#248

OGO-6

COSMIC RAY COUNT RATES

69-051A-20A

349
(~~5~~ 7 tapes)

OGO 6

COUNT RATES + PULSE HEIGHT, TAPE

69-051A-20A

THIS DATA SET HAS BEEN RESTORED. THERE WERE ORIGINALLY 349 9-TRACK, 800 BPI TAPES, WRITTEN IN BINARY. THERE ARE 13 RESTORED TAPES. THE DR TAPES ARE 3480 CARTRIDGES AND THE DS TAPES ARE 9-TRACK, 6250 BPI. THE FOLLOWING TAPES WERE BAD; D13770, D13794, D13956, D14145, D14149, D14152, D14478, D14483, D15925, D13131-55, D13756,D14153-64, AND D15928-41. THE DATA FROM THE FOLLOWING TAPES WERE LOST; D14165, D12255-306, AND D12873-97. THERE ARE THREE DR/DS TAPES THAT HAVE DUPLICATE FILES. THE ORIGINAL TAPES WERE CREATED ON AN IBM 360 COMPUTER AND WERE RESTORED ON AN IBM 9021 COMPUTER. THE DR AND DS NUMBERS ALONG WITH THE CORRESPONDING D NUMBERS AND TIME SPANS ARE AS FOLLOWS:

DR#	DS#	DD#	FILES	TIME SPAN	
DR003018	DS003018	D011808	1	06/07/69 - 06/07/69	
		D011809	2	06/07/69 - 06/08/69	
		D011810	3	06/08/69 - 06/08/69	(a)
		D011811	4	06/08/69 - 06/08/69	
		D011812	5	06/08/69 - 06/09/69	
		D011813	6	06/09/69 - 06/09/69	
		D011814	7	06/09/69 - 06/10/69	(b)
		D011815	8	06/10/69 - 06/10/69	
		D011816	9	06/10/69 - 06/11/69	
		D011817	10	06/11/69 - 06/11/69	
		D011818	11	06/12/69 - 06/12/69	
		D011819	12	06/12/69 - 06/13/69	
		D011820	13	06/13/69 - 06/13/69	
		D011821	14	06/13/69 - 06/14/69	
		D011822	15	06/14/69 - 06/14/69	
		D011823	16	06/14/69 - 06/15/69	(c)
		D011824	17	06/15/69 - 06/15/69	
		D011825	18	06/15/69 - 06/15/69	(d)
		D011826	19	06/15/69 - 06/16/69	
		D011827	20	06/17/69 - 06/17/69	
		D011828	21	06/17/69 - 06/18/69	(e)
		D011829	22	06/18/69 - 06/19/69	(f)
		D011830	23	06/19/69 - 06/21/69	
		D011831	24	06/21/69 - 06/22/69	
		D011832	25	06/22/69 - 06/23/69	(g)

69-051A-20A

DR#	DS#	DD#	FILES	TIME SPAN	
DR003019	DS003019	D011833	1	06/23/69 - 06/23/69	
		D011834	2	06/23/69 - 06/25/69	(h)
		D011835	3	06/25/69 - 06/25/69	(i)
		D011836	4	06/26/69 - 06/27/69	(j)
		D011837	5	06/27/69 - 06/27/69	(i)
		D011838	6	06/28/69 - 06/29/69	
		D011839	7	06/29/69 - 06/30/69	
		D011840	8	06/30/69 - 06/30/69	
		D011841	9	07/01/69 - 07/01/69	
		D011842	10	07/02/69 - 07/03/69	
		D011843	11	07/03/69 - 07/03/69	
		D011844	12	07/04/69 - 07/05/69	
		D011845	13	07/05/69 - 07/06/69	
		D011846	14	07/06/69 - 07/07/69	
		D011847	15	07/08/69 - 07/08/69	
		D011848	16	07/09/69 - 07/10/69	
		D011849	17	07/10/69 - 07/11/69	
		D011850	18	07/11/69 - 07/12/69	
		D011851	19	07/12/69 - 07/13/69	
DR003020	DS003020	D011852	1	07/13/69 - 07/13/69	
		D011853	2	07/14/69 - 07/15/69	
		D011854	3	07/15/69 - 07/16/69	
		D011855	4	07/16/69 - 07/17/69	
		D011856	5	07/17/69 - 07/18/69	
		D012250	6	07/18/69 - 07/19/69	
		D012251	7	07/19/69 - 07/20/69	
		D012252	8	07/20/69 - 07/20/69	
		D012253	9	07/21/69 - 07/22/69	
		D012254	10	07/22/69 - 07/23/69	
DR003021	DS003021	D013789	1	12/07/69 - 12/07/69	
		D013790	2	12/06/69 - 12/06/69	
		D013791	3	12/08/69 - 01/03/70	
		D013792	4	12/09/69 - 12/09/69	
		D013793	5	12/09/69 - 12/11/69	
		D013795	6	12/14/69 - 12/14/69	
		D013797	7	12/14/69 - 01/17/69	
		D013796	8	12/13/69 - 12/13/69	
		D013798	9	12/15/69 - 12/15/69	
		D013948	10	12/16/69 - 12/16/69	

69-051A-20A

DR#	DS#	DD#	FILES	TIME SPAN
DR003022	DS003022	D013751	1	11/07/69 - 11/08/69
		D013752	2	11/09/69 - 11/10/69
		D013753	3	11/11/69 - 11/11/69
		D013754	4	11/12/69 - 11/12/69
		D013755	5	11/13/69 - 11/14/69
		D013757	6	11/15/69 - 11/16/69
		D013758	7	11/16/69 - 11/17/69
		D013759	8	11/17/69 - 11/17/69
		D013760	9	11/18/69 - 11/18/69
		D013761	10	11/19/69 - 11/20/69
		D013762	11	11/20/69 - 11/21/69
		D013763	12	11/21/69 - 11/22/69
		D013764	13	11/22/69 - 11/22/69
		D013765	14	11/23/69 - 11/24/69
		D013766	15	11/24/69 - 11/24/69
		D013767	16	11/25/69 - 11/26/69
		D013768	17	11/26/69 - 11/27/69
		D013769	18	11/27/69 - 11/28/69
		D013771	19	11/30/69 - 11/30/69
		D013772	20	12/01/69 - 12/02/69
		D013773	21	12/02/69 - 12/02/69
		D013787	22	12/03/69 - 12/04/69
		D013788	23	12/05/69 - 12/05/69
DR003023	DS003023	D014176	1	01/13/70 - 01/13/70
		D014177	2	01/12/70 - 01/13/70
		D014434	3	04/07/70 - 04/08/70
		D014434	4	04/07/70 - 04/08/70
		D014435	5	04/06/70 - 04/07/70
		D014436	6	04/05/70 - 04/06/70
		D014437	7	04/03/70 - 04/05/70
		D014438	8	04/03/70 - 04/04/70
		D014439	9	04/02/70 - 04/02/70
		D014440	10	04/01/70 - 04/02/70
		D014441	11	03/30/70 - 04/01/70
		D014442	12	03/30/70 - 03/31/70
		D014443	13	03/24/70 - 03/25/70
		D014444	14	03/26/70 - 03/27/70
		D014445	15	03/25/70 - 03/26/70
		D014446	16	03/27/70 - 03/28/70
		D014447	17	03/27/70 - 03/29/70
		D014448	18	03/22/70 - 03/24/70
		D014449	19	03/22/70 - 03/23/70

69-051A-20A

DR#	DS#	DD#	FILES	TIME SPAN	
DR003024	DS003024	D014450	1	03/21/70 - 03/22/70	
		D014451	2	03/20/70 - 03/21/70	
		D014452	3	03/19/70 - 03/19/70	
		D014453	4	03/18/70 - 03/19/70	
		D014454	5	02/26/70 - 02/26/70	
		D014455	6	02/25/70 - 02/26/70	
		D014456	7	02/24/70 - 02/25/70	
		D014457	8	02/23/70 - 02/24/70	
		D014458	9	02/21/70 - 02/23/70	
		D014477	10	02/21/70 - 02/21/70	
		D014479	11	02/19/70 - 02/19/70	
		D014480	12	02/18/70 - 02/19/70	
		D014481	13	02/17/70 - 02/18/70	
		D014482	14	03/15/70 - 03/16/70	
		D014484	15	03/14/70 - 03/14/70	
		D014484	16	03/14/70 - 03/14/70	
		D014485	17	03/13/70 - 03/14/70	
		D014485	18	03/13/70 - 03/14/70	(l)
		D014486	19	03/17/70 - 03/17/70	
		D014487	20	03/11/70 - 03/12/70	
		D014488	21	03/10/70 - 03/11/70	(m)
DR003025	DS003025	D014489	1	03/09/70 - 03/10/70	
		D014490	2	03/08/70 - 03/09/70	
		D014491	3	03/07/70 - 03/08/70	
		D014492	4	03/06/70 - 03/06/70	
		D014493	5	03/05/70 - 03/05/70	
		D014494	6	03/04/70 - 03/04/70	
		D014495	7	03/02/70 - 03/02/70	
		D014496	8	03/01/70 - 03/02/70	
		D014497	9	02/28/70 - 02/28/70	
		D014498	10	02/28/70 - 03/01/70	
		D015920	11	05/14/70 - 05/16/70	
		D015921	12	05/15/70 - 05/17/70	
		D015922	13	05/14/70 - 05/15/70	
		D015923	14	05/13/70 - 05/14/70	
		D015924	15	05/12/70 - 05/12/70	
		D015926	16	05/10/70 - 05/11/70	
		D015927	17	05/09/70 - 05/10/70	

DR#	DS#	DD#	FILES	TIME SPAN
DR003026	DS003026	D013949	1	12/17/69 - 12/18/69
		D013950	2	12/18/69 - 12/18/69
		D013951	3	12/19/69 - 12/20/69
		D013952	4	12/20/69 - 12/20/69
		D013953	5	12/20/69 - 12/21/69
		D013954	6	12/22/69 - 12/22/69
		D013955	7	12/23/69 - 12/23/69
		D013957	8	12/25/69 - 12/26/69
		D013958	9	12/26/69 - 12/26/69
		D013959	10	12/27/69 - 12/28/69
		D013991	11	12/28/69 - 12/29/69
		D014128	12	01/24/70 - 01/25/70
		D014129	13	01/23/70 - 01/24/70
		D014130	14	01/22/70 - 01/22/70
		D014131	15	01/21/70 - 01/22/70
		D014132	16	01/20/70 - 01/21/70
		D014133	17	01/19/70 - 01/20/70
		D014134	18	01/18/70 - 01/18/70
		D014135	19	02/07/70 - 02/08/70
		D014136	20	02/08/70 - 02/09/70
		D014137	21	02/08/70 - 02/10/70
		D014138	22	02/10/70 - 02/11/70
		D014139	23	02/10/70 - 02/12/70
		D014140	24	02/11/70 - 02/13/70
		D014141	25	02/13/70 - 02/14/70
		D014142	26	02/14/70 - 02/15/70
DR003027	DS003027	D014143	1	02/15/70 - 02/16/70
		D014144	2	02/16/70 - 02/16/70
		D014144	3	02/16/70 - 02/16/70
		D014146	4	01/09/70 - 01/09/70
		D014147	5	01/10/70 - 01/10/70
		D014148	6	01/08/70 - 01/08/70
		D014150	7	02/04/70 - 02/04/70
		D014151	8	02/05/70 - 02/05/70
DR003028	DS003028	D014166	1	01/03/70 - 01/03/70
		D014167	2	01/02/70 - 01/03/70
		D014168	3	01/01/70 - 01/02/70
		D014169	4	12/31/69 - 12/31/69
		D014170	5	12/30/69 - 12/31/69
		D014171	6	12/29/69 - 12/29/69
		D014172	7	01/17/70 - 01/18/70
		D014173	8	01/16/70 - 01/17/70
		D014174	9	01/14/70 - 01/14/70
		D014175	10	01/14/70 - 01/16/70

DR#	DS#	DD#	FILES	TIME SPAN	
DR003029	DS003029	D016146	1	05/20/70 - 05/21/70	(o)
		D016147	2	05/26/70 - 05/26/70	
		D016148	3	05/22/70 - 05/23/70	
		D016149	4	05/20/70 - 05/21/70	
		D016150	5	05/24/70 - 05/25/70	(p)
DR003030	DS003030	D015942	1	04/24/70 - 04/25/70	
		D015943	2	04/23/70 - 04/25/70	
		D015944	3	04/23/70 - 04/24/70	
		D016128	4	04/22/70 - 04/23/70	
		D016129	5	04/21/70 - 04/21/70	
		D016130	6	04/20/70 - 04/21/70	
		D016131	7	07/22/70 - 07/23/70	
		D016132	8	04/18/70 - 04/19/70	
		D016133	9	05/03/70 - 05/04/70	
		D016134	10	05/04/70 - 05/04/70	
		D016135	11	05/04/70 - 05/06/70	(n)
		D016136	12	05/05/70 - 05/07/70	
		D016137	13	05/06/70 - 05/08/70	
		D016138	14	04/28/70 - 04/29/70	
		D016139	15	04/28/70 - 04/30/70	
		D016140	16	04/30/70 - 05/01/70	
		D016141	17	05/01/70 - 05/02/70	
		D016142	18	05/23/70 - 05/23/70	
		D016143	19	05/17/70 - 05/19/70	
		D016144	20	05/19/70 - 05/19/70	
		D016145	21	05/25/70 - 05/25/70	

(a) I/O ERRORS ON FILE 1, RECORDS 6, 8, 10, 18, 27, 29, 41, 87, 198, 392
(b) I/O ERRORS ON FILE 1, RECORDS 1-10
(c) I/O ERRORS ON FILE 1, RECORDS 42, 98, 113, 234
(d) I/O ERRORS ON FILE 1, RECORDS 11, 12, 15, 23, 38
(e) I/O ERRORS ON FILE 1, RECORDS 1119, 1147
(f) I/O ERRORS ON FILE 1, RECORDS 594, 602
(g) I/O ERRORS ON FILE 1, RECORDS 1059, 1082, 1099
(h) I/O ERRORS ON FILE 1, RECORDS 7, 12, 14, 15, 17, 21, 537, 745, 753
(i) I/O ERRORS ON FILE 1, RECORDS 630, 656, 944, 2673
(j) I/O ERRORS ON FILE 1, RECORDS 1164-66
(k) I/O ERRORS ON FILE 1, RECORDS 585, 586, 831, 834-36, 840, 899, 903, 915
(l) I/O ERRORS ON FILE 1, RECORDS 186, 551, 647-50, 652-55
(m) I/O ERRORS ON FILE 1, RECORDS 1, 2, 3, 4
(n) I/O ERRORS ON FILE 1, RECORDS 53,56
(o) I/O ERRORS ON FILE 1, RECORDS 54, 68, 69, 193, 198
(p) I/O ERRORS ON FILE 1, RECORDS 656, 1094

REQ. AGENT
LAE
PAR

RASH NO.
RB3539

ACQ. AGENT
JJB

OGO-6

COSMIC RAY COUNT RATES

69-051A-20A

This data set consists of [redacted] tapes produced on an IBM 360 computer. The tapes are 9-track, 800 BPI, binary, with one file each.

There are 4 types of logical records in each physical record on these tapes. The first 2 bits of each logical record determines what type of record it is. That is, if the first 2 bits are 01, it is a 10 byte A-type record (page 1 of format); if they are 10, it is a 5 byte B-type record (page 2); if they are 11, it is a 30 byte C-type record (page 3); and if they are 00, it is a 556 byte D-type record (page 4). The formats and descriptions of these records can be found on the following pages.

