2MASS
OBSERVATORY/IPAC TAPE INTERFACE SPECIFICATION

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PRELIMINARY

ONLY FOR IPAC INTERNAL REVIEW

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OBSERVATORY/IPAC TAPE I/F SPECIFICATION

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OBSERVATORY/IPAC TAPE I/F SPECIFICATION

I. FORWARD

A. DOCUMENT DESCRIPTION

This document describes the 2MASS Observatory/IPAC tape interface. It defines the contents and format of the scan and scan-related monitor data that is recorded at the observatory, written to 8 mm cassette tapes and subsequently transported to IPAC for processing.

This document levies requirements on the observatory only to the extent imposed by the actual interface formats themselves. This is not intended to be a requirements document for either the observatory or IPAC.

In addition to this scan tape interface there is another IPAC/Observatory interface, one which is associated with the survey strategy and scan planning software. That survey strategy software has virtually no impact on the Observatory/IPAC tape interface specified herein. It is a separate task and consequently its Observatory/IPAC interface will be specified in a separate document.

B. ACKNOWLEDGEMENTS

The editor wishes to acknowledge the valuable design and editorial contributions made to this document by Gene Kopan and John Fowler.

II. OVERVIEW

2MASS data collected at the observatory are immediately recorded onto hard computer disk there. At a later time these data are written from disk to 8 mm tape cassettes, which will be mailed to IPAC for processing and analysis. Electronic transmission of data from the observatory to IPAC is not planned because of the very large amount of data collected in a single night of observing, typically 12 gigabytes. Since currently available 8 mm cassette tapes hold approximately five gigabytes each, and band data is written to separate tapes, three to six cassette tapes would usually suffice to hold a single night's worth of data. The actual number of tapes required would, of course, depend on the tape format itself, including whether the data are compressed, error corrected and other related considerations.

The design and timing as to when and how these data are written from disk to tape are determined by the observatory's software design and operating procedures and are not described in this interface specification.

The planned IPAC design is to process an entire night's worth of data at a time. Further, IPAC plans to load the *entire* night's data onto disk *before beginning* the nominal pipeline processing. This plan minimizes restrictions on the observatory relative to the order in which the observatory writes data from its disk to the 8 mm tapes. However, there are some restrictions on the content and format of the tapes and these are outlined in this specification.

In this version of the interface document some details are purposely specified at a functional level to allow the observatory as much freedom as possible. The observatory and IPAC will define these details at a later date.

III. CHANGE SUMMARY

SUMMARY OF REV G CHANGES:
1)Read2 and read1 data supplied for all frames
2)Scan data from different bands not to be interleaved on the same tape
3)Eliminate embedded frame number as pixel #1 of all reads.
4)Rename some observatory file suffixes.
5)Clarify certain sections dealing with read1 and read2.

IV. DATA FILES versus TAPE FILES

There are two types of files discussed in this document: data files and tape files.

Data files are those data sets which contain the actual observation data, monitor data or related directory data. There are four specific types of data files written at the observatory:

1) binary scan files (R2 & R1 reads) –one per scan per band
2) scan parameters files – one per band per scan
3) observatory scan log – one per night per band
4) tape directory files – one per 8 mm tape cassette

A tape file is an arbitrary collection of one or more data files written as a physical entity onto an 8 mm cassette and terminated by an EOF. In other words, some number of data files are gathered together and written as a single physical tape file. The final tape file on every tape must be followed by a definite end of data on tape marker.

There is only one type of tape cassette written at the observatory, a scan tape. Scan tapes may contain any of the file types listed above.Darks and calibration scans will be written to tape just as nominal scan would be.

There may be three or six scan tapes produced in a typical night. The final tape will contain the observatory scan log file as its second file. It would be useful to have the observatory also include an electronic observer’s log on the final 8 mm scan tape. At this time, this log is tbd.

Examples of an observatory/ipac interface tape showing functional contents are contained in appendix A and appendix B of this document (ref pg. 19 ff).

V. TAPE CASSETTE FORMAT

As stated in the preceding section, only one type of tape cassette is written at the observatory, a scan tape. Each tape will contain at least three of the four possible data file types outlined in the previous section: binary readout files, scan parameters files and a tape directory. Separate tapes will be written for each of the three bands. Restated, no tape will contain scan files or scan parameter files for more than a single band. Darks and calibration scans will be written to tape just as nominal scan files would be. They will however be clearly indicated to be calibrations or darks by appropriate setting of scan parameter file parameters. The final scan tape for the last scan file written will contain an observatory scan catalog file as the second file on that tape. In addition it would be useful to have an electronic observer's log on this same tape. However, at this time this log is tbd.

