JUNO

JIRAM Commanding Tool SW Requirements

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ACRONYM & ABBREVIATION LIST

AD	Applicable Document
AI	Action Item
ASI	Agenzia Spaziale Italiana
CDR	Critical Design Review
C&DH	Command and Data Handling
CICD	Communication Interface Control Document
CIDL	Configuration Item Data List
EDAC	Error Detection And Correction
EGSE	Electrical Ground Support Equipment
EM	Electrical Model
ESA	European Space Agency
FM	Flight Model
FSW	Flight SW
GA	Galileo Avionica
HEX	Hexadecimal format
HK	Housekeeping
HW	Hardware
HSSL	High Speed Serial Link
IF	Interface
IR	Infrared
INAF	Istituto Nazionale di Astrofisica
ITAR	International Traffic in Arms Regulations
JSOC	Juno Science Operations Center (at SwRI, Texas)
JPL	Jet Propulsion Laboratory
JIRAM	Jovian Infrared Auroral Mapper
LM	Lockheed Martin
LSSL	Low Speed Serial Link
NA	Not Appicalble
NASA	National Aeronautics and Space Administration
PI	Principal Investigator
RD	Reference Document
RID	Review Item Discrepancy
SC	Spacecraft
SCR	SW Change Request
SDD	SW Design Document

SP	Settable Parameter
SRR	SW Requirements Review
SRD	SW Requirements Document
STR	String format
SUM	SW User Manual
SW	Software
TBD	To Be Defined
TBC	To Be Confirmed
TBW	To Be Written
TC	Tele-command
TM	Telemetry
UDEC	Unsigned Decimal format

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DOCUMENT CHANGE LOG

Issue	Date	Pages/Paragraphs affected	Changes Description

APPLICABLE DOCUMENTS

The following documents at the latest issue in effect shall apply. These documents are herein referred as [AD-XX].

Id	*Document Number*	*Description*

REFERANCE DOCUMENTS

The following documents shall be used as reference background and support information. These documents are herein referred as [RD-XX].

Id	*Document Number*	*Description*
[RD-01]	JIR-IFSI-UR-002-2010	JIRAM_Operations_Interface_Control_Document_Issue_05.pdf
[RD-02]	JIRAM-GAF-IC-001	JIRAM-GAF-IC-001_rev6_CICD.pdf
[RD-03]	JIRAM-GAF-TN-027	JIRAM-GAF-TN-027_rev10.pdf
[RD-04]	JIRAM-GAF-RP-011	JIRAM-GAF-RP-011_rev0(CalibrationDataRecord).pdf
[RD-05]	JIR-IFSI-SY-002-2011	JIRAM_Uplink_Downlink_Procedures_Issue_02.pdf

1 PURPOSE OF THIS DOCUMENT

This document provides the basic requirements for the design and development of the JIRAM Ground Segment Commanding Tool. Additional requirements may be found in annexes (mainly details on the algorithms) and in the applicable and reference documents.

The requirements specified here are subject to revision by GA when required. In the event that a supplier believes that parts of the specified requirements would not apply, or additional requirements are necessary, such recommendations shall be submitted to INAF with substantiating analyses and documentation, for consideration and analysis.

2 JIRAM INSTRUMENT DESCRIPTION

JIRAM is equipped with a single telescope that accommodates both an infrared camera and a spectrometer to facilitate a large observational flexibility in obtaining simultaneous images in the L and M bands with the spectral radiance over the central zone of the images. Moreover, JIRAM will be able to perform spectral imaging of the planet in the 2.0-5.0 μm interval of wavelengths with a spectral resolution better than 10 nm. Instrument design, modes, and observation strategy will be optimized for operations onboard a spinning satellite in polar orbit around Jupiter. The JIRAM heritage comes from Italian-made, visual-infrared imaging spectrometers dedicated to planetary exploration, such as VIMS-V on Cassini, VIRTIS on Rosetta and Venus Express, and VIR-MS on the Dawn mission.
JIRAM combines two data channels in one instrument: the **imager** and the **spectrometer**, which are housed in the same optical subsystem (fig. 1). The instrument is composed of the Optical Head (OH) and the Main Electronic (ME). The ME contains the electronics to drive the Focal Plane Arrays (FPAs) and compensating mirror, and perform the acquisition and conversion of the science and housekeeping data. It also manages the operation of the two channels, gathers data and housekeeping information from them, stores the data, performs data compression, and interfaces the instrument with the spacecraft.

