Data Set Catalog # 195

ATS-I, Electron Content Data
66-110A-15B 1 tape

Table of Contents

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1. INTRODUCTION:

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 This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system.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

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

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

2. ERRATA/CHANGE LOG:

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

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

Version	Date	Person	Page	Description of Change
01				
02				

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

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

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

4. CATALOG MATERIALS:

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

b. Core Catalog Materials

66-110A-15B

The data are written on IBM-compatible magnetic tapes in the format labeled M-TAPE (see below). Both 7 and 9 levels can be used but the latter is recommended. Each record corresponds to one universal day and consists of 596 (2 byte) words. When a 9-level tape is used with a density of 800 bits/inch, each record occupies 2.25 inches (this includes the end-of-record gap). The record length is 2 x 596 + 4 = 1196 bytes and the block size is 1196 + 4 = 1200 bytes. One year's worth of data occupies 82 ft of tape. Usual tape length is 200 ft.

M-TAPE FORMAT

All words are half precision integers (2 bytes). Station code identifies both ground station and satellite used.

Word No.

1	Station Code.
2	Year - 1900 (Universal Time).
3	Day Number (Universal Time).
4	Modified Julian Day Number ≡ Julian Day Number - 2,429,999.5.
5	Modified Julian Day Number of the next record. If the present record is the last on the tape, this word is set equal to -1.
6	Height of the ionospheric point, km.
7	Latitude of the ionospheric point, radians (positive of north) x 10^{-3}.
8	East longitude of the ionospheric point, radians (0 to 2π) x 10^{-3}.
9	East longitude of the satellite, radians (0 to 2π) x 10^{-3}.
10	$G' \equiv \Omega/I$, degrees m^2 x 10^{18} (see note 1).
11	Record number.
12	Origin indicator: 0 if content was measured by the Faraday rotation technique; 1 if by the group delay technique.
13	Number of days over which the mean was taken.

14
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20

Reserve Words (filled with zeros).

21 Mean value of vertical electron content, $\langle I \rangle$, electrons x m^{-2} x 10^{-15}.

22 Deviation of the electron content from the mean, $\Delta I \equiv I - \langle I \rangle$, electrons x m^{-2} x 10^{-15}.

23 $\langle I \rangle$

24 ΔI

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595 $\langle I \rangle$

596 ΔI

NOTE 1: The parameter G' is provided to permit the calculation of the originally observed angle Ω. This angle may be the measured Faraday rotation angle or the measured group delay angle. G' relates Ω to the vertical electron content.

NOTE 2: The 288 values of mean electron content (odd numbered words 21 through 595) and the 288 values of electron content deviation (even numbered words 22 through 596) correspond to the values in each 5-minute of period of the day. The first value of $\langle I \rangle$ and the first value of ΔI are nominally attributed to the time 2.5 minutes after midnight, UT.

A listing of all available observed values of vertical electron content is sometimes useful. Such listings are however very voluminous and, therefore, expensive to produce. For this reason, they are not recommended as a method for routine data exchange. Figure 3.1 is suggested as convenient format for the listing mentioned.

...ED COLUMNAR ELECTRON CONTENT, EL.=***-2*10***-15
..., ATS-1
JAN 1967

DAY OF THE MONTH (UNIVERSAL TIME)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1[illegible] 0	121	114	115	91		117		171				96	174	157	80	94	66	105	74	114	143	106			117	111	135	150	130	134	119
1[illegible] 5	123	119	113	82		122		165				96	175	175	72	96	66	107	77	118	145	106			120	114	143	156	135	137	122
1[illegible]10	127	124	126	96		130		168	155			116	149	152	73	102	67	113	83	125	152	110			127		153	166	144	144	130
1[illegible]15	125	125	127			131		167	158			134	145	150	75	104	68	117	86	127	151	111			130		157	173	149	147	139
1[illegible]20	131	125	135	98		136		168	163			119	207	205	77	111			90	130	158	116			141		162	186	156	152	149
1[illegible]25	135	131	142	97		139		169	164			124	210	214	81	113			90	129	159	117					162	189	157	153	153
1[illegible]30	135	132	145	107		140		172	167			121	216	232	84	118	85	133	94	132	169	122			151		167	197	161	160	159
1[illegible]35	140	132	152	109		147		173	168			125	227	238	87		84		96	135	180	126			154		167	199	162	162	160
1[illegible]40	142	137	164	115				174	173			132	237		96	122	87	143	100	142	180	129			158		169	205	167	163	167
1[illegible]45	154	139	164	117				174	173			132	242		96	122	87	145	101	147	184	132			159		171	208	170	163	170
1[illegible]50	163	142	173	122		171		181	179			146	249	276	100	121	91	152	104	157	189	136			163		179	211	177	167	180
1[illegible]55	164	144	174	122		173		182	181			150	254	285	101	118	92	154	106	161	188	138			167		180	214	180	166	183
17[illegible] 0	171	153	182	127		175		183	181			154	255	296	104	116	102	155	108	173	194	145			168	160	186	219	181	169	193
17[illegible] 5	173	157	183	129		184		183	184			163	276	311	109	115	106	157	110	179	197	147			167	164	193	221	179	170	195
17[illegible]10	179	159	187	132	141	189		184	183			169	291	323	112	114	108	162	113	188	197	148			170	164	191	221	179	176	201
17[illegible]15		161	193	135	144	193		183	201			170	295	328	115	114	110	165	115	194	199	148			169	165	194	217	181	179	202
17[illegible]20		165	191	141	150	195		182	216			172	297	338	124	117	120	172	121	209	199	150			169	169	200	220	185	183	206
17[illegible]25		163	190	144	157	189		183	223			173	300	347	126	119	126	174	123	214	203	150			169	172	203	221	183	182	210
17[illegible]30		169	188	181	169	188		187	236				307	362	130	125	137	186	124	229	210	155			169	171	204	222	185	182	211
17[illegible]		168	192	194	182	191		183	244				313	366	131	127	140	188	130	236	213	156			169	173	205	223	187	183	212
17[illegible]			172		182	195	211	181	247				316	376	136	135	147	200	132	248	219	159			170	173	203	226	193	189	218
17[illegible]			170		183	194	207	194	245				321	384	144	138	150	200	132	256	220	160			170	171	204	225	195	191	219
17[illegible]			172	165	187	200	247	186	245				324	394	150	147	164	207	138	274	216	164		158	174	169	204	227	199	196	222
17[illegible]			174	167	171	202	255	183	249				335	397	155	155	169	210	141	282	219	166		159	176	169	205	226	198	195	221
18[illegible] 0	265		187	183	176	201	276	202	257			218	342	414	163	170	179	224	149	300	228	171		165	187	178	202	230	201	197	221
18[illegible] 5	273		191	179	178	203	285	204	258			221	345	424	171	175	185	228	151	308	233	176		168	195	186	203	232	201	198	219
18[illegible]10			201	177	195	204	287	211	267			226	345	447	180	186	198	240	157	324	243	171		180	200	200	203	233	204	199	223
18[illegible]			212	178	190	204	295	216	269			229	344	457		197	201	245	160	329	247	180		188	210	202	203	236	206	200	220
18[illegible]	276		207	179	196	201	302	220	273			240	343	471	201	212	207	252	168	339	258	187		195	222	210	205	238	209	202	224
18[illegible]	286		212	181	192	204	310	214	277			241	347	475	206	217	210	255	174	345	262	188			239	212	205	237	207	202	226
18[illegible]	305		221	181	174	200		224	280			242	330	439	220	232	212	262	194		277	198		203	248	214	205	237	211	206	227
18[illegible]	310		229	192	177	203		230	281			251	336	443	225	240	212	265	188		282	204		205	252	214	206	236	215		226
18[illegible]	321		240	199	178	213		262	281			254	337	450	237	252	219		191		294	207		206	259	214	206	242	230	212	229
18[illegible]	325		243	191		212		268	283			262	333	451	243	257	220		195		301	210		206	261	217	208	244	237	214	234
18[illegible]	335		250	195	186	220		281	294			265	345	469	251	265	227	270	194	365	315	212		212	261	231	215	250	246	218	241
18[illegible]	341		263	196	187	224		287	295			266	333	469	251	267	230	270	192	368	320	213		220	259	236	221	248	248	218	242
18[illegible]	339		239	196	189	216		330	287			272	329	484	256	272	236	269	191	376	328	218		232	255	241	231	262	253	216	247
18[illegible]	336		246	196	189	245		304	289			271	331	493	257	274	240	270	192	378	331	220		231	254	242	233	266	257	213	249
18[illegible]	337		253	203	205	262		315	295			273	328	476	265	280	239	272	193	386	332	224		241	255	242	238	272	260	217	254
18[illegible]	422		333	253	207	269		320	296			279	329	472	266	280	235	273	194	393	334	226		242	257	246	242	277	262	219	257
18[illegible]	314		310	211	211	279		321	299			279	329	457	274	278	241	271	198	401	335	230		243	260	251	246	285	270	223	260
18[illegible]	313		310	217	213	282		321	301			279	327	450	276		242	271	199	405	335	233		244	260	250	247	286	271	223	256
18[illegible]	310		312	243	216	299		315	305			277	331	441	274	279	247	276	204	415	333	237		250	273	250	255	290	273	231	255
18[illegible]	312		312	248	219	304		315	306			276	335	439	272	275	248	280	206	419	330	238		250	277	251	256	293	274	235	254
18[illegible]	236		314	249	222	312	430	313	312			267	343	430	263	277	254	282	213	424	319	238		253	278	250	261	295	280	242	255
18[illegible]	249		312	249	225	314	427	312	313			268	347	421	267	279	256	283	216	424	314	238		257	279	252	264	300	281	243	257
18[illegible]	277		316	252	216	319	414	307	314			263	349	399	261	272	259	284	223	422	302	239		259	275	256	266	302	285	249	263
18[illegible]	272		315	252		323	411	317	316			266	346	392	267	270	258	288	227	422	299	238		261	277	257	267	301	284	250	266

...MPLE FROM TAPE C0131

STANFORD ELECTRONICS LABORATORIES

STANFORD, CALIFORNIA 94305

SPONSORS: NASA and SAMSO

3.1 - Tabulation of all observed values of electron content for January 1967. (SAMPLE)

3.2 - Summary of Observed Values

A summary of the observed values of electron content can be conveniently presented in the form of the miniature plots and half-hourly tabulations developed by F. L. Smith and shown in Figure 3.3.

Twenty-four diurnal electron content plots are shown in each page, except that at the end of a year fewer plots appear. Vertical columnar electron content is plotted on the Y-axis in units of 2×10^{17} electrons/m^2 per division. Local standard time is plotted on the X-axis in units of 6 hours per division. Dates are specified by having the year printed at the top of each page and the day number printed at the top of each individual graph.

The plotter pen normally forms a continuous curve connecting all the data points in each day. However, the pen is raised between two consecutive data points whenever either of the following occurs:

a) the time interval between the two data points is greater than or equal to one hour;

b) the difference in the two consecutive Faraday rotation measurements is greater than or equal to 90% of a half rotation.

A page of electron content tabulations corresponding to each page of plots is generated. The left hand column on each page contains a list of local standard times in increments of 30 minutes. The other columns contain the corresponding electron content values in units of 10^{15} electrons/m^2. The number at the top of each column of electron content data is the day number.

The electron content values are all smoothed in that each value is obtained by fitting either a linear or parabolic curve to several experimental

observations. Blank spaces appear in the listings for times when there are not enough data available to perform the smoothing. A smoothed electron content value for time T is computed as follows:

a) Locate all experimental data points within the time interval $(T-25 \text{ min.}) \leq t \leq (T + 25 \text{ min.})$;

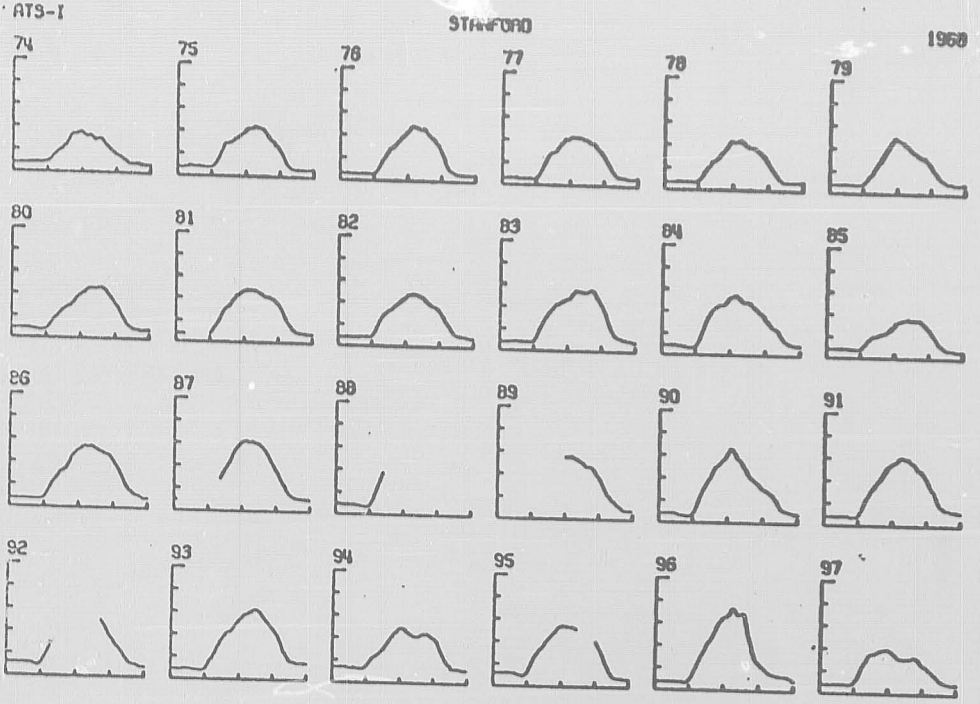
b) Check to see that at least one of the data points in the interval was recorded at a time $t \leq T$, and that another different point was recorded at a time $t \geq T$;

c) If there are more than 8 data points within the interval, discard all except the 8 that occur nearest time T;

d) Assuming that condition (b) is satisfied, if there are 4 or more data points within the interval then use a parabolic curve fit to compute a smoothed electron content value for time T;

e) Assuming that condition (b) is satisfied, if there are only 2 or 3 data points within the interval then use a linear curve fit to compute an electron content value for time T;

f) If condition (b) is not satisfied, then an electron content value is not computed for time T and a blank space will appear on the listing.