The time spans for the tapes are:

D#	C#	TIME SPAN
D-11808	C-09011	6/07/69
D-11809	C-09012	6/07/69 - 6/08/69
D-11810	C-09013	6/08/69
D-11811	C-09014	6/08/69
D-11812	C-09015	6/08/69 - 6/09/69
D-11813	C-09016	6/09/69
D-11814	C-09017	6/09/69 - 6/10/69
D-11815	C-09018	6/10/69
D-11816	C-09019	6/10/69 - 6/11/69
D-11817	C-09020	6/11/69
D-11818	C-09021	6/12/69
D-11819	C-09022	6/12/69 - 6/13/69
D-11820	C-09023	6/13/69
D-11821	C-09024	6/13/69 - 6/14/69

D#	C#	TIME SPAN
D-11822	C-09025	6/14/69
D-11823	C-09026	6/14/69 - 6/15/69
D-11824	C-09027	6/15/69
D-11825	C-09028	6/15/69
D-11826	C-09029	6/15/69 - 6/16/69
D-11827	C-09030	6/17/69
D-11828	C-09031	6/17/69 - 6/18/69
D-11829	C-09032	6/18/69 - 6/19/69
D-11830	C-09033	6/19/69 - 6/21/69
D-11831	C-09034	6/21/69 - 6/22/69
D-11832	C-09035	6/22/69 - 6/23/69
D-11833	C-09036	6/23/69
D-11834	C-09037	6/23/69 - 6/25/69
D-11835	C-09038	6/25/69
D-11836	C-09039	6/26/69 - 6/27/69
D-11837	C-09040	6/27/69
D-11838	C-09041	6/28/69 - 6/29/69
D-11839	C-09042	6/29/69 - 6/30/69
D-11840	C-09043	6/30/69
D-11841	C-09044	7/01/69
D-11842	C-09045	7/02/69 - 7/03/69
D-11843	C-09046	7/03/69
D-11844	C-09047	7/04/69 - 7/05/69
D-11845	C-09048	7/05/69 - 7/06/69
D-11846	C-09049	7/06/69 - 7/07/69
D-11847	C-09050	7/08/69
D-11848	C-09051	7/09/69 - 7/10/69
D-11849	C-09052	7/10/69 - 7/11/69
D-11850	C-09053	7/11/69 - 7/12/69
D-11851	C-09054	7/12/69 - 7/13/69
D-11852	C-09055	7/13/69

D#	C#	TIME SPAN
D-11853	C-09056	7/14/69 - 7/15/69
D-11854	C-09057	7/15/69 - 7/16/69
D-11855	C-09058	7/16/69 - 7/17/69
D-11856	C-09059	7/17/69 - 7/18/69
D-12250	C-09475	7/18/69 - 7/19/69
D-12251	C-09476	7/19/69 - 7/20/69
D-12252	C-09477	7/20/69
D-12253	C-09478	7/21/69 - 7/22/69
D-12254	C-09479	7/22/69 - 7/23/69
D-12255	C-09480	7/23/69 - 7/24/69
D-12256	C-09481	7/24/69
D-12257	C-09482	7/24/69 - 7/26/69
D-12258	C-09488	7/26/69 - 7/27/69
D-12259	C-09484	7/27/69
D-12260	C-09485	7/28/69 - 7/29/69
D-12261	C-09486	7/29/69 - 7/30/69
D-12262	C-09487	7/30/69 - 7/31/69
D-12263	C-09488	7/31/69 - 8/01/69
D-12264	C-09489	8/01/69 - 8/02/69
D-12265	C-09490	8/02/69 - 8/03/69
D-12266	C-09491	8/03/69
D-12267	C-09492	8/04/69 - 8/05/69
D-12268	C-09493	8/05/69 - 8/06/69
D-12269	C-09494	8/06/69 - 8/07/69
D-12270	C-09495	8/07/69 - 8/08/69
D-12271	C-09496	8/08/69 - 8/09/69
D-12272	C-09497	8/09/69 - 8/10/69
D-12273	C-09498	8/10/69
D-12274	C-09499	8/11/69 - 8/12/69
D-12275	C-09500	8/12/69

D#	C#	TIME SPAN
D-12276	C-09501	8/13/69 - 8/14/69
D-12277	C-09502	8/14/69 - 8/15/69
D-12278	C-09503	8/15/69
D-12279	C-09504	8/16/69 - 8/17/69
D-12280	C-09505	8/17/69
D-12281	C-09506	8/18/69 - 8/19/69
D-12282	C-09507	8/19/69
D-12283	C-09508	8/20/69 - 8/21/69
D-12284	C-09509	8/21/69 - 8/22/69
D-12285	C-09510	8/22/69
D-12286	C-09511	8/23/69
D-12287	C-09512	8/24/69
D-12288	C-09513	8/25/69
D-12289	C-09514	8/26/69 - 8/27/69
D-12290	C-09515	8/27/69 - 8/28/69
D-12291	C-09516	8/28/69
D-12292	C-09517	8/30/69 - 8/31/69
D-12293	C-09518	8/31/69 - 9/01/69
D-12294	C-09519	9/01/69 - 9/02/69
D-12295	C-09520	9/02/69
D-12296	C-09521	9/04/69 - 9/05/69
D-12297	C-09522	9/06/69
D-12298	C-09523	9/08/69
D-12299	C-09524	9/09/69
D-12300	C-09525	9/10/69 - 9/11/69
D-12301	C-09526	9/11/69 - 9/12/69
D-12302	C-09527	9/13/69
D-12303	C-09528	9/13/69 - 9/15/69
D-12304	C-09529	9/15/69 - 9/16/69
D-12305	C-09530	9/16/69
D-12306	C-09531	9/17/69 - 9/18/69

D#	C#	TIME SPAN
D-12873	C-09641	9/18/69 - 9/19/69
D-12874	C-09642	9/19/69 - 9/20/69
D-12875	C-09643	9/20/69 - 9/21/69
D-12876	C-09644	9/21/69 - 9/22/69
D-12877	C-09645	9/22/69 - 9/23/69
D-12878	C-09646	9/23/69 - 9/24/69
D-12879	C-09647	9/24/69
D-12880	C-09648	9/25/69
D-12881	C-09649	9/26/69
D-12882	C-09650	9/27/69 - 9/28/69
D-12883	C-09651	9/28/69
D-12884	C-09652	9/29/69 - 9/30/69
D-12885	C-09653	9/30/69 - 10/01/69
D-12886	C-09654	10/01/69 - 10/02/69
D-12887	C-09655	10/02/69 - 10/03/69
D-12888	C-09656	10/03/69
D-12889	C-09657	10/04/69 - 10/05/69
D-12890	C-09658	10/05/69 - 10/06/69
D-12891	C-09659	10/06/69 - 10/07/69
D-12892	C-09660	10/07/69
D-12893	C-09661	10/08/69 - 10/09/69
D-12894	C-09662	10/09/69
D-12895	C-09663	10/10/69 - 10/11/69
D-12896	C-09664	10/11/69 - 10/12/69
D-12897	C-09665	10/12/69

D#	C#	TIME SPAN
D-13131	C-09863	10/13/69 - 10/14/69
D-13132	C-09864	10/14/69
D-13133	C-09865	10/15/69
D-13134	C-09866	10/16/69
D-13135	C-09867	10/17/69 - 10/18/69
D-13136	C-09868	10/18/69 - 10/19/69
D-13137	C-09869	10/19/69
D-13138	C-09870	10/20/69
D-13139	C-09871	10/21/69 - 10/22/69
D-13140	C-09872	10/22/69
D-13141	C-09873	10/23/69 - 10/24/69
D-13142	C-09874	10/24/69 - 10/25/69
D-13143	C-09875	10/25/69 - 10/26/69
D-13144	C-09876	10/26/69 - 10/27/69
D-13145	C-09877	10/27/69
D-13146	C-09878	10/29/69 - 10/30/69
D-13147	C-09879	10/30/69 - 10/31/69
D-13148	C-09880	10/31/69
D-13149	C-09881	11/01/69 - 11/02/69
D-13150	C-09882	11/02/69
D-13151	C-09883	11/03/69 - 11/04/69
D-13152	C-09884	11/04/69 - 11/05/69
D-13153	C-09885	11/05/69 - 11/06/69
D-13154	C-09886	11/06/69
D-13155	C-09887	11/07/69

D#	C#	TIME SPAN
D-13751	C-10252	11/07/69 - 11/08/69
D-13752	C-10253	11/09/69 - 11/10/69
D-13753	C-10254	11/11/69 - 11/11/69
D-13754	C-10255	11/12/69 - 11/12/69
D-13755	C-10256	11/13/69 - 11/14/69
D-13756	C-10257	11/14/69 - 11/15/69
D-13757	C-10258	11/15/69 - 11/16/69
D-13758	C-10259	11/16/69 - 11/17/69
D-13759	C-10260	11/17/69 - 11/17/69
D-13760	C-10261	11/18/69 - 11/18/69
D-13761	C-10262	11/19/69 - 11/20/69
D-13762	C-10263	11/20/69 - 11/21/69
D-13763	C-10264	11/21/69 - 11/22/69
D-13764	C-10265	11/22/69 - 11/22/69
D-13765	C-10266	11/23/69 - 11/24/69
D-13766	C-10267	11/24/69 - 11/24/69
D-13767	C-10268	11/25/69 - 11/26/69
D-13768	C-10269	11/26/69 - 11/27/69
D-13769	C-10270	11/27/69 - 11/28/69
D-13770	C-10271	11/28/69 - 11/29/69
D-13771	C-10272	11/30/69 - 11/30/69
D-13772	C-10273	12/01/69 - 12/02/69
D-13773	C-10274	12/02/69 - 12/02/69
D-13787	C-10275	12/03/69 - 12/04/69
D-13788	C-10276	12/05/69 - 12/05/69
D-13789	C-10277	12/06/69 - 12/06/69
D-13790	C-10278	12/07/69 - 12/07/69
D-13791	C-10279	12/08/69 - 12/09/69

D#	C#	TIME SPAN
D-13792	C-10280	12/09/69 - 12/09/69
D-13793	C-10281	12/09/69 - 12/11/69
D-13794	C-10282	12/10/69 - 12/12/69
~~D-13795~~	~~C-10283~~	~~12/12/69 - 12/12/69~~
D-13796	C-10284	12/13/69 - 12/13/69
D-13797	C-10285	12/14/69 - 12/14/69
D-13798	C-10286	12/15/69 - 12/15/69
D-13948	C-10435	12/16/69 - 12/16/69
D-13949	C-10436	12/17/69 - 12/18/69
D-13950	C-10437	12/18/69 - 12/18/69
D-13951	C-10438	12/19/69 - 12/20/69
D-13952	C-10439	12/20/69 - 12/20/69
D-13953	C-10440	12/21/69 - 12/21/69
D-13954	C-10441	12/22/69 - 12/22/69
D-13955	C-10442	12/23/69 - 12/23/69
D-13956	C-10443	12/23/69 - 12/24/69
D-13957	C-10444	12/25/69 - 12/26/69
D-13958	C-10445	12/26/69 - 12/26/69
D-13959	C-10446	12/27/69 - 12/28/69
D-13991	C-10815	12/28/69 - 12/29/69

D#	C#	TIME SPAN
D-14128	C-11185	1/24/70 - 1/25/70
D-14129	C-11186	1/23/70 - 1/24/70
D-14130	C-11187	1/22/70 - 1/22/70
D-14131	C-11188	1/21/70 - 1/22/70
D-14132	C-11189	1/20/70 - 1/21/70
D-14133	C-11190	1/19/70 - 1/20/70
D-14134	C-11191	1/18/70 - 1/18/70
D-14135	C-11192	2/07/70 - 2/08/70
D-14136	C-11193	2/08/70 - 2/09/70
D-14137	C-11194	2/08/70 - 2/10/70
D-14138	C-11195	2/10/70 - 2/11/70
D-14139	C-11196	2/10/70 - 2/12/70
D-14140	C-11197	2/11/70 - 2/13/70
D-14141	C-11198	2/13/70 - 2/14/70
D-14142	C-11199	2/14/70 - 2/15/70
D-14143	C-11200	2/15/70 - 2/16/70
D-14144	C-11201	2/16/70 - 2/16/70
D-14145	C-11202	1/11/70 - 1/11/70
D-14146	C-11203	1/10/70 - 1/10/70
D-14147	C-11204	1/09/70 - 1/09/70
D-14148	C-11205	1/08/70 - 1/08/70
D-14149	C-11206	2/06/70 - 2/06/70
D-14150	C-11207	2/05/70 - 2/05/70
D-14151	C-11208	2/04/70 - 2/04/70
D-14152	C-11209	2/03/70 - 2/04/70

D#	C#	TIME SPAN
D-14153	C-11232	2/02/70 - 2/02/70
D-14154	C-11233	2/01/70 - 2/02/70
D-14155	C-11234	1/31/70 - 2/01/70
D-14156	C-11235	1/30/70 - 1/31/70
D-14157	C-11236	1/29/70 - 1/30/70
D-14158	C-11237	1/28/70 - 1/29/70
D-14159	C-11238	1/27/70 - 1/28/70
D-14160	C-11239	1/26/70 - 1/27/70
D-14161	C-11240	1/25/70 - 1/25/70
D-14162	C-11241	1/06/70 - 1/06/70
D-14163	C-11242	1/05/70 - 1/06/70
D-14164	C-11243	1/04/70 - 1/04/70
D-14165	C-11244	1/07/70 - 1/07/70
D-14166	C-11245	1/03/70 - 1/03/70
D-14167	C-11246	1/02/70 - 1/03/70
D-14168	C-11247	1/01/70 - 1/02/70
D-13169	C-11248	12/31/69 - 12/31/69
D-14170	C-11249	12/30/69 - 12/31/69
D-14171	C-11250	12/29/69 - 12/30/69
D-14172	C-11251	1/17/70 - 1/18/70
D-14173	C-11252	1/16/70 - 1/17/70
D-14174	C-11253	1/14/70 - 1/16/70
D-14175	C-11254	1/14/70 - 1/14/70
D-14176	C-11255	1/13/70 - 1/13/70
D-14177	C-11256	1/12/70 - 1/13/70

14172
14173
49

D#	C#	TIME SPAN
D-14434	C-11398	4/07/70 - 4/08/70
D-14435	C-11399	4/06/70 - 4/07/70
D-14436	C-11400	4/05/70 - 4/06/70
D-14437	C-11401	4/03/70 - 4/05/70
D-14438	C-11402	4/03/70 - 4/04/70
D-14439	C-11403	4/02/70 - 4/02/70
D-14440	C-11404	4/01/70 - 4/02/70
D-14441	C-11405	3/30/70 - 4/01/70
D-14442	C-11406	3/30/70 - 3/31/70
D-14443	C-11407	3/24/70 - 3/25/70
D-14444	C-11408	3/26/70 - 3/27/70
D-14445	C-11409	3/25/70 - 3/26/70
D-14446	C-11410	3/27/70 - 3/28/70
D-14447	C-11411	3/27/70 - 3/29/70
D-14448	C-11412	3/22/70 - 3/24/70
D-14449	C-11413	3/22/70 - 3/23/70
D-14450	C-11414	3/21/70 - 3/22/70
D-14451	C-11415	3/20/70 - 3/21/70
D-14452	C-11416	3/19/70 - 3/19/70
D-14453	C-11417	3/18/70 - 3/19/70
D-14454	C-11418	2/26/70 - 2/26/70
D-14455	C-11419	2/25/70 - 2/26/70
D-14456	C-11420	2/24/70 - 2/24/70
D-14457	C-11421	2/23/70 - 2/24/70
D-14458	C-11422	2/21/70 - 2/23/70

D#	C#	TIME SPAN
D-14477	C-11436	2/21/70 - 2/22/70
D-14478	C-11437	2/20/70 - 2/21/70
D-14479	C-11438	2/19/70 - 2/19/70
D-14480	C-11439	2/18/70 - 2/19/70
D-14481	C-11440	2/17/70 - 2/18/70
D-14482	C-11441	3/15/70 - 3/16/70
D-14483	C-11442	3/16/70 - 3/16/70
D-14484	C-11443	3/14/70 - 3/14/70
D-14485	C-11444	3/13/70 - 3/14/70
D-14486	C-11445	3/17/70 - 3/17/70
D-14487	C-11446	3/11/70 - 3/12/70
D-14488	C-11447	3/10/70 - 3/11/70
D-14489	C-11448	3/09/70 - 3/10/70
D-14490	C-11449	3/08/70 - 3/09/70
D-14491	C-11450	3/07/70 - 3/08/70
D-14492	C-11451	3/06/70 - 3/06/70
D-14493	C-11452	3/05/70 - 3/05/70
D-14494	C-11453	3/04/70 - 3/04/70
D-14495	C-11454	3/02/70 - 3/02/70
D-14496	C-11455	3/01/70 - 3/02/70
D-14497	C-11456	2/28/70 - 2/28/70
D-14498	C-11457	2/27/70 - 2/28/70

D#	C#	TIME SPAN
D-15920	C-12041	5/14/70 - 5/16/70
D=15021	C-12042	5/15/70 - 5/17/70
D-15922	C-12043	5/14/70 - 5/15/70
D-15923	C-12044	5/13/70 - 5/14/70
D-15924	C-12045	5/12/70 - 5/12/70
D-15925	C-12046	5/11/70 - 5/11/70
D-15926	C-12047	5/10/70 - 5/11/70
D-15927	C-12048	5/09/70 - 5/10/70
D-15928	C-12049	5/16/70 - 5/17/70
D-15929	C-12050	5/08/70 - 5/09/70
D-15930	C-12051	4/17/70 - 4/17/70
D-15931	C-12052	4/15/70 - 4/16/70
D-15932	C-12053	4/15/70 - 4/16/70
D-15933	C-12054	4/14/70 - 4/14/70
D-15934	C-12055	4/13/70 - 4/14/70
D-15935	C-12056	4/12/70 - 4/13/70
D-15936	C-12057	4/11/70 - 4/12/70
D-15937	C-12058	4/10/70 - 4/11/70
D-15938	C-12059	4/09/70 - 4/09/70
D-15939	C-12060	4/08/70 - 4/09/70
D-15940	C-12061	4/26/70 - 4/28/70
D-15941	C-12062	4/26/70 - 4/27/70
D-15942	C-12063	4/24/70 - 4/25/70
D-15943	C-12064	4/23/70 - 4/25/70
D-15944	C-12065	4/23/70 - 4/24/70

