発明の巻

C 言語の疑似スレッド最新版(ライセンスフリー) のサポートパック(324,000 円)

スレッドとは、コンピュータープログラミング上の、並列処理の機能です。スレッドをサポートしているプログラミング言語と、スレッドをサポートしていないプログラミング言語があります。高度な機能のスレッドをわざとサポートしない言語があるのは、パソコン以外の環境で実行するために、低レベルマイコン対応のプログラミング言語でいるから(例えば C 言語)です。代わりにマイコンにはインターバルタイマがあります。今回、マイコンのインターバルタイマを使用して、並行処理タイプのスレッド(疑似スレッドと命名)を作成しました。C 言語のスレッドです。低レベル環境に移植可能です。(16bit 以上)サンプルに、エレベーターのプログラムが入っています。「コントローラ」「シミュレータ」の 2 つのプログラムを並行処理技術により連携しながら同時実行するように開発しました。プロセスが 1 個でスレッド(プログラム)が複数で動かせます。LINUX よりも前の世代のマイコンはプロ

セスが 1 個しか入らないでしょうから。C , Assembly , Batch Shell Script 使用。2017 年 12 月 13 日版プログラムです。初期デバッグ対応します。日本語で、日本国内で、初期サポート対応可能です。改造は自己責任でお願いします。324,000 円の中身は初期サポート代です。サンプルコードは開発終了品です。購入後、ご自由に、使用・改造・配布、O.K. です。

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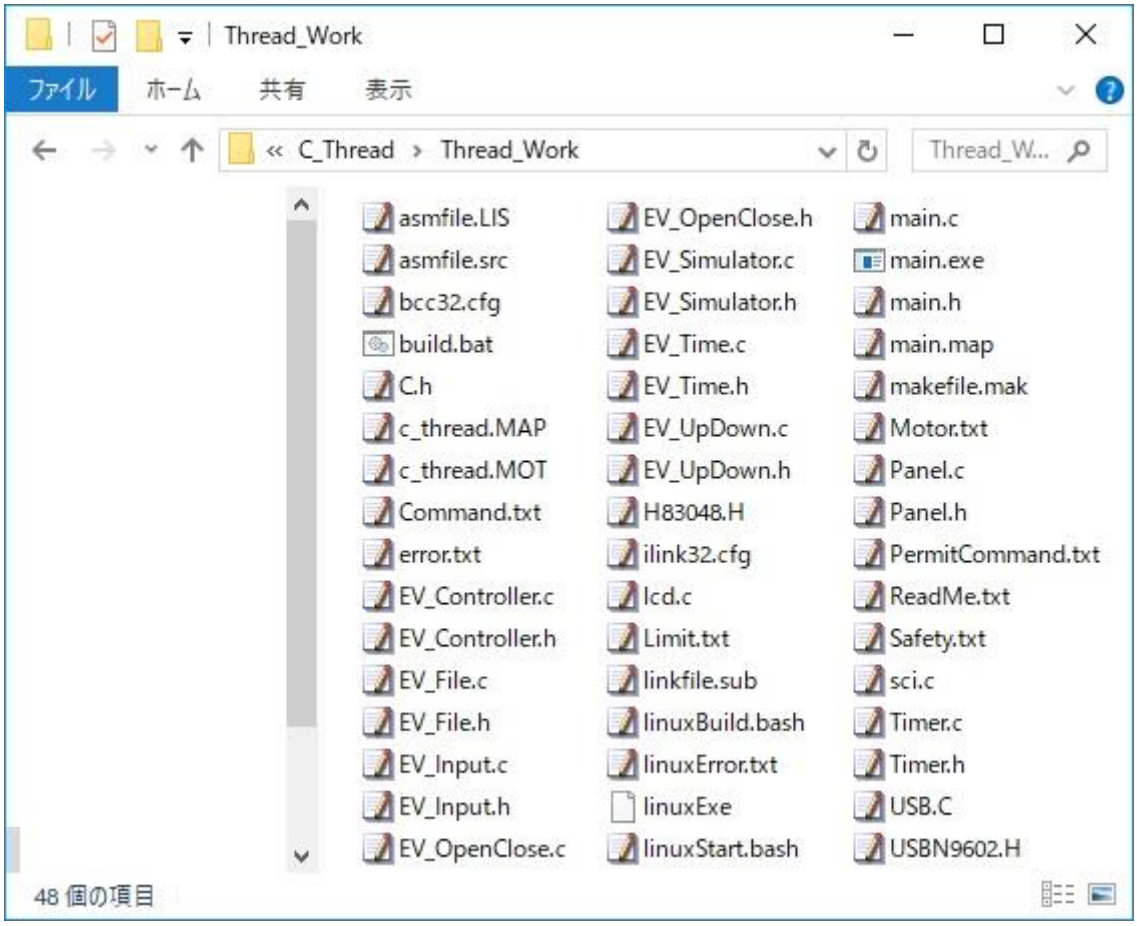

発明アルゴリズムに疑似スレッドと名付けました。本物に偽物と名付けました。特許申請はしないで、無料公開をいたしました。発明という手段で人類としてのノルマを達成し、また、生きた証が発生いたしました。篠宮氏を逆賊に祭り上げようとする人種がいます。篠宮氏は辞退いたします。秋篠宮家様は本物の皇族ですが、篠宮氏は偽物です。

タイトル(title):

C 言語の疑似スレッド

サブタイトル(subtitle):

C 言語の偽物のスレッド

The thread at the imitation of the C language.

似ているが独創的な別物

The resembling but original singleton.

C 言語によるスレッドという概念の模倣

Copying a concept,

the thread, by the C language.

