#407

Earth Sc

ATS-6 VHRR
DIGITAL DATA TAPES
74-039A-08C

ESAD-00165

Table of Contents

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1. INTRODUCTION:

The documentation for this data set was originally on paper, kept in NSSDC's Data Set Catalogs (DSCs). The paper documentation in the Data Set Catalogs have been made into digital images, and then collected into a single PDF file for each Data Set Catalog. The inventory information in these DSCs is current as of July 1, 2004. This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system. The information existing in the DSCs is now not needed for locating the data files, but we did not remove that inventory information.

The offline tape datasets have now been migrated from the original magnetic tape to Archival Information Packages (AIP's).

A prior restoration may have been done on data sets, if a requestor of this data set has questions; they should send an inquiry to the request office to see if additional information exists.

2. ERRATA/CHANGE LOG:

NOTE: Changes are made in a text box, and will show up that way when displayed on screen with a PDF reader.

When printing, special settings may be required to make the text box appear on the printed output.

Version	Date	Person	Page	Description of Change
01				
02				

3 LINKS TO RELEVANT INFORMATION IN THE ONLINE NSSDC INFORMATION SYSTEM:

http://nssdc.gsfc.nasa.gov/nmc/

[NOTE: This link will take you to the main page of the NSSDC Master Catalog. There you will be able to perform searches to find additional information]

4. CATALOG MATERIALS:

a. Associated Documents To find associated documents you will need to know the document ID number and then click here. http://nssdcftp.gsfc.nasa.gov/miscellaneous/documents/

b. Core Catalog Materials

B R I E F D E S C R I P T I O N
GVHRR IR Digital Image Data,Tape
74-039A-08C ESAD-00165

This data set consists of calibrated geosynchronous very high resolution radiometer (GVHRR) infrared data on BCD magnetic tapes produced by a Univac 1108 data processing system. Each tape contains from one to four files (one file for the full-earth mode and up to four files for the sector mode). Each file consists of a header record and up to 1201 data records. Each file is terminated by an end-of-file mark with the last file terminated by two end-of-file marks. The header record consists of 132 characters written in EBCDIC and contains documentation on processing history and data/time of data. The next record is a data record of 2488 words containing calibration information. Each of the remaining data records (2488 words each) contains a line of picture information. Each line consists of 2400 9-bit samples called pixels. The first data record contains the last picture line, and the last data record contains the first picture line. Words 2467 through 2488 of each data record contain 47 orbit/attitude data parameters. Before output to tape, the data were checked for correct line and time sequence and smoothed as required. Pixels were not shifted to account for camera movements on this tape. A detailed format description appears in section 4 of the "Applications Technology Satellite (ATS6-) GVHRR Guide for Experimenter's Tapes," TRF B25463-000A. These tapes are also called experimenter history tapes.

M A T E R I A L S F O R D I S T R I B U T I O N
74-039A-08C
GVHRR IR Digital Image Data,Tape

Send B25463-000A "ATS-6 VHRR Guide for Experimenter's Tapes".

REQ. AGENT	RAND NO.	ACQ. AGENT
DBN VJP	RC7948	BCD

ATS-6

VHHR DIGITAL DATA TAPES

74-039A-08C

This data set consists of 775 data tapes. The tapes are 1600 BPI, Binary, 9-track and most consists of either 1 or 4 files. The tapes were created on a UNIVAC 1108 computer. About 10% of these tapes were duped to create C tapes.

1 ATS#	FILE	DR	TIME SPAN	CR
2				
3				
4 0275	4	D-29677	06/25/74	
5 0288	4	D-29678	06/26/74	
6 0289	4	D-29679	06/26/74	
7 0185	1	D-29680	07/01/74	
8 0186	1	D-29681	07/01/74	
9 0187	1	D-29682	07/01/74	
10 0188	1	D-29683	07/01/74	
11 0190	1	D-29684	07/01/74	
12 0193	1	D-29686	07/01/74	
13 0194	1	D-29687	07/01/74	C-19325
14 0195	1	D-29688	07/01/74	
15 0196	1	D-29689	07/01/74	
16 0197	1	D-29690	07/01/74	
17 0198	1	D-29691	07/01/74	
18 0199	1	D-29692	07/01/74	
19 0200	1	D-29693	07/01/74	
20 0201	1	D-29694	07/01/74	
21 0202	1	D-29695	07/01/74	
22 0203	1	D-29696	07/01/74	
23 0204	1	D-29697	07/01/74	C-19326
24 0205	1	D-29698	07/01/74	
25 0502	4	D-29699	07/25/74	
26 0503	4	D-29700	07/25/74	
27 0551	4	D-29701	07/28/74	
28 0552	4	D-29702	07/28/74	
29 0547	4	D-29703	07/28/74	
30 0546	4	D-29704	07/28/74	
31 0545	4	D-29705	07/28/74	
32 0407	4	D-29706	07/16/74	
33 0406	4	D-29707	07/16/74	C-19327
34 0405	4	D-29708	07/16/74	
35 0239	1	D-29709	07/08/74	
36 0160	1	D-29710	06/30/74	
37 0159	1	D-29711	06/30/74	
38 0158	1	D-29712	06/30/74	
39 0157	1	D-29713	06/30/74	
40 0156	1	D-29714	06/30/74	
41 0155	1	D-29715	06/30/74	
42 0154	1	D-29716	06/30/74	
43 0153	1	D-29717	06/30/74	C-19328
44 0152	1	D-29718	06/30/74	
45 0151	1	D-29719	06/30/74	
46 0150	1	D-29720	06/30/74	
47 0149	1	D-29721	06/30/74	
48 0148	1	D-29722	06/30/74	
49 0147	1	D-29723	06/30/74	
50 0552	4	D-29724	07/28/74	
51 0553	4	D-29725	07/28/74	
52 0046	4	D-29726	06/24/74	
53 0045	1	D-29727	06/24/74	C-19329
54 0043	1	D-29728	06/24/74	
55 0042	1	D-29729	06/24/74	
56 0041	1	D-29730	06/24/74	
57 0040	1	D-29731	06/24/74	
58 0039	1	D-29732	06/24/74	

59	0605	4	D-29733	07/31/74	
60	0604	4	D-29734	07/31/74	
61	0425	4	D-29735	07/19/74	
62	0424	4	D-29736	07/19/74	
63	0423	4	D-29737	07/19/74	C-19330
64	0422	4	D-29738	07/19/74	
65	0421	4	D-29739	07/19/74	
66	0392	4	D-29740	07/15/74	
67	0391	4	D-29741	07/15/74	
68	0389	4	D-29742	07/15/74	
69	0388	4	D-29743	07/15/74	
70	0387	4	D-29744	07/15/74	
71	0386	1	D-29745	07/15/74	
72	0504	4	D-29746	07/25/74	
73	0579	4	D-29747	07/18/74	C-19331
74	0580	4	D-29748	07/18/74	
75	0646	1	D-29749	08/11/74	
76	0649	1	D-29750	08/11/74	
77	0650	1	D-29751	08/11/74	
78	0651	1	D-29752	08/11/74	
79	0652	1	D-29753	08/11/74	
80	0653	1	D-29754	08/11/74	
81	0654	1	D-29755	08/11/74	
82	0673	1	D-29756	08/11/74	
83	0674	1	D-29757	08/11/74	C-19332
84	0675	1	D-29758	08/11/74	
85	0677	1	D-29759	08/11/74	
86	0678	1	D-29760	08/11/74	
87	0679	1	D-29761	08/11/74	
88	0689	1	D-29762	08/12/74	
89	0691	1	D-29763	08/12/74	
90	0692	1	D-29764	08/12/74	
91	0054	4	D-29765	06/25/74	
92	0064	4	D-29766	06/25/74	
93	0069	4	D-29767	06/25/74	C-19333
94	0071	4	D-29768	06/25/74	
95	0072	4	D-29769	06/25/74	
96	0073	4	D-29770	06/25/74	
97	0175	1	D-29771	06/30/74	
98	0169	1	D-29772	06/30/74	
99	0337	1	D-29773	07/14/74	
100	0338	1	D-29774	07/14/74	
101	0339	1	D-29775	07/14/74	
102	0358	1	D-29776	07/14/74	
103	0359	1	D-29777	07/14/74	C-19334
104	0360	1	D-29778	07/14/74	
105	0362	1	D-29780	07/14/74	
106	0363	1	D-29781	07/14/74	
107	0364	1	D-29782	07/14/74	
108	0355	4	D-29783	07/20/74	
109	0443	4	D-29784	07/20/74	
110	0450	4	D-29785	07/20/74	
111	0451	4	D-29786	07/20/74	
112	0452	4	D-29787	07/20/74	C-19335
113	0453	4	D-29788	07/20/74	
114	0454	4	D-29789	07/20/74	
115	0455	4	D-29790	07/20/74	
116	0332	1	D-29791	07/14/74	

117	0329	1	D-29792	07/14/74	
118	0328	1	D-29793	07/14/74	
119	0327	1	D-29794	07/14/74	
120	0460	4	D-29795	07/14/74	
121	0459	4	D-29796	07/14/74	
122	0326	1	D-29797	07/14/74	C-19336
123	0295	1	D-29798	07/13/74	
124	0294	1	D-29799	07/13/74	
125	0293	1	D-29800	07/13/74	
126	0292	1	D-29801	07/13/74	
127	0291	1	D-29802	07/13/74	
128	0290	1	D-29803	07/13/74	
129	0258	1	D-29804	07/13/74	
130	0255	1	D-29805	07/11/74	
131	0253	1	D-29806	07/11/74	
132	0252	1	D-29807	07/11/74	C-19337
133	0251	1	D-29808	07/11/74	
134	0250	1	D-29809	07/11/74	
135	0249	1	D-29810	07/11/74	
136	0248	1	D-29811	07/09/74	
137	0357	1	D-29812	07/14/74	
138	0356	1	D-29813	07/14/74	
139	0355	1	D-29814	07/14/74	
140	0354	1	D-29815	07/14/74	
141	0353	1	D-29816	07/14/74	
142	0352	1	D-29817	07/14/74	C-19338
143	0351	1	D-29818	07/14/74	
144	0350	1	D-29819	07/14/74	
145	0331	1	D-29820	07/14/74	
146	0470	4	D-29821	07/20/74	
147	0485	4	D-29822	07/23/74	
148	0489	4	D-29823	07/23/74	
149	0490	4	D-29824	07/23/74	
150	0491	2	D-29825	07/23/74	
151	0492	4	D-29826	07/23/74	
152	0493	4	D-29827	07/24/74	C-19339
153	0540	4	D-29828	07/28/74	
154	0541	3	D-29829	07/28/74	
155	0542	4	D-29830	07/28/74	
156	0543	4	D-29831	07/28/74	
157	0544	3	D-29832	07/28/74	
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159	0657	1	D-29834	08/11/74	
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161	0659	1	D-29836	08/11/74	
162	0660	1	D-29837	08/11/74	C-19340
163	0661	4	D-29838	08/11/74	
164	0467	4	D-29839	07/20/74	
165	0466	4	D-29840	07/20/74	
166	0462	4	D-29841	07/20/74	
167	0461	4	D-29842	07/20/74	
168	0663	1	D-29843	08/11/74	
169	0662	1	D-29844	08/11/74	
170	0173	1	D-29845	06/30/74	
171	0175	1	D-29846	06/30/74	
172	0176	1	D-29847	06/30/74	C-19341
173	0177	1	D-29848	06/30/74	
174	0179	1	D-29849	06/30/74	

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176	0181	1	D-29851	06/30/74	
177	0182	1	D-29852	06/30/74	
178	0183	1	D-29853	06/30/74	
179	0211	1	D-29854	07/03/74	
180	0212	1	D-29855	07/03/74	
181	0213	1	D-29856	07/03/74	
182	0215	1	D-29857	07/03/74	C-19342
183	0447	4	D-29858	07/20/74	
184	0448	4	D-29859	07/20/74	
185	0449	4	D-29860	07/20/74	
186	0455	4	D-29861	07/20/74	
187	0456	4	D-29862	07/20/74	
188	0457	4	D-29863	07/20/74	
189	0501	4	D-29865	07/24/74	
190	0681	1	D-29866	08/11/74	
191	0680	1	D-29867	08/11/74	C-19343
192	0469	4	D-29868	07/20/74	
193	0167	1	D-29869	06/30/74	
194	0166	1	D-29870	06/30/74	
195	0165	1	D-29871	06/30/74	
196	0164	1	D-29872	06/30/74	
197	0163	1	D-29873	06/30/74	
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199	0161	1	D-29875	06/30/74	
200	0144	1	D-29876	06/30/74	
201	0142	1	D-29877	06/30/74	C-19344
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203	0141	1	D-29879	06/30/74	
204	0140	1	D-29880	06/30/74	
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206	0138	1	D-29882	06/30/74	
207	0137	1	D-29883	06/30/74	
208	0120	1	D-29884	06/29/74	
209	0119	1	D-29885	06/29/74	
210	0116	1	D-29886	06/29/74	
211	0115	1	D-29887	06/29/74	C-19345
212	0114	1	D-29888	06/29/74	
213	0113	1	D-29889	06/29/74	
214	0171	1	D-29890	06/30/74	
215	0172	1	D-29891	06/30/74	
216	0174	1	D-29892	06/30/74	
217	0379	1	D-29951	07/14/74	
218	0378	1	D-29952	07/14/74	
219	0352	1	D-29953	07/05/74	
220	0325	1	D-29954	07/14/74	
221	0324	1	D-29955	07/13/74	C-19424
222	0427	4	D-29956	07/19/74	
223	0403	1	D-29957	07/17/74	
224	0382	1	D-29958	07/15/74	
225	0565	1	D-29969	08/11/74	
226	0664	1	D-29970	08/11/74	
227	0565	1	D-29971	08/11/74	
228	0667	1	D-29972	08/11/74	
229	0419	1	D-29973	07/18/74	
230	0271	1	D-29974	07/13/74	
231	0413	1	D-29975	07/18/74	C-19425
232	0417	1	D-29976	07/18/74	

