Programmes Arduino Minitel

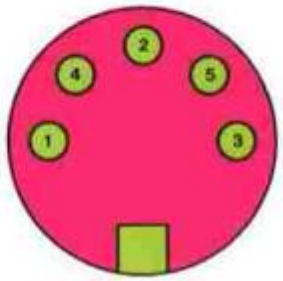
Librairies

Libraries Minitel1B_Soft

1.1 Prise mécanique

La prise péri-informatique est du type DIN 5 broches femelle sur laquelle sont disponibles les signaux suivants :

- **broche 1 :** réception des données par le terminal (signal Rx) ;
- **broche 2 :** masse ;
- **broche 3 :** émission de données par le terminal (signal Tx) ;
- **broche 4 :** périphérique en transmission (signal PT) ;
- **broche 5 :** sortie alimentation disponible pour les périphériques. Cette fonction n'est pas disponible sur les versions dont l'identification porte les références Cu2 à Cu4 incluses.



Prise femelle vue de face

- prise Arduino D2(RX) sur 3 minitel (TX)
- prise Arduino D3(TX) sur 1 minitel (RX)
- prise Arduino GND sur 2 minitel (Masse)

Arduino_Minitel.ino

```
#include <SoftwareSerial.h>
SoftwareSerial mySerial(2, 3);

byte gauche = 8;
byte droite = 9;
byte bas = 10;
byte haut = 11;
byte debutDeLigne = 13;
byte hautGauche = 30;
byte hautGaucheEfface = 12;
byte separateurDeSousArticle = 31;
byte remplissageEspace = 24; //Remplit le reste da la rangée avec des espaces
byte CBleu = 68; // caractère niveau gris bleu
```

```
byte CBlanc = 71; // caractère couleur blanche
byte Clignote = 72 ; // caractère clignote
byte Fixe = 73 ; // caractère fixe
byte NormalH = 76 ; // taille caractère normal
byte DoubleH = 77 ; // double hauteur
byte Ligne = 90 ; // caractère souligné
byte SLigne = 89; // annule soulingé

short incomming;
char inascii = » »;
short outcomming;
int TS = 0; // touche spéciale
String TSS = «  »; // touche spéciale texte

void setup() {

Serial.begin(1200); // port serie vers le PC
mySerial.begin(1200); // port serie vers le minitel

mySerial.write(hautGaucheEfface); //efface l'écran
// serialprint7(0x0E); // passe en mode graphique
delay(500);
sendMessage(« BONJOUR »);
CR();
sendMessage(« BONSOIR »);
Gauche(3);
sendMessage(« REBONSOIR »);
Droite(3);
delay(1000);
sendMessage(« JOUR »);
CR();
ESC(Clignote);
sendMessage(« BONJOUR »);
ESC(Fixe);
CR();
CR();
ESC(DoubleH);
sendMessage(« BONJOUR »);
CR();
ESC(NormalH);
ESC(CBleu);
sendMessage(« BONJOUR »);
CR();
ESC(CBlanc);
sendMessage(« BONJOUR »);
CR();
ESC(Ligne);
sendMessage( » BONJOUR »);
CR();
ESC(SLigne);
```

```
sendMessage(« BONJOUR »);
CR();
Serial.println( » « );
}

char modifyParity(char c) {
char i = 1 << 6;
boolean p = false;
c &= B01111111;
while (i) {
if (c & i) {
p = !p;
}
i >>= 1;
}
c |= p << 7;
return c;
}

void sendMessage(char *msg) {
int i = 0;
while (msg[i]) {
serialprint7(msg[i]);
i++;
}
Serial.write(msg);
Serial.flush();
}

void serialprint7(byte b) // permet d'ecrire en 7 bits + parité sur le
software serial
{
boolean i = false;
for (int j = 0; j < 8; j++)
{
if (bitRead(b, j) == 1) i = !i; //calcul de la parité
}
if (i) bitWrite(b, 7, 1); //ecriture de la partié
else bitWrite(b, 7, 0); //ecriture de la partié
mySerial.write(b);//ecriture du byte sur le software serial
}

void Gauche(int g) {
for (int i = 0; i <= g; i++) {
serialprint7(9);
}
}

void Droite(int g) {
for (int i = 0; i <= g; i++) {
serialprint7(8);
```

```
}
}

void Haut(int g) {
for (int i = 0; i <= g; i++) {
serialprint7(11);
}
}

void ESC(int c){
