

# FIRAS Explanatory Supplement Appendix H

## Record Definition Language Files (RDLs) for FIRAS Native VAX Binary Format Files

This appendix contains Record Definition Language Files (RDLs) for the following  
FIRAS native VAX binary format files:

### Sky Data Index:

FSS\_SSSKY\_RH, FSS\_SSSKY\_RL, FSS\_SSSKY\_LH, FSS\_SSSKY\_LL

### Calibration Data Index:

FEC\_SSCAL\_RH, FEC\_SSCAL\_RL, FEC\_SSCAL\_LH, FEC\_SSCAL\_LL

### Time-Ordered Interferogram:

FDQ\_SDF\_RH, FDQ\_SDF\_RL, FDQ\_SDF\_LH, FDQ\_SDF\_LL

### Engineering Data:

FDQ\_ENG

### Housekeeping Data:

NFS\_HKP

### Ancillary Housekeeping Data:

NFS\_ANC

### Engineering Mode Timing Data:

NFS\_EMF\_RH, NFS\_EMF\_RL, NFS\_EMF\_LH, NFS\_EMF\_LL

### Reference Datasets:

FEX\_DTRF.DAT

FEX\_GLTCHPRO.DAT

FEX\_BASIS.DAT

-----  
!  
! FIRAS Sky Data Short Science Index Record.  
!

Record FSS\_SSSKY FSS\_SSSKY

scalar/adt	TIME
	! Raw Science IFG GMT
scalar/byte	CHANNEL_ID
	! Channel ID
scalar/long	PIXEL_NO
	! Pixel Number
scalar/byte	MTM_SCAN_SPEED
	! MTM Speed
scalar/byte	MTM_SCAN_LENGTH
	! MTM Length
scalar/byte	SCI_MODE
scalar/byte	ADDS_PER_GROUP
	! Adds Per Group
scalar/byte	TRANSITION_FLAG
	! Flag denoting group
	! of coaddable raw
	! science IFGs
scalar/text/length=1	PIXEL_DEFINITION
	! Type of pixelization:

```

! 'q' = standard quad-cube
! 'O' = orbit average
! 'S' = scan angle
! 'E' = geocentric
!   quad-cube
scalar/word      SKYMAP_INDEX
! Information supporting
! PIXEL_DEFINITION:
!
! Type  SKYMAP_INDEX Content
! q    standard quad-cube
!      skymap index
! O    orbit origin
!      (units = 0.1d)
! S    scan angle
!      (units = 0.1d)
! E    skymap index
scalar/byte      DATA_QUALITY
! Summary Flag for Instruments
scalar/byte      ATTITUDE_QUALITY
! Summary Flag for Attitude
scalar/float     XCAL_TEMP
! External Calibrator Temperature
scalar/float     SKYHORN_TEMP
! Skyhorn Temperature
scalar/float     REFHORN_TEMP
! Reference Horn Temperature
scalar/float     ICAL_TEMP
! Internal Calibrator Temperature
scalar/float     DIHEDRAL_TEMP
! Dihedral Temperature
scalar/float     BOLOMETER_TEMP
! Detector Temperature
scalar/byte      BOL_CMD_BIAS
! Commanded Bias
scalar/word      EXC_GALACTIC_LAT
! Exclude data within +/-
! Galactic Latitude
! Range: 0 to +Pi/2
! Units: 10**-4 radians
scalar/word      SUN_ANGLE
! Angle of sun from FIRAS
! skyhorn Line-of-sight
! Range: 0 to Pi
! Units: 10**-4 radians
scalar/word      MOON_ANGLE
! Angle of moon from FIRAS
! skyhorn Line-of-sight
! Range: 0 to Pi
! Units: 10**-4 radians
scalar/word      EARTH_LIMB
! Angle of Earth limb from
! FIRAS skyhorn Line-of-sight
! Range: 0 to Pi

```

```

! Units: 10**-4 radians
scalar/word      GALACTIC_LATITUDE
! Galactic Latitude
! Range: -Pi/2 to +Pi/2
! Units: 10**-4 radians
array/byte/dim=6 SPARES
! Spares
end_record

```

```

-----
!
! FIRAS Calibration Data Short Science Index Record.
!
Record FSS_SSCAL FSS_SSCAL

```

```

scalar/adt      TIME
! Raw Science IFG GMT
scalar/byte     CHANNEL_ID
! Channel ID
scalar/long     PIXEL_NO
! Pixel Number
scalar/byte     MTM_SCAN_SPEED
! MTM Speed
scalar/byte     MTM_SCAN_LENGTH
! MTM Length
scalar/byte     SCI_MODE
scalar/byte     ADDS_PER_GROUP
! Adds Per Group
scalar/byte     TRANSITION_FLAG
! Flag denoting group
! of coaddable raw
! science IFGs
scalar/text/length=1 PIXEL_DEFINITION
! Type of pixelization:
! 'q' = standard quad-cube
! 'O' = orbit average
! 'S' = scan angle
! 'E' = geocentric
! quad-cube
scalar/word     SKYMAP_INDEX
! Information supporting
! PIXEL_DEFINITION:
!
! Type SKYMAP_INDEX Content
! q standard quad-cube
! skymap index
! O orbit origin
! (units = 0.1d)
! S scan angle
! (units = 0.1d)
! E skymap index
scalar/byte     DATA_QUALITY
! Summary Flag for Instruments

```

```

scalar/byte      ATTITUDE_QUALITY
                  ! Summary Flag for Attitude
scalar/float     XCAL_TEMP
                  ! External Calibrator Temperature
scalar/float     SKYHORN_TEMP
                  ! Skyhorn Temperature
scalar/float     REFHORN_TEMP
                  ! Reference Horn Temperature
scalar/float     ICAL_TEMP
                  ! Internal Calibrator Temperature
scalar/float     DIHEDRAL_TEMP
                  ! Dihedral Temperature
scalar/float     BOLOMETER_TEMP
                  ! Detector Temperature
scalar/byte      BOL_CMD_BIAS
                  ! Commanded Bias
scalar/word      EXC_GALACTIC_LAT
                  ! Exclude data within +/-
                  ! Galactic Latitude
                  ! Range: 0 to +Pi/2
                  ! Units: 10**-4 radians
scalar/word      SUN_ANGLE
                  ! Angle of sun from FIRAS
                  ! skyhorn Line-of-sight
                  ! Range: 0 to Pi
                  ! Units: 10**-4 radians
scalar/word      MOON_ANGLE
                  ! Angle of moon from FIRAS
                  ! skyhorn Line-of-sight
                  ! Range: 0 to Pi
                  ! Units: 10**-4 radians
scalar/word      EARTH_LIMB
                  ! Angle of Earth limb from
                  ! FIRAS skyhorn Line-of-sight
                  ! Range: 0 to Pi
                  ! Units: 10**-4 radians
scalar/word      GALACTIC_LATITUDE
                  ! Galactic Latitude
                  ! Range: -Pi/2 to +Pi/2
                  ! Units: 10**-4 radians
array/byte/dim=6 SPARES
                  ! Spares
end_record

```

```

-----

!
! FIRAS Time-Ordered Interferogram Record.
!
Record FDQ_SDF FDQ_SDF

```

```

Structure CT_HEAD
!
! COBETRIEVE header for time-ordered files.