233	0420	3	D-29977	07/15/74	
234	0459	1	D-29978	06/25/74	
235	0483	4	D-29979	07/21/74	
236	0158	1	D-29980	06/30/74	
237	0368	1	D-29981	07/14/74	
238	0370	1	D-29982	07/14/74	
239	0482	4	D-29983	07/21/74	
240	0441	5	D-29984	06/25/74	
241	0036	1	D-29985	06/24/74	C-19426
242	0485	4	D-29986	07/21/74	
243	0486	4	D-29987	07/21/74	
244	0487	4	D-29988	07/21/74	
245	0438	1	D-29989	06/25/74	
246	0484	4	D-29990	07/21/74	
247	0299	1	D-29991	07/13/74	
248	0302	4	D-29992	07/13/74	
249	0303	1	D-29993	07/13/74	
250	0298	1	D-29994	07/13/74	
251	0297	1	D-29995	07/13/74	C-19427
252	0296	1	D-29996	07/13/74	
253	0686	1	D-29997	08/12/74	
254	0301	1	D-29998	07/13/74	
255	0565	4	D-29999	07/28/74	
256	0549	4	D-30000	07/28/74	
257	0548	4	D-30001	07/28/74	
258	0526	4	D-30002	07/27/74	
259	0569	4	D-30003	07/28/74	
260	0568	4	D-30004	07/28/74	
261	0567	4	D-30005	07/28/74	C-19428
262	0566	4	D-30006	07/28/74	
263	0665	1	D-30007	08/11/74	
264	0664	1	D-30008	08/11/74	
265	0573	4	D-30009	07/28/74	
266	0571	4	D-30010	07/28/74	
267	0445	4	D-30011	07/20/74	
268	0430	4	D-30012	07/19/74	
269	0585	4	D-30013	06/25/74	
270	0584	4	D-30014	06/25/74	
271	0475	4	D-30015	07/20/74 - 7/21/74	C-19429
272	0606	4	D-30015	07/31/74 - 8/01/74	
273	0591	4	D-30017	06/27/74	
274	0590	4	D-30018	06/25/74	
275	0640	4	D-30019	08/08/74	
276	0632	4	D-30020	08/07/74	
277	0103	1	D-30021	06/29/74	
278	0281	1	D-30022	07/13/74	
279	0282	1	D-30023	07/13/74	
280	0639	4	D-30025	08/07/74	C-19430
281	0495	1	D-30026	07/23/74	
282	0598	4	D-30027	06/25/74	
283	0075	3	D-30028	06/25/74	
284	0670	1	D-30029	08/11/74	
285	0669	1	D-30030	08/11/74	
286	0668	1	D-30031	08/11/74	
287	0667	1	D-30032	08/11/74	
288	0666	1	D-30033	08/11/74	
289	0696	1	D-30034	08/13/74	
290	0693	1	D-30035	08/13/74	C-19431

291	0676	1	D-30036	08/11/74	
292	0672	1	D-30037	08/11/74	
293	0671	1	D-30038	08/11/74	
294	0015	1	D-30039	06/17/74	
295	0014	1	D-30040	06/17/74	
296	0214	1	D-30041	07/03/74	
297	0702	1	D-30042	08/14/74	
298	0701	4	D-30043	08/14/74	
299	0021	1	D-30044	06/17/74	
300	0020	1	D-30045	06/17/74	C-19432
301	0018	1	D-30046	06/17/74	
302	0017	1	D-30047	06/17/74	
303	0016	1	D-30048	06/17/74	
304	0093	4	D-30049	06/26/74	
305	0094	2	D-30050	06/26/74	
306	0095	1	D-30051	06/29/74	
307	0024	1	D-30052	06/17/74	
308	0023	1	D-30053	06/17/74	
309	0105	1	D-30054	06/29/74	
310	0107	1	D-30055	06/29/74	C-19433
311	0092	4	D-30056	06/26/74	
312	0096	1	D-30057	06/29/74	
313	0106	1	D-30058	06/29/74	
314	0686	1	D-30059	08/11/74	
315	0685	1	D-30060	08/11/74	
316	0684	1	D-30061	08/11/74	
317	0683	1	D-30062	08/11/74	
318	0682	1	D-30063	08/11/74	
319	0216	1	D-30064	07/03/74	
320	0695	1	D-30065	08/13/74	C-19434
321	0694	1	D-30066	08/13/74	
322	0687	1	D-30067	08/11/74	
323	0700	4	D-30068	08/14/74	
324	0410	2	D-30069	07/17/74	
325	0409	4	D-30070	07/17/74	
326	0408	2	D-30071	07/17/74	
327	0393	1	D-30072	07/15/74	
328	0077	4	D-30073	06/26/74	
329	0146	1	D-30074	06/30/74	
330	0512	4	D-30075	07/26/74	C-19435
331	0511	4	D-30076	07/26/74	
332	0510	4	D-30077	07/26/74	
333	0535	4	D-30078	07/26/74	
334	0411	4	D-30079	07/17/74	
335	0524	4	D-30080	07/27/74	
336	0522	4	D-30081	07/27/74	
337	0521	4	D-30082	07/27/74	
338	0520	4	D-30083	07/27/74	
339	0514	2	D-30084	07/26/74	
340	0533	4	D-30085	07/27/74	C-19436
341	0532	4	D-30086	07/27/74	
342	0531	4	D-30087	07/27/74	
343	0530	4	D-30088	07/27/74	
344	0122	1	D-30089	06/29/74	
345	0123	1	D-30090	06/29/74	
346	0110	1	D-30091	06/29/74	
347	0121	1	D-30092	06/29/74	
348	0127	1	D-30093	06/29/74	