D#	C#	TIME SPAN
D-16128	C-12155	4/22/70 - 4/23/70
D-16129	C-12156	4/21/70 - 4/21/70
D-16130	C-12157	4/20/70 - 4/21/70
D-16131	C-12158	4/18/70 - 4/20/70
D-16132	C-12159	4/18/70 - 4/19/70
D-16133	C-12160	5/03/70 - 5/04/70
D-16134	C-12161	5/04/70 - 5/04/70
D-16135	C-12162	5/04/70 - 5/06/70
D-16136	C-12163	5/05/70 - 5/07/70
D-16137	C-12164	5/06/70 - 5/08/70
D-16138	C-12165	4/28/70 - 4/29/70
D-16139	C-12166	4/28/70 - 4/30/70
D-16140	C-12167	4/30/70 - 5/01/70
D-16141	C-12168	5/01/70 - 5/02/70
D-16142	C-12169	5/23/70 - 5/23/70
D-16143	C-12170	5/17/70 - 5/19/70
D-16144	C-12171	5/19/70 - 5/19/70
D-16145	C-12172	5/25/70 - 5/25/70
D-16146	C-12173	5/20/70 - 5/21/70
D-16147	C-12174	5/26/70 - 5/26/70
D-16148	C-12175	5/22/70 - 5/23/70
D-16149	C-12176	5/20/70 - 5/21/70
D-16150	C-12177	5/24/70 - 5/25/70

Internal Report #24

OGO-6 DATA TAPE FORMATS

by

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CONTENTS:

I. Experiment tape format and data content

II. Orbit tape format and data content

III. Abstraction program: Experiment data checking

IV. Abstraction program: Orbit data checking

V. Abstraction program: Data conversions

VI. Abstract tape format and data content Copy held at NSSDC 69-051A-20A

VII. Differences between RMR, MR, and FMR tapes

VIII. Abstraction program output

IX. Appendix A: INPUTF Version 7

X. Appendix B: List of abstract tapes and time coverage

XI. Appendix C: Instructions for running the abstraction program (MERGER4)

XII. Figures

XIII. References

I. Experiment tape format and data content.

Refer to Figures 1 and 2. The tapes are labelled FEXnnn-1 and FEXnnn-2, or FXnnn1 and FXnnn2. There is no difference between FEX tapes and FX tapes. The 2 suffix indicates that the tape is a continuation of the tape having the same number, but with a 1 suffix. With a few exceptions, each tape or pair of tapes contains one day of data, usually beginning and ending shortly before midnight UT.

The tapes usually contain approximately one to thirty files. Each file contains data from a single acquisition, and thus represents a continuous time interval. Time order between files is unpredictable, but usually is fairly smooth. Overlaps and gaps of several minutes' duration are common.

The tapes are 7-track, odd parity, 556 bpi. Each file begins with a 390-character label record which contains information about the acquisition (see Figure 1.). The only information used from this record is the bit rate (character 67). The remainder of the file consists of a variable number of 3132-character records (Figure 2), each of which corresponds to one complete spacecraft subcommutator sequence. Characters 1-3072 are 128 groups of 24 characters: each 24-character group corresponds to one frame of data. Characters 3073-3120 contain experiment data that is available only once in each subcommutator sequence, and spacecraft status information. Characters 3121-3128 contain the day and time corresponding to the beginning of the subcom sequence, and characters 3129-3132 are unused. A few of the tapes have 3128-character records. These usually contain the same information as the first 3128 characters of the normal tapes.

Figure 2 shows the content of each character. The letter in the "Destination" column refers to the record type in the Abstract tape where

that information is stored (see Section VI). The "Representation" column refers to the maincom word number and the subcom number which is the source of the data; e.g., D(97,72) refers to the contents of maincom word 97, when the subcommutator is in position 72. References 2 and 3 contain detailed descriptions of the contents of the experiment-generated words; descriptions of the remaining words are contained in Reference 1.

Figure 3 describes the contents of D(129,n) and D(131,n), which are generated by ground equipment. Details may be found on pages 46-49 of Reference 1. The numbers marked "normal bit order" are used in subsequent references of the form MC129/6, which refers to bit 6 of MC129 - the fill data flag.

II. Orbit tape format and data content.

Refer to Appendix B of Reference 1. Orbit tapes are labelled FAOnnn. They contain approximately 50 files each, with one orbit per file. Each file except the last contains 53 or 54 records of 1500 characters (usually). The first record contains label information describing the orbit. Subsequent records contain information such as position, velocity, and orientation of the spacecraft computed for various instants of time. These are available each minute (integer multiple of 60000 milliseconds, UT) and at a few additional special points in the orbit, such as equator crossings. The special points are not always inserted in exact time order, but if they are deleted the remaining data occur uniformly at one-minute intervals. Each 1500-character physical record consists of two 750-character logical records which are identical except that they correspond to different times. All data are in 7094 floating-point format (36-bit word: bit 0 is sign; bits 1-8 are ponent E; bits 9-35 are absolute value of mantissa, M, with implied binary

point before bit 9; number = $M \times 2^{-27} \times 2^{E-128}$ if the binary point is considered to be after bit 35). The end of the tape is signalled by a file containing a single (250-word, 1500-character) record of 99999999.0's. The last logical record (second half of the last physical record) in an orbit file may be all zeroes. This occurs whenever the number of data points computed for an orbit is odd.

III. Abstraction program: Experiment data checking.

All of the discussions of the abstraction program which pertain to error checking and output listings refer to the program MERGER4, which produces FMRnnn tapes. Earlier versions of the abstraction program, which produced RMRnnn and MRnnnA tapes, incorporated very few error checks. Where an error check applies to all versions of the abstraction program, it will be so indicated.

1. Tape quality: standard IBM OS/370 error checking is performed when the tape is read. Whenever a permanent read error (e.g. a parity error) is encountered, a message is printed and the entire physical record is skipped.
2. Data quality: to be accepted for processing, the data in each record must satisfy certain constraints. These are:
   a. Day number must be greater than zero and less than 367;
   b. Day number must not increase by more than one from the previous accepted record, unless this is the first record of an acquisition;
   c. Time must be non-negative and less than or equal to 86400000;
   d. Time must not change by more than 150 seconds from previous accepted record, unless this is the first record of an acquisition.

3. Data content (all versions): fill frames are counted, then dropped.

IV. Abstraction program: Orbit data checking.

1. Tape quality: same as III. 1. above.

2. Data quality: similar to III. 2:

   a. Time must be an integer multiple of 60000 milliseconds (earlier versions required an even multiple of 60 milliseconds, which usually gives the same result);

   b. Day must be greater than zero (all versions);

   c. Day must be less than or equal to 366;

   d. Altitude must be greater than 99.0 and less than 2000.0;

   e. L. must be greater than or equal to .90 and less than or equal to 101.0;

   f. Day must not be less than previous day;

   g. Day must not increase by more than one;

   h. Time must behave properly at day change.

These checks (IV. 2.) are performed on each logical record. If any of the conditions are not met, the logical record is skipped and a message is printed.

V. Abstraction program: Data conversions.

A number of conversions are performed on the raw experiment data to facilitate later processing. In general, these are operations which convert data from a form which is convenient for the experiment electronics to a form which is convenient for the user. This section discusses only those conversions which are performed by the abstraction program. Refer to Appendix A for additional conversions done by INPUTF. Conversions are discussed in relation to logical record type. See Section VI below for details of the various record types. References 2 and 3 discuss the details of the experiment data format.

A-record:

1. The parity of MC113 and MC114 is checked. If it is incorrect, the corresponding bits (A1/5 or A1/6) are set. (The notation used corresponds to Figures 4-7. Xn/m means record type X, byte n, bit m. Bytes and bits are numbered beginning with 1. Bit 1 is the high-order bit of each byte.)
2. The MC113 and MC114 overflow bits are set to correspond to the current frame by looking ahead to the following frame of experiment data, if that is available. (A1/3 and A1/4)
3. The "next frame fill" flag (A1/8) is set by examining MC129/6 from the following frame.
4. Byte A2 (FRMDRP) is the number of fill frames counted since the last non-fill frame or the beginning of the current subcom sequence, whichever came last. This number is increased by 128 if there is a timing inconsistency between subcom sequences.
5. The MC113 and MC114 rates are decoded from the 217 shift code before being stored as A9 and A10.

B-record:

1. The MC10(C) overflow flag (B1/3) is set from MC9/6 of the following frame (cf. V. A. 2. above).
2. The parity of MC9 through MC12 is checked and the corresponding flag bits (B1/4 - B1/7) are set if the parity is incorrect.
3. MC10 is decoded in a way that depends on the event code (255 shift code for Cerenkov events and Range events, 217 shift code for Flare events and illegal event codes, and no decoding for Range-Range events).
4. MC11 and MC12 are decoded 255 shift code.

C-record: No conversions.

D-record:

1. Orbit number is converted to integer format.
2. All other data are converted to S/360 double-precision floating-point format.

VI. Abstract tape format and data content. Copy held at NSSDC, 69-051A-20A

The abstract tapes produced by the merge (abstraction) program are 9-track, 800 bpi, with variable length records (RECFM=U). The physical records contain a variable number of logical records of four types:

A-records: one for every frame of data (except fill). These are 10 bytes long, and contain information from MC39, MC87, MC113, MC114, MC129, and MC131, and the Sun Aspect Indicator (SAI, cf. Reference 1). Also included is a flag indicating whether the following frame was fill (before being deleted by the abstraction program), and a count of the number of fill frames dropped immediately preceding the current frame. See Figure 4.

B-record: one for every frame containing a new event or a change in any of MC9-MC12. These are 5 bytes long and immediately precede the A-record to which they correspond. They contain information from MC9 through MC12. See Figure 5.

C-record: one for every subcom sequence. These contain the day and time references for the A- and B-records following them, the bit rate for the current acquisition, and subcommutated data that is available once each subcom sequence. The day and time in the C-record correspond to the first frame of the subcom sequence. The time for subsequent frames may be found from the subcom count (MC131/6-12) and the bit rate. See Figure 6. These are 30 bytes long.

D-record: one each minute. These contain attitude-orbit data in S/360 double-precision floating-point format, and a flag indicating end-of-acquisition when appropriate. See Figure 7. These are 556 bytes long.

Normally each acquisition begins ~~and ends~~ with a D-record. There is then one C-record for each subcom sequence, followed by the B- and A-records for that sequence. D-records are inserted wherever appropriate to maintain time-order. Each physical record begins with either a D- or C-record, and no physical record contains more than 3 D-records or 3 C-records (except for error conditions in some RMR and MR tapes. See Section VII). The maximum physical record length in bytes is 3 x 556 (3 D-records) + 3 x 30 (3 C-records) + 128 x (5 + 10) (128 A-records each with an accompanying B-record) = 3678 bytes. Average length is about 2200 bytes. A B-record always occurs immediately before its associated A-record. Each tape consists of a single file, which contains one day of data. Acquisitions appear in the same order as on the Experiment tapes. Acquisitions always end with a D-record, which contains an end-of-acquisition flag. This may occur anywhere within a physical record.

VII. Differences between RMR, MR, and FMR tapes.

FMR tapes are produced by the current version of the abstraction program (MERGER4), and fit the description given above. RMR and MR tapes contain several errors due to bugs in earlier versions of the program. These may be divided into three groups as discussed below.

A. Buffer control errors: These occur when certain configurations of fill data cause an entire subcom sequence to be deleted. The program allocates buffer space for a C-record for that subcom sequence, but never writes the record into the buffer. The information that previously occupied that

buffer position is retained, and later misinterpreted when read by INPUTF. Version 7 of INPUTF checks for this by comparing the subcom count (A6/2-8) with that expected from the number of A-records since the last C-record and the number dropped (A2). It also checks for consistency between the fill flag (A1/8) and FRMDRP (A2) (if A1/8 is zero or one, A2 of the following frame must be zero or non-zero, respectively).

B. Timing errors: certain improbable combinations of conditions sometimes cause the program to lose synchronization between Experiment data time and Orbit data time, thus producing stretches of output with no D-records or with mismatched times. This cannot be corrected by INPUTF.

C. Maincom 10 decoding error (RMR tapes only): the program uses the event code from the previous event to decide how to decode MC10. INPUTF corrects this (if SETINV has previously been called) by checking the previous event code, translating MC10 (B3, decoded) back to the original form and then re-translating using the correct event code. This cannot be done in all cases, since the 217 shift code is not one-to-one. In cases where the translation cannot be accomplished unambigously, INPUTF signals an "inversion failure" (cf. Appendix A.)

VIII. Abstraction program output.

This section describes the printed and punched output produced by the abstraction program. Printed output applies only to the latest version (MERGER4); punched output is the same for all versions.

Printed output consists of: a) standard descriptive information, b) error messages, c) optional listings of input and/or output records. The standard information includes listing of control cards or defaults, listing of label records of each Experiment Tape or Orbit Tape file opened, listing

of day and time for each input record dropped (and reason for dropping it; cf. Sections III and IV above), listing of the internal Orbit File Dictionary maintained by the program, and a listing of acquisitions processed at the end of each run. Error messages are more or less self-explanatory, and are printed whenever I/O errors or internal errors are detected. Optional listings include the day and time for each logical record processed on input, and each C- and D-record, plus physical record number, on output. Additional information appropriate to each record type is also printed, such as altitude and L-value for input Orbit records. Appendix C explains how to request this optional output.

Punched output consists of one or two cards for each input end-of-file (except for unused Orbit files which are scanned and skipped). These contain acquisition start/end times or orbit start/end times, and other descriptive information (cf. Figure 8.)

JULY 30, 1971
J. W. BROWN
revised 9/29/71

IX. Appendix A

INPUTF VERSION 7

I. GENERAL INFORMATION

There are currently three versions of OGO-6 Abstract Tapes available. They are designated RMR, MR, or FMR, depending upon which version of the abstraction program produced them. FMR tapes are the most recent version, and should be used whenever they are available (some older tapes have been re-abstracted and FMR versions now exist.) RMR and MR tapes contain a number of rather serious errors which have recently been discovered. The worst of these errors will cause what appears to be random garbage to show up in various unexpected places in the data. Version 7 of INPUTF contains extensive error-checking procedures which should be able to detect these errors in most cases. When an error is detected, the entire physical record containing the error is discarded and an error message is printed on FORTRAN Unit 6. This checking is not necessary when processing FMR tapes, and can be bypassed by issuing CALL BYPCHK at any time. Once issued, the call is irreversible.

In addition, RMR tapes contain an error in decoding the Maincom Word 10 shift code. This can usually be corrected by issuing CALL SETINV before the first call to INPUTF. In the event the error cannot be corrected in an individual case,

an error indication will be given as discussed below.

Version 7 should be completely compatible with all programs that used earlier versions of INPUTF. However, some changes in results might be expected due to errors in the earlier versions. Version 7 has optional additional inputs and outputs which are essentially the same as those discussed in a previous writeup for Version 5.

For a detailed description of the errors in the RMR and MR tapes, the writeup* for the new abstraction program, MERGER4, should be consulted.

II. ENTRY POINTS

CALL INPUTF - returns data as discussed below.

CALL SETINV - causes correction of Maincom 10 decoding error. Should be used for RMR tapes only, and should be called once before any call to INPUTF.

CALL SKIPRC(N) - skips N physical records. May be called at any time. If INPUTF is in the middle of a physical record when SKIPRC is called, the current record will be skipped in addition.

CALL BYPCHK - causes suppression of error checking. Should be used with FMR tapes only. Needs to be called only once.

III. CONTROL INPUTS AND DATA RETURNS

```
COMMON/AREC/IA(17)
COMMON/BREC/IB(12),ILLEG*,INVERT*
COMMON/CREC/IC(27),IBITRT*
COMMON/DREC/IEOA,IORBIT,DWORD(69)
COMMON/CONTRL/NC(13)
```

All variables are INTEGER*4 except DWORD, which is REAL*8. The variables marked with an asterisk are optional, and need be present only if their function is requested (see below). All variables are outputs from INPUTF except NC(1) through NC(4), which control INPUTF. These have the following effects:

- NC(1) Return on A-record if odd, do not return if even.
- NC(2) Return on B-record if odd, no return if even.
- NC(3) Return on C-record if odd, no return if even.
- NC(4) Return on D-record if odd, no return if even.

Only the 1-bit is checked to determine a return request. Setting NC(1)=1 and NC(2)=NC(3)=NC(4)=0 will ensure that all records are read, except the last D-record on the tape, which is not followed by an A-record.

