FITS output format in DISCOS

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DOCUMENT CHANGE RECORD			
Issue No.	**Issue date**		**Description of change**
01	28/04/14		**FITS format aligned to DISCOS 0.3**
02	12/06/15		**FITS format aligned to DISCOS 0.5** Addition of summary.fits Spectroscopy-related updates Derotator position is now online
03	27/01/16		**FITS format aligned to DISCOS 0.6** Addition of SIGNAL keyword in main header Extended explanations throughout the text DATE → DATE-OBS in summary.fits header
04	16/11/18		**FITS format aligned to DISCOS 1.0** Update of SIGNAL keyword in main header Additional columns in SECTION TABLE Several keywords inside summary.fits are not set to NULL anymore Removal of MBFITS information, as it is not implemented

→ **IMPORTANT** ***Notice*** The FITS content might undergo further revisions. More keywords might be added, others might be renamed; the **keywords to be renamed** are written in **bold** in the tables provided in this document.

Keywords which still hold **dummy values** (i.e. numbers/strings which are not actually read on-line, but are instead assigned as placeholders) are given in **square beackets [ ]**.

DISCOS output files

The DISCOS system is provided with data-writing *containers/components* able to gather the data coming from the fully integrated backends and record them into a substantially standard FITS.

This document, referring to DISCOS 1.0, aims at describing such format in order to allow the users to find the data and ancillary information recorded inside the files.

1 FITS content

This version of the output file is an almost-standard FITS made out of the following extensions:

Index	Extension	Type
0	Primary	Image
1	SECTION TABLE	Binary
2	RF INPUTS	Binary
3	FEED TABLE	Binary
4	DATA TABLE	Binary
5	ANTENNA TEMP TABLE	Binary
6	SERVO TABLE	Binary

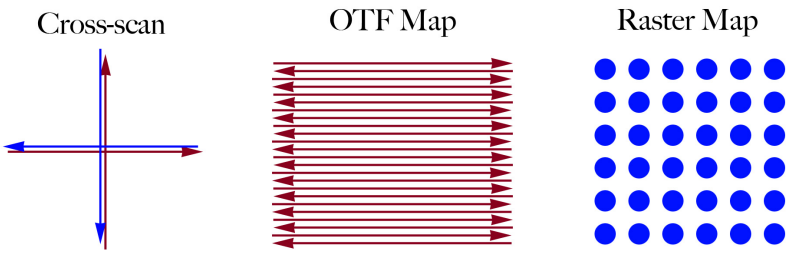
It opens and plots with any software reading regular FITS (FitsViewer, IDL routines, FITS I/O libraries, etc...).

DISCOS writes a FITS file for each subscan composing the ongoing observation, according to the following convention:

Scan
It is the lowest level object normally used by an observer. *It is a sequence of one or more subscans that share a single goal*: for instance cross-scans and maps involve a pattern of subscans. Whether OTF maps mosaicing observations are considered a single scan or a series of scans is rather a matter of how the user would like to define it. In our implementation each map is considered a scan.

Subscan
it is the minimal amount of data acquisition that can be commanded at the script language level. It is highly desirable that it is a simple enough element. For example, it is the single OTF “line” of a map or of a cross-scan.

The figure below visually represents what cross-scans, OTF maps and raster maps are.



In the case of cross-scan, a subscan is a single arrow (a line across the target), four arrows – i.e. two full crosses – constitute the schema which might be repeated as many times as needed within the scan.
For OTF maps, the subscan is again the single arrow, and the scan coincides with the whole map obtained with lines along one axis only (e.g. along RA or Dec). For raster maps, which are based on discrete acquisitions, each point is a subscan, and the final map constitutes the scan.

When choosing FITS as the data output format, a distinct FITS file is produced for each subscan listed in the schedule. In addition, for each scan a **summary.fits** file is produced at the end of the acquisitions: it sums up the main keywords/parameters in order to simplify archiving and querying procedures.

```
MainFolder
    |-----> YYYYMMDD
    |       |-----> Scan1Folder
    |       |               |-----> Subscan1.FITS
    |       |               |-----> Subscan2.FITS
    |       |               |-----> …
    |       |               |-----> summary.fits
    |       |
    |       |-----> Scan2Folder
    |                       |-----> Subscan1.FITS
    |                       |-----> Subscan2.FITS
    |       |               |-----> …
    |       |               |-----> summary.fits
    |
    |-----> YYYYMMDD
            |-----> Scan1Folder
            |               |-----> Subscan1.FITS
            |               |-----> Subscan2.FITS
            |               |-----> …
            |               |-----> summary.fits
            |
            |-----> Scan2Folder
                            |-----> Subscan1.FITS
                            |-----> Subscan2.FITS
                            |-----> …
                            |-----> summary.fits
```