```

```
!  
scalar/text/length=14  GMT  
! GMT of start collect  
scalar/adt             TIME  
! Binary time  
array/byte/dim=6      SPACE_TIME  
! Spacecraft time  
scalar/long           MJR_FRM_NO  
! Major frame number  
scalar/long           ORBIT  
! Orbit number
```

```
!  
! The original 28 COBETRIEVE spares are now reserved  
! for the COBE subsystems. The first 20 bytes are  
! reserved for use by the INGEST Subsystem.
```

```
!  
scalar/byte           HSKP1_TLM_FMT  
! Telemetry format for  
! major frame 1  
scalar/byte           HSKP2_TLM_FMT  
! Telemetry format for  
! major frame 2  
array/byte/dim=18     INGEST_SPARES  
! Spares
```

```
!  
! The remaining 8 bytes are reserved for use by the  
! instrument subsystems.
```

```
!  
scalar/word           DATASET_ID  
! CT dataset ID  
array/byte/dim=6      INSTR_SPARES  
! Spares
```

EndStructure

Structure SCI\_HEAD

```
!  
! Science data channel header written by the FIRAS stripper  
! and FIRAS Preprocessor.
```

```
!  
scalar/word           CHAN_ID  
! Channel id  
scalar/word           GAIN  
! Gain  
scalar/word           MTM_SPEED  
! MTM speed  
scalar/word           MTM_LENGTH  
! MTM scan length  
array/byte/dim=60     DATA_QUAL  
! Data quality flags  
array/word/dim=8      DATA_READY  
! Data ready flags
```

```
!  
! Scan data.
```

```
!
```

scalar/word        SC\_HEAD0  
                   ! Data block synchronization  
 scalar/byte        SC\_HEAD1A  
                   ! Block type (sci mode)  
 scalar/byte        SC\_HEAD1B  
                   ! Block ID  
 scalar/word        SC\_HEAD2  
                   ! SW version number  
 scalar/word        SC\_HEAD3  
                   ! Status bits  
 scalar/word        SC\_HEAD4  
                   ! Transmit time LSW  
 scalar/word        SC\_HEAD5  
                   ! Transmit time MSW  
 scalar/word        SC\_HEAD6  
                   ! Data check  
 scalar/word        SC\_HEAD7  
                   ! No a/d samples for collect  
                   ! cycle  
 scalar/word        SC\_HEAD8  
                   ! Points process for collect  
                   ! cycle  
 scalar/word        SC\_HEAD9  
                   ! Number of added points 1,2,  
                   ! 3,8,or 12 "adds per group"  
 scalar/word        SC\_HEAD10  
                   ! Data points per mirror sweep  
 scalar/word        SC\_HEAD11  
                   ! Number of mirror sweeps  
 scalar/word        SC\_HEAD12  
                   ! LSW frame counter  
 scalar/word        SC\_HEAD13  
                   ! MSW frame counter  
 scalar/word        SC\_HEAD14  
                   ! Deglitcher threshold factor  
 scalar/word        SC\_HEAD15  
                   ! Noise level  
 scalar/word        SC\_HEAD16  
                   ! S/L counter constants  
 scalar/word        SC\_HEAD17  
                   ! Deglitcher Seed Sample  
 scalar/word        SC\_HEAD18  
                   ! Command Counter  
 scalar/word        SC\_HEAD19  
                   ! Program Checksum  
 scalar/word        SC\_HEAD20  
                   ! Saturated Sample Count  
 scalar/word        SC\_HEAD21  
                   ! Glitch total  
 scalar/word        SC\_HEAD22  
                   ! Deglitcher overflow address  
 scalar/word        SC\_HEAD23  
                   ! Division of IFG performed  
                   ! (FCI RMS files only)

```
scalar/word      SC_HEAD24
! FCI raw science intermediate
! dump data type
scalar/word      SC_HEAD25
! High/low channel indicator
! 'HI' = high
! 'LO' = low
```

EndStructure

Structure IFG\_DATA

```
!
! Raw science data.
!
array/word/dim=512  IFG
! IFG in counts
array/word/dim=32   GLTCH
! On board glitch map
```

EndStructure

Structure DQ\_DATA

```
!
! Fields written by Data Qualify.
!
scalar/word      FAKE
! Fakeit pulse status
scalar/word      XCAL_POS
! Position of xcal 0
scalar/float     IREF_TEMP
! Internal reference source
! temperature
! This value is no longer being calaulated
! by FDQ
scalar/adt       ENG_TIME
! Time of associate
! engineering record
scalar/long      ENG_REC
! Engineering record number
array/byte/dim=110 DATA_QUALITY
! Data quality flags
scalar/long      IFG_NO
! IFG number within segment
array/byte/dim=24  DQ_SPARES
! Data qualify spares
```

EndStructure

Structure COLLECT\_TIME

```
!
! Fields written by the FIRAS Preprocessor.
!
scalar/adt       MIDPOINT_TIME
! Midpoint of Collect Time
! for science IFG
scalar/byte      BADTIME_FLAG
! Flag for invalid computed
```

```

! midpoint of collect time
scalar/byte    FPP_SPARE
! Preprocessor spare
EndStructure

```

Structure ATTITUDE

```

!
! Attitude related quantities.
! All quantities are in Epoch 2000.0 coordinates.
!

