilieuh*8+12]  'pd-pd8(y+-,x+-)            pa-
pa8(y+-,x+-)             pc-pc8(y+-,x+-)             pb-pb8(y+-,x+-)

   fxch st(1)                           'pa                         pd
pc                          pb
  fmul dword ptr [indicereac+ecx]       'pa*ind                     pd
pc                          pb
   fxch st(3)                           'pb                         pd
pc                          pa*ind
  fmul dword ptr [indicereac+ecx+4]     'pb*ind                     pd
pc                          pa*ind
   fxch st(2)                           'pc                         pd
pb*ind                      pa*ind
  fmul dword ptr [indicereac+ecx+8]     'pc*ind                     pd
pb*ind                      pa*ind
   fxch st(1)                           'pd
pc*ind                      pb*ind                      pa*ind
  fmul dword ptr [indicereac+ecx+12]    'pd*ind
pc*ind                      pb*ind                      pa*ind

   fxch st(3)                           'pa*ind
pc*ind                      pb*ind                      pd*ind
  fsub dword ptr [ptlb+ecx]             'pa*ind-paold
pc*ind                      pb*ind                      pd*ind
   fxch st(2)                           'pb*ind
pc*ind                      pa*ind-paold                pd*ind
```

```
  fsub dword ptr [ptlb+ecx+4]            'pb*ind-pbold
pc*ind                      pa*ind-paold                pd*ind
   fxch st(1)                            'pc*ind
pb*ind-pbold                pa*ind-paold                pd*ind
  fsub dword ptr [ptlb+ecx+8]            'pc*ind-pcold
pb*ind-pbold                pa*ind-paold                pd*ind
   fxch st(3)                            'pd*ind
pb*ind-pbold                pa*ind-paold                pc*ind-pcold
  fsub dword ptr [ptlb+ecx+12]           'pd*ind-pdold
pb*ind-pbold                pa*ind-paold                pc*ind-pcold

   fxch st(2)                            'pa*ind-paold
pb*ind-pbold                pd*ind-pdold                pc*ind-pcold
  fadd dword ptr [esi]                   'pa*ind-paold+pa0(yx)
pb*ind-pbold                pd*ind-pdold                pc*ind-pcold
   fxch st(1)                            'pb*ind-pbold
pa*ind-paold+pa0(yx)        pd*ind-pdold                pc*ind-pcold
  fadd dword ptr [esi+4]                 'pb*ind-pbold+pb0(yx)
pa*ind-paold+pa0(yx)        pd*ind-pdold                pc*ind-pcold
   fxch st(3)                            'pc*ind-pcold
pa*ind-paold+pa0(yx)        pd*ind-pdold                pb*ind-
pbold+pb0(yx)
  fadd dword ptr [esi+8]                 'pc*ind-pcold+pc0(yx)
pa*ind-paold+pa0(yx)        pd*ind-pdold                pb*ind-
pbold+pb0(yx)
   fxch st(2)                            'pd*ind-pdold
pa*ind-paold+pa0(yx)        pc*ind-pcold+pc0(yx)        pb*ind-
pbold+pb0(yx)
  fadd dword ptr [esi+12]                'pd*ind-pdold+pd0(yx)
pa*ind-paold+pa0(yx)        pc*ind-pcold+pc0(yx)        pb*ind-
pbold+pb0(yx)

   fxch st(1)                            'pa                         pd
pc                          pb
  fmul dword ptr [attenuation+ecx]       'pa*aten                    pd
pc                          pb
   fxch st(3)                            'pb                         pd
pc                          pa*aten
  fmul dword ptr [attenuation+ecx+4]     'pb*aten                    pd
pc                          pa*aten
   fxch st(2)                            'pc                         pd
pb*aten                     pa*aten
  fmul dword ptr [attenuation+ecx+8]     'pc*aten                    pd
pb*aten                     pa*aten
   fxch st(1)                            'pd
pc*aten                     pb*aten                     pa*aten
  fmul dword ptr [attenuation+ecx+12]    'pd*aten
pc*aten                     pb*aten                     pa*aten

   fxch st(3)                            'pa*aten
pc*aten                     pb*aten                     pd*aten
  fadd dword ptr [esi]                   'pa*aten+pa0(yx)
pc*aten                     pb*aten                     pd*aten
```

```
   fxch st(2)                           'pb*aten
pc*aten                     pa*aten+pa0(yx)             pd*aten
  fadd dword ptr [esi+4]                'pb*aten+pb0(yx)
pc*aten                     pa*aten+pa0(yx)             pd*aten
   fxch st(1)                           'pc*aten
pb*aten+pb0(yx)             pa*aten+pa0(yx)             pd*aten
  fadd dword ptr [esi+8]                'pc*aten+pc0(yx)
pb*aten+pb0(yx)             pa*aten+pa0(yx)             pd*aten
   fxch st(3)                           'pd*aten
pb*aten+pb0(yx)             pa*aten+pa0(yx)             pc*aten+pc0(yx)
  fadd dword ptr [esi+12]               'pd*aten+pd0(yx)
pb*aten+pb0(yx)             pa*aten+pa0(yx)             pc*aten+pc0(yx)

  fstp dword ptr [ptlb+12+ecx]          'pd*aten+pd0(yx)
pb*aten+pb0(yx)             pa*aten+pa0(yx)             pc*aten+pc0(yx)
  fstp dword ptr [ptlb+4+ecx]           'pb*aten+pb0(yx)
pa*aten+pa0(yx)             pc*aten+pc0(yx)
  fstp dword ptr [ptlb+0+ecx]           'pa*aten+pa0(yx)
pc*aten+pc0(yx)
  fstp dword ptr [ptlb+8+ecx]           'pc*aten+pc0(yx)


  add esi,16
  add ecx,16
  end asm

 next
 cptintmouse+=1:if cptintmouse>intervrafrechmouse then
cptintmouse=0:gosub testmousesurecran
next
return


calculb:'----------------------------------------------------------------
-------

'trameaoub=1

FOR jc=jcmin TO jcmax

 asm
 mov ecx, dword ptr [JC]
 imul ecx, sizemilieuh
 add ecx, dword ptr [icmin]
 imul ecx, 4
 lea esi,[ptlb]
 add esi,ecx
 end asm

 FOR ic=icmin TO icmax step 4

  asm
  fld dword ptr [esi-sizemilieuh*4]      'pa4(y-)
  fadd dword ptr [esi-4]                'pa4(y-,x-)
  fld dword ptr [esi-sizemilieuh*4+4]    'pb4(y-)
pa4(y-,x-)
  fadd dword ptr [esi-4+4]              'pb4(y-,x-)
pa4(y-,x-)
  fld dword ptr [esi-sizemilieuh*4+8]    'pc4(y-)
pb4(y-,x-)                  pa4(y-,x-)
  fadd dword ptr [esi-4+8]              'pc4(y-,x-)
pb4(y-,x-)                  pa4(y-,x-)
  fld dword ptr [esi-sizemilieuh*4+12]   'pd4(y-)
pc4(y-,x-)                  pb4(y-,x-)                  pa4(y-,x-)
  fadd dword ptr [esi-4+12]             'pd4(y-,x-)
pc4(y-,x-)                  pb4(y-,x-)                  pa4(y-,x-)

   fxch st(3)                           'pa4(y-,x-)
pc4(y-,x-)                  pb4(y-,x-)                  pd4(y-,x-)
  fadd dword ptr [esi+4]                'pa4(y-,x+-)
pc4(y-,x-)                  pb4(y-,x-)                  pd4(y-,x-)
   fxch st(2)                           'pb4(y-,x-)
pc4(y-,x-)                  pa4(y-,x+-)                 pd4(y-,x-)
  fadd dword ptr [esi+4+4]              'pb4(y-,x+-)
pc4(y-,x-)                  pa4(y-,x+-)                 pd4(y-,x-)
   fxch st(1)                           'pc4(y-,x-)
pb4(y-,x+-)                 pa4(y-,x+-)                 pd4(y-,x-)
  fadd dword ptr [esi+4+8]              'pc4(y-,x+-)
pb4(y-,x+-)                 pa4(y-,x+-)                 pd4(y-,x-)
   fxch st(3)                           'pd4(y-,x-)
pb4(y-,x+-)                 pa4(y-,x+-)                 pc4(y-,x+-)
  fadd dword ptr [esi+4+12]             'pd4(y-,x+-)
pb4(y-,x+-)                 pa4(y-,x+-)                 pc4(y-,x+-)

   fxch st(2)                           'pa4(y-,x+-)
pb4(y-,x+-)                 pd4(y-,x+-)                 pc4(y-,x+-)
  fadd dword ptr [esi+sizemilieuh*4]     'pa4(y+-,x+-)
pb4(y-,x+-)                 pd4(y-,x+-)                 pc4(y-,x+-)
   fxch st(1)                           'pb4(y-,x+-)
pa4(y+-,x+-)                pd4(y-,x+-)                 pc4(y-,x+-)
  fadd dword ptr [esi+sizemilieuh*4+4]   'pb4(y+-,x+-)
pa4(y+-,x+-)                pd4(y-,x+-)                 pc4(y-,x+-)
   fxch st(3)                           'pc4(y-,x+-)
pa4(y+-,x+-)                pd4(y-,x+-)                 pb4(y+-,x+-)
  fadd dword ptr [esi+sizemilieuh*4+8]   'pc4(y+-,x+-)
pa4(y+-,x+-)                pd4(y-,x+-)                 pb4(y+-,x+-)
   fxch st(2)                           'pd4(y-,x+-)
pa4(y+-,x+-)                pc4(y+-,x+-)                pb4(y+-,x+-)
  fadd dword ptr [esi+sizemilieuh*4+12]  'pd4(y+-,x+-)
pa4(y+-,x+-)                pc4(y+-,x+-)                pb4(y+-,x+-)

   fxch st(1)                           'pa4(yx)
pd4(yx)                     pc4(yx)                     pb4(yx)
  fmul dword ptr [float16]              'pa4(yx)*16
pd4(yx)                     pc4(yx)                     pb4(yx)
   fxch st(3)                           'pb4(yx)
pd4(yx)                     pc4(yx)                     pa4(yx)*16
```

```
  fmul dword ptr [float16]              'pb4(yx)*16
pd4(yx)                     pc4(yx)                     pa4(yx)*16
   fxch st(2)                           'pc4(yx)
pd4(yx)                     pb4(yx)*16                  pa4(yx)*16
  fmul dword ptr [float16]              'pc4(yx)*16
pd4(yx)                     pb4(yx)*16                  pa4(yx)*16
   fxch st(1)                           'pd4(yx)
pc4(yx)*16                  pb4(yx)*16                  pa4(yx)*16
  fmul dword ptr [float16]              'pd4(yx)*16
pc4(yx)*16                  pb4(yx)*16                  pa4(yx)*16

   fxch st(3)                           'pa4(yx)*16
pc4(yx)*16                  pb4(yx)*16                  pd4(yx)*16
  fld dword ptr [esi]                   'pa(yx)
pa4(yx)*16                  pc4(yx)*16                  pb4(yx)*16
pd4(yx)*16
  fmul dword ptr [floatm60]             'pa(yx)*-60
pa4(yx)*16                  pc4(yx)*16                  pb4(yx)*16
pd4(yx)*16
  faddp st(1)                           'pa(yx)*-60+pa4(yx)*16
pc4(yx)*16                  pb4(yx)*16                  pd4(yx)*16

   fxch st(2)                           'pb4(yx)*16
pc4(yx)*16                  pa(yx)*-60+pa4(yx)*16       pd4(yx)*16
  fld dword ptr [esi+4]                 'pb(yx)
pb4(yx)*16                  pc4(yx)*16                  pa(yx)*-
60+pa4(yx)*16       pd4(yx)*16
  fmul dword ptr [floatm60]             'pb(yx)*-60
pb4(yx)*16                  pc4(yx)*16                  pa(yx)*-
60+pa4(yx)*16       pd4(yx)*16
  faddp st(1)                           'pb(yx)*-60+pb4(yx)*16
pc4(yx)*16                  pa(yx)*-60+pa4(yx)*16       pd4(yx)*16

   fxch st(1)                           'pc4(yx)*16
pb(yx)*-60+pb4(yx)*16       pa(yx)*-60+pa4(yx)*16       pd4(yx)*16
  fld dword ptr [esi+8]                 'pc(yx)
pc4(yx)*16                  pb(yx)*-60+pb4(yx)*16       pa(yx)*-
60+pa4(yx)*16       pd4(yx)*16
  fmul dword ptr [floatm60]             'pc(yx)*-60
pc4(yx)*16                  pb(yx)*-60+pb4(yx)*16       pa(yx)*-
60+pa4(yx)*16       pd4(yx)*16
  faddp st(1)                           'pc(yx)*-60+pc4(yx)*16
pb(yx)*-60+pb4(yx)*16       pa(yx)*-60+pa4(yx)*16       pd4(yx)*16

   fxch st(3)                           'pd4(yx)*16
pb(yx)*-60+pb4(yx)*16       pa(yx)*-60+pa4(yx)*16       pc(yx)*-
60+pc4(yx)*16
  fld dword ptr [esi+12]                'pd(yx)
pd4(yx)*16                  pb(yx)*-60+pb4(yx)*16       pa(yx)*-
60+pa4(yx)*16       pc(yx)*-60+pc4(yx)*16
  fmul dword ptr [floatm60]             'pd(yx)*-60
pd4(yx)*16                  pb(yx)*-60+pb4(yx)*16       pa(yx)*-
60+pa4(yx)*16       pc(yx)*-60+pc4(yx)*16
```

```
  faddp st(1)                           'pd(yx)*-60+pd4(yx)*16
pb(yx)*-60+pb4(yx)*16       pa(yx)*-60+pa4(yx)*16       pc(yx)*-
60+pc4(yx)*16

   fxch st(2)                           'pa                         pb
pd                          pc
  fsub dword ptr [esi-sizemilieuh*8]     'pa-pa8(y-)                 pb
pd                          pc
   fxch st(1)                           'pb                         pa-
pa8(y-)                  pd                           pc
  fsub dword ptr [esi-sizemilieuh*8+4]   'pb-pb8(y-)                 pa-
pa8(y-)                  pd                           pc
   fxch st(3)                           'pc                         pa-
pa8(y-)                  pd                           pb-pb8(y-)
  fsub dword ptr [esi-sizemilieuh*8+8]   'pc-pc8(y-)                 pa-
pa8(y-)                  pd                           pb-pb8(y-)
   fxch st(2)                           'pd                         pa-
pa8(y-)                  pc-pc8(y-)                   pb-pb8(y-)
  fsub dword ptr [esi-sizemilieuh*8+12]  'pd-pd8(y-)                 pa-
pa8(y-)                  pc-pc8(y-)                   pb-pb8(y-)

   fxch st(1)                           'pa-pa8(y-)                 pd-
pd8(y-)                  pc-pc8(y-)                   pb-pb8(y-)
  fsub dword ptr [esi-8]                'pa-pa8(y-,x-)              pd-
pd8(y-)                  pc-pc8(y-)                   pb-pb8(y-)
   fxch st(3)                           'pb-pb8(y-)                 pd-
pd8(y-)                  pc-pc8(y-)                   pa-pa8(y-,x-)
  fsub dword ptr [esi-8+4]              'pb-pb8(y-,x-)              pd-
pd8(y-)                  pc-pc8(y-)                   pa-pa8(y-,x-)
   fxch st(2)                           'pc-pc8(y-)                 pd-
pd8(y-)                  pb-pb8(y-,x-)                pa-pa8(y-,x-)
  fsub dword ptr [esi-8+8]              'pc-pc8(y-,x-)              pd-
pd8(y-)                  pb-pb8(y-,x-)                pa-pa8(y-,x-)
   fxch st(1)                           'pd-pd8(y-)                 pc-
pc8(y-,x-)               pb-pb8(y-,x-)                pa-pa8(y-,x-)
  fsub dword ptr [esi-8+12]             'pd-pd8(y-,x-)              pc-
pc8(y-,x-)               pb-pb8(y-,x-)                pa-pa8(y-,x-)

   fxch st(3)                           'pa-pa8(y-,x-)              pc-
pc8(y-,x-)               pb-pb8(y-,x-)                pd-pd8(y-,x-)
  fsub dword ptr [esi+8]                'pa-pa8(y-,x+-)             pc-
pc8(y-,x-)               pb-pb8(y-,x-)                pd-pd8(y-,x-)
   fxch st(2)                           'pb-pb8(y-,x-)              pc-
pc8(y-,x-)               pa-pa8(y-,x+-)               pd-pd8(y-,x-)
  fsub dword ptr [esi+8+4]              'pb-pb8(y-,x+-)             pc-
pc8(y-,x-)               pa-pa8(y-,x+-)               pd-pd8(y-,x-)
   fxch st(1)                           'pc-pc8(y-,x-)              pb-
pb8(y-,x+-)              pa-pa8(y-,x+-)               pd-pd8(y-,x-)
  fsub dword ptr [esi+8+8]              'pc-pc8(y-,x+-)             pb-
pb8(y-,x+-)              pa-pa8(y-,x+-)               pd-pd8(y-,x-)
   fxch st(3)                           'pd-pd8(y-,x-)              pb-
pb8(y-,x+-)              pa-pa8(y-,x+-)               pc-pc8(y-,x+-)
  fsub dword ptr [esi+8+12]             'pd-pd8(y-,x+-)             pb-
pb8(y-,x+-)              pa-pa8(y-,x+-)               pc-pc8(y-,x+-)
```

```
   fxch st(2)                           'pa-pa8(y-,x+-)              pb-
pb8(y-,x+-)              pd-pd8(y-,x+-)              pc-pc8(y-,x+-)
  fsub dword ptr [esi+sizemilieuh*8]     'pa-pa8(y+-,x+-)            pb-
pb8(y-,x+-)              pd-pd8(y-,x+-)              pc-pc8(y-,x+-)
   fxch st(1)                           'pb-pb8(y-,x+-)              pa-
pa8(y+-,x+-)             pd-pd8(y-,x+-)              pc-pc8(y-,x+-)
  fsub dword ptr [esi+sizemilieuh*8+4]   'pb-pb8(y+-,x+-)            pa-
pa8(y+-,x+-)             pd-pd8(y-,x+-)              pc-pc8(y-,x+-)
   fxch st(3)                           'pc-pc8(y-,x+-)              pa-
pa8(y+-,x+-)             pd-pd8(y-,x+-)              pb-pb8(y+-,x+-)
  fsub dword ptr [esi+sizemilieuh*8+8]   'pc-pc8(y+-,x+-)            pa-
pa8(y+-,x+-)             pd-pd8(y-,x+-)              pb-pb8(y+-,x+-)
   fxch st(2)                           'pd-pd8(y-,x+-)              pa-
pa8(y+-,x+-)             pc-pc8(y+-,x+-)             pb-pb8(y+-,x+-)
  fsub dword ptr [esi+sizemilieuh*8+12]  'pd-pd8(y+-,x+-)            pa-
pa8(y+-,x+-)             pc-pc8(y+-,x+-)             pb-pb8(y+-,x+-)

   fxch st(1)                           'pa                          pd
pc                          pb
  fmul dword ptr [indicereac+ecx]       'pa*ind                      pd
pc                          pb
   fxch st(3)                           'pb                          pd
pc                          pa*ind
  fmul dword ptr [indicereac+ecx+4]     'pb*ind                      pd
pc                          pa*ind
   fxch st(2)                           'pc                          pd
pb*ind                      pa*ind
  fmul dword ptr [indicereac+ecx+8]     'pc*ind                      pd
pb*ind                      pa*ind
   fxch st(1)                           'pd
pc*ind                      pb*ind                      pa*ind
  fmul dword ptr [indicereac+ecx+12]    'pd*ind
pc*ind                      pb*ind                      pa*ind

   fxch st(3)                           'pa*ind
pc*ind                      pb*ind                      pd*ind
  fsub dword ptr [ptla+ecx]             'pa*ind-paold
pc*ind                      pb*ind                      pd*ind
   fxch st(2)                           'pb*ind
pc*ind                      pa*ind-paold                pd*ind
  fsub dword ptr [ptla+ecx+4]           'pb*ind-pbold
pc*ind                      pa*ind-paold                pd*ind
   fxch st(1)                           'pc*ind
pb*ind-pbold                pa*ind-paold                pd*ind
  fsub dword ptr [ptla+ecx+8]           'pc*ind-pcold
pb*ind-pbold                pa*ind-paold                pd*ind
   fxch st(3)                           'pd*ind
pb*ind-pbold                pa*ind-paold                pc*ind-pcold
  fsub dword ptr [ptla+ecx+12]          'pd*ind-pdold
pb*ind-pbold                pa*ind-paold                pc*ind-pcold

   fxch st(2)                           'pa*ind-paold
pb*ind-pbold                pd*ind-pdold                pc*ind-pcold
```

```
  fadd dword ptr [esi]                  'pa*ind-paold+pa0(yx)
pb*ind-pbold                pd*ind-pdold                pc*ind-pcold
   fxch st(1)                           'pb*ind-pbold
pa*ind-paold+pa0(yx)        pd*ind-pdold                pc*ind-pcold
  fadd dword ptr [esi+4]                'pb*ind-pbold+pb0(yx)
pa*ind-paold+pa0(yx)        pd*ind-pdold                pc*ind-pcold
   fxch st(3)                           'pc*ind-pcold
pa*ind-paold+pa0(yx)        pd*ind-pdold                pb*ind-
pbold+pb0(yx)
  fadd dword ptr [esi+8]                'pc*ind-pcold+pc0(yx)
pa*ind-paold+pa0(yx)        pd*ind-pdold                pb*ind-
pbold+pb0(yx)
   fxch st(2)                           'pd*ind-pdold
pa*ind-paold+pa0(yx)        pc*ind-pcold+pc0(yx)        pb*ind-
pbold+pb0(yx)
  fadd dword ptr [esi+12]               'pd*ind-pdold+pd0(yx)
pa*ind-paold+pa0(yx)        pc*ind-pcold+pc0(yx)        pb*ind-
pbold+pb0(yx)

   fxch st(1)                           'pa                         pd
pc                          pb
  fmul dword ptr [attenuation+ecx]      'pa*aten                    pd
pc                          pb
   fxch st(3)                           'pb                         pd
pc                          pa*aten
  fmul dword ptr [attenuation+ecx+4]    'pb*aten                    pd
pc                          pa*aten
   fxch st(2)                           'pc                         pd
pb*aten                     pa*aten
  fmul dword ptr [attenuation+ecx+8]    'pc*aten                    pd
pb*aten                     pa*aten
   fxch st(1)                           'pd
pc*aten                     pb*aten                     pa*aten
  fmul dword ptr [attenuation+ecx+12]   'pd*aten
pc*aten                     pb*aten                     pa*aten

   fxch st(3)                           'pa*aten
pc*aten                     pb*aten                     pd*aten
  fadd dword ptr [esi]                  'pa*aten+pa0(yx)
pc*aten                     pb*aten                     pd*aten
   fxch st(2)                           'pb*aten
pc*aten                     pa*aten+pa0(yx)             pd*aten
  fadd dword ptr [esi+4]                'pb*aten+pb0(yx)
pc*aten                     pa*aten+pa0(yx)             pd*aten
   fxch st(1)                           'pc*aten
pb*aten+pb0(yx)             pa*aten+pa0(yx)             pd*aten
  fadd dword ptr [esi+8]                'pc*aten+pc0(yx)
pb*aten+pb0(yx)             pa*aten+pa0(yx)             pd*aten
   fxch st(3)                           'pd*aten
pb*aten+pb0(yx)             pa*aten+pa0(yx)             pc*aten+pc0(yx)
  fadd dword ptr [esi+12]               'pd*aten+pd0(yx)
pb*aten+pb0(yx)             pa*aten+pa0(yx)             pc*aten+pc0(yx)
```