serialprint7(27);
serialprint7(c);
}

void CR() {
serialprint7(13);
serialprint7(10);
}

void loop() //tout ce que je recois sur le port serie, je le renvoi sur
le software serial
{

// Serial.println(« loop »);
if (Serial.available()) {
outcomming = Serial.read();
Serial.print(« saisie ardiuno: »);
Serial.println (outcomming);
// serialprint7(incomming);
serialprint7(outcomming);
}

if (mySerial.available()) {
incomming = mySerial.read() & B01111111; // ignore parity check //
ignore parity check
Serial.print(« saisie minitel : »);
inascii = char(incomming);
Serial.println (inascii);
if (TS == 1) {
touchespeciales();
TS = 0;
}
if (incomming == 19) {
TS = 1;
}

}

}
```

```
void touchespeciales() {
switch (incomming) {
case 70:
Serial.println (« Sommaire »);
TSS = « Sommaire »;
break;
case 69:
Serial.println (« Annulation »);
TSS = « Annulation »;
break;
case 66:
Serial.println (« Retour »);
TSS = « Retour »;
break;
case 67:
Serial.println (« Repetition »);
TSS = « Repetition »;
break;
case 68:
Serial.println (« Guide »);
TSS = « Guide »;
break;
case 71:
Serial.println (« Correction »);
TSS = « Correction » ;
break;
case 72:
Serial.println (« Suite »);
TSS = « Suite »;
break;
case 65:
Serial.println (« Envoi »);
TSS = « Envoi »;
break;
case 89:
Serial.println (« Connexion »);
TSS = « Connexion »;
break;

}
}
```

Programme 2

programme2-Minitel.ino

```
#include <Minitel1B_Hard.h>
```

```
#define MINITEL_PORT Serial2 //for ESP32
//#define MINITEL_PORT Serial1 //for Leonardo

#define DEBUG true
#define DEBUG_PORT Serial

#if DEBUG // Debug enabled
  #define debugBegin(x)     DEBUG_PORT.begin(x)
  #define debugPrint(x)     DEBUG_PORT.println(x)
  #define debugPrintHEX(x)  DEBUG_PORT.println(x,HEX)
  #define debugPrintBIN(x)  DEBUG_PORT.println(x,BIN)
#else // Debug disabled : Empty macro functions
  #define debugBegin(x)
  #define debugPrint(x)
  #define debugPrintHEX(x)
  #define debugPrintBIN(x)
#endif

#define CASE_WIDTH 4
#define CASE_HEIGHT 3
#define BOARD_TOP 1
#define BOARD_LEFT 1
#define PIECE_WIDTH 3
#define PIECE_HEIGHT 3

#define SCORE_TOP 1
#define SCORE_LEFT 33
#define SCORE_WIDTH 8
#define SCORE_HEIGHT 24
#define SCORE_BLACK_TOP 1
#define SCORE_WHITE_TOP 16
#define SCORE_HEIGHT_2 9 // indiv. score frame
#define SCORE_MOVE_TOP 10
#define SCORE_HEIGHT_3 6 // move frame

Minitel minitel(MINITEL_PORT);

enum { VOID, PAWN, ROOK, KNIGHT, BISHOP, QUEEN, KING};
enum {_BLACK = 0,_WHITE = 128};

byte piece[7][PIECE_WIDTH*PIECE_HEIGHT] = {
  // pieces en caractères semi-graphiques 3 par 3 décrites par lignes
de haut-gauche à bas-droite
  {0b000000, 0b000000, 0b000000, 0b000000, 0b000000, 0b000000,
0b000000, 0b000000, 0b000000}, // VOID
  {0b000000, 0b000000, 0b000000, 0b000101, 0b101111, 0b000000,
0b000100, 0b101100, 0b000000}, // PAWN
  {0b000010, 0b000010, 0b000010, 0b110101, 0b111101, 0b100000,
0b011100, 0b011100, 0b001000}, // ROOK
  {0b000000, 0b000111, 0b000010, 0b011110, 0b011101, 0b101010,
```

```
0b001100, 0b111100, 0b001000}, // KNIGHT
  {0b000001, 0b001011, 0b000000, 0b111111, 0b101111, 0b101010,
0b011100, 0b111100, 0b001000}, // BISHOP
  {0b001001, 0b000011, 0b001000, 0b000111, 0b101111, 0b000010,
0b111100, 0b011100, 0b101000}, // QUEEN
