

Skylab Data

There are quite a few inconsistencies and little quirks in the data that we've had to deal with in creating the images. There are also many factors such as vignetting function and stray light mask which must be addressed in order to calibrate the data. So, a rather voluminous fits header has been added to the data.

A sample file name is: **atmwlce_73d155.012541.fr02315.09cl.D.481x480.X00092.37.fts** , where 73 is the year (with 1900 subtracted), 155 is the day of year, 012541 is the observation time (1 hour, 25 minutes, 41 seconds) in UT. The frame number was 2315. The image was exposed for 09 seconds with the clear filter. 481x480 is the image size. The original tape the image came from was X00092, file 37. This is a fits file. Further explanation...

The exposure time, the filter, and the roll are three characteristics which change regularly from image to image.

The exposure times can be 3, 9, or 27 seconds.

The Filter

There are four filters.

'cl' is the clear aperture.

'p1' is a polaroid filter, offset 30.3 degrees clockwise (CW) from the +Y axis.

'p2' is a polaroid filter, offset 91.3 deg (CW) from the +Y axis.

'p3' is a polaroid filter, offset 29.5 deg counter clockwise (CCW) from the +Y axis.

Here are images exemplifying each:

Clear Filter

P1 Filter

P2 Filter

P3 Filter

The Roll

Roll is the direction of solar north with respect to the -Y axis in arc-minutes. Positive roll is in the CCW (Counter ClockWise) direction.

ROLL= 10800: north at top, east on left, south at bottom,
west under the pylon on the right.

ROLL= 5400: east at top, south on left, west at bottom,
north under the pylon on the right.

ROLL= 0: south at top, west on left, north at bottom,
east under the pylon on the right.

ROLL= -5400: west at top, north on left, east at bottom,

south under the pylon on the right.

Here are images exemplifying each. Each of these was taken with the clear filter:

Roll = 10800

Roll = 5400

Roll = 0

Roll = -5400

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Last revised February 2, 1996 - Cathy Andrulis

January 10, 1996

Calibrated images from Skylab are store in the anonymous ftp directory:

~ftp/calibrated/Data

The data in the ~ftp/calibrated/Data directory tree are of 4 types:

- I** Intensity data. This is the intensity of the corona in B/Bsun units.
- a** alpha-angle data. Using information from the p1,p2,and p3 filters, one can compute the angle out of the plane of the sky for the measured corona. These data are must be regarded very carefully and cautiously.
- p** polarization data. This is the computed fractional polarization of the corona.
- pB** polarization Brightness data. This is the Brightness of the polarized portion of the corona. ($p \cdot I = pB$). This data is in B/Bsun units.

They have been corrected for the earths elliptic orbit around the sun.

They may be used for quantitative studies.

The data are in subdirectories names after the year they were collected and the month.

For example data from June 1973 are in the directory:

1973/06_jun

Data from July 1973 would be in the directory:

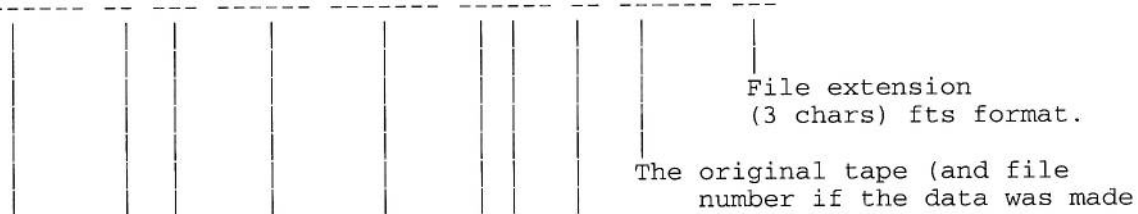
1973/07_jul

The filename convention for the fts files is as follows: (Thanks to the SOHO team for inspiration!)

File naming Convention For CALIBRATED ATM-WLCE Data:

```

01234567890123456789012345678901234567890123456789 <=== character index
atmwlce_73d155.013016.fr02325.27p123.pB.X00092.fts <=== filename
    
```



a single file.) All of these calibrated images are of dimension 481x480.