```
  fstp dword ptr [ptla+12+ecx]          'pd*aten+pd0(yx)
pb*aten+pb0(yx)             pa*aten+pa0(yx)             pc*aten+pc0(yx)
  fstp dword ptr [ptla+4+ecx]           'pb*aten+pb0(yx)
pa*aten+pa0(yx)             pc*aten+pc0(yx)
  fstp dword ptr [ptla+0+ecx]           'pa*aten+pa0(yx)
pc*aten+pc0(yx)
  fstp dword ptr [ptla+8+ecx]           'pc*aten+pc0(yx)


  add esi,16
  add ecx,16
  end asm


 next
 cptintmouse+=1:if cptintmouse>intervrafrechmouse then
cptintmouse=0:gosub testmousesurecran
next
return










modifiedoppler:'---------------------------------------------------------
-------

message$="entrez un nouveau rapport v/c entre 0 et 3":gosub
interrogemessage
dopplervsurc=val(message$)

' avance = 0.50096 pixel par trame
' si v/c=1 => v=c=0.50096
' si v/c=0 => v=0
' si v/c=2 => v=2*c=0.50096*2
' v=(v/c)*c

if dopplervsurc>3 then dopplervsurc=3
if dopplervsurc<-3 then dopplervsurc=-3
dopplerc=.50096
dopplerv=dopplervsurc*dopplerc

gosub initptlszonecalcul
gosub initlimitescalcul
t=0
return
```

```
tracecourbes:'-----------------------------------------------------------------

select case zoom
case -1
 if itracedecal>(imaxm2-largzoneaff*2) then itracedecal=(imaxm2-largzoneaff*2)
 if jtracedecal>(jmaxm2-hautzoneaff*2) then jtracedecal=(jmaxm2-hautzoneaff*2)
case 0
 if itracedecal>(imaxm2-largzoneaff) then itracedecal=(imaxm2-largzoneaff)
 if jtracedecal>(jmaxm2-hautzoneaff) then jtracedecal=(jmaxm2-hautzoneaff)
case 1
 if itracedecal>(imaxm2-largzoneaffsur2) then itracedecal=(imaxm2-largzoneaffsur2)
 if jtracedecal>(jmaxm2-hautzoneaffsur2) then jtracedecal=(jmaxm2-hautzoneaffsur2)
end select
if itracedecal<2 then itracedecal=2
if jtracedecal<2 then jtracedecal=2

workpage=visiblepage xor 1:pcopy visiblepage,workpage:screenset workpage,visiblepage

itracedecalint=int(itracedecal)
```

```
jtracedecalint=int(jtracedecal)

adrecran=screenptr
adrecranmin=adrecran+(53*sizeecranh+211)*4
adrecranmax=adrecran+(sizeecranv*sizeecranh+sizeecranh-1)*4
adrecranmaxm8=(adrecranmax-sizeecranh*8)*4
adrecran=adrecranmin

if tracecontourson=0 then goto traceshunt

select case paletteencours
 case 0
  coefpalette=256*256   'rouge
 case 1
  coefpalette=256       'vert
 case 2
  coefpalette=1         'bleu
 case 3
  coefpalette=1
 case 4
  coefpalette=256*256
 case 5
  coefpalette=1
end select

select case zoom
case 1
 for yecran=0 to hautzoneaff-1 step 2
  adrecranligney=adrecran+yecran*sizeecranh*4
  jtrace=jtracedecalint+yecran*.5
  for xecran=0 to largzoneaff-1 step 2
   itrace=itracedecalint+xecran*.5
   if indicereac(jtrace,itrace)=coefreac then col=rosemask else
col=coefpalette*int((1-indicereac(jtrace,itrace)/coefreac)*255)
   poke integer ,adrecranligney+xecran*4,col
   poke integer ,adrecranligney+xecran*4+4,col
   poke integer ,adrecranligney+xecran*4+sizeecranh*4,col
   poke integer ,adrecranligney+xecran*4+4+sizeecranh*4,col
  next
 next
case 0
 for yecran=0 to hautzoneaff
  adrecranligney=adrecran+yecran*sizeecranh*4
  jtrace=jtracedecalint+yecran
  for xecran=0 to largzoneaff
   itrace=itracedecalint+xecran
   if indicereac(jtrace,itrace)=coefreac then col=rosemask else
col=coefpalette*int((1-indicereac(jtrace,itrace)/coefreac)*255)
   poke integer ,adrecranligney+xecran*4,col
  next
 next
case -1
 for yecran=0 to hautzoneaff
  adrecranligney=adrecran+yecran*sizeecranh*4
  jtrace=jtracedecalint+yecran*2
  for xecran=0 to largzoneaff
   itrace=itracedecalint+xecran*2
   if indicereac(jtrace,itrace)=coefreac then col=rosemask else
col=coefpalette*int((1-indicereac(jtrace,itrace)/coefreac)*255)
   poke integer ,adrecranligney+xecran*4,col
  next
 next
end select
if tracecontourson then get (211,53)-(211+largzoneaff-1,53+hautzoneaff-
1),memoreac(0)

traceshunt:

select case paletteencours
 case 0
  contraste=contraste0:gosub tracegris
 case 1
  contraste=contraste1:gosub traceamplitude
 case 2
  contraste=contraste2:gosub traceamplitude
 case 3
  contraste=contraste3:gosub traceenergie
 case 4
  contraste=contraste4:gosub traceenergie
 case 5
  contraste=contraste5:gosub traceenergie
end select

if tracecontourson then Put (211,53),memoreac(0),alpha, 96
if grilleon then gosub tracegrille
gosub tracecroixelements
gosub tracespotavi
if obsactif then gosub traceobservateur
if aboutonoff=1 then gosub afficheabout
visiblepage=workpage:screenset workpage,visiblepage
return

tracegris:'--------------------------------------------------------------
-------

select case zoom
 case -1
  gosub tracegrisunzoom
 case 0
  gosub tracegrisnormal
 case 1
  gosub tracegriszoom
end select
return

tracegriszoom:'----------------------------------------------------------
-------
```

```
for yecran=0 to hautzoneaff-1 step 2
 adrecranligney=adrecran+yecran*sizeecranh*4
 jtrace=jtracedecalint+yecran*.5
 for xecran=0 to largzoneaff-1 step 2
  itrace=itracedecalint+xecran*.5
  if trameaoub=0 then
   ton=ptlb(jtrace,itrace)*contraste
  else
   ton=ptla(jtrace,itrace)*contraste
  end if
  tonb=ton-91+91*indicereac(jtrace,itrace)/coefreacbase
  traceattenuateur=0
  if attenuation(jtrace,itrace)<coefattenuation then
   tonb=ton-63+63*attenuation(jtrace,itrace)
   traceattenuateur=1
  end if
  iF ton>124 THEN ton=124
  IF ton<-124 THEN ton=-124
  iF tonb>124 THEN tonb=124
  IF tonb<-124 THEN tonb=-124
  if traceattenuateur then
   col=moitblanc+tonb*antibleu+ton*unitbleu
  else
   col=moitblanc+tonb*unitcolbar+ton*unitcol
  end if
  poke integer ,adrecranligney+xecran*4,col
  poke integer ,adrecranligney+xecran*4+4,col
  poke integer ,adrecranligney+xecran*4+sizeecranh*4,col
  poke integer ,adrecranligney+xecran*4+4+sizeecranh*4,col
 next
next
return

tracegrisnormal:'--------------------------------------------------------
-------

for yecran=0 to hautzoneaff
 adrecranligney=adrecran+yecran*sizeecranh*4
 jtrace=jtracedecalint+yecran
 for xecran=0 to largzoneaff
  itrace=itracedecalint+xecran
  if trameaoub=0 then
   ton=ptlb(jtrace,itrace)*contraste
  else
   ton=ptla(jtrace,itrace)*contraste
  end if
  tonb=ton-91+91*indicereac(jtrace,itrace)/coefreacbase
  traceattenuateur=0
  if attenuation(jtrace,itrace)<coefattenuation then
   tonb=ton-63+63*attenuation(jtrace,itrace)
   traceattenuateur=1
  end if
  iF ton>124 THEN ton=124
  IF ton<-124 THEN ton=-124
  iF tonb>124 THEN tonb=124
  IF tonb<-124 THEN tonb=-124
  if traceattenuateur then
   col=moitblanc+tonb*antibleu+ton*unitbleu
  else
   col=moitblanc+tonb*unitcolbar+ton*unitcol
  end if
  poke integer ,adrecranligney+xecran*4,col
 next
next
return

tracegrisunzoom:'-----------------------------------------------------------
-------

for yecran=0 to hautzoneaff
 adrecranligney=adrecran+yecran*sizeecranh*4
 jtrace=jtracedecalint+yecran*2
 for xecran=0 to largzoneaff
  itrace=itracedecalint+xecran*2
  if trameaoub=0 then
   ton=ptlb(jtrace,itrace)*contraste
  else
   ton=ptla(jtrace,itrace)*contraste
  end if
  tonb=ton-91+91*indicereac(jtrace,itrace)/coefreacbase
  traceattenuateur=0
  if attenuation(jtrace,itrace)<coefattenuation then
   tonb=ton-63+63*attenuation(jtrace,itrace)
   traceattenuateur=1
  end if
  iF ton>124 THEN ton=124
  IF ton<-124 THEN ton=-124
  iF tonb>124 THEN tonb=124
  IF tonb<-124 THEN tonb=-124
  if traceattenuateur then
   col=moitblanc+tonb*antibleu+ton*unitbleu
  else
   col=moitblanc+tonb*unitcolbar+ton*unitcol
  end if
  poke integer ,adrecranligney+xecran*4,col
 next
next
return



traceamplitude:'------------------------------------------------------------
-------

select case zoom
 case -1
  gosub traceamplitudeunzoom
 case 0
```

```
  gosub traceamplitudenormal
 case 1
  gosub traceamplitudezoom
end select
return

traceamplitudezoom:'---------------------------------------------------
-------

for yecran=0 to hautzoneaff-1 step 2
 adrecranligney=adrecran+yecran*sizeecranh*4
 jtrace=jtracedecalint+yecran*.5
 for xecran=0 to largzoneaff-1 step 2
  itrace=itracedecalint+xecran*.5
  if trameaoub=0 then
   ton=ptlb(jtrace,itrace)*contraste
  else
   ton=ptla(jtrace,itrace)*contraste
  end if
  IF ton>seuilcolmax THEN ton=seuilcolmax
  IF ton<seuilcolmin THEN ton=seuilcolmin
  col=colamplitude(ton)
  poke integer ,adrecranligney+xecran*4,col
  poke integer ,adrecranligney+xecran*4+4,col
  poke integer ,adrecranligney+xecran*4+sizeecranh*4,col
  poke integer ,adrecranligney+xecran*4+4+sizeecranh*4,col
 next
next
return

traceamplitudenormal:'---------------------------------------------------
-------

for yecran=0 to hautzoneaff
 adrecranligney=adrecran+yecran*sizeecranh*4
 jtrace=jtracedecalint+yecran
 for xecran=0 to largzoneaff
  itrace=itracedecalint+xecran
  if trameaoub=0 then
   ton=ptlb(jtrace,itrace)*contraste
  else
   ton=ptla(jtrace,itrace)*contraste
  end if
  IF ton>seuilcolmax THEN ton=seuilcolmax
  IF ton<seuilcolmin THEN ton=seuilcolmin
  col=colamplitude(ton)
  poke integer ,adrecranligney+xecran*4,col
 next
next
return

traceamplitudeunzoom:'---------------------------------------------------
-------
```

```
contrasteb=contraste*.7
for yecran=0 to hautzoneaff
 adrecranligney=adrecran+yecran*sizeecranh*4
 jtrace=jtracedecalint+yecran*2
 for xecran=0 to largzoneaff
  itrace=itracedecalint+xecran*2
  if trameaoub=0 then
   ton=ptlb(jtrace,itrace)*contrasteb
  else
   ton=ptla(jtrace,itrace)*contrasteb
  end if
  IF ton>seuilcolmax THEN ton=seuilcolmax
  IF ton<seuilcolmin THEN ton=seuilcolmin
  col=colamplitude(ton)
  poke integer ,adrecranligney+xecran*4,col
 next
next
return







traceenergie:'----------------------------------------------------------
-------

colgrilleenergie=colgrilleenergiea
select case zoom
 case -1
  gosub traceenergieunzoom
 case 0
  gosub traceenergienormal
 case 1
  gosub traceenergiezoom
end select
return

traceenergiezoom:'------------------------------------------------------
-------

for yecran=0 to hautzoneaff-1  step 2
 adrecranligney=adrecran+yecran*sizeecranh*4
 jtrace=jtracedecalint+yecran*.5
 for xecran=0 to largzoneaff-1 step 2
  itrace=itracedecalint+xecran*.5
  if trameaoub=0 then
   ton=(ptlb(jtrace,itrace-1)*ptlb(jtrace,itrace-
1)+ptlb(jtrace,itrace+1)*ptlb(jtrace,itrace+1)+ptlb(jtrace-
1,itrace)*ptlb(jtrace-
1,itrace)+ptlb(jtrace+1,itrace)*ptlb(jtrace+1,itrace))*contraste
  else
```

```
   ton=(ptla(jtrace,itrace-1)*ptla(jtrace,itrace-
1)+ptla(jtrace,itrace+1)*ptla(jtrace,itrace+1)+ptla(jtrace-
1,itrace)*ptla(jtrace-
1,itrace)+ptla(jtrace+1,itrace)*ptla(jtrace+1,itrace))*contraste
  end if
  iF ton<1 THEN ton=0
  iF ton>seuilcolmax THEN ton=seuilcolmax
  col=colenergie(ton)
  poke integer ,adrecranligney+xecran*4,col
  poke integer ,adrecranligney+xecran*4+4,col
  poke integer ,adrecranligney+xecran*4+sizeecranh*4,col
  poke integer ,adrecranligney+xecran*4+4+sizeecranh*4,col
 next
next
return

traceenergienormal:'-----------------------------------------------------
-------

if trameaoub=0 then adr=varptr(ptlb(0,0)) else adr=varptr(ptla(0,0))

for yecran=0 to hautzoneaff
 adrecranligney=adrecran+yecran*sizeecranh*4
 jtrace=jtracedecalint+yecran
 for xecran=0 to largzoneaff

  asm
  mov eax, dword ptr [_XECRAN]
  add eax, dword ptr [itracedecalint]
  mov dword ptr [itrace], eax
  mov ecx, dword ptr [jtrace]
  imul ecx, sizemilieuh
  add ecx, dword ptr [itrace]
  imul ecx, 4
  mov esi,[adr]
  add esi,ecx
  fld dword ptr [esi-sizemilieuh*4]
  fmul st(0)
  fld dword ptr [esi-4]
  fmul st(0)
  fxch st(1)
  faddp
  fld dword ptr [esi+4]
  fmul st(0)
  fxch st(1)
  faddp
  fld dword ptr [esi+sizemilieuh*4]
  fmul st(0)
  fxch st(1)
  faddp
  fmul dword ptr [_CONTRASTE]
  fistp dword ptr [_TON]
  end asm
  iF ton<1 THEN ton=0
  iF ton>seuilcolmax THEN ton=seuilcolmax
  col=colenergie(ton)
  poke integer ,adrecranligney+xecran*4,col
 next
next

return

traceenergieunzoom:'-----------------------------------------------------
-------

contrasteb=contraste*.3

if trameaoub=0 then adr=varptr(ptlb(0,0)) else adr=varptr(ptla(0,0))

for yecran=0 to hautzoneaff
 adrecranligney=adrecran+yecran*sizeecranh*4
 jtrace=jtracedecalint+yecran*2
 for xecran=0 to largzoneaff

  asm
  mov eax, dword ptr [_XECRAN]
  sal eax, 1
  add eax, dword ptr [itracedecalint]
  mov dword ptr [itrace], eax
  mov ecx, dword ptr [jtrace]
  imul ecx, sizemilieuh
  add ecx, dword ptr [itrace]
  imul ecx, 4
  mov esi,[adr]
  add esi,ecx

  fld dword ptr [esi-sizemilieuh*8-4]
  fmul st(0)
  fld dword ptr [esi-sizemilieuh*8+4]
  fmul st(0)
  fxch st(1)
  faddp

  fld dword ptr [esi-sizemilieuh*4-8]
  fmul st(0)
  fxch st(1)
  faddp
  fld dword ptr [esi-sizemilieuh*4]
  fmul st(0)
  fxch st(1)
  faddp
  fld dword ptr [esi-sizemilieuh*4+8]
  fmul st(0)
  fxch st(1)
  faddp

  fld dword ptr [esi-4]
```

```
   fmul st(0)
   fxch st(1)
   faddp
   fld dword ptr [esi+4]
   fmul st(0)
   fxch st(1)
   faddp

   fld dword ptr [esi+sizemilieuh*4-8]
   fmul st(0)
   fxch st(1)
   faddp
   fld dword ptr [esi+sizemilieuh*4]
   fmul st(0)
   fxch st(1)
   faddp
   fld dword ptr [esi+sizemilieuh*4+8]
   fmul st(0)
   fxch st(1)
   faddp

   fld dword ptr [esi+sizemilieuh*8-4]
   fmul st(0)
   fxch st(1)
   faddp
   fld dword ptr [esi+sizemilieuh*8+4]
   fmul st(0)
   fxch st(1)
   faddp

   fmul dword ptr [_CONTRASTEB]
   fistp dword ptr [_TON]
   end asm

   iF ton<1 THEN ton=0
   iF ton>seuilcolmax THEN ton=seuilcolmax
   col=colenergie(ton)
   poke integer ,adrecranligney+xecran*4,col
  next
next
return


contrasteplus:'------------------------------------------------------------
-------

message$="augmente la luminosit"+chr$(130)+"      actuellement = "
select case paletteencours
 case 0
  message$+=str$(contraste0)
 case 1
  message$+=str$(contraste1)
 case 2
  message$+=str$(contraste2)
 case 3
  message$+=str$(contraste3)
 case 4
  message$+=str$(contraste4)
 case 5
  message$+=str$(contraste5)
end select
gosub affichemessage
if mousebouton=0 then return

select case paletteencours
 case 0
  contraste0*=1.1
 case 1
  contraste1*=1.1
 case 2
  contraste2*=1.1
 case 3
  contraste3*=1.1
 case 4
  contraste4*=1.1
 case 5
  contraste5*=1.1
end select
gosub tracecourbes
gosub attendrelachemousecourt
return

contrastemoins:'----------------------------------------------------------
-------

message$="diminue la luminosit"+chr$(130)+"      actuellement = "
select case paletteencours
 case 0
  message$+=str$(contraste0)
 case 1
  message$+=str$(contraste1)
 case 2
  message$+=str$(contraste2)
 case 3
  message$+=str$(contraste3)
 case 4
  message$+=str$(contraste4)
 case 5
  message$+=str$(contraste5)
end select
gosub affichemessage
if mousebouton=0 then return

select case paletteencours
 case 0
  contraste0/=1.1
 case 1
  contraste1/=1.1
 case 2
  contraste2/=1.1
 case 3
  contraste3/=1.1
 case 4
  contraste4/=1.1
 case 5
  contraste5/=1.1
end select
gosub tracecourbes
gosub attendrelachemousecourt
return











tracespotavi:'-----------------------------------------------------------
-------

if aviopen=1 then
 avicpt+=1:if avicpt>avicptlim then avicpt=0:avispot=avispot xor 1
 if avispot=1 then
  Circle (226, 69),10,rouge,,,,F
 else
  if paletteencours=0 then
   Circle (226, 69),10,moitblanc,,,,F
  else
   Circle (226, 69),10,noir,,,,F
  end if
 end if
end if
return

tracecroixelements:'-----------------------------------------------------
-------

if numdernierelement<1 then return
for numelement=1 to numdernierelement
 xcroix=elementinfo(0,numelement)-itracedecal
 ycroix=elementinfo(1,numelement)-jtracedecal
 select case zoom
 case -1
  xcroix*=.5
  ycroix*=.5
 case 1
  xcroix*=2
  ycroix*=2
 end select

 xcroix=int(xcroix):ycroix=int(ycroix)
 if xcroix>7 then
  if xcroix<(largzoneaff-7) then
   if ycroix>7 then
    if ycroix<(hautzoneaff-7) then
     xcroix+=211:ycroix+=53
     col=blanc
     if elementselect(numelement)=1 then col=vertclair
     if numelement=numelementselect then col=vertclair
     line(xcroix-5,ycroix)-(xcroix+5,ycroix),col
     line(xcroix,ycroix-5)-(xcroix,ycroix+5),col

     if numelement=numelementselect then
      if elementnom$(numelement)="sources alignees" then
       angle=elementinfo(3,numelementselect)*deuxpisur360
       largeur=elementinfo(2,numelementselect)/2
       if zoom=-1 then largeur*=.5
       if zoom=1 then largeur*=2
       for larg=0 to largeur
        x=cos(angle)*larg:y=sin(angle)*larg
        xx=xcroix-x:yy=ycroix-y:if xx>211 then if xx<(211+largzoneaff-1)
then if yy>53 then if yy<(53+hautzoneaff-1) then pset(xx,yy),col
        xx=xcroix+x:yy=ycroix+y:if xx>211 then if xx<(211+largzoneaff-1)
then if yy>53 then if yy<(53+hautzoneaff-1) then pset(xx,yy),col
       next
      end if
     end if

    end if
   end if
  end if
 end if

next
return

tracegrille:'-------------------------------------------------------------
-------

col=colgrilleenergie
if paletteencours<=2 then col=colgrilleamplitude
if paletteencours=0 then col=colgrillegris
for grilley=56 to sizeecranv-21 step 16
 for grillex=217 to sizeecranh step 16
  pset(grillex,grilley),col
 next
next
return
```

```
affichemessage:'---------------------------------------------------------
-------

if message$=oldmessage$ then return
COLOR blanc, bleufond1
locate 95,2:?space(140);
locate 95,2:?message$;
oldmessage$=message$
return

afficheindice:'----------------------------------------------------------
-------

if message$=oldmessage$ then return
COLOR blanc, bleufond1
locate 95,2:?space(110);
locate 95,2:?messagea$;
locate 95,30:?messageb$;
locate 95,75:?messagec$;
oldmessage$=message$
return

affichenumerotrame:'-----------------------------------------------------
-------