Additional returns are requested by setting other bits in these words:

COMMON/CONTRL/NC(13)

- NC(1) All bits other than 1-bit are ignored.
- NC(2)
  - 2-bit: If zero, ignore all higher bits, if one, set ILLEG and INVERT as appropriate and check higher bits.
  - 16-bit: Ignore any B-record with event code = 0 or 1 (Cerenkov or null).
  - 32-bit: Ignore any B-record with event code = 0 or 2.
  - 64-bit: Ignore any B-record with event code = 0 or 4 (Range-no range).
  - 128-bit: Ignore any B-record with event code = 0 or 8 (Flare)

64-bit and
32-bit: Ignore any B-record with event code = 0,2,4, or 6 (Range-no range and Range-Range).

To determine effects of other combinations, calculate (15-(NC(2)/16)) and perform a logical AND with the event code. If the result is zero, the event will be ignored.

NC(3) 2-bit: If on, return bit rate code in IBITRT.

IBITRT	Meaning
0	8 kbps realtime data
1	16 kbps " "
2	64 kbps " "
3	8 kbps playback data

NC(4) All bits other than 1-bit are ignored.

INPUTF returns the following variables:

NC(5) = 0 AREC contains old data.
= 1 AREC contains new data.
NC(6) = 0 BREC contains old data.
= 1 BREC contains new data.
NC(7) = 0 CREC as above
= 1 CREC "
NC(8) = 0 DREC "
= 1 DREC "
NC(9) = 0 Normal
= 1 End of file encountered.
= 2 SYNAD error (data check or equip. check). Next record ready for processing.
= 3 Missing DD card for TAPEAT, or unable to open for some other reason. (INPUTF should not be reentered if NC(9) = 1 or 3).
NC(10) = 0 Normal.
= 1 Timing inconsistency between subcom sequences (from abstraction program).
NC(11) = -1 Sync found disagrees with expected sync; new value used, probably correct.
= 0 Sync found agrees with expected sync.
= +1 No sync found in this subcom sequence; digital data lines were probably off for all or most of sequence.

NC(12) = 0 Normal.
= 1 Unexpected sync frame found after first sync frame in this subcom sequence.
NC(13) = 0 Normal.
= 1 Digital data lines off, this frame.

```
COMMON/AREC/IA(17)
   IA(1)        SAI
   IA(2)  = 0   Not first frame of subcom sequence.
          = 1   First frame of subcom sequence (MC129/5).
   IA(3)  = 0   Normal (MC129/6).
          = 1   This frame is fill (may be forced by INPUTF
                error checking routine).
   IA(4)  = 1   Normal (MC131/4).
          = 0   Not in subcom sync.
   IA(5)  = 1   Normal (MC131/5): in frame sync.
          = 0   In lock, but errors.
   IA(6)        Subcom count (MC131/6-12) 0 thru 127.
   IA(7)        MC39/1-8  Analog D8 rate, channel #.
   IA(8)        MC87/1-8  Analog D4' rate, channel #.
   IA(9)        MC113 decoded from shift code:  negated if
                overflow, excess 300 if followed by fill.
   IA(10)       MC114 as above
   IA(11) = 0   Normal.
          = 1   MC113 parity error.
   IA(12) = 0   Normal.
          = 1   MC114 parity error.
   IA(13)       XY    (See Internal Report #19, Table III).
   IA(14)       CNT   (See Internal Report #19, page 15).
   IA(15)       Number of fill frames dropped since last
                C-record or since last good A-record, which-
                ever came last.
   IA(16)       Time in milliseconds.
   IA(17)       Day number.
```

```
COMMON/BREC/IB(12),ILLEG,INVERT
   IB(1)          Event code (MC9/1-4)
                  (= 9 if inversion error and NC(2) 2-bit = 0)
   IB(2)      = 0 New event (MC9/5) (error in some previous
                  writeups).
              = 1 Not new event.
   IB(3)      =   HTC1 (MC10 decoded 255 shift code) if event
                  code = 1 or 4.
              =   0 otherwise.
   IB(4)      =   HTC2 (MC11 decoded 255 Shift Code).
   IB(5)      =   HTC3 (MC12 decoded 255 Shift Code).
   IB(6)      =   FLR RATE (MC10 decoded 217 Shift Code)
                  if event code = 8 or illegal; negated if
                  overflow; = 300 if O/F flag lost due to fill.
              =   0 otherwise.
   IB(7)      =   Low range bits (MC10/5-8) if event = 6.
              =   0 otherwise.
   IB(8)      =   High range bits (MC10/1-4) if event = 6.
              =   0 otherwise.
   IB(9) thru
    IB(12)        Parity error flags for MC9 thru MC12 respec-
                  tively:  1 if parity error, 0 if parity OK.
   ILLEG      = 1 If illegal event code  } {Set only if
              = 0 If legal event code    } {NC(2) 2-bit = 1
   INVERT     = 1 If MC10 inversion error }      "
              = 0 If MC10 inverted OK     }      "
```

```
COMMON/CREC/IC(27),IBITRT
   IC(1)          Time, milliseconds.
   IC(2)          Day number.
   IC(3)          Command status (SC72/1-6).
   IC(4)          Range telescope temperature (SC87/2-9).
   IC(5)          Cerenkov telescope temperature (SC106/2-9).
   IC(6)          Subcom I (86)
   IC(7)             "     (34)
   IC(8)             "     (98)    } other experiments
   IC(9)             "     (36)
   IC(10)            "     (117)
   IC(11)         RI Status          SCI-9      bits 2-9
   IC(12)         RI  Status         SCI-83        "
   IC(13)         RR Mode            SCI-84        "
   IC(14)         -Z door temp.      SCIII-36      "
   IC(15)         -X door temp.      SCIII-3       "
   IC(16)         Buss Voltage       SCII-21       "
   IC(17)         Wideband A         SCII-36       "
   IC(18)         Wideband B         SCII-88       "
   IC(19)         Special Purpose    SCII-68       "
   IC(20)         Calibrations       SCII-82       "
   IC(21)               "            SCIII-81      "
   IC(22)               "            SCII-83       "
   IC(23)               "            SCIII-82      "
   IC(24)               "            SCII-84       "
   IC(25)               "            SCIII-83      "
   IC(26)               "            SCII-85       "
   IC(27)         RR Power           SCI-83        "
                   (Same as IC(11)
   IBITRT  = 0  if 8 kbps realtime data
           = 1  if 16 kbps   "       "
           = 2  if 64 kbps   "       "
           = 3  if 8 kbps playback data
                 (IBITRT Set only if NC(3) 2-bit = 1)
```

```
COMMON/DREC/IEOA,IORBIT,D(69)
```

IEOA	= 1	If this DREC indicates end-of-acquisition.
	= 0	Otherwise.
IORBIT		Orbit number.
D(1)		Day number (D(1) through D(69) all double precision floating point).
D(2)		Time, milliseconds.
D(3)		Right ascension, degrees.
D(4)		Declination, degrees.
D(5)		Position vector X
D(6)		" " Y } GEI, kilometers
D(7)		" " Z
D(8)		Velocity vector Vx
D(9)		" " Vy } GEI, km/sec
D(10)		" " Vz
D(11)		Solar Vector X
D(12)		" " Y } GEI, kilometers
D(13)		" " Z
D(14)		Latitude, geodetic, degrees.
D(15)		Longitude, geodetic, degrees.
D(16)		Altitude, kilometers.
D(17)		True anomaly, degrees.
D(18)		Sun-earth-satelitte angle, degrees.
D(19)		Actual body roll axis X
D(20)		" " " " Y } GEI, unit vector
D(21)		" " " " Z
D(22)		Actual body pitch axis X
D(23)		" " " " Y } GEI, unit vector
D(24)		" " " " Z
D(25)		Actual body yaw axis X
D(26)		" " " " Y } GEI, unit vector
D(27)		" " " " Z
D(28)		Magnetic range, earth radii.
D(29)		Magnetic latitude, degrees.
D(30)		McIlwain L-parameter, earth radii.
D(31)		Magnetic field (B), gamma (10^{-5} gauss).
D(32)		Field ratio B/B_0.
D(33)		Field line ingress latitude, degrees.
D(34)		" " " longitude, "
D(35)		Field line egress latitude, degrees
D(36)		" " " longitude, "
D(37)		Magnetic field direction X
D(38)		" " " " Y } GEI, unit vector
D(39)		" " " " Z

D(40)	Mag. field direction X	} body coords., unit vector
D(41)	" " " Y	
D(42)	" " " Z	
D(43)	Mag. field vector Geodetic (left-handed) Coordinates BGE	} gamma
D(44)	BGN	
D(45)	BGV	
D(46) thru D(54)	GEI to GSE transformation matrix in row order (11,12,13,21,22,23,31,32,33).	
D(55) thru D(63)	GEI to GSM transformation matrix, row order.	
D(64)	Satellite spin axis X	} GEI, unit vector
D(65)	" " " Y	
D(66)	" " " Z	
D(67) = 0.0	Normally.	
D(67) =-1.0	If attitude data housekeeping discrepancies detected.	
D(68)	No data flags	} See below
D(69)	Suspect data flags	

D(68) and D(69) are $K_0 \cdot 2^0 + K_1 \cdot 2^1 + K_2 \cdot 2^2 + \ldots + K_5 \cdot 2^5$, where K_n has the following meanings:

n	data
0	Roll
1	Pitch
2	Yaw
3	OPEP shaft angle
4	Paddle shaft angle
5	Array error

If K_n is 1 in D(68), the corresponding data is not available.

If K_n is 1 in D(69), the data is suspect. Otherwise $K_n = 0$.

More details on the meanings of these quantities can be found in various OGO writeups, e.g. NASA X-565-69-157 "OGO-F Data-Processing Plan," GSFC, March 1969.

IV. MISCELLANEOUS CONSIDERATIONS

1. NC(5) through NC(8) should always be checked to avoid reprocessing data that may not have changed since the preceeding call to INPUTF.

2. NC(9) should always be checked immediately upon return from INPUTF or SKIPRC. If NC(9) is 0 or 2, INPUTF or SKIPRC may be reentered and processing will continue (N will have to reset for SKIPRC(N), if NC(9) = 2, otherwise more records may be skipped than were intended.) If INPUTF or SKIPRC is reentered after NC(9) is returned as 1 or 3, the job step will probably ABEND.

3. With regard to illegal event codes, both the abstraction program and INPUTF treat these as if they were 8 (FLARE event) for purposes of decoding MC10. If the 2-bit of NC(2) is <u>on</u> (1), ILLEG will be set to 1 for illegal event codes. Otherwise, the calling program should check the event code each time.

ADDENDUM TO INPUTF WRITEUP
AND
DESCRIPTION OF INPUTF VERSIONS 5 and 6

0. Contents:

I. Errors found in INPUTF Version 3B (and Version 4)

II. General specifications applicable to Version 3B and Versions 5 and 6

III. Differences between Version 3B and Versions 5 and 6

IV. Errors in Version 5

I. Errors in Version 3B:

1. When a fill flag is encountered, MC10 is always decoded to 300, since it is assumed that the overflow flag (which would have been in the following spacecraft frame) was lost. This is necessary only for FLARE events, where MC10 is a rate, but is done for all event types by Version 3B.

2. When attempting to set B(6) (FLR RAT) to 300 when the above condition is encountered, Version 3B sets it to 44 instead.

3. The number of frames lost (FRMDRP) is reduced by 128 if it exceeds 127. This is a signal from the merge program which indicates a timing inconsistency between subcom sequences. NC (10) is set to 1 when this occurs.

4. The names for A(2) and A(3) (SUBSEQ and FILL, respectively) are reversed in the source code for Version 3B. The reversal does not

affect the operation of the program however, since it is done consistently.

5. SETINV does not save registers properly. This might cause strange things to happen in the main program.

II. General Specifications:

1. The computation of XY and CNT (A(13) and A(14)) is quite complicated. A search through the input buffer is done each time a C-record is encountered. INPUTF looks for an A-record which has MC114 = 255 and MC113 ≠ 255. It then sets XY = 3 and CNT = 16 for that frame and then works backwards to the first frame following the C-record. The values of XY and CNT thus obtained are compared with the values expected from previous computations, except at the beginning of an acquisition when the latter are not available. If the old and new values match, NC(11) is set to zero. If they do not match, NC(11) is set to -1, and the new values are used. If the sync frame described above is not found before the next C-record or before the end of the input buffer, NC(11) is set to +1, and the old values are used for XY and CNT.

2. The meaning of XY is not that which would be expected from some of the OGO-F write-ups. When XY = 1, MC114 is MC114(1) = D5' rate; etc. This is, MC114(XY) is what would be expected from, say, Fig. 14 of Althouse et al. (1967) (ignoring $\overline{XY}$) or Table III of Murray (1970), but not Table VIII of Murray (1970). The value of XY is not to be confused with the bits $\overline{XY}$.

3. Notice that C(11) (RI Status) and C(27) (RR Power) both contain the same information.

4. In case of overflow, the following words are negated, after shift-code decoding: MC113, MC114, MC10 (latter negated only for flare event).

5. Parity bits are not stored in B(9) through B(12), A(11), A(12) These are parity error flags, not the original spacecraft parity bits.

6. In case of a fill flag, MC113 and MC114 are set to 300 (cf. I. 1-2 above for MC10).

7. Due to an error in an early version of the MERGE Program, MC10 was decoded improperly in many cases. Abstract tapes which contain this error are labelled RMRnnn. Tapes which do not contain the error are labelled MRnnnA, or FMRnnn. For tapes with the error, it is necessary to issue CALL SETINV before the first call to INPUTF (Version 4 does this automatically but incorrectly. Do not use Version 4).

8. NC(13) is set to 1 (digital data off) whenever both MC113 and MC114 are 255 (decoded from zero).

9. NEOF is set to 1×2^{24} when an end-of-file is encountered. See below (III.6) for other possibilities.

10. NC(10) is set to 1 whenever FRMDRP > 127 and FRMDRP is set 128 smaller. (cf. I.3 above).

11. NC(1) through NC(4) are never changed by INPUTF. All other quantities in COMMON/CONTRL/ are set to zero unless otherwise indicated above, except NC(5) through NC(8) are set to 1 if a new record of the respective type was processed this call. Other COMMON blocks are not disturbed until a new record of the respective type is processed.

12. The MERGE program treats illegal event codes as if they were 8 (flare event). Occasional inversion errors may be expected following illegal events and flare events. Following other event types, one should <u>not</u> encounter any inversion errors. On illegal event codes, B(3), B(6), B(7), and B(8) should all be zero.

III. <u>Differences Between Version 3B and Version 5</u>:

1. Version 5 should be basically compatible with any program that used Version 3B. The errors described above (I.1, I.2, I.4, I.5) have been corrected, and some of the internal coding has been streamlined for faster running.

2. Additional returns are available if requested. These are:

```
COMMON/BREC/IB(12),ILLEG,INVERT
COMMON/CREC/IC(27),IBITRT
```

Where ILLEG is set to 1 if an illegal event code is encountered (zero otherwise), INVERT is set to <u>one</u> if an inversion error is encountered (zero otherwise), and IBITRT is 0,1,2 or 3 for 8, 16, or 64 kbps real-time, or 8 kbps playback, respectively.

3. Requests for the above extra variables are made by setting the 2-bit of NC(2) and NC(3). That is, if NC(2) = 2 or 3, ILLEG and INVERT

will be returned; if NC(3) = 2 or 3, IBITRT will be returned. Notice that the COMMON blocks must be extended to provide for these returns if they are requested, otherwise other data may be destroyed. The 1-bit of NC(2) and NC(3) is interpreted the same way by both versions: if zero (even), do not return; if one (odd), return.

4. If NC(2) is not 2 or 3, the event code B(1) is set to 9 by Version 5 in case of an inversion error. This is done by Version 3B regardless of the value of NC(2). If NC(2) is 2 or 3, Version 5 does not modify the event code from what is on the tape.

5. If NC(2) is 2 or 3 (more specifically, if the 2-bit is ON), additional requests can be made by setting the 16-, 32-, 64-, and 128- bits of NC(2) (Version 5 only). The meaning of each of these bits is as follows:

BIT ON	MEANS
16	Ignore BREC if event = 1
64	" " " " = 4
64 and 32	" " " " = 6
128	" " " " = 8

The event code is tested bit by bit against this mask, so some illegal event codes will also be ignored. All bit combinations with NC(2) < 255 are valid. The 4- and 8- bits are ignored. E.g.: Nc(2) = 128+64+32+2 means: ignore all B-records except those with odd event codes (Cerenkov events and some illegal codes), set ILLEG and INVERT as needed, and do not return on B-records. Note that these codes are meaningless to Version 3B, which examines only the 1-bit.

