InSight SEIS Seismometer
SEED Channel Configuration for SEIS Data

Owner	C. Pardo - Mars SEIS Data Service
Issue:	2
Revision:	9
Last Modification:	May, 2020

Service	Name	Approval Date	Remarks
Mars Data Service	C. Pardo		
Dataless SEED	T. Gabsi		
SISMOC	L. Luño		
Mars Quake Service	J. Clinton		
Mars Structure Service	A. Mocquet M.Drilleau		
PI	P. Lognonné		

InSight SEIS Seismometer
SEED Channel Configuration for SI

Owner	C. Pardo - Mars
Issue:	2
Revision:	10
Last Modification:	July 29, 2020

Version	Date
V1-4	2015-03-06
V1-5	2015-03-10
	2015-03-13
V1-6	2015-05-28
v1-7	2015-06-23
V2-0	2015-06-30
v2-1	2015-07-22
v2-2	2015-09-10
	2016-07-24
v2-3	
	2016-09-13
v2-4	2017-07-06
	2018-03-08
	2018-07-05
v2-5	2018-07-10

v2-6	2018-10-22
v2-7	2018-12-13
v2-8	2019-01-09
	2019-01-17
v2-9	2020-05-15
	2020-05-18
v2-10	2020-07-29

EIS Data

SEIS Data Service

Description

Start version under configuration control. Includes SEED Naming conventions for ELYS, ELYHK and ELYSP stations. From FSW to SEED naming.
Final modifications to be submitted to Ground Interfaces after SEIS Ground Segment Interfaces meeting
Add of STA/LTA and Kurtosis channels in ELYSP
Consolidated version submitted to Ph. Lognonné to approuval
Renaming HK stations
Fixed conflicting location Ids for some channels
Fix missing instrument (SCIT-B)
Fix problems with the ELYSP naming convention: 1- loss of gain/mode information 2- Not enough locID/channel combination to have unique filenames for all boxes outputs
New ELYS ALL LocID.CHA sheet summarizing all expected locID/channels for ELYS Station
Modified channels for TWINS data, channel codes for the processed LTS/STA and Kurtosis data
New ELYHK ALL locID.CHA sheet summarizing all expected locID/channels for ELYHK station (Housekeeping Data)
Add new network 7J and station code SYNT1 for Martian synthetics web services by ETHZ
Merge of v2-2 version with information provided by ETHZ about 7J Network into this new release
New sheet Synthetic Data 7J.SYNT1
Update information after postponing launch to May 2018
Fix wrong channel names for VBBR 100Hz and 10-80Hz (raw scientific data)
Put right revision in the header of each sheet
Fix typo in station descriptions, sheet NetworksANDStations
Fix incoherence in location codes SP Hight/Low gains 1Hz between Raw Scientifc Data ELYS ans ELYS ALL LocID.CHA sheets:
Sheet "Raw Scientifc Data ELYS" for SP1, SP2, SP3 (High Gain) were removed locID 65, 9 obsolete channels VH[UVW] UH[UVW] RH[UVW]
Sheet "ELYS ALL locID.CHA" for SP1, SP2, SP3 (high gain) were removed locID 65: channels VH[UVW] UH[UVW] RH[UVW] and LocIds 68, 66, 67, 68 : LH[UVW] VH[UVW] UH[UVW] RH[UVW] . Added locID 65 1sps LH[UVW]
Sheets "HK ELYHK Data" and "ELYHK ALL locID.CHA" : Add missing frequency 0.1 sps (V) for EBox HK channels

CRUI3 and CRHK3 stations added to NetworkANDStations
Pressure and Temperature of the Pressure sensor computed on Earth by CAB added (Raw Scientific Data)
S/C Voltage (80[LVUR]EV) from APSS moved from HouseKeeping to raw scientific data
Station 7J SYNT4 (MSS blind test) added to NetworkANDStations
Update station descriptions of Cruise checkouts and stations ELYS0, ELYH0 after landing and before deployment.
Set station start and end times
Add station comments
Sheet "ELYS ALL locID.CHA", following channels were removed:
10BDO (50sps) 11BDO (25sps) 13BDO (10sps) 10MDO (5sps) 11VDO (0,25sps) 13VDO (0,1sps) 10UDO (0,05) 10RDO (0,005sps) 12RDO (1/180
20BKI (50sps) 21BKI (25sps) 23BKI (10sps) 20MKI (5sps) 21VKI (0,25sps) 23VKI (0,1sps) 20UKI (0,05) 20RKI (0,005sps) 21RKI (0,001) 22RKI (
Sheet "Raw Scientific Data ELYS": following channels were modified
Row 96: UDO and RDO channels removed
Row 97: UKI and RKI channels removed
ELYS station becomes ELYSE
Renamed sheets (before ELYS):
Raw Scientific Data ELYSE
ELYSE ALL locID.CHA
Scientific Data ELYSE SEED
Add Stations SYNT2 and SYNT3, Network 7J. Sheet NetworksANDStations

Recover removed channels that are always in use. Sheet "ELYS ALL locID.CHA"
13BDO (10sps) 10MDO (5sps) 23BKI (10sps) and 20MKI (5sps) are defined in SISMOC (and on board) configuration and can be used.
Add Ancillary data (Current of Solar Array) in Raw Scientific Data ELYSE and ELYSE ALL LocID.CHA sheets
sheet ELYHK ALL locID.CHA: Correct location code 18 SEIS-DC+7VAV, column G, line 124 (wrong 17 instead of 18)

0sps) 13RDO (1/3600sps)
(1/1800sps) 23RKI (1/3600sps)

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Network Codes	StartTime	EndTime	Description
XB	**2018-01-01**	**2023-01-01**	**InSight Mission Data**
Station Codes			
CRUI1	2018-07-16	2018-07-17	InSight Cruise Checkout 1
CRHK1	2018-07-16	2018-07-17	InSight Cruise Checkout 1
CRUI2	2018-07-19	2018-08-07	InSight Cruise Checkout 2
CRHK2	2018-07-19	2018-08-07	InSight Cruise Checkout 2
CRUI3	2018-08-16	2018-09-01	InSight Cruise Checkout 3
CRHK3	2018-08-16	2018-09-01	InSight Cruise Checkout 3
ELYS0	2018-11-26	2018-12-20	Elysium Planitia, Mars - Scientific data
ELYH0	2018-11-26	2018-12-20	Elysium Planitia, Mars - Housekeeping data
ELYSE	2018-12-20	2023-01-01	Elysium Planitia, Mars - Scientific data
ELYHK	2018-12-20	2023-01-01	Elysium Planitia, Mars - Housekeeping data
7I	**2011-01-01**	**2023-01-01**	**InSight pre and post-flight test data**
Station Codes			
7J	**2016-01-01**	**2031-01-01**	**InSight pre and post-flight synthetic data**
Station Codes			
SYNT1	2019-01-01	2019-12-31	Precalculated synthetic waveforms for EHTZ event catalog (Ceylan at al., 2016
SYNT2	2019-01-01	2019-12-31	MQS 1D blindtest (Clinton et al, 2017)
SYNT3	2019-01-01	2019-12-31	MQS-ORT
SYNT4	2018-10-08	2030-12-31	MSS Blind Test (October 8, 2018 to November 12, 2018) MSS Blind Test (January 1, 2019 to January 4, 2019)

Comment		
	StartTime	**EndTime**
Scientific data from first Health cruise check	2018-07-16	2018-07-17
Housekeeping data from first Health cruise check	2018-07-16	2018-07-17
Scientific data from second Health cruise check	2018-07-19	2018-08-07
Housekeeping data from second Health cruise check	2018-07-19	2018-08-07
Scientific data from thirth Health cruise check	2018-08-16	2018-09-01
Housekeeping data from thirth Health cruise check	2018-08-16	2018-09-01
Scientific data from postlanding before instrument deployment	2018-11-26	2018-12-20
Housekeeping data from postlanding before instrument deploy	2018-11-26	2018-12-20
Scientific data from final configuration	2018-12-20	2023-01-01
Housekeeping data from final configuration	2018-12-20	2023-01-01

InSight SEIS Seismometer
SEED Channel Configuration for SEIS Data - Network XB

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Instrument code		Frequency	Location II Freq. Part	SP VBB	E H
High Gain Seismometer	H		0		100
Low Gain Seismometer	L		1		
Mass Position Seismometer	M		2		
Pressure	D		3		
Magnetometer	F		4		
Temperature	K				
Wind	W				
Synthetized beam data	Z				
Non-specific instruments	Y				
Electronic Test Point (S/C Voltages)	E				

	LocID	Science High G.
SEIS/VBB related data	VBB	00
	Replaced SP	20
	spare	
	VBB RMS	40
	MAX VBB RM	45
	spare	50
SEIS/Hybrid	VBB+SP	55
	spare	60
SEIS/SP related data	SP	65
	Rotated SP	75
	Replaced VBI	80
	SP RMS	85
	MAX SP RMS	90
	spare	95

Location ID is the sum of :
(a) the channel part
(b) the frequency part

Channel part is Loc ID mod(5)
Frequency part is the rest of Loc Id mod(5)

APSS related data

TWINS proc 1	**00**
TWINS Proc 2	**10**
Rotated MAG	**20**
MAG RMS	**30**
MAX MAG RM	**40**
P1 RMS	**50**
P2 RMS	**60**
MAX P1 RMS	**70**
MAX P2 RMS	**80**
spare	**90**

Location ID are those below for raw data at output of the SEIS AC A/D or APSS
Location ID are incremeted by value above for decreasing sampling rate

Channel	**Location ID Channel par**	**Baseline**	**Inst. Code**	**Orien. Code**	**100 Hz**
VBB Seismometer Channels					
VBB 1 Velocity High Gain Science mode	00	Transmitted raw data	H	U	HHU
VBB 1 Velocity Low Gain Science mode	05	Transmitted raw data	L	U	HLU
VBB 1 Velocity High Gain Engin. mode	10	Transmitted raw data	H	U	HHU
VBB 1 Velocity Low Gain Engin. mode	15	Transmitted raw data	L	U	HLU
VBB 1 Position High Gain Science mode	00	Transmitted raw data	M	U	
VBB 1 Position Low Gain Science mode	05	Transmitted raw data	M	U	
VBB 1 Position High Gain Engin. mode	10	Transmitted raw data	M	U	
VBB 1 Position Low Gain Engin. mode	15	Transmitted raw data	M	U	
VBB 1 Temperature	00	Transmitted raw data	K	U	
VBB 2 Velocity High Gain Science mode	00	Transmitted raw data	H	V	HHV
VBB 2 Velocity Low Gain Science mode	05	Transmitted raw data	L	V	HLV
VBB 2 Velocity High Gain Engin. mode	10	Transmitted raw data	H	V	HHV
VBB 2 Velocity Low Gain Engin. mode	15	Transmitted raw data	L	V	HLV
VBB 2 Position High Gain Science mode	00	Transmitted raw data	M	V	
VBB 2 Position Low Gain Science mode	05	Transmitted raw data	M	V	
VBB 2 Position High Gain Engin. mode	10	Transmitted raw data	M	V	
VBB 2 Position Low Gain Engin. mode	15	Transmitted raw data	M	V	
VBB 2 Temperature	00	Transmitted raw data	K	V	

VBB 3 Velocity High Gain Science mode	00	Transmitted raw data	H	W	HHW
VBB 3 Velocity Low Gain Science mode	05	Transmitted raw data	L	W	HLW
VBB 3 Velocity High Gain Engin. mode	10	Transmitted raw data	H	W	HHW
VBB 3 Velocity Low Gain Engin. mode	15	Transmitted raw data	L	W	HLW
VBB 3 Position High Gain Science mode	00	Transmitted raw data	M	W	
VBB 3 Position Low Gain Science mode	05	Transmitted raw data	M	W	
VBB 3 Position High Gain Engin. mode	10	Transmitted raw data	M	W	
VBB 3 Position Low Gain Engin. mode	15	Transmitted raw data	M	W	
VBB 3 Temperature	00	Transmitted raw data	K	W	
Scientific Temperature A	00	Transmitted raw data	K	I	
Scientific Temperature B	05	Transmitted raw data	K	I	
APSS Channels		**Baseline**	**Inst. Code**	**Orien. Code**	**100 Hz**
Wind Horizontal Speed - sensor 1	10	Computed on Earth (CAB)	W	S	
Wind Vertical Speed - sensor 1	15	Computed on Earth (CAB)	W	S	
Wind Direction - sensor 1	10	Computed on Earth (CAB)	W	D	
Atmosphere Temperature - sensor 1	10	Computed on Earth (CAB)	K	O	
Wind Horizontal Speed - sensor 2	20	Computed on Earth (CAB)	W	S	
Wind Vertical Speed - sensor 2	25	Computed on Earth (CAB)	W	S	
Wind Direction - sensor 2	20	Computed on Earth (CAB)	W	D	
Atmosphere Temperature - sensor 2	20	Computed on Earth (CAB)	K	O	
Wind Horizontal Speed - Composite	30	Computed on Earth (CAB)	W	S	
Wind Vertical Speed - Composite	35	Computed on Earth (CAB)	W	S	
Wind Direction - Composite	30	Computed on Earth (CAB)	W	D	
Atmosphere Temperature - Composite	30	Computed on Earth (CAB)	K	O	
Pressure (Outside)	10	Computed on Earth (CAB)	D	O	
Pressure Sensor Temperature (Inside)	20	Computed on Earth (CAB)	K	I	
Pressure (Outside)	00	Transmitted raw data	D	O	
Pressure Sensor Temperature (Inside)	10	Transmitted raw data	K	I	
Magnetomer1	00	Transmitted raw data	F	1	
Magnetomer2	00	Transmitted raw data	F	2	
Magnetomer3	00	Transmitted raw data	F	3	
Magnetometer temperature	00	Transmitted raw data	K	M	
S/C power voltage	80	Transmitted raw data	E	V	
SP Seismometer Channels					
SP1 (High Gain)	65	Transmitted raw data	H	U	EHU
SP2 (High Gain)	65	Transmitted raw data	H	V	EHV

SP3 High Gain)	65	Transmitted raw data	H	W	EHW
SP1 (Low Gain)	70	Transmitted raw data	H	U	EHU
SP2 (Low Gain)	70	Transmitted raw data	H	V	EHV
SP3 (Low Gain)	70	Transmitted raw data	H	W	EHW
SEIS Software Synthesized Data					
SEISVELZ	55	Transmitted processed data	Z	C	HZC
SPZ	75	Transmitted processed data	Z	C	EZC
VBBR	80	N/A	Z	C	HZC
SPR	20	N/A	Z	C	HZC
ESTAVBB	40	Transmitted processed data	H	Z	
MAXVBB	45	Transmitted processed data	Y	Z	
ESTASP	85	Transmitted processed data	L	Z	
MAXSP	90	Transmitted processed data	Y	Z	
MAGZ	20	Transmitted processed data	F	R	
ESTAP1	50	Transmitted processed data	D	O	
ESTAP2	60	Transmitted processed data	D	O	
MAXP1	70	Transmitted processed data	Y	O	
MAXP2	80	Transmitted processed data	Y	O	
ESTAM	30	Transmitted processed data	F	A	
MAXM	40	Transmitted processed data	Y	A	
Ancillary Data					
E-0771 SABC_1_SAPS_CURRENT	80	Engineering format	E	A	
E-0791 SABC_2_SAPS_CURRENT	81	Engineering format	E	A	
E-0772 AAC_PDDU_OFC_08_CHAN_12	82	Engineering format	E	A	
E-0792 AAC_PDDU_OFC_09_CHAN_12	83	Engineering format	E	A	