The images is in calibrated polarization Brightness units.

The filter(s) used, (The p1 p2 and p3 filters were combined to create this calibrated image.)

The exposure time, 3, 9, or 27 seconds.

Frame sequence number. (Of the earliest frame, if more than one image was used.)

Observation time (6 characters, in hhmmss format). (Of the earliest frame, if more than one image was used.)

Observation day of year

Observation year (with 1900 subtracted).

Data origin: Apollo Telescope Mount, White Light Coronagraph Experiment

May 25, 1998

Uncalibrated images from Skylab are store in the anonymous ftp directory:

~ftp/skylab/Images

The data in the ~ftp/corona/atm/Images directory tree are all DENSITY images. "DENSITY" refers to the measured film emulsion density as each frame was digitized with a PDS-microdensitometer. These images should be used for qualitative purposes only.

The data are in subdirectories names after the year they were collected and the month.

For example data from June 1973 are in the directory:

ALL_1973/06_jun

Data from July 1973 would be in the directory:

ALL_1973/07_jul

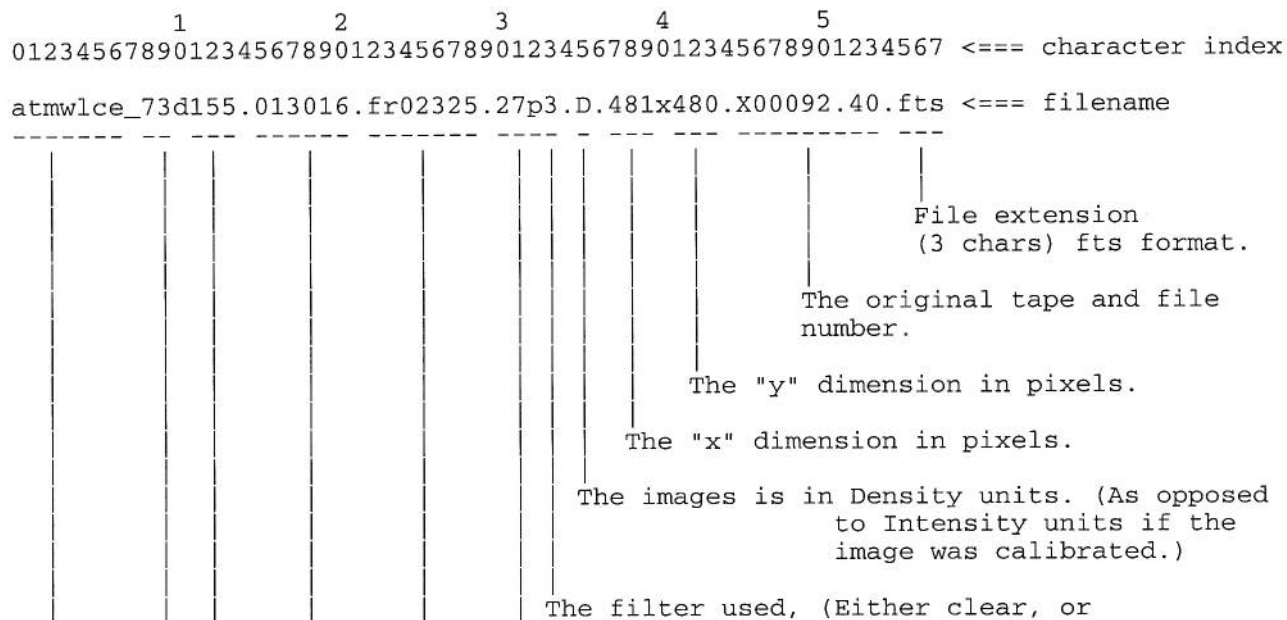
ALL of the digitized film images in DENSITY units are available as fits "fts" files.

Fits format CALIBRATED (pB and I) data... are available in the directory:

~ftp/skylab/calibrated/Data

The filename convention for the fts files is as follows: (Thanks to the SOHO team for inspiration!)