6. NEOF is set to 1 x 2^{24} for EOF, 2 x 2^{24} for data checks, and 3 if the data set cannot be opened. This has been changed to 1, 2. and 3 respectively in Version 6.

IV. Version 5 does not handle data checks properly. Version 3 ignores them. Version 6 prints a message and skips the bad record.

IV.A. Versions 3 and 5 set MC113=MC114=300 in case of fill. Version 6 adds 300 to MC113 and MC114 in case of fill.

X. Appendix B: List of abstract tapes and time coverage.

1969 ØGØ-6 ABSTRACT TAPES

Date	June 1969	July	August	September
1		RMR 029	RMR 060	RMR 091
2		RMR 030	RMR 061	RMR 092
3		MR 031A*	RMR 062	BAD TAPE
4		RMR 032	RMR 063	RMR 094
5		RMR 033	RMR 064	NØ DATA
6		RMR 034	FMR 065	RMR 096
7	RMR 001 RMR 002	RMR 035	RMR 066	NØ DATA
8	RMR 003 RMR 004	RMR 036	RMR 067	RMR 098
9	RMR 005 RMR 006	RMR 037	RMR 068	RMR 099
10	RMR 007 RMR 008	FMR 038	RMR 069	RMR 100
11	RMR 009 RMR 010	RMR 039	RMR 070	RMR 101
12	RMR 011 RMR 012	RMR 040	RMR 071	NØ DATA
13	RMR 013 RMR 014	FMR 041*	RMR 072	RMR 103
14	RMR 015 RMR 016	RMR 042	RMR 073	RMR 104
15	RMR 017 RMR 018	RMR 043	RMR 074	RMR 105
16	RMR 019	RMR 044	RMR 075	RMR 106
17	RMR 020	FMR 045*	RMR 076	RMR 107
18	RMR 021	RMR 046	RMR 077	RMR 108
19	RMR 022	RMR 047	RMR 078	FMR 109
20	RMR 023	RMR 048	FMR 079	RMR 110
21	RMR 023-1	RMR 049	FMR 080	FMR 111
22	RMR 023-2	RMR 050	FMR 081	FMR 112
23	RMR 023-3	RMR 051	FMR 082	RMR 113
24	RMR 023-4	FMR 052*	FMR 083	RMR 114
25	FMR 024*	RMR 053	FMR 084	RMR 115
26	RMR 025	RMR 054	FMR 085	RMR 116
27	RMR 026	RMR 055	RMR 086	RMR 117
28	RMR 027	RMR 056	RMR 087	RMR 118
29	RMR 027-2	RMR 057	NØ DATA	RMR 119
30	RMR 028	RMR 058	FMR 089	RMR 120
31		RMR 059	RMR 090	

*Also RMR

Date	Oct. 1969	November	December
1	RMR 121	RMR 152	FMR 182
2	RMR 122	MR 153A*	FMR 183
3	RMR 123	MR 154A*	FMR 184
4	RMR 124	RMR 155	FMR 185
5	RMR 125	RMR 156	FMR 186
6	RMR 126	MR 157A*	FMR 187
7	RMR 127	MR 158A*	FMR 188
8	RMR 128	MR 159A*	FMR 189
9	FMR 129	MR 160A*	FMR 190
10	RMR 130	MR 161A*	FMR 191
11	FMR 131	MR 162A*	FMR 192
12	RMR 132	MR 163A*	FMR 193
13	RMR 133	FMR 164*	FMR 194
14	MR 134A	FMR 165	FMR 195
15	MR 135A	FMR 166	FMR 196
16	RMR 136	FMR 167	FMR 197
17	RMR 137	FMR 168	FMR 198
18	RMR 138	MR 169A*	MR 199A
19	RMR 139	MR 170A*	FMR 200
20	MR 140A	MR 171A*	MR 201A
21	RMR 141	MR 172A*	MR 202A
22	RMR 142	MR 173A*	MR 203A
23	FMR 143	MR 174A*	MR 204A
24	RMR 144	RMR 175	MR 205A
25	FMR 145	RMR 176	FMR 206
26	RMR 146	RMR 177	FMR 207
27	RMR 147	RMR 178	FMR 208
28	BAD TAPE	RMR 179	FMR 209
29	FMR 149	FMR 180 INC BAD TAPES	FMR 210
30	FMR 150	RMR 181	MR 211A
31	RMR 151		MR 212A

* Also RMR

1970 ØGØ-6 ABSTRACT TAPES

Date	Jan. 1970	February	March	April
1	FMR 213	MR 247A	FMR 277	MR 309A
2	MR 214A	MR 248A	FMR 278	MR 310A
3	MR 215A	MR 249A	FMR 279	MR 311A
4	MR 216A	MR 250A	FMR 280	MR 312A
5	FMR 217	MR 251A	FMR 281	MR 313A
6	FMR 218	MR 252A	FMR 282	MR 314A
7	FMR 219	MR 253A	FMR 283	MR 315A
8	FMR 220	MR 254A	FMR 285	MR 316A
9	FMR 224(R)	FMR 255	FMR 286	FMR 317
10	FMR 225	FMR 256	FMR 287	FMR 318
11	FMR 226	FMR 257	FMR 288	FMR 319
12	FMR 227	FMR 258	FMR 289	FMR 320
13	FMR 228	FMR 259	FMR 290	FMR 321
14	FMR 229	FMR 260	FMR 291	FMR 322
15	FMR 230	FMR 261	FMR 292	FMR 323
16	FMR 231	FMR 262	FMR 293	FMR 324
17	FMR 232	FMR 263	FMR 294	FMR 325
18	FMR 233	FMR 264	FMR 295	FMR 326
19	FMR 234(R)	FMR 265	FMR 296	FMR 327
20	FMR 235	FMR 266	FMR 297	FMR 328
21	FMR 236	FMR 267	FMR 298	FMR 329
22	FMR 237	FMR 268	FMR 299	FMR 330
23	FMR 238	FMR 269	FMR 300	FMR 331
24	FMR 239	FMR 270	FMR 301	FMR 332
25	FMR 240	FMR 271	FMR 302	FMR 333
26	FMR 241	FMR 274	FMR 303	FMR 334
27	FMR 242	FMR 275	FMR 304	FMR 335
28	MR 243A	FMR 276	FMR 305	FMR 336
29	MR 244A		MR 306A	FMR 337
30	MR 245A		MR 307A	FMR 338
31	MR 246A		MR 308A	

1970 ØGØ-6 ABSTRACT TAPES

Date	May 1970	June	July	August
1	FMR 339	MR 370A	MR 400A	FMR 431
2	FMR 340	MR 371A	MR 401A	FMR 432
3	FMR 341	MR 372A	FMR 402	FMR 433(R)
4	FMR 342	MR 373A	MR 403A	FMR 434
5	FMR 343	MR 374A	FMR 404	FMR 435
6	FMR 344	MR 375A	MR 405A	FMR 436
7	FMR 345	MR 376A	FMR 406	FMR 437
8	FMR 346	MR 377A	FMR 407	FMR 438
9	FMR 347	FMR 378	MR 408A	FMR 439
10	FMR 348	MR 379A	FMR 409	FMR 440
11	FMR 349	MR 380A	FMR 410	FMR 441
12	FMR 350	FMR 381	FMR 411	FMR 442
13	FMR 351	MR 382A	FMR 412	FMR 443
14	FMR 352	FMR 383	FMR 413	FMR 444
15	FMR 353	MR 384A	FMR 414	NØ DATA
16	FMR 354	FMR 385	FMR 415	FMR 445
17	FMR 355	FMR 386	FMR 416	NØ DATA
18	FMR 356	MR 387A	FMR 417	FMR 448
19	FMR 357	FMR 388	FMR 418	NØ DATA
20	FMR 358	MR 389A	FMR 419	FMR 450
21	FMR 359	FMR 390	FMR 420	NØ DATA
22	FMR 360	MR 391A	FMR 421	FMR 452
23	FMR 361	MR 392A	FMR 422	NØ DATA
24	FMR 362	FMR 393	FMR 423	FMR 454
25	FMR 363	FMR 394	FMR 424	NØ DATA
26	FMR 364	MR 395A	FMR 425	FMR 456
27	FMR 365	FMR 396	FMR 426	NØ DATA
28	FMR 366	MR 397A	FMR 427	FMR 458
29	FMR 367	FMR 398	FMR 428	
30	FMR 368(R)	MR 399A	FMR 429	
31	FMR 369		FMR 430	

(R) indicates rerun

1970	Sept.	Oct.	Nov.	Dec. 1971	Jan.	Feb.	Mar.
1		FMR 462	-	1			
2		-	-	2			
3		FMR 463	-	3			FMR 504
4		-	FMR 472	4			
5		FMR 464		5			
6		-		6			
7		FMR 465		7			
8		-		8			
9		FMR 466		9			
10		-		10			FMR 505
11		FMR 467		11			
12		-		12			
13				13			
14		-		14			
15		FMR 469		15			
16		-		16			
17		-		17			FMR 509
18		-		18			
19		-		19			
20		-		20			
21		FMR 470		21			
22		-		22			
23		-		23			
24		-		24			
25		-		25			
26		-		26	FMR 500		
27	FMR 459	-		27	MR 501A		
28	FMR 460	FMR 471		28	MR 502A		
29	FMR 461	-		29			
30	FMR 462	-		30			
31		-		31			

XI. Appendix C

OGO-F MERGE PROGRAM -- VERSION 4

1. JCL:

```
//FABSTn   JOB    etc.
//       SET   PRT=25,PUN=300,IOC=200,TIME=7
//JOBLIB       DD     DSN=WJB.OGFABST,UNIT=SYSDA,DISP=SHR,
//                    VOL=SER=CITSCn
//       EXEC         PGM=MERGER4
//TAPEHD       DD     UNIT=TAPE7,LABEL=(1,BLP,,IN),DSN=ERA.FEX,
//                    DISP=OLD,VOL=SER=FEXnnn
//TAPEHO       DD     UNIT=TAPE7,LABEL=(1,BLP,,IN),DSN=ERA.FAO,
//                    DISP=OLD,VOL=SER=FAOnnn
//ATORB        DD     UNIT=TPE800,LABEL=(1,BLP),DSN=ERA.MR,
//                    DISP=(NEW,KEEP),VOL=SER=FMRnnn
//FT06F001     DD     SYSOUT=A
//SYSUDUMP     DD     SYSOUT=A
//FT07F001     DD     SYSOUT=B
//FT05F001     DD     *
       (one to five data cards, see below)
//     (end card)
```

2. DATA CARDS:

First card (required): FEXnnn or FXnnnn in cols. 1-6, any other information on rest of card;

Second card (optional): ISKF = # of files to skip at beginning of orbit tape: FORMAT(I5); default value is zero;

Third and fourth cards (optional, interchangeable): Cols. 1-60 are bad-file markers: if col. n is 1, file n will be skipped, otherwise col. n must be blank or zero; cols. 61-63 must contain either 'FEX' or 'FAO', depending on which tape the card refers to; cols. 64-80 may contain additional identification;

Fifth card: requests for listings: may be any combination of 'LISTEX','LISTAO','LISTAT' in cols. 1-6, 8-13, and 15-20. Commas or other separators in cols. 7 and 14 are optional. If the

appropriate keyword is not present, the corresponding listing will be suppressed.

All cards except the first are optional. However, if any card is omitted, all cards following it must be omitted. Blank cards may be inserted as needed to bypass this requirement.

In the listing request (fifth) card, requests will have the following results:

LISTEX: The day and time will be listed for each record on the experiment tape (approximately 4000-5000 lines per day of data).

LISTAO: The altitude, L-value, day and time will be listed for each half-record on the attitude/orbit tape (approx. 3000-4000 lines per day of data).

LISTAT: The day and time will be listed for each C- and D-record sent to the output buffer. In addition the command status and bit rate will be listed with each C-record (approx. 7000 lines per day of data).

If the listings are not requested, the program will still list all input records which are dropped, with the reason for dropping them.

A message will be printed for each input file that is opened, regardless of listing requests.

3. BAD TAPES

Input tapes with wrong record lengths can sometimes be processed by specifying DCB parameters on the DD card. These will be ignored, however, unless the corresponding DD name appears in the PARM field of the EXEC statement. Examples:

```
//STEPA     EXEC    PGM=MERGER4,PARM='TAPEHO'
   :
//TAPEHO    DD      DSN=&FAO,UNIT=TAPE7,LABEL=(1,BLP,,IN),
//                  DISP=OLD,VOL=SER=FAOnnn,
//                  DCB=(RECFM=U,BLKSIZE=1500,DEN=1,EROPT=SKP)
   :
//STEPB     EXEC    PGM=MERGER4,PARM='TAPEHD,TAPEHO'
   :
//TAPEHO    DD      as above
//TAPEHD    DD      DSN=&FEX,UNIT=TAPE7,LABEL=(1,BLP,,IN),
//                  DISP=OLD,VOL=SER=FEXnnn,
//                  DCB=(RECFM=U,BLKSIZE=3132,DEN=1,EROPT=ACC)
   :
```

The following considerations apply when modifying the DCB:

1. DCB parameters are ignored unless the DD name appears in the PARM field of the EXEC statement. These may appear in any order.

2. If the DD name does appear, DCB information must be supplied. The RECFM, BLKSIZE, and DEN subparameters must appear, other parameters may appear.

3. If the corresponding DD name(s) does not appear in the PARM field the defaults are:

```
ATORB:   RECFM=U,BLKSIZE=10000,DEN=2
TAPEHD:  RECFM=F,BLKSIZE=3132,DEN=1,EROPT=ACC
TAPEHO:  RECFM=F,BLKSIZE=1500,DEN=1,EROPT=SKP
```

XII. List of Figures

1. Format of an Experimenter Tape File Label
2. OGO-F Data Format for Experiment 20
3. Quality Status Fields F1 and F3
4. A-record Format
5. B-record Format
6. C-record Format
7. D-record Format
8. Punched Output format - Abstraction Program

XIII References

1. E. F. Szajna and G. R. Stonesifer, OGO-F Data Processing Plan, X-565-69-157, GSFC, March 1969.

2. W. E. Althouse, E. C. Stone, R. E. Vogt, and T. H. Harrington, A Solar and Galactic Cosmic Ray Experiment, IEEE Trans. Nuc. Sci., 15, 229 (1967).

3. S. Murray, OGO-F-20 Data Format, SRL Internal Report Number 19, June, 1970.

Character	Representation
1 - 5 + Space	Satellite universal ID
7 - 8 + Space	Year
10 - 12 + Space	Station number
14 - 15 + Space	Analog file number
17 - 20 + Space	Analog tape number
22 + Space	Time correction (1 = Yes, 0 = No)
24 - 28 + Space	Orbit number
30 - 32 + Space	Date of digitization (day of year) ← 34-39 Decom Run Number:
46 - 66	Blank
67 + Space	Data Type 0 = 8 kb real time 1 = 16 kb real time 2 = 64 kb real time 3 = command storage playback
69 - 71 + Space	Day of year } Start time of data
73 - 77 + Space	Seconds of day }
79 + Space	Flex format in use (1 = Yes, 0 = No)
81 - 82	Flex format number
83 - 88	Experimenter ON/OFF status (1 = Off, 0 = On)
89 + Space	Equipment group
91 - 94 + Space	Master binary tape number
96 - 97 + Space	Master binary file number
99 - 100 + Space	A/D line operator ID
102 - 103	A/D line ID
104 - 106 + Space	Day of year } Stop time of data
108 - 112 + Space	Seconds of day }
114 - 115	Decom reel sequence number
116 - 118	~~Decom run number~~ blank
119 - 120	Experiment number
121 - 124	Group number of time fit
125 - 126	Line number of time fit
127 - 132	First line time used in time fit
133 - 138	Last line time used in time fit
139 - 144	C_0, coefficient of time fit, floating point (7094 format)*
145 - 150	C_1, coefficient of time fit, floating point (7094 format)
151 - 156	C_2, coefficient of time fit, floating point (7094 format)
157 - 162	C_3, coefficient of time fit, floating point (7094 format)
163 - 168	C_4, coefficient of time fit, floating point (7094 format)
169 - 174	C_5, coefficient of time fit, floating point (7094 format)
175 - 228	Coefficients of 2nd time fit when used (same format as 54 previous characters)
229 - 282	Coefficients of 3rd time fit when used (same format as 54 previous characters)
283 - 336	Coefficients of 4th time fit when used (same format as 54 previous characters)
337 - 390	Coefficients of 5th time fit when used (same format as 54 previous characters)

*Corrected time = $C_0 + C_1 X + C_2 X^2 + C_3 X^3 + C_4 X^4 + C_5 X^5$

where X = spacecraft clock

The file label will have a density of 556 bpi and odd parity. Label will be BCD except as noted.