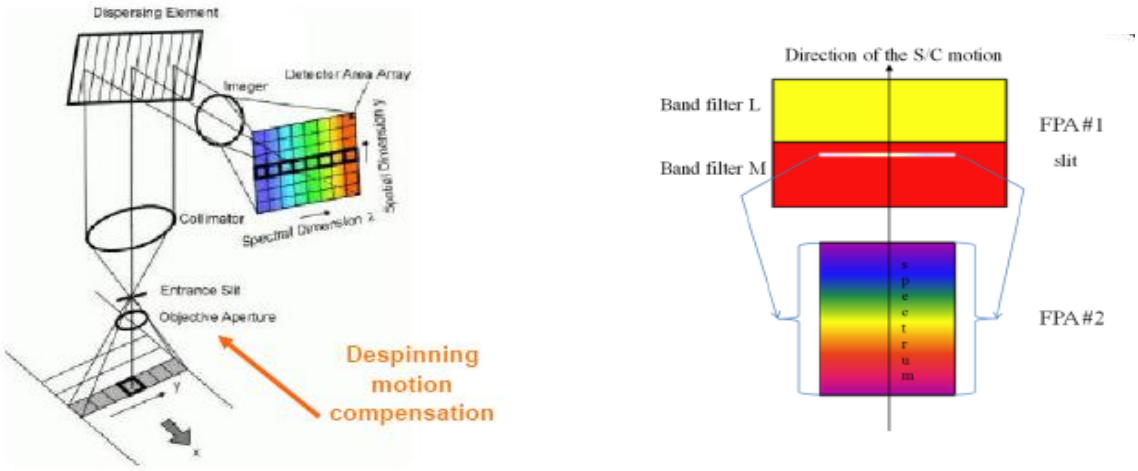


Fig. 1: the two FPAs

2.1 SCIENCE OBJECTIVES

The Jovian InfraRed Auroral Mapper (JIRAM) will explore the dynamics and the chemistry of Jovian auroral regions by high contrast imaging and spectroscopy. It will also analyze the Jovian hot spots to determine their vertical structure and infer possible mechanisms for their formation. JIRAM will sound the Jovian meteorological layer to map moist convection and determine water abundance and other constituents at depths that correspond to several bars pressure.

2.1.1 ACTIVITY DESCRIPTION

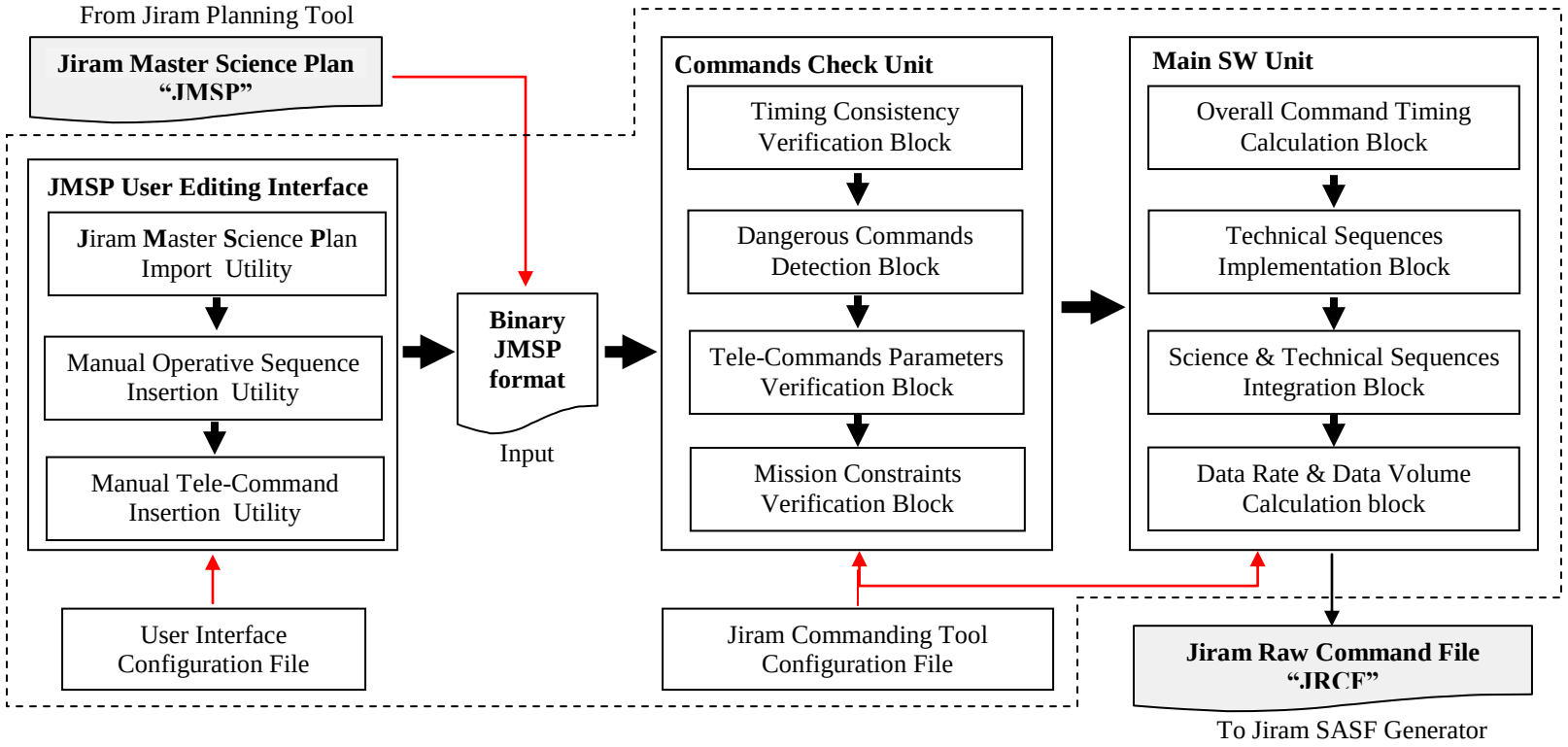
The JIRAM Ground Segment Commanding Tool **"JCoT"** implements procedures, algorithms and data formats in such a way to permit a user to perform tasks related to the Planning activities of the instrument mission. This activity leads to the generation of parameter values to be used, in automated processes, to command the instrument.

Nominal input to the Commanding Tool are instrument Timelines generated by the JIRAM Planning Tool **"JPlaT"**, validated within the Science Activity Plan file **"SAP"**. Alternatively, timelines can be manually defined or command parameters can be, again manually, selected.

Outputs of the Commanding Tool are a set of commands rows and a set of SP values to be used for instrument programming and formalized in the JIRAM Raw Command File **"JRCF"**. The Jiram raw command file will be translated into SASF format (JPL requirement) with the SASF Generator Tool.

