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#ifndef __BITMASK_H

#define __BITMASK_H

/*
    this file contains bit definitions as used in FES
*/

/*   revised january 1993   */

static char *bitmask_Sccs_Id = "@(#) bitmask.h 1.2 3/19/93";

/*   reference   FES manual   */

/*   Auxiliary Interferogram data           */

#define AID_BIT          0x0001
#define FAST_GAIN_BIT    0x0006
#define POSITION_BIT      0xffff
/* pag 6.5 */

/*   laser - photodiodes - position word   */
#define LASER_BIT        0x0001
#define PHF_BIT          0x0002
#define PHI_BIT          0x0004
/* pag 6.5 */

/*   status word                           */
#define UN_ACCEPTED_BIT  0x8000
#define CRASH_BIT        0x4000
#define PENDING_BIT      0x2000
#define NOT_ANTI_CLOCKWISE_BIT 0x1000
#define NOT_CLOCKWISE_BIT 0x0800
#define EMERGENCY_BREAK_BIT 0x0400
#define NOT_IN_WINDOW_BIT 0x0200
#define UNUSED_1         0x0100
#define ZERO_SEARCH_BIT  0x0080
#define DOWN_BIT         0x0040
#define MOVING_BIT       0x0020
#define SHUTDOWN_BIT    0x0010
#define ACTIVE_BIT       0x0008
#define START_UP_BIT     0x0004
#define STAND_BY_BIT     0x0002
#define BOOTSTRAP_BIT    0x0001
/* pag 6.12 */

/*   sap status word                       */
#define SAP_ENC_HTR_EN_BIT 0x8000
#define SAP_ENC_HTR_ON_BIT 0x4000
#define SAP_INC_HTR_EN_BIT 0x2000
#define SAP_INC_HTR_ON_BIT 0x1000
#define SAP_GYR_MOT_ON_BIT 0x0800
#define SAP_MOTOR_ON_BIT   0x0400
#define SAP_UNUSED_1_BIT   0x0200
#define SAP_UNUSED_2_BIT   0x0100
#define SAP_HEATER5_ON_BIT 0x0080
#define SAP_HEATER6_ON_BIT 0x0040
#define SAP_HEATER7_ON_BIT 0x0020
#define SAP_SHUTTER_ON_BIT 0x0010
#define SAP_NORMAL_BIT     0x0008
#define SAP_MANUAL_BIT     0x0004
#define SAP_ZERO_BIT       0x0002
#define SAP_FAST_BIT       0x0001

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/* following statement collects all bits which
   indicate an error when set ;

   Error :    !(status & ERROR_MASK) */

#define ERROR_MASK    \
    ( EMERGENCY_BREAK_BIT | NOT_IN_WINDOW_BIT )

/* following statement collects all bits which
   indicate the status of interferometer */

#define STATUS__MASK    \
    (BOOTSTRAP_BIT | STAND_BY_BIT | START_UP_BIT | ACTIVE_BIT |\
     SHUTDOWN_BIT | MOVING_BIT | DOWN_BIT)

/* following statement collects all bits which
   indicate possible error in command

   trouble:    (status & COMMAND_MASK) */

#define COMMAND_MASK    \
    (UN_ACCEPTED_BIT | PENDING_BIT)

/* following statement collects telescope bits

   trouble:    (status & TELESCOPE_MASK) != TELESCOPE_MASK

                                   */

#define TELESCOPE_MASK \
    (NOT_ANTI_CLOCKWISE_BIT | NOT_CLOCKWISE_BIT)