349	0124	1	D-30094	06/29/74	
350	0125	1	D-30095	06/29/74	C-19437
351	0123	1	D-30096	06/29/74	
352	0145	1	D-30097	06/29/74	
353	0126	1	D-30098	06/29/74	
354	0423	4	D-30099	07/19/74	
355	0527	4	D-30100	07/27/74	
356	0529	4	D-30101	07/27/74	
357	0528	4	D-30102	07/27/74	
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```
   755  0775    4        D-31223          07/08/74
   756  0776    4        D-31224          07/08/74
   757  0777    1        D-31225          07/08/74
   758  0778    1        D-31226          07/08/74
   759  0779    1        D-31227          07/08/74
   760  0780    1        D-31228          07/05/74
   761  0781    1        D-31229          07/05/74
   762  0782    1        D-31230          07/08/74
   763  0783    1        D-31231          06/24/74
   764  0784    3        D-31232          08/06/74
   765  0785    4        D-31233          07/27/74
   766  0786    4        D-31234          07/19/74
   767  0787    4        D-31235          07/16/74
   768  0788    1        D-31236          07/13/74
   769  0789    1        D-31237          07/13/74
   770  0790    1        D-31238          07/13/74
   771  0791    1        D-31239          07/13/74          C-19896
TOTAL RECORDS WRITTEN =   772
EXI
$WEO LPS
```

B25463-000A

CSC/TM-75/6222

APPLICATIONS TECHNOLOGY SATELLITE-6 (ATS-6)

VERY HIGH-RESOLUTION RADIOMETER (VHRR)

Guide For Experimenter's Tapes

Prepared for

GODDARD SPACE FLIGHT CENTER

By

COMPUTER SCIENCES CORPORATION

Under

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ABSTRACT

This document describes the organization and operation of the Very High-Resolution Radiometer (VHRR) Data Processing System to produce experimenter tapes and contains information on the contents and organization of the Experimenter History Tape (EHT) and the data files used to create the EHT. This document was produced by abstracting applicable descriptions from the ATS-6 VHRR System Programmer's Manual, numbered CSC/SD-75/6050.

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SECTION 1 - INTRODUCTION

The Applications Technology Satellite-6 (ATS-6) is a synchronous satellite launched by the National Aeronautics and Space Administration (NASA) in June 1974. This satellite has communications instrumentation and instrumentation to produce digital Very High Resolution Radiometer (VHRR) pictures of the Earth in both a visible and infrared (IR) spectra.

The VHRR system is a camera system which takes pictures of the Earth. This camera produces three types of data: visible sensor 1, visible sensor 2, and infrared (IR). Each produces a unique picture; however, visible sensor 1 and visible sensor 2 parallel each other, and one picture can be created from both, called the combined visible.

The camera produces data in two modes: full Earth and sectors. In both modes, the camera produces pictures vertically, from the bottom of the picture to the top, one horizontal line at a time. The camera produces pairs of horizontal lines: the first line is right to left, the second is left to right. Therefore, data from every other line has been reversed before writing to the Experimenter Tape. Each horizontal line contains 2400 9-bit samples called pixels. The full-Earth mode produces complete pictures of the Earth, which is normally 1200 lines of data. The sector mode produces pictures which contains up to 300 horizontal picture lines. The picture produced is thus a small horizontal section of the Earth. Each VHRR picture (both sector and full-Earth) also has an IR calibration line, called the IR calibration record. The IR calibration record is a scan line of data taken against a known background at the end of each VHRR picture. This data is then used to calibrate the VHRR pictures.

Each full-Earth picture is assigned a unique number; however, up to four sector pictures can have the same picture number. The file numbers (1 through 4) identify each sector of a picture.

1.1 PURPOSE

This document is concerned with the user tape, referred to as the Experimenter History tape, that is generated by processing Very High Resolution Radiometer (VHRR) digital data within the Information Processing Division (IPD) of the Telemetry Computation Branch (TCB) at Goddard Space Flight Center (GSFC) on the Univac 1108 VHRR Data Processing System.

This document contains information for the experimenter tape user community; including descriptions of the input tapes, the VHRR tape and the F1 orbit/attitude tape; descriptions of the output Experimenter History tape; and an overview of the VHRR data processing flow within IPD. The intent is that this document will serve as a user's guide for the purpose of customer review and reference.

1.2 DATA PROCESSING FLOW

The TCB receives VHRR digital tapes from the Rosman ATS tracking station for picture data processing. These tapes are 9-track, 800 bpi, and contain radiometer detector sensor data, housekeeping telemetry data, and calibration data. Each VHRR digital tape is approximately 24 minutes in duration for a full-Earth picture, and 6 minutes in duration for each sector of a sector picture. These tapes are processed by the UNIVAC 1108 VHRR Data Processing System (DPS) which provides editing, line-time correction, orbit/attitude (O/A) data merging, sensor data calibration, sensor data scaling, decommutation, and housekeeping. In addition, visibles and IR picture tapes are optionally generated by the VHRR system for DICOMED and IDAMS picture production.

The VHRR system first performs quality editing of the VHRR tape. The VHRR input tape and accompanying input tape control cards perform a quality check of the sensor data. The resultant output is an edit report. Next, line count and time corrections are performed, and a line-time correction report is produced.

For O/A data merging, the monitor program receives as additional input an ATS-6 experiment O/A tape, F1. O/A data is merged with the VHRR input tape.

A Master Data Tape (MDT) for the IPD branch for historical purposes and an Experiment History tape for the user community are output, which contain all sensor, O/A, and telemetry data. After the sensor data is calibrated using the IR calibration record, it is written out to the Experimenter History tape. Finally, the data is decommutated to the visibles and IR picture tape with scaled visible sensor data, gray scale area, and title area. Shipping letters for the picture tapes, Experimenter History tapes, and MDTs are produced. In addition, 06, 11A, 11B, and 13D accounting cards are produced.

The other two capabilities of the VHRR system are the input quick-look tape and MDT. The VHRR quick-look tape is 9-track, 1600 bpi, which is transferred to IPD via the high-speed data link. This permitted IPD and the experimenter to validate VHRR data on a near-real-time basis during the launch-support period.

Figure 1-1 is an overall data flow for IPD processing. Figure 1-2 is an overall program chart of the VHRR DPS system, showing the program inputs and outputs.

1.3 TIME/LINE CORRECTION PROCESS

The VHRR system records pictures vertically from the bottom of the picture to the top, one horizontal line at a time. The start time and line number of each horizontal line is saved. Because the line number is critical to the position of the line in the picture, time correction must be performed to correct any incorrectly recorded line numbers.

The time correction methodology initially determines if time correction is to be performed. Time correction is optionally not performed by user request on the control card or because the base line count (BLC) cannot be established. The BLC is established only when three consecutive lines, equal times apart, are found. These equal times, the basic line time (BLT), must be within 1 percent of the expected time between picture lines (1.2 seconds).

If time correction is not performed, all lines with a backward line jump are discarded.

Once a BLC is established, each previous line must be examined. A line will be discarded unless the time difference between that line and the last acceptable line is within 1 percent of the line difference times the BLT.

Time correction proceeds in a forward direction from the point where the BLC was established using the same algorithm until a line fails. The BLT is re-established, and processing continues until all lines have been processed.

A statistical summary report of time correction parameters and all discarded lines is printed by the VHRR Data Processing System.

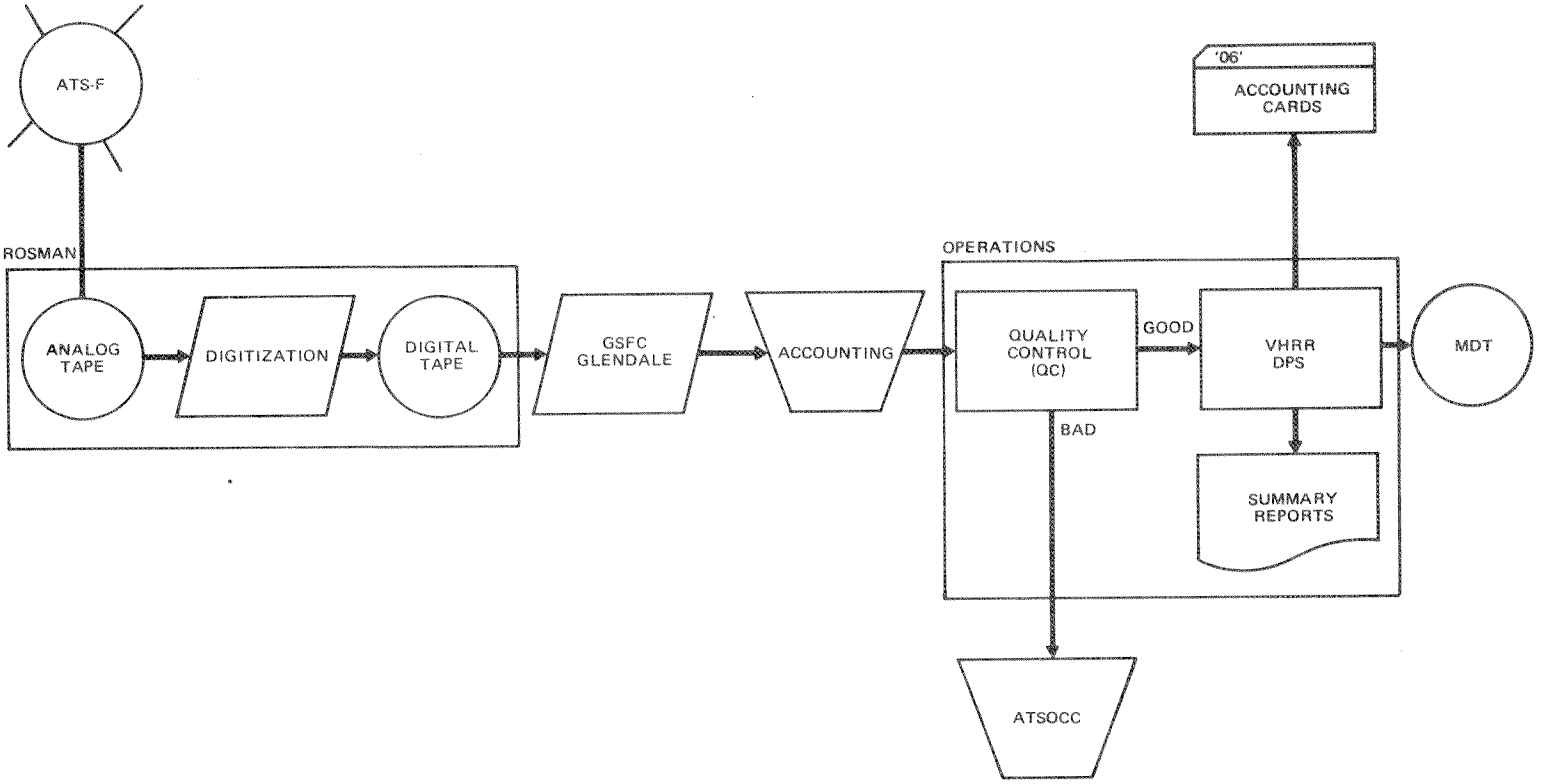


Figure 1-1. Data Flow for IPD Processing

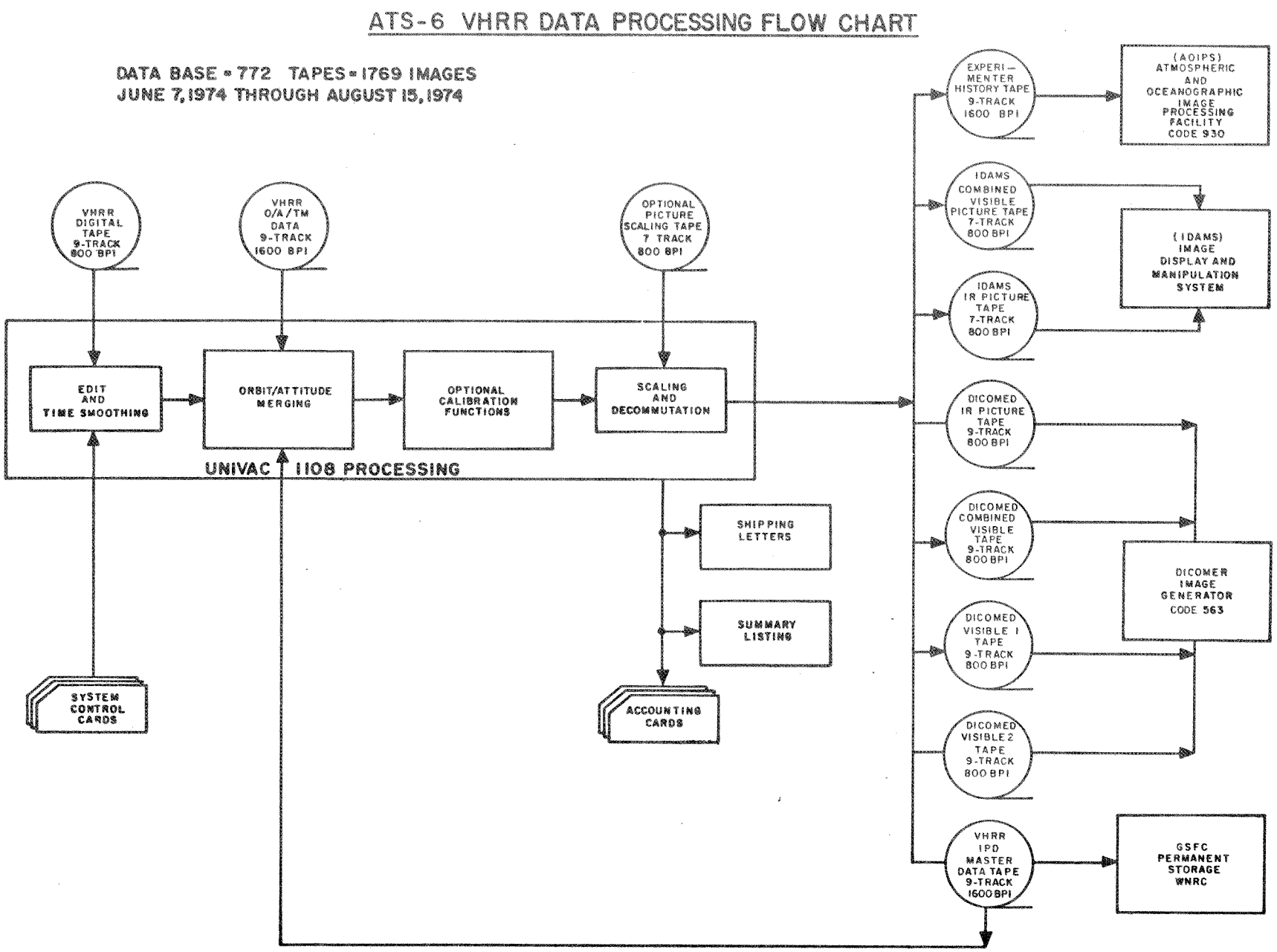


Figure 1-2. Program Chart of VHRR DPS System

SECTION 2 - VHRR TAPES

2.1 TAPE CONTENTS

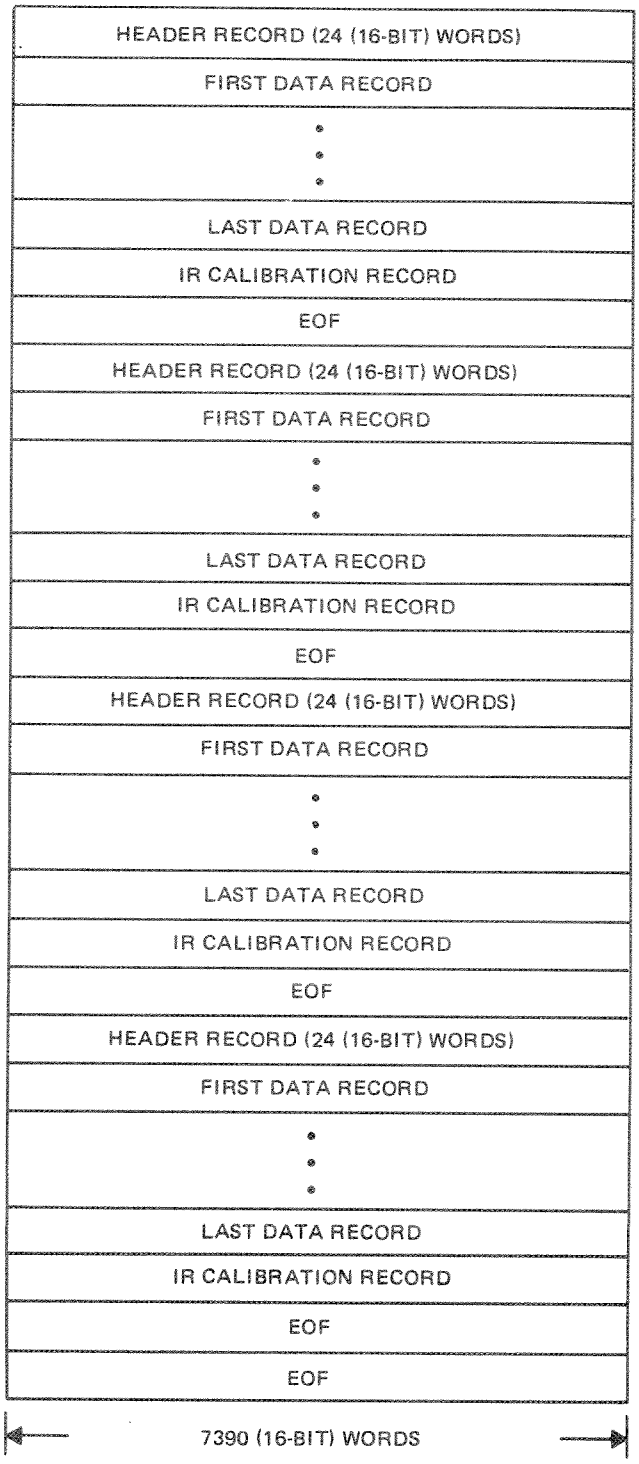
The VHRR tapes are sent from the ATS tracking station and are used as input source tapes to the UNIVAC 1108 VHRR Data Processing System to generate experimenter picture tapes. VHRR tapes are received in one of two modes: full-Earth or sector mode. A full-Earth mode VHRR tape contains one file of VHRR raw sensor data and one IR calibration record. A sector mode VHRR tape contains one to four sector files of VHRR raw sensor data and one IR calibration record.

2.2 TAPE STRUCTURE

The VHRR tapes are odd-parity, 9-track, 800-bpi tapes. The tape structure is illustrated in Figure 2-1. The data structure varies according to the two VHRR data modes:

In the full-Earth mode, the tape consists of one file beginning with a header record of 48 characters (Table 2-1), followed by 1200 line data records (Table 2-2) and one (optional) infrared calibration record (Table 2-3). Header records and line data records are separated by inter-record gaps. Two EOF marks follow the last record on the tape.

In the sector mode, there are one to four sector files on the tape. Each sector file begins with a header record (Table 2-1), followed by 300 line data records (240 line data records for sector 9), and one infrared (IR) calibration data record (optional). Sector files are separated by single EOF marks and two EOF marks following the last sector file.



NOTE: SECTOR TAPES MAY HAVE UP TO FOUR FILES OF DATA, WHEREAS FULL EARTH TAPES MAY HAVE ONLY ONE.

Figure 2-1. ATS-6 VHRR Tape Structure

Table 2-1. ATS-6 VHRR Header Record Format

16-BIT WORD	CHARACTERS	CONTENT	FORMAT
1-3		DATE OF RECORDING (YYMMDD)	INTEGER
4	1	SPACE	ALPHANUMERIC
	2	STATION CODE	ALPHANUMERIC
5			
6	1	SPACE	
	2	ANALOG TAPE NUMBER	INTEGER
7-8			
9	1	SPACE	ALPHANUMERIC
	2	ANALOG TAPE NUMBER	INTEGER
10	1	SPACE	ALPHANUMERIC
	2	ANALOG TAPE DECK ID	ALPHANUMERIC
11	1	SPACE	ALPHANUMERIC
	2	DIGITAL TAPE NUMBER	INTEGER
12-13			
14	1	SPACE	ALPHANUMERIC
	2	DIGITAL FILE NUMBER	INTEGER
15	1	SPACE	ALPHANUMERIC
	2	DIGITAL TAPE DECK ID	ALPHANUMERIC
16	1	SPACE	ALPHANUMERIC
	2	DIGITAL START TIME (DAY COUNT)	INTEGER
17			
18	1	SPACE	ALPHANUMERIC
	2	DIGITAL START TIME (HHMMSS)	INTEGER
19-20			
21	1		
	2	SPACE	ALPHANUMERIC
22	2	PROCESSING MODE	ALPHANUMERIC
23	1	SPACE	ALPHANUMERIC
	2	SCAN SECTOR ID	INTEGER
24	1	SPACE	ALPHANUMERIC
	2	SCAN OFFSET	ALPHANUMERIC

Table 2-2. ATS-6 VHRR Data Record Format (1 of 2)

16-BIT WORD	BITS	CONTENT	FORMAT
1	15-11	NOT USED	
	10-0	MILLISECONDS OF DAY (MOST SIGNIFICANT BITS)	BINARY
2	15-0	MILLISECONDS OF DAY (LEAST SIGNIFICANT BITS)	BINARY
3	15-13	NOT USED	BINARY
	12-10	COMPUTER ID	BINARY
	9	LINE REVERSAL FLAG	BINARY
	8-0	DAY OF YEAR	BINARY
4	15-13	NOT USED	BINARY
	12-0	PARITY ERROR COUNT	BINARY
5	15-8	BAD LINE FLAG	BINARY
	7	LOSS OF SYNC FLAG	BINARY
	6-0	HARDWARE STATUS	BINARY
6	15-10	NOT USED	BINARY
	9-1	IR ELECTRICAL CALIBRATION LEVEL 1 DATA	BINARY
	0	PARITY BIT	BINARY
7	15-10	NOT USED	BINARY
	9-1	VISIBLE 1 ELECTRICAL CALIBRATION LEVEL 1 DATA	BINARY
