

DATA SET CATALOG # 116
ALOWETTE 1 - SWEEP FREQUENCY IONO 'P'

62-049A-01P

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 This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system.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

ALOUETTE 1

UCLA N(H) INT PROFILES, TAPE

62-049A-01P

This data set has been restored. There was originally
2 Binary 7-Track, 800 BPI tapes. There is one restored tape.
The DR tape is a 3480 cartridge and the DS tape is 9-track, 6250 BPI.
The tape was created on an IBM 360 computer. The DR and DS number
along with the corresponding D number and the time span is as follows:

| DR# | DS# | D# | FILES | TIME SPAN |
|---------|---------|--------|-------|---------------------|
| DR03040 | DS03040 | D06052 | 1 | 09/30/62 - 12/13/62 |
| | | D06053 | 2 | 12/14/62 - 05/02/64 |

62-0493-01F

ALPHABETIC 1, SUMMER FARM ROAD "A"

TAPE ARE REC B01, BIK, 000, 7 track, 360/75

| <u>DE</u> | <u>CF</u> | <u>FILES</u> | <u>START</u> | <u>STOP</u> |
|-----------|-----------|--------------|--------------|-------------|
| D-06052 | C-04952 | 1 | 04/28/62 | 07/11/62 |
| D-06053 | C-04953 | 4 | 07/12/62 | 05/02/64 |

USERS' GUIDE FOR $N(h)$ ANALYSIS OF
CONVENTIONAL SF IONOGRAMS (PI-11D)

1. Introduction

Program PI-11D, stored in the NSSDC library, is an $N(h)$ reduction program for converting ^{ground} based ionosonde data into vertical electron distributions. It uses the parabolic in $\log(N)$ lamination method of analysis (Doupnik and Schmerling, 1965; Jackson, 1971).

This document describes how to (a) prepare the computer input data from $h'(f)$ data scaled from ionograms and (b) run the program. Full details on the interpretation and the scaling of the ionograms can be obtained from the "URSI Handbook of Ionogram Interpretation and Reduction" (Piggott and Rawer, 1961), and an extensive treatment of $N(h)$ reduction techniques is given in the special issue of Radio Science, Vol 2, published in September 1967.

2. Brief description of the program

Essentially the program uses the O-trace to calculate a number (specified by the user) of trial $N(h)$ profiles corresponding to different combinations of starting frequency and E-valley depth. A theoretical X-trace is computed for each trial $N(h)$ profile and the standard deviation and average virtual height difference between the observed X-trace and each computed trace are calculated. The $N(h)$ profile which

CARD

1

2

3

4

5

6

7...

k +1

leads to the minimum error is thus the most likely solution.

It should be appreciated, however, that the accuracy of the derived electron distributions depends critically on the quality of the ionograms. It is doubtful, therefore, whether it is worth taking account of the effects of the E-valley if the E-valley cusp is poorly defined or if the ionograms can not be scaled to an accuracy of better than 0.1 MHz in frequency and 5 km in virtual height (those recorded on photographic paper, for example).

3. Data Input

The program uses data cards containing the following parameters:

| <u>CARD</u> | <u>PARAMETERS</u> | <u>FORMAT</u> | <u>COMMENTS</u> |
|-------------|---|---------------------|--|
| 1 | KZN, HTN, GN, GIN | I10.3F10.4 | Remain in deck at all times; rarely changed |
| 2 | KZD, GD, GID, DELF | I10.3F10.4 | |
| 3 | TITLE | 20A4 | Heading for printer Output |
| 4 | TITLE | 20A4 | |
| 5 | N, LYP, MO, MD, ITI, IDY, NV, LVA | 8I10 | The remaining cards are supplied for each ionogram |
| 6 | HT, DIP, FHS, DLAT, DLONG, XDATA, RUN, VAL, START | 6F10.4, P4.1, 2F8.4 | |
| 7...k | HP(I), N(I), I=1, N | 8F10.4 | O-trace data in pairs, k pairs/card |
| k+1...k+3 | HPXD (I), FXD (I), I = 1, 10 | 8F10.4 | X-trace data in pairs, k pairs/card |