Scan folder names are composed as: **YYYYMMDD-HHMMSS-Project-Suffix**
where

HHMMSS is the UT time associated to the first sample of the acquisition

Project is the code/name specified using the “project=” command, or when starting a schedule with “startSchedule=project/schedulename.scd,N”

Suffix is a user-defined string retrieved from the schedule files. Though no control can be applied on the choice/check of this string, the agreement is that it should coincide with the target name.

FITS files, each corresponding to a subscan, are named like:

YYYYMMDD-HHMMSS-Project-Suffix_Scan#_Subscan#.fits

→ ***Notice*** **The example contents provided in the following sub-sections are relative to an XARCOS acquisition carried out using the XK77 configuration.**

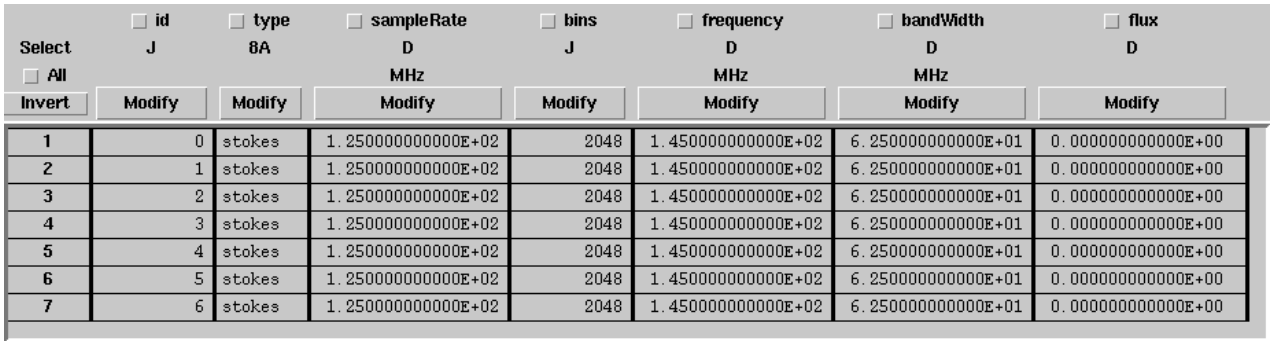
1.0 PRIMARY HEADER

Here the compulsory FITS header keywords are stored. A list of keywords dedicated to observing site info and telescope setup details then follows.

KEYWORD	EXAMPLE VALUE	DESCRIPTION
SIMPLE	T	file does conform to FITS standard
BITPIX	8	number of bits per data pixel
NAXIS	0	number of data axes
EXTEND	T	FITS data set may contain extensions
DATE	'2018-10-17T14:38:49'	File creation date (YYYY-MM-DDThh:mm:ss UT)
HIERARCH Project_Name	'ScheduleTest'	Name of the project
OBSERVER	' '	Name of the observer
ANTENNA	'SRT '	Name of the station
HIERARCH SiteLongitude	0.161358481873679	Longitude of the site (radians)
HIERARCH SiteLatitude	0.689283579621821	Latitude of the site (radians)
HIERARCH SiteHeight	650.	Height of the site (meters)
BEAMS	7	Number of beams
SECTIONS	7	Total number of sections
HIERARCH Sample Size	8	Number of bytes
HIERARCH Receiver Code	'KKG '	Keyword that identifies the receiver
SOURCE	'W3OH '	Source identifier
HIERARCH RightAscension	0.641749566532577	Source J2000 Right Ascension (radians)
HIERARCH Declination	1.07990065805584	Source J2000 Declination (radians)
VLSR	-50	Source radial velocity
HIERARCH Azimuth Offset	0.	Longitude offset in horizontal frame
HIERARCH Elevation Offset	0.	Latitude offset in horizontal frame
HIERARCH RightAscension Offset	0.	Longitude offset in equatorial frame
HIERARCH Declination Offset	0.	Latitude offset in equatorial frame
HIERARCH GalacticLon Offset	0.	Longitude offset in galactic frame
HIERARCH GalacticLat Offset	0.	Latitude offset in galactic frame
SCANID	2	Scan Identifier
HIERARCH SubScanID	1	Subscan Identifier
HIERARCH ScheduleName	'ScheduleTest_2018290143523.scd'	Name of the running schedule (if any)
HIERARCH SubScanType	'TRACKING'	Scan type (or OTF scanning axis) 'TRACKING' is for sidereal tracking or other pointed observations, like position switching. 'BEAMPARK' is for fixed Az-El observations. 'FOCUSING' is for focusing scans. For OTF scans it represent the scanning axis, i.e. 'RA', 'DEC', 'AZ', 'EL', 'GLON', 'GLAT' or "GCIRCLE'.
SIGNAL	'SIGNAL'	Flag for position switching phase. Possible values are: NONE - the subscan signal is undetermined, during OTF for example; SIGNAL - the subscan signal is on source; REFERENCE - the subscan signal is off source; REFCAL - the subscan signal is off source and calibration diode is fired; REFSIG - the subscan signal is on source and the calibration diode is fired.
HIERARCH Scan Tag	11	Scan tag identifier