	0	PARITY BIT	BINARY
8	15-10	NOT USED	BINARY
	9-1	VISIBLE 2 ELECTRICAL CALIBRATION LEVEL 1 DATA	BINARY
	0	PARITY BIT	BINARY
9-35		REPEAT WORDS 6 THROUGH 8 9 TIMES	BINARY
36-65		REPEAT WORDS 6 THROUGH 35 FOR LEVEL 2	BINARY
66-95		REPEAT WORDS 6 THROUGH 35 FOR LEVEL 3	BINARY
96-125		REPEAT WORDS 6 THROUGH 35 FOR LEVEL 4	BINARY
126-155		REPEAT WORDS 6 THROUGH 35 FOR LEVEL 5	BINARY
156-185		REPEAT WORDS 6 THROUGH 35 FOR LEVEL 6	BINARY
186	15-10	NOT USED	
	9-1	TELEMETRY DATA WORD	BINARY
	0	PARITY BIT	
187	15-10	NOT USED	
	9-0	LINE SYNC (BITS 1 TO 10)	
188	15-10	NOT USED	
	9-0	LINE SYNC (BITS 11-20)	
189	15-10	NOT USED	
	9-3	LINE SYNC (BITS 21-27)	
	2	NOT USED	
	1-0	LINE COUNT (MOST SIGNIFICANT BITS)	

Table 2-2. ATS-6 VHRR Data Record Format (2 of 2)

16-BIT WORD	BITS	CONTENT	FORMAT
190	15-10	NOT USED	
	9-1	LINE COUNT (LEAST SIGNIFICANT BITS)	
	0	NOT USED	
191	15-10	NOT USED	
	9-1	IR DATA WORD 1	
	0	PARITY BIT	
192	15-10	NOT USED	
	9-1	VISIBLE 1 DATA WORD 1	
	0	PARITY BIT	
193	15-10	NOT USED	
	9-1	VISIBLE 2 DATA WORD 1	
	0	PARITY BIT	
194-7390		REPEAT WORDS 191 THROUGH 193 2399 TIMES	

Table 2-3. IR Calibration Record Format for VHRR Tape (1 of 2)

16-BIT WORD	BITS	CONTENT	FORMAT
1	15-11	NOT USED	
	10-0	MILLISECONDS OF DAY (MOST SIGNIFICANT BITS)	BINARY
2	15-0	MILLISECONDS OF DAY (LEAST SIGNIFICANT BITS)	BINARY
3	15-13	NOT USED	BINARY
	12-10	COMPUTER ID	BINARY
	9	LINE REVERSAL FLAG	BINARY
	8-0	DAY OF YEAR	BINARY
4	15-13	NOT USED	BINARY
	12-0	PARITY ERROR COUNT	BINARY
5	15-8	BAD LINE FLAG	BINARY
	7	LOSS-OF-SYNC FLAG	BINARY
	6-0	HARDWARE STATUS	BINARY
6	15-10	NOT USED	BINARY
	9-1	IR ELECTRICAL CALIBRATION LEVEL 1 DATA	BINARY
	0	PARITY BIT	BINARY
7	15-10	NOT USED	BINARY
	9-1	VISIBLE ELECTRICAL CALIBRATION LEVEL 1 DATA	BINARY
	0	PARITY BIT	BINARY
8	15-10	NOT USED	BINARY
	9-1	VISIBLE ELECTRICAL CALIBRATION LEVEL 1 DATA	BINARY
	0	PARITY BIT	BINARY
9-35		REPEAT WORDS 6 THROUGH 8 9 TIMES	BINARY
36-65		REPEAT WORDS 6 THROUGH 35 FOR LEVEL 2	BINARY
66-95		REPEAT WORDS 6 THROUGH 35 FOR LEVEL 3	BINARY
96-125		REPEAT WORDS 6 THROUGH 35 FOR LEVEL 4	BINARY
126-155		REPEAT WORDS 6 THROUGH 35 FOR LEVEL 5	BINARY
156-185		REPEAT WORDS 6 THROUGH 35 FOR LEVEL 6	BINARY
186	15-10	NOT USED	
	9-1	TELEMETRY DATA WORD	BINARY
	0	PARITY BIT	
187	15-10	NOT USED	
	9-0	LINE SYNC (BITS 1 TO 10)	
188	15-10	NOT USED	
	9-0	LINE SYNC (BITS 11-20)	
189	15-10	NOT USED	
	9-3	LINE SYNC (BITS 21-27)	
	2	NOT USED	
	1-0	LINE COUNT (MOST SIGNIFICANT BITS)	

Table 2-3. IR Calibration Record Format for VHRR Tape (2 of 2)

16-BIT WORD	BITS	CONTENT	FORMAT
190	15-10	NOT USED	
	9-1	LINE COUNT (LEAST SIGNIFICANT BITS)	
	0	NOT USED	
191	15-10	NOT USED	
	9-1	IR CALIBRATION WORD 1	BINARY
	0	PARITY BIT	BINARY
192	15-10	NOT USED	BINARY
	9-1	VISIBLE 1 CALIBRATION WORD 1	
	0	PARITY BIT	
193	15-10	NOT USED	
	9-1	VISIBLE 2 CALIBRATION WORD 1	
	0	PARITY BIT	
194-367		CALIBRATION WORDS 2 THROUGH 59	
368	15-10	NOT USED	
	9-1	IR CALIBRATION WORD 60	BINARY
	0	PARITY BIT	
368	15-16	NOT USED	
	9-1	VISIBLE 1 CALIBRATION WORD 60	
	0	PARITY BIT	
370	15-10	NOT USED	
	9-1	VISIBLE 2 CALIBRATION WORD 60	
	0		
371-7390		REPEAT WORDS 191-370 39 TIMES	

SECTION 3 - F1 (ORBIT/ATTITUDE) TAPE

3.1 TAPE CONTENTS

The F1 tapes, which contain Orbit/Attitude data for the ATS-6 satellite, are generated within IPD and are used as input to the VHRR Data Processing System for merging O/A data onto each image line of the Experimentor History tape.

3.2 TAPE STRUCTURE

The F1 tapes are odd-parity, 9-track, 1600-bpi tapes. The F1 tapes are multi-file tapes and each file contains a header record (Table 3-1) describing the time interval of the data records in the file and several data records. Each data record (Table 3-2) contains 16 frames of data; each frame contains the time of the data and O/A data. The usual time between frames is 3 seconds. A detailed description of this tape is given in Figure 3-1.

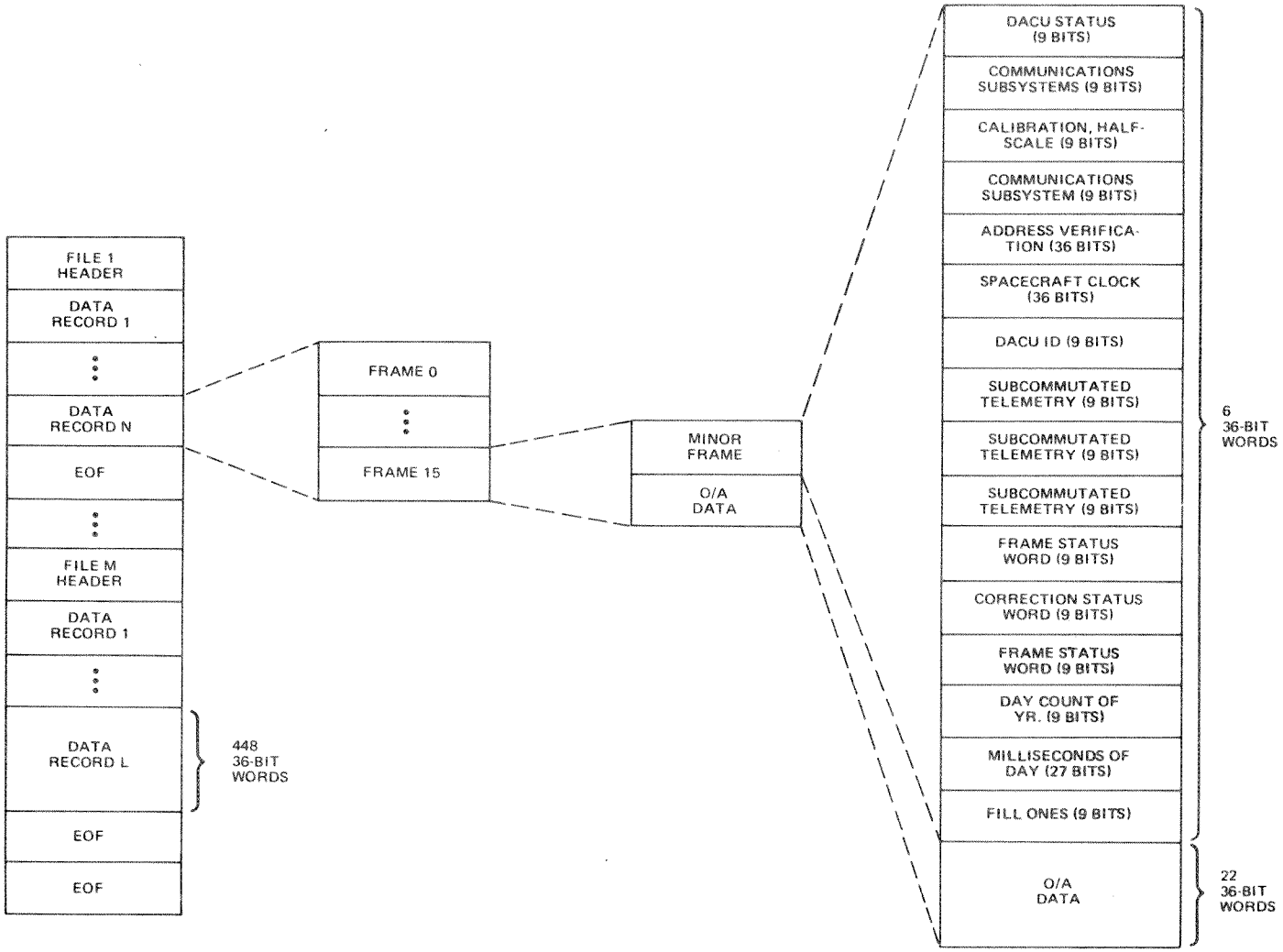


Figure 3-1. ATS-6 F1 Tape Format

Table 3-1. ATS-6 F1 Tape Header Record Format

8-BIT CHARACTERS	CONENTS	FORMAT
1-7	INTERNATIONAL CODE	EBCDIC
9-14	DATE OF RECORDING (YYMMDD)	EBCDIC
16-18	STATION ID	EBCDIC
20-25	EQUIPMENT PARAMETER	EBCDIC
27-30	ANALOG TAPE NUMBER	EBCDIC
32-33	ANALOG TAPE FILE NUMBER	EBCDIC
35-38	ANALOG START TIME (HHMM)	EBCDIC
40-43	ANALOG STOP TIME (HHMM)	EBCDIC
45-50	DATE DIGITIZE (YYMMDD)	EBCDIC
52-53	LINE	EBCDIC
55-58	BUFFER TAPE NUMBER	EBCDIC
60-61	BUFFER TAPE FILE NUMBER	EBCDIC
63-66	EDIT TAPE NUMBER	EBCDIC
68-69	EDIT TAPE FILE NUMBER	EBCDIC
71-74	FI-MDT TAPE NUMBER	EBCDIC
76-77	FI-MDT TAPE FILE NUMBER	EBCDIC
79-81	START DAY	EBCDIC
83-88	START TIME (HHMMSS)	EBCDIC
90-92	STOP DAY	EBCDIC
94-99	STOP TIME (HHMMSS)	EBCDIC
101-106	ELAPSE TIME (HHMMSS)	EBCDIC
108-111	DECOM RUN NUMBER	EBCDIC
113	DECOM RUN REEL NUMBER	EBCDIC
115-116	DECOM RUN REEL FILE NUMBER	EBCDIC
118-119	EXPERIMENTER ID	EBCDIC
121	TYPE	EBCDIC
122	MODE (DWELL = D, NORMAL = N)	EBCDIC
124-126	PERCENT RECOVERED	EBCDIC
128-130	RECOVERY INDEX	EBCDIC
132	TIME CORRECTION FLAG	EBCDIC

Table 3-2. ATS-6 F1 Tape Data Record Format

9-BIT WORD	BITS	CONTENTS FRAMED	FORMAT
1		DACU STATUS	BINARY
2		COMMUNICATIONS SUBSYSTEM	BINARY
3		CALIBRATION, HALFSCALE	BINARY
4		COMMUNICATIONS SUBSYSTEM	BINARY
5-8		ADDRESS VERIFICATION	BINARY
9-12		SPACECRAFT CLOCK	BINARY
13		DACU	BINARY
14		TELEMETRY WORD CHANNEL 122	BINARY
15		TELEMETRY WORD CHANNEL 123	BINARY
16		TELEMETRY WORD CHANNEL 124	BINARY
17		FRAME STATUS WORD	BINARY
18		CORRECTION STATUS WORD	BINARY
19		FRAME STATUS WORD	BINARY
20		DAY COUNT OF YEAR	BINARY
21-23		MILLISECONDS OF DAY	BINARY
24		FILL DATA ONES	BINARY
25-112		88 9-BIT WORDS OF ORBIT/ATTITUDE DATA	BINARY
113-224		REPEAT OF WORDS 1-112 FOR FRAME 0	BINARY
225-336		REPEAT OF WORDS 1-112 FOR FRAME 2	BINARY
.		.	
.		.	
.		.	
1681-1792		REPEAT OF WORDS 1-112 FOR FRAME 15	BINARY

SECTION 4 - EXPERIMENTER HISTORY TAPE

4.1 TAPE CONTENTS

Experimenter History tapes are produced by the VHRR Data Processing System and contain calibrated VHRR infrared and visible picture information. Before output to tape, the data is checked for correct line and time sequence and smoothed as required. Pixels are not shifted to account for camera movements on this tape.

4.2 TAPE STRUCTURE

Experimenter history tapes are 9-track, 1600-bpi tapes, containing from 1 to 4 files (1 file for the full-Earth mode and up to 4 files for the sector mode). Each file consists of a header record and up to 1201 data records, and each is terminated by an end-of-file (EOF) mark with the last file terminated by two end-of-file marks.

Figures 4-1 and 4-2 illustrate the tape structures in the full-Earth and sector modes, respectively. The format of the header record is presented in Table 4-1 and consists of 132 characters written in EBCDIC. Figure 4-3 describes the format of the IR calibration record.

Figure 4-4 illustrates the data record format. Word 66 in the data record contains an information summary of the quality of the data record, the software flag field, and is defined in Table 4-2. Words 2467 through 2488 contain 22 words of orbit/attitude information described in Table 4-3. The 47 orbit/attitude data parameters shown in Table 4-3 are further defined as follows:

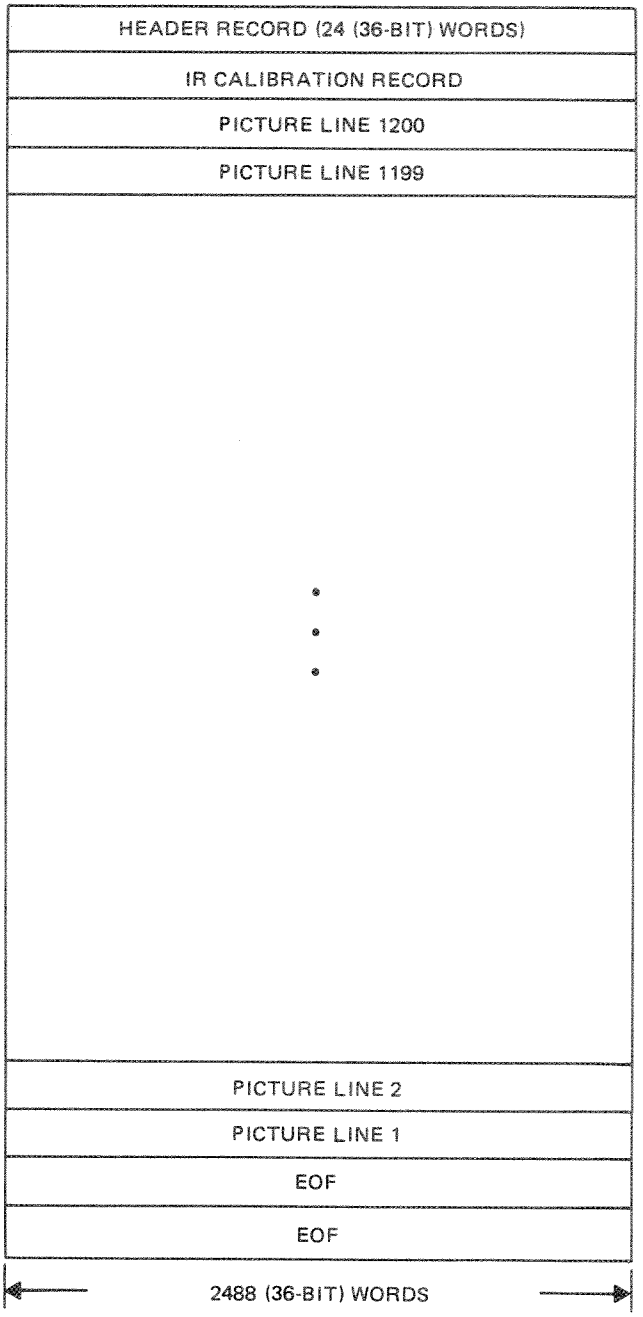


Figure 4-1. Experimenter History Tape Format (Full-Earth)

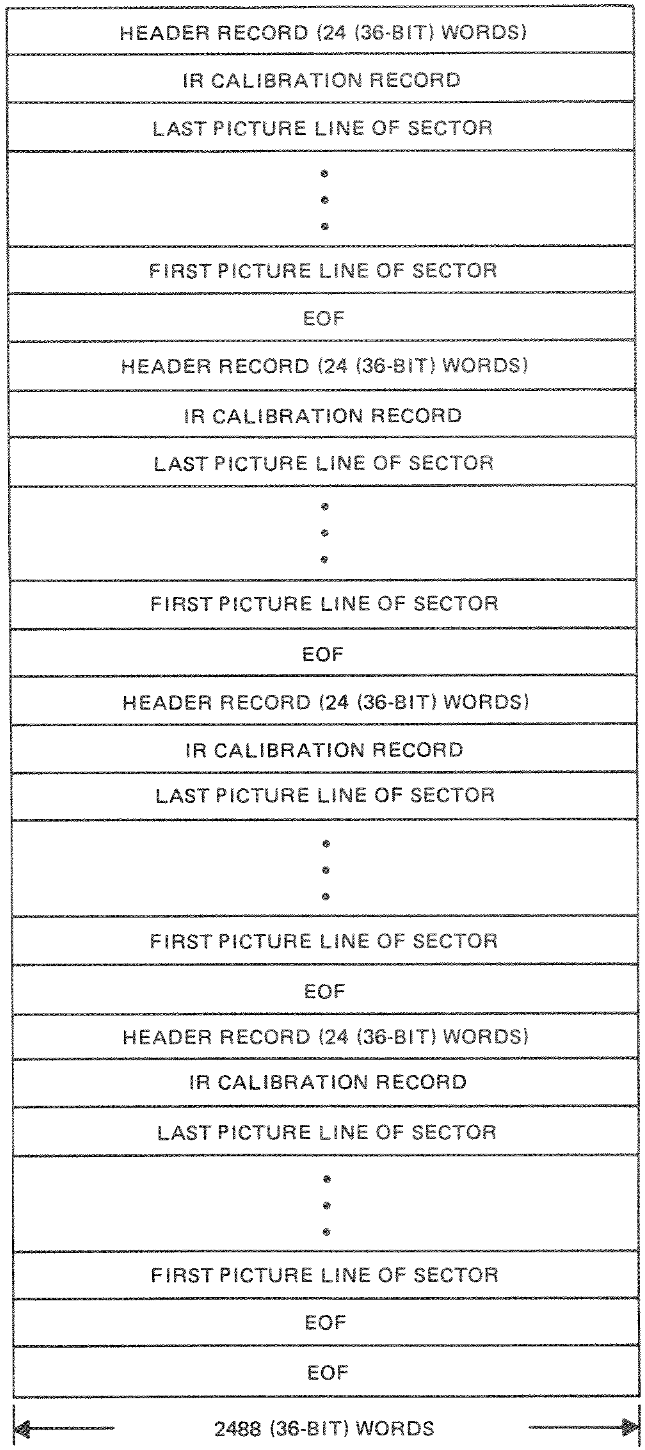


Figure 4-2. Experimenter History Tape Format (Sector Mode)

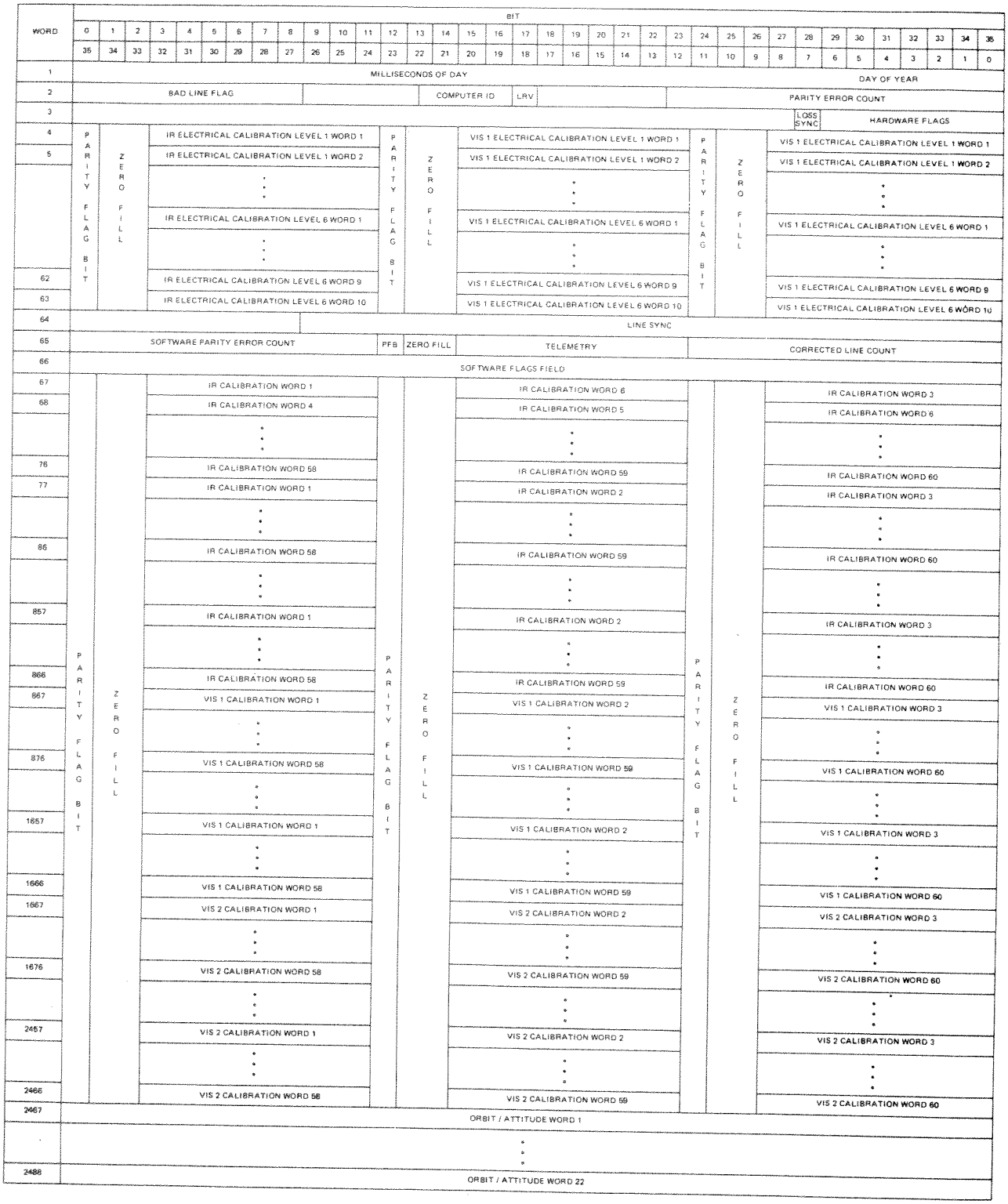


Figure 4-3. IR Calibration Record Format for Experimenter History Tape

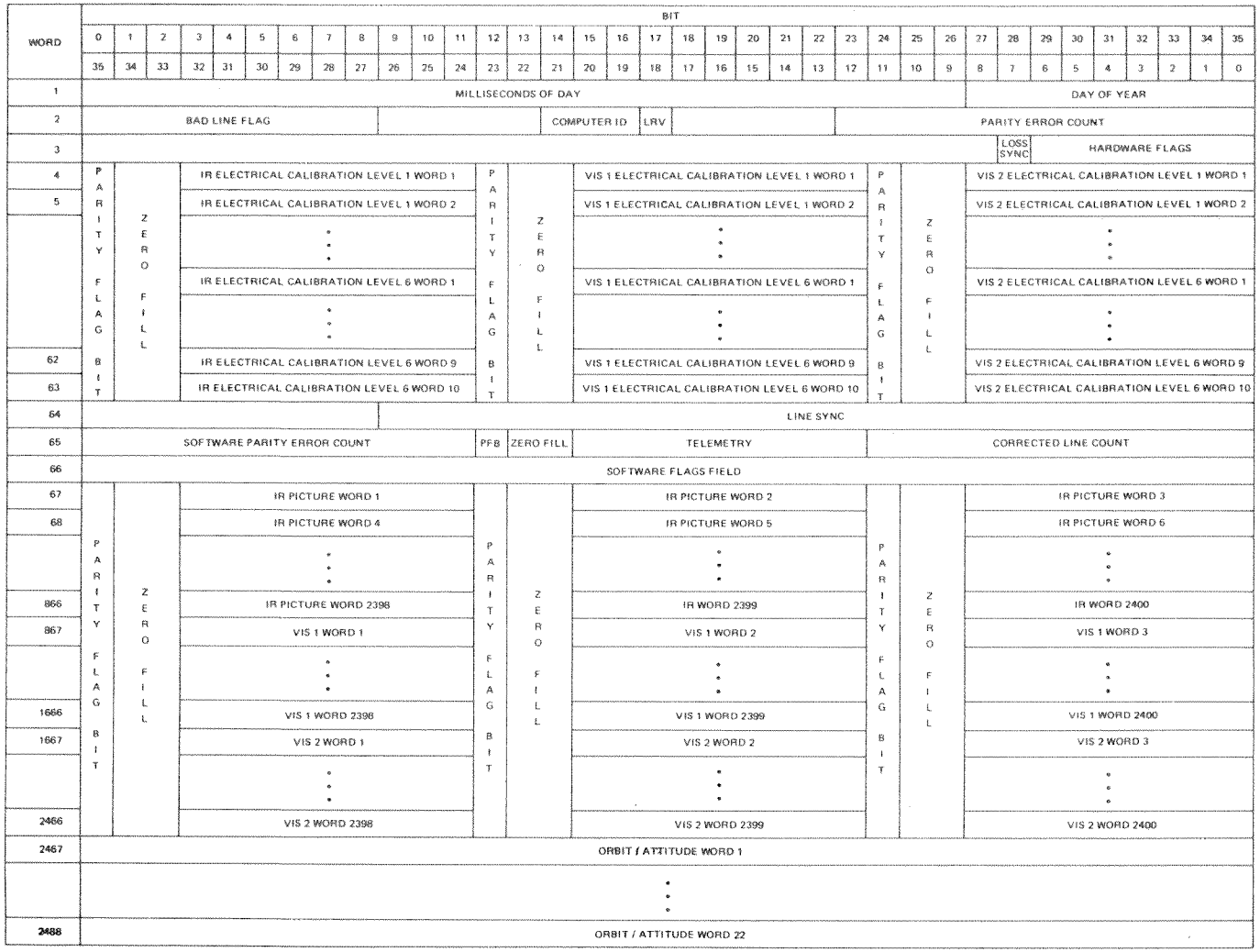


Figure 4-4. Experimenter History Tape Data Record Format

Table 4-1. Experimenter History Tape Header Record Format

CHARACTERS	DESCRIPTION
1-7 + SPACE	INTERNATIONAL CODE
9-14 + SPACE	DATE OF RECORDING (YYMMDD)
16-18 + SPACE	STATION CODE
20-24 + SPACE	ANALOG TAPE NUMBER
26 + SPACE	ANALOG FILE NUMBER
28 + SPACE	ANALOG TAPE DECK ID
30-34 + SPACE	DIGITAL TAPE NUMBER
36 + SPACE	DIGITAL FILE NUMBER
38 + SPACE	DIGITAL TAPE DECK ID
40-42 + SPACE	DIGITAL START TIME (DAY COUNT)
44-49 + SPACE	DIGITAL START TIME (HHMMSS)
51-55 + SPACE	CALIBRATION INDICATOR[1]
57-60 + SPACE	NOT USED
62-63 + SPACE	PROCESSING MODE
65 + SPACE	SCAN SECTOR ID
67 + SPACE	SCAN OFFSET
69-73 + SPACE	EXPERIMENTER HISTORY TAPE NUMBER
75 + SPACE	EXPERIMENTER HISTORY FILE NUMBER
77-79 + SPACE	EXPERIMENTER HISTORY START TIME (DAY COUNT)
81-86 + SPACE	EXPERIMENTER HISTORY START TIME (HHMMSS)
88-93 + SPACE	EXPERIMENTER HISTORY STOP TIME (HHMMSS)
95-100 + SPACE	EXPERIMENTER HISTORY ELAPSED TIME (HHMMSS)
102-105 + SPACE	INITIAL SCAN LINE COUNT
107-110 + SPACE	FINAL SCAN LINE COUNT
112-116 + SPACE	DECOM RUN NUMBER
118 + SPACE	REEL NUMBER
120 + SPACE	REEL FILE NUMBER
122-124 + SPACE	PERCENTAGE OF DATA RECOVERED
126-128 + SPACE	RECOVERY INDEX
130-132	EXPERIMENTER ID

[1]CALIBRATION INDICATOR:

C∅nnn — CALIBRATED WITH IR REFERENCE COUNT nnn
F∅nnn — CALIBRATED WITH FIXED REFERENCE COUNT nnn
u∅nnn — UNCALIBRATED

Table 4-2. Software Flag Field Definition

BITS (LEFTMOST BIT IS 0)	CONTENTS
0	1108 LINE REVERSAL FLAG. IF THIS BIT IS SET TO 1, THIS LINE WAS REVERSED BY THE AT06 VHRR DPS
1 – 5	SYNC ERROR COUNT (5 BITS). NUMBER OF BITS IN ERROR IN THE SYNC PATTERN FOR A LINE
6	SYNC ERROR FLAG (1 BIT). IF THIS BIT IS SET TO 1, IT INDICATES THAT THERE ARE MORE THAN 2 BIT SYNC ERRORS IN THE LINE SYNC PATTERN
7	PARITY ERROR COUNT FLAG (1 BIT). IF SET TO 1, THE PARITY ERROR COUNT FOR A LINE EXCEEDS 10 PERCENT OF THE TOTAL NUMBER OF DATA SAMPLES (7381) IN A LINE
8	PARITY CHECK FLAG (1 BIT). IF SET TO 1, THE GIVEN PARITY ERROR COUNT DISAGREES WITH THE COMPUTED PARITY ERROR COUNT (BITS 34 – 30)
9	GMT CORRECTION FLAG (1 BIT). IF SET TO 1, THE GMT TIME HAS BEEN CHANGED BY TIMC
10	TIME DISCONTINUITY FLAG (1 BIT). SET TO 1 WHENEVER THE LOSS OF SYNC FLAG IS SET. ALSO SET TO 1 WHEN THERE IS A TIME JUMP[a] IN THE CORRECTED LINE TIMES CALCULATED BY TIMC
11	LINE COUNT ERROR FLAG (1 BIT). IF SET TO 1, THE LINE COUNT HAS BEEN CHANGED BY TIMC
13 – 23[b]	UNCORRECTED LINE COUNT (11 BITS). LINE COUNT ASSOCIATED WITH EACH INPUT VHRR TAPE RECORD
25 – 35[b]	CORRECTED LINE COUNT (11 BITS). LINE COUNT CALCULATED BY SUBROUTINE TIMC

[a]TIME JUMP–TIME DIFFERENCE OTHER THAN 1.2 $\pm$0.012 SECONDS BETWEEN CONSECUTIVE LINES.

[b]BITS 12 AND 24 ARE ZERO FILL.

Table 4-3. Orbit/Attitude Words Definition

WORD			
1	(1) DAY COUNT	(2) MILLISECONDS OF DAY	
2	(3) x COORDINATE		(4) $\dot{x}$ COORDINATE
3	(5) y COORDINATE		(6) $\dot{y}$ COORDINATE
4	(7) z COORDINATE		(8) $\dot{z}$ COORDINATE
5	(9) YAW		(10) YAW RATE
6	(11) ROLL		(12) ROLL RATE
7	(13) PITCH		(14) PITCH RATE
8	(15) Z_B - AXIS INTERCEPT LATITUDE	(16) Z_B - AXIS INTERCEPT LONGITUDE	
9	(17) ROTATION OF BODY Y_B-AXIS FROM NORTH	(18) HEIGHT ABOVE EARTH (SUBSATELLITE POINT)	
10	(19) SUBSATELLITE LATITUDE	(20) SUBSATELLITE LONGITUDE	
11	(21) RANGE FROM SPACECRAFT TO Z_B - AXIS INTERCEPT		(22) CROSS POLARIZATION ANGLE
12	(23) θ (Theta)	(24) φ (Phi)	
13	(25) NF x-COORDINATE	(26) NF y-COORDINATE	(27) NF z-COORDINATE
14	(28) EF x-COORDINATE	(29) EF y-COORDINATE	(30) EF z-COORDINATE
15	(31) YAW UNCERTAINTY	(32) ROLL UNCERTAINTY	(33) PITCH UNCERTAINTY
16	(34) α (Alpha)	(35) ATTITUDE SENSOR I.D.	
17	(36) a_{11}	(37) a_{12}	
18	(38) a_{13}	(39) a_{21}	
19	(40) a_{22}	(41) a_{23}	
20	(42) a_{31}	(43) a_{32}	
21	(44) a_{33}	(45) PROGRAM STATUS	
22	(46) CALIBRATION I.D.	(47) MISALIGNMENT I.D.	

1. Name - Day Count of Year

Analytic Definition - This identifies the day on which the processed telemetry frame was transmitted by the spacecraft. The starting point for the count is 0000 hours of the first day of the calendar year (1 January).

Units - Days

Format - This is a nine-bit binary word with the most significant bit (MSB) leading. No sign bit exists.