3 JIRAM COMMANDING TOOL BLOCKS DIAGRAM

In nominal operations, the main Jiram Commanding Tool input is an Observation Timeline, Jiram Master Science Plan (**JMSP**) which defines the succession of operational sequences to be programmed, starting from a given absolute or relative reference time. For each operative sequence, details are provided to define the Tele-Commands and Settable Parameters (**SP**) that will be loaded/updated into the instrument.
The Jiram Commanding Tool provides also means to manually define the operative sequences, in case the **JMSP** file is not available, or even to generate a sequence of instrument Tele-Commands for special purposes, like for example to manage the submission of memory patch and dump request



4 JIRAM COMMANDING TOOL MODULES DESCRIPTION

The Jiram Commanding Tool functional architecture can be partitioned in modules as described in the following paragraph.

4.1 JIRAM USER EDITING INTERFACE

Basic Commanding Tool usage foresees the user to manage the task of "commanding" the instrument in different ways.

The main option is that to select one, timeline from the Planning schema **"JMSP file"**(these timelines are a product of the Jiram Planning Tool) and commit them for a standard processing..

As an alternative the user may bypass the standard generation process and perform an assisted manual input of Operative Sequences.

Other options include the possibility to perform a guided compilation of the Jiram Tele-Commands.

It is considered a fourth utility a third usage alternative, that to manage the submission of memory patch requests.

4.1.1 JIRAM MASTER SCIENCE PLAN (JMSP) FORMAT FILE

The following diagrams shows a graphical representation of a generic operative timeline. In the JMSP product, will be represented only Science and Calibration sequences, with the respective timing (T1/T2 & T3/T4) in UTC format.

The Commanding Tool will add to the final timeline, Jiram Raw Command File (**JRCF**), the technical sequences necessary for the operation of the instrument, like for example: "POWER ON" , "STB", "SAFE" and "POWER OFF".

The Commanding Tool will also calculate the overall timing in different format and the internal timing of each singe Sequence.