1.1 SECTION TABLE

This table shows basic info about the sections (i.e. “data streams”).



Select / All / Invert	id J Modify	type 8A Modify	sampleRate D MHz Modify	bins J Modify	frequency D MHz Modify	bandWidth D MHz Modify	flux D Modify
1	0	stokes	1.250000000000E+02	2048	1.450000000000E+02	6.250000000000E+01	0.000000000000E+00
2	1	stokes	1.250000000000E+02	2048	1.450000000000E+02	6.250000000000E+01	0.000000000000E+00
3	2	stokes	1.250000000000E+02	2048	1.450000000000E+02	6.250000000000E+01	0.000000000000E+00
4	3	stokes	1.250000000000E+02	2048	1.450000000000E+02	6.250000000000E+01	0.000000000000E+00
5	4	stokes	1.250000000000E+02	2048	1.450000000000E+02	6.250000000000E+01	0.000000000000E+00
6	5	stokes	1.250000000000E+02	2048	1.450000000000E+02	6.250000000000E+01	0.000000000000E+00
7	6	stokes	1.250000000000E+02	2048	1.450000000000E+02	6.250000000000E+01	0.000000000000E+00

Column meanings and units are also described in its header, as it happens for all the tables.
Each row is dedicated to one section:

id = section number
type = it is “simple” when the section provides total power (scalar) or spectral (array, with *bins* elements) data relative to a single polarization or “stokes” when it is an array listing the following contents [L, R, Q, U], each occuppying ¼ of the array in the given sequence.
sampleRate = data sampling rate (MHz)
bins = number of frequency bins (1 for total power)
*frequency*** = section start frequency (MHz)
*bandwidth*** = section bandwidth (MHz)
flux = when the observed source is among the ones allowing for an estimate of their flux density according to Ott et al., here such estimate is reported (computed using the actually-observed frequency and bandwidth)

** *NOTICE*: these values are strictly back-end related and differ from the ones reported in the RF-INPUTS table, where the actually-observed start frequency and bandwidth (each resulting from the combination of front-end and back-end features) are stored. **When using a spectrometer, spectral resolution must be computed dividing the section bandwidth by the section bin number.**

Header example:

KEYWORD	EXAMPLE VALUE	DESCRIPTION
XTENSION= 'BINTABLE'	'BINTABLE'	binary table extension
BITPIX	8	8-bit bytes
NAXIS	2	2-dimensional binary table
NAXIS1	48	width of table in bytes
NAXIS2	7	number of rows in table
PCOUNT	0	size of special data area
GCOUNT	1	one data group (required keyword)
TFIELDS	7	number of fields in each row
TTYPE1	'id '	label for field 1
TFORM1	'J '	data format of field: 4-byte INTEGER
TTYPE2	'type '	label for field 2
TFORM2	'8A '	data format of field: ASCII Character
TTYPE3	'sampleRate'	label for field 3
TFORM3	'D '	data format of field: 8-byte DOUBLE
TUNIT3	'MHz '	physical unit of field
TTYPE4	'bins '	label for field 4
TFORM4	'J '	data format of field: 4-byte INTEGER
TTYPE5	‘frequency’	label for field 5