Examples of a tape showing possible functional contents are outlined in appendix A and appendix B of this document (ref pg. 19 ff).

Following is a list of general tape format specifications dealing with the tape interface at the tape cassette level.

TAPE LABELS

Each tape must have an electronic as well as physical, human readable tape label. The human readable label includes the same data contained in the electronic label and is physically affixed to each cassette. The electronic label is a 18-character ASCII string and is incorporated as part of the tape directory file name, which is the first file on every cassette. The label format is YY/MM/DD_#_B_OBSRV, where

1) YY/MM/DD= the observation reference date (ref pg 17)
2) # = tape sequence number ranging monotonically from one to NTOTAL where NTOTAL is the count of all cassettes written that night
3) B = band:J,H,K
4) OBSRV = five-character ASCII observatory ID

A sample label might be : 96/04/21_3_K_KP13m

TAPE DIRECTORY

The first file on every tape consists solely of that tape's directory file. The tape directory file name consists of the tape label followed by ".DIR", ref the tape directory file format on pg. 8.

TAPE SET

Data from more than a single night may not be contained on the same tape. Thus, all data on any tape will contain the same observation reference date. The concept is that of a tape set. Every observing night has its own separate tape set.

SAME SCAN # DATA FILES

Related data files for a given band associated with the same scan must be contained in the same physical tape file. These related files are: scan parameter files and readout files.

DATA SEGREGATED BY BAND ON TAPE

Scan data will be written to tape segregated by band, j,h k. Data from different bands will not be interleaved on a single tape. Restated, a single physical 8 mm tape will contain data from one and only 1 infrared band, j, h or k. This requirement facilitates the observatory tape writing operation by not requiring the observatory to interleave the various bands together in scan order.

NO MULTI CASSETTE FILES

No data file or tape file may begin on one tape and end on another. Each tape must contain an integral and complete number of files. This requirement facilitates loading data from tape to disc at IAPC.

PHYSICAL TAPE FILE FORMAT

The actual physical format of the files on tape is not defined here. It is assumed that a format such as that used in the prototype effort will be agreed upon. This is the widely used "TAR" file format. TAR is an acronym for tape archive.

NUMBER OF TAPE FILES PER TAPE CASSETTE

A nominal scan tape cassette should contain approximately five to ten tape files. An entire physical tape should not, for example, be written as a single tape file. Use of multiple files allows recovery from read faults and facilitates restores in which a limited portion of the data are involved. However, too many files add unwanted overhead.

END OF DATA ON TAPE MARKER

The final tape file on each cassette must be followed by a definite marker indicating that no more data follows on this tape. The form and format of this end of data (EOD) marker is tbd.

VI. DATA FILES

This section describes the four data files contained in the Observatory/IPAC tape interface. Within this section there are corresponding subsections, one per data file type.

#	Data File	Suffix	File Name Format
1)	Tape Directory File	DIR	YY/MM/DD_#_B_OBSRV
2)	Observatory scan Log file	LOG	YY/MM/DD.LOG
3)	Readout Files (r1 and r2's)	RDO	BSSSSSS.RDO
4)	Scan Parameters File	PAR	BSSSSSS.PAR

A. TAPE DIRECTORY FILE

YY/MM/DD_#_B_OBSRV.DIR

A directory or table of contents file will be contained on every tape written at the observatory. This directory will be contained in a dedicated tape file which will always be the first file on every tape. Only directory data may be contained in the directory tape file. This arrangement allows IPAC to read a tape and immediately determine its contents. Were the directory at the end of a full tape, it could take up to two and 3/4 hours just to read past the data on the tape to get to the directory. Further, limiting the directory file solely to directory data minimizes the amount of data that must be read to retrieve directory information.

The directory file name will be tape_label.DIR. The tape label format (YY/MM/DD_#_B_OBSRV) is defined on page 5.