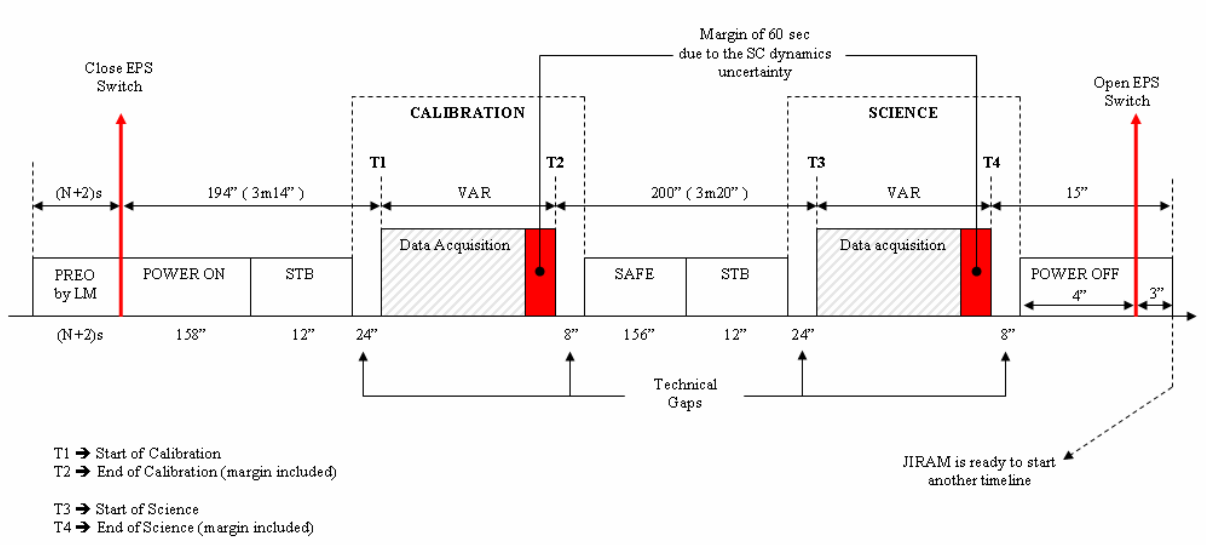


Figure 2

CALIBRATION SEQUENCE SPECIFICS & FORMAT

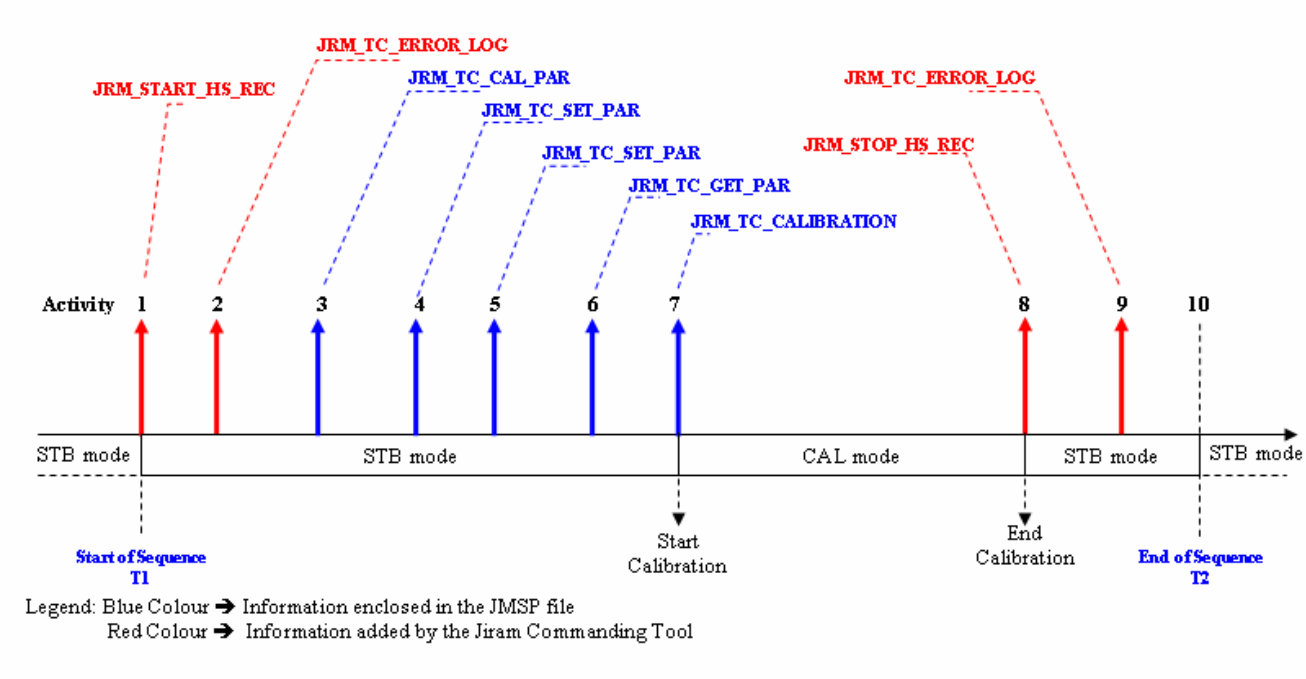


Figure 3

Field Description	File Field Naming Convention	Unit	Range
Activity	JIRAM_CALIB	STR	NA
Start Execution Time	Start_Execution_Time	STR	YY-DDDTHH:MM:SS.SSSZ
End Execution Time	End_Execution_Time	STR	YY-DDDTHH:MM:SS.SSSZ
JRM_TC_CAL_PAR	SP_I_GAIN1_LAMP1	UDEC	0 15
	SP_I_GAIN2_LAMP1	UDEC	0 15
	SP_I_GAIN1_LAMP2	UDEC	0 15
	SP_I_GAIN2_LAMP2	UDEC	0 15
	SP_T_EXPO_BACK_IMG	UDEC	0 40000
	SP_T_EXPO_BACK_SPE	UDEC	0 40000
	SP_T_EXPO_LAMP1_G1_IMG	UDEC	0 40000
	SP_T_EXPO_LAMP1_G1_SPE	UDEC	0 40000
	SP_T_EXPO_LAMP1_G2_IMG	UDEC	0 40000
	SP_T_EXPO_LAMP1_G2_SPE	UDEC	0 40000
	SP_T_EXPO_LAMP2_G1_IMG	UDEC	0 40000
	SP_T_EXPO_LAMP2_G1_SPE	UDEC	0 40000
	SP_T_EXPO_LAMP2_G2_IMG	UDEC	0 40000
	SP_T_EXPO_LAMP2_G2_SPE	UDEC	0 40000
	SP_T_STAB_LAMP1	UDEC	0 300
JRM_SET_PAR	SP_ID	UDEC	0 65535
	SP_VAL	UDEC	0 4294967295
JRM_SET_PAR	SP_ID	UDEC	0 65535
	SP_VAL	UDEC	0 4294967295

JRM_GET_PAR	SP_ID	UDEC	0
			65535
JRM_CALIBRATION	SUB_MODE	STR	"CAL_I0_S1"
			"CAL_I0_S2"
			"CAL_I0_S3"
			"CAL_I1_S0"
			"CAL_I1_S1"
			"CAL_I1_S2"
			"CAL_I1_S3"
			"CAL_I2_S0"
			"CAL_I2_S1"
			"CAL_I2_S2"
			"CAL_I2_S3"
			"CAL_I3_S0"
			"CAL_I3_S1"
			"CAL_I3_S2"
			"CAL_I3_S3"
	EN_DIS_COMP	STR	"IEN_SEN"
			"IDIS_SEN"
			"IEN_SDIS"
			"IDIS_SDIS"
	EN_DISABLE_SUB	STR	"DISABLE"
			"ENABLE"
	NUM_CYCLE_PER_PHASE	UDEC	1
			16
	LAMP_ID	STR	"LAMP_1"
			"LAMP_2"
			"BOTH_LAMPS"

