

Precipitation Processing System (PPS) Product Format Description

Digital Hybrid Scan Reflectivity (DHR)

Change History Log		
Author	Date	Build
Kelley Miles	3/8/2005	8
Jihong Liu	3/17/2005	correction

Setting	Value	Comment
Product type	256-level digital	
Time generated	Once every volume scan	
Product size	Fixed at 85668	
Compression	Yes	
Resolution	1-degree x 1-km	
Reflectivity values	-32.0 and +94.5 dBZ, in 0.5dBZ increments	
Data level codes	0 – below threshold 1 – range folded 2-255 – reflectivity values	
AWIPS ID	WSRDHRxxx	xxx is site ID for originating WFO

Description/Purpose:

The reflectivity values are assembled from the Hybrid Scan array, which is generated on the fly.

The Product Symbology block contains two layers:

Layer 1 (packet code 16)

- Reflectivity data – a fixed 230 x 360 array

Layer 2 (packet code 1)

- Precip Status Message values (CHAR)
- Adaptable parameters (CHAR)
- Supplemental data (CHAR)
- Bias Table (CHAR)

The following table provides a detailed specification of the DHR product.

Highlighted areas in the description below indicate changes since the previous Build

[Note: a half-word (INT*2) is 16 bits]

MESSAGE HEADER

References

2620001F (Class I User ICD):
Fig 3-3 “Message Header”

HALF-WORD	FIELDNAME	TYPE	UNITS	VALUE	PRECISION/ACCURACY	NOTES
01	Message Code	INT*2	N/A	32	N/A	
02	Date of Message	INT*2	Julian Date	1 to 32,767	1	
03-04	Time of Message	INT*4	Seconds	0 to 86,399	1	
05-06	Length of Message	INT*4	N/A	85668	1	CCR#NA04-32201
07	Source ID	INT*2	N/A	0 to 999	1	
08	Destination ID	INT*2	N/A	0 to 999	1	
09	Number of Blocks	INT*2	N/A	3	1	

PRODUCT DESCRIPTION BLOCK

References

2620001F (Class I Users ICD):
Fig 3-6 “Graphic Product Message” Sheet 2, Sheet 6, Sheet 7
Table III “Message Codes for Products”
Table V “Product Dependent Halfword Definition for Product Description Block”

2620003F (Product Spec ICD)

HALF-WORD	FIELDNAME	TYPE	UNITS	VALUE	PRECISION/ACCURACY	NOTES
10	Block Divider	INT*2	NA	-1	N/A	
11-12	Latitude of Radar	INT*4	Degrees	-90 to +90	0.001	
13-14	Longitude of Radar	INT*4	Degrees	-180 to +180	0.001	
15	Height of Radar	INT*2	Feet	-100 to	1	

HALF-WORD	FIELDNAME	TYPE	UNITS	VALUE	PRECISION/ACCURACY	NOTES
				+11000		
16	Product Code	INT*2	N/A	32	N/A	
17	Operational Mode	INT*2	N/A	0 to 2	N/A	
18	Volume Coverage Pattern	INT*2	N/A	1 to 767	N/A	
19	Sequence Number	INT*2	N/A	-13, 0 to 32767	1	
20	Volume Scan Number	INT*2	N/A	1 to 80	1	
21	Volume Scan Date	INT*2	Julian Date	1 to 32767	1	
22-23	Volume Scan Start Time	INT*4	Seconds GMT	0 to 86399	1	
24	Product Generation Date	INT*2	Julian Date	1 to 32767	1	
25-26	Product Generation Time	INT*4	Seconds	0 to 86399	1	
27	Not used	INT*2	N/A	0	N/A	
28	Not used	INT*2	N/A	0	N/A	
29	Elevation Number	INT*2	N/A	0 to 20	1	
30	Not used	INT*2	N/A	0	N/A	
31	Minimum DHR data level	INT*2	dBZ	-32.0	0.1	
32	Data level increment	INT*2	dBZ	0.5	0.1	
33	Number of data levels	INT*2	N/A	256	1	
34	Not used	INT*2	N/A	0	N/A	
35	Not used	INT*2	N/A	0	N/A	
36	Not used	INT*2	N/A	0	N/A	
37	Not used	INT*2	N/A	0	N/A	
38	Not used	INT*2	N/A	0	N/A	
39	Not used	INT*2	N/A	0	N/A	
40	Not used	INT*2	N/A	0	N/A	
41	Not used	INT*2	N/A	0	N/A	
42	Not used	INT*2	N/A	0	N/A	
43	Not used	INT*2	N/A	0	N/A	
44	Not used	INT*2	N/A	0	N/A	
45	Not used	INT*2	N/A	0	N/A	
46	Not used	INT*2	N/A	0	N/A	
47	Maximum Reflectivity	INT*2	dBZ	95	1	
48	Date of Scan	INT*2	Julian	1 to 32767	1	