	Band	Code			
S	M	L	V	U	R
B	M	L	V	U	R
50	5	1	0,5	0,05	0,005
25	4		0,25	0,025	0,001
20	2		0,20	0,02	1/1800
10			0,1	0,01	1/3600

default for raw acquisition and events
default continuous data

Low G.	Engin. High.G	Low G.
05	10	15
	30	35
70		

S A/D

10-80Hz	2-5Hz	1Hz	0,1-0,5 Hz	0,01-0,05	<0,01	first channel flag
BHU	MHU	LHU				G
BLU	MLU	LLU				G
BHU	MHU	LHU				G
BLU	MLU	LLU				G
		LMU	VMU	UMU	RMU	G
		LMU	VMU	UMU	RMU	G
		LMU	VMU	UMU	RMU	G
		LMU	VMU	UMU	RMU	G
		LKU	VKU	UKU	RKU	H
BHV	MHV	LHV				G
BLV	MLV	LLV				G
BHV	MHV	LHV				G
BLV	MLV	LLV				G
		LMV	VMV	UMV	RMV	G
		LMV	VMV	UMV	RMV	G
		LMV	VMV	UMV	RMV	G
		LMV	VMV	UMV	RMV	G
		LKV	VKV	UKV	RKV	H

BHW	MHW	LHW				G
BLW	MLW	LLW				G
BHW	MHW	LHW				G
BLW	MLW	LLW				G
		LMW	VMW	UMW	RMW	G
		LMW	VMW	UMW	RMW	G
		LMW	VMW	UMW	RMW	G
		LMW	VMW	UMW	RMW	G
		LKW	VKW	UKW	RKW	H
		LKI	VKI	UKI	RKI	H
		LKI	VKI	UKI	RKI	H
10-80Hz	**2-5Hz**	**1Hz**	**0,1-0,5 Hz**	**0,01-0,05**	**<0,01**	**first channel flag**
		LWS	VWS	UWS	RWS	W
		LWS	VWS	UWS	RWS	W
		LWD	VWD	UWD	RWD	W
		LKO	VKO	UKO	RKO	W
		LWS	VWS	UWS	RWS	W
		LWS	VWS	UWS	RWS	W
		LWD	VWD	UWD	RWD	W
		LKO	VKO	UKO	RKO	W
		LWS	VWS	UWS	RWS	W
		LWS	VWS	UWS	RWS	W
		LWD	VWD	UWD	RWD	W
		LKO	VKO	UKO	RKO	W
BDO	MDO	LDO	VDO			W
BKI	MKI	LKI	VKI			H
BDO	MDO	LDO	VDO	UDO	RDO	W
BKI	MKI	LKI	VKI	UKI	RKI	H
BF1	MF1	LF1	VF1	UF1	RF1	G
BF2	MF2	LF2	VF2	UF2	RF2	G
BF3	MF3	LF3	VF3	UF3	RF3	G
BKM	MKM	LKM	VKM	UKM	RKM	H
		LEV	VEV	UEV	REV	H
SHU	MHU	LHU				G
SHV	MHV	LHV				G

SHW	MHW	LHW				G
SHU	MHU	LHU	VHU	UHU	RHU	G
SHV	MHV	LHV	VHV	UHV	RHV	G
SHW	MHW	LHW	VHW	UHW	RHW	G
BZC	MZC	LZC	VZC	UZC	RZC	S
SZC	MZC	LZC	VZC	UZC	RZC	S
BZC	MZC	LZC	VZC	UZC	RZC	S
BZC	MZC	LZC	VZC	UZC	RZC	S
		LHZ	VHZ	UHZ	RHZ	S
		LYZ	VYZ	UYZ	RYZ	S
		LLZ	VLZ	ULZ	RLZ	S
		LYZ	VYZ	UYZ	RYZ	S
BFR	MFR	LFR	VFR	UFR	RFR	S
		LDO	VDO	UDO	RDO	S
		LDO	VDO	UDO	RDO	S
		LYO	VYO	UYO	RYO	S
		LYO	VYO	UYO	RYO	S
		LFA	VFA	UFA	RFA	S
		LYA	VYA	UYA	RYA	S
			VEA	UEA		H
			VEA	UEA		H
			VEA	UEA		H
			VEA	UEA		H

Short Period Seismometer
Very Broadband Seismometer
The LOC Id increment is added to the Channel LOC Id , offering 5 different sampling rate for each band

As the instrument noise depends on configuration, different location codes (LocID) are used.

Synthesized SP (from VBB1, VBB2, VBB3)
spare Ids for possible VBB open loop mode
High pass RMS over one second
Maximum RMS over N seconds

Hybrid channels

On board rotated SP (from SP1, SP2, SP3)
Synthesized VBB (from SP1, SP2, SP3)
High pass RMS over one second
Maximum RMS over N seconds

Magnetometer, Pressure, temperature (raw data)
On Earth Processed Data: wind amplitude and direction, atmospheric temperature
On board rotated MAG (from mag1, mag2, mag3)
High pass RMS over one second
Maximum RMS over N seconds
High pass RMS over one second

Maximum RMS over N seconds

Comments

(1) depending on sampling rate after decimation
U,V, W are chosen because VBB axis are non orthogonal.

VBB POS can also be sampled at 1 Hz

Seismometer temperature

Inside Thermal blanket temperature is State of Health channel.
Inside Thermal blanket temperature is State of Health channel.
Comments

A comment blockette will be added to explain how this data is generated
is linearly interpolated from raw Temperature acquisition rate to the raw pressure acquisition rate

Only one channel
Magnetometer is a three axis orthogonal instrument and will be not ZNE oriented
Magnetometer is a three axis orthogonal instrument and will be not ZNE oriented
Magnetometer is a three axis orthogonal instrument and will be not ZNE oriented
mnemonic "M" for magnetometer

SP are three almost, but not exactly, orthogonal sensors with known orientation
100 sps for E, but SP event could be downsampled to 50 sps (S)

SP are three almost, but not exactly, orthogonal sensors with known orientation
100 sps for E, but SP event could be downsampled to 50 sps (S)

Not transmitted as such but as the replacement of a VBB channel U,V,W
Not transmitted as such but as replacement of the SP channel U,V,W

Use Z though, even after leveling of the platform, this component will not be exactly vertical,
Use Z though, even after leveling of the platform, this component will not be exactly vertical,
with a departure of about 0.1°. The exact value may be written as a comment in the header.

Magnetometer is a three axis orthogonal instrument and will be not ZNE oriented
Magnetometer is a three axis orthogonal instrument and will be not ZNE oriented

Current from hard-tied string of the +Y / East Solar Array
Current from hard-tied string of the -Y / West Solar Array
Total current from the arrays minus the portion from the hard-tied strings (however currents from both wings are mixed in these parameters)

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Channel	LocID Root	Baseline		Inst. Code	Orien. Code
VBB Seismometer Channels					
VBB 1 Velocity High Gain Science mode	**00**	Transmitted raw data	H	H	U
			B	H	U
			B	H	U
			B	H	U
			B	H	U
			M	H	U
			M	H	U
			M	H	U
			L	H	U
VBB 1 Velocity Low Gain Science mode	**05**	Transmitted raw data	H	L	U
			B	L	U
			B	L	U
			B	L	U
			B	L	U
			M	L	U
			M	L	U
			M	L	U
			L	L	U
VBB 1 Velocity High Gain Engin. mode	**10**	Transmitted raw data	H	H	U
			B	H	U
			B	H	U
			B	H	U
			B	H	U

			M	H	U
			M	H	U
			M	H	U
			L	H	U
VBB 1 Velocity Low Gain Engin. mode	**15**	Transmitted raw data	H	L	U
			B	L	U
			B	L	U
			B	L	U
			B	L	U
			M	L	U
			M	L	U
			M	L	U
			L	L	U
VBB 1 Position High Gain Science mode	**00**	Transmitted raw data	L	M	U
			V	M	U
			V	M	U
			V	M	U
			V	M	U
			U	M	U
			U	M	U
			U	M	U
			U	M	U
			R	M	U
			R	M	U
			R	M	U
			R	M	U
VBB 1 Position Low Gain Science mode	**05**	Transmitted raw data	L	M	U
			V	M	U
			V	M	U
			V	M	U
			V	M	U
			U	M	U
			U	M	U
			U	M	U
			U	M	U
			R	M	U

			R	M	U
			R	M	U
			R	M	U
VBB 1 Position High Gain Engin. mode	**10**	Transmitted raw data	L	M	U
			V	M	U
			V	M	U
			V	M	U
			V	M	U
			U	M	U
			U	M	U
			U	M	U
			U	M	U
			R	M	U
			R	M	U
			R	M	U
			R	M	U
VBB 1 Position Low Gain Engin. mode	**15**	Transmitted raw data	L	M	U
			V	M	U
			V	M	U
			V	M	U
			V	M	U
			U	M	U
			U	M	U
			U	M	U
			U	M	U
			R	M	U
			R	M	U
			R	M	U
			R	M	U
VBB 1 Temperature	**00**	Transmitted raw data	L	K	U
			V	K	U
			V	K	U
			V	K	U
			V	K	U
			U	K	U
			U	K	U

			U	K	U
			U	K	U
			R	K	U
			R	K	U
			R	K	U
			R	K	U
VBB 2 Velocity High Gain Science mode	**00**	Transmitted raw data	H	H	V
			B	H	V
			B	H	V
			B	H	V
			B	H	V
			M	H	V
			M	H	V
			M	H	V
			L	H	V
VBB 2 Velocity Low Gain Science mode	**05**	Transmitted raw data	H	L	V
			B	L	V
			B	L	V
			B	L	V
			B	L	V
			M	L	V
			M	L	V
			M	L	V
			L	L	V
VBB 2 Velocity High Gain Engin. mode	**10**	Transmitted raw data	H	H	V
			B	H	V
			B	H	V
			B	H	V
			B	H	V
			M	H	V
			M	H	V
			M	H	V
			L	H	V
VBB 2 Velocity Low Gain Engin. mode	**15**	Transmitted raw data	H	L	V
			B	L	V
			B	L	V

			B	L	V
			B	L	V
			M	L	V
			M	L	V
			M	L	V
			L	L	V
VBB 2 Position High Gain Science mode	**00**	Transmitted raw data	L	M	V
			V	M	V
			V	M	V
			V	M	V
			V	M	V
			U	M	V
			U	M	V
			U	M	V
			U	M	V
			R	M	V
			R	M	V
			R	M	V
			R	M	V
VBB 2 Position Low Gain Science mode	**05**	Transmitted raw data	L	M	V
			V	M	V
			V	M	V
			V	M	V
			V	M	V
			U	M	V
			U	M	V
			U	M	V
			U	M	V
			R	M	V
			R	M	V
			R	M	V
			R	M	V
VBB 2 Position High Gain Engin. mode	**10**	Transmitted raw data	L	M	V
			V	M	V
			V	M	V
			V	M	V

			V	M	V
			U	M	V
			U	M	V
			U	M	V
			U	M	V
			R	M	V
			R	M	V
			R	M	V
			R	M	V
VBB 2 Position Low Gain Engin. mode	**15**	Transmitted raw data	L	M	V
			V	M	V
			V	M	V
			V	M	V
			V	M	V
			U	M	V
			U	M	V
			U	M	V
			U	M	V
			R	M	V
			R	M	V
			R	M	V
			R	M	V
VBB 2 Temperature	**00**	Transmitted raw data	L	K	V
			V	K	V
			V	K	V
			V	K	V
			V	K	V
			U	K	V
			U	K	V
			U	K	V
			U	K	V
			R	K	V
			R	K	V
			R	K	V
			R	K	V
VBB 3 Velocity High Gain Science mode	**00**	Transmitted raw data	H	H	W

			B	H	W
			B	H	W
			B	H	W
			B	H	W
			M	H	W
			M	H	W
			M	H	W
			L	H	W
VBB 3 Velocity Low Gain Science mode	**05**	Transmitted raw data	H	L	W
			B	L	W
			B	L	W
			B	L	W
			B	L	W
			M	L	W
			M	L	W
			M	L	W
			L	L	W
VBB 3 Velocity High Gain Engin. mode	**10**	Transmitted raw data	H	H	W
			B	H	W
			B	H	W
			B	H	W
			B	H	W
			M	H	W
			M	H	W
			M	H	W
			L	H	W
VBB 3 Velocity Low Gain Engin. mode	**15**	Transmitted raw data	H	L	W
			B	L	W
			B	L	W
			B	L	W
			B	L	W
			M	L	W
			M	L	W
			M	L	W
			L	L	W
VBB 3 Position High Gain Science mode	**00**	Transmitted raw data	L	M	W

			V	M	W
			V	M	W
			V	M	W
			V	M	W
			U	M	W
			U	M	W
			U	M	W
			U	M	W
			R	M	W
			R	M	W
			R	M	W
			R	M	W
	VBB 3 Position Low Gain Science mode	**05**	Transmitted raw data	L	M	W
				V	M	W
				V	M	W
				V	M	W
				V	M	W
				U	M	W
				U	M	W
				U	M	W
				U	M	W
				R	M	W
				R	M	W
				R	M	W
				R	M	W
	VBB 3 Position High Gain Engin. mode	**10**	Transmitted raw data	L	M	W
				V	M	W
				V	M	W
				V	M	W
				V	M	W
				U	M	W
				U	M	W
				U	M	W
				U	M	W
				R	M	W
				R	M	W

			R	M	W
			R	M	W
VBB 3 Position Low Gain Engin. mode	**15**	Transmitted raw data	L	M	W
			V	M	W
			V	M	W
			V	M	W
			V	M	W
			U	M	W
			U	M	W
			U	M	W
			U	M	W
			R	M	W
			R	M	W
			R	M	W
			R	M	W
VBB 3 Temperature	**00**	Transmitted raw data	L	K	W
			V	K	W
			V	K	W
			V	K	W
			V	K	W
			U	K	W
			U	K	W
			U	K	W
			U	K	W
			R	K	W
			R	K	W
			R	K	W
			R	K	W
Scientific Temperature A	**00**	Transmitted raw data	L	K	I
			V	K	I
			V	K	I
			V	K	I
			V	K	I
			U	K	I
			U	K	I
			U	K	I

			U	K	I
			R	K	I
			R	K	I
			R	K	I
			R	K	I
Scientific Temperature B	**05**	Transmitted raw data	L	K	I
			V	K	I
			V	K	I
			V	K	I
			V	K	I
			U	K	I
			U	K	I
			U	K	I
			U	K	I
			R	K	I
			R	K	I
			R	K	I
			R	K	I
APSS Channels		**Baseline**		**Inst. Code**	**Orien. Code**
Wind Horizontal Speed - sensor 1	**10**	computed on Earth	L	W	S
			V	W	S
			V	W	S
			V	W	S
			V	W	S
			U	W	S
			U	W	S
			U	W	S
			U	W	S
			R	W	S
			R	W	S
			R	W	S
			R	W	S
Wind Vertical Speed - sensor 1	**15**	computed on Earth	L	W	S
			V	W	S
			V	W	S
			V	W	S

