Data Set Catalog #143
OGO-5, Spectrometer
68-014A-18A 14 tapes

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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 This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system.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

OGO 5

O, HE + H ION CONCS + EPHEM, TAPE

68-014A-18A

THIS DATA SET HAS BEEN RESTORED. THERE WERE ORIGINALLY FOURTEEN 7-TRACK, 800 BPI TAPES, WRITTEN IN BINARY. THERE ARE TWO RESTORED TAPES, WHICH WERE PADDED DURING THE RESTORATION PROCESS. THE DR TAPES ARE 3480 CARTRIDGES AND THE DS TAPES ARE 9-TRACK, 6250 BPI. THE ORIGINAL TAPES WERE CREATED ON A 1108 COMPUTER. THE DR AND DS NUMBERS ALONG WITH THE CORRESPONDING D NUMBERS AND TIME SPANS ARE AS FOLLOWS:

DR#	DS#	D#	FILES	TIME SPAN
DR003945	DS003945	D006071	1-10	03/07/68 - 03/30/68
		D006072	11-19	04/01/68 - 04/23/68
		D006073	20-26	06/13/68 - 06/29/68
		D006074	27-38	07/01/68 - 07/30/68 (a)
		D006075	39-50	08/02/68 - 08/31/68 (b)
		D006076	51-61	09/02/68 - 09/28/68
		D006077	62-73	10/01/68 - 10/30/68
		D006078	74-85	11/01/68 - 11/30/68
		D006079	86-97	12/02/68 - 12/31/68 (c)
		D006080	98-108	01/02/69 - 01/31/69 (d)
DR003946	DS003946	D006081	1-10	02/03/69 - 02/26/69
		D011544	11-22	02/28/69 - 03/29/69 (e)
		D011545	23-33	04/01/69 - 04/30/69
		D011546	34-45	05/02/69 - 05/31/69 (f)

(a) D006074 - read error occurred in record 31 of file 1.
(b) D006075 - read error occurred in record 2 of file 6.
(c) D006079 - read error occurred in record 2 of file 1.
(d) D006080 - read error occurred in records 22, 26, 30, 32 of file 1.
(e) D011544 - read error occurred in record 44 of file 12.
(f) D011546 - read error occurred in record 26 of file 12.

OGO-5

O, HE + H ION CONC + Ephem, Tape
68-014A-18A

DR & DS 03945

~~LR 1026 & NC1023~~, D6071-80, C4591-99, C5345, 6250 & 3480, BIN 1108, 108 files, 3280 recs, 112283503 Bytes, 36001 Blksize, Variable, 54 recsize, 3/7/68 - 4/23/68 (F1-19), 6/13/68-1/31/69 (F20-108) REMARKS: Read error on Rec 31 file 1 of D06074, Rec 2, file 6 of D6075, Rec 2, file 1 of D6079, Recs 22, 26, 30, & 32, file 1 of D6080, CARLISLE, B26943215

DR & DS 03946

~~LR1015 & NC1024~~, D6081, D11544-46, C4600, C8905-7, 6250 & 3480, BIN 1108, 45 files, 1577 recs, 54143561 Bytes, 36001 Blksize, Variable, 52 recsize, 2/3/69 - 5/31/69, REMARKS: Read error Rec 44, file 12 on D11544, Rec 26, file 12 on D11546, BASF, 18212157 July 91 Lot 23

OGO-5 SPECTROMETER

68-014A-18A

This data set consists of 14 tapes. These tapes are 800 BPI, 7-track, binary with anywhere from 9 to 14 files per tape. Note: each tape is ended with a triple EOF.

The tapes contain header records in BCD format. The data records consist of 36 bit floating point words. The format for the data records is:

WORD	DESCRIPTION
1	JULIAN DAY
2	UNIVERSAL TIME
3	ION CONCENTRATION
4	GEODETIC LATITUDE
5	GEODETIC LONGITUDE
6	ALTITUDE
7	L
8	DISTANCE
9	LOCAL TIME
10	MAGNETIC LATITUDE
11	EGRESS LATITUDE
12	INGRESS LATITUDE

The time spans for the tapes are:

D#	C#	FILES	TIME SPAN
D-06071	C-04591	12	3/07/68 - 3/30/68
D-06072	C-05345	11	4/01/68 - 4/23/68
D-06073	C-04592	9	6/13/68 - 6/29/68
D-06074	C-04593	14	7/01/68 - 7/30/68
D-06075	C-04594	14	8/02/68 - 8/31/68

D#	C#	FILES	TIME SPAN
D-06076	C-04595	13	9/02/68 - 9/28/68
D-06077	C-04596	14	10/01/68 - 10/30/68
D-06078	C-04597	14	11/01/68 - 11/30/68
D-06079	C-04598	14	12/02/68 - 12/31/68
D-06080	C-04599	13	1/02/69 - 1/31/69
D-06081	C-04600	12	2/03/69 - 2/26/69
D-11544	C-08905	14	2/28/69 - 3/29/69
D-11545	C-08906	13	4/01/69 - 4/30/69
D-11546	C-08907	14	5/02/69 - 5/31/69

Lockheed
PALO ALTO
RESEARCH
LABORATORY

Department 52-12 Building 202

3251 HANOVER STREET • PALO ALTO, CALIFORNIA • 94304

5 May 1971

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

Gentlemen:

Accompanying this letter is a shipment of processed magnetic data tapes from the experiment E-18, A Light Ion Mass Spectrometer, for OGO-5.

The data contained on these magnetic tapes are in final analyzed form for the data acquired for the first year of instrument operation. This shipment is in accordance with "A Plan for Submission of Data from Experiment E-18 on OGO-V," Contract No. NAS 5-9092, and forms a portion of the data to be submitted to the National Space Science Data Center as per contract specifications. Additional data will be submitted in the form of charts, graphs, tables, etc., which formed the basis of published results. These additional data will accompany or appropriately be included in the final report to be subsequently submitted.

The format of the data contained on the magnetic tapes included herein is as follows: Each magnetic tape is written with 800 bits per inch, odd parity and binary; each word is a 36 bit word floating point, the left nine bits forming the characteristic; the first record is an indicative record written in BCD format, containing the number of files on tape, the month of year of the data acquisition and the beginning and ending orbit numbers, and address of principal investigators; the files are in ordered records of Oxygen (oxy), Helium (Hel) and Hydrogen (Hyd); each record consists of a 12 by X matrix with $X \leq 500$, the matrix elements in order are (1) day 2) universal time 3) ion concentration 4) geodetic latitude 5) geodetic longitude 6) altitude 7) L 8) distance 9) local time 10) magnetic latitude 11) egress latitude 12) ingress latitude. At the end of tape are placed 3 end of file marks.

A complete description of all computer programs developed for data analysis will be included within the final report.