```

```

scalar/long    PIXEL_NO
! FIRAS pixel number
array/float/dim=3 EQUATORIAL
! FIRAS pointing in
! celestial equatorial
! coordinates
! Unit vectors
scalar/word    RA
! Right ascension of
! FIRAS pointing
! Range: - Pi to + Pi
! Units: 10**-4 radians
scalar/word    DEC
! Declination of FIRAS
! pointing
! Range: - Pi/2 to + Pi/2
! Units: 10**-4 radians
scalar/long    TERR_PIXEL_NO
! Terrestrial coordinates
! based pixel number
scalar/word    TERR_LATITUDE
! Terrestrial latitude of
! COBE
! Range: - Pi/2 to + Pi/2
! Units: 10**-4 radians
scalar/word    TERR_LONGITUDE
! Terrestrial longitude of
! COBE
! Range: - Pi to + Pi
! Units: 10**-4 radians
scalar/word    EARTH_LIMB
! Angle of Earth limb from
! FIRAS skyhorn Line-of-Sight
! Range: 0 to Pi
! Units: 10**-4 radians
scalar/word    EARTH_LIMB_AZIMUTH
! Azimuth angle of Earth limb
! about FIRAS LOS in SC frame
! Range: - Pi to + Pi
! Units: 10**-4 radians
scalar/word    SUN_ANGLE
! Angle of Sun in FIRAS
! skyhorn LOS
! Range: 0 to Pi

```



scalar/word      ! Units:  $10^{*-4}$  radians  
                     MOON\_ANGLE  
                     ! Angle of Moon in FIRAS  
                     ! skyhorn LOS ( $\phi$ )  
                     ! Range: 0 to  $\pi$   
                     ! Units:  $10^{*-4}$  radians  
 scalar/word      MOON\_AZ\_ANGLE  
                     ! Azimuth angle of Moon about  
                     ! FIRAS LOS in SC frame  
                     ! ( $\theta$ )  
                     ! Range:  $-\pi$  to  $+\pi$   
                     ! Units:  $10^{*-4}$  radians  
 scalar/word      MOON\_PHASE  
                     ! Phase of Moon  
                     ! Range:  $-\pi$  to  $+\pi$   
                     ! Units:  $10^{*-4}$  radians  
 scalar/float      SUN\_MOON\_DIST  
                     ! Sun-Moon distance  
                     ! Units: km  
 scalar/float      COBE\_MOON\_DIST  
                     ! COBE-Moon distance  
                     ! Units: km  
 scalar/word      ALTITUDE  
                     ! COBE altitude  
                     ! Units: 0.1 km  
 scalar/word      PROJECTED\_BARYCENTRIC\_VELOCITY  
                     ! Solar system barycentric vel  
                     ! of COBE projected along LOS  
                     ! Units: 0.01 km/sec  
 scalar/word      MCILWAIN\_L\_PARAM  
                     ! McIlwain L parameter  
                     ! Units: Earth radii  
 scalar/word      GALACTIC\_LONGITUDE  
                     ! Galactic longitude  
                     ! Range:  $-\pi$  to  $+\pi$   
                     ! Units:  $10^{*-4}$  radians  
 scalar/word      GALACTIC\_LATITUDE  
                     ! Galactic latitude  
                     ! Range:  $-\pi/2$  to  $+\pi/2$   
                     ! Units:  $10^{*-4}$  radians  
 scalar/word      ECLIPTIC\_LONGITUDE  
                     ! Ecliptic longitude  
                     ! Range:  $-\pi$  to  $+\pi$   
                     ! Units:  $10^{*-4}$  radians  
 scalar/word      ECLIPTIC\_LATITUDE  
                     ! Ecliptic latitude  
                     ! Range:  $-\pi/2$  to  $+\pi/2$   
                     ! Units:  $10^{*-4}$  radians  
 scalar/word      ORBITAL\_PHASE  
                     ! Geocentric angle from  
                     ! the orbital ascending  
                     ! node to COBE position  
                     ! Range:  $-\pi$  to  $+\pi$   
                     ! Units:  $10^{*-4}$  radians

scalar/word        PROJECTED\_GEOCENTRIC\_VELOCITY  
 ! Geocentric velocity of  
 ! COBE projected along LOS  
 ! Units: 0.001 km/sec =  
 !        m/sec

scalar/word        SCAN\_ANGLE  
 ! Azimuth angle, about the  
 ! Sun direction, of FIRAS  
 ! LOS, positive in the  
 ! ascending sense from the  
 ! ecliptic  
 ! Range: - Pi to + Pi  
 ! Units: 10\*\*-4 radians

scalar/word        SC\_ROTATION\_ANGLE  
 ! Spacraft Rotation Angle  
 ! Range: - Pi to + Pi  
 ! Units: 10\*\*-4 radians

scalar/byte        SOLUTION  
 ! Source of attitude  
 ! solution  
 ! None    = 0  
 ! Simulated = 1  
 ! Predicted = 2  
 ! Coarse   = 3  
 ! Fine without Dirbe = 4  
 ! Fine with Dirbe = 5  
 ! Definitive = 6

scalar/text/length=1    PIXEL\_DEFINITION  
 ! Type of pixelization:  
 ! 'q' = standard quad-cube  
 ! 'O' = orbit average  
 ! 'S' = scan angle  
 ! 'E' = geocentric  
 !        quad-cube

scalar/word        SKYMAP\_INDEX  
 ! Information supporting  
 ! PIXEL\_DEFINITION:  
 !  
 ! Type    SKYMAP\_INDEX Content  
 ! q    standard quad-cube  
 !        skymap index  
 ! O    orbit origin  
 !        (units = 0.1d)  
 ! S    scan angle  
 !        (units = 0.1d)  
 ! E    skymap index

scalar/word        EXC\_GALACTIC\_LAT  
 ! Exclude data within +/-  
 ! Galactic latitude  
 ! Range: 0 to +Pi/2  
 ! Units: 10\*\*-4 radians

scalar/byte        TERR\_RAD\_BYTE  
 ! Terrestrial radiation region location flag  
 ! Information only

```

! Region determined from mission planning files
! Bit 0 = OK
! Bit 1 = North Van Allen Belt
! Bit 2 = South Van Allen Belt
! Bit 3 = South Atlantic Anomaly
! Independent of attitude quality flags
scalar/byte    OUTSIDE_GALAXY_CUT
! Flag indicating whether FDS destriper
! included this record in its stripe
! calculation based on whether its pixel center
! is outside the galactic latitude cut in the
! FDS driver. This flag is set by FAD.
! 0 = not set yet (pre-FAD data)
! 1 = record included (outside > galactic cut )
! 2 = record excluded (within <= galactic cut )
!
! Fill the rest of the block.
!
array/byte/dim=2    ATT_SPARES
! Rest of the record
EndStructure
End_Record

```

-----

Some additional notes relevant to various fields in the time-ordered interferogram RDL are as follows.