TFORM5	'D '	data format of field: 8-byte DOUBLE
TUNIT5	'MHz '	physical unit of field
TTYPE6	'bandWidth'	label for field 6
TFORM6	'D '	data format of field: 8-byte DOUBLE
TUNIT6	'MHz '	physical unit of field
TTYPE7	'flux '	label for field 7
TFORM7	'D '	data format of field: 8-byte DOUBLE
EXTNAME	'SECTION TABLE'	name of this binary table extension
HIERARCH Integration	10000	Integration time (milliseconds)

1.2 RF INPUTS

Receiver general setup.

	feed	ifChain	polarization	frequency	bandWidth	localOscillator	attenuation	calibrationMark	section
Select	J	J	8A	D	D	D	D	D	J
All				MHz	MHz	MHz	db	K	
Invert	Modify	Modify	Modify	Modify	Modify	Modify	Modify	Modify	Modify
1	0	0	LCP	2.231884858000E+04	6.250000000000E+01	2.217384858000E+04	1.858837851429E+01	3.145853700416E+01	0
2	0	1	RCP	2.231884858000E+04	6.250000000000E+01	2.217384858000E+04	1.858837851429E+01	2.761837960666E+01	0
3	1	0	LCP	2.231884858000E+04	6.250000000000E+01	2.217384858000E+04	1.858837851429E+01	5.535472612394E+01	1
4	1	1	RCP	2.231884858000E+04	6.250000000000E+01	2.217384858000E+04	1.858837851429E+01	5.181830232525E+01	1
5	2	0	LCP	2.231884858000E+04	6.250000000000E+01	2.217384858000E+04	1.858837851429E+01	6.641779972979E+01	2
6	2	1	RCP	2.231884858000E+04	6.250000000000E+01	2.217384858000E+04	1.858837851429E+01	6.316909827408E+01	2
7	3	0	LCP	2.231884858000E+04	6.250000000000E+01	2.217384858000E+04	1.858837851429E+01	5.299970244323E+01	3
8	3	1	RCP	2.231884858000E+04	6.250000000000E+01	2.217384858000E+04	1.858837851429E+01	4.986287842342E+01	3
9	4	0	LCP	2.231884858000E+04	6.250000000000E+01	2.217384858000E+04	1.858837851429E+01	6.780597949552E+01	4
10	4	1	RCP	2.231884858000E+04	6.250000000000E+01	2.217384858000E+04	1.858837851429E+01	6.643630693590E+01	4
11	5	0	LCP	2.231884858000E+04	6.250000000000E+01	2.217384858000E+04	1.858837851429E+01	3.942247161186E+01	5
12	5	1	RCP	2.231884858000E+04	6.250000000000E+01	2.217384858000E+04	1.858837851429E+01	3.949331332414E+01	5
13	6	0	LCP	2.231884858000E+04	6.250000000000E+01	2.217384858000E+04	1.858837851429E+01	3.531055007701E+01	6
14	6	1	RCP	2.231884858000E+04	6.250000000000E+01	2.217384858000E+04	1.858837851429E+01	4.027656522981E+01	6

feed = feed number
ifChain = IF number
polarisation = LCP, RCP, HLP or VLP
frequency = observed frequency at the beginning of the band (MHz)
bandWidth = actual observed bandwidth (MHz)
localOscillator = frontend LO frequency (MHz)
attenuation = attenuation (dB) applied to the section
calibrationMark = temperature of the frontend calibration mark
section = number of section associated to this RF input

Notice: to achieve the **central frequency** always compute it as (*frequency*+*bandWidth*/2). There are receivers for which *localOscillator* > *frequency*; in these cases the frequency decreases with increasing samples thus, for consistency, *bandWidth* is specified as a negative value.

Header example:

KEYWORD	EXAMPLE VALUE	DESCRIPTION
XTENSION	'BINTABLE'	binary table extension
BITPIX	8	8-bit bytes
NAXIS	2	2-dimensional binary table
NAXIS1	60	width of table in bytes
NAXIS2	14	number of rows in table
PCOUNT	0	size of special data area
GCOUNT	1	one data group (required keyword)
TFIELDS	9	number of fields in each row
TTYPE1	'feed '	label for field 1