ATS-I STANFORD 1968

TIME PST	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97
0000	77	75		55	67		84	77	82	82	86	99	66	87				77	78	122	88	147	116	79	91
0010	75	74	62	59	69		85	75	82									78	77	126	87	141	115	72	92
0110	75	77		63	70	76		76	81		89		71					82	77	119	87	139	115	75	79
0130	78				65	75		75	78	77	88	82			88			84	78	119	86	137	116	73	76
0200	80	87			71		85			79	88				87			86	78	119	87	138	118	76	75
0230	80	92		63	73	78	84			83	90	84						89	79	121		139	118	75	78
0300	79	90		60	74	77	89		80	84	86	84						88	81	141		153	117	76	78
0330	80	87	56	57	75	77	84		80	83	82	83						79	82	119	89	129	116	76	79
0400	83	90	55	57	74	78	81		81	79	75							83	81	116	84	129	116	75	79
0430	85	86		60	73		76		83	79					82			90	79	113	79	125	102	75	76
0500	83	84	59	58	72	76	72		86		85	78	69		77			96	78	103	77	121	95	69	74
0530	86	79	58	55	71	74	73		81	76	83	74	71		72			97	79	97	76	123	95	69	77
0600	92	80	57	60	76	81	82	72	91	86	82	79	86		69			74	87	116	94	149	121	85	96
0630	109	100	76	86	102	108	111	104	120	120	116	106	109		83			125	133	159	134	180	175	125	139
0700	140	137	119	133	141	126	153	150	144	107	176	104	177		127			190	188	215	172	212	233	178	190
0730	167	189	165	183	180	164	184	193	237	243	250	164	225		180			256	237	269	214	228	277	239	249
0800	191	247	205	232	212	203	208	246	275	288	316	187	257	274	258			300	282	316	275	244	312	296	289
0830	210	286	247	271	244	245	237	290	294	324	360	195	292	323	321			331	317		322	270	349	341	327
0900	234	291	277	289	261	282	262	315	317	358	397	203	316	363				391	340		359	295	376	396	346
0930	269	303	295	305	282	315	279	338	333	386	421	212	330	407				441	392		399	332	408	432	350
1000	315	326	319	335	312	365	296	376	358	413	440		367	460				487	421		418	368	438	472	397
1030	329	338	346	364	343	406	313	408	376	425	449		429	518				511	458		429	394	469	531	424
1100	344	359	376	391	376	448	344	430	395	441	440	291	469	558				540	497		459	438	498	582	483
1130	352	378	401	405	417	483	372	452	417	454	484	273	487	587				570	526		496	463	526	619	507
1200	356	401	426	415	427	484	394	466	438	467	511	303	508	606				610	549		527	486	541	643	508
1230	335	417	442	430	424	469	416	469	457	486	531	327	527	618			549	650	562		551	484	538	650	496
1300	327	424	476	425	432	447	435	471	469	519	533	348	545	616			550	634	588		572	486	549	649	468
1330	331	430	472	425	426	428	453	472	471	541	511	367	543	611			563	587	604		585	447	531	720	421
1400	328	432	463	421	403	392	450	461	440	535	469	354	539	608			531	558	599		593	429	527	686	383
1430	295	428	455	409	387	380	452	450	451	531	477	356	535	601			516	513	589		610	417	518		367
1500	306	416	448	395	378	364	458	435	436	526	478	369	517	590			503	473	571		617	416		648	354
1530	292	383	417	382	372	348	460	417	412	535	462	348	503	567			481	429	549		606	417		639	340
1600	262	343	383	374	355	331	456	407	392	544	420	345	496	535				396	511		570	435		642	312
1630	236	320	371	352	334	320	421	399	373	544	409	336	478	497			446	377	493	486	537	437		595	326
1700	208	295	339	321	310	307	390	391	360	487	388	315	470	468			440	353	478	465	545	433		527	309
1730	188	266	306	292	279	279	356	372	346	448	364	292	449	403			401	328	459	402	478	419		464	270
1800	167	231	257	259	240	237	315	341	320	404	327	265	410	357			362	304	396	357	446	391	391	397	237
1830	156	183	198	217	199	208	279	300	282	352	298	229	367	310			307	289	350	319	416	366	356	379	239
1900	139	132	137	172	160	177	228	249	236	273	271	192	328	260			297	272	316	280	365	307	342	389	216
1930	119	100	102	133	126	147	182	197	196	207	249	156	276	219			216	256	261	251	302	259	277	369	195
2000	101	80	86	105	100	127	144	156	160	166	229	116	220	174			176	219	195	209	245	219	182	348	177
2030	90	71	70	89	87	112	116	126	129	141	192	103	180	151			163	186	175	180	202	175	131	344	152
2100	85	69	63	83	78	98	102	109	113	125	155	90	155	135			139	159	167	147	173	145	99	330	127
2130	89	65	62	80	79	93	93	101	105	116	129	81	136	120			120	117	147	127	165	128		312	112
2200	92	62	60	75	75	90	88	93	99	105	112	77	119	114			97	107	143	123	159	126	82	329	98
2230	81			72	75	82	82	91	93	101	104	76	109				84	101	133	115	153	127	79	329	99
2300	76	61	58	68		81	82		91	97	98	69	99	109			81	93	130	113	149	130	78	330	97
2330	75	60	55			85	81	83		92			88				78	85	128	93	147	137	76	329	96
2400	75		54	67		85	77	80	82	87	90	66	87				77	79	121	88	144	119	79	91	93

Fig. 3.2 - Summary of observed electron content values.

IV. IONOSPHERIC STATISTICAL ABSTRACTS

The statistics below should be reported in the format indicated in Figure 4.1. Asterisks in any column denote insufficient data; caution must be exerted in interpreting the meaning of statistics under such circumstances. Thus, for instance, when the next to last column (IAVD, daytime average electron content) has asterisks, the value of IMAX (the maximum value of electron content during the day) is the maximum of all available values, but not necessarily the real maximum for the day.

It may be convenient to plot some of the statistics as shown in Figure 4.2.

IMAX, the maximum value of electron content.

IMIN, the minimum value of electron content.

TMAX, the time of occurrence of IMAX.

TMIN, the time of occurrence of IMIN.

IDTN, the rate of change of electron content in the predawn period (a two-hour period ending when the sun reaches a zenithal of 100°).

IDTM, the rate of change of electron content in the morning (a two-hour period beginning when the sun reaches a zenithal angle of 90°).

IDTA, the rate of change of electron content in the afternoon (1530 to 1730).

IDTE, the rate of change of electron content in the evening (2200 to 2400).

All the above rates of change are determined by fitting a straight line to the available data by the least squares technique. The standard deviation indicated below is the rms deviation of the data from the straight line:

SIGN, the standard deviation corresponding to IDTN.

SIGM, the standard deviation corresponding to IDTM.

SIGA, the standard deviation corresponding to IDTA.

SIGE, the standard deviation corresponding to IDTE.

IAVD, the daytime average value of electron content (0900 to 1500).

IAVN, the nighttime average value of electron content (2100 to 0300).

All times are local solar times, i.e., they are true solar times at the subionosphere point and include the equation of time correction.

The dates are civil time, i.e., the data used for each day start at 0000 and end at 2400 of a given time zone. The time zones corresponding to each station are indicated in the table in subsection 2.4.

YEAR	DAY	COLUMN. CONT. EL. M**-2 (*10** -16) MAX	MIN	TIME OF OCCURRENCE (LT) MAX	MIN	AVERAGE RATE OF CHANGE OF ELECTRON CONTENT BETWEEN FL 4**-2 SEC**-1 (*10**-12) PREDAWN	MORNING	AFTERNOON	STANDARD DEVIATIONS NIGHT					AVER. ELECTR. CONT. BETWEEN 9&15:00 21&3:00 LT	
69	12	40.28	2.14	12:28	21:51	0.146	18.048	-12.845	1.407	0.028	0.661	0.576	0.116	32.03	2.55
69	13	31.25	1.79	11:42	22: 3	-0.028	14.234	-13.701	0.985	0.041	0.562	1.021	0.058	24.91	2.18
69	14	40.16	1.87	11:46	1:14	-0.711	25.565	-11.283	0.193	0.111	0.323	0.627	0.076	31.37	2.30
69	15	41.00	2.43	11:37	0: 5	-0.832	22.283	-22.244	-0.719	0.046	0.343	1.365	0.125	35.21	2.94
69	16	35.42	2.26	12:10	6: 1	0.098	18.319	-23.316	0.487	0.054	0.163	1.096	0.067	30.50	3.72
69	17	37.41	3.24	12:33	22:55	-0.877	17.172	-21.007	-0.298	0.060	0.396	0.302	0.148	32.63	4.04
69	18	36.29	1.96	11:57	4:39	0.060	16.248	-16.651	1.507	0.040	1.022	0.601	0.374	29.13	3.01
69	19	35.67	2.16	12:19	0:54	-0.570	19.263	-11.558	0.112	0.061	0.307	0.309	0.131	27.50	2.88
69	20	32.11	1.94	12: 5	6: 3	-0.745	24.592	-9.354	0.989	0.053	0.327	0.514	0.046	26.10	3.04
69	21	31.62	3.12	12:45	6: 5	-0.462	14.448	-18.321	0.562	0.079	0.210	0.278	0.090	25.64	3.71
69	22	29.05	2.30	12:48	6:47	-0.798	17.955	-7.037	1.049	0.058	0.291	0.272	0.056	23.76	3.65
69	23	33.64	3.19	12:30	22:57	0.400	11.374	-10.848	1.451	0.037	0.203	0.515	0.105	26.38	3.80
69	24	41.55	2.75	11:19	3:36	0.414	20.574	-17.037	0.078	0.032	0.574	0.757	0.084	35.82	4.70
69	25	41.99	2.82	11:59	22:47	-2.043	26.978	-7.940	0.825	0.184	0.286	0.306	0.091	33.84	4.67
69	26	37.32	2.90	11:54	1:25	0.215	18.204	-13.588	1.269	0.067	0.829	0.624	0.047	30.19	3.21
69	27	38.92	3.54	11:38	3:33	0.139	25.579	*******	*******	0.040	0.340	******	******	32.01	4.12
69	28	36.55	3.49	12:12	21:58	*******	*******	-6.000	-0.158	******	******	0.602	0.064	27.94	3.62
69	29	33.80	2.75	12:32	21:44	-1.309	23.019	-13.407	0.715	0.037	0.320	0.209	0.071	28.88	3.71
69	30	31.56	2.60	13:46	4:24	0.411	16.901	-12.576	-0.090	0.046	0.291	0.686	0.159	29.71	3.18
69	31	41.26	2.82	11:34	1:34	-0.174	24.039	-7.973	0.339	0.040	0.357	0.661	0.066	33.84	3.16
69	32	37.48	2.97	12:44	6:32	-0.697	21.210	-19.434	-0.807	0.047	0.432	0.484	0.177	29.97	3.82
69	33	80.51	3.49	13:15	1: 8	-0.658	22.572	-36.579	-3.890	0.147	0.552	2.206	0.174	59.20	5.02
69	34	53.58	2.31	14:18	6:11	-0.973	26.600	-40.028	1.379	0.077	0.504	0.203	0.112	39.23	3.78
69	35	41.13	3.49	12: 9	6:27	-0.345	25.471	-5.590	0.760	0.068	0.351	1.149	0.053	36.14	3.98
69	36	40.10	3.05	12:10	21: 5	0.086	20.002	-9.412	1.253	0.031	0.203	0.926	0.067	35.45	4.59
69	37	44.91	3.39	12:30	6:24	-0.116	20.793	-26.913	0.073	0.042	0.238	0.684	0.064	39.67	3.93
69	38	42.69	2.97	12:50	4:35	-0.306	25.621	-21.975	0.008	0.095	0.356	0.170	0.073	36.30	3.89
69	39	42.97	3.12	11:46	5:18	0.177	20.599	-17.256	-0.052	0.048	0.445	1.187	0.074	37.99	3.81
69	40	37.20	3.64	12: 6	23:45	0.316	19.101	-12.108	0.145	0.046	0.256	0.845	0.093	31.44	3.97
69	41	41.96	3.49	12: 6	2: 7	0.744	17.982	-5.632	-1.913	0.068	0.206	0.498	0.215	34.40	4.52
69	42	41.13	3.71	12:17	0: 9	0.237	18.300	-3.445	1.264	0.162	1.150	0.738	0.158	33.95	4.85
69	43	38.22	7.98	11:31	5:15	-6.549	20.438	-6.641	-0.249	0.086	0.287	0.204	0.127	33.16	9.30
69	44	42.89	8.30	12: 8	5: 8	-0.850	24.429	-18.124	-1.417	0.327	0.415	0.617	0.073	37.92	9.45
69	45	42.15	8.01	12:12	5:20	0.076	20.953	-20.454	-0.742	0.052	0.511	0.865	0.170	36.15	8.65
69	46	48.76	4.25	14:24	23:59	0.276	23.287	-26.449	-1.893	0.046	0.285	0.577	0.161	43.15	9.22
69	47	36.43	3.46	13: 7	4:34	-0.089	25.884	-19.201	*******	0.008	0.425	0.595	******	32.40	******
69	48	47.80	11.94	12:22	23:57	*******	22.372	-13.639	-0.694	******	0.196	0.740	0.045	42.40	12.26
69	49	47.26	11.99	13: 2	0:11	-0.191	23.524	-18.091	-0.801	0.043	0.189	0.385	0.033	42.77	12.40
69	50	55.22	12.08	15: 8	5:59	-0.365	30.409	-20.778	-0.532	0.010	0.368	0.522	0.060	47.92	12.93
69	51	53.30	3.88	12:27	5:26	-0.183	27.623	-19.919	-1.583	0.034	0.212	0.473	0.044	43.47	4.37
69	52	52.05	3.83	13:18	6: 0	-2.058	27.196	-16.459	-1.683	0.040	0.188	0.155	0.090	43.01	5.15
69	53	53.25	4.62	13:49	3:37	0.101	25.630	-9.668	-3.696	0.026	0.239	0.862	0.250	45.14	6.26
69	54	59.71	4.99	13:16	5:27	-0.763	33.420	*******	*******	0.066	0.633	******	******	51.16	******
69	55	54.68	5.85	14:19	23:59	*******	*******	-15.508	-3.335	******	******	0.349	0.043	47.64	7.97
69	56	54.04	5.45	14:38	1: 4	0.364	27.010	-12.977	-4.028	0.022	0.351	0.255	0.254	46.18	6.92
69	57	55.19	5.75	13:49	2: 1	0.244	31.907	-15.496	-4.970	0.044	0.338	0.457	0.275	48.80	7.67
69	58	66.66	5.48	11:46	5:44	-0.376	38.326	-6.207	-3.352	0.032	0.743	0.615	0.192	54.45	7.86
69	59	57.06	5.94	13: 4	5:51	-1.335	28.986	-6.723	-2.261	0.075	0.159	0.893	0.079	48.47	7.62
69	60	62.19	5.13	14:18	3:37	0.924	29.482	-14.087	-5.335	0.024	0.366	0.235	0.184	50.49	9.44
69	61	54.53	5.72	13:37	3:26	1.584	32.907	-15.618	-0.944	0.061	0.553	0.285	0.064	47.47	6.98