For the science header (the SCI\_HEAD structure):

GAIN - The commandable gain for the detector is used in the conversion of the IFG raw counts to volts. Valid commandable gains are 1, 3, 10, 30, 100, 300, 1000, and 3000.

DATA\_QUAL - The telemetry data quality flags consist of packed bits, 4 for each of the telemetry minor frames over which the IFG is transmitted. The value of each set of four bits is a code which represents the quality of the telemetry as received on the ground from the spacecraft.

DATA\_READY - The data ready flags at transmit consist of 114 packed bits, one from each of the telemetry minor frames over which the IFG is transmitted. A value of 1 indicates that the corresponding section of the IFG buffer for this channel detector was ready for transmission. A value of 0 indicates the existence of a problem for transmission.

SC\_HEAD1A - All of the science data was taken in science mode 4 during the mission. In this mode the on-board microprocessor averages the data, uses the anti-aliasing filters, and flags the glitches without removing them. The removal of the glitches is done in the ground processing by the FIRAS pipeline.

For the IFG\_DATA structure:

IFG - The IFG in counts is an array of 512 observed points. The IFGs taken during the mission have been averaged by the on-board microprocessors. Depending on the MTM scan mode, a number of consecutive sample points have been averaged to form a group during each sweep of the mirror. The consecutive groups form a buffer of 512 points. In addition, a number of sweeps of these

512 points each are coadded together to form the resulting 512 point IFG which is then telemetered to the ground. The SC\_HEAD9 field contains the number of sample points per group and the SC\_HEAD11 field contains the number mirror sweeps that are coadded together.

GLTCH - The on-board glitch map is a packed array of bit flags set by the microprocessor to a value of 1 when it detects a glitch at one of the 512 point of the IFG. A value of 0 at the corresponding IFG position indicates no glitches were detected at that position during the entire collection of the IFG. The 512 bit flags are packed and stored into 32 sixteen bit words.

For the DQ\_Data structure:

FAKE - For most of the mission during the COBE passage through the South Atlantic Anomaly, the MTM was put in a position mode, the drive motor was turned off, and readings of a noise signal were taken using a "fake-it" pulse. Noise data taken in this mode are identified by the value of 1 in the fake-it (FAKE) status field.

XCAL\_POS - The external calibrator position (XCAL\_POS) field indicates whether the data are sky or calibration data. A value of 1 indicates that the XCAL is in the horn and the IFGs are thus calibration data. A value of 2 indicates that the XCAL is completely out of the horn and the IFGs are thus sky data. Sky IFGs are averaged together for the same pixel, MTM scan mode, and Ical temperature during a mission period. Calibration IFGs are similarly averaged over a constant temperature plateaus for the same scan mode. Data with any other value of the XCAL\_POS are not used.

DATA\_QUALITY - The 110 data quality flags indicate whether engineering, microprocessor, and attitude quantities associated with the IFG are within green, yellow, or red tolerance limits.

```
-----  
!  
! FIRAS Engineering Data Record.  
!  
record FDQ_ENG FDQ_ENG  
  
  structure ct_head  
  !  
  ! COBETRIEVE header for time-ordered files.  
  !  
    scalar/text/length=14  GMT  
      ! GMT of start collect  
  scalar/adt              TIME  
      ! Binary time  
  array/byte/dim=6      SPACE_TIME  
      ! Spacecraft time  
  scalar/long           MJR_FRM_NO  
      ! Major frame number  
  scalar/long           ORBIT  
      ! Orbit number  
  !  
  ! The original 28 COBETRIEVE spares are now reserved  
  ! for the COBE subsystems. The first 20 bytes are  
  ! reserved for use by the INGEST Subsystem.  
  !
```

```

scalar/byte      HSKP1_TLM_FMT
                  ! Telemetry format for
                  ! major frame 1
scalar/byte      HSKP2_TLM_FMT
                  ! Telemetry format for
                  ! major frame 2
array/byte/dim=18  INGEST_SPARES
                  ! Spares
!
! The remaining 8 bytes are reserved for use by the
! instrument subsystems.
!
```

```

scalar/word      DATASET_ID
                  ! CT dataset ID
array/byte/dim=6  INSTR_SPARES
                  ! Spares
endstructure
```

```
structure en_head
```

```
!
! Engineering header.
!
```

```

scalar/text/length=23  LIMITS
                        ! Limits file name
scalar/text/length=23  CONVERT
                        ! Conversion file name
scalar/long            A_SPARE
scalar/word            KEY_ID
                        ! Type of engineering data:
                        ! 0 = non-statistics
                        ! 1 = average
                        ! 2 = sigma
                        ! 3 = minimum
                        ! 4 = maximum
scalar/long            NUMBER_OF_RECORDS
                        ! Number of engineering
                        ! records used in
                        ! forming statistics
array/byte/dim=8      ENGHEAD_SPARES1
                        ! Spares
```

```

structure/dim=4      SCI_TIME
  scalar/adt          BIN_TIME
                      ! Binary time
endstructure
```

```

scalar/adt            FIRST_ENG_TIME
                      ! Time tag of first
                      ! engineering record
                      ! used in forming
                      ! engineering trends
scalar/adt            LAST_ENG_TIME
                      ! Time tag of last
                      ! engineering record
```

! used in forming  
! engineering trends

array/byte/dim=4 DQ\_SUMMARY\_FLAG  
! Data quality summary  
! flags for the four  
! FIRAS channels

array/long/dim=4 IFG\_NO  
! IFG number within  
! segment

array/byte/dim=4 ATT\_SUMMARY\_FLAG  
! Attitude data quality  
! summary flags for the  
! four FIRAS channels

array/byte/dim=34 ENGHEAD\_SPARES2  
! Spare time bytes

endstructure

structure en\_stat

!  
! Co-added engineering status bits.

union

map

!  
! Side A

! scalar/word STAT\_WORD\_1  
! scalar/word INT\_REF\_TEMP\_A  
! Internal reference source  
! scalar/word REF\_HRN\_TEMP\_A  
! Reference horn  
! scalar/word STAT\_WORD\_4  
! scalar/word STAT\_WORD\_5  
! scalar/word SKY\_HRN\_TEMP\_A  
! Sky horn  
! scalar/word EXT\_CAL\_TEMP\_A  
! External calibrator  
! scalar/word STAT\_WORD\_8

