


**esa**

**FAX**
**Herschel / Planck Project**

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from	S. Thürey (SCI-PT)		extension	5330	
to	O. Bauer, H. Feuchtgruber, MPE, Garching, GER K. King, RAL, UK K. Wafelbakker, L. Dubbeldam, SRON, Utrecht, NL C. Butler, M. Miccolis, Laben, Milano, I J. Charra, J-L Beney, P. Stassi, IAS, Orsay, F		n°fax		
copy	P. Couzin, B. Hibbert, B. Collaudin ASPI, Cannes , F F. Rame, ALS, Torino, I P. Estaria, G. Crone, A. Elfving, ESTEC, J. Dodsworth, ESOC		n°fax		

subject	<b>Instrument PS-ICD Usage, closure of AI 3</b>
reference	1) H-P-ASPI-MN-1328, Data Management WG 11, 9-4-2002 2) TN of L. Dubbeldam, SRON, 18-3-2002-05-27 3) PACS-CR-TN-015 4) SPIRE-RAL-NOT-001190

Dear colleagues,

After analysis and consolidation together with ASPI we would like to provide comments to documents Ref. 2 to 4, in order to close AI 3 of MoM Ref. 1..

In the ESA-Comments column of the table below several requirements are referred to, which can be found in the PS-ICD (issue 2.0).

### 1. Use of APIDs:

The allocation of APIDs, as in Ref. 2) to 4), is acceptable, except:

- HIFI: Parameter scans and memory management should not be merged with periodic HK, therefore APID1 shall be used instead of APID2.

## 2. Packet Transfer Protocol:

As the three instruments have an identical implementation of the SDB-Protocol the comments below apply for all of them:

General comments:

- 2.1. Although all basic/essential features for executing the SDB-Protocol in a RT are addressed, several open points remain, for example, to which extent instruments are compliant to the List of Mode Commands (Table 3.2.41).
- 2.2. It is required, that... ' For test and verification, the reference values, test methods and procedures, which are defined in Section 100 of AD 2, are directly applicable. For test cases, which are not covered by AD 2, or which are mission-specific, special test procedures have to be defined.' It is still not clear what the approach for I/F testing and validation will be.

2.3. Specific comments:

Description	Sub-address(es)	Instrument-Comments	ESA- Comments
Mode Command	SA 0R	Used to identify the RT addressed in this subframe. The instrument responds only to its own address.	A RT may use the RT address to decode, that an access to the buffers SA 11T to 26T will take place in this Subframe (Normal or Burst). However no conclusion can be drawn about the completion or success of a TM transfer. Also, no specific RT address will be sent for a TC transfer, or transfer of Time, etc.. TCs need to be processed, even if no TM transfer takes place in a certain Frame/second. Note that polling of a certain RT is not associated with a Subframe Sync with RT Address.
	SA 0T, 31T, 31R	Not Used	( SA 0T corresponds to Broadcast Synchronise)
Unit Control	SA 1R, 1T	Not Used	According to 3150-DLL and 4350-TFL to 4395-TFL the buffer SA 1T shall provide a user-specific status. The RT has to respond to the corresponding Mode Command with the data words defined in 4360-TFL, further details can be defined by each RT individually. Leaving SA 1R unused, however, may be acceptable, at least a SW-reset or equiv. is strongly recommended.
Data Send	SA 2T, 3T, 4T, 7T, 9T, 29T	Not Used	OK
Data Receive	SA 2R, 7R, 9R, 15R-26R, 29R	Not Used	OK
Asynchronous Short Commands	SA 3R, 4R	Not used	OK, as agreed

