

Level 1 Header Example

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SIMPLE = T / Written by IDL: Sun Aug 18 23:06:47 2013
BITPIX = -32 / Number of bits per data pixel
NAXIS = 2 / Number of data axes
NAXIS1 = 1024 /
NAXIS2 = 120 /
EXTEND = T / FITS data may contain extensions
DATE = '2013-07-15T05:59:03' / Creation date of FITS header (UTC)
FILENAME= 'sum_20101116_21595334_12166_05.fits' /Name of the FITS file
SORIG = 'GenuineIntel GNU/Linux' /Architecture and OS
DATASRC = 'Final Distribution (CDROM)' /Data Source
TELESCOP= 'SOHO' /
INSTRUME= 'SUMER' /
DATE_MOD= '2013-08-18T21:06:47.771' /Last modified
ORIGIN = 'SOHO MPS Lindau' /Where Data is Produced
OBS_SEQ = 'Temporal Series' /Name of observing sequence
DATE_OBS= '2010-11-16T21:59:53.345' /Beginning of Observation Date (UTC)
DATE_END= '2010-11-16T22:00:03.345' /End of Observation Date (UTC)
OBT_TIME= 1668636027.345 /Starting time of acquisition (TAI)
OBT_END = 1668636037.345 /End time of acquisition (TAI)
LEVEL = 1 /Data processing level
PRODLVL = 'L1' /Data calibration level
DETECTOR= 'B' /Detector used
EXPTIME = 10.00 /Exposure time [s]
IXWIDTH = 0.300000 /Image width ["]
IYWIDTH = 120.000 /Image height ["]
SLIT = '<7> 0.3" * 120" centered' /SUMER slit
INSTITUT= ' ' /Name of institutes for campaign
CMP_TYPE= 'None' /Type of coordinated program
CMP_NAME= 'None' /Name of campaign observation
CMP_ID = 0 /Campaign number
STUDY_ID= 2975 /Study number
STUDY_NM= 'GER LY_ALPHA_SI3' /Study name
OBJECT = 'SS' /Target
SCI_OBJ = 'Sunspot' /The science objective
SCI_SPEC= 'LY_ALPHA_SI3' /The specified objective
POPUDP = 2 /POP/UDP number
OBS_PROG= 'LY_ALPHA_SI3.SCL' /Name of scientist program
SCIENTIS= '< 94> Dietmar Germerott' /Scientist responsible of POP/UDP
FFONOFF = 'OFF' /On board flat field ON/OFF
BINX = 1 /Binning X (1 - 1024)
BINY = 1 /Binning X (1 - 360)
ROTCMP = 0.00000 /Solar rotation compensation
PIMGTYP = 'MULTIPLE' /Processing image Type (Single/Multiple)
COMPRESS= 5 /Compression method
COMPAR1 = 33 /Compression parameter 1
COMPAR2 = 351 /Compression parameter 2
COMPAR3 = 0 /Compression parameter 3
DECOMP = T /Decompression (F=No/T=Yes)
ODEV CORR= T /Odd Even correction
```

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FLATCORR=                T /Flatfield corrected on ground (F=No/T=Yes)
FLATFILE= 'sumff_b_20090419_04321805_03.fits' /Used Flatfield Data
GEOMCORR=                T /Geometry corrected on ground (F=No/T=Yes)
DEADCORR=                T /Dead time correction
DCXDLEV =                22135.7 /Dead time corr XDL input value
LGAINCOR=                T /Local gain correction
RADCORR =                T /Radiometry calibration
RADORDER=                1 /Radiometry for Wavelength order
AVARADO =                2 /Available Radiometry orders
WCSAXES =                3 /Number of WCS axis
CTYPE1 = 'WAVE          ' /Type of CRVAL1
CUNIT1 = 'ANGSTROM'     /Axis unit along axis 1
CRPIX1 =                  958 /Reference pixel along axis 1
CRVAL1 =                  1216.64 /Value at reference pixel of axis 1
CDEL1 =                   0.0432680 /Axis increments along axis 1
CTYPE2 = 'HPLT-TAN'     /Type of CRVAL2
CUNIT2 = 'ARCSEC        ' /Axis unit along axis 2
CRPIX2 =                  60.5000 /Reference pixel along axis 2
CRVAL2 =                  350.844 /Value at reference pixel of axis 2
CDEL2 =                   1 /Axis increments along axis 2
CTYPE3 = 'HPLN-TAN'     /Type of CRVAL3