!  
! Side B

! scalar/word STAT\_WORD\_9  
! scalar/word INT\_REF\_TEMP\_B  
! Internal reference source  
! scalar/word REF\_HRN\_TEMP\_B  
! Reference horn  
! scalar/word STAT\_WORD\_12  
! scalar/word STAT\_WORD\_13  
! scalar/word SKY\_HRN\_TEMP\_B  
! Sky horn  
! scalar/word EXT\_CAL\_TEMP\_B

```

        ! External calibrator
    scalar/word    STAT_WORD_16
endmap

map
    array/word/dim=16 GROUP1
endmap

endunion

!
! Miscellaneous status words.
!
union

map
    array/byte/dim=2  GRT_ADDR
        ! Dwell address A,B
    array/byte/dim=4  MICRO_STAT_BUS
        ! Micro status bus readout
    array/byte/dim=4  BOL_CMD_BIAS
        ! Bolometer bias
    array/byte/dim=2  DWELL_STAT
        ! Dwell status A,B
    array/byte/dim=2  LVDT_STAT
        ! LVDT status A,B
endmap

map
    array/byte/dim=14 GROUP2
endmap

endunion
array/byte/dim=2    HOT_SPOT_CMD
    ! Hot spot command for A, B side
array/byte/dim=10  ENGSTAT_SPARES1
array/byte/dim=2   POWER_A_STATUS
    ! Status for power to FIRAS A
array/byte/dim=2   POWER_B_STATUS
    ! Status for power to FIRAS B
array/byte/dim=6   ENGSTAT_SPARES2
endstructure

structure en_analog
!
! Instrument temperatures.
!
union

map

    array/float/dim=16  A_LO_GRT
        ! A side low current GRTS
    array/float/dim=16  A_HI_GRT
        ! A side high current GRTS

```

```

array/float/dim=16    B_LO_GRT
                      ! B side low current GRTS
array/float/dim=16    B_HI_GRT
                      ! B side high current GRTS
endmap

map

! A side low current GRTS
scalar/float          A_LO_XCAL_TIP
                      ! External calibrator tip
scalar/float          A_LO_SKYHORN
                      ! Sky horn
scalar/float          A_LO_REFHORN
                      ! Reference horn
scalar/float          A_LO_ICAL
                      ! Internal reference source
scalar/float          A_LO_DIHEDRAL
                      ! Dihedral
array/float/dim=4     A_LO_BOL_ASSEM
                      ! Bolometer assembly
scalar/float          A_LO_MIRROR
                      ! Mirror assembly
array/float/dim=4     A_LO_CAL_RESISTORS
                      ! Cal resistors
scalar/float          A_LO_XCAL_CONE
                      ! Additional xcal temp
scalar/float          A_LO_COLLIMATOR
                      ! Collimator

! A side high current GRTS
scalar/float          A_HI_XCAL_TIP
                      ! External calibrator tip
scalar/float          A_HI_SKYHORN
                      ! Sky horn
scalar/float          A_HI_REFHORN
                      ! Reference horn
scalar/float          A_HI_ICAL
                      ! Internal reference source
scalar/float          A_HI_DIHEDRAL
                      ! Dihedral
array/float/dim=4     A_HI_BOL_ASSEM
                      ! Bolometer assembly
scalar/float          A_HI_MIRROR
                      ! Mirror assembly
array/float/dim=4     A_HI_CAL_RESISTORS
                      ! Cal resistors
scalar/float          A_HI_XCAL_CONE
                      ! Additional xcal temp
scalar/float          A_HI_COLLIMATOR
                      ! Collimator

! B side low current GRTS
scalar/float          B_LO_XCAL_TIP
                      ! External calibrator tip
scalar/float          B_LO_SKYHORN

```



```

! Sky horn
scalar/float    B_LO_REFHORN
! Reference horn
scalar/float    B_LO_ICAL
! Internal reference source
scalar/float    B_LO_DIHEDRAL
! Dihedral
array/float/dim=4  B_LO_BOL_ASSEM
! Bolometer assembly
scalar/float    B_LO_MIRROR
! Mirror assembly
array/float/dim=4  B_LO_CAL_RESISTORS
! Cal resistors
scalar/float    B_LO_XCAL_CONE
! Additional xcal temp
scalar/float    B_LO_COLLIMATOR
! Collimator
! B side high current GRTS
scalar/float    B_HI_XCAL_TIP
! External calibrator tip
scalar/float    B_HI_SKYHORN
! Sky horn
scalar/float    B_HI_REFHORN
! Reference horn
scalar/float    B_HI_ICAL
! Internal reference source
scalar/float    B_HI_DIHEDRAL
! Dihedral
array/float/dim=4  B_HI_BOL_ASSEM
! Bolometer assembly
scalar/float    B_HI_MIRROR
! Mirror assembly
array/float/dim=4  B_HI_CAL_RESISTORS
! Cal resistors
scalar/float    B_HI_XCAL_CONE
! Additional xcal temp
scalar/float    B_HI_COLLIMATOR
! Collimator
endmap

map
  array/float/dim=64  GRT
endmap

endunion

union

map

  array/float/dim=8  TEMP_CTRL
  ! Temperature controllers
  array/float/dim=2  IPDU_TEMP
  ! IPDU temps A,B

```

```

array/float/dim=4    CNA_TEMP
    ! Channel temps
array/float/dim=2    DBX_TEMP
    ! Drive box temps
array/float/dim=2    STAT_MON_TEMP
    ! Status monitor temp
scalar/float        PAMP_CHAN
    ! Channel preamp
scalar/float        PAMP_OP
    ! Optical preamp
array/float/dim=2    HOT_SPOT
    ! Hot spot heater A,B
array/float/dim=2    MTM_CAL_MTR
    ! MTM/Cal motors
array/float/dim=2    MTM_POS
    ! MTM position
array/float/dim=4    BOL_VOLT
    ! Bolometer voltages
array/float/dim=20   IPDU_VOLT
    ! IPDU voltages
array/float/dim=12   IPDU_AMP
    ! IPDU currents

