

Ray Arvidson

To: PETER FORD / DIKE SIMPSON /
RAY ARVIDSON / PAUL FISHER

FROM: TOMMY THOMPSON

RELEASE VERSIONS OF

RES-101 PROCESSING BANDWIDTHS SIS

RES-104 MAPPING QUATERNIONS SIS

FOR YOUR FILES / RECORDS

November 29, 1989

INTEROFFICE MEMORANDUM

TO: DISTRIBUTION
FROM: S. Collins - CMSS *Stallie*
SUBJ: Original Document Release - SIS RES-101

Attached is the signed original release of subject document.
Please contact me at 30965 if you have any questions.

RES-101 DISTRIBUTION LIST

R. Borgen
R. Carr
S. Collins
J. Gilbert
J. Gunn
D. Halverstadt
J. Holladay
M. Jin
A. Johnson
L. Kolinsky (HAC)
M. McCullar
M. Maher (HAC)
J. Rector
T. Thompson
E. Wilson
K. C. Wong (HAC)

PROJECT MAGELLAN
SOFTWARE INTERFACE SPECIFICATION
Cover Sheet

NUMBER: MGN-RES-101
REVISION: Original
DATE: 09/15/89

SIS NAME: Processing Bandwidth (PBW) File

DOMAIN:

<u>System</u>	<u>Subsystem</u>	<u>Program</u>	<u>Make/Use</u>
MOS	RES	RMSS	MAKE
MOS	TPS	CDB/MHR	USE
MOS	SDPS	CONTROL	USE (ON EDR)
MOS	Science	N/A	USE (ON EDR)

Computer System: MicroVAX 3300/VAXSTATION 3100

PURPOSE OF INTERFACE (SUMMARY):

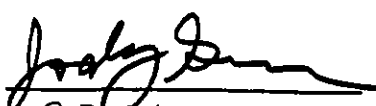

This specification describes an exchange between the Magellan Radar Engineering Subsystem (RES) which passes the radar Processing Bandwidth (PBW) file to the Telemetry Processing Subsystem (TPS). The TPS will include the RES generated PBW file in the Science Experiment Data Record (EDR) tape. The PBW file will be used by the SAR Data Processing Subsystem (SDPS) to process the radar sensor data. The format of the file which contains these data is described in this specification. It is supplied by the Radar Sensor Engineering Team (RSET).

INTERFACE MEDIUM:

Disk File: []
Magnetic Tape [] Tracks: Density: Data Code:
Other: [X] SFOC Local Area Network (TPS)

SIS COORDINATOR: K. C. Wong

SIGNATURES:

<u>Approvals</u>	<u>Name</u>	<u>Date</u>
^{Office manager} GDS Engineer	J. Gunn	 11/29/89
S/W System Engineer	R. Halverstadt	 10-19-89

<u>Subsystem/ Program</u>	<u>Position</u>	<u>Name</u>	<u>Date</u>
RES	Sys E	K. Wong	<u>K. Wong</u> 9/15/89
RES	Cog E	K. Wong	<u>K. Wong</u> 9/15/89
RMSS	Cog P.	M. Maher	<u>M.J. Maher</u> 15 Sept 1989
TPS	Sys E	E. Wilson	<u>E. Wilson</u> 10-3-89
SDPS	Sys E	M. Jin	<u>M. Jin</u> 9/22/89
SDPS	Cog E/P	J. Gilbert	<u>J. Gilbert</u> 9/28/89
MHR	Cog E/P	A. Johnson	<u>A. Johnson</u> 19 Sept 89
SFOC	Sys E	J. Holladay	<u>J. A. Holladay</u> 9/22/89
Science Manager		T. Thompson	<u>T. W. Thompson</u> 9/29/89
CDB	Sys E	R. Borgen	<u>R. Borgen</u> 19 Sept '89
	Cog E TGS	C. Carr	<u>C. Carr</u> 20 Oct 89
	Cog E	J. Rector	<u>C. Carr for J. Rector</u> 20 Oct 89

RES-101 DISTRIBUTION LIST

R. Borgen
R. Carr
S. Collins
J. Gilbert
J. Gunn
D. Halverstadt
J. Holladay
M. Jin
A. Johnson
L. Kolinsky (HAC)
M. McCullar
M. Maher (HAC)
J. Rector
T. Thompson
E. Wilson
K. C. Wong (HAC)

Document Change Log

Change Letter

Date

Affected Portions

Original

09/15/89

All

List of TBD Items

Page(PAR.)