File naming Convention For ATM-WLCE Data:



| | | | | | |
| | | | | | | p1, p2 or p3
| | | | | | | for polaroids in their
| | | | | | | various orientations.)
| | | | | | | The exposure time, 3, 9, or 27 seconds.
| | | | | | | Frame sequence number.
| | | | | | | Observation time (6 characters, in hhmmss format).
| | | | | | | Observation day of year
| | | | | | | Observation year (with 1900 subtracted).

Data origin: Apollo Telescope Mount, White Light Coronagraph Experiment

May 25, 1998

Images from Skylab are store in the anonymous ftp directory:

~ftp/skylab/Images

Data in the ~ftp/skylab/Images directory tree are all DENSITY images. "DENSITY" refers to the measured film emulsion density as each frame was digitized with a PDS-microdensitometer. These images should be used for qualitative purposes only.

The data are in subdirectories names after the year they were collected and the month.

For example data from June 1973 are in the directory:

ALL_1973/06_jun

Data from July 1973 would be in the directory:

ALL_1973/07_jul

ALL of the digitized film images in DENSITY units have been converted to "gif" files.

As they were converted to gif files, these images were corrected for spacecraft orientation and camera film load offsets. Thus all of these images are centered and oriented with solar north at the top of the image. The rotation scheme used was quite primitive, hence you'll notice zigzag edge effects on some of the images.

It appears as if some of the orientation parameters were either written wrong or read off incorrectly from the film. So, in some images the orientation will not be correct. We hope to fix these as we find them. In the mean time, treat these images with a bit of caution!

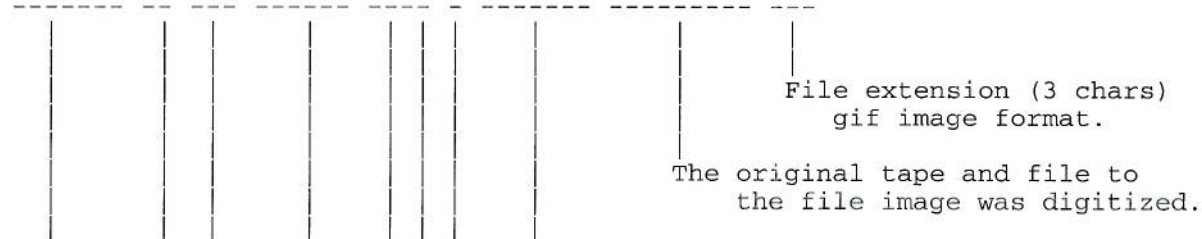
If you do notice an error, please inform: alice@hao.ucar.edu

The filename convention for the fts files is as follows: (Thanks to the SOHO team for inspiration!)

File naming Convention For ATM-WLCE Data:

01234567890123456789012345678901234567890123456789 <=== character index

atmwlce_73d181.213511.09c1.D.481x480.X00018.13.gif <=== filename



				The x and y dimension of the image.
				The images is in Density units. (As opposed to Intensity units if the image was calibrated.)
				The filter used, (Either clear, or p1, p2 or p3 for polaroids in their various orientations.)
				The exposure time, 3, 9, or 27 seconds.
				Observation time (6 characters, in hmmmss format).
				Observation day of year
				Observation year (with 1900 subtracted).

Data origin: Apollo Telescope Mount, White Light Coronagraph Experiment

Available Skylab Data

***** Fits *** format Calibrated (quantitative) data...**

[May 1973](#)
[Jun 1973](#)
[Jul 1973](#)
[Aug 1973](#)
[Sep 1973](#)
[Oct 1973](#)
[Nov 1973](#)
[Dec 1973](#)
[Jan 1974](#)
[Feb 1974](#)

***** Fits *** format DENSITY (qualitative) data...**

[May 1973](#)
[Jun 1973](#)
[Jul 1973](#)
[Aug 1973](#)
[Sep 1973](#)
[Oct 1973](#)
[Nov 1973](#)
[Dec 1973](#)
[Jan 1974](#)
[Feb 1974](#)

***** Gif *** format DENSITY (qualitative) data...**

[May 1973](#)
[Jun 1973](#)
[Jul 1973](#)
[Aug 1973](#)
[Sep 1973](#)
[Oct 1973](#)
[Nov 1973](#)
[Dec 1973](#)
[Jan 1974](#)
[Feb 1974](#)

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[To anonymous ftp instructions...](#)

Last revised January 31, 1996 - Cathy Andrulis

Skylab/ATM-WLCE anonymous ftp Instructions

At present (Feb 2, 1996) all of the digitized DENSITY images are available as "fits" files via anonymous ftp. "DENSITY" refers to the measured film emulsion density as each frame was digitized with a PDS-microdensitometer.