			V	W	S
			U	W	S
			U	W	S
			U	W	S
			U	W	S
			R	W	S
			R	W	S
			R	W	S
			R	W	S
Wind Direction - sensor 1	**10**	computed on Earth	L	W	D
			V	W	D
			V	W	D
			V	W	D
			V	W	D
			U	W	D
			U	W	D
			U	W	D
			U	W	D
			R	W	D
			R	W	D
			R	W	D
			R	W	D
Atmosphere Temperature - sensor 1	**10**	computed on Earth	L	K	O
			V	K	O
			V	K	O
			V	K	O
			V	K	O
			U	K	O
			U	K	O
			U	K	O
			U	K	O
			R	K	O
			R	K	O
			R	K	O
			R	K	O
Wind Horizontal Speed - sensor 2	**20**	computed on Earth	L	W	S

			V	W	S
			V	W	S
			V	W	S
			V	W	S
			U	W	S
			U	W	S
			U	W	S
			U	W	S
			R	W	S
			R	W	S
			R	W	S
			R	W	S
Wind Vertical Speed - sensor 2	**25**	computed on Earth	L	W	S
			V	W	S
			V	W	S
			V	W	S
			V	W	S
			U	W	S
			U	W	S
			U	W	S
			U	W	S
			R	W	S
			R	W	S
			R	W	S
			R	W	S
Wind Direction - sensor 2	**20**	computed on Earth	L	W	D
			V	W	D
			V	W	D
			V	W	D
			V	W	D
			U	W	D
			U	W	D
			U	W	D
			U	W	D
			R	W	D
			R	W	D

			R	W	D
			R	W	D
Atmosphere Temperature - sensor 2	**20**	computed on Earth	L	K	O
			V	K	O
			V	K	O
			V	K	O
			V	K	O
			U	K	O
			U	K	O
			U	K	O
			U	K	O
			R	K	O
			R	K	O
			R	K	O
			R	K	O
Wind Horizontal Speed - Composite	**30**	computed on Earth	L	W	S
			V	W	S
			V	W	S
			V	W	S
			V	W	S
			U	W	S
			U	W	S
			U	W	S
			U	W	S
			R	W	S
			R	W	S
			R	W	S
			R	W	S
Wind Vertical Speed - Composite	**35**	computed on Earth	L	W	S
			V	W	S
			V	W	S
			V	W	S
			V	W	S
			U	W	S
			U	W	S
			U	W	S

			U	W	S
			R	W	S
			R	W	S
			R	W	S
			R	W	S
Wind Direction - Composite	**30**	computed on Earth	L	W	D
			V	W	D
			V	W	D
			V	W	D
			V	W	D
			U	W	D
			U	W	D
			U	W	D
			U	W	D
			R	W	D
			R	W	D
			R	W	D
			R	W	D
Atmosphere Temperature - Composite	**30**	computed on Earth	L	K	O
			V	K	O
			V	K	O
			V	K	O
			V	K	O
			U	K	O
			U	K	O
			U	K	O
			U	K	O
			R	K	O
			R	K	O
			R	K	O
			R	K	O
Pressure (Outside)	**10**	computed on Earth	B	D	O
			B	D	O
			M	D	O
			M	D	O
			M	D	O

			L	D	O
			V	D	O
			V	D	O
Pressure Sensor Temperature (Inside)	**20**	computed on Earth	B	K	I
			B	K	I
			M	K	I
			M	K	I
			M	K	I
			L	K	I
			V	K	I
			V	K	I
Pressure (Outside)	**00**	Transmitted raw data	B	D	O
			B	D	O
			B	D	O
			B	D	O
			M	D	O
			M	D	O
			M	D	O
			L	D	O
			V	D	O
			V	D	O
			V	D	O
			V	D	O
			U	D	O
			U	D	O
			U	D	O
			U	D	O
			R	D	O
			R	D	O
			R	D	O
			R	D	O
Pressure Sensor Temperature (Inside)	**10**	Transmitted raw data	B	K	I
			B	K	I
			B	K	I
			B	K	I
			M	K	I

			M	K	I
			M	K	I
			L	K	I
			V	K	I
			V	K	I
			V	K	I
			V	K	I
			U	K	I
			U	K	I
			U	K	I
			U	K	I
			R	K	I
			R	K	I
			R	K	I
			R	K	I
	Magnetomer1	**00**	Transmitted raw data	B	F	1
				B	F	1
				B	F	1
				B	F	1
				M	F	1
				M	F	1
				M	F	1
				L	F	1
				V	F	1
				V	F	1
				V	F	1
				V	F	1
				U	F	1
				U	F	1
				U	F	1
				U	F	1
				R	F	1
				R	F	1
				R	F	1
				R	F	1
	Magnetomer2	**00**	Transmitted raw data	B	F	2

			B	F	2
			B	F	2
			B	F	2
			M	F	2
			M	F	2
			M	F	2
			L	F	2
			V	F	2
			V	F	2
			V	F	2
			V	F	2
			U	F	2
			U	F	2
			U	F	2
			U	F	2
			R	F	2
			R	F	2
			R	F	2
			R	F	2
Magnetomer3	**00**	Transmitted raw data	B	F	3
			B	F	3
			B	F	3
			B	F	3
			M	F	3
			M	F	3
			M	F	3
			L	F	3
			V	F	3
			V	F	3
			V	F	3
			V	F	3
			U	F	3
			U	F	3
			U	F	3
			U	F	3
			R	F	3

			R	F	3
			R	F	3
			R	F	3
Magnetometer temperature	**00**	Transmitted raw data	B	K	M
			B	K	M
			B	K	M
			B	K	M
			M	K	M
			M	K	M
			M	K	M
			L	K	M
			V	K	M
			V	K	M
			V	K	M
			V	K	M
			U	K	M
			U	K	M
			U	K	M
			U	K	M
			R	K	M
			R	K	M
			R	K	M
			R	K	M
S/C Power Voltage	**80**	Transmitted raw data	L	E	V
			V	E	V
			V	E	V
			V	E	V
			V	E	V
			U	E	V
			U	E	V
			U	E	V
			U	E	V
			R	E	V
			R	E	V
			R	E	V
			R	E	V

SP Seismometer Channels

SP1 (High Gain)	**65**	Transmitted raw data	E	H	U
			S	H	U
			S	H	U
			S	H	U
			S	H	U
			M	H	U
			M	H	U
			M	H	U
			L	H	U
SP2 (High Gain)	**65**	Transmitted raw data	E	H	V
			S	H	V
			S	H	V
			S	H	V
			S	H	V
			M	H	V
			M	H	V
			M	H	V
			L	H	V
SP3 (High Gain)	**65**	Transmitted raw data	E	H	W
			S	H	W
			S	H	W
			S	H	W
			S	H	W
			M	H	W
			M	H	W
			M	H	W
			L	H	W
SP1 (Low Gain)	**70**	Transmitted raw data	E	H	U
			S	H	U
			S	H	U
			S	H	U
			S	H	U
			M	H	U
			M	H	U
			M	H	U

			L	H	U
			V	H	U
			V	H	U
			V	H	U
			V	H	U
			U	H	U
			U	H	U
			U	H	U
			U	H	U
			R	H	U
			R	H	U
			R	H	U
			R	H	U
SP2 (Low Gain)	**70**	Transmitted raw data	E	H	V
			S	H	V
			S	H	V
			S	H	V
			S	H	V
			M	H	V
			M	H	V
			M	H	V
			L	H	V
			V	H	V
			V	H	V
			V	H	V
			V	H	V
			U	H	V
			U	H	V
			U	H	V
			U	H	V
			R	H	V
			R	H	V
			R	H	V
			R	H	V
SP3 (Low Gain)	**70**	Transmitted raw data	E	H	W
			S	H	W

			S	H	W
			S	H	W
			S	H	W
			M	H	W
			M	H	W
			M	H	W
			L	H	W
			V	H	W
			V	H	W
			V	H	W
			V	H	W
			U	H	W
			U	H	W
			U	H	W
			U	H	W
			R	H	W
			R	H	W
			R	H	W
			R	H	W
SEIS Software Synthesized Data					
SEISVELZ	**55**	Transmitted processed data	H	Z	C
			B	Z	C
			B	Z	C
			B	Z	C
			B	Z	C
			M	Z	C
			M	Z	C
			M	Z	C
			L	Z	C
			V	Z	C
			V	Z	C
			V	Z	C
			V	Z	C
			U	Z	C
			U	Z	C
			U	Z	C

			U	Z	C
			R	Z	C
			R	Z	C
			R	Z	C
			R	Z	C
SPZ	**75**	Transmitted processed data	E	Z	C
			S	Z	C
			S	Z	C
			S	Z	C
			S	Z	C
			M	Z	C
			M	Z	C
			M	Z	C
			L	Z	C
			V	Z	C
			V	Z	C
			V	Z	C
			V	Z	C
			U	Z	C
			U	Z	C
			U	Z	C
			U	Z	C
			R	Z	C
			R	Z	C
			R	Z	C
			R	Z	C
VBBR	**80**	N/A	H	Z	C
			B	Z	C
			B	Z	C
			B	Z	C
			B	Z	C
			M	Z	C
			M	Z	C
			M	Z	C
			L	Z	C
			V	Z	C

				V	Z	C
				V	Z	C
				V	Z	C
				U	Z	C
				U	Z	C
				U	Z	C
				U	Z	C
				R	Z	C
				R	Z	C
				R	Z	C
				R	Z	C
	SPR	**20**	N/A	H	Z	C
				B	Z	C
				B	Z	C
				B	Z	C
				B	Z	C
				M	Z	C
				M	Z	C
				M	Z	C
				L	Z	C
				V	Z	C
				V	Z	C
				V	Z	C
				V	Z	C
				U	Z	C
				U	Z	C
				U	Z	C
				U	Z	C
				R	Z	C
				R	Z	C
				R	Z	C
				R	Z	C
	ESTAVBB	**40**	Transmitted processed data	L	H	Z
				V	H	Z
				V	H	Z
				V	H	Z

			V	H	Z
			U	H	Z
			U	H	Z
			U	H	Z
			U	H	Z
			R	H	Z
			R	H	Z
			R	H	Z
			R	H	Z
MAXVBB	**45**	Transmitted processed data	L	Y	Z
			V	Y	Z
			V	Y	Z
			V	Y	Z
			V	Y	Z
			U	Y	Z
			U	Y	Z
			U	Y	Z
			U	Y	Z
			R	Y	Z
			R	Y	Z
			R	Y	Z
			R	Y	Z
ESTASP	**85**	Transmitted processed data	L	L	Z
			V	L	Z
			V	L	Z
			V	L	Z
			V	L	Z
			U	L	Z
			U	L	Z
			U	L	Z
			U	L	Z
			R	L	Z
			R	L	Z
			R	L	Z
			R	L	Z
MAXSP	**90**	Transmitted processed data	L	Y	Z

			V	Y	Z
			V	Y	Z
			V	Y	Z
			V	Y	Z
			U	Y	Z
			U	Y	Z
			U	Y	Z
			U	Y	Z
			R	Y	Z
			R	Y	Z
			R	Y	Z
			R	Y	Z
MAGZ	**20**	Transmitted processed data	B	F	R
			B	F	R
			B	F	R
			B	F	R
			M	F	R
			M	F	R
			M	F	R
			L	F	R
			V	F	R
			V	F	R
			V	F	R
			V	F	R
			U	F	R
			U	F	R
			U	F	R
			U	F	R
			R	F	R
			R	F	R
			R	F	R
			R	F	R
ESTAP1	**50**	Transmitted processed data	L	D	O
			V	D	O
			V	D	O
			V	D	O

			V	D	O
			U	D	O
			U	D	O
			U	D	O
			U	D	O
			R	D	O
			R	D	O
			R	D	O
			R	D	O
ESTAP2	**60**	Transmitted processed data	L	D	O
			V	D	O
			V	D	O
			V	D	O
			V	D	O
			U	D	O
			U	D	O
			U	D	O
			U	D	O
			R	D	O
			R	D	O
			R	D	O
			R	D	O
MAXP1	**70**	Transmitted processed data	L	Y	O
			V	Y	O
			V	Y	O
			V	Y	O
			V	Y	O
			U	Y	O
			U	Y	O
			U	Y	O
			U	Y	O
			R	Y	O
			R	Y	O
			R	Y	O
			R	Y	O
MAXP2	**80**	Transmitted processed data	L	Y	O

			V	Y	O
			V	Y	O
			V	Y	O
			V	Y	O
			U	Y	O
			U	Y	O
			U	Y	O
			U	Y	O
			R	Y	O
			R	Y	O
			R	Y	O
			R	Y	O
	ESTAM	**30**	Transmitted processed data	L	F	A
				V	F	A
				V	F	A
				V	F	A
				V	F	A
				U	F	A
				U	F	A
				U	F	A
				U	F	A
				R	F	A
				R	F	A
				R	F	A
				R	F	A
	MAXM	**40**	Transmitted processed data	L	Y	A
				V	Y	A
				V	Y	A
				V	Y	A
				V	Y	A
				U	Y	A
				U	Y	A
				U	Y	A
				U	Y	A
				R	Y	A
				R	Y	A

			R	Y	A
			R	Y	A
Ancillary data					
E-0771 SABC_1_SAPS_CURRENT	**80**	Engineering format	V	E	A
			U	E	A
E-0791 SABC_2_SAPS_CURRENT	**81**	Engineering format	V	E	A
			U	E	A
E-0772 AAC_PDDU_OFC_08_CHAN_12	**82**	Engineering format	V	E	A
			U	E	A
E-0792 AAC_PDDU_OFC_09_CHAN_12	**83**	Engineering format	V	E	A
			U	E	A

sps	LocID	Chan Code	locID.CHA (Unique Identifier	**Total:**	958
100	00	HHU	00.HHU		
50	00	BHU	00.BHU		
25	01	BHU	01.BHU		
20	02	BHU	02.BHU		
10	03	BHU	03.BHU		
5	00	MHU	00.MHU		
4	01	MHU	01.MHU		
2	02	MHU	02.MHU		
1	00	LHU	00.LHU		
100	05	HLU	05.HLU		
50	05	BLU	05.BLU		
25	06	BLU	06.BLU		
20	07	BLU	07.BLU		
10	08	BLU	08.BLU		
5	05	MLU	05.MLU		
4	06	MLU	06.MLU		
2	07	MLU	07.MLU		
1	05	LLU	05.LLU		
100	10	HHU	10.HHU		
50	10	BHU	10.BHU		
25	11	BHU	11.BHU		
20	12	BHU	12.BHU		
10	13	BHU	13.BHU		