Respectfully,

Kent K Harris

Dr. Kent K. Harris
OGO-5 Experimentor
Space Sciences Laboratory

Enclosure

Chapter 3

DATA ANALYSIS

3.1 DATA

The data from the LIMS is received from Goddard Space Flight Center (GSFC) in the form of magnetic tapes. The data have been preliminarily processed to be compatible with the Univac 1108 computing facility of Lockheed Missiles and Space Company. The processed tapes have been remarkably free from errors. Only on rare occasions has it been necessary to return a magnetic tape to GSFC to be reprocessed because it contained noisy or otherwise unmanageable data. Along with the basic data tapes magnetic tapes containing a complete set of orbit-altitude information were also supplied by GSFC. The analysis of the data from the LIMS required utilizing both the data tape and the orbit-attitude data as described in the following sub-section.

3.2 THE APPROACH TO ANALYSIS

The primary purpose of the LIMS was to obtain data on the cold ion distribution within the plasmasphere and plasmatrough. Although many others functions could be performed by the LIMS in the OGO-5 mission (e.g. measure the low energy component of the solar wind, measure the thermal H^+ ion distribution in the magnetosheath, determine bow shock, magnetosheath and magnetopause boundaries, etc.), these were relegated to secondary importance and thereby given only casual attention. The majority of the effort in

reducing and analyzing the LIMS data was confined to the region within approximately 12 earth radii (Re).

As has been described earlier in this report the LIMS is an instrument designed to look in the direction of the spacecraft velocity vector. In the region where the spacecraft velocity is large compared to the most probable ion thermal velocity, α, the ions are "scooped in" by the instrument. The measured ion current is then simply related to the ambient cold plasma density by

$$I_i^+ = N_i^+ AV \cos\theta F_i \qquad (3\text{-}1)$$

where: I_i^+ = ion current of species i measured by the electrometer of the LIMS.

N_i^+ = the ambient density of species i

A = the area of the entrance aperture of the LIMS

V = velocity of the spacecraft,

θ = angle between the velocity vector and the normal to the entrance aperture plane

F = the product of the transmission of the spectrometer and gain of the electron multiplier for species i.

The above expression (Eq. 3-1) is accurate to better than 3% even when the most probable ion velocity is equal to the spacecraft velocity. As the most probable ion velocity increases relative to the spacecraft velocity the relation becomes less and less valid. This relation is valid to within a factor of two even when α is as much as a factor of 5 greater than V.

The most probable ion velocity α depends upon the temperature and mass of the ion:

$$\alpha = (2FT/M)^{1/2} \qquad (3\text{-}2)$$

therefore α is uncertain to the degree that the ion temperature is unknown.

For the region within the plasmasphere (i.e. when the spacecraft is within from 6 to 8 Re) the ion temperature is probably somewhat less than 10,000°C. However, at this temperature and assuming the OGO-5 vehicle velocity corresponding to approximately 5 Re, the error in utilizing Eq. 3-1 for O^+ ions, He^+ ions and H^+ ions is 0%, 9% and 40% respectively. Thus for analysis of the LIMS data, keeping in mind the uncertainty of the ion temperatures, Equation 3-1 will be utilized to obtain ambient densities of the cold plasma.

The ion densities were calculated from Equation 3-1 with angles θ and velocities V determined from the orbit-attitude tape. The concentration data thus calculated were merged with several of the important geophysical parameters from the orbit-attitude tape and a final data magnetic tape was generated. The data for the entire first year of operation were analyzed and final data tapes constructed. The format of the data contained on the magnetic tapes is as follows: Each magnetic tape is written with 800 bits per inch, odd parity and binary; each word is a 36 bit word floating point, the left nine bits forming the characteristic; the first record is an indicative record written in B. C. D. format, containing the number of files on tape, the month of the year of data acquisition, and the beginning and ending orbit numbers, and address of principal investigators; the files are

in ordered records of oxygen (OXY), helium (HeL) and hydrogen (Hyd); each record consists of a 12 by x matrix with $x \leq 500$, the matrix elements in order are 1) day, 2) universal time, 3) ion concentration 4) geodetic latitude, 5) geodetic longitude, 6) altitude, 7) L, 8) distance, 9) local time, 10) magnetic latitude, 11) egress latitude, 12) ingress latitude. At the end of tape are placed 3 end of file marks. Each final data tape contains data for one specific month of instrument operation.

In the region of the magnetosheath the thermal distribution of H^+ ions is readily measured between 0-600 electron volts. The LIMS covers this region for H^+ ions very well but is displayed only when the larger data rates from the telemetry system (8 and 64 kilobits) are being used. Consequently several 0 to 600 eV thermal distributions of H^+ ions have been acquired and analyzed. These analyses are confined roughly within the orbital range from 8 Re outbound to apogee, and from apogee inbound to 8 Re. From these data the crossing of the boundaries of the various magnetospheric regions were readily discernable. The crossing of the bow shock was particularly dramatic. Signal levels from the LIMS dropped as much as 3 orders of magnitude when passing from the magnetosheath region through the bow shock and out into the solar wind.

The proton energy spectrum is determined for the energy range 0-600 volts in the period of time of the basic sweep cycle of the LIMS, i.e. approx. 4 sec.

The LIMS was designed to focus cold (essentially 0 volt) protons (H^+) through the instrument when the accelerating voltage was -600 volts. A proton with 10 volts energy and properly directed into the entrance aperture of the instrument will focus at -590 volts. In like manner, a 600 volt proton directed with 0° angle of attack into the instrument will focus through

the instrument when the accelerating voltage is 0 volts. In this latter case, the proton signal will appear at the beginning of what is called the "oxygen" state of the instrument. It is then clear that the energy of an entering ion is given by

$$Ep = 600 + Vs \qquad (3\text{-}3)$$

where Ep = proton energy in volts

Vs = sweep potential in volts.

Rather than detect a peak as in the case of the normal mass spectroscopy mode, the signal is then spread out over the full range of the sweep due to the energy distribution of the protons that are being focused thru the instrument. The detailed shape of the sweep of the accelerating potential as a function of time is known. With this information the signal out of the electrometer is converted from a time dependent function to an accelerating potential dependent function. This, in turn, is then converted to the proton energy distribution. The display of this data will then be in the form of the proton energy distribution for specific universal times. Those times being the start of each sweep cycle.

3.3 DATA ANALYSIS PROBLEMS

Many circumstances have occurred which have complicated the analysis of the data. Telemetry points on equipment group #2 were shared with experiment E-26 under a pre-arranged schedule. The data from the spacecraft when being transmitted on equipment group #2 therefore frequently came in piecemeal form. This substantially complicated the data analysis procedures; but even more important, it frequently created discontinuities in the LIMS

data, sometimes at rather critical points. The problem of piecemeal acquisition of data was compounded further by the failure of wideband transmitter A. The data transmittal procedures utilized after this failure returned the data for relatively short periods of operation.

The electron multiplier in the LIMS, as has been previously described, operated serially and cyclic in two modes, a high gain mode and a low gain mode. It was discovered that calibration of the high gain mode had changed relative to the low gain mode. It was suspected that this situation did arise from a small deposit of vacuum pump oil on the multiplier plates during the extensive pre-launch testing of the instrument. The high gain calibration was then corrected by normalizing to the low gain calibration in their region of overlap. This circumstance continued from initial turn on until about March 20, 1968, when the gain of the high gain mode shifted back to nearly the value of laboratory calibration. This phenomenon was interpreted as an expurgation of the surface of the multiplier plates by the removal of the vacuum pump oil. These two operational characteristics of the LIMS were appropriately compensated for in the computer programs that were developed to analyze the data. After these intial problems with the electron multiplier, no further abrupt changes in multiplier operation were detected except perhaps for the ultimate failure of the multiplier power supply. This can not be properly determined until the second year of data is analyzed. The inflight calibration system of the LIMS showed that a slight multiplier decay transpired throughout much of the flight. This decay was carefully followed and the final data were corrected to reflect the slightly changing gain of the multiplier.