<b>Event Messages</b>	SA 5R, 5T, 6R, 6T	Not Used	OK, as agreed
<b>Time Messages</b>	SA 8T	Not used	Recommendation: copy Time Message to SA 8T after reading, in order to complete handshake, if SA 8R is used, see below. This would be in line with the handshake approach used throughout the protocol.
	SA 8R	Used to transfer spacecraft time from CDMU to instrument (in subframe 33) rather than use packet service (9,5)	OK, as agreed.
<b>Packet Transfer</b> TM Transfer Request	SA 10T	Used by instrument to indicate to CDMU that a TM packet is ready to transfer	OK
TM Transfer Confirmation	SA 10R	Not Used – ignored by the instrument	Only an update of SA 10R indicates that a TM transfer was successful. If this was not the case, the RT shall do nothing, until a next Subframe Sync is received, see also Fig. 4.6.1.3-1. Not using SA 10R is a violation of the specification. It should also be pointed out that waiting for a Subframe with the address of the RT only is not in line with requirements (Fig. 4.6.1.3-1 is part of the requirements), however it may work well enough.
TC Transfer Confirmation	SA 27T	Instrument sends a copy of TC Transfer Descriptor to indicate reception of TC	OK
TC Transfer Descriptor	SA 27R	Used by the instrument to prepare for TC transfer	OK
<b>TM Data Send</b>	SA 11T-26T	Used to transfer TM packets from instrument to CDMU	OK
<b>TC Data Receive</b>	SA 11R-14R	Used to transfer TC packets from CDMU to instrument	OK
<b>Low-level Commands</b>	SA 28T, 28R	Not Used	OK
<b>Data Wrap</b>	SA 30T, 30R	Not Used, TBC Note: This is mandatory according to the PS-ICD	The use is mandatory according to MIL Std. 1553, Notice 2, para. 30.7, page 37 (page IV-13 of DDC-handbook). The size of the buffers shall be 64 octets, and a writing into SA 30R should cause any RT to copy these data into SA 30T for a read-back. This is a standard test specified for the 1553-bus.

### 3. Telecommand and Telemetry Packet Services:

General comments:

- Any Telecommand that is not used, or specified not to be applicable for instruments, shall result in an 'Telecommand Acceptance Report – Failure'.

Specific comments:

Description	Service Type	Instrument-Comments	ESA-Comments
Telecommand Verification Service	1		OK.
Device Command Distribution	2	Not Used	OK, CDMU and ACC only
Housekeeping and Diagnostic Data Reporting	3		As a minimum capability at least the capability to report HK/Diagnostic Packet definitions shall be provided. For HIFI and PACS no TM-Packets seem to be foreseen in support of reporting HK-data on request or during test/calibration (only). They should be classified as Diagnostic Packets.
Event Reporting	5		( Only TM)
Memory Management	6		OK for HIFI, PACS, SPIRE
Function Management	8		OK for SPIRE. It seems that HIFI is using TC (8,4) (Perform Activity..), however does not use TC(8,5) (Request for Status Report). This is considered incompatible with requirements. PACS, additionally, does not execute any Start- or Stop-TC. This needs to be explained and justified before it can be accepted.(what is the functional breakdown into Functions and OBCPs?)
Time Management	9		Utilisation of TC(9,7) only, and not executing TC(9,4) and (9,5) is confirmed to be acceptable.
On-Board Scheduling	11	Not Used	(OK, CDMS service)
On-Board Monitoring	12		HIFI and SPIRE seem to have implemented all TCs of this service, which is OK for instrument-internal monitoring. PACS does not seem to use this service, and explanation is needed how PACS intends to implement monitoring of the instrument instead.
Packet Transmission Control	14		OK for HIFI, PACS, SPIRE
On-Board Storage and Retrieval	15	Not Used	(OK, CDMS service)
On-Board Traffic Management	16	Not Used	(OK, CDMS service)
Test Service	17		OK for HIFI, PACS, SPIRE
On-Board Control procedures	18		Not used by HIFI and SPIRE, which may be considered acceptable. PACS, however seems to make extensive use of OBCPs. As no details of the intended SW-implementation are known, it is not possible to assess if this is in line with requirements.

			It is especially doubtful whether the PACS-OBCPs are compliant with the related requirements of the OIRD.
<b>Action/Event Service</b>	19	Not Used	(OK, CDMS only)
<b>Information Distribution Service</b>			Not used by HIFI, PACS. Therefore it will, for example, not be possible to indicate the start of a Raster Scan, or equiv., to these instruments. SPIRE states to use all TCs of this service, however only TC(20,4) should be decoded (if needed for the reception of information).
<b>Science Data</b>	21		OK, no TCs
<b>Context Saving Service</b>	22	TBD	AS there are seemingly no requirements to store instrument status and context in a central memory, it is acceptable not to use this service.

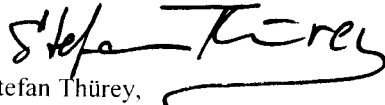
#### 4. Summary:

Herschel instruments seem to have taken an approach to the SDB-Protocol that works at first glance, however is not compliant with the specification. Further analysis and tests are considered necessary. Formally, a RfW should be issued.

W.r.t. TM/TC-packet services most of the design choices are acceptable, however, in view of the lack of insight into instrument SW-requirements and –design, and instrument operations, ESA and ASPI cannot express their approval to the instrument TM/TC approach, as currently defined.

Please feel free to contact me for further open points. In addition to the comments above, ASPI is preparing additional clarifications on some specific subjects.

Best regards,

  
Stefan Thürey,  
Herschel/Planck Project