2. Name - Milliseconds of Day

Analytic Definition - This identifies the time of day on which the processed telemetry frame was transmitted by the spacecraft. The starting point for this parameter is 0000 hours of the day specified in Output Parameter No. 1 (Day Count of Year).

Units - Milliseconds (Seconds $\times 10^{+3}$)

Format - This is a 27-bit binary word with the MSB leading. No sign bit exists.

3. Name - X-Coordinate

Analytic Definition - The X-component of the position vector of the ATS-F spacecraft expressed in an Earth centered inertial (ECI) coordinate system defined below.

X-axis points to the first point of Aries true-of-date and lies in the equatorial plane of the Earth

Z-axis points along the Polaris spin axis of the Earth; the positive direction is north

Y-axis is chosen to complete a right-handed orthogonal set

Units - Tenths of kilometers (kilometers $\times 10^{+1}$)

Format - This is a 20-bit binary word. The first bit is used for the sign and the following nineteen bits for magnitude with the MSB leading.

4. Name - $\dot{X}$- Coordinate

Analytic Definition - The X-component of the velocity vector of the ATS-F spacecraft expressed in the ECI coordinate system described in the Analytic Definition of Output Parameter No. 3.

Units - Meters per second

Format - This is a 16-bit binary word. The first bit is used for the sign and the following 15 bits for magnitude with the MSB leading.

5. Name - Y-Coordinate

Analytic Definition - The Y-component of the position vector of the ATS-F spacecraft expressed in the ECI coordinate system described in the Analytic Definition of Output Parameter No. 3.

Units - Tenths of kilometers (kilometers $\times 10^{+1}$)

Format - This is a 20-bit binary word. The first bit is used for the sign and the following 19 bits for magnitude with the MSB leading.

6. Name - $\dot{Y}$-Coordinate

Analytic Definition - The Y-component of the velocity vector of the ATS-F spacecraft expressed in the ECI coordinate system defined in the Analytic Definition of Output Parameter No. 3.

Units - Meters per second

Format - This is a 16-bit binary word. The first bit is used for the sign and the following 15 bits for magnitude with the MSB leading .

7. Name - Z-Coordinate

Analytic Definition - The Z-component of the position vector of the ATS-F spacecraft expressed in the ECI coordinate system described in the Analytic Definition of Output Parameter No. 3

Units - Tenths of kilometers (kilometers $\times 10^{+1}$)

Format - This is a 20-bit binary word. The first bit is used for the sign and the following 19 bits for magnitude with the MSB leading.

8. Name - $\dot{Z}$-Coordinate

Analytic Defintion - The Z-component of the velocity vector of the ATS-F spacecraft expressed in the ECI coordinate system defin in the Analytic Definition of Output Parameter No. 3.

Units - Meters per second.

Format - This is a 16-bit binary word. The first bit is used for the sign and the following 15 bits for magnitude with MSB leading.

9. Name - Yaw

Analytic Definition - The first of three rotations about ATS-F body axes that are used to define ATS-F attitude relative to the Local Vertical (LV) coordinate system defined below.

Z_C points along the local vertical toward the center of mass of the Earth

X_C points east parallel to the Earth's equatorial plane

Y_C is chosen to complete a right-handed orthogonal set (nominally points south)

The Euler rotations, in the sequence of their application, are as follows:

Yaw - rotation about the spacecraft body Z-axis (Z_B)

Roll - rotation about the spacecraft body X-axis (X_B)

Pitch - rotation about the spacecraft body Y-axis (Y_B)

Units - Thousandths of a degree (degree $\times$ 10^{+3}). Yaw is always taken to be positive ranging from) to 360 degrees.

Format - This is a 20-bit binary word with MSB leading. No sign bit exists.

10. Name - Yaw Rate

Analytic Definition - The time rate of change of the yaw Euler angle defined in the Analytic Definition of Output Parameter No. 9.

Units - Thousandths of a degree per minute (degrees per minute x 10^{+3})

Format - This is a 16-bit binary word. The first bit is used for the sign and the following 15 bits for magnitude with MSB leading.

11. Name - Roll

Analytic Definition - The second rotation in the Euler sequence used to define ATS-F attitude. This rotation is about the spacecraft body X-axis (X_B). The attitude is relative to the LV coordinate system defined in the Analytic Definition of Output Parameter No. 9.

Units - Thousandths of a degree (degrees x 10^{+3})

Format - This is a 20-bit binary word. The first bit is used for the sign and the following 19 bits for magnitude with MSB leading.

12. Name - Roll Rate

Analytic Definition - The time rate of change of the roll Euler angle defined in the Analytic Definition of Output Parameter No. 11.

Units - Thousandths of a degree per minute (degrees per minute x 10^{+3}).

Format - This is a 16-bit binary word. The first bit is used for the sign and the following 15 bits for magnitude with the MSB leading.

13. Name - Pitch

Analytic Description - The third rotation in the Euler sequence used to define ATS-F attitude. This rotation is about the spacecraft body Y-axis. The attitude is relative to the LV coordinate system defined in the Analytic Definition of Output Parameter No. 9.

Units - Thousandths of a degree (degrees x 10^{+3}).

Format - This is a 20-bit binary word. The first bit is used for the sign and the following 19 bits for magnitude with the MSB leading.

14. Name - Pitch Rate

Analytic Definition - The time rate of change of the pitch Euler angle defined in the Analytic Definition of Output Parameter No. 13.

Units - Thousandths of a degree per minute (degrees per minute $\times 10^{+3}$).

Format - This is a 16-bit binary word. The first bit is used for the sign and the following 15 bits for magnitude with the MSB leading.

15. Name - Z_B-Axis Intercept Latitude

Analytic Definition - The latitude of the intercept point of a line coincident with the spacecraft body Z-axis (Z_B) and the surface of the Earth. An ellipsoidal model of the Earth is used.

Units - Hundredths of a degree (degrees $\times 10^{+2}$).

Format - This is an 18-bit binary word. The first bit is used for the sign and the following 17 bits for magnitude with MSB leading.

16. Name - Z_B-Axis Intercept Longitude

Analytic Description - The longitude of the intercept point of a line coincident with the spacecraft body Z-axis (Z_B) and the surface of the Earth. An ellipsoidal model of the Earth is used.

Units - Hundredths of a degree (degree $\times 10^{+2}$). Longitude is always positive measured East from Greenwich and lies in the range 0 to 360 degrees.

Format - This is an 18-bit binary word with the MSB leading. No sign bit exists.

17. Name - Rotation of Y_B-Axis from North

Analytic Definition - The angle between the following planes.

Plane 1: Plane formed by the spacecraft Z-axis (Z_B) and the local north vector (i.e., $-Y_C$, see Analytic Definition of Output Parameter No. 9).

Plane 2: Plane formed by the spacecraft Z-axis (Z_B) and Y-axis (Y_B).

Units - Hundredths of a degree (degrees $\times 10^{+2}$).

Format - This is an 18-bit binary word with MSB leading. No sign bit exists.

18. Name - Height Above Subsatellite Point

Analytic Definition - The height of the ATS-F spacecraft above the surface of the Earth measured along the line between the spacecraft and the center of mass of the Earth. An ellipsoidal model of the Earth is used.

Units - Kilometers

Format - This is an 18-bit binary word. No sign bit exists.

19. Name - Subsatellite Latitude

Analytic Definition - The geodetic latitude of the intercept point on the surface of the Earth of a line between the spacecraft and the center of mass of the Earth. An ellipsoidal model of the Earth is used.

Units - Hundredths of a degree (degrees $\times 10^{+2}$).

Format - This is an 18-bit binary word. The first bit is used for the sign and the following 17 bits for magnitude with the MSB leading.

20. Name - Subsatellite Longitude

Analytic Definition - The longitude of the intercept point on the surface of the Earth of a line between the spacecraft and the center of mass of the Earth. An ellipsoidal model of the Earth is used.

Units - Hundredths of a degree (degrees $\times 10^{+2}$). Longitude is always positive measured east from Greenwich and lies between 0 and 360 degrees.

Format - This is an 18-bit binary word with the MSB leading. No sign bit exists.

21. Name - Range from Spacecraft to Z_B-Axis Intercept

Analytic Description - The distance between the spacecraft and the point defined by the intersection of the Z-axis (Z_B) with the Earth's surface given in the Analytic Descriptions of Output Parameters Nos. 15 and 16.

Units - Tenths of a kilometer (kilometers $\times 10^{+1}$).

Format - This is a 20-bit binary word with MSB leading. No sign bit exists.

22. Name - Cross-Polarization Angle

Analytic Description - The angle between the ATS-F receiver and a vertically polarized antenna located at the Z-axis (Z_B) intercept point. It is the acute angle between the following two planes:

Plane 1: Defined by (a) center of mass of the Earth and (b) the spacecraft body Z-axis (Z_B)

Plane 2: Defined by (a) the location of an antenna element in the spacecraft body X-Y plane (X_B-Y_B), and (b) the spacecraft body Z-axis (Z_B).

Units - Hundredths of a degree (degrees $\times 10^{+2}$), in the range 0 to 360 degrees.

Format - This is a 16-bit binary word with the MSB leading. No sign bit exists.

23. Name - Antenna Pattern Angle θ

Analytic Description - The angle between the spacecraft Z-axis (Z_B) and the vector to a preselected ground station.
The ground station coordinates will be user specified and available upon request.

Units - Hundredths of a degree (degrees $\times 10^{+2}$).

Format - This is an 18-bit binary word with the MSB leading. No sign bit exists.

24. Name - Antenna Pattern Angle ϕ

Analytic Description - The angle between the following two planes.

Plane 1: Plane defined by the spacecraft body X and Z-axes $(X_B \cdot Z_B)$

Plane 2: Plane defined by the vector to a preselected ground station and the spacecraft body Z-axis (Z_B)

The ground station coordinates will be user specified and available upon request.

Units: Hundredths of a degree (degrees $\times 10^{+2}$). Antenna pattern angle ϕ is always taken to be positive 0 to 360 degrees.

Format: This is an 18-bit binary word with the MSD leading. No sign bit exists.

25. Name - NFX

Analytic Description - The X-component (i_{NF} direction) of the unit vector to the Sun expressed in the Quartz experiment's coordinate system for the sensor assembly on the north face of the Earth Viewing Module (EVM). This coordinate system is defined by a counter-clockwise rotation of 270 degrees about the Z-component of the spacecraft body coordinate system.

Units: Thousandths of a unit (unit $\times 10^{+3}$).

Format: This is a 12-bit binary word. The first bit is used for the sign and the following 11 bits for magnitude with the MSB leading.

26. Name - NFY

Analytic Description - The Y-component (j_{NF} direction) of the unit vector to the Sun expressed in the Quartz experiment's coordinate system for the sensor assembly on the north face of the EVM. This coordinate system is defined by a counter-clockwise rotation of 270 degrees about the z-component of the spacecraft body coordinate system.

Units: Thousandths of a unit (unit $\times 10^{+3}$).

Format: This is a 12-bit binary word. The first bit is used for the sign and the following 11 bits for magnitude with the MSB leading.