HALF-WORD	FIELDNAME	TYPE	UNITS	VALUE	PRECISION/ACCURACY	NOTES
			Date			
49	Average Time of Hybrid Scan	INT*2	Minutes	1 – 1439	1	
50	Not Used	INT*2	N/A	0	N/A	
51	Not Used	INT*2	N/A	0	N/A	
52	Not used	INT*2	N/A	0	N/A	
53	Not used	INT*2	N/A	0	N/A	
54	Version	INT*1	N/A	2	1	
54	Spot Blank	INT*1	N/A	0 to 1	1	
55-56	Offset to Product Symbology block	INT*4	Half-words	60	1	
57-58	Offset to Graphic Attributes block	INT*4	Half-words	0	1	
59-60	Offset to Graphic Alphanumeric block	INT*4	Half-words	0	1	

PRODUCT SYMBOLOGY BLOCK

References

2620001F (Class I User ICD):

- Section 3.2.1.2 “Product Symbology Block”
- Fig 3-6 “Graphic Product Message” (Sheet 8)
- Fig 3-8b “Text and Special Symbol Packets”
- Fig 3-11c “Digital Radial Data Array Packet”

2620003 (ICD for Product Specification):

Appendix C, Format VIII “DHR and”

HALF-WORD	FIELDNAME	TYPE	UNITS	VALUE	PRECISION/ACCURACY	NOTES
61	Block Divider	INT*2	N/A	-1	N/A	
62	Block ID	INT*2	N/A	1	N/A	
63-64	Length of Block	INT*4	Bytes	85548	1	CCR#NA04-32201
65	Number of Layers	INT*2	N/A	2	1	
66	Layer Divider	INT*2	N/A	-1	N/A	
67-68	Length of Data Layer not including layer divider and layer	INT*4	N/A	84974	1	

HALF-WORD	FIELDNAME	TYPE	UNITS	VALUE	PRECISION/ACCURACY	NOTES
	length					
BEGINNING OF THE DHR REFLECTIVITY DATA LAYER						
69	Packet Code	INT*2	N/A	16	N/A	
70	Index of First Range Bin	INT*2	N/A	0	1	
71	Number of Range Bins	INT*2	N/A	230	1	
72	I Center of Sweep	INT*2	N/A	0	1	
73	J Center of Sweep	INT*2	N/A	0	1	
74	Range Scale Factor (230/#Bins)	Scaled Integer	N/A	1.0	0.001	
75	Number of Radials	INT*2	N/A	360	1	
76	Number of Bytes in Radial	INT*2	N/A	230	1	}Repeat }for
77	Radial Start Angle	Scaled Integer	Degrees	0.0 to 359.9	0.1	}
78	Radial Delta Angle	Scaled Integer	Degrees	1.0	0.1	}Each
79	Level 0	INT*1	N/A	0 to 255	1	}
	Level 1	INT*1	N/A	0 to 255	1	}
80	Level 2	INT*1	N/A	0 to 255	1	}
	Level 3	INT*1	N/A	0 to 255	1	}
...	}
...	}
193	Level (N-1)	INT*1	N/A	0 to 255	1	}
	Level (N)	INT*1	N/A	0 to 255	1	}Row
...	
...	}Between
...	}
...	}
42555	Level(N-1)	INT*1	N/A	0 to 255	1	}Radial 2 and
	Level(N)	INT*1	N/A	0 to 255	1	}Radial 360
BEGINNING OF THE DHR ALPHANUMERIC LAYER						
42556	Text layer divider	INT*2	N/A	-1	N/A	
42557-42558	Layer length not including layer divider and layer length	INT*4	N/A	552	1	CCR#NA04-32201
42559	Text layer packet	INT*2	N/A	1	N/A	