COLOR blanc, bleufond1
locate 95,146:?space(17);
locate 95,146:? numtrame;" -"; cint(timer-tempsdebut);"s";
return

afficheposelementenmvt:'-------------------------------------------------
-------

COLOR blanc,bleufond2
locate 20,2:? str$(elementinfo(0,numelementselect)-imaxsur2);"     ";
locate 24,2:? str$(elementinfo(1,numelementselect)-jmaxsur2);"      ";
select case elementtype$(numelementselect)
 case "source"
 if elementnom$(numelementselect)="sources alignees" then locate 32,2:?
elementinfo(3,numelementselect);"      "
 case "attenuateur"
 locate 32,2:? elementinfo(3,numelementselect);"      "
 case "objet"
 locate 36,2:? elementinfo(4,numelementselect);"      "
 case "objetbmp"
 locate 36,2:? elementinfo(4,numelementselect);"      "
end select
return

interrogemessage:'-------------------------------------------------------
-------

largmessage=(len(message$))/2+1
largfenetremessage=(largmessage+2)*8
hautfenetremessage=32
line(617-largfenetremessage,400-hautfenetremessage)-
(617+largfenetremessage,400+hautfenetremessage),bleufond2,BF
line(617-largfenetremessage,400-hautfenetremessage)-
(617+largfenetremessage,400+hautfenetremessage),quarblanc,B
COLOR blanc,bleufond2
locate 50,80-largmessage:? message$;
locate 52,80-largmessage:input message$
COLOR blanc,bleufond2
locate 52,80-largmessage:?"                "
return
```

```
tracemenu:'--------------------------------------------------------------
-------

if numelementselect=numelementselectold then return
```

```
SELECT CASE elementnom$(numelementselect)
 CASE "source ponctuelle"
  gosub tracedebutmenu:gosub tracemenusourceponctuelle:gosub tracefinmenu
 CASE "sources alignees"
  gosub tracedebutmenu:gosub tracemenusourcesalignees:gosub tracefinmenu
 CASE "source en rotation"
  gosub tracedebutmenu:gosub tracemenusourceenrotation:gosub tracefinmenu
 CASE "source en translation"
  gosub tracedebutmenu:gosub tracemenusourceentranslation:gosub tracefinmenu
 CASE "source circulaire"
  gosub tracedebutmenu:gosub tracemenusourcecirculaire:gosub tracefinmenu
 CASE "source AM"
  gosub tracedebutmenu:gosub tracemenusourceAM:gosub tracefinmenu
 CASE "source FM"
  gosub tracedebutmenu:gosub tracemenusourceFM:gosub tracefinmenu
 CASE "source offset"
  gosub tracedebutmenu:gosub tracemenusourceoffset:gosub tracefinmenu
 CASE "surface circulaire"
  gosub tracedebutmenu:gosub tracemenusurfacecirculaire:gosub tracefinmenu
 CASE "surface plane"
  gosub tracedebutmenu:gosub tracemenusurfaceplane:gosub tracefinmenu
 CASE "surface triangulaire"
  gosub tracedebutmenu:gosub tracemenusurfacetriangulaire:gosub tracefinmenu
 CASE "attenuateur"
  gosub tracedebutmenu:gosub tracemenuattenuateur:gosub tracefinmenu
 CASE "observateur"
  gosub tracedebutmenu:gosub tracemenuobservateur:gosub tracefinmenu
 case ""
  line(0,53)-(166,88),bleufond1,BF:line(0,89)-(209,588),bleufond2,BF
END SELECT
if elementtype$(numelementselect)="objetbmp" then
 gosub tracedebutmenu:gosub tracemenuobjetbmp:gosub tracefinmenu
end if
numelementselectold=numelementselect
return

tracedebutmenu:'----------------------------------------------------------------

line(0,53)-(166,88),bleufond1,BF:line(0,89)-(209,588),bleufond2,BF
COLOR griscreme, bleufond1
locate 10,2:? chr$(130);"l";chr$(130);"ment ";numelementselect;
COLOR blanc, bleufond2
locate 14,2:? left$(elementnom$(numelementselect),24);
COLOR griscreme, bleufond2
locate 18,2:?"centre x";
locate 22,2:?"centre y";
return

tracefinmenu:'------------------------------------------------------------------
```

```
COLOR blanc, bleufond2
locate 20,2:? str$(elementinfo(0,numelementselect)-imaxsur2);"   ";
locate 24,2:? str$(elementinfo(1,numelementselect)-jmaxsur2);"   ";
for n=2 to nbrinfosmax(numelementselect)
 locate 20+n*4,2:? str$(elementinfo(n,numelementselect));"   ";
next
return

tracemenusourceponctuelle:'--------------------------------------------------
-------

locate 26,2:?"longueur d'onde";
locate 30,2:?"amplitude";
locate 34,2:?"d";chr$(130);"phasage";
locate 38,2:?"offset";
locate 42,2:?"0:+/-  1:+  2:-";
locate 46,2:?"seuil de d";chr$(130);"clenchement";
locate 50,2:?"dur";chr$(130);"e d'emission";
return

tracemenusourceoffset:'------------------------------------------------------
-------

locate 26,2:?"offset";
locate 30,2:?"seuil de d";chr$(130);"clenchement";
return

tracemenusourcesalignees:'---------------------------------------------------
-------

locate 26,2:?"largeur";
locate 30,2:?"inclinaison";
locate 34,2:?"longueur d'onde";
locate 38,2:?"amplitude";
locate 42,2:?"offset";
locate 46,2:?"0:+/-  1:+  2:-";
locate 50,2:?"apodisation (0=Off)";
return

tracemenusourceenrotation:'--------------------------------------------------
-------

locate 26,2:?"rayon x";
locate 30,2:?"rayon y";
locate 34,2:?"p";chr$(130);"riode de rotation";
locate 38,2:?"longueur d'onde";
locate 42,2:?"amplitude";
locate 46,2:?"d";chr$(130);"phasage";
locate 50,2:?"offset";
locate 54,2:?"0:+/-  1:+  2:-";
locate 58,2:?"seuil de d";chr$(130);"clenchement";
locate 62,2:?"dur";chr$(130);"e d'emission";
return
```

```
tracemenusourceentranslation:'------------------------------------------
-------

locate 26,2:?"vitesse d";chr$(130);"placement x";
locate 30,2:?"vitesse d";chr$(130);"placement y";
locate 34,2:?"longueur d'onde";
locate 38,2:?"amplitude";
locate 42,2:?"d";chr$(130);"phasage";
locate 46,2:?"offset";
locate 50,2:?"0:+/-  1:+  2:-";
locate 54,2:?"seuil de d";chr$(130);"clenchement";
locate 58,2:?"dur";chr$(130);"e d'emission";
return

tracemenusourcecirculaire:'---------------------------------------------
-------

locate 26,2:?"rayon x";
locate 30,2:?"rayon y";
locate 34,2:?"nombre de sources";
locate 38,2:?"longueur d'onde";
locate 42,2:?"phase de rotation";
locate 46,2:?"secteur angulaire";
locate 50,2:?"inclinaison";
locate 54,2:?"amplitude";
locate 58,2:?"offset";
locate 62,2:?"0:+/-  1:+  2:-";
locate 66,2:?"seuil de d";chr$(130);"clenchement";
locate 2*35,2:?"dur";chr$(130);"e d'emission";
return

tracemenusourceAM:'-----------------------------------------------------
-------

locate 26,2:?"longueur d'onde";
locate 30,2:?"amplitude min";
locate 34,2:?"amplitude max";
locate 38,2:?"p";chr$(130);"riode de modulation";
locate 42,2:?"offset";
locate 46,2:?"0:+/-  1:+  2:-";
locate 50,2:?"seuil de d";chr$(130);"clenchement";
locate 54,2:?"dur";chr$(130);"e d'emission";
return

tracemenusourceFM:'-----------------------------------------------------
-------

locate 26,2:?"longueur d'onde min";
locate 30,2:?"longueur d'onde max";
locate 34,2:?"p";chr$(130);"riode de modulation";
locate 38,2:?"amplitude";
locate 42,2:?"offset";
locate 46,2:?"0:+/-  1:+  2:-";
locate 50,2:?"seuil de d";chr$(130);"clenchement";
locate 54,2:?"dur";chr$(130);"e d'emission";
return

tracemenusurfacecirculaire:'-----------------------------------------------
-------

locate 26,2:?"rayon x";
locate 30,2:?"rayon y";
locate 34,2:?"inclinaison";
locate 38,2:?"indice int";chr$(130);"rieur";
locate 42,2:?"indice ext";chr$(130);"rieur";
locate 46,2:?"n couches d'indice";
locate 50,2:?"couche interne fixe (%)";
locate 54,2:?"0=lin 1=sin 2=cos";
locate 58,2:?"demi-cercle 0=off 1=on"
locate 62,2:?"prior 0=off 1=si> 2=si<";
return

tracemenusurfaceplane:'-----------------------------------------------------
-------

locate 26,2:?"largeur";
locate 30,2:?"hauteur";
locate 34,2:?"inclinaison";
locate 38,2:?"indice int";chr$(130);"rieur";
locate 42,2:?"indice ext";chr$(130);"rieur";
locate 46,2:?"n couches d'indice";
locate 50,2:?"couche interne fixe (%)";
locate 54,2:?"0=lin 1=sin 2=cos"
locate 58,2:?"prior 0=off 1=si> 2=si<";
return

tracemenusurfacetriangulaire:'---------------------------------------------
-------

locate 26,2:?"largeur";
locate 30,2:?"hauteur";
locate 34,2:?"inclinaison";
locate 38,2:?"indice";
locate 42,2:?"prior 0=off 1=si> 2=si<";
return

tracemenuobservateur:'------------------------------------------------------
-------

locate 26,2:?"vitesse d";chr$(130);"placement x";
locate 30,2:?"vitesse d";chr$(130);"placement y";
return

tracemenuattenuateur:'------------------------------------------------------
-------

locate 26,2:?"largeur";
locate 30,2:?"inclinaison";
return

tracemenuobjetbmp:'-------------------------------------------------------------

locate 26,2:?"largeur";
locate 30,2:?"hauteur";
locate 34,2:?"inclinaison";
locate 38,2:?"prior 0=off 1=si> 2=si<";
return
```

```
litsources:'--------------------------------------------------------------------

for numelement=1 to numdernierelement
 SELECT CASE elementnom$(numelement)
  CASE "source ponctuelle"
   gosub sourceponctuelle
  CASE "sources alignees"
   gosub sourcesalignees
  CASE "source en rotation"
   gosub sourceenrotation
  case "source en translation"
   gosub sourceentranslation
  CASE "source circulaire"
   gosub sourcecirculaire
  CASE "source AM"
   gosub sourceAM
  CASE "source FM"
   gosub sourceFM
  CASE "source offset"
   gosub sourceoffset
 END SELECT
next
return

newsourceponctuelle:'-----------------------------------------------------
-------

numdernierelement+=1:if numdernierelement>numelementmax then
numdernierelement=numelementmax
numelement=numdernierelement

elementnom$(numelement)="source ponctuelle"
elementtype$(numelement)="source"
elementinfo(0,numelement)=itracedecal+largzoneaffsur2
elementinfo(1,numelement)=jtracedecal+hautzoneaffsur2
elementinfo(2,numelement)=16            'longueur d'onde en pixels
elementinfo(3,numelement)=1             'amplitude
elementinfo(4,numelement)=0             'dephasage
elementinfo(5,numelement)=0             'offset
elementinfo(6,numelement)=0             'mono alternance
elementinfo(7,numelement)=0             'seuil declenchement
elementinfo(8,numelement)=10000         'duree d'emission en longueur
d'onde
nbrinfosmax(numelement)=8

gosub initptlszonecalcul
gosub initlimitescalcul
numelementselect=numdernierelement:gosub tracemenu
gosub centreelement
return

sourceponctuelle:'--------------------------------------------------------
-------

isource=elementinfo(0,numelement)+dopplercpt
jsource=elementinfo(1,numelement)
lambda=elementinfo(2,numelement)
amplitude=elementinfo(3,numelement)
dephasage=elementinfo(4,numelement)
offset=elementinfo(5,numelement)
monoalternance=elementinfo(6,numelement)
seuildeclenche=elementinfo(7,numelement)
dureeemit=elementinfo(8,numelement)

dephasage*=deuxpisur360
freq=1/lambda
omega=deuxpi*freq

if seuildeclenche=0 then
```

```
 if t<(dureeemit*lambda) then
  enew=amplitude*SIN(omega*t+dephasage)
  eold=amplitude*SIN(omega*(t-deltat)+dephasage)
  edif=enew-eold
  GOSUB integresource
 end if

else

 if tdeclenche(0,numelement)<0 then if t>(-
tdeclenche(0,numelement)+dureeemit*lambda) then
tdeclenche(0,numelement)=valeurvide

 if tdeclenche(0,numelement)=valeurvide then
  if isource>2 then
   if isource<imaxm2 then
    if jsource>2 then
     if jsource<jmaxm2 then
      if trameaoub=0 then
       if abs(ptlb(jsource,isource))>=seuildeclenche then
tdeclenche(0,numelement)=t
      else
       if abs(ptla(jsource,isource))>=seuildeclenche then
tdeclenche(0,numelement)=t
      end if
     end if
    end if
   end if
  end if
 end if
 if tdeclenche(0,numelement)>valeurvide then
  tmtdeclenche=t-tdeclenche(0,numelement)
  if tmtdeclenche<(dureeemit*lambda) then
   enew=amplitude*SIN(omega*tmtdeclenche+dephasage)
   eold=amplitude*SIN(omega*(tmtdeclenche-deltat)+dephasage)
   edif=enew-eold
   GOSUB integresource
  else
   tdeclenche(0,numelement)=-t
  end if
 end if

end if
RETURN

newsourceoffset:'--------------------------------------------------------
-------

numdernierelement+=1:if numdernierelement>numelementmax then
numdernierelement=numelementmax
numelement=numdernierelement

elementnom$(numelement)="source offset"
elementtype$(numelement)="source"
```

```
elementinfo(0,numelement)=itracedecal+largzoneaffsur2
elementinfo(1,numelement)=jtracedecal+hautzoneaffsur2
elementinfo(2,numelement)=.5             'offset
elementinfo(3,numelement)=0             'seuil declenchement
nbrinfosmax(numelement)=3

gosub initptlszonecalcul
gosub initlimitescalcul
numelementselect=numdernierelement:gosub tracemenu
gosub centreelement
return

sourceoffset:'-----------------------------------------------------------
-------

isource=elementinfo(0,numelement)+dopplercpt
jsource=elementinfo(1,numelement)
offset=elementinfo(2,numelement)
seuildeclenche=elementinfo(3,numelement)

if seuildeclenche=0 then

 enew=0:eold=0:edif=0:GOSUB integresource

else

 if tdeclenche(0,numelement)=valeurvide then
  if isource>2 then
   if isource<imaxm2 then
    if jsource>2 then
     if jsource<jmaxm2 then
      if trameaoub=0 then
       if abs(ptlb(jsource,isource))>=seuildeclenche then
tdeclenche(0,numelement)=t
      else
       if abs(ptla(jsource,isource))>=seuildeclenche then
tdeclenche(0,numelement)=t
      end if
     end if
    end if
   end if
  end if
 end if
 if tdeclenche(0,numelement)>valeurvide then enew=0:eold=0:edif=0:GOSUB
integresource

end if
RETURN

newsourcesalignees:'-----------------------------------------------------
-------

numdernierelement+=1:if numdernierelement>numelementmax then
numdernierelement=numelementmax
```

```
numelement=numdernierelement

elementnom$(numelement)="sources alignees"
elementtype$(numelement)="source"
elementinfo(0,numelement)=itracedecal+largzoneaffsur2
elementinfo(1,numelement)=jtracedecal+hautzoneaffsur2
elementinfo(2,numelement)=400          'largeur
elementinfo(3,numelement)=90            'inclinaison
elementinfo(4,numelement)=16           'longueur d'onde en pixels
elementinfo(5,numelement)=.075          'amplitude
elementinfo(6,numelement)=0            'offset
elementinfo(7,numelement)=0            'mono alternance
elementinfo(8,numelement)=1            'apodisation
nbrinfosmax(numelement)=8

gosub initptlszonecalcul
gosub initlimitescalcul
numelementselect=numdernierelement:gosub tracemenu
gosub centreelement
return

sourcesalignees:'------------------------------------------------------
-------

isourcecentre=elementinfo(0,numelement)+dopplercpt
jsourcecentre=elementinfo(1,numelement)
sourcelarg=elementinfo(2,numelement)
sourceinclin=elementinfo(3,numelement)
lambda=elementinfo(4,numelement)
amplitude=elementinfo(5,numelement)
offset=elementinfo(6,numelement)
monoalternance=elementinfo(7,numelement)
appodisation=elementinfo(8,numelement)

sourcelargsur2=sourcelarg/2
freq=1/lambda
omega=deuxpi*freq
enew=amplitude*SIN(omega*t)
eold=amplitude*SIN(omega*(t-deltat))
edifmem=enew-eold
sourceinclin*=deuxpisur360
si=sin(sourceinclin):co=cos(sourceinclin)
for memocpt=0 to
19:sourcememox(memocpt)=1000000:sourcememoy(memocpt)=1000000:next
for sourcelargcpt=-sourcelargsur2 to sourcelargsur2 step .25
 isource=isourcecentre+co*sourcelargcpt
 jsource=jsourcecentre+si*sourcelargcpt
 isourcea=int(isource):jsourcea=int(jsource)
 sourcedejamise=0
 memocpt+=1:if memocpt>5 then memocpt=0
 for memocptb=0 to 19
  if isourcea=sourcememox(memocptb) then if
jsourcea=sourcememoy(memocptb) then sourcedejamise=1
 next
 sourcememox(memocpt)=isourcea:sourcememoy(memocpt)=jsourcea
 if sourcedejamise=0 then
  if appodisation then
   edif=edifmem*repartnormale(abs(sourcelargcpt*200)/sourcelargsur2)
  else
   edif=edifmem
  end if
  GOSUB integresource
 end if
next
RETURN

newsourceenrotation:'----------------------------------------------------
-------

numdernierelement+=1:if numdernierelement>numelementmax then
numdernierelement=numelementmax
numelement=numdernierelement

elementnom$(numelement)="source en rotation"
elementtype$(numelement)="source"
elementinfo(0,numelement)=itracedecal+largzoneaffsur2
elementinfo(1,numelement)=jtracedecal+hautzoneaffsur2
elementinfo(2,numelement)=64           'rayon x
elementinfo(3,numelement)=64           'rayon y
elementinfo(4,numelement)=512           'periode de rotation
elementinfo(5,numelement)=512          'periode en pixels
elementinfo(6,numelement)=1             'amplitude
elementinfo(7,numelement)=0             'dephasage
elementinfo(8,numelement)=0             'offset
elementinfo(9,numelement)=0             'mono alternance
elementinfo(10,numelement)=0            'seuil declenchement
elementinfo(11,numelement)=10000         'duree d'emission en longueur
d'onde
nbrinfosmax(numelement)=11

gosub initptlszonecalcul
gosub initlimitescalcul
numelementselect=numdernierelement:gosub tracemenu
gosub centreelement
return

sourceenrotation:'-------------------------------------------------------
-------

isourcecentre=elementinfo(0,numelement)+dopplercpt
jsourcecentre=elementinfo(1,numelement)
rayonx=elementinfo(2,numelement)
rayony=elementinfo(3,numelement)
lambdarotat=elementinfo(4,numelement)
lambda=elementinfo(5,numelement)
amplitude=elementinfo(6,numelement)
dephasage=elementinfo(7,numelement)
offset=elementinfo(8,numelement)
```

