

SPS File Format Description (FS-200 and FSX Instruments)

Typinski, 2015

Radio Sky Spectrograph (RSS) produces data files with an ".sps" extension. This document describes how the file is arranged.

Example from LGM_150127042000.sps

File size: 69,569,170 bytes

Position	Data	Type	Bytes		Notes
START OF HEADER					
Fixed-length portion of header					
1	Version	String	10	0000202020	The software version number of the RSS software that wrote the file. Example here indicates RSS version 2.2.20
11	Start	Real64	8	42031.18055630854	Chart start date & time in Microsoft Date data type. 0 = 0000 UTC on Jan 03, 1900 AD. Example here indicates 27 Jan 2015 04:20:00 UTC
19	End	Real64	8	42031.37682568586	Chart start date & time in Microsoft Date data type. 0 = 0000 UTC on Jan 03, 1900 AD. Example here indicates 27 Jan 2015 09:02:38 UTC
27	Latitude	Real64	8	29.80111122131348	Observatory latitude in degrees.
35	Longitude	Real64	8	-82.45944213867190	Observatory longitude in degrees.
43	ChartMax	Real64	8	N/A	Not used in SPS files.
51	ChartMin	Real64	8	N/A	Not used in SPS files.
59	TimeZone	Int16	2	0	Time zone of the observatory clock, UTC offset in hours.
61	Source	String	10	N/A	Not used in SPS files.
71	Author	String	20	Wes Greenman	Observer name.
91	Name	String	20	LGM Radio Alachua	Observatory name.
111	Location	String	40	Alachua FL 32615	Observatory location.
151	Channels	Int16	2	300	Number of frequency channels in the data.
153	NoteLength	Int32	4	88	Provides the length in bytes of the variable-length portion of the SPS file header.

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Position	Data	Type	Bytes	Notes
Variable-length portion of header				
157	Note	String	[NoteLength]	see example below
	EXAMPLE header note:		*[[*SWEEPS115563ÿLOWF17000000ÿHIF26000000ÿSTEPS300ÿDUALSPECFILEfalseÿRCVRÿCOLORRES4ÿ]]*	
			[[Start of note marker.
			SWEEPS115563	Number of frequency sweeps in the data.
			ÿ	Delimiter, 0xFF byte (ASCII 255 decimal).
			LOWF17000000	Sweep low frequency bound, value in Hz.
			ÿ	Delimiter, 0xFF byte (ASCII 255 decimal).
			HIF26000000	Sweep high frequency bound, value in Hz.
			ÿ	Delimiter, 0xFF byte (ASCII 255 decimal).
			STEPS300	Number of frequency channels in the data.
			ÿ	Delimiter, 0xFF byte (ASCII 255 decimal).
			DUALSPECFILEfalse	Is this a DPS file? True or False.
			ÿ	Delimiter, 0xFF byte (ASCII 255 decimal).
			RCVR	NOT USED.
			ÿ	Delimiter, 0xFF byte (ASCII 255 decimal).
			COLORRES4	Data range indicator, value "4" indicates 10-bit data, "1" indicates 12-bit data.
				This tag not present in older 10-bit data files (prior to RSS v 2.x.x).
				10-bit data: RSS color offset control max is 500
				12-bit data: RSS color offset control max is 2500
			ÿ	Delimiter, 0xFF byte (ASCII 255 decimal).
	NEW		BANNER0Top banner text label	Top waterfall text label
	as of		ÿ	Delimiter, 0xFF byte (ASCII 255 decimal).
	v2.4.20		BANNER1Bottom Banner Text Label	Bottom waterfall text label
	30-Dec-14		ÿ	Delimiter, 0xFF byte (ASCII 255 decimal).
]]	End of note marker.

END OF HEADER

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Example from LGM_150127042000.sps

