

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)

ESP32-Minitel Demo

[ESP32_Minitel-Demo.ino](#)

```
// Code OK apres test
////////////////////////////////////
/
/*
  Minitel1B_Hard - Démo - Version du 11 juin 2017 à 16h00
  Copyright 2016, 2017 - Eric Sérandour

  >> Légèrement adapté pour l'ESP32 par iodeo

  Documentation utilisée :
  Spécifications Techniques d'Utilisation du Minitel 1B
```

<http://543210.free.fr/TV/stum1b.pdf>

```
////////////////////////////////////  
/
```

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```
*/  
////////////////////////////////////  
/
```

```
////////////////////////////////////  
/
```

```
// DEBUT DU PROGRAMME
```

```
////////////////////////////////////  
/
```

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

```
Minitel minitel(Serial2); // Le port utilisé sur ESP32
```

```
int wait = 10000;
```

```
////////////////////////////////////  
/
```

```
void setup() {  
  Serial.begin(115200); // Le port de debug  
  minitel.changeSpeed(minitel.searchSpeed());  
}
```

```
////////////////////////////////////  
/
```

```
void loop() {  
  demoCaracteres();  
}
```

```

demoGraphic();
demoTailles();
demoCouleurs();
demoCurseur();
}

////////////////////////////////////
/

void newPage(String titre) {
  minitel.newScreen();
  minitel.println(titre);
  for (int i=1; i<=40; i++) {
    minitel.writeByte(0x7E);
  }
  minitel.moveCursorReturn(1);
}

////////////////////////////////////
/

void demoCaracteres() {
  newPage("LES CARACTERES");

  // Mode texte

  minitel.println("MODE TEXTE SANS LIGNAGE :");
  for (int i=0x20; i<=0x7F; i++) {
    minitel.writeByte(i);
  }
  minitel.moveCursorReturn(2);

  minitel.println("MODE TEXTE AVEC LIGNAGE :");
  minitel.attributs(DEBUT_LIGNAGE); // En mode texte, le lignage est
  déclenché par le premier espace rencontré (0x20).
  for (int i=0x20; i<=0x7F; i++) {
    minitel.writeByte(i);
  }
  minitel.attributs(FIN_LIGNAGE);
  minitel.moveCursorReturn(2);

  // Mode semi-graphique

  minitel.textMode();
  minitel.println("MODE SEMI-GRAPHIQUE SANS LIGNAGE :");
  minitel.graphicMode();
  for (int i=0x20; i<=0x7F; i++) {
    minitel.writeByte(i);
  }
  minitel.moveCursorReturn(2);
}

```

```
minitel.textMode();
minitel.println("MODE SEMI-GRAPHIQUE AVEC LIGNAGE :");
minitel.graphicMode();
minitel.attributs(DEBUT_LIGNAGE);
for (int i=0x20; i<=0x7F; i++) {
    minitel.writeByte(i);
}
minitel.attributs(FIN_LIGNAGE);
minitel.moveCursorReturn(2);

delay(wait);
}

//////////////////////////////////////
/

void demoGraphic() {
    newPage("LA FONCTION GRAPHIC");
    minitel.textMode();
    minitel.println("Un caractère semi-graphique est composé de 6 pseudo-
pixels :");
    minitel.println();
    minitel.graphicMode();
    minitel.attributs(DEBUT_LIGNAGE);
    minitel.writeByte(0x7F);
    minitel.attributs(FIN_LIGNAGE);
    minitel.textMode();
    minitel.print(" avec lignage ou ");
    minitel.graphicMode();
    minitel.writeByte(0x7F);
    minitel.textMode();
    minitel.println(" sans lignage.");
    minitel.println();
    String chaine = "";
    chaine += "minitel.graphic(0b101011) donne ";
    minitel.textMode();
    minitel.print(chaine);
    minitel.graphicMode();
    minitel.graphic(0b101011);
    minitel.textMode();
    minitel.println();
    minitel.println();
    chaine = "";
    chaine += "minitel.graphic(0b110110,30,15) donne ";
    minitel.print(chaine);
    minitel.graphicMode();
    minitel.graphic(0b110110,30,15);
    minitel.noCursor();
    delay(2*wait);
}
```