```
monoalternance=elementinfo(9,numelement)
seuildeclenche=elementinfo(10,numelement)
dureeemit=elementinfo(11,numelement)

dephasage=deuxpisur360*dephasage
freq=1/lambda
omega=deuxpi*freq
freqrotat=1/lambdarotat
omegarotat=deuxpi*freqrotat
isource=int(isourcecentre+rayonx*cos(omegarotat*t))
jsource=int(jsourcecentre+rayony*sin(omegarotat*t))

if seuildeclenche=0 then

 if t<(dureeemit*lambda) then
  enew=amplitude*SIN(omega*t+dephasage)
  eold=amplitude*SIN(omega*(t-deltat)+dephasage)
  edif=enew-eold
  GOSUB integresource
 end if

else

 if tdeclenche(0,numelement)=valeurvide then
  if isource>2 then
   if isource<imaxm2 then
    if jsource>2 then
     if jsource<jmaxm2 then
      if trameaoub=0 then
       if abs(ptlb(jsource,isource))>=seuildeclenche then
tdeclenche(0,numelement)=t
      else
       if abs(ptla(jsource,isource))>=seuildeclenche then
tdeclenche(0,numelement)=t
      end if
     end if
    end if
   end if
  end if
 end if
 if tdeclenche(0,numelement)>valeurvide then
  tmtdeclenche=t-tdeclenche(0,numelement)
  if tmtdeclenche<(dureeemit*lambda) then
   enew=amplitude*SIN(omega*tmtdeclenche+dephasage)
   eold=amplitude*SIN(omega*(tmtdeclenche-deltat)+dephasage)
   edif=enew-eold
   GOSUB integresource
  end if
 end if

end if
RETURN
```

```
newsourceentranslation:'-------------------------------------------------
-------

numdernierelement+=1:if numdernierelement>numelementmax then
numdernierelement=numelementmax
numelement=numdernierelement

elementnom$(numelement)="source en translation"
elementtype$(numelement)="source"
elementinfo(0,numelement)=itracedecal+largzoneaffsur2
elementinfo(1,numelement)=jtracedecal+hautzoneaffsur2
elementinfo(2,numelement)=.25           'vitesse de deplacement en x
elementinfo(3,numelement)=0             'vitesse de deplacement en y
elementinfo(4,numelement)=32            'periode en pixels
elementinfo(5,numelement)=1             'amplitude
elementinfo(6,numelement)=0             'dephasage
elementinfo(7,numelement)=0             'offset
elementinfo(8,numelement)=0             'mono alternance
elementinfo(9,numelement)=0             'seuil declenchement
elementinfo(10,numelement)=10000         'duree d'emission en longueur
d'onde
nbrinfosmax(numelement)=10

gosub initptlszonecalcul
gosub initlimitescalcul
numelementselect=numdernierelement:gosub tracemenu
gosub centreelement
return

sourceentranslation:'----------------------------------------------------
-------

isourcecentre=elementinfo(0,numelement)+dopplercpt
jsourcecentre=elementinfo(1,numelement)
speedtranslatx=elementinfo(2,numelement)
speedtranslaty=elementinfo(3,numelement)
lambda=elementinfo(4,numelement)
amplitude=elementinfo(5,numelement)
dephasage=elementinfo(6,numelement)
offset=elementinfo(7,numelement)
monoalternance=elementinfo(8,numelement)
seuildeclenche=elementinfo(9,numelement)
dureeemit=elementinfo(10,numelement)

dephasage=deuxpisur360*dephasage
freq=1/lambda
omega=deuxpi*freq
isource=int(isourcecentre+speedtranslatx*t)
jsource=int(jsourcecentre+speedtranslaty*t)

if seuildeclenche=0 then

 if t<(dureeemit*lambda) then
  enew=amplitude*SIN(omega*t+dephasage)
  eold=amplitude*SIN(omega*(t-deltat)+dephasage)
  edif=enew-eold
  GOSUB integresource
 end if

else

 if tdeclenche(0,numelement)=valeurvide then
  if isource>2 then
   if isource<imaxm2 then
    if jsource>2 then
     if jsource<jmaxm2 then
      if trameaoub=0 then
       if abs(ptlb(jsource,isource))>=seuildeclenche then
tdeclenche(0,numelement)=t
      else
       if abs(ptla(jsource,isource))>=seuildeclenche then
tdeclenche(0,numelement)=t
      end if
     end if
    end if
   end if
  end if
 end if
 if tdeclenche(0,numelement)>valeurvide then
  tmtdeclenche=t-tdeclenche(0,numelement)
  if tmtdeclenche<(dureeemit*lambda) then
   enew=amplitude*SIN(omega*tmtdeclenche+dephasage)
   eold=amplitude*SIN(omega*(tmtdeclenche-deltat)+dephasage)
   edif=enew-eold
   GOSUB integresource
  end if
 end if

end if
RETURN

newsourcecirculaire:'----------------------------------------------------
-------

numdernierelement+=1:if numdernierelement>numelementmax then
numdernierelement=numelementmax
numelement=numdernierelement

elementnom$(numelement)="source circulaire"
elementtype$(numelement)="source"
elementinfo(0,numelement)=itracedecal+largzoneaffsur2
elementinfo(1,numelement)=jtracedecal+hautzoneaffsur2
elementinfo(2,numelement)=300           'rayon x
elementinfo(3,numelement)=300           'rayon y
elementinfo(4,numelement)=3           'nombre de sources
elementinfo(5,numelement)=800            'periode en pixels
elementinfo(6,numelement)=0.09          'phase rotation
elementinfo(7,numelement)=360           'secteur angulaire
elementinfo(8,numelement)=0             'inclinaison
elementinfo(9,numelement)=1            'amplitude
elementinfo(10,numelement)=0            'offset
elementinfo(11,numelement)=0            'mono alternance
elementinfo(12,numelement)=0            'seuil declenchement
elementinfo(13,numelement)=10000         'duree d'emission en longueur
d'onde
nbrinfosmax(numelement)=13

gosub initptlszonecalcul
gosub initlimitescalcul
numelementselect=numdernierelement:gosub tracemenu
gosub centreelement
return

sourcecirculaire:'-----------------------------------------------------
-------

isourcecentre=elementinfo(0,numelement)+dopplercpt
jsourcecentre=elementinfo(1,numelement)
rayonx=elementinfo(2,numelement)
rayony=elementinfo(3,numelement)
nbrsources=elementinfo(4,numelement)
lambda=elementinfo(5,numelement)
angle=elementinfo(6,numelement)
secteurangul=elementinfo(7,numelement)
inclin=elementinfo(8,numelement)
amplitude=elementinfo(9,numelement)
offset=elementinfo(10,numelement)
monoalternance=elementinfo(11,numelement)
seuildeclenche=elementinfo(12,numelement)
dureeemit=elementinfo(13,numelement)

if nbrsources<1 then nbrsources=1
if nbrsources>512 then nbrsources=512
omega=deuxpi/lambda
angle*=deuxpisur360
secteurangul*=deuxpisur360
inclin*=deuxpisur360

omegarotat=0
for n=0 to nbrsources-1

 isource=int(isourcecentre+rayonx*cos(omegarotat+angle*t+inclin))
 jsource=int(jsourcecentre+rayony*sin(omegarotat+angle*t+inclin))
 omegarotat+=secteurangul/nbrsources

 if seuildeclenche=0 then

  if t<(dureeemit*lambda) then
   enew=amplitude*SIN(omega*t)
   eold=amplitude*SIN(omega*(t-deltat))
   edif=enew-eold
   GOSUB integresource
  end if

 else

  if tdeclenche(n,numelement)=valeurvide then
   if isource>2 then
    if isource<imaxm2 then
     if jsource>2 then
      if jsource<jmaxm2 then
       if trameaoub=0 then
        if abs(ptlb(jsource,isource))>=seuildeclenche then
tdeclenche(n,numelement)=t
       else
        if abs(ptla(jsource,isource))>=seuildeclenche then
tdeclenche(n,numelement)=t
       end if
      end if
     end if
    end if
   end if
  end if
  if tdeclenche(n,numelement)>valeurvide then
   tmtdeclenche=t-tdeclenche(n,numelement)
   if tmtdeclenche<(dureeemit*lambda) then
    enew=amplitude*SIN(omega*tmtdeclenche)
    eold=amplitude*SIN(omega*(tmtdeclenche-deltat))
    edif=enew-eold
    GOSUB integresource
   end if
  end if

 end if

next
RETURN

newsourceAM:'------------------------------------------------------------
-------

numdernierelement+=1:if numdernierelement>numelementmax then
numdernierelement=numelementmax
numelement=numdernierelement

elementnom$(numelement)="source AM"
elementtype$(numelement)="source"
elementinfo(0,numelement)=itracedecal+largzoneaffsur2
elementinfo(1,numelement)=jtracedecal+hautzoneaffsur2
elementinfo(2,numelement)=16            'longueur d'onde en pixels
elementinfo(3,numelement)=0             'amplitude min
elementinfo(4,numelement)=2           'amplitude max
elementinfo(5,numelement)=256           'periode de modulation
elementinfo(6,numelement)=0             'offset
elementinfo(7,numelement)=0             'mono alternance
elementinfo(8,numelement)=0             'seuil declenchement
elementinfo(9,numelement)=10000         'duree d'emission en longueur d'onde
nbrinfosmax(numelement)=9

gosub initptlszonecalcul
gosub initlimitescalcul
numelementselect=numdernierelement:gosub tracemenu
gosub centreelement
return

sourceAM:'---------------------------------------------------------------------

isource=elementinfo(0,numelement)+dopplercpt
jsource=elementinfo(1,numelement)
lambda=elementinfo(2,numelement)
amplitudemin=elementinfo(3,numelement)
amplitudemax=elementinfo(4,numelement)
lambdamodul=elementinfo(5,numelement)
offset=elementinfo(6,numelement)
monoalternance=elementinfo(7,numelement)
seuildeclenche=elementinfo(8,numelement)
dureeemit=elementinfo(9,numelement)

freq=1/lambda
omega=deuxpi*freq
freqmodul=1/lambdamodul
omegamodul=deuxpi*freqmodul
tauxmodul=(amplitudemax-amplitudemin)/(amplitudemax+amplitudemin)
amplitude=(amplitudemin+amplitudemax)/2

if seuildeclenche=0 then

 if t<(dureeemit*lambda) then
  enew=amplitude*sin(omega*t)*(1+tauxmodul*sin(omegamodul*t))
  eold=amplitude*sin(omega*(t-deltat))*(1+tauxmodul*sin(omegamodul*(t-deltat)))
  edif=enew-eold
  GOSUB integresource
 end if

else

 if tdeclenche(0,numelement)=valeurvide then
  if isource>2 then
   if isource<imaxm2 then
    if jsource>2 then
     if jsource<jmaxm2 then
      if trameaoub=0 then
       if abs(ptlb(jsource,isource))>=seuildeclenche then tdeclenche(0,numelement)=t
      else
       if abs(ptla(jsource,isource))>=seuildeclenche then tdeclenche(0,numelement)=t
      end if
     end if
    end if
   end if
  end if
 end if
 if tdeclenche(0,numelement)>valeurvide then
  tmtdeclenche=t-tdeclenche(0,numelement)
  if tmtdeclenche<(dureeemit*lambda) then

enew=amplitude*sin(omega*tmtdeclenche)*(1+tauxmodul*sin(omegamodul*tmtdec
lenche))
   eold=amplitude*sin(omega*(tmtdeclenche-
deltat))*(1+tauxmodul*sin(omegamodul*(tmtdeclenche-deltat)))
   edif=enew-eold
   GOSUB integresource
  end if
 end if

end if
RETURN

newsourceFM:'------------------------------------------------------------
-------

numdernierelement+=1:if numdernierelement>numelementmax then
numdernierelement=numelementmax
numelement=numdernierelement

elementnom$(numelement)="source FM"
elementtype$(numelement)="source"
elementinfo(0,numelement)=itracedecal+largzoneaffsur2
elementinfo(1,numelement)=jtracedecal+hautzoneaffsur2
elementinfo(2,numelement)=16             'periode min
elementinfo(3,numelement)=32            'periode max
elementinfo(4,numelement)=1024          'periode de modulation
elementinfo(5,numelement)=1             'amplitude
elementinfo(6,numelement)=0             'offset
elementinfo(7,numelement)=0             'mono alternance
elementinfo(8,numelement)=0             'seuil de declenchement
elementinfo(9,numelement)=100000         'duree d'emission en longueur
d'onde
nbrinfosmax(numelement)=9

gosub initptlszonecalcul
gosub initlimitescalcul
numelementselect=numdernierelement:gosub tracemenu
gosub centreelement
return

sourceFM:'---------------------------------------------------------------
-------

isource=elementinfo(0,numelement)+dopplercpt
```

```
jsource=elementinfo(1,numelement)
lambdamin=elementinfo(2,numelement)
lambdamax=elementinfo(3,numelement)
lambdamodul=elementinfo(4,numelement)
amplitude=elementinfo(5,numelement)
offset=elementinfo(6,numelement)
monoalternance=elementinfo(7,numelement)
seuildeclenche=elementinfo(8,numelement)
dureeemit=elementinfo(9,numelement)

lambda=(lambdamin+lambdamax)/2
freqmin=1/lambdamax
freqmax=1/lambdamin
deltaf=(freqmax-freqmin)/2
freq=1/lambda
omega=deuxpi*freq
freqmodul=1/lambdamodul
omegamodul=deuxpi*freqmodul

if seuildeclenche=0 then

 if t<(dureeemit*lambda) then
  enew=amplitude*sin(omega*t+(deltaf/freqmodul)*sin(omegamodul*t))
  eold=amplitude*sin(omega*(t-
deltat)+(deltaf/freqmodul)*sin(omegamodul*(t-deltat)))
  edif=enew-eold
  GOSUB integresource
 end if

else

 if tdeclenche(0,numelement)=valeurvide then
  if isource>2 then
   if isource<imaxm2 then
    if jsource>2 then
     if jsource<jmaxm2 then
      if trameaoub=0 then
       if abs(ptlb(jsource,isource))>=seuildeclenche then
tdeclenche(0,numelement)=t
      else
       if abs(ptla(jsource,isource))>=seuildeclenche then
tdeclenche(0,numelement)=t
      end if
     end if
    end if
   end if
  end if
 end if
 if tdeclenche(0,numelement)>valeurvide then
  tmtdeclenche=t-tdeclenche(0,numelement)
  if tmtdeclenche<(dureeemit*lambda) then

enew=amplitude*sin(omega*tmtdeclenche+(deltaf/freqmodul)*sin(omegamodul*t
mtdeclenche))
```

```
   eold=amplitude*sin(omega*(tmtdeclenche-
deltat)+(deltaf/freqmodul)*sin(omegamodul*(tmtdeclenche-deltat)))
   edif=enew-eold
   GOSUB integresource
  end if
 end if

end if
RETURN

integresource:'----------------------------------------------------------
-------

lambdab=lambda
if lambdab<16 then lambdab=16
if lambdab>192 then lambdab=192
edifb=edif/coefcompenslambda(lambdab)
if monoalternance=1 then if enew<0 then edifb=0:enew=0
if monoalternance=2 then if enew>0 then edifb=0:enew=0

isourcea=int(isource)
jsourcea=int(jsource)
jsourceb=jsourcea-2
isourceb=isourcea-1:gosub integresourceb
isourceb=isourcea:gosub integresourceb
isourceb=isourcea+1:gosub integresourceb
jsourceb=jsourcea-1
isourceb=isourcea-2:gosub integresourceb         '   OOO
isourceb=isourcea-1:gosub integresourceb         '  OOOOO
isourceb=isourcea:gosub integresourceb           '  OOOOO
isourceb=isourcea+1:gosub integresourceb         '  OOOOO
isourceb=isourcea+2:gosub integresourceb         '   OOO
jsourceb=jsourcea
isourceb=isourcea-2:gosub integresourceb
isourceb=isourcea-1:gosub integresourceb
isourceb=isourcea:gosub integresourceb
isourceb=isourcea+1:gosub integresourceb
isourceb=isourcea+2:gosub integresourceb
jsourceb=jsourcea+1
isourceb=isourcea-2:gosub integresourceb
isourceb=isourcea-1:gosub integresourceb
isourceb=isourcea:gosub integresourceb
isourceb=isourcea+1:gosub integresourceb
isourceb=isourcea+2:gosub integresourceb
jsourceb=jsourcea+2
isourceb=isourcea-1:gosub integresourceb
isourceb=isourcea:gosub integresourceb
isourceb=isourcea+1:gosub integresourceb
return

integresourceb:'---------------------------------------------------------
-------

if isourceb>2 then
```

```
 if isourceb<imaxm2 then
  if jsourceb>2 then
   if jsourceb<jmaxm2 then

    if testlimitescalculon then
     if isourceb<limitecalculimin then limitecalculimin=isourceb
     if isourceb>limitecalculimax then limitecalculimax=isourceb
     if jsourceb<limitecalculjmin then limitecalculjmin=jsourceb
     if jsourceb>limitecalculjmax then limitecalculjmax=jsourceb
    else
     if trameaoub=0 then
      if offset<>0 then
       ptla(jsourceb,isourceb)=offset+enew
      else
       ptla(jsourceb,isourceb)+=edifb*repartnormale2D(jsourceb-
jsourcea,isourceb-isourcea)
      end if
     else
      if offset<>0 then
       ptlb(jsourceb,isourceb)=offset+enew
      else
       ptlb(jsourceb,isourceb)+=edifb*repartnormale2D(jsourceb-
jsourcea,isourceb-isourcea)
      end if
     end if
    end if

   end if
  end if
 end if
end if
return

initrepartnormale:'----------------------------------------------------
-------

for y=-2 to 2
 for x=-2 to 2
  distxy=sqr(x*x+y*y)
  repartnormale2D(y,x)=2.228*exp(-distxy^2)/sqr(deuxpi)
 next
next
for x=0 to 200
 repartnormale(x)=2.228*1.5*exp(-(x/120)^2)/sqr(deuxpi)
next
return

initcoefcompenslambda:'------------------------------------------------
-------

restore debutcoefcompenslambda

for lambda=16 to 192 step 8
 read coefcompens
 coefcompenslambda(lambda)=coefcompens
next

for lambda=16 to 192 step 8
 for n=1 to 7
  coefcompenslambda(lambda+n)=coefcompenslambda(lambda)+(
coefcompenslambda(lambda+8)-coefcompenslambda(lambda) )*n/8
 next
next

debutcoefcompenslambda:
data 1,.8255,.6996,.60895,.5434,.4908,.44953,.4149
data .3862,.3614,.3401,.3214,.3050,.2902,.2771,.2652
data .2544,.24457,.23556,.22725,.21956,.21247,.20543
return

inittdeclenche:'-----------------------------------------------------------
-----------

for numelement=0 to numelementmax
 SELECT CASE elementnom$(numelement)
  CASE "source ponctuelle"
   tdeclenche(0,numelement)=valeurvide
  CASE "sources alignees"
   tdeclenche(0,numelement)=valeurvide
  CASE "source en rotation"
   tdeclenche(0,numelement)=valeurvide
  CASE "source en translation"
   tdeclenche(0,numelement)=valeurvide
  CASE "source circulaire"
   nbrsources=elementinfo(4,numelement)
   if nbrsources<1 then nbrsources=1:elementinfo(4,numelement)=1
   if nbrsources>512 then nbrsources=512:elementinfo(4,numelement)=512
   for n=0 to nbrsources-1:tdeclenche(n,numelement)=valeurvide:next
  CASE "source AM"
   tdeclenche(0,numelement)=valeurvide
  CASE "source FM"
   tdeclenche(0,numelement)=valeurvide
  CASE "source offset"
   tdeclenche(0,numelement)=valeurvide
 end select
next
return
```

```
litobjets:'--------------------------------------------------------------
-------

for numelement=0 to numdernierelement
 if elementtype$(numelement)="objetbmp" then gosub objetbmp
 SELECT CASE elementnom$(numelement)
  CASE "surface circulaire"
   gosub surfacecirculaire
  CASE "surface plane"
   gosub surfaceplane
  CASE "surface triangulaire"
   gosub surfacetriangulaire
 END SELECT
next
return

newsurfacecirculaire:'---------------------------------------------------
-------

numdernierelement+=1:if numdernierelement>numelementmax then
numdernierelement=numelementmax
numelement=numdernierelement
elementnom$(numelement)="surface circulaire"
elementtype$(numelement)="objet"
elementinfo(0,numelement)=itracedecal+largzoneaffsur2
elementinfo(1,numelement)=jtracedecal+hautzoneaffsur2
elementinfo(2,numelement)=256       'rayon x
elementinfo(3,numelement)=512       'rayon y
elementinfo(4,numelement)=0         'inclin
elementinfo(5,numelement)=.5        'indice interne
elementinfo(6,numelement)=1         'indice externe
elementinfo(7,numelement)=1         'nbr de couches d'indices dans
l'objet
elementinfo(8,numelement)=50        'couche interieure fixe en %
elementinfo(9,numelement)=0         'variation 0=lin 1=sin 2=cos
elementinfo(10,numelement)=1        'moitie 1=on
elementinfo(11,numelement)=1        'prior
nbrinfosmax(numelement)=11

gosub initindicesreac
gosub litobjets
numelementselect=numdernierelement:gosub tracemenu
gosub centreelement
tracecontourson=1
return

surfacecirculaire:'------------------------------------------------------
-------

objcentrei=elementinfo(0,numelement)
objcentrej=elementinfo(1,numelement)
objrayonj=elementinfo(2,numelement)
objrayoni=elementinfo(3,numelement)
objinclin=elementinfo(4,numelement)+90
objindiceint=elementinfo(5,numelement)
objindiceext=elementinfo(6,numelement)
objncouchemax=elementinfo(7,numelement)
objcoucheintfixe=elementinfo(8,numelement)
varindice=elementinfo(9,numelement)
moitieon=elementinfo(10,numelement)
objprior=elementinfo(11,numelement)

if objindiceint<0 then objindiceint=0
if objindiceint>1 then objindiceint=1
if objindiceext<0 then objindiceext=0
if objindiceext>1 then objindiceext=1
if objrayoni<1 then objrayoni=1
if objrayonj<1 then objrayonj=1
if objcoucheintfixe<1 then objcoucheintfixe=1
if objcoucheintfixe>100 then objcoucheintfixe=100
objcoucheintfixe/=100
objinclin*=deuxpisur360:co=COS(objinclin):si=SIN(objinclin)
objncouchemax-=1:if objncouchemax<1 then
objncouchemax=1:objcoucheintfixe=1
if objrayoni<objrayonj then
 objrayonmin=objrayoni
 objrayonmax=objrayonj
else
 objrayonmin=objrayonj
 objrayonmax=objrayoni
end if
objepaisseurtoutescouches=(1-objcoucheintfixe)*objrayonmin
objepaisseurunecouche=objepaisseurtoutescouches/objncouchemax
objindicedif=objindiceext-objindiceint
objindiceunecouche=objindicedif/(objncouchemax+1)

for objnumcouche=0 to objncouchemax

 if varindice=0 then objindice=objindiceext-
objindiceunecouche*(objnumcouche+1)
```

```
 if varindice=1 then objindice=objindiceext-
objindicedif*sin(pisur2*objnumcouche/objncouchemax)
 if varindice=2 then objindice=objindiceext-
objindicedif*cos(pisur2*objnumcouche/objncouchemax)

 objrayoncouchei=objrayoni-objepaisseurunecouche*objnumcouche
 objrayoncouchej=objrayonj-objepaisseurunecouche*objnumcouche
 if objrayonmax=objrayoni then objanglestep=1/objrayoncouchei else
objanglestep=1/objrayoncouchej
 FOR objAngle=0 TO deuxpi STEP objanglestep
  objpi=objrayoncouchei*COS(objAngle)
  objpj=objrayoncouchej*SIN(objAngle)
  if moitieon then if objAngle>pi then objpj=0
  GOSUB perimobjets
 NEXT

 if objnumcouche<objncouchemax then
  objrayoncouchei=objrayoni-objepaisseurunecouche*(objnumcouche+1)
  objrayoncouchej=objrayonj-objepaisseurunecouche*(objnumcouche+1)
  if objrayonmax=objrayoni then objanglestep=1/objrayoncouchei else
objanglestep=1/objrayoncouchej
  FOR objAngle=0 TO deuxpi STEP objanglestep
   objpi=objrayoncouchei*COS(objAngle)
   objpj=objrayoncouchej*SIN(objAngle)
   if moitieon then if objAngle>pi then objpj=0
   GOSUB periminterneobjets
  NEXT
 end if

 GOSUB rempliobjets
next
RETURN

newsurfaceplane:'-----------------------------------------------------
-------

numdernierelement+=1:if numdernierelement>numelementmax then
numdernierelement=numelementmax
numelement=numdernierelement
elementnom$(numelement)="surface plane"
elementtype$(numelement)="objet"
elementinfo(0,numelement)=itracedecal+largzoneaffsur2
elementinfo(1,numelement)=jtracedecal+hautzoneaffsur2
elementinfo(2,numelement)=2         'largeur
elementinfo(3,numelement)=800       'hauteur
elementinfo(4,numelement)=45        'inclin
elementinfo(5,numelement)=.25       'indice interne
elementinfo(6,numelement)=1         'indice externe
elementinfo(7,numelement)=1         'nbr de couches d'indices dans
l'objet
elementinfo(8,numelement)=0         'couche interieure fixe en %
elementinfo(9,numelement)=0         'variation indice 0=lin, 1=sin, 2=cos
elementinfo(10,numelement)=1        'prior
nbrinfosmax(numelement)=10
```