/* following statements define status of system

   if (STATUS_MASK == xxxxx_STATUS) ..... */

#define BOOTS_STATUS    (BOOTSTRAP_BIT)
#define STDBY_STATUS    (BOOTS_STATUS | STAND_BY_BIT)
#define START_STATUS    (STDBY_STATUS | START_UP_BIT)
#define ACTIV_STATUS    (START_STATUS | ACTIVE_BIT)
#define SHUTD_STATUS    (ACTIV_STATUS | SHUTDOWN_BIT)
#define MOVIN_STATUS    (ACTIV_STATUS | MOVING_BIT)
#define FORWA_STATUS    (MOVIN_STATUS)
#define REVER_STATUS    (MOVIN_STATUS | DOWN_BIT)

/* following statements collect all bits which
   indicate the status of optical drive */

#define OPTI_STDBY    0x02
#define OPTI_RECOR    0x01
#define OPTI_READ    0x04
#define OPTI_DIAG    0x08
#define OPTI_WORD    0xff

#endif

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#ifndef __FIREX_H

#define __FIREX_H

/*   revised january 1993   */

static char *firex_Sccs_Id = "@(#) firex.h 1.1 3/16/93";

/*   miscellaneous telemetry definitions   */

                /*   minor frame sync
                major frame sync
                allowed syn errors
                lock on major frame
                lock on minor frame
                no lock   */

#define mm_sync 0xeb90
#define MM_sync 0x146f
#define ALLOWED_SYNC_ERR 2
#define LOCK_ON_MM 1
#define LOCK_ON_mm -1
#define NO_LOCK 0

                /*   laser wavelength in microns   */
#define LASER_W .6328

                /*   nominal mirror speed   */

#ifndef FIREX_SPEED
#define FIREX_SPEED 6
#endif

                /*   interf' samples to skip   */

#ifndef FIREX_SAMPLE
#define FIREX_SAMPLE 0
#endif

                /*   standard wing length for phase   */

#ifndef WING_LENGTH
#define WING_LENGTH 32
#endif

                /*   nominal bit counter in step   */

/*   note : when evaluating speed you will not find this value
as the datum sent to telemetry is the position when tele-
metry clock requires it; as telemetry clock is slightly
faster (1024 ticks for 1000 samples) the expected step in
telemetry is about 1000/1024*40 = 39.1   */

#ifndef FIREX_STEP
#define FIREX_STEP 40
#endif

                /*   actual bit counter in step   */
#define ACTUAL_STEP (FIREX_STEP * FIREX_SPEED / 3 )
                /*   actual step in cm   */
#define STEP_IN_CM (ACTUAL_STEP * LASER_W * 0.0001 / 4 )
                /*   actual step in cm corrected   */
#define STEP_IN_CM_CORRECTED (STEP_IN_CM * (FIREX_SAMPLE + 1) )
                /*   interf' nyquist freq.   */
#define NYQUIST ( 1./ ( 2 * STEP_IN_CM_CORRECTED) )
                /*   interf' fft size   */
#define FFTSIZE (262144/((FIREX_SAMPLE+1)*(FIREX_SPEED/3)))

#endif

```

```

#ifndef __IDENTITY_H

#define __IDENTITY_H

static char *identity_Sccs_Id = "@(#) identity.h 1.2 3/16/93";

/*  this file contains the identifiers of all the
    housekeeping quantities as taken from FES manual
    pag 3.35, fig 3.3.3/4 ); there are two revisions,
    REV_0 refers to first flight, REV_1 to second
    flight; default is second flight */

/*  revision January 1993: I_DIGITAL__1  -->  I_OPTDISK */

/*----- line # 1 -----*/

#ifdef REV_0
#define I_MASK1_T1  0x90
#define I_MASK1_T2  0x91
#define I_MASK2_T1  0x92
#define I_MASK2_T2  0x93
#define I_M_MASK1_T  0x94
#define I_M_MASK2_T  0x95
#else
#define REV_1
#define I_MASK1_T1  0xcc
#define I_MASK1_T2  0xcd
#define I_MASK2_T1  0xce
#define I_MASK2_T2  0xcf
#define I_M_MASK1_T  0xca
#define I_M_MASK2_T  0xcb
#endif
#define I_SAP_DECK_T  0x96
#define I_INCLIN_T  0x97