HALF-WORD	FIELDNAME	TYPE	UNITS	VALUE	PRECISION/ACCURACY	NOTES
	code					
42560	Length of text layer in bytes	INT*2	N/A	548	1	CCR#NA04-32201
42561	I Starting Point	INT*2	Km/4 or Pixels	0	1	
42562	J Starting Point	INT*2	Km/4 or Pixels	0	1	
BEGINNING OF PRECIP STATUS MESSAGE SUB-LAYER OF DHR ALPHANUMERIC LAYER						
42563-42566	Precip Status Message (PSM) header	CHAR* 8	N/A	“PSM(6)” (space padded)	N/A	Corrections to original description (no format change)
42567-42570	Current Date Precip Function Ran	CHAR* 8	JULIAN DAYS	0 – 99999	1	
42571-42574	Current Time Precip Function Ran	CHAR* 8	SEC	0 – 86399	1	
42575-42578	Last Date Precip Detected	CHAR* 8	JULIAN DAYS	0 – 99999	1	
42579-42582	Last Time Precip Detected	CHAR* 8	SEC	0 – 86399	1	
42583-42586	Current Precip Category	CHAR* 8	N/A	0 to 2	1	Correction to original description (no format change)
42587-42590	Previous Precip Category	CHAR* 8	N/A	0 to 2	1	Correction to original description (no format change)
BEGINNING OF THE EPRE ADAPTATION DATA SUB-LAYER OF DHR ALPHANUMERIC LAYER						
42591-42594	Adaptation data header	CHAR* 8	N/A	“ADAP(32)”	N/A	CCR#NA04-32201

HALF-WORD	FIELDNAME	TYPE	UNITS	VALUE	PRECISION/ACCURACY	NOTES
42595-42598	Width of radar beam	CHAR* 8	Deg	“XXXXXX.XX” (space padded) Range: 0.80 to 1.00 Default: 0.90	0.01	
42599-42602	Blockage Threshold	CHAR* 8	%	“XXXXXX.XX” (space padded) Range: 0.00 to 100.00 Default: 50.00	0.01	
42603-42606	Clutter Threshold	CHAR* 8	%	“XXXXXX.XX” (space padded) Range: 0.00 to 100.00 Default: 50.00	0.01	
42607-42610	Weight Threshold	CHAR* 8	%	“XXXXXX.XX” Range: 0.00 to 100.00 Default: 50.00	0.01	
42611-42614	Full Hybrid Scan Threshold	CHAR* 8	%	“XXXXXX.XX” (space padded) Range: 90.00 to 100.00 Default: 99.70	0.01	
42615-42618	Low Reflectivity Threshold	CHAR* 8	dBZ	“XXXXXX.XX” (space padded) Range: -40.00 to -20.00 Default: -	0.01	

HALF-WORD	FIELDNAME	TYPE	UNITS	VALUE	PRECISION/ACCURACY	NOTES
				32.00		
42619-42622	Rain Detection Reflectivity Threshold	CHAR* 8	dBZ	“XXXXXX.XX” (space padded) Range: 10.00 to 30.00 Default: 20.00	0.01	
42623-42626	Rain Detection Area Threshold	CHAR* 8	Km ²	“XXXXXX.XX” (space padded) Range: 0.00 to 82800.00 Default: 80.00	0.01	
42627-42630	Rain Detection Time Threshold	CHAR* 8	MINS	“XXXXXX.XX” (space padded) Range: 0.00 to 1440.00 Default: 60.00	0.01	
42631-42634	Z-R Mult. Coef.	CHAR* 8	N/A	“XXXXXX.XX” (space padded) Range: 50.00 to 500.00 Default: 300.00	0.01	
42635-42638	Z-R Power Coef.	CHAR* 8	N/A	“XXXXXX.XX” Range: 1.00 to 2.00 Default: 1.40	0.01	
42639-42642	Min. Refl. to Convert to Rate	CHAR* 8	dBZ	“XXXXXX.XX” Range: -32.00 to	0.01	