3.1 Definition of the parameters

| | | | |
|-----------------------|---|-----|---|
| Night-time parameters | { | KZN | Number of trial starting frequencies - usually 8. |
| | { | HTN | Starting height - usually 150 km. |
| | { | GN | First trial starting frequency-usually 0.1 MHz. |

| | | |
|---------------------------------|-------|---|
| Day- time para- meters | {GIN | Increment by which starting frequency is increased- usually 0.1 MHz. |
| | {KED | Number of trial starting frequencies - usually 3. |
| | {GD | First trial starting frequency-usually 0.16 MHz. |
| | {GID | Increment by which starting frequency is increased- usually 0.1 MHz. |
| | {DELF | Increment by which E-valley depth is increased below foE-usually 0.2 MHz. |

TITLE Two cards are used for providing a heading to the computed results.

N Number of data points scaled from the O-trace.

IYR Year; for example, 1970 is given as 70.

MO Month.

MD Day.

ITI Local standard time(Hrs. Mins. Secs) eg 1724 30.

IDY Day of the year.

NV 1 + number of data points scaled between f_{min} and foE inclusive.

LVA Number of trial valley depths. i.e., 1 + LVA profiles are computed for each starting frequency with depths of 0, DELF, 2 DELF.....LVA x DELF MHz.

HT Starting height. If less than 120 km, 'Daytime parameters' assumed for calculating trial N(h) profiles.

DIP Estimated magnetic dip at starting height: recalculated in program.

FHS Estimated gyrofrequency at starting height: recalculated in program.

DLAT Geographic latitude (north positive)

LONG Geographic longitude (east positive).
 XDATA XDATA = 0.0 if X-trace data are available.
 Otherwise, set XDATA = -1.0 and set all X-trace
 to zero on the data cards.
 RUN RUN = 1.0 for special run, in which case VAL
 and START must be assigned values. Otherwise,
 RUN, VAL, START = 0.0.
 VAL [Minimum electron concentration in the E-valley]
 [Electron concentration corresponding to f_{min} .]
 START [Starting frequency]
 [FOE]
 P(1), HP(1) P(1) = 0.0 always. HP(1) = starting height (HT).
 F(2), HP(2) P(2) = f_{min} HP(2) = virtual height of f_{min} .
 F(3), HP(3) O-trace frequencies and corresponding virtual heights
 scaled at any frequency interval. It is unneces-
 sary to scale more than about 25 points.
 F(4), HP(4)
 F(XID), HP(XID) X-trace frequencies and corresponding virtual
 heights. Ten points should be scaled, five of which
 should be close to the E-layer cusp on the X-trace.
 F(10), HP(10)

4. Printer output

Three pages of output are provided for each ionogram.
 The first two show input data and details of the calculations.
 The third is a summary of the results. This output includes:

O-trace input data
 The magnetic dip and gyrofrequency at the starting height.
 The electron concentration and gyrofrequency at, and
 the height of, the refraction point of the coded O-trace
 frequencies.
 Extrapolated values of $h_m F_2$ and $h_p F_2$.
 Extrapolated values of electron concentration at 10 km
 intervals between $h_p(X)$ and $h_m F_2$.
 The computed X-trace.
 A detailed comparison of the observed and computed
 X-traces.
 Standard deviation and average difference between the
 observed and computed X-traces.
 Interpolated electron concentration at fixed densities

Interpolated electron concentration at 10 km intervals
above the E-valley.

ALOUETTE I TAPE FORMAT

CHARACTERISTICS

Seven (7) track IBM 360 converted (TRTCH=C) tapes at 800 BPI density, variable logical records, variable physical records. The logical records contain up to a maximum of 440 bytes (characters), the physical records contain up to a maximum of 7294 bytes.