In addition, we've converted most of the above digitized exposures to gif files. As they were converted, these images were corrected for spacecraft orientation and camera film load pointing offsets. Thus all of these images are centered and oriented with solar north at the top of the image. The rotation scheme used was quite primitive, hence you'll notice zigzag edge effects on some of the images.

The [data archive](#) .

The anonymous ftp [directory structure](#) and filename conventions.

Anonymous ftp instructions for DENSITY and gif data follows:

```
ftp 128.117.16.5
or
ftp ftp.hao.ucar.edu

anonymous
  enter some identification, such as your email address

cd skylab/Images          (for DENSITY and gif data)
mget README*
cd ALL_1973/06_jun        (or other appropriate directory)
binary
mget atmwlce_73*.fts
mget atmwlce_73*.gif
quit
```

Anonymous ftp instructions for CALIBRATED data follows:

```
ftp 128.117.16.5
or
ftp ftp.hao.ucar.edu

anonymous
  enter some identification, such as your email address

cd /skylab/calibrated/Data    (for CALIBRATED data)
mget README*
cd 1973/06_jun                (or other appropriate directory)
binary
mget atmwlce_73*.fts
quit
```

Last revised May 28, 1998 - Alice Lecinski

Skylab Sample Header

Here is a sample header. Comments and explanations are in curly brackets {} and refer to the lines **below** them. The sample header is all in capital letters.

```
SIMPLE = T / FITS FILE: SKYLAB-ATM-WLCE
BITPIX = 16 / 2-BYTE TWOS-COMPL INTEGER
NAXIS = 2 / NUMBER OF DIMENSIONS
```

*data type: integer x 2
data comm: short integers*

{There are 481 pixels in the horizontal 'x' direction.}

```
NAXIS1 = 481 / SIZE OF 'X' DIMENSION IN PIXELS
```

{There are usually 480 pixels in the vertical 'y' direction, but this number does vary.}

```
NAXIS2 = 480 / SIZE OF 'Y' DIMENSION IN PIXELS
```

{This is the date the header and image were created. Day/Month/Year}

```
DATE = '22/01/96' / DATE HEADER WRITTEN: DD/MM/YY [UT]
```

{These four lines do not change.}

```
ORIGIN = 'HIGH ALTITUDE OBSERVATORY'
INSTRUME= 'SKYLAB-APOLLO TELESCOPE MOUNT'
TELESCOP= 'S-052 WHITE LIGHT CORONAGRAPH EXPERIMENT: ATM-WLCE'
OBJECT = 'SOLAR CORONA IN WHITE LIGHT (3700-7000 ANGSTROMS)'
```

{The day of year, date, and time of the observation.}

```
DOY-OBS = '148' / OBSERVATION DOY (DAY OF YEAR) : DDD [UT]
DATE-OBS= '28/05/73' / OBSERVATION DATE: DD/MM/YY [UT]
TIME-OBS= '18.50.17' / OBSERVATION TIME: HH.MM.SS [UT]
```

{BUNIT tells whether the the data is measured in density or intensity. These imply BSCALE=800.0 or BSCALE=1.e11, respectively.}

```
BUNIT = 'DENSITY' / DENSITY UNITS
BSCALE = 800.0 / PHYSICAL VALUE = BZERO + BSCALE * (ARRAY VALUE)
```

