DATA SET CATALOG #138

Tilted Magnetopause and Tail Magnetic Fields

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 This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system.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

REQ. AGENT	RAND NO.	ACQ. AGENT
SAR	V0297	CYN
SAR	V0314	CYN
SAR	V0346	CYN

STS-41G (SIR-B)

IMAGE DATA AND ANNOTATION ON TAPE

84-108A-01B

This data set catalog consists of ~~136~~ 166 magnetic tapes. The tapes are 9-track, 1600 BPI, and were created on a VAX 11/780 computer. The tapes have an ASCII header record at the beginning of each file, followed by Binary data records. The D and C numbers along with the number of files and the imagery start time are on the following pages.

84-108A-01B

D#	C#	#FILES	FILE#	IMAGERY START TIME
D-73375		1	1	280/07:07:57
D-73086	C-25841	2	1	280/07:09:12
			2	280/07:09:24
D-75884		2	1	280/11:51:09
			2	280/16:30:57
D-72288		2	1	281/17:49:00
			2	281/17:49:10
D-72289		2	1	281/17:50:45
			2	281/17:50:55
D-72290	C-25443	2	1	281/17:51:27
			2	281/17:51:58
D-72291		2	1	281/17:52:09
			2	281/17:52:19
D-72292		2	1	281/17:52:51
			2	281/17:53:01
D-72293		2	1	281/17:53:12
			2	281/17:53:22
D-72294	C-25444	2	1	281/17:53:33
			2	281/17:53:43
D-72295		2	1	281/17:53:54
			2	281/17:54:04
D-72296		2	1	281/17:54:15
			2	281/17:54:25
D-72297	C-25445	2	1	281/17:54:36
			2	281/17:54:46
D-72298		3	1	281/17:54:57
			2	281/17:55:07
			3	281/17:55:18
D-73383	C-25888	2	1	281/17:55:19
D-72494	C-25715	2	1	281/20:30:52
			2	281/20:31:02
D-73082	C-25837	2	1	281/20:52:10
			2	281/20:52:20
D-66491	C-24883	3	1	281/21:07:00
			2	281/21:07:12
			3	281/21:07:24

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D#	C#	#FILES	FILE#	IMAGERY START TIME
D-75885	C-26647	3	1	283/18:51:41
			2	282/10:05:50
			3	282/10:06:01
D-75892		3	1	282/10:07:07
			2	282/10:07:18
			3	282/10:07:29
D-75898		3	1	282/10:07:40
			2	282/10:07:49
			3	282/10:08:02
D-73383		2	2	282/15:25:59
D-73377		2	1	282/15:26:10
			2	282/15:26:21
D-73378		2	1	282/15:26:32
			2	282/15:26:43
D-74077		2	1	282/15:26:36
			2	282/15:26:47
D-74078		2	1	282/15:26:58
			2	282/15:27:09
D-74079	C-26192	2	1	282/15:27:20
			2	282/15:27:31
D-74080		2	1	282/15:27:42
			2	282/15:27:42
D-74079	C-26192	2	1	282/15:27:20
			2	282/15:27:31
D-74080		2	1	282/15:27:42
			2	282/15:27:42
D-74081		2	1	282/15:28:04
			2	282/15:28:15
D-74082		2	1	282/15:28:28
			2	282/15:28:37
D-74083		2	1	282/15:28:49
			2	282/15:29:00
D-74084	C-26193	2	1	282/15:29:11
			2	282/15:29:22

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D#	C#	#FILES	FILE#	IMAGERY START TIME
D-74085		2	1	282/15:29:33
			2	282/15:29:44
D-74086		2	1	282/15:29:55
			2	285/10:32:17
D-75904		2	1	282/17:28:52
			2	282/17:29:03
D-75905	C-26652	2	1	282/17:29:19
			2	282/17:29:30
D-75907		1	1	282/17:29:40
D-71171		3	1	282/19:09:11
			2	282/19:09:22
			3	282/19:09:33
D-71172		3	1	282/19:09:44
			2	282/19:09:56
			3	282/19:10:07
D-71173	C-25446	3	1	282/19:10:18
			2	282/19:10:29
			3	282/19:10:40
D-71174		3	1	282/19:10:51
			2	282/19:11:02
			3	282/19:11:14
D-75908		3	1	282/22:31:31
			2	282/22:31:42
			3	282/22:31:53
D-73081	C-25836	2	1	283/12:33:39
			2	283/12:33:50
D-71336		1	1	283/12:34:09
D-75906		3	1	283/15:09:29
			2	283/15:09:40
			3	283/15:09:51
D-75882		2	1	283/18:51:43
			2	283/19:25:00
D-72491	C-25716	1	1	283/18:51:55
D-73374	C-25885	3	1	283/20:01:02
			2	283/20:01:12
			3	283/20:01:22

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D#	C#	#FILES	FILE#	IMAGERY START TIME
D-70006	C-25440	2	1	283/22:14:47
			2	283/22:14:57
D-70007		2	1	283/22:15:07
			2	283/22:15:18
D-70008		2	1	283/22:15:28
			2	283/22:15:39
D-70009	C-25441	1	1	283/22:15:49
D-72490	C-25717	3	1	283/22:30:00
			2	283/22:30:11
			3	283/22:30:21
D-72492	C-25718	3	1	283/22:30:32
			2	283/22:30:42
			3	283/22:30:53
D-72493	C-25719	3	1	283/22:31:04
			2	283/22:31:14
			3	283/22:31:25
D-72495	C-25720	3	1	283/22:31:35
			2	283/22:31:46
			3	283/22:32:03
D-72496	C-25721	3	1	283/22:32:14
			2	283/22:32:25
			3	283/22:32:35
D-72497	C-25722	3	1	283/22:32:46
			2	283/22:32:57
			3	283/22:33:07
D-72498	C-25723	1	1	283/22:33:18
D-72499	C-25724	2	1	283/22:33:29
			2	283/22:33:39
D-72500	C-25725	2	1	283/22:33:50
			2	283/22:34:00
D-72501	C-25726	2	1	283/22:34:11
			2	283/22:34:22
D-74087		1	1	284/10:53:51
D-74088		1	1	284/10:54:02
D-74089	C-26194	1	1	284/10:54:12

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D#	C#	#FILES	FILE#	IMAGERY START TIME
D-74090		1	1	284/10:54:22
D-74091		1	1	284/10:54:33
D-74092		1	1	284/10:54:43
D-74093		1	1	284/10:54:54
D-74094	C-26195	1	1	284/10:55:04
D-74095		1	1	284/10:55:15
D-74096		1	1	284/10:55:25
D-74097		1	1	284/10:55:36
D-74098		1	1	284/10:55:46
D-75896		3	1	284/14:53:12
			2	284/14:53:23
			3	284/14:53:34
D-75902		3	1	284/14:53:45
			2	284/14:53:56
			3	284/14:54:07
D-70010		2	1	284/18:32:34
			2	284/18:32:44
D-70011		2	1	284/18:32:55
			2	284/18:33:06
D-73376	C-25886	3	1	284/18:34:18
			2	284/18:34:29
			3	284/18:34:40
D-73379		2	1	284/18:34:51
D-73083	C-25838	2	1	284/20:01:28
			2	284/20:01:39
D-73084	C-25839	1	1	284/20:01:49
D-75888		3	1	284/21:57:54
			2	284/21:58:05
			3	284/21:58:16

84D#08A-01B	C#	#FILES	FILE#	IMAGERY START TIME
D-70012		1	1	285/11:59:24
D-70013		2	1	285/11:59:35
			2	285/11:59:45
D-73085	C-25840	1	1	285/12:00:04
D-70014	C-25442	2	1	285/12:00:24
			2	285/12:00:34
D-70015		2	1	285/12:00:45
			2	285/12:00:55
D-75890		1	1	285/21:50:12
D-75891		1	1	285/21:50:24
D-75893		1	1	285/21:50:35
D-75894	C-26649	1	1	285/21:50:46
D-75897	C-26650	1	1	285/21:50:57
D-75899		1	1	285/21:51:09
D-75901	C-26651	2	1	285/21:51:20
			2	285/21:51:31
D-75903		1	1	285/21:51:42
D-74074	C-26195	2	1	286/00:43:56
			2	286/00:44:07
D-74075		2	1	286/00:44:18
			2	286/00:44:36
D-74076		2	1	286/00:44:46
			2	286/00:44:57
D-73078	C-25833	2	1	286/00:44:46
			2	286/00:44:56
D-73079	C-25934	2	1	286/00:45:07
			2	286/00:45:17
D-73080	C-25935	2	1	286/00:45:28
			2	286/00:45:39
D-75881	C-26646	3	1	286/13:04:48
			2	286/13:05:00
			3	286/13:05:11

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D#	C#	#FILES	FILE#	IMAGERY START TIME
D-75883		3	1	286/13:05:22
			2	286/13:05:33
			3	286/13:05:44
D-73373		2	1	286/13:05:45
			2	286/13:05:57
D-75886		3	1	286/13:05:55
			2	286/13:06:06
			3	286/13:06:17
D-75889	C-26648	3	1	286/13:06:26
			2	286/13:06:38
			3	286/13:06:49
D-75895		3	1	286/13:07:00
			2	286/13:07:11
			3	286/13:07:22
D-75900		3	1	286/13:07:33
			2	286/13:07:40
			3	286/13:07:52
D-75887		1	1	286/16:32:16
D-71175		2	1	286/18:06:10
			2	286/18:06:41
D-71176		2	1	286/18:06:52
			2	286/18:07:35
D-71177	C-25447	2	1	286/18:07:46
			2	286/18:07:56
D-71178		2	1	286/18:08:07
			2	286/18:08:17
D-71179		1	1	286/18:08:28
D-71337		2	1	286/18:08:40
			2	286/18:08:51
D-71338	C-25448	2	1	286/18:09:01
			2	286/18:09:12
D-71339		2	1	286/18:09:22
			2	286/18:09:33
D-71340		2	1	286/18:09:44
			2	286/18:09:55

D#	C#	#FILES	FILE#	IMAGERY START TIME
D-71341		2	1 2	286/18:10:05 286/18:10:26
D-71342	C-25449	2	1 2	286/18:10:36 286/18:10:47
D-71343		2	1 2	286/18:10:57 286/18:11:08
D-71344		2	1 2	286/18:11:18 286/18:11:29
D-71180		2	1 2	286/18:12:10 286/18:12:20
D-71181		2	1 2	286/18:12:32 286/18:12:42
D-73383	C-25887	2	2	286/18:55:15
D-73087	C-25842	2	1 2	286/20:29:00 286/20:29:21
D-73088	C-25843	2	1 2	286/20:29:32 286/20:31:55
D-73089	C-25844	2	1 2	286/20:32:06 286/20:32:17
D-73090	C-25845	2	1 2	286/20:32:27 286/20:32:38
D-73091	C-25846	2	1 2	286/20:32:49 286/20:32:59
D-73380		2	1 2	286/20:33:10 286/20:33:21
D-73381		2	1 2	286/20:33:32 286/20:33:42
D-73382		1	1	286/20:33:53

B R I E F   D E S C R I P T I O N

Image Data & Annotation on Tape

84-108A-01B

This data set contains radar images of the earth on 9-track, 1600-bpi magnetic tapes. The digitally correlated images were acquired at 1.28 GHz frequency (23 cm wavelength) and at varying incidence angles from 15 to 60 deg. The resulting imagery has a scale of 1:500,000. Its resolution is 25 m along track and 15-58 m across track, and it has a swath width of 20-40 km. In addition to image data, annotation is also included on a tape. Limited coverage of all continents except Antarctica is available. For more detail, refer to the maps in "The Shuttle Imaging Radar B (SIR-B) Experiment Report," JPL 88-2. This data set can be obtained from the Radar Data Center at NASA/JPL. Requests for digital and film SIR-B data can be directed to the following: Ms. Anne H. Richardson, or Mr. Don Harrison, Jet Propulsion Laboratory, Radar Data Center, Mail Stop 300-233, 4800 Oak Grove Drive, Pasadena, CA 91109-8099, (818)354-2386 or fax (818)354-9476.

D A T A S E T   R E M A R K S

84-108A-01B

Image Data & Annotation on Tape

Restricted Distribution. Currently government users only.

A C K N O W L E D G E M E N T S

When using the data in any reports, publications, or presentations, please acknowledge the National Space Science Data Center.

```
     DUMPS ASCII TAPE

     INTEGER*2 LIMS(2,61)
     BYTE B(8192)
     DATA LIMS/
   1    1,  50,  51,  85,  86, 123, 124, 148, 149, 184, 185, 222,
   1  223, 276, 277, 320, 321, 340, 341, 363, 364, 400, 401, 442,
   1  443, 470, 471, 498, 499, 526, 527, 555, 556, 584, 585, 613,
   1  614, 645, 646, 684, 685, 716, 717, 736, 737, 755, 756, 776,
   1  777, 796, 797, 815, 816, 832, 833, 858, 859, 887, 888, 911,
   1  912, 949, 950, 982, 983,1062,1063,1144,1145,1228,1229,1266,
   1 1267,1297,1298,1330,1331,1364,1365,1397,1398,1431,1432,1464,
   7 1465,1498,1499,1531,1532,1565,1566,1593,1594,1612,1613,1641,
   8 1642,1672,1673,1700,1701,1734,1735,1777,1778,1813,1814,1859,
   9 1860,1906,1907,1943,1944,1965,1966,2001,2002,2030,2031,2061,
   9 2062,2104/
     CALL TAPIO(1,B,1,IDUM)
     WRITE(5,1002)
002  FORMAT('$OUTPUT TO TERMINAL (5) OR PRINTER (6)? ')
     READ(5,1003) IOUT
003  FORMAT(I1)
     CALL TAPIO(3,B,8192,IDUM)
     DO 100 I=1,61
     WRITE(IOUT,1000) (B(J),J=LIMS(1,I),LIMS(2,I))
100  CONTINUE
000  format(1x,84a1)
     CALL EXIT
     END
```

This is the program we use to dump the SIR-B header from tape

ASA JPL SIR-B DIGITALLY CORRELATED SAR IMAGE
ATA TAKE KI-070.10 SCENE 011
ENTER GMT 283/18:52: 2.759, 1984
ORR. DATE: 09/06/85
ENTER LAT: 39 DEG 23.7 MIN (N)
ER LONG: 89 DEG 41.3 MIN (W)
TE: ILLINOIS
ENTER RES: 18.7 M (GRND R) X 27.4 M (AZ)
AW DATA: 6 BPS
IXEL SIZE = 12.5M
ENTER INCIDENCE ANGLE: 48.6 DEG
RACK ----> 124.9 DEG (TO TRUE NORTH)
POSITION: -4541.629 KM
POSITION: -2566.509 KM
POSITION: 4046.856 KM
VELOCITY: -393.601 M/S
VELOCITY: -6347.391 M/S
VELOCITY: -4463.168 M/S
EAR SLANT RANGE: 339.78 KM
ARTH RADIUS AT TARGET: 6369.50 KM
HUTTLE ALTITUDE: 232.29 KM
OLL: 180.0 DEG
AW: .0 DEG
ITCH: .0 DEG
AIN: 89.68 DB
RF: 1539.8 HZ
AL LEVEL: 1
ORE ANGLE: 47.4 DEG
ATA WINDOW POSITION: 32
ATA RATE: 30.4 MHZ
UMBER OF SAMPLES PER LINE = 6984
OTAL NUMBER OF LINES = 1173
OEFF ACROSS TRACK: FD:A =   .00, FD:B =   6.47, FD:C = -2960.95 HZ
DDOT COEFF ACROSS TRACK: FR:D =   .00, FR:E =   -38.84, FR:F = 1372.56 HZ/S
DDOT COEFF ALONG TRACK: FR:A1 =   .00, FR:A2 =   .00, FR:A3 =   .00 HZ/S
ARTH RADIUS AT NADIR: 6370.01 KM
ZIMUTH SKEW: 24 PIXELS
AT(NE): 39 DEG 39.0 MIN (N)
ON(NE): 90 DEG 4.7 MIN (W)
AT(NL): 39 DEG 3.1 MIN (N)
ON(NL): 89 DEG 25.6 MIN (W)
AT(FE): 39 DEG 44.3 MIN (N)
ON(FE): 89 DEG 57.1 MIN (W)
AT(FL): 39 DEG 18.0 MIN (N)
ON(FL): 89 DEG   .0 MIN (W)
AL TONE EST: 72.53 DB
ER: -51.13 DB
TART TIME: 283/18:51:54
TARTING SAMPLE NO. =   1
CALE FACTOR: 148.05
R AZIMUTH INCREMENT FLAG = 0
LOCKS PER FDDOT AZIMUTH INCREMENT = 21
INES PER REFERENCE UPDATE = 8
AMPLES PER SLANT RANGE IMAGE LINE = 4608
UMBER OF SLANT RANGE IMAGE RECORDS = 1117
IGNAL TO NOISE RATIO = 5.36 DB
OISE = 44.49 DB
ROCESSOR SOFTWARE VERSION 2.3
QUINT ANGLE = 1.52 DEG
WATH VELOCITY = 7.2600 KM/SEC
ROUND RANGE PIXEL SIZE: 13.2M (RNG), 18.9M (AZ)

This is what the SIRB header looks like

SIR-B
DIGITALLY C[illegible]ELATED IMAGERY
ME[illegible] TAPE

ANNOTATION PARAMETERS

SITE NAME: CALIFORNIA/NEVADA
DATA TAKE-SCENE NO.: AM-098.20-016
CENTER LAT/LONG: 34 Deg 7.3 Min / -119 Deg 24.7 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 20.0 M x 33.9 M
TRACK (DEG TO TRUE NORTH): 52.3

CENTER TIME (GMT): 285/11:59:33.031
CORRELATION DATE: 04/05/85
CENTER INCIDENCE ANGLE: 44.7 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER
X POSITION: 1080.771 KM
Y POSITION: 5281.855 KM
Z POSITION: 3804.373 KM
SLANT RANGE TO NEAR EDGE: 304.02 KM
ALTITUDE: 227.49 KM
YAW .0 Deg

X VELOCITY: -5728.391 M/S
Y VELOCITY: -2252.047 M/S
Z VELOCITY: 4746.738 M/S
EARTH RADIUS AT TARGET: 6371.46 KM
ROLL: .0 Deg
PITCH: 180.0 Deg

RADAR PARAMETERS

RECEIVER GAIN 92.59 DB
BORE ANGLE 42.4 Deg

PRF: 1274.9 Hz
DATA WINDOW POSITION: 38

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 7044
NO. SAMPLES/SLANT RANGE IMAGE LINE: 3840

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 2312

NO. IMAGE RECORDS: 2588
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK. FD:A= .00 Hz
FD:B= -48.21 Hz
FD:C=-1858.82 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK. FR:D= .00 Hz/S
ALONG TRACK. FR:A1= .00 Hz/S
FR:E= -49.43 Hz/S
FR:A2= .00 Hz/S
FR:F= 1532.62 Hz/S
FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6371.46 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A
AZIMUTH SKEW: 56 Pixels
RANGE = N/A
SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES
NEAR EARLY LATITUDE: 33 Deg 55.3 Min
NEAR LATE LATITUDE : 34 Deg 31.2 Min
FAR EARLY LATITUDE : 33 Deg 43.4 Min
FAR LATE LATITUDE : 34 Deg 19.2 Min

NEAR EARLY LONGITUDE: -119 Deg 50.9 Min
NEAR LATE LONGITUDE : -119 Deg 14.1 Min
FAR EARLY LONGITUDE : -119 Deg 35.4 Min
FAR LATE LONGITUDE : -118 Deg 58.6 Min