TFORM1	'J '	data format of field: 4-byte INTEGER
TTYPE2	'ifChain '	label for field 2
TFORM2	'J '	data format of field: 4-byte INTEGER
TTYPE3	'polarization'	label for field 3
TFORM3	'8A '	data format of field: ASCII Character
TTYPE4	'frequency'	label for field 4
TFORM4	'D '	data format of field: 8-byte DOUBLE
TUNIT4	'MHz '	physical unit of field
TTYPE5	'bandWidth'	label for field 5
TFORM5	'D '	data format of field: 8-byte DOUBLE
TUNIT5	'MHz '	physical unit of field
TTYPE6	'localOscillator'	label for field 6
TFORM6	'D '	data format of field: 8-byte DOUBLE
TUNIT6	'MHz '	physical unit of field
TTYPE7	'attenuation'	label for field 7
TFORM7	'D '	data format of field: 8-byte DOUBLE
TUNIT7	'db '	physical unit of field
TTYPE8	'calibrationMark'	label for field 8
TFORM8	'D '	data format of field: 8-byte DOUBLE
TUNIT8	'K '	physical unit of field
TTYPE9	'section '	label for field 9
TFORM9	'J '	data format of field: 4-byte INTEGER
EXTNAME	'RF INPUTS'	name of this binary table extension

1.3 FEED TABLE

Information on the feeds position (meaningful for Multi Feed receivers).

	id	xOffset	yOffset	relativePower
Select	J	D	D	D
All				
Invert	Modify	Modify	Modify	Modify
1	0	0.000000000000E+00	0.000000000000E+00	1.000000000000E+00
2	1	3.335520500000E-04	-5.777285900000E-04	9.700000000000E-01
3	2	-3.335520500000E-04	-5.777285900000E-04	9.900000000000E-01
4	3	-6.671036500000E-04	0.000000000000E+00	9.700000000000E-01
5	4	-3.335520500000E-04	5.777285900000E-04	9.500000000000E-01
6	5	3.335520500000E-04	5.777285900000E-04	9.700000000000E-01
7	6	6.671036500000E-04	0.000000000000E+00	9.700000000000E-01

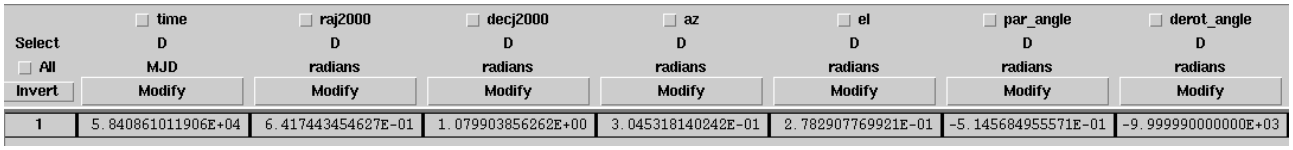
id = feed number
xOffset = x offset position (radians) w.r.t. the central feed, along the Azimuth axis, considering the receiver in its reference position (no rotation is applied to dewar); x>0 for increasing azimuth
yOffset = y offset position (radians) w.r.t. the central feed, along the Elevation axis, considering the receiver in its reference position (no rotation is applied to dewar); y>0 for increasing elevation
relativePower = nominal ratio between this feed gain and the central feed gain. Do not use these values for calibration purposes.

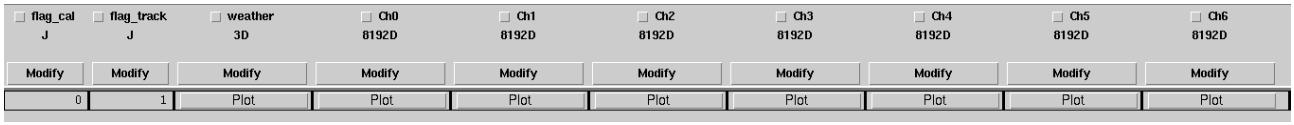
Header example:

KEYWORD	EXAMPLE VALUE	DESCRIPTION
XTENSION	'BINTABLE'	binary table extension
BITPIX	8	8-bit bytes
NAXIS	2	2-dimensional binary table
NAXIS1	28	width of table in bytes
NAXIS2	7	number of rows in table
PCOUNT	0	size of special data area
GCOUNT	1	one data group (required keyword)
TFIELDS	4	number of fields in each row
TTYPE1	'id '	label for field 1
TFORM1	'J '	data format of field: 4-byte INTEGER
TTYPE2	'xOffset '	label for field 2
TFORM2	'D '	data format of field: 8-byte DOUBLE
TTYPE3	'yOffset '	label for field 3
TFORM3	'D '	data format of field: 8-byte DOUBLE
TTYPE4	'relativePower'	label for field 4
TFORM4	'D '	data format of field: 8-byte DOUBLE
EXTNAME	'FEED TABLE'	name of this binary table extension
DEWRTMOD	'UNDEFINED'	Dewar positioner configuration mode
DEWUSER	0.	Dewar static initial angle

1.4 DATA TABLE

Large table containing all the raw data, one row for each sample.