HALF-WORD	FIELDNAME	TYPE	UNITS	VALUE	PRECISION/ACCURACY	NOTES
				+20.00 Default: 0.00		
42643-42646	Max. Refl. to Convert to Rate	CHAR* 8	dBZ	“XXXXX.XX” (space padded) Range: 50.00 to 90.00 Default: 70.00	0.01	
42647-42650	Number of Exclusion Zones	CHAR* 8	N/A	“XXXXX.XX” (space padded) Range: 0.00 to 20.00 Default: 0.00	1.00	Correction to original description (no format change)
BEGINNING OF THE RATE ALGORITHM ADAPTATION DATA SUB-LAYER OF DHR ALPHANUMERIC LAYER						
42651 42654	Max Storm Speed	CHAR* 8	M/S	“XXXXX.XX” (space padded) Range: 10.00 to 40.00 Default: 25.00	0.01	CCR#NA04-32201
42655 42658	Thresh. Max Time Difference	CHAR* 8	MINS	“XXXXX.XX” (space padded) Range: 10.00 to 30.00 Default: 15.00	0.01	CCR#NA04-32201
42659 42662	MINS. Area Time Continuity	CHAR* 8	KM**2	“XXXXX.XX” (space padded) Range: 50.00 to 1000.00 Default: 200.00	0.01	CCR#NA04-32201

HALF-WORD	FIELDNAME	TYPE	UNITS	VALUE	PRECISION/ACCURACY	NOTES
42663 42666	Time Continuity Parameter #1	CHAR* 8	1/HR	“XXXXXX.XX” (space padded) Range: 0.10 to 99.90 Default: 24.00	0.01	CCR#NA04-32201
42667 42670	Time Continuity Parameter #2	CHAR* 8	1/HR	“XXXXXX.XX” (space padded) Range: 0.10 to 99.90 Default: 13.20	0.01	CCR#NA04-32201
42671 42674	Max. Rate Echo Area Change	CHAR* 8	KM**2/H R	“XXXXXX.XX” (space padded) Range: 20.00 to 700.00 Default: 200.00	0.01	CCR#NA04-32201
Note: as a result of implementing this CCR the halfword addresses of all remaining fields have changed						
42651- 42654	Range Cut-Off	CHAR* 8	KM	“XXXXXX.XX” (space padded) Range: 0.00 to 230.00 Default: 230.00	1.00	Correction to original description (no format change)
42655- 42658	Range Effect Coeff. #1	CHAR* 8	dBR	“XXXXXX.XX” (space padded) Range: 0.00 to 3.00 Default: 0.00	0.10	Corrections to original description (no format change)

HALF-WORD	FIELDNAME	TYPE	UNITS	VALUE	PRECISION/ACCURACY	NOTES
42659-42662	Range Coeff. Coeff. #2	CHAR* 8	dBR	“XXXXX.XX” (space padded) Range: 1.00 to 10.00 Default: 1.00	0.10	Corrections to original description (no format change)
42663-42666	Range Coeff. Coeff. #3	CHAR* 8	dBR	“XXXXX.XX” (space padded) Range: 0.00 to 1.00 Default: 0.00	0.10	Corrections to original description (no format change)
42667-42670	Min. Precip. Rate for inclusion	CHAR* 8	MM/HR	“XXXXX.XX” (space padded) Range: 0.00 to 10.00 Default: 0.00	0.10	Correction to original description (no format change)
42671-42674	Max Precip. Rate allowed	CHAR* 8	MM/HR	“XXXXX.XX” (space padded) Range: 50.00 to 1600.00 Default: 103.80	0.10	Corrections to original description (no format change)
BEGINNING OF THE ACCUM ALGORITHM ADAPTATION DATA SUB-LAYER OF DHR ALPHANUMERIC LAYER						
42675-42678	Thresh. Elapsed Time to Restart	CHAR* 8	MINS	“XXXXX.XX” (space padded) Range: 45.00 to 60.00 Default: 60.00	1.00	Corrections to original description (no format change)
42679-	Max. Time for	CHAR*	MINS	“XXXXX.XX”	1.00	Corrections to