  {0b000001, 0b001011, 0b000000, 0b000111, 0b101111, 0b000010,
0b111100, 0b011100, 0b101000} // KING
};

byte board[8][8] { //top-left to bottom-right - _BLACK or _WHITE added
later
  /*{ROOK,   KNIGHT, BISHOP, QUEEN,  KING,   BISHOP, KNIGHT, ROOK  },
  {PAWN,   PAWN,   PAWN,   PAWN,   PAWN,   PAWN,   PAWN,   PAWN  },
  {VOID,   VOID,   VOID,   VOID,   VOID,   VOID,   VOID,   VOID  },
  {VOID,   VOID,   VOID,   VOID,   VOID,   VOID,   VOID,   VOID  },
  {VOID,   VOID,   VOID,   VOID,   VOID,   VOID,   VOID,   VOID  },
  {VOID,   VOID,   VOID,   VOID,   VOID,   VOID,   VOID,   VOID  },
  {PAWN,   PAWN,   PAWN,   PAWN,   PAWN,   PAWN,   PAWN,   PAWN  },
  {ROOK,   KNIGHT, BISHOP, QUEEN,  KING,   BISHOP, KNIGHT, ROOK  }*/
};

int cx = 0; // 0-7 > A-H
int cy = 7; // 0-7 > 8-1

int scx = -1; // first case selected
int scy = -1; //

String moveStr = "   -  ";
String lastStr = "   -  ";

byte player = _WHITE;

void setup() {

  debugBegin(115200);
  debugPrint("> Debug start");

  delay(500);

  // Minitel setup
  int baud = minitel.searchSpeed();
  debugPrint("> Minitel is at " + String(baud) + "bds");
  if (baud != 4800) {
    debugPrint("> Set to 4800 bauds");
    if (minitel.changeSpeed(4800) < 0) {  // try set speed to 4800 if
needed
      debugPrint("  *** Failed to change speed ***");
      minitel.searchSpeed();              // search back if failed
    }
  }
```

```
  //minitel.modeVideotex();
  minitel.echo(false);
  minitel.extendedKeyboard(); //need arrows
  minitel.clearScreen();
  minitel.moveCursorXY(1,1);
  minitel.noCursor();
  minitel.attributs(FIXE);
  debugPrint("> Minitel setup done");

  // Intialize game board
  initBoard();
  drawBoard();
  drawAllPieces();
  drawScoreBoard();

  //hoverCase(cx,cy, true);

}


String keyboardInput = "";

void loop() {

  char c = 0;

  c = getKeyboardInput();

  switch (c) {
    // nothing
    case 0:     break;

    // move on board
    case UP:    moveUp();    break;
    case DOWN:  moveDown();  break;
    case LEFT:  moveLeft();  break;
    case RIGHT: moveRight(); break;

    // cancel selection
    case DEL:
    case CAN:
      if (scx != -1) { // cancel selection
        selectCase(scx, scy, false);
        scx = -1; scy = -1;
        moveStr = "   -  ";
        writeMove();
      }
      break;

    // move selection
```

```
    case CR:
      if (scx == -1 || scy == -1) {
        // first case selection
        scx = cx;
        scy = cy;
        selectCase(cx, cy, true);
        moveStr.setCharAt(1,cx+65);  // A(65)-H
        moveStr.setCharAt(2,56-cy);  // 8(56)-1
        writeMove();
      }
      else {
        if (cx == scx && cy == scy) {
          // cancel first case selection
          selectCase(cx, cy, false);
          moveStr = "   -  ";
          writeMove();
          scx = -1; scy = -1;
        }
        else {
          // second case selection
          //TODO: verifiy legal move
          moveStr.setCharAt(4,cx+65);  // A(65)-H
          moveStr.setCharAt(5,56-cy);  // 8(56)-1
          writeMove();
          board[cx][cy] = board[scx][scy];
          board[scx][scy] = VOID;
          erasePiece(scx, scy);
          selectCase(scx, scy, false);
          drawPiece(cx, cy, board[cx][cy]);