CUNIT3 = 'ARCSEC        ' /Axis unit along axis 3
CRPIX3 =                   1 /Reference pixel along axis 3
CRVAL3 =                  629.336 /Value at reference pixel of axis 3
CDEL3 =                   0.300000 /Axis increments along axis 3 (Set to slit width)
IMGUNITS='W/sr/m^2/Angstroem' /Units for Image
REFPIX =                   66 /Original reference Pixel
DETXSTRT=                  0 /Detector readout start / X
DETXEND =                  1023 /Detector readout end / X
DETYSTRT=                  120 /Detector readout start / Y
DETYEND =                  239 /Detector readout end / Y
WAVEMIN =                 1205.45 /Minimum wavelength in image <mulmod>
WAVEMAX =                 1217.72 /Maximum wavelength in image <mulmod>
CORORB =                   F /Orbitology corrected
INS_X =                   -666.188 /Pointing of instrument / instrument X-axis
INS_Y =                   -274.500 /Pointing of instrument / instrument Y-axis
SOLAR_X =                  629.336 /Instrument pointing / solar X-axis
SOLAR_Y =                  350.844 /Instrument pointing / solar Y-axis
RASTYPE = 'TEMPORAL'     /Sequence type
SC_XO =                   0.00000 /Spacecraft pointing / solar X-axis
SC_YO =                   0.00000 /Spacecraft pointing / solar Y-axis
SC_ROLL =                 -173.255 /Spacecraft roll angle relative to the solar coor
SOLAR_P0=                 20.9018072935 /Solar angle P0 (degree)
SOLAR_B0=                 2.69290137291 /Solar angle B0 (degree)
GEIX_OBS=                 -3.42516E+08 /Geocentric equatorial inertial X
GEIY_OBS=                 -1.22981E+09 /Geocentric equatorial inertial Y
GEIZ_OBS=                 -4.64937E+08 /Geocentric equatorial inertial Z
GSEX_OBS=                 1.26628E+09 /Geocentric solar ecliptic X
GSEY_OBS=                 4.88386E+08 /Geocentric solar ecliptic Y

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GSEZ_OBS=      6.25772E+07 /Geocentric solar ecliptic Z
GSMX_OBS=      1.26628E+09 /Geocentric solar magnetic X
GSMY_OBS=      4.91444E+08 /Geocentric solar magnetic Y
GSMZ_OBS=      3.03241E+07 /Geocentric solar magnetic Z
HAEX_OBS=      8.59967E+10 /Heliocentric Aries Ecliptic X
HAEY_OBS=      1.18802E+11 /Heliocentric Aries Ecliptic Y
HAEZ_OBS=      5.87081E+07 /Heliocentric Aries Ecliptic Z
DSUN_OBS=      1.46661E+11 /Distance from Sun
HGLN_OBS=      -0.171889 /Stonyhurst heliographic longitude
HGLT_OBS=      2.69290 /Stonyhurst heliographic latitude
CRLN_OBS=      129.145 /Carrington heliographic longitude
CRLT_OBS=      2.69290 /Carrington heliographic latitude
XCEN   =      629.336 /Center of the instrument FOV / solar X-axis
YCEN   =      350.844 /Center of the instrument FOV / solar Y-axis
ANGLE  =      -173.255 /Orientation of instrument FOV (degree)
UDP_ID =      3569 /Reference to observing program
PROG_NM = 'GER LY_ALPHA_SI3' /Name of observing program
T3TELE =      52.8000 /Telescope (MC2) temperature (degree C)
T3REAR =      21.1200 /SUMER rear (MC3) temperature (degree C)
T3FRONT =     22.7200 /SUMER front (MC4) temperature (degree C)
T3SPACER=     24.7600 /SUMER spacer (MC6) temperature (degree C)
MC2ENC =      1684 /SUMER MC2 Encoder Position
MC3ENC =      1838 /SUMER MC3 Encoder Position
MC4ENC =      2247 /SUMER MC4 Encoder Position
MC6ENC =      2097 /SUMER MC6 Encoder Position
MC8ENC =      138439 /SUMER MC8 Encoder Position
HKOTIME = '2010-11-16T22:00:04.592' /Time stamp of HKO Record (UTC)
```