Contained in the tape directory as record one is:

1) the total number of tape files on the tape

For each data file on the tape the directory includes the following information:

1) 2MASS data file name
2) file size in bytes
3) file location on tape (tape file number containing this data file)
4) time the file was initially created on disk

B. OBSERVATORY SCAN LOG FILE

YY/MM/DD.LOG

During an observing night, scan files will be created and written to tape cassettes. The final tape cassette will contain an observatory scan log file as the second tape file, the first tape file containing the usual tape directory. . For every scan recorded during the observing night a summary log record will be written into the scan log file. Thus there will be as many log records as there are scans. The sequence of the entries will be in time order. All log records are of the same fixed format and length. The scan log filename will be YY/MM/DD.LOG

Preceding the sorted log records is a tape count and tape label array. The tape count equals the total number of tapes written during the night and therefore specifies the total number of entries in the tape label array. There is one entry per tape in the tape label array. The position in the array corresponds to the tape sequence number. The last entry in the list will be the tape label of the final tape written. Entries will be contiguous with no empty slots and the total number of entries will equal the total tape count for the night.

Individual scan catalog records follow the tape label array. It may be useful to have one or two header records preceding the first scan catalog record. Each catalog record will contain at least the following information:

1) Scan Number
2) Strip id which uniquely identifies the inertial survey scan location
3) Scan type: S(survey scan), C(calibration), D(dark)
4) Begin scan time
5) Three tape cassette sequence numbers (tape id) containing this scan file. Three entries are required because each of the three bands is written to separate tapes.
6) Three tape file numbers containing the scan, 1 for each of the bands.

C. READOUT FILE (R2 and R1 Readouts)

BSSSSSS.RDO

Scan data for a single band are collected as a series of overlapping frames. A frame contains 256x256 pixels, each a two-byte integer (I*2). Two physical read-outs of the chip are collected for each integration, one shortly after the reset and a second after the integration time has elapsed. The primary integration is the difference between the two reads.

At the observatory as a scan proceeds the pixel read-outs are collected together into a single disc file. 256x256 read1 pixels are followed by 256x256 read2 pixels. In the case of a six degree scan, about 260 read1 and read2 frame would be collected. Each readout is written to disk and eventually to tape as a single 256x256x2x260 byte (34.1 megabytes) record. It is expected that the bytes constituting each two-byte integer are in Intel byte order. Thus IPAC will be required to swap each byte pair at initial tape read time.

The read-out file name consists of an 11-character ASCII string in the format: BSSSSSS.RDO where

B : Band letter

SSSSSS : Scan sequence number. For a discussion of scan sequence number please see page 17

RDO : a three-character ASCII suffix used to indicate that this is a readout file..

D. SCAN PARAMETERS FILE

BSSSSSS.PAR

Each scan received from an observatory will be accompanied by a scan parameters (PAR) file associated with that band and that scan. A single PAR file applies to both the read2 and the read1 data for that scan. On tape, each band will have a PAR file associated with each scan. The format and contents of the scan parameters file are specified here. This format is based on the prototype camera format currently in use. Please note that the lists of keywords comprising the scan parameters file contained in this version of the document are preliminary and subject to change.

1. GENERAL FORMAT RULES

KEYWORD=VALUE

"keyword=value" is the required format for each line. A colon (:) may not be used in place of an equal sign (=).

NO KEYWORD ABBREVIATIONS

To be recognized as such at IPAC the entire keyword must appear without abbreviations or truncations.

CASE SENSITIVITY

Keywords are case sensitive. "Focus" is different from "focus".

BLANKS

Leading or imbedded blanks are not significant. For example, 'minvolt', ' min volt ' and 'min volt' are treated identically.

LINE LENGTH

Line length is variable to a maximum of 40 characters.

KEYWORD LENGTH

Keyword length is variable to a maximum of 24 characters including the required equal sign (=).

PARAMETER GROUPS

Within the scan parameter file there are three logical groupings of parameters:

Group#1: Camera parameters
Group#2: Observatory parameters recorded at Start of Scan
Group#3: Observatory parameters recorded at End Of Scan

The required order of these groups is one followed by two followed by three. Group#2 and Group#3 are identical in keyword content and have as their first keyword "Observatory param time =". The parameter value is "Start Of Scan" or "End Of Scan" for Group#2 and Group#3 respectively. The groups are contiguous in the same file with no special characters, lines or separators between groups. Parameters associated with the start of the scan must be preceded by the "Start Of Scan" entry and must precede the "End Of Scan" entry. Those observatory parameters associated with the end of scan must be preceded by the "End Of Scan" entry.