参照ライブラリ

```
/************************************************************************/
/*      H8/3048F Include File                                           */
/************************************************************************/
struct st_sam {                         /* struct DMAC  */
      void              *MAR;           /* MAR          */
      unsigned int      ETCR;           /* ETCR         */
      unsigned char     IOAR;           /* IOAR         */
      unsigned char     DTCR;           /* DTCR         */
};

struct st_fam {                         /* struct DMAC  */
      void              *MARA;          /* MARA         */
      unsigned int      ETCRA;          /* ETCRA        */
      unsigned char     IOARA;          /* IOAR         */
      unsigned char     DTCRA;          /* DTCRA        */
      void              *MARB;          /* MARB         */
      unsigned int      ETCRB;          /* ETCRB        */
      unsigned char     IOARB;          /* IOAR         */
      unsigned char     DTCRB;          /* DTCRB        */
};

struct st_itu {                         /* struct ITU   */
      unsigned char     TSTR;           /* TSTR         */
      unsigned char     TSNC;           /* TSNC         */
      unsigned char     TMDR;           /* TMDR         */
      unsigned char     TFCR;           /* TFCR         */
      char              wk[44];         /*              */
      unsigned char     TOER;           /* TOER         */
      unsigned char     TOCR;           /* TOCR         */
};

struct st_itu0 {                        /* struct ITU0  */
      unsigned char     TCR;            /* TCR          */
      unsigned char     TIOR;           /* TIOR         */
      unsigned char     TIER;           /* TIER         */
      unsigned char     TSR;            /* TSR          */
      unsigned int      TCNT;           /* TCNT         */
      unsigned int      GRA;            /* GRA          */
      unsigned int      GRB;            /* GRB          */
};

struct st_itu3 {                        /* struct ITU3  */
      unsigned char     TCR;            /* TCR          */
      unsigned char     TIOR;           /* TIOR         */
      unsigned char     TIER;           /* TIER         */
      unsigned char     TSR;            /* TSR          */
      unsigned int      TCNT;           /* TCNT         */
      unsigned int      GRA;            /* GRA          */
      unsigned int      GRB;            /* GRB          */
      unsigned int      BRA;            /* BRA          */
      unsigned int      BRB;            /* BRB          */
      char              wk[2];          /*              */
};

struct st_tpc {                         /* struct TPC   */
      unsigned char     TPMR;           /* TPMR         */
      unsigned char     TPCR;           /* TPCR         */
```

```
    unsigned char   NDERB;      /* NDERB            */
    unsigned char   NDERA;      /* NDERA            */
    unsigned char   NDRB1;      /* NDRB (H'A4)  */
    unsigned char   NDRA1;      /* NDRA (H'A5)  */
    unsigned char   NDRB2;      /* NDRB (H'A6)  */
    unsigned char   NDRA2;      /* NDRA (H'A7)  */
};

struct st_rfshc {                   /* struct RFSHC */
    unsigned char   RFSHCR;     /* RFSHCR           */
    unsigned char   RTMCSR;     /* RTMCSR           */
    unsigned char   RTCNT;      /* RTCNT            */
    unsigned char   RTCOR;      /* RTCOR            */
};

struct st_sci {                     /* struct SCI   */
    unsigned char   SMR;        /* SMR              */
    unsigned char   BRR;        /* BRR              */
    unsigned char   SCR;        /* SCR              */
    unsigned char   TDR;        /* TDR              */
    unsigned char   SSR;        /* SSR              */
    unsigned char   RDR;        /* RDR              */
    char            wk[2];      /*                  */
};

struct st_p1 {                      /* struct P1    */
    unsigned char   DDR;        /* P1DDR            */
    char            wk;         /*                  */
    unsigned char   DR;             /* P1DR         */
};

struct st_p2 {                      /* struct P2    */
    unsigned char   DDR;        /* P2DDR            */
    char            wk1;        /*                  */
    unsigned char   DR;             /* P2DR         */
    char            wk2[20];    /*                  */
    unsigned char   PCR;        /* P2PCR            */
};

struct st_p4 {                      /* struct P4    */
    unsigned char   DDR;        /* P4DDR            */
    char            wk1;        /*                  */
    unsigned char   DR;             /* P4DR         */
    char            wk2[18];    /*                  */
    unsigned char   PCR;        /* P4PCR            */
};

struct st_p5 {                      /* struct P5    */
    unsigned char   DDR;        /* P5DDR            */
    char            wk1;        /*                  */
    unsigned char   DR;             /* P5DR         */
    char            wk2[16];    /*                  */
    unsigned char   PCR;        /* P5PCR            */
};

struct st_p6 {                      /* struct P6    */
    unsigned char   DDR;        /* P6DDR            */
```

```
	char		wk;		/*			*/
	unsigned char	DR;		/* P6DR		*/
};

struct st_p7 {			/* struct P7	*/
	unsigned char	DR;		/* P7DR		*/
};

struct st_p8 {			/* struct P8	*/
	unsigned char	DDR;		/* P8DDR		*/
	char		wk;		/*			*/
	unsigned char	DR;		/* P8DR		*/
};

struct st_p9 {			/* struct P9	*/
	unsigned char	DDR;		/* P9DDR		*/
	char		wk;		/*			*/
	unsigned char	DR;		/* P9DR		*/
};

struct st_da {			/* struct D/A	*/
	unsigned char	STCR;		/* DASTCR		*/
	char		wk[127];	/*			*/
	unsigned char	DR0;		/* DADR0		*/
	unsigned char	DR1;		/* DADR1		*/
	unsigned char	CR;		/* DACR		*/
};

struct st_ad {			/* struct A/D	*/
	unsigned int	DRA;		/* ADDRA		*/
	unsigned int	DRB;		/* ADDRB		*/
	unsigned int	DRC;		/* ADDRC		*/
	unsigned int	DRD;		/* ADDRD		*/
	unsigned char	CSR;		/* ADCSR		*/
	unsigned char	CR;		/* ADCR		*/
};

struct st_bsc {			/* struct BSC	*/
	unsigned char	CSCR;		/* CSCR		*/
	char		wk1[140];	/*			*/
	unsigned char	ABWCR;		/* ABWCR		*/
	unsigned char	ASTCR;		/* ASTCR		*/
	unsigned char	WCR;		/* WCR		*/
	unsigned char	WCER;		/* WCER		*/
	char		wk2[3];		/*			*/
	unsigned char	BRCR;		/* BRCR		*/
};

struct st_intc {		/* struct INTC	*/
	unsigned char	ISCR;		/* ISCR		*/
	unsigned char	IER;		/* IER		*/
	unsigned char	ISR;		/* ISR		*/
	char		wk;		/*			*/
	unsigned char	IPRA;		/* IPRA		*/
	unsigned char	IPRB;		/* IPRB		*/
};
```

```
#define DMAC0A  (*(volatile struct st_sam      *)0xFFFF20) /* DMAC 0A Addr */
#define DMAC0B  (*(volatile struct st_sam      *)0xFFFF28) /* DMAC 0B Addr */
#define DMAC1A  (*(volatile struct st_sam      *)0xFFFF30) /* DMAC 1A Addr */
#define DMAC1B  (*(volatile struct st_sam      *)0xFFFF38) /* DMAC 1B Addr */
#define DMAC0   (*(volatile struct st_fam      *)0xFFFF20) /* DMAC 0  Addr */
#define DMAC1   (*(volatile struct st_fam      *)0xFFFF30) /* DMAC 1  Addr */
#define ITU     (*(volatile struct st_itu      *)0xFFFF60) /* ITU       Address*/
#define ITU0    (*(volatile struct st_itu0     *)0xFFFF64) /* ITU0  Address*/
#define ITU1    (*(volatile struct st_itu0     *)0xFFFF6E) /* ITU1  Address*/
#define ITU2    (*(volatile struct st_itu0     *)0xFFFF78) /* ITU2  Address*/
#define ITU3    (*(volatile struct st_itu3     *)0xFFFF82) /* ITU3  Address*/
#define ITU4    (*(volatile struct st_itu3     *)0xFFFF92) /* ITU4  Address*/
#define TPC     (*(volatile struct st_tpc      *)0xFFFFA0) /* TPC       Address*/
#define RFSHC   (*(volatile struct st_rfshc *)0xFFFFAC) /* RFSHC Address*/
#define SCI0    (*(volatile struct st_sci      *)0xFFFFB0) /* SCI0  Address*/
#define SCI1    (*(volatile struct st_sci      *)0xFFFFB8) /* SCI1  Address*/
#define P1          (*(volatile struct st_p1       *)0xFFFFC0) /* P1        Address*/
#define P2          (*(volatile struct st_p2       *)0xFFFFC1) /* P2        Address*/
#define P3          (*(volatile struct st_p1       *)0xFFFFC4) /* P3        Address*/
#define P4          (*(volatile struct st_p4       *)0xFFFFC5) /* P4        Address*/
#define P5          (*(volatile struct st_p5       *)0xFFFFC8) /* P5        Address*/
#define P6          (*(volatile struct st_p6       *)0xFFFFC9) /* P6        Address*/
#define P7          (*(volatile struct st_p7       *)0xFFFFCE) /* P7        Address*/
#define P8          (*(volatile struct st_p8       *)0xFFFFCD) /* P8        Address*/
#define P9          (*(volatile struct st_p9       *)0xFFFFD0) /* P9        Address*/
#define PA          (*(volatile struct st_p1       *)0xFFFFD1) /* PA        Address*/
#define PB          (*(volatile struct st_p1       *)0xFFFFD4) /* PB        Address*/
#define DA          (*(volatile struct st_da       *)0xFFFF5C) /* D/A       Address*/
#define AD          (*(volatile struct st_ad       *)0xFFFFE0) /* A/D       Address*/
#define BSC     (*(volatile struct st_bsc      *)0xFFFF5F) /* BSC       Address*/
#define FLMCR   (*(volatile unsigned char  *)0xFFFF40) /* FLMCR Address*/
#define EBR1    (*(volatile unsigned char      *)0xFFFF42) /* EBR1  Address*/
#define EBR2    (*(volatile unsigned char      *)0xFFFF43) /* EBR2  Address*/
#define RAMCR   (*(volatile unsigned char  *)0xFFFF48) /* RAMCR Address*/
#define DIVCR   (*(volatile unsigned char  *)0xFFFF5D) /* DIVCR Address*/
#define MSTCR   (*(volatile unsigned char  *)0xFFFF5E) /* MSTCR Address*/
#define MDCR    (*(volatile unsigned char      *)0xFFFFF1) /* MDCR  Address*/
#define SYSCR   (*(volatile unsigned char *)0xFFFFF2) /* SYSCR Address*/
#define INTC    (*(volatile struct st_intc     *)0xFFFFF4) /* INTC  Address*/
#define st_itu1 st_itu0                                 /* Change Struct ITU1   */
#define st_itu2 st_itu0                                 /* Change Struct ITU2   */
#define st_itu4 st_itu3                                 /* Change Struct ITU4   */
#define st_p3   st_p1                                   /* Change Struct P3->P1 */
#define st_pa   st_p1                                   /* Change Struct PA->P1 */
#define st_pb   st_p1                                   /* Change Struct PB->P1 */
```

```
/*===============================================================
                        N9604 Address
===============================================================*/
#define     USB9602R        (*(volatile unsigned char *)0x400003)
#define     USB9602D        (*(volatile unsigned char *)0x400001)

/*===============================================================
                        N9604 Define
===============================================================*/
#define     USB_CLKDIV      0x04    /* CLKOUT = 48MHz/4 = 12MHz */


/* USB1.0リクエスト */
#define     USB_GET_STATUS          0
#define     USB_CLEAR_FEATURE       1
#define     USB_SET_FEATURE         3
#define     USB_SET_ADDRESS         5
#define     USB_GET_DESCRIPTOR      6
#define     USB_SET_DESCRIPTOR      7
#define     USB_GET_CONFIGURATION   8
#define     USB_SET_CONFIGURATION   9
#define     USB_GET_INTERFACE       10
#define     USB_SET_INTERFACE       11
#define     USB_SYNCH_FRAME         12

/* ディスクリプタ名 */
#define     USB_DEVICE              1
#define     USB_CONFIGURATION       2
```

```
#define     USB_XSTRING                 3
#define     USB_INTERFACE               4
#define     USB_ENDPOINT                5
#define     USB_HID                     0x21
#define     USB_HIDREPORT               0x22
#define     USB_HIDPHYSICAL             0x23

/* HIDリクエスト */
#define     USB_GET_REPORT              0x01
#define     USB_GET_IDLE                0x02
#define     USB_GET_PROTOCOL            0x03
#define     USB_SET_REPORT              0x09
#define     USB_SET_IDLE                0x0A
#define     USB_SET_PROTOCOL            0x0B


/*============================================================
                        N9604 Register
============================================================*/
#define     USB_MCNTRL              0x00    /*Main control register   */
#define     USB_CCONF               0x01    /*Clk. config. register   */
#define     USB_TCR                 0x02    /*Xcvr config. register   */
#define     USB_RID                 0x03    /*Rev. ID     register   */
#define     USB_FAR                 0x04    /*Func address register   */
#define     USB_NFSR                0x05    /*Node func st register   */
#define     USB_MAEV                0x06    /*Main event   register   */
#define     USB_MAMSK               0x07    /*Main mask    register   */
#define     USB_ALTEV               0x08    /*Alt. event   register   */
#define     USB_ALTMSK              0x09    /*ALT  mask    register   */
```

```
#define     USB_TXEV            0x0A   /*TX  event  register  */
#define     USB_TXMSK           0x0B   /*TX  mask   register  */
#define     USB_RXEV            0x0C   /*RX  event  register  */
#define     USB_RXMSK           0x0D   /*RX  mask   register  */
#define     USB_NAKEV           0x0E   /*NAK event  register  */
#define     USB_NAKMSK          0x0F   /*NAK mask   register  */
#define     USB_FWEV            0x10   /*FIFO warning register  */
#define     USB_FWMSK           0x11   /*FIFO warning mask     */
#define     USB_FNH             0x12   /*Frame nbr hi register  */
#define     USB_FNL             0x13   /*Frame nbr lo register  */
#define     USB_DMACNTRL        0x14   /*DMA  control register  */

#define     USB_EPC0            0x20   /*Endpoint0   register  */
#define     USB_TXD0            0x21   /*TX  data   register 0 */
#define     USB_TXS0            0x22   /*TX  status  register 0 */
#define     USB_TXC0            0x23   /*TX  command register 0 */

#define     USB_RXD0            0x25   /*RX  data   register 0 */
#define     USB_RXS0            0x26   /*RX  status  register 0 */
#define     USB_RXC0            0x27   /*RX  command register 0 */

#define     USB_EPC1            0x28   /*Endpoint1   register  */
#define     USB_TXD1            0x29   /*TX  data   register 1 */
#define     USB_TXS1            0x2A   /*TX  status  register 1 */
#define     USB_TXC1            0x2B   /*TX  command register 1 */

#define     USB_EPC2            0x2C   /*Endpoint2   register  */
#define     USB_RXD1            0x2D   /*RX  data   register 1 */
#define     USB_RXS1            0x2E   /*RX  status  register 1 */
```

```
#define     USB_RXC1                0x2F    /*RX   command register 1 */

#define     USB_EPC3                0x30    /*Endpoint3    register   */
#define     USB_TXD2                0x31    /*TX   data    register 2 */
#define     USB_TXS2                0x32    /*TX   status  register 2 */
#define     USB_TXC2                0x33    /*TX   command register 2 */

#define     USB_EPC4                0x34    /*Endpoint4    register   */
#define     USB_RXD2                0x35    /*RX   data    register 2 */
#define     USB_RXS2                0x36    /*RX   status  register 2 */
#define     USB_RXC2                0x37    /*RX   command register 2 */

#define     USB_EPC5                0x38    /*Endpoint5    register   */
#define     USB_TXD3                0x39    /*TX   data    register 3 */
#define     USB_TXS3                0x3A    /*TX   status  register 3 */
#define     USB_TXC3                0x3B    /*TX   command register 3 */

#define     USB_EPC6                0x3C    /*Endpoint6    register   */
#define     USB_RXD3                0x3D    /*RX   data    register 3 */
#define     USB_RXS3                0x3E    /*RX   status  register 3 */
#define     USB_RXC3                0x3F    /*RX   command register 3 */

/*---------- MCNTRL bits -------------*/
#define     USB_SRST                0x01    /*software reset        */
#define     USB_DBG                 0x02    /*debug mode            */
#define     USB_VGE                 0x04    /*voltage regulator enable*/
#define     USB_NAT                 0x08    /*node attached         */
#define     USB_INT_DIS             0x00    /*interrupts disabled    */
#define     USB_INT_L_O             0x40    /*act lo ints, open drain */
```

```
#define       USB_INT_H_P              0x80    /*act hi ints, push pull  */
#define       USB_INT_L_P              0xC0    /*act lo ints, push pull  */

/*------------ FAR bits --------------*/
#define       USB_AD_EN                0x80    /*address enable        */

/*------------ NFSR bits -------------*/
#define       USB_RST_ST               0x00    /*reset      state      */
#define       USB_RSM_ST               0x01    /*resume     state      */
#define       USB_OPR_ST               0x02    /*operational state      */
#define       USB_SUS_ST               0x03    /*suspend    state      */

/*-------- MAEV, MAMSK bits ---------*/
#define       USB_WARN                 0x01    /*warning bit has been set*/
#define       USB_ALT                  0x02    /*alternate event        */
#define       USB_TX_EV                0x04    /*transmit event         */
#define       USB_FRAME                0x08    /*SOF packet received    */
#define       USB_NAK                  0x10    /*NAK event              */
#define       USB_ULD                  0x20    /*unlock locked detected  */
#define       USB_RX_EV                0x40    /*receive event          */
#define       USB_INTR_E               0x80    /*master interrupt enable */

/*-------- ALTEV, ALTMSK bits --------*/
#define       USB_EOP                  0x08    /*end of packet          */
#define       USB_SD3                  0x10    /*3 ms suspend           */
#define       USB_SD5                  0x20    /*5 ms suspend           */
#define       USB_RESET_A              0x40    /*reset  detected        */
#define       USB_RESUME_A             0x80    /*resume detected        */
```

```
/*--------- TXEV, TXMSK bits ---------*/
#define     USB_TXFIFO0             0x01    /*TX_DONE, FIFO 0      */
#define     USB_TXFIFO1             0x02    /*TX_DONE, FIFO 1      */
#define     USB_TXFIFO2             0x04    /*TX_DONE, FIFO 2      */
#define     USB_TXFIFO3             0x08    /*TX_DONE, FIFO 3      */
#define     USB_TXUDRN0             0x10    /*TX_URUN, FIFO 0      */
#define     USB_TXUDRN1             0x20    /*TX_URUN, FIFO 1      */
#define     USB_TXUDRN2             0x40    /*TX_URUN, FIFO 2      */
#define     USB_TXUDRN3             0x80    /*TX_URUN, FIFO 3      */

/*--------- RXEV, RXMSK bits ---------*/
#define     USB_RXFIFO0             0x01    /*RX_DONE, FIFO 0      */
#define     USB_RXFIFO1             0x02    /*RX_DONE, FIFO 1      */
#define     USB_RXFIFO2             0x04    /*RX_DONE, FIFO 2      */
#define     USB_RXFIFO3             0x08    /*RX_DONE, FIFO 3      */
#define     USB_RXOVRN0             0x10    /*RX_OVRN, FIFO 0      */
#define     USB_RXOVRN1             0x20    /*RX_OVRN, FIFO 1      */
#define     USB_RXOVRN2             0x40    /*RX_OVRN, FIFO 2      */
#define     USB_RXOVRN3             0x80    /*RX_OVRN, FIFO 3      */

/*------- NAKEV, NAKMSK bits ---------*/
#define     USB_NAK_I0              0x01    /*IN  NAK, FIFO 0      */
#define     USB_NAK_I1              0x02    /*IN  NAK, FIFO 1      */
#define     USB_NAK_I2              0x04    /*IN  NAK, FIFO 2      */
#define     USB_NAK_I3              0x08    /*IN  NAK, FIFO 3      */
#define     USB_NAK_O0              0x10    /*OUT NAK, FIFO 0      */
#define     USB_NAK_O1              0x20    /*OUT NAK, FIFO 1      */
```

```
#define       USB_NAK_O2              0x40    /*OUT NAK, FIFO 2       */
#define       USB_NAK_O3              0x80    /*OUT NAK, FIFO 3       */

/*--------- EPCX bits ----------------*/
#define       USB_EP_EN               0x10    /*enables endpt.  (1-6)   */
#define       USB_ISO                 0x20    /*set for isochr. (1-6)   */
#define       USB_DEF                 0x40    /*force def. adr (0 only) */
#define       USB_STALL               0x80    /*force stall handshakes  */

/*---------- TXCx bits ---------------*/
#define       USB_TX_EN               0x01    /*transmit enable       */
#define       USB_TX_LAST             0x02    /*last data in FIFO     */
#define       USB_TX_TOGL             0x04    /*specifies PID used    */
#define       USB_FLUSH               0x08    /*flushes all FIFO data   */
#define       USB_IGNIOS              0x80    /*      */

/*----------- TXSx bits --------------*/
#define       USB_TX_DONE             0x20    /*transmit done         */
#define       USB_ACK_STAT            0x40    /*ack status of xmission  */

/*------------ RXCx bits -------------*/
#define       USB_RX_EN               0x01    /*receive  enable       */
#define       USB_IGN_OUT             0x02    /*ignore out tokens     */
#define       USB_IGN_SETUP           0x04    /*ignore setup tokens    */

/*------------- RXS0 bits ------------*/
#define       USB_RX_LAST             0x10    /*indicates RCOUNT valid  */
#define       USB_RX_TOGL             0x20    /*last pkt was DATA1 PID  */
#define       USB_SETUP_RX            0x40    /*setup packet received   */
```

```
#define	USB_RX_ERR		0x80	/*last packet had an error*/
```

```
/*

      USB N9604 コントロール

                                                    (C)2002 C.I.M

*/

#include      <stdio.h>
#include      <string.h>
#include      "usbn9602.h"
#include      "h83048.h"

extern  void PrintSCI(const char *fmt, ...);          /* sci.c */

static void RegisterSet();
static void ResetUSB();
static void WakeupUSB();

static void rx0();
static void rx1();
static void tx0();
static void tx1();
static void nako0();
static void nako1();
static void naki0();
static void naki1();

static void clrfeature();
```

```
static void setfeature();
static void getdescriptor();
static void send_desc_sub(void *ptr,int size);
static void send_desc();
static void getstatus();
static void setconfiguration();

static void SetStallUSB(int adr);
static void ClearStallUSB(int adr);
static void FlushRXC(int no);
static void FlushTXC(int no);
static void TxTogle(int no);

static void WriteUSB(int adr,int data);
static unsigned char ReadUSB(int adr);
static int ReadUSBBurst(int adr,int adr2,char *buff,int cnt);
static int WriteUSBBurst(int adr,int adr2,char *buff,int cnt);

/*---------------------------------*/
static int SendTX1();

/*---------------------------------*/
int get_inbufflen(void);
void init_usbbuff(void);
int write_inbuff(char *p,int size);
int get_outbufflen(void);
int write_buff(char *p,int size);
int read_outbuff(char *p,int size);
/*---------------------------------*/
```

```
static  unsigned char   usbevent;           /* USB割り込みイベント        */
static  unsigned char   SETADDR;            /* アドレスセット             */
static  unsigned char   configno;           /* コンフィグレーションNO */
static  unsigned char   usbbuff[64];    /* 読み込みバッファ               */
static  unsigned char   rx1buff[64];
static  unsigned char   rx2buff[64];
static  unsigned char   STALLD;             /* ECPの状態                  */
static  unsigned char   DATA0_1;            /* USB_TXTGLのフラグ          */
static  char            senddesc;           /* 1 = ディスクリプタ送信中   */
static  int             desc_size;          /* ディスクリプタ送信サイズ */
static  char            *desc_ptr;          /* ディスクリプタポインタ  */


static  const unsigned char     epctbl[8] =
{USB_EPC0,USB_EPC1,USB_EPC2,USB_EPC3,USB_EPC4,USB_EPC5,USB_EPC6,USB_EPC0};
static int      txcreg[4] = {USB_TXC0,USB_TXC1,USB_TXC2,USB_TXC3};
static int rxcreg[4] = {USB_RXC0,USB_RXC1,USB_RXC2,USB_RXC3};

/*-----------------------------------------------------------*/
/*-----------------------------------------------------------*/
static const unsigned char dev_desc[] = {
    0x12,               /* length of this desc.                   */
    0x01,               /* デバイス・ディスクリプタ 1             */
    0x00,0x01,              /* USB Version 1.0                        */
    0x00,               /* device class クラス無し                */
    0x00,               /* device subclass                        */
    0x00,               /* device protocol                        */
    0x08,               /* EP0の最大パケットサイズ                */
```

```
    0xfe,0xff,              /* vendor ID    サンプルなのでとりあえず        */
    0x10,0x00,              /* product ID                                   */
    0x01,0x00,              /* revision ID                                  */
    0x01,                   /* index of manuf. string                       */
    0x01,                   /* index of prod.  string                       */
    0x02,                   /* index of ser. # string                       */
    0x01                    /* bNumConfigurations                           */
};


/* コンフィグレーションディスクリプタ */
static const unsigned char cfg_desc[] = {
    0x09,                   /* length of this desc.                         */
    0x02,                   /* コンフィグレーション・ディスクリプタ         */
    9+9+7*3,                /* インターフェース／エンドポイントディスクリプタ等の合計長 CFG + IF +
EP*3 */
    0x00,                   /*                                              */
    0x01,                   /* インターフェース数 1                         */
    0x01,                   /* コンフィグレーションは 1                     */
    0x00,                   /* index of config. string                      */
    0xc0,                   /* attr.: self powered  D6=自己電源             */
    100,                    /*     ;max power (100 mA)                      */
/*},*/
/*static const unsigned char if_desc[] = {*/
    0x09,                   /* length of this desc.                         */
    0x04,                   /* INTERFACE descriptor                         */
    0x00,                   /* interface number                             */
    0x00,                   /* alternate setting                            */
    0x03,                   /* # of (non 0) endpoints                       */
    0x00,                   /* interface class                              */
```

```
    0x00,               /* interface subclass                   */
    0x00,               /* interface protocol                   */
    0x03,               /* index of intf. string                */
/*};*/
/*static const unsigned char endp_desc[] = {*/
    /* pipe 0 */
    7,                  /* length of this desc.                 */
    5,                  /* ENDPOINT descriptor                  */
    0x81,               /* address (IN)                         */
    0x02,               /* attributes  (BULK)                   */
    0x40,0x00,          /* max packet size (64)                 */
    255,                /* interval (ms)                        */
    /* pipe 1 */
    7,                  /* length of this desc.                 */
    5,                  /* ENDPOINT descriptor                  */
    0x02,               /* address (OUT)                        */
    0x02,               /* attributes  (BULK)                   */
    0x40,0x00,          /* max packet size (64)                 */
    255,                /* interval (ms)                        */

    /* pipe 2 (not use) */
    7,                  /* length of this desc.                 */
    5,                  /* ENDPOINT descriptor                  */
    0x83,               /* address (IN)                         */
    0x02,               /* attributes  (BULK)                   */
    0x40,0x00,          /* max packet size (64)                 */
    255,                /* interval (ms)                        */
};
```

```
static const char lang_data[] = {
        4,3,9,4             /* LANGID (English)                                    */
};

static const char mfg_str[] = {
        18,3,
        'U',0,'S',0,'B',0,' ',0,'T',0,'E',0,'S',0,'T',0,
};



static const char nbr_str[] = {
    8,3,
    '1',0,'.',0,'0',0,
};

static const char int_str[] = {
    34,3,
    'U',0,'S',0,'B',0,' ',0,
    'T',0,'E',0,'S',0,'T',0,' ',0,'P',0,'R',0,'O',0,'G',0,'R',0,'A',0,'M',0,
};

static void wait(int c)
{
    int         i,j;
    for(j=0;j<c;j++)
    {
        for(i=0;i<0x682;i++)
```

```
            {
            }
        }
    }

    /*-----------------------------------------------------------*/
    /* USB初期化 */
    void InitUSB()
    {
        init_usbbuff();
        ResetUSB();
        RegisterSet();
        WakeupUSB();
    /*     PrintSCI(" REV = %d¥n",ReadUSB(USB_RID)); */
    /*     PrintSCI(" CLOCK = %02X¥n",ReadUSB(USB_CCONF)); */

    }

    static void RegisterSet()
    {
        STALLD = 0;
        senddesc = 0;
        DATA0_1 = 0;
        SETADDR = 0;

        WriteUSB(USB_FAR,USB_AD_EN+0);                  /* アドレス初期化     */
        WriteUSB(USB_EPC0,USB_EP_EN);                   /* EP0をｲﾈｰﾌﾞﾙ         */
        WriteUSB(USB_NAKMSK,USB_NAK_O0);                /* NAK MASKをｾｯﾄ */
        WriteUSB(USB_TXMSK,USB_TXFIFO0+USB_TXFIFO1+USB_TXFIFO2+USB_TXFIFO3);    /* TX MASK
```

```
をｾｯﾄ */
    WriteUSB(USB_RXMSK,USB_RXFIFO0+USB_RXFIFO1+USB_RXFIFO2+USB_RXFIFO3);  /* RX MASK
をｾｯﾄ */
    WriteUSB(USB_ALTMSK,USB_SD3+USB_RESET_A);          /* ALT MASKをｾｯﾄ */
    WriteUSB(USB_MAMSK,USB_INTR_E+USB_RX_EV+USB_NAK+USB_TX_EV+USB_ALT);          /*
MAIN MASKをｾｯﾄ */
    FlushTXC(0);
    FlushRXC(1);
    FlushTXC(1);
    WriteUSB(USB_TXC1,0);
    WriteUSB(USB_RXC1,0);
    WriteUSB(USB_RXC0,USB_RX_EN);                  /* RX0をｲﾈｰﾌﾞﾙ        */
}

static void ResetUSB()
{
    WriteUSB(USB_MCNTRL,USB_SRST+USB_VGE);                /* USBリセット 3.3V供給 */
    wait(100);                                          /* 100msec */
    WriteUSB(USB_MCNTRL,USB_INT_L_P+USB_VGE);             /* 割込みはactive low push pull */
    WriteUSB(USB_CCONF,USB_CLKDIV-1);                     /* 48MHz/4 = 12MHz */
}

static void WakeupUSB()
{
    WriteUSB(USB_NFSR,USB_OPR_ST);                        /* 動作可にする */
    WriteUSB(USB_MCNTRL,USB_INT_L_P+USB_NAT+USB_VGE);     /* USBのﾉｰﾄﾞを動作可にする */
}

/* USBポートデータ表示 */
```

```
/* ※リードすると、ステータスが変わるレジスタもあるので注意 */
void DispUSBPort()
{
        int         i,j;
        PrintSCI("00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F¥n");
        for(j=0;j<4;j++)
        {
            for(i=0;i<16;i++)
                PrintSCI("%02X ",ReadUSB(i+j*16));
            PrintSCI("¥n");
        }
}

/*-----------------------------------------------------------*/
/* USB割り込み */
#ifdef  __GNUC__
void usb_int()  __attribute__ ((interrupt_handler));
#endif
void usb_int()
{
    unsigned char   nakevent,rxevent,txevent,altevent;
    char    reg;


    usbevent = ReadUSB(USB_MAEV);

    if( usbevent & USB_NAK )
    {
```

```
        nakevent = ReadUSB(USB_NAKEV);
        if( nakevent & USB_NAK_O0 )
        {
            nako0();
        }
        if( nakevent & USB_NAK_O1 )
        {
            nako1();
        }
        else if( nakevent & USB_NAK_I0 )
        {
            naki0();
        }
        else if( nakevent & USB_NAK_I1 )
        {
            naki1();
        }
    }
    else if( usbevent & USB_RX_EV )
    {
        rxevent = ReadUSB(USB_RXEV);
        if( rxevent & USB_RXFIFO0 )
        {
            rx0();
        }
        else if( rxevent & USB_RXFIFO1 )
        {
            rx1();
        }
```

```
}
else if( usbevent & USB_TX_EV )
{
    txevent = ReadUSB(USB_TXEV);
    if( txevent & USB_TXFIFO0 )
    {
        tx0();
    }
    else if( txevent & USB_TXFIFO1 )
    {
        tx1();
    }
}
else if( usbevent & USB_ALT )
{
    altevent = ReadUSB(USB_ALTEV);
    if( altevent & USB_RESET_A )
    {
        /* リセット */
        RegisterSet();
        WakeupUSB();
    }
    else if( altevent & USB_SD3 )
    {
        /* サスペンド */
        /* ALTMSKをｾｯﾄ          */
        WriteUSB(USB_ALTMSK,USB_RESUME_A+USB_RESET_A);
        /* ﾉｰﾄﾞをｻｽﾍﾟﾝﾄﾞ */
        WriteUSB(USB_NFSR,USB_SUS_ST);
```

```
        }
        else if( altevent & USB_RESUME_A )
        {
            /* リジューム */
            /* ALTMSKをｾｯﾄ                */
            WriteUSB(USB_ALTMSK,USB_SD3+USB_RESET_A);
            /* ﾉｰﾄﾞを動作可能にする */
            WriteUSB(USB_NFSR,USB_OPR_ST);
        }
    }
}

/*================================================================
                        RXイベントの処理
================================================================*/
/* RX0(system) */
/*
 リクエストコードの取得
        0 byte
            D7 ... データ方向 0=ホスト->デバイス , 1=デバイス->ホスト
            D6-D5 ... タイプ
                    0:標準 , 1:クラス , 2:ベンダ , 3:予約
            D4-D0 ... 受信側
                    0:デバイス , 1:インターフェイス , 2:エンドポイント , 3:その他
        1 byte
            特定のリクエスト
        2 byte
            value
```

```
        2 byte
            index
        2 byte
            length
*/
static void rx0()
{
    unsigned char   rxstat;
    rxstat = ReadUSB(USB_RXS0);
    if( rxstat & USB_SETUP_RX )
    {
        ReadUSBBurst(USB_RXD0,USB_RXS0,(char*)usbbuff,8);
        FlushRXC(0);
        FlushTXC(0);
        ClearStallUSB(USB_EPC0);
        if( (usbbuff[0] & 0x60) == 0 )
        {
            /* 標準リクエスト */
            switch( usbbuff[1] )
            {
                case    USB_CLEAR_FEATURE :
                    clrfeature();
                    break;
                case    USB_GET_CONFIGURATION :
                    WriteUSB(USB_TXD0,configno);
                    break;
                case    USB_GET_DESCRIPTOR :
                    getdescriptor();
```

```
                break;
            case    USB_GET_STATUS :
                getstatus();
                break;
            case    USB_GET_INTERFACE :
                WriteUSB(USB_TXD0,0);
                break;
            case    USB_SET_ADDRESS :
                WriteUSB(USB_EPC0,USB_DEF);
                SETADDR = usbbuff[2]¦USB_AD_EN;
                WriteUSB(USB_FAR,SETADDR);
                break;
            case    USB_SET_CONFIGURATION :
                setconfiguration();
                break;
            case    USB_SET_FEATURE :
                setfeature();
                break;
            case    USB_SET_INTERFACE :
                if( usbbuff[2] != 0 )
                    SetStallUSB(USB_EPC0);
                break;
            default :
                /* 未定義 */
                SetStallUSB(USB_EPC0);
                break;
        }
    }
    else if( (usbbuff[0] &0x60 ) ==  0x20 )
```

```
        {
            /* クラスリクエスト */
            SetStallUSB(USB_EPC0);
        }
        else if( (usbbuff[0] &0x60 ) ==  0x40 )
        {
            /* ベンダリクエスト */
            SetStallUSB(USB_EPC0);
        }
        else
        {
            /* 未定義 */
            SetStallUSB(USB_EPC0);
        }
        /* SETUPなのﾃﾞｰﾀの有無に関係無くDATA1として送信 */
        DATA0_1 ¦= 1;
        TxTogle(0);
    }
    else
    {
        if( senddesc )
        {
            senddesc = 0;
        }
        FlushTXC(0);
        WriteUSB(USB_RXC0,USB_RX_EN);
    }
}
```

```
/*-----------------------------------------------------------*/
/* RX1 受信 */
static void rx1()
{
    int             cnt;
    unsigned char   rxstat;
    rxstat = ReadUSB(USB_RXS1);             /* RX1ステータス取得 */
    /* SETUP,ERRORパケットでない */
    if( !(rxstat & (USB_SETUP_RX¦USB_RX_ERR)) )
    {
        /* ホストからデータの受信 */
        /* FIFOからデータ取得 */
        cnt = ReadUSBBurst(USB_RXD1,USB_RXS1,(char*)rx1buff,64);
        /* リングバッファに書き込み */
        write_inbuff((char*)rx1buff,cnt);
    }
    FlushRXC(1);                            /* バッファをフラッシュ */
    WriteUSB(USB_RXC1,USB_RX_EN);       /* 受信可に設定                 */
}

/*-----------------------------------------------------------*/
/* RX2 受信(not use) */
static void rx2()
{
    unsigned char   rxstat;
    rxstat = ReadUSB(USB_RXS2);
}

/*===========================================================
```

```
                                TXイベントの処理
==========================================================================*/
/* TX0 送信終了 */
static void tx0()
{
    unsigned char   txstat;
    txstat = ReadUSB(USB_TXS0);
    if( (txstat & USB_ACK_STAT) && (txstat & USB_TX_DONE) )
    {
        /* ok */
        FlushTXC(0);
        if( senddesc )
        {
            send_desc();
            TxTogle(0);                         /* TX0送信可 */
        }
        else
        {
            WriteUSB(USB_RXC0,USB_RX_EN);   /* RX0受信可 */
        }
    }
    else
    {
        /* error ? */
    }
}

/*--------------------------------------------------------*/
```

```
/* TX1送信終了 */
static void tx1()
{
    unsigned char   txstat;
    txstat = ReadUSB(USB_TXS1);
    if( (txstat & USB_ACK_STAT) && (txstat & USB_TX_DONE) )
    {
        /*
            送信終了後に次の送信データを送信するようにする
            送信データが無い場合、HOSTには0バイトで送る
        */
        SendTX1();
    }
    else
    {
        /*
            送ったサイズより小さい読み込みが行われた場合、こちらにくる場合がある
        */
    }
}

/*==========================================================================
                                NAKイベントの処理
==========================================================================*/
/*
    NAKイベントは、エラーが発生した場合など再送信する場合処理する
    NAK0しかENABLEにしていないので、それ以外は処理無し
*/
static void nako0()
```

```
{
}
static void nako1()
{
}
static void naki0()
{
}

static void naki1()
{
}



/*=============================================================
                        標準リクエストの処理
=============================================================*/
/* 選択機器 */
static void clrfeature()
{
    if( (usbbuff[0] & 3) == 2 )
    {
        /* エンドポイントデータ */
        if((usbbuff[3]&7) != 0 )
            ClearStallUSB(epctbl[usbbuff[3]&7]);
        STALLD &= -1 ^ (1<<(usbbuff[3]&7));
    }
}
static void setfeature()
```

```
{
    if( (usbbuff[0]&3) == 2 )           /* ENDPOINT */
    {
        /* エンドポイントデータ */
        if((usbbuff[3]&7) != 0 )
            SetStallUSB(epctbl[usbbuff[3]&7]);
        STALLD |= (1<<(usbbuff[3]&7));
    }
}

/*-------------------------------------------------------------*/
/* ディスクリプタを返す */
static void getdescriptor()
{
    DATA0_1 &= 0xfe;
    switch( usbbuff[3] )
    {
        case   USB_DEVICE :
            send_desc_sub((void*)dev_desc,dev_desc[0]);
            break;
        case   USB_CONFIGURATION :
        {
            send_desc_sub((void *)cfg_desc,cfg_desc[2]);
            break;
        }
        case   USB_XSTRING :
        {
            switch( usbbuff[2] )
            {
```

```
                case  0 :
                    send_desc_sub((void *)lang_data,lang_data[0]);
                    break;
                case  1 :
                    send_desc_sub((void *)mfg_str,mfg_str[0]);
                    break;
                case  2 :
                    send_desc_sub((void *)nbr_str,nbr_str[0]);
                    break;
                case  3 :
                    send_desc_sub((void *)int_str,int_str[0]);
                    break;
            }
            break;
        }
        default :
        {
        }
    }
}

static void send_desc_sub(void *ptr,int size)
{
    desc_size = (usbbuff[7] << 8) + usbbuff[6];
    /* 受信要求バッファ以上はデータを送らない */
    if( desc_size > size )  desc_size = size;
    desc_ptr = ptr;
    senddesc = 1;   /* ディスクリプタ送信中フラグを立てる */
```

```
    send_desc();
}

static void send_desc()
{
    int         sz;
    sz = 8;
    if( desc_size == 0 )    return;
    if( desc_size <= 8 )    sz = desc_size;
    sz = WriteUSBBurst(USB_TXD0,USB_TXS0,desc_ptr,sz);
    desc_size -= sz;
    desc_ptr += sz;
    if( desc_size == 0 )    senddesc = 0;
}
/*-------------------------------------------------------------*/
/* ステータス */
static void getstatus()
{
    int         data,ep;
    data = usbbuff[0]&3;
    if( (data == 0) || (data == 1) )       /* DEVICE,INTERFACE */
    {
        WriteUSB(USB_TXD0,0);
        WriteUSB(USB_TXD0,0);
    }
    else if( data== 2)                          /* エンドポイント */
    {
        ep = usbbuff[3]&7;
        /* epのSTALL状態を送信 */
```

```
        if( STALLD & (1<<ep) )  WriteUSB(USB_TXD0,1);
        else                    WriteUSB(USB_TXD0,0);
    }
    else
    {
        WriteUSB(USB_TXD0,0);
    }
}

/*-------------------------------------------------------*/
static void setconfiguration()
{
    configno = usbbuff[2];
    if( configno == 0 )
    {
        WriteUSB(USB_EPC1,0);           /* EPC1を使用不可 */
        WriteUSB(USB_EPC2,0);           /* EPC2を使用不可 */
        WriteUSB(USB_EPC3,0);           /* EPC3を使用不可 */
        WriteUSB(USB_EPC4,0);           /* EPC4を使用不可 */
        WriteUSB(USB_EPC5,0);           /* EPC5を使用不可 */
        WriteUSB(USB_EPC6,0);           /* EPC6を使用不可 */
    }
    else
    {
        STALLD = 0;
        FlushTXC(1);
        /* EPC1をｱﾄﾞﾚｽ1としてｲﾈｰﾌﾞﾙ */
        WriteUSB(USB_EPC1,USB_EP_EN+01);
        /* TX1送信可 */
```

```
        WriteUSB(USB_TXC1,USB_TX_EN¦USB_TX_LAST);


        FlushRXC(1);
        /* EPC2をｱﾄﾞﾚｽ2としてｲﾈｰﾌﾞﾙ */
        WriteUSB(USB_EPC2,USB_EP_EN+02);
        /* RX1受信可 */
        WriteUSB(USB_RXC1,USB_RX_EN);
        /*
            USB_TX_LASTを立てると、READ時ストールしなくなる。
            ただし、データを送る前の最初のREADは0byteになります。
            host側は複数のリクエストを同時発行できないので、
            リクエストがストールするのはまずいの回避。
        */
    }
}

/*============================================================
                        汎用ルーチン
============================================================*/
/* STALLのセットとクリア */
static void SetStallUSB(int adr)
{
    WriteUSB(adr,ReadUSB(adr) ¦ 0x80);
}

static void ClearStallUSB(int adr)
{
    WriteUSB(adr,ReadUSB(adr)&0x7f);
}
```

```
/* FIFOのフラッシュ */
static void FlushRXC(int no)
{
	WriteUSB(rxcreg[no],USB_FLUSH);
}

static void FlushTXC(int no)
{
	int		d;
	d = ReadUSB(txcreg[no]);
	d ¦= USB_FLUSH;
	WriteUSB(txcreg[no],d);
}

/* 送信終了フラグセット */
/* reg = USB_TXC0～6	*/
static void TxTogle(int no)
{
	unsigned char	d;
	d = USB_TX_EN;
	if( DATA0_1 & (1<<no) ) d ¦= USB_TX_TOGL;
	else			d &= ˜USB_TX_TOGL;
	d ¦= USB_TX_LAST;
	WriteUSB(txcreg[no],d);
	DATA0_1 ^= (1<<no);
}
```

```
/*-----------------------------------------------------------*/
/* USBのアドレスから読み込み */
static unsigned char ReadUSB(int adr)
{
	USB9602R = (unsigned char)adr;
	return( USB9602D );
}
/* USBのアドレスへ書き込み */
static void WriteUSB(int adr,int data)
{
	USB9602R = (unsigned char)adr;
	USB9602D = (unsigned char)data;
}


/* バーストト転送 */
static int ReadUSBBurst(int adr,int adr2,char *buff,int cnt)
{
	int		i;
	int		rcnt;
	USB9602R = (unsigned char)adr;
	for(rcnt=0,i=0;i<cnt;i++)
	{
		if( (ReadUSB(adr2) & 0xf) == 0 )	break;

		USB9602R = (unsigned char)adr;
		*buff = USB9602D;
		buff++;
		rcnt++;
```

```
	}
	return(rcnt);
}

static int WriteUSBBurst(int adr,int adr2,char *buff,int cnt)
{
	int		i,scnt;
	for(scnt=0,i=0;i<cnt;i++)
	{
		if( (ReadUSB(adr2) & 0x1f) == 0 )	break;

		USB9602R = (unsigned char)adr;
		USB9602D = *buff;
		buff++;
		scnt++;
	}
	return(scnt);
}

/*==========================================================================
				サンプルプログラム
==========================================================================*/
/* TX1送信ルーチン */
/*
	USBから一方的に送信できないため、今回は、
	TX1送信終了時にバッファ(outbuff)にあるデータを送信します。
	よって、HOSTからは定期的にREADを行う。
	それ以外のタイミングではEPC1のFIFOバッファのサイズに注意する。
*/
```

```
static int SendTX1()
{
	int		c,cnt,sz,i;

	cnt = 0;
	/* FIFOは最大64byte */
	sz = read_outbuff((char*)rx2buff,64);
	FlushTXC(1);	/* 送信バッファをフラッシュ */
	if( sz != 0 )
	{
		/* バースト転送 */
		cnt = WriteUSBBurst(USB_TXD1,USB_TXS1,(char*)rx2buff,sz);
	}
	TxTogle(1);		/* 送信終了処理 */
	return( cnt );	/* 送信データ数を返す sz==cntのはず */
}

/*-------------------------------------------------------------*/
/*
 送受信バッファ
	inbuffがHOSTから送られてきたデータのバッファ
	outbuffがHOSTへ送るデータ用
	このサンプルではリングバッファを超えた分は捨てられます。
	今回は、256バイト確保しています。バッファがあふれないように
	メイン側で処理してください。
*/
#define	USBBUFFLEN	256		/* バッファのサイズ */
static int	inpos,inlen;		/* 入力バッファ位置、サイズ */
static int	outpos,outlen;		/* 出力バッファ位置、サイズ */
```

```
static char    inbuff[USBBUFFLEN];          /* 入力リングバッファ */
static char    outbuff[USBBUFFLEN];   /* 出力リングバッファ */

/*-------------------------------------------------------------*/
/*                              バッファの初期化                                */
/*-------------------------------------------------------------*/
void init_usbbuff()
{
      inpos = inlen = 0;
      outpos = outlen = 0;
}

/*-------------------------------------------------------------*/
/*                    HOSTからの受信バッファへ書き込み                    */
/*     char        *p          バッファポインタ                              */
/*     int              size   書き込みサイズ                                */
/*     戻り値                   書き込んだサイズ                              */
/*-------------------------------------------------------------*/
int write_inbuff(char *p,int size)
{
      int          i;
      INTC.IER &= (-1^0x20);                  /* IRQ5 Disable */
      for(i=0;i<size;i++)
      {
      if( inlen >= USBBUFFLEN )      break;
      inbuff[inpos] = *p;
      inpos = (inpos + 1)%USBBUFFLEN;
      inlen++;
```

```
        p++;
    }
        INTC.IER |= 0x20;                       /* IRQ5 Enable */
        return(i);
}
/*-------------------------------------------------------------*/
/*                      送信バッファへ書き込み                 */
/*    char      *p        バッファポインタ                     */
/*    int           size   書き込みサイズ                      */
/*    戻り値              書き込んだサイズ                     */
/*-------------------------------------------------------------*/
int write_buff(char *p,int size)
{
        int         i;
        INTC.IER &= (-1^0x20);                  /* IRQ5 Disable */
        for(i=0;i<size;i++)
        {
        if( outlen >= USBBUFFLEN )    break;
        outbuff[outpos%USBBUFFLEN] = *p;
        outpos = (outpos + 1)%USBBUFFLEN;
        outlen++;
        p++;
    }
        INTC.IER |= 0x20;                       /* IRQ5 Enable */
        return(i);
}

/*-------------------------------------------------------------*/
/*                      送信バッファから読み込み               */
```

```
/*     char        *p          バッファポインタ                          */
/*     int             size    バッファ最大サイズ                        */
/*     戻り値                  読み込んだサイズ                          */
/*--------------------------------------------------------------*/
int read_outbuff(char *p,int size)
{
    int    i;
    INTC.IER &= (-1^0x20);                  /* IRQ5 Disable */
    for(i=0;outlen>0;i++)
    {
        if( i >= size ) break;
        p[i] = outbuff[ (USBBUFFLEN+outpos-outlen)%USBBUFFLEN ];
        outlen--;
    }
    INTC.IER |= 0x20;                       /* IRQ5 Enable */
    return(i);
}
/*--------------------------------------------------------------*/
/*                      受信バッファから読み込み                */
/*     char        *p          バッファポインタ                          */
/*     int             size    バッファ最大サイズ                        */
/*     戻り値                  読み込んだサイズ                          */
/*--------------------------------------------------------------*/
int read_buff(char *p,int size)
{
    int    i;
    INTC.IER &= (-1^0x20);                  /* IRQ5 Disable */
    for(i=0;inlen>0;i++)
    {
```

```
        if( i >= size ) break;
        p[i] = inbuff[ (USBBUFFLEN+inpos-inlen)%USBBUFFLEN ];
        inlen--;
    }
    INTC.IER |= 0x20;                   /* IRQ5 Enable */
    return(i);
}
/*-------------------------------------------------------------*/
/*                      受信バッファのサイズ取得                    */
/*-------------------------------------------------------------*/
int get_inbufflen()
{
    return( inlen%USBBUFFLEN );
}

/*-------------------------------------------------------------*/
/*                      送信バッファのサイズ取得                    */
/*-------------------------------------------------------------*/
int get_outbufflen()
{
    return( outlen%USBBUFFLEN );
}
```

```
/*

                    SCI処理

                                                    (C)2002 C.I.M

*/

#include    <stdio.h>
#include    <stdarg.h>
#include    "h83048.h"


static  char buff[80]; /* 文字列展開用バッファ(必要なら増やす) */


/*=================================================================
                                SCI初期化
-----------------------------------------------------------------
    9600bps ﾊﾟﾘﾃｨ無し STOP1
=================================================================*/
void InitSCI()
{
    int         i;
    SCI1.SCR = 0;
    SCI1.SMR = 0;                   /* ﾊﾟﾘﾃｨ無し STOP1                  */
    SCI1.BRR = 80;                  /* 9600bps     3052                */
    for(i=0;i<280;i++)    {}        /* wait                            */
    SCI1.SCR = 0x30;                /* TE = 1 , RE = 1                 */
    i = SCI1.SSR;
    SCI1.SSR = 0x80;                /* Clear Error Flag (TDRE=1)    */
```

```
}

/*================================================================
                        SCI出力
----------------------------------------------------------------
================================================================*/
void PutSCI(char c)
{
    unsigned char   i;
    while( 1 )
    {
        i = SCI1.SSR;
        if( i & 0x80 )      break;
    }
    SCI1.TDR = c;
    SCI1.SSR = i&0x7f;
}

/*================================================================
                        SCI入力
----------------------------------------------------------------
    データを受信するまで待ちつづけます。
================================================================*/
char GetSCI()
{
    unsigned char   i;
    char            c;
    while( 1 )
    {
```

```
        i = SCI1.SSR;
        if( i & 0x40 )      break;
    }
    c = SCI1.RDR;
    SCI1.SSR = i&0xbf;
    return(c);
}

/*=============================================================
                        SCI入力データチェック
-------------------------------------------------------------
    SCIにデータがあるかチェックします。
    戻り値          1 = データあり、0 = データなし
=============================================================*/
int ScanSCI()
{
    if( SCI1.SSR & 0x40 )   return(1);
    return(0);
}

/*=============================================================
                        SCI文字列出力
-------------------------------------------------------------
書式はprintf()と同じです。バッファは80文字分しか取っていないので、
必要ならば、増やしてください。
=============================================================*/
void PrintSCI(char *fmt, ...)
{
    int         i;
```

```
    va_list arg;
    va_start(arg, fmt);
    *buff = '¥0';
    vsprintf(buff,fmt,arg);
    va_end(arg);

    for(i=0;;i++)
    {
        if( buff[i] == 0 )      break;
        /* 改行コードは2バイトにして送信 */
        if( buff[i] == '¥n' )   PutSCI('¥r');
        PutSCI(buff[i]);
    }
}
```

```
/*

        LCD処理

                                                (C)2002 C.I.M
*/



#include      <stdio.h>
#include      <stdarg.h>
#include      "h83048.h"

void ClearLCD();

/* PortB (write) b0..3 = LCD(LED) out , bit4 = LCD RS , bit7 = LCD E */
#define       LCD_RS              0x10
#define       LCD_E               0x80
#define       LCDMASK             0x60

static void wait(int c)
{
    int         i,j;
    for(j=0;j<c;j++)
    {
        for(i=0;i<0x682;i++)    {}
    }
}
```

```
/*====================================================================
                                LCD BYTE 出力
====================================================================*/
/*
    今回の基板は4bit接続なので、下位4bitのみ出力
*/
static void LCDOut8(short rs,short code)
{
    int         stat;
    int         pb;

    pb = PB.DR;                         /* 現在のPBDを退避 */

    if( rs )    stat = (pb & LCDMASK) ¦ LCD_RS;
    else        stat = (pb & LCDMASK);
    PB.DR = code ¦ stat ¦ LCD_E;
    PB.DR = code ¦ stat;
    PB.DR = pb;                         /* 元のPBDに復帰 */
    wait(4);
}

/*====================================================================
                                LCD BYTE 出力(4bit)
====================================================================*/
void LCDOut4(int rs,int code)
{
    int         stat;
    int         pb;
    char    lb,hb;
```

```
    pb = PB.DR;                         /* 現在のPBDを退避 */

    if( rs )        stat = (pb & LCDMASK) ¦ LCD_RS;
    else            stat = (pb & LCDMASK);

    hb = ((code>>4)&0xf) ¦ stat;
    lb = (code&0xf) ¦ stat;

    PB.DR = hb ¦ LCD_E;
    PB.DR = hb;

    PB.DR = lb ¦ LCD_E;
    PB.DR = lb;

    PB.DR = pb;                         /* 元のPBDに復帰 */
    wait(4);
}

/*================================================================
                        LCD コントロール
----------------------------------------------------------------
    LCD初期化、表示、クリア
================================================================*/

void InitLCD()
{
    int         i;
    wait(15);
```

```
    for(i=0;i<3;i++)
    {
        LCDOut8(0,0x3);
    }
    LCDOut8(0,0x2);


    LCDOut4(0,0x28); /* bit4=8/4bit , bit3=1/2line , bit2=large/small */
    LCDOut4(0,0x10); /* bit3=Display/Cursor , bit2=Right/Left */
    LCDOut4(0,0x0e); /* bit2=display , bit1=coursor , bit0=blink */
    LCDOut4(0,0x06);

    LCDOut4(0,0x01); /* クリア */
    LCDOut4(0,0x02); /* カーソルホーム */

}


/*================================================================
                                LCD クリア
----------------------------------------------------------------
    LCD初期化、表示、クリア
================================================================*/
void ClearLCD()
{
    LCDOut4(0,0x01);      /* クリア */
    LCDOut4(0,0x02);      /* カーソルホーム */
}
```

```
/*================================================================
                        LCDキャラクタ表示
----------------------------------------------------------------
    '¥n','¥r','¥f'はLCDクリア処理を行います。
================================================================*/
void PutLCD(char c)
{
    if( c == '¥f' ) ClearLCD();
    else if( c == '¥n' )   ClearLCD();
    else if( c == '¥r' )   ClearLCD();
    else LCDOut4(1,c);
}

/*================================================================
                        LCDカーソル移動
----------------------------------------------------------------
    x = 0～15
    y = 0,1
================================================================*/
void LocateLCD(int x,int y)
{
    LCDOut4(0,0x80 + y*0x40 + x);
}

/*================================================================
                        LCD文字列表示
----------------------------------------------------------------
    パラメータはprintf()と同じです。64文字を超えないように設定してく
```

```
      ださい。'¥f'はLCDクリア、'¥n'は改行。
==========================================================================*/
void PrintLCD(char *fmt,...)
{
      int           i;
      static  char    buff[64];
      va_list arg;
      va_start(arg, fmt);
      *buff = '¥0';
      vsprintf(buff,fmt,arg);
      va_end(arg);
      for(i=0;;i++)
      {
            if( buff[i] == 0 ) break;
            else if( buff[i] == '¥n' ) LocateLCD(0,1); /* 改行 */
            else if( buff[i] == '¥r' ) LCDOut4(0,0x2); /* カーソルホーム */
            else if( buff[i] == '¥f' ) ClearLCD(); /* LCDクリア */
            else LCDOut4(1,buff[i]); /* データ出力 */
      }
}
```