Columns:

time = MJD (Modified Julian Day)
raJ2000 = J2000.0 Right Ascension (radians)
decJ2000 = J2000.0 Declination (radians)
az = azimuth (radians)
el = elevation (radians)
par_angle = parallactic angle (radians)
derot_angle = rotation angle of the dewar (radians) wrt its reference position
flag_cal = calibration mark flag, 0=off, 1=on
flag_track = tracking flag: 1 = pointing error is < 0.1*HPBW, 0 = pointing error is > 0.1*HPBW
weather = array of three values: temperature (°C), relative humidity (%) and atmospheric pressure (hPa), measured at ground level
Ch0,...,ChN = N columns, one for each active section, containing the signal data in raw counts (scalar values for total power acquisitions, arrays for spectra/full-stokes data)

Header example:

KEYWORD	EXAMPLE VALUE	DESCRIPTION
XTENSION	'BINTABLE'	binary table extension
BITPIX	8	8-bit bytes
NAXIS	2	2-dimensional binary table
NAXIS1	458840	width of table in bytes
NAXIS2	1	number of rows in table
PCOUNT	0	size of special data area
GCOUNT	1	one data group (required keyword)
TFIELDS	17	number of fields in each row
TTYPE1	'time '	label for field 1
TFORM1	'D '	data format of field: 8-byte DOUBLE
TUNIT1	'MJD '	physical unit of field
TTYPE2	'raj2000 '	label for field 2
TFORM2	'D '	data format of field: 8-byte DOUBLE
TUNIT2	'radians '	physical unit of field
TTYPE3	'decj2000'	label for field 3
TFORM3	'D '	data format of field: 8-byte DOUBLE
TUNIT3	'radians '	physical unit of field
TTYPE4	'az '	label for field 4
TFORM4	'D '	data format of field: 8-byte DOUBLE
TUNIT4	'radians '	physical unit of field
TTYPE5	'el '	label for field 5
TFORM5	'D '	data format of field: 8-byte DOUBLE
TUNIT5	'radians '	physical unit of field
TTYPE6	'par_angle'	label for field 6
TFORM6	'D '	data format of field: 8-byte DOUBLE
TUNIT6	'radians '	physical unit of field
TTYPE7	'derot_angle'	label for field 7
TFORM7	'D '	data format of field: 8-byte DOUBLE
TUNIT7	'radians '	physical unit of field
TTYPE8	'flag_cal'	label for field 8
TFORM8	'J '	data format of field: 4-byte INTEGER
TTYPE9	'flag_track'	label for field 9
TFORM9	'J '	data format of field: 4-byte INTEGER
TTYPE10	'weather '	label for field 10
TFORM10	'3D '	data format of field: 8-byte DOUBLE
TTYPE11	'Ch0 '	label for field 11
TFORM11	'8192D '	data format of field: 8-byte DOUBLE
TTYPE12	'Ch1 '	label for field 12
TFORM12	'8192D '	data format of field: 8-byte DOUBLE
TTYPE13	'Ch2 '	label for field 13
TFORM13	'8192D '	data format of field: 8-byte DOUBLE
TTYPE14	'Ch3 '	label for field 14
TFORM14	'8192D '	data format of field: 8-byte DOUBLE
TTYPE15	'Ch4 '	label for field 15
TFORM15	'8192D '	data format of field: 8-byte DOUBLE
TTYPE16	'Ch5 '	label for field 16
TFORM16	'8192D '	data format of field: 8-byte DOUBLE
TTYPE17	'Ch6 '	label for field 17
TFORM17	'8192D '	data format of field: 8-byte DOUBLE
EXTNAME	'DATA TABLE'	name of this binary table extension

1.5 ANTENNA TEMP TABLE

It contains N columns (Ch0, ..., ChN) with the signal converted in antenna temperature (K). Conversion is performed using a counts-to-K factor retrieved from the last available T_{sys} measurement. This means that the conversion factor, if the T_{sys} value had been achieved in a distant time or position w.r.t. the data stream, could be obsolete and/or not applicable to the data! Pay much attention to the usage of this table, as discussed in the "Observing at the SRT with DISCOS" user's guide.