SCIENCE SEQUENCE SPECIFICS & FORMAT

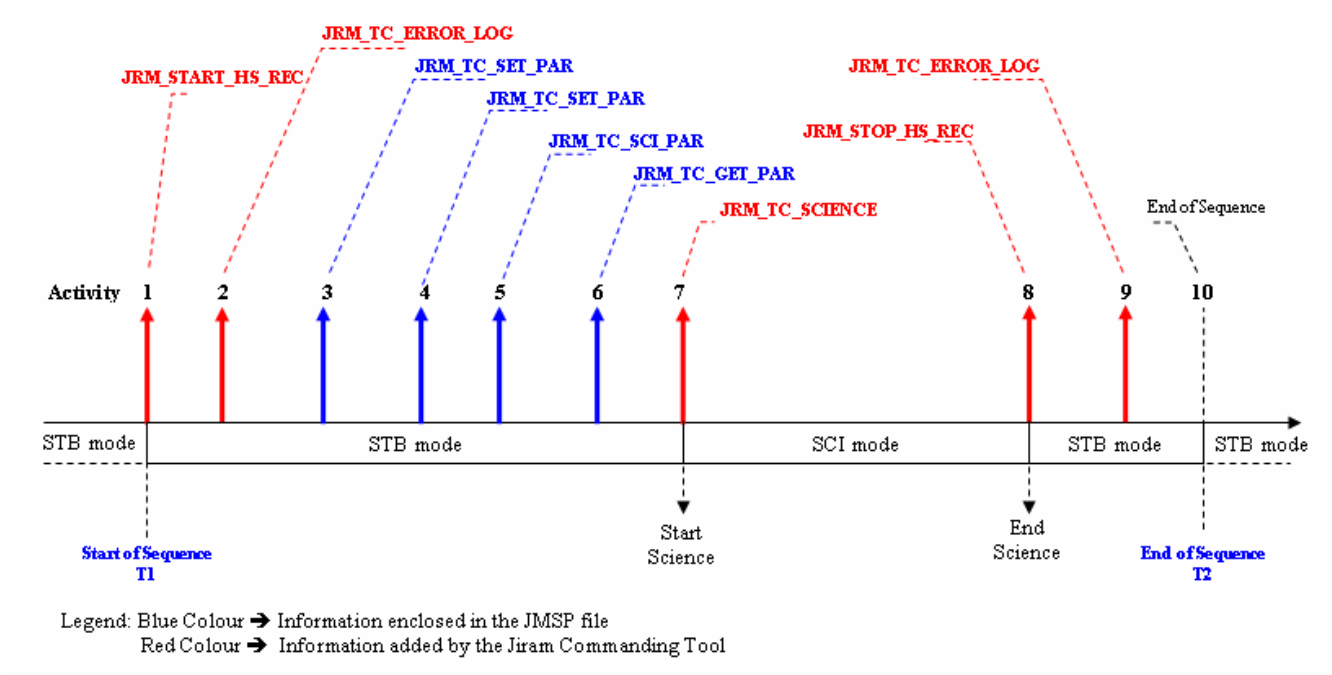


Figure 4

Field Description	File Field Naming Convention	Unit	Range
Activity	JIRAM_CALIB	STR	NA
Start Execution Time	Start_Execution_Time	STR	YY-DDDTHH:MM:SS.SSSZ
End Execution Time	End_Execution_Time	STR	YY-DDDTHH:MM:SS.SSSZ
JRM_SET_PAR	SP_ID	UDEC	0
			65535
	SP_VAL	UDEC	0
			4294967295
JRM_SET_PAR	SP_ID	UDEC	0
			65535
	SP_VAL	UDEC	0
			4294967295

JRM_SCI_PAR	SP_EN_DIS_DOUC_SCI	STR	"DISABLE"
			"ENABLE"
	SP_ACQ_DURATION	UDEC	0
			255
	SP_NADIR_DELTA	UDEC	0
			3186
	SP_I_EXP_1	UDEC	0
			50000
	SP_S_EXP_1	UDEC	0
			50000
	SP_I_GAIN_1	STR	"LOW"
			"HIGH"
	SP_S_GAIN_1	STR	"LOW"
			"HIGH"
	SP_M_MODE_1	STR	"POINT"
			"SPIN"
	SP_NADIR_OFFSET_1	SDEC	-57343
			57343
	SP_I_EXP_2	UDEC	0
			50000
	SP_S_EXP_2	UDEC	0
			50000
	SP_I_GAIN_2	STR	"LOW"
			"HIGH"
	SP_S_GAIN_2	STR	"LOW"
			"HIGH"
	SP_M_MODE_2	STR	"POINT"
			"SPIN"
	SP_NADIR_OFFSET_2	SDEC	-57343
			57343
	SP_SUMMED_SCIENCE	STR	"NO_SUMMED_SCI"
			"SUMMED_SCI"
JRM_GET_PAR	SP_ID	UDEC	0
			65535

4.1.2 "OPERATIVE SEQUENCES " MANUAL INSERTION UTILITY "

This module permit the generation of the Operative Timeline, without the ingestion and processing of the JMSP file produced by the Planning Tool.
The user has the possibility, through a graphical interface, to select the desired Macro Sequences, already packed and stored into the Commanding Tool local database and edit each available editable filed of the various Tele-Commands.

The following tables show all the available Macro Sequences that should be implemented into the Local Archive:

JIRAM POWER ON SEQUENCE

Not editable Inputs

JIRAM SW MAINTENANCE DOWNLOAD MEMORY

Tele-Command	Editable Fields	Type	Range
JIRAM_TC_RESET	RESET_LEVEL	STR	"HW_RESET"
			"SW_RESET"
JIRAM_TC_DOWNLOAD_MEM	START_ADD	HEX	0X00000000
			0XFFFFFFFF
	SIZE	UDEC	0
			4294967295
	EEPROM_EDAC	STR	"DISABLE"
			"ENABLE"

JIRAM SW MAINTENANCE CHECK MEMORY

Tele-Command	Editable Fields	Type	Range
JIRAM_TC_RESET	RESET_LEVEL	STR	"HW_RESET"
			"SW_RESET"
JIRAM_TC_CHECK_MEM	START_ADD	HEX	0X00000000
			0XFFFFFFFF
	SIZE	UDEC	0
			4294967295
	EEPROM_EDAC	STR	"DISABLE"
			"ENABLE"

JIRAM STANDBY

Tele-Command	Editable Fields	Type	Range
JIRAM_TC_RESET	RESET_LEVEL	STR	"HW_RESET"
			"SW_RESET"
JIRAM_TC_STANDBY	I_IR_ON_OFF	STR	“OFF”
			“ON”
			“AUTO”
	S_IR_ON_OFF	STR	“OFF”
			“ON”
			“AUTO”
	M_MOTOR_ENABLE	STR	“OFF”
			“ON”

JIRAM SAFE

Tele-Command	Editable Fields	Type	Range
JIRAM_TC_SET_PAR	SP_ID	UDEC	0
			65535
	SP_VAL	UDEC	0
			4294967295
JIRAM_TC_EEPROM_LOAD	LOAD	STR	"USE_DEF_PARAMS"
			"USE_PARAMS_IN_TC"
	EEPROM_EDAC	STR	"DISABLE"
			"ENABLE"
	EEPROM_ADD	HEX	0X00000000
			0XFFFFFFFF
	RAM_ADD	HEX	0X00000000
			0XFFFFFFFF
	SIZE	UDEC	0
			4294967295
	START_ADD	HEX	0X00000000
			0XFFFFFFFF