27. Name - NFZ

Analytic Description - The Z-component (k_{NF} direction) of the unit vector to the Sun expressed in the Quartz experiment's coordinate system for the sensor assembly on the north fact of the EVM. This coordinate system is defined by a counter-clockwise rotation of 270 degrees about the Z-component of the spacecraft body coordinate system.

Units: Thousandths of a unit (unit $\times 10^{+3}$).

Format: This is a 12-bit binary word. The first bit is used for the sign and the following 11 bits for magnitude with the MSB leading.

28. Name - EFX

Analytic Description - The X-component (i_{EF} direction) of the unit vector to the Sun expressed in the ATF Experiment's coordinate system for the sensor assembly on the east fact of the EVM. This coordinate system is coincident with the spacecraft body coordinate system.

Units: Thousandths of a unit (unit $\times 10^{+3}$).

Format: This is a 12-bit binary word. The first bit is used for the sign and the following 11 bits for magnitude with the MSB leading.

29. Name - EFY

Analytic Description - The Y-component (i_{EF} direction) of the unit vector to the Sun expressed in the ATS Experiment's coordinate system for the sensor assembly on the east face of the EVM. This coordinate system is coincident with the spacecraft body coordinate system.

Units: Thousandths of a unit (unit $\times 10^{+3}$).

Format: This is a 12-bit binary word. The first bit is used for the sign and the following 11 bits for magnitude with the MSB leading.

30. Name - EFZ

Analytic Description - The Z-component (k_{EF} direction) of the unit vector to the Sun expressed in the ATS Experiment's coordinate system for the sensor assembly on the east face of the EVM. This coordinate system is coincident with the spacecraft body coordinate system.

Units: Thousandths of a unit (unit $\times 10^{+3}$).

Format: This is a 12-bit binary word. The first bit is used for the sign and the following bits for magnitude with the MSB leading.

31. Name - Yaw Uncertainty

Analytic Description - The statistical uncertainty in the estimate of the yaw angle. It is the square root of the diagonal element of the state covariance matrix corresponding to the yaw state.

Units - Thousandths of a degree (degrees $\times 10^{+3}$).

Format - This is a 12-bit binary word with the MSB leading. No sign bit exists.

32. Name - Roll Uncertainty

Analytic Description - The statistical uncertainty in the estimate of the roll angle. It is the square root of the diagonal element of the state covariance matrix corresponding to the roll state.

Units - Thousandths of a degree (degrees $\times 10^{+3}$).

Format - This is a 12-bit binary word with the MSB leading. No sign bit exists.

33. Name - Pitch Uncertainty

Analytic Description - The statistical uncertainty in the estimate of the pitch angle. It is the square root of the diagonal element of the state covariance matrix corresponding to the pitch state.

Units - Thousandths of a degree (degrees $\times 10^{+3}$).

Format - This is a 12-bit binary word with the MSB leading. No sign bit exists.

34. Name - Offset Pointing Angle, α

Analytic Description - The angle between the line of sight to the subsatellite point (output parameter 19 and 20) and the spacecraft Z-axis (Z_B).

Units - Hundredths of a degree (degrees $\times 10^{+2}$).

Format - This is a 14-bit binary word with the MSB leading. No sign bit exists.

35. Name - Attitude Sensor ID

Analytic Description - This identifies the attitude sensors whose data is being utilized in the attitude estimation process.

Units - None (binary flags)

Format - This is a string of 22 bits. Each bit corresponds to a specific sensor on ATS-F and indicates whether that sensor's output is used in the attitude estimation process. The state "1" indicates it is used. The bits refer to the following sensors in the indicated order.

Bit No.		Sensor
1		Earth Sensor
2		Yaw Inertial Reference Unit
3		Polaris Sensor No. 2
4		Digital Sun Sensor +X axis
5		Digital Sun Sensor -X axis
6	Auxiliary	Digital Sun Sensor A111
7	Auxiliary	Digital Sun Sensor A112
8	Auxiliary	Digital Sun Sensor A113
9		Interferometer No. 1
10		Interferometer No. 2
11		Monopulse VHF
12		Monopulse S-Band
13		Monopulse C-Band
14		Coarse Sun Sensor No. 1
15		Coarse Sun Sensor No. 2
16		Coarse Sun Sensor No. 3

Bit No.	Sensor
17	Coarse Sun Sensor No. 4
18	Fine Sun Sensor +X axis
19	Fine Sun Sensor -X axis
20	Rate Gyro Assembly No. 1
21	Rate Gyro Assembly No. 2
22	Spare

36-44. Name - Elements of the Attitude Transformation Matrix (a_{ij})

Analytic Description - Elements of the transformation matrix from the local vertical (L-V) coordinate frame to the spacecraft body coordinate frame. The matrix is of the form:

$$[A] = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$$

The matrix transforms a vector in the local vertical coordinate frame ($\bar{V}_{L-V}$) to a vector in the spacecraft body frame ($\bar{V}_B$) according to the following relationship:

$$V_B = [A]\,\bar{V}_{L-V}$$

Units - Hundred thousandths of a unit (unit $\times 10^{+5}$)

Format - Each element is an 18-bit binary word. The first bit is used for the sign and the following 17 bits for magnitude with the MSB leading.

Output Parameter No.	a_{ij}
36	a_{11}
37	a_{12}
38	a_{13}
39	a_{21}
40	a_{22}
41	a_{23}
42	a_{31}
43	a_{32}
44	a_{33}

45. Name - Program Status

Analytic Description - Code words for internal use by attitude generation personnel to identify program status.

Units - None. Code words.

Format - Program Status Flag (XXX, X = 0 or 1)
- XX0 - No cold start
- XX1 - Filter algorithm cold start
- X0X - Filter adaptive option not on
- X1X - Filter adaptive option on
- 0XX - Attitude state vector calculated normally
- 1XX - Attitude state vector was propagated due to mission or bad data.

46. Name - Calibration Identifier

Analytic Description - Code words for internal use by attitude generation personnel to identify telemetry calibration curves used in generating attitude.

Units - None. Code words.

Format - This is an 18-bit binary word with the MSB leading. No sign bit exists. The value of this word indicates the telemetry curve set used. A value of "1" indicates telemetry curve set No. 1, a value of "2" indicates telemetry curve set No. 2, etc.

47. Name - Misalignment Identifier

Analytic Description - Code words for internal use by attitude generation personnel to identify attitude sensor misalignment sets used in generating attitudes.

Units - None. Code words.

Format - Misalignment calibration flag.

0 - Non-calibration mode (default value). Bias estimates determined. The program employs user specified bias values.

1 - Calibration mode. Selected biases are estimated. Biases that are not estimated are user-specified.

4.3 EXPERIMENTER HISTORY TAPE SHIPPING LETTER

A shipping letter is generated by the ATS-VHRR data processing system for each experimenter tape created.

Samples of Experimenter History Tape Shipping letters for full-Earth mode and sector mode files are given in Figures 4-5 and 4-6, respectively.

Modifications that are currently being implemented on the shipping letters are noted. These modifications will indicate when calibration has been performed on the experimenter data and will assume the following format:

CXXX - meaning calibration performed with IR reference count XXX

FXXX - meaning calibration performed with fixed IR reference count XXX

U⌀⌀⌀ - meaning calibration requested but failed

EXPERIMENTER HISTORY TAPE SHIPPING LETTER

****

		ANALOG			**DIGITAL							MDI																
DATE YYMMDD	STA	TAPE NO.	F N	I D	TAPE NO.	F N	I D	D/C	START TIME HHMMSS	STOP D/C	TIME HHMMSS	PM	S I	S O	TAPE	F L	ST DAY	START HHMMSS	STOP HHMMSS	ELAP HHMMSS	LINE INIT	CNT FIN	DECOM RUN	R N	F N	I DTA REC	REC IDA	EXP ID
******	***	*****	*	*	*****	*	*	***	******	***	******	**	*	*	*****	*	***	******	******	******	****	****	*****	*	*	***	***	***
740712	ROS	00050			00267	1	1	193	232558			PR	0	E	00267	1	193	232558	234958	024 1	1	1200	1	1	1	99	99	MSI

NOTE: CALIBRATION INDICATOR TO BE ADDED IN SHADED AREA.

Figure 4-5. Experimenter History Tape Shipping Letter (Full-Earth Mode)

EXPERIMENTER HISTORY TAPE SHIPPING LETTER

****

DATE YYMMDD	STA	ANALOG TAPE NO.	F N	I D	DIGITAL TAPE NO.	F N	I D	D/C	START TIME HHMMSS	STOP TIME D/C	HHMMSS	PM	S I	S O	MDI TAPE	F L	ST DAY	START HHMMSS	STOP HHMMSS	ELAP HHMMSS	LINE INIT	CNT FIN	DECOM RUN	R N	F N	DTA REC	REC IDX	EXP ID
******	***	*****	*	*	*****	*	*	***	******	***	******	**	*	*	*****	*	***	******	******	******	****	****	*****	*	*	***	***	***
740626	ROS	00018			00092	1	0	177	16343			PM	7	E	00092	1	177	16 430	161029	0 6 1	721	1020	7	1	1	99	99	HSI

****

DATE YYMMDD	STA	ANALOG TAPE NO.	F N	I D	DIGITAL TAPE NO.	F N	I D	D/C	START TIME HHMMSS	STOP TIME D/C	HHMMSS	PM	S I	S O	MDI TAPE	F L	ST DAY	START HHMMSS	STOP HHMMSS	ELAP HHMMSS	LINE INIT	CNT FIN	DECOM RUN	R N	F N	DTA REC	REC IDX	EXP ID
******	***	*****	*	*	*****	*	*	***	******	***	******	**	*	*	*****	*	***	******	******	******	****	****	*****	*	*	***	***	***
740626	ROS	00018			00092	2	0	177	161104			PM	7	E	00092	2	177	1611 5	1617 2	0 6 1	722	1019	7	2	2	99	83	HSI

****

DATE YYMMDD	STA	ANALOG TAPE NO.	F N	I D	DIGITAL TAPE NO.	F N	I D	D/C	START TIME HHMMSS	STOP TIME D/C	HHMMSS	PM	S I	S O	MDI TAPE	F L	ST DAY	START HHMMSS	STOP HHMMSS	ELAP HHMMSS	LINE INIT	CNT FIN	DECOM RUN	R N	F N	DTA REC	REC IDX	EXP ID
******	***	*****	*	*	*****	*	*	***	******	***	******	**	*	*	*****	*	***	******	******	******	****	****	*****	*	*	***	***	***
740626	ROS	00018			00092	3	0	177	161740			PM	7	E	00092	3	177	161740	162336	0 6 0	722	1019	7	3	3	99	29	HSI

****

DATE YYMMDD	STA	ANALOG TAPE NO.	F N	I D	DIGITAL TAPE NO.	F N	I D	D/C	START TIME HHMMSS	STOP TIME D/C	HHMMSS	PM	S I	S O	MDI TAPE	F L	ST DAY	START HHMMSS	STOP HHMMSS	ELAP HHMMSS	LINE INIT	CNT FIN	DECOM RUN	R N	F N	DTA REC	REC IDX	EXP ID
******	***	*****	*	*	*****	*	*	***	******	***	******	**	*	*	*****	*	***	******	******	******	****	****	*****	*	*	***	***	***
740626	ROS	00018			00092	4	0	177	162414			PM	7	E	00090	4	177	162414	163010	0 6 0	722	1019	7	4	4	99	99	HST

NOTE: CALIBRATION INDICATOR TO BE ADDED IN SHADED AREA.

Figure 4-6. Experimenter History Tape Shipping Letter (Sector Mode)

Addendum A - Contents of Title Area on DICOMED Photograph

Field	Contents	Conditions
1	ATS-6	Constant
2	ROS	Station identifier
3	Sensor Identifier:	
	IR	IR sensor
	V1	Visible 1 sensor
	V2	Visible 2 sensor
	V1/V2	Combined visible sensors
4	10.5 to 12.5 μm	Constant for IR
	0.55 to 0.75 μm	Constant for visible
5	Processing Mode:	
	DIG	Primary (digital mode)
	ANLG	Secondary (FM mode)
6	Picture number-file number	ppppp-f (i.e., picture 31, file 1 would appear as 00031-1)
7	SHIFT nnn-R	Picture has been shifted nnn pixels to the right
8	SCALE n	Scaling table number n used to produce picture
9	Sector Identification	Sector identifier for picture: FULL EARTH or SECTOR n (where n is 1 to 9)
10	Scan Offset for image	
	.2°N OFFSET	SSP Pointing
	5.8°S OFFSET	Rosman Pointing
11	Calibration Indication	
	C nnn	Calibrated with IR reference count nnn
	F nnn	Calibrated with fixed reference count nnn
	U nnn	Uncalibrated
12	Date data was taken	Six digit date: yymmdd where yy is year, mm is month, dd is day
13	Time data was taken	Four digit time: hhmm where hh is hour, mm is minute
14	Z	Constant

REFERENCES

1. Computer Sciences Corporation, Applications Technology Satellite-6 (ATS-6) Very High-Resolution Radiometer (VHRR) System User's Manual, CSC/SD-75/6044, M. X. Mason, M. A. Baker, T. K. Chen, June 1975

2. --, Applications Technology Satellite-6 (ATS-6) Very High-Resolution Radiometer (VHRR) System Programmer's Manual, CSC/SD-75/6050, M. X. Mason, M. A. Baker, T. K. Chen, September 1975