```

```
endmap
```

```
map
```

```
    array/float/dim=62    GROUP1
```

```
endmap
```

```
endunion
```

```
endstructure
```

```
structure en_xcal
```

```
!
```

```
! Science Mode Setup
```

```
!
```

```
    array/word/dim=2    POS
```

```
        ! XCal position
```

```
        ! 0 = error
```

```
        ! 1 = in sky horn
```

```
        ! 2 = stowed (out of horn)
```

```
        ! 3 = transit (between in and out)
```

```
    array/byte/dim=50   XCAL_SPARES
```

```
endstructure
```

```
structure/dim=4 chan
```

```
!
```

```
! Channel specific setup fields.
```

```
!
```

```
    scalar/byte        UP_SCI_MODE
```

```
        ! uP science mode
```

```
    scalar/byte        FAKEIT
```

```
        ! Fake-it
```

```
    scalar/byte        UP_ADDS_PER_GROUP
```

```
        ! uP adds per group
```

```

scalar/byte      UP_SWPS_PER_IFG
                  ! uP sweeps per ifg
scalar/byte      XMIT_MTM_SPEED
                  ! MTM speed at transmit
scalar/byte      XMIT_MTM_LEN
                  ! MTM length at transmit
scalar/word      SCI_GAIN
                  ! Science gain
scalar/byte      DITHER
                  ! Dither bit
array/byte/dim=15  SETUP_SPARES
                  ! Setup spares
endstructure

structure/dim=2 en_tempdiff
!
! Temperature difference between bracketing major frames
! in units of a tenth of a millikelvin.
!
scalar/word      XCAL
                  ! External calibrator temp diff
scalar/word      ICAL
                  ! Internal ref source temp diff
scalar/word      SKYHORN
                  ! Sky horn temp diff
scalar/word      REFHORN
                  ! Reference horn temp diff
scalar/word      DIHEDRAL
                  ! Dihedral temp diff
scalar/word      COLLIMATOR_MIRROR
                  ! Collimator and mirror temp diff
array/word/dim=4  BOL_ASSEM
                  ! Bolometer assembly temp diff
endstructure

structure en_tail
!
! Engineering record trailer.
!
array/byte/dim=8  ENGTAIL_SPARES
                  ! Channel specific spares
scalar/byte      HSKP_FLAG
                  ! Housekeeping flag
                  ! 0=housekeeping present
                  ! 1=no housekeeping data for
                  ! time of engineering record
scalar/float      LMAC_ANALOG_TEMP
                  ! LMAC temperature for analog
                  ! converter.
                  ! Spacecraft Sides 1 and 2
                  ! read FIRAS A Side only.
scalar/float      LMAC_DIGITAL_TEMP
                  ! LMAC temperature for digital
                  ! converter.

```

```

        ! Spacecraft Sides 1 and 2
        ! read FIRAS A Side only.
array/byte/dim=2    TLM_QUAL_MAJ_FRM
        ! Overall telemetry quality
        ! for MJF
!
! Fill the record out to a block boundary.
!
array/byte/dim=9    ENG_SPARES
        ! Engineering record spares
endstructure

end_record

```

-----

Some additional notes relevant to various fields in the engineering record RDL are as follows.

For the EN\_HEAD structure:

GMT and TIME - The Julian time in character and binary format of the engineering record; this is the average time of the science records with which this engineering record is associated.

BIN\_TIME - The binary Julian time of the science records (from one to four) with which an engineering record is associated. The four values are for the right high, right low, left high, and left low channels respectively. A zero time value in any of the four positions indicates that no science record in that channel is associated with this engineering record.

DQ\_SUMMARY\_FLAG and ATT\_SUMMARY\_FLAG] - The data quality and attitude quality as stored in the associated science records.

For the EN\_STAT structure:

GROUP1 - The sixteen microprocessor status words; these data may be referenced either by their individual names or as mapped into the GROUP1 field.

for the EN\_ANALOG structure:

GRT - The 64 GRT temperature readings. The data are stored in three maps, the first divided into four groups according to instrument side and high or low current, the second with descriptions of the GRT positions, and the third by number.

GROUP1 - The other temperature readings, bolometer voltages, and Internal Power Distribution Unit voltages and currents.

For the EN\_XCAL, CHAN, and EN\_TEMPDIFF structures:

POS - The external calibrator position field indicates whether the data are sky or calibration data. A value of 1 indicates that the XCAL is in the horn and the interferograms are thus calibration data. A value of 2 indicates that the XCAL is completely out of the horn and the interferograms are sky data. Data with any other value are not used.

CHAN - This structure stores some of the information associated with the science records corresponding to this engineering record.

EN\_TEMPDIFF - Stores temperature differences between the bracketing housekeeping major frames from which this engineering record was derived. These values are used for consistency checking in the FIRAS pipeline software

to eliminate data whose housekeeping values vary too much between major frames.

```
-----  
!  
! FIRAS Housekeeping Data Record.  
!  
RECORD NFS_HKP NFS_HKP  
  
  STRUCTURE CT_HEAD  
!  
! COBETRIEVE header for time-ordered files.  
!  
  scalar/text/length=14  GMT  
                        ! GMT of start collect  
  scalar/adt             TIME  
                        ! Binary time  
  array/byte/dim=6      SPACE_TIME  
                        ! Spacecraft time  
  scalar/long           MJR_FRM_NO  
                        ! Major frame number  
  scalar/long           ORBIT  
                        ! Orbit number  
!  
! The original 28 COBETRIEVE spares are now reserved  
! for the COBE subsystems. The first 20 bytes are  
! reserved for use by the INGEST Subsystem.  
!  
  scalar/byte           HSKP1_TLM_FMT  
                        ! Telemetry format for  
                        ! major frame 1  
  scalar/byte           HSKP2_TLM_FMT  
                        ! Telemetry format for  
                        ! major frame 2  
  array/byte/dim=18     INGEST_SPARES  
                        ! Spares  
!  
! The remaining 8 bytes are reserved for use by the  
! instrument subsystems.  
!  
  scalar/word           DATASET_ID  
                        ! CT dataset ID  
  array/byte/dim=6      INSTR_SPARES  
                        ! Spares  
ENDSTRUCTURE  
  
STRUCTURE/DIM=2 FRAME  
!  
! The main contents of the housekeeping record.  
!  
  structure HSKP_HEAD  
!  
! Housekeeping header.  
!
```

```

array/word/dim=8    STAT_MONITOR_CMD
    ! Status monitor command
array/byte/dim=8    IPDU_STAT
    ! IPDU status
array/byte/dim=2    DWELL_STAT
    ! Dwell status
array/byte/dim=2    LVDT_STAT
    ! MTM status
array/byte/dim=4    U_PROC_STAT
    ! Micro processor status
array/byte/dim=4    BOL_CMD_BIAS
    ! Bolometer command bias
endstructure

```

```

structure TEMPS

```

```

!
! Instrument temperatures.
!