本文

```
/* C.h */

#define USE_THREAD
/* #define USE_BCC */
/* #define USE_LINUX */
#ifdef USE_LINUX
#define USE_BCC
#endif
#include <stdio.h> /* printf() */
#include <string.h> /* strcmp(), strlen() */
#include <stdlib.h> /* calloc(), free(), rand() */
#ifndef USE_BCC
#include "h83048.h"
#define SLEEP_PER_SEC 16000.0
#define NOTUSE_FILES
#else
#include <time.h> /* time_t, tm, time(), clock(), CLOCKS_PER_SEC */
#ifdef USE_LINUX
#include <termios.h> /* kbhit() */
#include <unistd.h> /* kbhit() */
#include <fcntl.h> /* kbhit() */
#else
#include <conio.h> /* kbhit(), getche() */
#endif
#define SLEEP_PER_SEC 100000000.0
#endif
#ifdef USE_LINUX
#define CLEAR system("clear")
#else
#define CLEAR system("cls")
#endif
#define OK 0
#define NG 1
#define ONE_MORE_TIME 2
#define ON 1
#define OFF 0
```

```
/* Panel.h */

#ifndef USE_BCC
/*=====================================================================
                                    外部参照
=====================================================================*/
/* start内に定義 */
extern  void EnableInterrupt(void);
extern  void DisableInterrupt(void);
/* lcd.c */
extern  void InitLCD(void);
extern  void PrintLCD(char *fmt,...);
extern  void PutLCD(char c);
/* usb.c */
extern  void InitUSB(void);
extern  void DispUSBPort(void);
/* バッファ処理 */
extern  int get_inbufflen(void);
extern  int write_buff(char *p,int size);
extern  int read_buff(char *p,int size);
/* sci.c */
extern  void InitSCI(void);
extern  void PrintSCI(char *fmt, ...);
extern  int ScanSCI(void);
extern  char GetSCI(void);
/* main.c内定義 */
void H8init(void);
int SetLED(int no,int onoff);
```

```
int GetSW(int no);
#endif
/* 表示を表す列挙体宣言 */
enum PrintF
{
 Panel,
 ClsPnl,
 InputCommand,
 Monitor
};
/* 画面クリア */
void Clear(void);
/* 表示を表す関数のプロトタイプ宣言 */
void PrintF(int mode, char *str);
#ifdef USE_LINUX
int kbhit(void);
#endif
```

```
/* Panel.c */

#include "C.h"
#include "Panel.h"

/* 画面クリア */
void Clear(void)
{
#ifndef USE_BCC
 static char buff[64];
 sprintf(buff,"¥f");
 PrintLCD(buff);
#else
 CLEAR;
#endif
}

/* 表示のための関数 */
void PrintF(int mode, char *str)
{
#ifndef USE_BCC
 static char buff[64];
#endif
 switch(mode)
 {
 case ClsPnl:
#ifndef USE_BCC
  Clear();
```

```
  if(strcmp(str, "¥n¥0") == 0)
  {
      sprintf(str, "%s", "¥n¥f");
  }
  sprintf(buff,"%s", str);
  PrintSCI("%s",buff);
  PrintLCD(str);
#endif
  break;
 case Panel:
#ifndef USE_BCC
  if(strcmp(str, "¥n¥0") == 0)
  {
      sprintf(str, "%s", "¥n¥f");
  }
  sprintf(buff,"%s", str);
  PrintSCI("%s",buff);
  PrintLCD(str);
#else
  printf("%s", str);
#endif
  break;
 case InputCommand:
#ifdef USE_BCC
  printf("%s", str);
#endif
  break;
 case Monitor:
#ifndef USE_BCC
```

```
  sprintf(buff,"%s", str);
  PrintSCI("%s",buff);
  write_buff(buff,strlen(buff)+1);
#else
  printf("%s", str);
#endif
  break;
 default:
  break;
 }
 return;
}

#ifdef USE_LINUX
int kbhit(void)
{
    struct termios oldt, newt;
    int ch;
    int oldf;

    tcgetattr(STDIN_FILENO, &oldt);
    newt = oldt;
    newt.c_lflag &= ~(ICANON | ECHO);
    tcsetattr(STDIN_FILENO, TCSANOW, &newt);
    oldf = fcntl(STDIN_FILENO, F_GETFL, 0);
    fcntl(STDIN_FILENO, F_SETFL, oldf | O_NONBLOCK);

    ch = getchar();
```

```
    tcsetattr(STDIN_FILENO, TCSANOW, &oldt);
    fcntl(STDIN_FILENO, F_SETFL, oldf);

    if (ch != EOF) {
        ungetc(ch, stdin);
        return 1;
    }

    return 0;
}
#endif
```

```
/* Timer.h */

#ifndef Panel_h
#define Panel_h
#include "Panel.h"
#endif

/* 疑似スレッド定義 */
#ifdef USE_THREAD
/* 疑似スレッドに使用する定数の宣言 */
#define INITCLOCKNO -1
#define STOPCLOCKNO -2

/* 構造体宣言 */
typedef struct tag_Thread
{
	/* 疑似スレッドID */
	int ID;
	/* 指定開始時 */
	double preClock;
	/* woviClockがpreClockからsetClock秒増えたらRunを呼ぶ */
	double setClock;
	/* Runが呼ばれた回数を調べるために使用(countUpNextRunが呼ばれた回数) */
	long count;
	/* List機能 */
	struct tag_Thread *previous;
	struct tag_Thread *next;
}Thread;
```

```
/* 疑似メソッドとwovi用関数のプロトタイプ宣言 */
/* 宣言の順番は以下の通り */
#endif
double getClock(void);
void SleepMSec(long ms); /* ミリ秒待ち関数 */
#ifdef USE_THREAD
void nextRun(Thread *This, long ms);
void countUpNextRun(Thread *This, long ms);
void Run(Thread *This); /* main.cで内容を定義します */
void Init(Thread *This); /* main.cで内容を定義します */
void Destroy(Thread *This); /* main.cで内容を定義します */
Thread *new_Thread(int id);
void delete_(Thread *This);
void Start(Thread *This);
void Stop(Thread *This);
int Thread_checkAllDelete(void);
int Thread_checkStayAnother(void);
Thread *Thread_getThread(int id);
Thread *Thread_Start(int id);
void Thread_Toggle(int id);
/* タイマ関数 */
void woviRun(void); /* Runを呼ぶタイミング */
void woviInit(void); /* タイマ初期化関数 */
#ifndef USE_BCC
void InitITU(void); /* タイマ割り込み用 */
void InterruptITU0(void); /* タイマ割り込み用 */
#endif
void wovi(double threadPerSec); /* タイマ関数 */
```

```
void initWOVI(void); /* タイマ初期化関数 */
#endif
#ifdef USE_BCC
void PrintCurrentTime(void); /* 現在日時表示 */
#endif
```

```
/* Timer.c */

#include "C.h"
#include "Timer.h"

/* 時間を表す外部変数宣言 */
double woviClock;

/* 疑似スレッド定義 */
#ifdef USE_THREAD
/* wovi用疑似インスタンス宣言 */
Thread woviThreadFirst;
Thread woviThreadLast;
#endif

/* 時刻取得 */
double getClock(void)
{
	return woviClock;
}

/* ミリ秒待ち関数 */
void SleepMSec(long ms)
{
#ifndef USE_BCC
	double start;
	double set;
	double end;
```

```
	start = getClock();
	set = ((double) ms) / 1000;
	end = start;
	while(end < start + set)
	{
		end = getClock();
	}
#else
	double cnt;
	double set;
	cnt = 0.0;
	set = ((double) ms) / 1000;
	while(cnt < set)
	{
		cnt += 1.0 / SLEEP_PER_SEC;
	}
#endif
	return;
}

#ifdef USE_THREAD
/* スレッドのvoid Sleep(int ms)の代用 */
void nextRun(Thread *This, long ms)
{
	This->preClock = getClock();
	This->setClock = (((double) ms) / 1000);
	return;
}
```

```
/* スレッドのvoid Sleep(int ms)の代用 */
void countUpNextRun(Thread *This, long ms)
{
	nextRun(This, ms);
	This->count++;
}

#ifndef USE_BCC
Thread th101;
Thread th102;
Thread th111;
Thread th112;
Thread th113;
Thread th114;
Thread th119;
Thread th120;
Thread th121;
Thread th122;
Thread th123;
Thread th130;
Thread th131;
Thread th141;
Thread th142;
Thread th143;
#endif

/* スレッドのコンストラクタの代用 */
Thread *new_Thread(int id)
{
```

```
    Thread *List;
    Thread *new_List;
    List = &woviThreadFirst;
    while(List->next->next != NULL)
    {
        List = List->next;
    }
#ifndef USE_BCC
    if(id == 1)
    {
        new_List = &th101;
    }
    else if(id == 2)
    {
        new_List = &th102;
    }
    else if(id == 11)
    {
        new_List = &th111;
    }
    else if(id == 12)
    {
        new_List = &th112;
    }
    else if(id == 13)
    {
        new_List = &th113;
    }
    else if(id == 14)
```

```
{
	new_List = &th114;
}
else if(id == 19)
{
	new_List = &th119;
}
else if(id == 20)
{
	new_List = &th120;
}
else if(id == 21)
{
	new_List = &th121;
}
else if(id == 22)
{
	new_List = &th122;
}
else if(id == 23)
{
	new_List = &th123;
}
else if(id == 30)
{
	new_List = &th130;
}
else if(id == 31)
```

```
    {
        new_List = &th131;
    }
    else if(id == 41)
    {
        new_List = &th141;
    }
    else if(id == 42)
    {
        new_List = &th142;
    }
    else if(id == 43)
    {
        new_List = &th143;
    }
#endif
#ifdef USE_BCC
    new_List = (Thread *)calloc(1, sizeof(Thread));
#endif
    if(new_List == NULL)
    {
        PrintF(Panel, "¥n");
        PrintF(Panel, "calloc failed");
        return NULL;
    }
    new_List->previous = List;
    new_List->next = List->next;
    new_List->next->previous = new_List;
    List->next = new_List;
```

```
	new_List->preClock = INITCLOCKNO;
	new_List->setClock = 0;
	new_List->ID = id;
	new_List->count = 0;
	/* スレッドのvoid init(void)の代用 */
	Init(new_List);
	return new_List;
}

/* スレッドのデストラクタの代用 */
void delete_(Thread *This)
{
	Destroy(This);
	This->previous->next = This->next;
	This->next->previous = This->previous;
#ifdef USE_BCC
	free(This);
#endif
	return;
}

/* スレッドのvoid start(void)の代用 */
void Start(Thread *This)
{
	woviClock = getClock();
	This->preClock = woviClock;
	return;
}
```

```
/* スレッドのvoid stop(void)の代用 */
void Stop(Thread *This)
{
	This->preClock = STOPCLOCKNO;
	return;
}

int Thread_checkAllDelete(void)
{
	if(woviThreadFirst.next->next == NULL)
	{
		return OK;
	}
	else
	{
		return NG;
	}
}

int Thread_checkStayAnother(void)
{
	Thread *checkthread = woviThreadFirst.next->next;
	int i = 0;
	while(checkthread != NULL)
	{
		checkthread = checkthread->next;
		i = i + 1;
	}
	return i;
```

```
}

Thread *Thread_getThread(int id)
{
    Thread *th;

    if(woviThreadFirst.next->next == NULL)
    {
        return NULL;
    }
    else
    {
        th = woviThreadFirst.next;
        do
        {
            if(th->ID == id)
            {
                return th;
            }
            else
            {
                th = th->next;
            }
        }while(th->next != NULL);
    }
    return NULL;
}
```

```
Thread *Thread_Start(int id)
{
	Thread *th;

	th = Thread_getThread(id);
	if(th == NULL)
	{
		th = new_Thread(id);
		Start(th);
	}
	else if(th->preClock == STOPCLOCKNO)
	{
		Start(th);
	}
	return th;
}

void Thread_Toggle(int id)
{
	Thread *th;

	th = Thread_getThread(id);
	if(th == NULL)
	{
		th = new_Thread(id);
		Start(th);
	}
	else if(th->preClock == STOPCLOCKNO)
	{
```

```
            Start(th);
        }
        else
        {
            delete_(th);
        }
        return;
    }

    /* タイマ関数 */
    /* Runを呼ぶタイミング */
    void woviRun(void)
    {
        Thread *List;
        Thread *next_List;
        List = &woviThreadFirst;
        List = List->next;
        while(List->next != NULL)
        {
            next_List = List->next;
            if((List->preClock != INITCLOCKNO) && (List->preClock != STOPCLOCKNO))
            {
                if(woviClock >= List->preClock + List->setClock)
                {
                    List->preClock = woviClock;
                    /* スレッドのvoid run(void)の代用 */
                    Run(List);
                }
            }
```

```
            List = next_List;
        }
        return;
}

/* タイマ初期化関数 */
/* 関数main の冒頭で、 */
/* スレッド構造体リスト の 両端 を初期化します。 */
void wovilnit(void)
{
        woviThreadFirst.previous = NULL;
        woviThreadFirst.next = &woviThreadLast;
        woviThreadLast.previous = &woviThreadFirst;
        woviThreadLast.next = NULL;
        return;
}

#ifndef USE_BCC
/* タイマ割り込み用 */
/* 関数main の冒頭で、 */
/* タイマ割り込み の専用設定をして、 */
/* タイマ0割り込み を立ち上げます。 */
void lnitITU(void)
{
        ITU.TSTR = 0x01; /* timer 0 enable */
        ITU.TSNC = 0;
        ITU.TMDR = 0x0;
        ITU.TFCR = 0x0;
        ITU.TOER = 0x0;
```

```
	ITU.TOCR = 0xff;
	ITU0.TCR = 0x00; /* 分周なし */
	ITU0.TIOR = 0x88;
	ITU0.TIER = 0x04; /* オーバーフロー割り込み許可 */
	/* AKI-H8 3052F USB の演算速度は 25MHz なので、 */
	/* 25Kカウント すると、 1ms です。 */
	ITU0.TCNT = 0xffff - 25000; /* 1 msec interval */
	ITU0.GRA = 0;
	ITU0.GRB = 0;
}

/* タイマ割り込み用 */
/* 周りの関数が 関数main から呼び出されているのに、 */
/* この関数だけは、 asmfile.src の タイマ0割り込み から */
/* 直接呼び出されています。 */
void InterruptITU0(void)
{
	ITU0.TSR &= 0xfb;
	/* AKI-H8 3052F USB の演算速度は 25MHz なので、 */
	/* 25Kカウント すると、 1ms です。 */
	ITU0.TCNT = 0xffff - 25000;/* 1 msec interval */
	/* woviClock はシステムリセット時からの秒数時計です。 */
	woviClock += 0.001;
	return;
}
#endif

/* タイマ関数 */
```

```
void wovi(double threadPerSec)
{
#ifdef USE_BCC
	/* woviClock は秒数時計 */
	/* threadPerSec で受け取る数値が1に近づく程、 */
	/* スピードが上がります。 */
	/* threadPerSec で受け取る数値が大きくなる程、 */
	/* スピードが下がります。 */
	/* タイマ割り込み を使用できない時に */
	/* threadPerSec を使用します。 */
	woviClock += 1.0 / threadPerSec;
#endif
	woviRun(); /* スレッドのためのRunを呼ぶタイミング */
	return;
}

/* タイマ初期化関数 */
void initWOVI(void)
{
	/* 関数main の冒頭で、 */
	/* 秒数時計woviClock を */
	/* 0.0秒 で初期化します。 */
	woviClock = 0.0;
	/* タイマ割り込み用 */
#ifndef USE_BCC
	/* タイマ0割り込み を立ち上げます。 */
	InitITU();
	/* asmfile.src の 割り込み許可ラベル を呼びます。 */
	EnableInterrupt();
```

```
#endif
    /* スレッド構造体リスト の 両端 を初期化します。 */
    wovilnit();
    return;
}
#endif

#ifdef USE_BCC
/* 現在日時表示 */
void PrintCurrentTime(void)
{
    time_t timer;
    struct tm *t_st;

    /* 現在時刻の取得 */
    time(&timer);

    /* 現在時刻を構造体に変換 */
    t_st = localtime(&timer);

    printf("%d",t_st->tm_year+1900);
    if(t_st->tm_mon+1 < 10)
    {
        printf("0%d",t_st->tm_mon+1);
    }
    else
    {
        printf("%d",t_st->tm_mon+1);
    }
```

```
if(t_st->tm_mday < 10)
{
	printf("0%d",t_st->tm_mday);
}
else
{
	printf("%d",t_st->tm_mday);
}
printf(" ");
if(t_st->tm_hour < 10)
{
	printf("0%d",t_st->tm_hour);
}
else
{
	printf("%d",t_st->tm_hour);
}
if(t_st->tm_min < 10)
{
	printf("0%d",t_st->tm_min);
}
else
{
	printf("%d",t_st->tm_min);
}
if(t_st->tm_sec < 10)
{
	printf("0%d",t_st->tm_sec);
}
```

```
        else
        {
                printf("%d",t_st->tm_sec);
        }

        return;
}
#endif
```

```
/* EV_Time.h */

#ifndef Panel_h
#define Panel_h
#include "Panel.h"
#endif

#ifndef Timer_h
#define Timer_h
#include "Timer.h"
#endif

/*==============================================================
 時間を表す構造体
==============================================================*/
struct EV_Time{
	double TimeTemp;
	double *p_TimeTemp;
	int Permit;
	int *p_Permit;
	int tmpTimeSafety;
	Thread *th;
};

/*==============================================================
 時間を表すプロトタイプ宣言
==============================================================*/
void EV_Time(struct EV_Time *This, Thread *th);
```

```
void SetCurrentTime(struct EV_Time *This);
int GetCurrentTime(struct EV_Time *This);
void WaitSecond(struct EV_Time *This, int num_Second);
void SetPermit(struct EV_Time *This, int P);
int GetPermit(struct EV_Time *This);
void Checkfmove(int *p_check, int *p_fmove, int tmp);
void Wait_ms(struct EV_Time *This, int num);
```

```
/* EV_Time.c */

#include "C.h"
#include "EV_Time.h"

/*==========================================================================
  時間を表す関数
==========================================================================*/
void EV_Time(struct EV_Time *This, Thread *th)
{
	This->TimeTemp = 0;
	This->p_TimeTemp = &This->TimeTemp;
	SetCurrentTime(This);
	This->p_Permit = &This->Permit;
	This->Permit = OFF;
	This->tmpTimeSafety = 0;
	This->th = th;

	/* 戻る */
	return;
}

void SetCurrentTime(struct EV_Time *This)
{
	This->p_TimeTemp = &This->TimeTemp;
	*This->p_TimeTemp = getClock();

	/* 戻る */
```

```
	return;
}

int GetCurrentTime(struct EV_Time *This)
{
	This->p_TimeTemp = &This->TimeTemp;
	return (int) (getClock() - *This->p_TimeTemp);
}

void WaitSecond(struct EV_Time *This, int num_Second)
{
	nextRun(This->th, (num_Second * 1000));
	/* 戻る */
	return;
}

void SetPermit(struct EV_Time *This, int P)
{
	This->p_Permit = &This->Permit;
	if(P == ON) This->Permit = ON;
	else if(P == OFF) This->Permit = OFF;

	/* 戻る */
	return;
}

int GetPermit(struct EV_Time *This)
{
	This->p_Permit = &This->Permit;
```

```
	return This->Permit;
}

void Checkfmove(int *p_check, int *p_fmove, int tmp)
{
	if(*p_check != tmp){
		*p_fmove = OFF;
		*p_check = tmp;
	}

	/* 戻る */
	return;
}

void Wait_ms(struct EV_Time *This, int num){

	nextRun(This->th, num);
	/* 戻る */
	return;
}
```

```
/* EV_File.h */

#ifndef Panel_h
#define Panel_h
#include "Panel.h"
#endif

/*============================================================
  ファイルを表す構造体
============================================================*/
#ifdef NOTUSE_FILES
typedef struct tag_Handle_EV_Status
{
	char safety;
	char *p_limit;
	char limit[9];
	char motor;
	char command;
	char permitcommand;
}Handle_EV_Status;

typedef struct tag_EV_Status
{
	Handle_EV_Status *p_status;
}EV_Status;
#endif

/* ファイルストリーム */
```

```
struct EV_File
{
	FILE *fp;
};

/*==========================================================
  ファイルを表すプロトタイプ宣言
==========================================================*/
#ifdef NOTUSE_FILES
void new_EV_Status(EV_Status *This);
#endif

void EV_File(struct EV_File *This);
int Write(struct EV_File *This, char *filename, char ch);
int WriteString(struct EV_File *This, char *filename, char *str);
int Read(struct EV_File *This, char *filename, char *p_ch);
int ReadString(struct EV_File *This, char *filename, char *str, int strlength);
int PermitCommand_Write(struct EV_File *This, char PermitCommand);
int Command_Read(struct EV_File *This, char *p_Command);
int Command_Write(struct EV_File *This, char Command);
int PermitTurnOpen_Write(struct EV_File *This, char PermitTurnOpen);
int TurnOpen_Read(struct EV_File *This, char *p_chTurnOpen);
int TurnOpen_Write(struct EV_File *This, char TurnOpen);
void Motor_Write(struct EV_File *This, char Motor);
char Motor_Read(struct EV_File *This);
void Limit_Read(struct EV_File *This, char *str);
```

```
/* EV_File.c */

#include "C.h"
#include "EV_File.h"

/*==========================================================================
  ファイル不使用時大域オブジェクト宣言
==========================================================================*/
#ifdef NOTUSE_FILES
Handle_EV_Status status;
#endif

/*==========================================================================
  ファイルを表す関数
==========================================================================*/
#ifdef NOTUSE_FILES
void new_EV_Status(EV_Status *This)
{
	This->p_status = &status;
	status.safety = 'r';
	status.p_limit = &status.limit[0];
	strcpy(status.p_limit, "yynnyynn¥0");
	status.motor = 's';
	status.command = 'N';
	status.permitcommand = 'N';
}
#endif
```

```
void EV_File(struct EV_File *This)
{
	/* 初期値 */
	This->fp = NULL;

	/* 戻る */
	return;
}

#ifdef NOTUSE_FILES
int Write(struct EV_File *This, char *filename, char ch)
{
	switch(filename[0])
	{
	case 'S':
		status.safety = ch;
		break;
	case 'M':
		status.motor = ch;
		break;
	case 'C':
		status.command = ch;
		break;
	case 'P':
		status.permitcommand = ch;
		break;
	default:
		break;
	}
```

```
	return OK;
}
#else
int Write(struct EV_File *This, char *filename, char ch)
{
	int Ret = OK;
	if((This->fp = fopen(filename, "w")) == NULL){
		Ret = NG;
	}
	else if(fputc(ch, This->fp) == ch){
		fclose(This->fp);
		Ret = OK;
	}
	else{
		fclose(This->fp);
		Ret = NG;
	}
	return Ret;
}
#endif

#ifdef NOTUSE_FILES
int WriteString(struct EV_File *This, char *filename, char *str)
{
	switch(filename[0])
	{
	case 'L':
		status.p_limit = &status.limit[0];
		strcpy(status.p_limit, str);
```

```
            break;
        default:
            break;
        }
        return OK;
}
#else
/* 文字列書き込み */
int WriteString(struct EV_File *This, char *filename, char *str)
{
        int Ret = OK;
        if((This->fp = fopen(filename, "w")) == NULL){
            Ret = NG;
        }
        /* ¥nは追記されない */
        else if(fputs(str, This->fp) >= 0){
            fclose(This->fp);
            /* 書き込み成功 */
            Ret = OK;
        }
        else{
            fclose(This->fp);
            /* 書き込み失敗 */
            Ret = NG;
        }
        return Ret;
}
#endif
```

```
#ifdef NOTUSE_FILES
int Read(struct EV_File *This, char *filename, char *p_ch)
{
	switch(filename[0])
	{
	case 'S':
		*p_ch = status.safety;
		break;
	case 'M':
		*p_ch = status.motor;
		break;
	case 'C':
		*p_ch = status.command;
		break;
	case 'P':
		*p_ch = status.permitcommand;
		break;
	default:
		break;
	}
	return OK;
}
#else
int Read(struct EV_File *This, char *filename, char *p_ch)
{
	int Ret = OK;
	if((This->fp = fopen(filename, "r")) == NULL){
		Ret = NG;
```

```
	}
	else if((*p_ch = fgetc(This->fp)) == EOF){
		fclose(This->fp);
		Ret = ONE_MORE_TIME;
	}
	else if(*p_ch == '¥n'){
		fclose(This->fp);
		Ret = ONE_MORE_TIME;
	}
	else if(*p_ch == 'N'){
		fclose(This->fp);
		Ret = ONE_MORE_TIME;
	}
	else{
		fclose(This->fp);
		Ret = OK;
	}
	return Ret;
}
#endif

#ifdef NOTUSE_FILES
int ReadString(struct EV_File *This, char *filename, char *str, int strlength)
{
	switch(filename[0])
	{
	case 'L':
		status.p_limit = &status.limit[0];
		strcpy(str, status.p_limit);
```

```
            break;
        default:
            break;
        }
        return OK;
}
#else
int ReadString(struct EV_File *This, char *filename, char *str, int strlength)
{
        int Ret = OK;
        if((This->fp = fopen(filename, "r")) == NULL){
            Ret = NG;
        }
        else if(fgets(str, strlength, This->fp) == NULL){
            fclose(This->fp);
            Ret = ONE_MORE_TIME;
        }
        else if(str[0] == '¥n'){
            fclose(This->fp);
            Ret = ONE_MORE_TIME;
        }
        else if(str[0] == 'N'){
            fclose(This->fp);
            Ret = ONE_MORE_TIME;
        }
        else{
            fclose(This->fp);
            Ret = OK;
        }
```

```
	return Ret;
}
#endif

int PermitCommand_Write(struct EV_File *This, char PermitCommand)
{
	int Ret = OK;
	switch(Write(This, "PermitCommand.txt¥0", PermitCommand)){
	case NG:
		PrintF(ClsPnl, "¥nWriting Error");
		Ret = NG;
		break;
	case OK:
		Ret = OK;
		break;
	default:
		Ret = NG;
		break;
	}
	return Ret;
}

int Command_Read(struct EV_File *This, char *p_Command)
{
	int Ret = OK;
	switch(Read(This, "Command.txt¥0", p_Command)){
	case NG:
		PrintF(ClsPnl, "¥nReading Error");
		Ret = NG;
```

```
            break;
        case ONE_MORE_TIME:
            Ret = ONE_MORE_TIME;
            break;
        default:
            Ret = OK;
            break;
        }
        return Ret;
}

int Command_Write(struct EV_File *This, char Command)
{
        int Ret = OK;
        switch(Write(This, "Command.txt¥0", Command)){
        case NG:
            PrintF(ClsPnl, "¥nWriting Error");
            Ret = NG;
            break;
        case OK:
            Ret = OK;
            break;
        default:
            Ret = NG;
            break;
        }
        return Ret;
}
```

```
int PermitTurnOpen_Write(struct EV_File *This, char PermitTurnOpen)
{
	int Ret = OK;
	switch(Write(This, "PermitTurnOpen.txt¥0", PermitTurnOpen)){
	case NG:
		PrintF(ClsPnl, "¥nWriting Error");
		Ret = NG;
		break;
	case OK:
		Ret = OK;
		break;
	default:
		Ret = NG;
		break;
	}
	return Ret;
}

int TurnOpen_Read(struct EV_File *This, char *p_chTurnOpen)
{
	int Ret = OK;
	switch(Read(This, "TurnOpen.txt¥0", p_chTurnOpen)){
	case NG:
		PrintF(ClsPnl, "¥nReading Error");
		Ret = NG;
		break;
	case ONE_MORE_TIME:
		Ret = ONE_MORE_TIME;
```

```
            break;
        default:
            Ret = OK;
            break;
        }
        return Ret;
}

int TurnOpen_Write(struct EV_File *This, char TurnOpen)
{
        int Ret = OK;
        switch(Write(This, "TurnOpen.txt¥0", TurnOpen)){
        case NG:
            PrintF(ClsPnl, "¥nWriting Error");
            Ret = NG;
            break;
        case OK:
            Ret = OK;
            break;
        default:
            Ret = NG;
            break;
        }
        return Ret;
}

void Motor_Write(struct EV_File *This, char Motor)
{
        switch(Write(This, "Motor.txt¥0", Motor)){
```

```
	case NG:
		PrintF(ClsPnl, "¥nWriting Error");
		break;
	case OK:
		return;
		break;
	default:
		break;
	}

	/* 戻る */
	return;
}

char Motor_Read(struct EV_File *This)
{
	char ch;
	char *p_ch;
	ch = '¥0';
	p_ch = &ch;

	switch(Read(This, "Motor.txt¥0", p_ch)){
	case NG:
		break;
	case ONE_MORE_TIME:
		return '¥0';
		break;
	case OK:
		return ch;
```

```
            break;
        default:
            break;
        }
        return '¥0';
}

void Limit_Read(struct EV_File *This, char *str)
{
        switch(ReadString(This, "Limit.txt¥0", str, 9)){
        case NG:
            PrintF(ClsPnl, "¥nReading Error");
            break;
        case ONE_MORE_TIME:
            return;
            break;
        default:
            return;
            break;
        }

        /* 戻る */
        return;
}
```

```
/* EV_UpDown.h */

#ifndef Panel_h
#define Panel_h
#include "Panel.h"
#endif

#ifndef Timer_h
#define Timer_h
#include "Timer.h"
#endif

#ifndef EV_Time_h
#define EV_Time_h
#include "EV_Time.h"
#endif

#ifndef EV_File_h
#define EV_File_h
#include "EV_File.h"
#endif

/*==========================================================================
  上昇下降を表す構造体
==========================================================================*/
struct Position
{
    int m_UNSL;
```

```
    int m_UNST;
    int m_UPSL;
    int m_UPST;
    /* 下降減速位置 */
    int *p_UnderSlow;
    /* 下降停止位置 */
    int *p_UnderStop;
    /* 上昇減速位置 */
    int *p_UpperSlow;
    /* 上昇停止位置 */
    int *p_UpperStop;
    /* Sleep用 */
    int fstop;
    int *p_fstop;
    int fmove;
    int *p_fmove;
};

/* 上昇 */
struct UpMotor
{
    struct EV_File SF;
    struct EV_File MF;
};

/* 下降 */
struct DownMotor
{
    struct EV_File SF;
```

```
	struct EV_File MF;
};

/* エレベーターの位置仮想ログ */
struct WaitPositionChangeLog
{
	struct EV_File LF;
	char strLimit[9];
	char *p_strLimit;
	/* Sleep用 */
	int tmp;
};

/*==========================================================
  上昇下降を表すプロトタイプ宣言
==========================================================*/
void Position(struct Position *This);
/* 上昇 */
void UpMotor(struct UpMotor *This);
void OnUpMotor(struct UpMotor *This, struct Position P, char *p_Safety);
/* 下降 */
void DownMotor(struct DownMotor *This);
void OnDownMotor(struct DownMotor *This, struct Position P, char *p_Safety);
/* 経過時間 */
void WaitPositionChangeLog(struct WaitPositionChangeLog *This);
void OnInitWaitPositionChangeLog(struct WaitPositionChangeLog *This, struct Position *P);
void OnWaitUpPositionChangeLog(struct WaitPositionChangeLog *This, struct Position *P);
void OnWaitDownPositionChangeLog(struct WaitPositionChangeLog *This, struct Position *P);
/* 上昇 */
```

```
void Up(struct Position *P, struct UpMotor UPMT, struct WaitPositionChangeLog WPCL, char
*p_Safety);
/* 下降 */
void Down(struct Position *P, struct DownMotor DNMT, struct WaitPositionChangeLog WPCL, char
*p_Safety);
```

```
/* EV_UpDown.c */

#include "C.h"
#include "EV_UpDown.h"

/*==========================================================================
  上昇下降を表す関数
==========================================================================*/
/*
 * Position
 */
void Position(struct Position *This)
{
	/* 初期値 */
	This->m_UNSL = OFF;
	This->m_UNST = OFF;
	This->m_UPSL = OFF;
	This->m_UPST = OFF;
	This->p_UnderSlow = &This->m_UNSL;
	This->p_UnderStop = &This->m_UNST;
	This->p_UpperSlow = &This->m_UPSL;
	This->p_UpperStop = &This->m_UPST;
	/* Sleep用 */
	This->fstop = OFF;
	This->p_fstop = &This->fstop;
	This->fmove = OFF;
	This->p_fmove = &This->fmove;
```

```
	/* 戻る */
	return;
}

/*
 * UpMotor
 */
void UpMotor(struct UpMotor *This)
{
	EV_File(&This->SF);
	EV_File(&This->MF);

	/* 戻る */
	return;
}

/*
 * OnUpMotor
 */
/* 上昇 */
void OnUpMotor(struct UpMotor *This, struct Position P, char *p_Safety)
{
	if(*P.p_UpperStop == ON){
		/* Sleep用 */
		if(*P.p_fstop == OFF){
			*P.p_fstop = ON;
			/* 現在実行中の命令を外部に報告 */
			Motor_Write(&This->MF, 's');
			PrintF(ClsPnl, "STOP");
```

```
        }
        if(*p_Safety == 'Y'){
            *p_Safety = 'r';
            Write(&This->SF, "Safety.txt¥0", 'r');
        }
    }
    else if(*P.p_UpperSlow == ON){
        /* Sleep用 */
        *P.p_fstop = OFF;
        if(*P.p_fmove == OFF){
            *P.p_fmove = ON;
            /* 現在実行中の命令を外部に報告 */
            Motor_Write(&This->MF, 'u');
            PrintF(ClsPnl, "UP");
        }
        else if(*p_Safety == 'Y'){
            Motor_Write(&This->MF, 'j');
            *p_Safety = 'r';
            Write(&This->SF, "Safety.txt¥0", 'r');
        }
    }
    else if(*P.p_UnderSlow == OFF){
        /* Sleep用 */
        *P.p_fstop = OFF;
        if(*P.p_fmove == OFF){
            *P.p_fmove = ON;
            /* 現在実行中の命令を外部に報告 */
            Motor_Write(&This->MF, 'U');
            PrintF(ClsPnl, "UP Speedy");
```

```
        }
        else if(*p_Safety == 'Y'){
            Motor_Write(&This->MF, 'j');
            *p_Safety = 'r';
            Write(&This->SF, "Safety.txt¥0", 'r');
        }
    }
    else if(*P.p_UnderStop == OFF){
        /* Sleep用 */
        *P.p_fstop = OFF;
        if(*P.p_fmove == OFF){
            *P.p_fmove = ON;
            /* 現在実行中の命令を外部に報告 */
            Motor_Write(&This->MF, 'u');
            PrintF(ClsPnl, "UP");
        }
        else if(*p_Safety == 'Y'){
            Motor_Write(&This->MF, 'j');
            *p_Safety = 'r';
            Write(&This->SF, "Safety.txt¥0", 'r');
        }
    }
    else if(*P.p_UnderStop == ON){
        /* Sleep用 */
        *P.p_fstop = OFF;
        if(*P.p_fmove == OFF){
            *P.p_fmove = ON;
            /* 現在実行中の命令を外部に報告 */
            Motor_Write(&This->MF, 'j');
```

```
            PrintF(ClsPnl, "UP Start");
        }
        if(*p_Safety == 'Y'){
            *p_Safety = 'r';
            Write(&This->SF, "Safety.txt¥0", 'r');
        }
    }

    /* 戻る */
    return;
}

/*
 * DownMotor
 */
void DownMotor(struct DownMotor *This)
{
    EV_File(&This->SF);
    EV_File(&This->MF);

    /* 戻る */
    return;
}

/*
 * OnDownMotor
 */
/* 下降 */
```

```
void OnDownMotor(struct DownMotor *This, struct Position P, char *p_Safety)
{
	if(*P.p_UnderStop == ON){
		/* Sleep用 */
		if(*P.p_fstop == OFF){
			*P.p_fstop = ON;
			/* 現在実行中の命令を外部に報告 */
			Motor_Write(&This->MF, 's');
			PrintF(ClsPnl, "STOP");
		}
		if(*p_Safety == 'Y'){
			*p_Safety = 'r';
			Write(&This->SF, "Safety.txt¥0", 'r');
		}
	}
	else if(*P.p_UnderSlow == ON){
		/* Sleep用 */
		*P.p_fstop = OFF;
		if(*P.p_fmove == OFF){
			*P.p_fmove = ON;
			/* 現在実行中の命令を外部に報告 */
			Motor_Write(&This->MF, 'd');
			PrintF(ClsPnl, "DOWN");
		}
		else if(*p_Safety == 'Y'){
			Motor_Write(&This->MF, 'k');
			*p_Safety = 'r';
			Write(&This->SF, "Safety.txt¥0", 'r');
		}
```

```
    }
    else if(*P.p_UpperSlow == OFF){
        /* Sleep用 */
        *P.p_fstop = OFF;
        if(*P.p_fmove == OFF){
            *P.p_fmove = ON;
            /* 現在実行中の命令を外部に報告 */
            Motor_Write(&This->MF, 'D');
            PrintF(ClsPnl, "DOWN Speedy");
        }
        else if(*p_Safety == 'Y'){
            Motor_Write(&This->MF, 'k');
            *p_Safety = 'r';
            Write(&This->SF, "Safety.txt¥0", 'r');
        }
    }
    else if(*P.p_UpperStop == OFF){
        /* Sleep用 */
        *P.p_fstop = OFF;
        if(*P.p_fmove == OFF){
            *P.p_fmove = ON;
            /* 現在実行中の命令を外部に報告 */
            Motor_Write(&This->MF, 'd');
            PrintF(ClsPnl, "DOWN");
        }
        else if(*p_Safety == 'Y'){
            Motor_Write(&This->MF, 'k');
            *p_Safety = 'r';
            Write(&This->SF, "Safety.txt¥0", 'r');
```

```
            }
        }
        else if(*P.p_UpperStop == ON){
            /* Sleep用 */
            *P.p_fstop = OFF;
            if(*P.p_fmove == OFF){
                *P.p_fmove = ON;
                /* 現在実行中の命令を外部に報告 */
                Motor_Write(&This->MF, 'k');
                PrintF(ClsPnl, "DOWN Start");
            }
            if(*p_Safety == 'Y'){
                *p_Safety = 'r';
                Write(&This->SF, "Safety.txt¥0", 'r');
            }
        }

        /* 戻る */
        return;
    }

    /*
     * WaitPositionChangeLog
     */
    /* エレベーターの位置仮想ログ */