5	10	MHU	10.MHU
4	11	MHU	11.MHU
2	12	MHU	12.MHU
1	10	LHU	10.LHU
100	15	HLU	15.HLU
50	15	BLU	15.BLU
25	16	BLU	16.BLU
20	17	BLU	17.BLU
10	18	BLU	18.BLU
5	15	MLU	15.MLU
4	16	MLU	16.MLU
2	17	MLU	17.MLU
1	15	LLU	15.LLU
1	00	LMU	00.LMU
0.5	00	VMU	00.VMU
0.25	01	VMU	01.VMU
0.2	02	VMU	02.VMU
0.1	03	VMU	03.VMU
0.05	00	UMU	00.UMU
0.025	01	UMU	01.UMU
0.02	02	UMU	02.UMU
0.01	03	UMU	03.UMU
0.005	00	RMU	00.RMU
0.001	01	RMU	01.RMU
1/1800	02	RMU	02.RMU
1/3600	03	RMU	03.RMU
1	05	LMU	05.LMU
0.5	05	VMU	05.VMU
0.25	06	VMU	06.VMU
0.2	07	VMU	07.VMU
0.1	08	VMU	08.VMU
0.05	05	UMU	05.UMU
0.025	06	UMU	06.UMU
0.02	07	UMU	07.UMU
0.01	08	UMU	08.UMU
0.005	05	RMU	05.RMU

0.001	06	RMU	06.RMU
1/1800	07	RMU	07.RMU
1/3600	08	RMU	08.RMU
1	10	LMU	10.LMU
0.5	10	VMU	10.VMU
0.25	11	VMU	11.VMU
0.2	12	VMU	12.VMU
0.1	13	VMU	13.VMU
0.05	10	UMU	10.UMU
0.025	11	UMU	11.UMU
0.02	12	UMU	12.UMU
0.01	13	UMU	13.UMU
0.005	10	RMU	10.RMU
0.001	11	RMU	11.RMU
1/1800	12	RMU	12.RMU
1/3600	13	RMU	13.RMU
1	15	LMU	15.LMU
0.5	15	VMU	15.VMU
0.25	16	VMU	16.VMU
0.2	17	VMU	17.VMU
0.1	18	VMU	18.VMU
0.05	15	UMU	15.UMU
0.025	16	UMU	16.UMU
0.02	17	UMU	17.UMU
0.01	18	UMU	18.UMU
0.005	15	RMU	15.RMU
0.001	16	RMU	16.RMU
1/1800	17	RMU	17.RMU
1/3600	18	RMU	18.RMU
1	00	LKU	00.LKU
0.5	00	VKU	00.VKU
0.25	01	VKU	01.VKU
0.2	02	VKU	02.VKU
0.1	03	VKU	03.VKU
0.05	00	UKU	00.UKU
0.025	01	UKU	01.UKU

0.02	02	UKU	02.UKU
0.01	03	UKU	03.UKU
0.005	00	RKU	00.RKU
0.001	01	RKU	01.RKU
1/1800	02	RKU	02.RKU
1/3600	03	RKU	03.RKU
100	00	HHV	00.HHV
50	00	BHV	00.BHV
25	01	BHV	01.BHV
20	02	BHV	02.BHV
10	03	BHV	03.BHV
5	00	MHV	00.MHV
4	01	MHV	01.MHV
2	02	MHV	02.MHV
1	00	LHV	00.LHV
100	05	HLV	05.HLV
50	05	BLV	05.BLV
25	06	BLV	06.BLV
20	07	BLV	07.BLV
10	08	BLV	08.BLV
5	05	MLV	05.MLV
4	06	MLV	06.MLV
2	07	MLV	07.MLV
1	05	LLV	05.LLV
100	10	HHV	10.HHV
50	10	BHV	10.BHV
25	11	BHV	11.BHV
20	12	BHV	12.BHV
10	13	BHV	13.BHV
5	10	MHV	10.MHV
4	11	MHV	11.MHV
2	12	MHV	12.MHV
1	10	LHV	10.LHV
100	15	HLV	15.HLV
50	15	BLV	15.BLV
25	16	BLV	16.BLV

20	17	BLV	17.BLV
10	18	BLV	18.BLV
5	15	MLV	15.MLV
4	16	MLV	16.MLV
2	17	MLV	17.MLV
1	15	LLV	15.LLV
1	00	LMV	00.LMV
0.5	00	VMV	00.VMV
0.25	01	VMV	01.VMV
0.2	02	VMV	02.VMV
0.1	03	VMV	03.VMV
0.05	00	UMV	00.UMV
0.025	01	UMV	01.UMV
0.02	02	UMV	02.UMV
0.01	03	UMV	03.UMV
0.005	00	RMV	00.RMV
0.001	01	RMV	01.RMV
1/1800	02	RMV	02.RMV
1/3600	03	RMV	03.RMV
1	05	LMV	05.LMV
0.5	05	VMV	05.VMV
0.25	06	VMV	06.VMV
0.2	07	VMV	07.VMV
0.1	08	VMV	08.VMV
0.05	05	UMV	05.UMV
0.025	06	UMV	06.UMV
0.02	07	UMV	07.UMV
0.01	08	UMV	08.UMV
0.005	05	RMV	05.RMV
0.001	06	RMV	06.RMV
1/1800	07	RMV	07.RMV
1/3600	08	RMV	08.RMV
1	10	LMV	10.LMV
0.5	10	VMV	10.VMV
0.25	11	VMV	11.VMV
0.2	12	VMV	12.VMV

0.1	13	VMV	13.VMV
0.05	10	UMV	10.UMV
0.025	11	UMV	11.UMV
0.02	12	UMV	12.UMV
0.01	13	UMV	13.UMV
0.005	10	RMV	10.RMV
0.001	11	RMV	11.RMV
1/1800	12	RMV	12.RMV
1/3600	13	RMV	13.RMV
1	15	LMV	15.LMV
0.5	15	VMV	15.VMV
0.25	16	VMV	16.VMV
0.2	17	VMV	17.VMV
0.1	18	VMV	18.VMV
0.05	15	UMV	15.UMV
0.025	16	UMV	16.UMV
0.02	17	UMV	17.UMV
0.01	18	UMV	18.UMV
0.005	15	RMV	15.RMV
0.001	16	RMV	16.RMV
1/1800	17	RMV	17.RMV
1/3600	18	RMV	18.RMV
1	00	LKV	00.LKV
0.5	00	VKV	00.VKV
0.25	01	VKV	01.VKV
0.2	02	VKV	02.VKV
0.1	03	VKV	03.VKV
0.05	00	UKV	00.UKV
0.025	01	UKV	01.UKV
0.02	02	UKV	02.UKV
0.01	03	UKV	03.UKV
0.005	00	RKV	00.RKV
0.001	01	RKV	01.RKV
1/1800	02	RKV	02.RKV
1/3600	03	RKV	03.RKV
100	00	HHW	00.HHW

50	00	BHW	00.BHW
25	01	BHW	01.BHW
20	02	BHW	02.BHW
10	03	BHW	03.BHW
5	00	MHW	00.MHW
4	01	MHW	01.MHW
2	02	MHW	02.MHW
1	00	LHW	00.LHW
100	05	HLW	05.HLW
50	05	BLW	05.BLW
25	06	BLW	06.BLW
20	07	BLW	07.BLW
10	08	BLW	08.BLW
5	05	MLW	05.MLW
4	06	MLW	06.MLW
2	07	MLW	07.MLW
1	05	LLW	05.LLW
100	10	HHW	10.HHW
50	10	BHW	10.BHW
25	11	BHW	11.BHW
20	12	BHW	12.BHW
10	13	BHW	13.BHW
5	10	MHW	10.MHW
4	11	MHW	11.MHW
2	12	MHW	12.MHW
1	10	LHW	10.LHW
100	15	HLW	15.HLW
50	15	BLW	15.BLW
25	16	BLW	16.BLW
20	17	BLW	17.BLW
10	18	BLW	18.BLW
5	15	MLW	15.MLW
4	16	MLW	16.MLW
2	17	MLW	17.MLW
1	15	LLW	15.LLW
1	00	LMW	00.LMW

0.5	00	VMW	00.VMW
0.25	01	VMW	01.VMW
0.2	02	VMW	02.VMW
0.1	03	VMW	03.VMW
0.05	00	UMW	00.UMW
0.025	01	UMW	01.UMW
0.02	02	UMW	02.UMW
0.01	03	UMW	03.UMW
0.005	00	RMW	00.RMW
0.001	01	RMW	01.RMW
1/1800	02	RMW	02.RMW
1/3600	03	RMW	03.RMW
1	05	LMW	05.LMW
0.5	05	VMW	05.VMW
0.25	06	VMW	06.VMW
0.2	07	VMW	07.VMW
0.1	08	VMW	08.VMW
0.05	05	UMW	05.UMW
0.025	06	UMW	06.UMW
0.02	07	UMW	07.UMW
0.01	08	UMW	08.UMW
0.005	05	RMW	05.RMW
0.001	06	RMW	06.RMW
1/1800	07	RMW	07.RMW
1/3600	08	RMW	08.RMW
1	10	LMW	10.LMW
0.5	10	VMW	10.VMW
0.25	11	VMW	11.VMW
0.2	12	VMW	12.VMW
0.1	13	VMW	13.VMW
0.05	10	UMW	10.UMW
0.025	11	UMW	11.UMW
0.02	12	UMW	12.UMW
0.01	13	UMW	13.UMW
0.005	10	RMW	10.RMW
0.001	11	RMW	11.RMW

1/1800	12	RMW	12.RMW
1/3600	13	RMW	13.RMW
1	15	LMW	15.LMW
0.5	15	VMW	15.VMW
0.25	16	VMW	16.VMW
0.2	17	VMW	17.VMW
0.1	18	VMW	18.VMW
0.05	15	UMW	15.UMW
0.025	16	UMW	16.UMW
0.02	17	UMW	17.UMW
0.01	18	UMW	18.UMW
0.005	15	RMW	15.RMW
0.001	16	RMW	16.RMW
1/1800	17	RMW	17.RMW
1/3600	18	RMW	18.RMW
1	00	LKW	00.LKW
0.5	00	VKW	00.VKW
0.25	01	VKW	01.VKW
0.2	02	VKW	02.VKW
0.1	03	VKW	03.VKW
0.05	00	UKW	00.UKW
0.025	01	UKW	01.UKW
0.02	02	UKW	02.UKW
0.01	03	UKW	03.UKW
0.005	00	RKW	00.RKW
0.001	01	RKW	01.RKW
1/1800	02	RKW	02.RKW
1/3600	03	RKW	03.RKW
1	00	LKI	00.LKI
0.5	00	VKI	00.VKI
0.25	01	VKI	01.VKI
0.2	02	VKI	02.VKI
0.1	03	VKI	03.VKI
0.05	00	UKI	00.UKI
0.025	01	UKI	01.UKI
0.02	02	UKI	02.UKI

0.01	03	UKI	03.UKI
0.005	00	RKI	00.RKI
0.001	01	RKI	01.RKI
1/1800	02	RKI	02.RKI
1/3600	03	RKI	03.RKI
1	05	LKI	05.LKI
0.5	05	VKI	05.VKI
0.25	06	VKI	06.VKI
0.2	07	VKI	07.VKI
0.1	08	VKI	08.VKI
0.05	05	UKI	05.UKI
0.025	06	UKI	06.UKI
0.02	07	UKI	07.UKI
0.01	08	UKI	08.UKI
0.005	05	RKI	05.RKI
0.001	06	RKI	06.RKI
1/1800	07	RKI	07.RKI
1/3600	08	RKI	08.RKI
1	10	LWS	10.LWS
0.5	10	VWS	10.VWS
0.25	11	VWS	11.VWS
0.2	12	VWS	12.VWS
0.1	13	VWS	13.VWS
0.05	10	UWS	10.UWS
0.025	11	UWS	11.UWS
0.02	12	UWS	12.UWS
0.01	13	UWS	13.UWS
0.005	10	RWS	10.RWS
0.001	11	RWS	11.RWS
1/1800	12	RWS	12.RWS
1/3600	13	RWS	13.RWS
1	15	LWS	15.LWS
0.5	15	VWS	15.VWS
0.25	16	VWS	16.VWS
0.2	17	VWS	17.VWS

0.1	18	VWS	18.VWS
0.05	15	UWS	15.UWS
0.025	16	UWS	16.UWS
0.02	17	UWS	17.UWS
0.01	18	UWS	18.UWS
0.005	15	RWS	15.RWS
0.001	16	RWS	16.RWS
1/1800	17	RWS	17.RWS
1/3600	18	RWS	18.RWS
1	10	LWD	10.LWD
0.5	10	VWD	10.VWD
0.25	11	VWD	11.VWD
0.2	12	VWD	12.VWD
0.1	13	VWD	13.VWD
0.05	10	UWD	10.UWD
0.025	11	UWD	11.UWD
0.02	12	UWD	12.UWD
0.01	13	UWD	13.UWD
0.005	10	RWD	10.RWD
0.001	11	RWD	11.RWD
1/1800	12	RWD	12.RWD
1/3600	13	RWD	13.RWD
1	10	LKO	10.LKO
0.5	10	VKO	10.VKO
0.25	11	VKO	11.VKO
0.2	12	VKO	12.VKO
0.1	13	VKO	13.VKO
0.05	10	UKO	10.UKO
0.025	11	UKO	11.UKO
0.02	12	UKO	12.UKO
0.01	13	UKO	13.UKO
0.005	10	RKO	10.RKO
0.001	11	RKO	11.RKO
1/1800	12	RKO	12.RKO
1/3600	13	RKO	13.RKO
1	20	LWS	20.LWS

0.5	20	VWS	20.VWS
0.25	21	VWS	21.VWS
0.2	22	VWS	22.VWS
0.1	23	VWS	23.VWS
0.05	20	UWS	20.UWS
0.025	21	UWS	21.UWS
0.02	22	UWS	22.UWS
0.01	23	UWS	23.UWS
0.005	20	RWS	20.RWS
0.001	21	RWS	21.RWS
1/1800	22	RWS	22.RWS
1/3600	23	RWS	23.RWS
1	25	LWS	25.LWS
0.5	25	VWS	25.VWS
0.25	26	VWS	26.VWS
0.2	27	VWS	27.VWS
0.1	28	VWS	28.VWS
0.05	25	UWS	25.UWS
0.025	26	UWS	26.UWS
0.02	27	UWS	27.UWS
0.01	28	UWS	28.UWS
0.005	25	RWS	25.RWS
0.001	26	RWS	26.RWS
1/1800	27	RWS	27.RWS
1/3600	28	RWS	28.RWS
1	20	LWD	20.LWD
0.5	20	VWD	20.VWD
0.25	21	VWD	21.VWD
0.2	22	VWD	22.VWD
0.1	23	VWD	23.VWD
0.05	20	UWD	20.UWD
0.025	21	UWD	21.UWD
0.02	22	UWD	22.UWD
0.01	23	UWD	23.UWD
0.005	20	RWD	20.RWD
0.001	21	RWD	21.RWD

1/1800	22	RWD	22.RWD
1/3600	23	RWD	23.RWD
1	20	LKO	20.LKO
0.5	20	VKO	20.VKO
0.25	21	VKO	21.VKO
0.2	22	VKO	22.VKO
0.1	23	VKO	23.VKO
0.05	20	UKO	20.UKO
0.025	21	UKO	21.UKO
0.02	22	UKO	22.UKO
0.01	23	UKO	23.UKO
0.005	20	RKO	20.RKO
0.001	21	RKO	21.RKO
1/1800	22	RKO	22.RKO
1/3600	23	RKO	23.RKO
1	30	LWS	30.LWS
0.5	30	VWS	30.VWS
0.25	31	VWS	31.VWS
0.2	32	VWS	32.VWS
0.1	33	VWS	33.VWS
0.05	30	UWS	30.UWS
0.025	31	UWS	31.UWS
0.02	32	UWS	32.UWS
0.01	33	UWS	33.UWS
0.005	30	RWS	30.RWS
0.001	31	RWS	31.RWS
1/1800	32	RWS	32.RWS
1/3600	33	RWS	33.RWS
1	35	LWS	35.LWS
0.5	35	VWS	35.VWS
0.25	36	VWS	36.VWS
0.2	37	VWS	37.VWS
0.1	38	VWS	38.VWS
0.05	35	UWS	35.UWS
0.025	36	UWS	36.UWS
0.02	37	UWS	37.UWS