/Multiple Image Header Entries

```
OTYPIMG =      10 / Original Image Type
IREFPIX1=      958 / Image Refpix 1
REFPIX1 =      66 / Refpix 1
WAVEL1  =     1216.64 / Wavelength (Angstroem) 1
IMGCNT1 =      658 / Image Counter 1
BPCNTS1 =      351 / Brightest Pixel Counts 1
TOTCNTS1=     77138 / Total Counts in Image 1
XSSMDU1 =      0 / Missing data in image 0=no,1=yes 1
XSSQAC1 =      0 / Quality of image data 0=OK,1=NOTOK 1
IREFPIX2=      908 / Image Refpix 2
REFPIX2 =      116 / Refpix 2
WAVEL2  =     1214.50 / Wavelength (Angstroem) 2
IMGCNT2 =      659 / Image Counter 2
BPCNTS2 =      347 / Brightest Pixel Counts 2
TOTCNTS2=     94576 / Total Counts in Image 2
XSSMDU2 =      0 / Missing data in image 0=no,1=yes 2
XSSQAC2 =      0 / Quality of image data 0=OK,1=NOTOK 2
IREFPIX3=      724 / Image Refpix 3
REFPIX3 =      300 / Refpix 3
```

Level 1 Header Example

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WAVEL3 =          1206.53 / Wavelength (Angstroem) 3
IMGCNT3 =          660 / Image Counter 3
BPCNTS3 =          136 / Brightest Pixel Counts 3
TOTCNTS3=         17082 / Total Counts in Image 3
XSSMDU3 =           0 / Missing data in image 0=no,1=yes 3
XSSQAC3 =           0 / Quality of image data 0=OK,1=NOTOK 3

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/SUMER Raw Image Header Entries

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SSYNCO =          235 /Header Sync Byte 0 (0xEB)
SSYNC1 =          144 /Header Sync Byte 1 (0x90)
IMG_REC =          128 /Header Record Id (0x80)
SSTYPIMG=           5 /SUMER image format index
XSSTAI =          1668636027.345 /Exposure start time (TAI)
SSOPCNT =           32 /Operations counter. 0 after switch on, increased
SSPOUDP=           2 /POP/UDP number. 0 no POP/UDP executing
SSIMGCNT=          658 /Image counter, 0 at start of op +1 at spectrohel
SSLOC =            94 /Scientist ID (after Jun 1996)
SSTARGET=          159 /Target as set by SYS_Operator
SSFLDATE=           0 /Never really used
SSFLREQN=           0 /Never really used
SSREFPIX=          2719 /Reference pixel where lambda is on
FREFPIX =           66 /Ref pixel reduced by det B offset (2653)
SSSTAT =           16 /Status
SSEETRIG=           0 /Explosive event trigger
SSFF =             0 /Flatfield correction 1=on,0=off
SSFF_T = 'OFF' ,    /Flatfield correction status as text
SSDETTYP=           2 /Current detector in use (1=A,2=B,3=RSC)
SSDET_T = 'B' ,    /Detector in use as text
SSINTSTA=           0 /IIF/TC spectrohelio interrupt status
SSDETSTA=           255 /Detector status
SSSUNY =          -10659 /SUMER coordinate Y [0.0625"]
SSSUNZ =           4392 /SUMER coordinate Z [0.0625"]
P_SUNY =          -666.188 /SUMER coordinate Y ["]
P_SUNZ =           274.500 /SUMER coordinate Z ["]
SSEXPTIM=          10.0003 /Exposure time [s]
SSIIDZ =            0 /Inter instrument sun z coordinate
SSIIDY =            0 /Inter instrument sun y coordinate
SSBPADDY=           935 /Brightest pix addr Y (spec dir 0..1023) <mulmod>
SSBPADDZ=            74 /Brightest pix addr Z (spat dir 0..359) <mulmod>
SSIMGTOT=          188796. /Total counts in image <mulmod>
SSROTCOM=           0.00000 /Rotation compensation time
SSBPCNTS=           351 /Brightest pixel counts <mulmod>
SSACIMGC=           9257 /Accumulative image counter (0 after boot)
SSSTEPN =          -319 /Number of raster steps (+ E->W, - W->E)
SSSTEPsz=           0 /Raster step size in motor steps (neg=Schmiersch
SSSLITN =            7 /Number of slit selected
SSBINNY =            1 /Binning factor spectral dimension
SSBINNZ =            1 /Binning factor spatial direction