FIGURE 4.1 Ionospheric statistical abstracts (see text for explanation).

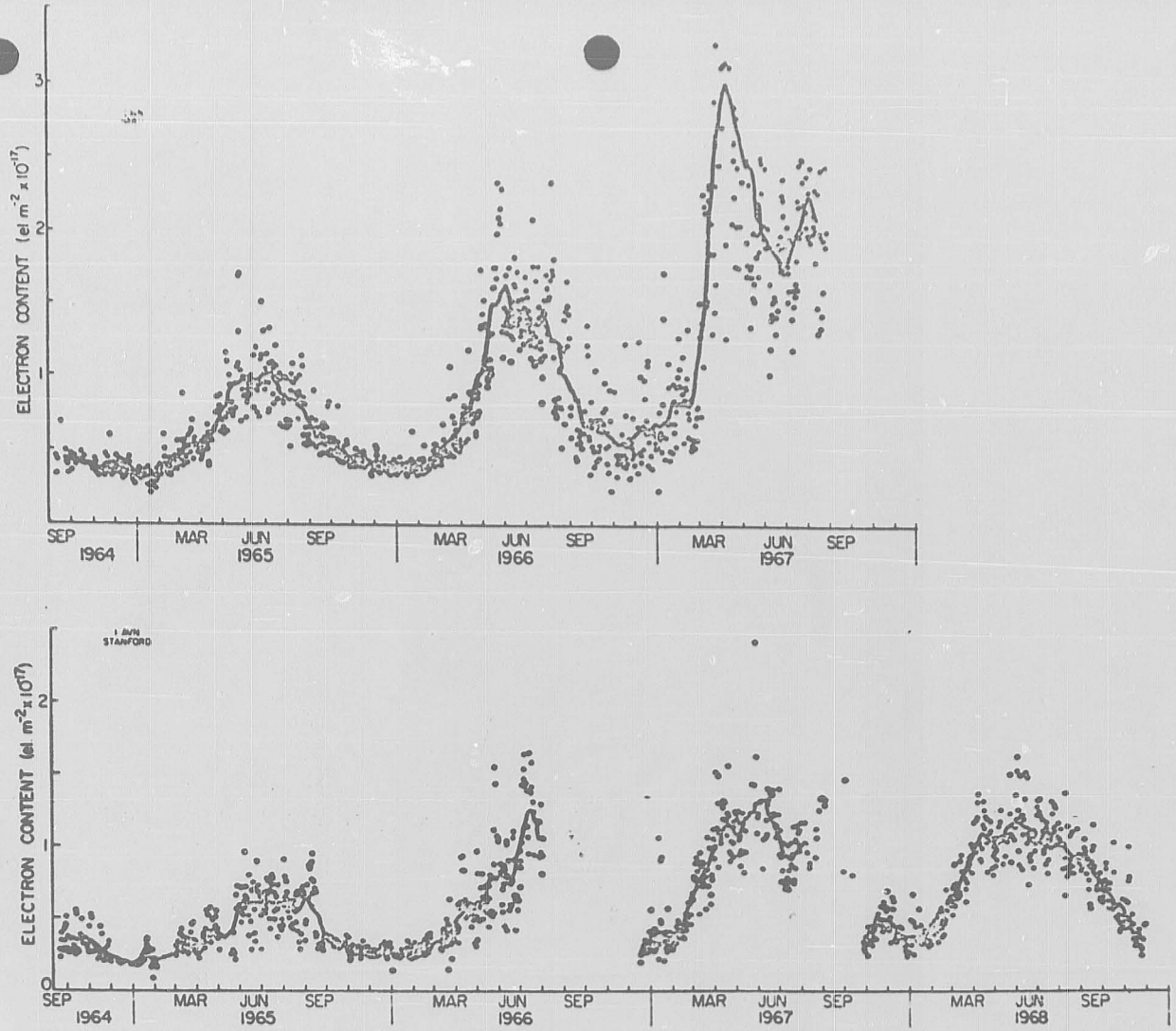


FIGURE 4.2 Daily average nighttime value of electron content at Hawaii and at Stanford. The solid line is a 30-day running mean.

V. MEAN VALUES OF ELECTRON CONTENT

The ionosphere is noted for its erratic day-to-day variations which frequently obscure the longer term trends in its behavior. For this reason, as pointed out in Chapter III, it is convenient to express the electron content as a sum of a seven day running mean plus the deviation of the observed value from this mean. Figure 5.1 illustrates the advantages of such a scheme. On the top of the figure a plot of 2.8 GHz solar radio flux, S, is shown. In the middle, the daily average electron content IMEAN, is plotted for each day and is indicated by a solid dot. One can see a rather chaotic variation from which it is quite difficult to determine a correlation between the solar radio flux and the ionospheric electron content. Still in the middle of the figure, the seven day running mean $\langle IMEAN \rangle_7$, through all the data values has been plotted and it becomes now evident that a reasonable good correlation exists between S and $\langle IMEAN \rangle_7$.

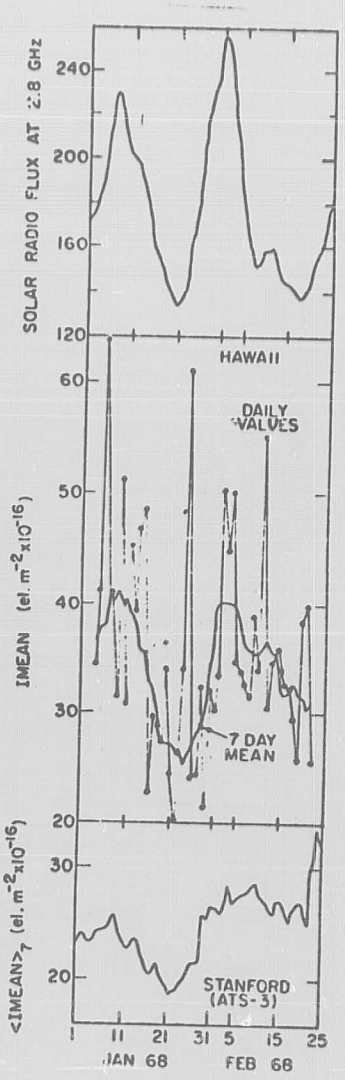


Figure 5.1. The correlation beween the solar radio flux, S, and the electron content becomes apparent only when the seven day mean of the daily average electron content is considered. See plot for Hawaii in middle of the figure.

Thus for the study of the long term behavior of the ionosphere in response to annual effects, solar cycle variation, etc., it is often useful to have available running mean values of electron content.

As discussed in Chapter III, a running mean should be taken over a period of time long enough to remove much of the day-to-day variations and yet short enough compared to 27 days so as not to obscure the solar rotation effects. A seven day running mean appears to satisfy the above criterion.

Figure 5.2 shows a mean diurnal variation of electron content at Stanford. Each point used in the construction of the curve in this figure is the result (in this particular case) of a 31-day running mean. This kind of curve brings out very clearly both the annual and the solar cycle effects on the electron content.

The recommended format for presentation of the mean electron content data is shown in Figure 5.3.

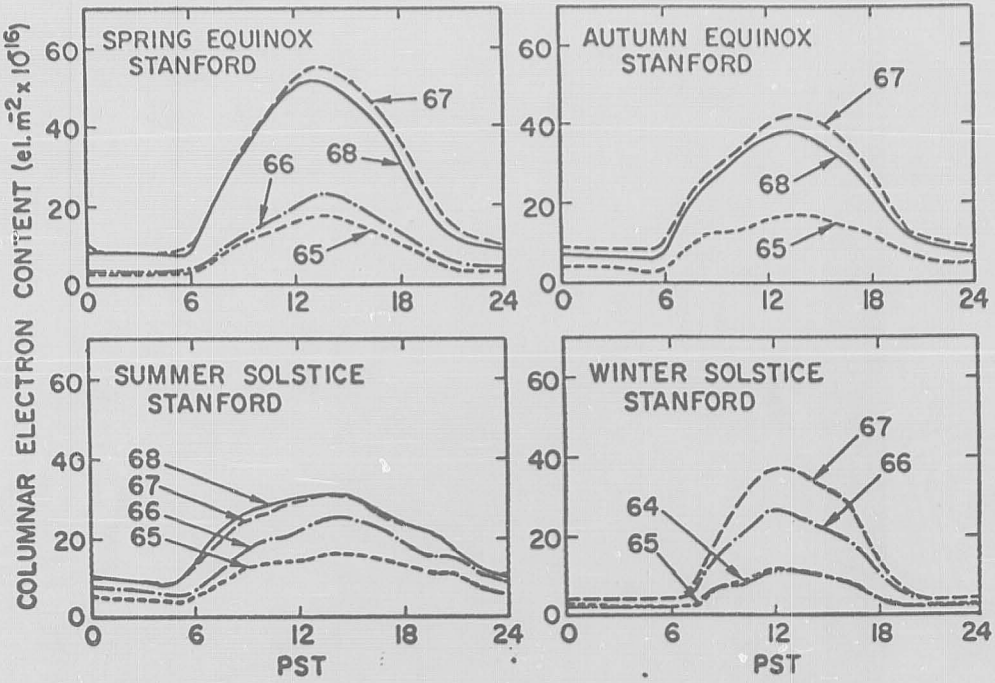


Figure 5.2. Mean electron content at Stanford at different times of the year and different phases of the solar cycle.