Figure 1. Format of an Experimenter Tape File Label

OGO-F DATA FORMAT FOR EXPERIMENT 20

Revision B (4-3-69)

Character	Destination	Representation	
1 → 2 + 24N	—	D (65, n)	Spacecraft ID Word
3 → 4 + 24N	A	D (107, n)	SAI
5 → 8 + 24N	A	D (129, n)	F1 Status Field
	A	D (131, n)	F3 Status Field
9 → 24 + 24N	B	D (9, n)	Experiment Main Commutator Data
	B	D (10, n)	
	B	D (11, n)	HTC2
	B	D (12, n)	HTC3
	A	D (39, n)	Analog D8 Rate
	A	D (87, n)	Analog D4' Rate
	A	D (113, n)	
	A	D (114, n)	
3073 → 3078	C	D (97, 72)	CMD STATUS, $\bar{x}\bar{y}$
	C	D (97, 87)	ΔE-R TEMP.
	C	D (97, 105)	ΔE-C TEMP.
3079 → 3088	C	D (97, 86)	Other Experiment Subcommutator Words
	C	D (97, 34)	
	C	D (97, 98)	
	C	D (97, 36)	
	C	D (97, 117)	
3089 → 3094	C	D (97, 9)	R_{II} Status
	C	D (97, 83)	R and RR Status R_I
	C	D (97, 84)	R and RR Mode
3095 → 3098	C	D (99, 36)	-Z Door Temperature (top third)
	C	D (99, 3)	-X Door Temperature (aft third)
3099 → 3100	C	D (98, 21)	Load Bus Voltage
3101 → 3106	C	D (98, 36)	WB-A Foward Power
	C	D (98, 88)	WB-B Foward Power
	C	D (98, 68)	SP Foward Power
3107 → 3120	C	D (98, 82)	Calibration 1-1
	C	D (99, 81)	Calibration 2-1
	C	D (98, 83)	Calibration 1-2
	C	D (99, 82)	Calibration 2-2
	C	D (98, 84)	Calibration 1-3
	C	D (99, 83)	Calibration 2-3
	C	D (98, 85)	Calibration 1-4

Figure 2.1

Character		Representation	
3121 → 3122	C	D (132, 1)	Day of Year
3123 → 3128	C C C	D (133, 1) D (134, 1) D (135, 1)	Time of Day In Milliseconds
3129 → 3132		SPARES	

$0 \leq N \leq 127$

$n = N + 1$

Packing:
9 bits into 12
6+3 with 3 high order bits zero.

eg

111 111 111 → 000 111, 111 111

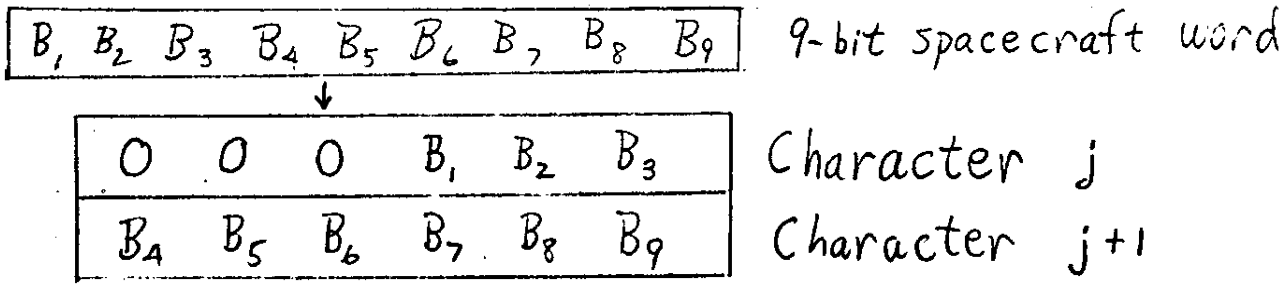


Figure 2.2

NORMAL BIT ORDER ↓

MC 129

	Bit**	State	Representation for F1, Quality Control Status
7-12	1-6		Total bit errors in the 27 bit frame sync word
6	7	1	This frame is fill data
5	8	1	This frame is the beginning of a subcomm sequence
1-4	9-12		Number of bits shifted to find frame sync word. This is expressed as sign and magnitude, bit 9 is the sign (1 = - for left shift) and bits 10-12 are the number of shifts performed to find the frame synch word.

**Bit 1 of the field is the least significant bit

Quality Status Field F1

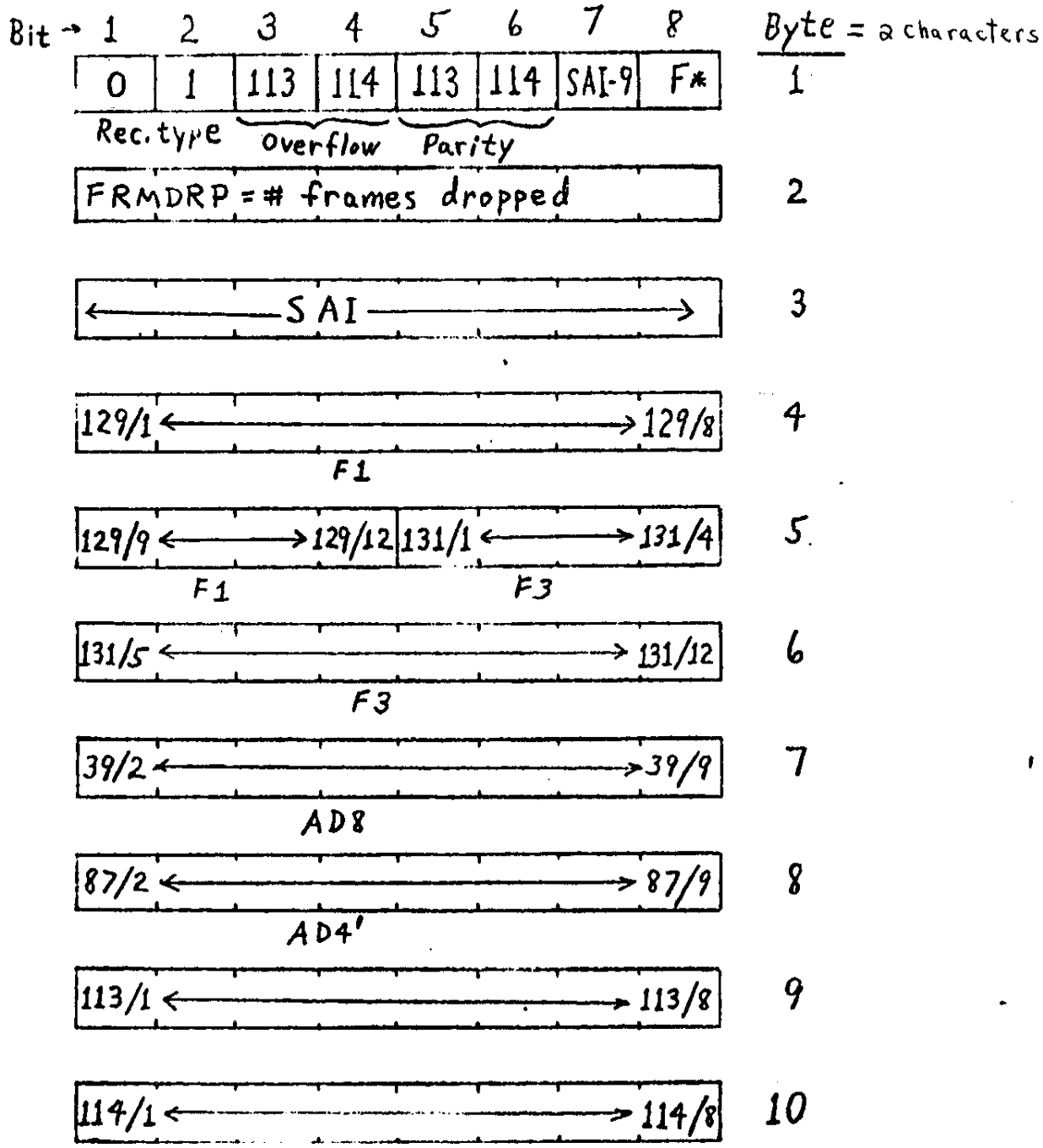
MC 131

	Bit**	State	Representation for F3, Data Status
6-12	1-7		Subcomm count; 0 - 127
5	8	1	Lock mode; in frame sync
	8	0	Flywheel mode; still in lock but bit errors in frame sync exceed tolerance
4	9	1	In subcomm sync
	9	0	Not in subcomm sync
3	10	0	BCD decoded time agrees with the accumulating register
	10	1	BCD decoded time disagrees with the accumulating register
1-2	11-12		Presently not used

**Bit 1 of the field is the least significant bit

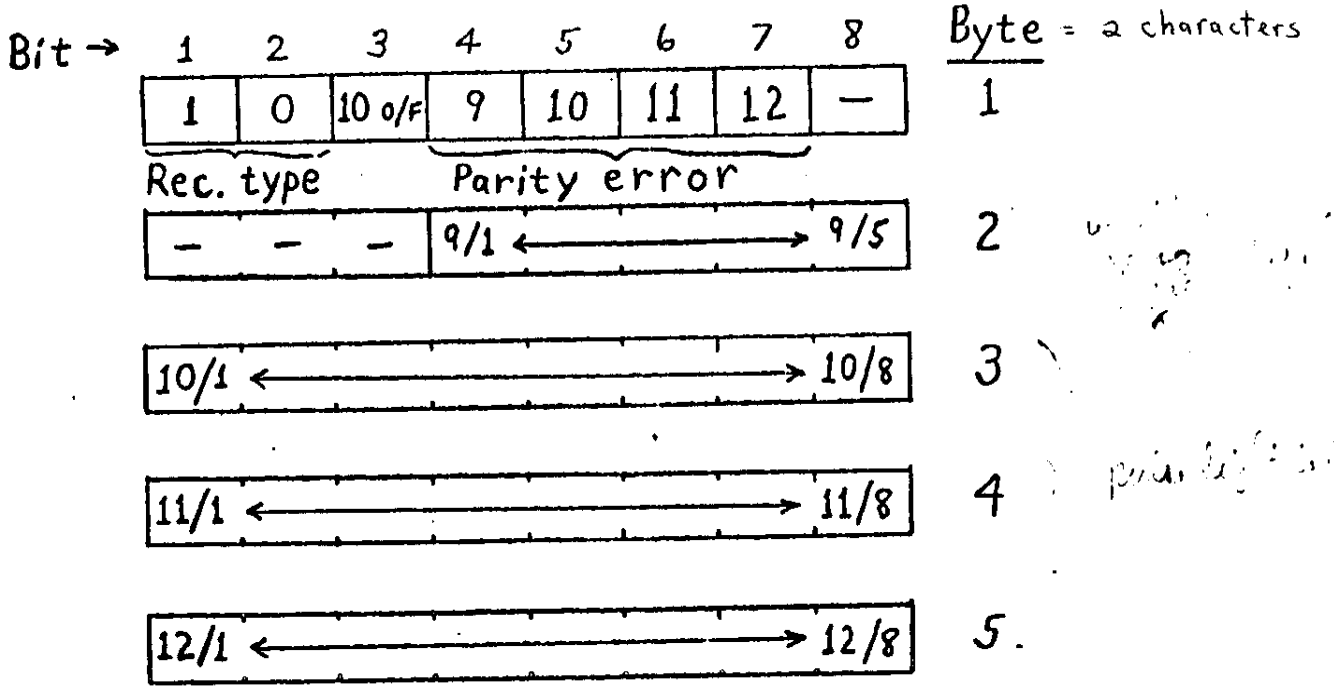
Quality Status Field F3

A-record format



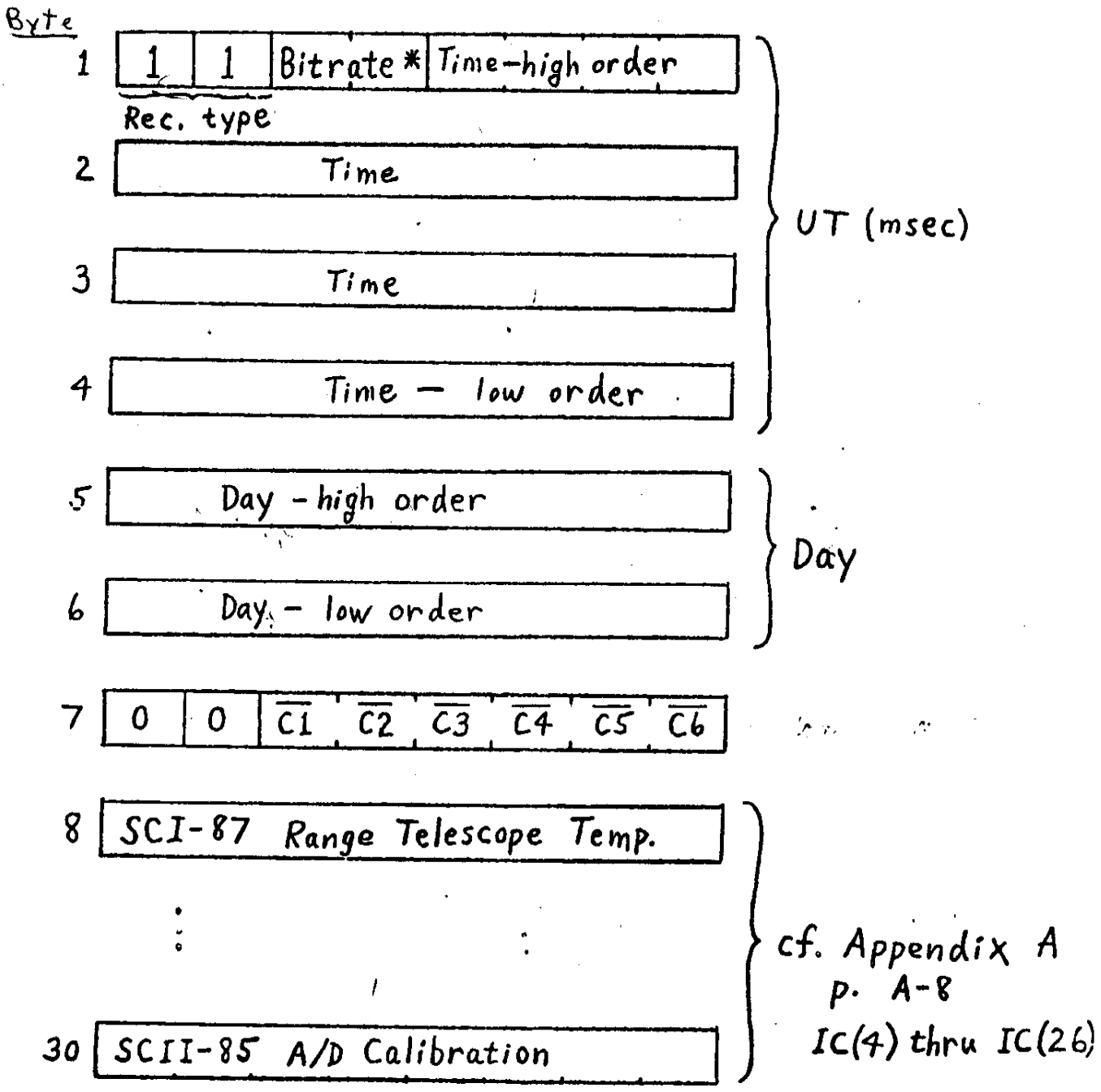
F*: 1 ⇒ next frame fill - O/F flags unreliable
0 ⇒ O/F flags OK

B-record format



~~Figure 5~~

C-record format



*Bitrate: 00 ⇒ 8 kbps realtime
01 ⇒ 16 kbps realtime
10 ⇒ 64 kbps realtime
11 ⇒ 8 kbps playback