    void WaitPositionChangeLog(struct WaitPositionChangeLog *This)
    {
        This->p_strLimit = &This->strLimit[0];
```

```
	/* 戻る */
	return;
}

/*
 * OnInitWaitPositionChangeLog
 */
/* エレベーターの位置仮想ログ */
void OnInitWaitPositionChangeLog(struct WaitPositionChangeLog *This, struct Position *P)
{
	/* センサ初期値 */
	/* リミットスイッチの読み込み */
	This->p_strLimit = &This->strLimit[0];
	Limit_Read(&This->LF, This->p_strLimit);
	This->tmp = ((This->strLimit[0] == 'y') ? ON : OFF);
	Checkfmove(P->p_UnderStop, P->p_fmove, This->tmp);
	This->tmp = ((This->strLimit[1] == 'y') ? ON : OFF);
	Checkfmove(P->p_UnderSlow, P->p_fmove, This->tmp);
	This->tmp = ((This->strLimit[2] == 'y') ? ON : OFF);
	Checkfmove(P->p_UpperSlow, P->p_fmove, This->tmp);
	This->tmp = ((This->strLimit[3] == 'y') ? ON : OFF);
	Checkfmove(P->p_UpperStop, P->p_fmove, This->tmp);

	/* 戻る */
	return;
}

/*
```

```
 * OnWaitUpPositionChangeLog
 */
/* エレベーターの位置仮想ログ */
void OnWaitUpPositionChangeLog(struct WaitPositionChangeLog *This, struct Position *P)
{
	/* リミットスイッチの読み込み */
	This->p_strLimit = &This->strLimit[0];
	Limit_Read(&This->LF, This->p_strLimit);
	This->tmp = (This->strLimit[0] == 'y') ? ON : OFF;
	Checkfmove(P->p_UnderStop, P->p_fmove, This->tmp);
	This->tmp = (This->strLimit[1] == 'y') ? ON : OFF;
	Checkfmove(P->p_UnderSlow, P->p_fmove, This->tmp);
	This->tmp = (This->strLimit[2] == 'y') ? ON : OFF;
	Checkfmove(P->p_UpperSlow, P->p_fmove, This->tmp);
	This->tmp = (This->strLimit[3] == 'y') ? ON : OFF;
	Checkfmove(P->p_UpperStop, P->p_fmove, This->tmp);

	/* 戻る */
	return;
}

/*
 * OnWaitDownPositionChangeLog
 */
/* エレベーターの位置仮想ログ */
void OnWaitDownPositionChangeLog(struct WaitPositionChangeLog *This, struct Position *P)
{
	/* リミットスイッチの読み込み */
	This->p_strLimit = &This->strLimit[0];
```

```
	Limit_Read(&This->LF, This->p_strLimit);
	This->tmp = (This->strLimit[0] == 'y') ? ON : OFF;
	Checkfmove(P->p_UnderStop, P->p_fmove, This->tmp);
	This->tmp = (This->strLimit[1] == 'y') ? ON : OFF;
	Checkfmove(P->p_UnderSlow, P->p_fmove, This->tmp);
	This->tmp = (This->strLimit[2] == 'y') ? ON : OFF;
	Checkfmove(P->p_UpperSlow, P->p_fmove, This->tmp);
	This->tmp = (This->strLimit[3] == 'y') ? ON : OFF;
	Checkfmove(P->p_UpperStop, P->p_fmove, This->tmp);

	/* 戻る */
	return;
}

/*
 * Up
 */
/* 上昇 */
void Up(struct Position *P, struct UpMotor UPMT, struct WaitPositionChangeLog WPCL, char
*p_Safety)
{
	/* 到着まで */
	if(*P->p_UpperStop == OFF){
		/* 上昇 */
		OnUpMotor(&UPMT, *P, p_Safety);

		/* エレベーターの位置仮想ログ */
		OnWaitUpPositionChangeLog(&WPCL, P);
	}
```

```
	/* 戻る */
	return;
}

/*
 * Down
 */
/* 下降 */
void Down(struct Position *P, struct DownMotor DNMT, struct WaitPositionChangeLog WPCL, char
*p_Safety)
{
	/* 到着まで */
	if(*P->p_UnderStop == OFF){
		/* 下降 */
		OnDownMotor(&DNMT, *P, p_Safety);

		/* エレベーターの位置仮想ログ */
		OnWaitDownPositionChangeLog(&WPCL, P);
	}

	/* 戻る */
	return;
}
```

```
/* EV_OpenClose.h */

#ifndef Panel_h
#define Panel_h
#include "Panel.h"
#endif

#ifndef Timer_h
#define Timer_h
#include "Timer.h"
#endif

#ifndef EV_Time_h
#define EV_Time_h
#include "EV_Time.h"
#endif

#ifndef EV_File_h
#define EV_File_h
#include "EV_File.h"
#endif

#ifndef EV_UpDown_h
#define EV_UpDown_h
#include "EV_UpDown.h"
#endif

/*==========================================================================
```

```
 開閉を表す構造体
==========================================================================*/
struct Door
{
	int m_CLSL;
	int m_CLST;
	int m_OPSL;
	int m_OPST;
	/* 閉減速位置 */
	int *p_CloserSlow;
	/* 閉停止位置 */
	int *p_CloserStop;
	/* 開減速位置 */
	int *p_OpennerSlow;
	/* 開停止位置 */
	int *p_OpennerStop;
	/* Sleep用 */
	int fstop;
	int *p_fstop;
	int fmove;
	int *p_fmove;
};

/* 開 */
struct OpenMotor
{
	struct EV_File SF;
	struct EV_File MF;
};
```

```
/* 閉 */
struct CloseMotor
{
	struct EV_File  SF;
	struct EV_File  MF;
};

/* エレベーターの位置仮想ログ */
struct WaitDoorChangeLog
{
	struct EV_File TOF;
	char chTurnOpen;
	char *p_chTurnOpen;
	struct EV_File LF;
	char strLimit[9];
	char *p_strLimit;
	/* Sleep用 */
	int tmp;
};

/*==========================================================
  開閉を表すプロトタイプ宣言
==========================================================*/
void Door(struct Door *This);
/* 開 */
void OpenMotor(struct OpenMotor *This);
void OnOpenMotor(struct OpenMotor *This, struct Door DR, char *p_Safety);
/* 閉 */
```

```
void CloseMotor(struct CloseMotor *This);
void OnCloseMotor(struct CloseMotor *This, struct Door DR, char *p_Safety);
/* 経過時間 */
void WaitDoorChangeLog(struct WaitDoorChangeLog *This);
void OnInitWaitDoorChangeLog(struct WaitDoorChangeLog *This, struct Door *DR);
void OnWaitOpenDoorChangeLog(struct WaitDoorChangeLog *This, struct Door *DR);
void OnWaitCloseDoorChangeLog(struct WaitDoorChangeLog *This, struct Door *DR);
/* 開 */
void Open(struct Door *DR, struct OpenMotor OPMT, struct WaitDoorChangeLog WDCL, char
*p_Safety);
/* 閉 */
void Close(struct Door *DR, struct CloseMotor CLMT, struct WaitDoorChangeLog WDCL, char
*p_Safety);
```

```
/* EV_OpenClose.c */

#include "C.h"
#include "EV_OpenClose.h"

/*==========================================================================
 開閉を表す関数
==========================================================================*/
/*
 * Door
 */
void Door(struct Door *This)
{
	/* 初期値 */
	This->m_CLSL = OFF;
	This->m_CLST = OFF;
	This->m_OPSL = OFF;
	This->m_OPST = OFF;
	This->p_CloserSlow = &This->m_CLSL;
	This->p_CloserStop = &This->m_CLST;
	This->p_OpennerSlow = &This->m_OPSL;
	This->p_OpennerStop = &This->m_OPST;
	/* Sleep用 */
	This->fstop = OFF;
	This->p_fstop = &This->fstop;
	This->fmove = OFF;
	This->p_fmove = &This->fmove;
```

```
	/* 戻る */
	return;
}

/*
 * OpenMotor
 */
void OpenMotor(struct OpenMotor *This)
{
	EV_File(&This->SF);
	EV_File(&This->MF);

	/* 戻る */
	return;
}

/*
 * OnOpenMotor
 */
/* 開 */
void OnOpenMotor(struct OpenMotor *This, struct Door DR, char *p_Safety)
{
	if(*DR.p_OpennerStop == ON){
		/* Sleep用 */
		if(*DR.p_fstop == OFF){
			*DR.p_fstop = ON;
			/* 現在実行中の命令を外部に報告 */
			Motor_Write(&This->MF, 's');
			PrintF(ClsPnl, "STOP");
```

```
        }
        if(*p_Safety == 'Y'){
            *p_Safety = 'r';
            Write(&This->SF, "Safety.txt¥0", 'r');
        }
    }
    else if(*DR.p_OpennerSlow == ON){
        /* Sleep用 */
        *DR.p_fstop = OFF;
        if(*DR.p_fmove == OFF){
            *DR.p_fmove = ON;
            /* 現在実行中の命令を外部に報告 */
            Motor_Write(&This->MF, 'o');
            PrintF(ClsPnl, "OPEN");
        }
        else if(*p_Safety == 'Y'){
            Motor_Write(&This->MF, 'h');
            *p_Safety = 'r';
            Write(&This->SF, "Safety.txt¥0", 'r');
        }
    }
    else if(*DR.p_CloserSlow == OFF){
        /* Sleep用 */
        *DR.p_fstop = OFF;
        if(*DR.p_fmove == OFF){
            *DR.p_fmove = ON;
            /* 現在実行中の命令を外部に報告 */
            Motor_Write(&This->MF, 'O');
            PrintF(ClsPnl, "OPEN Speedy");
```

```
        }
        else if(*p_Safety == 'Y'){
            Motor_Write(&This->MF, 'h');
            *p_Safety = 'r';
            Write(&This->SF, "Safety.txt¥0", 'r');
        }
    }
    else if(*DR.p_CloserStop == OFF){
        /* Sleep用 */
        *DR.p_fstop = OFF;
        if(*DR.p_fmove == OFF){
            *DR.p_fmove = ON;
            /* 現在実行中の命令を外部に報告 */
            Motor_Write(&This->MF, 'o');
            PrintF(ClsPnl, "OPEN");
        }
        else if(*p_Safety == 'Y'){
            Motor_Write(&This->MF, 'h');
            *p_Safety = 'r';
            Write(&This->SF, "Safety.txt¥0", 'r');
        }
    }
    else if(*DR.p_CloserStop == ON){
        /* Sleep用 */
        *DR.p_fstop = OFF;
        if(*DR.p_fmove == OFF){
            *DR.p_fmove = ON;
            /* 現在実行中の命令を外部に報告 */
            Motor_Write(&This->MF, 'h');
```

```
            PrintF(ClsPnl, "OPEN Start");
        }
        if(*p_Safety == 'Y'){
            *p_Safety = 'r';
            Write(&This->SF, "Safety.txt¥0", 'r');
        }
    }

    /* 戻る */
    return;
}

/*
 * CloseMotor
 */
void CloseMotor(struct CloseMotor *This)
{
    EV_File(&This->SF);
    EV_File(&This->MF);

    /* 戻る */
    return;
}

/*
 * OnCloseMotor
 */
/* 閉 */
```

```
void OnCloseMotor(struct CloseMotor *This, struct Door DR, char *p_Safety)
{
	if(*DR.p_CloserStop == ON){
		/* Sleep用 */
		if(*DR.p_fstop == OFF){
			*DR.p_fstop = ON;
			/* 現在実行中の命令を外部に報告 */
			Motor_Write(&This->MF, 's');
			PrintF(ClsPnl, "STOP");
		}
		if(*p_Safety == 'Y'){
			*p_Safety = 'r';
			Write(&This->SF, "Safety.txt¥0", 'r');
		}
	}
	else if(*DR.p_CloserSlow == ON){
		/* Sleep用 */
		*DR.p_fstop = OFF;
		if(*DR.p_fmove == OFF){
			*DR.p_fmove = ON;
			/* 現在実行中の命令を外部に報告 */
			Motor_Write(&This->MF, 'c');
			PrintF(ClsPnl, "CLOSE");
		}
		else if(*p_Safety == 'Y'){
			Motor_Write(&This->MF, 't');
			*p_Safety = 'r';
			Write(&This->SF, "Safety.txt¥0", 'r');
		}
```

```
}
else if(*DR.p_OpennerSlow == OFF){
	/* Sleep用 */
	*DR.p_fstop = OFF;
	if(*DR.p_fmove == OFF){
		*DR.p_fmove = ON;
		/* 現在実行中の命令を外部に報告 */
		Motor_Write(&This->MF, 'C');
		PrintF(ClsPnl, "CLOSE Speedy");
	}
	else if(*p_Safety == 'Y'){
		Motor_Write(&This->MF, 't');
		*p_Safety = 'r';
		Write(&This->SF, "Safety.txt¥0", 'r');
	}
}
else if(*DR.p_OpennerStop == OFF){
	/* Sleep用 */
	*DR.p_fstop = OFF;
	if(*DR.p_fmove == OFF){
		*DR.p_fmove = ON;
		/* 現在実行中の命令を外部に報告 */
		Motor_Write(&This->MF, 'c');
		PrintF(ClsPnl, "CLOSE");
	}
	else if(*p_Safety == 'Y'){
		Motor_Write(&This->MF, 't');
		*p_Safety = 'r';
		Write(&This->SF, "Safety.txt¥0", 'r');
```

```
            }
        }
        else if(*DR.p_OpennerStop == ON){
            /* Sleep用 */
            *DR.p_fstop = OFF;
            if(*DR.p_fmove == OFF){
                *DR.p_fmove = ON;
                /* 現在実行中の命令を外部に報告 */
                Motor_Write(&This->MF, 't');
                PrintF(ClsPnl, "CLOSE Start");
            }
            if(*p_Safety == 'Y'){
                *p_Safety = 'r';
                Write(&This->SF, "Safety.txt¥0", 'r');
            }
        }

        /* 戻る */
        return;
    }

    /*
     * WaitDoorChangeLog
     */
    /* エレベーターの位置仮想ログ */
    void WaitDoorChangeLog(struct WaitDoorChangeLog *This)
    {
        This->p_chTurnOpen = &This->chTurnOpen;
        This->p_strLimit = &This->strLimit[0];
```

```
	/* 戻る */
	return;
}

/*
 * OnInitWaitDoorChangeLog
 */
/* エレベーターの位置仮想ログ */
void OnInitWaitDoorChangeLog(struct WaitDoorChangeLog *This, struct Door *DR)
{
	/* センサ初期値 */
	/* リミットスイッチの読み込み */
	This->p_strLimit = &This->strLimit[0];
	Limit_Read(&This->LF, This->p_strLimit);
	This->tmp = (This->strLimit[4] == 'y') ? ON : OFF;
	Checkfmove(DR->p_CloserStop, DR->p_fmove, This->tmp);
	This->tmp = (This->strLimit[5] == 'y') ? ON : OFF;
	Checkfmove(DR->p_CloserSlow, DR->p_fmove, This->tmp);
	This->tmp = (This->strLimit[6] == 'y') ? ON : OFF;
	Checkfmove(DR->p_OpennerSlow, DR->p_fmove, This->tmp);
	This->tmp = (This->strLimit[7] == 'y') ? ON : OFF;
	Checkfmove(DR->p_OpennerStop, DR->p_fmove, This->tmp);

	/* 戻る */
	return;
}
```

```
/*
 * OnWaitOpenDoorChangeLog
 */
/* エレベーターの位置仮想ログ */
void OnWaitOpenDoorChangeLog(struct WaitDoorChangeLog *This, struct Door *DR)
{
	/* リミットスイッチの読み込み */
	This->p_strLimit = &This->strLimit[0];
	Limit_Read(&This->LF, This->p_strLimit);
	This->tmp = (This->strLimit[4] == 'y') ? ON : OFF;
	Checkfmove(DR->p_CloserStop, DR->p_fmove, This->tmp);
	This->tmp = (This->strLimit[5] == 'y') ? ON : OFF;
	Checkfmove(DR->p_CloserSlow, DR->p_fmove, This->tmp);
	This->tmp = (This->strLimit[6] == 'y') ? ON : OFF;
	Checkfmove(DR->p_OpennerSlow, DR->p_fmove, This->tmp);
	This->tmp = (This->strLimit[7] == 'y') ? ON : OFF;
	Checkfmove(DR->p_OpennerStop, DR->p_fmove, This->tmp);

	/* 戻る */
	return;
}

/*
 * OnWaitCloseDoorChangeLog
 */
/* エレベーターの位置仮想ログ */
void OnWaitCloseDoorChangeLog(struct WaitDoorChangeLog *This, struct Door *DR)
{
	/* リミットスイッチの読み込み */
```

```
	This->p_strLimit = &This->strLimit[0];
	Limit_Read(&This->LF, This->p_strLimit);
	This->tmp = (This->strLimit[4] == 'y') ? ON : OFF;
	Checkfmove(DR->p_CloserStop, DR->p_fmove, This->tmp);
	This->tmp = (This->strLimit[5] == 'y') ? ON : OFF;
	Checkfmove(DR->p_CloserSlow, DR->p_fmove, This->tmp);
	This->tmp = (This->strLimit[6] == 'y') ? ON : OFF;
	Checkfmove(DR->p_OpennerSlow, DR->p_fmove, This->tmp);
	This->tmp = (This->strLimit[7] == 'y') ? ON : OFF;
	Checkfmove(DR->p_OpennerStop, DR->p_fmove, This->tmp);

	/* 戻る */
	return;
}

/*
 * Open
 */
/* 開 */
void Open(struct Door *DR, struct OpenMotor OPMT, struct WaitDoorChangeLog WDCL, char
*p_Safety)
{
	/* 到着まで */
	if(*DR->p_OpennerStop == OFF)
	{
		/* 開 */
		OnOpenMotor(&OPMT, *DR, p_Safety);

		/* エレベーターの位置仮想ログ */
```

```
        OnWaitOpenDoorChangeLog(&WDCL, DR);
    }

    /* 戻る */
    return;
}

/*
 * Close
 */
/* 閉 */
void Close(struct Door *DR, struct CloseMotor CLMT, struct WaitDoorChangeLog WDCL, char
*p_Safety)
{
    /* 到着まで */
    if(*DR->p_CloserStop == OFF)
    {
        /* 閉 */
        OnCloseMotor(&CLMT, *DR, p_Safety);

        /* エレベーターの位置仮想ログ */
        OnWaitCloseDoorChangeLog(&WDCL, DR);
    }

    /* 戻る */
    return;
}
```

```
/* EV_Input.h */

#ifndef Panel_h
#define Panel_h
#include "Panel.h"
#endif

#ifndef Timer_h
#define Timer_h
#include "Timer.h"
#endif

#ifndef EV_Time_h
#define EV_Time_h
#include "EV_Time.h"
#endif

#ifndef EV_File_h
#define EV_File_h
#include "EV_File.h"
#endif

#ifndef EV_UpDown_h
#define EV_UpDown_h
#include "EV_UpDown.h"
#endif

#ifndef EV_OpenClose_h
```

```
#define EV_OpenClose_h
#include "EV_OpenClose.h"
#endif

/*==========================================================================
  入力を表す関数のプロトタイプ宣言
==========================================================================*/
char GetChar(char Ret);

/*==========================================================================
  入力を表す構造体
==========================================================================*/
struct EV_Input
{
    /* 安全 */
    char Safety;
    char *p_Safety;
    char Command;
    char PermitCommand;
    char ch;
    char *p_ch;
    char str[9];
    char *p_str;

    /* ファイルストリーム */
    struct EV_File SF;
    struct EV_File CF;
    struct EV_File PF;
    struct EV_File LF;
```

```
    struct EV_File MF;
};

/*==========================================================================
  入力を表すコンストラクタとメソッドのプロトタイプ宣言
==========================================================================*/
void EV_Input(struct EV_Input *This);
void OnInput(struct EV_Input *This, Thread *th);
```

```
/* EV_Input.c */

#include "C.h"
#include "EV_Input.h"

/*==========================================================================
  入力を表す関数
==========================================================================*/
char GetChar(char Ret)
{
#ifndef USE_BCC
	char sw[4];
	int i;
	int j;
	/* スイッチワーク初期化 */
	sw[0] = sw[1] = sw[2] = sw[3] = 0;
	/* ボタンが押された時にLCD,SCI,USBにメッセージを送る */
	for(j=0;j<4;j++)
	{
		i = GetSW(j);
		if( ((sw[j]^1) & i) ) /* sw = off->onで条件成立 */
		{
			switch(j){
			case 0:
				Ret = 'u';
				break;
			case 1:
				Ret = 'd';
```

```
                break;
            case 2:
                Ret = 'o';
                break;
            case 3:
                Ret = 'c';
                break;
            default:
                break;
            }
        }
    }
#elif USE_LINUX
    if(kbhit())
    {
        Ret = (char) getchar();
    }
#elif USE_MSVS2005
    if(_kbhit())
    {
        Ret = (char) _getche();
    }
#else
    if(kbhit())
    {
        Ret = (char) getche();
    }
#endif
    return Ret;
```

```
}

/*==============================================================
  入力を表すコンストラクタとメソッド
==============================================================*/
void EV_Input(struct EV_Input *This)
{
	/* 初期化 */
	This->Command = '¥0';
	This->PermitCommand ='¥0';
	This->p_ch = &This->ch;
	This->p_str = &This->str[0];
	This->str[8] = '¥0';
	/* 安全初期化 */
	This->p_Safety = &This->Safety;

	EV_File(&This->SF);
	EV_File(&This->CF);
	EV_File(&This->PF);
	EV_File(&This->MF);

	/* 安全入力 */
	if(Read(&This->SF, "Safety.txt¥0", This->p_Safety) == NG) return;
	/* モーター命令解読 */
	if(Read(&This->MF, "Motor.txt¥0", This->p_ch) == NG) return;
	/* リミットスイッチの前状態読み込み */
	ReadString(&This->LF, "Limit.txt¥0", This->p_str, 9);
}
```

```
void OnInput(struct EV_Input *This, Thread *th)
{
	This->Command = GetChar(This->Command);

	/* 安全入力 */
	if(Read(&This->SF, "Safety.txt¥0", This->p_Safety) == NG) return;
	/* モーター命令解読 */
	if(Read(&This->MF, "Motor.txt¥0", This->p_ch) == NG) return;
	/* リミットスイッチの前状態読み込み */
	ReadString(&This->LF, "Limit.txt¥0", This->p_str, 9);

	switch(This->Command){
	case 's':
		/* 命令入力 */
		Write(&This->SF, "Safety.txt", 's');
		Motor_Write(&This->MF, 's');
		This->Command = 'N';
		Command_Write(&This->CF, 'N');
		PermitCommand_Write(&This->PF, 'c');
		break;
	case 'r':
		/* 命令入力 */
		Write(&This->SF, "Safety.txt", 'h');
		This->Command = 'N';
		Command_Write(&This->CF, 'N');
		break;
	case 'o':
	case 'c':
	case 'u':
```

```
case 'd':
    if(This->Safety == 'h'){
        /* 命令入力 */
        This->Safety = 'Y';
        Write(&This->SF, "Safety.txt", 'Y');
    }
    /* 命令入力 */
    Command_Write(&This->CF, This->Command);
    PermitCommand_Write(&This->CF, 'N');
    break;
case 'y':
    if((This->str[0] != 'y') && (This->str[4] != 'y')){
        PrintF(ClsPnl, "¥nA Basket isn't 1st Floor");
    }
    else{
        if(This->Safety == 'h'){
            /* 命令入力 */
            This->Safety = 'Y';
            Write(&This->SF, "Safety.txt", 'Y');
        }
        /* 命令入力 */
        Command_Write(&This->CF, This->Command);
        PermitCommand_Write(&This->CF, 'N');
    }
    break;
case 'Y':
    if((This->str[3] != 'y') && (This->str[4] != 'y')){
        PrintF(ClsPnl, "¥nA Basket isn't 2nd Floor");
```

```
        }
        else{
            if(This->Safety == 'h'){
                /* 命令入力 */
                This->Safety = 'Y';
                Write(&This->SF, "Safety.txt", 'Y');
            }
            /* 命令入力 */
            Command_Write(&This->CF, This->Command);
            PermitCommand_Write(&This->CF, 'N');
        }
        break;
    case 'h':
        if(This->str[0] != 'y'){
            PrintF(ClsPnl, "¥nA Basket isn't 1st Floor");
        }
        else{
            if(This->Safety == 'h'){
                /* 命令入力 */
                This->Safety = 'Y';
                Write(&This->SF, "Safety.txt", 'Y');
            }
            /* 命令入力 */
            Command_Write(&This->CF, This->Command);
            PermitCommand_Write(&This->CF, 'N');
        }
        break;
    case 'H':
        if(This->str[3] != 'y'){
```

```
            PrintF(ClsPnl, "¥nA Basket isn't 2nd Floor");
        }
        else{
            if(This->Safety == 'h'){
                /* 命令入力 */
                This->Safety = 'Y';
                Write(&This->SF, "Safety.txt", 'Y');
            }
            /* 命令入力 */
            Command_Write(&This->CF, This->Command);
            PermitCommand_Write(&This->CF, 'N');
        }
        break;
    case 'q':
        /* 命令入力 */
        Command_Write(&This->CF, This->Command);
        delete_(th);
        break;
    default:
        break;
    }
    return;
}
```

```
/* EV_Controller.h */

#ifndef Panel_h
#define Panel_h
#include "Panel.h"
#endif

#ifndef Timer_h
#define Timer_h
#include "Timer.h"
#endif

#ifndef EV_Time_h
#define EV_Time_h
#include "EV_Time.h"
#endif

#ifndef EV_File_h
#define EV_File_h
#include "EV_File.h"
#endif

#ifndef EV_UpDown_h
#define EV_UpDown_h
#include "EV_UpDown.h"
#endif

#ifndef EV_OpenClose_h
```

```
#define EV_OpenClose_h
#include "EV_OpenClose.h"
#endif

/*==========================================================================
 制御盤を表す構造体宣言
==========================================================================*/
struct EV_Controller
{
    /* エレベーターの現在位置オブジェクトの宣言 */
    struct Position P;
    struct Position *p_P;

    /* 上昇オブジェクトの宣言 */
    struct UpMotor UPMT;
    /* 下降オブジェクトの宣言 */
    struct DownMotor DNMT;

    /* エレベーターの位置仮想ログ */
    struct WaitPositionChangeLog WPCL;

    /* エレベーターの現在位置オブジェクトの宣言 */
    struct Door DR;
    struct Door *p_DR;

    /* 開オブジェクトの宣言 */
    struct OpenMotor OPMT;
    /* 閉オブジェクトの宣言 */
    struct CloseMotor CLMT;
```

```
	/* エレベーターの位置仮想ログ */
	struct WaitDoorChangeLog WDCL;

	/* 経過時間テンポラリ */
	struct EV_Time T;

	/* 安全 */
	char Safety;
	char *p_Safety;

	/* 命令 */
	char Command;
	char *p_Command;

	/* ファイルストリーム */
	struct EV_File SF;
	struct EV_File CF;
	struct EV_File MF;
};

/*==========================================================================
  制御を表すコンストラクタとメソッドのプロトタイプ宣言
==========================================================================*/
void EV_Controller(struct EV_Controller *This, Thread *th);
void OnController(struct EV_Controller *This, Thread *th);
```

```
/* EV_Controller.c */

#include "C.h"
#include "EV_Controller.h"

/*==========================================================================
 制御関数
==========================================================================*/
void EV_Controller(struct EV_Controller *This, Thread *th)
{
    /* 初期化 */
    This->p_P = &This->P;
    Position(This->p_P);
    UpMotor(&This->UPMT);
    DownMotor(&This->DNMT);
    WaitPositionChangeLog(&This->WPCL);
    This->p_DR = &This->DR;
    Door(This->p_DR);
    OpenMotor(&This->OPMT);
    CloseMotor(&This->CLMT);
    WaitDoorChangeLog(&This->WDCL);
    EV_Time(&This->T, th);
    EV_File(&This->SF);
    EV_File(&This->CF);
    EV_File(&This->MF);

    /* 安全初期化 */
    This->p_Safety = &This->Safety;
```

```
	/* 命令初期化 */
	This->p_Command = &This->Command;

	/* モーター停止命令 */
	Motor_Write(&This->MF, 's');

	/* エレベーターの位置仮想ログ */
	/* 初期値 */
	OnInitWaitPositionChangeLog(&This->WPCL, This->p_P);

	/* エレベーターの位置仮想ログ */
	/* 初期値 */
	OnInitWaitDoorChangeLog(&This->WDCL, This->p_DR);

	/* 命令初期化 */
	if(Command_Write(&This->CF, 'N') == NG) return;

	/* ファイル初期化 */
	if(PermitCommand_Write(&This->CF, 'c') == NG) return;
}

/*
 * 主制御関数
 */
void OnController(struct EV_Controller *This, Thread *th)
{
	/* 安全入力 */
	if(Read(&This->SF, "Safety.txt¥0", This->p_Safety) == NG) return;
```

```
/* 命令入力 */
if(Command_Read(&This->CF, This->p_Command) == NG) return;

switch(This->Command){
	/* 終了命令ならば */
	case	'q':
		Motor_Write(&This->MF, 's');
		delete_(th);
		break;
	/* 非常停止命令ならば */
	case	's':
		break;
	/* 復帰命令ならば */
	case	'r':
		break;
	/* 上階呼命令ならば */
	case	'Y':
		if((*This->p_P->p_UnderStop == ON) && (*This->p_DR->p_OpennerStop == ON)){
			break;
		}
	/* 上昇命令ならば */
	case	'u':
		if(*This->p_P->p_UpperStop == ON){
			/* 開完了時 */
			if(*This->p_DR->p_OpennerStop == ON){
				Motor_Write(&This->MF, 's');
				Command_Write(&This->CF, 'N');
				PermitCommand_Write(&This->CF, 'c');
```

```
            }
            else{
                /* 開 */
                Open(This->p_DR,This->OPMT,This->WDCL, This->p_Safety);
            }
        }
        else if(*This->p_DR->p_CloserStop == ON){
            /* 閉完了時 */
            /* 上昇 */
            Up(This->p_P,This->UPMT,This->WPCL, This->p_Safety);
        }
        else if(*This->p_DR->p_CloserStop == OFF){
            /* 閉 */
            Close(This->p_DR,This->CLMT,This->WDCL, This->p_Safety);
        }
        break;
    /* 下階呼命令ならば */
    case   'y':
        if((*This->p_P->p_UpperStop == ON) && (*This->p_DR->p_OpennerStop == ON)){
            break;
        }
    /* 下降命令ならば */
    case   'd':
        if(*This->p_P->p_UnderStop == ON){
            /* 開完了時 */
            if(*This->p_DR->p_OpennerStop == ON){
                Motor_Write(&This->MF, 's');
                Command_Write(&This->CF, 'N');
                PermitCommand_Write(&This->CF, 'c');
```

```
            }
            else{
                /* 開 */
                Open(This->p_DR,This->OPMT,This->WDCL, This->p_Safety);
            }
        }
        else if(*This->p_DR->p_CloserStop == ON){
            /* 閉完了時 */
            /* 下降 */
            Down(This->p_P,This->DNMT,This->WPCL, This->p_Safety);
        }
        else if(*This->p_DR->p_CloserStop == OFF){
            /* 閉 */
            Close(This->p_DR,This->CLMT,This->WDCL, This->p_Safety);
        }
        break;
    /* 開命令ならば */
    case   'o':
        /* 開完了時 */
        if(*This->p_DR->p_OpennerStop == ON){
            Motor_Write(&This->MF, 's');
            Command_Write(&This->CF, 'N');
            PermitCommand_Write(&This->CF, 'c');
        }
        else{
            /* 開 */
            Open(This->p_DR,This->OPMT,This->WDCL, This->p_Safety);
        }
```

```
        break;
    /* 閉命令ならば */
    case   'c':
        /* 閉完了時 */
        if(*This->p_DR->p_CloserStop == ON){
            Motor_Write(&This->MF, 's');
            Command_Write(&This->CF, 'N');
            PermitCommand_Write(&This->CF, 'c');
        }
        else{
            /* 閉 */
            Close(This->p_DR,This->CLMT,This->WDCL, This->p_Safety);
        }
        break;
    /* 閉命令ならば */
    case   'H':
        if(*This->p_P->p_UpperStop == ON){
            /* 閉完了時 */
            if(*This->p_DR->p_CloserStop == ON){
                Motor_Write(&This->MF, 's');
                Command_Write(&This->CF, 'N');
                PermitCommand_Write(&This->CF, 'c');
            }
            else{
                /* 閉 */
                Close(This->p_DR,This->CLMT,This->WDCL, This->p_Safety);
            }
        }
```

```
            break;
        /* 閉命令ならば */
        case    'h':
            if(*This->p_P->p_UnderStop == ON){
                /* 閉完了時 */
                if(*This->p_DR->p_CloserStop == ON){
                    Motor_Write(&This->MF, 's');
                    Command_Write(&This->CF, 'N');
                    PermitCommand_Write(&This->CF, 'c');
                }
                else{
                    /* 閉 */
                    Close(This->p_DR,This->CLMT,This->WDCL, This->p_Safety);
                }
            }

            break;
        default:
            break;
    }

    return;
}
```

```
/* EV_Simulator.h */

#ifndef Panel_h
#define Panel_h
#include "Panel.h"
#endif

#ifndef Timer_h
#define Timer_h
#include "Timer.h"
#endif

#ifndef EV_Time_h
#define EV_Time_h
#include "EV_Time.h"
#endif

#ifndef EV_File_h
#define EV_File_h
#include "EV_File.h"
#endif

#ifndef EV_UpDown_h
#define EV_UpDown_h
#include "EV_UpDown.h"
#endif

#ifndef EV_OpenClose_h
```

```
#define EV_OpenClose_h
#include "EV_OpenClose.h"
#endif

/*==========================================================================
 シミュレータを表す関数のプロトタイプ宣言
==========================================================================*/
void DispInput(void);
void Disp(char ch, char str[9]);

/*==========================================================================
 シミュレータを表す構造体
==========================================================================*/
struct EV_Simulator
{
	char ch;
	char *p_ch;
	char ch2;
	char *p_ch2;
	char ch3;
	char *p_ch3;
	char str[9];
	char *p_str;

	/* 時間管理 */
	struct EV_Time T;

	/* ファイルストリーム */
	struct EV_File SF;
```

```
    struct EV_File CF;
    struct EV_File MF;
    struct EV_File LF;
};

/*==========================================================
  シミュレータを表すコンストラクタとメソッドのプロトタイプ宣言
==========================================================*/
void EV_Simulator(struct EV_Simulator *This, Thread *th);
void OnSimulator(struct EV_Simulator *This, Thread *th);
```

```
/* EV_Simulator.c */

#include "C.h"
#include "EV_Simulator.h"

/*==========================================================================
  シミュレータ関数
==========================================================================*/
void EV_Simulator(struct EV_Simulator *This, Thread *th)
{
	/* 初期化 */
	EV_Time(&This->T, th);
	SetCurrentTime(&This->T);
	This->p_ch = &This->ch;
	This->p_ch2 = &This->ch2;
	This->p_ch3 = &This->ch3;
	This->p_str = &This->str[0];
	This->str[8] = '¥0';
	EV_File(&This->SF);
	EV_File(&This->CF);
	EV_File(&This->MF);
	EV_File(&This->LF);

	/* モーター命令解読 */
	if(Read(&This->MF, "Motor.txt¥0", This->p_ch) == NG) return;
	/* リミットスイッチの前状態読み込み */
	if(ReadString(&This->LF, "Limit.txt¥0", This->p_str, 9) == NG) return;
	/* 籠表示 */
```

```
	Disp(This->ch, This->str);
}

void OnSimulator(struct EV_Simulator *This, Thread *th)
{
	/* 終了条件 */
	Read(&This->CF, "Command.txt¥0", This->p_ch3);
	if(This->ch3 == 'q'){
		Clear();
		delete_(th);
		return;
	}

	/* モーター命令解読 */
	Read(&This->MF, "Motor.txt¥0", This->p_ch);

	/* リミットスイッチの前状態読み込み */
	ReadString(&This->LF, "Limit.txt¥0", This->p_str, 9);

	/* 停止条件 */
	Read(&This->SF, "Safety.txt¥0", This->p_ch2);
	if(This->ch2 == 's'){
		Write(&This->CF, "Command.txt¥0", 'N');
		/* 籠表示 */
		Disp(This->ch, This->str);
		return;
	}

	/* リミットスイッチの新状態作成 */
```

```
if(This->ch == 'u'){
        if(This->str[0] == 'y');
        else if(This->str[1] == 'y') This->str[1] = 'n';
        else if(This->str[2] == 'n');
        else if(This->str[3] == 'n') This->str[3] = 'y';
}
else if(This->ch == 'U'){
        if(This->str[0] == 'y');
        else if(This->str[1] == 'y');
        else if(This->str[2] == 'n') This->str[2] = 'y';
        else if(This->str[3] == 'n');
}
else if(This->ch == 'j'){
        if(This->str[0] == 'y') This->str[0] = 'n';
        else if(This->str[1] == 'y') This->str[1] = 'n';
        else if(This->str[2] == 'n') This->str[2] = 'y';
        else if(This->str[3] == 'n') This->str[3] = 'y';
}
else if(This->ch == 'd'){
        if(This->str[3] == 'y');
        else if(This->str[2] == 'y') This->str[2] = 'n';
        else if(This->str[1] == 'n');
        else if(This->str[0] == 'n') This->str[0] = 'y';
}
else if(This->ch == 'D'){
        if(This->str[3] == 'y');
        else if(This->str[2] == 'y');
        else if(This->str[1] == 'n') This->str[1] = 'y';
        else if(This->str[0] == 'n');
```

```
}
else if(This->ch == 'k'){
    if(This->str[3] == 'y') This->str[3] = 'n';
    else if(This->str[2] == 'y') This->str[2] = 'n';
    else if(This->str[1] == 'n') This->str[1] = 'y';
    else if(This->str[0] == 'n') This->str[0] = 'y';
}
else if(This->ch == 'o'){
    if(This->str[4] == 'y');
    else if(This->str[5] == 'y') This->str[5] = 'n';
    else if(This->str[6] == 'n');
    else if(This->str[7] == 'n') This->str[7] = 'y';
}
else if(This->ch == 'O'){
    if(This->str[4] == 'y');
    else if(This->str[5] == 'y');
    else if(This->str[6] == 'n') This->str[6] = 'y';
    else if(This->str[7] == 'n');
}
else if(This->ch == 'h'){
    if(This->str[4] == 'y') This->str[4] = 'n';
    else if(This->str[5] == 'y') This->str[5] = 'n';
    else if(This->str[6] == 'n') This->str[6] = 'y';
    else if(This->str[7] == 'n') This->str[7] = 'y';
}
else if(This->ch == 'c'){
    if(This->str[7] == 'y');
    else if(This->str[6] == 'y') This->str[6] = 'n';
    else if(This->str[5] == 'n');
```

```
        else if(This->str[4] == 'n') This->str[4] = 'y';
    }
    else if(This->ch == 'C'){
        if(This->str[7] == 'y');
        else if(This->str[6] == 'y');