```
gosub initindicesreac
gosub litobjets
numelementselect=numdernierelement:gosub tracemenu
gosub centreelement
tracecontourson=1
return

surfaceplane:'-------------------------------------------------------------
-------

objcentrei=elementinfo(0,numelement)
objcentrej=elementinfo(1,numelement)
objlargeur=elementinfo(2,numelement)
objhauteur=elementinfo(3,numelement)
objinclin=elementinfo(4,numelement)
objindiceint=elementinfo(5,numelement)
objindiceext=elementinfo(6,numelement)
objncouchemax=elementinfo(7,numelement)
objcoucheintfixe=elementinfo(8,numelement)
varindice=elementinfo(9,numelement)
objprior=elementinfo(10,numelement)

if objindiceint<0 then objindiceint=0
if objindiceint>1 then objindiceint=1
if objindiceext<0 then objindiceext=0
if objindiceext>1 then objindiceext=1
if objcoucheintfixe<1 then objcoucheintfixe=1
if objcoucheintfixe>100 then objcoucheintfixe=100
objcoucheintfixe/=100
objinclin*=deuxpisur360:co=COS(objinclin):si=SIN(objinclin)
objncouchemax-=1:if objncouchemax<1 then
objncouchemax=1:objcoucheintfixe=1
if objlargeur<objhauteur then objlargeurmin=objlargeur else
objlargeurmin=objhauteur
objepaisseurtoutescouches=(1-objcoucheintfixe)*objlargeurmin
objepaisseurunecouche=objepaisseurtoutescouches/objncouchemax
objindicedif=objindiceext-objindiceint
objindiceunecouche=objindicedif/(objncouchemax+1)

for objnumcouche=0 to objncouchemax
 if varindice=0 then objindice=objindiceext-
objindiceunecouche*(objnumcouche+1)
 if varindice=1 then objindice=objindiceext-
objindicedif*sin(pisur2*objnumcouche/objncouchemax)
 if varindice=2 then objindice=objindiceext-
objindicedif*cos(pisur2*objnumcouche/objncouchemax)

 objlargsur2=(objlargeur-objepaisseurunecouche*objnumcouche)/2
 objhautsur2=(objhauteur-objepaisseurunecouche*objnumcouche)/2
 FOR objpj=-objhautsur2 TO objhautsur2 STEP .05
  objpi=-objlargsur2:GOSUB perimobjets
  objpi=objlargsur2:GOSUB perimobjets
 NEXT
 FOR objpi=-objlargsur2 TO objlargsur2 STEP .05
  objpj=-objhautsur2:GOSUB perimobjets
  objpj=objhautsur2:GOSUB perimobjets
 NEXT

 if objnumcouche<objncouchemax then
  objlargsur2=(objlargeur-objepaisseurunecouche*(objnumcouche+1))/2
  objhautsur2=(objhauteur-objepaisseurunecouche*(objnumcouche+1))/2
  objpi=-objlargsur2
  FOR objpj=-objhautsur2 TO objhautsur2 STEP .05
   objpi=-objlargsur2:GOSUB perimobjets
   objpi=objlargsur2:GOSUB perimobjets
  NEXT
  FOR objpi=-objlargsur2 TO objlargsur2 STEP .05
   objpj=-objhautsur2:GOSUB perimobjets
   objpj=objhautsur2:GOSUB perimobjets
  NEXT
 end if

 GOSUB rempliobjets
next
return

newsurfacetriangulaire:'---------------------------------------------------
-------

numdernierelement+=1:if numdernierelement>numelementmax then
numdernierelement=numelementmax
numelement=numdernierelement
elementnom$(numelement)="surface triangulaire"
elementtype$(numelement)="objet"
elementinfo(0,numelement)=itracedecal+largzoneaffsur2
elementinfo(1,numelement)=jtracedecal+hautzoneaffsur2
elementinfo(2,numelement)=1200       'largeur
elementinfo(3,numelement)=1200       'hauteur
elementinfo(4,numelement)=33.75         'inclin
elementinfo(5,numelement)=.5        'indice
elementinfo(6,numelement)=1         'prior
nbrinfosmax(numelement)=6

gosub initindicesreac
gosub litobjets
numelementselect=numdernierelement:gosub tracemenu
gosub centreelement
tracecontourson=1
return

surfacetriangulaire:'------------------------------------------------------
-------

objcentrei=elementinfo(0,numelement)
objcentrej=elementinfo(1,numelement)
objlargeur=elementinfo(2,numelement)
objhauteur=elementinfo(3,numelement)
```

```
objinclin=elementinfo(4,numelement)
objindice=elementinfo(5,numelement)
objprior=elementinfo(6,numelement)

if objindice<0 then objindice=0
if objindice>1 then objindice=1

objinclin*=deuxpisur360:co=COS(objinclin):si=SIN(objinclin)
objlargsur2=objlargeur/2
objhautsur2=objhauteur/2
FOR objpj= -objhautsur2 TO objhautsur2 STEP .05
 objlarg=objlargsur2*(objpj+objhautsur2)/objhauteur
 objpi=-objlarg: GOSUB perimobjets
 objpi=objlarg: GOSUB perimobjets
NEXT
FOR objpi= -objlarg TO objlarg STEP .05
 GOSUB perimobjets
NEXT
GOSUB rempliobjets
RETURN



perimobjets:'------------------------------------------------------------
-------

objperimi=cint(objcentrei+objpi*co+objpj*si)
objperimj=cint(objcentrej-objpi*si+objpj*co)

IF objperimi<2 THEN objperimi=2
IF objperimi>imaxm2 THEN objperimi=imaxm2
IF objperimj<2 THEN objperimj=2
IF objperimj>jmaxm2 THEN objperimj=jmaxm2
IF objperimi<objperimin(objperimj) THEN objperimin(objperimj)=objperimi
IF objperimi>objperimax(objperimj) THEN objperimax(objperimj)=objperimi
RETURN

periminterneobjets:'-----------------------------------------------------
-------

objperimi=cint(objcentrei+objpi*co+objpj*si)
objperimj=cint(objcentrej-objpi*si+objpj*co)

IF objperimi<2 THEN objperimi=2
IF objperimi>imaxm2 THEN objperimi=imaxm2
IF objperimj<2 THEN objperimj=2
IF objperimj>jmaxm2 THEN objperimj=jmaxm2
IF objperimi<objperiminb(objperimj) THEN objperiminb(objperimj)=objperimi
IF objperimi>objperimaxb(objperimj) THEN objperimaxb(objperimj)=objperimi
RETURN

rempliobjets:'-----------------------------------------------------------
-------
```

```
coefreacobjet=coefreacbase*objindice

if objprior=0 then
 FOR objrempj=2 TO jmaxm2
  IF objperimin(objrempj)<10000000 THEN
   if objperiminb(objrempj)<10000000 THEN
    FOR objrempi=objperimin(objrempj) TO objperiminb(objrempj)
     indicereac(objrempj,objrempi)=coefreacobjet
    NEXT
    FOR objrempi=objperimaxb(objrempj) TO objperimax(objrempj)
     indicereac(objrempj,objrempi)=coefreacobjet
    NEXT
   else
    FOR objrempi=objperimin(objrempj) TO objperimax(objrempj)
     indicereac(objrempj,objrempi)=coefreacobjet
    NEXT
   end if
  END IF
  asm
  mov eax, dword ptr [OBJREMPJ]
  mov dword ptr [OBJPERIMIN+eax*4],10000000
  mov dword ptr [OBJPERIMAX+eax*4],-10000000
  mov dword ptr [OBJPERIMINB+eax*4],10000000
  mov dword ptr [OBJPERIMAXB+eax*4],-10000000
  end asm
 NEXT
end if

if objprior=1 then
 FOR objrempj=2 TO jmaxm2
  IF objperimin(objrempj)<10000000 THEN
   if objperiminb(objrempj)<10000000 THEN
    FOR objrempi=objperimin(objrempj) TO objperiminb(objrempj)
     if coefreacobjet<indicereac(objrempj,objrempi) then
indicereac(objrempj,objrempi)=coefreacobjet
    NEXT
    FOR objrempi=objperimaxb(objrempj) TO objperimax(objrempj)
     if coefreacobjet<indicereac(objrempj,objrempi) then
indicereac(objrempj,objrempi)=coefreacobjet
    NEXT
   else
    FOR objrempi=objperimin(objrempj) TO objperimax(objrempj)
     if coefreacobjet<indicereac(objrempj,objrempi) then
indicereac(objrempj,objrempi)=coefreacobjet
    NEXT
   end if
  END IF
  asm
  mov eax, dword ptr [OBJREMPJ]
  mov dword ptr [OBJPERIMIN+eax*4],10000000
  mov dword ptr [OBJPERIMAX+eax*4],-10000000
  mov dword ptr [OBJPERIMINB+eax*4],10000000
  mov dword ptr [OBJPERIMAXB+eax*4],-10000000
  end asm
 NEXT
end if

if objprior=2 then
 FOR objrempj=2 TO jmaxm2
  IF objperimin(objrempj)<10000000 THEN
   if objperiminb(objrempj)<10000000 THEN
    FOR objrempi=objperimin(objrempj) TO objperiminb(objrempj)
     if coefreacobjet>indicereac(objrempj,objrempi) then
indicereac(objrempj,objrempi)=coefreacobjet
    NEXT
    FOR objrempi=objperimaxb(objrempj) TO objperimax(objrempj)
     if coefreacobjet>indicereac(objrempj,objrempi) then
indicereac(objrempj,objrempi)=coefreacobjet
    NEXT
   else
    FOR objrempi=objperimin(objrempj) TO objperimax(objrempj)
     if coefreacobjet>indicereac(objrempj,objrempi) then
indicereac(objrempj,objrempi)=coefreacobjet
    NEXT
   end if
  END IF
  asm
  mov eax, dword ptr [OBJREMPJ]
  mov dword ptr [OBJPERIMIN+eax*4],10000000
  mov dword ptr [OBJPERIMAX+eax*4],-10000000
  mov dword ptr [OBJPERIMINB+eax*4],10000000
  mov dword ptr [OBJPERIMAXB+eax*4],-10000000
  end asm
 NEXT
end if

RETURN
```

```
newobservateur:'---------------------------------------------------------
-------

if elementtype$(numelementobserv)<>"observ" then
 numdernierelement+=1:if numdernierelement>numelementmax then
numdernierelement=numelementmax
 numelement=numdernierelement
 elementnom$(numelement)="observateur"
 elementtype$(numelement)="observ"
 elementinfo(0,numelement)=itracedecal+largzoneaffsur2
 elementinfo(1,numelement)=jtracedecal+hautzoneaffsur2
 elementinfo(2,numelement)=0                    'deplacement en x
 elementinfo(3,numelement)=0                    'deplacement en y
 nbrinfosmax(numelement)=3
 numelementobserv=numdernierelement
 numelementselect=numdernierelement:gosub tracemenu
 gosub centreelement
end if
return

observateur:'------------------------------------------------------------
-------

obscentrei=elementinfo(0,numelementobserv)
obscentrej=elementinfo(1,numelementobserv)
obsvitx=elementinfo(2,numelementobserv)
obsvity=elementinfo(3,numelementobserv)

obsi=obscentrei+int(obsvitx*t)
obsj=obscentrej+int(obsvity*t)
if obsi<2 then obsi=2
if obsi>imaxm2 then obsi=imaxm2
if obsj<2 then obsj=2
if obsj>jmaxm2 then obsj=jmaxm2

for obscpt=1 to 255:obsmem(obscpt-1)=obsmem(obscpt):next
if trameaoub=0 then obsmem(255)=ptla(obsj,obsi) else
obsmem(255)=ptlb(obsj,obsi)

if sgn(obsmem(255))<>sgn(obsmem(254)) then
 if obsdemiperiode=0 then
  obsdemiperiode=1
 else
  obsdemiperiode=0
  obstold=obst:obst=t:obslambda=(obst-obstold)
  if obslambda<254 then
   obsniveaumin=100000
   obsniveaumax=-100000
   for obscpt=int(254-obslambda) to 254
    if obsmem(obscpt)<obsniveaumin then obsniveaumin=obsmem(obscpt)
    if obsmem(obscpt)>obsniveaumax then obsniveaumax=obsmem(obscpt)
   next
   obsamplitude=(obsniveaumax-obsniveaumin)/2
  end if
 end if
end if
return

traceobservateur:'-------------------------------------------------------
-------

put (212,sizeecranv-117),observa(0),alpha,200
col=blanc

obsamp=obsmem(0)*hauteurobs
if obsamp<-30 then obsamp=-30
if obsamp>30 then obsamp=30
pset(212+1,sizeecranv-60-obsamp),col
for obscpt=0 to 253
 obsamp=obsmem(obscpt)*hauteurobs
 if obsamp<-30 then obsamp=-30
 if obsamp>30 then obsamp=30
 line-(212+1+obscpt,sizeecranv-60-obsamp),col
next

color blanc,vertobserv
locate 83,29:? "Lambda=";left$(str$(obslambda),5)
obsamplitudeb=obsamplitude*1000
if (obsamplitudeb)>1000 then locate 83,43:? "Amp=
"+left$(str$(obsamplitude*1),5):goto shuntobs
if (obsamplitudeb)>100 then locate 83,43:? "Amp=
0."+left$(str$(int(obsamplitude*1000000)),3):goto shuntobs
if (obsamplitudeb)>10 then locate 83,43:? "Amp=
0.0"+left$(str$(int(obsamplitude*1000000)),2):goto shuntobs
```

```
if (obsamplitudeb)>1 then locate 83,43:? "Amp=
0.00"+left$(str$(int(obsamplitude*1000000)),1)

shuntobs:

if numdernierelement<1 then return

obscentrei=elementinfo(0,numelementobserv)
obscentrej=elementinfo(1,numelementobserv)
obsvitx=elementinfo(2,numelementobserv)
obsvity=elementinfo(3,numelementobserv)

xcroix=obscentrei+int(obsvitx*t/deltat)-itracedecal
ycroix=obscentrej+int(obsvity*t/deltat)-jtracedecal
select case zoom
case -1
 xcroix*=.5
 ycroix*=.5
case 1
 xcroix*=2
 ycroix*=2
end select
if xcroix>7 then
 if xcroix<(largzoneaff-7) then
  if ycroix>7 then
   if ycroix<(hautzoneaff-7) then
    xcroix+=211:ycroix+=53
    col=blanc
    if elementselect(numelementobserv)=1 then col=vertclair
    if numelementobserv=numelementselect then col=vertclair
    circle (xcroix,ycroix),6,col
   end if
  end if
 end if
end if

return
```

```
litattenuateurs:'--------------------------------------------------------
-------

if elementenmvt=0 then gosub initbordure
for numelement=0 to numdernierelement
 if elementnom$(numelement)="attenuateur" then gosub attenuateur
next
return

newattenuateur:'---------------------------------------------------------
-------

numdernierelement+=1:if numdernierelement>numelementmax then
numdernierelement=numelementmax
numelement=numdernierelement
elementnom$(numelement)="attenuateur"
elementtype$(numelement)="attenuateur"
elementinfo(0,numelement)=itracedecal+largzoneaffsur2
elementinfo(1,numelement)=jtracedecal+hautzoneaffsur2
elementinfo(2,numelement)=800       'largeur
elementinfo(4,numelement)=0         'inclin
nbrinfosmax(numelement)=3

gosub initatten
gosub litattenuateurs
numelementselect=numdernierelement:gosub tracemenu
gosub centreelement
return

attenuateur:'------------------------------------------------------------
-------

attencentrei=elementinfo(0,numelement)
attencentrej=elementinfo(1,numelement)
attenlargeur=elementinfo(2,numelement)
atteninclin=elementinfo(3,numelement)

attenlargsur2=attenlargeur/2
if atteninclin<90 then elementinfo(3,numelement)=0:goto attenuateur0degre
if atteninclin<180 then elementinfo(3,numelement)=90:goto
attenuateur90degre
if atteninclin<270 then elementinfo(3,numelement)=180:goto
attenuateur180degre
if atteninclin<360 then elementinfo(3,numelement)=270:goto
attenuateur270degre
elementinfo(3,numelement)=0:goto attenuateur0degre
return

attenuateur0degre:'------------------------------------------------------
-------

attenimin=attencentrei-attenlargsur2:if attenimin<2 then attenimin=2
attenimax=attencentrei+attenlargsur2:if attenimax>imaxm2 then
attenimax=imaxm2
if attencentrej<(2+48) then attencentrej=(2+48)
if attencentrej>(jmaxm2-48) then attencentrej=(jmaxm2-48)

attenj=attencentrej-32
FOR atteni=attenimin TO attenimax
 attenuation(attenj,atteni)=0
next

attenjmin=attencentrej-31
attenjmax=attencentrej+32
distbord=0
FOR attenj=attenjmin TO attenjmax
 attenuationbordure=attenbord(distbord)
 FOR atteni=attenimin TO attenimax
  if attenuationbordure<attenuation(attenj,atteni) then
attenuation(attenj,atteni)=attenuationbordure
 next
 distbord+=1
next
return
```

```
attenuateur180degre:'---------------------------------------------------
-------

attenimin=attencentrei-attenlargsur2:if attenimin<2 then attenimin=2
attenimax=attencentrei+attenlargsur2:if attenimax>imaxm2 then
attenimax=imaxm2
if attencentrej<(2+48) then attencentrej=(2+48)
if attencentrej>(jmaxm2-48) then attencentrej=(jmaxm2-48)

attenjmin=attencentrej-31
attenjmax=attencentrej+32
distbord=63
FOR attenj=attenjmin TO attenjmax
 attenuationbordure=attenbord(distbord)
 FOR atteni=attenimin TO attenimax
  if attenuationbordure<attenuation(attenj,atteni) then
attenuation(attenj,atteni)=attenuationbordure
 next
 distbord-=1
next

attenj=attencentrej+33
FOR atteni=attenimin TO attenimax
 attenuation(attenj,atteni)=0
next
return

attenuateur90degre:'----------------------------------------------------
-------

attenjmin=attencentrej-attenlargsur2:if attenjmin<2 then attenjmin=2
attenjmax=attencentrej+attenlargsur2:if attenjmax>jmaxm2 then
attenjmax=jmaxm2
if attencentrei<(2+48) then attencentrei=(2+48)
if attencentrei>(imaxm2-48) then attencentrei=(imaxm2-48)

atteni=attencentrei-32
FOR attenj=attenjmin TO attenjmax
 attenuation(attenj,atteni)=0
next

attenimin=attencentrei-31
attenimax=attencentrei+32
distbord=0
FOR atteni=attenimin TO attenimax
 attenuationbordure=attenbord(distbord)
 FOR attenj=attenjmin TO attenjmax
  if attenuationbordure<attenuation(attenj,atteni) then
attenuation(attenj,atteni)=attenuationbordure
 next
 distbord+=1
next
return
```

```
attenuateur270degre:'----------------------------------------------------
-------

attenjmin=attencentrej-attenlargsur2:if attenjmin<2 then attenjmin=2
attenjmax=attencentrej+attenlargsur2:if attenjmax>jmaxm2 then
attenjmax=jmaxm2
if attencentrei<(2+48) then attencentrei=(2+48)
if attencentrei>(imaxm2-48) then attencentrei=(imaxm2-48)

attenimin=attencentrei-31
attenimax=attencentrei+32
distbord=63
FOR atteni=attenimin TO attenimax
 attenuationbordure=attenbord(distbord)
 FOR attenj=attenjmin TO attenjmax
  if attenuationbordure<attenuation(attenj,atteni) then
attenuation(attenj,atteni)=attenuationbordure
 next
 distbord-=1
next

atteni=attencentrei+33
FOR attenj=attenjmin TO attenjmax
 attenuation(attenj,atteni)=0
next
return
```

```
testclavier:'------------------------------------------------------------
-------

keyb$=inkey$
if multikey(SC_DELETE) then now=timer:gosub supprimeselectionshunt:gosub
tempoclav
if multikey(SC_LEFT) then now=timer:itracedecal-=decalecranpasgosub:gosub
tracecourbes:gosub tempoclav
```

```
if multikey(SC_RIGHT) then now=timer:itracedecal+=decalecranpas:gosub
tracecourbes:gosub tempoclav
if multikey(SC_UP) then now=timer:jtracedecal-=decalecranpas:gosub
tracecourbes:gosub tempoclav
if multikey(SC_DOWN) then now=timer:jtracedecal+=decalecranpas:gosub
tracecourbes:gosub tempoclav
if multikey(SC_ESCAPE) then now=timer:goto quitteshunt:gosub tempoclav
return

lecturemouse:'------------------------------------------------------------
-------

GETMOUSE mousex, mousey,,mousebouton
if mousex=-1 then return                             ' si souris en dehors
de l'ecran
gosub mousexytoij
return

lecturemousefenetre:'-----------------------------------------------------
-------

mousexold=mousex
mouseyold=mousey
GETMOUSE mousex, mousey,, mousebouton
if mousex=-1 then return                             ' si souris en dehors
de l'ecran
if mousex<211 then mousex=211
if mousey<53 then mousey=53
if mousey>(sizeecranv-21) then mousey=sizeecranv-21
difmousex=mousex-mousexold
difmousey=mousey-mouseyold
if zoom=1 then difmousex*=.5:difmousey*=.5
if zoom=-1 then difmousex*=2:difmousey*=2
gosub mousexytoij
return

mousexytoij:'-------------------------------------------------------------
-------

select case zoom
case -1
 mousei=(mousex-211)*2+itracedecal
 mousej=(mousey-53)*2+jtracedecal
case 0
 mousei=mousex-211+itracedecal
 mousej=mousey-53+jtracedecal
case 1
 mousei=(mousex-211)*.5+itracedecal
 mousej=(mousey-53)*.5+jtracedecal
end select
return

attendclickmouse:'--------------------------------------------------------
-------
```

```
now=timer
do
 GETMOUSE mousex, mousey,,mouseboutontemp
 if TIMER>(now+5) then mouseboutontemp=1
 loop while mouseboutontemp=0
return

attendrelachemouse:'-----------------------------------------------------
------

now=timer
do
 GETMOUSE mousex, mousey,,mouseboutontemp
 if TIMER>(now+.175) then mouseboutontemp=0
loop while mouseboutontemp>0
return

attendrelachemousemoyen:'------------------------------------------------
-------

now=timer
do
 GETMOUSE mousex, mousey,,mouseboutontemp
 if TIMER>(now+.1) then mouseboutontemp=0
loop while mouseboutontemp>0
return

attendrelachemousecourt:'------------------------------------------------
-------

now=timer
do
 GETMOUSE mousex, mousey,,mouseboutontemp
 if TIMER>(now+.015) then mouseboutontemp=0
loop while mouseboutontemp>0
return

tempoclav:'--------------------------------------------------------------
-------

if timer<(now+.15) then goto tempoclav
return

testmousesurecran:'------------------------------------------------------
-------

mousesurzonebarrehaute=0
mousesurzoneselectelement=0
mousesurzonebarrebasse=0
mousesurzoneinfos=0
mousesurbouton=0
mousesurpetitbouton=0
message$=""
```