CALIBRATION LEVEL ESTIMATE: 69.38
BLOCKS PER FDDOT AZIMUTH INCREMENT: 18
SIGNAL TO NOISE RATIO: 5.09 DB

BIT ERROR RATE: -61.80 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 41.65 DB

SCALE FACTOR: 120.64
START TIME (GMT):285/11:59:24
REQUEST NUMBER: 1350

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS:

SIR-B
DIGITALLY CORRELATED IMAGERY
MENU TAPE

ANNOTATION PARAMETERS

SITE NAME: CALIFORNIA/NEVADA
DATA TAKE-SCENE NO.: AM-098.20-017
CENTER LAT/LONG: 34 Deg 38.3 Min / -118 Deg 52.6 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 20.0 M x 33.9 M
TRACK (DEG TO TRUE NORTH): 52.9

CENTER TIME (GMT): 285/11:59:43.473
CORRELATION DATE: 04/05/85
CENTER INCIDENCE ANGLE: 44.7 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER

X POSITION: 1020.877 KM
Y POSITION: 5257.941 KM
Z POSITION: 3853.647 KM
SLANT RANGE TO NEAR EDGE: 304.02 KM
ALTITUDE: 227.64 KM
YAW: .0 Deg

X VELOCITY: -5743.598 M/S
Y VELOCITY: -2328.315 M/S
Z VELOCITY: 4691.156 M/S
EARTH RADIUS AT TARGET: 6371.28 KM
ROLL: .0 Deg
PITCH: 180.0 Deg

RADAR PARAMETERS

RECEIVER GAIN: 92.59 DB
BORE ANGLE: 42.4 Deg

PRF: 1274.9 Hz
DATA WINDOW POSITION: 38

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 7044
NO SAMPLES/SLANT RANGE IMAGE LINE: 3840

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 2312

NO. IMAGE RECORDS: 2589
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK: FD:A= .00 Hz | FD:B= -48.21 Hz | FD:C=-1858.82 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK: FR:D= .00 Hz/S | FR:E= -49.43 Hz/S | FR:F= 1532.62 Hz/S
ALONG TRACK: FR:A1= .00 Hz/S | FR:A2= .00 Hz/S | FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6371.28 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW: 56 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES

NEAR EARLY LATITUDE:	34 Deg 26.4 Min	NEAR EARLY LONGITUDE:	-119 Deg 19.0 Min
NEAR LATE LATITUDE:	35 Deg 2.1 Min	NEAR LATE LONGITUDE:	-118 Deg 41.7 Min
FAR EARLY LATITUDE:	34 Deg 14.4 Min	FAR EARLY LONGITUDE:	-119 Deg 3.5 Min
FAR LATE LATITUDE:	34 Deg 50.1 Min	FAR LATE LONGITUDE:	-118 Deg 26.2 Min

CALIBRATION LEVEL ESTIMATE: 69.36
BLOCKS PER FDDOT AZIMUTH INCREMENT: 18
SIGNAL TO NOISE RATIO: 7.53 DB

BIT ERROR RATE: -61.80 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 41.63 DB

SCALE FACTOR: 100.14
START TIME (GMT): 285/11:59:35
REQUEST NUMBER: 1351

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS

SIR-B
DIGITALLY CORRELATED IMAGERY
MENU TAPE

ANNOTATION PARAMETERS

SITE NAME: CALIFORNIA/NEVADA
DATA TAKE-SCENE NO.: AM-098.20-018
CENTER LAT/LONG: 35 Deg 9.1 Min / -118 Deg 20.1 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 20.0 M x 33.9 M
TRACK (DEG TO TRUE NORTH): 53.4

CENTER TIME (GMT): 285/11:59:53.914
CORRELATION DATE: 04/05/85
CENTER INCIDENCE ANGLE: 44.7 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER
X POSITION: 960.830 KM
Y POSITION: 5233.234 KM
Z POSITION: 3902.336 KM
SLANT RANGE TO NEAR EDGE: 304.02 KM
ALTITUDE: 227.78 KM
YAW: .0 Deg

X VELOCITY: -5757.937 M/S
Y VELOCITY: -2404.225 M/S
Z VELOCITY: 4634.867 M/S
EARTH RADIUS AT TARGET: 6371.10 KM
ROLL: .0 Deg
PITCH: 180.0 Deg

RADAR PARAMETERS

RECEIVER GAIN: 92.59 DB
BORE ANGLE : 42.5 Deg

PRF: 1274.9 Hz
DATA WINDOW POSITION: 38

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 7040
NO. SAMPLES/SLANT RANGE IMAGE LINE: 3840

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 2312

NO. IMAGE RECORDS: 2591
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK: FD:A= .00 Hz | FD:B= -48.21 Hz | FD:C=-1858.82 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK: FR:D= .00 Hz/S | FR:E= -49.43 Hz/S | FR:F= 1532.62 Hz/S
ALONG TRACK : FR:A1= .00 Hz/S | FR:A2= .00 Hz/S | FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6371.10 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW: 56 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES
NEAR EARLY LATITUDE: 34 Deg 57.4 Min
NEAR LATE LATITUDE : 35 Deg 32.9 Min
FAR EARLY LATITUDE : 34 Deg 45.3 Min
FAR LATE LATITUDE : 35 Deg 20.7 Min

NEAR EARLY LONGITUDE: -118 Deg 46.7 Min
NEAR LATE LONGITUDE : -118 Deg 8.9 Min
FAR EARLY LONGITUDE : -118 Deg 31.2 Min
FAR LATE LONGITUDE : -117 Deg 53.4 Min

CALIBRATION LEVEL ESTIMATE: 69.35
BLOCKS PER FDDOT AZIMUTH INCREMENT: 18
SIGNAL TO NOISE RATIO: 6.52 DB

BIT ERROR RATE: -61.80 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 41.59 DB

SCALE FACTOR: 112.97
START TIME (GMT): 285/11:59:45
REQUEST NUMBER: 1352

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS:

ANNOTATION PARAMETERS

SITE NAME: CALIFORNIA/NEVADA
DATA TAKE-SCENE NO.: AM-098.20-019
CENTER LAT/LONG: 37 Deg 2.6 Min / -116 Deg 14.2 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 20.1 M x 33.8 M
TRACK (DEG TO TRUE NORTH): 55.3

CENTER TIME (GMT): 285/12:00:32.710
CORRELATION DATE: 04/06/85
CENTER INCIDENCE ANGLE: 44.5 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER
X POSITION: 736.523 KM
Y POSITION: 5134.535 KM
Z POSITION: 4078.004 KM
SLANT RANGE TO NEAR EDGE: 304.02 KM
ALTITUDE: 228.31 KM
YAW: .0 Deg

X VELOCITY: -5803.574 M/S
Y VELOCITY: -2682.970 M/S
Z VELOCITY: 4419.656 M/S
EARTH RADIUS AT TARGET: 6370.43 KM
ROLL: .0 Deg
PITCH: 180.0 Deg

RADAR PARAMETERS

RECEIVER GAIN: 92.59 DB
BORE ANGLE: 42.4 Deg

PRF: 1274.9 Hz
DATA WINDOW POSITION: 38

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 7036
NO. SAMPLES/SLANT RANGE IMAGE LINE: 3840

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 2312

NO. IMAGE RECORDS: 2597
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK: FD:A= .00 Hz   FD:B= -54.12 Hz   FD:C=-1505.87 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK: FR:D= .00 Hz/S   FR:E= -45.93 Hz/S   FR:F= 1532.68 Hz/S
ALONG TRACK: FR:A1= .00 Hz/S   FR:A2= .00 Hz/S   FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6370.43 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW: 51 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES				
	NEAR EARLY LATITUDE:	36 Deg 51.5 Min	NEAR EARLY LONGITUDE:	-116 Deg 41.9 Min
	NEAR LATE LATITUDE:	37 Deg 26.1 Min	NEAR LATE LONGITUDE:	-116 Deg 2.1 Min
	FAR EARLY LATITUDE:	36 Deg 39.1 Min	FAR EARLY LONGITUDE:	-116 Deg 26.4 Min
	FAR LATE LATITUDE:	37 Deg 13.6 Min	FAR LATE LONGITUDE:	-115 Deg 46.5 Min

CALIBRATION LEVEL ESTIMATE: 69.39
BLOCKS PER FDDOT AZIMUTH INCREMENT: 18
SIGNAL TO NOISE RATIO: 3.78 DB

BIT ERROR RATE: -99.99 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 41.68 DB

SCALE FACTOR: 128.74
START TIME (GMT): 285/12:00:24
REQUEST NUMBER: 1353

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS:

SIR-B
DIGITALLY CORRELATED IMAGERY
MENU TAPE

ANNOTATION PARAMETERS

SITE NAME: CALIFORNIA/NEVADA
DATA TAKE-SCENE NO.: AM-098.20-020
CENTER LAT/LONG: 37 Deg 32.5 Min / -115 Deg 39.3 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 20.1 M x 33.8 M
TRACK (DEG TO TRUE NORTH): 55.9

CENTER TIME (GMT): 285/12:00:43.151
CORRELATION DATE: 04/06/85
CENTER INCIDENCE ANGLE: 44.5 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER

X POSITION: 675.872 KM
Y POSITION: 5106.137 KM
Z POSITION: 4123.840 KM
SLANT RANGE TO NEAR EDGE: 304.02 KM
ALTITUDE: 228.45 KM
YAW: .0 Deg

X VELOCITY: -5813.789 M/S
Y VELOCITY: -2757.051 M/S
Z VELOCITY: 4360.145 M/S
EARTH RADIUS AT TARGET: 6370.25 KM
ROLL: .0 Deg
PITCH: 180.0 Deg

RADAR PARAMETERS

RECEIVER GAIN: 92.59 DB
BORE ANGLE: 42.4 Deg

PRF: 1274.9 Hz
DATA WINDOW POSITION: 38

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 7036
NO. SAMPLES/SLANT RANGE IMAGE LINE: 3840

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 2312

NO. IMAGE RECORDS: 2599
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK: FD:A= .00 Hz | FD:B= -53.49 Hz | FD:C=-1484.49 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK: FR:D= .00 Hz/S | FR:E= 45.93 Hz/S | FR:F= 1532.50 Hz/S
ALONG TRACK: FR:A1= .00 Hz/S | FR:A2= .00 Hz/S | FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6370.25 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW: 50 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES

NEAR EARLY LATITUDE: 37 Deg 21.5 Min
NEAR LATE LATITUDE: 37 Deg 55.9 Min
FAR EARLY LATITUDE: 37 Deg 9.1 Min
FAR LATE LATITUDE: 37 Deg 43.3 Min

NEAR EARLY LONGITUDE: -116 Deg 7.4 Min
NEAR LATE LONGITUDE: -115 Deg 26.9 Min
FAR EARLY LONGITUDE: -115 Deg 51.8 Min
FAR LATE LONGITUDE: -115 Deg 11.3 Min

CALIBRATION LEVEL ESTIMATE: 69.34
BLOCKS PER FDDOT AZIMUTH INCREMENT: 27
SIGNAL TO NOISE RATIO: 4.75 DB

BIT ERROR RATE: -99.99 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 41.82 DB

SCALE FACTOR: 121.21
START TIME (GMT): 285/12:00:34
REQUEST NUMBER: 1354

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS

ANNOTATION PARAMETERS

SITE NAME: CALIFORNIA/NEVADA
DATA TAKE-SCENE NO.: AM-098.20-021
CENTER LAT/LONG: 38 Deg 2.2 Min / -115 Deg 4.0 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 20.1 M x 33.8 M
TRACK (DEG TO TRUE NORTH): 56.4

CENTER TIME (GMT): 285/12:00:53.593
CORRELATION DATE: 04/06/85
CENTER INCIDENCE ANGLE: 44.4 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER
X POSITION: 615.116 KM
Y POSITION: 5076.961 KM
Z POSITION: 4169.055 KM
SLANT RANGE TO NEAR EDGE: 304.02 KM
ALTITUDE: 228.60 KM
YAW: .0 Deg

X VELOCITY: -5823.129 M/S
Y VELOCITY: -2830.715 M/S
Z VELOCITY: 4299.973 M/S
EARTH RADIUS AT TARGET: 6370.07 KM
ROLL: .0 Deg
PITCH: 180.0 Deg

RADAR PARAMETERS

RECEIVER GAIN: 92.59 DB
BORE ANGLE: 42.4 Deg

PRF: 1274.9 Hz
DATA WINDOW POSITION: 38

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 7032
NO. SAMPLES/SLANT RANGE IMAGE LINE: 3840

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 2312

NO. IMAGE RECORDS: 2601
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK: FD:A= .00 Hz   FD:B= 52.86 Hz   FD:C=-1462.95 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK: FR:D= .00 Hz/S   FR:E= -45.93 Hz/S   FR:F= 1532.34 Hz/S
ALONG TRACK: FR:A1= .00 Hz/S   FR:A2= .00 Hz/S   FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6370.07 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW: 49 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES
NEAR EARLY LATITUDE: 37 Deg 51.4 Min
NEAR LATE LATITUDE: 38 Deg 25.6 Min
FAR EARLY LATITUDE: 37 Deg 38.8 Min
FAR LATE LATITUDE: 38 Deg 12.9 Min

NEAR EARLY LONGITUDE: -115 Deg 32.3 Min
NEAR LATE LONGITUDE: -114 Deg 51.2 Min
FAR EARLY LONGITUDE: -115 Deg 16.7 Min
FAR LATE LONGITUDE: -114 Deg 35.6 Min

CALIBRATION LEVEL ESTIMATE: 69.39
BLOCKS PER FDDOT AZIMUTH INCREMENT: 27
SIGNAL TO NOISE RATIO: 4.47 DB

BIT ERROR RATE: -99.99 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 41.74 DB

SCALE FACTOR: 133.09
START TIME (GMT): 285/12:00:45
REQUEST NUMBER: 1355

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS:

SIR
DIGITALLY CORRELATED IMAGERY
MENU TAPE

ANNOTATION PARAMETERS

SITE NAME: CALIFORNIA/NEVADA
DATA TAKE-SCENE NO.: AM-098.20-022
CENTER LAT/LONG: 38 Deg 31.7 Min / -114 Deg 28.0 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 20.1 M x 33.8 M
TRACK (DEG TO TRUE NORTH): 56.9

CENTER TIME (GMT): 285/12:01:04.034
CORRELATION DATE: 04/06/85
CENTER INCIDENCE ANGLE: 44.4 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER

X POSITION: 554.270 KM
Y POSITION: 5047.023 KM
Z POSITION: 4213.633 KM
SLANT RANGE TO NEAR EDGE: 304.02 KM
ALTITUDE: 228.74 KM
YAW: .0 Deg

X VELOCITY: -5831.590 M/S
Y VELOCITY: -2903.945 M/S
Z VELOCITY: 4239.156 M/S
EARTH RADIUS AT TARGET: 6369.89 KM
ROLL: .0 Deg
PITCH: 180.0 Deg

RADAR PARAMETERS

RECEIVER GAIN: 92.59 DB
BORE ANGLE : 42.4 Deg

PRF: 1274.9 Hz
DATA WINDOW POSITION: 38

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 7032
NO. SAMPLES/SLANT RANGE IMAGE LINE: 3840

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 2312

NO. IMAGE RECORDS: 2602
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK: FD:A= .00 Hz FD:B= -52.22 Hz FD:C=-1441.21 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK: FR:D= .00 Hz/S FR:E= -45.93 Hz/S FR:F= 1532.17 Hz/S
ALONG TRACK : FR:A1= .00 Hz/S FR:A2= .00 Hz/S FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6369.89 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW: 49 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES

NEAR EARLY LATITUDE: 38 Deg 21.1 Min
NEAR LATE LATITUDE : 38 Deg 55.0 Min
FAR EARLY LATITUDE : 38 Deg 8.4 Min
FAR LATE LATITUDE : 38 Deg 42.2 Min

NEAR EARLY LONGITUDE: -114 Deg 56.7 Min
NEAR LATE LONGITUDE : -114 Deg 15.0 Min
FAR EARLY LONGITUDE : -114 Deg 41.1 Min
FAR LATE LONGITUDE : -113 Deg 59.4 Min

CALIBRATION LEVEL ESTIMATE: 69.32
BLOCKS PER FDDOT AZIMUTH INCREMENT: 27
SIGNAL TO NOISE RATIO: 3.23 DB

BIT ERROR RATE: -99.99 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 41.57 DB

SCALE FACTOR: 139.93
START TIME (GMT): 285/12:00:55
REQUEST NUMBER: 1356

REMARKS:

PROCESSOR SOFTWARE VERSION NO.: N/A

ANNOTATION PARAMETERS

SITE NAME: RIO PICO
DATA TAKE-SCENE NO.: AG-072 40-007
CENTER LAT/LONG: -40 Deg 15.2 Min / -76 Deg 5.2 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 19.8 M x 33.8 M
TRACK (DEG TO TRUE NORTH): 121.0

CENTER TIME (GMT): 283/22:14:24.028
CORRELATION DATE: 04/07/85
CENTER INCIDENCE ANGLE: 45.4 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER

X POSITION: 326.227 KM
Y POSITION: -4930.141 KM
Z POSITION: -4378.375 KM
SLANT RANGE TO NEAR EDGE: 315.04 KM
ALTITUDE: 233.10 KM
YAW: .0 Deg

X VELOCITY: 5383.668 M/S
Y VELOCITY: 3916.725 M/S
Z VELOCITY: -4004.846 M/S
EARTH RADIUS AT TARGET: 6369.26 KM
ROLL: 180.0 Deg
PITCH: .0 Deg

RADAR PARAMETERS

RECEIVER GAIN: 92.59 DB
BORE ANGLE: 43.1 Deg

PRF: 1274.9 Hz
DATA WINDOW POSITION: 44

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 7004
NO. SAMPLES/SLANT RANGE IMAGE LINE: 3840

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 2312

NO. IMAGE RECORDS: 2558
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK: FD:A= .00 Hz   FD:B= -22.61 Hz   FD:C=-1044.35 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK FR:D= .00 Hz/S   FR:E= -43.86 Hz/S   FR:F= 1473.17 Hz/S
ALONG TRACK: FR:A1= .00 Hz/S   FR:A2= .00 Hz/S   FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6369.26 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW: 28 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES

NEAR EARLY LATITUDE: -40 Deg 5.1 Min
NEAR LATE LATITUDE: -40 Deg 37.9 Min
FAR EARLY LATITUDE: -39 Deg 52.5 Min
FAR LATE LATITUDE: -40 Deg 25.1 Min

NEAR EARLY LONGITUDE: -76 Deg 34.9 Min
NEAR LATE LONGITUDE: -75 Deg 50.9 Min
FAR EARLY LONGITUDE: -76 Deg 19.5 Min
FAR LATE LONGITUDE: -75 Deg 35.5 Min

CALIBRATION LEVEL ESTIMATE: 69.44
BLOCKS PER FDOOT AZIMUTH INCREMENT: 18
SIGNAL TO NOISE RATIO: 3.25 DB

BIT ERROR RATE: -54.21 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 41.19 DB

SCALE FACTOR: 191.17
START TIME (GMT): 283/22:14:15
REQUEST NUMBER: 1360

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS:

ANNOTATION PARAMETERS

SITE NAME: RIO PICO
DATA TAKE-SCENE NO. AQ-072.40-008
CENTER LAT/LONG: -40 Deg 43.5 Min / -75 Deg 26.6 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 19.8 M x 33.8 M
TRACK (DEG TO TRUE NORTH): 120.5