        else if(This->str[5] == 'n') This->str[5] = 'y';
        else if(This->str[4] == 'n');
    }
    else if(This->ch == 't'){
        if(This->str[7] == 'y') This->str[7] = 'n';
        else if(This->str[6] == 'y') This->str[6] = 'n';
        else if(This->str[5] == 'n') This->str[5] = 'y';
        else if(This->str[4] == 'n') This->str[4] = 'y';
    }

    /* リミットスイッチの新状態書き込み */
    WriteString(&This->LF, "Limit.txt¥0", This->str);

    /* 籠表示 */
    Disp(This->ch, This->str);

    return;
}

void DispInput(void)
{
    /* 入力指示 */
    PrintF(InputCommand, "¥nUP = 'u', DOWN = 'd', OPEN = 'o', CLOSE = 'c'");
```

```
    PrintF(InputCommand, "¥nEMERGENCY = 's', RECOVERY = 'r'");
    PrintF(InputCommand, "¥n1st Floor CALL = 'y', 2nd Floor CALL = 'Y'");
    PrintF(InputCommand, "¥n1st Floor CLOSE = 'h', 2nd Floor CLOSE = 'H'");
    PrintF(InputCommand, "¥nQUITE = 'q'");
    PrintF(InputCommand, "¥nCOMMAND>");
}

/*
 * 表示関数
 */
void Disp(char ch, char str[9])
{
    int    i;
#ifdef USE_BCC
    /* 画面クリア */
    CLEAR;
#endif
    if      ((((ch == 'u') || (ch == 'j')) && (str[3] == 'y') && (str[2] == 'y'))
        ||  ((ch == 'k') && (str[3] == 'n') && (str[2] == 'y')))
    {
        for(i = 0; i < 4; i++)
        {
                PrintF(Monitor, "¥n    00000000    ");
        }
        for(i = 4; i < 12; i++)
        {
                PrintF(Monitor, "¥n                ");
        }
    }
```

```
    else if((((ch == 'U') ¦¦ (ch == 'j')) && (str[3] == 'n') && (str[2] == 'y'))
        ¦¦  (((ch == 'd') ¦¦ (ch == 'k')) && (str[3] == 'n') && (str[2] == 'n') && (str[1] == 'n') && (str[0] ==
'n'))
        ¦¦  ((ch == 's') && (str[3] == 'n') && (str[2] == 'y')))
    {
        for(i = 0; i < 2; i++)
        {
            PrintF(Monitor, "¥n            ");
        }
        for(i = 2; i < 6; i++)
        {
            PrintF(Monitor, "¥n    00000000    ");
        }
        for(i = 6; i < 12; i++)
        {
            PrintF(Monitor, "¥n            ");
        }
    }
    else if((ch == 's') && (str[3] == 'n') && (str[2] == 'n') && (str[1] == 'n') && (str[0] == 'n'))
    {
        for(i = 0; i < 4; i++)
        {
            PrintF(Monitor, "¥n            ");
        }
        for(i = 4; i < 8; i++)
        {
            PrintF(Monitor, "¥n    00000000    ");
        }
        for(i = 8; i < 12; i++)
```

```
        {
                PrintF(Monitor, "¥n              ");
        }
    }
    else if((((ch == 'u') ¦¦ (ch == 'j')) && (str[3] == 'n') && (str[2] == 'n') && (str[1] == 'n') && (str[0] ==
'n'))
        ¦¦  (((ch == 'D') ¦¦ (ch == 'k')) && (str[1] == 'y') && (str[0] == 'n'))
        ¦¦  ((ch == 's') && (str[1] == 'y') && (str[0] == 'n')))
    {
        for(i = 0; i < 6; i++)
        {
                PrintF(Monitor, "¥n              ");
        }
        for(i = 6; i < 10; i++)
        {
                PrintF(Monitor, "¥n    00000000    ");
        }
        for(i = 10; i < 12; i++)
        {
                PrintF(Monitor, "¥n              ");
        }
    }
    else if(((ch == 'j') && (str[1] == 'y') && (str[0] == 'n'))
        ¦¦  (((ch == 'd') ¦¦ (ch == 'k')) && (str[1] == 'y') && (str[0] == 'y')))
    {
        for(i = 0; i < 8; i++)
        {
                PrintF(Monitor, "¥n              ");
        }
```

```
        for(i = 8; i < 12; i++)
        {
                PrintF(Monitor, "¥n    00000000    ");
        }
    }
    else if((str[3] == 'y') && (str[2] == 'y'))
    {
        if    (((ch == 's') && (str[7] == 'y') && (str[6] == 'y'))
            ¦¦  (((ch == 'o') ¦¦ (ch == 'h')) && (str[7] == 'y') && (str[6] == 'y'))
            ¦¦  ((ch == 't') && (str[7] == 'n') && (str[6] == 'y')))
        {
            for(i = 0; i < 4; i++)
            {
                PrintF(Monitor, "¥n0000       0000");
            }
            for(i = 4; i < 12; i++)
            {
                PrintF(Monitor, "¥n              ");
            }
        }
        else if((((ch == 'O') ¦¦ (ch == 'h')) && (str[7] == 'n') && (str[6] == 'y'))
            ¦¦  (((ch == 'c') ¦¦ (ch == 't')) && (str[7] == 'n') && (str[6] == 'n') && (str[5] == 'n') && (str[4]
== 'n'))
            ¦¦  ((ch == 's') && (str[7] == 'n') && (str[6] == 'y')))
        {
            for(i = 0; i < 4; i++)
            {
                PrintF(Monitor, "¥n 0000     0000 ");
```

```
            }
            for(i = 4; i < 12; i++)
            {
                PrintF(Monitor, "¥n              ");
            }
        }
        else if((ch == 's') && (str[7] == 'n') && (str[6] == 'n') && (str[5] == 'n') && (str[4] == 'n'))
        {
            for(i = 0; i < 4; i++)
            {
                PrintF(Monitor, "¥n  0000    0000  ");
            }
            for(i = 4; i < 12; i++)
            {
                PrintF(Monitor, "¥n              ");
            }
        }
        else if((((ch == 'o') ¦¦ (ch == 'h')) && (str[7] == 'n') && (str[6] == 'n') && (str[5] == 'n') && (str[4]
== 'n'))
            ¦¦  (((ch == 'C') ¦¦ (ch == 't')) && (str[5] == 'y') && (str[4] == 'n'))
            ¦¦  ((ch == 's') && (str[5] == 'y') && (str[4] == 'n')))
        {
            for(i = 0; i < 4; i++)
            {
                PrintF(Monitor, "¥n   0000  0000   ");
            }
            for(i = 4; i < 12; i++)
            {
                PrintF(Monitor, "¥n              ");
```

```
            }
        }
        else if(((ch == 's') && (str[5] == 'y') && (str[4] == 'y'))
            ¦¦  ((ch == 'h') && (str[5] == 'y') && (str[4] == 'n'))
            ¦¦  (((ch == 'c') ¦¦ (ch == 't')) && (str[5] == 'y') && (str[4] == 'y')))
        {
            for(i = 0; i < 4; i++)
            {
                PrintF(Monitor, "¥n    00000000    ");
            }
            for(i = 4; i < 12; i++)
            {
                PrintF(Monitor, "¥n                ");
            }
        }
    }
    else if((str[1] == 'y') && (str[0] == 'y'))
    {
        if    (((ch == 's') && (str[7] == 'y') && (str[6] == 'y'))
            ¦¦  (((ch == 'o') ¦¦ (ch == 'h')) && (str[7] == 'y') && (str[6] == 'y'))
            ¦¦  ((ch == 't') && (str[7] == 'n') && (str[6] == 'y')))
        {
            for(i = 0; i < 8; i++)
            {
                PrintF(Monitor, "¥n                ");
            }
            for(i = 8; i < 12; i++)
            {
                PrintF(Monitor, "¥n0000       0000");
```

```
            }
        }
        else if((((ch == 'O') ¦¦ (ch == 'h')) && (str[7] == 'n') && (str[6] == 'y'))
            ¦¦  (((ch == 'c') ¦¦ (ch == 't')) && (str[7] == 'n') && (str[6] == 'n') && (str[5] == 'n') && (str[4]
== 'n'))
            ¦¦  ((ch == 's') && (str[7] == 'n') && (str[6] == 'y')))
        {
            for(i = 0; i < 8; i++)
            {
                PrintF(Monitor, "¥n              ");
            }
            for(i = 8; i < 12; i++)
            {
                PrintF(Monitor, "¥n 0000     0000 ");
            }
        }
        else if((ch == 's') && (str[7] == 'n') && (str[6] == 'n') && (str[5] == 'n') && (str[4] == 'n'))
        {
            for(i = 0; i < 8; i++)
            {
                PrintF(Monitor, "¥n              ");
            }
            for(i = 8; i < 12; i++)
            {
                PrintF(Monitor, "¥n  0000    0000  ");
            }
        }
        else if((((ch == 'o') ¦¦ (ch == 'h')) && (str[7] == 'n') && (str[6] == 'n') && (str[5] == 'n') && (str[4]
== 'n'))
```

```
        ¦¦ (((ch == 'C') ¦¦ (ch == 't')) && (str[5] == 'y') && (str[4] == 'n'))
        ¦¦ ((ch == 's') && (str[5] == 'y') && (str[4] == 'n')))
    {
        for(i = 0; i < 8; i++)
        {
            PrintF(Monitor, "¥n              ");
        }
        for(i = 8; i < 12; i++)
        {
            PrintF(Monitor, "¥n   0000  0000   ");
        }
    }
    else if(((ch == 's') && (str[5] == 'y') && (str[4] == 'y'))
        ¦¦ ((ch == 'h') && (str[5] == 'y') && (str[4] == 'n'))
        ¦¦ (((ch == 'c') ¦¦ (ch == 't')) && (str[5] == 'y') && (str[4] == 'y')))
    {
        for(i = 0; i < 8; i++)
        {
            PrintF(Monitor, "¥n              ");
        }
        for(i = 8; i < 12; i++)
        {
            PrintF(Monitor, "¥n    00000000    ");
        }
    }
}
/* 入力指示 */
DispInput();
```

```
        return;
    }
```

```
/* main.h */

#ifndef Panel_h
#define Panel_h
#include "Panel.h"
#endif

#ifndef Timer_h
#define Timer_h
#include "Timer.h"
#endif

#ifndef EV_Time_h
#define EV_Time_h
#include "EV_Time.h"
#endif

#ifndef EV_File_h
#define EV_File_h
#include "EV_File.h"
#endif

#ifndef EV_UpDown_h
#define EV_UpDown_h
#include "EV_UpDown.h"
#endif

#ifndef EV_OpenClose_h
#define EV_OpenClose_h
#include "EV_OpenClose.h"
#endif

#ifndef EV_Input_h
#define EV_Input_h
#include "EV_Input.h"
#endif

#ifndef EV_Controller_h
#define EV_Controller_h
#include "EV_Controller.h"
#endif

#ifndef EV_Simulator_h
#define EV_Simulator_h
#include "EV_Simulator.h"
#endif

#ifdef USE_THREAD
typedef struct tag_Count
{
#ifndef USE_BCC
	int cnt[2];
#else
	int cnt[8];
#endif
}Count;
#endif
```

```
/* main.c */

#include "C.h"
#include "main.h"

#ifdef USE_THREAD
Count Cnt;
int i_cnt, j_cnt;
#ifndef USE_BCC
/* 擬似スレッドの擬似インスタンス宣言 */
Thread* th[2];
#else
/* 擬似スレッドの擬似インスタンス宣言 */
Thread* th[8];
#endif
/* 疑似スレッドの疑似インスタンス宣言 */
Thread *th1[4];
Thread *th19;
Thread *th20;
Thread *th41;
Thread *th42;
Thread *th43;
#endif
#ifdef NOTUSE_FILES
EV_Status s;
#endif

/*==============================================================
```

```
 入力オブジェクト宣言
==========================================================================*/
struct EV_Input in;

/*==========================================================================
 制御オブジェクト宣言
==========================================================================*/
struct EV_Controller cntrl;

/*==========================================================================
 シミュレータオブジェクト宣言
==========================================================================*/
struct EV_Simulator simu;

void main(void)
{
#ifndef USE_BCC
    char sw[4];
    int i;
    int j;
    int f;
    int cnt;
    static char buff[64];
#endif
#ifdef USE_THREAD
    Thread *th30;
    Thread *th31;
#endif
#ifndef USE_BCC
```

```
    for(i=0;i<0x7fff;i++) {}
    H8init(); /* H8 レジスタ初期化 */
    InitSCI(); /* SCI1初期化(serial) */
    InitLCD(); /* LCD初期化 */

    /* LED OFF */
    SetLED(0,0);
    SetLED(1,0);
    SetLED(2,0);
    SetLED(3,0);

    /*-------------------------------------------------*/
    /* USB初期化 */
    InitUSB();
    INTC.ISCR &= (-1^0x20);  /* IRQ_5 ｾﾝｽｺﾝﾄﾛｰﾙ Active Low */
    INTC.IER ¦= 0x20; /* IRQ5 Enable */
    /*-------------------------------------------------*/
    EnableInterrupt(); /* 割り込み許可 ccr */

    f = 0;
    PrintSCI("CPU MODE %02X¥n",MDCR); /* MODE 6 */
    PrintLCD("¥fReady!3052"); /* '¥f'はLCDクリアに利用 */

    /* スイッチワーク初期化 */
    sw[0] = sw[1] = sw[2] = sw[3] = 0;
#else
    printf("¥nHello BCC");
#endif
#ifdef NOTUSE_FILES
```

```
    /* ファイル初期化 */
    new_EV_Status(&s);
#endif
#ifdef USE_THREAD
    /* タイマー初期化 */
    initWOVI();
    /* 2秒待機 */
    SleepMSec(2000);
    /* LEDTEST */
    th30 = new_Thread(30);
    th31 = new_Thread(31);
    Start(th30);
    Start(th31);
    for(;;)
    {
        /* タイマー呼び出し */
        wovi(5000000.0);
        if(Thread_checkStayAnother() == 1)
        {
            break;
        }
    }
#endif
    Clear();
#ifdef USE_THREAD
    /* LEDTEST */
    delete_(th30);
#endif
    PrintF(Panel, "NEXT          ");
```

```
    /* 2秒待機 */
    SleepMSec(2000);
    Clear();
#ifndef USE_BCC
    for(;;)
    {
        /*-----------------------------------------------*/
        /* ボタンが押された時にLCD,SCI,USBにメッセージを送る */
        for(j=0;j<4;j++)
        {
            i = GetSW(j);
            if( ((sw[j]^1) & i) ) /* sw = off->onで条件成立 */
            {
                SetLED(j,1); /* LED押した瞬間点灯 */
                sprintf(buff,"sw%u",j+1);
                PrintSCI("%s¥n",buff);
                /* NULL(0x00)まで送信 */
                write_buff(buff,strlen(buff)+1);
                PrintLCD(buff);
            }
            else    SetLED(j,0);
            sw[j] = i;
        }

        /*-----------------------------------------------*/
        /* HOSTからのシリアル入力をLCD,USBに送る */
        if( ScanSCI() ) /* SCIに受信データあり? */
        {
```

```
            i = GetSCI(); /* シリアル入力 */
            PutLCD(i); /* LCD出力 */
            buff[0] = i;
            write_buff(buff,1); /* USB出力 */
        }

        /*-----------------------------------------------*/
        /* USBからデータを受信した場合、そのままHOSTへリダイレクトする  */
        if( get_inbufflen() ) /* 受信データあり? */
        {
            /* データ取得(buffサイズは64byteまで) */
            cnt = read_buff(buff,64);
            PrintLCD("¥f"); /* LCDクリア */
            PrintLCD(buff); /* LCDへ表示 */
            PrintSCI(buff); /* シリアル出力 */
            write_buff(buff,cnt); /* USBへリダイレクト */
        }

        /*-----------------------------------------------*/
        /* 動作確認のため点滅 */
        SetLED(3,f);
        f ^= 1;
        for(i=0;i<10000;i++) {} /* 適当にウエイト */
    }
#else
    printf("END");
    /* 5秒待機 */
    SleepMSec(5000);
    return;
```

```
#endif
}

#ifdef USE_THREAD
/*
 * 擬似スレッドの擬似メソッド関数
 */
 /* public void paint(Graphics g)の代用 */
void Repaint(void)
{
#ifndef USE_BCC
    int i;
#else
    int i,j;
#endif
    Clear();
#ifndef USE_BCC
    for(i = 0; i < Cnt.cnt[0]; i++)
    {
        PrintF(Panel, " ");
    }
    PrintF(Panel, "<1>");
    PrintF(Panel, "¥n");
    for(i = 0; i < Cnt.cnt[1]; i++)
    {
        PrintF(Panel, " ");
    }
    PrintF(Panel, "<2>");
#else
```

```
	for(i = 0; i < 8; i++)
	{
		for(j = 0; j < Cnt.cnt[i]; j++)
		{
			printf(" ");
		}
		printf("<%d>", (i + 1));
		printf("¥n");
	}
#endif
	return;
}

/*
 * 疑似スレッドの疑似メソッド関数
 */
/* スレッドのpublic void run()の代用 */
void Run(Thread *This)
{
	int i;
	Thread *th11;
#ifdef USE_BCC
	char key = '¥0';
#else
	int j;
	char sw[4];
	/* スイッチワーク初期化 */
	sw[0] = sw[1] = sw[2] = sw[3] = 0;
#endif
```

```
        if(This->ID == 1)
        {
            Repaint();
#ifndef USE_BCC
            Cnt.cnt[0]++;
            nextRun(This, (((rand() % 9) + 10) * 100));
#else
            if(kbhit())
            {
#ifdef USE_LINUX
                key = (char) getchar();
#else
                key = (char) getche();
#endif
            }
            if(key == 'r')
            {
                Cnt.cnt[0]++;
            }
            nextRun(This, (((rand() % 9) + 10) * 30));
            while(kbhit())
            {
#ifdef USE_LINUX
                key = (char) getchar();
#else
                key = (char) getche();
#endif
            }
```

```
#endif
    }
    else if(This->ID == 2)
    {
        Repaint();
#ifndef USE_BCC
        Cnt.cnt[1]++;
        nextRun(This, (((rand() % 9) + 10) * 100));
#else
        if(kbhit())
        {
#ifdef USE_LINUX
            key = (char) getchar();
#else
            key = (char) getche();
#endif
        }
        if(key == 'l')
        {
            Cnt.cnt[1]++;
        }
        nextRun(This, (((rand() % 9) + 10) * 30));
        while(kbhit())
        {
#ifdef USE_LINUX
            key = (char) getchar();
#else
            key = (char) getche();
#endif
```

```
            }
#endif
        }
#ifdef USE_BCC
        else if(((This->ID) >= 3) && ((This->ID) <= 8))
        {
                Repaint();
                Cnt.cnt[(This->ID) - 1]++;
                nextRun(This, (((rand() % 9) + 10) * 200));
        }
#endif
        else if(This->ID == 11)
        {
            if(This->count == 1)
            {
                Clear();
                PrintF(Panel, "<1>1st         ");
                countUpNextRun(This, (1900 * 1));
            }
            else if(This->count == 2)
            {
                Clear();
                PrintF(Panel, "<1>2nd");
                PrintF(Panel, "<1>Stop   ");
                Stop(This);
            }
            else if(This->count == 3)
            {
                Clear();
```

```
            PrintF(Panel, "<1>3rd        ");
            countUpNextRun(This, (1500 * 1));
        }
        else if(This->count == 4)
        {
            Clear();
            PrintF(Panel, "<1>Stop       ");
            Stop(This);
        }
    }
    else if(This->ID == 12)
    {
        if(This->count == 1)
        {
            Clear();
            PrintF(Panel, "<2>1st        ");
            countUpNextRun(This, (1700 * 2));
        }
        else if(This->count == 2)
        {
            Clear();
            PrintF(Panel, "<2>2nd        ");
            countUpNextRun(This, (1700 * 2));
        }
        else if(This->count == 3)
        {
            Clear();
            PrintF(Panel, "<2>3rd        ");
            countUpNextRun(This, (1700 * 2));
```

```
        }
        else
        {
            Clear();
            PrintF(Panel, "<2>Stop");
            Stop(This);
            delete_(This);
        }
    }
    else if(This->ID == 13)
    {
        if(This->count == 1)
        {
            Clear();
            PrintF(Panel, "<3>1st         ");
            countUpNextRun(This, (1700 * 3));
        }
        else if(This->count == 2)
        {
            Clear();
            PrintF(Panel, "<3>2nd         ");
            countUpNextRun(This, (1700 * 3));
        }
        else if(This->count == 3)
        {
            Clear();
            PrintF(Panel, "<3>3rd         ");
            countUpNextRun(This, (1700 * 3));
```

```
        }
        else
        {
            Clear();
            PrintF(Panel, "<3>Stop");
            Stop(This);
            delete_(This);
        }
    }
    else if(This->ID == 14)
    {
        if(This->count == 1)
        {
            Clear();
            PrintF(Panel, "<4>1st         ");
            countUpNextRun(This, (1500 * 4));
        }
        else if(This->count == 2)
        {
            Clear();
            PrintF(Panel, "<4>2nd");
            countUpNextRun(This, (1500 * 4));

            PrintF(Panel, "<1>Start  ");
            th11 = Thread_Start(11);
            countUpNextRun(th11, (1500 * 1));
        }
        else if(This->count == 3)
        {
```

```
            Clear();
            PrintF(Panel, "<4>3rd         ");
            countUpNextRun(This, (1500 * 4));
        }
        else if(This->count == 4)
        {
            th11 = Thread_getThread(11);
            if(th11 != NULL)
            {
                delete_(th11);
            }

            PrintF(Panel, "<4>Sto");
            Stop(This);
            delete_(This);
        }
    }
    else if(This->ID == 19)
    {
#ifdef USE_LINUX
        nextRun(This, 4000);
#else
        nextRun(This, 1);
#endif
#ifndef USE_BCC
        /* ボタンが押された時にLCD,SCI,USBにメッセージを送る */
        for(j=0;j<4;j++)
        {
            i = GetSW(j);
```

```
            if( ((sw[j]^1) & i) ) /* sw = off->onで条件成立 */
            {
                Thread_Toggle(j + 20);
                nextRun(This, 1000);
            }
        }
#else
        key = '¥0';
        key = GetChar(key);

        if(key == '1')
        {
            Thread_Toggle(21);
        }
        else if(key == '2')
        {
            Thread_Toggle(22);
        }
        else if(key == '3')
        {
            Thread_Toggle(23);
        }
        else if(key == '4')
        {
            Thread_Toggle(24);
        }
        else if(key == '5')
        {
            Thread_Toggle(25);
```

```
        }
        else if(key == '6')
        {
            Thread_Toggle(26);
        }
        else if(key == '7')
        {
            Thread_Toggle(27);
        }
        else if(key == '8')
        {
            Thread_Toggle(28);
        }
        else if(key == '9')
        {
            Thread_Toggle(29);
        }
        else if(key == '0')
        {
            Thread_Toggle(20);
        }
#endif
    }
    else if(This->ID == 20)
    {
        PrintF(Panel, "0");
        countUpNextRun(This, 2000);
    }
```

```
    else if(This->ID == 21)
    {
        PrintF(Panel, "1");
        countUpNextRun(This, 2000);
    }
    else if(This->ID == 22)
    {
        PrintF(Panel, "2");
        countUpNextRun(This, 2000);
    }
    else if(This->ID == 23)
    {
        PrintF(Panel, "3");
        countUpNextRun(This, 2000);
    }
#ifdef USE_BCC
    else if((This->ID >= 24) && (This->ID <= 29))
    {
        printf("%d", This->ID - 20);
        nextRun(This, 2000);
    }
#endif
#ifndef USE_BCC
    else if(This->ID == 30)
    {
        if(This->count == 0)
        {
            This->count++;
            PB.DR &= 0x0e;
```

```
            nextRun(This, 1000);
        }
        else if(This->count == 1)
        {
            This->count--;
            PB.DR ¦= 0x01;
            nextRun(This, 1000);
        }
    }
#endif
    else if(This->ID == 31)
    {
        if(This->count == 0)
        {
            /* 第1部分 */
#ifdef USE_BCC
            printf("¥nThread Ready GO! There are 8 cources on a race.");
            printf("¥nThere are 80 cells to a GOAL.");
            printf("¥nFor the <1> cource, You click a 'R' button.");
            printf("¥nFor the <2> cource, You click a 'L' button.");
#endif
#ifndef USE_BCC
            countUpNextRun(This, 0);
#else
            /* 5秒待機 */
            countUpNextRun(This, 5000);
#endif
        }
        else if(This->count == 1)
```

```
        {
            /* 擬似スレッド開始 */
            PrintF(Panel, "¥n");
            PrintF(Panel, "Thread Ready GO!");
            /* 2秒待機 */
            countUpNextRun(This, 2000);
        }
        else if(This->count == 2)
        {
#ifndef USE_BCC
            /* 擬似スレッドの擬似インスタンス初期化 */
            for(i = 0; i < 2; i++)
            {
                th[i] = new_Thread(i + 1);
            }
#else
            /* 擬似スレッドの擬似インスタンス初期化 */
            for(i = 0; i < 8; i++)
            {
                th[i] = new_Thread(i + 1);
            }
#endif
            countUpNextRun(This, 1);
        }
        else if(This->count == 3)
        {
#ifndef USE_BCC
            if(Cnt.cnt[0] >= 13)
            {
```

```
                i_cnt = 1;
                This->count++;
            }
            else if(Cnt.cnt[1] >= 13)
            {
                i_cnt = 2;
                This->count++;
            }
#else
            i_cnt = Cnt.cnt[0];
            j_cnt = 0;
            for(i = 1; i < 8; i++)
            {
                if(i_cnt < Cnt.cnt[i])
                {
                    i_cnt = Cnt.cnt[i];
                    j_cnt = i;
                }
            }
            if(i_cnt >= 77) This->count++;
#endif
            nextRun(This, 1);
        }
        else if(This->count == 4)
        {
            Clear();
            if(i_cnt == 1)
            {
```

```
                PrintF(Panel, "GOAL!<1>WON    ");
            }
            else if(i_cnt == 2)
            {
                PrintF(Panel, "GOAL!<2>WON    ");
            }
#ifdef USE_BCC
            else
            {
                printf("GOAL!¥n<%d>WON", (j_cnt + 1));
            }
#endif
#ifndef USE_BCC
            delete_(th[0]);
            delete_(th[1]);
#else
            for(i = 0; i < 8; i++)
            {
                delete_(th[i]);
            }
#endif
            /* 2秒待機 */
            countUpNextRun(This, 2000);
        }
        else if(This->count == 5)
        {
            Clear();
            PrintF(Panel, "NEXT          ");
            /* 2秒待機 */
```

```
        countUpNextRun(This, 2000);
    }
    else if(This->count == 6)
    {
        Clear();
        /* 第2部分 */
        PrintF(Panel, "CountUp        ");
        /* 2秒待機 */
        countUpNextRun(This, 2000);
    }
    else if(This->count == 7)
    {
        /* 疑似スレッド開始 */
        Clear();
        /* 疑似スレッドの疑似インスタンス初期化 */
        for(i = 0; i < 4; i++)
        {
            th1[i] = new_Thread(i + 11);
        }
        countUpNextRun(This, 1);
    }
    else if(This->count == 8)
    {
        if(Thread_checkStayAnother() == 2)
        {
            This->count++;
        }
        nextRun(This, 1);
    }
```

```
else if(This->count == 9)
{
	/* 2秒待機 */
	countUpNextRun(This, 2000);
}
else if(This->count == 10)
{
	Clear();
	PrintF(Panel, "NEXT          ");
	/* 2秒待機 */
	countUpNextRun(This, 2000);
}
else if(This->count == 11)
{
	Clear();
	/* 第3部分 */
	PrintF(Panel, "Toggle        ");
	/* 2秒待機 */
	countUpNextRun(This, 2000);
}
else if(This->count == 12)
{
	th19 = new_Thread(19);
	Start(th19);
	th20 = new_Thread(20);
	Start(th20);
	countUpNextRun(This, 1);
}
else if(This->count == 13)
```

```
{
	if(Thread_checkStayAnother() == 3)
	{
		delete_(th19);
		This->count++;
	}
	nextRun(This, 1);
}
else if(This->count == 14)
{
	countUpNextRun(This, 2000);
}
else if(This->count == 15)
{
	Clear();
	PrintF(Panel, "NEXT          ");
	/* 2秒待機 */
	countUpNextRun(This, 2000);
}
else if(This->count == 16)
{
	Clear();
	/* 第4部分 */
	PrintF(Panel, "EV            ");
	/* 2秒待機 */
	countUpNextRun(This, 2000);
}
else if(This->count == 17)
```

```
        {
            /* 擬似スレッドの擬似インスタンス初期化 */
            th41 = new_Thread(41);
            th42 = new_Thread(42);
            th43 = new_Thread(43);

            delete_(This);
        }
    }
    else if(This->ID == 41)
    {
        nextRun(This, 100);
        OnInput(&in, This);
    }
    if(This->ID == 42)
    {
        nextRun(This, 100);
        OnController(&cntrl, This);
    }
    else if(This->ID == 43)
    {
        nextRun(This, 2000);
        OnSimulator(&simu, This);
    }
    return;
}

/* スレッドのコンストラクタのpublic void init()の代用 */
void Init(Thread *This)
```

```
{
    if(This->ID == 1)
    {
        Cnt.cnt[0] = 0;
        nextRun(This, (((rand() % 9) + 10) * 30));
    }
    else if(This->ID == 2)
    {
        Cnt.cnt[1] = 0;
        nextRun(This, (((rand() % 9) + 10) * 30));
    }
    else if((This->ID >= 3) && (This->ID <= 8))
    {
        Cnt.cnt[(This->ID) - 1] = 0;
        nextRun(This, (((rand() % 9) + 10) * 200));
    }
    else if(This->ID == 11)
    {
        PrintF(Panel, "<1>Init");
        countUpNextRun(This, (1500 * 1));
    }
    else if(This->ID == 12)
    {
        PrintF(Panel, "<2>Init  ");
        countUpNextRun(This, (1500 * 2));
    }
    else if(This->ID == 13)
    {
        PrintF(Panel, "¥n");
```

```
        PrintF(Panel, "<3>Init");
        countUpNextRun(This, (1500 * 3));
    }
    else if(This->ID == 14)
    {
        PrintF(Panel, "<4>Init  ");
        countUpNextRun(This, (1500 * 4));
    }
    else if(This->ID == 20)
    {
        Clear();
        PrintF(Panel, "<0>Init       ");
        PrintF(Panel, "¥n");
        countUpNextRun(This, 2000);
    }
    else if(This->ID == 21)
    {
        Clear();
        PrintF(Panel, "<1>Init       ");
        PrintF(Panel, "¥n");
        countUpNextRun(This, 2000);
    }
    else if(This->ID == 22)
    {
        Clear();
        PrintF(Panel, "<2>Init       ");
        PrintF(Panel, "¥n");
        countUpNextRun(This, 2000);
    }
```

```
    else if(This->ID == 23)
    {
        Clear();
        PrintF(Panel, "<3>Init        ");
        PrintF(Panel, "¥n");
        countUpNextRun(This, 2000);
    }
#ifdef USE_BCC
    else if((This->ID >= 24) && (This->ID <= 29))
    {
        printf("¥n<%d>Init¥n", This->ID - 20);
        nextRun(This,2000);
    }
#endif
#ifndef USE_BCC
    else if(This->ID == 30)
    {
        PB.DDR = 0xff; /* bit7..0 out  */
        PB.DR ¦= 0xff;
    }
#endif
    else if(This->ID == 41)
    {
        nextRun(This, 100);
        EV_Input(&in);
    }
    else if(This->ID == 42)
    {
```

```
        nextRun(This, 100);
        EV_Controller(&cntrl, This);
    }
    else if(This->ID == 43)
    {
        nextRun(This, 2000);
        EV_Simulator(&simu, This);
    }
    return;
}

/* スレッドのデストラクタの代用 */
void Destroy(Thread *This)
{
    if(This->ID == 11)
    {
        Clear();
        PrintF(Panel, "<1>Destroy");
    }
    else if(This->ID == 12)
    {
        PrintF(Panel, "<2>Destro");
    }
    else if(This->ID == 13)
    {
        PrintF(Panel, "<3>Destro");
    }
    else if(This->ID == 14)
    {
```

```
        PrintF(Panel, "¥n");
        PrintF(Panel, "<4>Destroy     ");
    }
    if(This->ID == 20)
    {
        Clear();
        PrintF(Panel, "<0>Destroy     ");
        PrintF(Panel, "¥n");
    }
    else if(This->ID == 21)
    {
        Clear();
        PrintF(Panel, "<1>Destroy     ");
        PrintF(Panel, "¥n");
    }
    else if(This->ID == 22)
    {
        Clear();
        PrintF(Panel, "<2>Destroy     ");
        PrintF(Panel, "¥n");
    }
    else if(This->ID == 23)
    {
        Clear();
        PrintF(Panel, "<3>Destroy     ");
        PrintF(Panel, "¥n");
    }
#ifdef USE_BCC
    else if((This->ID >= 24) && (This->ID <= 29))
```

```
    {
        printf("¥n<%d>Destroy¥n", This->ID - 20);
    }
#endif
    return;
}
#endif

#ifndef USE_BCC
/*=====================================================================
                                LEDコントロール
---------------------------------------------------------------------
    int SetLED(int no,int onoff)

    int         no              LEDナンバー 0～3
    int         onoff       0=OFF,1=ON
    戻り値                  以前のLEDの状態     (0=OFF,else=ON)

    LEDをコントロールします。
=====================================================================*/
int SetLED(int no,int onoff)
{
    int f;
    f = PB.DR&(1<<no);
    if( onoff == 0 ) PB.DR |= (1<<no); /* off (1) */
    else PB.DR &= 0xff^(1<<no); /* on (0) */
    return( f );
}
```

```
/*==========================================================================
                                    SW状態取得
---------------------------------------------------------------------
    int GetSW(int no)

    int         no              SWナンバー 0～3
    戻り値                      SWの状態(0=OFF,else=ON)

    SWの状態を取得します。
==========================================================================*/
int GetSW(int no)
{
    return( ((PA.DR&(1<<no))?0:1) );
}

/*==========================================================================
                                    H8初期化
---------------------------------------------------------------------
    BUSモードや、ポートの初期化

    P1    bit1  BUS       USB A0
    P3          BUS       USB D7..0
    P6 bit4     BUS       USB RD
    P6 bit5     BUS       USB WR
    P8 bit2     BUS       USB CS
    P9 bit5     BUS       USB INT(IRQ5)
    P9 bit3     BUS       RS232C
    P9 bit1     BUS       RS232C
```

```
	PA bit0..3	IN		SW0..3
	PB bit0..3	OUT		LED0..3  LCD DB4..7
	PB bit4		OUT			LCD RS
	PB bit7		OUT			LCD E
==========================================================*/
void H8init()
{
	BSC.ABWCR = 0x06; /* 8bit BUS MODE */

	P1.DDR = 0xff; /* all OUT */
	P2.DDR = 0xff; /* all OUT */
	P2.PCR = 0x00; /* Pull up off */
	P5.DDR = 0xff; /* all OUT */
	P5.PCR = 0x00; /* Pull up off */
	P6.DDR = 0xff; /* all OUT */
	P9.DDR = 0xdf; /* Bit5 IN */
	P8.DDR = 0xff; /* all OUT */
	PA.DDR = 0xf0; /* bit7..4 out , bit3..0 in */
	PB.DDR = 0xff; /* bit7..0 out */
}
#endif
```