```
GETMOUSE mousex,mousey,molette,mousebouton
if mousex=-1 then return                            ' si souris en dehors
de l'ecran

if molette<moletteold then if zoom>-1 then zoom-=1
if molette>moletteold then if zoom<1 then zoom+=1
if zoom<>zoomold then
 if zoom>zoomold then                'zoom
  select case zoom
  case 0
   itracedecal+=(mousex-211)
   jtracedecal+=(mousey-53)
  case 1
   itracedecal+=(mousex-211)*.5
   jtracedecal+=(mousey-53)*.5
  end select
 else                                'unzoom
  select case zoom
  case 0
   itracedecal-=largzoneaffsur2*.5
   jtracedecal-=hautzoneaffsur2*.5
  case -1
   itracedecal-=largzoneaffsur2
   jtracedecal-=hautzoneaffsur2
  end select
 end if
 gosub tracecourbes
end if
zoomold=zoom:moletteold=molette

if mousey>19 then
 if mousey<53 then
  mousesurzonebarrehaute=1
  gosub testmousesurbarrehaute
  mousesurzonefenetre=0
 end if
end if

if mousex>0 then
 if mousex<209 then
  if mousey>52 then
   if mousey<89 then
    mousesurzoneselectelement=1
    gosub testmousesurselectelement
   end if
  end if
 end if
end if

if mousex>0 then
 if mousex<209 then
  if mousey>88 then
   if mousey<645 then
```

```
    mousesurzoneinfos=1
    gosub testmousesurinfos
    mousesurzonefenetre=0
   end if
  end if
 end if
end if

if mousex>0 then
 if mousex<209 then
  if mousey>645 then
   if mousey<747 then
    mousesurzonebarrebasse=1
    gosub testmousesurbarrebasse
    mousesurzonefenetre=0
   end if
  end if
 end if
end if

if mousex>210 then
 if mousex<sizeecranh then
  if mousey>52 then
   if mousey<sizeecranv then
    mousesurzonefenetre+=1
    gosub testmousedansfenetre
   end if
  end if
 end if
end if

if mousesurzonefenetre=1 then gosub testmousesurbarrehaute:gosub
testmousesurbarrebasse:gosub testmousesurinfos       'efface rectangles
de selection si 1er acces a zone fenetre

if message$="" then gosub affichemessage
ciblex=sizeecranh-11:cibley=8:gosub testsurcible:if surcible then gosub
quitte
gosub testclavier

return

testmousesurbarrehaute:'-----------------------------------------------
-------

nbouton=0
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Nouveau projet":gosub affichemessage
if boutonactif(nbouton) then largzone=sizemilieuh-
128:hautzone=sizemilieuv-128:gosub initvariables:gosub inittableaux:gosub
initbordure:gosub initlimitescalcul:gosub tracemenu

nbouton+=1
```

```
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Charge un projet existant":gosub
affichemessage
if boutonactif(nbouton) then chargeafaire=1

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Sauvegarde le projet":gosub
affichemessage
if boutonactif(nbouton) then sauvegardeafaire=1

nbouton+=1
nbouton+=1
nbouton+=1
nbouton+=1
nbouton+=1
nbouton+=1
nbouton+=1
nbouton+=1

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Duplique la
s"+chr$(130)+"lection":gosub affichemessage
if boutonactif(nbouton) then gosub dupliqueselection

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Supprime la
s"+chr$(130)+"lection":gosub affichemessage
if boutonactif(nbouton) then gosub supprimeselection

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Undo":gosub affichemessage
if boutonactif(nbouton) then gosub undo

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Redo":gosub affichemessage
if boutonactif(nbouton) then gosub redo

nbouton+=1
nbouton+=1
nbouton+=1
nbouton+=1

nbouton+=1
```

```
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Ajoute une source ponctuelle":gosub
affichemessage
if boutonactif(nbouton) then gosub newsourceponctuelle

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Ajoute des sources
align"+chr$(130)+"es sur une droite":gosub affichemessage
if boutonactif(nbouton) then gosub newsourcesalignees

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Ajoute des sources
align"+chr$(130)+"es sur un cercle":gosub affichemessage
if boutonactif(nbouton) then gosub newsourcecirculaire

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Ajoute une source en
translation":gosub affichemessage
if boutonactif(nbouton) then gosub newsourceentranslation

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Ajoute une source en rotation":gosub
affichemessage
if boutonactif(nbouton) then gosub newsourceenrotation

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Ajoute un offset":gosub
affichemessage
if boutonactif(nbouton) then gosub newsourceoffset

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Ajoute une source
modul"+chr$(130)+"e en amplitude":gosub affichemessage
if boutonactif(nbouton) then gosub newsourceAM

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Ajoute une source
modul"+chr$(130)+"e en fr"+chr$(130)+"quence":gosub affichemessage
if boutonactif(nbouton) then gosub newsourceFM
```

```
nbouton+=1
nbouton+=1
nbouton+=1
nbouton+=1

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Ajoute une surface circulaire":gosub
affichemessage
if boutonactif(nbouton) then gosub newsurfacecirculaire

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Ajoute une surface plane":gosub
affichemessage
if boutonactif(nbouton) then gosub newsurfaceplane

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Ajoute une surface
triangulaire":gosub affichemessage
if boutonactif(nbouton) then gosub newsurfacetriangulaire

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Importe un masque BMP":gosub
affichemessage
if boutonactif(nbouton) then gosub importebmp

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Ajoute une zone
d'att"+chr$(130)+"nuation":gosub affichemessage
if boutonactif(nbouton) then gosub newattenuateur

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Passe l'objet devant d'une
position":gosub affichemessage
if boutonactif(nbouton) then gosub objetpriorplus

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Passe l'objet derri"+chr$(138)+"re
d'une position":gosub affichemessage
if boutonactif(nbouton) then gosub objetpriormoins
```

```
nbouton+=1

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then if obsactif then
message$="D"+chr$(130)+"sactive l'observateur" else message$="affiche
l'observateur" end if :gosub affichemessage
if boutonactif(nbouton) then obsactif=obsactif xor 1:if obsactif then
gosub newobservateur

nbouton+=1
nbouton+=1
nbouton+=1
nbouton+=1

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Indice de r"+chr$(130)+"action du
milieu (actuellement="+str$(coefreac/coefreacbase)+")":gosub
affichemessage
if boutonactif(nbouton) then gosub modifiecoefreac

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Coefficient
d'att"+chr$(130)+"nuation des ondes
(actuellement="+str$(coefattenuation)+")":gosub affichemessage
if boutonactif(nbouton) then gosub modifiecoefattenuation

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Effet doppler (actuellement
v/c="+str$(dopplervsurc)+")":gosub affichemessage
if boutonactif(nbouton) then gosub modifiedoppler

nbouton+=1
nbouton+=1
nbouton+=1
nbouton+=1

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Au sujet du programme":gosub
affichemessage
if boutonactif(nbouton) then aboutonoff=aboutonoff xor 1:if aboutonoff=1
then gosub afficheabout else gosub tracecourbes

return
```

```
testmousesurbarrebasse:'-------------------------------------------------
-------

nbouton=51

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then if modepauseon=0 then message$="Mettre en
pause le calcul" else message$="Reprendre le calcul" end if:gosub
affichemessage
if boutonactif(nbouton) then modepauseon=modepauseon xor 1

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Grille ON/OFF":gosub affichemessage
if boutonactif(nbouton) then grilleon=grilleon xor 1:gosub tracecourbes

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Trace les objets (actuellement=":if
tracecontourson then message$+="On)" else message+="Off)" end if:gosub
affichemessage
if boutonactif(nbouton) then tracecontourson=tracecontourson xor 1:gosub
tracecourbes

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Vitesse de rafraichissement":gosub
affichemessage
if boutonactif(nbouton) then speedrafrecheon=speedrafrecheon xor 1

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Recommence le calcul":gosub
affichemessage
if boutonactif(nbouton) then gosub initptlszonecalcul:gosub
initlimitescalcul:gosub initindicesreac:gosub
litobjets:t=0:numtrame=0:tempsdebut=timer

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Capture de l'image
compl"+chr$(138)+"te":gosub affichemessage
if boutonactif(nbouton) then captureafaire=1

nbouton+=1
```

```
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Captures automatiques":gosub
affichemessage
if boutonactif(nbouton) then message$="intervalle entre 2 captures
?":gosub interrogemessage:intervalcapture=val(message$):if
intervalcapture<0 then intervalcapture=10000000

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Trace l'"+chr$(130)+"nergie en
bleu":gosub affichemessage
if boutonactif(nbouton) then paletteencours=4:gosub rafrechepalette:gosub
tracecourbes

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Trace l'"+chr$(130)+"nergie en
rouge":gosub affichemessage
if boutonactif(nbouton) then paletteencours=3:gosub rafrechepalette:gosub
tracecourbes

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Trace l'"+chr$(130)+"nergie en
multicolor":gosub affichemessage
if boutonactif(nbouton) then paletteencours=5:gosub rafrechepalette:gosub
tracecourbes

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Cr"+chr$(130)+"e une
vid"+chr$(130)+"o "+chr$(133)+" partir des images affich"+chr$(130)+"es
"+chr$(133)+" l'ecran":gosub affichemessage
if boutonactif(nbouton) then if aviopen=0 then
avispot=1:avicpt=0:avifichier$="v"+STR$(numtrame)+".avi":gosub
initavifile:speedrafrecheon=1

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then message$="Stoppe la vid"+chr$(130)+"o en
cours":gosub affichemessage
if boutonactif(nbouton) then if aviopen=1 then gosub closeavifile

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then if modepauseon=0 then message$="Trace
l'amplitude en gris":gosub affichemessage
```

```
if boutonactif(nbouton) then paletteencours=0:gosub rafrechepalette:gosub
tracecourbes

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then if modepauseon=0 then message$="Trace
l'amplitude en rouge et bleu":gosub affichemessage
if boutonactif(nbouton) then paletteencours=1:gosub rafrechepalette:gosub
tracecourbes

nbouton+=1
testsibouton(boutonposx(nbouton),boutonposy(nbouton),mousex,mousey,mouseb
outon,boutonactif(nbouton),boutonsel(nbouton),boutonhelp$(nbouton))
if boutonsel(nbouton) then if modepauseon=0 then message$="Trace
l'amplitude en rouge et vert":gosub affichemessage
if boutonactif(nbouton) then paletteencours=2:gosub rafrechepalette:gosub
tracecourbes

ciblex=180:cibley=676:gosub testsurcible
if surcible then gosub contrasteplus
ciblex=180:cibley=723:gosub testsurcible
if surcible then gosub contrastemoins

return

testmousesurselectelement:'----------------------------------------------
-------

ciblex=177:cibley=71:gosub testsurciblecourt
if surcible then
mousesurpetitbouton=1:boutonx=ciblex:boutony=cibley:gosub
selectelementprecedant
ciblex=193:cibley=71:gosub testsurciblecourt
if surcible then
mousesurpetitbouton=1:boutonx=ciblex:boutony=cibley:gosub
selectelementsuivant
return

testmousedansfenetre:'---------------------------------------------------
-------

gosub lecturemouse
if aboutonoff then if mousebouton then aboutonoff=0

messagea$="    x="+str$(int(mousei-imaxsur2))+"    y="+str$(int(mousej-
jmaxsur2))
messageb$="               indice de reaction =
"+str$(indicereac(mousej,mousei)/coefreacbase)
messagec$="                 coefficient d'att"+chr$(130)+"nuation =
"+str$(attenuation(mousej,mousei))
message$=messagea$+messageb$+messagec$

mousesurelement=0
```

```
for numelement=1 to numdernierelement
 ciblei=elementinfo(0,numelement)
 ciblej=elementinfo(1,numelement)
 gosub testsurcibleij
 if surcible then
  mousesurelement=1
  numelementselectb=numelementselect
  numelementselect=numelement
  if numelementselect<>numelementselectb then gosub tracemenu
  if elementselect(numelement)=0 then for numelementb=1 to
numdernierelement:elementselect(numelementb)=0:next 'si ne fait pas deja
parti d'un groupe, ne selectionne que cet element la
  elementselect(numelement)=1:numelementselect=numelement
  if elementtype$(numelementselect)="source" then
   message$="maintenez le bouton gauche pour d"+chr$(130)+"placer"
  else
   message$="maintenez le bouton gauche pour d"+chr$(130)+"placer ou le
droit pour tourner"
  end if
 end if
next
if mousebouton=1 then
 if mousesurelement then
  selectbin=0                   ' 00000111  ->   00000 obj src aten
  for numelement=1 to numdernierelement
   if elementselect(numelement)=1 then
    if elementtype$(numelement)="objet" then selectbin=selectbin or 4
    if elementtype$(numelement)="objetbmp" then selectbin=selectbin or 4
    if elementtype$(numelement)="source" then selectbin=selectbin or 2
    if elementtype$(numelement)="attenuateur" then selectbin=selectbin or
1
   end if
  next
  gosub deplaceelements
 else
  gosub creeuneselection
 end if
end if

if mousebouton=2 then
 if mousesurelement=1 then gosub tourneelementseul else gosub
deplaceecransouris
end if

if left$(message$,6)="    x=" then gosub afficheindice else gosub
affichemessage
return

testmousesurinfos:'-----------------------------------------------------
-------

if numelementselect=-1 then return
changementinfos=-1
clickdansinfo=0
```

```
if numelementselect=0 then return

for nsaisi=0 to nbrinfosmax(numelementselect)

testsisaisie(saisiposx(nsaisi),saisiposy(nsaisi),mousex,mousey,mousebouto
n,saisincar(nsaisi),bleufond2,saisiactif(nsaisi),saisisel(nsaisi))
 if saisiactif(nsaisi) then
  clickdansinfo=1
  if nsaisi=0 then
saisichaine$(nsaisi)=str$(elementinfo(nsaisi,numelementselect)-imaxsur2)
  if nsaisi=1 then
saisichaine$(nsaisi)=str$(elementinfo(nsaisi,numelementselect)-jmaxsur2)
  if nsaisi>1 then
saisichaine$(nsaisi)=str$(elementinfo(nsaisi,numelementselect))
  saisichaineold$=saisichaine$(nsaisi)

saisie(saisichaine$(nsaisi),saisiposx(nsaisi),saisiposy(nsaisi),saisincar
(nsaisi),blanc,bleufond2,bleufond1,saisitampon$,saisistatus,saisiposcursm
em)
  if saisichaine$(nsaisi)<>saisichaineold$ then changementinfos=nsaisi
 end if
next

if changementinfos=-1 then
 if clickdansinfo then numelementselectold=-1:gosub tracemenu
 return
end if

if changementinfos=0 then
elementinfo(changementinfos,numelementselect)=val(saisichaine$(changement
infos))+imaxsur2
if changementinfos=1 then
elementinfo(changementinfos,numelementselect)=val(saisichaine$(changement
infos))+jmaxsur2
if changementinfos>1 then
elementinfo(changementinfos,numelementselect)=val(saisichaine$(changement
infos))

if elementtype$(numelementselect)="source" then gosub
initptlszonecalcul:gosub initlimitescalcul
if elementtype$(numelementselect)="objet" then gosub
initindicesreac:gosub litobjets
if elementtype$(numelementselect)="objetbmp" then gosub
initindicesreac:gosub litobjets
if elementtype$(numelementselect)="attenuateur" then gosub
initatten:gosub litattenuateurs
if elementtype$(numelementselect)="observ" then end if

numelementselectold=-1:gosub tracemenu
return
```

```
testsurcible:'-----------------------------------------------------------
-------
surcible=0
IF SQR((mousex-ciblex)*(mousex-ciblex)+(mousey-cibley)*(mousey-
cibley))<13 THEN surcible=1
RETURN

testsurciblecourt:'------------------------------------------------------
-------
surcible=0
IF SQR((mousex-ciblex)*(mousex-ciblex)+(mousey-cibley)*(mousey-cibley))<9
THEN surcible=1
RETURN

testsurcibleij:'---------------------------------------------------------
-------
surcible=0
select case zoom
 case 1
  IF SQR((mousei-ciblei)*(mousei-ciblei)+(mousej-ciblej)*(mousej-
ciblej))<(13*.5) THEN surcible=1
 case 0
  IF SQR((mousei-ciblei)*(mousei-ciblei)+(mousej-ciblej)*(mousej-
ciblej))<13 THEN surcible=1
 case -1
  IF SQR((mousei-ciblei)*(mousei-ciblei)+(mousej-ciblej)*(mousej-
ciblej))<(13*2) THEN surcible=1
end select
RETURN

testsurciblehoriz:'------------------------------------------------------
-------
surcible=0
IF (abs(mousex-ciblex))<200 THEN surcible=1
if (abs(mousey-cibley))>15 THEN surcible=0
RETURN
```

```
creeuneselection:'-------------------------------------------------------
-------

selmousexold=mousex:selmouseyold=mousey
selmouseiold=mousei:selmousejold=mousej

do
 for numelement=1 to numdernierelement:elementselect(numelement)=0:next
 gosub lecturemousefenetre
 if selmouseiold<mousei then
  selectionimin=selmouseiold:selectionimax=mousei
 else
  selectionimin=mousei:selectionimax=selmouseiold
 end if
 if selmousejold<mousej then
  selectionjmin=selmousejold:selectionjmax=mousej
 else
  selectionjmin=mousej:selectionjmax=selmousejold
 end if
 for numelement=0 to numdernierelement
  if elementinfo(0,numelement)>selectionimin then
   if elementinfo(0,numelement)<selectionimax then
    if elementinfo(1,numelement)>selectionjmin then
     if elementinfo(1,numelement)<selectionjmax then
      elementselect(numelement)=1
     end if
    end if
   end if
  end if
 next
 gosub tracecourbes
 line(selmousexold,selmouseyold)-(mousex,mousey),blanc,B
loop while mousebouton=1
return

dupliqueselection:'------------------------------------------------------
-------

numdernierelementold=numdernierelement
```

```
for numelement=1 to numdernierelementold
 if elementtype$(numelement)<>"observ" then
  if (elementselect(numelement)=1) or (numelement=numelementselect) then
   numdernierelement+=1:if numdernierelement>numelementmax then
numdernierelement=numelementmax
   elementnom$(numdernierelement)=elementnom$(numelement)
   elementtype$(numdernierelement)=elementtype$(numelement)
   nbrinfosmax(numdernierelement)=nbrinfosmax(numelement)
   elementinfo(0,numdernierelement)=elementinfo(0,numelement)+32
   elementinfo(1,numdernierelement)=elementinfo(1,numelement)+32
   elementselect(numelement)=0
   for nduplique=2 to 31

elementinfo(nduplique,numdernierelement)=elementinfo(nduplique,numelement
)
   next
  end if
 end if
next
gosub inittableaux
gosub initbordure
gosub initlimitescalcul
gosub litobjets
gosub litattenuateurs
numelementselectold=-1:numelementselect=numdernierelement:gosub tracemenu
for numelement=numdernierelementold+1 to numdernierelement
 elementselect(numelement)=1
next
gosub attendrelachemouse
return

supprimeselection:'-----------------------------------------------------
-------

supprimeselectionshunt:
for numelement=1 to numdernierelement
 if (elementselect(numelement)=1) or (numelement=numelementselect) then
  elementnom$(numelement)="vide"
  if elementtype$(numelement)="observ" then obsactif=0
 end if
next
numdernierelementold=numdernierelement
for numelement=0 to numdernierelementold
 if elementnom$(numelement)="vide" then
  for nsupprime=numelement to numdernierelementold
   elementnom$(nsupprime)=elementnom$(nsupprime+1)
   elementtype$(nsupprime)=elementtype$(nsupprime+1)
   nbrinfosmax(nsupprime)=nbrinfosmax(nsupprime+1)
   elementselect(nsupprime)=0
   for nsupprimeb=0 to 31
    elementinfo(nsupprimeb,nsupprime)=elementinfo(nsupprimeb,nsupprime+1)
   next
  next
  elementnom$(numdernierelement)=""
  numdernierelement-=1:if numdernierelement=-1 then exit for
  numelement-=1
 end if
next
gosub inittableaux
gosub initbordure
gosub initlimitescalcul
gosub litobjets
gosub litattenuateurs
if numdernierelement<0 then numdernierelement=0
for numelement=1 to numdernierelement
 if elementtype$(numelement)="observ" then numelementobserv=numelement
next
numelementselectold=-1:numelementselect=numdernierelement:gosub tracemenu
gosub attendrelachemouse
return

selectelementprecedant:'-------------------------------------------------
-------

message$="s"+chr$(130)+"lectionne l'"+chr$(130)+"l"+chr$(130)+"ment
pr"+chr$(130)+"c"+chr$(130)+"dent"
gosub affichemessage
if mousebouton=0 then return

if numdernierelement=0 then return
numelementselect-=1
if numelementselect<1 then numelementselect=numdernierelement
gosub centreelement
gosub tracemenu
gosub tracecourbes
gosub attendrelachemouse
return

selectelementsuivant:'---------------------------------------------------
-------

message$="s"+chr$(130)+"lectionne l'"+chr$(130)+"l"+chr$(130)+"ment
suivant"
gosub affichemessage
if mousebouton=0 then return

if numdernierelement=0 then return
if numelementselect=-1 then numelementselect=1 else numelementselect+=1
if numelementselect>numdernierelement then numelementselect=1
gosub centreelement
gosub tracecourbes
gosub tracemenu
gosub attendrelachemouse
return
```