MEAN COLUMNAR ELECTRON CONTENT (EL.*M**-2*10**-15) AT STANFORD, ATS-1
UNFILTERED

69 JAN UT

DAY->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
NUM->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
12: 0	23	23	24	21	23	24	25	26	26	27	28	28	28	30	30	30	30	31	32	34	32	36	37	39	40	41	39	40	38	39	38
12:15	24	24	24	21											31	30	29	31	32	33	31	35	36	38	39	40	38	39	37	39	37
12:30	24	25	25	22	23	24	25	26	26	27	28	28	28	30	29	30	29	30	31	33	31	35	36	38	39	40	37	38	37	39	37
12:45	26	26	26	23	23				27		28	28	28	30	29	29	28	29	31	32	31	34	35	37	38	39	36	37	37	39	37
13: 0	26	26	26	23	24	24	26	26	26	26	28	28	28	30	29	29	28	29	30	32	31	33	35	37	38	39	36	37	37	38	37
13:15	25	26	26	23	23	23	26								29	28	27	28	30	31	31	33	34	37	38	39	36	37	37	38	36
13:30	26	26	27	23	25	25	26		27	27	27	26		30	28	28	27	28	29	31	30	32	34	37	38	38	36	37	36	37	35
13:45	26	27	27	24	24					28	27	27	27	28	28	27	26	27	29	31	30	32	34	37	37	38	36	36	36	36	34
14: 0	27	27	27	25	26	25	27	27	27	27	26	26	26	27	26	26	25	26	26	30	29	31	33	37	38	38	35	36	35	36	33
14:15	28	28	28	25	27	27							24	27	26	26	26	27	28	31	30	32	33	36	36	37	34	35	34	35	32
14:30	28	29	29	26	27	25	28	26	26	26	26	26	27	28	28	28	27	28	29	31	30	32	33	36	36	37	34	35	34	35	33
14:45	29	29	29	27	28	27						29	29	31	31	31	30	32	31	33	33	35	36	38	38	40	38	38	38	39	37
15: 0	36	36	35	33	34	32								39	38	38	37	39	38	40	40	42	43	45	45	48	46	47	46	47	48
15:15	50	51	50	49	52	52	53	53	53	53	53	52	52	52	53	52	52	52	52	52	53	55	56	58	59	62	61	62	61	63	64
15:30	72	71	70	70	72	71	70	70	71	70	70	69	71	70	71	72	72	72	70	69	71	74	74	78	80	84	84	85	83	86	84
15:45	95	93	91	91	94	93	91	91	91	91	93	91	92	91	93	93	94	92	89	88	92	94	96	99	102	107	107	107	105	107	110
16: 0	114	113	112	113	115	114	111	110	109	108	110	109	109	108	110	112	114	110	106	104	110	114	116	119	122	128	130	130	128	132	134
16:15	131	131	131	131	133	133	127	127	124	122	125	123	123	122	124	127	132	127	123	120	125	129	131	134	137	145	153	156	152	156	158
16:30	150	145	141	140	141	141	139	138	139	137	144	142	142	140	138	140	147	140	135	131	135	145	145	148	153	162	172	177	170	176	177
16:45	162	162	157	157	158	160	158	155	154	153	160	158	157	156	156	157	161	152	148	142	146	159	157	165	170	177	188	194	184	192	193
17: 0	175	167	167	166	168	171	167	164	169	165	172	170	171	174	174	172	179	170	167	160	164	180	178	184	189	191	200	204	193	200	202
17:15	194	184	181	181	184	187	183	179	186	182	188	185	185	191	192	188	190	181	176	170	172	187	185	188	194	202	216	222	204	212	220
17:30	213	201	196	197	201	205	199	202	211	206	211	207	209	218	212	207	207	196	189	180	183	197	196	210	214	220	231	234	221	227	228
17:45	229	218	213	213	218	228	221	217	225	217	222	219	219	228	233	227	228	216	204	193	196	208	209	222	226	234	246	247	232	240	244
18: 0	245	234	230	227	229	237	233	231	239	232	235	233	236	246	253	247	250	239	224	209	213	223	225	238	241	253	270	270	251	264	267
18:15	264	253	247	244	246	254	252	251	259	252	254	253	258	269	278	271	274	263	243	227	217	225	231	247	250	265	283	283	263	286	289
18:30	285	270	265	261	259	264	263	264	273	266	267	272	279	290	299	292	296	284	263	247	252	260	264	277	277	292	308	297	279	308	307
18:45	306	288	280	275	271	276	280	282	293	286	289	297	303	306	314	307	312	299	277	264	271	277	283	294	293	308	324	310	292	331	332
19: 0	317	299	291	287	284	287	291	295	306	303	307	316	326	329	337	328	332	317	296	281	289	296	301	312	311	326	341	339	323	361	358
19:15	327	309	303	301	291	289	297	305	321	312	319	333	344	346	354	345	349	334	310	299	307	314	320	331	332	348	363	360	344	388	381
19:30	339	320	315	314	311	308	315	321	334	325	331	341	353	355	362	352	357	342	320	312	320	327	335	344	347	362	374	374	357	407	401
19:45	344	324	320	318	308	310				340	350	362	360	368	357	361	345	326	322	329	337	344	348	356	371	360	360	345	394	389
20: 0	343	321	316	313	312	306	314	318	336	335	342	354	372	371	370	361	365	352	334	331	337	345	350	354	362	367	356	356	345	382	383
20:15	337	317	314	314	315	309	317	321	339	337	340	352	371	371	367	360	362	351	333	330	334	343	341	346	354	362	351	350	345	394	395
20:30	327	309	309	315	317	308	317	322	339	337	336	347	367	369	366	359	359	350	333	333	335	342	336	342	347	357	347	344	339	424	423
20:45	301	301	305	299	305	296	304	307	329	322	333	343	361	364	360	354	354	345	330	328	331	337	333	339	344	351	343	338	337	417	419
21: 0	295	295	300	309	314	309	317	315	328	330	323	334	352	355	364	354	345	338	321	319	322	327	325	330	334	342	337	333	333	418	422
21:15	307	289	295	302	309	305	313	310	319	315	307	319	334	338	345	334	335	329	312	310	312	317	319	323	328	336	332	328	330	415	421
21:30	302	285	292	298	303	301	308	305	311	305	293	307	319	326	334	323	324	320	299	301	304	308	315	321	324	333	332	326	327	406	417
21:45	284	286	286	286	271	277	275	278	276	281	278	282	298	312	320	328	320	320	320	301	298	299	300	310	317	317	326	328	322	325	400	416
22: 0	295	281	283	289	293	291	296	294	295	295	272	290	301	310	319	313	311	312	292	290	293	294	306	313	312	320	323	315	316	389	409
22:15	280	281	278	286	291	299	310	305	305	306	269	292	293	303	311	307	307	309	288	286	290	290	295	302	299	309	312	303	306	381	404
22:30	291	273	271	280	286	285	293	290	290	288	259	278	285	295	301	298	300	302	283	281	286	287	292	299	294	301	303	289	294	364	385
22:45	265	266	264	274	280	285	296	290	290	288	255	278	281	290	296	293	302	302	280	277	283	285	292	292	287	291	291	278	285	346	372
23: 0	278	261	261	274	282	284			283	274	252	271	278	287	293	289	297	297	276	274	280	279	287	287	277	280	275	260	270	323	352
23:15	271	257	257	269	272	278	279	271	269	266	248	266	271	284	289	285	292	290	269	265	270	268	276	276	266	269	263	249	259	304	333
23:30	259	257	254	260	262	260	259	260	261	259	248	259	271	286	281	277	286	281	265	257	263	258	266	266	258	265	257	238	253	295	326
23:45	266	251	251	257	258	254	252	249	251	249	242	246	259	274	277	267	274	269	257	249	256	249	258	258	261					291	291

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Figure 5.3 Seven day mean values of electron content

VI. DEVIATIONS OF ELECTRON CONTENT FROM ITS MEAN

The marked day-to-day variations of electron content mentioned in the previous chapter are in themself an important feature of the ionosphere deserving a careful study. To facilitate this study, it is recommended that the date be presented in the form indicated in the Figure 6.1 in which the following information is given:

The first column (after the date) shows the "Daily Average Value of Electron Content", IMEAN, i.e., the value of electron content averaged over the whole universal day.

The second column shows the "Mean Average Electron Content", <MEAN>, i.e., the value of IMEAN averaged over the number of days indicated in the tables.

The third column shows the "Standard Deviation of the Electron Content", IRMS, for the whole UT day. This is the standard deviation of the observed values from the mean value (mean taken over the time period indicated in the tables).

The next eight columns contain the values of IRMS calculated for each 3-hour (UT) interval. These intervals coincide with the periods to which Kp indices are assigned.

The last eight columns contain, in percentage, the ratio between the 3-hour IRMS values and the corresponding mean values of electron content.

It should be noted that the ratio between IRMS (over the whole day) and IMEAN is a convenient disturbance index which might be used as a criterion for classifying ionospheric storms. Figure 6.2 shows a typical distribution of disturbance indices as defined above while Figure 6.3 shows the corresponding cumulative distribution function.

TAPE READ: C0108 TAPE WRITTEN: M0108/7 MEAN TAKEN OVER 7 DAYS

		DATE UT			DAILY AVE	MEAN AVE	STANDARD DEVIATION FROM THE MEAN CONTENT (ELECTRONS M**-2 *10**-16)									MEAN CONTENT (PERCENTAGE)								DISTURBANCE INDEX PERCENT
							DAILY	0-3	0-6	6-9	9-12	12-15	15-18	18-21	21-24										
71	54	(51	TO	57)	17.91	18.38	5.09	5.88	1.37	0.21	0.63	0.33	1.32	1.21	12.93	23	16	3	12	5	6	3	31	28
71	55	(52	TO	58)	19.80	18.56	3.49	7.45	1.47	1.11	0.26	0.33	1.49	2.91	5.28	29	18	20	5	5	7	7	12	19
71	56	(53	TO	59)	22.34	18.63	7.18	10.23	4.92	0.88	0.35	0.46	8.74	13.07	5.91	40	62	15	6	8	44	34	14	39
71	57	(54	TO	60)	18.26	18.76	6.61	6.04	2.32	2.54	0.52	0.36	4.00	13.18	10.55	23	27	45	9	6	20	35	25	35
71	58	(55	TO	61)	17.49	18.67	4.02	0.65	1.39	2.19	1.87	0.73	3.14	3.62	9.76	2	16	39	35	12	16	9	23	22
71	59	(56	TO	62)	17.36	18.78	2.73	2.65	1.60	1.01	0.96	0.38	2.26	5.44	3.66	9	17	18	17	6	11	14	9	15
71	60	(57	TO	63)	17.70	18.60	1.62	2.39	0.74	0.42	0.36	0.65	0.78	2.88	2.24	9	8	7	6	10	4	7	5	9
71	61	(58	TO	64)	17.54	18.58	1.63	2.32	0.92	0.12	0.31	0.38	0.66	2.57	2.77	8	11	2	5	6	3	7	6	9
71	62	(59	TO	65)	20.54	18.54	2.57	3.61	2.21	0.50	0.60	0.82	1.69	2.72	4.83	13	26	9	10	13	8	7	12	14
71	63	(60	TO	66)	21.15	18.58	4.16	5.23	2.38	0.39	0.23	0.50	1.93	8.24	5.77	19	28	7	4	7	9	22	14	22
71	64	(61	TO	67)	18.32	18.80	1.07	1.48	1.46	0.84	0.23	0.18	0.60	1.10	1.59	5	16	15	3	2	2	2	4	6
71	65	(62	TO	68)	17.18	18.82	2.77	1.22	0.77	0.77	0.50	0.26	2.85	6.28	3.33	4	8	13	8	4	13	16	8	15
71	66	(63	TO	69)	17.64	18.68	2.05	0.93	0.16	0.30	0.32	0.24	1.15	4.62	3.11	3	1	5	5	3	5	11	8	11
71	67	(64	TO	70)	19.20	18.03	3.43	1.95	1.59	1.56	0.95	0.43	2.64	7.80	4.05	8	18	26	15	6	12	20	11	19
71	68	(65	TO	71)	17.82	18.40	3.07	2.91	1.39	1.59	1.60	0.51	0.84	1.63	7.49	12	16	26	25	7	3	4	19	17
71	69	(66	TO	72)	19.50	18.92	3.68	3.95	0.72	0.72	0.52	0.35	3.52	8.75	1.60	17	8	10	8	5	15	21	4	19
71	70	(67	TO	73)	16.52	19.16	4.67	1.56	1.87	1.35	0.79	0.69	3.18	6.60	10.58	7	21	20	12	10	14	15	26	24
71	71	(68	TO	74)	21.01	19.09	6.53	1.87	2.08	0.67	0.13	1.53	2.28	5.16	17.27	8	22	10	2	23	10	12	43	34
71	72	(69	TO	75)	20.61	19.27	4.99	7.11	1.21	2.16	0.95	0.39	1.44	11.21	3.63	32	13	34	15	6	6	26	8	26
71	73	(70	TO	76)	19.31	19.50	1.99	3.93	0.83	0.78	0.57	0.62	1.14	3.26	1.56	17	9	12	8	9	5	7	3	10
71	74	(71	TO	77)	18.78	19.99	3.58	2.17	1.80	0.83	0.57	0.55	3.34	3.34	8.43	9	18	12	8	7	15	7	19	18
71	75	(72	TO	78)	18.89	19.96	2.54	3.70	0.76	0.83	0.69	0.65	2.36	4.11	3.66	15	7	12	10	9	10	9	8	13
71	76	(73	TO	79)	21.16	19.81	4.49	4.33	1.29	0.34	0.53	2.10	2.76	2.66	11.30	18	12	5	7	29	12	6	27	23
71	77	(74	TO	80)	19.90	19.89	10.30	8.29	3.92	2.12	2.72	3.53	10.27	15.03	20.16	32	39	31	39	50	45	36	50	52
71	78	(75	TO	81)	21.24	20.65	10.09	7.37	4.62	2.19	1.82	3.09	10.88	17.47	15.87	28	47	32	27	45	47	43	39	49
71	79	(76	TO	82)	20.21	20.99	9.20	10.64	5.18	2.08	2.76	2.07	9.82	13.98	14.08	38	52	30	40	29	42	34	35	44
71	80	(77	TO	83)	19.75	21.12	10.69	11.68	4.46	2.75	3.25	2.23	9.87	18.71	15.37	43	44	38	46	31	41	46	38	51
71	81	(78	TO	84)	20.93	20.37	6.03	13.42	4.06	2.96	3.20	4.39	6.85	2.23	2.54	50	41	41	45	58	28	5	6	30
71	82	(79	TO	85)	20.63	19.73	2.92	4.42	0.34	1.67	1.22	0.44	1.41	2.45	5.99	17	3	23	17	6	5	6	16	15
71	83	(80	TO	86)	21.59	19.26	4.58	2.10	0.94	1.70	1.69	1.27	3.18	11.03	4.84	8	9	26	23	16	13	28	13	24
71	84	(81	TO	87)	18.26	19.04	2.92	2.03	1.24	1.06	0.56	0.26	0.33	0.97	7.44	8	12	14	7	3	1	2	20	15
71	85	(82	TO	88)	19.41	18.69	5.13	6.82	1.49	0.28	0.32	0.90	3.69	9.69	7.42	29	15	3	4	11	16	26	20	27
71	86	(83	TO	89)	16.73	18.41	5.27	3.48	0.53	0.24	1.00	0.90	0.73	10.29	10.05	15	5	3	12	10	3	28	28	29
71	87	(84	TO	90)	15.25	18.25	12.35	1.80	0.31	1.31	0.85	4.36	3.21	4.16	34.36	8	9	17	10	27	15	11	100	68
71	88	(85	TO	91)	17.36	17.61	3.40	4.49	2.45	3.99	1.04	0.80	1.79	2.15	6.41	21	24	53	13	9	9	6	19	19
71	89	(86	TO	92)	19.58	17.09	3.04	3.57	1.04	0.90	0.88	0.94	0.81	2.02	7.34	17	10	12	11	11	4	6	22	18
71	90	(87	TO	93)	20.60	16.90	5.99	2.15	1.42	1.88	1.84	1.66	4.91	13.64	7.75	10	14	25	23	20	26	43	25	35
71	91	(88	TO	94)	14.37	16.71	3.79	3.79	1.17	0.91	2.60	2.12	3.67	6.38	5.87	17	11	12	34	26	18	20	20	23
71	92	(89	TO	95)	14.84	16.41	4.25	3.41	2.13	0.93	0.97	0.64	3.64	3.84	9.91	16	19	13	13	8	19	12	34	26
71	93	(90	TO	96)	15.79	15.94	1.98	3.58	1.99	0.21	0.39	0.55	2.66	0.95	2.47	17	13	2	5	7	14	3	9	12
71	94	(91	TO	97)	15.91	15.34	3.56	4.90	2.95	1.81	0.95	1.25	2.56	2.21	7.18	24	28	27	14	17	13	7	28	23
71	95	(92	TO	98)	15.02	15.91	2.88	3.49	0.84	1.59	0.33	1.12	3.77	4.96	3.30	17	9	24	4	14	19	17	11	18
71	96	(93	TO	99)	15.41	16.31	2.17	0.66	0.50	1.92	0.34	0.33	0.84	2.97	4.84	3	4	28	5	3	4	9	17	13
71	97	(94	TO	100)	16.45	16.13	2.71	2.91	1.23	0.61	0.23	0.43	4.53	5.18	0.88	14	12	9	3	5	23	17	3	17
71	98	(95	TO	101)	17.90	15.68	4.92	0.73	0.31	0.27	0.46	1.04	1.88	3.55	13.24	3	3	4	7	13	10	11	46	31
71	99	(96	TO	102)	17.88	16.15	4.66	7.30	0.32	0.22	0.59	0.31	1.20	8.47	6.83	38	3	3	9	4	6	27	22	29
71	100	(97	TO	103)	14.39	16.60	3.96	5.16	0.41	0.41	0.27	0.62	3.86	8.27	3.86	26	4	6	4	7	19	25	12	24
71	101	(98	TO	104)	12.69	18.01	8.43	1.87	0.85	0.29	1.28	1.56	6.06	14.36	17.81	9	8	4	20	18	30	41	47	47
71	102	(99	TO	105)	18.31	18.11	4.42	9.15	2.00	0.27	0.19	0.58	1.40	5.24	6.19	37	18	3	2	6	7	15	17	24
71	103	(100	TO	106)	18.51	17.89	2.21	3.90	0.38	1.69	0.29	0.73	2.66	1.97	2.96	16	8	24	4	8	13	6	8	12