実行環境

```
-I"c:\borland\Bcc55\include"
-L"c:\borland\Bcc55\lib"
```

-L"c:\borland\Bcc55\Lib"

```
# makefile.mak
CC = bcc32
LL = ilink32
INCLUDE = -I"C:\borland\bcc55\Include"
LIB = -L"C:\borland\bcc55\Lib"
CFLAGS = -O2 -w -tWC -D"USE_BCC"
LFLAGS = /Tpe
TARGET = main.exe
OBJS = Panel.obj Timer.obj EV_Time.obj EV_File.obj EV_UpDown.obj EV_OpenClose.obj EV_Input.obj
EV_Controller.obj EV_Simulator.obj main.obj
$(TARGET): $(OBJS)
	$(LL) $(LFLAGS) $(LIB) \
	$(OBJS) c0x32.obj,$(TARGET),,cw32.lib import32.lib
main.obj : main.c main.h EV_Simulator.h EV_Controller.h EV_Input.h EV_OpenClose.h EV_UpDown.h
EV_File.h EV_Time.h Timer.h Panel.h C.h
	$(CC) $(CFLAGS) -c main.c
EV_Simulator.obj : EV_Simulator.c EV_Simulator.h EV_OpenClose.h EV_UpDown.h EV_File.h EV_Time.h
Timer.h Panel.h C.h
	$(CC) $(CFLAGS) -c EV_Simulator.c
EV_Controller.obj : EV_Controller.c EV_Controller.h EV_OpenClose.h EV_UpDown.h EV_File.h EV_Time.h
Timer.h Panel.h C.h
	$(CC) $(CFLAGS) -c EV_Controller.c
EV_Input.obj : EV_Input.c EV_Input.h EV_OpenClose.h EV_UpDown.h EV_File.h EV_Time.h Timer.h Panel.h
C.h
	$(CC) $(CFLAGS) -c EV_Input.c
EV_OpenClose.obj : EV_OpenClose.c EV_OpenClose.h EV_UpDown.h EV_File.h EV_Time.h Timer.h Panel.h
C.h
	$(CC) $(CFLAGS) -c EV_OpenClose.c
EV_UpDown.obj : EV_UpDown.c EV_UpDown.h EV_File.h EV_Time.h Timer.h Panel.h C.h
	$(CC) $(CFLAGS) -c EV_UpDown.c
EV_File.obj : EV_File.c EV_File.h Panel.h C.h
	$(CC) $(CFLAGS) -c EV_File.c
EV_Time.obj : EV_Time.c EV_Time.h Timer.h Panel.h C.h
	$(CC) $(CFLAGS) -c EV_Time.c
Timer.obj : Timer.c Timer.h Panel.h C.h
	$(CC) $(CFLAGS) -c Timer.c
Panel.obj : Panel.c Panel.h C.h
	$(CC) $(CFLAGS) -c Panel.c
clean:
	del *.obj
	del main.tds
	del main.ilc
	del main.ild
	del main.ilf
	del main.ils
```

```
        .CPU 300HA
        .SECTION        V,CODE,LOCATE=H'000000
        .IMPORT _main
        .IMPORT _usb_int
        .IMPORT _InterruptITU0

        .DATA.L         _start          ;リセットベクトル
;1 Reserved
_INT_Reserved1: .DATA.L         int_error
;2 Reserved
_INT_Reserved2: .DATA.L         int_error
;3 Reserved
_INT_Reserved3: .DATA.L         int_error
;4 Reserved
_INT_Reserved4: .DATA.L         int_error
;5 Reserved
_INT_Reserved5: .DATA.L         int_error
;6 Reserved
_INT_Reserved6: .DATA.L         int_error
;7 NMI
_INT_NMI:       .DATA.L         int_error
;8 TRAP
_INT_TRAP1:     .DATA.L         int_error
;9 TRAP
_INT_TRAP2:     .DATA.L         int_error
;10 TRAP
_INT_TRAP3:     .DATA.L         int_error
;11 TRAP
```

```
_INT_TRAP4:    .DATA.L       int_error
;12 IRQ0
IRQ0:  .DATA.L       int_error
;13 IRQ1
IRQ1:  .DATA.L       int_error
;14 IRQ2
IRQ2:  .DATA.L       int_error
;15 IRQ3
IRQ3:  .DATA.L       int_error
;16 IRQ4
IRQ4:  .DATA.L       int_error
;17 IRQ5
IRQ5:  .DATA.L       usb_interrupt        ;USB割り込み
;18 Reserved
_INT_Reserved18:      .DATA.L       int_error
;19 Reserved
_INT_Reserved19:      .DATA.L       int_error
;20 WOVI
_INT_WOVI:    .DATA.L       int_error
;21 CMI
_INT_CMI:     .DATA.L       int_error
;22 Reserved
_INT_Reserved22:      .DATA.L       int_error
;23 Reserved
_INT_Reserved23:      .DATA.L       int_error
;24 IMIA0
_INT_IMIA0:    .DATA.L       int_error
;25 IMIB0
_INT_IMIB0:    .DATA.L       int_error
```

```
;26 OVI0
_INT_OVI0:     .DATA.L       _ITU_OVI_0          ;タイマ0割り込み
;27 Reserved
_INT_Reserved27:       .DATA.L       int_error
;28 IMIA1
_INT_IMIA1:    .DATA.L       int_error
;29 IMIB1
_INT_IMIB1:    .DATA.L       int_error
;30 OVI1
_INT_OVI1:     .DATA.L       int_error
;31 Reserved
_INT_Reserved31:       .DATA.L       int_error
;32 IMIA2
_INT_IMIA2:    .DATA.L       int_error
;33 IMIB2
_INT_IMIB2:    .DATA.L       int_error
;34 OVI2
_INT_OVI2:     .DATA.L       int_error
;35 Reserved
_INT_Reserved35:       .DATA.L       int_error
;36 IMIA3
_INT_IMIA3:    .DATA.L       int_error
;37 IMIB3
_INT_IMIB3:    .DATA.L       int_error
;38 OVI3
_INT_OVI3:     .DATA.L       int_error
;39 Reserved
_INT_Reserved39:       .DATA.L       int_error
;40 IMIA4
```

```
_INT_IMIA4:     .DATA.L        int_error
;41 IMIB4
_INT_IMIB4:     .DATA.L        int_error
;42 OVI4
_INT_OVI4:      .DATA.L        int_error
;43 Reserved
_INT_Reserved43:        .DATA.L        int_error
;44 DEND0A
_INT_DEND0A:    .DATA.L        int_error
;45 DEND0B
_INT_DEND0B:    .DATA.L        int_error
;46 DEND1A
_INT_DEND1A:    .DATA.L        int_error
;47 DEND1B
_INT_DEND1B:    .DATA.L        int_error
;48 Reserved
_INT_Reserved48:        .DATA.L        int_error
;49 Reserved
_INT_Reserved49:        .DATA.L        int_error
;50 Reserved
_INT_Reserved50:        .DATA.L        int_error
;51 Reserved
_INT_Reserved51:        .DATA.L        int_error
;52 ERI0
_INT_ERI0:      .DATA.L        int_error
;53 RXI0
_INT_RXI0:      .DATA.L        int_error
;54 TXI0
_INT_TXI0:      .DATA.L        int_error
```

```
;55 TEI0
_INT_TEI0:      .DATA.L         int_error
;56 ERI1
_INT_ERI1:      .DATA.L         int_error
;57 RXI1
_INT_RXI1:      .DATA.L         int_error
;58 TXI1
_INT_TXI1:      .DATA.L         int_error
;59 TEI1
_INT_TEI1:      .DATA.L         int_error
;60 ADI
_INT_ADI:       .DATA.L         int_error

;------------------------------------------------------
        .SECTION        P,CODE,ALIGN=2
_start:
        mov.l   #H'0FFFF10,er7

;初期化付きデータを使用する場合、RAMに転送する
        mov.l   #H'91C0, er0                ; 転送元(91C0)
        mov.l   #H'0FFE000, er1             ; 転送先
        mov.l   #DATA_END, er2              ; 転送終了
init_loop:
        cmp.l   er1, er2
        beq     init_end
        mov.b   @er0+, r3l
        mov.b   r3l, @er1
        inc.l   #1, er1
```

```
        bra     init_loop
init_end:
        jsr     @_main

; 割り込み未使用
int_error:
        rte

usb_interrupt:
        push.l  er0
        push.l  er1
        push.l  er2
        push.l  er3
        push.l  er4
        push.l  er5
        push.l  er6
        jsr     @_usb_int
        pop.l   er6
        pop.l   er5
        pop.l   er4
        pop.l   er3
        pop.l   er2
        pop.l   er1
        pop.l   er0
        rte

_ITU_OVI_0:
        push.l  er0
        push.l  er1
```

```
        push.l  er2
        push.l  er3
        push.l  er4
        push.l  er5
        push.l  er6
        jsr @_InterruptITU0
        pop.l   er6
        pop.l   er5
        pop.l   er4
        pop.l   er3
        pop.l   er2
        pop.l   er1
        pop.l   er0
        rte

;---------------------------------------------------------
; 割り込み許可、禁止ルーチン

        .EXPORT _EnableInterrupt,_DisableInterrupt
_EnableInterrupt:
        andc.b  #H'3f,ccr
        rts
_DisableInterrupt:
        orc.b   #H'c0,ccr
        rts

;---------------------------------------------------------
        .SECTION        D,DATA
```

```
        .SECTION        B,DATA
DATA_END:       .RES.W          1

        .END
```

```
OUTPUT c_thread
PRINT c_thread
INPUT asmfile, main, EV_Simulator, EV_Controller, EV_Input, EV_OpenClose, EV_UpDown, EV_File,
EV_Time, Timer, Panel, sci, lcd, usb
LIB c:\h8\akic\c38hab
START R(0FFE000), P(200), D(91C0), C(9200)
ROM (D, R)
EXIT
```

```
@rem build.bat
C:
set bccDir="C:\borland\bcc55\Bin"
set akih8asmDir="c:\h8\akiasm"
set akih8cDir="c:\h8\akic"
set path=%bccDir%;%path%
set path=%akih8cDir%;%akih8asmDir%;%path%
set CurrentDir="%~dp0"
cd %CurrentDir%
del error.txt
make -f makefile.mak >> error.txt
make -f makefile.mak clean >> error.txt
cc38h -cpu=300ha -include=%akih8cDir% Panel.c >> error.txt
cc38h -cpu=300ha -include=%akih8cDir% Timer.c >> error.txt
cc38h -cpu=300ha -include=%akih8cDir% EV_Time.c >> error.txt
cc38h -cpu=300ha -include=%akih8cDir% EV_File.c >> error.txt
cc38h -cpu=300ha -include=%akih8cDir% EV_UpDown.c >> error.txt
cc38h -cpu=300ha -include=%akih8cDir% EV_OpenClose.c >> error.txt
cc38h -cpu=300ha -include=%akih8cDir% EV_Input.c >> error.txt
cc38h -cpu=300ha -include=%akih8cDir% EV_Controller.c >> error.txt
cc38h -cpu=300ha -include=%akih8cDir% EV_Simulator.c >> error.txt
cc38h -cpu=300ha -include=%akih8cDir% main.c >> error.txt
cc38h -cpu=300ha -include=%akih8cDir% usb.c >> error.txt
cc38h -cpu=300ha -include=%akih8cDir% sci.c >> error.txt
cc38h -cpu=300ha -include=%akih8cDir% lcd.c >> error.txt
a38h asmfile.src >> error.txt
l38h -subcommand=linkfile.sub >> error.txt
c38h c_thread >> error.txt
del %CurrentDir%*.obj >> error.txt
del %CurrentDir%c_thread.abs >> error.txt
error.txt
exit
```

```
#!/bin/bash
cd `dirname $0`
find $PWD -name linuxBuild.bash
rm ./linuxError.txt
gcc -D"USE_LINUX" -o linuxExe main.c EV_Simulator.c EV_Controller.c EV_Input.c EV_OpenClose.c
EV_UpDown.c EV_File.c EV_Time.c Timer.c Panel.c &>>./linuxError.txt
exit
```

```
#!/bin/bash
cd `dirname $0`
find $PWD -name linuxStart.bash
./linuxExe
exit
```