0.01	38	UWS	38.UWS
0.005	35	RWS	35.RWS
0.001	36	RWS	36.RWS
1/1800	37	RWS	37.RWS
1/3600	38	RWS	38.RWS
1	30	LWD	30.LWD
0.5	30	VWD	30.VWD
0.25	31	VWD	31.VWD
0.2	32	VWD	32.VWD
0.1	33	VWD	33.VWD
0.05	30	UWD	30.UWD
0.025	31	UWD	31.UWD
0.02	32	UWD	32.UWD
0.01	33	UWD	33.UWD
0.005	30	RWD	30.RWD
0.001	31	RWD	31.RWD
1/1800	32	RWD	32.RWD
1/3600	33	RWD	33.RWD
1	30	LKO	30.LKO
0.5	30	VKO	30.VKO
0.25	31	VKO	31.VKO
0.2	32	VKO	32.VKO
0.1	33	VKO	33.VKO
0.05	30	UKO	30.UKO
0.025	31	UKO	31.UKO
0.02	32	UKO	32.UKO
0.01	33	UKO	33.UKO
0.005	30	RKO	30.RKO
0.001	31	RKO	31.RKO
1/1800	32	RKO	32.RKO
1/3600	33	RKO	33.RKO
20	12	BDO	12.BDO
10	13	BDO	13.BDO
5	10	MDO	10.MDO
4	11	MDO	11.MDO
2	12	MDO	12.MDO

1	10	LDO	10.LDO
0.5	10	VDO	10.VDO
0.2	12	VDO	12.VDO
20	22	BKI	22.BKI
10	23	BKI	23.BKI
5	20	MKI	20.MKI
4	21	MKI	21.MKI
2	22	MKI	22.MKI
1	20	LKI	20.LKI
0.5	20	VKI	20.VKI
0.2	22	VKI	22.VKI
50	00	BDO	00.BDO
25	01	BDO	01.BDO
20	02	BDO	02.BDO
10	03	BDO	03.BDO
5	00	MDO	00.MDO
4	01	MDO	01.MDO
2	02	MDO	02.MDO
1	00	LDO	00.LDO
0.5	00	VDO	00.VDO
0.25	01	VDO	01.VDO
0.2	02	VDO	02.VDO
0.1	03	VDO	03.VDO
0.05	00	UDO	00.UDO
0.025	01	UDO	01.UDO
0.02	02	UDO	02.UDO
0.01	03	UDO	03.UDO
0.005	00	RDO	00.RDO
0.001	01	RDO	01.RDO
1/1800	02	RDO	02.RDO
1/3600	03	RDO	03.RDO
50	10	BKI	10.BKI
25	11	BKI	11.BKI
20	12	BKI	12.BKI
10	13	BKI	13.BKI
5	10	MKI	10.MKI

4	11	MKI	11.MKI
2	12	MKI	12.MKI
1	10	LKI	10.LKI
0.5	10	VKI	10.VKI
0.25	11	VKI	11.VKI
0.2	12	VKI	12.VKI
0.1	13	VKI	13.VKI
0.05	10	UKI	10.UKI
0.025	11	UKI	11.UKI
0.02	12	UKI	12.UKI
0.01	13	UKI	13.UKI
0.005	10	RKI	10.RKI
0.001	11	RKI	11.RKI
1/1800	12	RKI	12.RKI
1/3600	13	RKI	13.RKI
50	00	BF1	00.BF1
25	01	BF1	01.BF1
20	02	BF1	02.BF1
10	03	BF1	03.BF1
5	00	MF1	00.MF1
4	01	MF1	01.MF1
2	02	MF1	02.MF1
1	00	LF1	00.LF1
0.5	00	VF1	00.VF1
0.25	01	VF1	01.VF1
0.2	02	VF1	02.VF1
0.1	03	VF1	03.VF1
0.05	00	UF1	00.UF1
0.025	01	UF1	01.UF1
0.02	02	UF1	02.UF1
0.01	03	UF1	03.UF1
0.005	00	RF1	00.RF1
0.001	01	RF1	01.RF1
1/1800	02	RF1	02.RF1
1/3600	03	RF1	03.RF1
50	00	BF2	00.BF2

25	01	BF2	01.BF2
20	02	BF2	02.BF2
10	03	BF2	03.BF2
5	00	MF2	00.MF2
4	01	MF2	01.MF2
2	02	MF2	02.MF2
1	00	LF2	00.LF2
0.5	00	VF2	00.VF2
0.25	01	VF2	01.VF2
0.2	02	VF2	02.VF2
0.1	03	VF2	03.VF2
0.05	00	UF2	00.UF2
0.025	01	UF2	01.UF2
0.02	02	UF2	02.UF2
0.01	03	UF2	03.UF2
0.005	00	RF2	00.RF2
0.001	01	RF2	01.RF2
1/1800	02	RF2	02.RF2
1/3600	03	RF2	03.RF2
50	00	BF3	00.BF3
25	01	BF3	01.BF3
20	02	BF3	02.BF3
10	03	BF3	03.BF3
5	00	MF3	00.MF3
4	01	MF3	01.MF3
2	02	MF3	02.MF3
1	00	LF3	00.LF3
0.5	00	VF3	00.VF3
0.25	01	VF3	01.VF3
0.2	02	VF3	02.VF3
0.1	03	VF3	03.VF3
0.05	00	UF3	00.UF3
0.025	01	UF3	01.UF3
0.02	02	UF3	02.UF3
0.01	03	UF3	03.UF3
0.005	00	RF3	00.RF3

0.001	01	RF3	01.RF3
1/1800	02	RF3	02.RF3
1/3600	03	RF3	03.RF3
50	00	BKM	00.BKM
25	01	BKM	01.BKM
20	02	BKM	02.BKM
10	03	BKM	03.BKM
5	00	MKM	00.MKM
4	01	MKM	01.MKM
2	02	MKM	02.MKM
1	00	LKM	00.LKM
0.5	00	VKM	00.VKM
0.25	01	VKM	01.VKM
0.2	02	VKM	02.VKM
0.1	03	VKM	03.VKM
0.05	00	UKM	00.UKM
0.025	01	UKM	01.UKM
0.02	02	UKM	02.UKM
0.01	03	UKM	03.UKM
0.005	00	RKM	00.RKM
0.001	01	RKM	01.RKM
1/1800	02	RKM	02.RKM
1/3600	03	RKM	03.RKM
1	80	LEV	80.LEV
0.5	80	VEV	80.VEV
0.25	81	VEV	81.VEV
0.2	82	VEV	82.VEV
0.1	83	VEV	83.VEV
0.05	80	UEV	80.UEV
0.025	81	UEV	81.UEV
0.02	82	UEV	82.UEV
0.01	83	UEV	83.UEV
0.005	80	REV	80.REV
0.001	81	REV	81.REV
1/1800	82	REV	82.REV
1/3600	83	REV	83.REV

100	65	EHU	65.EHU
50	65	SHU	65.SHU
25	66	SHU	66.SHU
20	67	SHU	67.SHU
10	68	SHU	68.SHU
5	65	MHU	65.MHU
4	66	MHU	66.MHU
2	67	MHU	67.MHU
1	65	LHU	65.LHU
100	65	EHV	65.EHV
50	65	SHV	65.SHV
25	66	SHV	66.SHV
20	67	SHV	67.SHV
10	68	SHV	68.SHV
5	65	MHV	65.MHV
4	66	MHV	66.MHV
2	67	MHV	67.MHV
1	65	LHV	65.LHV
100	65	EHW	65.EHW
50	65	SHW	65.SHW
25	66	SHW	66.SHW
20	67	SHW	67.SHW
10	68	SHW	68.SHW
5	65	MHW	65.MHW
4	66	MHW	66.MHW
2	67	MHW	67.MHW
1	65	LHW	65.LHW
100	70	EHU	70.EHU
50	70	SHU	70.SHU
25	71	SHU	71.SHU
20	72	SHU	72.SHU
10	73	SHU	73.SHU
5	70	MHU	70.MHU
4	71	MHU	71.MHU
2	72	MHU	72.MHU

1	73	LHU	73.LHU
0.5	70	VHU	70.VHU
0.25	71	VHU	71.VHU
0.2	72	VHU	72.VHU
0.1	73	VHU	73.VHU
0.05	70	UHU	70.UHU
0.025	71	UHU	71.UHU
0.02	72	UHU	72.UHU
0.01	73	UHU	73.UHU
0.005	70	RHU	70.RHU
0.001	71	RHU	71.RHU
1/1800	72	RHU	72.RHU
1/3600	73	RHU	73.RHU
100	70	EHV	70.EHV
50	70	SHV	70.SHV
25	71	SHV	71.SHV
20	72	SHV	72.SHV
10	73	SHV	73.SHV
5	70	MHV	70.MHV
4	71	MHV	71.MHV
2	72	MHV	72.MHV
1	73	LHV	73.LHV
0.5	70	VHV	70.VHV
0.25	71	VHV	71.VHV
0.2	72	VHV	72.VHV
0.1	73	VHV	73.VHV
0.05	70	UHV	70.UHV
0.025	71	UHV	71.UHV
0.02	72	UHV	72.UHV
0.01	73	UHV	73.UHV
0.005	70	RHV	70.RHV
0.001	71	RHV	71.RHV
1/1800	72	RHV	72.RHV
1/3600	73	RHV	73.RHV
100	70	EHW	70.EHW
50	70	SHW	70.SHW

25	71	SHW	71.SHW
20	72	SHW	72.SHW
10	73	SHW	73.SHW
5	70	MHW	70.MHW
4	71	MHW	71.MHW
2	72	MHW	72.MHW
1	73	LHW	73.LHW
0.5	70	VHW	70.VHW
0.25	71	VHW	71.VHW
0.2	72	VHW	72.VHW
0.1	73	VHW	73.VHW
0.05	70	UHW	70.UHW
0.025	71	UHW	71.UHW
0.02	72	UHW	72.UHW
0.01	73	UHW	73.UHW
0.005	70	RHW	70.RHW
0.001	71	RHW	71.RHW
1/1800	72	RHW	72.RHW
1/3600	73	RHW	73.RHW
100	55	HZC	55.HZC
50	55	BZC	55.BZC
25	56	BZC	56.BZC
20	57	BZC	57.BZC
10	58	BZC	58.BZC
5	55	MZC	55.MZC
4	56	MZC	56.MZC
2	57	MZC	57.MZC
1	58	LZC	58.LZC
0.5	55	VZC	55.VZC
0.25	56	VZC	56.VZC
0.2	57	VZC	57.VZC
0.1	58	VZC	58.VZC
0.05	55	UZC	55.UZC
0.025	56	UZC	56.UZC
0.02	57	UZC	57.UZC

0.01	58	UZC	58.UZC
0.005	55	RZC	55.RZC
0.001	56	RZC	56.RZC
1/1800	57	RZC	57.RZC
1/3600	58	RZC	58.RZC
100	75	EZC	75.EZC
50	75	SZC	75.SZC
25	76	SZC	76.SZC
20	77	SZC	77.SZC
10	78	SZC	78.SZC
5	75	MZC	75.MZC
4	76	MZC	76.MZC
2	77	MZC	77.MZC
1	78	LZC	78.LZC
0.5	75	VZC	75.VZC
0.25	76	VZC	76.VZC
0.2	77	VZC	77.VZC
0.1	78	VZC	78.VZC
0.05	75	UZC	75.UZC
0.025	76	UZC	76.UZC
0.02	77	UZC	77.UZC
0.01	78	UZC	78.UZC
0.005	75	RZC	75.RZC
0.001	76	RZC	76.RZC
1/1800	77	RZC	77.RZC
1/3600	78	RZC	78.RZC
100	80	HZC	80.HZC
50	80	BZC	80.BZC
25	81	BZC	81.BZC
20	82	BZC	82.BZC
10	83	BZC	83.BZC
5	80	MZC	80.MZC
4	81	MZC	81.MZC
2	82	MZC	82.MZC
1	83	LZC	83.LZC
0.5	80	VZC	80.VZC

0.25	81	VZC	81.VZC
0.2	82	VZC	82.VZC
0.1	83	VZC	83.VZC
0.05	80	UZC	80.UZC
0.025	81	UZC	81.UZC
0.02	82	UZC	82.UZC
0.01	83	UZC	83.UZC
0.005	80	RZC	80.RZC
0.001	81	RZC	81.RZC
1/1800	82	RZC	82.RZC
1/3600	83	RZC	83.RZC
100	20	HZC	20.HZC
50	20	BZC	20.BZC
25	21	BZC	21.BZC
20	22	BZC	22.BZC
10	23	BZC	23.BZC
5	20	MZC	20.MZC
4	21	MZC	21.MZC
2	22	MZC	22.MZC
1	23	LZC	23.LZC
0.5	20	VZC	20.VZC
0.25	21	VZC	21.VZC
0.2	22	VZC	22.VZC
0.1	23	VZC	23.VZC
0.05	20	UZC	20.UZC
0.025	21	UZC	21.UZC
0.02	22	UZC	22.UZC
0.01	23	UZC	23.UZC
0.005	20	RZC	20.RZC
0.001	21	RZC	21.RZC
1/1800	22	RZC	22.RZC
1/3600	23	RZC	23.RZC
1	40	LHZ	40.LHZ
0.5	40	VHZ	40.VHZ
0.25	41	VHZ	41.VHZ
0.2	42	VHZ	42.VHZ

0.1	43	VHZ	43.VHZ
0.05	40	UHZ	40.UHZ
0.025	41	UHZ	41.UHZ
0.02	42	UHZ	42.UHZ
0.01	43	UHZ	43.UHZ
0.005	40	RHZ	40.RHZ
0.001	41	RHZ	41.RHZ
1/1800	42	RHZ	42.RHZ
1/3600	43	RHZ	43.RHZ
1	45	LYZ	45.LYZ
0.5	45	VYZ	45.VYZ
0.25	46	VYZ	46.VYZ
0.2	47	VYZ	47.VYZ
0.1	48	VYZ	48.VYZ
0.05	45	UYZ	45.UYZ
0.025	46	UYZ	46.UYZ
0.02	47	UYZ	47.UYZ
0.01	48	UYZ	48.UYZ
0.005	45	RYZ	45.RYZ
0.001	46	RYZ	46.RYZ
1/1800	47	RYZ	47.RYZ
1/3600	48	RYZ	48.RYZ
1	85	LLZ	85.LLZ
0.5	85	VLZ	85.VLZ
0.25	86	VLZ	86.VLZ
0.2	87	VLZ	87.VLZ
0.1	88	VLZ	88.VLZ
0.05	85	ULZ	85.ULZ
0.025	86	ULZ	86.ULZ
0.02	87	ULZ	87.ULZ
0.01	88	ULZ	88.ULZ
0.005	85	RLZ	85.RLZ
0.001	86	RLZ	86.RLZ
1/1800	87	RLZ	87.RLZ
1/3600	88	RLZ	88.RLZ
1	90	LYZ	90.LYZ