STANFORD, ATS-1 "DEVLIST" FROM PROGRAM MTAPE1

Fig. 6.1 Daily mean values of electron content and standard deviations.

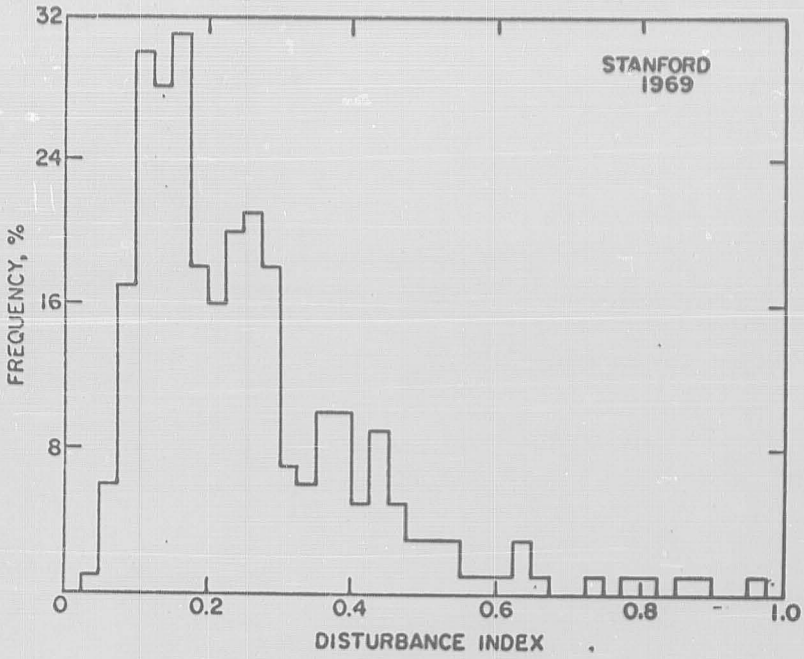

Figure 6.2 Frequency of occurrence of days with a given disturbance index at Stanford (ATS-3) in 1969.

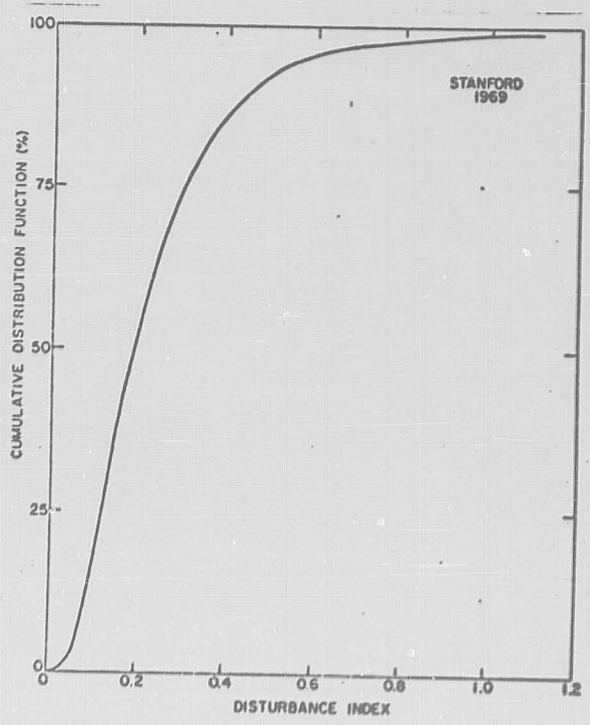

Figure 6.3 Cumulative distribution function corresponding to the data of Figure 6.2.

Reference

da Rosa, A. V., Significance of electron content measurements, symposium on the Future Application of Satellite Beacon Experiments, Lindau/Harz (Germany), 2-4 June 1970.

Acknowledgment

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STANFORD ELECTRONICS LABORATORIES

STANFORD, CALIFORNIA 94305

June 14, 1972

Lee Dubach
National Space Science Data Center
Goddard Space Flight Center
Code 601
Greenbelt, Maryland 20771

Dear Mr. Dubach,

We have now corrected the difficulty we experienced in copying our 9-track master tape into your 7-track format. I am sending you a new and verified copy of our M-0107/7 tape, whose test printout is enclosed here. Please destroy the copy of the tape you presently hold.

In view of the recent recommendation of one of the COSPAR sponsored symposia, we will probably send our tapes to the Upper Atmosphere Geophysics data center (see enclosed letter). Do you wish to continue receiving copies of such tapes or should a single data center handle this matter?

Very truly yours,

A. V. da Rosa

A.V. da Rosa

AVR/smb
ENCL.

STANFORD ELECTRONICS LABORATORIES

STANFORD, CALIFORNIA 94305

June 14, 1972

World Data Center A
Upper Atmosphere Geophysics
National Oceanic and Atmospheric Administration
Boulder, Colorado 80302

Dear Sir:

Under the terms of one of our National Science Foundation Grants, we are required to report our ionospheric observations to an appropriate agency capable of making our data available to other scientists. The recent Symposium for the Future Application of Beacon Satellite Measurements, in Graz, May 1972, a symposium that is part of COSPAR, approved a recommendation to the effect that such data should be reported to the nearest Ionospheric World Data Center. It appears that to comply with both the requirements of the grant and the recommendations of the Symposium, we ought to deposit our data with your organization. Please inform us if such an arrangement is satisfactory, and please let us know any specific procedure we should follow, as well as any particular person whom we should address.

Our data are usually reported in two different forms: one is a magnetic tape containing all the observed values; the other is a booklet containing the summary of the observed data. We are sending you a sample of one booklet, and also a pamphlet describing the data format adopted for both the booklet and the tape. In the past, we have sent our tapes to the Rockets and Satellite World Data Center at Goddard Space Flight Center, in Greenbelt, Maryland, and they have requested that the tape format to be used be a 7-track, even parity, 800 bits per inch tape.

Very truly yours,

A.V. da Rosa

A.V. da Rosa

AVR/smb
Encl:

BIN 401	SEQ	233	DA ROSA	START	13:36	06/12	START	DA ROSA	SEQ	233	BIN 401
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M-0107/7

```
$ 13.35.15 JOB  233 -- MDUMP1   -- BEGINNING EXEC - PART 5 - CLASS B
 *13.36.18 JOB  233 IEF280E K 0C0,1499  ,MDUMP1,GO
$ 13.36.19 JOB  233 END EXECUTION.
```

```
//MDUMP1 JOB 'N593,401,1,5','DA ROSA'                                   JOB  233
***SERVICE EXEC=I
***SETUP TAPE,'MOUNT U1499,7-TRK,OCO,READ ONLY,SALLY,N593'
// EXEC FORTHCG,PARM.FORT='OPT=2'
XXCOMPILE  PROC  LEVEL=H                                                 00000000
XXFORT  EXEC  PGM=FORT&LEVEL     (USERLIST)                              00000100
IEF653I SUBSTITUTION JCL - PGM=FORTH
XXSYSPRINT DD  SYSOUT=A                                                  00000200
XXSYSPUNCH DD  SYSOUT=B                                                  00000300
XXSYSLIN   DD  DSNAME=&LOADSET,UNIT=SYSDA,DISP=(MOD,PASS),              *00000400
IEF653I SUBSTITUTION JCL - DSNAME=&LOADSET,UNIT=SYSDA,DISP=(MOD,PASS),
XX             SPACE=(CYL,(3,1)),DCB=(LRECL=80,BLKSIZE=3200,RECFM=FB)    00000500
XXSYSUT1 DD DSNAME=SYS1.UT1,DISP=OLD,DCB=(KEYLEN=0)                      00000600
XXSYSUT2 DD DSNAME=SYS1.UT2,DISP=OLD,DCB=(KEYLEN=0)                      00000700
//FORT.SYSIN DD *
IEF236I ALLOC. FOR MDUMP1   FORT
IEF237I 365   ALLOCATED TO SYSPRINT
IEF237I 241   ALLOCATED TO SYSPUNCH
IEF237I 293   ALLOCATED TO SYSLIN
IEF237I 1C0   ALLOCATED TO SYSUT1
IEF237I 293   ALLOCATED TO SYSUT2
IEF237I 344   ALLOCATED TO SYSIN
IEF285I   SYS72164.T130558.RF000.MDUMP1.R0000251        DELETED
IEF285I   VOL SER NOS=        .
IEF285I   SYS72164.T130558.RF000.MDUMP1.LOADSET         PASSED
IEF285I   VOL SER NOS= SYS02 .
IEF285I   SYS1.UT1                                      KEPT
IEF285I   VOL SER NOS= CAMP08.
IEF285I   SYS1.UT2                                      KEPT
IEF285I   VOL SER NOS= SYS02 .
IEF285I   SYS72164.T130558.RF000.MDUMP1.R0000253        DELETED
IEF285I   VOL SER NOS=        .
XXGO   EXEC  PGM=LOADER,PARM='MAP,LET',COND=(5,LT,FORT)                  00000800
XXSYSPRINT DD  SYSOUT=A                                                  00000900
XXSYSLOUT   DD  SYSOUT=A                                                 00001000
XXSYSLIN   DD  DSNAME=*.FORT.SYSLIN,DISP=(OLD,DELETE)                    00001100
XXSYSLIB   DD   DSNAME=SYS1.FORTLIB,DISP=SHR                             00001200
XX         DD  DSNAME=SYS2.SSPLIB,DISP=SHR                               00001300
XX         DD  DSNAME=SYS2.SUBLIB1,DISP=SHR                              00001400
XXFT01F001 DD DSNAME=SYS1.UT1,DISP=OLD,DCB=(RECFM=VS,LRECL=796,         X00001500
XX             BLKSIZE=800)                                              00001600
XXFT02F001 DD DSNAME=SYS1.UT2,DISP=OLD,DCB=*.FT01F001                    00001700
XXFT03F001 DD DSNAME=SYS1.UT3,DISP=OLD,DCB=*.FT01F001                    00001800
XXFT04F001 DD DSNAME=SYS1.UT4,DISP=OLD,DCB=*.FT01F001                    00001900
XXFT05F001 DD  DDNAME=SYSIN                                              00002000
XXFT06F001 DD  SYSOUT=A                                                  00002100
XXFT07F001 DD  SYSOUT=B                                                  00002200
XXFT13F001 DD DSNAME=SYS1.UT5,DISP=OLD,DCB=*.FT01F001                    00002300
XXFT16F001  DD UNIT=2314,VOLUME=SER=SYS03,DISP=(NEW,PASS),              X00002400
XX             DCB=(RECFM=F,BLKSIZE=600),SPACE=(TRK,(15,5),RLSE)         00002500
//GO.FT09F001 DD DSN=INPUT,DISP=(OLD,PASS),UNIT=TAPE7,VOL=SER=1499,
// LABEL=(1,BLP,,IN),DCB=(RECFM=VS,LRECL=1196,BLKSIZE=1200,DEN=2,
//  TRTCH=C)
//GO.SYSIN DD *
//
IEF236I ALLOC. FOR MDUMP1   GO
IEF237I 365   ALLOCATED TO SYSPRINT
IEF237I 36D   ALLOCATED TO SYSLOUT
IEF237I 293   ALLOCATED TO SYSLIN
IEF237I 337   ALLOCATED TO SYSLIB
```

```
IEF237I 318   ALLOCATED TO
IEF237I 318   ALLOCATED TO
IEF237I 1C0   ALLOCATED TO FT01F001
IEF237I 293   ALLOCATED TO FT02F001
IEF237I 316   ALLOCATED TO FT03F001
IEF237I 293   ALLOCATED TO FT04F001
IEF237I 345   ALLOCATED TO FT05F001
IEF237I 36E   ALLOCATED TO FT06F001
IEF237I 241   ALLOCATED TO FT07F001
IEF237I 316   ALLOCATED TO FT13F001
IEF237I 316   ALLOCATED TO FT16F001
IEF237I 0C0   ALLOCATED TO FT09F001
IEF285I   SYS72164.T130558.RF000.MDUMP1.R0000255        DELETED
IEF285I   VOL SER NOS=        .
IEF285I   SYS72164.T130558.RF000.MDUMP1.LOADSET         DELETED
IEF285I   VOL SER NOS= SYS02 .
IEF285I   SYS1.FORTLIB                                  KEPT
IEF285I   VOL SER NOS= SYS07 .
IEF285I   SYS2.SSPLIB                                   KEPT
IEF285I   VOL SER NOS= SYS01 .
IEF285I   SYS2.SUBLIB1                                  KEPT
IEF285I   VOL SER NOS= SYS01 .
IEF285I   SYS1.UT1                                      KEPT
IEF285I   VOL SER NOS= CAMP08.
IEF285I   SYS1.UT2                                      KEPT
IEF285I   VOL SER NOS= SYS02 .
IEF285I   SYS1.UT3                                      KEPT
IEF285I   VOL SER NOS= SYS03 .
IEF285I   SYS1.UT4                                      KEPT
IEF285I   VOL SER NOS= SYS02 .
IEF285I   SYS72164.T130558.RF000.MDUMP1.R0000259        DELETED
IEF285I   VOL SER NOS=        .
IEF285I   SYS72164.T130558.RF000.MDUMP1.R0000256        DELETED
IEF285I   VOL SER NOS=        .
IEF285I   SYS1.UT5                                      KEPT
IEF285I   VOL SER NOS= SYS03 .
IEF285I   SYS72164.T130558.RF000.MDUMP1.R0000258        PASSED
IEF285I   VOL SER NOS= SYS03 .
IEF285I   INPUT                                         PASSED
IEF285I   VOL SER NOS= 1499  .
IEF285I   SYS72164.T130558.RF000.MDUMP1.R0000258        DELETED
IEF285I   VOL SER NOS= SYS03 .
IEF285I   INPUT                                         KEPT
IEF285I   VOL SER NOS= 1499  .
IEF280E K 0C0,1499  ,MDUMP1,GO


RALPH JOB STATISTICS --     100 CARDS READ --     2,571 LINES PRINTED --       0 CARDS PUNCHED --    0.77 MINUTES EXECUTION TIME
```

```
        COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=58,SIZE=0000K,
                           SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF
                                                                        12 JUN 72
              C     ' M D U M P 1 '
              C
              C     DUMP THE CONTENT OF AN "MTAPE".
              C     TO LIST THE CONTENT IN AN EDITED FASHION, USE PROGRAM "MLIST1".
              C
ISN 0002            LOGICAL CORR/.FALSE./
ISN 0003            INTEGER IA*2(596),PCOUNT
ISN 0004            DIMENSION TAPENM(3)
ISN 0005          101 FORMAT(I5)
ISN 0006          102 FORMAT(2I3)
ISN 0007          103 FORMAT(L5)
ISN 0008          104 FORMAT(3A4)
ISN 0009          204 FORMAT('+',80X,'PAGE',I3)
ISN 0010          205 FORMAT('1PROGRAM MDUMP1  27 JAN 72 VERSION'/' DUMPED FROM TAPE ',3
                     *A4/)
ISN 0011          206 FORMAT(' ',20I6)
ISN 0012          207 FORMAT(' ',32I4)
ISN 0013          208 FORMAT(' ')
ISN 0014          293 FORMAT('0END OF FILE')
ISN 0015          298 FORMAT('0PARITY ERROR')
ISN 0016            PCOUNT=0
ISN 0017            LCOUNT=-1
              C
ISN 0018            III=9
              C-----------------------------------------------------------------------
              C
              C     READ INSTRUCTIONS TO CORRECT THE RECORD NUMBER OF A TAPE. IF CORR=.TRUE.
              C     A NEW TAPE WILL BE MADE WITH CONSECUTIVE RECORD NUMBERS STARTING WITH 1.
              C
                                                                        RCARD
ISN 0019            READ(5,103)CORR
              C
              C-----------------------------------------------------------------------
              C
ISN 0020            IF(.NOT.CORR)GO TO 21
              C
              C-----------------------------------------------------------------------
              C
              C     THIS BLOCK IS USED TO CORRECT RECORD NUMBERS AND MUST BE BYPASSED FOR
              C     THE REGULAR DUMPING OF A TAPE.
              C
ISN 0022            RKNUM=0
ISN 0023          11 READ(9,END=20,ERR=98)IA                            RTAPE
ISN 0024            RKNUM=RKNUM+1
ISN 0025            IA(11)=RKNUM
ISN 0026            WRITE(8)IA                                          WTAPE
ISN 0027            GO TO 11
ISN 0028            III=8
ISN 0029          20 REWIND 8
              C-----------------------------------------------------------------------
              C
ISN 0030          21 CONTINUE
ISN 0031            READ(5,104)(TAPENM(I),I=1,3)                        RCARD
              C
```

```
                C     ------------------------------------------------------------------------
                C                                                                             |
                C     READ THE NUMBER OF LINES OF ELECTRON CONTENT INFORMATION TO BE DUMPED FOR|
                C     EACH DAY.  THIS IS IN ADDITION TO THE ONE LINE CONTAINING THE TWENTY     |
                C     PREAMBLE WORDS IN EACH RECORD.  IF NO CARD IS READ IN, THE DEFAULT VALUE |
                C     OF 1 LINE IS DUMPED.  TO DUMP ALL ELECTRON CONTENT INFORMATION, MAKE     |
                C     NLINES=18.                                                              |
                C                                                                             |
ISN 0032                READ(5,101,END=1)NLINES                                       RCARD   |
                C                                                                             |
                C     ------------------------------------------------------------------------
ISN 0033                GO TO 5
ISN 0034              1 NLINES=1
ISN 0035              5 LSTOP=57/(NLINES+2)
ISN 0036                NN=32*NLINES+20
ISN 0037                IF(NN.GT.596)NN=596
ISN 0039              3 LCOUNT=LCOUNT+1
ISN 0040                READ(III,END=93,ERR=98)IA
ISN 0041              7 MODL=MOD(LCOUNT,LSTOP)
ISN 0042                IF(MODL.NE.0)GO TO 4
ISN 0044                WRITE(6,205)(TAPENM(I),I=1,3)                                 WRITE
ISN 0045                PCOUNT=PCOUNT+1
ISN 0046                WRITE(6,204)PCOUNT                                            WRITE
ISN 0047              4 WRITE(6,206)(IA(I),I=1,20)                                    WRITE
ISN 0048                WRITE(6,207)(IA(I),I=21,NN)                                   WRITE
ISN 0049                WRITE(6,208)                                                  WRITE
ISN 0050                GO TO 3
ISN 0051             93 WRITE(6,293)
ISN 0052                GO TO 99
ISN 0053             98 WRITE(6,298)
ISN 0054             99 STOP
ISN 0055                END
```

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	F	I*4	000160	IA	SF	I*2	000188	NN	SF	I*4	000164	III	SF	I*4	000168
CORR	S	L*4	00016C	MODL	S	I*4	000170	LSTOP	SFA	I*4	000174	RKNUM	SF	R*4	000178
IBCOM#	F XF	I*4	000000	LCOUNT	SFA	I*4	00017C	NLINES	SF	I*4	000180	PCOUNT	SF	I*4	000184
TAPENM	SF	R*4	000650												

LABEL	ADDR	LABEL	ADDR	LABEL	ADDR	LABEL	ADDR
11	0006C2	20	00072C	21	000738	1	000784
5	000788	3	0007B6	7	0007DC NR	4	000840
93	0008B4	98	0008CC	99	0008E0		

```
                ERROR CD   LEVEL        ERROR MESSAGE

    ISN    0028   IEK224I        4       THE STATEMENT AFTER AN ARITHMETIC IF, GO TO, OR RETURN HAS NO LABEL.
  LABEL  100002   IEK610I        4       THE STATEMENT NUMBER OR GENERATED LABEL IS UNREACHABLE.

*OPTIONS IN EFFECT*      NAME=  MAIN,OPT=02,LINECNT=58,SIZE=0000K,

*OPTIONS IN EFFECT*      SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF

*STATISTICS*     SOURCE STATEMENTS =      54 ,PROGRAM SIZE =     2316

*STATISTICS*    2 DIAGNOSTICS GENERATED, HIGHEST SEVERITY CODE IS  4

****** END OF COMPILATION ******                                  128K BYTES OF CORE NOT USED
```

OPTIONS USED - PRINT,MAP,LET,CALL,NORES,SIZE=250880

NAME	TYPE	ADDR	NAME	TYPE	ADDR	NAME	TYPE	ADDR	NAME	TYPE	ADDR	NAME	TYPE	ADDR
MAIN	SD	3BEC0	IHCECOMH*	SD	3C7D0	IBCOM# *	LR	3C7D0	FDIOCS# *	LR	3C88C	INTSWTCH*	LR	3D6FE
IHCCOMH2*	SD	3D720	SEQDASD *	LR	3DA8C	IHCERRM *	SD	3DD78	ERRMON *	LR	3DD78	IHCERRE *	LR	3DD90
IHCUOPT *	SD	3E338	IHCEFNTH*	SD	3E638	ARITH# *	LR	3E638	ADJSWTCH*	LR	3E9A4	IHCEFIOS*	SD	3EB50
FIOCS# *	LR	3EB50	FIOCSBEP*	LR	3EB56	IHCFCVTH*	SD	3FEB8	ADCON# *	LR	3FEB8	FCVAOUTP*	LR	3FF62
FCVLOUTP*	LR	3FFF2	FCVZOUTP*	LR	40142	FCVIOUTP*	LR	404F0	FCVEOUTP*	LR	409F2	FCVCOUTP*	LR	40C0C
INTGSWCH*	LR	40EF3	IHCUATBL*	SD	41058	IHCETRCH*	SD	41690	IHCTRCH *	LR	41690	ERRTRA *	LR	41698

TOTAL LENGTH 5A60
ENTRY ADDRESS 3BEC0

DUMPED FROM THE 7-TRACK COPY.