KEYWORD ORDER

No specific keyword order within a parameter group is required.

NON-STANDARD KEYWORDS

A keyword other than those contained in this format specification will not cause an abnormal termination of the IPAC input program. It may, however, produce a minor exception message at IPAC.

BLANKS IN "I" AND "F" FORMATS

In fortran "f" and "i" formats leading and trailing blanks may be substituted in place of numeric digits.

Example 1: The number 23 represented as an I5 may be specified as 0023b or 23bbb or bbb23, where "b" implies a blank, i.e. space, character.

Example 2: The number 8.023 specified as an f8.3 may be represented as bbb8.023, bb8.023b or 8.023bbb. Note however, there should be three decimal places since the format specifically calls for three decimal places (f8.3).

ONE KEYWORD PER LINE

There may be one and only one keyword=value entry per line.

NO LINE WRAP

Each keyword=value entry must be entirely contained on a single line.

ONE PARAMETER FILE PER BAND PER SCAN

Each scan for each band will have a corresponding scan parameters file with the name BSSSSSS.PAR. This parameters file applies equally to both the read1 and the read2 data file associated with that specific scan. Each readout file for the same scan but different band will have a copy of the parameters file associated with it on tape.

SPECIAL CHARACTERS NOT ALLOWED

Special and unprintable characters including tabs are not allowed.

PARAMETER UNITS

Parameter units should be specified as part of the each keyword field. If this is impractical then the units should be included in the documentation remarks field of this interface specification.

ALL FIELDS INPUT AS ASCII CHARACTERS

All data entered in a scan parameters file are entered as ASCII characters. This document specifies the format of each field using standard fortran format notation. However the actual data entered are always ASCII characters. The fortran notation specified here serves to document the fortran-like format of the corresponding data value.

2. CAMERA PARAMETERS

(PAR Group#1)

```
L   KEYWORD                 = FORMAT      (documentation remarks)
#   1234567890123456789012345678901234567890
-----------------------------------------------------------------

1  *Readout Filename Prefix= c7          BSSSSSS
          B         = J H K  filter
          SSSSSS    = Scan#, (ref Scan Sequence Number, pg 17)
2   Pixel Dwell (microsec) = f6.3        tbd
3   Integration Time  (s)  = f6.3        tbd
4   Delay Time (s)         = f6.3        tbd
5  * Filter                = c1          J H K filter letter
6   Focus Setting          = c5          tbd
7   Number of Frames       = i4          frame count
8   Secondary Mode         = c8          "Scan", "Darks"
9   Stare Mode Voltage (V) = f6.3        tbd
10  Flyback Time (s)       = f6.3        tbd
11  Dwell Time (s)         = f6.3        tbd
12  Slew Time (s)          = f6.3        tbd
13  Additional Time (s)    = f6.3        tbd
14  Minimum Voltage (V)    = f7.3        tbd
15 *Maximum Voltage (V)    = f7.3        tbd
16 * Comment=                c32        appropriate text (no
          special characters allowed)
```

* This line has been changed from the prototype interface. It has been either modified, added or deleted.

3. OBSERVATORY PARAMETERS at SOS

(PAR Group#2)

```
L   KEYWORD                = FORMAT      (documentation remarks)
#   1234567890123456789012345678901234567890
-----------------------------------------------------------------

1  *OBSERVATORY PARAM TIME = c14      START OF SCAN
2   IRAF_TIME =            i10       ex:403778704
3   TELNAME =              c8        KP13m etal.
4   TELERROR =             f8.2      tbd
5   OBS_DATE =             c8        dd/mm/yy
6   UT =                   c11       hh:mm:ss
7   ST =                   c11       hh:mm:ss.ss
8   RA =                   c11       hh:mm:ss.ss
9  *DEC =                  c12       Sdd:mm:ss.ss S=+-b(space)
              N.B. IPAC truncates ss.ss to ss.s
10  EPOCH =                f6.1      ex: 1992.8
11  HA =                   c12       hh:mm:ss.ss
12  ZD =                   f7.3      ex: 16.360
13  AIRMASS =              f8.5      ex: 1.04000
   *FOCUS =                          *DELETED --now in Group#1
   *FILTER =                         *DELETED --now in Group#1
14  WINDSPEED =            f9.3      tbd
15  Wind_DIR =             f9.3      tbd
16  HUMIDITY =             f6.2      tbd
17  SEEING =               f6.2      tbd
18  ROTANGLE =             f9.3      tbd
19  BAROMETER =            f9.3      tbd
   *SCAN DIRECTION         c1        A or D
          This parameter may not be required in the Obs/IPAC I/F.
          IPAC may compute it.
20 *STRIP ID =             i6        inertial scan location id
          (ref Strip id, pg. 17)
21 *SCAN SEQUENCE # =      i6        monotonically increasing
          scan seq num. (ref Scan Sequence Numbers, pg. 17)
22 *OBS_REF_DATE           c8        YY/MM/DD
          (ref Observation Reference Date, pg. 17)
```