          scx = -1; scy = -1;
          if (player == _WHITE) player = _BLACK;
          else player = _WHITE;
          lastStr = moveStr;
          moveStr = "   -  ";
          redrawMove();
        }
      }
      break;
  }
}

void initBoard() {
  for (int i = 0; i < 5; i++) board[i][0] = (i+2)   + _BLACK;
  for (int i = 5; i < 8; i++) board[i][0] = (5-i+4) + _BLACK;
  for (int i = 0; i < 8; i++) board[i][1] = PAWN    + _BLACK;
  for (int j = 2; j < 6; j++) {
    for (int i = 0; i < 8; i++) board[i][j] = VOID;
  }
  for (int i = 0; i < 5; i++) board[i][7] = (i+2)   + _WHITE;
  for (int i = 5; i < 8; i++) board[i][7] = (5-i+4) + _WHITE;
  for (int i = 0; i < 8; i++) board[i][6] = PAWN    + _WHITE;
```

```
}

void drawBoard() {

  minitel.textMode();
  minitel.attributs(GRANDEUR_NORMALE);

  minitel.graphicMode();
  minitel.moveCursorXY(BOARD_LEFT, BOARD_TOP);
  bool dark = false;
  int cy = 8;
  while (cy > 0) {
    int row = 1;
    while (row <= CASE_HEIGHT) {
      int cx = 1;
      while (cx < 9) {
        if (dark) minitel.attributs(FOND_BLEU);
        else minitel.attributs(FOND_VERT);
        minitel.graphic(0b000000);
        minitel.repeat(CASE_WIDTH - 1);
        if (row < 3) {
          minitel.moveCursorLeft(CASE_WIDTH);
          minitel.textMode();
          if (dark) minitel.attributs(CARACTERE_BLEU);
          else minitel.attributs(CARACTERE_VERT);
          minitel.attributs(INVERSION_FOND);
          if (row == 1) minitel.printChar(cx+64);    // A-H
          else minitel.printChar(cy+48);             // 1-8
          minitel.moveCursorRight(CASE_WIDTH - 1);
          minitel.graphicMode();
        }
        dark = !dark;
        cx++;
      }
      minitel.moveCursorLeft(CASE_WIDTH*8);
      minitel.moveCursorDown(1);
      row++;
    }
    dark = !dark;
    cy--;
  }
}

void drawScoreBoard() {

  drawBackground();

  drawFrame(SCORE_LEFT, SCORE_BLACK_TOP, SCORE_WIDTH, SCORE_HEIGHT_2,
_BLACK);
  //drawFrame(SCORE_LEFT, SCORE_MOVE_TOP, SCORE_WIDTH, SCORE_HEIGHT_3,
```

```
_WHITE);
  drawFrame(SCORE_LEFT, SCORE_WHITE_TOP, SCORE_WIDTH, SCORE_HEIGHT_2,
_WHITE);

  minitel.textMode();
  minitel.attributs(GRANDEUR_NORMALE);
  int sx = SCORE_BLACK_TOP;
  minitel.attributs(CARACTERE_NOIR);
  minitel.attributs(INVERSION_FOND);
  sx++;
  minitel.moveCursorXY(SCORE_LEFT+1,sx);
  minitel.print("BLACK ");
  minitel.attributs(FOND_NORMAL);
  sx+=2;
  minitel.moveCursorXY(SCORE_LEFT+1,sx);
  minitel.print("time:");
  minitel.attributs(INVERSION_FOND);
  sx++;
  minitel.moveCursorXY(SCORE_LEFT+1,sx);
  minitel.print(" --:--");
  minitel.attributs(FOND_NORMAL);
  sx+=2;
  minitel.moveCursorXY(SCORE_LEFT+1,sx);
  minitel.print("str:");
  minitel.attributs(INVERSION_FOND);
  sx++;
  minitel.moveCursorXY(SCORE_LEFT+1,sx);
  minitel.print("    --");

  sx = SCORE_MOVE_TOP;
  minitel.attributs(CARACTERE_BLANC);
  minitel.attributs(FOND_NORMAL);
  sx++;
  minitel.moveCursorXY(SCORE_LEFT+1,sx);
  minitel.print("move:");
  minitel.attributs(CARACTERE_BLANC);
  minitel.attributs(INVERSION_FOND);
  sx++;
  minitel.moveCursorXY(SCORE_LEFT+1,sx);
  minitel.print(moveStr);
  minitel.attributs(CARACTERE_NOIR);
  minitel.attributs(FOND_NORMAL);