JIRAM CALIBRATION

Tele-Command	Editable Fields	Type	Range
JIRAM_TC_CAL_PAR	SP_I_GAIN1_LAMP1	UDEC	0
			15
	SP_I_GAIN2_LAMP1	UDEC	0
			15
	SP_I_GAIN1_LAMP2	UDEC	0
			15
	SP_I_GAIN2_LAMP2	UDEC	0
			15
	SP_T_EXPO_BACK_IMG	UDEC	0
			40000
	SP_T_EXPO_BACK_SPE	UDEC	0
			40000
	SP_T_EXPO_LAMP1_G1_IMG	UDEC	0
			40000
	SP_T_EXPO_LAMP1_G1_SPE	UDEC	0
			40000
	SP_T_EXPO_LAMP1_G2_IMG	UDEC	0
			40000
	SP_T_EXPO_LAMP1_G2_SPE	UDEC	0
			40000
	SP_T_EXPO_LAMP2_G1_IMG	UDEC	0
			40000
	SP_T_EXPO_LAMP2_G1_SPE	UDEC	0
			40000
	SP_T_EXPO_LAMP2_G2_IMG	UDEC	0
			40000
	SP_T_EXPO_LAMP2_G2_SPE	UDEC	0
			40000
	SP_T_STAB_LAMP1	UDEC	0
			300
JIRAM_SET_PAR	SP_ID	UDEC	0
			65535
	SP_VAL	UDEC	0
			4294967295
JIRAM_SET_PAR	SP_ID	UDEC	0
			65535
	SP_VAL	UDEC	0
			4294967295
JIRAM_TC_GET_PAR	SP_ID	UDEC	0
			65535

JIRAM_TC_CAL_PAR	SUB_MODE	STR	"CAL_I0_S1"
			"CAL_I0_S2"
			"CAL_I0_S3"
			"CAL_I1_S0"
			"CAL_I1_S1"
			"CAL_I1_S2"
			"CAL_I1_S3"
			"CAL_I2_S0"
			"CAL_I2_S1"
			"CAL_I2_S2"
			"CAL_I2_S3"
			"CAL_I3_S0"
			"CAL_I3_S1"
			"CAL_I3_S2"
			"CAL_I3_S3"
			"CAL_I0_S1"
	EN_DIS_COMP	STR	"IEN_SEN"
			"IDIS_SEN"
			"IEN_SDIS"
			"IDIS_SDIS"
	EN_DISABLE_SUB	STR	"DISABLE"
			"ENABLE"
	NUM_CYCLE_PER_PHASE	UDEC	1
			16
	LAMP_ID	STR	"LAMP_1"
			"LAMP_2"
			"BOTH_LAMPS"

JIRAM SCIENCE

Tele-Command	Editable Fields	Type	Range
JIRAM_SET_PAR	SP_ID	UDEC	0
			65535
	SP_VAL	UDEC	0
			4294967295
JIRAM_SET_PAR	SP_ID	UDEC	0
			65535
	SP_VAL	UDEC	0
			4294967295
JIRAM_SCI_PAR	SUB_MODE	STR	"SCI_I0_S0"
			"SCI_I0_S1"
			"SCI_I0_S2"
			"SCI_I0_S3"
			"SCI_I1_S0"
			"SCI_I1_S1"
			"SCI_I1_S2"
			"SCI_I1_S3"
			"SCI_I2_S0"
			"SCI_I2_S1"
			"SCI_I2_S2"
			"SCI_I2_S3"
			"SCI_I3_S0"
			"SCI_I3_S1"
			"SCI_I3_S2"
			"SCI_I3_S3"
	SP_ACQ_N	UDEC	1
			65535
	SP_ACQ_REPETITION	UDEC	1
			255
	SP_BKG_REPETITION	UDEC	0
			50
	SP_EN_DIS_COMP	STR	"IEN_SEN"
			"IDIS_SEN"
			"IEN_SDIS"
			"IDIS_SDIS"
	SP_SCI_LINK	STR	"HSSL"
			"LSSL"
	SP_EN_DIS_SUB	STR	"DISABLE"
			"ENABLE"
	SP_BKG_RN	STR	"BKG"
			"RN"
			"DARK"

JIRAM_SCI_PAR	SP_EN_DIS_DOUC_SCI	STR	"DISABLE"
			"ENABLE"
	SP_ACQ_DURATION	UDEC	0
			255
	SP_NADIR_DELTA	UDEC	0
			3186
	SP_I_EXP_1	UDEC	0
			50000
	SP_S_EXP_1	UDEC	0
			50000
	SP_I_GAIN_1	STR	"LOW"
			"HIGH"
	SP_S_GAIN_1	STR	"LOW"
			"HIGH"
	SP_M_MODE_1	STR	"POINT"
			"SPIN"
	SP_NADIR_OFFSET_1	SDEC	-57343
			57343
	SP_I_EXP_2	UDEC	0
			50000
	SP_S_EXP_2	UDEC	0
			50000
	SP_I_GAIN_2	STR	"LOW"
			"HIGH"
	SP_S_GAIN_2	STR	"LOW"
			"HIGH"
	SP_M_MODE_2	STR	"POINT"
			"SPIN"
	SP_NADIR_OFFSET_2	SDEC	-57343
			57343
	SP_SUMMED_SCIENCE	STR	"NO_SUMMED_SCI"
			"SUMMED_SCI"
JIRAM_TC_GET_PAR	SP_ID	UDEC	0
			65535

JIRAM UPLOAD SP PARAMETER

Tele-Command	Editable Fields	Type	Range
JIRAM_TC_SET_PAR	SP_ID	UDEC	0
			65535
	SP_VAL	UDEC	0
			4294967295