* This line has been changed from the prototype I/F. It has been either modified, added or deleted.

4. OBSERVATORY PARAMETERS at EOS

(PAR Group#3)

```
L   KEYWORD                 = FORMAT    (documentation remarks)
#   1234567890123456789012345678901234567890
-------------------------------------------------------------------
1  *OBSERVATORY PARAM TIME = c11      "END OF SCAN"
2
.
.
n
```

All keywords in Group#3 are identical to those in Group#2. Note however the first keyword in Group#2 must be "OBSERVATORY PARAM TIME = START OF SCAN" whereas the first keyword in Group#3 must be "OBSERVATORY PARAM TIME = END OF SCAN".

---

*This keyword line has been changed from the prototype I/F. It has been either modified, added or deleted.

5. NOTES

1)OBSERVATION REFERENCE DATE: A nominal observation run typically begins before and ends after local sidereal midnight. If the corresponding dates were used as data reference dates, the data collected during the observation run could have two different dates. Indeed a single scan itself could have different start and end scan dates. To facilitate data reference and storage, the Observation Reference Day and Observation Reference Date are defined. The Observation Reference Day is the 24 hour period centered on local sidereal midnight. This period spans midnight -12 hrs to midnight +12 hrs. The Observation Reference Date is the local date in the pre-midnight half of the Observation Reference Day. Use of this date to tag all data collected before or after local midnight allows all data taken during a single observation run to have the same date tag. In the case of darks actually taken more than 12 hours before local sidereal midnight, (improbable but theoretically possible), they must have the same date as the associated actual data scans. Briefly restated, Observation Reference Date is a 24 hour period centered on local sidereal midnight having the date of the local sidereal day preceding midnight. The date format is YY/MM/DD.

2)SCAN SEQUENCE NUMBERS: Each scan collected at any observatory will be stored into its own corresponding scan file. It will be identified with a unique six-digit monotonically increasing scan sequence number. No two scans or re-scans may have the same sequence number. Once a sequence number has been used it may never be used again even to repeat a scan of the exact same location, (strip). Sequence numbers of scans in the northern hemisphere range from 000001 to 499999; sequence numbers of scans in the southern hemisphere range from 500001 to 999999.

3)STRIP ID: The entire sky is divided into scan swaths eight and a half arcmins wide and some number of degrees long. The value of 8.5 arcmins is based on the current pixel size and frame array size. Scans are always made along lines having constant Right Ascension. This geometric sky survey pattern is determined by the survey strategy software months before commencement of the actual survey itself. At that time a unique number is assigned to each possible survey scan strip by that software. This strip id therefore uniquely locates each scan's inertial position in the sky. It is quite useful to have this number appended to the actual data it references.