One further difficulty in data analysis occurred when the sweep monitor circuit failed. As described above, the entire mode of operation

of the LIMS assumed a new pattern. This of course required another programming change to properly extract the data.

3.4 COMPUTER PROGRAMS

The computer programs that have been developed to analyze the LIMS data fall basically into two categories. One category encompasses the primary program of data analysis, i.e., the cold plasma in the region of the plasmasphere and plasma trough. The other category is that of the proton energy distribution in the 0-600 eV range. In the first category 3 similar computer programs were developed to reduce the data to an analyzable form. The three programs correspond to the 3 modes of instrument operation described above. The first program, OGO-E-1, is utilized for the data prior to 20 March 1968. This program compensates for the shift in calibration of the high gain mode of the electron multiplier. The second program, OGO-E-2, is utilized for data after 20 March 1968 to 22 April 1968. During this period the multiplier calibration was re-established near the laboratory level. After 22 April 1968 the third computer program OGO-E-3 was used. This program incorporated the change in the instrument logic caused by the failure of the sweep monitor circuit. In addition to these 3 basic programs, other computer programs were developed to display the data in convenient forms. The most frequently used program was that program which plotted the ion concentrations as a function of the geomagnetic parameter, L. The listings of this plot program, the ion concentration programs OGO-E-1 and OGO-E-3 and the proton energy distribution from 0-600 eV are given in the Appendices.

These magnetic tapes have been received by the National Space Science Data Center.

OGO-5, Experiment E-18

Tape #

OGO-5	March 68
OGO-5	April 68
OGO-5	June 68
OGO-5	July 68
OGO-5	August 68
OGO-5	September 68
OGO-5	October 68
OGO-5	November 68
OGO-5	December 68
OGO-5	January 69
OGO-5	February 69

Signed

Return to: Dr. Kent K. Harris
Dept. 52-12, Bldg. 202
Lockheed Palo Alto Research Lab.
3251 Hanover Street
Palo Alto, California 94304

2225	-167321075265	+220416332563	02227	+204617527200	+220500132207	
2229	+211776764734	+206543606557	02231	-170367424556	+207430124630	
2233	+206710000000	+220663673561	02235	+172721206174	+206537377073	
2237	-167321077441	+220416421044	02239	+204617623325	+220500220471	
2241	+211777040530	+206543601623	02243	-170367417770	+207430130044	
2245	+206710000000	+220663716116	02247	+173416173624	+206537370120	
2249	-167321101615	+220416507324	02251	+204617717452	+220500306752	
2253	+211777114323	+206543574667	02255	-170367413201	+207430133257	
2257	+206710000000	+220663740453	02259	+172721444105	+206537361142	
2261	-167321103765	+220416575602	02263	+204620013564	+220500375232	
2265	+211777170110	+206543567726	02267	-170367406415	+207430136473	
2269	+206710000000	+220663763011	02271	+172721562736	+206537352052	
2273	-167321106777	+220416663777	02275	+204620107134	+220500463430	
2277	+211777243401	+206543562542	02279	-170367401743	+207430141727	
2281	+206710000000	+220664000656	02283	+000000000000	+000000000000	
	WORDS 02285 TO 02292 ARE ALL +000000000000					
2293	+206710000000	+220664032240	02295	+172722137240	+206537324601	
2297	-167321114033	+220417106855	02299	+204620371413	+220500725211	
2301	+211777445446	+206543543006	02303	-170367364145	+207430153653	
2305	+206710000000	+220664074575	02307	+173416616305	+206537315511	
2309	-167321116043	+220417214747	02311	+204620464760	+220501014404	
2313	+211777520736	+206543535622	02315	-170367357473	+207430157107	
2317	+206710000000	+220664117132	02319	+172722374714	+206537306420	
2321	-167321120055	+220417303141	02323	+204620560325	+220501102600	
2325	+211777574225	+206543530437	02327	-170367353021	+207430162343	
2329	+206710000000	+220664141470	02331	+172607303477	+206537277330	
2333	-167321122067	+220417371335	02335	+204620653675	+220501170775	
2337	+211777647518	+206543523262	02339	-170367346347	+207430165577	
2341	+206710000000	+220664164025	02343	+173417027510	+206537270237	
2345	-167321124101	+220417457527	02347	+204620747242	+220501267171	
2349	+211777723005	+206543516067	02351	-170367341675	+207430171032	
2353	+206710000000	+220664206362	02355	+172722751222	+206537261147	
2357	-167321126111	+220417545721	02359	+204621042607	+220501345364	
2361	+211777776276	+206543510753	02363	-170367335223	+207430174266	

IBTD of last record of last tape in Data set to check stop time against 360/30 dump.

2365	+206710000000	+220664230717	02367	+172507611677	+206537252057
2369	-167321130123	+220417634113	02371	+204621136154	+220501433557
2373	+212400024671	+206543503517	02375	-170367330581	+207430177522
2377	+206710000000	+220664253254	02379	+172723206676	+206537242767
2381	-167321132135	+220417722309	02383	+204621231521	+220501521752
2385	+212400052425	+206543476433	02387	-170367324077	+207430202756
2389	+206710000000	+220664275612	02391	+173417316514	+206537233576
2393	-167321134145	+220420010502	02395	+204621325071	+220501610150
2397	+212400100162	+206543471147	02399	-170367317425	+207430206212
2401	+206710000000	+220664320147	02403	+173417374314	+206537224605
2405	-167321136157	+220420076673	02407	+204621420432	+220501676342
2409	+212400125713	+206543463762	02411	-170367312754	+207430211446
2413	+206710000000	+220664342504	02415	+172610222055	+206537215402
2417	-167321140011	+220420164776	02419	+204621513213	+220501764447
2421	+212400152271	+206543456336	02423	-170367306427	+207430214727
2425	+206710000000	+220664365041	02427	+172610324025	+206537206177
2429	-167321141645	+220420253102	02431	+204621605774	+220502052553
2433	+212400200646	+206543450712	02435	-170367302102	+207430220207
2437	+206710000000	+220664407376	02439	+172610425777	+206537176774
2441	-167321143477	+220420341205	02443	+204621700555	+220502140660
2445	+212400226284	+206543443267	02447	-170367275555	+207430223467
2449	+206710000000	+220664431733	02451	+173417663026	+206537167570
2453	-167321145333	+220420427310	02455	+204621773336	+220502225765
2457	+212400253601	+206543435643	02459	-170367271227	+207430226750
2461	+206710000000	+220664454271	02463	+172724255524	+206537150365
2465	-167321147167	+220420515417	02467	+204622066122	+220502315075
2469	+212400301160	+206543430217	02471	-170367264702	+207430232230
2473	+206710000000	+220664476626	02475	+172724374232	+206537151162
2477	-167321151021	+220420603529	02479	+204622160703	+220502403204
2481	+212400326535	+206543422873	02483	-170367263355	+207430235511