Resolution

Item

None

TABLE OF CONTENTS

1	GENERAL DESCRIPTION	
1.1	CONTENT OVERVIEW	1-1
1.2	SCOPE	1-1
1.3	APPLICABLE DOCUMENTS	1-1
1.4	SUBSYSTEM SITING	1-1
1.4.1	Interface Location, Medium	1-1
1.4.2	Data Source, Destination, and Transfer Method	1-1
1.4.3	Generation Method and Frequency	1-1
1.4.4	Pertinent Relationships With Other Interfaces	1-2
1.4.5	Labeling and Identification (Internal/External)	1-2
1.5	ASSUMPTIONS AND CONSTRAINTS	1-2
2	INTERFACE CHARACTERISTICS	
2.1	HARDWARE CHARACTERISTICS AND LIMITATIONS	2-1
2.1.1	Special Equipment and Device Interfaces	2-1
2.1.2	Special Setup Requirements	2-1
2.2	VOLUME AND SIZE	2-1
2.3	INTERFACE MEDIUM CHARACTERISTICS	2-1
2.4	FAILURE PROTECTION, DETECTION, AND RECOVERY PROCEDURES	2-1
2.4.1	File Backup Requirements	2-1
2.4.2	Security/Integrity Measures	2-1
3	ACCESS	
3.1	PROGRAMS USING THE INTERFACE	3-1
3.2	SYNCHRONIZATION CONSIDERATIONS	3-1
3.2.1	Timing and Sequencing Characteristics	3-1
3.2.2	Effective Duration	3-1
3.2.3	Priority Interrupts	3-1
3.3	INPUT/OUTPUT PROTOCOLS, CALLING SEQUENCES	3-1
4	DETAILED INTERFACE SPECIFICATIONS	
4.1	STRUCTURE AND ORGANIZATION OVERVIEW	4-1
4.2	STRUCTURE DEFINITION AND FORMAT	4-1
4.2.1	Headers	4-1
4.2.2	PBW File Data Section	4-5
	APPENDIX A Sample PBW File	

SECTION 1
GENERAL DESCRIPTION

1.1 CONTENT OVERVIEW

The Processing Bandwidth file contains the SAR Processing Bandwidth (PBW) information, Pulse Repetition Frequency (PRF), and corresponding time since periapsis.

1.2 SCOPE

The specifications in this document apply to the processing bandwidth data generated by the RMSS for use by the SDPS in processing the radar sensor data.

1.3 APPLICABLE DOCUMENTS

PD630-300, 4-130	MGN MOS Requirements, Radar System Engineering Team September 1989 (Draft Revision)
PD630-300, 4-230	MGN MOS GDS Radar Engineering Subsystem September 1989 (Draft Revision)
DS32466-402	MGN Software Requirements Document, Radar Mapping Sequencing Software, October 1988 (Draft Rev)
HS513-034E	MGN Radar System Software Management Plan, April 1989
JJPL0006-01-00	JPL Standard Formatted Data Unit (SFDU) Usage and Description, Issue 5, March 7 1988
SFOC-5-SYS-*DU-NJPL	SFOC-SIS NJPL SFDU Global Definitions, 03-16-89

1.4 SUBSYSTEM SITING

1.4.1 Interface Location, Medium

This interface shall be implemented as a disk file element. It will be created on a VAX computer and transferred to the SFOC Central Data Base (CDB). The element will be an ASCII file in Standard Formatted Data Unit (SFDU) format.

1.4.2 Data Source, Destination, and Transfer Method

The PBW file will be generated by the Radar Sensor Engineering Team (RSET) for each upload. It will be created on the VAX and transferred to the SFOC CDB via the SFOC Local Area Network using the SFOC supplied File Transfer Program (FTP).