JIRAM GET SP PARAMETER

Tele-Command	Editable Fields	Type	Range
JIRAM_TC_GET_PAR	SP_ID	UDEC	0
			65535

JIRAM RESTORE SP PARAMETER

Tele-Command	Editable Fields	Type	Range
JRM_DEF_PAR	SP_ID	UDEC	0
			65535

JIRAM COMMAND MOTOR MODE

Tele-Command	Editable Fields	Type	Range
JIRAM_TC_MOTOR	MOTOR_MODE	STR	"DESPIN"
			"POINT"
	MOTOR_START_PT_POSITION	UDEC	0
			8190
	MOTOR_MIRROR_SPEED	UDEC	0
			65535
	MOTOR_MIRROR_DIRECTION	STR	"CLOCKWISE"
			"COUNTERCLOCKWISE"
	MOTOR_SPIN_TIME	UDEC	0
			65535

JIRAM COMMAND CALIBRATION SOURCE

Tele-Command	Editable Fields	Type	Range
JRM_CALIBSOURCE	ID_LAMP	STR	"LAMP_1"
			"LAMP_2"
			"BOTH_LAMPS"
	ACTION	STR	"OFF"
			"ON"
	CURRENT	STR	"CURRENT_01"
			"CURRENT_02"
			"CURRENT_03"
			"CURRENT_04"
			"CURRENT_05"
			"CURRENT_06"
			"CURRENT_07"
			"CURRENT_08"
			"CURRENT_09"
			"CURRENT_10"
			"CURRENT_11"
			"CURRENT_12"
			"CURRENT_13"
			"CURRENT_14"
			"CURRENT_15"
			"CURRENT_16"

JIRAM DETECTORS SETTABLE PARAMETERS

Tele-Command	Editable Fields	Type	Range
JRM_DET_PAR	SP_I_VDETADJ	UDEC	0
			4095
	SP_S_VDETADJ	UDEC	0
			4095
	SP_IR_STAB_TIME	UDEC	0
			500
	SP_I_DELAY	UDEC	0
			65535
	SP_S_DELAY	UDEC	0
			65535
	SP_I_X_L_BAND	UDEC	0
			6
	SP_I_Y_L_BAND	UDEC	0
			7
	SP_I_X_M_BAND	UDEC	0
			6
	SP_I_Y_M_BAND	UDEC	135
			142
	SP_S_X_WIN	UDEC	0
			102
	SP_S_Y_WIN	UDEC	0
			14

JIRAM POWER OFF SEQUENCE

Not editable Inputs

4.1.3 MANUAL TELE-COMMAND INSERTION UTILITY

This module permit the generation of the Operative Timeline, without the ingestion and processing of the JMSP file produced by the Planning Tool.
The user has the possibility, through a graphical interface, to select the desired Tele-Command. The following paragraphs describe the format

JIRAM POWER ON SEQUENCE

There are not editable Tele-Commands by the user. The Switch-On block has been implemented on board. The user can only insert the complete Power on block.

JIRAM_TC_DOWNLOAD_MEM

Tele-Command field Name Convention	Type	Range	Default
START_ADD	HEX	0X40000000 0XFFFFFFFF	0X40000000
SIZE	UDEC	0 4294967295	0
EEPROM_EDAC	STR	"DISABLE" "ENABLE"	“ENABLE”

Note: The default value of the START_ADD corresponds to the first row of the EEPROM block

JIRAM_TC_CHECK_MEM

Tele-Command field Name Convention	Type	Range	Default
START_ADD	HEX	0X00000000 0XFFFFFFFF	0X40000000
SIZE	UDEC	0 4294967295	0
EEPROM_EDAC	STR	"DISABLE" "ENABLE"	“DISABLE”

JIRAM_TC_EEPROM_LOAD

Tele-Command field Name Convention	Type	Range	Default
LOAD	STR	"USE_DEF_PARAMS" "USE_PARAMS_IN_TC"	"USE_DEF_PARAMS"
EEPROM_EDAC	STR	"DISABLE" "ENABLE"	"DISABLE"
EEPROM_ADD	HEX	0X00000000 0XFFFFFFFF	0X00000000
RAM_ADD	HEX	0X00000000 0XFFFFFFFF	0X00000000
SIZE	UDEC	0 4294967295	0
START_ADD	HEX	0X00000000 0XFFFFFFFF	0X00000000

Note: The default parameters of the Tele-Command are the same parameters of the on board Power On block. This Tele-Command could be used to Power on the instrument in case of an anomaly of the onboard Power on block.

JIRAM_TC_STANDBY

Tele-Command field Name Convention	Type	Range	Default
I_IR_ON_OFF	STR	“OFF” “ON” “AUTO”	“ON”
S_IR_ON_OFF	STR	“OFF” “ON” “AUTO”	“ON”
M_MOTOR_ENABLE	STR	“OFF” “ON”	“ON”

JIRAM_TC_CALIBRATION

Tele-Command field Name Convention	Type	Range	Default
SUB_MODE	STR	"CAL_I0_S1"	"CAL_I1_S1"
		"CAL_I0_S2"	
		"CAL_I0_S3"	
		"CAL_I1_S0"	
		"CAL_I1_S1"	
		"CAL_I1_S2"	
		"CAL_I1_S3"	
		"CAL_I2_S0"	
		"CAL_I2_S1"	
		"CAL_I2_S2"	
		"CAL_I2_S3"	
		"CAL_I3_S0"	
		"CAL_I3_S1"	
		"CAL_I3_S2"	
		"CAL_I3_S3"	
EN_DIS_COMP	STR	"IEN_SEN"	"IDIS_SDIS"
		"IDIS_SEN"	
		"IEN_SDIS"	
		"IDIS_SDIS"	
EN_DISABLE_SUB	STR	"DISABLE"	"DISABLE"
		"ENABLE"	
NUM_CYCLE_PER_PHASE	UDEC	1	1
		16	
LAMP_ID	STR	"LAMP_1"	"LAMP_1"
		"LAMP_2"	
		"BOTH_LAMPS"	