~~Figure 1~~

D-record format

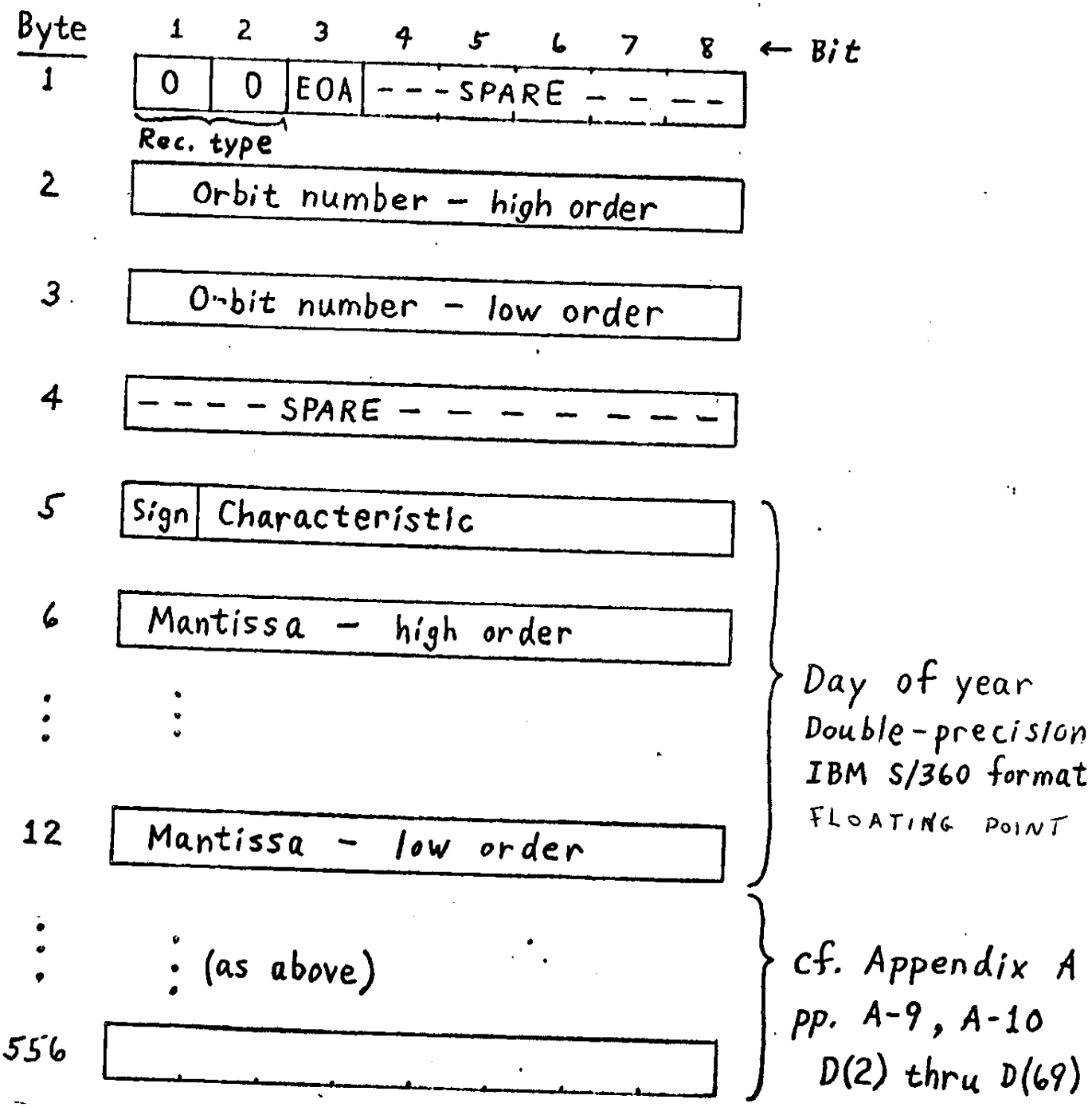


FIGURE 8. Punched output format - abstraction program

Card columns	Contents
1-5	Orbit number (I5)
6-8	blank
9	flag: 0 or 1 (see below)
10-19	Start time (F10.3)* . (seconds)
20-29	End time (F10.3)** (seconds)
30-32	Day#(start) (I3)
33-35	Month (I3)
37-38	Day (I2)
40-41	Year (I2)
42-45	' RV.'
46-50	Orbit number (I5)
51-64	blank
65-70	FEX tape ID (A6)

** End time of current orbit if flag = 0
End time of current acquisition if flag = 1

* Start time of current orbit if flag and End time are the same as the previous card; otherwise, start time of current acquisition.

69-05114-20A

Internal Report # 19

OGO-F-20 DATA FORMAT

STEVE MURRAY

June, 1970

Experiment F-20 uses the following data words of OGO-F telemetry:

From the main commutator F-20 has assigned to it words 9, 10, 11, 12, 39, 87, 113, and 114.

From the experiment subcomm (97) F-20 is assigned words 72, 87, and 106.

The interpretation of these data words is given in detail in the following section. Briefly, experiment F-20 is a cosmic ray experiment which is designed to measure the intensity and composition of cosmic rays in the energy range of 1 Mev to 1 Gev per nucleon. The experiment consists of four parts, Range telescope (R), Čerenkov telescope ($\check{C}$), Flare telescope (F), and Electronics (E). The three telescopes contain varying numbers of solid state detectors (R contains 7, $\check{C}$ contains 2, F contains 2) and passive (F) or active (R & $\check{C}$) collimators. In the case of the R & $\check{C}$ telescopes active collimation is achieved by use of cylindrical plastic scintillators. In addition, the $\check{C}$ telescope has a photomultiplier (D3') which has a quartz radiator (1 cm thick) fused to the photocathode. These telescopes cover the energy and intensity ranges of interest as follows:

R	1 mev/nucl → 300 mev/nucl	Galactic cosmic rays and low intensity solar flare
$\check{C}$	350 mev/nucl → 1 Gev/nucl	
F	17 mev → 100 mev protons	high intensity solar flare
	70 mev → 400 mev alphas	

The OGO-F data is readout in the following format. Each time the spacecraft is readout, one frame of information is said to have been read. A frame (spacecraft readout) consists of 128 words, a word being a 9 bit entity, bits consisting of a binary bit 1 or 0.

Thus the frame may be diagramed as follows:

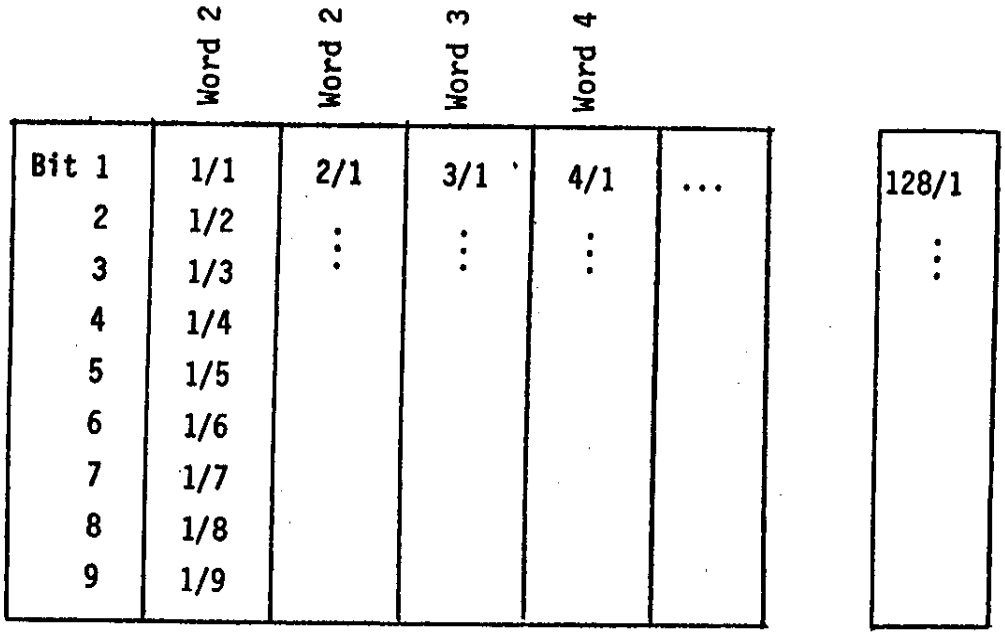


Figure 1

A frame contains 9x128 = 1152 bits. Of the 128 words in a frame, Expt F-20 is assigned words 9, 10, 11, 12, 39, 87, 113, 114. In addition the following words which are spacecraft generated are also considered part of F-20 data, words 33, 34, 35, 65, 97. Thus an F-20 data frame (i.e. that part of spacecraft frame which pertains to F-20) is words 9, 10, 11, 12, 33, 34, 35, 39, 65, 87, 97, 113, and 114, i.e., 13 words.

The Caltech GSE for F-20 however presents a somewhat different data frame. In this case, the following parts of a spacecraft frame are presented: Words 9, 10, 11, 12, 33, 34, 39, 65, 87, 97, 113, and 114. Notice the difference is that the GSE does not present word 35.

Summary of terminology:

1) Frame = readout of the spacecraft = 128 words = 1152 bits (GSE frame = readout of F-20 experiment via simulator).

2) Word = group of 9 bits of correlated information which makes up a segment of data.

3) Bit = one binary bit of information.

The interpretation of the data is as follows:

A) Word 9:

The first four bits of word 9 indicate the type of event which the readout contains. There are four distinct types of events:

9/1	9/2	9/3	9/4	
0	0	0	1	Cerenkov event
0	1	0	0	Range - no Range
0	1	1	0	Range - Range
1	0	0	0	Flare event

Table I

(0 ⇒ bit off
1 ⇒ bit on)

Bit 9/5 indicates that there was not a new event since the previous readout.

i.e, if 9/5 = 1 then there was <u>not</u> a new event since the previous readout

if 9/5 = 0 then a new event has occurred and been recorded.

Bits 9/6, 9/7, 9/8 are overflow indicator for the previous readout.

i.e. bits 9/6, 9/7, 9/8 of frame N refer to frame N-1

9/6 is the 10 overflow indicator
9/7 is the 113 overflow indicator
9/8 is the 114 overflow indicator

(see below for explanation of O/F indicators)

as with previous bits, if 9/6, 9/7, 9/8 = { 1 overflow occurred ; 0 no overflow }

Bit 9/9 is a parity bit. Certain words (9, 10, 11, 12, 113,

114) have a parity bit which is experiment generated. (This is not to be confused with magnetic tape parity). This parity is odd i.e. if there is an even number of bits on (=1) in word 9 (bits 9/1 through 9/8) then, bit word 9/9 will be on, so that overall, there is always an odd number of bits on.

Overflow: The information in words 10, 113, 114 is in the form of a 217 shift code counter which counts from 0 to 217 but in a random fashion. That is, the 9 bits code for each number cannot be found from any mathematical formula but must be tabulated. If a rate exceeds 217 counts per sampling interval, we have an overflow condition. When this happens the O/F bit in the following word 9 is turned on and the rate counter begins accumulating time in the form of a fixed clock whose frequency is less than 217 clocks/sample interval.

Clock Frequencies & Sample Interval

Rate	Sampling Interval (Words)	Sampling Rate $(\text{frames})^{-1}$	Fraction of Time Sample	Clock Frequency $(\text{frames})^{-1}$	Clock Pulses per S.I.
D5'D6'	127	1	127/128	192	$(192)(\frac{127}{128}) = 190.5000$
D1D8 D2D8 D2D3D8 $\overline{D1'D2'D3'D4'}$	383	1/3	383/384	72	$(3)(72)(\frac{383}{384}) = 215.4375$
D5'	127	1/3	$\frac{127}{384}$	192	$(3)(192)(\frac{127}{384}) = 190.5000$
Rate Comm (114(3) Subcomm) 48 Frame Period	383	1/48	$\frac{383}{6144}$	72	$(48)(72)(\frac{383}{6144}) = 215.4375$

Table II

Thus depending upon which rate has overflowed the clock being accumulated is given in clocks/frame above. Note this number is still encoded in the 217 shift code.

OGO-VI Rate Calculations

Source	Rate	SI(sec) @ 1kbs	@ 8	@ 16	@ 64	O/F Clock Pulses/SI
MC 10	D5'D6'	1.14300	0.142875	0.07144	0.01786	190.50
MC 113(1)	D1D8	3.4470	0.430875	0.21544	0.05386	215.4375
(2)	D2D8					
(3)	D2D3D8					
MC 114(2)	D1'D2'D3'D4'					
MC 114(1)	D5'	1.1430	0.142875	0.07144	0.01786	190.50
MC 114(3)	D1	3.4470	0.430875	0.21544	0.05386	215.4375
	D2					
	D3					
	D4					
	D5					
	D6					
	D7					
	D8					
	D1'					
	D2'					
	D3'					
	D4'					
	D6'					
	D1 D2 $\overline{D8}$					
	clock					

Table III

Using the above tables we can calculate actual rates in counts/sec and if an overflow has occurred, we can find the time to overflow and from that the count rate.

Examples:

1) D5'D6' rate = 112, no O/F Bit rate - 8 kbs.
The count rate is 112 counts/sampling interval. The sampling interval is 127 words out of 128 words and at 8kbs we get

$$SI = \frac{127}{128} \times 1152 \times \frac{1}{8000} = 0.143 \text{ seconds}$$

↑ SI in frame; ↑ bits/frame; ↑ sec/bit

thus Rate = $\frac{112}{.143}$ = 784 counts/sec

2) D1D8 rate = 25, O/F on Bit rate = 64 kbs
sample interval = 383 words out of 384 words = $\frac{383}{384}$ x 3 frames

$= \frac{383}{128} \times \frac{1}{64000} \times 1152$ sec

SI = .0539 sec

time to O/F = SI $(1 - \frac{25}{215.4})$ (25 ← count; 215.4 ← clock pulses/SI (see chart))

= .0477 sec

thus Rate = $\frac{217}{0.0477}$ counts/sec

= 4.56×10^3 counts/sec

3) What number should the overflow clock monitor in the word 114(3) subcomm read?
Counter will sample 72 count/frame clock after o/F before o/F counter samples 192 count/frame clock. The sampling interval is $\frac{283}{128}$ frame and it will take $\frac{217}{192}$ frames to read o/F

therefore N = $(\frac{383}{128} - \frac{217}{192}) \times 72$

= 134

this particular rate will be independent of the bit rate!

4) O/F clock reads 134 O/F on

Rate = 217/TOF

$$TOF = SI\left(1 - \frac{134}{215.4375}\right) = SI(1-0.62199)$$

$$= 0.43088(0.37801)$$

$$= 0.16288$$

$$Rate = 1332.27\ sec^{-1}$$

B) Word 10:

The interpretation of word 10 depends upon the type of event as indicated by bits 9/1 through 9/4.

9/1 9/4

1) If word 9 indicates a Čerenkov event, (0001) then word 10 contains the HTC content from detector D1'. (This is called HTC 1).

The interpretation of the bits in word 10 is as follows:

Bits 10/1 through 10/8 contain a shift code (255) counter output. This can be converted to a decimal integer by looking up a shift code table.

Bit 10/8 is the least significant bit

10/1 is the most significant bit

Interpretation of an HTC shift code counter is illustrated:

Word 10 = 11000110

↑ ↑

10/1 10/8

look up this combination of bits in shift code table get

HTC1 = 120

9/1 9/4

2) If word 9 indicates a Range - D1 event (0100) then word 10 contains the HTC output from detector D1. (This is called HTC1).

The interpretation of word 10 is the same as for a Čerenkov event.

9/1 9/4

3) If word 9 indicates a Range-Range (0110) then word 10 contains the range information. This information comes in the

form of indicator bits as described in the table:

Bit	Disc.
10/1	$D7_H$
10/2	$D6_H$
10/3	$D5_H$
10/4	$D4_H$
10/5	D7
10/6	D6
10/7	D5
10/8	D4

Table IV

e.g. if the following discriminators were triggered D4, D5, D6, $D4_H$ then word 10 is:

00010111

↑ ↑

10/1 10/8

9/1 9/4

4) If word 9 indicates a Flare event (1000) then word 10 contains rate information.
Now, bits 10/1 through 10/8 contain a 217 shift code counter output (as opposed to the 255 SCC for HTC information)
Once again bit 10/8 is the least significant bit
10/1 is the most significant bit
the output is converted to a decimal by looking up in a table.
Illustration:

Word 10 = 11000110

↑ ↑

110/11 110/8

look up this combination of bits in shift code list
get D5'D6' rate = 61.

The last bit of word 10 i.e. 10/9 is a parity bit. Regardless of the interpretation given to bits 10/1 through 10/8, bit 10/9 is always set such that there will be an odd number of bits = 1.

C) Words 11 & 12:

Words 11 & 12 always contain HTC information in the form of 255 shift code counters. The detectors with which these HTC's are connected depends upon the type of event.

Event	Bit 9/1-9/4	Word 11 HTC2	Word 12 HTC3
Cerenkov	0001	D2'	D3'
Range D1	0100	D2	D3
Range D1	0110	D2	D3
Flare	1000	D5'	D6'

Table V

As with word 10, the bits 11/1 through 11/8
12/1 through 12/8
are to be interpreted in terms of a shift code table. Bits 11/9 and 12/9 are parity bits.

D) Words 33, 34, and 35

Words 33, 34, and 35 make up the time data. This is spacecraft supplied data. The interpretation of this data is straightforward binary as illustrated in the GSFC bulletin #F-52, revised 3/30/68.

Bit	Value
35/9	2^0
35/8	2^1
35/7	.
35/6	.
35/5	.
35/4	
35/3	
35/2	
35/1	
34/9	
34/8	

Bit	Value
34/7	
34/6	
34/5	
34/4	
34/3	
34/2	
34/1	
33/9	
33/8	
33/7	
33/6	
33/5	
33/4	
33/3	2^{24}
33/2	not used
33/1	not used

The accumulated time thus obtained is in units of 1.152 seconds.