```
deplaceecransouris:'-----------------------------------------------------
-------

do
 itracedecalold=itracedecal
 jtracedecalold=jtracedecal
 gosub lecturemousefenetre
 itracedecal-=difmousex
 jtracedecal-=difmousey
 if itracedecal=itracedecalold then if jtracedecal=jtracedecalold then
goto deplaceecransourisshunt
 gosub tracecourbes

deplaceecransourisshunt:
if fairetempo then fairetempo=0:sleep 250
loop while mousebouton=2
return

deplaceelements:'--------------------------------------------------------
-------

do
 itracedecalold=itracedecal
 jtracedecalold=jtracedecal
 gosub lecturemousefenetre
 if (difmousex<>0) or (difmousey<>0) then deplacementeffectue=1 else
deplacementeffectue=0
 for numelement=1 to numdernierelement
  if elementselect(numelement) or numelement=numelementselect then
   elementinfo(0,numelement)+=difmousex
   elementinfo(1,numelement)+=difmousey
   if mousex<(211+50) then
    itracedecal=itracedecalold-
decalecranpas:fairetempo=1:deplacementeffectue=1
    if itracedecal<0 then itracedecal=0
    elementinfo(0,numelement)-=decalecranpas
    if elementinfo(0,numelement)<20 then elementinfo(0,numelement)=20
   end if
   if mousex>sizeecranh-50 then

itracedecal=itracedecalold+decalecranpas:fairetempo=1:deplacementeffectue
=1
    if itracedecal>imaxm2-largzoneaff then itracedecal=imaxm2-largzoneaff
    elementinfo(0,numelement)+=decalecranpas
    if elementinfo(0,numelement)>imaxm2-20 then
elementinfo(0,numelement)=imaxm2-20
   end if
   if mousey<(52+50) then
    jtracedecal=jtracedecalold-
decalecranpas:fairetempo=1:deplacementeffectue=1
    if jtracedecal<0 then jtracedecal=0
    elementinfo(1,numelement)-=decalecranpas
    if elementinfo(1,numelement)<20 then elementinfo(1,numelement)=20
   end if
   if mousey>697 then

jtracedecal=jtracedecalold+decalecranpas:fairetempo=1:deplacementeffectue
=1
    if jtracedecal>jmaxm2-hautzoneaff then jtracedecal=jmaxm2-hautzoneaff
    elementinfo(1,numelement)+=decalecranpas
    if elementinfo(1,numelement)>jmaxm2-20 then
elementinfo(1,numelement)=jmaxm2-20
   end if
  end if
 next
 if deplacementeffectue then
  if bit(selectbin,2)=-1 then gosub initindicesreaczoneecran:gosub
litobjets
  if bit(selectbin,0)=-1 then gosub
initattenzoneecran:elementenmvt=1:gosub litattenuateurs
  gosub tracecourbes
  gosub afficheposelementenmvt
 end if
 if fairetempo then fairetempo=0:sleep 250
loop while mousebouton=1

if bit(selectbin,2)=-1 then gosub initindicesreac:gosub litobjets
if bit(selectbin,1)=-1 then gosub initptlszonecalcul:gosub
initlimitescalcul
if bit(selectbin,0)=-1 then gosub initatten:gosub litattenuateurs
gosub tracecourbes
return

tourneelementseul:'----------------------------------------------------
-------

do
 select case elementtype$(numelementselect)
  case "source"
```

```
   if elementnom$(numelementselect)="sources alignees" then
    elementinfo(3,numelementselect)+=45:if
elementinfo(3,numelementselect)>=360 then
elementinfo(3,numelementselect)=0
    gosub initptlszonecalcul:gosub initlimitescalcul
    fairetempo=1
   end if
  case "attenuateur"
   elementinfo(3,numelementselect)+=90:if
elementinfo(3,numelementselect)>=360 then
elementinfo(3,numelementselect)=0
   gosub initattenzoneecran
   elementenmvt=1:gosub litattenuateurs
   fairetempo=1
  case "objet"
   elementinfo(4,numelementselect)+=11.25:if
elementinfo(4,numelementselect)>=360 then
elementinfo(4,numelementselect)=0
   gosub initindicesreaczoneecran
   gosub litobjets
   fairetempo=1
  case "objetbmp"
   elementinfo(4,numelementselect)+=90:if
elementinfo(4,numelementselect)>=360 then
elementinfo(4,numelementselect)=0
   gosub initindicesreaczoneecran
   gosub litobjets
   fairetempo=1
 end select
 gosub tracecourbes
 gosub afficheposelementenmvt
 if fairetempo then fairetempo=0:sleep 150
 gosub lecturemousefenetre
loop while mousebouton=2

select case elementtype$(numelementselect)
 case "objet"
  gosub initindicesreac
  gosub litobjets
 case "objetbmp"
  gosub initindicesreac
  gosub litobjets
 case "attenuateur"
  gosub initatten
  elementenmvt=0:gosub litattenuateurs
 case "source"
  gosub initptls
  gosub initlimitescalcul
end select
gosub attendrelachemouse
return

centreelement:'-----------------------------------------------------------
-------
```

```
select case zoom
case -1
 itracedecal=elementinfo(0,numelementselect)-largzoneaff
 jtracedecal=elementinfo(1,numelementselect)-hautzoneaff
case 0
 itracedecal=elementinfo(0,numelementselect)-largzoneaffsur2
 jtracedecal=elementinfo(1,numelementselect)-hautzoneaffsur2
case 1
 itracedecal=elementinfo(0,numelementselect)-largzoneaffsur2*.5
 jtracedecal=elementinfo(1,numelementselect)-hautzoneaffsur2*.5
end select
return
```

```
objetpriormoins:'----------------------------------------------------------
-------

if numelementselect<=1 then return
swap elementnom$(numelementselect),elementnom$(numelementselect-1)
swap elementtype$(numelementselect),elementtype$(numelementselect-1)
swap elementselect(numelementselect),elementselect(numelementselect-1)
for n=0 to 31
 swap elementinfo(n,numelementselect),elementinfo(n,numelementselect-1)
next
numelementselect-=1
gosub objetreinit
return

objetpriorplus:'-----------------------------------------------------------
-------

if numelementselect>=numdernierelement then return
swap elementnom$(numelementselect),elementnom$(numelementselect+1)
swap elementtype$(numelementselect),elementtype$(numelementselect+1)
swap elementselect(numelementselect),elementselect(numelementselect+1)
for n=0 to 31
 swap elementinfo(n,numelementselect),elementinfo(n,numelementselect+1)
next
numelementselect+=1
```

```
objetreinit:
if elementtype$(numelementselect)="objet" then gosub
initindicesreac:gosub litobjets
if elementtype$(numelementselect)="objetbmp" then gosub
initindicesreac:gosub litobjets
if elementtype$(numelementselect)="attenuateur" then gosub
initatten:gosub litattenuateurs
gosub tracemenu
return





testsichargeobjetbmp:'----------------------------------------------------
-------

for numelement=0 to numdernierelement
 if elementtype$(numelement)="objetbmp" then
  fichiernom$=elementnom$(numelement)
  fichierbmp$="\imagesbmp\"+fichiernom$+".bmp"
  fichierobj$="\datas\objs\"+fichiernom$+".obj"
  SCREENSET 2,visiblepage
  bload exepath+fichierbmp$
  for bmpcpty=0 to 799
   for bmpcptx=0 to 799
    memobmp(bmpcpty,bmpcptx)=((point(bmpcptx,bmpcpty)) and 255)/255
   next
  next
  bmpadr=varptr(memobmp(0,0))
  bmpmemsize=800*800*4+4
  bsave exepath+fichierobj$,bmpadr,bmpmemsize
  SCREENSET workpage,visiblepage
 end if
next
return

importebmp:'---------------------------------------------------------------
-------

attrib=32   'readonly=1, ib_hidden=2, system=4, directory=16, archive=32
line(0,53)-(166,88),bleufond1,BF:line(0,89)-(209,588),bleufond2,BF
COLOR blanc, bleufond2:locate 14,3
?"fichiers accessibles:":?

nchoix=0
fichiersdisk$=dir$(exepath+"\imagesbmp\*.bmp",attrib)
DO
 choixliste$(0,nchoix)=left$(fichiersdisk$,len(fichiersdisk$)-4)
 fichiersdisk$=dir$("",attrib)
 nchoix+=1
LOOP WHILE fichiersdisk$<>""
choixposx(0)=3
choixposy(0)=18
```

```
choixncar(0)=20
choixchoix(0)=1
choixnmax(0)=nchoix-1
nchoix=0
creecasechoix(strptr(choixliste$(nchoix,0)),choixchoix(nchoix),choixnmax(
nchoix),choixposx(nchoix),choixposy(nchoix),choixncar(nchoix),griscreme,b
leufond1+&h101010)
choixselect(strptr(choixliste$(nchoix,0)),choixchoix(nchoix),choixnmax(nc
hoix),choixposx(nchoix),choixposy(nchoix),choixncar(nchoix),griscreme,ble
ufond1+&h101010,colsel)
message$=choixliste$(0,choixchoix(0))

fichiernom$=message$
fichierbmp$="\imagesbmp\"+fichiernom$+".bmp"
fichierobj$="\datas\objs\"+fichiernom$+".obj"
message$="chargement en cours....":gosub affichemessage

SCREENSET 2,visiblepage:line(0,0)-(520,520),0,BF
bload exepath+fichierbmp$
for bmpcpty=0 to 799
 for bmpcptx=0 to 799
  memobmp(bmpcpty,bmpcptx)=((point(bmpcptx,bmpcpty)) and 255)/255
 next
next
bmpadr=varptr(memobmp(0,0))
bmpmemsize=800*800*4+4
bsave exepath+fichierobj$,bmpadr,bmpmemsize

numdernierelement+=1:if numdernierelement>numelementmax then
numdernierelement=numelementmax
numelement=numdernierelement
elementnom$(numelement)=fichiernom$
elementtype$(numelement)="objetbmp"
elementinfo(0,numelement)=itracedecal+largzoneaffsur2
elementinfo(1,numelement)=jtracedecal+hautzoneaffsur2
elementinfo(2,numelement)=800       'largeur
elementinfo(3,numelement)=800       'hauteur
elementinfo(4,numelement)=0         'inclin
elementinfo(5,numelement)=1         'prior
nbrinfosmax(numelement)=5
SCREENSET workpage,visiblepage
gosub initindicesreac
tracecontourson=1
gosub litobjets
numelementselect=numdernierelement:gosub tracemenu
return


objetbmp:'---------------------------------------------------------------
-------

fichierobj$=elementnom$(numelement)+".obj"
bmpadr=varptr(memobmp(0,0))
bload exepath+"\datas\objs\"+fichierobj$,bmpadr
```

```
objcentrei=int(elementinfo(0,numelement))
objcentrej=int(elementinfo(1,numelement))
objlargeur=elementinfo(2,numelement)
objhauteur=elementinfo(3,numelement)
objinclin=elementinfo(4,numelement)
objprior=elementinfo(5,numelement)

if objcentrei<(2+400) then objcentrei=2+400
if objcentrei>(imaxm2-400) then objcentrei=imaxm2-400
if objcentrej<(2+400) then objcentrej=2+400
if objcentrej>(jmaxm2-400) then objcentrej=jmaxm2-400

if objinclin<90 then elementinfo(4,numelement)=0:goto objetbmp0degre
if objinclin<180 then elementinfo(4,numelement)=90:goto objetbmp90degre
if objinclin<270 then elementinfo(4,numelement)=180:goto objetbmp180degre
if objinclin<360 then elementinfo(4,numelement)=270:goto objetbmp270degre
elementinfo(4,numelement)=0:goto objetbmp0degre
return

objetbmp0degre:'---------------------------------------------------------
-------

bmpjmin=objcentrej-400

if objprior=0 then
 for bmpcpty=0 to 799
  bmpimin=objcentrei-400
  for bmpcptx=0 to 799 step 8
   indicereac(bmpjmin,bmpimin)=coefreacbase*memobmp(bmpcpty,bmpcptx)
   indicereac(bmpjmin,bmpimin+1)=coefreacbase*memobmp(bmpcpty,bmpcptx+1)
   indicereac(bmpjmin,bmpimin+2)=coefreacbase*memobmp(bmpcpty,bmpcptx+2)
   indicereac(bmpjmin,bmpimin+3)=coefreacbase*memobmp(bmpcpty,bmpcptx+3)
   indicereac(bmpjmin,bmpimin+4)=coefreacbase*memobmp(bmpcpty,bmpcptx+4)
   indicereac(bmpjmin,bmpimin+5)=coefreacbase*memobmp(bmpcpty,bmpcptx+5)
   indicereac(bmpjmin,bmpimin+6)=coefreacbase*memobmp(bmpcpty,bmpcptx+6)
   indicereac(bmpjmin,bmpimin+7)=coefreacbase*memobmp(bmpcpty,bmpcptx+7)
   bmpimin+=8
  next
 bmpjmin+=1
 next
end if

if objprior=1 then
 for bmpcpty=0 to 799
  bmpimin=objcentrei-400
  for bmpcptx=0 to 799 step 8
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx+1)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx+2)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx+3)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx+4)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx+5)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx+6)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx+7)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
  next
 bmpjmin+=1
 next
end if

if objprior=2 then
 for bmpcpty=0 to 799
  bmpimin=objcentrei-400
  for bmpcptx=0 to 799 step 8
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx+1)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx+2)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx+3)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx+4)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx+5)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx+6)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx+7)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
  next
 bmpjmin+=1
 next
end if
return

objetbmp90degre:'---------------------------------------------------------
-------

bmpjmin=objcentrej-400

if objprior=0 then
 for bmpcptx=799 to 0 step -1
  bmpimin=objcentrei-400
  for bmpcpty=0 to 799 step 8
   indicereac(bmpjmin,bmpimin)=coefreacbase*memobmp(bmpcpty,bmpcptx)
   indicereac(bmpjmin,bmpimin+1)=coefreacbase*memobmp(bmpcpty+1,bmpcptx)
   indicereac(bmpjmin,bmpimin+2)=coefreacbase*memobmp(bmpcpty+2,bmpcptx)
   indicereac(bmpjmin,bmpimin+3)=coefreacbase*memobmp(bmpcpty+3,bmpcptx)
   indicereac(bmpjmin,bmpimin+4)=coefreacbase*memobmp(bmpcpty+4,bmpcptx)
   indicereac(bmpjmin,bmpimin+5)=coefreacbase*memobmp(bmpcpty+5,bmpcptx)
   indicereac(bmpjmin,bmpimin+6)=coefreacbase*memobmp(bmpcpty+6,bmpcptx)
   indicereac(bmpjmin,bmpimin+7)=coefreacbase*memobmp(bmpcpty+7,bmpcptx)
   bmpimin+=8
  next
 bmpjmin+=1
 next
end if

if objprior=1 then
 for bmpcptx=799 to 0 step -1
  bmpimin=objcentrei-400
  for bmpcpty=0 to 799 step 8
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty+1,bmpcptx)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty+2,bmpcptx)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty+3,bmpcptx)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty+4,bmpcptx)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty+5,bmpcptx)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty+6,bmpcptx)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty+7,bmpcptx)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
  next
 bmpjmin+=1
 next
end if

if objprior=2 then
 for bmpcptx=799 to 0 step -1
  bmpimin=objcentrei-400
  for bmpcpty=0 to 799 step 8
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty+1,bmpcptx)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty+2,bmpcptx)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty+3,bmpcptx)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty+4,bmpcptx)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty+5,bmpcptx)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty+6,bmpcptx)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty+7,bmpcptx)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
  next
 bmpjmin+=1
 next
end if
return

objetbmp180degre:'-----------------------------------------------------
-------

bmpjmin=objcentrej-400

if objprior=0 then
 for bmpcpty=799 to 0 step -1
  bmpimin=objcentrei-400
  for bmpcptx=799 to 0 step -8
   indicereac(bmpjmin,bmpimin)=coefreacbase*memobmp(bmpcpty,bmpcptx)
   indicereac(bmpjmin,bmpimin+1)=coefreacbase*memobmp(bmpcpty,bmpcptx-1)
   indicereac(bmpjmin,bmpimin+2)=coefreacbase*memobmp(bmpcpty,bmpcptx-2)
   indicereac(bmpjmin,bmpimin+3)=coefreacbase*memobmp(bmpcpty,bmpcptx-3)
   indicereac(bmpjmin,bmpimin+4)=coefreacbase*memobmp(bmpcpty,bmpcptx-4)
   indicereac(bmpjmin,bmpimin+5)=coefreacbase*memobmp(bmpcpty,bmpcptx-5)
   indicereac(bmpjmin,bmpimin+6)=coefreacbase*memobmp(bmpcpty,bmpcptx-6)
   indicereac(bmpjmin,bmpimin+7)=coefreacbase*memobmp(bmpcpty,bmpcptx-7)
   bmpimin+=8
  next
 bmpjmin+=1
 next
end if

if objprior=1 then
 for bmpcpty=799 to 0 step -1
  bmpimin=objcentrei-400
  for bmpcptx=799 to 0 step -8
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx-1)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx-2)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx-3)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx-4)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx-5)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx-6)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx-7)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
  next
 bmpjmin+=1
 next
end if

if objprior=2 then
 for bmpcpty=799 to 0 step -1
  bmpimin=objcentrei-400
  for bmpcptx=799 to 0 step -8
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx-1)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx-2)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx-3)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx-4)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx-5)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx-6)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx-7)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
  next
 bmpjmin+=1
 next
end if
return

objetbmp270degre:'-------------------------------------------------------
-------

bmpjmin=objcentrej-400

if objprior=0 then
 for bmpcptx=0 to 799
  bmpimin=objcentrei-400
  for bmpcpty=799 to 0 step -8
   indicereac(bmpjmin,bmpimin)=coefreacbase*memobmp(bmpcpty,bmpcptx)
   indicereac(bmpjmin,bmpimin+1)=coefreacbase*memobmp(bmpcpty-1,bmpcptx)
   indicereac(bmpjmin,bmpimin+2)=coefreacbase*memobmp(bmpcpty-2,bmpcptx)
   indicereac(bmpjmin,bmpimin+3)=coefreacbase*memobmp(bmpcpty-3,bmpcptx)
   indicereac(bmpjmin,bmpimin+4)=coefreacbase*memobmp(bmpcpty-4,bmpcptx)
   indicereac(bmpjmin,bmpimin+5)=coefreacbase*memobmp(bmpcpty-5,bmpcptx)
   indicereac(bmpjmin,bmpimin+6)=coefreacbase*memobmp(bmpcpty-6,bmpcptx)
   indicereac(bmpjmin,bmpimin+7)=coefreacbase*memobmp(bmpcpty-7,bmpcptx)
   bmpimin+=8
  next
 bmpjmin+=1
 next
end if

if objprior=1 then
 for bmpcptx=0 to 799
  bmpimin=objcentrei-400
  for bmpcpty=799 to 0 step -8
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty-1,bmpcptx)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty-2,bmpcptx)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty-3,bmpcptx)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty-4,bmpcptx)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty-5,bmpcptx)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty-6,bmpcptx)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty-7,bmpcptx)
   if objindice<indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
  next
 bmpjmin+=1
 next
end if

if objprior=2 then
 for bmpcptx=0 to 799
  bmpimin=objcentrei-400
  for bmpcpty=799 to 0 step -8
   objindice=coefreacbase*memobmp(bmpcpty,bmpcptx)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty-1,bmpcptx)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty-2,bmpcptx)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty-3,bmpcptx)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty-4,bmpcptx)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty-5,bmpcptx)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty-6,bmpcptx)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
   objindice=coefreacbase*memobmp(bmpcpty-7,bmpcptx)
   if objindice>indicereac(bmpjmin,bmpimin) then
indicereac(bmpjmin,bmpimin)=objindice
   bmpimin+=1
  next
 bmpjmin+=1
 next
end if
return
```

```
captureversbmp:'---------------------------------------------------------
-------

if numtrame=numtramemem then cptcapture+=1 else cptcapture=0
captfichier$="c"+STR$(numtrame)+chr$(97+cptcapture)+".BMP"
numtramemem=numtrame

OPEN captfichier$ FOR binary AS #254
message$="capture d'image en cours ...."
gosub affichemessage
captlarg=imaxm2-2+1
capthaut=jmaxm2-2+1
if zoom<0 then captlarg*=.5:capthaut*=.5

v2=19778:put #254,1,v2                          'BM
```

```
v4=&h36+captlarg*capthaut:put #254,3,v4             'size of file in
bytes
v4=0:put #254,7,v4                                  'reserve
v4=&h36:put #254,11,v4                              'offset de debut
v4=&h28:put #254,15,v4                              'size header
v4=captlarg:put #254,19,v4                          'largeur
v4=capthaut:put #254,23,v4                          'hauteur
v2=1:put #254,27,v2                                 'nbr de plans
v2=32:put #254,29,v2                                '32 bits par pixel
v4=0:put #254,31,v4                                 'type de compression
v4=0:put #254,35,v4                                 'compression size
v4=&hc30e:put #254,39,v4                            'resol x
v4=&hc30e:put #254,43,v4                            'resol y
v4=0:put #254,47,v4                                 'coul
v4=0:put #254,51,v4                                 'nbr coul importantes

captadr=&h37
if zoom<0 then
 select case paletteencours
  case 0
   contraste=contraste0
   gosub capturegrisunzoom
  case 1
   contraste=contraste1
   gosub captureamplitudeunzoom
  case 2
   contraste=contraste2
   gosub captureamplitudeunzoom
  case 3
   contraste=contraste3
   gosub captureenergieunzoom
  case 4
   contraste=contraste4
   gosub captureenergieunzoom
  case 5
   contraste=contraste5
   gosub captureenergieunzoom
 end select
else
 select case paletteencours
  case 0
   contraste=contraste0
   gosub capturegris
  case 1
   contraste=contraste1
   gosub captureamplitude
  case 2
   contraste=contraste2
   gosub captureamplitude
  case 3
   contraste=contraste3
   gosub captureenergie
  case 4
   contraste=contraste4
   gosub captureenergie
  case 5
   contraste=contraste5
   gosub captureenergie
 end select
end if