VII. APPENDICES

A. TAPE FUNCTIONAL CONTENTS example #1 - nth tape
B. TAPE FUNCTIONAL CONTENTS example #2 - final tape

A. TAPE FUNCTIONAL CONTENTS - EXAMPLE # 1 - nth tape

The following example is a functional outline of a possible J band tape for any cassette except the last cassette.

```
Begin Tape File#1
     6/10/23_4_J_KP13m.DIR  -  Tape Directory data file
          data contents:
          6/10/23_4_J_KP13m - Cassette Tape Label
          count of tape files on this cassette
          count of data files on this cassette
          (directory of data files on this cassette):
          data file#1  :name, size, tape file#, Create time, etc.
          data file#2  :name, size, tape file#, Create time, etc.
          .
          .
          .
          data file#n  :name, size, tape file#, Create time, etc.
     End Directory data file
EOF Tape File #1

Begin Tape File#2
     J000100.PAR    - scan parameters file
     J000100.RDO    - readout file  (darks)
     J000101.PAR    - scan parameters file
     J000101.RDO    - readout file  (calibration)
     .
     .
     .
     J000124,PAR    - scan parameters file
     J000124.RDO    - readout file  (science)
EOF Tape File#2


Tape File #3

Tape File #4

Tape File #5

Tape File #6

Tape File #7


Begin Tape File#8
     J000175.PAR    - Scan Parameter File
     J000175.RDO    - readout file
```

```
     J000176.PAR    - scan parameters file
     J000176.RDO    - readout file
     .
     .
     .
     J000180.PAR    - scan parameters file
     J000180.RDO    - readout file
EOF Tape File#8

EOD                 - End of Data on this tape
```

B. TAPE FUNCTIONAL CONTENTS - EXAMPLE # 2 - FINAL TAPE

The following example is a functional outline of a possible last tape for a selected night. This tape unlike the preceding tapes must contain the Observatory Scan Catalog File as file #2.

```
Tape File#1
     6/10/23_4_J_KP13m.DIR  -  Tape Directory Data file
          data contents:
          6/10/23_4_J_KP13m - Cassette Tape Label
          count of tape files on this cassette
          count of data files on this cassette
          (directory of data files on this cassette):
          data file#1  :name, size, tape file#, Create time, etc.
          data file#2  :name, size, tape file#, Create time, etc.
          .
          .
          .
          data file#n  :name, size, tape file#, Create time, etc.
     EOF data file (DIR)
End Tape File#1


Begin Tape File#2
     96/10/23.LOG        - Observatory Scan Catalog Data File
          data contents:
          total cassette count (rec #1)
          (cassette label array, 1 entry per cassette):
          96/10/23_1_J_KP13m
          96/10/23_2_J_KP13m
          96/10/23_3_J_KP13m
          96/10/23_4_J_KP13m
          (scan log entries, 1 per scan:)
          scan#100:strip id,scan type,time,tape#,tp file#,etc.
          scan#101:strip id,scan type,time,tape#,tp file#,etc.
               .              .
               .
               .
          scan#N  :strip id,scan type,time,tape#,tp file#,etc.
     End LOG data file
End Tape File#2
```

```
Begin Tape File#3
     data files:
     J000200.PAR    - scan parameters file
     J000200.RDO    - readout file
     J000201.PAR    - scan parameters file
     J000201.RDO    - readout file
          .
          .
          .
End Tape File#3


Begin Tape File#4
     J000220.PAR    - scan parameters file
     J000220.RDO    - readout file
     J000221.PAR    - scan parameters file
     J000221.RDO    - readout file
     .
     .
     .
     J000283.PAR    - scan parameters file
     J000283.RDO    - readout file
EOF Tape File#4


EOD                 - End Of Data on this tape
```

GLOSSARY

2MASS	:Two Micron All Sky Survey
airmass	:secant of the zenith angle
b	:abbreviation for a blank or space character
darks	:Exposures taken in the dark to allow noise estimations
DEC	:declination usually expressed in degrees
DIR	:Tape Directory File suffix
EOD	:End of Data on tape marker
EOF	:End of File
EOS	:End of Scan
etal.	:abbreviation for "and others"
filter	:the infrared band being exposed, J, H or K. Indicated as a single uppercase letter.
Intel	:A computer manufacturer
IPAC	:Infrared Processing and Analysis Center at Caltech
keyword	:a word identifying the parameter value following it.
LOG	:observatory scan catalog data file
microsec	:microsecond, 1 millionth of a second.
Obs Ref Date:	Observation Reference Date, ref pg. 17
obsrv	:observation or observatory
PAR	:scan parameter filename suffix
RDO	:a binary scan file consisting of R2 and R1 reads
read1	:R1,the 1st readout of the camera’s NICMOS chip
read2	:R2,the 2nd readout of the camera’s NICMOS chip
scan	:a series of overlapping frames made at constant right ascension

scan sequence number: ref pg. 17

SOS :Start of Scan

stackers :mechanical devices holding multiple tape cassettes for automatic sequential input by a tape reader

strip :a particular inertial sky location designated as one of a predefined set of scan locations

strip id :ref Strip id on pg 17.