  sx++;
  minitel.moveCursorXY(SCORE_LEFT+1,sx);
  minitel.print("last:");
  minitel.attributs(CARACTERE_NOIR);
  minitel.attributs(INVERSION_FOND);
  sx++;
  minitel.moveCursorXY(SCORE_LEFT+1,sx);
  minitel.print(lastStr);
```

```
  sx = SCORE_WHITE_TOP;
  minitel.attributs(CARACTERE_BLANC);
  minitel.attributs(INVERSION_FOND);
  sx++;
  minitel.moveCursorXY(SCORE_LEFT+1,sx);
  minitel.print("WHITE ");
  minitel.attributs(FOND_NORMAL);
  sx+=2;
  minitel.moveCursorXY(SCORE_LEFT+1,sx);
  minitel.print("time:");
  minitel.attributs(INVERSION_FOND);
  sx++;
  minitel.moveCursorXY(SCORE_LEFT+1,sx);
  minitel.print(" --:--");
  minitel.attributs(FOND_NORMAL);
  sx+=2;
  minitel.moveCursorXY(SCORE_LEFT+1,sx);
  minitel.print("str:");
  minitel.attributs(INVERSION_FOND);
  sx++;
  minitel.moveCursorXY(SCORE_LEFT+1,sx);
  minitel.print("    --");

}

void drawBackground() {
  int sy = SCORE_TOP;
  minitel.graphicMode();
  minitel.attributs(FOND_MAGENTA);
  while (sy < SCORE_TOP + SCORE_HEIGHT) {
    minitel.moveCursorXY(SCORE_LEFT,sy);
    minitel.graphic(0b000000);
    minitel.repeat(SCORE_WIDTH-1);
    sy++;
  }
}


void writeMove() {
  minitel.textMode();
  if (player == _WHITE) {
    minitel.attributs(CARACTERE_BLANC);
    minitel.attributs(INVERSION_FOND);
  }
  minitel.moveCursorXY(SCORE_LEFT+1,SCORE_MOVE_TOP+2);
  minitel.print(moveStr);
}

void redrawMove() {
  int sx = SCORE_MOVE_TOP;
```

```
  minitel.textMode();
  if (player == _WHITE) minitel.attributs(CARACTERE_BLANC);
  else minitel.attributs(CARACTERE_NOIR);
  minitel.attributs(FOND_NORMAL);
  sx++;
  minitel.moveCursorXY(SCORE_LEFT+1,sx);
  minitel.print("move:");
  if (player == _WHITE) minitel.attributs(CARACTERE_BLANC);
  else minitel.attributs(CARACTERE_NOIR);
  minitel.attributs(INVERSION_FOND);
  sx++;
  minitel.moveCursorXY(SCORE_LEFT+1,sx);
  minitel.print(moveStr);
  if (player == _WHITE) minitel.attributs(CARACTERE_NOIR);
  else minitel.attributs(CARACTERE_BLANC);
  minitel.attributs(FOND_NORMAL);
  sx++;
  minitel.moveCursorXY(SCORE_LEFT+1,sx);
  minitel.print("last:");
  if (player == _WHITE) minitel.attributs(CARACTERE_NOIR);
  else minitel.attributs(CARACTERE_BLANC);
  minitel.attributs(INVERSION_FOND);
  sx++;
  minitel.moveCursorXY(SCORE_LEFT+1,sx);
  minitel.print(lastStr);

}


void drawFrame(int x, int y, int w, int h, int c) {
  int sy = y;
  minitel.graphicMode();
  minitel.attributs(FOND_MAGENTA);
  if (c == _BLACK) minitel.attributs(CARACTERE_NOIR);
  else minitel.attributs(CARACTERE_BLANC);
  minitel.moveCursorXY(x,sy);
  minitel.graphic(0b000001);
  minitel.graphic(0b000011);
  minitel.repeat(w-3);
  minitel.graphic(0b000010);
  sy++;
  while (sy < y + h - 1) {
    minitel.moveCursorXY(x,sy);
    minitel.graphic(0b010101);
    minitel.graphic(0b000000);
    minitel.repeat(w-3);
    minitel.graphic(0b101010);
    sy++;
  }
  minitel.moveCursorXY(x,sy);
  minitel.graphic(0b010000);
```

```
  minitel.graphic(0b110000);
  minitel.repeat(w-3);
  minitel.graphic(0b100000);
}

void drawPiece(int cx, int cy, byte pc) {
  // x : from 0 to 7 - left to right
  // y : from 0 to 7 - top to bottom
  int x = cx * CASE_WIDTH + 1;
  int y = cy * CASE_HEIGHT + 1;

  byte color = _BLACK;