CENTER TIME (GMT): 283/22:14:34.510
CORRELATION DATE: 04/07/85
CENTER INCIDENCE ANGLE: 45.4 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER
X POSITION: 382.633 KM
Y POSITION: -4888.711 KM
Z POSITION: -4420.020 KM
SLANT RANGE TO NEAR EDGE: 315.04 KM
ALTITUDE: 233.24 KM
YAW: 0 Deg

X VELOCITY: 5378.531 M/S
Y VELOCITY: 3987.887 M/S
Z VELOCITY: -3940.886 M/S
EARTH RADIUS AT TARGET: 6369.08 KM
ROLL: 180.0 Deg
PITCH: .0 Deg

RADAR PARAMETERS

RECEIVER GAIN: 92.59 DB
BORE ANGLE: 43.1 Deg

PRF: 1274.9 Hz
DATA WINDOW POSITION: 44

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 7000
NO. SAMPLES/SLANT RANGE IMAGE LINE: 3840

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 2312

NO. IMAGE RECORDS: 2560
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK: FD:A= .00 Hz   FD:B= -22.61 Hz   FD:C=-1044.35 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK: FR:D= .00 Hz/S   FR:E= -43.86 Hz/S   FR:F= 1473.17 Hz/S
ALONG TRACK: FR:A1= .00 Hz/S   FR:A2= .00 Hz/S   FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6369.08 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW: 28 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES
NEAR EARLY LATITUDE: -40 Deg 33.7 Min
NEAR LATE LATITUDE: -41 Deg 6.1 Min
FAR EARLY LATITUDE: -40 Deg 20.9 Min
FAR LATE LATITUDE: -40 Deg 53.2 Min

NEAR EARLY LONGITUDE: -75 Deg 56.6 Min
NEAR LATE LONGITUDE: -75 Deg 11.9 Min
FAR EARLY LONGITUDE: -75 Deg 41.2 Min
FAR LATE LONGITUDE: -74 Deg 56.5 Min

CALIBRATION LEVEL ESTIMATE: 69.43
BLOCKS PER FDDOT AZIMUTH INCREMENT: 18
SIGNAL TO NOISE RATIO: 3.24 DB

BIT ERROR RATE: -54.21 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 41.27 DB

SCALE FACTOR: 188.36
START TIME (GMT): 283/22:14:26
REQUEST NUMBER: 1361

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS

ANNOTATION PARAMETERS

SITE NAME: RIO PICO
DATA TAKE-SCENE NO.: AG-072.40-009
CENTER LAT/LONG: -41 Deg 11.3 Min / -74 Deg 47.7 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 19.8 M x 33.8 M
TRACK (DEG TO TRUE NORTH): 119.9

CENTER TIME (GMT): 283/22:14:44.911
CORRELATION DATE: 04/07/85
CENTER INCIDENCE ANGLE: 45.3 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER
X POSITION: 438.545 KM
Y POSITION: -4846.867 KM
Z POSITION: -4460.676 KM
SLANT RANGE TO NEAR EDGE: 315.04 KM
ALTITUDE: 233.39 KM
YAW: .0 Deg

X VELOCITY: 5372.625 M/S
Y VELOCITY: 4057.896 M/S
Z VELOCITY: -3876.829 M/S
EARTH RADIUS AT TARGET: 6368.91 KM
ROLL: 180.0 Deg
PITCH: .0 Deg

RADAR PARAMETERS

RECEIVER GAIN: 92.59 DB
BORE ANGLE: 43.1 Deg

PRF: 1274.9 Hz
DATA WINDOW POSITION: 44

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 7000
NO. SAMPLES/SLANT RANGE IMAGE LINE: 3840

STARTING SAMPLE NO.: 1
NO SLANT RANGE IMAGE RECORDS: 2312

NO. IMAGE RECORDS: 2561
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK: FD:A= .00 Hz FD:B= -22.61 Hz FD:C=-1044.35 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK: FR:D= .00 Hz/S FR:E= -43.86 Hz/S FR:F= 1473.17 Hz/S
ALONG TRACK: FR:A1= .00 Hz/S FR:A2= .00 Hz/S FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6368.91 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW: 28 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES

NEAR EARLY LATITUDE:	-41 Deg 1.7 Min	NEAR EARLY LONGITUDE:	-75 Deg 18.0 Min
NEAR LATE LATITUDE:	-41 Deg 33.9 Min	NEAR LATE LONGITUDE:	-74 Deg 32.6 Min
FAR EARLY LATITUDE:	-40 Deg 48.8 Min	FAR EARLY LONGITUDE:	-75 Deg 2.7 Min
FAR LATE LATITUDE:	-41 Deg 20.9 Min	FAR LATE LONGITUDE:	-74 Deg 17.3 Min

CALIBRATION LEVEL ESTIMATE: 69.43
BLOCKS PER FDDOT AZIMUTH INCREMENT: 18
SIGNAL TO NOISE RATIO: 3.27 DB

BIT ERROR RATE: -54.21 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 41.30 DB

SCALE FACTOR: 184.65
START TIME (GMT): 283/22:14:36
REQUEST NUMBER: 1362

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS:

SIR-B
DIGITALLY CORRELATED IMAGERY
MENU TAPE

ANNOTATION PARAMETERS

SITE NAME: RIO PICO
DATA TAKE-SCENE NO.: AO-072.40-010
CENTER LAT/LONG: -41 Deg 39.0 Min / -74 Deg 8.0 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 19.8 M x 33.8 M
TRACK (DEG TO TRUE NORTH): 119.4

CENTER TIME (GMT): 283/22:14:55.353
CORRELATION DATE: 04/07/85
CENTER INCIDENCE ANGLE: 45.3 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER

X POSITION: 494.610 KM
Y POSITION: -4804.133 KM
Z POSITION: -4500.820 KM
SLANT RANGE TO NEAR EDGE: 315.04 KM
ALTITUDE: 233.54 KM
YAW: .0 Deg

X VELOCITY: 5365.891 M/S
Y VELOCITY: 4127.566 M/S
Z VELOCITY: -3811.941 M/S
EARTH RADIUS AT TARGET: 6368.74 KM
ROLL: 180.0 Deg
PITCH: .0 Deg

RADAR PARAMETERS

RECEIVER GAIN: 92.59 DB
BORE ANGLE: 43.1 Deg

PRF: 1274.9 Hz
DATA WINDOW POSITION: 44

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 7000
NO. SAMPLES/SLANT RANGE IMAGE LINE: 3840

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 2312

NO. IMAGE RECORDS: 2563
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK FD:A= .00 Hz FD:B= -22.61 Hz FD:C=-1044.35 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK FR:D= .00 Hz/S FR:E= 43.86 Hz/S FR:F= 1473.17 Hz/S
ALONG TRACK FR:A1= .00 Hz/S FR:A2= .00 Hz/S FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6368.74 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW: 28 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES

NEAR EARLY LATITUDE: -41 Deg 29.6 Min
NEAR LATE LATITUDE: -42 Deg 1.5 Min
FAR EARLY LATITUDE: -41 Deg 16.6 Min
FAR LATE LATITUDE: -41 Deg 48.3 Min

NEAR EARLY LONGITUDE: -74 Deg 38.7 Min
NEAR LATE LONGITUDE: -73 Deg 52.6 Min
FAR EARLY LONGITUDE: -74 Deg 23.4 Min
FAR LATE LONGITUDE: -73 Deg 37.3 Min

CALIBRATION LEVEL ESTIMATE: 69.41
BLOCKS PER FDDOT AZIMUTH INCREMENT: 18
SIGNAL TO NOISE RATIO: 5.27 DB

BIT ERROR RATE: -54.21 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 41.30 DB

SCALE FACTOR: 153.39
START TIME (GMT): 283/22:14:47
REQUEST NUMBER: 1363

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS

S R
DIGITALLY C   LATED IMAGERY
MENU TAPE

ANNOTATION PARAMETERS

SITE NAME: RIO PICO
DATA TAKE-SCENE NO.: AG-072.40-011
CENTER LAT/LONG: -42 Deg 6.4 Min / -73 Deg 27.7 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 19.8 M x 33.8 M
TRACK (DEG TO TRUE NORTH): 118.8

CENTER TIME (GMT): 283/22:15:05.794
CORRELATION DATE: 04/07/85
CENTER INCIDENCE ANGLE: 45.2 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER
X POSITION: 550.598 KM
Y POSITION: -4760.676 KM
Z POSITION: -4540.281 KM
SLANT RANGE TO NEAR EDGE: 315.04 KM
ALTITUDE: 233.69 KM
YAW: .0 Deg

X VELOCITY: 5358.348 M/S
Y VELOCITY: 4196.609 M/S
Z VELOCITY: -3746.482 M/S
EARTH RADIUS AT TARGET: 6368.57 KM
ROLL: 180.0 Deg
PITCH: .0 Deg

RADAR PARAMETERS

RECEIVER GAIN: 92.59 DB
BORE ANGLE: 43.1 Deg

PRF: 1274.9 Hz
DATA WINDOW POSITION: 44

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 7000
NO. SAMPLES/SLANT RANGE IMAGE LINE: 3840

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 2312

NO. IMAGE RECORDS: 2565
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK: FD:A= .00 Hz | FD:B= -22.61 Hz | FD:C=-1044.35 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK: FR:D= .00 Hz/S | FR:E= -43.86 Hz/S | FR:F= 1473.17 Hz/S
ALONG TRACK: FR:A1= .00 Hz/S | FR:A2= .00 Hz/S | FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6368.57 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW: 28 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES

NEAR EARLY LATITUDE: -41 Deg 57.2 Min
NEAR LATE LATITUDE: -42 Deg 28.8 Min
FAR EARLY LATITUDE: -41 Deg 44.1 Min
FAR LATE LATITUDE: -42 Deg 15.5 Min

NEAR EARLY LONGITUDE: -73 Deg 58.8 Min
NEAR LATE LONGITUDE: -73 Deg 11.9 Min
FAR EARLY LONGITUDE: -73 Deg 43.5 Min
FAR LATE LONGITUDE: -72 Deg 56.7 Min

CALIBRATION LEVEL ESTIMATE: 69.41
BLOCKS PER FDDOT AZIMUTH INCREMENT: 18
SIGNAL TO NOISE RATIO: 6.08 DB

BIT ERROR RATE: -54.21 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 41.31 DB

SCALE FACTOR: 119.32
START TIME (GMT): 283/22:14:57
REQUEST NUMBER: 1364

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS:

SI[illegible]

DIGITALLY CORRELATED IMAGERY

MENU TAPE

ANNOTATION PARAMETERS

SITE NAME: RIO PICO
DATA TAKE-SCENE NO.: AG-072.40-012
CENTER LAT/LONG: -42 Deg 33.5 Min / -72 Deg 46.8 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 19.8 M x 33.8 M
TRACK (DEG TO TRUE NORTH): 118.3

CENTER TIME (GMT): 283/22:15:16.236
CORRELATION DATE: 04/07/85
CENTER INCIDENCE ANGLE: 45.2 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER

X POSITION: 606.506 KM
Y POSITION: -4716.496 KM
Z POSITION: -4579.055 KM
SLANT RANGE TO NEAR EDGE: 315.04 KM
ALTITUDE: 233.83 KM
YAW: .0 Deg

X VELOCITY: 5349.996 M/S
Y VELOCITY: 4265.016 M/S
Z VELOCITY: -3680.456 M/S
EARTH RADIUS AT TARGET: 6368.40 KM
ROLL: 180.0 Deg
PITCH: .0 Deg

RADAR PARAMETERS

RECEIVER GAIN 92.59 DB
BORE ANGLE 43.1 Deg

PRF: 1274.9 Hz
DATA WINDOW POSITION: 44

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 7000
NO. SAMPLES/SLANT RANGE IMAGE LINE: 3840

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 2312

NO. IMAGE RECORDS: 2566
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK. FD A= .00 Hz FD B= -22.61 Hz FD:C=-1044.35 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK FR:D= .00 Hz/S FR:E= -43.86 Hz/S FR:F= 1473.17 Hz/S
ALONG TRACK. FR:A1= .00 Hz/S FR:A2= .00 Hz/S FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6368.40 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW 28 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES

NEAR EARLY LATITUDE: -42 Deg 24.6 Min
NEAR LATE LATITUDE: -42 Deg 55.8 Min
FAR EARLY LATITUDE: -42 Deg 11.4 Min
FAR LATE LATITUDE: -42 Deg 42.4 Min

NEAR EARLY LONGITUDE: -73 Deg 18.2 Min
NEAR LATE LONGITUDE: -72 Deg 30.6 Min
FAR EARLY LONGITUDE: -73 Deg 2.9 Min
FAR LATE LONGITUDE: -72 Deg 15.4 Min

CALIBRATION LEVEL ESTIMATE: 69.35
BLOCKS PER FDDOT AZIMUTH INCREMENT: 18
SIGNAL TO NOISE RATIO: 7.23 DB

BIT ERROR RATE -54.21 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE 41.33 DB

SCALE FACTOR: 98.24
START TIME (GMT): 283/22:15:07
REQUEST NUMBER: 1365

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS:

ANNOTATION PARAMETERS

SITE NAME: RIO PICO
DATA TAKE-SCENE NO.: AG-072.40-013
CENTER LAT/LONG: -43 Deg .4 Min / -72 Deg 5.2 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 19.8 M x 33.8 M
TRACK (DEG TO TRUE NORTH): 117.7

CENTER TIME (GMT): 283/22:15:26.677
CORRELATION DATE: 04/07/85
CENTER INCIDENCE ANGLE: 45.2 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER

X POSITION: 662.322 KM
Y POSITION: -4671.609 KM
Z POSITION: -4617.137 KM
SLANT RANGE TO NEAR EDGE: 315.04 KM
ALTITUDE: 233.97 KM
YAW: .0 Deg

X VELOCITY: 5340.840 M/S
Y VELOCITY: 4332.777 M/S
Z VELOCITY: -3613.878 M/S
EARTH RADIUS AT TARGET: 6368.23 KM
ROLL: 180.0 Deg
PITCH: .0 Deg

RADAR PARAMETERS

RECEIVER GAIN 92.59 DB
BORE ANGLE 43.1 Deg

PRF: 1274.9 Hz
DATA WINDOW POSITION: 44

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 7000
NO. SAMPLES/SLANT RANGE IMAGE LINE: 3840

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 2312

NO. IMAGE RECORDS: 2568
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK FD:A= .00 Hz
FD:B= -22.61 Hz
FD:C=-1044.35 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK: FR:D= .00 Hz/S
ALONG TRACK FR:A1= .00 Hz/S
FR:E= -43.86 Hz/S
FR:A2= .00 Hz/S
FR:F= 1473.17 Hz/S
FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6368.23 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A
AZIMUTH SKEW 28 Pixels
RANGE = N/A
SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES

NEAR EARLY LATITUDE: -42 Deg 51.6 Min
NEAR LATE LATITUDE: -43 Deg 22.5 Min
FAR EARLY LATITUDE: -42 Deg 38.3 Min
FAR LATE LATITUDE: -43 Deg 9.0 Min

NEAR EARLY LONGITUDE: -72 Deg 37.0 Min
NEAR LATE LONGITUDE: -71 Deg 48.6 Min
FAR EARLY LONGITUDE: -72 Deg 21.8 Min
FAR LATE LONGITUDE: -71 Deg 33.5 Min

CALIBRATION LEVEL ESTIMATE: 69.27
BLOCKS PER FDDOT AZIMUTH INCREMENT: 18
SIGNAL TO NOISE RATIO: 9.29 DB

BIT ERROR RATE: -54.21 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 41.34 DB

SCALE FACTOR: 87.46
START TIME (GMT): 283/22:15:12
REQUEST NUMBER: 1366

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS:

SIR-B
DIGITALLY CORRELATED IMAGERY
MENU TAPE

ANNOTATION PARAMETERS

SITE NAME: RIO PICO
DATA TAKE-SCENE NO.: AG-072.40-014
CENTER LAT/LONG: -43 Deg 26.9 Min / -71 Deg 23.0 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 19.9 M x 33.8 M
TRACK (DEG TO TRUE NORTH): 117.1

CENTER TIME (GMT): 283/22:15:37.118
CORRELATION DATE: 04/07/85
CENTER INCIDENCE ANGLE: 45.1 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER
X POSITION: 718.032 KM
Y POSITION: -4626.020 KM
Z POSITION: -4654.520 KM
SLANT RANGE TO NEAR EDGE: 315.04 KM
ALTITUDE: 234.12 KM
YAW: 0 Deg

X VELOCITY: 5330.879 M/S
Y VELOCITY: 4399.875 M/S
Z VELOCITY: -3546.763 M/S
EARTH RADIUS AT TARGET: 6368.07 KM
ROLL: 180.0 Deg
PITCH: .0 Deg

RADAR PARAMETERS

RECEIVER GAIN: 92.59 DB
BORE ANGLE: 43.1 Deg

PRF: 1274.9 Hz
DATA WINDOW POSITION: 44

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 7000
NO. SAMPLES/SLANT RANGE IMAGE LINE: 3840

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 2312

NO. IMAGE RECORDS: 2569
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK: FD:A= .00 Hz FD:B= -22.61 Hz FD:C=-1044.35 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK: FR:D= .00 Hz/S FR:E= -43.86 Hz/S FR:F= 1473.17 Hz/S
ALONG TRACK: FR:A1= .00 Hz/S FR:A2= .00 Hz/S FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6368.07 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW: 28 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES

NEAR EARLY LATITUDE: -43 Deg 18.4 Min
NEAR LATE LATITUDE: -43 Deg 48.9 Min
FAR EARLY LATITUDE: -43 Deg 4.9 Min
FAR LATE LATITUDE: -43 Deg 35.3 Min

NEAR EARLY LONGITUDE: -71 Deg 55.1 Min
NEAR LATE LONGITUDE: -71 Deg 6.0 Min
FAR EARLY LONGITUDE: -71 Deg 40.0 Min
FAR LATE LONGITUDE: -70 Deg 50.9 Min

CALIBRATION LEVEL ESTIMATE: 69.38
BLOCKS PER FDDOT AZIMUTH INCREMENT: 18
SIGNAL TO NOISE RATIO: 7.18 DB

BIT ERROR RATE: -54.21 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 41.34 DB

SCALE FACTOR: 104.44
START TIME (GMT): 283/22:15.28
REQUEST NUMBER: 1367

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS

ANNOTATION PARAMETERS

SITE NAME: RIO PICO
DATA TAKE-SCENE NO.: AG-072.40-015
CENTER LAT/LONG: -43 Deg 53.1 Min / -70 Deg 40.1 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 19.9 M x 33.8 M
TRACK (DEG TO TRUE NORTH): 116.6

CENTER TIME (GMT): 283/22:15:47.560
CORRELATION DATE: 04/07/85
CENTER INCIDENCE ANGLE: 45.1 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER

X POSITION: 773.640 KM
Y POSITION: -4579.730 KM
Z POSITION: -4691.199 KM
SLANT RANGE TO NEAR EDGE: 315.04 KM
ALTITUDE: 234.26 KM
YAW: .0 Deg

X VELOCITY: 5320.113 M/S
Y VELOCITY: 4466.316 M/S
Z VELOCITY: -3479.109 M/S
EARTH RADIUS AT TARGET: 6367.90 KM
ROLL: 180.0 Deg
PITCH: .0 Deg