0.5	90	VYZ	90.VYZ
0.25	91	VYZ	91.VYZ
0.2	92	VYZ	92.VYZ
0.1	93	VYZ	93.VYZ
0.05	90	UYZ	90.UYZ
0.025	91	UYZ	91.UYZ
0.02	92	UYZ	92.UYZ
0.01	93	UYZ	93.UYZ
0.005	90	RYZ	90.RYZ
0.001	91	RYZ	91.RYZ
1/1800	92	RYZ	92.RYZ
1/3600	93	RYZ	93.RYZ
50	20	BFR	20.BFR
25	21	BFR	21.BFR
20	22	BFR	22.BFR
10	23	BFR	23.BFR
5	20	MFR	20.MFR
4	21	MFR	21.MFR
2	22	MFR	22.MFR
1	20	LFR	20.LFR
0.5	20	VFR	20.VFR
0.25	21	VFR	21.VFR
0.2	22	VFR	22.VFR
0.1	23	VFR	23.VFR
0.05	20	UFR	20.UFR
0.025	21	UFR	21.UFR
0.02	22	UFR	22.UFR
0.01	23	UFR	23.UFR
0.005	20	RFR	20.RFR
0.001	21	RFR	21.RFR
1/1800	22	RFR	22.RFR
1/3600	23	RFR	23.RFR
1	50	LDO	50.LDO
0.5	50	VDO	50.VDO
0.25	51	VDO	51.VDO
0.2	52	VDO	52.VDO

0.1	53	VDO	53.VDO
0.05	50	UDO	50.UDO
0.025	51	UDO	51.UDO
0.02	52	UDO	52.UDO
0.01	53	UDO	53.UDO
0.005	50	RDO	50.RDO
0.001	51	RDO	51.RDO
1/1800	52	RDO	52.RDO
1/3600	53	RDO	53.RDO
1	60	LDO	60.LDO
0.5	60	VDO	60.VDO
0.25	61	VDO	61.VDO
0.2	62	VDO	62.VDO
0.1	63	VDO	63.VDO
0.05	60	UDO	60.UDO
0.025	61	UDO	61.UDO
0.02	62	UDO	62.UDO
0.01	63	UDO	63.UDO
0.005	60	RDO	60.RDO
0.001	61	RDO	61.RDO
1/1800	62	RDO	62.RDO
1/3600	63	RDO	63.RDO
1	70	LYO	70.LYO
0.5	70	VYO	70.VYO
0.25	71	VYO	71.VYO
0.2	72	VYO	72.VYO
0.1	73	VYO	73.VYO
0.05	70	UYO	70.UYO
0.025	71	UYO	71.UYO
0.02	72	UYO	72.UYO
0.01	73	UYO	73.UYO
0.005	70	RYO	70.RYO
0.001	71	RYO	71.RYO
1/1800	72	RYO	72.RYO
1/3600	73	RYO	73.RYO
1	80	LYO	80.LYO

0.5	80	VYO	80.VYO
0.25	81	VYO	81.VYO
0.2	82	VYO	82.VYO
0.1	83	VYO	83.VYO
0.05	80	UYO	80.UYO
0.025	81	UYO	81.UYO
0.02	82	UYO	82.UYO
0.01	83	UYO	83.UYO
0.005	80	RYO	80.RYO
0.001	81	RYO	81.RYO
1/1800	82	RYO	82.RYO
1/3600	83	RYO	83.RYO
1	30	LFA	30.LFA
0.5	30	VFA	30.VFA
0.25	31	VFA	31.VFA
0.2	32	VFA	32.VFA
0.1	33	VFA	33.VFA
0.05	30	UFA	30.UFA
0.025	31	UFA	31.UFA
0.02	32	UFA	32.UFA
0.01	33	UFA	33.UFA
0.005	30	RFA	30.RFA
0.001	31	RFA	31.RFA
1/1800	32	RFA	32.RFA
1/3600	33	RFA	33.RFA
1	40	LYA	40.LYA
0.5	40	VYA	40.VYA
0.25	41	VYA	41.VYA
0.2	42	VYA	42.VYA
0.1	43	VYA	43.VYA
0.05	40	UYA	40.UYA
0.025	41	UYA	41.UYA
0.02	42	UYA	42.UYA
0.01	43	UYA	43.UYA
0.005	40	RYA	40.RYA
0.001	41	RYA	41.RYA

1/1800	42	RYA	42.RYA
1/3600	43	RYA	43.RYA
0.25	80	VEA	80.VEA
1/30	80	UEA	80.UEA
0.25	81	VEA	81.VEA
1/30	81	UEA	81.UEA
0.25	82	VEA	82.VEA
1/30	82	UEA	82.UEA
0.25	83	VEA	83.VEA
1/30	83	UEA	83.UEA

InSight SEIS Seismometer
SEED Channel Configuration for SEIS Data - Network XB

Owner	C. Pardo - Mars SEIS Data Service
Issue:	2
Revision:	10
Last Modification:	September 10, 2015

LocId and Channel codes are the same as the original raw data input.
(Except when signal is rotated, then UVW become XYZ)

ONLY BOXES FOR WHICH THE OUTPUTS ARE SAVED AS mSEED ARE LISTED.

Black Box Number / Name	Station Code	Description
B01	EP010	Main Box Output
	EP011	Difference (In-Out) - Removed low frequency signal
B03	EP030	Main Box Output
	EP031	Difference (In-Out) -- Shows glitch and spike locatio
B04	EP040	Main Box Output
	EP041	Difference (In-Out) -- Polarized noise
B05	EP050	Main Box Output
	EP051	Difference (In-Out) -- VEL/POS Integrator Noise
B08	EP080	Main Box Output
	EP081	MAG1 decorellated noise

	EP082	MAG2 decorellated noise
	EP083	MAG3 decorellated noise
B09	EP090	Rotated Data
B10	EP100	Main Box Output
	EP101	PRESS Decorrelated Noise
B11	EP110	Main Box Output
	EP111	VBB1 Decorrelated Noise
	EP112	VBB2 Decorrelated Noise
	EP113	VBB3 Decorrelated Noise
	EP114	VBBFB1 Decorrelated Noise
	EP115	VBBFB2 Decorrelated Noise
	EP116	VBBFB3 Decorrelated Noise
	EP117	SCIT Decorrelated Noise
STA/LTA - Kurtosis & STA/LTA from ESTA	EP200	STA/LTA Output
	EP201	Kurtosis Output

Example: Initial data is low gain position data in nomical case

Initial locID.CHA	**ELYS.00.VMU**	**Raw data**
	EP010.00.VMU	**Start of processed data**
	EP011.00.VMU	
	EP030.00.VMU	
ns	**EP031.00.VMU**	
	EP040.00.VMU	
	EP041.00.VMU	
	EP050.00.VMU	
	EP051.00.VMU	
	EP080.00.VMU	
	EP081.00.VMU	

EP082.00.VMU
EP083.00.VMU

EP090.00.VMX **Rotated data (U/V/W becomes X/Y/Z)**

EP100.00.VMX
EP101.00.VMX

EP110.00.VMX **Data used for automatic event identification**
EP111.00.VMX
EP112.00.VMX
EP113.00.VMX
EP114.00.VMX
EP115.00.VMX
EP116.00.VMX
EP117.00.VMX

EP200.00.VMX
EP201.00.VMX

InSight SEIS Seismometer
SEED Channel Configuration for SEIS Data - Network XB

Owner C. Pardo - Mars SEIS Data Service
Issue: 2
Revision: 10
Last Modification October 22, 2018

SEED/Mini-SEED/PDS only		**Channel**	**Location ID**	**Location ID**	**Channel ID 2 last digits**
	HK available from S/C				
PDS Only		SEIS PPS AOBT		81	**ACE ?**
		spare		82-99	
	HK available in MDE				
PDS Only		Motor Temperature	00	60	KI
PDS Only		Tilt X	10	61	A1
PDS Only		Tilt Y	10	62	A2
PDS Only		High Resolution Tilt X	00	63	AU
PDS Only		High Resolution Tilit Y	00	64	AV
PDS Only		Status Flag Register		65	YS

PDS Only	Step Counter	66	YN
PDS Only	LVL Power Control Register	67	YP
PDS Only	LVL Motor Control Register	68	YM
PDS Only	Start Speed Register	69	YA
PDS Only	Ramp Parameter Register	70	YB
PDS Only	Quad Step Count Register	71	YC
PDS Only	Overtemperature Limit Register	72	YD
PDS Only	Executive Register	73	YE
PDS Only	Preset Quad Step Register	74	YF
	spare	75-79	

HK available in Ebox Housekeeping data (HK channels) list order TBC by SYDERAL (according to th

	HK ID	**Signal name**		
	1	Dummy	01	
SEED	2	SP-HK1-MPOS1	02	MA
SEED	3	SP-HK2-MPOS1	03	MA
miniSEED	4	SEIS-DC+13VV	04	EV
miniSEED	5	CAL1-HKT	05	YO
SEED	6	SP-HK1-MPOS2	06	MB
SEED	7	SP-HK2-MPOS2	07	MB
miniSEED	8	SEIS-DC+15VA	08	EA
SEED	9	VBB2-PXT	09	K1
SEED	10	SP-HK1-MPOS3	10	MC
SEED	11	SP-HK2-MPOS3	11	MC

miniSEED	12	SEIS-DC-13VV	12	EV
SEED	13	VBB3-PXT	13	K1
SEED	14	SP-HK1-TEMP-FB	14	KP
SEED	15	SP-HK2-TEMP-FBE	15	KP
miniSEED	16	SEIS-DC-15VA	16	EA
SEED	17	VBB3-HKT	17	K2
miniSEED	18	SEIS-DC+7VAV	18	EV
SEED	19	SP-HK1-SP1-TEMP	19	K1
SEED	20	SP-HK2-SP1-TEMPE	20	K2
miniSEED	21	SEIS-DC+7VAA	21	EA
SEED	22	VBB1-HKT	22	K2
SEED	23	SP-HK1-SP2-TEMP	23	K1
SEED	24	SP-HK2-SP2-TEMPE	24	K2
miniSEED	25	SEIS-DC-10VV	25	EV
SEED	26	VBB2-HKT	26	K2
SEED	27	SP-HK1-SP3-TEMP	27	K1
SEED	28	SP-HK2-SP3-TEMPE	28	K2
miniSEED	29	SEIS-DC-10VA	29	EA
miniSEED	30	VBB1-PXT	30	K1
miniSEED	31	SP-HK1+VREF	31	EV
miniSEED	32	SP-HK2-VREF	32	EV
SEED	33	ACQ-HKT	33	KA
miniSEED	34	SEIS-DC+1V2VA	34	EV
miniSEED	35	SEIS-AC+5VREF	35	EV
miniSEED	36	SEIS-DC+1V2VA	36	EA
SEED	37	DC-HKT	37	KD
miniSEED	38	SEIS-DC+3V3VA	38	EA
miniSEED	39	SEIS-AC-6VSV	39	EV
miniSEED	40	SEIS-DC+3V3V	40	EV
miniSEED	41	SEIS-AC+6VSV	41	EV
miniSEED	42	SEIS-DC-5VV	42	EV

SEED	43	CTL-HKT	43	KC
miniSEED	44	SEIS-DC+5VV	44	EV
miniSEED	45	SEIS-AC+6VSA	45	EA
miniSEED	46	SEIS-DC-5VA	46	EA
SEED	47	CAL2-HKT	47	YO
miniSEED	48	SEIS-DC+5VA	48	EA

Band code					Comments
L **1sps**	**V** **0,1sps**	**U** **0,01sps**	**R** **<0,01**	**Channel Flag**	
			ACE?	**H**	
LKI	VKI	UKI	RKI	H	Information only valid during motor operation
LA1	VA1	UA1	RA1	G	Define better resolution by setting location ID to 00
LA2	VA2	UA2	RA2	G	orientation of sensors is orthogonal and along axes of SEIS sensor head reference coordinate system, but this is still non-traditional (i.e. not N and E). SEED manual App. A only suggests G as channel flag for tiltmeters?!
LAU	VAU	UAU	RAU	G	replaced by U and V as non-orthogonal
LAV	VAV	UAV	RAV	G	SEED manual App. A only suggests G as channel flag for tiltmeters?!
LYS	VYS	UYS	RYS	H	16 status flags with information on MDE status and health

LYN	VYN	UYN	RYN	H	counts steps commanded to the motors (cummulative), reset to 0 after power on
LYP	VYP	UYP	RYP	H	16 status flags for MDE configuration
LYM	VYM	UYM	RYM	H	16 status flags for motor operation configuration
LYA	VYA	UYA	RYA	H	motor controller parameter 0x0A
LYB	VYB	UYB	RYB	H	motor controller parameter 0x0B
LYC	VYC	UYC	RYC	H	motor controller parameter 0x0C
LYD	VYD	UYD	RYD	H	motor controller parameter 0x0D (raw output not yet in temperature units)
LYE	VYE	UYE	RYE	H	MDE control register 0x0E
LYF	VYF	UYF	RYF	H	motor controller parameter 0x0F

eir design for ELM and QM/FM)

				Signal description
L	V	U	H	Dummy value (can be any value), 16-bit
LMA	VMA	UMA	H	SP1 mass position, 16-bit
LMA	VMA	UMA	H	SP1 mass position (redundant acquisition), 16-bit
LEV	VEV	UEV	H	Voltage on +13V, 16-bit
LYO	VYO	UYO	H	Cross-strapped fixed 1KOhm resistor for the calibration of the HK circuit (offset compensation), 16-bit
LMB	VMB	UMB	H	SP2 mass position, 16-bit
LMB	VMB	UMB	H	SP2 mass position (redundant acquisition), 16-bit
LEA	VEA	UEA	H	Current on +15V, 16-bit
LK1	VK1	UK1	H	VBB2-PE temperature, 16-bit
LMC	VMC	UMC	H	SP3 mass position, 16-bit
LMC	VMC	UMC	H	SP3 mass position (redundant acquisition), 16-bit