HALF-WORD	FIELDNAME	TYPE	UNITS	VALUE	PRECISION/ACCURACY	NOTES
42682	Interpolation	8		” (space padded) Range: 15.00 to 60.00 Default: 30.00		original description (no format change)
42683-42686	Min. Time in Hourly Period	CHAR* 8	MINS	“XXXXX.XX” (space padded) Range: 0.00 to 60.00 Default: 54.00	1.00	Corrections to original description (no format change)
42687-42690	Threshold Hourly Outlier	CHAR* 8	MM	“XXXXX.XX” (space padded) Range: 50.00 to 800.00 Default: 400.00	1.00	Corrections to original description (no format change)
42691-42694	End Time Gage Accumulation	CHAR* 8	MINS	“XXXXX.XX” (space padded) Range: 0.00 to 59.00 Default: 0.00	1.00	Corrections to original description (no format change)
42695-42698	Max Period Accum Value	CHAR* 8	MM	“XXXXX.XX” (space padded) Range: 50.00 to 400.00 Default: 400.00	1.00	Corrections to original description (no format change)
42699-42702	Max Hourly Accum Value	CHAR* 8	MM	“XXXXX.XX” (space	1.00	Corrections to original description (no

HALF-WORD	FIELDNAME	TYPE	UNITS	VALUE	PRECISION/ACCURACY	NOTES
				padded) Range: 50.00 to 1600.00 Default: 800.00		format change)
BEGINNING OF THE ADJUSTMENT ALGORITHM ADAPTATION DATA SUB-LAYER OF DHR ALPHANUMERIC LAYER						
42703- 42706	Time Bias Estimation	CHAR* 8	MINS	“XXXXX.XX ” (space padded) Range: 50.00 to 59.00 Default: 50.00	1.00	Corrections to original description (no format change)
42707- 42710	Thresh. No. Gage- Radar Pairs	CHAR* 8	N/A	“XXXXX.XX ” (space padded) Range: 6.00 to 30.00 Default: 10.00	1.00	Corrections to original description (no format change)
42711- 42714	Reset Bias Value	CHAR* 8	N/A	“XXXXX.XX ” (space padded) Range: 0.50 to 2.00 Default: 1.00	0.10	Corrections to original description (no format change)
42715- 42718	Longest Allowable Lag	CHAR* 8	HRS	“XXXXX.XX ” (space padded) Range: 100.00 to 1000.00 Default: 168.00	1.00	Corrections to original description (no format change)
42719- 42722	Bias Applied Flag	CHAR* 8	N/A	“XXXXXXXX X” (space	N/A	