```
$JOB    6:11:39
$NOP ********* DUMP OF X-468 *************
$ASS IN MS2
$EXEC DPHEX 3S
 INPUT TAPE ON MS2
 DATA INPUT    4 1 STOP
  FILE  1       RECORD   1       LENGTH   144 BYTES
  (       0)    F0404040  40407C7C  7C7C7C7C  C1E3F0F6  40404040  F7F4F0F6  F2F540D9  D6E240F0  F0F0F0F9  40404040
  (      40)    40F0F0F0  F7F540F1  40F140F1  F7F640F1  F1F1F6F4  7C7CC340  F2F1F540  40404040  40D7D940  F740C540
  (      80)    F0F0F0F7  F540F140  F1F7F640  F1F1F1F6  F4F540F1  F1F2F2F4  F1404040  40F5F5F6  4040F7F2  F240F1F0
  (     120)    F1F94040  404040F1  40F140F1  4040F9F9  4040F2F1  40C8E2E3
 FILE      1        # OF DATA RECORDS   300       # SUCCESSFUL READS  300
         # PERMANENT READ ERRORS    0          # ZERO BYTE ERRORS  0          # SHORT RECORDS    0          # UNDEFINED ERRORS  0
            # OF RECORDS RETRIED    0          TOTAL # OF RETRIES  0
  FILE  2       RECORD   1       LENGTH   144 BYTES
  (       0)    F0404040  40407C7C  7C7C7C7C  C1E3F0F6  40404040  F7F4F0F6  F2F540D9  D6E240F0  F0F0F0F9  40404040
  (      40)    40F0F0F0  F7F540F2  40F140F1  F7F640F1  F1F2F3F1  7C7CC340  40F8F740  40404040  40D7D940  F740C540
  (      80)    F0F0F0F7  F540F240  F1F7F640  F1F1F2F3  F1F940F1  F1F2F9F1  F6404040  40F5F5F6  4040F7F2  F240F1F0
  (     120)    F1F94040  404040F1  40F240F2  4040F9F9  4040F9F9  40C8E2E3
 FILE      2        # OF DATA RECORDS   300       # SUCCESSFUL READS  300
         # PERMANENT READ ERRORS    0          # ZERO BYTE ERRORS  0          # SHORT RECORDS    0          # UNDEFINED ERRORS  0
            # OF RECORDS RETRIED    0          TOTAL # OF RETRIES  0
  FILE  3       RECORD   1       LENGTH   144 BYTES
  (       0)    F0404040  40407C7C  7C7C7C7C  C1E3F0F6  40404040  F7F4F0F6  F2F540D9  D6E240F0  F0F0F0F9  40404040
  (      40)    40F0F0F0  F7F540F3  40F140F1  F7F640F1  F1F2F9F5  7C7CC340  40F9F040  40404040  40D7D940  F740C540
  (      80)    F0F0F0F7  F540F340  F1F7F640  F1F1F2F9  F5F340F1  F1F3F5F5  F0404040  40F5F5F6  4040F7F2  F240F1F0
  (     120)    F1F94040  404040F1  40F340F3  4040F9F9  4040F8F1  40C8E2E3
 FILE      3        # OF DATA RECORDS   300       # SUCCESSFUL READS  300
         # PERMANENT READ ERRORS    0          # ZERO BYTE ERRORS  0          # SHORT RECORDS    0          # UNDEFINED ERRORS  0
            # OF RECORDS RETRIED    0          TOTAL # OF RETRIES  0
  FILE  4       RECORD   1       LENGTH   144 BYTES
  (       0)    F0404040  40407C7C  7C7C7C7C  C1E3F0F6  40404040  F7F4F0F6  F2F540D9  D6E240F0  F0F0F0F9  40404040
  (      40)    40F0F0F0  F7F540F4  40F140F1  F7F640F1  F1F3F6F2  7C7CC340  F2F1F540  40404040  40D7D940  F740C540
  (      80)    F0F0F0F7  F540F440  F1F7F640  F1F1F3F6  F2F840F1  F1F4F2F2  F4404040  40F5F5F6  4040F7F2  F240F1F0
  (     120)    F1F94040  404040F1  40F440F4  4040F9F9  404040F0  40C8E2E3