LEV	VEV	UEV	H	Voltage on -3V, 16-bit
LK1	VK1	UK1	H	VBB3 PE temperature, 16-bit
LKP	VKP	UKP	H	SP-FB PCB temperature #1, 16-bit
LKP	VKP	UKP	H	SP-FB PCB temperature #2, 16-bit
LEA	VEA	UEA	H	Current on -15V, 16-bit
LK2	VK2	UK2	H	VBB3 FB temperature, 16-bit
LEV	VEV	UEV	H	Voltage on +7V, 16-bit
LK1	VK1	UK1	H	SP1 sensor temperature, 16-bit
LK2	VK2	UK2	H	SP1 housing temperature, 16-bit
LEA	VEA	UEA	H	Current on +7V, 16-bit
LK2	VK2	UK2	H	VBB1 FB temperature, 16-bit
LK1	VK1	UK1	H	SP2 sensor temperature, 16-bit
LK2	VK2	UK2	H	SP2 housing temperature, 16-bit
LEV	VEV	UEV	H	Voltage on -10V, 16-bit
LK2	VK2	UK2	H	VBB2 FB temperature, 16-bit
LK1	VK1	UK1	H	SP3 sensor temperature, 16-bit
LK2	VK2	UK2	H	SP3 housing temperature, 16-bit
LEA	VEA	UEA	H	Current on -10V, 16-bit
LK1	VK1	UK1	H	VBB1 PE temperature
LEV	VEV	UEV	H	Regulated +6V voltage supplied to SP and sampled via a resistance divider (2x 100K), 16-bit
LEV	VEV	UEV	H	Regulated -6V voltage supplied to SP and sampled via a resistance divider (2x 100K), 16-bit
LKA	VKA	UKA	H	SEIS-AC ACQ temperature, 16-bit
LEV	VEV	UEV	H	Voltage on +1.2V, 16-bit
LEV		UEV	H	Voltage on +5VREF used for the SCIT circuitry, 16-bit
LEA	VEA	UEA	H	Current on +1.2V, 16-bit
LKD	VKD	UKD	H	SEIS-DC Temperature, 16-bit
LEA	VEA	UEA	H	Current on +3.3V, 16-bit
LEV	VEV	UEV	H	Voltage on -6VS, 16-bit
LEV	VEV	UEV	H	Voltage on +3.3V, 16-bit
LEV	VEV	UEV	H	Voltage on +6VS, 16-bit
LEV	VEV	UEV	H	Voltage on -5V, 16-bit

LKC	VKC	UKC	H	SEIS-AC CTL temperature
LEV	VEV	UEV	H	Voltage on +5V, 16-bit
LEA	VEA	UEA	H	Current on +6VS, 16-bit
LEA	VEA	UEA	H	Current on -5V
LYO	VYO	UYO	H	Non cross-strapped (1 resistor per side) fixed 1KOhm resistor used for the reference, but not for the offset compensation, 16-bit
LEA	VEA	UEA	H	Current on +5V, 16 -bit

Notes on HK codes

E:electronic test point (SEED manual: Appendix A).
V or A: Voltage or Current)
SEED channel Y for non-specific instruments.
Orientation code O for units OHM ? SEED manual:
Appendix A

cabinet source 1: PE

cabinet source 1: PE
mnemonic type P for SP
mnemonic type P for SP

cabinet source 2: FB

cabinet source 1: sensor temperature
cabinet source 2: housing temperature

cabinet source 2: FB
cabinet source 1: sensor temperature
cabinet source 2: housing temperature

cabinet source 2: FB
cabinet source 1: sensor temperature
cabinet source 2: housing temperature

Or Y channel?

Or Y channel?
mnemonic type A for SEIS-AC AQC

mnemonic type D for SEIS-DC

mnemonic type A for SEIS-AC CTL

InSight SEIS Seismometer
SEED Channel Configuration for SEIS Data - Netwo

Owner	C. Pardo - Mars SEIS Data Service
Issue:	2
Revision:	10
Last Modification:	July 29, 2020

HK ID	Channel / Signal Name	Band Code	Channel ID	sps	LocID	Chan Code	locID.CHA (Unique Identifie
	HK available from S/C						
	SEIS PPS AOBT	R	ACE ?	<0.01	81		
	HK available in MDE						
	Motor Temperature	L	KI	1	60	LKI	60.LKI
		V	KI	0.1	60	VKI	60.VKI
		U	KI	0.01	60	UKI	60.UKI
		R	KI	<0.01	60	RKI	60.RKI
	Tilt X	L	A1	1	61	LA1	61.LA1
		V	A1	0.1	61	VA1	61.VA1
		U	A1	0.01	61	UA1	61.UA1
		R	A1	<0.01	61	RA1	61.RA1
	Tilt Y	L	A2	1	62	LA2	62.LA2
		V	A2	0.1	62	VA2	62.VA2
		U	A2	0.01	62	UA2	62.UA2
		R	A2	<0.01	62	RA2	62.RA2
	High Resolution Tilt X	L	AU	1	63	LAU	63.LAU
		V	AU	0.1	63	VAU	63.VAU
		U	AU	0.01	63	UAU	63.UAU
		R	AU	<0.01	63	RAU	63.RAU
	High Resolution Tilit Y	L	AV	1	64	LAV	64.LAV
		V	AV	0.1	64	VAV	64.VAV
		U	AV	0.01	64	UAV	64.UAV
		R	AV	<0.01	64	RAV	64.RAV
	Status Flag Register	L	YS	1	65	LYS	65.LYS

	V	YS	0.1	65	VYS	65.VYS
	U	YS	0.01	65	UYS	65.UYS
	R	YS	<0.01	65	RYS	65.RYS
Step Counter	L	YN	1	66	LYN	66.LYN
	V	YN	0.1	66	VYN	66.VYN
	U	YN	0.01	66	UYN	66.UYN
	R	YN	<0.01	66	RYN	66.RYN
LVL Power Control Register	L	YP	1	67	LYP	67.LYP
	V	YP	0.1	67	VYP	67.VYP
	U	YP	0.01	67	UYP	67.UYP
	R	YP	<0.01	67	RYP	67.RYP
LVL Motor Control Register	L	YM	1	68	LYM	68.LYM
	V	YM	0.1	68	VYM	68.VYM
	U	YM	0.01	68	UYM	68.UYM
	R	YM	<0.01	68	RYM	68.RYM
Start Speed Register	L	YA	1	69	LYA	69.LYA
	V	YA	0.1	69	VYA	69.VYA
	U	YA	0.01	69	UYA	69.UYA
	R	YA	<0.01	69	RYA	69.RYA
Ramp Parameter Register	L	YB	1	70	LYB	70.LYB
	V	YB	0.1	70	VYB	70.VYB
	U	YB	0.01	70	UYB	70.UYB
	R	YB	<0.01	70	RYB	70.RYB
Quad Step Count Register	L	YC	1	71	LYC	71.LYC
	V	YC	0.1	71	VYC	71.VYC
	U	YC	0.01	71	UYC	71.UYC
	R	YC	<0.01	71	RYC	71.RYC
Overtemperature Limit Register	L	YD	1	72	LYD	72.LYD
	V	YD	0.1	72	VYD	72.VYD
	U	YD	0.01	72	UYD	72.UYD
	R	YD	<0.01	72	RYD	72.RYD
Executive Register	L	YE	1	73	LYE	73.LYE
	V	YE	0.1	73	VYE	73.VYE
	U	YE	0.01	73	UYE	73.UYE
	R	YE	<0.01	73	RYE	73.RYE
Preset Quad Step Register	L	YF	1	74	LYF	74.LYF

		V	YF	0.1	74	VYF	74.VYF
		U	YF	0.01	74	UYF	74.UYF
		R	YF	<0.01	74	RYF	74.RYF
	HK available in Ebox						
2	SP-HK1-MPOS1	L	MA	1	02	LMA	02.LMA
		V	MA	0.1	02	VMA	02.VMA
		U	MA	0.01	02	UMA	02.UMA
3	SP-HK2-MPOS1	L	MA	1	03	LMA	03.LMA
		V	MA	0.1	03	VMA	03.VMA
		U	MA	0.01	03	UMA	03.UMA
4	SEIS-DC+13VV	L	EV	1	04	LEV	04.LEV
		V	EV	0.1	04	VEV	04.VEV
		U	EV	0.01	04	UEV	04.UEV
5	CAL1-HKT	L	YO	1	05	LYO	05.LYO
		V	YO	0.1	05	VYO	05.VYO
		U	YO	0.01	05	UYO	05.UYO
6	SP-HK1-MPOS2	L	MB	1	06	LMB	06.LMB
		V	MB	0.1	06	VMB	06.VMB
		U	MB	0.01	06	UMB	06.UMB
7	SP-HK2-MPOS2	L	MB	1	07	LMB	07.LMB
		V	MB	0.1	07	VMB	07.VMB
		U	MB	0.01	07	UMB	07.UMB
8	SEIS-DC+15VA	L	EA	1	08	LEA	08.LEA
		V	EA	0.1	08	VEA	08.VEA
		U	EA	0.01	08	UEA	08.UEA
9	VBB2-PXT	L	K1	1	09	LK1	09.LK1
		V	K1	0.1	09	VK1	09.VK1
		U	K1	0.01	09	UK1	09.UK1
10	SP-HK1-MPOS3	L	MC	1	10	LMC	10.LMC
		V	MC	0.1	10	VMC	10.VMC
		U	MC	0.01	10	UMC	10.UMC
11	SP-HK2-MPOS3	L	MC	1	11	LMC	11.LMC
		V	MC	0.1	11	VMC	11.VMC
		U	MC	0.01	11	UMC	11.UMC
12	SEIS-DC-13VV	L	EV	1	12	LEV	12.LEV
		V	EV	0.1	12	VEV	12.VEV

		U	EV	0.01	12	UEV	12.UEV
13	VBB3-PXT	L	K1	1	13	LK1	13.LK1
		V	K1	0.1	13	VK1	13.VK1
		U	K1	0.01	13	UK1	13.UK1
14	SP-HK1-TEMP-FB	L	KP	1	14	LKP	14.LKP
		V	KP	0.1	14	VKP	14.VKP
		U	KP	0.01	14	UKP	14.UKP
15	SP-HK2-TEMP-FBE	L	KP	1	15	LKP	15.LKP
		V	KP	0.1	15	VKP	15.VKP
		U	KP	0.01	15	UKP	15.UKP
16	SEIS-DC-15VA	L	EA	1	16	LEA	16.LEA
		V	EA	0.1	16	VEA	16.VEA
		U	EA	0.01	16	UEA	16.UEA
17	VBB3-HKT	L	K2	1	17	LK2	17.LK2
		V	K2	0.1	17	VK2	17.VK2
		U	K2	0.01	17	UK2	17.UK2
18	SEIS-DC+7VAV	L	EV	1	18	LEV	18.LEV
		V	EV	0.1	18	VEV	18.VEV
		U	EV	0.01	18	UEV	18.UEV
19	SP-HK1-SP1-TEMP	L	K1	1	19	LK1	19.LK1
		V	K1	0.1	19	VK1	19.VK1
		U	K1	0.01	19	UK1	19.UK1
20	SP-HK2-SP1-TEMPE	L	K2	1	20	LK2	20.LK2
		V	K2	0.1	20	VK2	20.VK2
		U	K2	0.01	20	UK2	20.UK2
21	SEIS-DC+7VAA	L	EA	1	21	LEA	21.LEA
		V	EA	0.1	21	VEA	21.VEA
		U	EA	0.01	21	UEA	21.UEA
22	VBB1-HKT	L	K2	1	22	LK2	22.LK2
		V	K2	0.1	22	VK2	22.VK2
		U	K2	0.01	22	UK2	22.UK2
23	SP-HK1-SP2-TEMP	L	K1	1	23	LK1	23.LK1
		V	K1	0.1	23	VK1	23.VK1
		U	K1	0.01	23	UK1	23.UK1
24	SP-HK2-SP2-TEMPE	L	K2	1	24	LK2	24.LK2
		V	K2	0.1	24	VK2	24.VK2

		U	K2	0.01	24	UK2	24.UK2
25	SEIS-DC-10VV	L	EV	1	25	LEV	25.LEV
		V	EV	0.1	25	VEV	25.VEV
		U	EV	0.01	25	UEV	25.UEV
26	VBB2-HKT	L	K2	1	26	LK2	26.LK2
		V	K2	0.1	26	VK2	26.VK2
		U	K2	0.01	26	UK2	26.UK2
27	SP-HK1-SP3-TEMP	L	K1	1	27	LK1	27.LK1
		V	K1	0.1	27	VK1	27.VK1
		U	K1	0.01	27	UK1	27.UK1
28	SP-HK2-SP3-TEMPE	L	K2	1	28	LK2	28.LK2
		V	K2	0.1	28	VK2	28.VK2
		U	K2	0.01	28	UK2	28.UK2
29	SEIS-DC-10VA	L	EA	1	29	LEA	29.LEA
		V	EA	0.1	29	VEA	29.VEA
		U	EA	0.01	29	UEA	29.UEA
30	VBB1-PXT	L	K1	1	30	LK1	30.LK1
		V	K1	0.1	30	VK1	30.VK1
		U	K1	0.01	30	UK1	30.UK1
31	SP-HK1+VREF	L	EV	1	31	LEV	31.LEV
		V	EV	0.1	31	VEV	31.VEV
		U	EV	0.01	31	UEV	31.UEV
32	SP-HK2-VREF	L	EV	1	32	LEV	32.LEV
		V	EV	0.1	32	VEV	32.VEV
		U	EV	0.01	32	UEV	32.UEV
33	ACQ-HKT	L	KA	1	33	LKA	33.LKA
		V	KA	0.1	33	VKA	33.VKA
		U	KA	0.01	33	UKA	33.UKA
34	SEIS-DC+1V2VA	L	EV	1	34	LEV	34.LEV
		V	EV	0.1	34	VEV	34.VEV
		U	EV	0.01	34	UEV	34.UEV
35	SEIS-AC+5VREF	L	EV	1	35	LEV	35.LEV
		V	EV	0.1	35	VEV	35.VEV
		U	EV	0.01	35	UEV	35.UEV
36	SEIS-DC+1V2VA	L	EA	1	36	LEA	36.LEA
		V	EA	0.1	36	VEA	36.VEA

		U	EA	0.01	36	UEA	36.UEA
37	DC-HKT	L	KD	1	37	LKD	37.LKD
		V	KD	0.1	37	VKD	37.VKD
		U	KD	0.01	37	UKD	37.UKD
38	SEIS-DC+3V3VA	L	EA	1	38	LEA	38.LEA
		V	EA	0.1	38	VEA	38.VEA
		U	EA	0.01	38	UEA	38.UEA
39	SEIS-AC-6VSV	L	EV	1	39	LEV	39.LEV
		V	EV	0.1	39	VEV	39.VEV
		U	EV	0.01	39	UEV	39.UEV
40	SEIS-DC+3V3V	L	EV	1	40	LEV	40.LEV
		V	EV	0.1	40	VEV	40.VEV
		U	EV	0.01	40	UEV	40.UEV
41	SEIS-AC+6VSV	L	EV	1	41	LEV	41.LEV
		V	EV	0.1	41	VEV	41.VEV
		U	EV	0.01	41	UEV	41.UEV
42	SEIS-DC-5VV	L	EV	1	42	LEV	42.LEV
		V	EV	0.1	42	VEV	42.VEV
		U	EV	0.01	42	UEV	42.UEV
43	CTL-HKT	L	KC	1	43	LKC	43.LKC
		V	KC	0.1	43	VKC	43.VKC
		U	KC	0.01	43	UKC	43.UKC
44	SEIS-DC+5VV	L	EV	1	44	LEV	44.LEV
		V	EV	0.1	44	VEV	44.VEV
		U	EV	0.01	44	UEV	44.UEV
45	SEIS-AC+6VSA	L	EA	1	45	LEA	45.LEA
		V	EA	0.1	45	VEA	45.VEA
		U	EA	0.01	45	UEA	45.UEA
46	SEIS-DC-5VA	L	EA	1	46	LEA	46.LEA
		V	EA	0.1	46	VEA	46.VEA
		U	EA	0.01	46	UEA	46.UEA
47	CAL2-HKT	L	YO	1	47	LYO	47.LYO
		V	YO	0.1	47	VYO	47.VYO
		U	YO	0.01	47	UYO	47.UYO
48	SEIS-DC+5VA	L	EA	1	48	LEA	48.LEA
		V	EA	0.1	48	VEA	48.VEA