FILE 0001 REC 0001 CH 0162

D-6071

0001	241424416505	211614153105	152423052206	303305302512	103127242212	311227051514	340530150627	230505231115		
0049	202005150627	271630050521	241023151212	110525062124	050621312405	271230120607	101505210607	050505050515		
0097	241516300531	062512051024	233105162330	051106310605	132427053115	120522242331	150524130522	052171130551		
0145	171660050524	270716331005	510541056151							

FILE 0001 REC 0002 CH 750061 CREIPS 1-11 Epmont 5 OF 5 REC 4 Tab

0001	207414000000	214423000202	175533713210	203577565325	210470722357	220514415541	204435460170	220676255054		
0049	213406711217	576374272644	571047631254	207454062343	207414000000	214423100202	000000000000	000000000000		
0097	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000		
0145	207414000000	214422533715	175535774651	203576764531	210470630065	220614105175	204435260533	220675754423		
0193	213406723327	576367235573	571047713252	207454062242	207414000000	214426351563	175711542313	203675453252		
0241	210470572760	220513740540	204435160651	220675610055	213406730407	576356615574	571047744314	207454052144		
0289	207414000000	214427467431	175524427266	203676161646	210470535657	220613574150	204435060757	220677443355		
0337	213406735471	576362175221	571047775365	207454062040	207414000000	214430605277	175657172173	203675550233		
0385	210470500557	220613427557	204434761055	220675277077	213406742553	576357554646	571050026435	207454051714		
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5425	567374434061	217556444467	204507633120	217722046501	214406717413	206576202271	570357757430	207402450604
5473	210456000000	217476274457	167656031434	206527555100	567374462223	217556625263	204510073751	217722227257
5521	214406731770	206576264552	570357733535	207402460745	210456000000	217476341351	167656356733	206527617745
5569	567374510367	217557006050	204510334602	217722410036	214406744345	206576347033	570357707641	207402471107
5617	210456000000	217476406244	170612763747	206527662612	567374536531	217557166655	204510575436	217722570617
5665	214406756722	206576431315	570357663745	207402501250	210456000000	217476453136	167657231537	206527725457
5713	567374564675	217557347451	204511036267	217722751376	214406771300	206576513575	570357640051	207402511412
5761	210456000000	217476520003	167657557036	206527770323	567374610337	217557530244	204511277117	217723132154
5809	214407003655	206576576056	570357614155	207402521553	210456000000	217476564723	167660104342	206530033171
5857	567374641203	217557711043	204511537754	217723312730	214407016232	206576660340	570357570261	207402531715
5905	210456000000	217476631615	170614175263	206530075163	567374667143	217560071604	204512000517	217723473462
5953	214407030547	206576741612	570357544605	207402542471	210456000000	217476676510	171572174641	206530136667
6001	567374715013	217560252334	204512241242	217723654175	214407043046	206577022525	570357521227	207402553431
6049	210456000000	217476743402	167660224426	206530203472	567374742655	217560433061	204512501754	217724034706
6097	214407055344	206577103440	570357475652	207402564370	210456000000	217477010274	167660232342	206530242075
6145	567374777535	217560613605	204512742470	217724215417	214407067643	206577164352	570357452274	207402575327
6193	210456000000	217477055173	171572214231	206530303605	567375016411	217560774352	204513203231	217724376146
6241	214407102143	206577265273	570357426714	207402605267	210456000000	217477122065	171440156647	206530346310
6289	567375044261	217561115076	204513443745	217724556657	214407114443	206577326205	570357403336	207402617226

6337	210456000000	217477166757	171440162605	206530407013	567375072131	217561335623	204513704461	217724737370
6385	214407126740	206577407117	570357357761	20[illegible]402630165	210456000000	217477233652	167660262024	206530450517
6433	567375120003	217561516353	204514145202	217725120103	214407141237	206577470033	570357334402	207402641124
6481	210456000000	217477300544	167560267740	206530512222	567375145653	217561677100	204514405716	217725300614
6529	214407153536	206577550745	570357311025	207402652063	210456000000	217477345437	167660275655	206530553726
6577	567375173523	217562057630	204514646436	217725461027	214407166035	206577631661	570357265447	207402663023
6625	210456000000	217477412331	170614263331	206530615431	567375221375	217562240355	204515107152	217725642040
6673	214407200333	206577712573	570357242071	207402673762	210456000000	217477457223	171440206331	206530657134
6721	567375247245	217562421102	204515347666	217726022550	214407212632	206577773505	570357216514	207402704721
6769	210456000000	217477524115	167560317421	206530720637	567375275115	217562601632	204515610406	217726203264
6817	214407225131	206600054421	570357173135	207402715660	210456000000	217477566554	167660304451	206530757500
6865	567375321311	217562753277	204516036720	217726354716	214407236657	206600131376	570357151130	207402726707
6913	210456000000	217477633447	167560257557	206531020061	567375346671	217563133756	204516277162	217726535361
6961	214407251100	206600210764	570357126060	207402740722	210456000000	217477702575	170614214603	206531062461
7009	567375375531	217563323457	204516551433	217726725044	214407264031	206600273327	570357101645	207402753435
7057	210456000000	217477747467	171440130354	206531123042	567375423111	217563504133	204517011671	217727105504
7105	214407276252	206600352713	570357056575	207402765450	210456000000	217500014361	170614146405	206531163423
7153	567375450467	217563664607	204517252127	217727266144	214407310472	206600432277	570357033525	207402777462
7201	210456000000	217500061254	171440074512	206531224005	567375476047	217564045266	204517512371	217727446607
7249	214407322713	206600511665	570357010454	207403011475	210456000000	217500126146	171440056571	206531264365
7297	567375523427	217564225742	204517752626	217727627247	214407335133	206600571251	570356765404	207403023507
7345	210456000000	217500173041	170614055110	206531324747	567375551007	217564406622	204520213070	217730007712
7393	214407347354	206600650636	570356742333	207403035522	210456000000	217500237733	171440022730	206531365330
7441	567375576367	217564567076	204520453326	217730170352	214407361575	206600730222	570356717263	207403047534
7489	210456000000	217500304625						

Data Set Catalog #143
OGO-5, Spectrometer
68-014A-18A 14 tapes

SPHE-00009

OGO 5

O, HE + H ION CONCS + EPHEM, TAPE

68-014A-18A

THIS DATA SET HAS BEEN RESTORED. THERE WERE ORIGINALLY FOURTEEN 7-TRACK, 800 BPI TAPES, WRITTEN IN BINARY. THERE ARE TWO RESTORED TAPES, WHICH WERE PADDED DURING THE RESTORATION PROCESS. THE DR TAPES ARE 3480 CARTRIDGES AND THE DS TAPES ARE 9-TRACK, 6250 BPI. THE ORIGINAL TAPES WERE CREATED ON A 1108 COMPUTER. THE DR AND DS NUMBERS ALONG WITH THE CORRESPONDING D NUMBERS AND TIME SPANS ARE AS FOLLOWS:

DR#	DS#	D#	FILES	TIME SPAN
DR003945	DS003945	D006071	1-10	03/07/68 - 03/30/68
		D006072	11-19	04/01/68 - 04/23/68
		D006073	20-26	06/13/68 - 06/29/68
		D006074	27-38	07/01/68 - 07/30/68 (a)
		D006075	39-50	08/02/68 - 08/31/68 (b)
		D006076	51-61	09/02/68 - 09/28/68
		D006077	62-73	10/01/68 - 10/30/68
		D006078	74-85	11/01/68 - 11/30/68
		D006079	86-97	12/02/68 - 12/31/68 (c)
		D006080	98-108	01/02/69 - 01/31/69 (d)
DR003946	DS003946	D006081	1-10	02/03/69 - 02/26/69
		D011544	11-22	02/28/69 - 03/29/69 (e)
		D011545	23-33	04/01/69 - 04/30/69
		D011546	34-45	05/02/69 - 05/31/69 (f)

(a) D006074 - read error occurred in record 31 of file 1.
(b) D006075 - read error occurred in record 2 of file 6.
(c) D006079 - read error occurred in record 2 of file 1.
(d) D006080 - read error occurred in records 22, 26, 30, 32 of file 1.
(e) D011544 - read error occurred in record 44 of file 12.
(f) D011546 - read error occurred in record 26 of file 12.

OGO-5

O, HE + H ION CONC + Ephem, Tape
68-014A-18A

DR & DS 03945

~~LR 1026 & NC1023~~, D6071-80, C4591-99, C5345, 6250 & 3480, BIN 1108, 108 files, 3280 recs, 112283503 Bytes, 36001 Blksize, Variable, 54 recsize, 3/7/68 - 4/23/68 (F1-19), 6/13/68-1/31/69 (F20-108) REMARKS: Read error on Rec 31 file 1 of D06074, Rec 2, file 6 of D6075, Rec 2, file 1 of D6079, Recs 22, 26, 30, & 32, file 1 of D6080, CARLISLE, B26943215

DR & DS 03946

~~LR1015 & NC1024~~, D6081, D11544-46, C4600, C8905-7, 6250 & 3480, BIN 1108, 45 files, 1577 recs, 54143561 Bytes, 36001 Blksize, Variable, 52 recsize, 2/3/69 - 5/31/69, REMARKS: Read error Rec 44, file 12 on D11544, Rec 26, file 12 on D11546, BASF, 18212157 July 91 Lot 23

OGO-5 SPECTROMETER

68-014A-18A

This data set consists of 14 tapes. These tapes are 800 BPI, 7-track, binary with anywhere from 9 to 14 files per tape. Note: each tape is ended with a triple EOF.

The tapes contain header records in BCD format. The data records consist of 36 bit floating point words. The format for the data records is:

WORD	DESCRIPTION
1	JULIAN DAY
2	UNIVERSAL TIME
3	ION CONCENTRATION
4	GEODETIC LATITUDE
5	GEODETIC LONGITUDE
6	ALTITUDE
7	L
8	DISTANCE
9	LOCAL TIME
10	MAGNETIC LATITUDE
11	EGRESS LATITUDE
12	INGRESS LATITUDE

The time spans for the tapes are:

D#	C#	FILES	TIME SPAN
D-06071	C-04591	12	3/07/68 - 3/30/68
D-06072	C-05345	11	4/01/68 - 4/23/68
D-06073	C-04592	9	6/13/68 - 6/29/68
D-06074	C-04593	14	7/01/68 - 7/30/68
D-06075	C-04594	14	8/02/68 - 8/31/68

D#	C#	FILES	TIME SPAN
D-06076	C-04595	13	9/02/68 - 9/28/68
D-06077	C-04596	14	10/01/68 - 10/30/68
D-06078	C-04597	14	11/01/68 - 11/30/68
D-06079	C-04598	14	12/02/68 - 12/31/68
D-06080	C-04599	13	1/02/69 - 1/31/69
D-06081	C-04600	12	2/03/69 - 2/26/69
D-11544	C-08905	14	2/28/69 - 3/29/69
D-11545	C-08906	13	4/01/69 - 4/30/69
D-11546	C-08907	14	5/02/69 - 5/31/69

Lockheed
PALO ALTO
RESEARCH
LABORATORY

Department 52-12 Building 202

3251 HANOVER STREET • PALO ALTO, CALIFORNIA • 94304

5 May 1971

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

Gentlemen:

Accompanying this letter is a shipment of processed magnetic data tapes from the experiment E-18, A Light Ion Mass Spectrometer, for OGO-5.

The data contained on these magnetic tapes are in final analyzed form for the data acquired for the first year of instrument operation. This shipment is in accordance with "A Plan for Submission of Data from Experiment E-18 on OGO-V," Contract No. NAS 5-9092, and forms a portion of the data to be submitted to the National Space Science Data Center as per contract specifications. Additional data will be submitted in the form of charts, graphs, tables, etc., which formed the basis of published results. These additional data will accompany or appropriately be included in the final report to be subsequently submitted.

The format of the data contained on the magnetic tapes included herein is as follows: Each magnetic tape is written with 800 bits per inch, odd parity and binary; each word is a 36 bit word floating point, the left nine bits forming the characteristic; the first record is an indicative record written in BCD format, containing the number of files on tape, the month of year of the data acquisition and the beginning and ending orbit numbers, and address of principal investigators; the files are in ordered records of Oxygen (oxy), Helium (Hel) and Hydrogen (Hyd); each record consists of a 12 by X matrix with $X \leq 500$, the matrix elements in order are (1) day 2) universal time 3) ion concentration 4) geodetic latitude 5) geodetic longitude 6) altitude 7) L 8) distance 9) local time 10) magnetic latitude 11) egress latitude 12) ingress latitude. At the end of tape are placed 3 end of file marks.

A complete description of all computer programs developed for data analysis will be included within the final report.

Respectfully,

Kent K Harris

Dr. Kent K. Harris
OGO-5 Experimentor
Space Sciences Laboratory

Enclosure

Chapter 3

DATA ANALYSIS

3.1 DATA

The data from the LIMS is received from Goddard Space Flight Center (GSFC) in the form of magnetic tapes. The data have been preliminarily processed to be compatible with the Univac 1108 computing facility of Lockheed Missiles and Space Company. The processed tapes have been remarkably free from errors. Only on rare occasions has it been necessary to return a magnetic tape to GSFC to be reprocessed because it contained noisy or otherwise unmanageable data. Along with the basic data tapes magnetic tapes containing a complete set of orbit-altitude information were also supplied by GSFC. The analysis of the data from the LIMS required utilizing both the data tape and the orbit-attitude data as described in the following sub-section.

3.2 THE APPROACH TO ANALYSIS

The primary purpose of the LIMS was to obtain data on the cold ion distribution within the plasmasphere and plasmatrough. Although many others functions could be performed by the LIMS in the OGO-5 mission (e.g. measure the low energy component of the solar wind, measure the thermal H^+ ion distribution in the magnetosheath, determine bow shock, magnetosheath and magnetopause boundaries, etc.), these were relegated to secondary importance and thereby given only casual attention. The majority of the effort in

reducing and analyzing the LIMS data was confined to the region within approximately 12 earth radii (Re).