実行環境状態ファイル

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出力ファイル

```
 Start         Length     Name                   Class
0001:00401000 00000F618H _TEXT                  CODE
0002:00411000 000003680H _DATA                  DATA
0003:00414680 000000B14H _BSS                   BSS
0004:00000000 0000000A4H _TLS                   TLS
```

PROGRAM NAME =

```
1                    1          .CPU 300HA
2 000000             2          .SECTION      V,CODE,LOCATE=H'000000
3                    3          .IMPORT _main
4                    4          .IMPORT _usb_int
5                    5          .IMPORT _InterruptITU0
6                    6
7 000000 00000000    7          .DATA.L       _start       ;リセットベクトル
8                    8     ;1 Reserved
9 000004 00000000    9     _INT_Reserved1: .DATA.L       int_error
10                   10    ;2 Reserved
11 000008 00000000   11    _INT_Reserved2: .DATA.L       int_error
12                   12    ;3 Reserved
13 00000C 00000000   13    _INT_Reserved3: .DATA.L       int_error
14                   14    ;4 Reserved
15 000010 00000000   15    _INT_Reserved4: .DATA.L       int_error
16                   16    ;5 Reserved
17 000014 00000000   17    _INT_Reserved5: .DATA.L       int_error
18                   18    ;6 Reserved
19 000018 00000000   19    _INT_Reserved6: .DATA.L       int_error
20                   20    ;7 NMI
21 00001C 00000000   21    _INT_NMI:     .DATA.L       int_error
22                   22    ;8 TRAP
23 000020 00000000   23    _INT_TRAP1:   .DATA.L       int_error
24                   24    ;9 TRAP
```

```
25 000024 00000000          25    _INT_TRAP2:    .DATA.L       int_error
26                          26    ;10 TRAP
27 000028 00000000          27    _INT_TRAP3:    .DATA.L       int_error
28                          28    ;11 TRAP
29 00002C 00000000          29    _INT_TRAP4:    .DATA.L       int_error
30                          30    ;12 IRQ0
31 000030 00000000          31    IRQ0:  .DATA.L       int_error
32                          32    ;13 IRQ1
33 000034 00000000          33    IRQ1:  .DATA.L       int_error
34                          34    ;14 IRQ2
35 000038 00000000          35    IRQ2:  .DATA.L       int_error
36                          36    ;15 IRQ3
37 00003C 00000000          37    IRQ3:  .DATA.L       int_error
38                          38    ;16 IRQ4
39 000040 00000000          39    IRQ4:  .DATA.L       int_error
40                          40    ;17 IRQ5
41 000044 00000000          41    IRQ5:  .DATA.L       usb_interrupt       ;USB割り込み
42                          42    ;18 Reserved
43 000048 00000000          43    _INT_Reserved18:      .DATA.L       int_error
44                          44    ;19 Reserved
45 00004C 00000000          45    _INT_Reserved19:      .DATA.L       int_error
46                          46    ;20 WOVI
47 000050 00000000          47    _INT_WOVI:     .DATA.L       int_error
48                          48    ;21 CMI
49 000054 00000000          49    _INT_CMI:      .DATA.L       int_error
50                          50    ;22 Reserved
51 000058 00000000          51    _INT_Reserved22:      .DATA.L       int_error
52                          52    ;23 Reserved
53 00005C 00000000          53    _INT_Reserved23:      .DATA.L       int_error
```

```
  54                    54    ;24 IMIA0
  55 000060 00000000          55    _INT_IMIA0:    .DATA.L       int_error
  56                    56    ;25 IMIB0
  57 000064 00000000          57    _INT_IMIB0:    .DATA.L       int_error
*** H8/300H ASSEMBLER (Evaluation software) Ver.1.0 ***     12/13/17 18:41:00
PAGE    2
PROGRAM NAME =


  58                    58    ;26 OVI0
  59 000068 00000000          59    _INT_OVI0:     .DATA.L       _ITU_OVI_0          ;タイマ0割り込み
  60                    60    ;27 Reserved
  61 00006C 00000000          61    _INT_Reserved27:       .DATA.L       int_error
  62                    62    ;28 IMIA1
  63 000070 00000000          63    _INT_IMIA1:    .DATA.L       int_error
  64                    64    ;29 IMIB1
  65 000074 00000000          65    _INT_IMIB1:    .DATA.L       int_error
  66                    66    ;30 OVI1
  67 000078 00000000          67    _INT_OVI1:     .DATA.L       int_error
  68                    68    ;31 Reserved
  69 00007C 00000000          69    _INT_Reserved31:       .DATA.L       int_error
  70                    70    ;32 IMIA2
  71 000080 00000000          71    _INT_IMIA2:    .DATA.L       int_error
  72                    72    ;33 IMIB2
  73 000084 00000000          73    _INT_IMIB2:    .DATA.L       int_error
  74                    74    ;34 OVI2
  75 000088 00000000          75    _INT_OVI2:     .DATA.L       int_error
  76                    76    ;35 Reserved
  77 00008C 00000000          77    _INT_Reserved35:       .DATA.L       int_error
  78                    78    ;36 IMIA3
```

```
 79 000090 00000000          79    _INT_IMIA3:    .DATA.L       int_error
 80                          80    ;37 IMIB3
 81 000094 00000000          81    _INT_IMIB3:    .DATA.L       int_error
 82                          82    ;38 OVI3
 83 000098 00000000          83    _INT_OVI3:     .DATA.L       int_error
 84                          84    ;39 Reserved
 85 00009C 00000000          85    _INT_Reserved39:       .DATA.L       int_error
 86                          86    ;40 IMIA4
 87 0000A0 00000000          87    _INT_IMIA4:    .DATA.L       int_error
 88                          88    ;41 IMIB4
 89 0000A4 00000000          89    _INT_IMIB4:    .DATA.L       int_error
 90                          90    ;42 OVI4
 91 0000A8 00000000          91    _INT_OVI4:     .DATA.L       int_error
 92                          92    ;43 Reserved
 93 0000AC 00000000          93    _INT_Reserved43:       .DATA.L       int_error
 94                          94    ;44 DEND0A
 95 0000B0 00000000          95    _INT_DEND0A:   .DATA.L       int_error
 96                          96    ;45 DEND0B
 97 0000B4 00000000          97    _INT_DEND0B:   .DATA.L       int_error
 98                          98    ;46 DEND1A
 99 0000B8 00000000          99    _INT_DEND1A:   .DATA.L       int_error
100                         100    ;47 DEND1B
101 0000BC 00000000         101    _INT_DEND1B:   .DATA.L       int_error
102                         102    ;48 Reserved
103 0000C0 00000000         103    _INT_Reserved48:       .DATA.L       int_error
104                         104    ;49 Reserved
105 0000C4 00000000         105    _INT_Reserved49:       .DATA.L       int_error
106                         106    ;50 Reserved
107 0000C8 00000000         107    _INT_Reserved50:       .DATA.L       int_error
```

```
 108                    108    ;51 Reserved
 109 0000CC 00000000        109    _INT_Reserved51:      .DATA.L       int_error
 110                    110    ;52 ERI0
 111 0000D0 00000000        111    _INT_ERI0:    .DATA.L       int_error
 112                    112    ;53 RXI0
 113 0000D4 00000000        113    _INT_RXI0:    .DATA.L       int_error
 114                    114    ;54 TXI0
*** H8/300H ASSEMBLER (Evaluation software) Ver.1.0 ***    12/13/17 18:41:00
PAGE    3
PROGRAM NAME =

 115 0000D8 00000000        115    _INT_TXI0:    .DATA.L       int_error
 116                    116    ;55 TEI0
 117 0000DC 00000000        117    _INT_TEI0:    .DATA.L       int_error
 118                    118    ;56 ERI1
 119 0000E0 00000000        119    _INT_ERI1:    .DATA.L       int_error
 120                    120    ;57 RXI1
 121 0000E4 00000000        121    _INT_RXI1:    .DATA.L       int_error
 122                    122    ;58 TXI1
 123 0000E8 00000000        123    _INT_TXI1:    .DATA.L       int_error
 124                    124    ;59 TEI1
 125 0000EC 00000000        125    _INT_TEI1:    .DATA.L       int_error
 126                    126    ;60 ADI
 127 0000F0 00000000        127    _INT_ADI:     .DATA.L       int_error
 128                    128
 129                    129    ;------------------------------------------------------
 130 000000                 130            .SECTION      P,CODE,ALIGN=2
 131 000000                 131    _start:
```

```
132 000000 7A0700FFFF10      132          mov.l   #H'0FFFF10,er7
133                          133
134                          134    ;初期化付きデータを使用する場合、RAMに転送する
135 000006 7A00000091C0      135          mov.l   #H'91C0, er0              ; 転送元(91C0)
136 00000C 7A0100FFE000      136          mov.l   #H'0FFE000, er1            ; 転送先
137 000012 7A0200000000      137          mov.l   #DATA_END, er2             ; 転送終了
138 000018                138    init_loop:
139 000018 1F92           139          cmp.l   er1, er2
140 00001A 58700008       140          beq     init_end
141 00001E 6C0B           141          mov.b   @er0+, r3l
142 000020 689B           142          mov.b   r3l, @er1
143 000022 0B71           143          inc.l   #1, er1
144 000024 40F2           144          bra     init_loop
145 000026                145    init_end:
146 000026 5E000000       146          jsr     @_main
147                          147
148                          148    ; 割り込み未使用
149 00002A                149    int_error:
150 00002A 5670           150          rte
151                          151
152 00002C                152    usb_interrupt:
153 00002C 01006DF0       153          push.l  er0
154 000030 01006DF1       154          push.l  er1
155 000034 01006DF2       155          push.l  er2
156 000038 01006DF3       156          push.l  er3
157 00003C 01006DF4       157          push.l  er4
158 000040 01006DF5       158          push.l  er5
159 000044 01006DF6       159          push.l  er6
160 000048 5E000000       160          jsr     @_usb_int
```

```
  161 00004C 01006D76          161          pop.l   er6
  162 000050 01006D75          162          pop.l   er5
  163 000054 01006D74          163          pop.l   er4
  164 000058 01006D73          164          pop.l   er3
  165 00005C 01006D72          165          pop.l   er2
  166 000060 01006D71          166          pop.l   er1
  167 000064 01006D70          167          pop.l   er0
  168 000068 5670            168          rte
  169                    169
  170 00006A                 170     _ITU_OVI_0:
  171 00006A 01006DF0          171          push.l  er0
*** H8/300H ASSEMBLER (Evaluation software) Ver.1.0 ***     12/13/17 18:41:00
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PROGRAM NAME =


  172 00006E 01006DF1          172          push.l  er1
  173 000072 01006DF2          173          push.l  er2
  174 000076 01006DF3          174          push.l  er3
  175 00007A 01006DF4          175          push.l  er4
  176 00007E 01006DF5          176          push.l  er5
  177 000082 01006DF6          177          push.l  er6
  178 000086 5E000000          178          jsr @_InterruptITU0
  179 00008A 01006D76          179          pop.l   er6
  180 00008E 01006D75          180          pop.l   er5
  181 000092 01006D74          181          pop.l   er4
  182 000096 01006D73          182          pop.l   er3
  183 00009A 01006D72          183          pop.l   er2
  184 00009E 01006D71          184          pop.l   er1
  185 0000A2 01006D70          185          pop.l   er0
```

```
 186 0000A6 5670            186         rte
 187                  187
 188                  188   ;---------------------------------------------------------
 189                  189   ; 割り込み許可、禁止ルーチン
 190                  190
 191                  191         .EXPORT _EnableInterrupt,_DisableInterrupt
 192 0000A8              192   _EnableInterrupt:
 193 0000A8 063F          193         andc.b  #H'3f,ccr
 194 0000AA 5470          194         rts
 195 0000AC               195   _DisableInterrupt:
 196 0000AC 04C0          196         orc.b   #H'c0,ccr
 197 0000AE 5470          197         rts
 198                  198
 199                  199   ;---------------------------------------------------------
 200 000000               200         .SECTION      D,DATA
 201                  201
 202                  202
 203 000000               203         .SECTION      B,DATA
 204 000000 00000002        204   DATA_END:     .RES.W        1
 205                  205
 206                  206         .END
 *****TOTAL ERRORS     0
 *****TOTAL WARNINGS    0
*** H8/300H ASSEMBLER (Evaluation software) Ver.1.0 ***    12/13/17 18:41:00
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 *** CROSS REFERENCE LIST

 NAME                    SECTION  ATTR VALUE          SEQUENCE
```

```
B                       B       SCT  00000000    203*
D                       D       SCT  00000000    200*
DATA_END                        B          00000000    137   204*
IRQ0                    V          00000030    31*
IRQ1                    V          00000034    33*
IRQ2                    V          00000038    35*
IRQ3                    V          0000003C    37*
IRQ4                    V          00000040    39*
IRQ5                    V          00000044    41*
P                       P       SCT  00000000    130*
V                       V       SCT  00000000     2*
_DisableInterrupt               P       EXPT 000000AC    191   195*
_EnableInterrupt                P       EXPT 000000A8    191   192*
_INT_ADI                V          000000F0    127*
_INT_CMI                V          00000054     49*
_INT_DEND0A                V          000000B0     95*
_INT_DEND0B                V          000000B4     97*
_INT_DEND1A                V          000000B8     99*
_INT_DEND1B                V          000000BC    101*
_INT_ERI0               V          000000D0    111*
_INT_ERI1               V          000000E0    119*
_INT_IMIA0                 V          00000060     55*
_INT_IMIA1                 V          00000070     63*
_INT_IMIA2                 V          00000080     71*
_INT_IMIA3                 V          00000090     79*
_INT_IMIA4                 V          000000A0     87*
_INT_IMIB0                 V          00000064     57*
```

```
_INT_IMIB1              V       00000074    65*
_INT_IMIB2              V       00000084    73*
_INT_IMIB3              V       00000094    81*
_INT_IMIB4              V       000000A4    89*
_INT_NMI                V       0000001C    21*
_INT_OVI0               V       00000068    59*
_INT_OVI1               V       00000078    67*
_INT_OVI2               V       00000088    75*
_INT_OVI3               V       00000098    83*
_INT_OVI4               V       000000A8    91*
_INT_RXI0               V       000000D4   113*
_INT_RXI1               V       000000E4   121*
_INT_Reserved1          V       00000004    9*
_INT_Reserved18         V       00000048    43*
_INT_Reserved19         V       0000004C    45*
_INT_Reserved2          V       00000008    11*
_INT_Reserved22         V       00000058    51*
_INT_Reserved23         V       0000005C    53*
_INT_Reserved27         V       0000006C    61*
_INT_Reserved3          V       0000000C    13*
_INT_Reserved31         V       0000007C    69*
_INT_Reserved35         V       0000008C    77*
_INT_Reserved39         V       0000009C    85*
_INT_Reserved4          V       00000010    15*
_INT_Reserved43         V       000000AC    93*
_INT_Reserved48         V       000000C0   103*
_INT_Reserved49         V       000000C4   105*
*** H8/300H ASSEMBLER (Evaluation software) Ver.1.0 ***     12/13/17 18:41:00
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```

*** CROSS REFERENCE LIST

NAME SECTION ATTR VALUE SEQUENCE

_INT_Reserved5 V 00000014 17*
_INT_Reserved50 V 000000C8 107*
_INT_Reserved51 V 000000CC 109*
_INT_Reserved6 V 00000018 19*
_INT_TEI0 V 000000DC 117*
_INT_TEI1 V 000000EC 125*
_INT_TRAP1 V 00000020 23*
_INT_TRAP2 V 00000024 25*
_INT_TRAP3 V 00000028 27*
_INT_TRAP4 V 0000002C 29*
_INT_TXI0 V 000000D8 115*
_INT_TXI1 V 000000E8 123*
_INT_WOVI V 00000050 47*
_ITU_OVI_0 P 0000006A 59 170*
_InterruptITU0 IMPT 00000000 5 178
_main IMPT 00000000 3 146
_start P 00000000 7 131*
_usb_int IMPT 00000000 4 160
init_end P 00000026 140 145*
init_loop P 00000018 138* 144
int_error P 0000002A 9 11 13 15 17 19 21 23 25 27 29 31
33 35 37 39 43 45 47 49 51 53 55 57
61 63 65 67 69 71 73 75 77 79 81 83
85 87 89 91 93 95 97 99 101 103 105 107

109 111 113 115 117 119 121 123 125 127 149*

usb_interrupt P 0000002C 41 152*

*** H8/300H ASSEMBLER (Evaluation software) Ver.1.0 *** 12/13/17 18:41:00

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*** SECTION DATA LIST

SECTION	ATTRIBUTE	SIZE	START
V	ABS-CODE	00000F4	000000
P	REL-CODE	00000B0	
D	REL-DATA	0000000	
B	REL-DATA	0000002	

S00E0000635F7468726561644D4F54C8
S1130000000002000000022A0000022A0000022A67
S1130010000022A0000022A0000022A0000022A2D
S1130020000022A0000022A0000022A0000022A1D
S10B00300000022A0000022A6D
S1130038000022A0000022A0000022A0000022C03
S1130048000022A0000022A0000022A0000022AF5
S1130058000022A0000022A0000022A0000022AE5
S10B00680000026A0000022AF5
S1130070000022A0000022A0000022A0000022ACD
S1130080000022A0000022A0000022A0000022ABD
S1130090000022A0000022A0000022A0000022AAD
S10B00A00000022A0000022AFD
S11300A80000022A0000022A0000022A0000022A95
S11300B80000022A0000022A0000022A0000022A85
S11300C80000022A0000022A0000022A0000022A75
S10B00D80000022A0000022AC5
S11300E00000022A0000022A0000022A0000022A5D
S10700F00000022ADD
S11302007A0700FFFF107A00000091C07A0100FF17
S1130210E0007A0200FFE0101F92587000086C0B98
S1130220689B0B7140F25E0002B0567001006DF0E6
S113023001006DF101006DF201006DF301006DF439
S113024001006DF501006DF65E004A2801006D7630
S113025001006D7501006D7401006D7301006D7215
S113026001006D7101006D70567001006DF00100A9
S11302706DF101006DF201006DF301006DF40100F9
S11302806DF501006DF65E00440801006D76010016
S11302906D7501006D7401006D7301006D720100D5
S11302A06D7101006D705670063F547004C0547038
S11302B05E005B3E7A370000000A790B00011933B8
S11302C00FF47A0600FFE19419550B5579257FFF4A
S11302D04DF85C000F6E5E0045A45E0047240D38A8
S11302E00D305C000EEA0D380DB05C000EE20D38E7
S11302F0790000025C000ED80D38790000035C0021
S11303000ECE5E0048CA7FF472507FF570505E00D7
S113031002A80D3228F117506DF07A000000920008
S113032001006DF05E0045F40B970B877A00000027
S1130330920F01006DF05E0047F80B9718886EC8A6
S113034000036EC800026EC8000168C87A0000FF8F
S1130350E0465E0039E65E0044347A00000007D0D0
S11303605E003F0C7900001E5E0040020F8579009D
S1130370001F5E00400201006FF000040FD05E001A
S113038041BE01006F7000045E0041BE01006B209E
S11303900000948A01006DF001006B200000948638
S11303A001006DF05E0044300B970B975E00422412
S11303B07920000146D65E00444E0FD05E00418A8C
S11303C07A010000921B0D305E0044767A00000033
S11303D007D05E003F0C5E00444E19550D505C0083
S11303E00E3C0D0D0D5117F10AC16819D90117D132
S11303F0660147540DB80D505C000DD40D5009B083
S11304006DF07A000000922C01006DF00FE05E00A9
S113041053E00B970B8701006DF67A0000009231D1
S113042001006DF05E0045F40B970B970FE05E0043
S1130430548409B00D010FE05E00525C01006DF6BB
S11304405E0047F80B9740080D380D505C000D8097
S11304500DD017F50FC10AD168980B557925000403

S108046058D0FF785E97
S11304650045E40D0047165E0045D417D00D055E23
S11304750047A868ED0DB10FE05E00525C5E0053C6
S11304857E0D004738790100400FE05E0053200DD3
S1130495057A010000923501006DF15E0047F80B06
S11304A59701006DF65E0047F80B9701006DF65E48
S11304B50045F40B970D510FE05E00525C0D287952
S11304C50000035C000D040D20795000010D021995
S11304D5550B55792527104DF85A0003DA54705EEC
S11304E5005B3E7A0500FFE01219665E00444E1973
S11304F5EE400E7A01000092370D605E0044760BE4
S11305055E69501D0E4DEC7A01000092390D605E57
S11305150044767A010000923D0D605E0044761931
S1130525EE400E7A01000092370D605E0044760BB3
S11305355E6F5000021D0E4DEA7A010000923F0DD9
S1130545605E0044765E005B1C54705E005B3E7A21
S1130555370000000A7A03000000017A040000074F
S1130565D019550F8618886EF800036EF800026ED1
S1130575F8000168F869607920000146365C00FFE0
S11305855E7A0000FFE01269010B5169815E005339
S1130595A617F07902000901D053207918000A79CA
S11305A5000064528017F00F810FE05E003F9E5AF2
S11305B5000E2269607920000246365C00FF207A2E
S11305C50000FFE01469010B5169815E0053A61712
S11305D5F07902000901D053207918000A79000047
S11305E564528017F00F810FE05E003F9E5A000EA4
S11305F52269607920000B586000B601006F600026
S1060605127A2043
S10A06080000000146205E23
S113060F00444E7A01000092430D505E0044767A07
S113061F010000076C0FE05E003FE25A000E22015B
S113062F006F6000127A200000000246265E00442D
S113063F4E7A01000092540D505E0044767A010009
S113064F00925B0D505E0044760FE05E0041EC5A62
S113065F000E2201006F6000127A20000000034693
S113066F1E5E00444E7A01000092660D505E0044F8
S113067F767A01000005DC0FE05E003FE2402401C3
S113068F006F6000127A200000000446165E0044DB
S106069F4E7A018C
S11306A2000092770D505E0044760FE05E0041EC4D
S11306B25A000E2269607920000C586000A80100DC
S11306C26F6000127A200000000146205E00444E53
S11306D27A01000092880D505E0044767A01000090
S11306E20D480FE05E003FE25A000E2201006F60E8
S11306F200127A200000000246205E00444E7A0176
S1130702000092990D505E0044767A0100000D4874
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H8/300H LINKAGE EDITOR (Evaluation software) Ver.1.0

LINK COMMAND LINE

LNK -subcommand=linkfile.sub

LINK SUBCOMMANDS

```
OUTPUT c_thread
PRINT c_thread
INPUT asmfile, main, EV_Simulator, EV_Controller, EV_Input, EV_OpenClose, EV_UpDown, EV_File,
EV_Time, Timer, Panel, sci, lcd, usb
LIB c:\h8\akic\c38hab
START R(0FFE000), P(200), D(91C0), C(9200)
ROM (D, R)
EXIT
```


*** LINKAGE EDITOR LINK MAP LIST ***

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SECTION   NAME                START     -     END       LENGTH
                                  UNIT NAME                  MODULE NAME

ATTRIBUTE :  CODE  NOSHR

V                      H'00000000   -   H'000000F3   H'000000F4
                                  asmfile                    asmfile

* TOTAL ADDRESS *           H'00000000   -   H'000000F3   H'000000F4

ATTRIBUTE :  CODE  NOSHR

P                      H'00000200   -   H'000002AF   H'000000B0
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                                  main                       main
                       H'00001270   -   H'00001E93   H'00000C24
                                  EV_Simulator               EV_Simulator
                       H'00001E94   -   H'000024CB   H'00000638
                                  EV_Controller              EV_Controller
                       H'000024CC   -   H'00002915   H'0000044A
                                  EV_Input                   EV_Input
                       H'00002916   -   H'0000318D   H'00000878
                                  EV_OpenClose               EV_OpenClose
                       H'0000318E   -   H'000039E5   H'00000858
                                  EV_UpDown                  EV_UpDown
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                H'000039E6   -   H'00003DA1   H'000003BC
                                 EV_File              EV_File
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                                 EV_Time              EV_Time
                H'00003EFA   -   H'0000444D   H'00000554
                                 Timer                Timer
                H'0000444E   -   H'000045A3   H'00000156
                                 Panel                Panel
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                                 sci                  sci
                H'00004676   -   H'000048B3   H'0000023E
                                 lcd                  lcd
                H'000048B4   -   H'000053A5   H'00000AF2
                                 usb                  usb
                H'000053A6   -   H'000053DF   H'0000003A
                                 rand                 rand
                H'000053E0   -   H'0000543D   H'0000005E
                                 sprintf              sprintf
                H'0000543E   -   H'00005467   H'0000002A
                                 strcmp               strcmp
                H'00005468   -   H'00005483   H'0000001C
                                 strcpy               strcpy
                H'00005484   -   H'0000549F   H'0000001C
                                 strlen               strlen


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                   ***    LINKAGE EDITOR LINK MAP LIST     ***


SECTION   NAME              START    -    END      LENGTH
                                 UNIT NAME              MODULE NAME


ATTRIBUTE :   CODE  NOSHR

P                H'000054A0   -   H'000054CF   H'00000030
                                 vsprintf             vsprintf
                H'000054D0   -   H'000057A9   H'000002DA
                                 addd3                addd3
                H'000057AA   -   H'000059DB   H'00000232
                                 divd3                divd3
                H'000059DC   -   H'00005A55   H'0000007A
                                 dtol3                dtol3
                H'00005A56   -   H'00005A61   H'0000000C
                                 eqd3                 eqd3
                H'00005A62   -   H'00005A71   H'00000010
                                 ged3                 ged3
                H'00005A72   -   H'00005A81   H'00000010
                                 ltd3                 ltd3
                H'00005A82   -   H'00005AC7   H'00000046
                                 ltod3                ltod3
                H'00005AC8   -   H'00005AE5   H'0000001E
                                 mv83                 mv83
                H'00005AE6   -   H'00005B0D   H'00000028
```

```
                    mvn3                    mvn3
H'00005B0E  -  H'00005B1B  H'0000000E
                    ned3                    ned3
H'00005B1C  -  H'00005B3D  H'00000022
                    spregld3                spregld3
H'00005B3E  -  H'00005B65  H'00000028
                    spregsv3                spregsv3
H'00005B66  -  H'00007913  H'00001DAE
                    _fmtout                 _fmtout
H'00007914  -  H'000079CF  H'000000BC
                    cmpd3                   cmpd3
H'000079D0  -  H'000079F5  H'00000026
                    divl3                   divl3
H'000079F6  -  H'00007A15  H'00000020
                    mull3                   mull3
H'00007A16  -  H'00007DFB  H'000003E6
                    _dti                    _dti
H'00007DFC  -  H'00007F9F  H'000001A4
                    _its                    _its
H'00007FA0  -  H'00007FF9  H'0000005A
                    memcpy                  memcpy
H'00007FFA  -  H'00008035  H'0000003C
                    divul3                  divul3
H'00008036  -  H'0000805D  H'00000028
                    _allzero                _allzero
H'0000805E  -  H'00008155  H'000000F8
                    _calcnpw                _calcnpw


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    ***    LINKAGE EDITOR LINK MAP LIST    ***


SECTION  NAME              START    -    END      LENGTH
                    UNIT NAME                MODULE NAME


ATTRIBUTE :  CODE  NOSHR

P                  H'00008156  -  H'000081F9  H'000000A4
                    _log10                  _log10
H'000081FA  -  H'00008271  H'00000078
                    _lsfts                  _lsfts
H'00008272  -  H'0000829F  H'0000002E
                    _pow5                   _pow5
H'000082A0  -  H'00008319  H'0000007A
                    _rsfts                  _rsfts
H'0000831A  -  H'000083C5  H'000000AC
                    _sub                    _sub
H'000083C6  -  H'00008469  H'000000A4
                    _unpack                 _unpack
H'0000846A  -  H'000084A7  H'0000003E
                    memcmp                  memcmp
H'000084A8  -  H'0000852F  H'00000088
                    _mult64                 _mult64
```