E) Word 39:

Word 39 is the analog D8 rate. This information is originally in analog form as a voltage from a rate-meter in the F-20 experiment. The spacecraft analog-to-digital converter then digitalizes this analog level, and the result is in word 39 in binary form.
(Note this is the instantaneous rate at the time of sampling).

Bit	Value
39/1	0 (always)
2	2^7
3	2^6
4	2^5
5	2^4
6	2^3
7	2^2
8	2^1
9	2^0

Note: No parity for Word 39.
Conversion of this binary number to actual rate is

F) Word 65:

Word 65 is a spacecraft generated word and it gives the experiment sub-commutator position. That is, in a frame, one word (= #97) wil contain different information for each frame. The information in word 97 repeats every 128 frames, i.e. word 97 is sub-commutated. Word 65 tells us which piece of information is in word #97. The number in 65 is in binary form as follows:

Bit	Value
65/1	2^6
2	2^5
3	2^4
4	2^3
5	2^2
6	2^1
7	2^0
8	Not Used
9	Not Used

when word 65 = n, word #97 will contain the (n+1) (Modulo 128) variant.

e.g. WD 65 = 113
WD 97 = 97 (114)

G) Word 87:

Word 87 is the analog D4' rate and has the same interpretation as word 39. As with word 39, the binary number from the ADC is not converted into an actual rate at this time.

H) Word 97 (Experiment Sub-Comm)

As mentioned earlier, F-20 uses words 97(72) 97(87) & 97(106). These positions on the sub-comm are identified by looking at word 65 - the sub-comm counter.

1) 97(72)

This word contains the impulse command status of the experiment and a position counter for the 113-114 sub-comm which is explained later.

The command status is as follows:
F-20 has 6 impulse commands - C1-C6 and a reset command C7. The status of commands C1-C6 (i.e. on or off) is indicated by the first 6 bits of 97(72).

Bit	Command	
97(72)/1	C1	The meaning is as follows:
2	C2	if a bit is on, it means
3	C3	that the command is not
4	C4	on. (not sent). Thus
5	C5	in the reset condition
6	C6	(i.e. if on is sent)
		bits 1-6 will be on (=1)

Table VI

The interpretation of the commands is as follows:

Command	Meaning
C1	Flare telescope disable
C2	D1'D3' analysis enable
C3	D2'D3' analysis enable
C2 & C3	Čerenkov telescope disable
C4	D1 analysis disable
C5	D3 analysis enable
C6	D2 analysis enable
C5 & C6	Range telescope disable

A truth table will clarify the above.

A) Flare telescope:

97(72)/1	Flare event means
1	D5' D6' coincidence
0	telescope disabled

B) Čerenkov telescope

97(72)/2	97(72)/3:	Čerenkov event means
1	1	D1'D2'D3'$\overline{D4}$' coincidence
0	1	D1'D3'$\overline{D4}$'
1	0	D2'D3'$\overline{D4}$'
		telescope disabled

C) Range telescope

97(72)/4	97(72)/5	97(72)/6	No Range event means	Range event means
1	1	1	(D1VD2D3)$\overline{D8}$	(D1VD2D3)(D4VD5VD6VD7)$\overline{D8}$
0	1	1	(D2D3)$\overline{D8}$	(D2D3) (")$\overline{D8}$
1	0	1	(D1VD3)$\overline{D8}$	(D1VD3) (")$\overline{D8}$
1	1	0	(D1VD2)$\overline{D8}$	(D1VD2) (")$\overline{D8}$
0	0	1	(D3) $\overline{D8}$	(D3) (")$\overline{D8}$
0	1	0	(D2) $\overline{D8}$	(D2) (")$\overline{D8}$
1	0	0	Telescope	
0	0	0	disabled	

Notes: "V" means logical or
( ) ( ) means logical and

The commands C5 and C6 will also change the meaning of several rates which are discussed below:

The two remaining bits in 97(72) give the position of another commutator. That of words 113 & 114.
These bits - 97(72)/7 & 97(72)/8 are called x & y respectively.
The table of x y values and the 113, 114 commutator position is given:

x	y	113, 114 SC
1	1	3
0	1	1
1	0	2

Table VIII

Bit 97(72)/9 is a parity bit.

II) 97(87) and 97(106)

These words are the analog Range telescope temperature and Cerenkov telescope temperatures. The information is given as a binary number decoded as follows:

Bit	Value
/1	not used
/2	2^7
/3	2^6
/4	2^5
/5	2^4
/6	2^3
/7	2^2
/8	2^1
/9	2^0

These numbers are not actual temperatures and must be further decoded by comparison with calibration. However, this is not done here.

I) Words 113 & 114

Words 113 and 114 are digital rates. They are jointly commutated on a modulus 3 basis. I.e. there are 3 rates which appear alternately in word 113 and 3 rates which appear alternately in Word 114. Which of these rates is present at any given time is determined by a counter which counts modulo 3 and is synchronized with xy from word 97(72).

These rates are encoded by a 217 shift code counter, as the flare rate is. Thus the interpretation of the rates as decimal number is done through a table.

Bit 8 is the least significant bit

1 is the most significant bit

thus if Word 113 = 11000110

↑ ↑

bit 1 bit 8

this rate is 61.

As already mentioned, which rate depends upon the sub-comm position:

113(1)	113(2)	113(3)	114(1)	114(2)	114(3)
$D_1\overline{D_8}$ rate	$D_2\overline{D_8}$ rate	$D_2D_3\overline{D_8}$ rate	D_5 rate	$\bar{C}$ rate	Comm rate

In addition to this 3 position commutator, 114(3) is sub-commutated with 16 positions. Thus it takes 48 frames for all the data about rates to be read.

114(3)	sub-comm	
1	D1	rate
2	D2	"
3	D3	"
4	D4	"
5	D5	"
6	D6	"
7	D7	"
8	D8	"
9	D1'	"
10	D2'	"
11	D3'	"
12	D4'	"
13	D6'	"
14	$D1D2\overline{D8}$	"
15	192 pulse/frame clock	
16	all zeros (sync)	

Note: A rate of all zeros (before SCC conversion) is a unique state which cannot be reached by a SCC. Thus it identifies position 16 of the 114(3) sub-comm. The D2D8 rate counter and the D2D3D8 rate counter will take on different meanings when impulse commands have modified the normal range system operation. The following table gives the proper interpretation of these rates.

C5 97(72)/5	C6 97(72)/6	$D2\overline{D8}$ Rate Means	$D2D3\overline{D8}$ Rate Means
1	1	$D2\overline{D8}$	$D2D3\overline{D8}$
0	1	$D2\overline{D8}$	$D3\overline{D8}$
1	0	$D2D3\overline{D8}$	D2D8

Further Note: The D5' rate (114(1)) upon overflow resets to 192 rather than 0. Therefore an overflow count of 192 → 217 is really given by subtracting 192 and a count of 0 to 167 is given by adding 25.

NUMBERS OF INTEREST

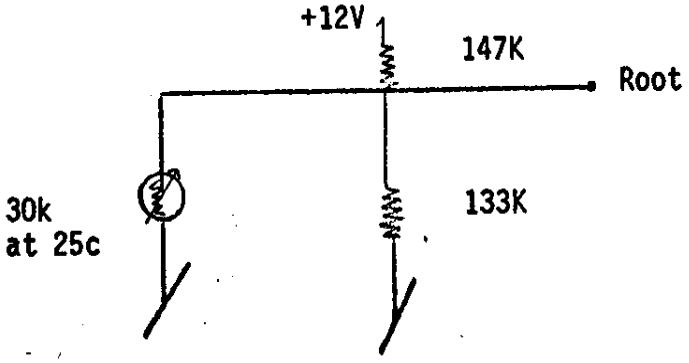
OGO-F

Bit Rate / sec^{-1}	Bit Period / sec	Word Length / sec	Frame Length / sec	Frame Rate / sec^{-1}	Sub-Comm Frame Length / sec	Sub-Comm Frame Length / sec^{-1}	Notes
(1000)	1×10^{-3}	9×10^{-3}	1.152	0.87	147.5	0.0068	Not used on OGO-F but available from GSE for ground use.
(4000)	250×10^{-6}	2.25×10^{-3}	0.288	3.47	36.86	0.027	
8000	125×10^{-6}	1.125×10^{-3}	0.144	6.74	18.43	0.056	Rate used most often on OGO-F
16000	62.5×10^{-6}	562.5×10^{-6}	0.072	13.7	9.22	0.11	
64000	15.625×10^{-6}	140.625×10^{-6}	0.018	55.6	2.30	0.43	

OGO-F-20

Conversion for SC 97(87) & SC 97(106)

These data words contain analog temperatures as read from the following circuit:



Root (Volts)	Temp (^{o}C)
.80	49.5
1.00	41.5
1.20	35.9
1.40	31.3
1.80	23.2
2.00	19.6
2.20	16.2
2.40	13.1
2.60	10.4
2.80	7.4
3.00	4.5
3.20	1.6
3.40	-1.3
3.60	-4.2
3.80	-7.2
4.00	-10.1

$$E_r = \sqrt{\left(\text{Statistical Error}\right)^2 + \left(\frac{\text{Clock Error}}{2\sqrt{\pi}}\right)^2}$$

$$\text{Statistical Error} \rightarrow \frac{1}{\sqrt{N}}$$

gaussian (law of large numbers)

$$\text{Clock Error} \rightarrow \frac{T_c R}{P_{SI} - T_c R}$$

T_2 = clock period (Frames)

R = rate (Frames)

$$P_{SI} = \frac{\text{clock pulsers}}{\text{sampling interval}} = \left[\sum (T_c \times S.I.)\right]$$

S.I. =

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```
00601C00429E000000C0CC004730FB100000000042B09C1AC0000000C1D8FA39000000000C41C476348000000431ACDBA5400  REC      1. LENGTH  4562
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4738148090000000C1DA2E4E2000000C4242CF1740000000434381 3CE000000042C34358E000000042694ACOACCOCOOCO3D
74114000 0000C0554E13D0C0000040E96A3A800000003F695839C0000000C0F0E38980000000C056507B50C0000040FE6D64
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0140000000019013 0F00CC4C0000000191120F5EC150000000192121000874000000001931210000040000C0000194131 06E
0140000000019513 1000FF4C0000000C1961 41000004000000001971 4106201400000000198141000014000000001 9914 1000
00400000000019A140F5BC14C0000000019B140F0066400000 00019C140F0000400000000019D140F6401400000000019E140F00
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0140000000 1A412CF00C180020F1518400C000001 A5130F0000400000000 1A6120F5A024000000001A712CF00014CCC0000
01A8120F0000400000C00001A9120F4AC1400000000 1AA120F0003400000000 1AB110F0000400000000 1AC110F57C280C2100E
1C400000000 1AD110F001E400000000C1AE120F0000400000000 1AF120F4C0150000000001B0120E00364000C00001B113CE00
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0140000000 1BC140D00C2400000000 1BD140D0000400000000 1BE130D5D0140000000001BF130E0001400000000 1C0130E00
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00800804000040000000001D3130E64C1400C000001 D4130E0001400000000 1D5130E0000400000000 1D6130E5D0140CC0000
01D7130E0002400000000 1D8130F00CC400C000001 D9120E4B0141000000001DA120E00039E01D01A94400D0000D1E8020F52
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01F2120F0087400000000C1F312F00CC400C000001 F4120F5E0140000000001F5120F00FF4000000001F6110F0000400C00000
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J1FC110E0000400000000C1FD12CE5401400000000 1FE120E0003400000000 1FF120E0000F3103F62009E37706E68D5D65E05
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0190130E0055400000000C1911300C00C400C000001 92130D4B0140000000019313 0D0002400000000194120D0C0040CC0000
0195130E5501800800 03C5400000000 196130D0114400C000 00019714 0E0000400000000 198130D5701400000000 199130D00
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0040000000 1AD100E5EC1400000000 1AE1 C0E0001800210 0F1B4000000001AF100E0000400000000 1B010CE4DC240CC0000
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01C0110E004A4000000 0C1C1110E00CC400C000001 C2110E5301400000000 1C3110E0002400000000 1C412CE0000800200E3D
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01E7120D0002400000000C1E8120D00CC400C000001 E9120D4E0140000000001EA120C0001400000000 1EB110D0000400C00000
01EC120D5B0140000000C1ED120D001E4000000001 EE120D0000400000000 1EF120D5F0150000000001F0120D002840CC0000
01F1120D0000 4C000000C1F212CD4401400C000001 F3120D0001400000000 1F4120C0000400000000 1F513CD4B0140C00000
01F6120D0012400000000C1F7130D00CC8002050A1C4000000001F8120D5602400000000 1F9120C0011400000001FA13CD00
0040000000 1FB140D56C14C0000000 1FC140D0C0140000000 1FD140D0000400000000 1FE130E5201400000000 1FF140E00
)1F31087620C9E37706E66CCD50005CC396700DDD6000026001955849FCEFD4000000801801 40E0000400C0000018113CE3D
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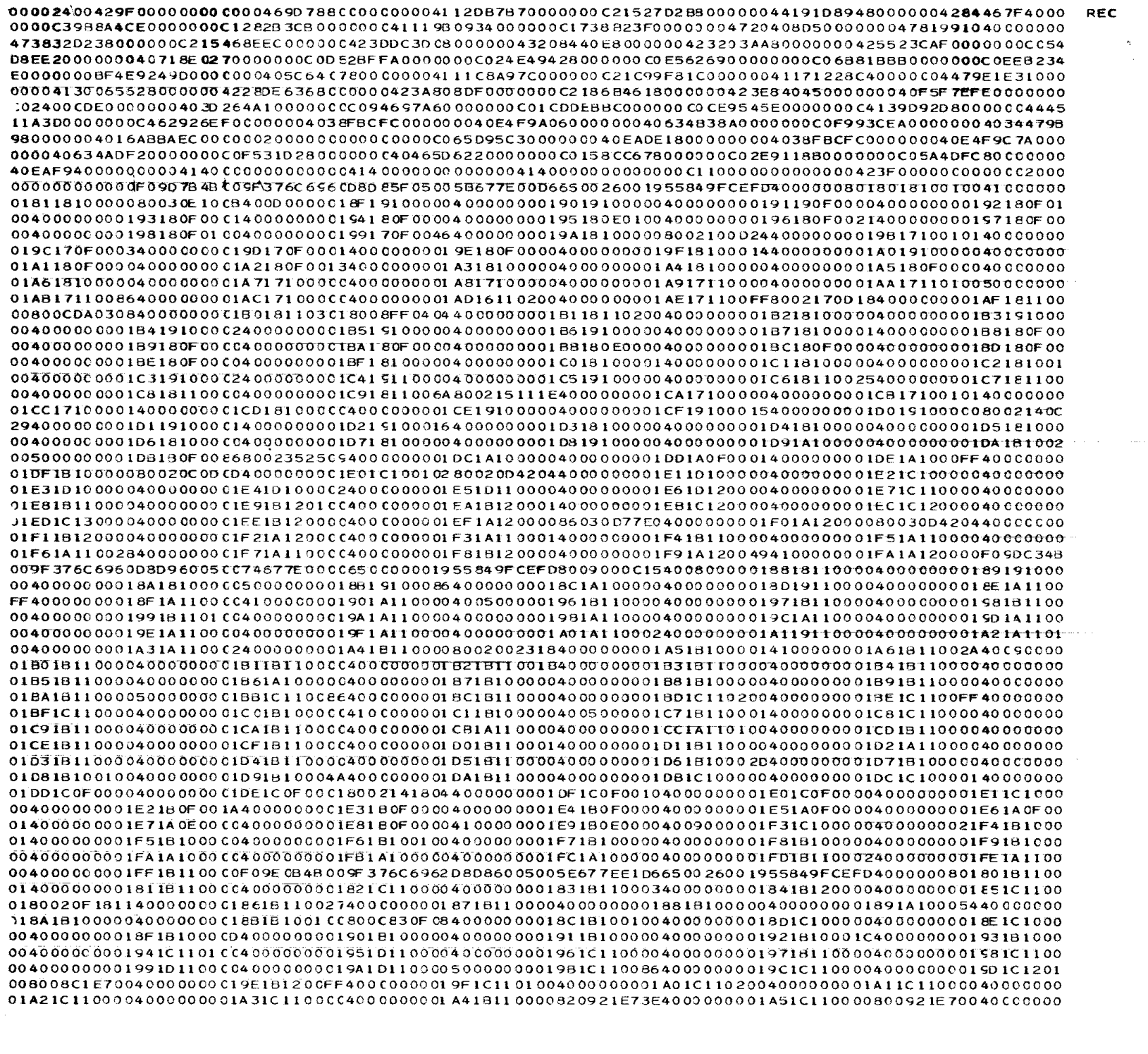
D-11809
C-09012

6/7/69 6/8/69

REC 1. LENGTH 3971

D-11810
C-09013

6/8/69