{This field always equals 0.00}

```
BZERO = 0.00
```

```
COMMENT THERE IS A STRAY LIGHT FIELD AND VIGNETTING FUNCTION IMPOSED
```

```
COMMENT      BY THE INSTRUMENT ON THE DATA.  TO ARRIVE AT TRUE SOLAR
COMMENT      INTENSITY AND PB, THESE MUST BE REMOVED.  HENCE THE
COMMENT      FOLLOWING PARAMETERS.
```

{These fields are 'Y' (yes) if the function is still in the data, and 'N' (no) if it is not.}

```
STRAYIN = 'Y'                / STRAY LIGHT FIELD  IS STILL IN IF 'Y'
VIGNETIN= 'Y'                / VIGNETTING FUNCTION IS STILL IN IF 'Y'
COMMENT   BOTH THE STRAY LIGHT FIELD AND VIGNETTING FUNCTION BECOME
COMMENT   LESS AND LESS RELIABLE BELOW 2.3 SOLAR RADII.  THUS
COMMENT   ***** DATA BELOW 2.3 RSUN ARE UNRELIABLE. *****
```

{These fields give the exact location of the sun's center.}

```
CTYPE1 = 'X'                / AXIS 1 TYPE: X
CRPIX1 =                    240.342 / X SUN CENTER [PIXEL]
CRVAL1 =                    0.00 / X SUN CENTER [ARCSEC]
CDELTA1 =                   24.00 / X COORD INCREMENT [ARCSEC/PIXEL]
CTYPE2 = 'Y'                / AXIS 2 TYPE: Y
CRPIX2 =                    248.900 / Y SUN CENTER [PIXEL]
CRVAL2 =                    0.00 / Y SUN CENTER [ARCSEC]
CDELTA2 =                   24.00 / Y COORD INCREMENT [ARCSEC/PIXEL]
*****
```

{The film frame number. The first frame, 1, was exposed in May 1973, and the last frame was 35798 from February of 1974.}

```
FRAME =                    61 / FILM FRAME NUMBER
```

{Images can be exposed for 3, 9, or 27 seconds.}

```
EXPOSURE=                  9 / SECONDS THAT FILM WAS EXPOSED
```

{There are four filters.

'cl' is the clear aperture.

'p1' has a polaroid filter offset of 30.3 degrees (clockwise) from the +y axis.

'p2' has a polaroid filter offset of 91.3 deg (CW) from the +y axis.

'p3' has a polaroid filter offset of 29.5 deg (CCW) from the +y axis.}

```
FILTER = 'CL'                / CLEAR FILTER
```