1.4.3 Generation Method and Frequency

The PBW file shall be generated by the RSET using the Radar Engineering Subsystem's Radar Mapping Sequencing Software (RMSS). It will be generated once for each spacecraft upload.

1.4.4 Pertinent Relationships with Other Interfaces

The PBW file will be used by the SDPS to process the SAR data from the Science-EDR tapes. The PBW file will be in a format suitable for SDPS use and described in SIS-TPS-101. The RMSS generates the RCPF and corresponding PBW file using the Average Orbital Elements file (SIS-NAVS-136) obtained from the Navigation Subsystem.

1.4.5 Labeling and Identification

The file name shall be assigned for external purposes to be consistent with the header records as defined in Section 4.2.1.

1.5 ASSUMPTIONS AND CONSTRAINTS

The PBW file will include the pulse repetition frequency (PRF), the corresponding processing bandwidth, and the corresponding time since periapsis. The PBW will change only when the corresponding PRF changes.

SECTION 2

INTERFACE CHARACTERISTICS

2.1 HARDWARE CHARACTERISTICS AND LIMITATIONS

2.1.1 Special Equipment and Device Interfaces

None.

2.1.2 Special Setup Requirements

None

2.2 VOLUME AND SIZE

The size of the PBW file containing SFDU headers, and a maximum of 950 processing bandwidths, the corresponding pulse repetition frequency, and time since periapsis will be at most 28K bytes in size.

2.3 INTERFACE MEDIUM CHARACTERISTICS

The file shall be written by the VAX as a disk image with one logical record per physical record. It will be transferred from the VAX to the SFOC CDB using the File Transfer Protocol (FTP).

The normal method of file transfer between the VAX and CDB shall be through the SFOC LAN. If the SFOC LAN cannot be used for transfer, an ANSI standard 1600 bpi tape containing the PBW file and SFDU headers shall be generated and transferred to the CDB.

2.4 FAILURE PROTECTION, DETECTION, AND RECOVERY FEATURES

2.4.1 File Backup Requirements

Since the PBW file will be part of the Science-EDR tape, the PBW file will automatically be backed-up and archived as part of the back-up and archiving process the Data Management and Archive Team (DMAT) performs on the Science-EDR tapes.

2.4.2 Security/Integrity Measures

These files have no inherent security because they are assumed to be produced by an RSET computer system which maintains its own data integrity checks.

2.5 END-OF-FILE (OR MEDIUM) CONVENTIONS

End-of-file conventions shall be in accordance with the ANSI standard.

SECTION 3

ACCESS

3.1 PROGRAMS USING THE INTERFACE

The TPS Science-EDR Generation program will incorporate the PBW file into the Science-EDR tape. The SDPS will subsequently use the PBW file in the processing of the SAR data from the Science-EDR tape.

3.2 SYNCHRONIZATION CONSIDERATIONS

3.2.1 Timing and Sequencing Characteristics

In the PBW file, the processing bandwidth and pulse repetition frequency are computed by the RMSS using an averaged set of orbital elements file obtained from the Navigation Subsystem (SIS NAVS-136). The RSET computes a generic mapping start time based on the current average orbital elements. This start of mapping time is provided to the Spacecraft Team (SCT) which passes it the Sequence Generation. All RMSS computations are based on this mapping start time. The Sequence Generation Subsystem takes the Radar Control Parameters generated by the RMSS and using the Navigation predictions for time of periapsis for the upcoming upload adjusts the timing of the radar control parameters accordingly.

3.2.2 Effective Duration

There shall be an upload number in the SFDU header section as described in Section 4.2 which defines the span of orbits the PBW file covers.

3.2.3 Priority Interrupts

Not applicable.

3.3 INPUT/OUTPUT PROTOCOLS, CALLING SEQUENCES

The file transfer between VAX and the TPS computer will be done via TCP/IP using FTP. The PBW file will be pulled to the Central Data Base (CDB) over the SFOC LAN by the OPCT.