HALF-WORD	FIELDNAME	TYPE	UNITS	VALUE	PRECISION/ACCURACY	NOTES
				padded) Range: T or F Default: F		
BEGINNING OF THE SUPPLEMENTAL SUB-LAYER OF DHR ALPHANUMERIC LAYER						
42723-42726	Supplemental data header	CHAR* 8	N/A	“SUPL(15)”	N/A	Correction to original description (no format change)
42727-42730	Average Scan Date	CHAR* 8	Julian Dalys	0-99999	1	
42731-42734	Average Scan Time	CHAR* 8	Sec	0-86399	1	
42735-42738	Flag Zero Hybrid	CHAR* 8	N/A	0 or 1	1	
42739-42742	Rain Detection Flag	CHAR* 8	N/A	0 or 1	1	
42743-42746	Reset STP Flag	CHAR* 8	N/A	0 or 1	1	
42747-42750	Precip. Begin Flag	CHAR* 8	N/A	0 or 1	1	
42751-42754	Last Date Rain	CHAR* 8	Julian Days	0-99999	1	
42755-42758	Last Time Rain	CHAR* 8	Sec	0-86399	1	
42759-42762	Rejected Blockage Counter	CHAR* 8	N/A	0-82800	1	
42763-42766	Rejected AP/Clutter Counter	CHAR* 8	N/A	0-82800	1	
42767-42770	Total Bins Smooth	CHAR* 8	N/A	0	N/A	Not implemented
42771-42774	Pecentage Filled Hybrid Scan	CHAR* 8	N/A	0.00 to 100.00	0.01	
42775-42778	Highest Elevation Angle	CHAR* 8	N/A	0.50 to 19.50	0.01	
42779-42782	Rain Summation Area	CHAR* 8	N/A	0.0-166190.3	0.1	CCR #NA04-27811
42783-42786	Volume Spot Blank	CHAR* 8	N/A	0 to 1	1	
BEGINNING OF THE BIAS TABLE SUB-LAYER OF DHR ALPHANUMERIC LAYER						
42787-42790	Bias Table data header	CHAR* 8	N/A	“BIAS(11)”	N/A	Correction to original

HALF-WORD	FIELDNAME	TYPE	UNITS	VALUE	PRECISION/ACCURACY	NOTES
						description (no format change)
42791-42794	Time Last Update of Local Bias Value	CHAR* 8	Sec	0-86399	1	
42795-42798	Date Last Update of Local Bias Value	CHAR* 8	Julian Days	0-99999	1	
42799-42802	Time of Last Update of Local Bias Table	CHAR* 8	Sec	0-86399	1	
42803-42806	Date of Last Update of Local Bias Table	CHAR* 8	Julian Days	0-99999	1	
42807-42810	Observation Time of Latest Bias Table	CHAR* 8	Sec	0-86399	1	
42811-42814	Observation Date of Latest Bias Table	CHAR* 8	Julian Days	0-99999	1	
42815-42818	Generation Time of Latest Bias Table	CHAR* 8	Sec	0-86399	1	
42819-42822	Generation Date of Latest Bias Table	CHAR* 8	Julian Days	0-99999	1	
42823-42826	Mean-Field Bias Estimate	CHAR* 8	N/A	.01-100.	.01	
42827-42830	Effective G-R Pair	CHAR* 8	N/A	0.00-999.99	.01	
42831-42834	Memory Span	CHAR* 8	N/A	0.001-10.**7	.001	

[GRAPHIC ALPHANUMERIC BLOCK IS NOT USED BY DHR]

[TABULAR ALPHANUMERIC BLOCK IS NOT USED BY DHR]

The following is an example of the alphanumeric layer (layer 2) of the DHR product, as rendered by CODE cvt.

```

*** ORPG DATABASE PRODUCT LOAD UTILITY ***
-> Number of Products Available=5417
-> Message ID=5394
-> Product Info: LBuffer# 057 MSGLEN 026141 VOLNUM 158 ELEV 07
    
```

-> Set Processing ONLY for Layer Number 2
packet code 1 found

Packet 1: Write Text (No Value) Summary Information
Length of Data Block (in bytes) = 548

I Starting Point: 0
J Starting Point: 0

Message to follow:

PSM (6)	12335	48300	12355	48300	1	1	ADAP (32)	0.90	50.00
50.00	50.00	99.70	-32.00	20.00	80.00	60.00	300.00	1.40	0.00
70.00	3.00	230.00	0.00	1.00	0.00	0.00	103.80	60.00	0.00
54.00	400.00	0.00	400.00	800.00	50.00	10.00	1.00	168.00	T
SUPL(15)	12335	48448	0	1	0	0	12355	48448	0
12576	0	99.86	9.90	14772.4	0	BIAS(11)	58368	10461	0
0	72000	11695	75453	11695	1.2550	13.49	168.		

program complete