/*----- line # 2 -----*/

#define I_SHA_ENC_T  0x98
#define I_LASER_T  0x99
#define I_COFFIN_T  0x9a
#define I_AIR_T  0x9b
#define I_BS_INSTR_T  0x9c
#define I_M_BRAKE_T  0xb0
#define I_BARATRON_T  0xb1
#define I_TELESCOPE_T  0xb2

/*----- line # 3 -----*/

#define I_SENSOTEC_T  0xb3
#define I_CEU_T  0xb4
#define I_PREAMP_T  0xd3      /* <- has also pc bias */
#define I_PC_BIAS  0xd3
#define I_GYRO_T  0xa2

/* <- void */

#define I_INCLINOM_1  0xc8
#define I_SPARE_AN_1  0xbf
#define I_SODEME  I_SPARE_AN_1
#define I_SPARE_AN_2  0xc5
#define I_OPTDSK_PR  I_SPARE_AN_2

/*----- line # 4 -----*/

#ifdef REV_0

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#define I_DUMMY      0x8e
#else
#define I_BATTERIES_AMP 0x8e
#endif
#define I_BARATRON_P  0xc1
#define I_SENSOTEC_P  0xc0
#ifdef REV_0
#define I_BATTERIES_AMP 0x8f
#else
#define I_OPTDISK     0x8f
#endif

/* <- dummy */

#define I_INCLINOM_2  0xc9
#define I_SPARE_AN_3  0xc6
#define I_MAGNETOMETER I_SPARE_AN_3
#define I_SPARE_AN_4  0xc7

/*----- line # 5 -----*/

#define I_INT_NUMBER  0x80
#define I_NOW_CONF    0x81
#define I_NEXT_CONF   0x82
#define I_NOW_SLOW    0x83
#define I_NEXT_SLOW   0x84
#define I_PATH_LASER  0x85
#define I_DC_FLAGS    0x86

/* <- dummy */

/*----- line # 6 -----*/

#define I_YEARS_MONTHS 0x87
#define I_DAYS_HOURS   0x88
#define I_MINS_SECS    0x89

/* <- dummy */

#define I_VOLT_MON_5   0xbb
#define I_VOLT_MON_P15 0xbc
#define I_VOLT_MON_M15 0xbd
#define I_VOLT_MON_P28 0xbe

/*----- line # 7 -----*/

#define I_GYRO_TORQUE  0xb6
#define I_FILT_INCLIN 0xb8
#define I_SAP_SERVO    0xba
#define I_ELEV_REGISTER 0x9e
#define I_GYRO_COMP    0x9f
#define I_SAP_STATUS   0xa0
#define I_GYRO_EXCIT   0xa1
#define I_M_GYRO_AC    0xa3

/*----- line # 8 -----*/

/* If using two detectors configuration
   x_DET13_y is a dummy */

#define I_DET02_VOLT1  0xd0
#define I_DET02_VOLT2  0xd1
#define I_DET13_VOLT1  0xd4
#define I_DET13_VOLT2  0xd5
#define I_DET02_BIAS   0xd2
#define I_DET13_BIAS   0xd6

/* <- dummy */
/* <- dummy */

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/*----- line # 9 -----*/
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```
#define I_LASER_PRESS 0xc2
```

```
#define I_M_SHUTTLE 0xc3
```

```
#define I_M_LIMB 0xc4
```

```
/* <- dummy */
```

```
/* <- dummy */
```

```
/* <- dummy */
```

```
/* <- dummy */
```

```
/* <- dummy */
```

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

```
#define I_GYRO_PICKOFF 0xb5
```

```
#define I_INCLIN 0xb7
```

```
#define I_LVDT 0xb9
```

```
#define I_SHA_ENC 0x9d
```

```
#define I_DUMMY_DATA 0xff
```

```
#endif
```