CLOSE #254
return

capturegris:'-------------------------------------------------------------
-------

for captj=jmaxm2 to 2 step -1
 captcpti=0
 for capti=2 to imaxm2
  if trameaoub=0 then
   ton=ptlb(captj,capti)*contraste
  else
   ton=ptla(captj,capti)*contraste
  end if
  tonb=ton-91+91*indicereac(captj,capti)/coefreacbase
  traceattenuateur=0
  if attenuation(captj,capti)<coefattenuation then
   tonb=ton-63+63*attenuation(captj,capti)
   traceattenuateur=1
  end if
  iF ton>124 THEN ton=124
  IF ton<-124 THEN ton=-124
  iF tonb>124 THEN tonb=124
  IF tonb<-124 THEN tonb=-124
  if traceattenuateur then
   col=moitblanc+tonb*antibleu+ton*unitbleu
  else
   col=moitblanc+tonb*unitcolbar+ton*unitcol
  end if
  if tracecontourson then
   if indicereac(captj,capti)<>indicereac(captj,capti-1) then
col=colgrillegris
   if indicereac(captj,capti)<>indicereac(captj-1,capti) then
col=colgrillegris
  end if
  captlignecol(captcpti)=col
  captadr+=4
  captcpti+=1
 next
 put #254,captadr,captlignecol()
next
return

capturegrisunzoom:'-------------------------------------------------------
-------

for captj=jmaxm2 to 2 step -2
```

```
 captcpti=0
 for capti=2 to imaxm2 step 2
  if trameaoub=0 then
   ton=ptlb(captj,capti)*contraste
  else
   ton=ptla(captj,capti)*contraste
  end if
  tonb=ton-91+91*indicereac(captj,capti)/coefreacbase
  traceattenuateur=0
  if attenuation(captj,capti)<coefattenuation then
   tonb=ton-63+63*attenuation(captj,capti)
   traceattenuateur=1
  end if
  iF ton>124 THEN ton=124
  IF ton<-124 THEN ton=-124
  iF tonb>124 THEN tonb=124
  IF tonb<-124 THEN tonb=-124
  if traceattenuateur then
   col=moitblanc+tonb*antibleu+ton*unitbleu
  else
   col=moitblanc+tonb*unitcolbar+ton*unitcol
  end if
  if tracecontourson then
   if indicereac(captj,capti)<>indicereac(captj,capti-1) then col=colgrillegris
   if indicereac(captj,capti)<>indicereac(captj-1,capti) then col=colgrillegris
   if indicereac(captj,capti)<>indicereac(captj,capti+1) then col=colgrillegris
   if indicereac(captj,capti)<>indicereac(captj+1,capti) then col=colgrillegris
  end if
  captlignecol(captcpti)=col
  captadr+=4
  captcpti+=1
 next
 put #254,captadr,captlignecol()
next
return

captureamplitude:'----------------------------------------------------------------

for captj=jmaxm2 to 2 step -1
 captcpti=0
 for capti=2 to imaxm2
  if trameaoub=0 then
   ton=ptlb(captj,capti)*contraste
  else
   ton=ptla(captj,capti)*contraste
  end if
  IF ton>seuilcolmax THEN ton=seuilcolmax
  IF ton<seuilcolmin THEN ton=seuilcolmin
  col=colamplitude(ton)
  if tracecontourson then
   if indicereac(captj,capti)<>indicereac(captj-1,capti) then
col=colgrilleamplitude
   if indicereac(captj,capti)<>indicereac(captj,capti-1) then
col=colgrilleamplitude
  end if
  captlignecol(captcpti)=col
  captadr+=4
  captcpti+=1
 next
 put #254,captadr,captlignecol()
next
return

captureamplitudeunzoom:'-------------------------------------------------
-------

for captj=jmaxm2 to 2 step -2
 captcpti=0
 for capti=2 to imaxm2 step 2
  if trameaoub=0 then
   ton=ptlb(captj,capti)*contraste
  else
   ton=ptla(captj,capti)*contraste
  end if
  IF ton>seuilcolmax THEN ton=seuilcolmax
  IF ton<seuilcolmin THEN ton=seuilcolmin
  col=colamplitude(ton)
  if tracecontourson then
   if indicereac(captj,capti)<>indicereac(captj-1,capti) then
col=colgrilleamplitude
   if indicereac(captj,capti)<>indicereac(captj,capti-1) then
col=colgrilleamplitude
   if indicereac(captj,capti)<>indicereac(captj+1,capti) then
col=colgrilleamplitude
   if indicereac(captj,capti)<>indicereac(captj,capti+1) then
col=colgrilleamplitude
  end if
  captlignecol(captcpti)=col
  captadr+=4
  captcpti+=1
 next
 put #254,captadr,captlignecol()
next
return

captureenergie:'---------------------------------------------------------
-------

if trameaoub=0 then adr=varptr(ptlb(0,0)) else adr=varptr(ptla(0,0))

for captj=jmaxm2 to 2 step -1
 captcpti=0
 for capti=2 to imaxm2
```

```
  asm
  mov ecx, dword ptr [captj]
  imul ecx, sizemilieuh
  add ecx, dword ptr [capti]
  imul ecx, 4
  mov esi,[adr]
  add esi,ecx
  fld dword ptr [esi-sizemilieuh*4]
  fmul st(0)
  fld dword ptr [esi-4]
  fmul st(0)
  fxch st(1)
  faddp
  fld dword ptr [esi+4]
  fmul st(0)
  fxch st(1)
  faddp
  fld dword ptr [esi+sizemilieuh*4]
  fmul st(0)
  fxch st(1)
  faddp
  fmul dword ptr [_CONTRASTE]
  fistp dword ptr [_TON]
  end asm
  iF ton<1 THEN ton=0
  iF ton>seuilcolmax THEN ton=seuilcolmax
  col=colenergie(ton)
  if tracecontourson then
   if indicereac(captj,capti)<>indicereac(captj-1,capti) then
col=colgrilleenergie
   if indicereac(captj,capti)<>indicereac(captj,capti-1) then
col=colgrilleenergie
  end if
  captlignecol(captcpti)=col
  captadr+=4
  captcpti+=1
 next
 put #254,captadr,captlignecol()
next
return

captureenergieunzoom:'------------------------------------------------------
-------

if trameaoub=0 then adr=varptr(ptlb(0,0)) else adr=varptr(ptla(0,0))

for captj=jmaxm2 to 2 step -2
 captcpti=0
 for capti=2 to imaxm2 step 2

  asm
  mov ecx, dword ptr [captj]
  imul ecx, sizemilieuh
  add ecx, dword ptr [capti]
```

```
imul ecx, 4
mov esi,[adr]
add esi,ecx
fld dword ptr [esi-sizemilieuh*8-4]
fmul st(0)
fld dword ptr [esi-sizemilieuh*8+4]
fmul st(0)
fxch st(1)
faddp
fld dword ptr [esi-sizemilieuh*4-8]
fmul st(0)
fxch st(1)
faddp
fld dword ptr [esi-sizemilieuh*4]
fmul st(0)
fxch st(1)
faddp
fld dword ptr [esi-sizemilieuh*4+8]
fmul st(0)
fxch st(1)
faddp
fld dword ptr [esi-4]
fmul st(0)
fxch st(1)
faddp
fld dword ptr [esi+4]
fmul st(0)
fxch st(1)
faddp
fld dword ptr [esi+sizemilieuh*4-8]
fmul st(0)
fxch st(1)
faddp
fld dword ptr [esi+sizemilieuh*4]
fmul st(0)
fxch st(1)
faddp
fld dword ptr [esi+sizemilieuh*4+8]
fmul st(0)
fxch st(1)
faddp
fld dword ptr [esi+sizemilieuh*8-4]
fmul st(0)
fxch st(1)
faddp
fld dword ptr [esi+sizemilieuh*8+4]
fmul st(0)
fxch st(1)
faddp
fmul dword ptr [_CONTRASTEB]
fistp dword ptr [_TON]
end asm

iF ton<1 THEN ton=0
```

```
  iF ton>seuilcolmax THEN ton=seuilcolmax
  col=colenergie(ton)
  if tracecontourson then
   if indicereac(captj,capti)<>indicereac(captj-1,capti) then
col=colgrilleenergie
   if indicereac(captj,capti)<>indicereac(captj,capti-1) then
col=colgrilleenergie
   if indicereac(captj,capti)<>indicereac(captj+1,capti) then
col=colgrilleenergie
   if indicereac(captj,capti)<>indicereac(captj,capti+1) then
col=colgrilleenergie
  end if
  captlignecol(captcpti)=col
  captadr+=4
  captcpti+=1
 next
 put #254,captadr,captlignecol()
next

return
```

```
initavifile:'------------------------------------------------------------
-------

aviopen=1
avintrame=0
```

```
imagesize=800*600*3
fileentete=freefile:open exepath+"\datas\entete800600.ave" for binary as
#fileentete
avifile=freefile:open avifichier$ for binary as #avifile
for avis=0 to &h0809:get #fileentete,avis,cravi: put #avifile,avis,cravi:
next
close #fileentete
return

writeavifile:'-----------------------------------------------------------
-------

adrecran=screenptr
adrecran+=(100*sizeecranh+217)*4

seek #avifile,2049+((8+imagesize)*avintrame):put #avifile,,nndb:put
#avifile,,imagesize
for avijecr=599 to 0 step -1
 adrecranligney=adrecran+avijecr*sizeecranh*4
 avihcpt=0
 for aviiecr=adrecranligney to adrecranligney+799*4 step 4
  cbavi=peek (byte ,aviiecr)
  cgavi=peek (byte ,aviiecr+1)
  cravi=peek (byte ,aviiecr+2)
  aviligne(avihcpt)=cbavi:avihcpt+=1
  aviligne(avihcpt)=cgavi:avihcpt+=1
  aviligne(avihcpt)=cravi:avihcpt+=1
 next
 put #avifile,,aviligne()
next
avintrame+=1
return

closeavifile:'-----------------------------------------------------------
-------

seek #avifile,49:put #avifile,,avintrame
seek #avifile,141:put #avifile,,avintrame
avis=4+avintrame*(imagesize+8)
seek #avifile,2041:put #avifile,,avis
avis=avintrame*(imagesize+8)
seek #avifile,2049+avis
ail.idx1Chunk=&H31786469
ail.idx1Size =avintrame*16
put #avifile,,ail
aie.chunkid=nndb:aie.dwAVIIF_=&H10
aie.dwChunkLength=imagesize
for avis=0 to avintrame-1
 aie.dwChunkOffset=4+avis*(imagesize+8)
 put #avifile,,aie
next
avis=2040+8+avintrame*(imagesize+8+16)
seek #avifile,5:put #avifile,,avis
close #avifile
```

```
aviopen=0
return
```

```
sauvegarde:'-----------------------------------------------------------------
-------

sauvegardeafaire=0
line(0,53)-(166,88),bleufond1,BF:line(0,89)-(209,588),bleufond2,BF
COLOR blanc, bleufond2:locate 14,3
?"fichiers existants:":?
fichiersdisk$=dir$(exepath+"\datas\saves\*.sv1",attrib)
DO
 PRINT space(2);left$(fichiersdisk$,len(fichiersdisk$)-4)
 fichiersdisk$=dir$("",attrib)
```

```
LOOP WHILE fichiersdisk$<>""
message$="entrez un nom de fichier sans l'extension":gosub
interrogemessage
fichiersave1$=exepath+"\datas\saves\"+message$+".sv1"
fichiersave2$=exepath+"\datas\saves\"+message$+".sv2"
fichiersave3$=exepath+"\datas\saves\"+message$+".sv3"
fichiersave4$=exepath+"\datas\saves\"+message$+".sv4"
fichiersave5$=exepath+"\datas\saves\"+message$+".sv5"

for n=1 to 127:infosave(n)=0:next
'infosave(1)=largzone
'infosave(2)=hautzone
infosave(3)=itracedecal
infosave(4)=jtracedecal
infosave(5)=coefreac
infosave(6)=coefattenuation
infosave(7)=dopplerv
infosave(8)=dopplervsurc
infosave(9)=numdernierelement
infosave(10)=numelementselect
infosave(11)=contraste0
infosave(12)=contraste1
infosave(13)=contraste2
infosave(14)=contraste3
infosave(15)=contraste4
infosave(16)=contraste5
infosave(17)=paletteencours
infosave(18)=tracecontourson
infosave(19)=speedrafrecheon
infosave(20)=numelementobserv
infosave(21)=obsactif
infosave(22)=zoom
infosave(23)=zoomold
infosave(24)=grilleon
infosave(25)=numelementselect

message$="sauvegarde en cours....":gosub affichemessage
adr=varptr(elementinfo(0,0)):size=1024*32*4+4:bsave
fichiersave1$,adr,size
adr=varptr(elementnom$(0)):size=1024*32+4:bsave fichiersave2$,adr,size
adr=varptr(elementtype$(0)):size=1024*32+4:bsave fichiersave3$,adr,size
adr=varptr(nbrinfosmax(0)):size=1024*4+4:bsave fichiersave4$,adr,size
adr=varptr(infosave(0)):size=128*4+4:bsave fichiersave5$,adr,size

numelementselectold=-1:gosub tracemenu
return

charge:'------------------------------------------------------------------------
-------

chargeafaire=0
gosub initvariables

line(0,53)-(166,88),bleufond1,BF:line(0,89)-(209,588),bleufond2,BF
```

```
COLOR blanc, bleufond2:locate 14,3
?"sauvegardes pr";chr$(130);"sentes:":?
nchoix=0
fichiersdisk$=dir$(exepath+"\datas\saves\*.sv1",attrib)
DO
 'PRINT space(2);left$(fichiersdisk$,len(fichiersdisk$)-4)
 choixliste$(0,nchoix)=left$(fichiersdisk$,len(fichiersdisk$)-4)
 fichiersdisk$=dir$("",attrib)
 nchoix+=1
LOOP WHILE fichiersdisk$<>""
choixposx(0)=3
choixposy(0)=18
choixncar(0)=20
choixchoix(0)=1
choixnmax(0)=nchoix-1
nchoix=0
creecasechoix(strptr(choixliste$(nchoix,0)),choixchoix(nchoix),choixnmax(
nchoix),choixposx(nchoix),choixposy(nchoix),choixncar(nchoix),griscreme,b
leufond1+&h101010)
choixselect(strptr(choixliste$(nchoix,0)),choixchoix(nchoix),choixnmax(nc
hoix),choixposx(nchoix),choixposy(nchoix),choixncar(nchoix),griscreme,ble
ufond1+&h101010,colsel)
message$=choixliste$(0,choixchoix(0))
'message$="entrez un nom de fichier":gosub interrogemessage

chargeshunt:
fichiersave1$=exepath+"\datas\saves\"+message$+".sv1"
fichiersave2$=exepath+"\datas\saves\"+message$+".sv2"
fichiersave3$=exepath+"\datas\saves\"+message$+".sv3"
fichiersave4$=exepath+"\datas\saves\"+message$+".sv4"
fichiersave5$=exepath+"\datas\saves\"+message$+".sv5"

message$="chargement du fichier "+message$+".svx"
gosub affichemessage
adr=varptr(elementinfo(0,0)):bload fichiersave1$,adr
adr=varptr(elementnom$(0)):bload fichiersave2$,adr
adr=varptr(elementtype$(0)):bload fichiersave3$,adr
adr=varptr(nbrinfosmax(0)):bload fichiersave4$,adr
adr=varptr(infosave(0)):bload fichiersave5$,adr

'largzone=infosave(1)
'hautzone=infosave(2)
itracedecal=infosave(3)
jtracedecal=infosave(4)
coefreac=infosave(5)
coefattenuation=infosave(6)
dopplerv=infosave(7)
dopplervsurc=infosave(8)
numdernierelement=infosave(9)
numelementselect=infosave(10)
contraste0=infosave(11)
contraste1=infosave(12)
contraste2=infosave(13)
contraste3=infosave(14)
```

```
contraste4=infosave(15)
contraste5=infosave(16)
paletteencours=infosave(17)
tracecontourson=infosave(18)
speedrafrecheon=infosave(19)
numelementobserv=infosave(20)
obsactif=infosave(21)
zoom=infosave(22)
zoomold=infosave(23)
grilleon=infosave(24)
numelementselect=infosave(25)

gosub inittableaux
gosub initbordure
gosub testsichargeobjetbmp
gosub litobjets
gosub litattenuateurs
gosub initlimitescalcul
gosub rafrechepalette
aboutonoff=1
gosub tracecourbes
numelementselect=infosave(25):gosub tracemenu
t=0:tempsdebut=timer
return
```

```
rafrechepalette:'--------------------------------------------------------
-------

select case paletteencours
 case 0
  gosub initcolgris
 case 1
  gosub initcolrb
 case 2
  gosub initcolvb
 case 3
  gosub initcolr
 case 4
  gosub initcolb
 case 5
  gosub initmulticol
end select
return

initcolgris:'------------------------------------------------------------
-------

colcpt=0
for ncol=0 to 127
 colamplitude(colcpt)=rgb(ncol,ncol,ncol)
 colcpt+=1
next
seuilcolmax=colcpt-1

colcpt=0
for ncol=0 to 127
 colamplitude(colcpt)=rgb(ncol,ncol,ncol)
 colcpt-=1
next
seuilcolmin=colcpt+1
return

initcolrb:'--------------------------------------------------------------
-------

colcpt=0
for ncol=0 to 255
 colamplitude(colcpt)=rgb(ncol,0,0)
 colcpt+=1
next
for ncol=0 to 255
 colamplitude(colcpt)=rgb(255,ncol,0)
 colcpt+=1
next
for ncol=0 to 255
 colamplitude(colcpt)=rgb(255,255,ncol)
 colcpt+=1
next
seuilcolmax=colcpt-1

colcpt=0
for ncol=0 to 255
 colamplitude(colcpt)=ncol
 colcpt-=1
next
```

```
for ncol=0 to 255
 colamplitude(colcpt)=rgb(0,ncol,255)
 colcpt-=1
next
for ncol=0 to 255
 colamplitude(colcpt)=rgb(ncol,255,255)
 colcpt-=1
next
seuilcolmin=colcpt+1
return

initcolvb:'--------------------------------------------------------------
-------

colcpt=0
for ncol=0 to 255
 colamplitude(colcpt)=rgb(ncol,0,0)
 colcpt+=1
next
for ncol=0 to 255
 colamplitude(colcpt)=rgb(255,0,ncol)
 colcpt+=1
next
for ncol=0 to 255
 colamplitude(colcpt)=rgb(255,ncol,255)
 colcpt+=1
next
seuilcolmax=colcpt-1

colcpt=0
for ncol=0 to 255
 colamplitude(colcpt)=rgb(0,ncol,0)
 colcpt-=1
next
for ncol=0 to 255
 colamplitude(colcpt)=rgb(0,255,ncol)
 colcpt-=1
next
for ncol=0 to 255
 colamplitude(colcpt)=rgb(ncol,255,255)
 colcpt-=1
next
seuilcolmin=colcpt+1
return

initcolr:'---------------------------------------------------------------
-------

colcpt=0
for ncol=0 to 63
 colenergie(colcpt)=rgb(ncol,0,0)
 colcpt+=1
next
for ncol=128 to 511
```

```
 colenergie(colcpt)=rgb(int(ncol/2),0,0)
 colcpt+=1
next
for ncol=0 to 511
 colenergie(colcpt)=rgb(255,int(ncol/2),0)
 colcpt+=1
next
for ncol=0 to 511
 colenergie(colcpt)=rgb(255,255,int(ncol/2))
 colcpt+=1
next
seuilcolmax=colcpt-1
return

initcolb:'----------------------------------------------------------------
-------

colcpt=0
for ncol=0 to 511
 colenergie(colcpt)=rgb(int(ncol/4),int(ncol/4),int(ncol/2))
 colcpt+=1
next
for ncol=0 to 511
 colenergie(colcpt)=rgb(128+int(ncol/4),128+int(ncol/4),255)
 colcpt+=1
next
for ncol=0 to 2047
 colenergie(colcpt)=rgb(255-int(ncol/16),255-int(ncol/16),255)
 colcpt+=1
next
seuilcolmax=colcpt-1
return

initmulticol:'------------------------------------------------------------
-------

colr=0:colv=0:colb=0:colcpt=0

for ncol=0 to 127
 colr+=.4
 colv+=.1
 colb+=.5
 gosub memorisecolenergie
 colcpt+=1
next
for ncol=0 to 127
 colr+=-.4
 colv+=.1
 colb+=.75
 gosub memorisecolenergie
 colcpt+=1
next
for ncol=0 to 127*2
 colr+=-.25/2
 colv+=1.5/2
 colb+=-1/2
 gosub memorisecolenergie
 colcpt+=1
next
for ncol=0 to 37*4
 colr+=0
 colv+=1/4
 colb+=-1/4
 gosub memorisecolenergie
 colcpt+=1
next
for ncol=0 to 127*4
 colr+=2/8
 colv+=0
 colb+=0
 gosub memorisecolenergie
 colcpt+=1
next
for ncol=0 to 255*8
 colr+=2/8
 colv+=-1/8
 colb+=0
 gosub memorisecolenergie
 colcpt+=1
next
for ncol=0 to 255*32
 colr+=2/32
 colv+=2/32
 colb+=2/32
 gosub memorisecolenergie
 colcpt+=1
next
seuilcolmax=colcpt-1
return

memorisecolenergie:
if colr<0 then colr=0
if colr>255 then colr=255
if colv<0 then colv=0
if colv>255 then colv=255
if colb<0 then colb=0
if colb>255 then colb=255
colenergie(colcpt)=rgba(colr,colv,colb,0)
return
```

```
initboutons:'---------------------------------------------------------------
-------

nbouton=0
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonnew.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonopen.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonsave.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"

nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonduplic.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutoncut.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonundo.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonredo.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonsourceponctuelle.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonsourcealignee.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonsourcecirculaire.bmp"
```

```
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonsourceentranslation.bm
p"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonsourceenrotation.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonsourceoffset.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonsourceAM.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonsourceFM.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonsurfacecirculaire.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonsurfaceplane.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonsurfacetriangulaire.bm
p"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonimportebmp.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonajoutezoneaten.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonobjetpriorplus.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonobjetpriormoins.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonoeuil.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"

nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonmodifiecoefreac.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonmodifiecoefaten.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonmodifiedoppler.bmp"
```

```
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonvide.bmp"
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonabout.bmp"

for n=0 to nbouton
 boutonposx(n)=3+n*3
 boutonposy(n)=4
next

nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonpause.bmp"
boutonposx(nbouton)=3
boutonposy(nbouton)=84
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutongrille.BMP"
boutonposx(nbouton)=3+3
boutonposy(nbouton)=84
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutoncontouronoff.BMP"
boutonposx(nbouton)=2+3*3
boutonposy(nbouton)=84
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonspeed.BMP"
boutonposx(nbouton)=2+3*4
boutonposy(nbouton)=84
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutontegalzero.bmp"
boutonposx(nbouton)=2+3*5
boutonposy(nbouton)=84

nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutoncapture.bmp"
boutonposx(nbouton)=3
boutonposy(nbouton)=84+3
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutoncaptureauto.bmp"
boutonposx(nbouton)=3+3
boutonposy(nbouton)=84+3
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonbleu.BMP"
boutonposx(nbouton)=2+3*3
boutonposy(nbouton)=84+3
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonrouge.BMP"
boutonposx(nbouton)=2+3*4
boutonposy(nbouton)=84+3
nbouton+=1
```

```
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonmulticolor.BMP"
boutonposx(nbouton)=2+3*5
boutonposy(nbouton)=84+3

nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonavidebut.bmp"
boutonposx(nbouton)=3
boutonposy(nbouton)=84+6
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonavifin.bmp"
boutonposx(nbouton)=3+3
boutonposy(nbouton)=84+6
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonnoiretblanc.bmp"
boutonposx(nbouton)=2+3*3
boutonposy(nbouton)=84+6
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonrougeetbleu.BMP"
boutonposx(nbouton)=2+3*4
boutonposy(nbouton)=84+6
nbouton+=1
boutonfile$(nbouton)=exepath+"/datas/boutons/boutonrougeetvert.BMP"
boutonposx(nbouton)=2+3*5
boutonposy(nbouton)=84+6

for n=0 to nbouton
 creebouton(boutonfile$(n),boutonposx(n),boutonposy(n))
next

nboutonmax=nbouton
return

initsaisie:'--------------------------------------------------------------
-------

saisitampon$="tampon"
for nsaisi=0 to 16
 saisincar(nsaisi)=25
 saisichaine$(nsaisi)="texte"+str$(nsaisi)
 saisiposx(nsaisi)=2
 saisiposy(nsaisi)=20+nsaisi*4
next
return

initchoixliste:'----------------------------------------------------------
-------

for nchoix=0 to 20
 choixliste$(0,nchoix)="choix "+str$(nchoix)
next
nchoix=0
choixposx(nchoix)=3
choixposy(nchoix)=55
choixncar(nchoix)=12
```

```
choixchoix(nchoix)=16
choixnmax(nchoix)=15
creecasechoix(strptr(choixliste$(nchoix,0)),choixchoix(nchoix),choixnmax(
nchoix),choixposx(nchoix),choixposy(nchoix),choixncar(nchoix),noir,griscr
eme)
return









undo:'-------------------------------------------------------------------
-------
return

redo:'-------------------------------------------------------------------
-------
return

quitte:'-----------------------------------------------------------------
-------

message$="quitte le programme"
gosub affichemessage
if mousebouton=0 then return

quitteshunt:
if aviopen then gosub closeavifile
close
end
```