{There were nine camera loads: 1, 2A, 2B, 3A, 3B, 4A, 4B, 5A, 5B.}

```
FILMLOAD= '1'                / CAMERA FILM LOAD
```

```
-----
COMMENT   IMAGE ORIENTATION IS WITH THE PYLON ON THE RIGHT, AND
```

```

COMMENT      IMAGE ORIGIN IN THE LOWER LEFT.
COMMENT      IMAGE ORIGIN IS PIXEL POSITION 0,0
-----
COMMENT      MUCH OF THE WORK DONE ON THE ORIGINAL FILM WAS DONE IN
COMMENT      MEASUREMENTS OF MICROMETERS (THE ABBREVIATION MICRONS IS
COMMENT      USED BELOW) HENCE THE REFERRAL TO MICRONS IN MANY OF THE
COMMENT      MEASUREMENTS BELOW.
COMMENT      UNFORTUNATELY, THE MICRON MEASUREMENT SYSTEM WAS DONE WITH
COMMENT      THE IMAGE ORIGIN IN THE LOWER *RIGHT* CORNER, AND THE
COMMENT      X DIRECTION INCREASING TO THE LEFT, THE REVERSE OF CONVENTION.
COMMENT      ALL POSITIONS OF STEP WEDGES, SUN, VIGNETTING, AND STRAY LIGHT
COMMENT      CENTERS WERE DONE IN THIS REVERSE X COORDINATE SYSTEM.
COMMENT      SO, TO KEEP THINGS UNDERSTANDABLE,
COMMENT      ALL PIXEL POSITIONS AND ARCSEC POSITIONS ARE
COMMENT      IN "NORMAL" X INCREASING TO THE RIGHT COORDINATES.
COMMENT      ALL MICRON POSITIONS ARE GIVEN
COMMENT      IN "REVERSE" X INCREASING TO THE LEFT COORDINATES.
COMMENT      TO CONVERT FROM MICRONS TO PIXELS:
COMMENT      X PIXEL = 480 - (X MICRONS)/50.
COMMENT      Y PIXEL =      (Y MICRONS)/50.
COMMENT      TO CONVERT FROM PIXELS TO MICRONS:
COMMENT      X MICRONS = 24000 - (X PIXELS)*50.
COMMENT      Y MICRONS =      (Y PIXELS)*50.

RSUN-PIX=          40.0 / RADIUS OF THE SUN IN PIXELS
RSUN-MIC=          2000.0 / RADIUS OF THE SUN ON THE FILM IN MICRONS
RSUN-ARC=          960.0 / RADIUS OF THE SUN IN ARC SECONDS
FILM-SCL=          50.0 / MICRONS PER PIXEL ON THE FILM
-----
COMMENT      ON THE IMAGES THERE ARE FOUR FIDUCIAL DOTS.  THEY ARE NEAR
COMMENT      THE FOUR CORNERS OF THE IMAGE AND APPEAR AS WHITE DOTS
COMMENT      IN A STANDARD WHITE TO BLACK COLOR TABLE.
COMMENT      AGAIN, IMAGE ORIGIN IS PIXEL POSITION 0,0

FIDUM-LR= '1200,1200' / X,Y POSITION OF LOWER RIGHT FIDUCIAL IN MICRONS
FIDUP-LR= '456,24' / X,Y POSITION OF LOWER RIGHT FIDUCIAL IN PIXELS
FIDUM-LL= '23400,1200' / X,Y POSITION OF LOWER LEFT FIDUCIAL IN MICRONS
FIDUM-UR= '1200,23400' / X,Y POSITION OF UPPER RIGHT FIDUCIAL IN MICRONS
FIDUM-UL= '23400,23400' / X,Y POSITION OF UPPER LEFT FIDUCIAL IN MICRONS
-----
COMMENT      ROLL IS THE DIRECTION OF SOLAR NORTH W.R.T -Y AXIS IN ARC-MINUTES
COMMENT      +ROLL IS IN THE CCW DIRECTION.
COMMENT      ROLL= 10800: NORTH AT TOP, EAST ON LEFT, SOUTH AT BOTTOM,
COMMENT      WEST UNDER THE PYLON ON THE RIGHT.
COMMENT      ROLL= 5400: EAST AT TOP, SOUTH ON LEFT, WEST AT BOTTOM,
COMMENT      NORTH UNDER THE PYLON ON THE RIGHT.
COMMENT      ROLL= 0: SOUTH AT TOP, WEST ON LEFT, NORTH AT BOTTOM,
COMMENT      EAST UNDER THE PYLON ON THE RIGHT.
COMMENT      ROLL= -5400: WEST AT TOP, NORTH ON LEFT, EAST AT BOTTOM,
COMMENT      SOUTH UNDER THE PYLON ON THE RIGHT.

{Actual value for the spacecraft roll in arc-minutes. It is the angle, Counter ClockWise (CCW)
where **North** is located with respect to the negative 'Y' axis. }

ROLL      =          -7372 / DIR OF SOLAR NORTH W.R.T -Y AXIS IN ARC-MINUTES
-----
COMMENT      FINDING SUN CENTER AND THE CENTER OF THE VIGNETTING FUNCTION
COMMENT      IS BASED ON PRE-FLIGHT POSITIONS FOR SUN CENTER AND
COMMENT      VIGNETTING CENTER.  THE PRE-FLIGHT POSITIONS ARE THEN

```

COMMENT MODIFIED BY POINTING ERRORS AND OFFSETS INTRODUCED BY
 COMMENT HOW THE FILM WAS LOADED.
 COMMENT THE CENTER OF THE STRAY LIGHT FUNCTION WAS ASSUMED TO BE CONSTANT.