PROGRAM MDUMP1 27 JAN 72 VERSION
DUMPED FROM TAPE M-0107/7


```
    1    70     1 10588 10589   400   597  4094  3675  4034     1     0     7     0     0     0     0     0     0     0
242 -51 239 -54 234 -53 229 -52 224 -49 218 -44 212 -36 207 -29 202 -23 196 -17 190 -12 186  -8 180  -4 175   0 164   8 159   6

    1    70     2 10589 10590   400   597  4094  3675  4034     2     0     7     0     0     0     0     0     0     0
235  20 233  20 227  22 222  24 217  27 211  31 206  33 201  35 196  37 191  37 187  33 182  30 178  27 174  25 163  31 159  30

    1    70     3 10590 10591   400   597  4094  3675  4034     3     0     7     0     0     0     0     0     0     0
231  54 229  54 225  53 220  56 216  58 211  57 207  55 202  55 197  54 190  53 185  50 180  48 175  46 172  44 1619999 1589999

    1    70     4 10591 10592   400   597  4094  3675  4034     4     0     7     0     0     0     0     0     0     0
220 -27 217 -25 213 -23 208 -19 205 -19 201 -19 198 -20 195 -21 191 -21 186 -24 181 -25 177 -27 173 -27 170 -28 159 -20 156 -19

    1    70     5 10592 10593   400   597  4094  3675  4034     5     0     7     0     0     0     0     0     0     0
226 -20 223 -19 219 -19 213 -19 209 -20 204 -19 200 -18 195 -18 191 -19 185 -21 179 -18 174 -16 170 -14 166 -14 156  -6 153  -6

    1    70     6 10593 10594   400   597  4094  3675  4034     6     0     7     0     0     0     0     0     0     0
224  -5 220  -2 216   1 210   0 206   1 200   1 195   1 191   0 186   1 180   2 174   4 170   4 166   5 1599999 149  17 147  18

    1    70     7 10594 10595   400   597  4094  3675  4034     7     0     7     0     0     0     0     0     0     0
216 -26 212 -28 209 -31 201 -35 197 -35 191 -34 186 -34 182 -33 177 -31 171 -28 166 -26 162 -24 158 -23 148 -14 150 -17 147 -16

    1    70     8 10595 10596   400   597  4094  3675  4034     8     0     7     0     0     0     0     0     0     0
224  12 220   8 216   6 208   0 203   0 196   0 191  -2 185  -1 179   0 173   2 168  -3 164  -4 159  -3 150   3 150   1 147   3

    1    70     9 10596 10597   400   597  4094  3676  4034     9     0     7     0     0     0     0     0     0     0
226  10 222  11 217  13 209  16 204  16 197  13 192  15 186  17 181  15 176  13 170  15 167  15 162  14 1499999 155  -2 148   1

    1    70    10 10597 10598   400   597  4094  3676  4034    10     0     7     0     0     0     0     0     0     0
236  -7 231  -4 226  -2 218   0 213  -3 206  -2 200  -2 194  -1 188  -1 183  -2 177   0 174   0 169  -4 163  -3 153   3 144   6

    1    70    11 10598 10599   400   597  4094  3676  4034    11     0     7     0     0     0     0     0     0     0
249   6 244   4 239   2 232   2 227   1 220  -1 214  -4 208 -10 202 -14 196 -17 193 -21 187 -26 182 -27 180 -31 166 -22 159 -19

    1    70    12 10599 10600   400   597  4094  3676  4034    12     0     7     0     0     0     0     0     0     0
256 -36 252 -35 248 -38 242 -38 237 -39 231 -38 225 -35 220 -33 214 -30 207 -25 2069999 198 -18 192 -13 1939999 175   4 1709999

    1    70    13 10600 10601   400   597  4094  3676  4034    13     0     7     0     0     0     0     0     0     0
259  24 256  24 251  24 245  26 240  28 235  29 229  24 223  20 217  18 211  19 211  14 200  22 195  25 193  25 1799999 1759999

    1    70    14 10601 10602   400   597  4094  3676  4034    14     0     7     0     0     0     0     0     0     0
293 -11 289 -11 284 -12 278 -11 274 -11 268 -12 263 -10 257  -7 251  -6 244  -5 250 -17 233  -6 228  -6 231 -13 217  -7 222 -14

    1    70    15 10602 10603   400   597  4094  3676  4034    15     0     7     0     0     0     0     0     0     0
306 -20 302 -18 298 -17 293 -16 288 -14 283 -12 278 -11 273  -8 267  -5 262 -10 272 -26 252 -14 247 -18 254 -33 241 -33 250 -49

    1    70    16 10603 10604   400   597  4094  3676  4034    16     0     7     0     0     0     0     0     0     0
3349999 3309999 3259999 3209999 3159999 3109999 3039999 2979999 2919999 2849999 2789999 2729999 2649999 2589999 2579999 2499999

    1    70    17 10604 10605   400   597  4094  3676  4034    17     0     7     0     0     0     0     0     0     0
349  84 345  84 340  84 334  83 329  82 323  84 317  86 311  86 304  85 296  87 289  87 282  87 274  86 266  85 257  89 249  91

    1    70    18 10605 10606   400   597  4094  3676  4034    18     0     7     0     0     0     0     0     0     0
363 -32 358 -32 353 -30 348 -29 343 -29 336 -29 330 -30 323 -29 316 -27 308 -25 300 -22 293 -19 284 -15 276 -12 267  -7 257  -5

    1    70    19 10606 10607   400   597  4094  3676  4034    19     0     7     0     0     0     0     0     0     0
377  11 373   8 368   4 362   4 356   4 349   4 342   2 334   0 327  -1 320  -1 313  -2 304  -5 296 -11 288 -14 279 -18 271 -28
```

```
    1    70    20 10607 10608   400   597  4094  3677  4034    20     0     7     0     0     0     0     0     0     0
368   8 364   7 359   7 354   6 348   6 341   2 335  -1 328  -5 321  -9 315 -13 307 -17 299 -16 290 -14 282 -13 274 -15 264 -16

    1    70    21 10608 10609   400   597  4094  3677  4034    21     0     7     0     0     0     0     0     0     0
3489999 3459999 3409999 3369999 3309999 3229999 3159999 3089999 3029999 2959999 2889999 2809999 2719999 2639999 2559999 2419999

    1    70    22 10609 10610   400   597  4094  3677  4034    22     0     7     0     0     0     0     0     0     0
341  18 338  21 333  20 328  20 333   9 315  22 308  22 301  22 294  23 288  26 281  27 271  25 263  26 254  26 245  22 2299999

    1    70    23 10610 10611   400   597  4094  3677  4034    23     0     7     0     0     0     0     0     0     0
316   2 314   2 311   5 307   7 308   0 295   5 290   6 284  10 277  15 270  18 264  17 256  17 248  15 241  13 235  14 221  16

    1    70    24 10611 10612   400   597  4094  3677  4034    24     0     7     0     0     0     0     0     0     0
300  17 298  18 295  17 292  14 291   9 282  12 281   6 276   6 270   3 264   0 258   3 250   3 243   1 231   5 226   6 209  16

    1    70    25 10612 10613   400   597  4094  3677  4034    25     0     7     0     0     0     0     0     0     0
305 -18 301 -18 299 -18 295 -21 2949999 284 -23 280 -25 275 -24 269 -23 262 -22 257 -25 248 -25 241 -22 230 -20 224 -22 209 -15

    1    70    26 10613 10614   400   597  4094  3677  4034    26     0     7     0     0     0     0     0     0     0
300 -59 295 -57 292 -55 289 -52 288 -50 278 -41 273 -38 269 -40 263 -41 256 -42 250 -40 243 -37 234 -35 224 -27 219 -18 211 -12

    1    70    27 10614 10615   400   597  4094  3677  4034    27     0     7     0     0     0     0     0     0     0
298 -21 293 -20 290 -18 287 -14 286 -17 277 -12 2719999 2669999 2609999 2529999 2469999 2379999 2299999 219  -9 214 -12 206 -17

    1    70    28 10615 10616   400   597  4094  3677  4034    28     0     7     0     0     0     0     0     0     0
304  33 300  25 296  23 293  22 293  16 283  12 279  -2 273  -1 267  -4 259  -5 252  -5 244  -5 235  -5 224  -1 218  -1 210   0

    1    70    29 10616 10617   400   597  4094  3677  4034    29     0     7     0     0     0     0     0     0     0
307  13 302  10 298  12 295  12 291  12 286   8 281   7 275   9 269  12 261  14 254  15 246  15 236  13 226  12 220  11 211  11

    1    70    30 10617 10618   400   597  4094  3677  4034    30     0     7     0     0     0     0     0     0     0
315 -11 310  -7 307  -7 304  -6 299  -4 292  -1 290  -4 285  -6 279  -6 272  -8 264 -10 256 -15 246 -15 234 -15 226 -15 217 -14

    1    70    31 10618 10619   400   597  4094  3678  4034    31     0     7     0     0     0     0     0     0     0
327  38 322  41 317  38 313  36 308  36 301  38 294  37 289  34 283  33 277  31 267  33 259  34 250  32 242  32 234  30 225  27

    1    70    32 10619 10620   400   597  4094  3678  4034    32     0     7     0     0     0     0     0     0     0
318 -13 314 -17 310 -20 305 -20 300 -18 295 -17 291 -20 286 -23 280 -24 274 -23 265 -24 257 -23 248 -21 240 -20 233 -20 224 -20

    1    70    33 10620 10621   400   597  4094  3678  4034    33     0     7     0     0     0     0     0     0     0
321 -21 318 -18 313 -10 308  -7 300  -9 300 -15 295  -9 291  -4 285  -3 279  -2 270   3 262   4 254   5 247   5 239   6 231   7

    1    70    34 10621 10622   400   597  4094  3678  4034    34     0     7     0     0     0     0     0     0     0
327  29 323  28 317  28 311  26 302  28 302  23 298  23 292  26 286  27 280  27 271  15 264  18 257  17 250  17 243  17 234  15

    1    70    35 10622 10623   400   597  4094  3678  4034    35     0     7     0     0     0     0     0     0     0
323 -47 318 -45 314 -50 308 -50 298 -42 298 -43 293 -41 288 -41 282 -41 276 -41 267 -38 260 -40 253 -38 246 -35 239 -35 231 -34

    1    70    36 10623 10624   400   597  4094  3678  4034    36     0     7     0     0     0     0     0     0     0
319  22 315  24 310  26 305  26 2949999 295  33 290  31 285  32 279  33 274  35 265  41 258  43 249  42 242  42 236  43 228  45

    1    70    37 10624 10625   400   597  4094  3678  4034    37     0     7     0     0     0     0     0     0     0
324  23 319  18 314  14 308  11 300  11 300   7 295   6 289   2 283  -1 277  -5 269 -10 261 -10 253  -5 246  -4 238  -4 230  -3

    1    70    38 10625 10626   400   597  4094  3678  4034    38     0     7     0     0     0     0     0     0     0
322  11 318  14 313  16 307  18 298  22 298  13 293   9 288   7 282   6 277   5 271   5 264   2 256  -1 249  -6 241  -6 234  -7
```

```
    1    70   115 10702 10703   400   597  4095  3682  4034   115     0     7     0     0     0     0     0     0     0
346  20 342  19 339  17 335  16 330  15 326  16 322  15 319  15 316  16 312  18 309  18 305  19 301  20 297  23 293  26 289  28

    1    70   116 10703 10704   400   597  4095  3683  4034   116     0     7     0     0     0     0     0     0     0
374 -28 369 -24 365 -21 361 -19 357 -20 353 -19 348 -17 345 -17 342 -17 338 -16 335 -16 331 -14 327 -13 324 -13 321 -14 316 -16

    1    70   117 10704 10705   400   597  4095  3683  4034   117     0     7     0     0     0     0     0     0     0
387  84 382  77 378  72 373  68 368  64 363  59 359  53 354  52 351  48 347  44 343  40 339  36 336  32 332  28 328  25 324  21

    1    70   118 10705 10706   400   597  4095  3683  4034   118     0     7     0     0     0     0     0     0     0
379 -38 374 -36 371 -36 367 -35 363 -31 360 -29 356 -27 353 -25 351 -24 348 -23 346 -26 343 -24 341 -21 338 -19 336 -20 332 -18

    1    70   119 10706 10707   400   597  4095  3683  4034   119     0     7     0     0     0     0     0     0     0
391 -18 386 -18 382 -18 377 -17 373 -17 370 -17 367 -17 363 -17 359 -15 356 -13 353  -8 350  -7 348  -6 345  -3 342   0 338   2

    1    70   120 10707 10708   400   597  4095  3683  4034   120     0     7     0     0     0     0     0     0     0
402  12 397  14 393  15 388  16 383  13 380  12 377   9 373   7 369   6 366   5 363   6 360   6 358   3 355   0 353  -2 349  -3

    1    70   121 10708 10709   400   597  4095  3684  4034   121     0     7     0     0     0     0     0     0     0
400 -59 396 -57 393 -54 388 -49 385 -45 382 -39 380 -31 377 -25 374 -20 371 -15 369 -11 367  -8 365  -4 362  -1 360   2 357   5

    1    70   122 10709 10710   400   597  4095  3684  4034   122     0     7     0     0     0     0     0     0     0
411  37 407  35 404  32 398  24 394  22 389  24 387  22 383  18 380  10 377   6 375   2 372   2 369   1 367  -1 365   1 362   0

    1    70   123 10710 10711   400   597  4095  3684  4034   123     0     7     0     0     0     0     0     0     0
412  17 409  16 405  16 400  16 396  15 391  14 389  12 385  13 382  14 379  12 377  12 373  13 371  13 368  14 366  13 363  14

    1    70   124 10711 10712   400   597  4095  3684  4034   124     0     7     0     0     0     0     0     0     0
415  40 412  40 408  41 402  44 398  44 394  41 392  42 390  42 387  45 384  46 381  43 378  41 376  39 374  35 371  34 369  31

    1    70   125 10712 10713   400   597  4095  3684  4034   125     0     7     0     0     0     0     0     0     0
414   6 410   5 406   3 399   2 395   1 390  -5 386  -9 382  -9 379  -8 375  -7 371  -9 367 -12 365 -14 362 -11 360 -13 357 -11

    1    70   126 10713 10714   400   597  4095  3684  4034   126     0     7     0     0     0     0     0     0     0
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    1    71   245 11197 11198   400   597  4095  3683  4035   609     0     7     0     0     0     0     0     0     0
175 -11 172 -10 170  -9 170  -9 169  -9 167  -7 168  -9 165  -6 164  -5 163  -5 163  -5 162  -4 162  -4 161  -4 161  -5 161  -7

    1    71   246 11198 11199   400   597  4095  3683  4035   610     0     7     0     0     0     0     0     0     0
172 -33 171 -38 169 -40 168 -40 167 -39 166 -39 166 -39 163 -36 162 -35 161 -34 160 -32 159 -29 158 -27 157 -25 157 -24 156 -22

    1    71   247 11199 11200   400   597  4095  3683  4035   611     0     7     0     0     0     0     0     0     0
166  -5 164  -4 163  -3 162  -3 162  -3 161  -3 1619999 1589999 1589999 1579999 1569999 1569999 1559999 1549999 1539999 1539999

    1    71   248 11200 11201   400   597  4095  3683  4035   612     0     7     0     0     0     0     0     0     0
166  58 165  58 163  57 162  56 162  56 162  56 162  55 161  55 161  57 161  58 161  58 161  58 160  60 159  60 159  59 158  60

    1    71   249 11201 11202   400   597  4095  3683  4035   613     0     7     0     0     0     0     0     0     0
167 -14 165 -13 164 -12 163 -12 162 -12 162 -12 163 -13 162 -14 162 -15 162 -16 162 -17 162 -18 161 -20 160 -21 160 -22 159 -22

    1    71   250 11202 11203   400   597  4095  3683  4035   614     0     7     0     0     0     0     0     0     0
174 -17 173 -16 172 -15 171 -14 171 -14 171 -13   09999   09999   09999   09999   09999   09999   09999   09999   09999

    1    71   251 11203 11204   400   597  4095  3683  4035   615     0     7     0     0     0     0     0     0     0
09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999

    1    71   252 11204 11205   400   597  4095  3683  4035   616     0     7     0     0     0     0     0     0     0
09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999

    1    71   253 11205 11206   400   597  4095  3683  4035   617     0     7     0     0     0     0     0     0     0
09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999

    1    71   254 11206 11207   400   597  4095  3683  4035   618     0     7     0     0     0     0     0     0     0
09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999   09999

    1    71   255 11207 11208   400   597  4095  3683  4035   619     0     7     0     0     0     0     0     0     0
148   3 148   1 146   1 145  -1 144  -3 143  -5 142  -5 140  -6 139  -6 138  -7 136  -5 135  -5 134  -5 133  -5 131  -6 130  -7

    1    71   256 11208 11209   400   597  4095  3683  4035   620     0     7     0     0     0     0     0     0     0
147  14 146  17 144  18 143  19 142  20 141  20 140  21 138  23 137  24 136  25 134  26 133  25 132  24 131  24 129  24 128  24

    1    71   257 11209 11210   400   597  4095  3683  4035   621     0     7     0     0     0     0     0     0     0
147 -24 146 -24 144 -23 143 -22 142 -21 141 -21 140 -20 138 -18 137 -18 136 -17 134 -16 133 -15 132 -14 131 -14 129 -12 128 -11

    1    71   258 11210 11211   400   597  4095  3683  4035   622     0     7     0     0     0     0     0     0     0
151   6 150   6 149   5 148   5 147   5 146   6 146   2 145  -1 137   4 136   3 134   2 133   1 132   1 131   0 129   1 128   1

    1    71   259 11211 11212   400   597  4095  3683  4035   623     0     7     0     0     0     0     0     0     0
144  -3 144  -5 142  -5 142  -6 141  -7 141  -8 141  -9 140  -9 131  -1 130  -1 129  -2 127  -1 127  -1 125  -2 124  -2 124  -3

    1    71   260 11212 11213   400   597  4095  3683  4035   624     0     7     0     0     0     0     0     0     0
1459999 1439999 1429999 1419999 1419999 1409999 1399999 1389999 1289999 1279999 1259999 1249999 1239999 1229999 1219999 1209999

    1    71   261 11213 11214   400   597  4095  3683  4035   625     0     7     0     0     0     0     0     0     0
151  21 150  21 148  22 148  23 147  25 146  28 144  32 143  34 1339999 1329999 1309999 1299999 1289999 1269999 1259999 1239999

    1    71   262 11214 11215   400   597  4095  3682  4035   626     0     7     0     0     0     0     0     0     0
159 -49 157 -47 154 -45 153 -45 151 -44 150 -43 148 -42 147 -41 139 -35 137 -34 136 -34 135 -34 134 -34 133 -33 124 -25 122 -23

    1    71   263 11215 11216   400   597  4095  3682  4035   627     0     7     0     0     0     0     0     0     0
162   2 160   2 158   2 160  -1 158  -1 157  -2 155  -3 154  -5 147  -1 146  -2 144  -2 143  -2 142  -2 141  -2 134   3 132   2
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    1    71   340 11292 11293   400   597  4095  3680  4030   705     0     7     0     0     0     0     0     0
133   2 130   3 129   0 128  -3 129 -10 123 -13 119 -14 116 -16 114 -19 109 -15 108 -15 106 -16 101 -16  97 -17  93 -16  90 -14

    1    71   341 11293 11294   400   597  4095  3680  4030   706     0     7     0     0     0     0     0     0
136 -16 133 -15 130 -13 128 -16 1309999 124 -18 121 -17 119 -15 117 -14 114 -11 111  -8 108  -6 104  -4 100  -4  96  -3  93  -3

    1    71   342 11294 11295   400   597  4095  3680  4030   707     0     7     0     0     0     0     0     0
137  -6 135  -5 132  -1 130   2 131   0 125   4 122   5 119   3 117   4 114   3 111   2 108   2 104   2 100   2  97   1  94  -1

    1    71   343 11295 11296   400   597  4095  3680  4030   708     0     7     0     0     0     0     0     0
143  -1 141  -3 139  -2 137   0 139  -2 132   3 128   4 125   4 122   7 118  -5 115  -8 112  -8 108  -9 103 -11 100 -14  97 -14

    1    71   344 11296 11297   400   597  4095  3680  4030   709     0     7     0     0     0     0     0     0
148  13 146  11 144   6 143   2 147  -3 140   5 135  11 132  16 129  18 125  20 121  21 117  24 113  25 109  25 106  23 103  20

    1    71   345 11297 11298   400   597  4095  3680  4030   710     0     7     0     0     0     0     0     0
157 -17 155 -18 154 -18 153 -16 152 -15 149 -15 143 -19 139 -22 136 -22 131 -17 127 -17 122 -20 118 -21 115 -19 112 -14 108  -8

    1    71   346 11298 11299   400   597  4095  3680  4030   711     0     7     0     0     0     0     0     0
158  16 156  17 155  17 154  16 152  16 149  15 142  15 137  15 135  13 131  12 127  11 122  11 118  11 114   9 111   8 107   6

    1    71   347 11299 11300   400   597  4095  3680  4030   712     0     7     0     0     0     0     0     0
163   8 161   7 159   8 157   9 154  11 150  14 144  13 139  10 136   8 134   7 131   4 127   1 123   0 120   2 117   5 114   6

    1    71   348 11300 11301   400   597  4095  3680  4030   713     0     7     0     0     0     0     0     0
175   4 172   8 171  12 169  13 167  12 162  10 155   4 150   4 148   3 146   0 143  -2 138   0 134   3 131   6 129   3 126  -1

    1    71   349 11301 11302   400   597  4095  3680  4030   714     0     7     0     0     0     0     0     0
180 -38 179 -40 178 -40 176 -38 173 -37 170 -41 165 -46 161 -50 160 -51 159 -47 158 -41 155 -45 152 -50 149 -53 146 -54 142 -54

    1    71   350 11302 11303   400   597  4095  3680  4030   715     0     7     0     0     0     0     0     0
180  -4 176  -3 175 -11 173 -15 170 -20 167 -23 162 -18 158 -14 156 -14 155 -16 154 -17 152 -16 149 -15 147 -18 143 -17 139 -11

    1    71   351 11303 11304   400   597  4095  3680  4030   716     0     7     0     0     0     0     0     0
176  64 172  65 171  64 169  64 166  66 163  67 160  67 157  68 155  72 152  75 151  74 150  70 148  69 146  70 142  70 138  71

    1    71   352 11304 11305   400   597  4095  3680  4030   717     0     7     0     0     0     0     0     0
175   6 170  14 167  21 165  19 163  18 160  24 159  30 157  38 154  46 151  55 150  61 148  70 147  74 143  78 139  78 135  74

    1    71   353 11305 11306   400   597  4095  3680  4030   718     0     7     0     0     0     0     0     0
185 -16 180 -29 177 -29 173 -24 170 -21 169 -26 168 -32 167 -40 164 -43 160 -43 158 -43 156 -42 155 -43 152 -45 148 -47 144 -47

    1    71   354 11306 11307   400   597  4095  3680  4030   719     0     7     0     0     0     0     0     0
192 -46 183 -42 181 -43 179 -42 177 -39 176 -35 174 -29 171 -29 168 -36 163 -48 160 -48 158 -46 158 -44 155 -41 150 -38 145 -36

    1    71   355 11307 11308   400   597  4095  3680  4030   720     0     7     0     0     0     0     0     0
184 -10 176 -10 173 -13 172 -17 171 -19 169 -18 164 -13 161  -9 157  -8 152  -9 148 -14 147 -19 146 -20 143 -22 138 -23 133 -25

    1    71   356 11308 11309   400   597  4095  3680  4030   721     0     7     0     0     0     0     0     0
186  24 176  31 173  30 171  25 170  21 166  22 161  26 156  28 150  28 141  33 135  37 132  34 130  29 126  28 121  29 116  31

    1    71   357 11309 11310   400   597  4095  3680  4030   722     0     7     0     0     0     0     0     0
186  38 181  15 175  20 172  28 171  27 169  23 163  23 158  16 153  15 144  17 138  14 135  14 133  21 129  23 124  19 119  17

    1    71   358 11310 11311   400   597  4095  3680  4030   723     0     7     0     0     0     0     0     0
189  -2 185  -1 179   3 176   7 174  12 170  11 162  -7 157  -6 150   0 144   1 137   3 134   5 131   4 127   3 122   6 117   8
```