→ Notice: XARCOS is not yet provided with the possibility to perform T_{sys} measurements. The ANTENNA TEMP TABLE data streams are thus filled with 0.0 values.

Header example:

KEYWORD	EXAMPLE VALUE	DESCRIPTION
XTENSION	'BINTABLE'	binary table extension
BITPIX	8	8-bit bytes
NAXIS	2	2-dimensional binary table
NAXIS1	64	width of table in bytes
NAXIS2	6	number of rows in table
PCOUNT	0	size of special data area
GCOUNT	1	one data group (required keyword)
TFIELDS	4	number of fields in each row
TTYPE1	'Ch0 '	label for field 1
TFORM1	'2D '	data format of field: 8-byte DOUBLE
TUNIT1	'K '	physical unit of field
TTYPE2	'Ch1 '	label for field 2
TFORM2	'2D '	data format of field: 8-byte DOUBLE
TUNIT2	'K '	physical unit of field
TTYPE3	'Ch2 '	label for field 3
TFORM3	'2D '	data format of field: 8-byte DOUBLE
TUNIT3	'K '	physical unit of field
TTYPE4	'Ch3 '	label for field 4
TFORM4	'2D '	data format of field: 8-byte DOUBLE
TUNIT4	'K '	physical unit of field
TTYPE5	'Ch4 '	label for field 5
TFORM5	'2D '	data format of field: 8-byte DOUBLE
TUNIT5	'K '	physical unit of field
TTYPE6	'Ch5 '	label for field 6
TFORM6	'2D '	data format of field: 8-byte DOUBLE
TUNIT6	'K '	physical unit of field
TTYPE7	'Ch6 '	label for field 7
TFORM7	'2D '	data format of field: 8-byte DOUBLE
TUNIT7	'K '	physical unit of field
EXTNAME	'ANTENNA TEMP TABLE'	name of this binary table extension

1.6 SERVO TABLE (SRT only)

It contains the readout of each axis for every servo system involved.
Servo systems are:

Primary focus (PFP)
Gregorian focus (SRP, GFR)
BWG (SRP, GRF, M3R)
PFP: Primary Focus Positioner
SRP: SubReflector Positioner, Gregorian Feed Rotator
M3R: Mirror 3 Rotator

Notice: the present release of this table contains several errors. For example, measure units specified in the header are wrong/missing.

	time	SRP_TX	SRP_TY	SRP_TZ	SRP_RX	SRP_RY	SRP_RZ	GFR_RZ
Select	D	D	D	D	D	D	D	D
All	MJD	TX	TY	TZ	RX	RY	RZ	mm
Invert	Modify	Modify	Modify	Modify	Modify	Modify	Modify	Modify
1	5.673273613461E+04	-1.499927034393E+00	1.479600033567E+01	1.966389330694E+00	4.141411823968E-02	-3.610823004669E-02	3.196720137144E-06	1.323500000000E+03
2	5.673273613472E+04	-1.499925806859E+00	1.479731217005E+01	1.966724363668E+00	4.141076104813E-02	-3.610835363404E-02	3.278719121723E-06	1.323500000000E+03
3	5.673273613484E+04	-1.499924579325E+00	1.479862400443E+01	1.967059396642E+00	4.140740385658E-02	-3.610847722139E-02	3.360718106302E-06	1.323500000000E+03
4	5.673273613495E+04	-1.499923351791E+00	1.479993583881E+01	1.967394429615E+00	4.140404666503E-02	-3.610860080874E-02	3.442717090881E-06	1.323500000000E+03
5	5.673273613507E+04	-1.499922124257E+00	1.480124767319E+01	1.967729462589E+00	4.140068947348E-02	-3.610872439609E-02	3.524716075460E-06	1.323500000000E+03
6	5.673273613519E+04	-1.499920896722E+00	1.480255950757E+01	1.968064495562E+00	4.139733228193E-02	-3.610884798344E-02	3.606715060038E-06	1.323500000000E+03
7	5.673273613530E+04	-1.499919669188E+00	1.480387134195E+01	1.968399528536E+00	4.139397509038E-02	-3.610897157079E-02	3.688714044617E-06	1.323500000000E+03
8	5.673273613542E+04	-1.499918441654E+00	1.480518317633E+01	1.968734561510E+00	4.139061789883E-02	-3.610909515813E-02	3.770713029196E-06	1.323500000000E+03

time = MJD associated to the following positions
SRP_TX = SRP translation along the X axis (mm)
SRP_TY = SRP translation along the Y axis (mm)
SRP_TZ = SRP translation along the Z axis (mm)
SRP_RX = SRP rotation around the X axis (mm)
SRP_RY = SRP rotation around the Y axis (mm)
SRP_RZ = SRP rotation around the Z axis (mm)
GFR_RZ = GFR rotation (mm)