```

////////////////////////////////////
/

void demoTailles() {
  newPage("LES TAILLES");
  minitel.println("GRANDEUR_NORMALE");
  minitel.attributs(DOUBLE_HAUTEUR);
  minitel.print("DOUBLE_HAUTEUR");
  minitel.attributs(DOUBLE_LARGEUR);
  minitel.println();
  minitel.println("DOUBLE_LARGEUR");
  minitel.attributs(DOUBLE_GRANDEUR);
  minitel.println("DOUBLE_GRANDEUR");
  minitel.println();
  minitel.attributs(GRANDEUR_NORMALE);
  minitel.attributs(DEBUT_LIGNAGE); // En mode texte, le lignage est
  déclenché par le premier espace rencontré (0x20).
  minitel.println("SEULEMENT EN MODE TEXTE");
  minitel.attributs(FIN_LIGNAGE);
  minitel.println();
  delay(wait);
}

////////////////////////////////////
/

void demoCouleurs() {
  newPage("LES COULEURS");
  for (int i=0; i<=1; i++) {
    if (i==0) { minitel.textMode(); }
    if (i==1) { minitel.graphicMode(); }
    minitel.attributs(INVERSION_FOND);
    minitel.print("CARACTERE_NOIR, FOND_BLANC");
    minitel.attributs(FOND_NORMAL);
    minitel.println(" (INVERSION)");
    minitel.attributs(CARACTERE_ROUGE);
    minitel.println("CARACTERE_ROUGE");
    minitel.attributs(CARACTERE_VERT);
    minitel.println("CARACTERE_VERT");
    minitel.attributs(CARACTERE_JAUNE);
    minitel.println("CARACTERE_JAUNE");
    minitel.attributs(CARACTERE_BLEU);
    minitel.println("CARACTERE_BLEU");
    minitel.attributs(CARACTERE_MAGENTA);
    minitel.println("CARACTERE_MAGENTA");
    minitel.attributs(CARACTERE_CYAN);
    minitel.println("CARACTERE_CYAN");
    minitel.attributs(CARACTERE_BLANC);
    minitel.println("CARACTERE_BLANC");
    minitel.println();
  }
}

```

```
    }
    delay(wait);
}

/////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
/

void demoCurseur() {
  minitel.cursor();
  newPage("DEPLACER LE CURSEUR");
  minitel.moveCursorXY(20,12);
  for (int i=1; i<=100; i++) {
    delay(100);
    switch (random(4)) {
      case 0: minitel.moveCursorRight(1+random(3)); break;
      case 1: minitel.moveCursorLeft(1+random(3)); break;
      case 2: minitel.moveCursorDown(1+random(3)); break;
      case 3: minitel.moveCursorUp(1+random(3)); break;
    }
  }
  newPage("POSITIONNER LE CURSEUR");
  minitel.textMode();
  for (int i=1; i<1000; i++) {
    minitel.moveCursorXY(1+random(40),3+random(22));
    minitel.writeByte(0x20 + random(0x60));
  }

  minitel.newScreen();
  minitel.textMode();
  minitel.noCursor();
  for (int i=1; i<1000; i++) {
    if (random(4)<3) { minitel.textMode(); }
    else {
      minitel.graphicMode();
      minitel.attributs(DEBUT_LIGNAGE);
    }
    minitel.attributs(0x4C+random(5));
    minitel.writeByte(0x20 + random(0x60));
    minitel.attributs(FIN_LIGNAGE);
  }
}

/////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
/
```

ESP32-Minitel Pong

Esp32-Minitel_Pong.ino

```
//Programme OK

#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

// SOUND FX
#define SOUND 1 // score using bip
//#define SOUND2 1 // hit using modem connection

// SCREEN SIZE
#define WIDTH 40
#define HEIGHT 24

// GAME FIELD
#define X1 2 //player1 column
#define X2 40 //player2 column
#define XNET 21 //net column
#define SPACE 2 //score digit space
#define YSCORE 2 //score top row
#define WSCORE 2 //score width
#define HSCORE 4 //score height
#define XSCORE1 14 //player 1 score column - align right
#define XSCORE1_U XSCORE1-WSCORE+1 //unit digit
#define XSCORE1_T XSCORE1_U-WSCORE-SPACE //tenth digit
#define XSCORE2 26 //player 2 score column - align left
#define XSCORE2_T XSCORE2 // unit digit
#define XSCORE2_U XSCORE2+WSCORE+SPACE // tenth digit

// GAME PARAMETER
#define NBALL 15 //NB OF BALLS IN THE MATCH

// BALL DIRECTION
```

```
#define HAUT_DROITE 1
#define BAS_DROITE 2
#define BAS_GAUCHE 3
#define HAUT_GAUCHE 4