  if (pc > _WHITE) color = _WHITE;
  byte p = pc - color;

  minitel.graphicMode();

  if (color == _WHITE) {
    minitel.attributs(DEBUT_LIGNAGE);
    minitel.attributs(CARACTERE_BLANC);
  }
  else { // _BLACK
    minitel.attributs(CARACTERE_NOIR);
  }
  if ((cx+cy)%2 == 1) minitel.attributs(FOND_BLEU);
  else minitel.attributs(FOND_VERT);

  for (int j = 0; j < PIECE_HEIGHT; j++) {
    minitel.moveCursorXY(x+1,y+j);
    for (int i = 0; i < PIECE_WIDTH; i++) {
      minitel.graphic(piece[p][i+j*PIECE_WIDTH]);
    }
  }
  if (color == _WHITE) {
    minitel.attributs(FIN_LIGNAGE);
  }
}

void erasePiece(int cx, int cy) {
  // x : from 0 to 7 - left to right
  // y : from 0 to 7 - top to bottom
  drawPiece(cx, cy, VOID);
}

void drawAllPieces() {
  for (int i = 0; i < 8; i++) {
    for (int j = 0; j < 8; j++) {
      if (j<2 || j>5) drawPiece(i, j, board[i][j]);
    }
  }
```

```
}

void hoverCase(int cx, int cy, bool hover) {
  if (cx == scx && cy == scy) selectCase(cx, cy, true);
  else {
    int x = cx*CASE_WIDTH + 1;
    int y = cy*CASE_HEIGHT + 3;
    bool dark = false;
    if ((cx+cy)%2 == 1) dark = true;
    minitel.moveCursorXY(x,y);
    minitel.graphicMode();
    if (dark) minitel.attributs(FOND_BLEU);
    else minitel.attributs(FOND_VERT);
    if (hover) {
      minitel.attributs(CARACTERE_BLANC);
      minitel.graphic(0b111111);
    }
    else minitel.graphic(0b000000);
  }
}

void selectCase(int cx, int cy, bool sel) {
  int x = cx*CASE_WIDTH + 1;
  int y = cy*CASE_HEIGHT + 3;
  bool dark = false;
  if ((cx+cy)%2 == 1) dark = true;
  minitel.moveCursorXY(x,y);
  minitel.graphicMode();
  if (dark) minitel.attributs(FOND_BLEU);
  else minitel.attributs(FOND_VERT);
  if (sel) {
    minitel.attributs(CARACTERE_NOIR);
    minitel.graphic(0b111111);
  }
  else {
    minitel.graphic(0b000000);
  }
}

void moveUp() {
  if (cy > 0) {
    hoverCase(cx,cy, false);
    cy--;
    hoverCase(cx,cy, true);
  }
}

void moveDown() {
  if (cy < 7) {
    hoverCase(cx,cy, false);
    cy++;
```

```
    hoverCase(cx,cy, true);
  }
}

void moveLeft() {
  if (cx > 0) {
    hoverCase(cx,cy, false);
    cx--;
    hoverCase(cx,cy, true);
  }
}

void moveRight() {
  if (cx < 7) {
    hoverCase(cx,cy, false);
    cx++;
    hoverCase(cx,cy, true);
  }
}

char getKeyboardInput() {

  unsigned long key = minitel.getKeyCode();
  if (key != 0) {
    debugPrintHEX(key);
    // key redirection/inhibition
    switch (key) {

      // cancel selection
      case CORRECTION:
      case ANNULATION:
      case RETOUR:
      case ESC:
                                  return CAN;   break;
      // validate selection
      case ENVOI:
      case SP:
                                  return CR;    break;

      // navigate
      case TOUCHE_FLECHE_HAUT:    return UP;    break;
      case TOUCHE_FLECHE_BAS:     return DOWN;  break;
      case TOUCHE_FLECHE_DROITE:  return RIGHT; break;
      case TOUCHE_FLECHE_GAUCHE:  return LEFT;  break;

      // inhibited
      case CONNEXION_FIN:
      case SOMMAIRE:
      case REPETITION:
      case GUIDE:
```

```
      case SUITE:
                                  return 0; break;

      default: return key;

    }
  }
  else return 0;
}
```