RADAR PARAMETERS

RECEIVER GAIN: 92.59 DB
BORE ANGLE: 43.1 Deg

PRF: 1274.9 Hz
DATA WINDOW POSITION: 44

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 7000
NO. SAMPLES/SLANT RANGE IMAGE LINE: 3840

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 2312

NO. IMAGE RECORDS: 2571
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK: FD:A= .00 Hz   FD:B= -22.61 Hz   FD:C=-1044.35 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK: FR:D= .00 Hz/S   FR:E= -43.86 Hz/S   FR:F= 1473.17 Hz/S
ALONG TRACK: FR:A1= .00 Hz/S   FR:A2= .00 Hz/S   FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6367.90 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW: 28 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES

NEAR EARLY LATITUDE: -43 Deg 44.8 Min
NEAR LATE LATITUDE: -44 Deg 15.0 Min
FAR EARLY LATITUDE: -43 Deg 31.3 Min
FAR LATE LATITUDE: -44 Deg 1.3 Min

NEAR EARLY LONGITUDE: -71 Deg 12.6 Min
NEAR LATE LONGITUDE: -70 Deg 22.7 Min
FAR EARLY LONGITUDE: -70 Deg 57.5 Min
FAR LATE LONGITUDE: -70 Deg 7.7 Min

CALIBRATION LEVEL ESTIMATE: 69.44
BLOCKS PER FDDOT AZIMUTH INCREMENT: 18
SIGNAL TO NOISE RATIO: 5.70 DB

BIT ERROR RATE: -54.21 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 41.29 DB

SCALE FACTOR: 143.21
START TIME (GMT): 283/22:15:39
REQUEST NUMBER: 1368

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS:

SIR-B
DIGITALLY CORRELATED IMAGERY
MENU TAPE

ANNOTATION PARAMETERS

SITE NAME: RIO PICO
DATA TAKE-SCENE NO.: AG-072.40-016
CENTER LAT/LONG: -44 Deg 19.0 Min / -69 Deg 56.5 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 19.9 M x 33.8 M
TRACK (DEG TO TRUE NORTH): 116.0

CENTER TIME (GMT): 283/22:15:58.001
CORRELATION DATE: 04/07/85
CENTER INCIDENCE ANGLE: 45.1 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER
X POSITION: 829.130 KM
Y POSITION: -4532.754 KM
Z POSITION: -4727.172 KM
SLANT RANGE TO NEAR EDGE: 315.04 KM
ALTITUDE: 234.40 KM
YAW: .0 Deg

X VELOCITY: 5308.551 M/S
Y VELOCITY: 4532.074 M/S
Z VELOCITY: -3410.935 M/S
EARTH RADIUS AT TARGET: 6367.74 KM
ROLL: 180.0 Deg
PITCH: .0 Deg

RADAR PARAMETERS

RECEIVER GAIN: 92.59 DB
BORE ANGLE: 43.1 Deg

PRF: 1274.9 Hz
DATA WINDOW POSITION: 44

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 7000
NO. SAMPLES/SLANT RANGE IMAGE LINE: 3840

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 2312

NO. IMAGE RECORDS: 2572
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK: FD:A= .00 Hz   FD:B= -22.61 Hz   FD:C=-1044.35 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK: FR:D= .00 Hz/S   FR:E= -43.86 Hz/S   FR:F= 1473.17 Hz/S
ALONG TRACK: FR:A1= .00 Hz/S   FR:A2= .00 Hz/S   FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6367.74 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW: 28 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES

NEAR EARLY LATITUDE:	-44 Deg 11.0 Min	NEAR EARLY LONGITUDE:	-70 Deg 29.4 Min
NEAR LATE LATITUDE:	-44 Deg 40.7 Min	NEAR LATE LONGITUDE:	-69 Deg 38.7 Min
FAR EARLY LATITUDE:	-43 Deg 57.3 Min	FAR EARLY LONGITUDE:	-70 Deg 14.4 Min
FAR LATE LATITUDE:	-44 Deg 26.9 Min	FAR LATE LONGITUDE:	-69 Deg 23.8 Min

CALIBRATION LEVEL ESTIMATE: 69.44
BLOCKS PER FDDOT AZIMUTH INCREMENT: 18
SIGNAL TO NOISE RATIO: 3.86 DB

BIT ERROR RATE: -54.21 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 41.17 DB

SCALE FACTOR: 159.77
START TIME (GMT): 283/22:15:49
REQUEST NUMBER: 1369

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS:

ANNOTATION PARAMETERS

SITE NAME: NORTH/SOUTH DAKOTA
DATA TAKE-SCENE NO.: KI-086.10-031
CENTER LAT/LONG: 46 Deg 28.7 Min / -98 Deg 22.0 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 16.5 M x 25.8 M
TRACK (DEG TO TRUE NORTH): 117.9

CENTER TIME (GMT): 284/18:32:41.626
CORRELATION DATE: 04/09/85
CENTER INCIDENCE ANGLE: 58.6 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER
X POSITION: -4552.066 KM
Y POSITION: -1303.665 KM
Z POSITION: 4594.332 KM
SLANT RANGE TO NEAR EDGE: 417.25 KM
ALTITUDE: 229.96 KM
YAW: .0 Deg

X VELOCITY: -1791.613 M/S
Y VELOCITY: -6624.184 M/S
Z VELOCITY: -3648.981 M/S
EARTH RADIUS AT TARGET: 6366.87 KM
ROLL: 180.0 Deg
PITCH: .0 Deg

RADAR PARAMETERS

RECEIVER GAIN: 92.59 DB
BORE ANGLE: 55.7 Deg

PRF: 1624.2 Hz
DATA WINDOW POSITION: 34

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 6972
NO. SAMPLES/SLANT RANGE IMAGE LINE: 4864

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 1408

NO. IMAGE RECORDS: 1302
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK: FD:A= .00 Hz   FD:B= 8.74 Hz   FD:C=-1536.74 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK: FR:D= .00 Hz/S   FR:E= -25.60 Hz/S   FR:F= 1122.80 Hz/S
ALONG TRACK: FR:A1= .00 Hz/S   FR:A2= .00 Hz/S   FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6366.87 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW: 13 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES

NEAR EARLY LATITUDE:	46 Deg 42.1 Min	NEAR EARLY LONGITUDE:	-98 Deg 50.6 Min
NEAR LATE LATITUDE:	46 Deg 9.1 Min	NEAR LATE LONGITUDE:	-98 Deg 2.1 Min
FAR EARLY LATITUDE:	46 Deg 48.4 Min	FAR EARLY LONGITUDE:	-98 Deg 41.9 Min
FAR LATE LATITUDE:	46 Deg 15.4 Min	FAR LATE LONGITUDE:	-97 Deg 53.4 Min

CALIBRATION LEVEL ESTIMATE: 69.43
BLOCKS PER FDDOT AZIMUTH INCREMENT: 22
SIGNAL TO NOISE RATIO: 1.93 DB

BIT ERROR RATE: -58.14 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 42.75 DB

SCALE FACTOR: 183.67
START TIME (GMT): 284/18:32:34
REQUEST NUMBER: 1375

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS:

SIR-B
DIGITALLY CORRELATED IMAGERY
MENU TAPE

ANNOTATION PARAMETERS

SITE NAME: NORTH/SOUTH DAKOTA
DATA TAKE-SCENE NO.: KI-086.10-032
CENTER LAT/LONG: 45 Deg 59.0 Min / -97 Deg 38.9 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 16.5 M x 25.8 M
TRACK (DEG TO TRUE NORTH): 118.5

CENTER TIME (GMT): 284/18:32:52.344
CORRELATION DATE: 04/09/85
CENTER INCIDENCE ANGLE: 58.6 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER

X POSITION: -4570.906 KM
Y POSITION: -1374.558 KM
Z POSITION: 4554.855 KM
SLANT RANGE TO NEAR EDGE: 417.25 KM
ALTITUDE: 229.83 KM
YAW: .0 Deg

X VELOCITY: -1723.901 M/S
Y VELOCITY: -6604.305 M/S
Z VELOCITY: -3717.094 M/S
EARTH RADIUS AT TARGET: 6367.05 KM
ROLL: 180.0 Deg
PITCH: .0 Deg

RADAR PARAMETERS

RECEIVER GAIN: 92.59 DB
BORE ANGLE : 55.6 Deg

PRF: 1624.2 Hz
DATA WINDOW POSITION: 34

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 6972
NO. SAMPLES/SLANT RANGE IMAGE LINE: 4864

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 1408

NO. IMAGE RECORDS: 1302
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK. FD:A= .00 Hz FD:B= 14.14 Hz FD:C=-1507.90 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK: FR:D= .00 Hz/S FR:E= -28.61 Hz/S FR:F= 1122.91 Hz/S
ALONG TRACK : FR:A1= .00 Hz/S FR:A2= .00 Hz/S FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6367.05 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW: 12 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES

NEAR EARLY LATITUDE: 45 Deg 12.5 Min
NEAR LATE LATITUDE : 45 Deg 39.2 Min
FAR EARLY LATITUDE : 46 Deg 18.8 Min
FAR LATE LATITUDE : 45 Deg 45.4 Min

NEAR EARLY LONGITUDE: -98 Deg 7.1 Min
NEAR LATE LONGITUDE : -97 Deg 19.5 Min
FAR EARLY LONGITUDE : -97 Deg 58.3 Min
FAR LATE LONGITUDE : -97 Deg 10.7 Min

CALIBRATION LEVEL ESTIMATE: 69.40
BLOCKS PER FDDOT AZIMUTH INCREMENT: 22
SIGNAL TO NOISE RATIO: 2.11 DB

BIT ERROR RATE: -58.14 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 42.58 DB

SCALE FACTOR: 174.77
START TIME (GMT): 284/18:32:44
REQUEST NUMBER: 1376

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS

ANNOTATION PARAMETERS

SITE NAME: NORTH/SOUTH DAKOTA
DATA TAKE-SCENE NO.: KI-086.10-033
CENTER LAT/LONG: 45 Deg 29.0 Min / -96 Deg 56.7 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 16.5 M x 25.8 M
TRACK (DEG TO TRUE NORTH): 119.0

CENTER TIME (GMT): 284/18:33:03.061
CORRELATION DATE: 04/09/85
CENTER INCIDENCE ANGLE: 58.6 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER

X POSITION: -4589.016 KM
Y POSITION: -1445.227 KM
Z POSITION: 4514.656 KM
SLANT RANGE TO NEAR EDGE: 417.25 KM
ALTITUDE: 229.69 KM
YAW: .0 Deg

X VELOCITY: -1655.915 M/S
Y VELOCITY: -6583.375 M/S
Z VELOCITY: -3784.615 M/S
EARTH RADIUS AT TARGET: 6367.24 KM
ROLL: 180.0 Deg
PITCH: .0 Deg

RADAR PARAMETERS

RECEIVER GAIN: 92.59 DB
BORE ANGLE : 55.6 Deg

PRF: 1624.2 Hz
DATA WINDOW POSITION: 34

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 6972
NO. SAMPLES/SLANT RANGE IMAGE LINE: 4864

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 1408

NO. IMAGE RECORDS: 1301
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK: FD:A= .00 Hz — FD:B= 14.14 Hz — FD:C=-1507.90 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK: FR:D= .00 Hz/S — FR:E= -28.61 Hz/S — FR:F= 1122.91 Hz/S
ALONG TRACK : FR:A1= .00 Hz/S — FR:A2= .00 Hz/S — FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6367.24 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW: 12 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES

NEAR EARLY LATITUDE: 45 Deg 42.7 Min	NEAR EARLY LONGITUDE: -97 Deg 24.5 Min
NEAR LATE LATITUDE : 45 Deg 9.1 Min	NEAR LATE LONGITUDE : -96 Deg 37.7 Min
FAR EARLY LATITUDE : 45 Deg 48.9 Min	FAR EARLY LONGITUDE : -97 Deg 15.6 Min
FAR LATE LATITUDE : 45 Deg 15.2 Min	FAR LATE LONGITUDE : -96 Deg 28.9 Min

CALIBRATION LEVEL ESTIMATE: 69.42
BLOCKS PER FDDOT AZIMUTH INCREMENT: 22
SIGNAL TO NOISE RATIO: 3.32 DB

BIT ERROR RATE: -58.14 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 41.56 DB

SCALE FACTOR: 171.81
START TIME (GMT): 284/18:32:55
REQUEST NUMBER: 1377

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS:

SIR-B
DIGITALLY CORRELATED IMAGERY
MENU TAPE

ANNOTATION PARAMETERS

SITE NAME: NORTH/SOUTH DAKOTA
DATA TAKE-SCENE NO.: KI-086.10-034
CENTER LAT/LONG: 44 Deg 58.7 Min / -96 Deg 15.2 Min
CENTER RESOLUTION (GROUND RANGE x AZIMUTH): 16.5 M x 25.8 M
TRACK (DEG TO TRUE NORTH): 119.6

CENTER TIME (GMT): 284/18:33:13.779
CORRELATION DATE: 04/09/85
CENTER INCIDENCE ANGLE: 58.6 Deg
PIXEL SIZE: 12.5 M
RAW DATA: 5 BPS

SHUTTLE PARAMETERS

FOR IMAGE CENTER
X POSITION: -4606.398 KM
Y POSITION: -1515.670 KM
Z POSITION: 4473.734 KM
SLANT RANGE TO NEAR EDGE: 417.25 KM
ALTITUDE: 229.55 KM
YAW: 0 Deg

X VELOCITY: -1587.661 M/S
Y VELOCITY: -6561.395 M/S
Z VELOCITY: -3851.536 M/S
EARTH RADIUS AT TARGET: 6367.43 KM
ROLL: 180.0 Deg
PITCH: .0 Deg

RADAR PARAMETERS

RECEIVER GAIN: 92.59 DB
BORE ANGLE: 55.6 Deg

PRF: 1624.2 Hz
DATA WINDOW POSITION: 34

CALIBRATOR LEVEL SETTING: 1
DOWNLINK RATE: 30.4 MHz

IMAGE PARAMETERS

NO. SAMPLES PER IMAGE LINE: 6972
NO. SAMPLES/SLANT RANGE IMAGE LINE: 4864

STARTING SAMPLE NO.: 1
NO. SLANT RANGE IMAGE RECORDS: 1408

NO. IMAGE RECORDS: 1301
LINES PER REF. UPDATE: 8

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY

ACROSS TRACK: FD:A= .00 Hz   FD:B= 14.14 Hz   FD:C=-1507.90 Hz

COEFFICIENTS USED TO CALCULATE DOPPLER FREQUENCY RATE

ACROSS TRACK: FR:D= .00 Hz/S   FR:E= -28.61 Hz/S   FR:F= 1122.91 Hz/S
ALONG TRACK: FR:A1= .00 Hz/S   FR:A2= .00 Hz/S   FR:A3= .00 Hz/S

EARTH RADIUS AT NADIR: 6367.43 KM
GROUND RANGE PIXEL SIZE: AZIMUTH = N/A

AZIMUTH SKEW: 12 Pixels
RANGE = N/A

SQUINT ANGLE: Deg
SWATH VELOCITY: N/A

CORNER COORDINATES

NEAR EARLY LATITUDE:	45 Deg 12.6 Min	NEAR EARLY LONGITUDE:	-96 Deg 42.6 Min
NEAR LATE LATITUDE:	44 Deg 38.7 Min	NEAR LATE LONGITUDE:	-95 Deg 56.7 Min
FAR EARLY LATITUDE:	45 Deg 18.8 Min	FAR EARLY LONGITUDE:	-96 Deg 33.7 Min
FAR LATE LATITUDE:	44 Deg 44.8 Min	FAR LATE LONGITUDE:	-95 Deg 47.8 Min

CALIBRATION LEVEL ESTIMATE: 69.44
BLOCKS PER FDDOT AZIMUTH INCREMENT: 22
SIGNAL TO NOISE RATIO: 2.89 DB

BIT ERROR RATE: -58.14 DB
FR AZIMUTH INCREMENT FLAG: 0
NOISE: 42.41 DB

SCALE FACTOR: 163.64
START TIME (GMT): 284/18:33:06
REQUEST NUMBER: 1378

PROCESSOR SOFTWARE VERSION NO.: N/A

REMARKS:

RA 7663

Data Set Name:	Tilted Magnetopause and tail magnetic fields.
Date:	August 16, 1971
Objective:	To convert CDC Fortran program to IBM Compatible Fortran.
Description:	Minor changes were made to the program as follows: (1) The 026 punched deck was changed to 029 punched deck; (2) Unit assignments for Sysin and Sysout was changed to IBM Compatible units; (3) Buffer areas were cleared before executable statements. (see attached for JCL set up)
Input: Cards	Data input via SYSIN DD*
Output:	SYSOUT=A printout

JCL Procedure

```
//JOBNAME   JOB   (acct.Information........),Box#,MSGLEVEL=1
//STEP1    EXEC    FORTRANH
//SOURCE.SYSIN    DD    *



                SOURCE MODULE



/*
//STEP2    EXEC    LOADER
//GO.SYSUDUMP    DD    SYSOUT=A
/*
```

5301 Bolsa Avenue, Huntington Beach, CA 92647 (714) 896 3311

June 29, 1971
A3-830-BBKO-269

Dr. J. H. King
National Space Science Data Center
NASA Goddard Space Flight Center
Greenbelt, Md.

Dear Joe,

Enclosed is the program deck for my tilted magnetopause and tail magnetic fields. I have sent: (1) a Fortran IV deck, (2) a program listing from that deck, and (3) written comments on the use of the program.

The deck includes a main program which can be used for testing and the data cards for the power series coefficient representation of the fields (through n = 4). I will send you the sets of coefficients for selected tilt angles shortly. They are best used with a different version of the subroutine, ENTERP.

Please feel free to contact me if there are any problems.

Very truly yours,

Bill

W. P. Olson
Space Sciences Department

WPO:ph

Enclosure (u)

COMMENTS ON TILTED MAGNETOSPHERE MAGNETIC

FIELD MODEL

Two magnetospheric magnetic fields, produced by the magnetopause and tail currents, are represented as scalar potential series expanded about the center of the earth.

The magnetopause currents are determined for various orientations of the earth's dipole axis to the solar wind direction by self consistently solving a pressure balance equation (Olson, J. Geophys. Res., 74, 5642, 1969). The tail currents are determined empirically by demanding that the field they produce exhibit the features observed in the tail magnetic field. (Olson, MDAC paper WD 1332, 1970).

The following subroutines are provided; MAGNET, ENTERP, POTNTL, LGNFAC, and LEGND.

The user's program should call ENTERP before the other subroutines are used. In ENTERP, the magnetopause field is set to a given strength (determined by the standoff distance of the solar wind at the subsolar point). The tail field is presently adjusted in the same manner (for convenience). The user can easily modify ENTERP so that the tail field has any desired strength independent of the magnetopause field. The coefficients are also "tilt" dependent. In ENTERP auxiliary coefficients are expanded in power series in the tilt angle, μ (the complement of the angle between the solar wind direction and the geomagnetic dipole axis). μ is positive in northern hemispheric summer.