SECTION 4

DETAILED INTERFACE SPECIFICATIONS

4.1 STRUCTURE AND ORGANIZATION OVERVIEW

The PBW file shall be an ASCII file with SFDU headers. The SFDU headers will consist of identifiers and keywords which are required by the CDB to identify and catalogue the PBW data file. The structure of the file is shown in Figure 4-1 and in Table 4-1. The details are described in subsequent sections. A sample PBW file appears in Appendix A.

4.2 STRUCTURE DEFINITION AND FORMAT

4.2.1 Headers

The file header for the PBW file shall be a SFDU header as specified in JPL document JJPL0006-00-02. The structure and format of the SFDU headers for the Processing Bandwidth file are detailed in Figure 4-1.

T	CCSD1Z000001		
L	LENGTH L1		
T	NJPL1KOOKLOO		
L	LENGTH L2		
V	UPLOAD_ID=XXXXXX		
A	PROCESS_TIME=YYYY-MM-DDTHH:MM:SS.FFF		
L	DATA_OBJECT_TYPE=PROCESSED_BANDWIDTH	L2	L1
U	MISSION_ID=4		
E	SPACECRAFT_NAME=MAGELLAN		
	DATA_SET_NAME=PBXXXXXX.OUT		
	MISSION_NAME=MAGELLAN		
	SPACECRAFT_ID=18		
T	CCSD1R000003		
L	LENGTH L3		
V	DELIMITER=SMARKER		
A	PRODUCT_NAME=PBXXXXXX.OUT		
L	TYPE=NJPL1I000124	L3	
E	PROTOCOL=NONE		
PROCESSING BANDWIDTH D A T A (See Section 4.2.2)			
T	CCSD1R000003		
L	LENGTH L4		
V	DELIMITER=EMARKER		
L	PRODUCT_NAME=PBXXXXXX.OUT	L4	

Figure 4-1 SFDU-Processing Bandwidth File Structure

<u>BYTES</u>	<u>CONTENTS</u>
00-11	CCSDS SFDU Label (12 bytes)
12-19	Length Field L1 = length of Keyword Header & SMARKER Header (8 bytes)
20-31	NJPL Control Authority ID for Keyword Header (12 bytes)
32-39	Length Field L2 = length of Keyword value data (8 bytes)
40-55	Upload ID = Upload Number the Processed Bandwidth file data covers (XXXXXX = Magellan Upload Number convention where the first X = type of upload (C = cruise, I = IOC, M = Mapping, T = test the 2nd - 5th X = 4 digit upload number the 6th X = Revision Letter (A,B, ... Z) (16 bytes)
56-57	Carriage Return, Line Feed (CR, LF)
58-93	PROCESS_TIME = creation time of the PBW file in UTC (YYYY-MM-DDTHH:MM:SS.FFF) (36 bytes)
94-95	CR, LF
96-131	DATA_OBJECT_TYPE = Unique keyword id name to identify the Processed Bandwidth (36 bytes)
132-133	CR, LF
134-145	MISSION_ID = Designated DSN Mission Number for Magellan = 4 (12 bytes)
146-147	CR, LF
148-171	SPACECRAFT_NAME = Magellan (24 bytes)
172-173	CR, LF
174-199	DATA_SET_NAME = Unique id name to identify PBWs are valid for. XXXXXX = upload number per Magellan standard (26 bytes)
200-201	CR, LF
202-222	MISSION_NAME = Magellan (21 bytes)
223-224	CR, LF

Figure 4-1 SFDU-Processing Bandwidth File Structure --- cont.