FORMAT: (Physical Record)

| | | |
|-------------|----------|--|
| Bytes 1-4 | BDW | This word (4 bytes) is the Block Descriptor Word and contains the number of bytes in the physical record including its own 4 bytes. $BDW \leq 7294$. |
| Bytes 5-8 | RDW | This word (4 bytes) is the Record Descriptor Word and contains the number of bytes in the logical record including its own 4 bytes. $RDW \leq 440$. |
| Bytes 9-13 | PROFNUM | Number of 4 byte data words beyond LON below. The value of this number is always 9 less the value in RDW. It indicates the number of 4-byte words beyond LON that fills up the logical record. |
| Bytes 14-15 | FIRST_HT | Half-word (2 bytes) containing the height of the first data word beyond LON below. |
| Bytes 16-17 | DELTA-HT | Half-word (2 bytes) containing the height increment value between the data words beyond LON below. |
| Bytes 18-19 | IPAS | Half-word containing pass number. |
| Bytes 20-21 | LEN | The number of data words beyond LON that make up the interpolated profiles at intervals of DELTA-HT. |
| Bytes 22-23 | YEAR | Half-word containing the last two digits of YEAR (i.e., 63 for 1963) |
| Bytes 24-25 | DAY | Half-word containing julian day of year (1-365). |

Page 2

| | | |
|-------------|-------------------------|--|
| Bytes 23-24 | HOUR | Half-word containing hour of ionogram. |
| Bytes 25-26 | MNT | Minute of ionogram |
| Bytes 27-28 | SEC | Second of ionogram |
| Bytes 29-33 | COMENTS CHARACTER | TX (topside extraordinary ray) |
| Bytes 34 | CRTFRQPRES CHARACTER | Y denotes critical frequency scaled N denotes no critical frequency scaled. |
| Bytes 35-40 | STATION CHARACTER | Station Name |

All the rest of the record is in 360 4 byte full-word binary, floating point format.

| | | |
|-------------|-----|--|
| Bytes 41-44 | GFQ | Gryofrequency |
| Bytes 45-48 | DIP | Magnetic dip angle |
| Bytes 49-52 | LAT | North geographic latitude |
| Bytes 53-56 | LON | East geographic latitude |
| Bytes 57-60 | | a list of data values described as follows |

042

Bytes $n-3, n_1$

where $i = \text{PROFNUM}$ and $N \leq 440$

a. The first LEN of these are the interpolated real height profile with the height of the first specified by FIRST_HT and the rest of these are at heights of last height DELTA_HT.

The rest of the PROFNUM items are pairs of words, the first of which is the density, the second of which is the corresponding real heights for that density.

PROPRES = 'Y', the last value is not the density, but the critical
F₀F₂) and its corresponding extrapolated (by Chapman layer)

Length or occurrence of the above data values (bytes 57-60) are variable and
depend on the values of PROFNUM and LEN. If the value of PROFNUM is
greater than 30, it means that there are 30 4-byte full-words beginning from LON (east
longitude) and ending with the end of a logical record. If the value
of PROFNUM is less than 26 that indicates that there are 26 words beginning from LON and
contain satellite data as described in (a.). The value of PROFNUM minus LEN
indicates the remainder of the data as described in (b.). Bytes 5 thru (56+n),
where n=PROFNUM or the number of occurrences of the 4-byte data elements
above, are considered as one logical record. The next logical record is a
repetition of bytes 5 thru (56+n).

DEFINITIONS

BYTE = one character (in a tape hexadecimal dump one
character or byte is represented as 2 hexadecimal
values)

WORD = 4 bytes (IBM 360)

HALF-WORD = 2 bytes (IBM 360)

LOGICAL RECORD = a logical unit of data ranging from one data element
to a number of data elements that are meaningful
and are logically grouped.

PHYSICAL RECORD = from 1 to n number of logical records recorded
on a physical device such as a tape or disk.
Records are always written or recorded in terms
of a physical record.