```

```

structure/dim=4 SIDE_AMP
union

```

```

map

```

```

    scalar/word    EX_CAL
        ! External calibrator
    scalar/word    SKY_HORN
        ! Sky horn
    scalar/word    REF_HORN
        ! Reference horn
    scalar/word    IREF_SOURCE
        ! Internal reference source
    scalar/word    DIHEDRAL
        ! Dihedral
    array/word/dim=4 BOL_ASSEM
        ! Bolometer assembly
    scalar/word    MIRROR
        ! Mirror assembly
    array/word/dim=4 CAL_RESIST
        ! Cal resistors
    scalar/word    EX_CAL_SEGMENT
        ! Additional external
        ! calibrator temps
    scalar/word    COLIMATOR
        ! Colimator

```

```

endmap

```

```

map

```

```

    array/word/dim=16 GRT
endmap

```

```

endunion
endstructure

```

```

array/byte/dim=2    IPDU
    ! IPDU temperatures A,B

```

```

scalar/byte    DRIVE_BOX_A
                ! Drive box temp A
scalar/byte    CHAN_PRE_AMP
                ! Channel preamp
array/byte/dim=4  CHAN_TEMP
                ! Channel temps
array/byte/dim=2  STAT_MON
                ! Status monitor temp
array/byte/dim=2  HOT_SPOT_CURRENT
                ! Hot spot heater A,B
scalar/byte    OPTICAL_PREAMP
                ! Optical preamp
scalar/byte    DRIVE_BOX_B
                ! Drive box temp B
endstructure

```

```

structure V_AND_I

```

```

!
! IDPU voltages and currents.
!

```

```

union

```

```

map

```

```

array/byte/dim=2  DIG_CONV_N_15
                ! Digital conv, -15v,
                ! sides A and B
array/byte/dim=2  DIG_CONV_P_15
                ! Digital conv, +15v,
                ! sides A and B
array/byte/dim=2  DIG_CONV_P_5
                ! Digital conv, +5v,
                ! sides A and B
array/byte/dim=2  ANA_CONV_P_15
                ! Analog conv, +15v,
                ! sides A and B
array/byte/dim=2  ANA_CONV_N_15
                ! Analog conv, -15v,
                ! sides A and B
array/byte/dim=2  BIAS_PRE_REG
                ! Bias pre-reg, +25v,
                ! sides A and B
array/byte/dim=2  INT_PS_P_28
                ! Int. P.S., +28v,
                ! sides A and B
array/byte/dim=2  INT_PS_P_15
                ! Int. P.S., +15v,
                ! sides A and B
array/byte/dim=2  INT_PS_N_15
                ! Int. P.S., -15v,
                ! sides A and B
array/byte/dim=2  INT_PS_P_5
                ! Int. P.S., +5v,
                ! sides A and B

```

```

endmap

```

```
map
  array/byte/dim=20  IPDU_VOLT
endmap
```

```
endunion
```

```
union
```

```
map
  array/byte/dim=2  CUR_BIAS_PRE_REG
    ! Bias pre-reg cur,
    ! sides A and B
  array/byte/dim=2  CUR_ANA_CONV
    ! Analog conv cur,
    ! sides A and B
  array/byte/dim=2  CUR_DIG_CONV
    ! Digital conv cur,
    ! sides A and B
  array/byte/dim=4  CON_CURRENT
    ! Const cur, RH,LH,RL,LL
  array/byte/dim=2  CON_INT_CONV
    ! Int conv cur,
    ! sides A and B
endmap
```

```
map
  array/byte/dim=12  IPDU_AMP
endmap
```

```
endunion
```

```
array/byte/dim=2  MTM_CAL_MOTOR
  ! MTM cal motor,
  ! sides A and B
array/byte/dim=4  BOL_BIAS_VOLT
  ! Bolometer bias,
  ! RH,RL,LH,LL
```

```
endstructure
ENDSTRUCTURE
```

```
STRUCTURE HSKP_TAIL
```

```
!
! Additional housekeeping information.
```

```
!
  scalar/text/length=14  GMT_MJF2
    ! Major frame 2 time tag
```

```
  scalar/word  SPARES
ENDSTRUCTURE
```

```
STRUCTURE/DIM=2 MJ_FRM
```

```
!
! Notch filters and spares
```



```

!
array/byte/dim=5    NTCH_FLT_A
                    ! A side notch filters
array/byte/dim=5    NTCH_FLT_B
                    ! B side notch filters
scalar/byte        TLM_QUAL_MAJ_FRM
                    ! Overall telemetry quality
                    ! for major frame
scalar/byte        POWER_A_STATUS
                    ! Status bits in Subcom Word
                    ! 105 for power to A side
                    ! Bits 7:6 MTM & XCAL motor
                    ! power
                    ! Bits 5:4 IPDU Bias prereg.
                    ! converter.
                    ! Bits 3:2 IPDU Internal conv.
                    ! Bits 1:0 IPDU Analog & dig.
                    ! converter.
scalar/byte        POWER_B_STATUS
                    ! Status bits in Subcom Word
                    ! 105 for power to B side; bit
                    ! order same as for A side
scalar/byte        LMAC_ANALOG_TEMP
                    ! LMAC temperature for analog
                    ! converter.
                    ! Spacecraft Sides 1 and 2
                    ! read FIRAS A Side only.
scalar/byte        LMAC_DIGITAL_TEMP
                    ! LMAC temperature for digital
                    ! converter.
                    ! Spacecraft Sides 1 and 2
                    ! read FIRAS A Side only.
array/byte/dim=17   SPARES
                    ! Spare bytes
ENDSTRUCTURE

```

END\_RECORD

```

-----
!
! FIRAS Ancillary Housekeeping Data Record.
!
record NFS_ANC NFS_ANC

```

```

structure ct_head
!
! COBETRIEVE header for time-ordered files.
!
scalar/text/length=14 GMT
                    ! GMT of start collect
scalar/adt          TIME
                    ! Binary time
array/byte/dim=6    SPACE_TIME

```

```

! Spacecraft time
scalar/long      MJR_FRM_NO
! Major frame number
scalar/long      ORBIT
! Orbit number
!
! The original 28 COBETRIEVE spares are now reserved
! for the COBE subsystems. The first 20 bytes are
! reserved for use by the INGEST Subsystem.
!
scalar/byte      HSKP1_TLM_FMT
! Telemetry format for
! major frame 1
scalar/byte      HSKP2_TLM_FMT
! Telemetry format for
! major frame 2
array/byte/dim=18  INGEST_SPARES
! Spares
!
! The remaining 8 bytes are reserved for use by the
! instrument subsystems.
!
scalar/word      DATASET_ID
! CT dataset ID
array/byte/dim=6   INSTR_SPARES
! Spares
endstructure

!
! The main contents of the ancillary housekeeping record.
!
structure/dim=2 frame
array/byte/dim=128  MINOR_FRAME_STATUS_BITS
! MTM scan direction bit,
! XCAL status bit:
! in or out=1, neither=0,
! MTM scan length,
! MTM scan speed,
! Four uP data ready bits
array/byte/dim=32   SPARES
endstructure

scalar/adt      GMT_MJF2
! Major frame 2 time tag

end_record

-----

!
! FIRAS Engineering Mode Timing Data Record
!
RECORD NFS_EMF NFS_EMF