PROGRAM MDUMP1 27 JAN 72 VERSION
DUMPED FROM TAPE M-0107/7


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    1    71   359 11311 11312   400   597  4095  3679  4030   724     0     7     0     0     0     0     0     0     0
184   7 181   9 175  13 173   7 170   4 165   4 157   7 151   9 144   8 137  -3 131 -13 127 -13 124 -14 121 -18 116 -20 111 -22

    1    71   360 11312 11313   400   597  4095  3679  4030   725     0     7     0     0     0     0     0     0     0
171  -3 165999 163  -3 161  -5 159  -1 154   6 146   7 140   6 133   9 126  13 119  18 116  18 113  19 109  21 105  18 100  17

    1    71   361 11313 11314   400   597  4095  3679  4030   726     0     7     0     0     0     0     0     0     0
161   7 157   9 155   8 153   9 151   8 146   3 138   2 134  -4 127 -13 120 -10 114  -6 112  -6 108  -4 105  -4 101  -4  98  -4

    1    71   362 11314 11315   400   597  4095  3679  4030   727     0     7     0     0     0     0     0     0     0
151  -9 144  -4 144  -7 142  -9 139 -12 135 -18 130 -16 126 -15 120 -15 114 -18 109 -22 105 -22 101 -25  98 -23  95 -23  92 -22

    1    71   363 11315 11316   400   597  4095  3679  4030   728     0     7     0     0     0     0     0     0     0
144 -24 135 -19 137 -22 135 -19 133 -20 129 -18 124 -14 120 -13 115 -15 111 -16 107 -16 103 -18 100 -22  98 -24  95 -22  92 -20

    1    71   364 11316 11317   400   597  4095  3679  4030   730     0     7     0     0     0     0     0     0     0
132 -19 127 -21 125 -22 123 -20 120 -18 116 -16 113 -16 111 -14 108  -9 104  -2 100   1  95  -3  90  -4  89  -5  87  -2  85  -2
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END OF FILE

BIN 401	SEQ 233	DA ROSA	END	13:39	06/12	END	DA ROSA	SEQ 233	BIN 401
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BIN 401	SEQ 233	DA ROSA	END	13:39	06/12	END	DA ROSA	SEQ 233	BIN 401
BIN 401	SEQ 233	DA ROSA	END	13:39	06/12	END	DA ROSA	SEQ 233	BIN 401
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