BYTESCONTENTS

225-240	SPACECRAFT_ID = designated DSN Spacecraft Number for Magellan = 18 (16 bytes)
241-242	CR, LF
243-254	Type Label Aggregation start (12 bytes)
255-262	Length Field L3=length of value field (8 bytes)
263-279	DELIMITER = SMARKER start marker, indicates that a collection of data structures follow the value field of this label (17 bytes)
280-281	CR, LF
282-306	PRODUCT_NAME = id this collection by a unique name, where XXXXXX=the upload number (25 bytes)
307-308	CR, LF
309-325	TYPE - identifies the 12 byte type field assigned to data structure (17 bytes)
326-327	CR, LF
328-340	Protocol id = NONE (13 bytes)
341-342	CR, LF
343-eod (end-of-data)	Processing Bandwidth Data
eod+1-eod+2	CR, LF
eod+3-eod+14	Fixed NJPL1 Control Authority ID for End Marker Header (12 bytes) (End Marker for end of data)
eod+15-eod+22	Length L4 = length of EMARKER Header (8 bytes)
eod+23-eod+39	End of data Marker (= EMARKER) (17 bytes)
eod+40-eod+41	CR, LF
eod+42-eod+66	PRODUCT_NAME = unique id identifying this collection of data, where XXXXXX = the upload number (25 bytes)
eod+67-eod+68	CR, LF

Figure 4-1 SFDU-Processing Bandwidth File Structure --- cont.

4.2.2 PBW File Data Section

The data section of the PBW file will consist of up to 950 records with 3 pieces of data per record (the time since periapsis, the pulse repetition frequency, and the corresponding processing bandwidth). The size for each PBW data record is 29 bytes. The structure and content of each data record is shown in Table 4-1.

Table 4-1. PBW File Data Section Structure

<u>BYTE</u>	<u>CONTENT</u>
0-8	TIME SINCE PERIAPSIS (in integer RTIs, 1 RTI = 1/15 sec, value is signed (if negative) and the field is right justified)
9-11	BLANK
12-15	INTEGER PORTION OF THE PULSE REPETITION FREQUENCY (PRF) in Hertz
16	DECIMAL POINT
17	FRACTIONAL PART OF PRF (in tenths of Hertz)
18-20	BLANK
21-24	INTEGER PORTION OF THE PROCESSING BANDWIDTH in Hertz
25	DECIMAL POINT
26	FRACTIONAL PORTION OF THE PROCESSING BANDWIDTH (in tenths of Hertz)
27-28	CR, LF

APPENDIX A

SAMPLE PBW FILE

CCSD1Z00000100000323NJPL1KOOKL000000203UPLOAD_ID=M0027A
 PROCESS_TIME=1990-12-17T15:50:01.321
 DATA_OBJECT_TYPE=PROCESSED_BANDWIDTH
 MISSION_ID=4
 SPACECRAFT_NAME=MAGELLAN
 DATA_SET_NAME=PBXXXXXX.OUT
 MISSION_NAME=MAGELLAN
 SPACECRAFT_ID=18
 CCSD1R00000300000080DELIMITER=SMARKER
 PRODUCT_NAME=PBM0027A.OUT
 TYPE=NJPL1I000124
 PROTOCOL=NONE

-282780	4544.3	2974.4
-281325	4581.2	3328.9
-279690	4618.7	3527.3
-278070	4656.7	3553.8
-276480	4553.5	3477.0

-11745	5495.2	2859.0
-10845	4764.8	2807.2
9750	4705.3	2778.7
15645	5041.3	3324.4
17580	5018.9	3309.6

277875	4562.7	3484.7
279285	4666.4	3561.9
280725	4562.7	3321.2
282150	4666.4	3218.2
283440	4499.0	2781.7

CCSD1R00000300000046DELIMITER=EMARKER
 PRODUCT_NAME=PBM0027A.OUT

November 29, 1989

INTEROFFICE MEMORANDUM

TO: DISTRIBUTION
FROM: S. Collins - CMSS *S. Collins*
SUBJ: Original Document Release - SIS RES-104

Attached is the signed original release of subject document.
Please contact me at 30965 if you have any questions.

RES-104 DISTRIBUTION LIST

K. Andersen
R. Borgen
R. Carr
S. Collins
C. Gay (MMAG)
J. Gilbert -
J. Gunn
D. Halverstadt
J. Holladay
M. Jin
A. Johnson
L. Kolinsky (HAC)
M. McCullar
M. Maher (HAC)
D. Meyers (MMAG)
J. Miller
J. Rector
K. Rehm (MMAG)
T. Thompson
E. Wilson
R. Wilson
K. C. Wong (HAC)