```

## Structure CT\_HEAD

```
!  
! COBETRIEVE header for time-ordered files.  
!  
  scalar/text/length=14  GMT  
                        ! GMT of start collect  
  scalar/adt             TIME  
                        ! Binary time  
  array/byte/dim=6      SPACE_TIME  
                        ! Spacecraft time  
  scalar/long           MJR_FRM_NO  
                        ! Major frame number  
  scalar/long           ORBIT  
                        ! Orbit number  
  
!  
! The original 28 COBETRIEVE spares are now reserved  
! for the COBE subsystems. The first 20 bytes are  
! reserved for use by the INGEST Subsystem.  
!  
  scalar/byte           HSKP1_TLM_FMT  
                        ! Telemetry format for  
                        ! major frame 1  
  scalar/byte           HSKP2_TLM_FMT  
                        ! Telemetry format for  
                        ! major frame 2  
  array/byte/dim=18     INGEST_SPARES  
                        ! Spares  
  
!  
! The remaining 8 bytes are reserved for use by the  
! instrument subsystems.  
!  
  scalar/word           DATASET_ID  
                        ! CT dataset ID  
  array/byte/dim=6      INSTR_SPARES  
                        ! Spares  
  
EndStructure
```

## Structure SCI\_HEAD

```
!  
! Science data channel header written by the FIRAS stripper  
! and FIRAS Preprocessor.  
!  
  scalar/word           CHAN_ID  
                        ! Channel id  
  scalar/word           GAIN  
                        ! Gain  
  scalar/word           MTM_SPEED  
                        ! MTM speed  
  scalar/word           MTM_LENGTH  
                        ! MTM scan length  
  array/byte/dim=60     DATA_QUAL  
                        ! Data quality flags  
  array/word/dim=8      DATA_READY  
                        ! Data ready flags
```

```

!
! Scan data.
!
  scalar/word      SC_HEAD0
                    ! Data block synchronization
  scalar/byte      SC_HEAD1A
                    ! Block type (sci mode)
  scalar/byte      SC_HEAD1B
                    ! Block ID
  scalar/word      SC_HEAD2
                    ! SW version number
  scalar/word      SC_HEAD3
                    ! Status bits
  scalar/word      SC_HEAD4
                    ! Transmit time LSW
  scalar/word      SC_HEAD5
                    ! Transmit time MSW
  scalar/word      SC_HEAD6
                    ! Data check
  scalar/word      SC_HEAD7
                    ! No a/d samples for collect
                    ! cycle
  scalar/word      SC_HEAD8
                    ! Points process for collect
                    ! cycle
  scalar/word      SC_HEAD9
                    ! Number of added points 1,2,
                    ! 3,8,or 12 "adds per group"
  scalar/word      SC_HEAD10
                    ! Data points per mirror sweep
  scalar/word      SC_HEAD11
                    ! Number of mirror sweeps
  scalar/word      SC_HEAD12
                    ! LSW frame counter
  scalar/word      SC_HEAD13
                    ! MSW frame counter
  scalar/word      SC_HEAD14
                    ! Deglitcher threshold factor
  scalar/word      SC_HEAD15
                    ! Noise level
  scalar/word      SC_HEAD16
                    ! S/L counter constants
  scalar/word      SC_HEAD17
                    ! Deglitcher Seed Sample
  scalar/word      SC_HEAD18
                    ! Command Counter
  scalar/word      SC_HEAD19
                    ! Program Checksum
  scalar/word      SC_HEAD20
                    ! Saturated Sample Count
  scalar/word      SC_HEAD21
                    ! Glitch total
  scalar/word      SC_HEAD22
                    ! Deglitcher overflow address

```

```
scalar/word      SC_HEAD23
! Division of IFG performed
! (FCI RMS files only)
scalar/word      SC_HEAD24
! FCI raw science intermediate
! dump data type
scalar/word      SC_HEAD25
! High/low channel indicator
! 'HI' = high
! 'LO' = low
```

EndStructure

```
array/word/dim=512  SC_ENG_DATA
! MTM scan timing data
```

```
array/byte/dim=312  EMF_SPARES
! Spares
```

End\_Record

-----

```
!
! FIRAS Digital Transient Response Function Record Structure
!
record FEX_DTRF FEX_DTRF
```

```
array/float/dim=128  TRANS
! Transient Response Functions
!
! Stored in 8 records:
! RH or LH channel  1 - 4
!   SS scan mode    1
!   SF scan mode    2
!   LS scan mode    3
!   LF scan mode    4
! RL or LL channel  5 - 8
!   SS scan mode    5
!   SF scan mode    6
!   LS scan mode    7
!   LF scan mode    8
```

end\_record

-----

```
!
! FIRAS Glitch Profile Record Structure
!
Record FEX_GLTCHPRO FEX_GLTCHPRO
```

```
Array/Float/Dim=512  GLTCHPRO
! Glitch Profiles
!
! First 510 points store actual profile;
```

```

! point 511 is index of glitch peak
! position; point 512 is offset from 511
! to "true" peak position obtained by
! parabolic interpolation.
!
! Stored in 312 records; each group of 26
! records has 1 record for adds-per-group=1,
! 2 for adds-per-group=2, and so on for
! adds-per-group values 1,2,3,8, and 12.
!
! Slow MTM Speed 1 - 104
!   RH      1 - 26
!   RL     27 - 52
!   LH     53 - 78
!   LL     79 - 104
! Fast MTM Speed 105 - 208
!   RH     105 - 130
!   RL    131 - 156
!   LH    157 - 182
!   LL    183 - 208
! Fake-it Mode 209 - 312
!   RH     209 - 234
!   RL    235 - 260
!   LH    261 - 286
!   LL    287 - 312

```

End\_Record

```

-----
!
! Legendre Polynomial Basis Vectors for Baseline Subtraction
!
record FEX_BASIS FEX_BASIS

array/double/dim=(512,5) LEG_POLY
! Legendre polynomials for 512 index points.
! Second index value is degree of polynomial
! plus one. Independent variable is divided
! by 512 to decrease dynamic range for better
! precision in the fit.

end_record

```