As has been described earlier in this report the LIMS is an instrument designed to look in the direction of the spacecraft velocity vector. In the region where the spacecraft velocity is large compared to the most probable ion thermal velocity, α, the ions are "scooped in" by the instrument. The measured ion current is then simply related to the ambient cold plasma density by

$$I_i^+ = N_i^+ AV \cos\theta F_i \qquad (3\text{-}1)$$

where: I_i^+ = ion current of species i measured by the electrometer of the LIMS.

N_i^+ = the ambient density of species i

A = the area of the entrance aperture of the LIMS

V = velocity of the spacecraft,

θ = angle between the velocity vector and the normal to the entrance aperture plane

F = the product of the transmission of the spectrometer and gain of the electron multiplier for species i.

The above expression (Eq. 3-1) is accurate to better than 3% even when the most probable ion velocity is equal to the spacecraft velocity. As the most probable ion velocity increases relative to the spacecraft velocity the relation becomes less and less valid. This relation is valid to within a factor of two even when α is as much as a factor of 5 greater than V.

The most probable ion velocity α depends upon the temperature and mass of the ion:

$$\alpha = (2FT/M)^{1/2} \qquad (3\text{-}2)$$

therefore α is uncertain to the degree that the ion temperature is unknown.

For the region within the plasmasphere (i.e. when the spacecraft is within from 6 to 8 Re) the ion temperature is probably somewhat less than 10,000°C. However, at this temperature and assuming the OGO-5 vehicle velocity corresponding to approximately 5 Re, the error in utilizing Eq. 3-1 for O^+ ions, He^+ ions and H^+ ions is 0%, 9% and 40% respectively. Thus for analysis of the LIMS data, keeping in mind the uncertainty of the ion temperatures, Equation 3-1 will be utilized to obtain ambient densities of the cold plasma.

The ion densities were calculated from Equation 3-1 with angles θ and velocities V determined from the orbit-attitude tape. The concentration data thus calculated were merged with several of the important geophysical parameters from the orbit-attitude tape and a final data magnetic tape was generated. The data for the entire first year of operation were analyzed and final data tapes constructed. The format of the data contained on the magnetic tapes is as follows: Each magnetic tape is written with 800 bits per inch, odd parity and binary; each word is a 36 bit word floating point, the left nine bits forming the characteristic; the first record is an indicative record written in B. C. D. format, containing the number of files on tape, the month of the year of data acquisition, and the beginning and ending orbit numbers, and address of principal investigators; the files are

in ordered records of oxygen (OXY), helium (HeL) and hydrogen (Hyd); each record consists of a 12 by x matrix with $x \leq 500$, the matrix elements in order are 1) day, 2) universal time, 3) ion concentration 4) geodetic latitude, 5) geodetic longitude, 6) altitude, 7) L, 8) distance, 9) local time, 10) magnetic latitude, 11) egress latitude, 12) ingress latitude. At the end of tape are placed 3 end of file marks. Each final data tape contains data for one specific month of instrument operation.

In the region of the magnetosheath the thermal distribution of H^+ ions is readily measured between 0-600 electron volts. The LIMS covers this region for H^+ ions very well but is displayed only when the larger data rates from the telemetry system (8 and 64 kilobits) are being used. Consequently several 0 to 600 eV thermal distributions of H^+ ions have been acquired and analyzed. These analyses are confined roughly within the orbital range from 8 Re outbound to apogee, and from apogee inbound to 8 Re. From these data the crossing of the boundaries of the various magnetospheric regions were readily discernable. The crossing of the bow shock was particularly dramatic. Signal levels from the LIMS dropped as much as 3 orders of magnitude when passing from the magnetosheath region through the bow shock and out into the solar wind.

The proton energy spectrum is determined for the energy range 0-600 volts in the period of time of the basic sweep cycle of the LIMS, i.e. approx. 4 sec.

The LIMS was designed to focus cold (essentially 0 volt) protons (H^+) through the instrument when the accelerating voltage was -600 volts. A proton with 10 volts energy and properly directed into the entrance aperture of the instrument will focus at -590 volts. In like manner, a 600 volt proton directed with 0° angle of attack into the instrument will focus through

the instrument when the accelerating voltage is 0 volts. In this latter case, the proton signal will appear at the beginning of what is called the "oxygen" state of the instrument. It is then clear that the energy of an entering ion is given by

$$Ep = 600 + Vs \qquad (3\text{-}3)$$

where Ep = proton energy in volts

Vs = sweep potential in volts.

Rather than detect a peak as in the case of the normal mass spectroscopy mode, the signal is then spread out over the full range of the sweep due to the energy distribution of the protons that are being focused thru the instrument. The detailed shape of the sweep of the accelerating potential as a function of time is known. With this information the signal out of the electrometer is converted from a time dependent function to an accelerating potential dependent function. This, in turn, is then converted to the proton energy distribution. The display of this data will then be in the form of the proton energy distribution for specific universal times. Those times being the start of each sweep cycle.

3.3 DATA ANALYSIS PROBLEMS

Many circumstances have occurred which have complicated the analysis of the data. Telemetry points on equipment group #2 were shared with experiment E-26 under a pre-arranged schedule. The data from the spacecraft when being transmitted on equipment group #2 therefore frequently came in piecemeal form. This substantially complicated the data analysis procedures; but even more important, it frequently created discontinuities in the LIMS

data, sometimes at rather critical points. The problem of piecemeal acquisition of data was compounded further by the failure of wideband transmitter A. The data transmittal procedures utilized after this failure returned the data for relatively short periods of operation.

The electron multiplier in the LIMS, as has been previously described, operated serially and cyclic in two modes, a high gain mode and a low gain mode. It was discovered that calibration of the high gain mode had changed relative to the low gain mode. It was suspected that this situation did arise from a small deposit of vacuum pump oil on the multiplier plates during the extensive pre-launch testing of the instrument. The high gain calibration was then corrected by normalizing to the low gain calibration in their region of overlap. This circumstance continued from initial turn on until about March 20, 1968, when the gain of the high gain mode shifted back to nearly the value of laboratory calibration. This phenomenon was interpreted as an expurgation of the surface of the multiplier plates by the removal of the vacuum pump oil. These two operational characteristics of the LIMS were appropriately compensated for in the computer programs that were developed to analyze the data. After these intial problems with the electron multiplier, no further abrupt changes in multiplier operation were detected except perhaps for the ultimate failure of the multiplier power supply. This can not be properly determined until the second year of data is analyzed. The inflight calibration system of the LIMS showed that a slight multiplier decay transpired throughout much of the flight. This decay was carefully followed and the final data were corrected to reflect the slightly changing gain of the multiplier.

One further difficulty in data analysis occurred when the sweep monitor circuit failed. As described above, the entire mode of operation

of the LIMS assumed a new pattern. This of course required another programming change to properly extract the data.