The present version of MAGNET finds the dipole contribution to the total field and adds to it the fields from the magnetopause and tail currents which are determined in POTNTL. Note that the fields are determined in solar magnetospheric coordinates. The dipole axis therefore makes an angle, μ, to the Z_{SM} axis. (The X_{SM} axis points toward the sun, the Z_{SM} axis is in the plane formed by X_{SM} and the dipole axis and is perpendicular to Z_{SM}. Y_{SM} is perpendicular to X_{SM} and Y_{SM} so that serially X_{SM}, Y_{SM} and Z_{SM} describe a right handed coordinate system.) The coefficients given in power series form are not as accurate as the "raw" gaussian coefficients and should not be used for geocentric distances larger than $\sim 7\ R_E$. (They work quite well out to geosynchronous altitude [see Olson and Cummings, J. Geophys. Res., 75, 7117, 1970].) For larger geocentric distances, especially in the antisolar direction, the raw coefficients must be used. In the regions where the source currents flow these scalar potential representations of the magnetic field can not be used. Because the expansions contain a finite number of terms, they should not be used at any position with geocentric distance larger than the minimum geocentric distance of the currents. Generally, this restricts the use of these potentials to geocentric distances less than 10 R_E although they have often been used out to 15 R_E in the tail.

The magnetopause and tail fields are determined in POTNTL. They are obtained from a scalar potential, V. The components are B_r, B_θ, B_ϕ and point radially outward, south, and east (all in the direction of increasing argument) respectively. V is given in terms of a series of the form:

$$V = \sum_{n=1}^{\infty} \sum_{m=1}^{n} r^n A_n^m \cos (m\phi)\ P_n^m(\theta)$$

where P_n^m are the associated legendre polynomials. The P_n^m are computed with their derivatives in LEGND. Before calling LEGND, POTNTL calls LGNFAC where the

Schmidt normalization for the coefficients A_n^m and other "constants" are determined.

Please address any questions to:

W. P. Olson
Space Sciences Department, BBKO, MS 20
McDonnell Douglas Astronautics Company
5301 Bolsa Avenue
Huntington Beach, Ca. 92647

DRAFT
7/23/71
J. King

MDTILT

This FORTRAN package was generated by Dr. W. P. Olson of McDonnell Douglas Corp. to compute, in solar magnetospheric coordinates, magnetospheric vector magnetic fields separately resulting from magnetopause and magnetotail current systems. The analysis allows for variable incident solar wind pressure and for an arbitrary tilt angle of the geomagnetic dipole axis with respect to the incident solar wind. Legendre polynomial expansions are used, with the two coefficients (one for each source current system) for a given n, m themselves expanded as power series in the previously mentioned tilt angle. The analysis is recommended for geocentric distances out to about $7R_E$. It is anticipated that raw coefficients (not involving expansions in the tilt angle) will be submitted to NSSDC eventually; this will extend the limits of validity of the analysis somewhat beyond $7R_E$, especially in the antisolar direction. The FORTRAN package, named MDTILT, consists of a brief main program and a series of subroutines in which the actual computations are done. Although the package was initially generated to run on a CDC/6600 machine, it is readily adaptible to other machines due to the basic level of FORTRAN programming used.

PRELIMINARY COPY
MDAC PAPER WD 1332
MARCH 1970

A SCALAR POTENTIAL REPRESENTATION OF THE TILTED MAGNETOPAUSE AND NEUTRAL SHEET MAGNETIC FIELDS

W. P. OLSON

McDonnell Douglas Astronautics Company - Western Division
Santa Monica, California 90406

INTRODUCTION

The shape of the magnetopause has been determined for the range of 'tilt angles' of geophysical interest by solving a pressure balance equation (Olson, 1969). The tilt angle, μ, is the complement of the angle between the direction of the undisturbed solar wind and the geomagnetic dipole axis (see Figure 1). Since the magnetopause currents reside on the magnetopause, it is easy to calculate them once the shape of the magnetopause is known. The magnetic field from the magnetopause currents is then found by integration over the current system using the Biot-Savart Law.

The neutral sheet current system is inferred from in-situ measurements of the magnetic field of the magnetospheric tail. Although this current system is not obtained from a basic knowledge of the magnetosphere, the model developed here incorporates several of the features observed in the tail. These include gradients in the total field as a function of X_{sm} (see Figure 1), field gradients across the neutral sheet, and the rate of magnetic merging, the position of the neutral sheet within the cylindrical tail of the magnetopause, a 'theta' cross section (see Figure 2) with currents flowing across the neutral sheet and returning on the cylindrical boundary, and the observed diameter of the cylinder. Finally, care was taken to insure that no infinite fields are produced by the current system as occurs in previous models. The tail field is found by integration over the tail (neutral sheet) current system.

Because the integration is so time consuming, both boundary (magnetopause) and tail (neutral sheet) fields are given here in terms of scalar potentials. Since the two potentials add as scalar quantities, the combined field of both the boundary and tail current systems can be calculated as rapidly for any tilt angle as the 'zero tilt' boundary field of Mead (1964).

MAGNETOPAUSE CURRENT SYSTEM

The formation of the magnetopause current system is well understood (Parker 1958, Beard 1960). The solar wind ion and electrons are deflected in opposite directions when they encounter the geomagnetic field. This interaction takes place over the region (the magnetopause) where the kinetic pressure of the solar wind balances the energy density (pressure) of the geomagnetic field. The calculation of the shape of the magnetopause is thus equivalent to the determination of the position of the magnetopause current system. The shape of the magnetopause has been calculated for the entire range of tilt angles of geophysical interest (Olson 1969). The procedure used is similar to the one developed by Mead and Beard (1964). It involves finding a 'first surface' and then computing the magnetic field resulting from currents flowing on that surface to more accurately predict a 'second surface'. The position and strength of the currents flowing on the magnetopause are therefore obtained as a by-product of the calculation of the shape of the magnetopause.

The magnetopause current system consists of two sets of closed loops centered on the two neutral points. As seen from the sun, it is very similar in appearance to the equivalent overhead Sq current system. The position of the magnetopause current system and its strength are of course, dependent on the tilt angle. The line of centers between the neutral points is approximately parallel to the geomagnetic dipole axis for all tilts. The currents flowing on the tail of the magnetopause ($X_{xm} < 0$) are generally two orders of magnitude smaller than those on the nose and in the vicinity of the neutral points. The antisolar cross sections of the magnetopause are almost circular for all tilts.

NEUTRAL SHEET CURRENT SYSTEM

The features of the neutral sheet current system are inferred from measurements of the magnetic field it produces. The tail of the magnetopause has an observed radius of about 20 R_E (Ness, 1965). The field lines are roughly parallel to the undisturbed solar wind direction below the neutral sheet ($Z_{sm} < 0$) and antiparallel above it (Heppner et al. 1963, Ness, 1965). The tail field has been measured past the orbit of the moon (60 R_E) (Ness, et al. 1967). The neutral sheet (Ness, 1965) is defined to be the region where the where the magnetic field reverses its direction and is small in magnitude. It is thin (a few hundred kilometers thick). The position of the neutral sheet within the cylindrical magnetopause boundary is constantly changing. It is above the earth-sun line in summer and below it in winter (Speiser and Ness 1967). This seasonal variation has been attributed to the tilt angle and it has been suggested that the neutral sheet is hinged to the dipole axis (Murayama, 1966 and Olson and Cummings, 1969). The tail-like magnetic field begins at 10 $\pm$ 3 R_E on the midnight meridian (Speiser and Ness 1967). The strength of the tail field has been reported by several investigators (Ness 1965, Ness, et al. 1967, and Mihalov et al. 1968) (see Figure 3). Mihalov et al. and Speiser and Ness have also studied the merging of field lines through the neutral sheet and the strength of the component of the field perpendicular to the neutral sheet there.

The model of the neutral sheet current system used here (details are given in Olson, (1970a) has a 'theta' cross section (see Figure 2). The neutral sheet is hinged to the dipole axis. (See Figure 1). The currents flow across the neutral sheet and return in equal amounts on the two halves of the cylindrical boundary. The length of the hinge is 10 R_E. The distance of the neutral sheet above the solar magnetospheric equatorial plane ($Z_{sm} = 0$) is given by $\Delta Z = (10 \sin \alpha)\ R_E$, where $\alpha = \mu/2$. This allows $/\Delta Z/$ to have a maximum value of 3 R_E which is similar to the observed deviation of the neutral sheet from the center of the cylinder (Anderson, 1970). The current density and its gradient are both zero at the inner edge of the neutral sheet. This is done to avoid the infinite field present at the edge of the current sheet in previous models. The currents then leveled to their maximum value 2 R_E behind the 'front' of the neutral sheet. They then decay exponentially with a folding distance of 24 R_E. The folding distance for the tail magnetic field is about 60 R_E (Mihalov, et al. 1968).

DETERMINATION OF THE MAGNETOPAUSE

AND NEUTRAL SHEET MAGNETIC FIELDS

The magnetic field associated with each current system is found by integration over the currents using the Biot-Savart law. Since this cannot be done analytically for either current system, they both must be divided into several area elements and the integration replaced by a summation. For the magnetopause current system this involves about 2500 area elements, for the tail and neutral sheet, over 1800 area elements. This brute force summation is of course very costly in computer time. The magnetopause field, $\vec{B}_{MP}$, and the tail field, $\vec{B}_{NS}$, are therefore described in terms of scalar potentials, V and U, $\vec{B}_{MP} = -\nabla V$, and $\vec{B}_{NS} = \nabla U$. For a given solar wind strength and tilt angle V and U are functions only of the position where the magnetic field is to be calculated. Their use results in considerable savings of computation time. Both V and U are expanded in spherical harmonics about the earth's center. Since a scalar potential cannot be used to represent the magnetic field in a region where the field source currents exist, the use of V and U is restricted to a geocentric spherical region with a radius of about 10 R_E. This is also true for the 'zero tilt' coefficients of Mead (1964). Thus U cannot be used to accurately predict $\vec{B}_{NS}$ for $X_{SM} < -10\ R_E$. ($\vec{B}_{NS}$ can be found in that region by the direct integration method described above.)

The Calculation of V and U

It is convenient to represent V and U in a geocentric spherical polar coordinate system. Since the orientation of the dipole axis to the flow direction of the unperturbed solar wind determines the magnetopause shape, V and U are presented here in solar-magnetospheric coordinates (See Fig. 1).

(If geographic or geomagnetic coordinates were used, V and U would have to be redetermined for all times through the year. Here they depend only on the tilt angle.)

The general form of V or U in a spherical coordinate system is:

$$V = \sum_{n=1}^{\infty} \sum_{m=0}^{n} a \left(\frac{r}{a}\right)^{n} \left(A_n^m \cos m\phi + B_n^m \sin m\phi\right) P_n^m (\cos\theta)$$

where a is a constant length (here it is 1 R_e), r, θ, and φ are defined in solar magnetospheric coordinates, $P_n^m (\cos\theta)$ are the associated Legendre functions and A_n^m, B_n^m, $A_n^{'m}$, $B_n^{'m}$ are the coefficients that must be determined — These go with the r^{-n-1} terms not written down — by a spherical least squares best fit. For an external field source (source distance larger than a) $A_n^{'m}$ and $B_n^{'m}$ are zero for all n and m. (The currents they induce within the earth, however, will be given in terms of the primed coefficients). Since the plane containing the solar wind flow direction and the dipole axis is the plane of symmetry for the magnetopause and its associated magnetic field, if φ is measured from this plane (See Fig. 1), V can be given in terms of the A_n^m. (All B_n^m are zero). Additional symmetry present for the $\mu = 0°$ magnetopause does not remain for $\mu \neq 0°$ and the A_n^m must be calculated for all values of n and m. The A_n^m were determined through n = 6 for $0° < \mu < 35°$ in 5° steps for the magnetopause field and in 10° steps for the neutral sheet field. The coefficients for $\mu < 0°$ are readily determined from symmetry conditions. (If n + m is even, $A_n^m(-\mu) = -A_n^m(\mu)$, and if n + m is odd, $A_n^m(-\mu) = A_n^m(\mu)$.)

The Values of A_n^m for V (the magnetopause field)

For given values of n, m, and μ, A_n^m is dependent only on the size of the magnetopause, or, equivalently, on the pressure of the solar wind. As the scale of the magnetopause decreases by a factor γ, the ratio of the magnetopause field to the dipole field (for each component) remains constant. It is the same at the original $r(\theta, \phi)$ and at the new r value (given by $\gamma r(\theta, \phi)$. This condition is satisfied if

must be proven elsewhere

$$A_n^m \cdot r(\theta_{REF}, \phi_{REF})^{n+2} \equiv C_n^m = \text{constant}, \quad (1)$$

where θ_{REF} and ϕ_{REF} are the values of θ and ϕ where the size of the magnetosphere is measured. For 'zero tilt' Mead (1964) used the subsolar distance, i.e., the value of r at the magnetopause along the earth-sun line. It is noted that any values of θ_{REF} and ϕ_{REF} can be used. For the tilted boundary considered here, θ_{REF} is zero and ϕ_{REF} is ? 90° in solar magnetic coordinates. In solar magnetospheric coordinates ϕ_{REF} remains zero while θ_{REF} is $(90 + \mu)$. (The value of $r(\theta_{REF}, \phi_{REF})$ is independent of the coordinate system used.) For a given solar wind strength, $r(\theta_{REF}, \phi_{REF})$ is dependent on the tilt angle (See Table 1). Using the C_n^m, it is possible to represent the magnetic field of the magnetopause current system for any solar wind pressure. This involves a separate list of coefficients for every tilt angle. The values of C_n^m, which are not dependent on the solar wind pressure, are given for four tilt angles in Table 2.

r vs sw. strength for μ=0 is not given

Since it is often necessary to know the C_n^m for values of μ not given in the tables, it is convenient to represent the $C_n^m(\mu)$ in terms of power series in μ. There results a set of coefficients (for the power series) that allow V, which depends on both solar wind pressure and the tilt angle, to be represented analytically. Thus $C_n^m(\mu)$ is given in terms of three constants a1, a2, a3, such that

$$C_n^m(\mu) = a1 + a2 * \mu + a3 * \mu^2 \quad (2)$$

A least squares best fit was used to find a1, a2, and a3. Fitting $C_n^m(\mu)$ to a higher order polynomial did not considerably improve the overall fit. For this reason and because a rapid computer code for the boundary field is desired only terms up to μ^2 are considered. Representing V through n = 6 results in 28 values of $C_n^m(\mu)$, each of which is given in terms of the first 3 coefficients to a power series. This list is shown in Table 3. The coefficients $C_n^m(\mu)$ can therefore be found for any value of μ. The values of A_n^m, which are finally used to compute V and $\vec{B}_{MP}$, are then found from (1) together with a knowledge of the solar wind strength. Thus, V is represented as a continuously varying function of both tilt angle and solar wind pressure.

The Values of A_n^m for U (The neutral sheet field)

U is also dependent on the tilt angle since the neutral sheet is 'hinged' to the geomagnetic dipole axis. It is also under the control of the solar wind. The relation of the solar wind pressure to the neutral sheet current strength is not well understood. The A_n^m for the tail field are therefore, for convenience, represented by C_n^m, exactly the same way as was done for V. The C_n^m for the tail field are given in table 4. It must be emphasized that this representation does not imply that the neutral sheet currents are under the same control by the solar wind as the magnetopause currents. A_n^m can be found from C_n^m for all n and m and then used according to any relationship between solar wind parameters and neutral sheet current strength. (If left as they appear in Table 4 the C_n^m can be added linearly to the C_n^m in Table 2. The magnetopause and neutral sheet fields will then change their strengths in the same manner as the solar wind pressure changes). The C_n^m are again represented by power series expansions. The coefficients are given in Table 5.

DESCRIPTION OF THE MAGNETOPAUSE MAGNETIC FIELD

The magnetopause magnetic field consists of field lines terminating at the two neutral points. The field persists both within and outside of the magnetopause. The field lines are perpendicular to the current direction and the unit vector normal to the magnetopause at all points on the magnetopause. The field is strongest in the subsolar region and falls off rapidly beyond the neutral points. Note that the neutral point with the smallest geocentric distance (for $\mu \neq 0°$) has the larger field. The magnetopause field is quite small in the region of the tail (less than 6γ at the front edge of the neutral sheet). Field lines from both magnetopause and tail currents are shown in Fig. 4 with $\mu = 15°$ using U and V with n = 4.

DESCRIPTION OF THE MAGNETIC FIELD OF THE NEUTRAL SHEET CURRENT SYSTEM PREDICTED BY THE MODEL

The field lines predicted by the model are parallel to the flow direction of the solar wind throughout the tail region except near the front edge of the neutral sheet and just above or below it. The total field strength decreases abruptly near the neutral sheet for large negative X_{sm} ($X_{sm} < -35\ R_E$) over a region of 1 R_E. The Z_{sm} component of the field (perpendicular to the neutral sheet) falls from about +5γ at 40 R_E to 1γ at 100 R_E. This compares well with Explorer 33 data published by Mihalov et al. (1968) (See Fig. 5). The decay in the total field is given in Fig. 3. It is seen that the exponential folding length of the field is about 60 R_E, close to the value reported by Mihalov et al. This is larger than the folding length of 32 R_E used for the currents. This difference in the folding lengths results because the field depends on the entire current system.

The model is not closed, i.e, it does produce a field beyond the cylindrical magnetopause boundary. However, the field does fall off much more rapidly in this region than the field produced by the semi-infinite plane sheet of Williams and Mead (1965). Because both the current density and its gradient are zero at the front edge of the neutral sheet, the present model avoids the logarithmic infinites present at the edges of the semi-infinite plane sheet model.

SOME MANIFESTATIONS OF THE COMBINED MAGNETOPAUSE AND TAIL FIELDS

MAGNETIC VARIATIONS AT THE EARTH'S SURFACE

The magnetic variations at the earth's surface produced by the magnetopause and neutral sheet currents have been calculated. The neutral sheet contribution is seen to be similar to the average observed variation pattern. (See Fig. 6). This is quite remarkable in that the neutral sheet currents are geometrically much more simple than the ionospheric dynamo currents which produce most of the surface magnetic variations.

The magnetopause variations have been examined in considerable detail (Olson, 1970b). They include not only the average daily variation pattern, but also both semiannual and annual periodicities. The magnetopause also produces longitudinal variations in the earth's surface field. In all respects these variations (both temporal and spatial) agree in form with the observations. The magnetopause and neutral sheet currents thus are responsible for over 20% of the earth's surface magnetic variations. The daily variation pattern at summer solstice at 111° east longitude is shown in Figure 7. It is very similar to the neutral sheet pattern illustrated in Figure 6.

TIME VARIATIONS IN CONJUGATE POINT PHENOMENA

The effects of the combined magnetopause and tail fields on magnetopause and tail fields on magnetic conjugate point location have been examined. If only the internal field is considered, the conjugate point position does not change with time. This is also true when the main field is used together with the magnetopause and tail fields and the solar wind is considered to be incident perpendicular to the geomagnetic dipole axis. However, when the effect of the continuously changing orientation of the dipole axis with respect to the solar wind direction is considered, the magnetopause and neutral sheet currents produce time varying magnetic fields which cause both daily and seasonal variations in geomagnetic conjugate point position.

In Table 6 the conjugate point positions as predicted by the potentials U and V with $n = 4$ are given for a set of θ, ϕ values (in solar-magnetospheric coordinates) with $\mu = 15°$. It is seen that, except for high geomagnetic latitudes, the deviation of the conjugate point position from the main field conjugate point location is only a few kilometers. The magnetopause field effects the conjugate point position more than the tail field everywhere except near midnight at high latitudes. The conjugate point displacements predicted here are almost everywhere opposite in direction to those predicted by Barrish and Roederer (1969). The present values may be used with caution in the auroral region but certainly do not accurately predict conjugate phenomena in the polar cap region. This is because of the other current systems present in that region.

Note in Table 6 that open lines go back into the tail. For $n = 4$ there were no lines that wandered out through the magnetopause. For $n = 2$, the line originating at $\theta = 65°$, $\phi = 0°$ did wander.