Minitel minitel(MINITEL_PORT);

int yP1 = 13; //player1 position
int yP2 = 13; //player2 position
int xBall = 0;
int yBall = 0;
int xBallOld = 0;
int yBallOld = 0;
int d = HAUT_DROITE; //ball direction
int p1 = 0; //player1 score
int p2 = 0; //player2 score
int startingCounter = 0;
int level = 2; //the smaller the quicker
int bypassCounter = 0;
int hitCounter = 0; //nb hit
bool ping = true;

const byte digit[10][WSCORE*HSCORE] = { // digit de 0 à 9 sur 2
cellules par 4
  // les cellules sont décrites horizontalement de gauche a droite et
de haut en bas
  {0b111110,0b111101,0b101010,0b010101,0b101010,0b010101,0b101111,0b01111
1}, //0
  {0b000000,0b010101,0b000000,0b010101,0b000000,0b010101,0b000000,0b01010
1}, //1
  {0b111100,0b111101,0b001111,0b011111,0b101010,0b000000,0b101111,0b00111
1}, //2
  {0b111100,0b111101,0b001111,0b011111,0b000000,0b010101,0b001111,0b01111
1}, //3
  {0b101010,0b010101,0b101111,0b011111,0b000000,0b010101,0b000000,0b01010
1}, //4
  {0b111110,0b111100,0b101111,0b001111,0b000000,0b010101,0b001111,0b01111
1}, //5
  {0b101010,0b000000,0b101111,0b001111,0b101010,0b010101,0b101111,0b01111
1}, //6
  {0b111100,0b111101,0b000000,0b010101,0b000000,0b010101,0b000000,0b01010
1}, //7
  {0b111110,0b111101,0b101111,0b011111,0b101010,0b010101,0b101111,0b01111
1}, //8
  {0b111110,0b111101,0b101111,0b011111,0b000000,0b010101,0b000000,0b01010
1} //9
};

// image of welcome page
```



```
//draw welcome screen
minitel.newScreen();
minitel.attributs(CARACTERE_BLANC);
minitel.attributs(FOND_NOIR);
for (int i=0; i<LONGUEUR_TRAME_IMAGE; i++) {
  minitel.writeByte(pgm_read_byte_near(IMAGE + i));
}

minitel.textMode();
minitel.noCursor();
minitel.attributs(CARACTERE_BLANC);
minitel.attributs(DOUBLE_HAUTEUR);
minitel.moveCursorXY(12,19);
minitel.attributs(CLIGNOTEMENT);
minitel.print("APPUYER SUR ENTREE");

minitel.attributs(CARACTERE_BLEU);
minitel.attributs(GRANDEUR_NORMALE);
minitel.attributs(FIXE);
minitel.moveCursorXY(1,23);
// 40 char -----*****-----*****
minitel.print("PLAYER 1                                PLAYER 2");
minitel.print("UP:Q DOWN:W                                UP:J DOWN:N");

//flush any input
while(MINITEL_PORT.available()) {
  byte b = MINITEL_PORT.read();
  debugPrint(b);
}
//wait touch is pressed
while(getKeyCodeOverride() != 141) {
  delay(10);
}

//clean up
minitel.newScreen();
minitel.attributs(FIXE);
minitel.graphicMode();
}

void startGame() {

  //draw game field
  drawGameField();
  debugPrint("game field done");
  //init game parameters
  initGame();
  debugPrint("init game done");
}
```

```
//start
while (p1+p2 < NBALL) {
  playGame();
}
minitel.attributs(CLIGNOTEMENT);
if (p1>p2) drawScore1(p1);
else drawScore2(p2);
#ifdef SOUND
minitel.bip();
delay(1000);
minitel.bip();
delay(1000);
minitel.bip();
delay(1000);
#else delay(5000);
#endif
#ifdef SOUND2
  if (!ping) ping = pingpong(ping);
#endif

  p1 = 0;
  p2 = 0;
  yP1 = 13;
  yP2 = 13;
  xBall = 0;
  yBall = 0;
  ping = true;
}

void handlePlayer() {

  int dy1 = 0;
  int dy2 = 0;

  byte key = getKeyCodeOverride();

  if (key == 215 && yP1<22) dy1++;
  if (key == 209 && yP1>3) dy1--;
  if (key == 78 && yP2<22) dy2++;
  if (key == 202 && yP2>3) dy2--;

  minitel.graphic(0b111111, X1, yP1+3*dy1);
  minitel.moveCursorXY(X1, yP1-2*dy1);
  if (dy1!=0) minitel.graphic(0b000000);
  else minitel.graphic(0b111111); //preserve frame rate
  yP1+=dy1;

  minitel.graphic(0b111111, X2, yP2+3*dy2);
  minitel.moveCursorXY(40, yP2-2*dy2);
  if (dy2!=0) minitel.graphic(0b000000);
```