3.4 COMPUTER PROGRAMS

The computer programs that have been developed to analyze the LIMS data fall basically into two categories. One category encompasses the primary program of data analysis, i.e., the cold plasma in the region of the plasmasphere and plasma trough. The other category is that of the proton energy distribution in the 0-600 eV range. In the first category 3 similar computer programs were developed to reduce the data to an analyzable form. The three programs correspond to the 3 modes of instrument operation described above. The first program, OGO-E-1, is utilized for the data prior to 20 March 1968. This program compensates for the shift in calibration of the high gain mode of the electron multiplier. The second program, OGO-E-2, is utilized for data after 20 March 1968 to 22 April 1968. During this period the multiplier calibration was re-established near the laboratory level. After 22 April 1968 the third computer program OGO-E-3 was used. This program incorporated the change in the instrument logic caused by the failure of the sweep monitor circuit. In addition to these 3 basic programs, other computer programs were developed to display the data in convenient forms. The most frequently used program was that program which plotted the ion concentrations as a function of the geomagnetic parameter, L. The listings of this plot program, the ion concentration programs OGO-E-1 and OGO-E-3 and the proton energy distribution from 0-600 eV are given in the Appendices.

These magnetic tapes have been received by the National Space Science Data Center.

OGO-5, Experiment E-18

Tape #

OGO-5	March 68
OGO-5	April 68
OGO-5	June 68
OGO-5	July 68
OGO-5	August 68
OGO-5	September 68
OGO-5	October 68
OGO-5	November 68
OGO-5	December 68
OGO-5	January 69
OGO-5	February 69

Signed

Return to: Dr. Kent K. Harris
Dept. 52-12, Bldg. 202
Lockheed Palo Alto Research Lab.
3251 Hanover Street
Palo Alto, California 94304

2225	-167321075265	+220416332563	02227	+204617527200	+220500132207	
2229	+211776764734	+206543606557	02231	-170367424556	+207430124630	
2233	+206710000000	+220663673561	02235	+172721206174	+206537377073	
2237	-167321077441	+220416421044	02239	+204617623325	+220500220471	
2241	+211777040530	+206543601623	02243	-170367417770	+207430130044	
2245	+206710000000	+220663716116	02247	+173416173624	+206537370120	
2249	-167321101615	+220416507324	02251	+204617717452	+220500306752	
2253	+211777114323	+206543574667	02255	-170367413201	+207430133257	
2257	+206710000000	+220663740453	02259	+172721444105	+206537361142	
2261	-167321103765	+220416575602	02263	+204620013564	+220500375232	
2265	+211777170110	+206543567726	02267	-170367406415	+207430136473	
2269	+206710000000	+220663763011	02271	+172721562736	+206537352052	
2273	-167321106777	+220416663777	02275	+204620107134	+220500463430	
2277	+211777243401	+206543562542	02279	-170367401743	+207430141727	
2281	+206710000000	+220664000656	02283	+000000000000	+000000000000	
	WORDS 02285 TO 02292 ARE ALL +000000000000					
2293	+206710000000	+220664032240	02295	+172722137240	+206537324601	
2297	-167321114033	+220417106855	02299	+204620371413	+220500725211	
2301	+211777445446	+206543543006	02303	-170367364145	+207430153653	
2305	+206710000000	+220664074575	02307	+173416616305	+206537315511	
2309	-167321116043	+220417214747	02311	+204620464760	+220501014404	
2313	+211777520736	+206543535622	02315	-170367357473	+207430157107	
2317	+206710000000	+220664117132	02319	+172722374714	+206537306420	
2321	-167321120055	+220417303141	02323	+204620560325	+220501102600	
2325	+211777574225	+206543530437	02327	-170367353021	+207430162343	
2329	+206710000000	+220664141470	02331	+172607303477	+206537277330	
2333	-167321122067	+220417371335	02335	+204620653675	+220501170775	
2337	+211777647518	+206543523262	02339	-170367346347	+207430165577	
2341	+206710000000	+220664164025	02343	+173417027510	+206537270237	
2345	-167321124101	+220417457527	02347	+204620747242	+220501267171	
2349	+211777723005	+206543516067	02351	-170367341675	+207430171032	
2353	+206710000000	+220664206362	02355	+172722751222	+206537261147	
2357	-167321126111	+220417545721	02359	+204621042607	+220501345364	
2361	+211777776276	+206543510753	02363	-170367335223	+207430174266	

IBTD of last record of last tape in Data set to check stop time against 360/30 dump.

2365	+206710000000	+220664230717	02367	+172507611677	+206537252057
2369	-167321130123	+220417634113	02371	+204621136154	+220501433557
2373	+212400024671	+206543503517	02375	-170367330581	+207430177522
2377	+206710000000	+220664253254	02379	+172723206676	+206537242767
2381	-167321132135	+220417722309	02383	+204621231521	+220501521752
2385	+212400052425	+206543476433	02387	-170367324077	+207430202756
2389	+206710000000	+220664275612	02391	+173417316514	+206537233576
2393	-167321134145	+220420010502	02395	+204621325071	+220501610150
2397	+212400100162	+206543471147	02399	-170367317425	+207430206212
2401	+206710000000	+220664320147	02403	+173417374314	+206537224605
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2409	+212400125713	+206543463762	02411	-170367312754	+207430211446
2413	+206710000000	+220664342504	02415	+172610222055	+206537215402
2417	-167321140011	+220420164776	02419	+204621513213	+220501764447
2421	+212400152271	+206543456336	02423	-170367306427	+207430214727
2425	+206710000000	+220664365041	02427	+172610324025	+206537206177
2429	-167321141645	+220420253102	02431	+204621605774	+220502052553
2433	+212400200646	+206543450712	02435	-170367302102	+207430220207
2437	+206710000000	+220664407376	02439	+172610425777	+206537176774
2441	-167321143477	+220420341205	02443	+204621700555	+220502140660
2445	+212400226284	+206543443267	02447	-170367275555	+207430223467
2449	+206710000000	+220664431733	02451	+173417663026	+206537167570
2453	-167321145333	+220420427310	02455	+204621773336	+220502225765
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2465	-167321147167	+220420515417	02467	+204622066122	+220502315075
2469	+212400301160	+206543430217	02471	-170367264702	+207430232230
2473	+206710000000	+220664476626	02475	+172724374232	+206537151162
2477	-167321151021	+220420603529	02479	+204622160703	+220502403204
2481	+212400326535	+206543422873	02483	-170367263355	+207430235511

FILE 0001 REC 0001 CH 0162

D-6071

0001	241424416505	211614153105	152423052206	303305302512	103127242212	311227051514	340530150627	230505231115		
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0097	241516300531	062512051024	233105162330	051106310605	132427053115	120522242331	150524130522	052171130551		
0145	171660050524	270716331005	510541056151							