When the power series coefficients are used to represent C_n^m it is suggested that since some accuracy is lost, the series should not be used with n greater than 4. Finally, since U and V are <u>scalar</u> potentials, they can not be used in the region of the source currents for $\vec{B}_{MP}$ and $\vec{B}_{NS}$. This implies that U and V should not be used for geocentric distances much larger than 10 R_E. (The same restriction applies to Mead's (1964) 'zero tilt' coefficients.)

ACKNOWLEDGMENTS

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FIGURE CAPTIONS

Figure 1 Definition of the tilt angle, μ. The tilt angle is positive in northern hemisphere summer. The 'hinge', connecting the neutral sheet and the dipole axis, is also shown. Note both solar magnetic and solar magnetospheric axes.

Figure 2 Theta cross section of tail and neutral sheet current system looking from the earth. The current flows across the neutral sheet and returns on the cylindrical boundary. The amount of current on each lobe is inversely proportional to the area of that lobe.

Figure 3 The observed and computed strength of the tail field. Results from several model parameters are included.

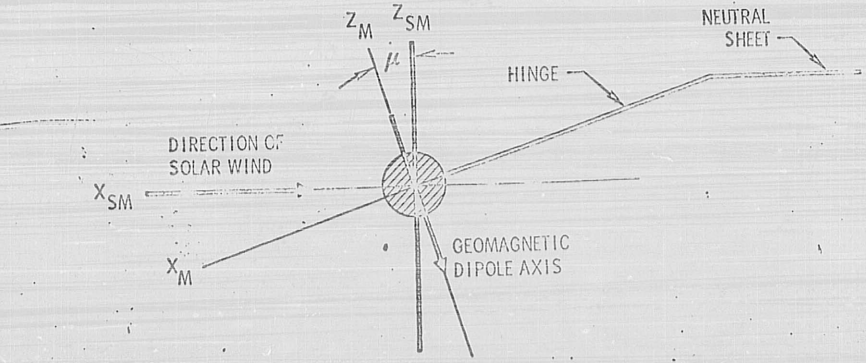
Figure 4 Magnetic field line configuration in the noon-midnight meridian plane using U and V with $\mu = 15°$ through $n = 4$.

Figure 5 Observed and computed field gradient perpendicular to the neutral sheet.

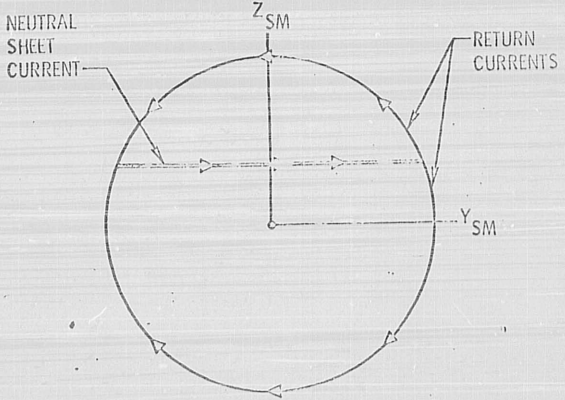
Figure 6 Magnetic variations at the earth's surface from the neutral sheet currents.

Figure 7 Magnetic variations at the earth's surface from the magnetopause currents.

DEFINITION OF TILT ANGLE

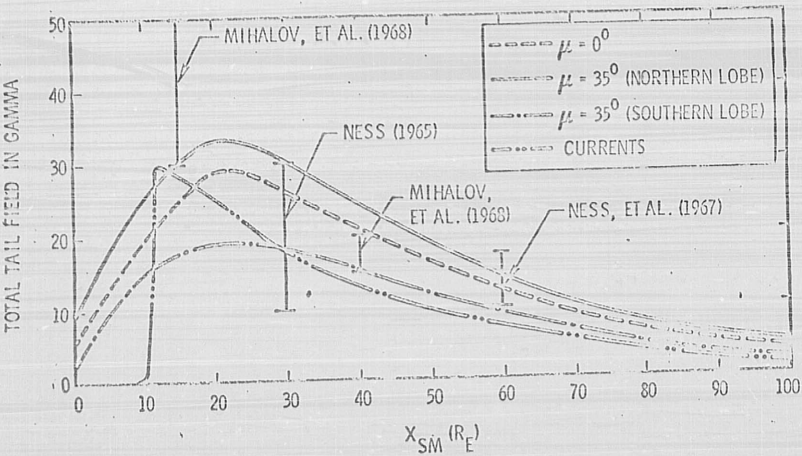


01177

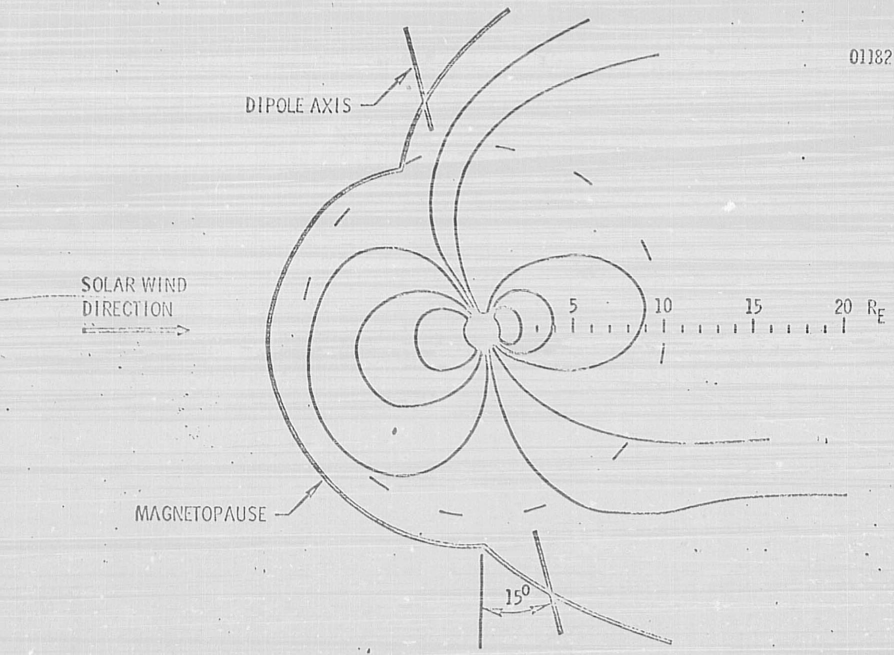


CROSS SECTION OF TAIL CURRENT SYSTEM

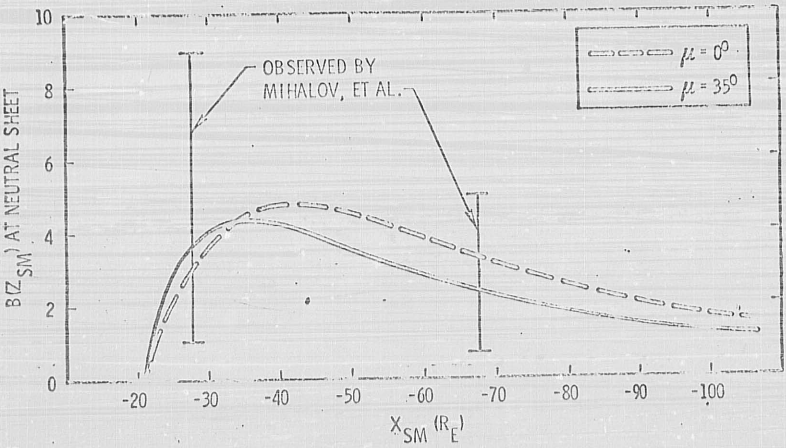
OBSERVED AND COMPUTED STRENGTH OF TAIL FIELD



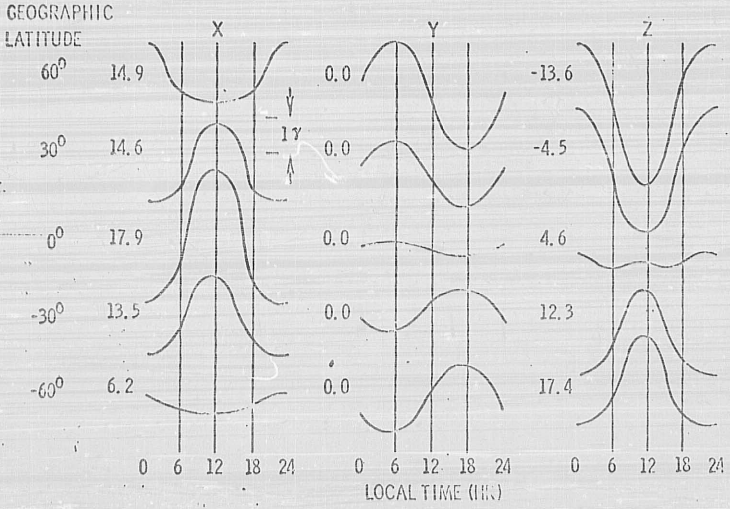
01182


DIPOLE AXIS
SOLAR WIND DIRECTION
5
10
15
20
R_E
MAGNETOPAUSE
15^0

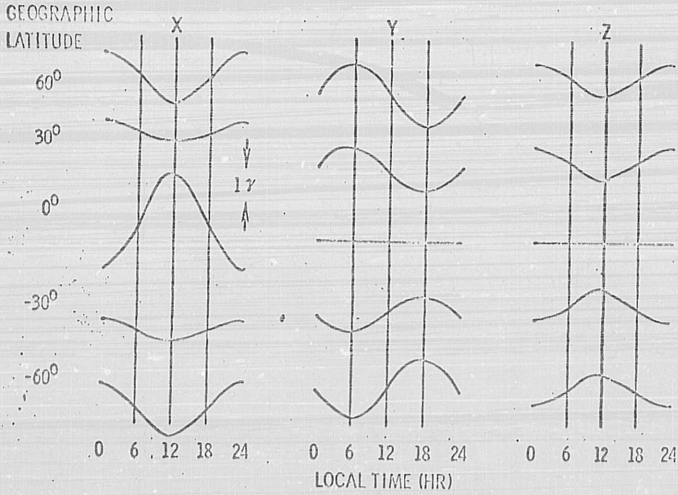
FIELD LINE RECONNECTION THROUGH THE NEUTRAL SHEET



M73396



GEOGRAPHIC LATITUDE
X
Y
Z
60°
30°
0°
-30°
-60°
14.9
14.6
17.9
13.5
6.2
0.0
0.0
0.0
0.0
0.0
-13.6
-4.5
4.6
12.3
17.4
1 γ
0 6 12 18 24
0 6 12 18 24
0 6 12 18 24
LOCAL TIME (HR)



GEOGRAPHIC
LATITUDE
X
Y
Z
60°
30°
0°
-30°
-60°
1 γ
0
6
12
18
24
LOCAL TIME (HR)

Table 1. Values of $r(\theta_{ref}, \phi_{ref})$ for various tilt angles. ($r(\theta_{ref}, \phi_{ref})$ is perpendicular to the dipole axis and lies in the solar-magnetospheric noon meridian plane. $r(\theta_{ref}, \phi_{ref})$ is given in earth radii.

μ	$r(\theta_{ref}, \phi_{ref})$	θ_{ref}(deg)	ϕ_{ref}(deg)
0	10.725	90	0
5	10.767	95	0
10	10.841	100	0
15	10.889	105	0
20	10.898	110	0
25	10.993	115	0
30	11.128	120	0
35	11.165	125	0

(FOR THE MAGNETOPAUSE FIELD)

Table 2. The values of C_n^m for various tilt angles. ($C_n^m = A_n^m \cdot r(\theta_{ref}, \phi_{ref})^{n+2}$).

n	m	Value of ψ: 0°	10°	20°	30°
0	0	.0000	.0000	0.0000	.0000
1	0	.2473	.2593	.2359	.2297
1	1	.0000	-.0549	-.0906	-.1412
2	0	.0000	.0105	.0208	.0291
2	1	-.1257	-.1257	-.1252	-.1365
2	2	.0000	-.0228	-.0452	-.0744
3	0	-.0333	-.0403	-.0081	-.0167
3	1	.0000	-.0312	-.0382	-.0512
3	2	-.0175	-.0223	-.0346	-.0606
3	3	.0000	-.0020	-.0100	-.0231
4	0	.0000	.0319	.0340	.0514
4	1	-.0531	-.0501	-.0257	-.0065
4	2	.0000	-.0293	-.0390	-.0602
4	3	.0006	.0009	-.0099	-.0325
4	4	.0000	.0026	.0011	-.0045
5	0	.0005	-.0033	.0156	.0301
5	1	.0000	-.0032	.0049	.0328
5	2	-.0104	-.0100	-.0232	-.0099
5	3	.0000	-.0013	-.0131	-.0384
5	4	.0037	.0036	.0081	-.0109
5	5	.0000	.0009	.0019	.0015
6	0	.0000	.0344	.0193	.0089
6	1	-.0319	-.0222	.0147	.0543
6	2	.0000	-.0347	-.0203	-.0026
6	3	.0115	.0034	-.0168	-.0420
6	4	.0000	.0112	.0027	-.0176
6	5	-.0004	.0033	.0043	.0038
6	6	.0000	-.0004	.0014	.0036

Table 3. The values of the coefficients of power series representations of C_n^m for the magnetopause field. $C_n^m = a1 + a2 \cdot \mu + a3 \cdot \mu^2$ where μ is in degrees. (.2341 E-3 = .0002341)

n	m	a1	a2	a3
0	0	.0000	.0000	.0000
1	0	-.2555	.0000	.2998E-4
1	1	.0000	-.4683E-2	.0000
2	0	.0000	.1147E-2	.0000
2	1	-.1260	.0000	-.9994E-7
2	2	.0000	-.2310E-2	.0000
3	0	-.3279E-1	.0000	.2001E-4
3	1	.0000	-.1738E-2	.0000
3	2	-.5856E-1	.0000	.5327E-5
3	3	.0000	-.6828E-3	.0000
4	0	.0000	.1519E-2	.0000
4	1	-.5266E-1	.0000	.4523E-4
4	2	.0000	-.1764E-2	.0000
4	3	.5809E-2	.0000	-.3869E-4
4	4	.0000	-.1362E-3	.0000
5	0	-.1070E-3	.0000	.2284E-4
5	1	.0000	.6585E-3	.0000
5	2	-.1265E-1	.0000	-.1109E-4
5	3	.0000	.9469E-3	.0000
5	4	.5719E-2	.0000	-.1822E-4
5	5	.0000	.1553E-4	.0000
6	0	.0000	.4996E-3	.0000
6	1	-.3272E-1	.0000	.8618E-4
6	2	.0000	-.2265E-3	.0000
6	3	.8499E-2	.0000	-.4466E-4
6	4	.0000	-.4070E-3	.0000
6	5	.3090E-2	.0000	-.2868E-5
6	6	.0000	.6961E-4	.0000

Table 4. The values of C_n^m (for the neutral sheet field) for various tilt angles. Again, $C_n^m = A_n^m \cdot r\,(\theta_{ref}, \phi_{ref})^{n+2}$.

		Value of μ			
n	m	0°	10°	20°	30°
0	0	.0000	.0000	.0000	.0000
1	0	.0856	.0883	.0892	.0942
1	1	.0000	.0045	.0092	.0146
2	0	.0000	.0004	.0076	.0123
2	1	-.0569	-.0591	-.0597	-.0637
2	2	.0000	-.0022	-.0044	-.0071
3	0	-.0021	-.0216	-.0214	-.0225
3	1	.0000	-.0034	-.0069	-.0113
3	2	.0018	.0189	.0188	.0200
3	3	.0000	.0000	.0017	.0027
4	0	.0000	.0000	-.0034	-.0057
4	1	.0075	.0072	.0001	-.0056
4	2	.0000	.0016	.0034	.0057
4	3	-.0046	-.0049	-.0034	-.0038
4	4	.0000	-.0002	.0007	.0018

Table 5. The values of the coefficients of power series representations of C_n^m for the neutral sheet field. $C_n^m = a1 + a2 \cdot \mu + a3 \cdot \mu^2$ where is in degrees. (.2341 E-3 = .0002341)

n	m	a1	a2	a3
0	0	.0000	.0000	.0000
1	0	.8654E-1	.0000	.8326E-5
1	1	.0000	.4748E-3	.0000
2	0	.0000	.3740E-3	.0000
2	1	-.5767E-1	.0000	-.6567E-5
2	2	.0000	-.2310E-4	.0000
3	0	-.1482E-1	.0000	-.1043E-4
3	1	.0000	-.3648E-3	.0000
3	2	.1294E-1	.0000	.9433E-5
3	3	.0000	-.8266E-4	.0000
4	0	.0000	-.1699E-3	.0000
4	1	.1143E-1	.0000	-.3541E-4
4	2	.0000	.1815E-3	.0000
4	3	-.4539E-2	.0000	.1132E-5
4	4	.0000	.3481E-4	.0000

Table 6. Conjugate point locations as predicted by U and U + V. θ and φ are solar-magnetospheric latitude and longitude, respectively. The series are expanded through n = 4 and the tilt angle is 15°. (The power series coefficients were used to represent C_n^m and $r(\theta_{ref}, \phi_{ref})$ was set at 10 R_e).