File size: 69,569,170 bytes

Position	Data	Type	Bytes	Notes
START OF DATA				
NOTE: SPS file ADC data values are unsigned 16-bit integers. They are also big-endian -- i.e., the byte order is reversed (low byte is the MSB).				
NOTE: Data starts at byte number 157 + NoteLength. Here we use an example NoteLength of 88, but this varies from file to file.				
NOTE: Data value range is 0 to 1023 for 10-bit ADC's (FSX-1, FSX-2, FSX-3, FS-200B spectrographs).				
NOTE: Data value range is 0 to 4095 for 12-bit ADC's (FSX-4, FSX-5, FSX-6, DPS spectrographs).				
NOTE: DPS data files have RCP and LCP data interleaved channel by channel, NOT sweep by sweep. The LCP word is stored first, then the RCP word.				
245	Data	UInt16	2	Sweep 1, highest frequency channel ADC output (channel 001).
247	Data	UInt16	2	Sweep 1, next highest frequency channel ADC output (channel 002).
:	:	:	:	:
843	Data	UInt16	2	Sweep 1, lowest frequency channel ADC output (channel 300).
845	Delimiter	UInt16	2	65278 (two consecutive 0xFE bytes) End-of-Sweep delimiter.
847	Data	UInt16	2	Sweep 2, highest frequency channel ADC output (channel 001).
849	Data	UInt16	2	Sweep 2, next highest frequency channel ADC output (channel 002).
:	:	:	:	:
1,445	Data	UInt16	2	Sweep 2, lowest frequency channel ADC output (channel 300).
1,447	Delimiter	UInt16	2	65278 (two consecutive 0xFE bytes) End-of-Sweep delimiter.
:	:	:	:	:
69,568,569	Data	UInt16	2	Sweep 115,563, highest frequency channel ADC output (channel 001).
69,568,571	Data	UInt16	2	Sweep 115,563, next highest frequency channel ADC output (channel 002).
:	:	:	:	:
69,569,167	Data	UInt16	2	Sweep 115,563, lowest frequency channel ADC output (channel 300).
69,569,169	Delimiter	UInt16	2	65278 (two consecutive 0xFE bytes) End-of-Sweep delimiter.

END OF DATA

SPS File Format Description (for DPS instrument ONLY)

Typinski, 2015

Example from AJ4CO_DPS_150101071000 corrected using CA 2014 12 18 B.sps

Position	Data	Type	Bytes	File size: 4,596,689 bytes	Notes
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Radio Sky Spectrograph (RSS) produces data files with an ".sps" extension. This document describes how the file is arranged.

START OF HEADER

Fixed-length portion of header

1	Version	String	10	0000202019	The software version number of the RSS software that wrote the file. Example here indicates RSS version 2.2.19
11	Start	Real64	8	42005.29861291749	Chart start date & time in Microsoft Date data type. 0 = 0000 UTC on Jan 03, 1900 AD. Example here indicates 01 Jan 2015 07:10:00.156 UTC
19	End	Real64	8	42005.30555735007	Chart start date & time in Microsoft Date data type. 0 = 0000 UTC on Jan 03, 1900 AD. Example here indicates 01 Jan 2015 07:20:00.155 UTC
27	Latitude	Real64	8	29.83694458008	Observatory latitude in degrees.
35	Longitude	Real64	8	82.62139129639	Observatory longitude in degrees. Note: longitude should be NEGATIVE for AJ4CO, but the observer entered it incorrectly.
43	ChartMax	Real64	8	N/A	Not used in SPS files.
51	ChartMin	Real64	8	N/A	Not used in SPS files.
59	TimeZone	Int16	2	0	Time zone of the observatory clock, UTC offset in hours.
61	Source	String	10	N/A	Not used in SPS files.
71	Author	String	20	Dave Typinski	Observer name.
91	Name	String	20	AJ4CO DPS	Observatory name and/or instrumentation
111	Location	String	40	High Springs, FL	Observatory location.
151	Channels	Int16	2	300	Number of frequency channels in the data.
153	NoteLength	Int32	4	85	Provides the length in bytes of the variable-length portion of the SPS file header.

SPS File Format Description (for DPS instrument ONLY)

Typinski, 2015

Example from AJ4CO_DPS_150101071000 corrected using CA 2014 12 18 B.sps

Position	Data	Type	Bytes	File size: 4,596,689 bytes	Notes
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Radio Sky Spectrograph (RSS) produces data files with an ".sps" extension. This document describes how the file is arranged.

Variable-length portion of header

157	Note	String	[NoteLength]	see example below	Variable-length portion of file header.
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EXAMPLE header note: *[[*SWEEPS3824ÿLOWF16000000ÿHIF32000000ÿSTEPS300ÿDUALSPECFILETrueÿRCVRÿCOLORRES1ÿ*]]*