JIRAM_TC_SET_PAR

Tele-Command field Name Convention	Type	Range	Default
SP_ID	UDEC	0	
		65535	
SP_VAL	UDEC	0	
		4294967295	

JIRAM_TC_SCI_PAR

Tele-Command field Name Convention	Type	Range	Default
SUB_MODE	STR	"SCI_I0_S0" "SCI_I0_S1" "SCI_I0_S2" "SCI_I0_S3" "SCI_I1_S0" "SCI_I1_S1" "SCI_I1_S2" "SCI_I1_S3" "SCI_I2_S0" "SCI_I2_S1" "SCI_I2_S2" "SCI_I2_S3" "SCI_I3_S0" "SCI_I3_S1" "SCI_I3_S2" "SCI_I3_S3"	"SCI_I1_S1"
SP_ACQ_N	UDEC	1 65535	1
SP_ACQ_REPETITION	UDEC	1 255	1
SP_BKG_REPETITION	UDEC	0 50	0
SP_EN_DIS_COMP	STR	"IEN_SEN" "IDIS_SEN" "IEN_SDIS" "IDIS_SDIS"	"IDIS_SDIS"
SP_SCI_LINK	STR	"HSSL" "LSSL"	"HSSL"
SP_EN_DIS_SUB	STR	"DISABLE" "ENABLE"	"ENABLE"
SP_BKG_RN	STR	"BKG" "RN" "DARK"	"DARK"

SP_EN_DIS_DOUC_SCI	STR	"DISABLE" "ENABLE"	"DISABLE"
SP_ACQ_DURATION	UDEC	0 255	30
SP_NADIR_DELTA	UDEC	0 3186	0
SP_I_EXP_1	UDEC	0 50000	10
SP_S_EXP_1	UDEC	0 50000	750
SP_I_GAIN_1	STR	"LOW" "HIGH"	"LOW"
SP_S_GAIN_1	STR	"LOW" "HIGH"	"LOW"
SP_M_MODE_1	STR	"POINT" "SPIN"	"POINT"
SP_NADIR_OFFSET_1	SDEC	-57343 57343	-57343
SP_I_EXP_2	UDEC	0 50000	10
SP_S_EXP_2	UDEC	0 50000	750
SP_I_GAIN_2	STR	"LOW" "HIGH"	"LOW"
SP_S_GAIN_2	STR	"LOW" "HIGH"	"LOW"
SP_M_MODE_2	STR	"POINT" "SPIN"	"SPIN"
SP_NADIR_OFFSET_2	SDEC	-57343 57343	0
SP_SUMMED_SCIENCE	STR	"NO_SUMMED_SCI" "SUMMED_SCI"	"NO_SUMMED_SCI"

JIRAM_TC_DET_PAR

Tele-Command field Name Convention	Type	Range	Default
SP_I_VDETADJ	UDEC	0 4095	2194
SP_S_VDETADJ	UDEC	0 4095	2194
SP_IR_STAB_TIME	UDEC	0 500	200
SP_I_DELAY	UDEC	0 65535	0
SP_S_DELAY	UDEC	0 65535	0
SP_I_X_L_BAND	UDEC	0 6	2
SP_I_Y_L_BAND	UDEC	0 7	1
SP_I_X_M_BAND	UDEC	0 6	2
SP_I_Y_M_BAND	UDEC	135 142	139
SP_S_X_WIN	UDEC	0 102	50
SP_S_Y_WIN	UDEC	0 14	12

JIRAM_TC_DET_PAR

JIRAM_TC_CAL_PAR (JRM_CAL_PAR)				
JRM Team, Tc's field Name Convention	**JPL, Tc's field Name Convention**	**Type**	**Range**	**Tc Field Raw Conversion**
SP_I_GAIN1_LAMP1	jrm_sp_i_gn1lmp1	UDEC	0	NA
			15	NA
SP_I_GAIN2_LAMP1	jrm_sp_i_gn2lmp1	UDEC	0	NA
			15	NA
SP_I_GAIN1_LAMP2	jrm_sp_i_gn1lmp2	UDEC	0	NA
			15	NA
SP_I_GAIN2_LAMP2	jrm_sp_i_gn2lmp2	UDEC	0	NA
			15	NA
SP_T_EXPO_BACK_IMG	jrm_sp_tex_bkimg	UDEC	0	NA
			40000	NA
SP_T_EXPO_BACK_SPE	jrm_sp_tex_bkspe	UDEC	0	NA
			40000	NA
SP_T_EXPO_LAMP1_G1_IMG	jrm_sp_tex_l1g1i	UDEC	0	NA
			40000	NA
SP_T_EXPO_LAMP1_G1_SPE	jrm_sp_tex_l1g1s	UDEC	0	NA
			40000	NA
SP_T_EXPO_LAMP1_G2_IMG	jrm_sp_tex_l1g2i	UDEC	0	NA
			40000	NA
SP_T_EXPO_LAMP1_G2_SPE	jrm_sp_tex_l1g2s	UDEC	0	NA
			40000	NA
SP_T_EXPO_LAMP2_G1_IMG	jrm_sp_tex_l2g1i	UDEC	0	NA
			40000	NA
SP_T_EXPO_LAMP2_G1_SPE	jrm_sp_tex_l2g1s	UDEC	0	NA
			40000	NA
SP_T_EXPO_LAMP2_G2_IMG	jrm_sp_tex_l2g2i	UDEC	0	NA
			40000	NA
SP_T_EXPO_LAMP2_G2_SPE	jrm_sp_tex_l2g2s	UDEC	0	NA
			40000	NA
SP_T_STAB_LAMP1	jrm_sp_t_stblmp1	UDEC	0	NA
			300	NA