	φ = 0°		φ = 180°	
θ	B_{MP}	$B_{MP} + B_{NS}$	B_{MP}	$B_{MP} + B_{NS}$
45	-75.066	-75.022	-14.916	-14.921
55	-85.062	-85.012	-24.939	-24.947
65	-89.464	-89.661	-34.969	-34.986
75	OPEN	OPEN	-45.000	-45.041
85	OPEN	OPEN	-54.905	-55.276
-45	14.927	14.929	75.044	74.990
-55	24.941	24.943	85.151	84.770
-65	34.970	34.976	OPEN	OPEN
-75	45.015	45.044	OPEN	OPEN
-85	55.014	55.072	OPEN	OPEN

```
H699,2,100,100,100,47777,47777.
ID          OLSON     A03833BBK051522 40H699   9662150010
RUN(S,,,,,,,,,1)
SETCORE.
REDUCE.
MAP(ON)
LOAD(LGO)
EXECUTE.

      PROGRAM H699(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT)
C  THE PRIME LONGITUDE IS THE MAGNETOSPHERIC NOON MERIDIAN PLANE.  THE
C DIPOLE AXIS IS TILTED U RADIANS AWAY FROM THE Z(XM) AXIS AND TOWARD
C  THE EARTH-SUN (SOLAR WIND) LINE.  THE DIPOLE ALWAYS LIES IN THE SOLAR
C  MAGNETOSPHERIC NOON-MIDNIGHT MERIDIAN PLANE AND IN NORTHERN
C  HEMISPHERE SUMMER U IS POSITIVE.
      DIMENSION COEF(2,28,3),ANM(2,28),ALP(28) ,ALL(28),BET(28)
      COMMON COEF,RB,EMU,ANM,NMAX,INDEX1,INDEX2,ALP,BET,A,U,LIMIT
  100 FORMAT(1H0,3I10)
 101  FORMAT(1H ,3F16.9)
 102  FORMAT(1H1,30X,14HTILT ANGLE IS ,I3,9H DEGREES.)
      A=-31320.
      PI=ATAN2(0.,-1.)
      PICON=PI/180.
      RB=10.
      NMAX=4
      LIMIT=(NMAX+1)*(NMAX+2)/2
      DO 1 IJ=1,2
      DO 2 IK=1,28
      READ(5,101)(COEF(IJ,IK,IL),IL=1,3)
 2    CONTINUE
 1    CONTINUE
      DO 3 I=1,3
      INDEX1=3-I
      INDEX2=I-1
      DO 121 IKIK=1,4
      MU=10*(IKIK-1)
      WRITE(6,102) MU
      EMU=MU
      U=EMU*PICON
      CALL ENTERP
      DO 120 IR=1,10,3
      RR=IR
      DO 119 IT=10,170,40
      TT=IT
```

```
      T=IT*PICON
      DO 118 IP=90,270,90
      PP=IP-90
      P=FLOAT(IP-90)*PICON
      IPP=PP
      WRITE(6,100)IR,IPP,IT
      CALL MAGNET(RR,E,P,BR,BT,BP,BB,T,EM)
  118 CONTINUE
  119 CONTINUE
  120 CONTINUE
  121 CONTINUE
  3   CONTINUE
      STOP
      END
      SUBROUTINE MAGNET(R ,E,P,BR,BT,BP,BB,T,EM)
C DIPOLE POINTS SOUTH. POTNTL FINDS FIELD FROM VARIOUS MAGNETOSPHERIC
C SOURCES. BR IS RADIALLY OUTWARD, BT IS SOUTH, AND BP IS EAST.
      COMMON COEF,RB,EMU,ANM,NMAX,INDEX1,INDEX2,ALP,BET,A,U,LIMIT
      DIMENSION COEF(2,28,3),ANM(2,28),ALP(28),BET(28)
 100  FORMAT(1H ,12F10.2)
      PI=ATAN2(0.0,-1.0)
      PICON=PI/180.
      STM=SIN(T)
      CTM=COS(T)
      SPM=SIN(P)
      CPM=COS(P)
      XSM=STM*CPM
      YSM=STM*SPM
      ZSM=CTM
      CU=COS(U)
      SU=SIN(U)
      X=XSM*CU-ZSM*SU
      Y=YSM
      Z=ZSM*CU+XSM*SU
      PH=ATAN2(Y,X)
      EL=SQRT(X*X+Y*Y)
      TH=ATAN2(EL,Z)
      R3=R*R*R
      CT=COS(TH)
      ST=SIN(TH)
      CP=COS(PH)
      SP=SIN(PH)
      BR=2.*A*CT/R3
      BT=A*ST/R3
```

```
      BP=0.
      X=BR*ST*CP+BT*CP*CT-BP*SP
      Y=BR*ST*SP+BT*CT*SP+BP*CP
      Z=BR*CT-BT*ST
      ZSM=Z*CU-X*SU
      XSM=X*CU+Z*SU
      YSM=Y
      BTT=XSM*CPM*CTM+YSM*SPM*CTM-ZSM*STM
      BPP=YSM*CPM-XSM*SPM
      BRR=ZSM*CTM+XSM*CPM*STM+YSM*SPM*STM
      BBB=SQRT(BTT*BTT+BPP*BPP+BRR*BRR)
      CALL POTNTL(R,T,P,BX,BY,BZ)
      BW=SQRT(BX*BX+BY*BY+BZ*BZ)
      BXXX=-BX
      BT=BTT-BX
      BR=BRR+BZ
      BP=BPP+BY
      BB=SQRT(BR*BR+BT*BT+BP*BP)
      WRITE(6,100) BRR,BTT,BPP,BBB,BZ,BXXX,BY,BW,BR,BT,BP,BB
      RETURN
      END
      SUBROUTINE ENTERP
C  THE RAW COEFFICIENTS (COEF(I,J,K)) ARE EXPANDED IN A POWER SERIES IN
C  THE TILE ANGLE (EMU) TO GIVE THE TILT DEPENDENCE AND THEN FIT TO THE
C  INPUT SUBSOLAR DISTANCE,RB (RELATED TO THE SOLAR WIND PRESSURE).  IF
C  INDEX1 ISNT ZERO, THE BOUNDARY FIELD IS COMPUTED.  IF INDEX2 IS NON-
C  ZERO, THE TAIL FIELD IS COMPUTED.  IF BOTH ARE NON-ZERO, BOTH FIELDS
C  ARE DETERMINED.
      COMMON COEF,RB,EMU,ANM,NMAX,INDEX1,INDEX2,ALP,BET,AA,U,LIMIT
      DIMENSION A(2,28),ANM(2,28),COEF(2,28,3),ALP(28)
      DIMENSION BET(28)
  197 FORMAT(1H ,7E15.5)
      NM=NMAX+1
      DO 10 L=1,LIMIT
      BET(L)=0.
   10 ALP(L)=0.0
      DO 1 I=1,2
      DO 2 J=1,LIMIT
      A(I,J)=COEF(I,J,1)+EMU*COEF(I,J,2)+EMU*COEF(I,J,3)*EMU
      A(I,J)=A(I,J)*100000.
    2 CONTINUE
    1 CONTINUE
      WRITE(6,197) A
      DO 3 K=1,2
```

```
      RFAC=RB
      MM=1
      DO 4 N=1,NM
      RFAC=RB*RFAC
      DO 5 M=1,N
      ANM(K,MM)=A(K,MM)/RFAC
      MM=MM+1
    5 CONTINUE
    4 CONTINUE
    3 CONTINUE
      IF(INDEX1.EQ.0) GO TO 9
      DO 6 IAD=1,LIMIT
    6 ALP(IAD)=ANM(1,IAD)
      WRITE(6,197) ALP
    9 CONTINUE
      IF(INDEX2.EQ.0) GO TO 8
      DO 7 IAC=1,28
    7 ALP(IAC)=ALP(IAC)+ANM(2,IAC)
      WRITE(6,197) ALP
    8 RETURN
      END
      SUBROUTINE POINTL(RR,THETA,PHI,BX,BY,BZ)
C  THE BOUNDARY AND/OR TAIL FIELDS ARE DETERMINED FROM THE EVEN
C  COEFFICIENTS, ALP.  THE ODD COEFFICIENTS,BET, ARE ALL ZERO BY
C  SYMMETRY ACROSS THE NOON-MIDNIGHT MERIDIAN PLANE.
      DIMENSION ALP(28),BET(28),PS(66),DPS(66),FAC(66),SCHMDT(66),AM(66)
      DIMENSION COEF(2,28,3),ANM(2,28)
      COMMON COEF,RB,EMU,ANM,NMAX,INDEX1,INDEX2,ALP,BET,A,U,LIMIT
      CALL LGNFAC(FAC,SCHMDT,AM,NMAX)
      CALL LEGN D(THETA,NMAX,PS,SCHMDT,AM,DPS)
      BX=0.
      BY=0.
      BZ=0.
      NNNN=NMAX+1
      DO 1 N=1,NNNN
      FN=N-1
      JN=(N*(N-1))/2
      DO 1 M=1,N
      EM1=M-1
      JNM=JN+M
      R=EM1*PHI
      BX=BX+DPS(JNM)*RR**(N-2)*(ALP(JNM)*COS(R)+BET(JNM)*SIN(R))
      BY=BY+EM1*RR**(N-2)*PS(JNM)*(ALP(JNM)*SIN(R)-BET(JNM)*COS(R))
    1 BZ=BZ-FN*RR**(N-2)*PS(JNM)*(ALP(JNM)*COS(R)+BET(JNM)*SIN(R))
```

```
      BY=BY/SIN(THETA)
C  BX IS NORTH,BY IS EAST, BZ IS VERTICAL OUT.
      RETURN
      END
      SUBROUTINE LGNFAC(FAC,SCHMDT,AM,NMAX)
C     LGNFAC SETS UP THE SCHMIDT NORMALIZATION COEFFICIENTS AND OTHER
C  CONSTANTS NEEDED FOR THE EXPANSION IN ASSOCIATED LEGENDRE
C  POLYNOMIALS.
      REAL    FAC(1),SCHMDT(1),AM(1)
      NE=NMAX+1
      DO 1 N=1,NE
      J=((N-1)*N)/2+1
      SCHMDT(J)=1.
    1 AM(J)=FLOAT(N-1)/FLOAT(N)
      FAC(1)=1.
      JE=2*NE-1
      DO 2 J=2,JE
    2 FAC(J)=FAC(J-1)*(J-1)
      DO 3 N=2,NE
      DO 3 M=2,N
      J=((N-1)*N)/2+M
      SCHMDT(J)=SQRT(2.*FAC(N-M+1)/FAC(N+M-1))
    3 AM(J)=FLOAT(N+M-2)/FLOAT(N-M+1)
      RETURN
      END
      SUBROUTINE LEGND(THETA,NMAX,P,SCHMDT ,AM,PP)
C**** COMPUTES THE ASSOCIATED LEGENDRE POLYNOMIALS P(0,0) THRU P(N,N) OF
C     THE ARGUEMENT X=COS(THETA) AND PERFORMS SCHMIDT QUAS-NORMALIZATION.
C     RESULTS ARE STORED IN ARRAY P IN THE ORDER P(0,0),P(1,0),P(1,1),P(2,0),
C     P(1,1),P(2,2), ETC.
C     ALSO CALCULATES DERIVATIVES OF THE POLYNOMIALS
C**** CALL SUBROUTINE LGNFAC FROM THE MAIN PROGRAM BEFORE USING THIS ROUTINE
C
      REAL    P(1),SCHMDT(1),AM(1) ,PP(1)
      IF(NMAX.LE.1) GO TO 10
      X=COS(THETA)
      NE=NMAX+1
      J=0
      DO 6 M=1,NE
      J=J+M
    6 PP(J)=0.
      PP(2)=1.
      P(1)=1.
      P(2)=X
```

```
      MEN=NMAX-1
      J=1
      J1=2
      DO 1 M=1,MEN
      NB=M+2
      DO 2 N=NB,NE
      J=((N-1)*N)/2+M
      JJ=J-N+1
      P(J)=(1.+AM(JJ))*X*P(JJ)-AM(JJ)*P(JJ-N+2)
    2 PP(J)=(1.+AM(JJ))*(X*PP(JJ)+P(JJ))-AM(JJ)*PP(JJ-N+2)
      J=(M*(M+1))/2+M+1
      J1=J+M+1
      P(J)=1.
      P(J1)=X*3.
      PP(J1)=3.
      ME=2*M+1
      IF(M.EQ.1) GO TO 1
      DO11 MM=5,ME,2
      P(J)=P(J)*(MM-2)
      PP(J1)=PP(J1)*MM
   11 P(J1)=P(J1)*MM
    1 CONTINUE
      JM=(NMAX*(NMAX+1))/2+NMAX+1
      P(JM)=1
      NE=2*NMAX-1
      DO 3 MM=3,NE,2
    3 P(JM)=P(JM)*MM
      XX=1.-X**2
      IF(XX.LT.0.) XX=0.
      XX2=SQRT(XX)
      JN=1
      DO 4 M=1,NMAX
      JN=JN+M
      PP(JN)=XX2*PP(JN)
      J=(M*(M+1))/2+M+1
      XF=XX**(FLOAT(M)/2.)
      XF1=XX**(FLOAT(M+1)/2.)
      XF2=M*X
      IF(M.NE.1) XF2=XF2*(XX**(FLOAT(M-1)/2.))
      DO 4 N=M,NMAX
      PP(J)=XF1*PP(J)-XF2*P(J)
      P(J)=P(J)*XF
    4 J=J+N+1
      DO 5 J=1,JM
```

```
      P(J)=P(J)*SCHMDT(J)
5     PP(J)=-PP(J)*SCHMDT(J)
      RETURN
10    WRITE(6,100) NMAX
100   FORMAT(1H ,9HBAD NMAX ,I4)
      RETURN
      END
```

0.0	0.0000000	0.000000
-0.255491	0.000000	0.00002998
0.0000000	-0.004683	0.00000
0.00000	0.0011466	.00000
-0.125995	0.0	-0.0000001
0.000000	-0.00231	0.0000000
-0.032792	0.0	0.000020014
0.00000	--0.001738	0.00000
-0.058553	0.0	0.000005327
0.0	-0.0006828	0.0
0.0	0.0015185	0.0
-0.05266	0.0	0.000045226
0.0	-0.0017636	0.0
0.005809	0.0	-0.000038694
0.0	-0.0001362	0.0
-0.000107	0.0	0.000022839
0.0	0.0006585	0.0
-0.012647	0.0	-0.000011088
0.0	-0.0009469	0.0
0.005719	0.00000	-0.00001822
0.0	0.0000155	0.0
0.0	0.0004996	0.0
-0.032724	0.00000	0.000086185
0.0	-0.0002265	0.0
0.008499	0.0	-0.000044658
0.00000	-0.000407	0.00000
0.00309	0.00000	-0.000002868
0.0	0.0000696	0.0
0.0	0.0	0.0
0.086538	0.0	0.000008326
0.0	0.0004748	0.0
0.0	0.000374	0.0
-0.057674	0.0	-0.000006567
0.0	-0.000231	0.0
-0.014822	0.0	-0.000010433
0.0	-0.0003648	0.0

0.012938	0.0	0.000009433
0.0	0.0000827	0.0
0.0	-0.0001699	0.0
0.003009	0.0	0.00007075
0.0	0.0001815	0.0
-0.004539	0.0	0.000001132
0.0	0.0	0.0
0.0	0.0	0.0
0.0	0.0	0.0
-0.000134	0.0	-0.000000385
0.0	0.0	0.0
0.0	0.0	0.0
0.0	0.0	0.0
0.0	0.0	0.0
0.0	0.0	0.0
0.0	0.0	0.0
0.0	0.0	0.0
0.0	0.0	0.0
0.0	0.0	0.0

0327 CARDS

```
$$$$$$$$$     $$$$$$      $$$$$$      $$$$$$    $$$$$$$$$    $$$$$$$$   $$$$$$$$$    B333B7F
$$$$$$$$$     $$$$$$      $$$$$$      $$$$$$    $$$$$$$$$    $$$$$$$$   $$$$$$$$$    B333B7F
$$      $$   $$    $$    $$    $$    $$    $$   $$      $$        $$    $$           B333B7F
$$      $$   $$    $$    $$    $$    $$    $$   $$      $$        $$    $$           B333B7F
$$$$$$$$$        $$$         $$$         $$$    $$$$$$$$$       $$      $$$$$$$      B333B7F
$$$$$$$$$        $$$         $$$         $$$    $$$$$$$$$       $$      $$$$$$$      B333B7F
$$      $$         $$          $$          $$   $$      $$     $$       $$           B333B7F
$$      $$         $$          $$          $$   $$      $$     $$       $$           B333B7F
$$      $$   $$    $$    $$    $$    $$    $$   $$      $$    $$        $$           B333B7F
$$      $$   $$    $$    $$    $$    $$    $$   $$      $$    $$        $$           B333B7F
$$$$$$$$$     $$$$$$      $$$$$$      $$$$$$    $$$$$$$$$    $$         $$           B333B7F
$$$$$$$$$     $$$$$$      $$$$$$      $$$$$$    $$$$$$$$$    $$         $$           B333B7F
```

```
$$$$$$$$$$   $$$$$$     $$$$$$     $$$$$$    $$$$$$$$$$  $$$$$$$$$$  $$$$$$$$$$   833387F
$$$$$$$$$$   $$$$$$     $$$$$$     $$$$$$    $$$$$$$$$$  $$$$$$$$$$  $$$$$$$$$$   833387F
$$      $$ $$      $$ $$      $$ $$      $$  $$      $$          $$  $$           833387F
$$      $$ $$      $$ $$      $$ $$      $$  $$      $$          $$  $$           833387F
$$$$$$$$$$       $$$        $$$        $$$   $$$$$$$$$$         $$   $$$$$$$      833387F
$$$$$$$$$$       $$$        $$$        $$$   $$$$$$$$$$         $$   $$$$$$$      833387F
$$      $$          $$         $$         $$ $$      $$       $$     $$           833387F
$$      $$          $$         $$         $$ $$      $$       $$     $$           833387F
$$      $$ $$      $$ $$      $$ $$      $$  $$      $$     $$       $$           833387F
$$      $$ $$      $$ $$      $$ $$      $$  $$      $$     $$       $$           833387F
$$$$$$$$$$   $$$$$$     $$$$$$     $$$$$$    $$$$$$$$$$    $$        $$           833387F
$$$$$$$$$$   $$$$$$     $$$$$$     $$$$$$    $$$$$$$$$$    $$        $$           833387F
```

```
              PROGRAM H699(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT)
C  THE PRIME LONGITUDE IS THE MAGNETOSPHERIC NOON MERIDIAN PLANE.  THE
C DIPOLE AXIS IS TILTED U RADIANS AWAY FROM THE Z(XM) AXIS AND TOWARD
C  THE EARTH-SUN (SOLAR WIND) LINE.  THE DIPOLE ALWAYS LIES IN THE SOLAR
C  MAGNETOSPHERIC NOON-MIDNIGHT MERIDIAN PLANE AND IN NORTHERN
C  HEMISPHERE SUMMER U IS POSITIVE.
000003        DIMENSION COEF(2,28,3),ANM(2,28),ALP(28) ,ALL(28),BET(28)
000003        COMMON COEF,RB,EMU,ANM,NMAX,INDEX1,INDEX2,ALP,BET,A,U,LIMIT
000003    100 FORMAT(1H0,3I10)
000003    101 FORMAT(1H ,3F16.9)
000003    102 FORMAT(1H1,30X,14HTILT ANGLE IS ,I3,9H DEGREES.)
000003        A=-31320.
000005        PI=ATAN2(0.,-1.)
000010        PICON=PI/180.
000012        RB=10.
000013        NMAX=4
000014        LIMIT=(NMAX+1)*(NMAX+2)/2
000022        DO 1 IJ=1,2
000023        DO 2 IK=1,28
000024        READ(5,101)(COEF(IJ,IK,IL),IL=1,3)
000040      2 CONTINUE
000042      1 CONTINUE
000044        DO 3 I=1,3
000046        INDEX1=3-I
000050        INDEX2=I-1
000052        DO 121 IKIK=1,4
000053        MU=10*(IKIK-1)
000056        WRITE(6,102) MU
000063        EMU=MU
000065        U=EMU*PICON
000067        CALL ENTERP
000070        DO 120 IR=1,10,3
000072        RR=IR
000073        DO 119 IT=10,170,40
000075        TT=IT
000076        T=IT*PICON
000101        DO 118 IP=90,270,90
000102        PP=IP-90
000104        P=FLOAT(IP-90)*PICON
000107        IPP=PP
000111        WRITE(6,100)IR,IPP,IT
000122        CALL MAGNET(RR,T,P,BR,BT,BP,BB,T,EM)
000133    118 CONTINUE
000135    119 CONTINUE
000137    120 CONTINUE
000141    121 CONTINUE
000143      3 CONTINUE
000145        STOP
000147        END
```

```
CROSS REFERENCE MAP-H699

PROGRAM LENGTH INCLUDING I/O BUFFERS
004344

STATEMENT FUNCTION REFERENCES

         LOCATION  GEN TAG   SYM TAG   REFERENCES

STATEMENT NUMBER REFERENCES

         LOCATION  GEN TAG   SYM TAG   REFERENCES
         000161    C00010    100       000110
         000164    C00013    101       000023
         000167    C00016    102       000055

BLOCK NAMES AND LENGTHS
      -  000440

VARIABLE REFERENCES

         LOCATION  GEN TAG   SYM TAG   REFERENCES
         000435C01 V00006    A         000004
         000215    A00004    ALL       NONE
         000345C01 A00003    ALF       NONE
         000252C01 A00002    ANM       NONE
         000276    V00043    BB        000126
         000401C01 A00005    BET       NONE
         000275    V00042    BP        000124
         000273    V00040    BR        000123
         000274    V00041    BT        000124
         000000C01 A00001    COEF      NONE
         000272    V00037    E         000122
         000277    V00044    EM        000130
         000231C01 V00024    EMU       000064
         000256    V00017    I         000045    000143
         000253    V00014    IJ        000022    000027    000042
         000254    V00015    IK        000023    000030    000040
         000257    V00022    IKIK      000052    000141
         000255    V00016    IL        NONE
         000343C01 V00020    INDEX1    000047
         000344C01 V00021    INDEX2    000051
         000266    V00033    IP        000101    000133
         000271    V00036    IPP       000110    000115
         000261    V00026    IR        000071    000113    000137
         000263    V00030    IT        000074    000117    000135
         000437C01 V00013    LIMIT     000021
         000260    V00023    MU        000055    000060    000063
         000342C01 V00012    NMAX      000013
         000270    V00035    P         000106    000123
         000251    V00007    PI        000007
         000252    V00010    PICON     000011    000065    000077    000105
         000267    V00034    PR        000103    000106
         000250C01 V00011    RB        000012
         000262    V00027    RR        000072    000122
         000265    V00032    T         000100    000127
```