FILE 0001 REC 0002 CH 750061 CREIPS 1-11 Epmont 5 OF 5 REC 4 Tab

0001	207414000000	214423000202	175533713210	203577565325	210470722357	220514415541	204435460170	220676255054		
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0193	213406723327	576367235573	571047713252	207454062242	207414000000	214426351563	175711542313	203675453252		
0241	210470572760	220513740540	204435160651	220675610055	213406730407	576356615574	571047744314	207454052144		
0289	207414000000	214427467431	175524427266	203676161646	210470535657	220613574150	204435060757	220677443355		
0337	213406735471	576362175221	571047775365	207454062040	207414000000	214430605277	175657172173	203675550233		
0385	210470500557	220613427557	204434761055	220675277077	213406742553	576357554646	571050026435	207454051714		
0433	207414000000	214431723145	175432160421	203675356620	210470443457	220613263147	204434661173	220675132537		
0481	213406747636	576355134274	571050057506	207454061630	207414000000	214433041013	177422220376	203675055255		
0529	210470406355	220613116575	204434561302	220674766120	213406754720	576352513721	571050255165	207454051524		
0577	207414000000	214434156661	175504567517	203674553572	210470351256	220612752206	204434461410	220674521530		
0625	213406762002	576350073345	571050141627	207454061420	207414000000	214435274527	175447621207	203674231550		
0673	210470314167	220612605553	204434361503	220674455076	213406767071	576345452272	571050172715	207454051276		
0721	207414000000	214436412375	175450075751	203673747120	210470257126	220612441006	204434261532	220674310332		
0769	213406774173	576343027740	571050224042	207454061117	207414000000	214437530243	176673264224	203673444350		
0817	210470222064	220612274241	204434161554	220674143567	213407001274	576340045407	571050255165	207454050740		
0865	207414000000	214440646110	175433332273	203673141621	210470165023	220612127474	204434061615	220673777324		
0913	213407006376	576335763060	571050305311	207454060561	207414000000	214441763756	175574073333	203672637351		
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1249	210467743642	220611137604	204433361703	220673007142	213407040140	576321223315	571050504273	207454057354		
1297	207414000000	214447571013	177440346451	203570715304	210467706636	220610772663	204433261650	220672512222		
1345	213407045260	576315576730	571050535473	207454057112	207414000000	214450705661	200754453674	203670412413		
1393	210467651632	220610625741	204433161636	220672475301	213407052401	576314152344	571050566674	207454056551		
1441	207414000000	214452024527	177507315415	203670106522	210467164627	220610461020	204433061614	220672330351		
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1633	213407071766	576304454277	571050702512	207454055665	207414000000	214455376110	177477706042	203655677122		
1681	210467465667	220610002015	204432561433	220671651362	213407077125	576302025567	571050733771	207454055334		
1729	207414000000	214456513755	177541100524	233656464371	210467430710	220607634720	204432461334	220671534255		
1777	213407104263	576277377057	571050765251	207454055034	207414000000	214457631624	176653550164	203555157340		
1825	210467373740	220607457521	204432361215	220671337170	213407111422	576274750347	571051015530	207454054453		
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1921	000000000000	000000000000	000000000000	000000000000	207414000000	214462065340	175416745243	203555345256		
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2017	207414000000	214463203205	175734420657	233655040226	210467245050	220607010325	204432060740	220670557700		
2065	213407131055	576265244420	571051132545	207454053241	207414000000	214464321054	176517111157	203554532226		
2113	210467210132	220605543101	204431760575	220670512454	213407136230	576252614201	571051164072	207454052531		
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2209	213407143407	576260163421	571051215430	207454052203	207414000000	214466554567	175572620263	203663713624		
2257	210467116314	220606330350	204431560244	220670177725	213407150566	576255532640	571051246756	207454051550		
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2353	213407155744	576253102062	571051300324	207454051131	207414000000	214471010303	177423421506	203553131221		
2401	210467024475	220606015529	204431357713	220667665177	213407163123	576250451302	571051331662	207454050504		
2449	207414000000	214472126151	177423732335	233652573017	210466767565	220605650344	204431257536	220667517724		
2497	213407170302	576246020522	571051363220	207454050056	207414000000	214473244017	177400066100	203552254341		
2545	210466732666	220605503031	204431157345	220667352412	213407175464	576243367247	571051414574	207454047246		
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2689	210466641142	220605167744	204430756660	220667037327	213407210057	576236301355	571051477632	207454044576		

FILE 0001 REC 0002 CH 7500

2737	207414000000	214477733247	175715364545	203550626457	210466547416	220604654657	204430556173	220665524245		
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2881	207414000000	214502166762	176507540232	203550007527	210466455672	220604341573	204430355507	220665211152		
2929	213407235044	576224125573	571051645727	207454037206	207414000000	214503304630	176452255315	203657477203		
2977	210466421052	220504174013	204430255211	220666043404	213407242256	576221471100	571051577415	207454035743		
3025	207414000000	214504422476	175752074533	203657166434	210466364241	220604026202	204430154701	220665675574		
3073	213407247474	576217033777	571051731117	207454034503	207414000000	214505540344	176662320530	203656655556		
3121	210466327431	220603560371	204430054370	220665527764	213407254712	576214376677	571051762620	207454033243		
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3841	210465670204	220601665354	204426550001	220653534760	213407341665	576162715453	571052363422	207454016250		
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3937	213407347011	576160325365	571052414175	207454015057	207414000000	214523406212	176665115071	203652071072		
3985	210465576747	220601351067	204425445577	220653220475	213407354414	576155612524	571052446364	207454013504		
4033	207414000000	214524524050	177415172524	203651555730	210465542234	220601202716	204426346230	220653052327		
4081	213407361671	576153150717	571052477724	207454012356	207414000000	214525641726	176474222303	203651242555		
4129	210465505521	220601034545	204425245551	220652704157	213407367146	576150507112	571052531264	207454011130		
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4225	213407374423	576146045307	571052562624	207454007731	207414000000	214530075441	176523675414	203650414262		
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4513	213407421753	576133631026	571052730557	207454002506	207414000000	214534564671	176631162445	203646733354		
4561	210465231772	220577666507	204425441755	220651536230	213407427250	576131164722	571052762167	207454001240		
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5233	213407507654	576102041505	571053330266	207453765053	207414000000	214550177064	175501124104	203642725744		
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5521	213407535431	576067577730	571053477005	207453757277	207414000000	214556004120	175611527217	203640712526		
5569	210464356263	220574662531	204423525251	220650532172	213407550327	576062455776	571053562277	207453754357		
5617	207414000000	214556104120	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000		
5665	000000000000	000000000000	000000000000	000000000000	207414000000	214560237634	176444716735	203640053503		

FILE 0001 REC 0003 CH 7500

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3361	214401235141	206573237160	570361075460	207402065214	210456000000	217474217416	167644505272	206525526725
3409	567373243671	217550315555	204476772751	217713720360	214401247654	206573324440	570361050653	207402076613
3457	210456000000	217474264311	170601674401	206525574156	567373272625	217550476462	204477234262	217714101247
3505	214401262367	206573411722	570361024046	207402110212	210456000000	217474331203	167645204351	206525641406
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3697	567373376105	217551212134	204500166331	217714614650	214401321604	206573646472	570360727061	207402144127
3745	210456000000	217474507662	167646143056	206526021320	567373426375	217551402072	204500441714	217715004570
3793	214401335043	206573737226	570360701024	207402156206	210456000000	217474554554	171431527055	206526066550
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