H'00008530 - H'00008691 H'00000162
_power _power
H'00008692 - H'0000877B H'000000EA
_rnd _rnd
H'0000877C - H'00008817 H'0000009C
_setsbit _setsbit
H'00008818 - H'0000891D H'00000106
frexp frexp
H'0000891E - H'00008A53 H'00000136
modf modf
H'00008A54 - H'00008A75 H'00000022
dslc3 dslc3
H'00008A76 - H'00008A97 H'00000022
dsruc3 dsruc3
H'00008A98 - H'00008ACD H'00000036
itod3 itod3
H'00008ACE - H'00008DBB H'000002EE
muld3 muld3
H'00008DBC - H'00008E0D H'00000052
_duchek _duchek
H'00008E0E - H'00008E5F H'00000052
_lsft _lsft
H'00008E60 - H'00008FED H'0000018E
_mult _mult
H'00008FEE - H'00009089 H'0000009C
_pow10 _pow10
H'0000908A - H'000090D1 H'00000048
_add _add
H'000090D2 - H'00009101 H'00000030
memset memset

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*** LINKAGE EDITOR LINK MAP LIST ***

SECTION NAME START - END LENGTH
UNIT NAME MODULE NAME

* TOTAL ADDRESS * H'00000200 - H'00009101 H'00008F02

ATTRIBUTE : DATA NOSHR ROM

D H'000091C0 - H'000091C0 H'00000000
asmfile asmfile
H'000091C0 - H'000091CF H'00000010
usb usb

* TOTAL ADDRESS * H'000091C0 - H'000091CF H'00000010

ATTRIBUTE : DATA NOSHR

C H'00009200 - H'0000948D H'0000028E

```
                    main                    main
          H'0000948E  -  H'000095E9  H'0000015C
                    EV_Simulator            EV_Simulator
          H'000095EA  -  H'000095F5  H'0000000C
                    EV_Controller           EV_Controller
          H'000095F6  -  H'00009656  H'00000061
                    EV_Input                EV_Input
          H'00009658  -  H'000096A3  H'0000004C
                    EV_OpenClose            EV_OpenClose
          H'000096A4  -  H'000096E6  H'00000043
                    EV_UpDown               EV_UpDown
          H'000096E8  -  H'00009767  H'00000080
                    EV_File                 EV_File
          H'00009768  -  H'0000976F  H'00000008
                    EV_Time                 EV_Time
          H'00009770  -  H'000097A7  H'00000038
                    Timer                   Timer
          H'000097A8  -  H'000097B2  H'0000000B
                    Panel                   Panel
          H'000097B4  -  H'0000986D  H'000000BA
                    usb                     usb
          H'0000986E  -  H'00009875  H'00000008
                    _fmtout                 _fmtout
          H'00009876  -  H'00009975  H'00000100
                    _ctype                  _ctype
          H'00009976  -  H'000099FD  H'00000088
                    _its                    _its
          H'000099FE  -  H'00009A05  H'00000008
                    _log10                  _log10
          H'00009A06  -  H'00009AE5  H'000000E0
                    _pow5                   _pow5
          H'00009AE6  -  H'00009BE9  H'00000104
                    _power                  _power


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             ***    LINKAGE EDITOR LINK MAP LIST     ***


SECTION   NAME              START    -    END      LENGTH
                    UNIT NAME               MODULE NAME


ATTRIBUTE :  DATA  NOSHR

C                   H'00009BEA  -  H'00009BF1  H'00000008
                    frexp                   frexp
          H'00009BF2  -  H'00009BF9  H'00000008
                    modf                    modf

* TOTAL ADDRESS *          H'00009200  -  H'00009BF9  H'000009FA


ATTRIBUTE :  DATA  NOSHR RAM
```

```
R                   H'00FFE000   -   H'00FFE000   H'00000000
                                    asmfile                 asmfile
                    H'00FFE000   -   H'00FFE00F   H'00000010
                                    usb                     usb

* TOTAL ADDRESS *           H'00FFE000   -   H'00FFE00F   H'00000010


ATTRIBUTE :  DATA  NOSHR

B                   H'00FFE010   -   H'00FFE011   H'00000002
                                    asmfile                 asmfile
                    H'00FFE012   -   H'00FFE1D3   H'000001C2
                                    main                    main
                    H'00FFE1D4   -   H'00FFE1E5   H'00000012
                                    EV_File                 EV_File
                    H'00FFE1E6   -   H'00FFE409   H'00000224
                                    Timer                   Timer
                    H'00FFE40A   -   H'00FFE489   H'00000080
                                    Panel                   Panel
                    H'00FFE48A   -   H'00FFE4D9   H'00000050
                                    sci                     sci
                    H'00FFE4DA   -   H'00FFE519   H'00000040
                                    lcd                     lcd
                    H'00FFE51A   -   H'00FFE7ED   H'000002D4
                                    usb                     usb
                    H'00FFE7EE   -   H'00FFE829   H'0000003C
                                    _fmtout                 _fmtout
                    H'00FFE82A   -   H'00FFE82D   H'00000004
                                    _rnext                  _rnext
                    H'00FFE82E   -   H'00FFE82F   H'00000002
                                    _errno                  _errno

* TOTAL ADDRESS *           H'00FFE010   -   H'00FFE82F   H'00000820


                    H8/300H LINKAGE EDITOR (Evaluation software) Ver.1.0   PAGE :    1

                      ***  LINKAGE EDITOR EXTERNALLY DEFINED SYMBOLS LIST  ***

                    SYMBOL  NAME                ADDR            TYPE

                    $ADDD$3                     H'0000559A      DAT
                    $CMPD$3                     H'00007914      DAT
                    $DIVD$3                     H'00005844      DAT
                    $DIVL$3                     H'000079D0      DAT
                    $DIVUL$3                    H'00007FFA      DAT
                    $DSLC$3                     H'00008A54      DAT
                    $DSRUC$3                    H'00008A76      DAT
                    $DTOL$3                     H'000059DC      DAT
                    $EQD$3                      H'00005A56      DAT
                    $GED$3                      H'00005A62      DAT
                    $ITOD$3                     H'00008A98      DAT
                    $LTD$3                      H'00005A72      DAT
                    $LTOD$3                     H'00005A82      DAT
                    $MULD$3                     H'00008B84      DAT
```

$MULL$3	H'000079F6	DAT
$MV8$3	H'00005AC8	DAT
MVN3	H'00005AE6	DAT
NED3	H'00005B0E	DAT
$SUBD$3	H'0000556A	DAT
sp_regld3	H'00005B1C	DAT
sp_regsv3	H'00005B3E	DAT
_Checkfmove	H'00003EBC	ENT
_Clear	H'0000444E	ENT
_ClearLCD	H'00004794	ENT
_Close	H'00003140	ENT
_CloseMotor	H'00002BEC	ENT
_Cnt	H'00FFE012	DAT
_Command_Read	H'00003B74	ENT
_Command_Write	H'00003BC0	ENT
_Destroy	H'000010DA	ENT
_DisableInterrupt	H'000002AC	DAT
_Disp	H'0000177E	ENT
_DispInput	H'0000172E	ENT
_DispUSBPort	H'000049C4	ENT
_Door	H'00002916	ENT
_Down	H'00003998	ENT
_DownMotor	H'00003464	ENT
_EV_Controller	H'00001E94	ENT
_EV_File	H'00003A34	ENT
_EV_Input	H'00002538	ENT
_EV_Simulator	H'00001270	ENT
_EV_Time	H'00003DA2	ENT
_EnableInterrupt	H'000002A8	DAT
_GetChar	H'000024CC	ENT
_GetCurrentTime	H'00003E04	ENT
_GetPermit	H'00003E9E	ENT
_GetSCI	H'000045D4	ENT
_GetSW	H'0000121E	ENT
_H8init	H'00001244	ENT
_Init	H'00000E6C	ENT
_InitITU	H'000043D2	ENT

*** LINKAGE EDITOR EXTERNALLY DEFINED SYMBOLS LIST ***

SYMBOL NAME	ADDR	TYPE
_InitLCD	H'00004724	ENT
_InitSCI	H'000045A4	ENT
_InitUSB	H'000048CA	ENT
_InterruptITU0	H'00004408	ENT
_LCDOut4	H'000046CC	ENT
_Limit_Read	H'00003D5E	ENT
_LocateLCD	H'000047D4	ENT
_Motor_Read	H'00003D10	ENT
_Motor_Write	H'00003CD8	ENT
_OnCloseMotor	H'00002C08	ENT
_OnController	H'00001FB2	ENT

_OnDownMotor H'00003480 ENT
_OnInitWaitDoorChangeLog H'00002E76 ENT
_OnInitWaitPositionChangeLog H'000036E0 ENT
_OnInput H'00002612 ENT
_OnOpenMotor H'000029A6 ENT
_OnSimulator H'0000135A ENT
_OnUpMotor H'0000321E ENT
_OnWaitCloseDoorChangeLog H'0000301E ENT
_OnWaitDownPositionChangeLog H'0000387C ENT
_OnWaitOpenDoorChangeLog H'00002F4A ENT
_OnWaitUpPositionChangeLog H'000037AE ENT
_Open H'000030F2 ENT
_OpenMotor H'0000298A ENT
_PermitCommand_Write H'00003B30 ENT
_PermitTurnOpen_Write H'00003C04 ENT
_Position H'0000318E ENT
_PrintF H'00004476 ENT
_PrintLCD H'000047F8 ENT
_PrintSCI H'000045F4 ENT
_PutLCD H'000047A8 ENT
_PutSCI H'000045C4 ENT
_Read H'00003AB4 ENT
_ReadString H'00003AF8 ENT
_Repaint H'000004E4 ENT
_Run H'00000550 ENT
_ScanSCI H'000045E4 ENT
_SetCurrentTime H'00003DE6 ENT
_SetLED H'000011D0 ENT
_SetPermit H'00003E6A ENT
_SleepMSec H'00003F0C ENT
_Start H'000041BE ENT
_Stop H'000041EC ENT
_Thread_Start H'00004284 ENT
_Thread_Toggle H'000042C2 ENT
_Thread_checkAllDelete H'0000420A ENT
_Thread_checkStayAnother H'00004224 ENT
_Thread_getThread H'0000424A ENT
_TurnOpen_Read H'00003C48 ENT
_TurnOpen_Write H'00003C94 ENT
_Up H'0000394A ENT

*** LINKAGE EDITOR EXTERNALLY DEFINED SYMBOLS LIST ***

SYMBOL NAME ADDR TYPE

_UpMotor H'00003202 ENT
_WaitDoorChangeLog H'00002E4E ENT
_WaitPositionChangeLog H'000036C6 ENT
_WaitSecond H'00003E48 ENT
_Wait_ms H'00003EDE ENT
_Write H'00003A3E ENT
_WriteString H'00003A7C ENT
__add H'0000908A ENT

```
__allzero                H'00008036        ENT
__calcnpw                H'0000805E        ENT
__ctype                  H'00009876        DAT
__dti                    H'00007A16        ENT
__duchek                 H'00008DBC        ENT
__errno                  H'00FFE82E        DAT
__fmtout                 H'00005B66        ENT
__its                    H'00007DFC        ENT
__log10                  H'00008156        ENT
__lsft                   H'00008E0E        ENT
__lsfts                  H'000081FA        ENT
__mult                   H'00008E60        ENT
__mult64                 H'000084A8        ENT
__pow10                  H'00008FEE        ENT
__pow5                   H'00008272        ENT
__power                  H'00008530        ENT
__rnd                    H'00008692        ENT
__rnext                  H'00FFE82A        DAT
__rsfts                  H'000082A0        ENT
__setsbit                H'0000877C        ENT
__sub                    H'0000831A        ENT
__unpack                 H'000083C6        ENT
_cntrl                   H'00FFE07A        DAT
_countUpNextRun          H'00003FE2        ENT
_delete_                 H'0000418A        ENT
_frexp                   H'00008818        ENT
_getClock                H'00003EFA        ENT
_get_inbufflen           H'0000537E        ENT
_get_outbufflen          H'00005392        ENT
_i_cnt                   H'00FFE016        DAT
_in                      H'00FFE04A        DAT
_initWOVI                H'00004434        ENT
_init_usbbuff            H'000051E2        ENT
_j_cnt                   H'00FFE018        DAT
_main                    H'000002B0        ENT
_memcmp                  H'0000846A        ENT
_memcpy                  H'00007FA0        ENT
_memset                  H'000090D2        ENT
_modf                    H'0000891E        ENT
_new_EV_Status           H'000039E6        ENT
_new_Thread              H'00004002        ENT
_nextRun                 H'00003F9E        ENT
_rand                    H'000053A6        ENT
```


*** LINKAGE EDITOR EXTERNALLY DEFINED SYMBOLS LIST ***

```
SYMBOL NAME              ADDR            TYPE

_read_buff               H'00005320      ENT
_read_outbuff            H'000052C2      ENT
_s                       H'00FFE046      DAT
_simu                    H'00FFE14C      DAT
_sprintf                 H'000053E0      ENT
```

_status	H'00FFE1D4	DAT
_strcmp	H'0000543E	ENT
_strcpy	H'00005468	ENT
_strlen	H'00005484	ENT
_th	H'00FFE01A	DAT
_th1	H'00FFE022	DAT
_th101	H'00FFE22A	DAT
_th102	H'00FFE248	DAT
_th111	H'00FFE266	DAT
_th112	H'00FFE284	DAT
_th113	H'00FFE2A2	DAT
_th114	H'00FFE2C0	DAT
_th119	H'00FFE2DE	DAT
_th120	H'00FFE2FC	DAT
_th121	H'00FFE31A	DAT
_th122	H'00FFE338	DAT
_th123	H'00FFE356	DAT
_th130	H'00FFE374	DAT
_th131	H'00FFE392	DAT
_th141	H'00FFE3B0	DAT
_th142	H'00FFE3CE	DAT
_th143	H'00FFE3EC	DAT
_th19	H'00FFE032	DAT
_th20	H'00FFE036	DAT
_th41	H'00FFE03A	DAT
_th42	H'00FFE03E	DAT
_th43	H'00FFE042	DAT
_usb_int	H'00004A28	ENT
_vsprintf	H'000054A0	ENT
_wovi	H'00004430	ENT
_woviClock	H'00FFE1E6	DAT
_woviInit	H'000043A0	ENT
_woviRun	H'00004306	ENT
_woviThreadFirst	H'00FFE1EE	DAT
_woviThreadLast	H'00FFE20C	DAT
_write_buff	H'0000525C	ENT
_write_inbuff	H'00005200	ENT

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	bcc32 -O2 -w -tWC -D"USE_BCC" -c Panel.c

Borland C++ 5.5.1 for Win32 Copyright (c) 1993, 2000 Borland

Panel.c:

	bcc32 -O2 -w -tWC -D"USE_BCC" -c Timer.c

Borland C++ 5.5.1 for Win32 Copyright (c) 1993, 2000 Borland

Timer.c:

	bcc32 -O2 -w -tWC -D"USE_BCC" -c EV_Time.c

Borland C++ 5.5.1 for Win32 Copyright (c) 1993, 2000 Borland

EV_Time.c:

	bcc32 -O2 -w -tWC -D"USE_BCC" -c EV_File.c

Borland C++ 5.5.1 for Win32 Copyright (c) 1993, 2000 Borland

EV_File.c:

警告 W8004 EV_File.c 63: 'Ret' に代入した値は使われていない(関数 Write)

警告 W8004 EV_File.c 97: 'Ret' に代入した値は使われていない(関数 WriteString)

警告 W8071 EV_File.c 145: 変換によって有効桁が失われる(関数 Read)

警告 W8004 EV_File.c 141: 'Ret' に代入した値は使われていない(関数 Read)

警告 W8004 EV_File.c 182: 'Ret' に代入した値は使われていない(関数 ReadString)

警告 W8004 EV_File.c 208: 'Ret' に代入した値は使われていない(関数 PermitCommand_Write)

警告 W8004 EV_File.c 226: 'Ret' に代入した値は使われていない(関数 Command_Read)

警告 W8004 EV_File.c 244: 'Ret' に代入した値は使われていない(関数 Command_Write)

警告 W8004 EV_File.c 262: 'Ret' に代入した値は使われていない(関数 PermitTurnOpen_Write)

警告 W8004 EV_File.c 280: 'Ret' に代入した値は使われていない(関数 TurnOpen_Read)

警告 W8004 EV_File.c 298: 'Ret' に代入した値は使われていない(関数 TurnOpen_Write)

警告 W8066 EV_File.c 322: 実行されないコード(関数 Motor_Write)

警告 W8066 EV_File.c 343: 実行されないコード(関数 Motor_Read)

警告 W8066 EV_File.c 346: 実行されないコード(関数 Motor_Read)

警告 W8066 EV_File.c 361: 実行されないコード(関数 Limit_Read)

警告 W8066 EV_File.c 364: 実行されないコード(関数 Limit_Read)

bcc32 -O2 -w -tWC -D"USE_BCC" -c EV_UpDown.c

Borland C++ 5.5.1 for Win32 Copyright (c) 1993, 2000 Borland

EV_UpDown.c:

bcc32 -O2 -w -tWC -D"USE_BCC" -c EV_OpenClose.c

Borland C++ 5.5.1 for Win32 Copyright (c) 1993, 2000 Borland

EV_OpenClose.c:

bcc32 -O2 -w -tWC -D"USE_BCC" -c EV_Input.c

Borland C++ 5.5.1 for Win32 Copyright (c) 1993, 2000 Borland

EV_Input.c:

bcc32 -O2 -w -tWC -D"USE_BCC" -c EV_Controller.c

Borland C++ 5.5.1 for Win32 Copyright (c) 1993, 2000 Borland

EV_Controller.c:

bcc32 -O2 -w -tWC -D"USE_BCC" -c EV_Simulator.c

Borland C++ 5.5.1 for Win32 Copyright (c) 1993, 2000 Borland

EV_Simulator.c:

警告 W8019 EV_Simulator.c 68: コードは効果を持たない(関数 OnSimulator)

警告 W8019 EV_Simulator.c 86: コードは効果を持たない(関数 OnSimulator)

警告 W8019 EV_Simulator.c 104: コードは効果を持たない(関数 OnSimulator)

警告 W8019 EV_Simulator.c 122: コードは効果を持たない(関数 OnSimulator)

bcc32 -O2 -w -tWC -D"USE_BCC" -c main.c

Borland C++ 5.5.1 for Win32 Copyright (c) 1993, 2000 Borland

main.c:

警告 W8004 main.c 286: 'key' に代入した値は使われていない(関数 Run)

ilink32 /Tpe -L"C:¥borland¥bcc55¥Lib" Panel.obj Timer.obj EV_Time.obj EV_File.obj EV_UpDown.obj EV_OpenClose.obj EV_Input.obj EV_Controller.obj EV_Simulator.obj main.obj c0x32.obj,main.exe,,cw32.lib import32.lib

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MAKE Version 5.2 Copyright (c) 1987, 2000 Borland

```
        del *.obj
        del main.tds
        del main.ilc
        del main.ild
        del main.ilf
        del main.ils
H8/300H ASSEMBLER (Evaluation software) Ver.1.0
 *****TOTAL ERRORS      0
 *****TOTAL WARNINGS    0
H8/300H LINKAGE EDITOR (Evaluation software) Ver.1.0

: OUTPUT c_thread
: PRINT c_thread
: INPUT asmfile, main, EV_Simulator, EV_Controller, EV_Input, EV_OpenClose, EV_UpDown, EV_File,
EV_Time, Timer, Panel, sci, lcd, usb
: LIB c:¥h8¥akic¥c38hab
: START R(0FFE000), P(200), D(91C0), C(9200)
: ROM (D, R)
: EXIT

LINKAGE EDITOR COMPLETED
H8/300H OBJECT CONVERTER (Evaluation software) Ver.1.0

OBJECT CONVERTER COMPLETED
```

解説

C言語のプロジェクト Thread について、

このプロジェクトは予告なくデバッグ目的で更新されることがあります。

このプロジェクトは、お客様が改造して、よりお客様に使いやすい
プログラムにするために、提供されるサンプルプログラムであり、
お客様の好みに完成させてください。

==========

asmfile.src について。

リセットベクトル の 転送先ラベル が _start になっています。
ずっと下の方の _start の ラベル から処理を開始して、
 jsr @_main
で C言語の関数main を呼び出しています。

C言語の関数main は、 void main(void); という形で、
main.c に記述があります。

その後、
int_error:
 rte
で rte (returnと同じ意味) で終了しています。

リセットベクトル に続く1番から60番までの 割り込みベクトル について、

使用しない 割り込みベクトル は ラベルint_error に転送されます。

;26 OVI0

_INT_OVI0: .DATA.L _ITU_OVI_0 ;タイマ0割り込み

で、 タイマ0割り込み は、 ラベル_ITU_OVI_0 に転送されます。

ラベル_ITU_OVI_0 から開始して、 スタック 退避をして、

jsr @_InterruptITU0

で、 C言語の関数InterruptITU0 を呼び出しています。

C言語の関数InterruptITU0 は void InterruptITU0(void); という形で、

Timer.h Timer.c に記述があります。

戻ってくると、再び スタック を戻して、 rte です。

ファイルの先頭に、

.IMPORT _main

.IMPORT _InterruptITU0

という記述があり、 C言語の関数 を参照しています。

.EXPORT _EnableInterrupt,_DisableInterrupt

_EnableInterrupt:

andc.b #H'3f,ccr

rts

_DisableInterrupt:

orc.b #H'c0,ccr

rts

で、C言語から

_EnableInterrupt (割り込み許可)

_DisableInterrupt (割り込み禁止)

を呼び出せるようにしています。

C言語からの呼び出し名は、

EnableInterrupt();

DisableInterrupt();

です。

==========

main.c の 関数 Run の ID==31 を見てください。

Thread Ready GO! で開始して競馬のコースが8コースあります。

Thread Ready GO! There are 8 cources on a race.

ゴールまで80歩です。

There are 80 cells to a GOAL.

<1>コースは'r'ボタンが鞭で<2>コースは'l'ボタンが鞭です。

For the <1> cource, You click a 'R' button.

For the <2> cource, You click a 'L' button.

スレッドを使用しています。

Thread *th[8]; でオブジェクト宣言しています。

th[i] = new_Thread(i + 1); で初期値設定しています。

この2行は Java で次と同じ意味です。

Thread th[] = new Thread[8];

th[i] = new Thread(i + 1);

void Repaint(void)

{

```
	...
}
void Run(Thread *This)
{
	...
}
void Init(Thread *This)
{
	...
}
void Destroy(Thread *This)
{
	...
}
```

はそれぞれ Java で次と同じ意味です。

```
public void paint(Graphics g)
{
	...
}
public void run()
{
	...
}
public void init()
{
	...
}
public void destroy()
{
```

```
    ...
}
```

delete_(th[i]); でオブジェクトを消去しています。

この1行は C++ で次と同じ意味です。

delete th[i];

スレッド20が走り始めたら、

0以外の数字キーを押してみてください。

その数字に20を加えた番号のスレッドが、キーを押す度毎に、

起動・消去を繰り返します。

20を含めて、全部スレッドが消去されると、終了です。

これらのスレッドに関する仕様は Timer.c に記述しました。

==========

2階建エレベーターEVについて

使用方法

EV_Simulator にエレベーターが表示されます

EV_Controller にエレベーターの動作が表示されます

EV_Input の使用方法

u キーを押すとエレベーターが2階に上昇して扉が開きます

d キーを押すとエレベーターが1階に下降して扉が開きます

o キーを押すと扉が開きます

c キーを押すと扉が閉じます

s キーを押すと籠が非常停止します

r キーを押すと籠が非常停止から復帰します

Y キーを押すとエレベーターが2階に上昇して扉が開きます

H キーを押すと2階で扉が閉じます

y キーを押すとエレベーターが1階に下降して扉が開きます

h キーを押すと1階で扉が閉じます

籠が無い階で H h キーを押しても籠は動作しません

籠が無い階で Y y キーを押したとき籠の扉が開いていると籠は動作しません

閉まりかけの時に開く動作をするキーを押すと扉が反転して開きます

動作説明

全体の動作説明

モーターの情報は Motor.txt にあります

エレベーター塔内のリミットスイッチの情報は Limit.txt にあります

EV_Simulator はエレベーターの次の位置を出力していて Safety.txt

Motor.txt Limit.txt を採取して Safety.txt Limit.txt に書き込んで

エレベーターの画面表示もしています

EV_Controller はエレベータを制御していて Command.txt Limit.txt

を採取して PermitCommand.txt Motor.txt に書き込んでいます

EV_Controllerの動作説明

エレベーターには現在位置情報(Limit.txt)があります

最簡形の2階建ての場合通常系には5個の位置状態があります

下の階の停止状態

下の階の低速区域

中間の高速区域

上の階の低速区域

上の階の停止状態

5個の区域の境界に合計4個のセンサーがあります

4個のセンサーがエレベーターの現在位置を取得しています

4個のセンサーからの信号はメンバ変数(Positionクラスの

*p_UnderSlow *p_UnderStop *p_UpperSlow *p_UpperStop)

に読み込みます

昇りのメソッド(UpMotorクラスのOnUpMotor)と降りのメソッド

(DownMotorクラスのOnDownMotor)で使って

モーターに出力(Motor.txtに出力)します

全く同じ様にドアも通常系で4個のセンサーがありドアの開閉では

エレベーターの昇降と全く同じクラス構造です

後はインスタンス(Position P UpMotor UPMT DownMotor DNMT

Door DR OpenMotor OPMT CloseMotor CLMT)

を宣言して仕様に合わせてメソッドを呼び出すだけでO.K.です

終了方法

エレベーターが通常停止しているときに q キーを押します

メンテナンス

異常終了した場合、終了後、Thread_Work フォルダの次のファイルを

チェックしてください

Safety.txt

Safety.txt を開いて r にして上書き保存してください

r は通常動作を意味します

s は非常停止を意味します

h は復帰を意味します

Y はスターデルタのスター起動を意味します

Command.txt

Command.txt を開いて q にして上書き保存してください

q は終了を意味します

u は上昇を意味します

d は下降を意味します

o は開を意味します

c は閉を意味します

Y は上階呼びを意味します

y は下階呼びを意味します

H は上階閉を意味します

h は下階閉を意味します

N は信号無しを意味します

PermitCommand.txt

PermitCommand.txt を開いて N にして上書き保存してください

N は命令入力禁止を意味します

c は命令入力許可を意味します

Motor.txt

Motor.txt を開いて s にして上書き保存してください

s はモーター停止を意味します

j はモーター上昇回転開始を意味します

u はモーター低速上昇回転を意味します

U はモーター高速上昇回転を意味します

k はモーター下降回転開始を意味します

d はモーター低速下降回転を意味します

D はモーター高速下降回転を意味します

h はモーター開回転開始を意味します

o はモーター低速開回転を意味します

O はモーター高速開回転を意味します

t はモーター閉回転開始を意味します

c はモーター低速閉回転を意味します

C はモーター高速閉回転を意味します

Limit.txt

Limit.txt を開いて yynnyynn にして上書き保存してください

yynnyynn は籠が下階停止状態で扉が閉停止状態であることを意味します

yynnnynn は籠が下階停止状態で扉が閉低速区域であることを意味します

yynnnnnn は籠が下階停止状態で扉が中間高速区域であることを意味します

yynnnnyn は籠が下階停止状態で扉が開低速区域であることを意味します

yynnnnyy は籠が下階停止状態で扉が開停止状態であることを意味します

nynnyynn は籠が下階低速区域で扉が閉停止状態であることを意味します

nnnnyynn は籠が中間高速区域で扉が閉停止状態であることを意味します

nnynyynn は籠が上階低速区域で扉が閉停止状態であることを意味します

nnyyyynn は籠が上階停止状態で扉が閉停止状態であることを意味します

nnyynynn は籠が上階停止状態で扉が閉低速区域であることを意味します

nnyynnnn は籠が上階停止状態で扉が中間高速区域であることを意味します

nnyynnyn は籠が上階停止状態で扉が開低速区域であることを意味します

nnyynnyy は籠が上階停止状態で扉が開停止状態であることを意味します

==========

Linux CentOS6 の GCC を使用するときは、文字コードを utf8 にして

改行コードを <LF>のみ(UNIX) にして名前を付けて保存してください

makefile.mak build.bat asmfile.src linkfile.sub linuxBuild.bash は

複数のファイルを1個のプロジェクトとして

コンパイルするためのファイルです。

error.txt linuxError.txt はコンパイルエラーを表示するファイルです。

main.exe をダブルクリックすると、BCC実行ソフトが起動します。

c_thread.MOT を AKI-H8 3052F USB に書き込みます。

linuxStart.bash をダブルクリックすると、

GCC実行ソフト linuxExe が起動します。

著作者:

しのみや　ひでみね

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