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        000264     V00031     1T          000075
        000436C01  V00025     U           000066

START OF CONSTANTS
000151

START OF TEMPORARIES
000205

START OF INDIRECTS
000215

UNUSED COMPILER SPACE
012300
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```
                 SUBROUTINE MAGNET(R ,E,P,BR,BT,BP,BB,T,EM)
          C DIPOLE POINTS SOUTH, POINTL FINDS FIELD FROM VARIOUS MAGNETOSPHERIC
          C SOURCES, BR IS RADIALLY OUTWARD, BT IS SOUTH, AND BP IS EAST.
000014           COMMON COEF,RB,EMU,ANM,NMAX,INDEX1,INDEX2,ALP,BET,A,U,LIMIT
000014           DIMENSION COEF(2,28,3),ANM(2,28),ALP(28),BET(28)
000014     100   FORMAT(1H ,12F10.2)
000014           PI=ATAN2(0.0,-1.0)
000017           PICON=PI/180.
000021           STM=SIN(T)
000024           CTM=COS(T)
000027           SPM=SIN(P)
000040           CPM=COS(P)
000046           XSM=STM*CPM
000050           YSM=STM*SPM
000052           ZSM=CTM
000053           CU=COS(U)
000056           SU=SIN(U)
000060           X=XSM*CU-ZSM*SU
000063           Y=YSM
000065           Z=ZSM*CU+XSM*SU
000067           PH=ATAN2(Y,X)
000072           EL=SQRT(X*X+Y*Y)
000077           TH=ATAN2(EL,Z)
000102           R3=R*R*R
000107           CT=COS(TH)
000111           ST=SIN(TH)
000113           CP=COS(PH)
000115           SP=SIN(PH)
000117           BR=2.*A*CT/R3
000126           BT=A*ST/R3
000127           BP=0.
000130           X=BR*ST*CP+BT*CP*CT-BP*SP
000135           Y=BR*ST*SP+BT*CT*SP+BP*CP
000142           Z=BR*CT-BT*ST
000145           ZSM=Z*CU-X*SU
000150           XSM=X*CU+Z*SU
000153           YSM=Y
000154           BTT=XSM*CPM*CTM+YSM*SPM*CTM-ZSM*STM
000163           BPP=YSM*CPM-XSM*SPM
000166           BRR=ZSM*CTM+XSM*CPM*STM+YSM*SPM*STM
000174           BBB=SQRT(BTT*BTT+BPP*BPP+BRR*BRR)
000203           CALL POINTL(R,T,P,BX,BY,BZ)
000212           BW=SQRT(BX*BX+BY*BY+BZ*BZ)
000221           BXXX=-BX
000222           BT=BTT-BX
000227           BR=BRR+BZ
000231           BP=BPP+BY
000233           BB=SQRT(BR*BR+BT*BT+BP*BP)
000245           WRITE(6,100) BRR,BTT,BPP,BBB,BZ,BXXX,BY,BW,BR,BT,BP,BB
000300           RETURN
000301           END
```

CROSS REFERENCE MAP-MAGNET

SUBPROGRAM LENGTH
000415

STATEMENT FUNCTION REFERENCES

LOCATION	GEN TAG	SYM TAG	REFERENCES

STATEMENT NUMBER REFERENCES

LOCATION	GEN TAG	SYM TAG	REFERENCES
000304	C00001	100	000244

BLOCK NAMES AND LENGTHS
- 000440

VARIABLE REFERENCES

LOCATION	GEN TAG	SYM TAG	REFERENCES				
000435C01	V00045	A	000122				
000345C01	A00003	ALP	NONE				
000252C01	A00002	ANM	NONE				
000000	L00011	BR	000243	000275			
000407	V00051	BRG	000202	000255			
000401C01	A00004	BET	NONE				
000405	V00047	BPP	000165	000174	000231	000253	
000406	V00050	BRR	000173	000175	000227	000247	
000404	V00046	BTT	000162	000174	000225	000251	
000413	V00055	BW	000220	000265			
000410	V00052	BX	000207	000212	000220		
000414	V00056	BXXX	000221	000261			
000411	V00053	BY	000207	000212	000231	000263	
000412	V00054	BZ	000210	000213	000227	000257	
000000C01	A00001	COEF	NONE				
000402	V00043	CP	000114	000130	000137		
000363	V00023	CPM	000045	000154	000163		
000400	V00041	CT	000110	000123			
000361	V00021	CTM	000026	000051	000155		
000367	V00027	CU	000055	000060	000145		
000375	V00036	EL	000076				
000002	L00013	EM	NONE				
000374	V00035	PH	000071	000112	000114		
000356	V00016	PI	000016				
000357	V00017	PICON	000020				
000377	V00040	R3	000106	000124			
000403	V00044	SP	000116	000132			
000362	V00022	SPM	000037	000050	000156	000164	000171
000401	V00042	ST	000112	000125	000142		
000360	V00020	STM	000023	000046	000160	000167	
000370	V00031	SU	000057	000061	000146		
000001	L00012	T	000020	000023	000206		
000376	V00037	TH	000101	000106	000110		
000436C01	V00030	U	000053	000055			
000371	V00032	X	000062	000067	000071	000134	000145
000364	V00024	XSM	000047	000057	000152	000154	000163

000372	V00033	Y	000064	000066	000072	000141	000152
000365	V00025	YSM	000051	000063	000153	000156	000170
000373	V00034	Z	000066	000077	000144	000150	
000366	V00026	ZSM	000052	000060	000147	000157	000166

START OF CONSTANTS
000303

START OF TEMPORARIES
000314

START OF INDIRECTS
000356

UNUSED COMPILER SPACE
012000

7	0	130									
62.46	-85.81	0.	106.13	0.11	7.30	0.	7.31	62.57	-78.50	0.	100.39
7	90	130									
110.21	-65.73	-31.23	132.15	4.48	5.67	5.03	8.81	114.79	-60.06	-26.20	132.17
7	180	130									
158.16	-45.66	-0.00	164.61	16.10	1.17	0.00	16.14	174.26	-44.49	-0.00	179.85
7	0	170									
158.16	-45.66	0.	164.61	5.78	4.45	0.	7.30	163.94	-41.20	0.	169.04
7	90	170									
169.00	-14.90	-31.23	172.51	5.60	1.04	4.11	7.02	174.60	-13.86	-27.12	177.24
7	180	170									
179.85	15.86	-0.00	180.55	5.85	-4.34	0.00	7.28	185.70	11.52	-0.00	186.05
10	0	10									
-61.69	5.44	-0.00	61.93	-6.43	0.87	0.	6.49	-68.12	6.31	-0.00	68.41
10	90	10									
-57.97	-5.11	-10.71	59.17	-2.52	0.81	-1.76	4.02	-61.49	-4.30	-12.47	62.89
10	180	10									
-54.25	-15.66	0.00	56.46	-2.24	-4.54	-0.00	5.06	-56.49	-20.20	0.00	59.99
10	0	50									
-54.25	-15.66	-0.	56.46	-0.35	10.68	0.	10.69	-54.60	-4.98	-0.	54.83
10	90	50									
-37.84	-22.55	-10.71	45.33	-4.15	5.45	-5.67	8.91	-41.99	-17.08	-16.39	48.20
10	180	50									
-21.42	-29.43	-0.00	36.40	-24.33	1.22	-0.00	24.36	-45.75	-28.21	-0.00	53.75
10	0	90									
-21.42	-29.43	-0.	36.40	0.19	-3.65	0.	3.66	-21.24	-33.08	-0.	39.31
10	90	90									
-0.00	-29.43	-10.71	31.32	-0.35	8.60	1.00	8.67	-0.35	-20.83	-9.71	22.98
10	180	90									
21.42	-29.43	-0.00	36.40	5.55	33.80	0.00	34.25	26.98	4.37	-0.00	27.33
10	0	130									
21.42	-29.43	0.	36.40	-1.65	10.98	0.	11.11	19.77	-18.45	0.	27.04
10	90	130									
37.84	-22.55	-10.71	45.33	3.50	4.84	6.16	8.58	41.33	-17.71	-4.55	45.20
10	180	130									
54.25	-15.66	-0.00	56.46	21.57	-7.03	0.00	22.68	75.81	-22.69	-0.00	79.14
10	0	170									
54.25	-15.66	0.	56.46	7.12	0.47	0.	7.13	61.37	-15.19	0.	63.22
10	90	170									
57.97	-5.11	-10.71	59.17	3.22	0.65	0.19	3.29	61.19	-4.47	-10.52	62.25
10	180	170									
61.69	5.44	-0.00	61.93	0.01	-2.47	0.00	2.47	61.70	2.96	-0.00	61.77

TILT ANGLE IS 30 DEGREES.

0.	0.	-0.22851E 05	0.94031E 04	-0.14049E 05	0.14244E 04	0.34398E 04
0.11220E 04	-0.12609E 05	-0.63578E 04	-0.69300E 04	-0.69300E 03	-0.14779E 04	-0.24212E 04
-0.52140E 04	-0.10944E 04	-0.53759E 04	0.21428E 04	-0.20484E 04	0.24810E 03	0.45555E 04
-0.50970E 03	-0.11957E 04	0.66684E 04	-0.52908E 04	0.54450E 03	-0.29016E 04	-0.35202E 03
-0.40860E 04	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.
0.	0.94031E 01	0.	0.	0.	0.	0.
-0.10944E-02	0.21428E-01	0.14244E 01	0.11220E 00	-0.63578E 00	-0.69300E-01	-0.24212E-01
0.	0.	0.24810E-02	-0.50970E-03	0.66684E-02	0.54450E-03	-0.35202E-03
0.	0.	0.	0.	0.	0.	0.

1	0	10					9.37	-58871.62	10713.38	-0.00	59838.49
-58862.34	10712.07	-0.00	59829.12	-9.28	1.31	0.					
1	90	10					9.56	-53433.09	-4708.36	-15659.66	55879.23
-53423.68	-4710.02	-15660.00	55870.47	-9.41	1.66	0.33					
1	180	10					9.75	-47994.56	-20130.07	0.00	52045.15
-47985.02	-20132.11	0.00	52037.14	-9.54	2.03	0.00					
1	0	50					8.73	-58868.41	-10705.79	-0.	59833.96
-58862.34	-10712.07	-0.	59829.12	-6.06	6.28	0.					
1	90	50					9.54	-34875.95	-20770.84	-15659.29	43508.31
-34869.83	-20778.12	-15660.00	43507.14	-6.12	7.29	0.71					
1	180	50					10.45	-10883.40	-30835.67	-0.00	32699.96
-10877.32	-30844.18	-0.00	32705.95	-6.08	8.50	0.00					
1	0	90					8.45	-31321.22	-27115.55	-0.	41427.91
-31320.00	-27123.92	-0.	41432.46	-1.22	8.36	0.					
1	90	90					9.51	-0.01	-27114.52	-15658.57	31311.15
-0.00	-27123.92	-15660.00	31320.00	-0.01	9.40	1.43					
1	180	90					10.73	31321.68	-27113.32	-0.00	41426.80
31320.00	-27123.92	-0.00	41432.46	1.68	10.60	0.00					
1	0	130					8.68	10881.31	-30836.47	0.	32700.01
10877.32	-30844.18	0.	32705.95	3.99	7.71	0.					
1	90	130					9.47	34875.75	-20771.05	-15657.88	43507.74
34869.83	-20778.13	-15660.00	43507.14	5.92	7.08	2.12					
1	180	130					10.36	58870.66	-10705.90	-0.00	59836.20
58862.34	-10712.07	-0.00	59829.12	8.32	6.18	0.00					
1	0	170					9.26	47993.41	-20128.19	0.	52043.37
47985.02	-20132.11	0.	52037.14	8.39	3.92	0.					
1	90	170					9.44	53432.66	-4708.43	-15657.54	55878.23
53423.68	-4710.02	-15660.00	55870.47	8.97	1.59	2.46					
1	180	170					9.63	58871.93	10711.19	-0.00	59838.40
58862.34	10712.07	-0.00	59829.12	9.59	-0.88	0.00					
4	0	10					9.03	-925.13	170.67	-0.00	943.69
-915.72	167.38	-0.00	934.83	-8.41	3.30	0.					
4	90	10					9.27	-843.63	-72.00	-246.75	881.92
-834.75	-73.59	-244.69	872.98	-8.89	1.60	-2.07					

4 -749.77	180 -314.55	10 0.00	813.08	-9.61	-0.80	-0.00	9.64	-759.37	-315.37	0.00	822.25
4 -919.72	0 -167.38	50 -0.	934.83	-3.52	6.66	0.	7.54	-923.24	-160.71	-0.	937.13
4 -544.84	90 -324.66	50 -244.69	679.80	-6.00	7.24	-1.55	9.53	-550.84	-317.42	-246.23	681.77
4 -169.56	180 -481.94	50 -0.00	511.03	-10.71	8.44	-0.00	13.63	-180.66	-473.50	-0.00	506.79
4 -489.37	0 -423.81	90 -0.	647.38	-0.78	5.18	0.	5.24	-490.16	-418.63	-0.	544.60
4 -0.00	90 -423.81	90 -244.69	489.37	-0.06	9.32	1.44	9.43	-0.06	-414.49	-243.25	480.60
4 489.37	180 -423.81	90 -0.00	647.38	2.90	16.11	0.00	16.37	492.27	-407.70	-0.00	639.18
4 169.56	0 -481.94	130 0.	511.03	1.84	7.33	0.	7.56	171.80	-474.61	0.	504.74
4 544.84	90 -324.66	130 -244.69	679.80	5.28	6.45	4.06	9.28	550.12	-318.20	-240.63	679.55
4 919.72	180 -167.38	130 -0.00	934.83	12.51	3.99	0.00	13.13	932.24	-163.39	-0.00	946.45
4 749.77	0 -314.56	170 0.	813.08	6.85	4.91	0.	8.43	756.62	-309.65	0.	817.53
4 834.75	90 -73.59	170 -244.69	872.98	7.40	1.33	4.08	8.55	842.14	-72.26	-240.60	878.81
4 919.72	180 167.38	170 -0.00	934.83	8.18	-3.31	0.00	8.83	927.91	164.07	-0.00	942.30
7 -171.61	0 31.23	10 -0.00	174.43	-8.79	1.14	0.	8.86	-180.40	32.37	-0.00	183.28
7 -155.75	90 -13.73	10 -45.66	162.89	-6.69	1.29	-0.67	6.85	-162.45	-12.44	-46.33	169.38
7 -139.90	180 -58.69	10 0.00	151.71	-5.52	-1.47	-0.00	5.71	-145.41	-60.16	0.00	157.37
7 -171.61	0 -31.23	50 -0.	174.43	-2.02	10.03	0.	10.23	-173.63	-21.20	-0.	174.92
7 -101.66	90 -60.68	50 -45.66	126.84	-5.33	6.67	-3.89	9.38	-106.99	-53.91	-49.55	129.65
7 -31.71	180 -89.92	50 -0.00	95.35	-17.72	4.38	-0.00	18.25	-49.43	-85.55	-0.00	98.80
7 -91.31	0 -79.08	90 -0.	120.79	-0.39	-0.17	0.	0.43	-91.70	-79.25	-0.	121.20
7 -0.00	90 -79.08	90 -45.66	91.31	-0.21	9.15	1.46	9.27	-0.21	-69.93	-44.19	82.72
7 91.31	180 -79.08	90 -0.00	120.79	5.00	26.60	0.00	27.07	96.32	-52.48	-0.00	109.68

7 31.71	0 -89.92	130 0.	95.35	0.27	10.45	0.	10.46	31.98	-79.47	0.	85.67
7 101.66	90 -60.58	130 -45.66	126.84	4.30	5.58	5.70	9.06	105.96	-55.00	-39.96	125.89
7 171.61	180 -31.23	130 -0.00	174.43	17.64	-3.35	0.00	17.95	189.25	-34.58	-0.00	192.38
7 139.90	0 -58.69	170 0.	151.71	7.70	1.54	0.	7.86	147.60	-57.16	0.	158.28
7 155.75	90 -13.73	170 -45.66	162.69	4.98	0.94	0.97	5.16	160.74	-12.79	-44.68	167.32
7 171.61	180 31.23	170 -0.00	174.43	2.80	-2.13	0.00	3.51	174.41	29.10	-0.00	176.82
10 -58.86	0 10.71	10 -0.00	59.83	-12.38	-8.07	0.	14.78	-71.25	2.64	-0.00	71.29
10 -53.42	90 -4.71	10 -15.66	55.87	-2.50	0.71	7.72	8.15	-55.93	-4.00	-7.94	56.63
10 -47.99	180 -20.13	10 0.00	52.04	5.19	2.48	0.00	5.75	-42.79	-17.65	0.00	46.29
10 -58.86	0 -10.71	50 -0.	59.83	-1.61	19.42	0.	19.48	-60.47	8.70	-0.	61.09
10 -34.87	90 -20.78	50 -15.66	43.51	-4.02	5.47	-6.25	9.22	-38.89	-15.31	-21.91	47.19
10 -10.88	180 -30.84	50 -0.00	32.71	-27.81	-6.50	-0.00	28.56	-78.69	-37.35	-0.00	53.77
10 -31.32	0 -27.12	90 -0.	41.43	0.23	-10.33	0.	10.38	-31.04	-37.50	-0.	48.68
10 -0.00	90 -27.12	90 -15.56	31.32	-0.53	3.89	1.51	9.03	-0.53	-18.24	-14.15	23.09
10 31.32	180 -27.12	90 -0.00	41.43	8.33	44.75	0.00	45.52	39.65	17.62	-0.00	43.39
10 10.88	0 -30.84	130 0.	32.71	-1.40	19.37	0.	19.92	9.48	-10.98	0.	14.50
10 34.87	90 -20.78	130 -15.66	43.51	3.04	4.53	6.98	8.85	37.91	-15.25	-8.68	42.15
10 58.86	180 -10.71	130 -0.00	59.83	23.66	-18.88	0.00	30.27	82.52	-29.59	-0.00	87.67
10 47.99	0 -20.13	170 0.	52.04	13.41	-3.67	0.	15.97	61.40	-28.80	0.	67.82
10 53.42	90 -4.71	170 -15.66	55.87	2.05	0.46	-10.06	10.28	55.47	-4.25	-25.72	61.30
10 58.86	180 10.71	170 -0.00	59.83	-8.54	5.58	-0.00	10.20	50.32	16.29	-0.00	52.89

3743 LINES OUTPUT.

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$JOB          YZJRJCQ,K1008,2,385L,P,K00011
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