Header example:

KEYWORD	EXAMPLE VALUE	DESCRIPTION
XTENSION	'BINTABLE'	binary table extension
BITPIX	8	8-bit bytes
NAXIS	2	2-dimensional binary table
NAXIS1	64	width of table in bytes
NAXIS2	285	width of table in bytes
PCOUNT	0	size of special data area
GCOUNT	1	one data group (required keyword)
TFIELDS	8	number of fields in each row
TTYPE1	'time '	label for field 1
TFORM1	'D '	data format of field: 8-byte DOUBLE
TUNIT1	'MJD '	physical unit of field
TTYPE2	'SRP_TX '	label for field 2
TFORM2	'D '	data format of field: 8-byte DOUBLE
TUNIT2	'TX '	physical unit of field
TTYPE3	'SRP_TY '	label for field 3
TFORM3	'D '	data format of field: 8-byte DOUBLE
TUNIT3	'TY '	physical unit of field
TTYPE4	'SRP_TZ '	label for field 4
TFORM4	'D '	data format of field: 8-byte DOUBLE
TUNIT4	'TZ '	physical unit of field
TTYPE5	'SRP_RX '	label for field 5
TFORM5	'D '	data format of field: 8-byte DOUBLE

TUNIT5	'RX '	physical unit of field
TTYPE6	'SRP_RY '	label for field 6
TFORM6	'D '	data format of field: 8-byte DOUBLE
TUNIT6	'RY '	physical unit of field
TTYPE7	'SRP_RZ '	label for field 7
TFORM7	'D '	data format of field: 8-byte DOUBLE
TUNIT7	'RZ '	physical unit of field
TTYPE8	'M3R_RZ '	label for field 8
TFORM8	'D '	data format of field: 8-byte DOUBLE
TUNIT8	'RZ '	physical unit of field
EXTNAME	'SERVO TABLE'	name of this binary table extension

1.7 summary.fits CONTENT

Each scan is provided with an additional FITS file, whose goal is to sum up the most useful information. This file is always named summary.fits and is exploited for archiving/querying procedures.
It contains only a primary header, at the moment listing the following keywords:

KEYWORD	EXAMPLE VALUE	DESCRIPTION
SIMPLE	T	file does conform to FITS standard
BITPIX	8	number of bits per data pixel
NAXIS	0	number of data axes
EXTEND	T	FITS data set may contain extensions
DATE-OBS	'2018-10-17T14:38:49'	File creation date (YYYY-MM-DDThh:mm:ss UT)
HIERARCH BackendName	'XArcos '	Backend name
CREATOR	'DISCOS-1.0.SRT'	Software (incl. version)
HIERARCH Declination	1.06475750272639	Target J2000 declination (radians)
HIERARCH RightAscension	0.641749566532577	Target J2000 right ascension (radians)
[EQUINOX]	0.	Equinox of RA, Dec
EXPTIME	10.	Total integration time (seconds)
FITSVER	'V.1.2 '	FITS version
LST	'16:59:59.644'	Local sidereal time
HIERARCH LogFileName	'ScheduleTest_2018290143523.log'	Name of the log file
HIERARCH NUSEBANDS	7	Number of sections
OBJECT	'W3OH '	Target source name
OBSID	'AO'	Observer or operator initials
PROJID	'ScheduleTest'	ProjectID
HIERARCH RESTFREQ1	22345.18	Rest Frequency (MHz)
HIERARCH ReceiverCode	'KKG '	Receiver name
[SCANGEOM]	'NULL '	Scan geometry
[SCANMODE]	'NULL '	Mapping mode
[SCANTYPE]	'NULL '	Scan astronomical type
[SCANXVEL]	0.	Tracking rate (optional, OTF)
[SWTCHMOD]	'NULL '	Switch mode
HIERARCH ScheduleName	'ScheduleTest_2018290143523. scd'	Name of schedule
TELESCOP	'SRT '	Telescope name
VDEF	'RD '	Radial velocity definition
VFRAME	'LSRK '	Radial velocity reference frame
VRAD	-50.	Radial velocity (km/s)
WOBUSED	0.	Wobbler used?