```
else minitel.graphic(0b111111); //preserve frame rate
yP2+=dy2;

}

void playGame() {

  handlePlayer();

  if (startingCounter > 0) {
    countdown();
  }
  else {
    //updateLevel
    if (hitCounter == 3) level=1;
    if (hitCounter == 6) level=0;
    if (bypassCounter < level) {
      //bypass frame to slow down
      bypassCounter++;
    }
    else {
      bypassCounter=0;

      xBallOld = xBall;
      yBallOld = yBall;

      // move ball
      if(d == HAUT_DROITE){
        xBall+=2;
        yBall--;
      }
      if(d == BAS_DROITE){
        xBall+=2;
        yBall++;
      }
      if(d == BAS_GAUCHE){
        xBall-=2;
        yBall++;
      }
      if(d == HAUT_GAUCHE){
        xBall-=2;
        yBall--;
      }

      //erase old ball
      eraseBall(xBallOld, yBallOld);
      //draw new ball
      minitel.graphic(0b111111, xBall, yBall);

      // top limit
```

```
if(yBall == 1) {
  if(d == HAUT_DROITE) d = BAS_DROITE;
  if(d == HAUT_GAUCHE) d = BAS_GAUCHE;
}

// bottom limit
if(yBall == HEIGHT) {
  if (d == BAS_GAUCHE) d = HAUT_GAUCHE;
  if (d == BAS_DROITE) d = HAUT_DROITE;
}

// player1 side
if (xBall <= X1 + 2) {
  // player1 send back
  if(abs(yBall-yP1) < 3) {
    if(d == BAS_GAUCHE) d = BAS_DROITE;
    if(d == HAUT_GAUCHE) d = HAUT_DROITE;
    hitCounter++;
    #ifdef SOUND2
    ping = pingpong(ping);
    #endif
  }
  else{ // player2 win
#ifdef SOUND
    minitel.bip();
#endif
    p2++;
    drawScore2(p2);
    initGame();
  }
}

// player2 side
if (xBall >= X2 - 2) {
  // player2 send back
  if(abs(yBall-yP2) < 3) {
    if(d == BAS_DROITE) d = BAS_GAUCHE;
    if(d == HAUT_DROITE) d = HAUT_GAUCHE;
    hitCounter++;
    #ifdef SOUND2
    ping = pingpong(ping);
    #endif
  }
  else{ // player1 win
#ifdef SOUND
    minitel.bip();
#endif
    p1++;
    drawScore1(p1);
    initGame();
  }
}
```

```
    }
  }
}

bool pingpong(bool ping) {
  if (ping) {
    minitel.connexion(true);
    return false;
  }
  else {
    minitel.connexion(false);
    return true;
  }
}

void eraseBall(int x, int y) {
  // erase ball preserving game field and score

  minitel.moveCursorXY(x,y);

  bool erase = true;

  if (x == XNET) { // Ball in net
    if (y%2 == 1) erase = false;
  }

  if (y >= YSCORE && y < YSCORE + HSCORE) { // Ball in score
    if (x >= XSCORE1_T && x < XSCORE1_T + WSCORE) { //ball in score1
tenths
      if (p1 >= 10) {
        drawDigit(p1/10, XSCORE1_T, YSCORE);
        erase = false;
      }
    }
    if (x >= XSCORE1_U && x < XSCORE1_U + WSCORE) { //ball in score1
unit
      drawDigit(p1%10, XSCORE1_U, YSCORE);
      erase = false;
    }
    if (x >= XSCORE2_T && x < XSCORE2_T + WSCORE) { //ball in score2
tenths
      if (p2 >= 10) {
        drawDigit(p2/10, XSCORE2_T, YSCORE);
        erase = false;
      }
    }
    if (x >= XSCORE2_U && x < XSCORE2_U + WSCORE) { //ball in score2
```

```

unit
    drawDigit(p2%10, XSCORE2_U, YSCORE);
    erase = false;
}
}
if (erase) minitel.graphic(0b000000);
}