$$
$NOTE EOJ    6:13:54
```

AT 6   74 06 25 R OS   75 1

AT 6   74 06 25

AT 6   74 06 25

AT 6   74 06 25

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DATA INPUT 4 1 3

FILE 1 RECORD 1 LENGTH 144 BYTES 74/06/26

(0) FC404040 4040C7C7C 7C7C7C7C C1E3F0F6 40404040 F7F4F0F6 F2F640D9 D6E240F0 F0F0F1F5 40404040
(40) 40F0F0F0 F8F840F1 40F140F1 F7F740F0 F9F5F5F5 7C7CC340 40F8F740 40404040 40D7D940 F740C540
(80) F0F0F0F8 F840F140 F1F7F740 40F9F5F5 F5F740F1 F0F0F1F5 F4404040 40F5F5F6 4040F7F2 F240F1F0
(120) F1F94040 404040F5 40F140F1 4040F9F9 4040F6F1 40C3E2E3
FILE 1 # OF DATA RECORDS 300 # SUCCESSFUL READS 298
PERMANENT READ ERRORS 0 # ZERO BYTE ERRORS 2 # SHORT RECORDS 0 # UNDEFINED ERRORS 0
OF RECORDS RETRIED 2 TOTAL # OF RETRIES 2

FILE 2 RECORD 1 LENGTH 144 BYTES
(0) FC404040 4040C7C7C 7C7C7C7C C1E3F0F6 40404040 F7F4F0F6 F2F640D9 D6E240F0 F0F0F1F5 40404040
(40) 40F0F0F0 F8F840F2 40F140F1 F7F740F1 F0F0F2F3 7C7CC340 F2F1F540 40404040 40D7D940 F740C540
(80) F0F0F0F8 F840F240 F1F7F740 F1F0F0F2 F3E240F1 F0F0F8F2 F8404040 40F5F5F6 4040F7F2 F240F1F0
(120) F1F94040 404040F5 40F240F2 4040F9F9 404040F0 40C3E2E3
FILE 2 # OF DATA RECORDS 300 # SUCCESSFUL READS 298
PERMANENT READ ERRORS 3 # ZERO BYTE ERRORS 2 # SHORT RECORDS 0 # UNDEFINED ERRORS 0
OF RECORDS RETRIED 2 TOTAL # OF RETRIES 2

FILE 3 RECORD 1 LENGTH 144 BYTES
(0) FC404040 4040C7C7C 7C7C7C7C C1E3F0F6 40404040 F7F4F0F6 F2F640D9 D6E240F0 F0F0F1F5 40404040
(40) 40F0F0F0 F8F840F3 40F140F1 F7F740F1 F0F0F9F0 7C7CC340 40F8F840 40404040 40D7D940 F740C540
(80) F0F0F0F8 F840F340 F1F7F740 F1F0F0F9 F0F040F1 F0F1F5F0 F2404040 40F5F5F6 4040F7F2 F240F1F0
(120) F1F94040 404040F5 40F340F3 4040F9F9 4040F9F9 40C8E2E3
FILE 3 # OF DATA RECORDS 300 # SUCCESSFUL READS 296
PERMANENT READ ERRORS 0 # ZERO BYTE ERRORS 4 # SHORT RECORDS 0 # UNDEFINED ERRORS 0
OF RECORDS RETRIED 4 TOTAL # OF RETRIES 4

FILE 4 RECORD 1 LENGTH 144 BYTES 74/06/26
(0) FC404040 4040C7C7C 7C7C7C7C C1E3F0F6 40404040 F7F4F0F6 F2F640D9 D6E240F0 F0F0F1F5 40404040
(40) 40F0F0F0 F8F840F4 40F140F1 F7F740F1 F0F1F5F4 7C7CC340 40F8F840 40404040 40D7D940 F740C540
(80) F0F0F0F8 F840F440 F1F7F740 F1F0F1F5 F4F040F1 F0F2F1F3 F6404040 40F5F5F6 4040F7F2 F240F1F0
(120) F1F94040 404040F5 40F440F4 4040F9F9 4040F4F9 40C8E2E3
FILE 4 # OF DATA RECORDS 300 # SUCCESSFUL READS 290
PERMANENT READ ERRORS 3 # ZERO BYTE ERRORS 10 # SHORT RECORDS 0 # UNDEFINED ERRORS 0
OF RECORDS RETRIED 10 TOTAL # OF RETRIES 17

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DATA INPUT 4 1

FILE 1 RECORD 1 LENGTH 144 BYTES 74/06/26

(0) FC404040 4040C7C7C 7C7C7C7C C1E3E0F6 40404040 F7F4F0F6 F2F640D9 D6E240F0 F0F0F1F5 40404040
(40) 40F0F0F0 F8F940F1 40F040F1 F7F740F1 F0F2F2F1 7C7CC340 F2F1F540 40404040 40D7D940 F740C540
(80) F0F0F0F8 F940F140 F1F7F740 F1F0F2F2 F1F440F1 F0F2F8F1 F0404040 40F5F5F6 4040F7F2 F240F1F0
(120) F1F94040 40404CF5 40F140F1 4040F9F9 4C4040F0 40C8E2E3
FILE 1 # OF DATA RECORDS 300 # SUCCESSFUL READS 300
PERMANENT READ ERRORS 0 # ZERO BYTE ERRORS 0 # SHORT RECORDS 0 # UNDEFINED ERRORS 0
OF RECORDS RETRIED 0 TOTAL # OF RETRIES 0

FILE 2 RECORD 1 LENGTH 144 BYTES
(0) FC404040 4040C7C7C 7C7C7C7C C1E3E0F6 40404040 F7F4F0F6 F2F640D9 D6E240F0 F0F0F1F5 40404040
(40) 40F0F0F0 F8F940F2 40F040F1 F7F740F1 F0F2F8F4 7C7CC340 40F6F940 40404040 40D7D940 F740C540
(80) F0F0F0F8 F940F240 F1F7F740 F1F0F2F8 F4F840F1 F0F3F4F4 F5404040 40F5F5F6 4040F7F2 F240F1F0
(120) F1F94040 40404CF5 40F240F2 4040F9F9 4040F6F3 40C8E2E3
FILE 2 # OF DATA RECORDS 301 # SUCCESSFUL READS 300
PERMANENT READ ERRORS 0 # ZERO BYTE ERRORS 1 # SHORT RECORDS 0 # UNDEFINED ERRORS 0
OF RECORDS RETRIED 2 TOTAL # OF RETRIES 2

FILE 3 RECORD 1 LENGTH 144 BYTES
(0) FC404040 4040C7C7C 7C7C7C7C C1E3E0F6 40404040 F7F4F0F6 F2F640D9 D6E240F0 F0F0F1F5 40404040
(40) 40F0F0F0 F8F940F3 40F040F1 F7F740F1 F0F3F5F2 7C7CC340 F2F1F540 40404040 40D7D940 F740C540
(80) F0F0F0F8 F940F340 F1F7F740 F1F0F3F5 F2F240F1 F0F4F1F1 F9404040 40F5F5F6 4040F7F2 F240F1F0
(120) F1F94040 40404CF5 40F340F3 4040F9F9 4040F9F9 40C8E2E3
FILE 3 # OF DATA RECORDS 300 # SUCCESSFUL READS 300
PERMANENT READ ERRORS 0 # ZERO BYTE ERRORS 0 # SHORT RECORDS 0 # UNDEFINED ERRORS 0
OF RECORDS RETRIED 0 TOTAL # OF RETRIES 0

FILE 4 RECORD 1 LENGTH 144 BYTES 74/06/26
(0) FC404040 4040C7C7C 7C7C7C7C C1E3E0F6 40404040 F7F4F0F6 F2F640D9 D6E240F0 F0F0F1F5 40404040
(40) 40F0F0F0 F8F940F4 40F040F1 F7F740F1 F0F4F1F5 7C7CC340 F2F1F540 40404040 40D7D940 F740C540
(80) F0F0F0F8 F940F440 F1F7F740 F1F0F4F1 F5F740F1 F0F4F7F5 F3404040 40F5F5F6 4040F7F2 F240F1F0
(120) F1F94040 4040C4F5 40F440F4 4040F9F9 4040F6F5 40C8E2E3
FILE 4 # OF DATA RECORDS 300 # SUCCESSFUL READS 300
PERMANENT READ ERRORS 0 # ZERO BYTE ERRORS 0 # SHORT RECORDS 0 # UNDEFINED ERRORS 0
OF RECORDS RETRIED 0 TOTAL # OF RETRIES 0

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