[[Start of note marker.
SWEEPS3824	Number of frequency sweeps in the data.
ÿ	Delimiter, 0xFF byte (ASCII 255 decimal).
LOWF16000000	Sweep low frequency bound, value in Hz.
ÿ	Delimiter, 0xFF byte (ASCII 255 decimal).
HIF32000000	Sweep high frequency bound, value in Hz.
ÿ	Delimiter, 0xFF byte (ASCII 255 decimal).
STEPS300	Number of frequency channels in the data.
ÿ	Delimiter, 0xFF byte (ASCII 255 decimal).
DUALSPECFILETrue	Is this a DPS file? True or False.
ÿ	Delimiter, 0xFF byte (ASCII 255 decimal).
RCVR	NOT USED.
ÿ	Delimiter, 0xFF byte (ASCII 255 decimal).
COLORRES1	Data range indicator, value "4" indicates 10-bit data, "1" indicates 12-bit data.
	This tag not present in older 10-bit data files (prior to RSS v 2.x.x).
	10-bit data: RSS color offset control max is 500
	12-bit data: RSS color offset control max is 2500
ÿ	Delimiter, 0xFF byte (ASCII 255 decimal).
NEW	Top waterfall text label
as of	Delimiter, 0xFF byte (ASCII 255 decimal).
v2.4.20	Bottom waterfall text label
30-Dec-14	Delimiter, 0xFF byte (ASCII 255 decimal).
]]	End of note marker.

END OF HEADER

SPS File Format Description (for DPS instrument ONLY)

Typinski, 2015

Example from AJ4CO_DPS_150101071000 corrected using CA 2014 12 18 B.sps

Position	Data	Type	Bytes	File size: 4,596,689 bytes	Notes
----------	------	------	-------	----------------------------	-------

Radio Sky Spectrograph (RSS) produces data files with an ".sps" extension. This document describes how the file is arranged.

START OF DATA

NOTE: SPS file ADC data values are unsigned 16-bit integers. **They are also big-endian -- i.e., the byte order is reversed (low byte is the MSB).**

NOTE: Data starts at byte number 157 + NoteLength. Here we use an example NoteLength of 85, but this varies from file to file.

NOTE: Data value range is 0 to 1023 for 10-bit ADC's (FSX-1, FSX-2, FSX-3, FS-200B spectrographs).

NOTE: Data value range is 0 to 4095 for 12-bit ADC's (FSX-4, FSX-5, FSX-6, DPS spectrographs).

NOTE: DPS data files have RCP and LCP data interleaved channel by channel, NOT sweep by sweep. The LCP word is stored first, then the RCP word.

242	LCP Data	UInt16	2		Sweep 1, highest frequency channel LCP ADC output (channel 001).
244	RCP Data	UInt16	2		Sweep 1, highest frequency channel RCP ADC output (channel 001).
246	LCP Data	UInt16	2		Sweep 1, next highest frequency channel LCP ADC output (channel 002).
248	RCP Data	UInt16	2		Sweep 1, next highest frequency channel RCP ADC output (channel 002).
:	:	:	:		:
1,438	LCP Data	UInt16	2		Sweep 1, lowest frequency LCP channel ADC output (channel 300).
1,440	RCP Data	UInt16	2		Sweep 1, lowest frequency RCP channel ADC output (channel 300).
1,442	Delimiter	UInt16	2	65278 (two consecutive 0xFE bytes)	End-of-Sweep delimiter.
1,444	LCP Data	UInt16	2		Sweep 2, highest frequency channel LCP ADC output (channel 001).
1,446	RCP Data	UInt16	2		Sweep 2, highest frequency channel RCP ADC output (channel 001).
1,448	LCP Data	UInt16	2		Sweep 2, next highest frequency channel LCP ADC output (channel 002).
1,450	RCP Data	UInt16	2		Sweep 2, next highest frequency channel RCP ADC output (channel 002).
:	:	:	:		:
2,640	LCP Data	UInt16	2		Sweep 2, lowest frequency channel LCP ADC output (channel 300).
2,642	RCP Data	UInt16	2		Sweep 2, lowest frequency channel RCP ADC output (channel 300).
2,644	Delimiter	UInt16	2	65278 (two consecutive 0xFE bytes)	End-of-Sweep delimiter.
:	:	:	:		:
4,595,488	LCP Data	UInt16	2		Sweep 3,824, highest frequency channel LCP ADC output (channel 001).
4,595,490	RCP Data	UInt16	2		Sweep 3,824, highest frequency channel RCP ADC output (channel 001).
4,595,492	LCP Data	UInt16	2		Sweep 3,824, next highest frequency channel LCP ADC output (channel 002).
4,595,494	RCP Data	UInt16	2		Sweep 3,824, next highest frequency channel RCP ADC output (channel 002).
:	:	:	:		:
4,596,686	LCP Data	UInt16	2		Sweep 3,824, lowest frequency channel LCP ADC output (channel 300).
4,596,686	RCP Data	UInt16	2		Sweep 3,824, lowest frequency channel RCP ADC output (channel 300).
4,596,688	Delimiter	UInt16	2	65278 (two consecutive 0xFE bytes)	End-of-Sweep delimiter.

END OF DATA