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```
SSXCNT =          3116 /X event count (raw value)
SSYCNT =          3115 /Y event count (raw value)
X_EVCNT =        22195.3 /X event count (corrected for detector)
Y_EVCNT =        22076.0 /Y event count (corrected for detector)
S_MCPV =           245 /High voltage raw value
S_MCPVF =        5434.00 /High voltage [V]
SIMCPI =           217 /MCP current (Raw value)
SIMCPIF =        130.020 /MCP current [uA]
SSMC2POS=         4050 /MC2-Azimuth position [0.38"]
SSMC3POS=         4498 /MC3-Elev position [0.38"]
SSMC4POS=         774 /MC4-Slit select position [half step]
SSMC6POS=        10580 /MC6-Grat position [half step]
SSMC8POS=         5134 /MC8-Scan mirror position [half step]
SSMCERR =          0 /Motor controller error
SSCOMPRM=         5 /Compression method
SSWAVEL =        1216.64 /Wavelength at reference pixel (Angstrom)
SSCOMPP1=         33 /Compression parameter 1
SSCOMPP2=        351 /Compression parameter 2
SSCOMPP3=          0 /Compression parameter 3
SSADM CNT=        3569 /Admin cnt (gives the database udp id)
XSSMDU =          0 /Missing data in image 0=no,1=yes
XSSQAC =          0 /Quality of image data 0=OK,1=NOTOK
XSSFID =          0 /File id from TM file catalog
XSSFPTR =       15296360 /Pointer to image position in bin file
XSCDID =          5298 /CD ID of TM file
XSSEQID =          1 /CD Sequence ID of TM file
XSTMFIL=        3210101 /TM filename without ext
PROCVERS=         396 /SVN Version of write_sumerfits
COMMENT FITS (Flexible Image Transport System) format is defined in 'Astronomy
COMMENT and Astrophysics', volume 376, page 359; bibcode 2001A&A...376..359H
COMMENT The original raw image header is stored in the extention sumer-orig-raw-
COMMENT The wavelength is stored low -> high
COMMENT SOHO at 180 degree / The data is stored with north down!
COMMENT Detector B degraded - center part not usable
COMMENT This Image is a collection of multiple Images
HISTORY Written with write_sumerfits Version:$Revision: 396 $
HISTORY Applied update_fits $Revision: 395 $ 15-Jul-2013 05:59:02.814
HISTORY Applied DEADTIME_CORR Sun Aug 18 23:06:47 2013
HISTORY Applied SUM_FLATFIELD with odd even corr Sun Aug 18 23:06:47 2013
HISTORY Applied LOCAL_GAIN_CORR Sun Aug 18 23:06:47 2013
HISTORY Applied SUM_FLATFIELD Sun Aug 18 23:06:47 2013
HISTORY Applied DESTR_BILIN Sun Aug 18 23:06:47 2013
HISTORY Applied RADIOMETRY Sun Aug 18 23:06:47 2013
HISTORY Applied sumer_calib_fits Version:$Revision: 393 $
END
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