{These are the expected, pre-flight values for the sun, vignetting, and stray light centers.}

PRESUNX = 12075 / PRE-FLIGHT X SUNCENTER IN MICRONS
 PRESUNY = 12479 / PRE-FLIGHT Y SUNCENTER IN MICRONS
 PREVIGX = 12234 / PRE-FLIGHT X VIGNETTING CENTER IN MICRONS
 PREVIGY = 12440 / PRE-FLIGHT Y VIGNETTING CENTER IN MICRONS
 STRYCENX= 12000 / PRE-FLIGHT X STRAY LIGHT CENTER IN MICRONS
 STRYCENY= 12000 / PRE-FLIGHT Y STRAY LIGHT CENTER IN MICRONS

 COMMENT PES AND IAS ERRORS ARE POINTING ERRORS.
 COMMENT UD REFERS TO UP/DOWN (Y AXIS)
 COMMENT RL REFERS TO RIGHT/LEFT (X AXIS)
 COMMENT IAS IS "INTERNAL ALIGNMENT SENSOR" ERROR AND IS USED FOR
 COMMENT QUALITY INFORMATION ONLY.
 COMMENT PES IS "POINTING ERROR SENSOR" AND IS USED TO DETERMINE
 COMMENT SUN CENTER ON THE FILM FRAME.
 COMMENT "SUNOFFDX" AND "SUNOFFDY" ARE OFFSETS THAT ARE CAMERA FILM LOAD
 COMMENT SPECIFIC. SEE BELOW.
 COMMENT BOTH PES AND IAS WERE SUPPOSED TO BE IN ARCSEC. BUT THE
 COMMENT EQUATION FOR SUNCEN BELOW INDICATES THAT THEY ARE NOT.
 COMMENT THE UNITS ARE UNCLEAR, BUT THE X DIRECTION SIGN IS TAKEN
 COMMENT CARE OF BELOW.

PESUDOK = 17.0 / REASONABLE VALUE FOR PESUD ERROR
 PESRLOK = 11.0 / REASONABLE VALUE FOR PESRL ERROR
 PESLIM = 5.0 / PES ERRORS ARE OK WITHIN +-PESLIM OF PES..OK

IASUDOK = 0.0 / REASONABLE VALUE FOR IASUD ERROR
 IASRLOK = 0.0 / REASONABLE VALUE FOR IASRL ERROR
 IASLIM = 10.0 / IAS ERRORS ARE OK WITHIN +-IASLIM OF IAS..OK

PESUD = -7.0 / PES UP-DOWN (Y AXIS) MEASUREMENT
 PESRL = -11.0 / PES RIGHT-LEFT (X AXIS) MEASUREMENT
 IASUD = -13.0 / IAS UP-DOWN (Y AXIS) MEASUREMENT
 IASRL = 10.0 / IAS RIGHT-LEFT (X AXIS) MEASUREMENT

SUNOFFDX= 68.0 / X OFFSET IN CENTER FROM FILM LOADING (MICRONS)
 SUNOFFDY= 47.0 / Y OFFSET IN CENTER FROM FILM LOADING (MICRONS)

 COMMENT +++RAW DATA+++ SUN CENTER IS CALCULATED THUSLY:
 COMMENT SUNCENX = PRESUNX - SUNOFFDX + 2.19*PESRL (IN MICRONS)
 COMMENT SUNCENY = PRESUNY - SUNOFFDY - 1.86*PESUD (IN MICRONS)

SUNCENX = 11982.9 / TRUE SUN CENTER X POSITION IN MICRONS
 SUNCENY = 12445.0 / TRUE SUN CENTER Y POSITION IN MICRONS

 COMMENT +++RAW DATA+++ VIGNETTING FUNCTION CENTER IS CALCULATED THUSLY:
 COMMENT VIGCENX = PREVIGX - SUNOFFDX (IN MICRONS)
 COMMENT VIGCENY = PREVIGY - SUNOFFDY (IN MICRONS)
 VIGCENX = 12166.0 / VIGNETTING FUNCTION X CENTER IN MICRONS
 VIGCENY = 12393.0 / VIGNETTING FUNCTION Y CENTER IN MICRONS

COMMENT
END

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