AP
Tape
Tape
Tape
Total

| TAPE | | DESCRIPTION | NO. OF PROFILES | START TIME YYDD-HHMMSS | STOP TIME YYDD-HHMMSS |
|--------|---|--|--------------------|---------------------------|--------------------------|
| Tape 1 | 1 | One file, one tape | 16,286 | 62273-032958 | 62347-175555 |
| Tape 2 | 1 | First of four files | 8,050 | 62348-180240 | 63082-160106 |
| | 2 | Second of four files | 7,657 | 63083-050955 | 63188-025053 |
| | 3 | Third of four files | 6,121 | 63189-145315 | 64052-182614 |
| | 4 | Fourth of four files | 5,667 | 64061-185858 | 64123-115525 |
| Tape 3 | 1 | One file, one tape selected by ASM. PGM | 1,031 | 62274-033247 | 64198-134209 |
| Total | 6 | | 44,812 | | |

01 0003011100030010003A3E740404028E20603C105E34083E864C 21E25EBC21F
01 C444211B64444 32A14445 F6E044447 3354444E B0584454 339C4458576C4464609E
C 9927451149C645159F13451875CF45236A87452E633C494007FD45581C894571
00 C417D0F8B4318CD39009C00000140401FF7000C0018003F0111003001E0023
22 0DF71C2215345C245C09F442CF853442FC1FE44329F734434A213943600E14437
F 0444EERC24458A9E4A4465027F447464044489513444441FFF44C6CE0F44F40D4E
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5F34088DE81C2236F54C2236365C24572154419454F441925AA44191F0844193158
R1B15024418CC49441CA485441E63444421057644249C1C4429D58344323588443E
A D451092B5451550FC451DD24445278834453426804544627A4553E50165641846
0H8000000210401FFE7000C0010003E11100030015201E5E7E7404040E9E20603C1
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247AA74427687544311839443C9627444914F74458142F447996E344A1735544D1
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B3442D16F0442FF855443163DF443437F44437D0C0443CA4374443575A4448FF8A
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51F20F245264034452EFS0845399987A5444888454FCC104555F32E442882489340
01FFF7000C0019003F0111000300210003E3E7404040D9E20603C105E340929733
59829C445E8137445F01934461C32344553E804469A809446F18524976274E447F
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9F7C243F775445C22A27BC242A2344429094184215C00442C08CC442E19654430
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9E8609C22FF0D5C22FA27BC242A2344429094184215C00442C08CC442E19654430
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536641445C847244687424447735844489A88844804910448C9869446E03DF54510
85452A82D445330094453808445438FD1A54641E44435383D4340300041543033
1F003E0111000300110024E3E7404040E8E20603C1D5E340A0A887C230C835C230A016C2425498
C444390360443AF77D443C17AC443D3D1C443CAE8144405F524442818C4445899F
68CD954479AA074420D35444886088244E85177451293634517857D451D98284525
1F455D97845690104457325E44435F2F043408000416CFA2042FFAF91000C0000
12000DE3E7404040E8E20603C1D5E340A0A887C230C835C230A016C2425498
924434C2A84435E81C44375L5F4439450044389789443E679AA441E84F444655E8
73AE314493C088448919C844EA39E545129CFD4517D0612451E481045265E724530
07442L713C43408000416971964312483000A8000000100401FFF7000C0018003E
C3D6C540A65D4432240E8541746D24C2458B0A493336924433E4874434C8664435
5F443D0770443F6174442460549A5C0524449FD4F444FA348445684C2445F79F8
FE743445151E624518607F45232303452C8A16453855C945466D56443305974340
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7404040D5D8FA9F3D6C54096D388421A3EAF40FC9820C249B48644397A36443A
2D4442B21D446567FD44484EDA444CA1D544515E184456FE9A445E61814468A2AD
7A966A451494724518816E452598284533ACE6454411A945592F1E457590CC459A
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1844846C62449AF05744BC62F044EF713E451390945199A0E452164864528F72C
C7000005C0000000A01FFE7000C0008003C0111000300150013E7E7404040D5

REC 1. LENGTH 7204

4-28-62 - 7-11-62
D-06052
1st. last 5. inc of
file 1