/*void drawDigit(int num, int x, int y) {
    for (int i = 0; i < WSCORE; i++) {
        for (int j = 0; j < HSCORE; j++) {
            minitel.graphic(digit[num][i+WSCORE*j],x+i,y+j);
        }
    }
}*/

void initGame() {
    // init level
    hitCounter = 0;
    level = 2;
    bypassCounter = 2;
    // get random starting point
    xBallOld = xBall;
    yBallOld = yBall;
    d = random(1,4);
    xBall = random(1,5)*2+1;
    if (d>2) xBall = 40-xBall;
    yBall = random(3,22);
    // draw new ball
    minitel.graphic(0b111111, xBall, yBall);
    // starting countdown
    startingCounter = 10;
}

void countdown() {
    if (xBallOld != 0) {
        if (startingCounter == 8) {
            minitel.attributs(CARACTERE_BLEU);
            minitel.graphic(0b111111, xBallOld, yBallOld);
            minitel.attributs(CARACTERE_BLANC);
        }
        if (startingCounter == 6) {
            minitel.attributs(CARACTERE_VERT);
            minitel.graphic(0b111111, xBallOld, yBallOld);
            minitel.attributs(CARACTERE_BLANC);
        }
        if (startingCounter == 4) {
            minitel.attributs(CARACTERE_BLEU);
            minitel.graphic(0b111111, xBallOld, yBallOld);
            minitel.attributs(CARACTERE_BLANC);
        }
    }
}

```

```
    if (startingCounter == 2) {
        minitel.attributs(CARACTERE_VERT);
        minitel.graphic(0b111111, xBallOld, yBallOld);
        minitel.attributs(CARACTERE_BLANC);
    }
    if (startingCounter == 1) {
        minitel.graphic(0b000000, xBallOld, yBallOld); //erase ball
#ifdef SOUND2
        ping = pingpong(ping);
#endif
    }
}
startingCounter--;
}

byte getKeyCodeOverride() {
    byte b = 255;
    if (MINITEL_PORT.available()) {
        b = MINITEL_PORT.read();
        MINITEL_PORT.flush();
        debugPrint(b);
    }
    return b;
}

void drawGameField() {
    //draw net
    for (int i = 1; i < HEIGHT; i+=2) {
        minitel.graphic(0b111111, 21, i);
    }
    //draw players
    for (int i = -2; i < 3; i++) {
        minitel.graphic(0b111111,X1,yP1+i);
        minitel.graphic(0b111111,X2,yP2+i);
    }
    // draw score
    drawScore1(p1);
    drawScore2(p2);
}

void drawScore1(int score) {
    drawDigit(score%10, XSCORE1_U, YSCORE);
    if (score>=10) drawDigit(score/10, XSCORE1_T, YSCORE);
}

void drawScore2(int score) {
    drawDigit(score%10, XSCORE2_U, YSCORE);
    if (score>=10) drawDigit(score/10, XSCORE2_T, YSCORE);
}
```

```

}

void drawDigit(int num, int x, int y) {
  for (int i = 0; i < WSCORE; i++) {
    for (int j = 0; j < HSCORE; j++) {
      minitel.graphic(digit[num][i+WSCORE*j],x+i,y+j);
    }
  }
}
}
}

```

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 souligné

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); //écriture de la partié  
else bitWrite(b, 7, 0); //écriture de la partié  
mySerial.write(b); //écriture 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 arduino: »);
  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 Minitel1B_ChessUI.ino

Minitel1B_ChessUI.ino

```
// programme tester = OK  
  
#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.attributes(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: verify 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.attributes(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.attributes(FOND_BLEU);
                else minitel.attributes(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.attributes(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.attributes(CARACTERE_BLANC);
    minitel.attributes(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.attributes(CARACTERE_BLANC);
  else minitel.attributes(CARACTERE_NOIR);
  minitel.attributes(FOND_NORMAL);
  sx++;
  minitel.moveCursorXY(SCORE_LEFT+1, sx);
  minitel.print("move:");
  if (player == _WHITE) minitel.attributes(CARACTERE_BLANC);
  else minitel.attributes(CARACTERE_NOIR);
  minitel.attributes(INVERSION_FOND);
  sx++;
  minitel.moveCursorXY(SCORE_LEFT+1, sx);
  minitel.print(moveStr);
  if (player == _WHITE) minitel.attributes(CARACTERE_NOIR);
  else minitel.attributes(CARACTERE_BLANC);
  minitel.attributes(FOND_NORMAL);
  sx++;
  minitel.moveCursorXY(SCORE_LEFT+1, sx);
  minitel.print("last:");
  if (player == _WHITE) minitel.attributes(CARACTERE_NOIR);
  else minitel.attributes(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.setCursorXY(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;
}
```

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