	U	EA	0.01	48	UEA	48.UEA

Total: 1

InSight SEIS Seismometer
SEED Channel Configuration for SEIS Data - Network XB

Owner	C. Pardo - Mars SEIS Data Service
Issue:	2
Revision:	8
Last Modification:	September 10, 2015

Metadata	Blockette Name	Blockette ID
Volume Index Control Header		
	Volume identifier Blockette	10
	Volume Station Header Index Blockette	11
	Volume Time Span Index Blockette	12
Abbreviation Dictionary Headers		
	Data Format Dictionary Blockette	30
	Comment Description Blockette	31
	Generic Abbreviation Blockette	33
	Units Abbreviations Blockette	34
Raw channels Dictionary (Acquisition System Dictionary)		
SEIS-AC	FIR Dictionary Blockette	41
APSS	FIR Dictionary Blockette	41
APSS	Decimation Dictionary Blockette	47
TWINS	None	
FSW channels Dictionary		
FSW FIR Dictionary	FIR Dictionary Blockette	41

Metadata	Blockette Name	Blockette ID
TWINS	Decimation Dictionary Blockette	47
FSW channel Disctionnary: FIR Dictionary		
	FIR Dictionary Blockette	41
	Response (Coefficients) Dictionary Blockette	44
	Decimation Dictionary Blockette	47
	Channel Sensitivity/Gain Dictionary Blockette	48
Note: The mean of N samples shall be listed here as a FIR		
Composite channels other operation Dictionary		
VBBZ, SPZ	Beam Configuration Blockette	35
SEISVELZ	Beam Configuration Blockette	35
ESTASP, ESTAVBB, ESTAP, ESTAM	Beam configuration Blockette	35
ESTASP, ESTAVBB, ESTAP, ESTAM	Response (Polynomial) Dictionary Blockette	42
Station Control Headers		
	Station Identifier Blockette	50
	Station comment Blockette	51
	Channel identifier Blockette	52

Metadata	Blockette Name	Blockette ID
Channel Instrument response information		
For all Temperature channels	Response Polynomial Blockette	62
For all seismic channels of VBB (POSVBB, VBB)	Response (Poles and Zeros) Blockette + Channel Sensitivity /Gain Blockette	53+58
For all seismic channels of SP (POSSP, VELSP)	Response (Poles and Zeros) Blockette + Decimation Blockette + Channel Sensitivity /Gain Blockette	53+57+58
For all APSS channels related to MAG	Response (Poles and Zeros) Blockette + Decimation Blockette + Channel Sensitivity /Gain Blockette	53+57+58
For all APSS channels related to the pressure sensor	Response (Poles and Zeros) Blockette + Decimation Blockette + Channel Sensitivity /Gain Blockette	53+57+58
FOR TWINS	Only the Channel sensitivity ?	57+58
Note and question: Poles and Zeros are recommanded. However, the response can be provided also with blockette 55 if only a response function with frequency variable can be provided. Blockette 55 provide also a plot of the transfer function. Shall whe put it?		
Flight sofware processing history		
For all channels decimated by the flight software or resulting from flight software decimated data	Response Reference Blockette	60
Data Records blockettes		
For all data	Fixed Data header	

Metadata	Blockette Name	Blockette ID
	Sample Rate Blockette	100
	Timing Blockette	500
	Data Only SEED Blockette	1000

InSight SEIS Seismometer
SEED Channel Configuration for S

Owner
Issue:
Revision:
Last Modification:

Metadata	Comments
Volume Index Control Header	
	To store a reference providing the SEIS config file
Abbreviation Dictionary Headers	
	Provide the general description of the Instrument and experiment Provide the Units of all fields after transfert function Proposal: use a dictionnary for these filters, as they are not expected to be
Raw channels Dictionary (Acquisition System Dictionary)	changed and as many of these filters will be used for different channels
SEIS-AC	FIR acquisition filter from SEIS AC (100 sps, 20 sps, 1 sps and 1/10 sps)
APSS	FIR acquisition filter from APSS (20 sps) Decimation performed by the FPGA, if any
APSS	
TWINS	IS Twins making a raw acquisition without any FIR or filtering?
FSW channels Dictionary	
FSW FIR Dictionary	FIR decimation filters applied to any channel by the FSW

Metadata	Comments
	Decimation performed by the FSW, if any
TWINS	
FSW channel Disctionnary: FIR Dictionary	
	List all FIRs of the FSW dictionary List the coefficient of all FIRS of the FSW Dictionary
	List the decimation of all FIRS of the FSW Dictionary
	List the gain of all FIRs of the FSW Dictionary
Note: The mean of N samples shall be listed here as a FIR	
Composite channels other operation Dictionary	
VBBZ, SPZ	Beam formation (i.e. addition with coefficient) from 3 channels
SEISVELZ	Beam formation (i.e. addition with coefficient) from 6 channels
ESTASP, ESTAVBB, ESTAP, ESTAM	Beam formation from 2 channels (mean of square MINUS squared mean)
ESTASP, ESTAVBB, ESTAP, ESTAM	
Station Control Headers	
	Location of the sensors from Mission info Include any data outage and times corrections history on weekly basis
	(when providing validated data). To be defined. Which is the best approach? Mix stations and FSW informations and Instrument informations (Azimuth and dip of the sensor)

Metadata	Comments
Channel Instrument response information	
For all Temperature channels	Polynomial interpolation of the temperature sensor
For all seismic channels of VBB (POSVBB, VBB)	Transfert function of the VBB axis, for all differents configurations. 53 for transfert function and 58 for gain change, assuming the later without impact on the transfer function
For all seismic channels of SP (POSSP, VELSP)	Transfert function of the SP axis, for all differents configurations
For all APSS channels related to MAG	Transfert function of the MAG axis, for all differents configurations
For all APSS channels related to the pressure sensor	Transfert function of the pressure sensor, for all differents configurations
FOR TWINS	A priori no transfert function, as data transmitted to CNES in physical unit.
Note and question: Poles and Zeros are response can be provided also with bloc function with frequency variable can be also a plot of the transfer function. Shall	
Flight sofware processing history	
For all channels decimated by the flight software or resulting from flight software decimated data	List all stages of the processing from instrument to output of a given channel
Data Records blockettes	
For all data	To be populated by SISMOC related or operation related informations on the following events:

Metadata	Comments
	Calibration in action Event data request Not used. Saturation detection history will be put in QuakeML Not used. Spike detection history will be put in QuakeML Not used. Glitches detection history will be put in QuakeML Not used. Block is stop and restart when a data is missing. Not used. Transmission error are assumed to be small. Generaly not used, as only event data can have this status of digital filter charging Set to 1 as timing is not perfect. To store the timing information Mandatory blockette

InSight SEIS Seismometer
SEED Channel Configuration for S

Owner
Issue:
Revision:
Last Modification:

Metadata	Provider
Volume Index Control Header	
	SISMOC
	SISMOC
	SISMOC
Abbreviation Dictionary Headers	
	SISMOC
	SISMOC ALL INST INST-IPGP
Raw channels Dictionary (Acquisition System Dictionary)	
SEIS-AC	SISMOC from FSW
APSS	INST-APSS
APSS	INST-APSS
TWINS	INST-TWINS
FSW channels Dictionary	
FSW FIR Dictionary	SISMOC from FSW

Metadata	Provider
TWINS	SISMOC from FSW
FSW channel Disctionnary: FIR Dictionary	
	SISMOC from FSW
	SISMOC from FSW
	SISMOC from FSW
	SISMOC from FSW
Note: The mean of N samples shall be listed here as a FIR	
Composite channels other operation Dictionary	
VBBZ, SPZ	SISMOC from FSW
SEISVELZ	SISMOC from FSW
ESTASP, ESTAVBB, ESTAP, ESTAM	SISMOC from FSW
ESTASP, ESTAVBB, ESTAP, ESTAM	SISMOC from FSW
Station Control Headers	
	SISMOC FROM JPL
	SISMOC
	SISMOC + INST

Metadata	Provider
Channel Instrument response information	
For all Temperature channels	INST-CNES
For all seismic channels of VBB (POSVBB, VBB)	INST-IPGP
For all seismic channels of SP (POSSP, VELSP)	INST-IC
For all APSS channels related to MAG	INST-UCLA
For all APSS channels related to the pressure sensor	INST-JPL
FOR TWINS Note and question: Poles and Zeros are response can be provided also with bloc function with frequency variable can be also a plot of the transfer function. Shall	SISMOC
Flight sofware processing history	
For all channels decimated by the flight software or resulting from flight software decimated data	SISMOC from FSW
Data Records blockettes	
For all data	SISMOC

Metadata	Provider
	SISMOC from FSW
	SISMOC
	SISMOC from auto-SISMOC
	SISMOC from auto-SISMOC
	SISMOC from auto-SISMOC
	SISMOC
	SISMOC
	SISMOC from FSW
	SISMOC from JPL
	SISMOC
	SISMOC
	SISMOC

InSight SEIS Seismometer
SEED Channel Configuration for SEIS Data - Network XB

Owner	C. Pardo - Mars SEIS Data Service
Issue:	2
Revision:	8
Last Modification:	September 10, 2015

Channel Id	Algorithm Type	Input Channel 1	Input Channel 2	Input Channel 3
202	NO_PROCESSING	2	0	0
203	FIR	3	0	0
204	ROOT_MEAN_SQUARE	4	0	0
221	LINEAR_CONBINATION	21	22	23
208	MAXIMUM	8	0	0
281	VECTOR_NORM	81	82	83
212	STANDARD_DEVIATION	12	0	0
213	AVERAGE	13	0	0
214	DELAY	14	0	0

Algorithm Type	Input Channel 1	Input Channel 2	Input Channel 3

NO_PROCESSING

FIR

ROOT_MEAN_SQUARE

Only the square of RMS can be coded in SEED. Archive the square of ESTA values

LINEAR_CONBINATION

MAXIMUM
Cannot be coded in SEED

VECTOR_NORM
Should create intermediate channels with B062, then use linear combination

STANDARD_DEVIATION
Only variance can be coded in SEED, with one channel for the average of squared values (see RMS), and on c
NOT DONE YET

AVERAGE

DELAY

Fir Filter	Linear Combination Coeff	Linear Combination Coeff	Linear Combination Coeff	Averaging Window Size
	0	0	0	0
d:/seis/Antialias_1_2.bin	0	0	0	0
	0	0	0	1
	0.3	0.4	0.3	0
	0	0	0	1
	0.3333	0.3333	0.3333	0
	0	0	0	1
	0	0	0	1
	0	0	0	0

Fir Filter	Linear Combination Coeff 1	Linear Combination Coeff 2	Linear Combination Coeff 3	Averaging Window Size

:hannel with average to the square, and then linear combination to substract and FIR to average

Downsampling / Decimat	Enable Downlink	Delay	Frequency	complete FIR Delay
0	VRAI		1	0
2	VRAI		0.5	202
1	FAUX		1	0
0			0	0
1			1	0
0			20	0
1			1	0
1			1	0
0		10	1	0

Downsampling / Decimation	Enable Downlink	Delay	**Blockette #1**	**parameters**
			B057	Sample rate (in Hz) in B0
				Downsampling ratio (colu
				B057F06=0
				B057F07=0
				B057F08=0
			B061	FIR coefs (column F) in B
			B062	B062F03= 'P'
				B062F07= 'M'
				B062F14= 3

	B062F15-00 = 0.0 ; B062 B062F16-00 = 0.0 ; B062
B035	B035F03=column A B035F04=3 (number of c B035F05-00 to B035F05- B035F06-00 to B035F06- B035F07-00 to B035F07- B035F07-00= colmun G,
B062 **For each Channel**	B062F03= 'P' B062F07= 'M' B062F14= 3 B062F15-00 = 0.0 ; B062 B062F16-00 = 0.0 ; B062
B061	Averaging FIR over N san B061F05='A' B061F08='N' B061F09-00 to B061F09-
B057	Input sample rate (in Hz) B057F05=1 B057F06=0 B057F07= column M * dt B057F08=0

Group Delay	MiniSEED channel
0	VBB_1_Pos_1_Hz_Raw_High_Gain_Science_Mode
51	VBB_1_Temp_PT1_Hz_Raw
0	
0	
0	
0	
0	
0	
0	

Blockette #2	parameters	Blockette #3	parameters	Blockette #4
57F04 mn K) in B057F05				
B057	Sample rate (in Hz) in B0 Downsampling ratio (column K) in B057F05 B057F06=0 B057F07=0 B057F08=0	B058	Gain of FIR in B058F04 B058F05 = 0.0	
B061	Averaging FIR over N san B061F05='A' B061F08='N'	B057	Sample rate (in Hz) in B057F04 Downsampling ratio B057F05 = column K / dt (in s B057F06=0	

2F15-01 = 0.0 ; B062F15-
2F16-01 = 0.0 ; B062F16-

B061F09-00 to B061F09-(N-1) = 1/N
02 = 0.0 ;

B057F07=0
B057F08=0

B400
hannels ofr combination)
02 = 'Station code'
02 = 'location code'
02 = Channel ID' of columns C, D, E
B035F07-01= colmun H, B035F07-02= colmun I

B400F03=0.0
B400F04=0.0
B400F05=column A

B035
For linear combination

2F15-01 = 0.0 ; B062F15-
2F16-01 = 0.0 ; B062F16-

B035F03=column A
B035F04=3 (number of channels ofr combination)
B035F05-00 to B035F05-02 = 'Station code'
B035F06-00 to B035F06-02 = 'location code'
B035F07-00 to B035F07-02 = Channel ID' of columns C, D, E
B035F07-00= colmun G, B035F07-01= colmun H, B035F07-02= colmun I

B400
B400F03=0.0
B400F04=0.0
B400F05=column A

B057
(N-1) = 1/N
in B057F04
(in s)

Input sample rate (in Hz) in B057F04
Downsampling ratio B057F05 = column K / dt (in s)
B057F06=0
B057F07=0
B057F08=0

parameters

)

InSight Mission
InSight Synthetic data - Network 7J

Owner	C. Pardo - Mars SEIS Data Service
Issue:	2
Revision:	8
Last Modification:	September 13, 2016

7J.SYNT1 summary info

Name	
Year of simulation	2019
Network code	7J
Station code	SYNT1
Instrument code	X
Channel codes	BXN (north), BXE (east), BXZ (vertical)
Samples per second	20
Location codes	00: Thin crust, no noise 01: Thin crust, with noise 10: Thick crust, no noise 11: Thick crust, with noise

Model name*	**Model description**	**Location code**
C30VH-AKSNL-1s	Thin crust (30 km), no noise	00
C30VH-AKSNL-1s	Thin crust (30 km), with noise	01
C80VH-AKSNL-1s	Thick crust (80 km), no noise	10
C80VH-AKSNL-1s	Thick crust (80 km), with noise	11

* For the models used, refer to http://synthetics.mars.ethz.ch/ and http://instaseis.ethz.ch/marssynthetics/